# * TM 1-1520-238-23-3

**TECHNICAL MANUAL**

**AVIATION UNIT AND INTERMEDIATE MAINTENANCE MANUAL**

**VOLUME 3 OF 9**

# HELICOPTER, ATTACK, AH-64A APACHE (NSN 1520-01-106-9519) (EIC: RHA)

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MAIN ROTOR HEAD MAINTENANCE

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This document has been reviewed for the presence of Class I Ozone Depleting Chemicals. As of base through change 05, dated 10 May 2000, all references to Class I Ozone Depleting Chemicals have been removed from this document by substitution with chemicals that do not cause atmospheric ozone depletion.

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**HELICOPTER, ATTACK,**
**AH-64A APACHE**
**(NSN 1520-01-106-9519)**
**(EIC: RHA)**

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited

TM 1-1520-238-23-3, 16 May 1994, is changed as follows:

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| Remove pages | Insert pages |
|---|---|
| 4-3 and 4-4 | 4-3 and 4-4 |
| 4-57 and 4-58 | 4-57 and 4-58 |
| 4-58.1/(4-58.2 blank) | 4-58.1/(4-58.2 blank) |
| 4-59 through 4-60.1/(4-60.2 blank) | 4-59 through 4.60-1/(4-60.2 blank) |
| 4-181 through 4-184 | 4-181 through 4-184 |
| 4-251 and 4-252 | 4-251 and 4-252 |
| 4-259 through 4-262.1/(4-262.2 blank) | 4-259 through 4-262.1/(4-262.2 blank) |
| 4-263 through 4-264.2 | 4-263 through 4-264.2 |
| ----- | 4-264.3 and 264.4 |
| 4-427 through 4-430 | 4-427 through 4-430 |
| 5-1 and 5-2 | 5-1 and 5-2 |
| 5-9 and 5-10 | 5-9 and 5-10 |
| 5-105 and 5-106 | 5-105 and 5-106 |
| 5-127 and 5-128 | 5-127 and 5-128 |
| ----- | 5-142.1 through 5-142.3/(5-142.4 blank) |
| 5-149 through 5-152 | 5-149 through 5-152 |
| 5-157 through 5-160 | 5-157 through 5-160 |
| ----- | 5-160.1 through 5-160.3/(5-160.4 blank) |
| ----- | 5-162.1 through 5-162.4 |
| 5-167 and 5-168 | 5-167 and 5-168 |
| 5-171 and 5-172 | 5-171 and 5-172 |
| ----- | 5-172.1/(5-172.2 blank) |
| 5-173 through 5-176 | 5-173 through 5-176 |
| 5-239 and 5-240 | 5-239 and 5-240 |
| 5-265 and 5-266 | 5-265 and 5-266 |

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By Order of the Secretary of the Army:

DENNIS J. REIMER
*General, United States Army*
*Chief of Staff*

Official:

JOEL B. HUDSON
*Acting Administrative Assistant to the*
*Secretary of the Army*
01678

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CHANGE NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 17 MAY 1995

# Aviation Unit and Intermediate Maintenance Manual

**HELICOPTER, ATTACK,**
**AH-64A APACHE**
**(NSN 1520-01-106-9519)**
**(EIC: RHA)**

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

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| Remove pages | Insert pages |
|---|---|
| 4-57 and 4-58 | 4-57 and 4-58 |
| ----- | 4-58.1/(4-58.2 blank) |
| 4-59 and 4-60 | 4-59 and 4-60 |
| ----- | 4-60.1/(4-60.2 blank) |
| 4-81 and 4-82 | 4-81 and 4-82 |
| 4-181 through 4-186 | 4-181 through 4-186 |
| ----- | 4-186.1 through 4-186.4 |
| 4-187 through 4-190 | 4-187 through 4-190 |
| ----- | 4-190.1 through 4-190.4 |
| 4-191 through 4-194 | (4-191 blank)/4-192 through 4-194 |
| ----- | 4-194.1 and 4-194.2 |
| 4-195 through 4-198 | 4-195 through 4-198 |
| ----- | 4-198.1 through 4-198.3/(4-198.4 blank) |
| 4-199 and 4-200 | 4-199 and 4-200 |
| ----- | 4-200.1/(4-200.2 blank) |
| 4-201 through 4-204 | 4-201 through 4-204 |
| 4-221 through 4-224 | 4-221 through 4-224 |
| 4-247 and 4-248 | 4-247 and 4-248 |
| 4-251 through 4-258 | 4-251 through 4-258 |
| 4-261 and 4-262 | 4-261 and 4-262 |
| ----- | 4-262.1/(4-262.2 blank) |
| 4-263 and 4-264 | 4-263 and 4-264 |
| ----- | 4-264.1 and 4-264.2 |
| 4-265 and 4-266 | (4-265 blank)/4-266 |
| 4-269 through 4-272 | 4-269 through 4-272 |
| 4-377 and 4-378 | 4-377 through 4-378 |
| ----- | 4-378.1 and 4-378.2 |
| 4-379 and 4-380 | (4-379 blank)/4-380 |
| 4-389 and 4-390 | 4-389 and 4-390 |
| 4-467 and 4-468 | 4-467 and 4-468 |
| 4-481 and 4-482 | 4-481 and 4-482 |
| 4-493 through 4-500 | 4-493 through 4-500 |
| ----- | 4-500.1/( 4-500.2 blank) |
| 4-501 through 4-504 | 4-501 through 4-504 |
| 4-527 through 4-532 | 4-527 through 4-532 |

| Remove pages | Insert pages |
|---|---|
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| 4-577 through 4-580 | 4-577 through 4-580 |
| 4-599 through 4-604 | 4-599 through 4-604 |
| 4-609 through 4-614 | 4-609 through 4-614 |
| 4-619 through 4-624 | 4-619 through 4-624 |
| 4-629 through 4-632 | 4-629 through 4-632 |
| 4-637 through 4-666 | 4-637 through 4-666 |
| 5-1 through 5-4 | 5-1 through 5-4 |
| 5-7 through 5-12 | 5-7 through 5-12 |
| ----- | 5-12.1/(5-12.2 blank) |
| 5-33 through 5-50 | 5-33 through 5-50 |
| ----- | 5-50.1 through 5-50.4 |
| 5-51 and 5-52 | (5-51 blank)/5-52 |
| 5-63 and 5-64 | 5-63 and 5-64 |
| 5-67 through 5-76 | 5-67 through 5-76 |
| 5-79 through 5-84 | 5-79 through 5-84 |
| 5-93 through 5-100 | 5-79 through 5-84 |
| 5-109 and 5-110 | 5-109 and 5-110 |
| 5-1 11 through 5-122 | 5-1 11 through 5-122 |
| 5-127 through 5-130 | 5-127 through 5-130 |
| 5-133 through 5-142 | 5-133 through 5-142 |
| 5-161 and 5-162 | 5-161 and 5-162 |
| 5-173 through 5-176 | 5-173 through 5-176 |
| 5-199 through 5-206 | 5-199 through 5-206 |
| 5-209 through 5-214 | 5-209 through 5-214 |
| 5-221 through 5-226 | 5-221 through 5-226 |
| 5-249 through 2-256 | 5-249 through 2-256 |
| ----- | 5-256.1 through 2-256.14 |
| 5-257 through 5-260 | 5-257 through 5-260 |
| 5-267 through 5-270 | 5-267 through 5-270 |

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
*General, United States Army*
*Chief of Staff*

Official:

JOEL B. HUDSON
*Acting Administrative Assistant to the Secretary of the Army*
00178

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**NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.**

**Date of issue for original and change pages are:**

Original . . . . . 0 . . . . . 16 May 1994
Change . . . . . 1 . . . . . 17 May 1885
Change . . . . . 2 . . . . . 16 February 1996
Change . . . . . 3 . . . 30 September 1996
Change . . . . . 4 . . . . 19 December 1997
Change . . . . . 5 . . . . . 10 May 2000
Change . . . . . 6 . . . . . 31 July 2001
Change . . . . . 7 . . . . . 15 May 2002
Change . . . . . 8 . . . . . 25 October 2002
Change . . . . . 9 . . . . . 31 January 2003
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**TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 1,164, CONSISTING OF THE FOLLOWING:**

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| Cover | 0 | 4-83 - 4-88 | 0 |
| Blank | 0 | 4-89 | 4 |
| A - E | 10 | 4-90 - 4-92 | 0 |
| F Blank | 10 | 4-93 | 7 |
| 4-1 - 4-3 | 0 | 4-94 - 4-100 | 0 |
| 4-4 | 7 | 4-101 | 5 |
| 4-5 | 8 | 4-102 | 0 |
| 4-6 | 0 | 4-103 | 4 |
| 4-7 - 4-8 | 5 | 4-104 - 4-108 | 0 |
| 4-9 - 4-11 | 0 | 4-109 | 4 |
| 4-12 | 3 | 4-110 - 4-113 | 0 |
| 4-13 | 0 | 4-114 | 4 |
| 4-14 | 6 | 4-115 - 4-116 | 0 |
| 4-15 - 4-18 | 0 | 4-117 | 4 |
| 4-19 | 4 | 4-118 | 0 |
| 4-20 - 4-37 | 0 | 4-119 | 4 |
| 4-38 | 4 | 4-120 - 4-121 | 0 |
| 4-39 - 4-41 | 0 | 4-122 | 4 |
| 4-42 - 4-44 | 4 | 4-123 - 4-125 | 0 |
| 4-45 - 4-46 | 0 | 4-126 | 4 |
| 4-47 | 4 | 4-127 - 4-128 | 0 |
| 4-48 - 4-51 | 0 | 4-129 - 4-130 | 4 |
| 4-52 | 4 | 4-131 - 4-132 | 0 |
| 4-53 - 4-56 | 0 | 4-133 - 4-134 | 4 |
| 4-57 - 4-58 | 2 | 4-135 | 8 |
| 4-58.1 | 2 | 4-136 - 4-138 | 0 |
| 4-58.2 Blank | 2 | 4-139 | 4 |
| 4-59 | 4 | 4-140 | 9 |
| 4-60 | 2 | 4-141 -4-144 | 0 |
| 4-60.1 | 2 | 4-145 | 4 |
| 4-60.2 Blank | 2 | 4-146 | 0 |
| 4-61 - 4-62 | 4 | 4-147 - 4-148 | 4 |
| 4-63 | 0 | 4-149 | 0 |
| 4-64 - 4-65 | 4 | 4-150 | 4 |
| 4-66 - 4-68 | 0 | 4-151 | 0 |
| 4-69 | 4 | 4-152 | 4 |
| 4-70 - 4-71 | 0 | 4-153 - 4-158 | 0 |
| 4-72 | 4 | 4-159 | 4 |
| 4-73 - 4-76 | 0 | 4-160 - 4-161 | 0 |
| 4-77 | 4 | 4-162 | 4 |
| 4-78 - 4-81 | 0 | 4-163 - 4-164 | 0 |
| 4-82 | 1 | 4-165 - 4-166 | 4 |

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| 4-167 - 4-176 | 0 |
| 4-177 - 4-178 | 8 |
| 4-179 - 4-181 | 4 |
| 4-182 - 4-183 | 2 |
| 4-184 - 4-186 | 3 |
| 4-186.1 - 4-186.3 | 3 |
| 4-186.4 | 7 |
| 4-187 | 3 |
| 4-188 | 1 |
| 4-189 | 3 |
| 4-190 | 1 |
| 4-190.1 - 4-190.2 Added | 1 |
| 4-190.3 - 4-190.4 | 3 |
| 4-191 Blank | 3 |
| 4-192 | 3 |
| 4-193 - 4-194 | 1 |
| 4-194.1 | 1 |
| 4-194.2 | 7 |
| 4-194.3 - 4-194.4 Added | 1 |
| 4-195 | 3 |
| 4-196 - 4-198 | 1 |
| 4-198.1 - 4-198.2 Added | 1 |
| 4-198.3 | 3 |
| 4-198.4 Blank | 3 |
| 4-199 | 1 |
| 4-200 | 4 |
| 4-200.1 Added | 1 |
| 4-200.2 Blank, Added | 1 |
| 4-201 | 0 |
| 4-202 - 4-203 | 1 |
| 4-204 - 4-211 | 0 |
| 4-212 | 3 |
| 4-213 - 4-214 | 0 |
| 4-215 | 7 |
| 4-216 - 4-219 Deleted | 7 |
| 4-220 - 4-221 | 0 |
| 4-222 - 4-224 | 1 |
| 4-225 - 4-237 | 0 |
| 4-238 | 4 |
| 4-239 - 4-245 | 0 |
| 4-246 | 4 |
| 4-247 | 0 |
| 4-248 | 1 |
| 4-249 | 4 |
| 4-250 | 0 |
| 4-251 | 2 |
| 4-252 | 4 |
| 4-253 | 0 |
| 4-254 - 4-255 | 1 |
| 4-256 | 4 |
| 4-257 - 4-258 | 1 |
| 4-259 | 0 |
| 4-260 | 4 |
| 4-261 - 4-262 | 2 |
| 4-262.1 | 2 |
| 4-262.2 Blank | 2 |
| 4-263 | 4 |
| 4-264 | 2 |
| 4-264.1 - 4-264.2 | 2 |
| 4-264.3 Added | 2 |
| 4-264.4 | 3 |
| 4-265 Blank | 1 |
| 4-266 | 1 |
| 4-267 - 4-269 | 0 |
| 4-270 - 4-271 | 1 |
| 4-272 | 0 |
| 4-273 | 3 |
| 4-274 | 4 |
| 4-274.1 | 6 |
| 4-274.2 | 4 |
| 4-274.3 | 8 |
| 4-274.4 Blank, Added | 3 |
| 4-275 - 4-319 | 0 |
| 4-320 | 4 |
| 4-321 | 0 |
| 4-322 | 4 |
| 4-323 | 0 |
| 4-324 | 8 |
| 4-325 through 4-330 Deleted | 8 |
| 4-331 - 4-339 | 0 |
| 4-340 | 4 |
| 4-341 - 4-352 | 0 |
| 4-353 | 5 |
| 4-354 - 4-361 | 0 |
| 4-362 | 4 |
| 4-363 - 4-369 | 0 |
| 4-370 | 4 |
| 4-371 | 7 |
| 4-372 | 4 |
| 4-373 | 7 |
| 4-374 | 4 |
| 4-375 | 0 |
| 4-376 | 4 |
| 4-377 | 0 |
| 4-378 | 5 |
| 4-378.1 | 5 |
| 4-378.2 | 8 |
| 4-378.3 - 4-378.4 | 5 |
| 4-379 Blank | 4 |
| 4-380 | 4 |
| 4-381 | 4 |
| 4-382 | 8 |
| 4-383 | 3 |
| 4-384 - 4-385 | 4 |

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INSERT LATEST CHANGED PAGES: DESTROY SUPERSEDED PAGES.

## LIST OF EFFECTIVE PAGES

| Page No. | *Change No. |
|---|---|
| 4-386 | 8 |
| 4-387 | 3 |
| 4-388 - 4-389 | 4 |
| 4-390 - 4-391 | 7 |
| 4-392 - 4-413 | 0 |
| 4-414 | 3 |
| 4-415 | 0 |
| 4-416 | 3 |
| 4-417 - 4-427 | 0 |
| 4-428 | 4 |
| 4-429 | 0 |
| 4-430 | 2 |
| 4-431 | 4 |
| 4-432 - 4-446 | 0 |
| 4-447 | 2 |
| 4-448 - 4-449 | 0 |
| 4-450 - 4-451 | 4 |
| 4-452 | 0 |
| 4-452.1 - 4-452.2 | 5 |
| 4-453 - 4-455 | 0 |
| 4-456 - 4-457 | 4 |
| 4-458 - 4-459 | 0 |
| 4-460 | 2 |
| 4-461 - 4-462 | 0 |
| 4-462.1 - 4-462.2 | 5 |
| 4-463 - 4-467 | 0 |
| 4-468 | 1 |
| 4-469 - 4-480 | 0 |
| 4-481 | 1 |
| 4-482 - 4-492 | 0 |
| 4-493 - 4-500 | 1 |
| 4-500.1 Added | 1 |
| 4-500.2 Blank, Added | 1 |
| 4-501 | 1 |
| 4-502 | 0 |
| 4-503 | 1 |
| 4-504 | 0 |
| 4-505 | 3 |
| 4-506 - 4-527 | 0 |
| 4-528 - 4-532 | 1 |
| 4-533 - 4-535 | 0 |
| 4-536 - 4-540 | 1 |
| 4-541 - 4-553 | 0 |
| 4-554 | 3 |
| 4-555 | 0 |
| 4-556 - 4-557 | 5 |
| 4-558 - 4-560 | 0 |
| 4-561 | 5 |
| 4-562 - 4-569 | 0 |
| 4-570 | 6 |
| 4-571 - 4-573 | 0 |
| 4-574 | 3 |
| 4-575 - 4-576 | 0 |
| 4-577 | 1 |
| 4-578 | 0 |
| 4-579 - 4-580 | 1 |
| 4-581 - 4-599 | 0 |
| 4-600 | 1 |
| 4-601 | 7 |
| 4-602 - 4-603 | 1 |
| 4-604 - 4-609 | 0 |
| 4-610 - 4-613 | 1 |
| 4-614 - 4-619 | 0 |
| 4-620 - 4-624 | 1 |
| 4-625 - 4-628 | 0 |
| 4-629 | 1 |
| 4-630 | 0 |
| 4-631 - 4-632 | 1 |
| 4-633 - 4-636 | 0 |
| 4-637 | 1 |
| 4-638 | 4 |
| 4-639 | 1 |
| 4-640 | 0 |
| 4-641 - 4-651 | 1 |
| 4-652 | 2 |
| 4-653 - 4-656 | 1 |
| 4-657 | 0 |
| 4-658 - 4-665 | 1 |
| 4-666 | 4 |
| 4-667 | 6 |
| 4-668 - 4-669 | 0 |
| 4-670 | 6 |
| 4-671 - 4-672 | 0 |
| 4-673 - 4-674 | 4 |
| 4-675 - 4-738 | 0 |
| 5-1 - 5-2 | 6 |
| 5-3 - 5-4 | 5 |
| 5-5 | 3 |
| 5-6 | 10 |
| 5-7 | 3 |
| 5-8 | 6 |
| 5-9 - 5-10 | 10 |
| 5-11 -5-12 | 3 |
| 5-12.1 | 7 |
| 5-12.2 Blank, Added | 3 |
| 5-13 - 5-15 | 0 |
| 5-16 | 6 |
| 5-17 - 5-18 | 0 |
| 5-19 | 5 |
| 5-20 | 3 |
| 5-21 | 8 |
| 5-22 -5-24 | 0 |
| 5-25 | 5 |
| 5-26 | 7 |

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INSERT LATEST CHANGED PAGES: DESTROY SUPERSEDED PAGES.

## LIST OF EFFECTIVE PAGES

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| 5-27 | 8 |
| 5-28 | 0 |
| 5-29 | 3 |
| 5-30 | 7 |
| 5-31 | 0 |
| 5-32 | 3 |
| 5-33 | 3 |
| 5-34 | 1 |
| 5-35 | 4 |
| 5-36 - 5-37 | 3 |
| 5-38 | 0 |
| 5-39 | 4 |
| 5-40 | 1 |
| 5-41 | 3 |
| 5-42 - 5-43 | 4 |
| 5-44 | 1 |
| 5-44.1 - 5-44.22 Added | 6 |
| 5-45 - 5-46 | 5 |
| 5-47 | 1 |
| 5-48 - 5-50 | 5 |
| 5-50.1 Added | 5 |
| 5-50.2 - 5-50.4 Added | 1 |
| 5-51 Blank | 1 |
| 5-52 | 1 |
| 5-53 | 4 |
| 5-54 - 5-57 | 0 |
| 5-58 | 3 |
| 5-59 - 5-62 | 0 |
| 5-63 - 5-64 | 1 |
| 5-65 - 5-66 | 0 |
| 5-67 | 1 |
| 5-68 - 5-69 | 0 |
| 5-70 | 1 |
| 5-71 | 5 |
| 5-72 - 5-73 | 1 |
| 5-74 | 4 |
| 5-75 | 5 |
| 5-76 | 6 |
| 5-77 - 5-78 | 0 |
| 5-78.1 - 5-78.6 Added | 6 |
| 5-79 | 6 |
| 5-80 | 1 |
| 5-81 | 0 |
| 5-82 - 5-83 | 1 |
| 5-84 - 5-89 | 0 |
| 5-90 - 5-92 | 3 |
| 5-93 - 5-94 | 1 |
| 5-95 | 0 |
| 5-96 | 3 |
| 5-97 | 0 |
| 5-98 | 6 |
| 5-99 | 1 |
| 5-100 - 5-105 | 0 |
| 5-106 | 10 |
| 5-107 | 4 |
| 5-108 | 0 |
| 5-109 - 5-110 | 1 |
| 5-111 - 5-114 | 6 |
| 5-115 - 5-116 | 3 |
| 5-117 | 7 |
| 5-118 - 5-119 | 1 |
| 5-120 | 0 |
| 5-121 | 7 |
| 5-122 | 0 |
| 5-123 | 10 |
| 5-124 - 5-126 | 0 |
| 5-127 | 4 |
| 5-128 | 10 |
| 5-129 -130 | 8 |
| 5-131 - 5-132 | 0 |
| 5-133 - 5-134 | 3 |
| 5-135 | 1 |
| 5-136 - 5-139 | 1 |
| 5-140 | 0 |
| 5-141 - 5-142 | 1 |
| 5-142.1 - 5-142.3 | 2 |
| 5-142.4 Blank, Added | 2 |
| 5-143 - 5-144 | 0 |
| 5-145 | 3 |
| 5-146 - 5-148 | 6 |
| 5-148.1 Added | 6 |
| 5-148.2 Blank, Added | 6 |
| 5-149 | 8 |
| 5-150 | 10 |
| 5-151 - 5-152 | 6 |
| 5-153 | 8 |
| 5-154 - 5-155 | 6 |
| 5-156 - 5-157 | 7 |
| 5-158 | 8 |
| 5-159 | 3 |
| 5-160 | 8 |
| 5-160.1 - 5-160.2 Added | 2 |
| 5-160.3 - 5-160.4 | 6 |
| 5-160.5 - 5-160.6 Added | 6 |
| 5-161 - 5-162 | 1 |
| 5-162.1 Added | 3 |
| 5-162.2 - 5-162.4 Added | 2 |
| 5-163 | 10 |
| 5-164 - 5-166 | 0 |
| 5-167 | 4 |
| 5-168 | 0 |
| 5-169 | 4 |
| 5-170 | 0 |
| 5-171 | 10 |

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## LIST OF EFFECTIVE PAGES

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|---|---|
| 5-172 | 7 |
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| 5-172.2 Blank | 7 |
| 5-173 - 5-174 | 2 |
| 5-175 - 5-176 | 8 |
| 5-177 - 5-183 | 0 |
| 5-184 - 5-186 | 3 |
| 5-187 | 10 |
| 5-188 - 5-190 | 0 |
| 5-191 | 10 |
| 5-192 | 3 |
| 5-193 | 4 |
| 5-194 - 5-198 | 0 |
| 5-199 | 1 |
| 5-200 | 0 |
| 5-201 | 1 |
| 5-202 - 5-203 | 0 |
| 5-204 - 5-205 | 1 |
| 5-206 | 0 |
| 5-207 | 6 |
| 5-208 | 0 |
| 5-208.1 - 5-208.3 | 3 |
| 5-208.4 | 7 |
| 5-208.5 - 5-208.10 Added | 3 |
| 5-208.11 - 5-208.16 Added | 5 |
| 5-209 | 1 |
| 5-210 | 0 |
| 5-211 | 1 |
| 5-212 - 5-213 | 0 |
| 5-214 | 1 |
| 5-215 - 5-221 | 0 |
| 5-222 | 1 |
| 5-222.1 | 5 |
| 5-222.2 | 8 |
| 5-222.3 - 5-222.4 | 5 |
| 5-222.5 | 8 |
| 5-222.6 | 5 |
| 5-223 Blank | 5 |
| 5-224 | 5 |
| 5-225 | 1 |
| 5-226 | 0 |
| 5-227 | 7 |
| 5-228 | 7 |
| 5-229 | 7 |
| 5-230 | 9 |
| 5-231 | 7 |
| 5-232 | 8 |
| 5-232.1 - 5-232.3 Added | 8 |
| 5-232.4 Blank Added | 8 |
| 5-233 | 7 |
| 5-234 | 0 |
| 5-235 | 7 |
| 5-236 - 5-237 | 0 |
| 5-238 - 5-239 | 3 |
| 5-240 | 2 |
| 5-241 | 6 |
| 5-242 - 5-245 | 3 |
| 5-246 | 8 |
| 5-246.1 Added | 6 |
| 5-246.2 Blank, Added | 6 |
| 5-247 - 5-249 | 0 |
| 5-250 | 3 |
| 5-251 | 1 |
| 5-252 | 3 |
| 5-253 | 6 |
| 5-254 - 5-255 | 4 |
| 5-256 | 6 |
| 5-256.1 | 7 |
| 5-256.2 | 6 |
| 5-256.3 Added | 1 |
| 5-256.4 | 4 |
| 5-256.5 - 5-256.6 Added | 1 |
| 5-256.7 | 7 |
| 5-256.8 - 5-256.10 Added | 1 |
| 5-256.11 | 6 |
| 5-256.12 - 5-256.13 | 7 |
| 5-256.14 Added | 1 |
| 5-257 - 5-260 | 1 |
| 5-261 - 5-262 | 0 |
| 5-263 and 5-264 | 5 |
| 5-265 and 5-266 | 9 |
| 5-266.1 | 7 |
| 5-266.2 | 5 |
| 5-267 Blank | 5 |
| 5-268 | 5 |
| 5-269 | 0 |
| 5-270 | 1 |
| 5-271 - 5-284 | 0 |
| 5-285 - 5-290 | 5 |

***Zero in this column indicates an original page.**

# CHAPTER 4
# POWER PLANTS

## CHAPTER OVERVIEW

Chapter 4 contains the maintenance instructions for the power plant. Power plant description, operation, and troubleshooting information is contained in TM 1-1520-238-T.

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# SECTION I. ENGINES TEARDOWN/BUILDUP

## 4.1. ENGINE CLEANING

Refer to TM 55-2840-248-23 for engine cleaning.

## 4.2. ENGINE INSPECTION

4.2.1. Description

This task covers: Inspection.

4.2.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**References:**

TM 1-1500-204-23
TM 55-1500-322-24
TM 55-1500-323-24
TM 55-2840-248-23

**Materials/Parts:**

Methyl ethyl ketone (item 124, App F)
Sealing compound (item 167, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access panels removed, as necessary |

4.2.3. Inspection

a. **Check engine tubes, hoses, and fittings for cracks, nicks, scratches, chafing, and dents.**

(1) No cracks allowed.

(2) If depth of defect can be measured on fuel carrying tubes, replace tube. No damage allowed.

(3) On non-fuel-carrying tubes nicks, scratches, and chafing not to exceed **0.005 INCH** are repairable if repair has not been previously done in same area.

(4) On straight or curved sections of tubing with a bend radius larger than twice the tube OD, replace tubing with dents larger than 20 percent of tube OD.

(5) On curved tubing with a bend radius less than twice tube OD, replace tubing with dents larger than 10 percent of tube OD.

b. **Check hoses for kinks and buckling.** None allowed.

c. **Check brackets and support clips for cracks** (TM 1-1500-204-23)**.**

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**4.2. ENGINE INSPECTION - continued**

d. **Check for fuel or oil leaks.** None allowed.

e. **Check for loose, broken, or missing nuts and bolts.** None allowed.

f. **Check quick-release pins in hydromechanical unit (HMU) and anti-ice and start valve linkage for proper engagement** (TM 55-2840-248-23)**.**

g. **Check fuel and oil filters for indication of impending bypass.** If impending bypass button is popped, replace filter (TM 55-2840-248-23).

h. **Check engine mounts for cracks and voids.** None allowed.

i. **Check engines and attaching hardware for corrosion** (para 1.49)**.**

j. **Check engine mount bearings** (TM 55-1500-322-24)**.**

(1) Axial play. Not applicable.

(2) Radial play **0.0035 INCH** max.

k. **Refer to TM 55-2840-248-23 for repair limits on engine components.**

l. **Check electrical connectors for corroded, bent, broken, loose, or missing pins.** Check wire harnesses for chafing and loose mounting (TM 55-1500-323-24).

m. **Check access panels** (para 2.2)**.**

n. **Check engine turbine case for cracks, and loose or broken third stage nozzle bolts** (TM 55-2840-248-23)**.**

o. **Engine air inlet and seal inspection.**

(1) Dents within **1.0 INCH** of the leading edge of the inlet, local dents not deviating from contour more than **0.020 INCH** and less than **1.50 SQUARE-INCHES** are acceptable. Areas further than **1.0 INCH** from the leading edge of the inlet having local dents not deviating **0.030 INCH** from contour and less than **0.50 SQUARE-INCHES** are acceptable.

(2) Rubber Seal. Rips or tears less than **0.25 INCH** in length and no closer than **2.0 INCHES** apart, and no material missing are acceptable.

(3) Bulkhead. All cracks must be repaired (TM 1-1500-204-23). Dents less than **0.30 INCH** in depth and less than **0.50 SQUARE-INCHES** are acceptable.

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**4.2. ENGINE INSPECTION - continued**

p. **Aft inboard engine mount and aft lower engine mount pins and bushings inspection.**

(1) Perform visual inspection of aft inboard engine mount and aft lower engine mount pins.

(2) Check for lanyard wrap up.

(a) If lanyard wrap up has occurred, clean and apply torque stripes across edge of bushing and adjacent area of bellcrank. Apply torque stripes on both sides of aft engine mount. Use sealing compound (item 167, App F). Inspect torque stripes prior to each flight for 10 flight hours to determine if bushings are rotating with respect to the bellcrank. If bushing rotates perform corrective action in step q.

(b) If lanyard wrap has not occurred no further maintenance action is required.

(3) Perform torque check of mount pin lock mechanism.

(a) Unlock pin.

(b) With no weight on pin, note minimum torque required to engage lock mechanism. Use torque wrench.

(c) If torque required to lock pin is not **55 to 100 INCH-POUNDS**, replace pin.

q. **Corrective action for aft inboard engine mount and aft lower engine mount pins and bushings.**

(1) Support engine as necessary and remove support pins from aft inboard and aft lower engine mount (para 4.6 No. 1 engine or para 4.10 No. 2 engine) (para 4.5 No. 1 engine or para 4.9 No. 2 engine).

(2) Remove the aft inboard mount/aft lower mount (para 4.29).

(3) Remove two bushings from engine aft inboard mount/aft lower mount (para 4.56).

(a) Clean OD of bushings and bore of bellcrank with methyl ethyl ketone (item 124, App F) and clean cloth.

(b) Check bushings for cracks and gouges. No cracks allowed. Gouges shall not exceed **0.031 INCH** depth either longitudinal or circular.

(c) Install two bushings in engine aft inboard mount/aft lower mount (para 4.56).

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**4.2. ENGINE INSPECTION - continued**

(4) Reinstall engine mounts (para 4.31).

(5) Reinstall support pin in aft lower engine mount (para 4.50 No. 1 engine or 4.54 No. 2 engine).

(6) Reinstall support pin in aft inboard engine mount (para 4.51 No. 1 engine or 4.55 No. 2 engine).

(7) Apply torque stripe per step p(2)(a).

(8) Monitor support pin and aft engine mount bushings for 10 flight hours to ensure bushing rotation has been corrected. If bushings continue to rotate, replace bushings.

END OF TASK

## 4.3. NO. 1 ENGINE REMOVAL

4.3.1. Description

This task covers: Removal.

4.4. No. 1 or No. 2 Engine Removal - Pilot Station
4.5. No. 1 Engine Removal - Upper Disconnection
4.6. No. 1 Engine Removal - Lower Disconnection
4.7. No. 1 Engine Removal - Remove from Helicopter

4.3.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Airframe adapter kit (item 25, App H)
Aircraft power unit (item 232, App H)
Engine lifting sling (item 291, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
Two persons to assist

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN1, LN3, and LN4 opened |
| 6.2 | No. 1 drive shaft removed |
| 1.22 | Fuel system vented |
| 1.97 | Maintenance crane installed |

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## 4.4. NO. 1 OR NO. 2 ENGINE REMOVAL - PILOT STATION

4.4.1. Description

This task covers: Removal.

4.4.2. Initial Setup

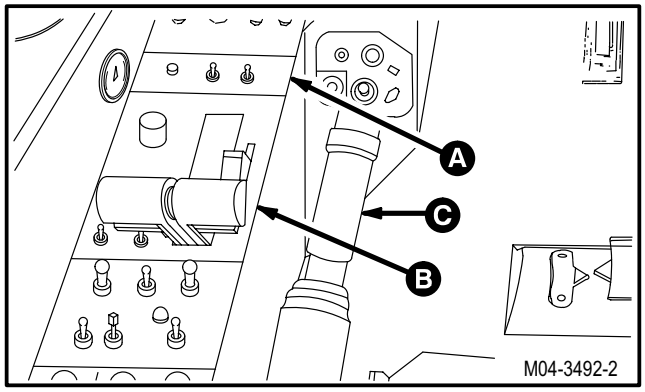
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.3 | No. 1 engine removal |

4.4.3. Removal

a. **Apply electrical** (para 1.70) **and hydraulic** (para 1.73) **power to helicopter. Observe all safety precautions.**

b. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

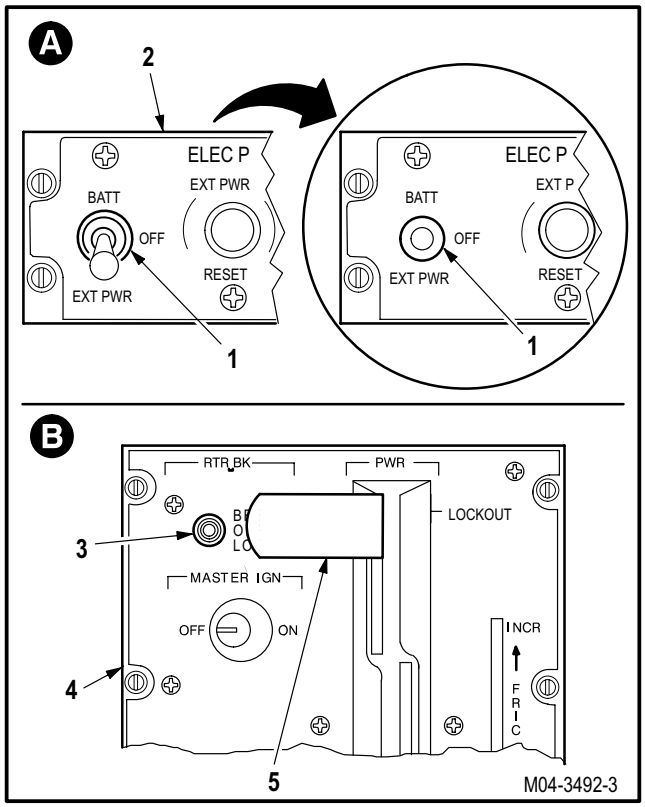



c. **Set ELEC PWR control switch (1) on ELEC PWR check panel (2) to EXT PWR.**

d. **Set RTR BK switch (3) on power quadrant panel (4) to OFF.**

e. **Set switch (1) on panel (2) to OFF.**

f. **Set applicable (No. 1 or No. 2) power lever (5) on panel (4) to LOCKOUT.**

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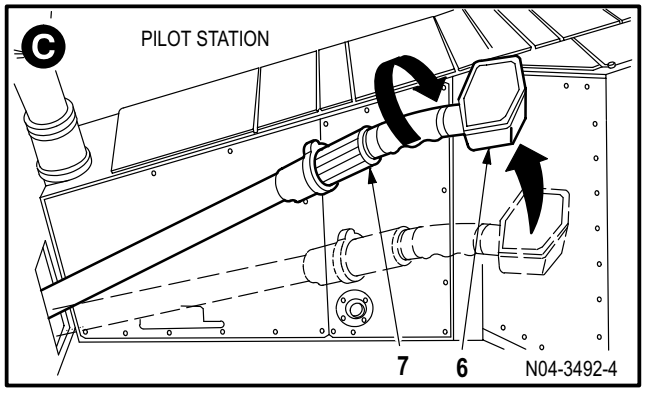
## 4.4. NO. 1 OR NO. 2 ENGINE REMOVAL - PILOT STATION - continued

g. **Move collective stick (6) to full up position.**

(1) Rotate flight gear handle (7) counterclockwise to lock.

h. **Remove electrical** (para 1.70) **and hydraulic** (para 1.73) **power from helicopter.**

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## 4.5. NO. 1 ENGINE REMOVAL - UPPER DISCONNECTION

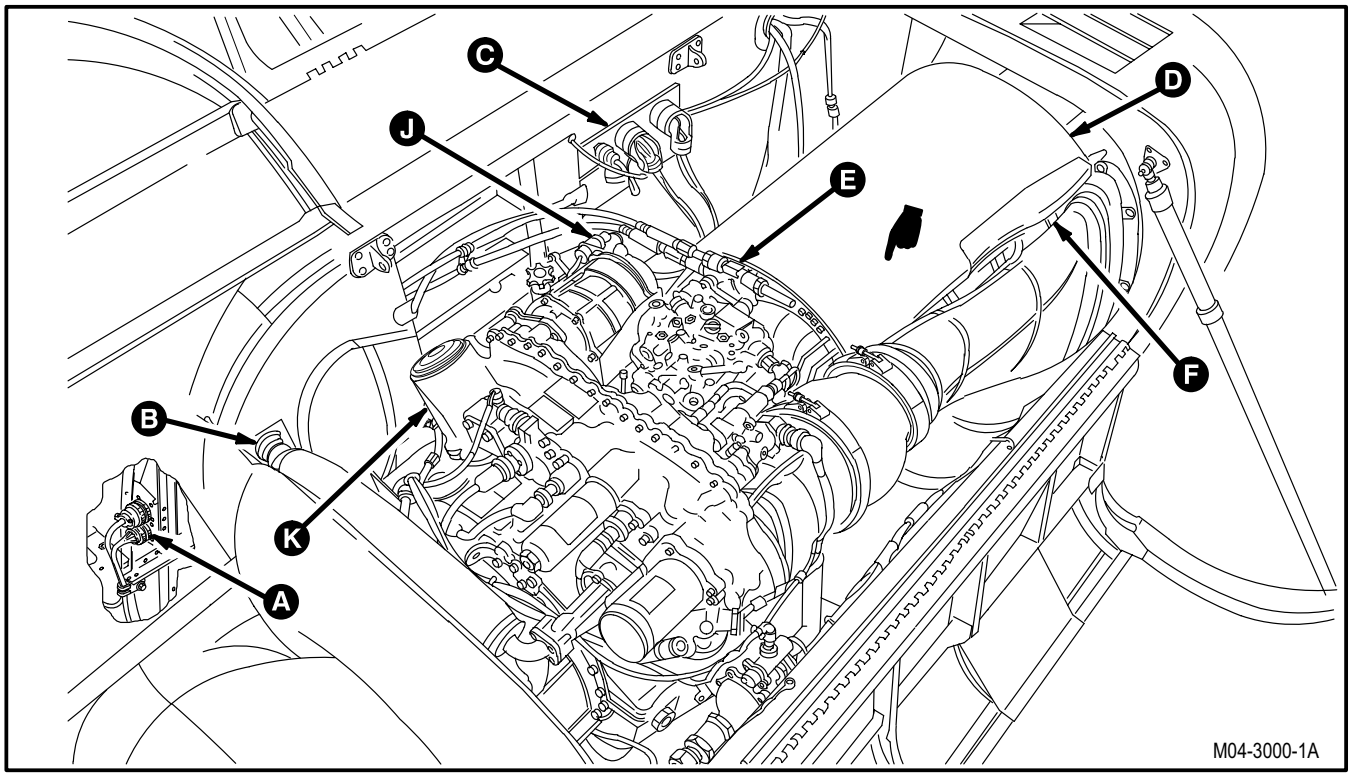
4.5.1. Description

This task covers: Removal.

4.5.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.3 | No. 1 engine removal |

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## 4.5. NO. 1 ENGINE REMOVAL - UPPER DISCONNECTION - continued

4.5.3. Removal

a. **Detach connectors P61 (1) and P47 (2).**

(1) Detach connector P61 (1) from receptacle J61 (3).

(2) Detach connector P47 (2) from receptacle J47 (4).

b. **Remove wire harness (5) from airframe (6).**

(1) Remove screw (7), washer (8), and clamp (9).

(2) Remove clamp (9) from wire harness (5).

c. **Remove fuel hose (10) from breakaway valve (11).**

(1) To release locking teeth, slide ratchet sleeve (12) away from adapter (13).

(2) Turn sleeve (12) counterclockwise until free.

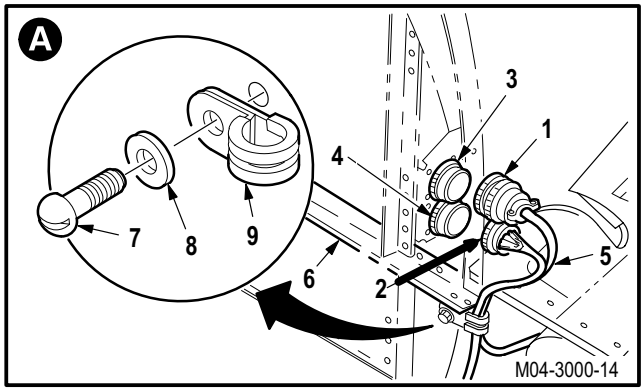
d. **Detach connectors P21 (14) and P23 (15).**

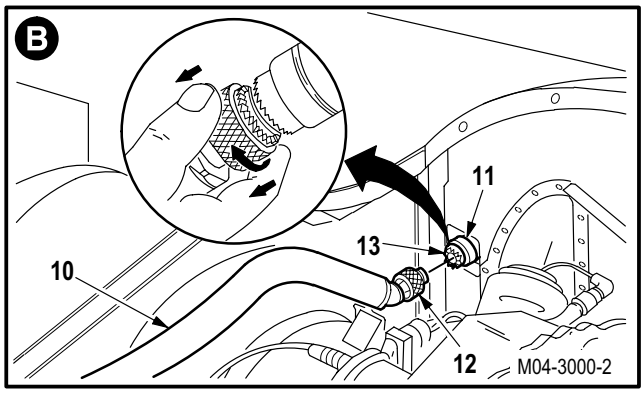
(1) Detach connector P21 (14) from receptacle J21 (16).

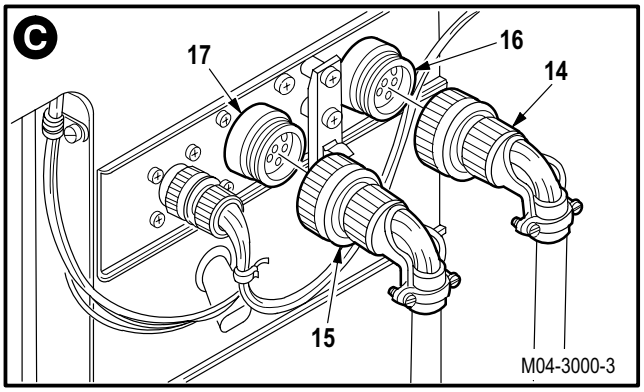
(2) Detach connector P23 (15) from receptacle J23 (17).

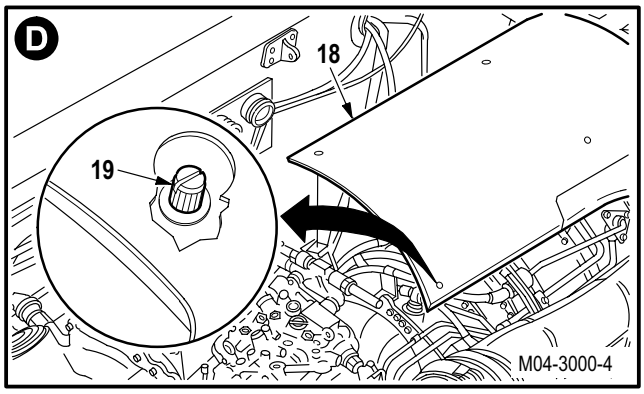
e. **Remove engine shroud (18).**

(1) Release four turnlock fasteners (19).

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## 4.5. NO. 1 ENGINE REMOVAL - UPPER DISCONNECTION - continued

f. **Remove load demand cable assembly (20) from load demand spindle gearbox (21).**

(1) Hold cable housing flats (22). Remove coupling nut (23).

(2) Pull cable (24) inboard and remove.

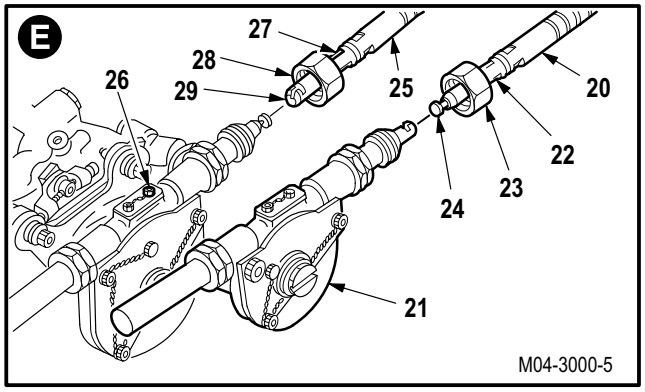
g. **Remove power available cable assembly (25) from power available spindle gearbox (26).**

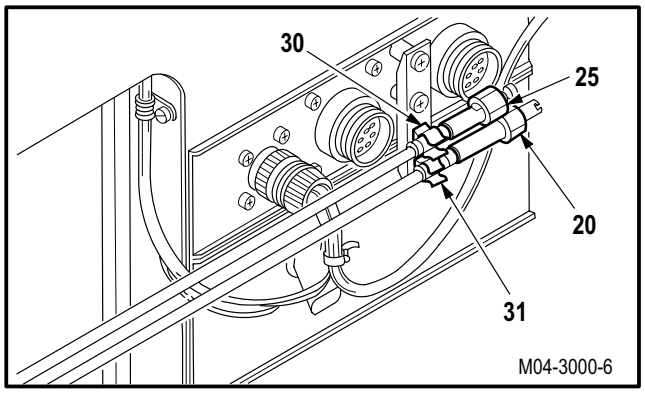
(1) Hold cable housing flats (27). Remove coupling nut (28).

(2) Pull cable (29) inboard and remove.

h. **Stow power available cable (25) in upper clip (30).**

i. **Stow load demand cable (20) in lower clip (31).**




j. **Remove coupling (32) from primary nozzle (33).**

(1) Loosen lower clamp nut (34).

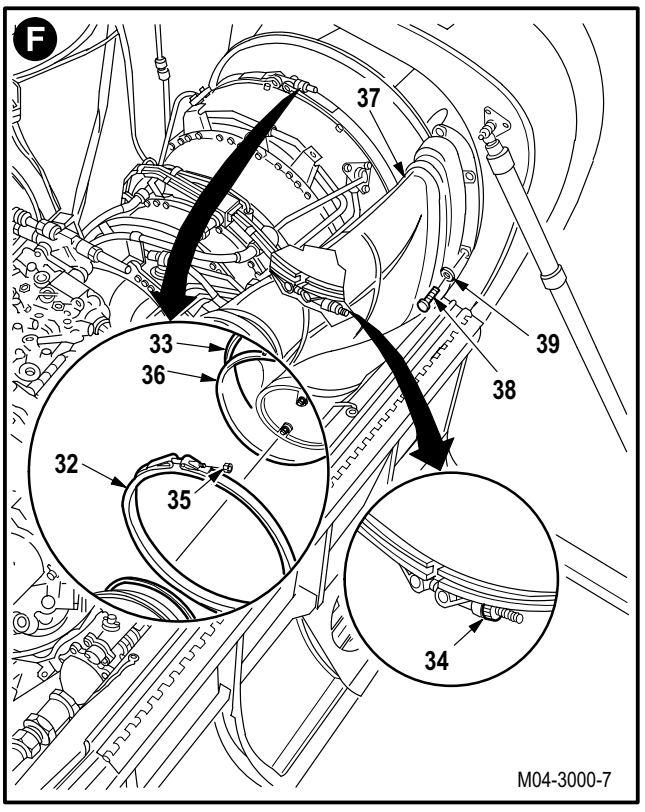
(2) Remove upper clamp nut (35).

(3) Slide coupling (32) aft off nozzle (33) until it clears engine flange (36).

k. **Remove air duct (37) from nozzle (33).**

(1) Remove three screws (38) and washers (39).

l. **Move nozzle (33) aft until it clears flange (36).**

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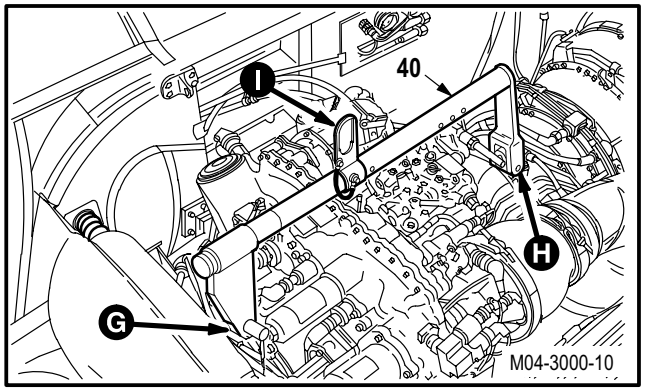
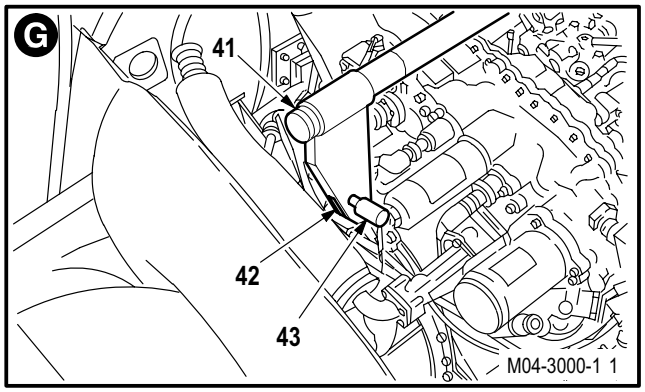
## 4.5. NO. 1 ENGINE REMOVAL - UPPER DISCONNECTION - continued

m. **Install engine lifting sling (40).**



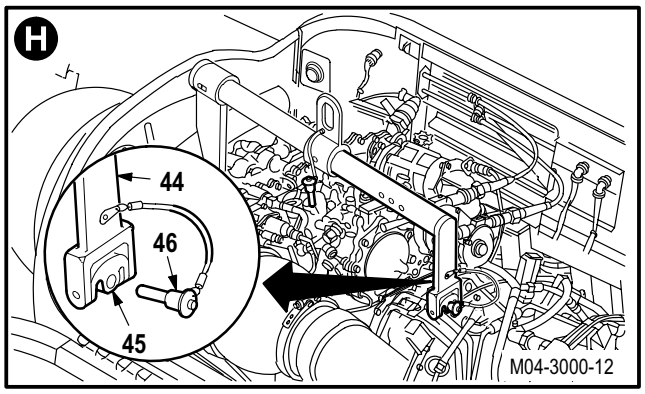

(1) Aline forward hanger link (41) with forward lifting lug (42).

(2) Install support pin (43) through link (41) and lug (42).




(3) Aline aft hanger link (44) with lifting lug (45).

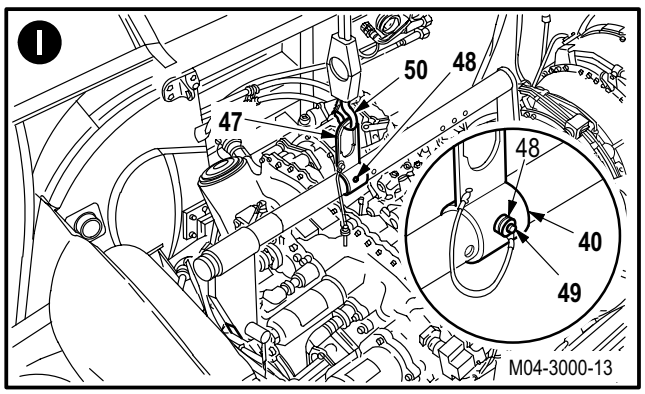
(4) Install aft support pin (46) through link (44) and lug (45).




(5) Position lifting eye (47) at hole No. 2 (48).

(6) Insert pin (49) through sling (40) and hole (48).

n. **Insert crane hook (50) into lifting eye (47).**

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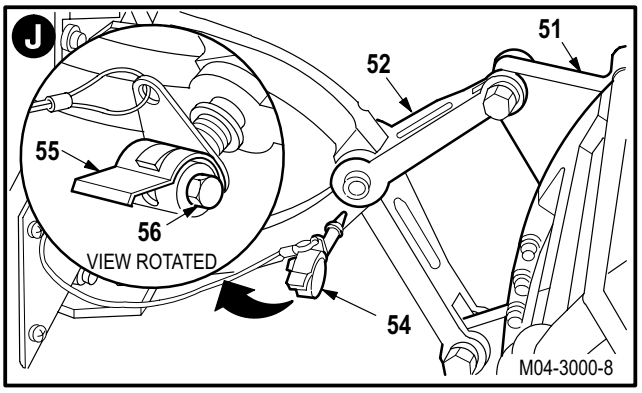
## 4.5. NO. 1 ENGINE REMOVAL - UPPER DISCONNECTION - continued

o. **Lift engine (51) with crane until weight is off aft inboard engine mount (52) and forward inboard engine mount (53).**

p. **Remove support pin (54) from mount (52).**

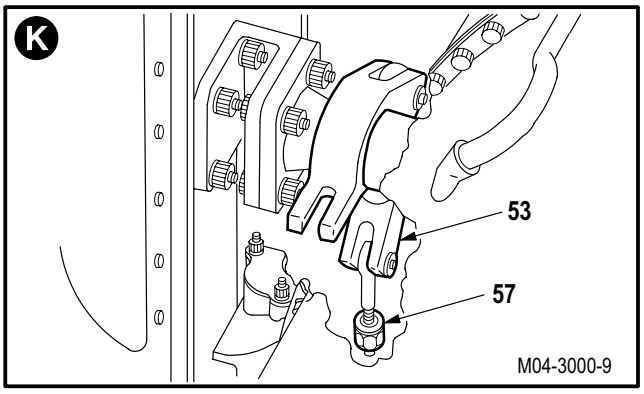
(1) Lift spring clip (55) to unlock pin (54) and turn bolt (56) counterclockwise to its internal stop.

(2) Remove support pin (54) from mount (52).




q. **Unlatch and open forward inboard engine mount (53).**

(1) Loosen nut (57). Open mount (53).

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## 4.6. NO. 1 ENGINE REMOVAL - LOWER DISCONNECTION

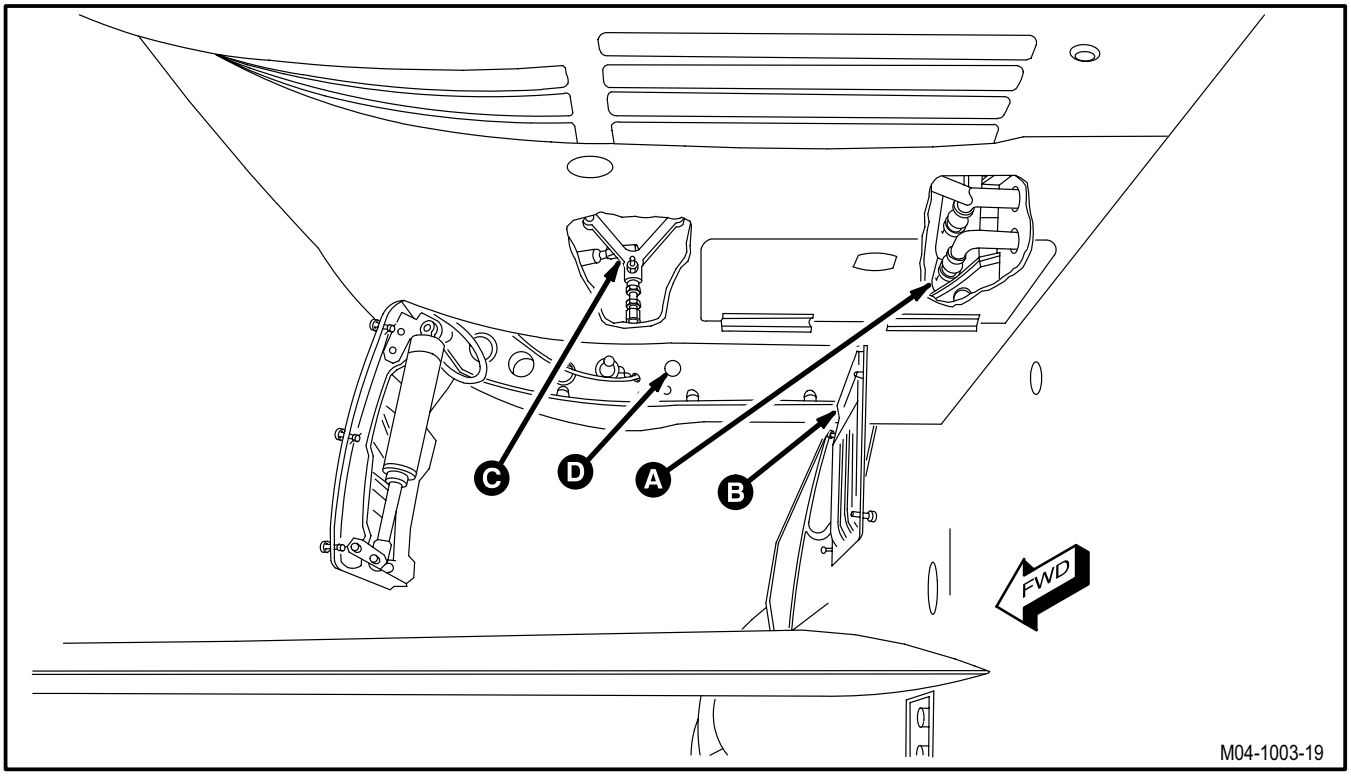
4.6.1. Description

This task covers: Removal.

4.6.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.3 | No. 1 engine removal |

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## 4.6. NO. 1 ENGINE REMOVAL - LOWER DISCONNECTION - continued

4.6.3. Removal

a. **Remove starter air tube (1) from coupling (2).**

(1) Loosen two clamp screws (3).

(2) Slide coupling (2) aft until tube (1) is clear.

b. **Remove bleed air tube (4) from coupling (5).**

(1) Loosen two clamp screws (6).

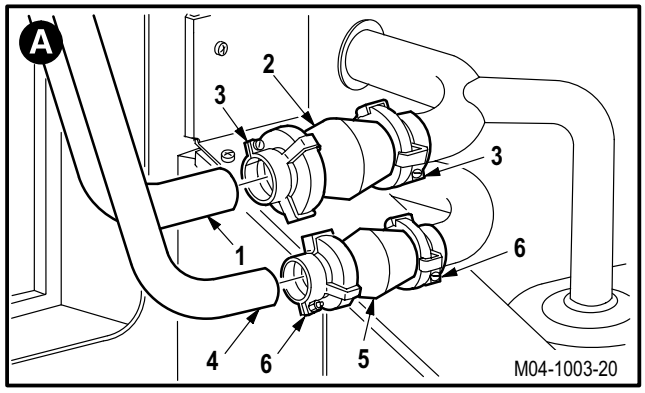
(2) Slide coupling (5) aft until tube (4) is clear.

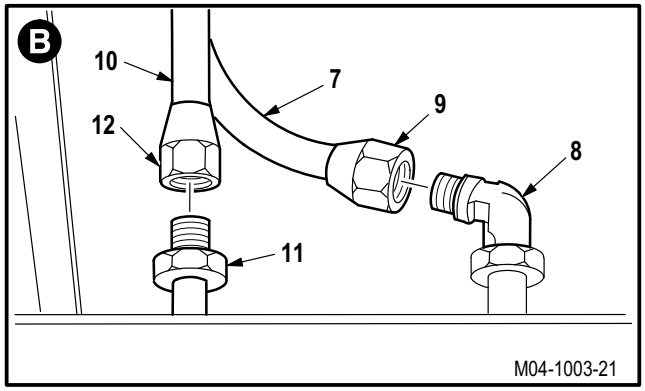
c. **Remove drain hose (7) from elbow (8).**

(1) Hold elbow (8). Remove nut (9).

d. **Remove drain tube (10) from fitting (11).**

(1) Hold fitting (11). Remove nut (12).




e. **Remove quick release pin (13) from aft lower engine mount (14).**

(1) Push release button (15). Remove pin (13).

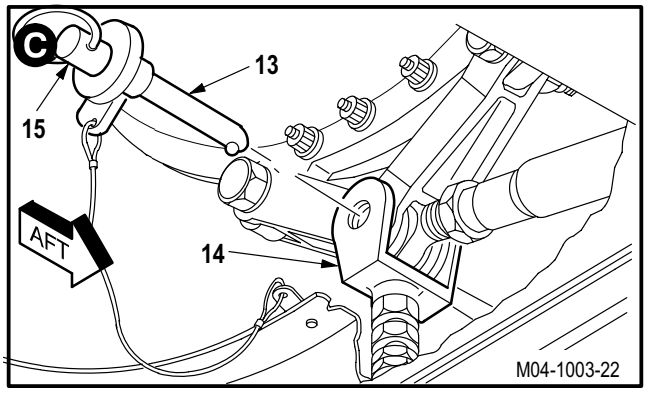
f. **Remove support pin (16) from forward lower engine mount (17).**

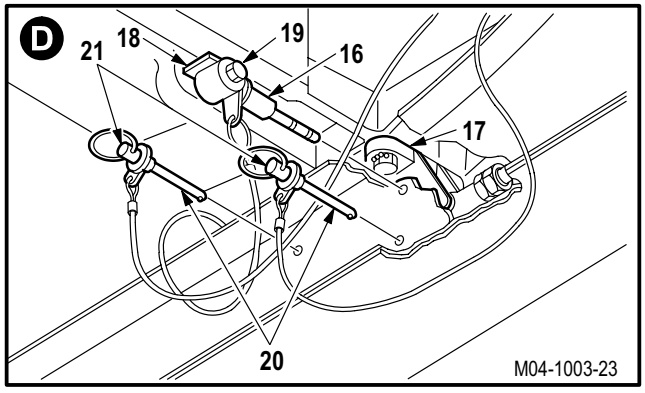
(1) Lift spring clip (18) to unlock pin (16) and turn bolt (19) counterclockwise to its internal stop.

(2) Remove support pin (16) from mount (17).

g. **Remove two quick release pins (20) from mount (17).**

(1) Push release button (21). Remove pin (20).

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## 4.7. NO. 1 ENGINE REMOVAL - REMOVE FROM HELICOPTER

4.7.1. Description

This task covers: Removal.

4.7.2. Initial Setup

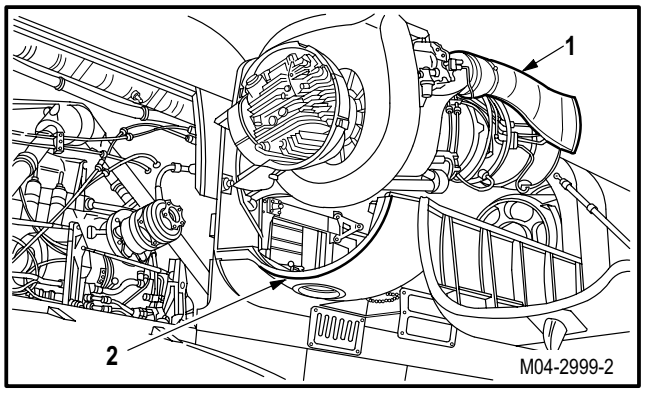
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.3 | No. 1 engine removal |

4.7.3. Removal

**WARNING**

**If hoisted components are allowed to fall, personnel can suffer injury or death. Keep away from component mounting surfaces and loaded crane boom. If injury occurs, seek medical aid.**

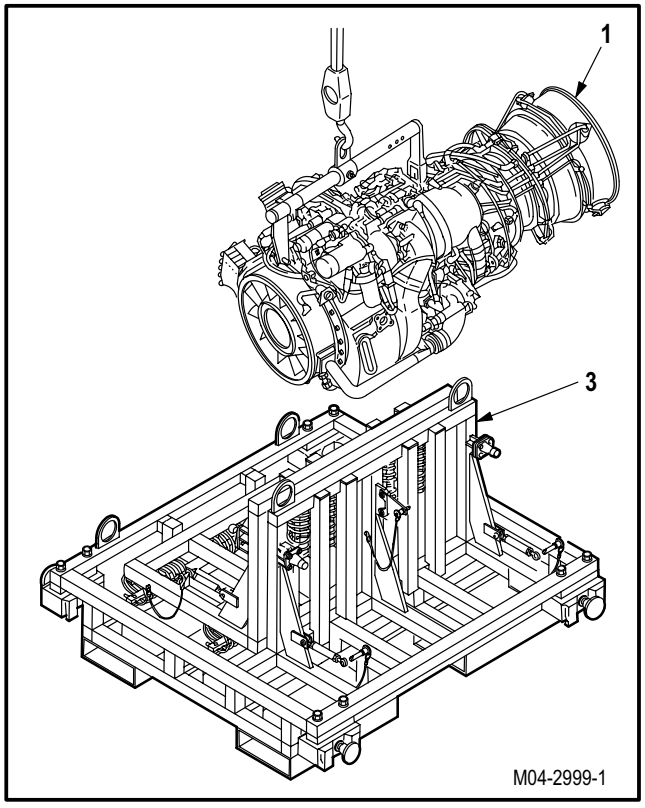



**CAUTION**

When lifting engine from nacelle, ensure that all hoses, electrical plugs, lines, and cables are clear of obstructions.

a. **Lift engine (1) straight up and out of nacelle (2).** Use aircraft mounting crane.

b. **Install engine (1) on handling adapter (3)** (para 4.32)**.**




END OF TASK

## 4.8. NO. 2 ENGINE REMOVAL

4.8.1. Description

This task covers: Removal

4.9. No. 2 Engine Removal - Upper Disconnection
4.10. No. 2 Engine Removal - Lower Disconnection
4.11. No. 2 Engine Removal - Remove from Helicopter

4.8.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Airframe adapter kit (item 25, App H)
Engine lifting sling (item 291, App H)

**Personnel Required:**

| | |
|---|---|
| 67R | Attack Helicopter Repairer |
| | Two persons to assist |

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.4 | No. 1 or No. 2 Engine Removal - Pilot Station |
| 2.2 | Access doors RN1, RN3, and RN4 opened and panel R200 removed |
| 6.2 | No. 2 drive shaft removed |
| 1.22 | Fuel system vented |
| 1.97 | Maintenance crane installed |

GO TO NEXT PARAGRAPH

## 4.9. NO. 2 ENGINE REMOVAL - UPPER DISCONNECTION

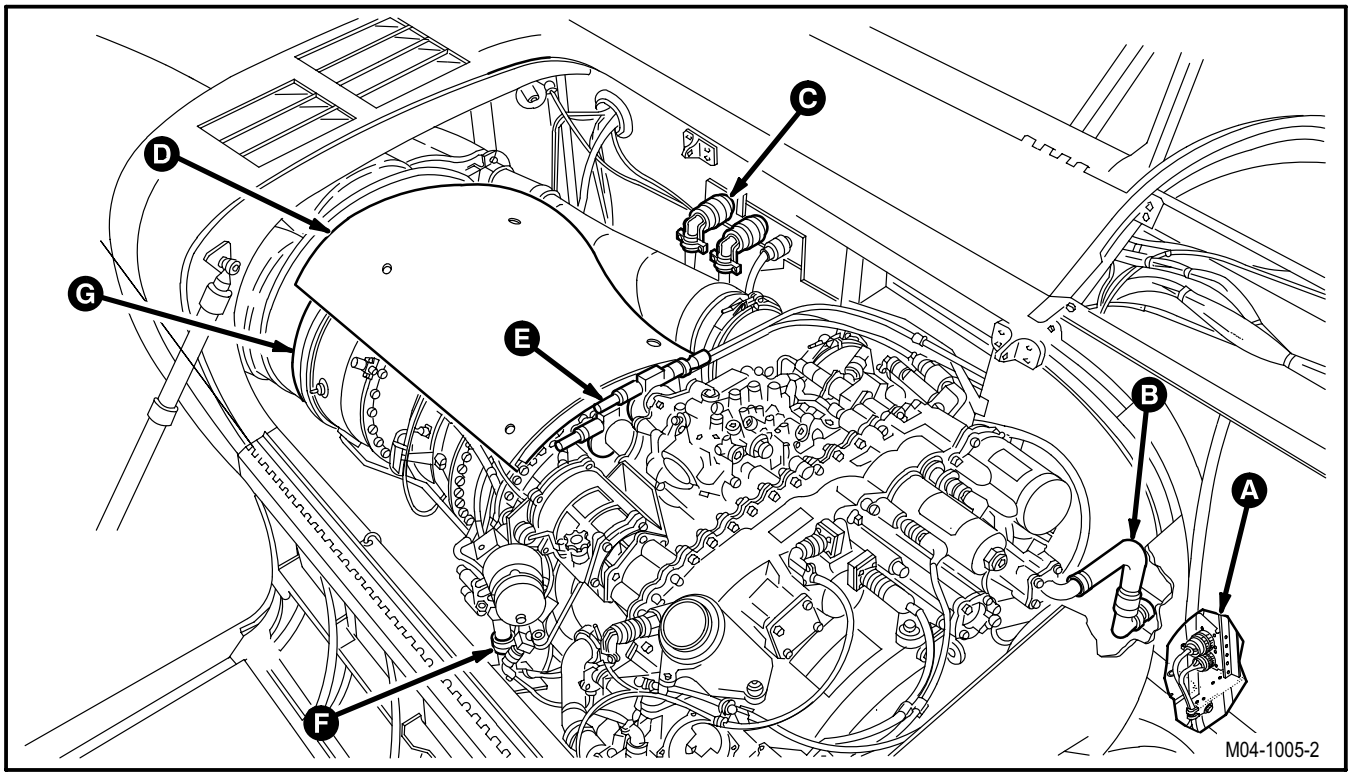
4.9.1. Description

This task covers: Removal.

4.9.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.8 | No. 2 engine removal |

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## 4.9. NO. 2 ENGINE REMOVAL - UPPER DISCONNECTION - continued

4.9.3. Removal

a. **Detach connector P60 (1) and connector P48 (2).**

(1) Detach connector P60 (1) from receptacle J60 (3).

(2) Detach connector P48 (2) from receptacle J48 (4).

b. **Remove wire harness (5) from airframe (6).**

(1) Remove screw (7), washer (8), clamp (9), and spacer (10).

(2) Remove clamp (9) from wire harness (5).

c. **Remove fuel hose (11) from breakaway valve (12).**

(1) To release locking teeth, slide ratchet sleeve (13) away from adapter (14).

(2) Turn sleeve (13) counterclockwise until free.

d. **Detach aft connector P22 (15) and connector P24 (16).**

(1) Detach connector P22 (15) from receptacle J22 (17).

(2) Detach connector P24 (16) from receptacle J24 (18).

e. **Remove wire harness (19) from airframe (20).**

(1) Remove screw (21), clamp (22), and spacer (23).

(2) Remove clamp (22) from harness (19).

f. **Remove engine shroud (24).**

(1) Release four turnlock fasteners (25).

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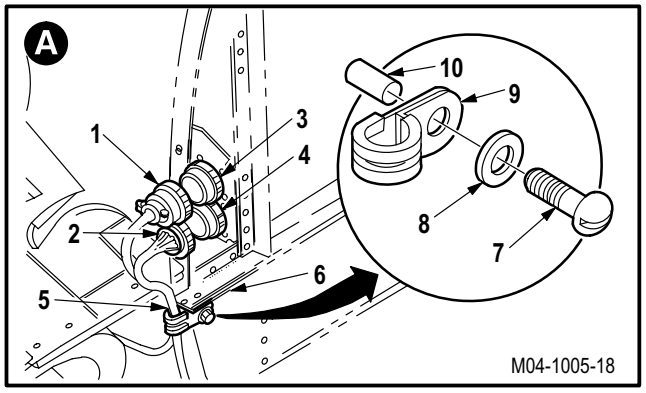
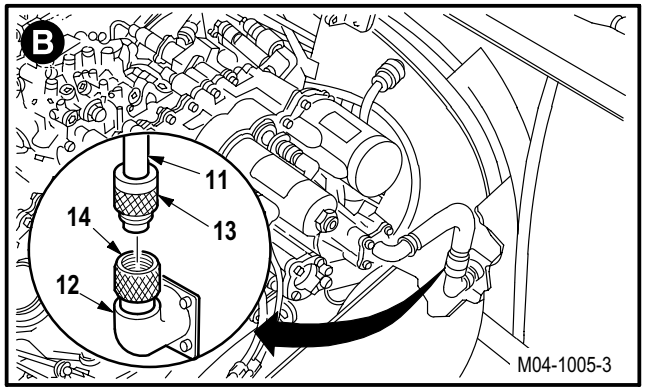
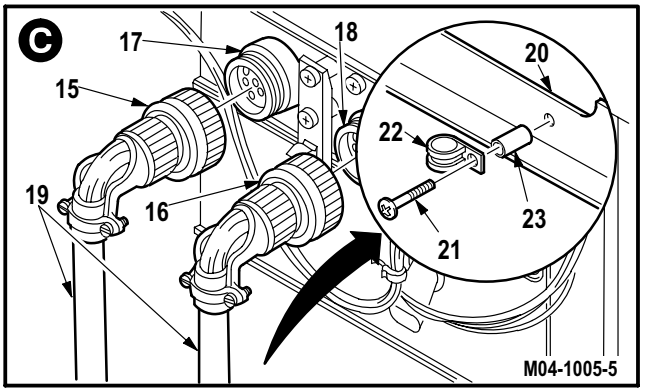
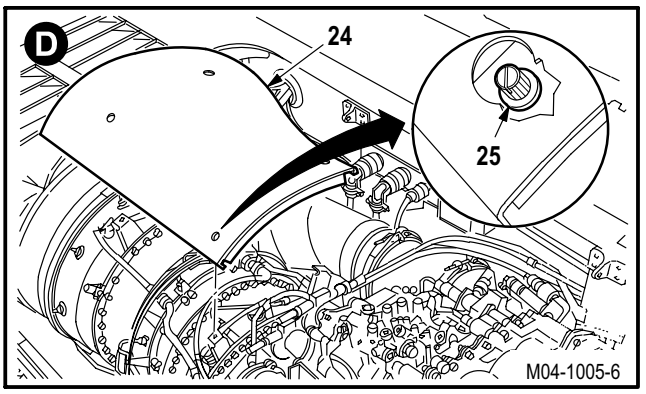


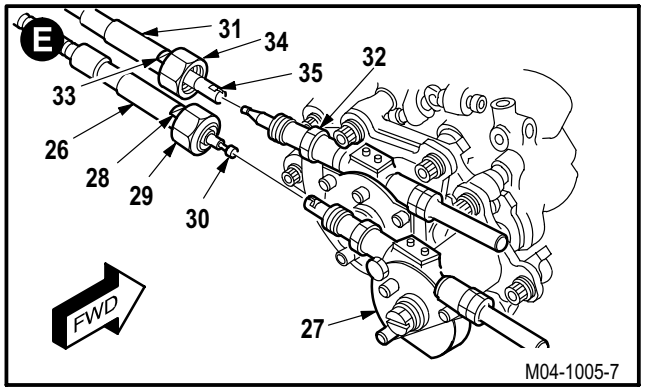



## 4.9. NO. 2 ENGINE REMOVAL - UPPER DISCONNECTION - continued

g. **Remove load demand cable assembly (26) from load demand spindle gearbox (27).**

(1) Hold cable housing flats (28). Remove coupling nut (29).

(2) Pull cable (30) inboard and remove.



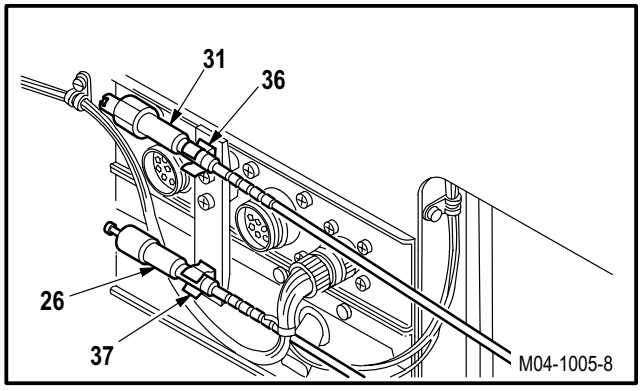

h. **Remove power available cable assembly (31) from power available spindle gearbox (32).**

(1) Hold cable housing flats (33). Remove coupling nut (34).

(2) Pull cable (35) inboard and disconnect.

i. **Stow power available cable (31) in upper clip (36).**

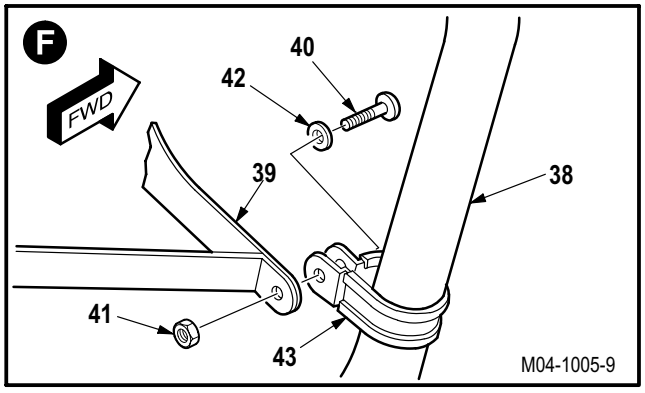
j. **Stow load demand cable (26) in lower clip (37).**




k. **Remove starter air tube (38) from support (39).**

(1) Hold screw (40). Remove nut (41).

(2) Remove screw (40) and washer (42) from clamp (43).

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## 4.9. NO. 2 ENGINE REMOVAL - UPPER DISCONNECTION - continued

l. **Remove coupling (44) from primary nozzle (45).**

(1) Loosen lower clamp nut (46).

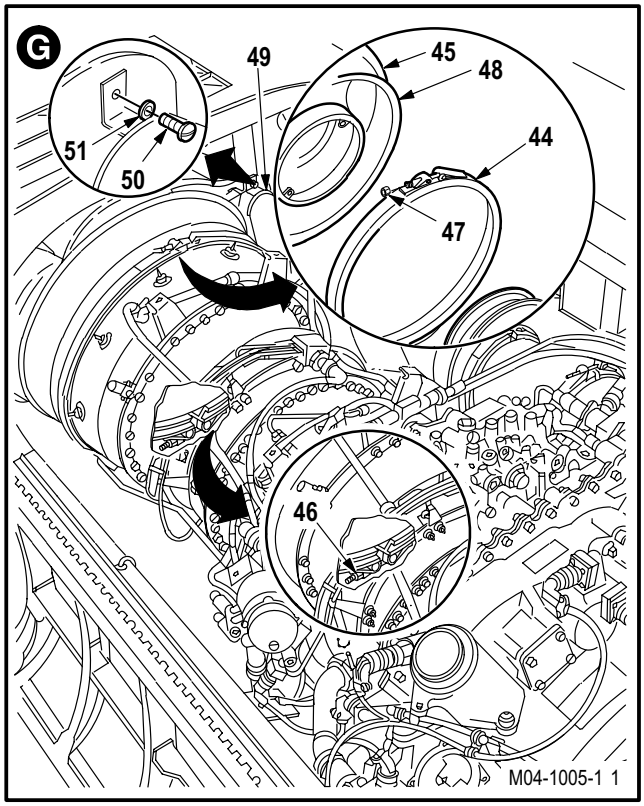
(2) Remove upper clamp nut (47).

(3) Slide coupling (44) aft off nozzle (45) until clear of engine flange (48).

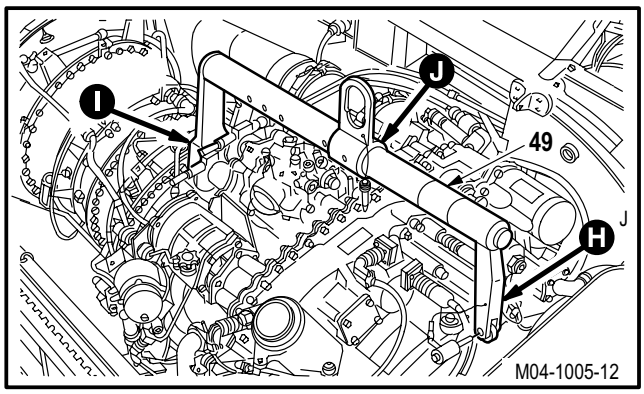
m. **Remove air duct (49) from primary nozzle (45).**

(1) Remove three screws (50) and washers (51).

n. **Move primary nozzle (45) aft until clear of engine flange (48).**

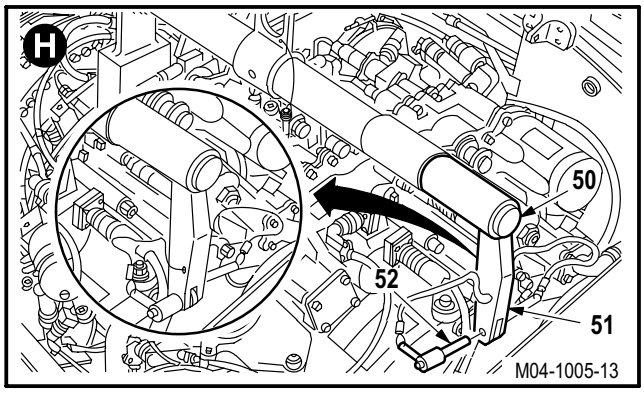



o. **Install engine lifting sling (49).**




(1) Aline forward hanger link (50) with lifting lug (51).

(2) Install support pin (52) through link (50) and lug (51).

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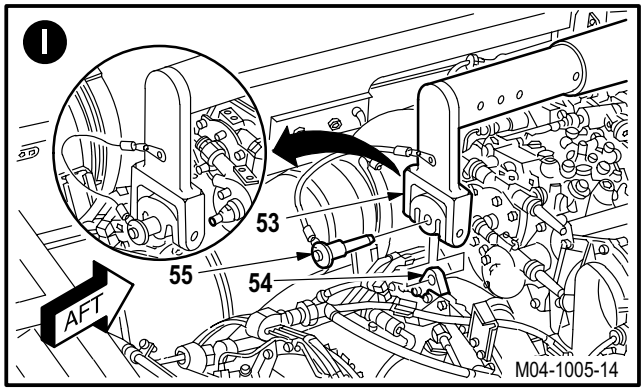
## 4.9. NO. 2 ENGINE REMOVAL - UPPER DISCONNECTION - continued

(3) Aline aft hanger link (53) with lifting lug (54).

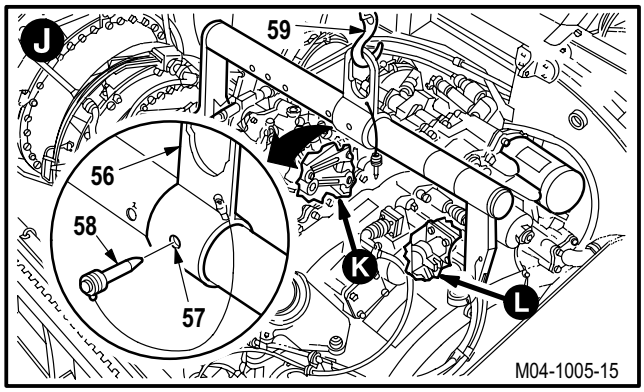
(4) Install aft support pin (55) through link (53) and lug (54).




(5) Position lifting eye (56) at hole No. 2 (57).

(6) Insert pin (58) through lifting eye (56) and hole (57).

p. **Insert crane hook (59) into lifting eye (56).**

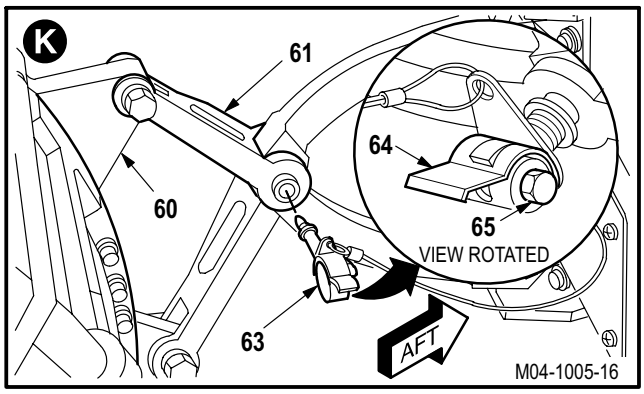



q. **Lift engine (60) with crane until weight is off aft inboard engine mount (61) and forward inboard engine mount (62).**

r. **Remove support pin (63) from aft inboard engine mount (61).**

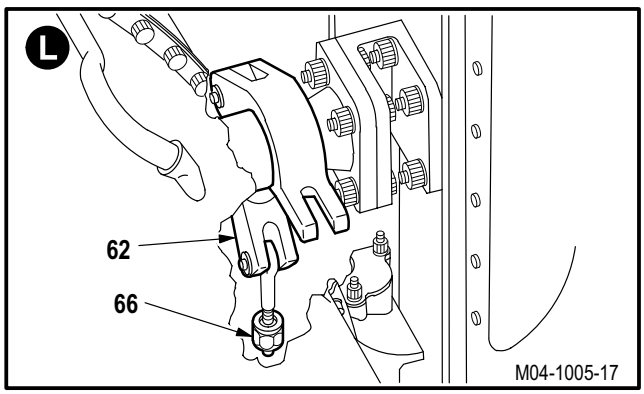
(1) Lift spring clip (64) to unlock pin (63) and turn bolt (65) counterclockwise to its internal stop.

(2) Remove pin (63) from mount (61).




s. **Unlatch and open forward inboard engine mount (62).**

(1) Loosen nut (66). Open mount (62).

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## 4.10. NO. 2 ENGINE REMOVAL - LOWER DISCONNECTION

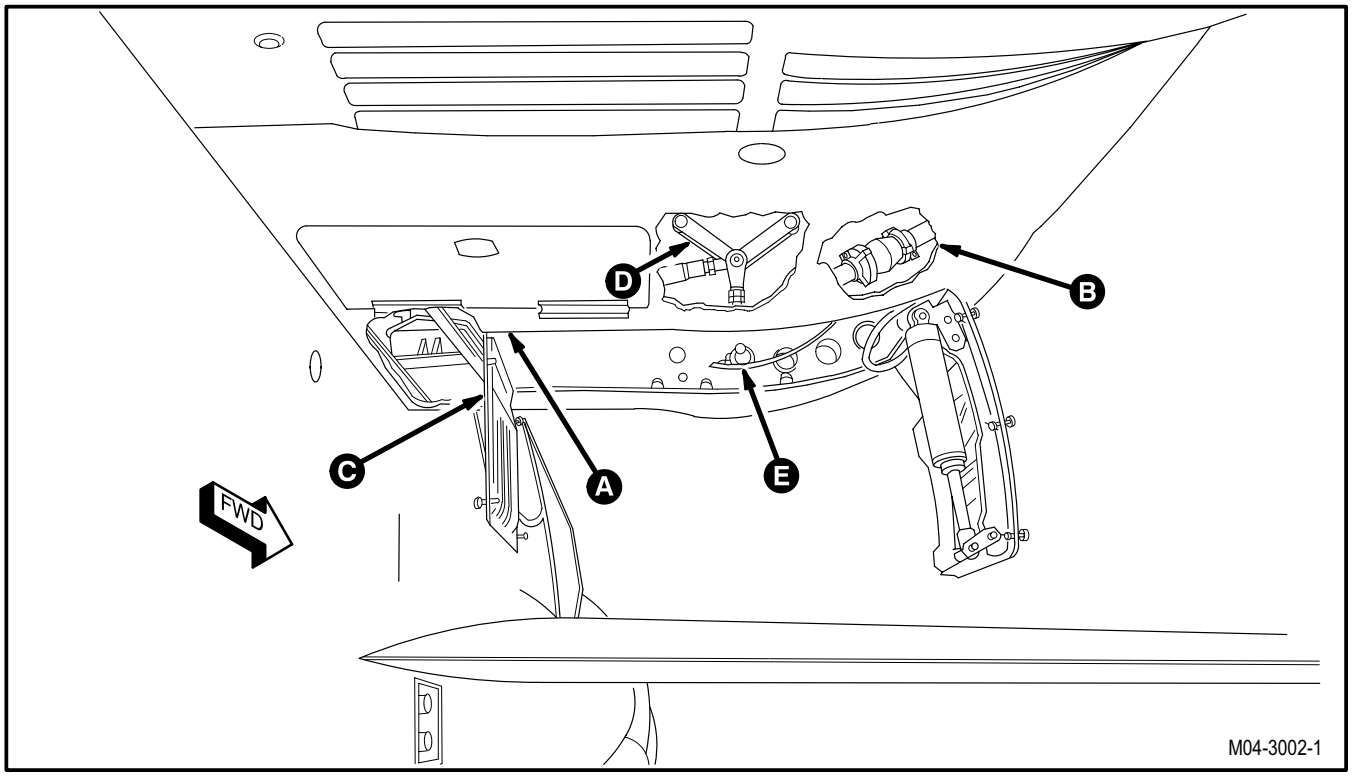
4.10.1. Description

This task covers: Removal.

4.10.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.8 | No. 2 engine removal |

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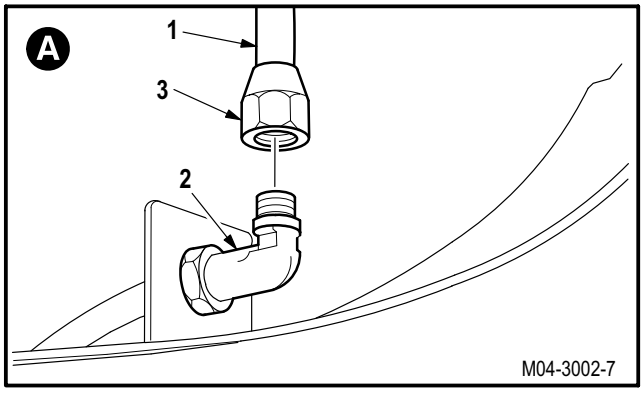
## 4.10. NO. 2 ENGINE REMOVAL - LOWER DISCONNECTION - continued

4.10.3. Removal

a. **Remove bleed hose (1) from elbow fitting (2).**

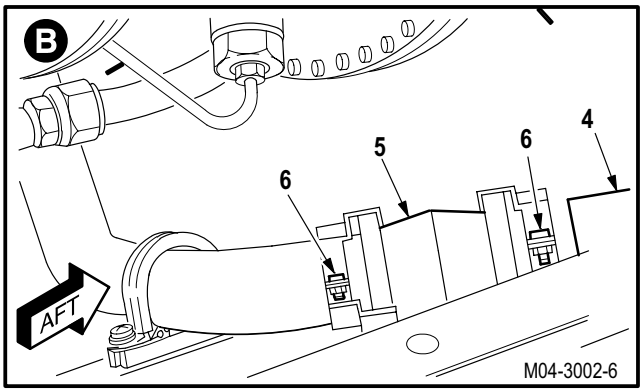
(1) Hold elbow (2). Remove nut (3).




b. **Remove starter air tube (4) from coupling (5).**

(1) Loosen two clamp screws (6).

(2) Slide coupling (5) aft until tube (4) is clear.

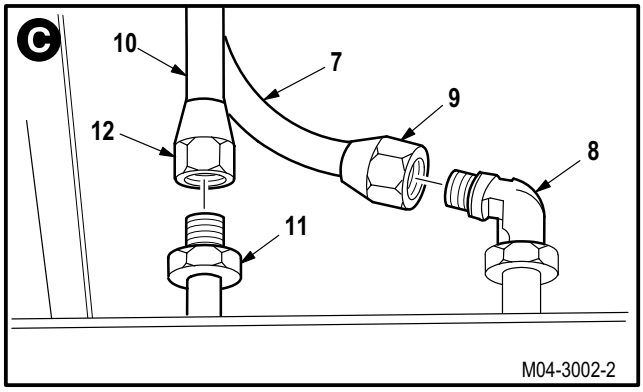



c. **Remove drain hose (7) from elbow fitting (8).**

(1) Hold elbow (8). Remove nut (9).

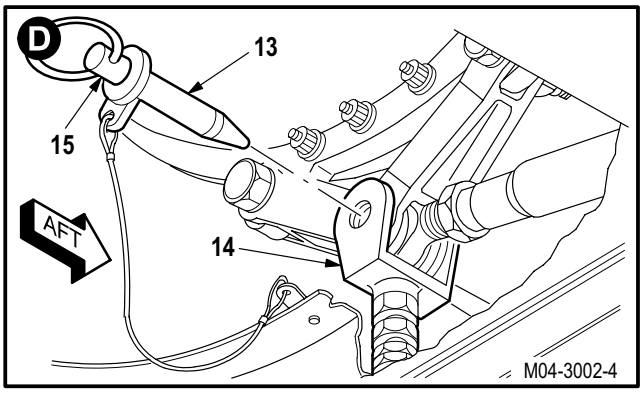
d. **Remove drain tube (10) from fitting (11).**

(1) Hold fitting (11). Remove nut (12).




e. **Remove quick release pin (13) from aft lower engine mount (14).**

(1) Push release button (15). Remove pin (13).

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## 4.10. NO. 2 ENGINE REMOVAL - LOWER DISCONNECTION - continued

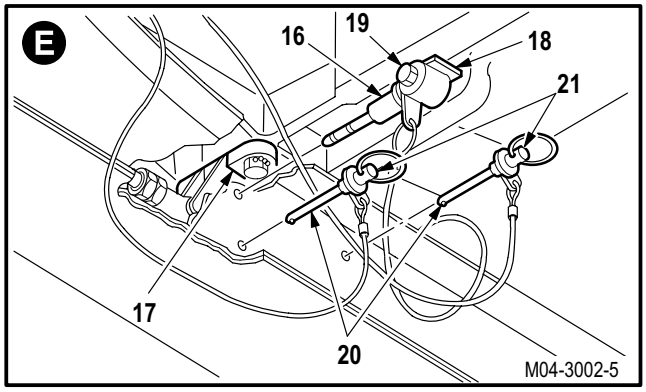
f. **Remove support pin (16) from forward lower engine mount (17).**

(1) Lift spring clip (18) to unlock pin (16) and turn bolt (19) counterclockwise to its internal stop.

(2) Remove pin (16) from mount (17).

g. **Remove quick release pins (20) from mount (17).**

(1) Push release button (21). Remove pin (20).

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## 4.11. NO. 2 ENGINE REMOVAL - REMOVE FROM HELICOPTER

4.11.1. Description

This task covers: Removal.

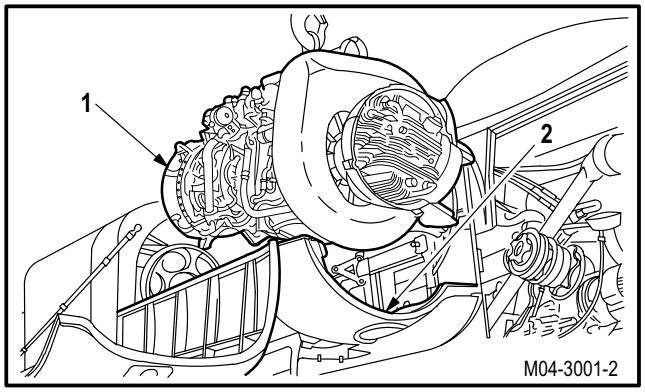
4.11.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.8 | No. 2 engine removal |

**WARNING**

**If hoisted components are allowed to fall, personnel can suffer injury or death. Keep away from component mounting surfaces and loaded crane boom. If injury occurs, seek medical aid.**



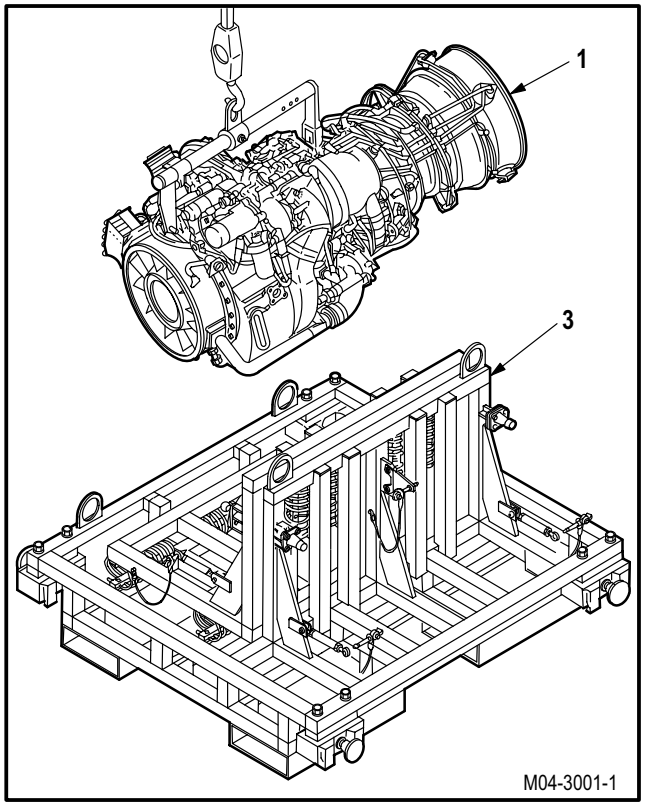

**CAUTION**

When lifting engine from nacelle, ensure that all hoses, electrical plugs, lines, and cables are clear of obstructions.

4.11.3. Removal

a. **Lift engine (1) straight up and out of nacelle (2).** Use maintenance crane.

b. **Install engine (1) on handling adapter (3)** (para 4.32)**.**




END OF TASK

## 4.12. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE

4.12.1. Description

This task covers: Teardown.

4.13. No. 1 and No. 2 Engine Air Duct Removal
4.14. No. 1 and No. 2 Engine Shroud Seal Ring Removal
4.15. No. 1 and No. 2 Engine Air Inlet Removal
4.16. No. 1 and No. 2 Engine Fuel Inlet Hose Removal
4.17. No. 1 Engine Wiring Removal
4.18. No. 2 Engine Wiring Removal
4.19. No. 1 Engine Air Starter and Regulating Valve Removal
4.20. No. 2 Engine Air Starter and Regulating Valve Removal
4.21. No. 1 Engine Anti-Ice and Bleed Air System Removal
4.22. No. 2 Engine Anti-Ice and Bleed Air System Removal
4.23. No. 1 and No. 2 Engine Baseplate and Spindle Gearboxes Removal
4.24. No. 1 and No. 2 Engine Shroud Support Removal
4.25. No. 1 and No. 2 Engine Drain System Removal (T700-GE-701 engine)
4.26. No. 1 and No. 2 Engine Drain System Removal (T700-GE-701C engine)
4.27. No. 1 and No. 2 Engine Oil Chip Collector Removal
4.28. No. 1 and No. 2 Engine Removal from Handling Adapter
4.29. No. 1 and No. 2 Engine Mount Removal

4.12.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 371, App H)
Aircraft mechanic's tool kit (item 376, App H)
Airframe adapter kit (item 25, App H)
Engine lifting sling (item 291, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)

**References:**

TM 1-1500-204-23
TM 55-2840-248-23

**Personnel Required:**

| | |
|---|---|
| 67R | Attack Helicopter Repairer<br>One person to assist |
| 68B | Aircraft Powerplant Repairer |

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 6.36 | Engine nose gearbox and quill shaft removed |
| 1.24 | Engine oil system drained |

**NOTE**

This task (off helicopter) covers tasks required for removal of accessory items to prepare engine for shipment. Tasks are in sequence of removal and may be used for No. 1 and/or No. 2 engine. All serviceable items shall be retained for installation on new engine (para 4.30).

GO TO NEXT PARAGRAPH

## 4.13. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE AIR DUCT REMOVAL

4.13.1. Description

This task covers: Removal.

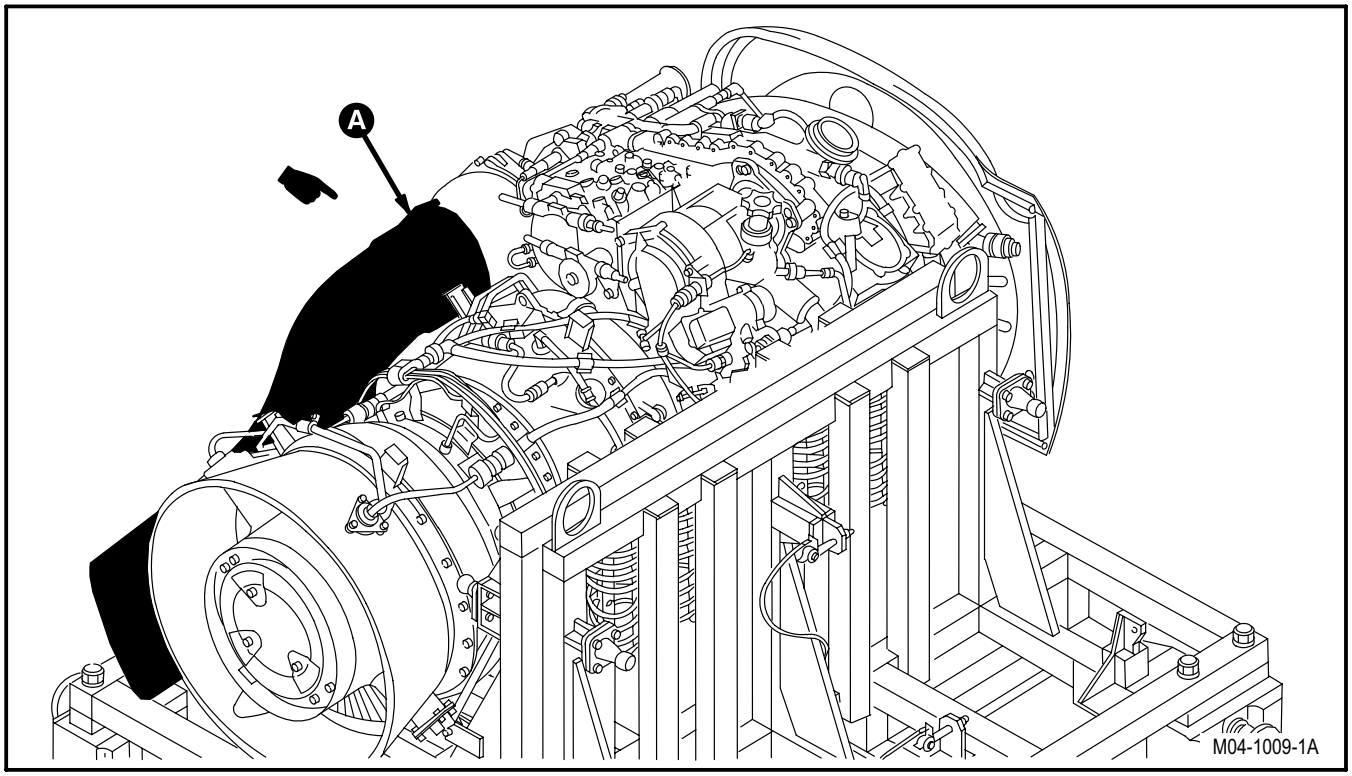
4.13.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine air duct.

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## 4.13. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE AIR DUCT REMOVAL - continued

4.13.3. Removal

a. **Remove air duct (1).**

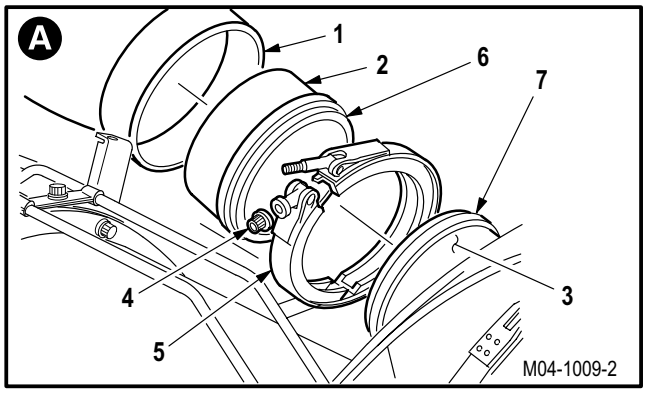
(1) Slide air duct (1) aft to clear adapter flange (2).

(2) Remove duct (1) from engine.

b. **Remove flange (2) from inlet particle separator blower (3).**

(1) Remove nut (4).

(2) Remove coupling (5) from mounting flanges (6) and (7).

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## 4.14. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE SHROUD SEAL RING REMOVAL

4.14.1. Description

This task covers: Removal. Cleaning. Inspection.

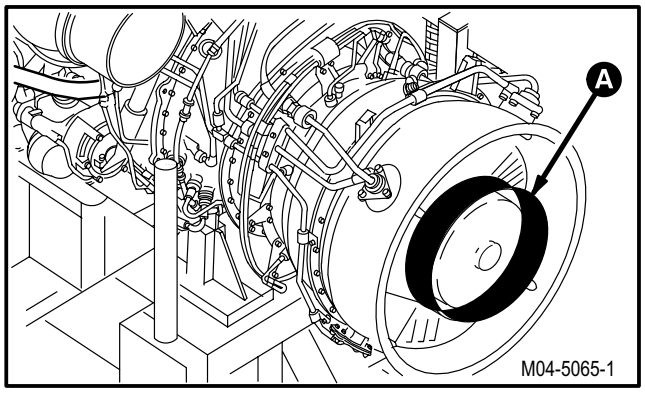
4.14.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine shroud seal ring.

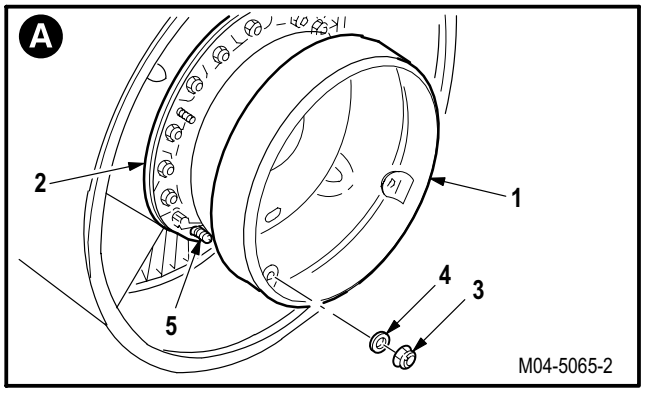



4.14.3. Removal

a. **Remove ring (1) from C-sump housing (2).**

(1) Remove four nuts (3) and washers (4) from studs (5).

(2) Remove ring (1).




4.14.4. Cleaning

a. **Clean housing** (TM 55-2840-248-23)**.**

4.14.5. Inspection

a. **Check housing for cracks and studs for stripped threads** (TM 55-2840-248-23)**.**

b. **Check seal ring for corrosion** (para 1.49)**.**

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## 4.15. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE AIR INLET REMOVAL

4.15.1. Description

This task covers: Removal. Cleaning. Inspection.

4.15.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

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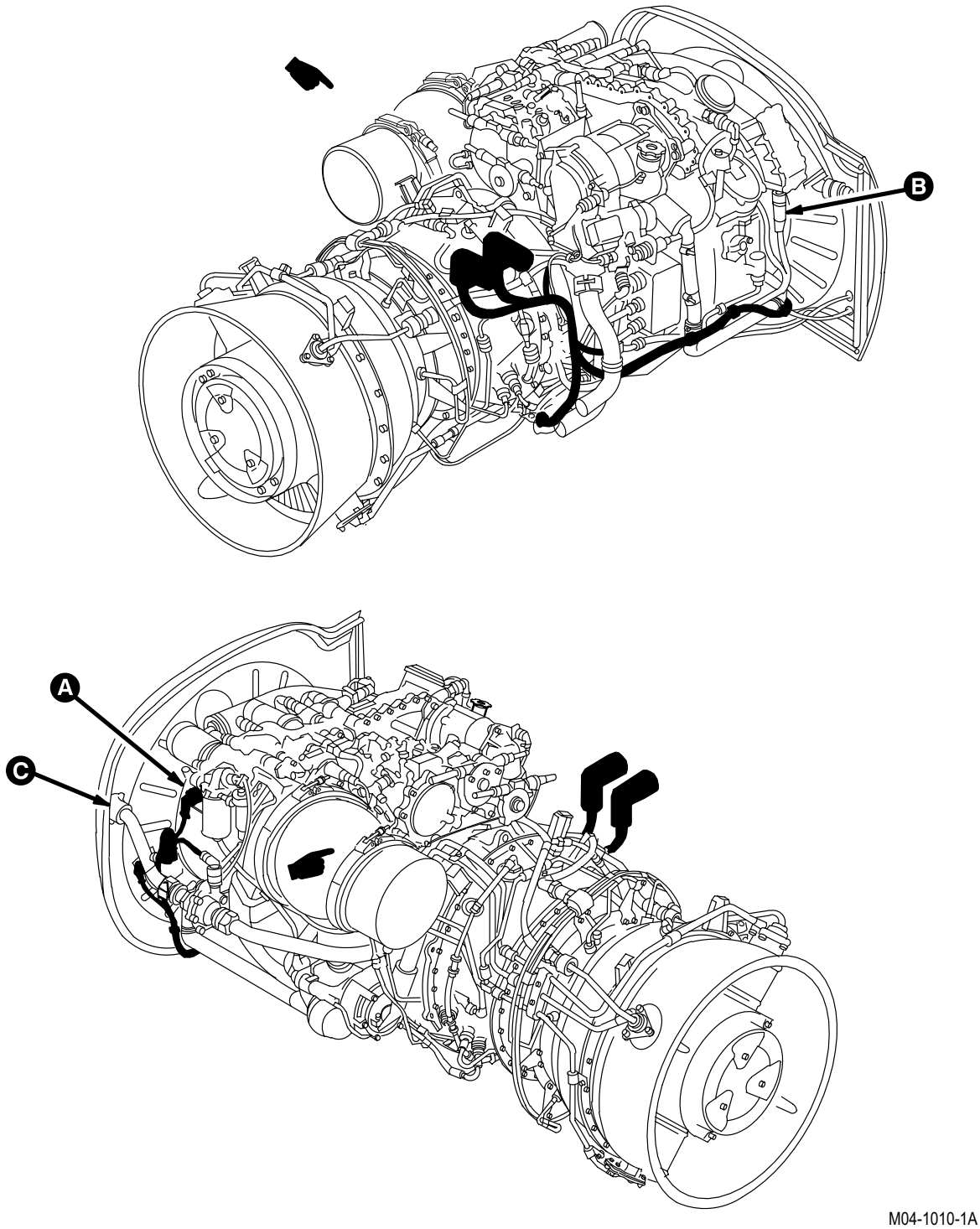
## 4.15. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE AIR INLET REMOVAL - continued

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## 4.15. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE AIR INLET REMOVAL - continued

4.15.3. Removal

**NOTE**

- This task is typical for No. 1 or No. 2 engine air inlet.
- If seals are to be replaced, go to paragraph 4.83.

a. **Remove air inlet (1) from engine inlet (2).**

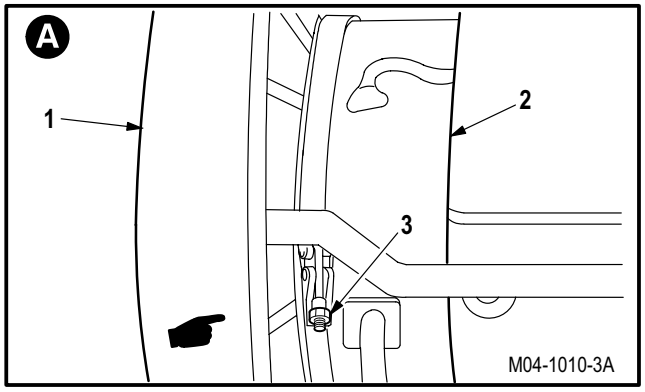
(1) Loosen nut (3).

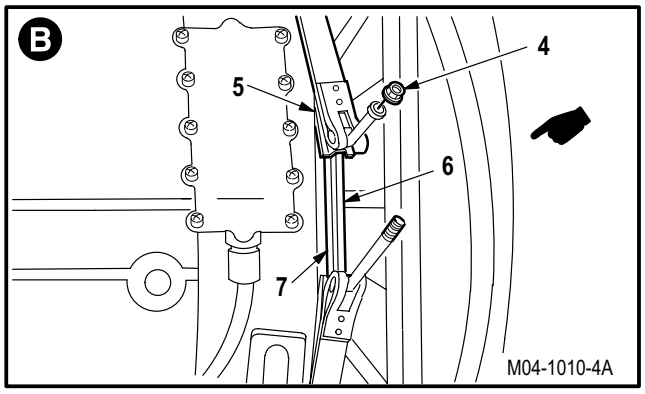
(2) Remove nut (4).

(3) Open coupling (5) and remove from flanges (6) and (7).

(4) Pull air inlet (1) forward until support (8) is clear of anti-ice tube (9).

(5) Remove and discard packing (10).



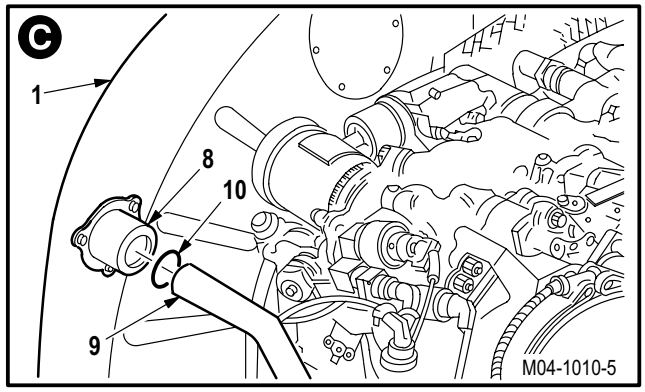

4.15.4. Cleaning

a. **Clean engine inlet and air inlet** (para 1.47)**.**

4.15.5. Inspection

a. **Check air tube for holes, cracks, or dents** (para 4.2)**.**

b. **Check air inlet assembly and seals for cracks, dents, rips, or tears** (para 4.2)**.**




GO TO NEXT PARAGRAPH

## 4.16. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE FUEL INLET HOSE REMOVAL

4.16.1. Description

This task covers: Removal. Cleaning. Inspection.

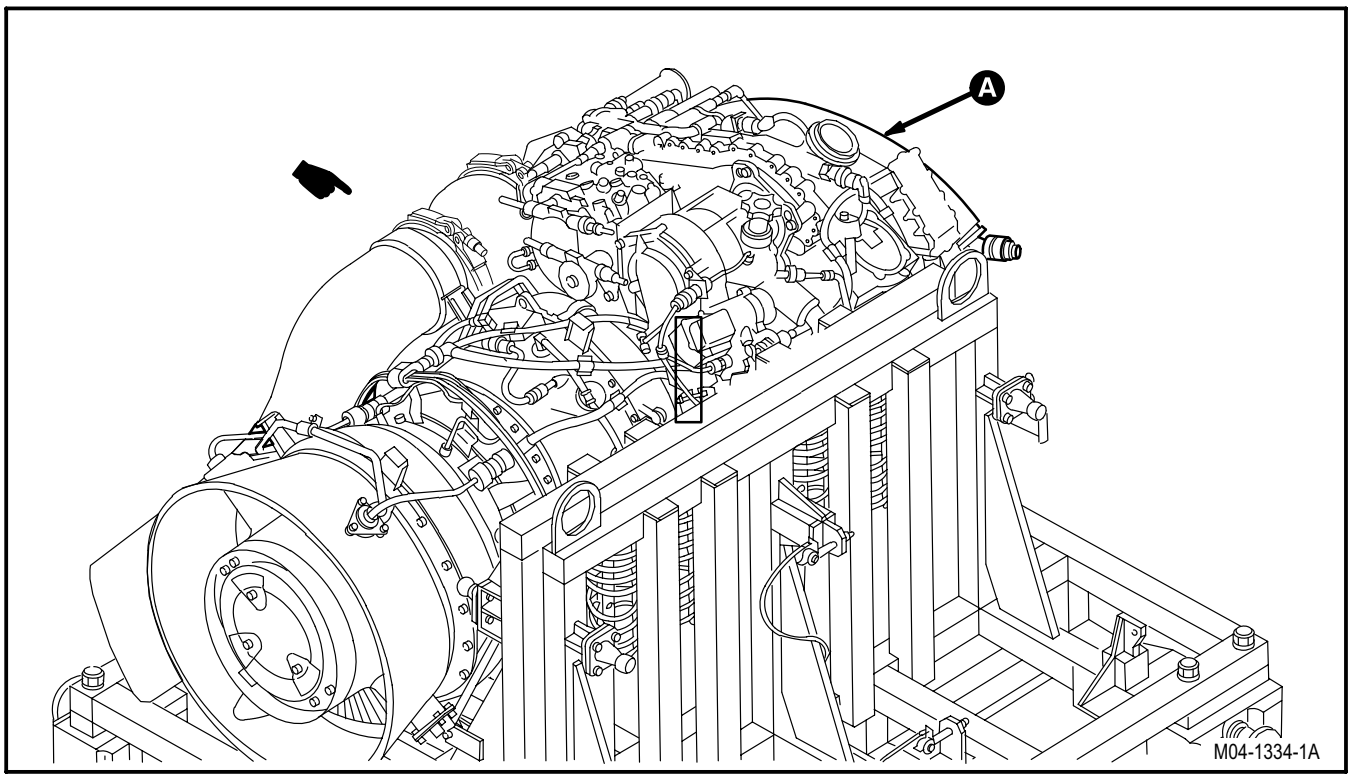
4.16.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine fuel inlet hose.

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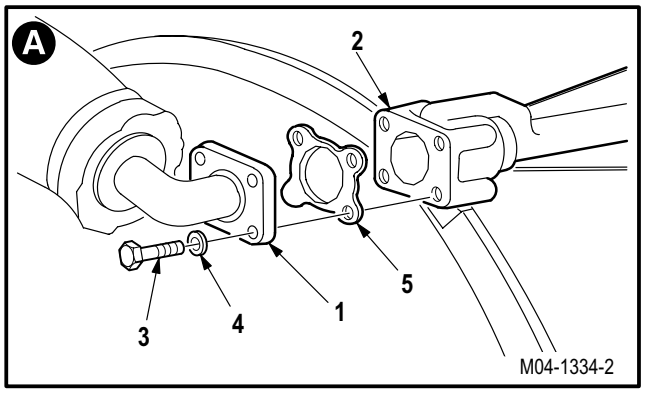
## 4.16. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE FUEL INLET HOSE REMOVAL - continued

4.16.3. Removal

a. **Remove fuel inlet hose (1) from fuel boost pump (2).**

(1) Remove four bolts (3) and washers (4).

(2) Remove and discard gasket (5).




4.16.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.16.5. Inspection

a. **Check fuel inlet hose and pump for leakage, abrasion, kinks, or cracks.** None allowed.

GO TO NEXT PARAGRAPH

## 4.17. ENGINE TEARDOWN - NO. 1 ENGINE WIRING REMOVAL

4.17.1. Description

This task covers: Removal. Inspection.

4.17.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

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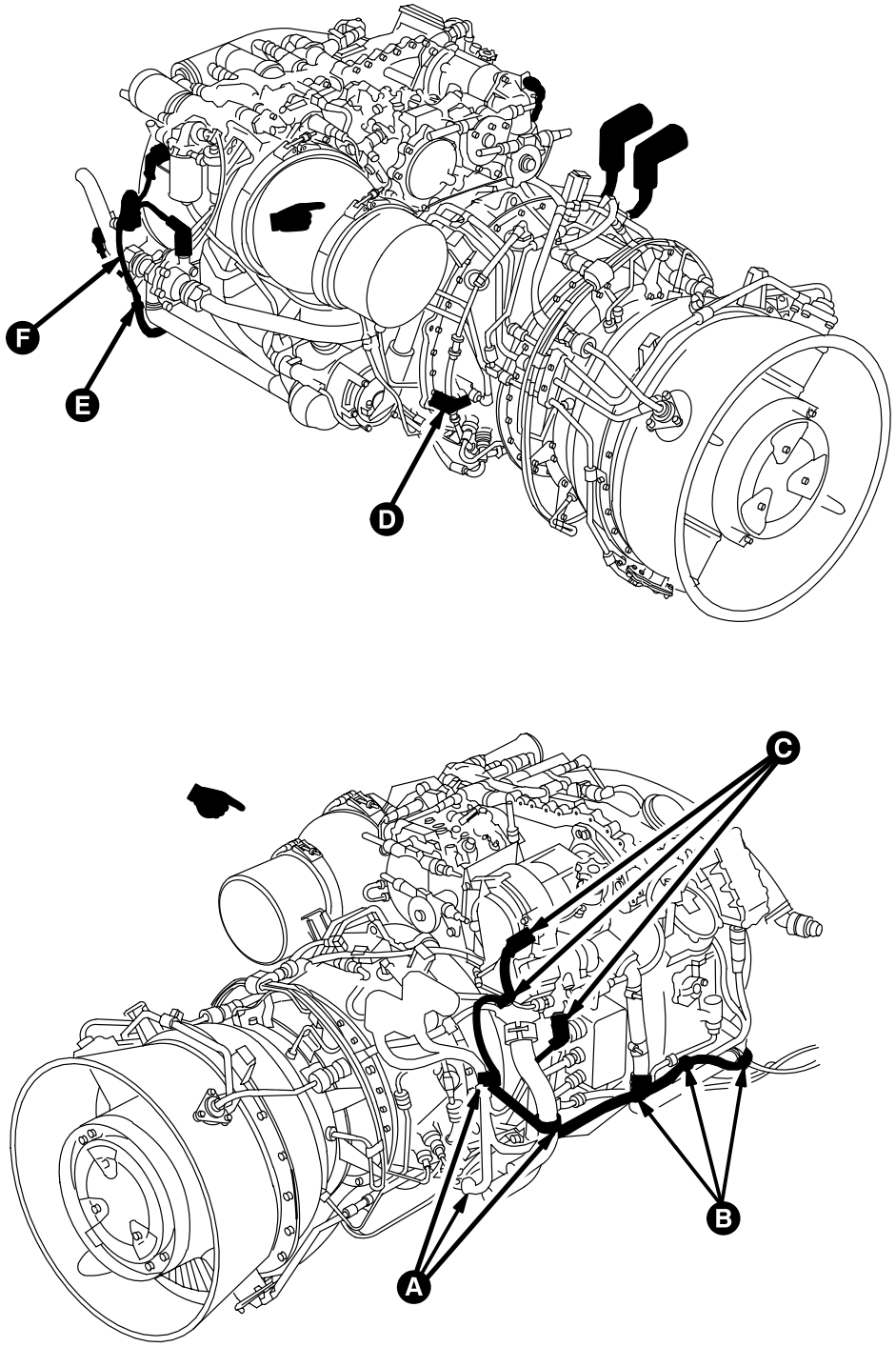
## 4.17. ENGINE TEARDOWN - NO. 1 ENGINE WIRING REMOVAL - continued

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## 4.17. ENGINE TEARDOWN - NO. 1 ENGINE WIRING REMOVAL - continued

4.17.3. Removal

a. **Remove wire harness support clamp (1) from C-sump seal pressure tube (2).**

(1) Hold screw (3). Remove nut (4) and washer (5).

(2) Remove screw (3) from clamps (1) and (6).

b. **Remove wire harness support clamp (7) from angle bracket (8).**

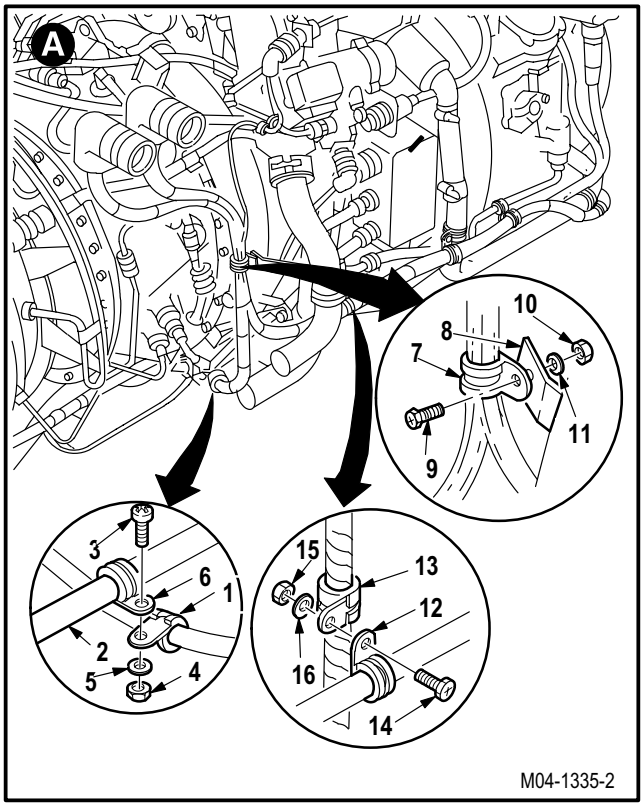
(1) Hold screw (9). Remove nut (10) and washer (11).

(2) Remove screw (9) from clamp (7) and bracket (8).

c. **Remove wire harness support clamp (12) from clamp (13).**

(1) Hold screw (14). Remove nut (15) and washer (16).

(2) Remove screw (14) from clamps (13) and (12).

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## 4.17. ENGINE TEARDOWN - NO. 1 ENGINE WIRING REMOVAL - continued

d. **Remove wire harness support clamps (18) and (19) from sensing tube (20).**

(1) Hold screw (21). Remove nut (22) and washer (23).

(2) Remove screw (21) from clamp (19), spacer (24), and clamp (18).

e. **Remove wire harness support clamps (25) and (26) from drain manifold (27).**

(1) Hold screw (28). Remove nut (29) and washer (30).

(2) Remove screw (28) from clamp (26), spacer (31), and clamp (25).

f. **Remove wire harness support clamps (32) and (33) from sensing tube (20).**

(1) Hold screw (34). Remove nut (35) and washer (36).

(2) Remove screw (34) from clamp (33), spacer (37), and clamp (32).

g. **Remove wire harness support clamps (38) and (39) from engine regulator valve tube (40).**

(1) Hold screw (41). Remove nut (42) and washer (43).

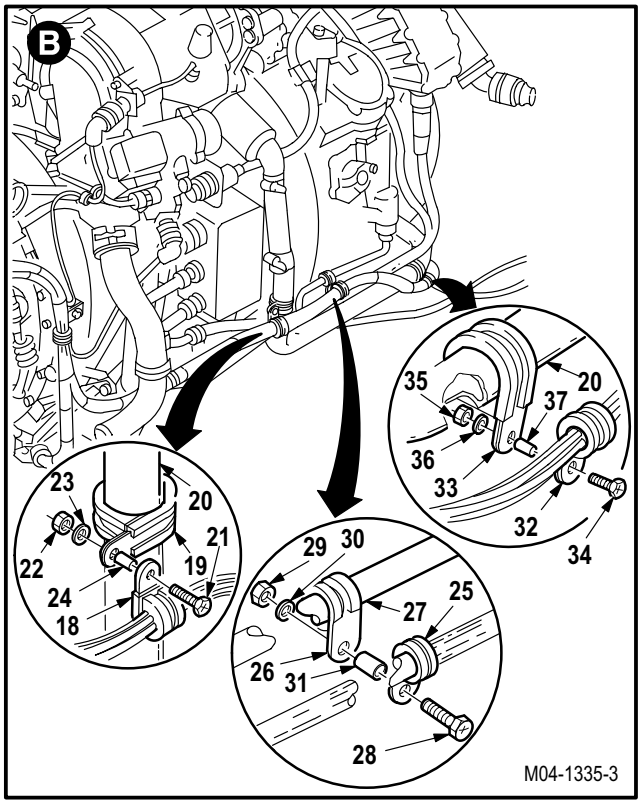
(2) Remove screw (41) from clamps (39) and (38).

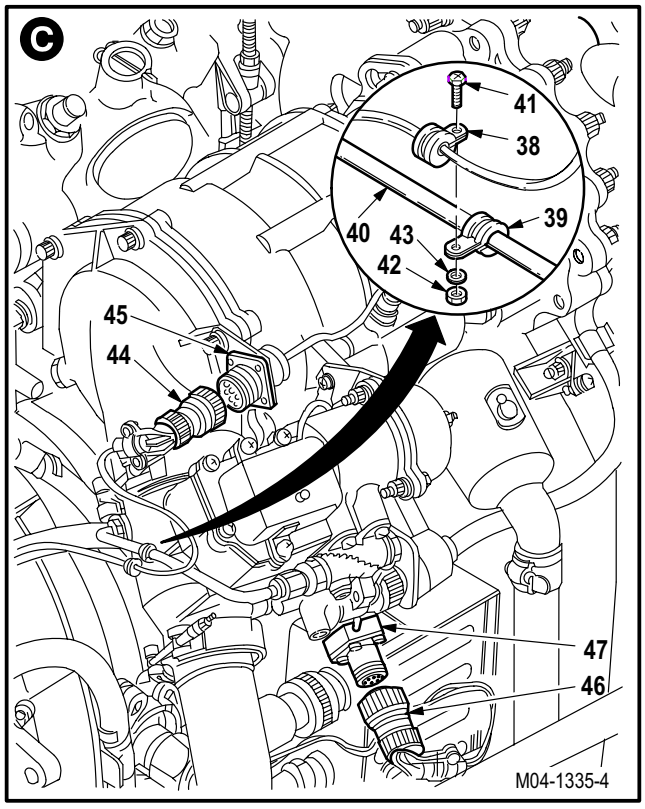
h. **Detach connector P35 (44) from starter receptacle A3 (45).**

(1) Remove lockwire.

i. **Detach connector P39 (46) from starter regulator valve receptacle L3 (47).**

(1) Remove lockwire.

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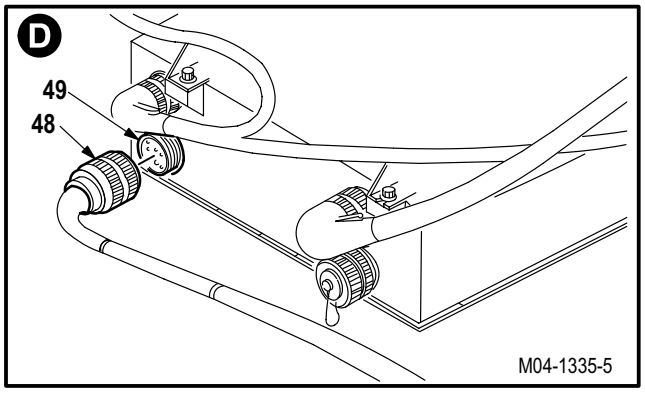
## 4.17. ENGINE TEARDOWN - NO. 1 ENGINE WIRING REMOVAL - continued

**NOTE**

Helicopters with T700-GE-701C engines installed are equipped with a digital electronic control (DEC).

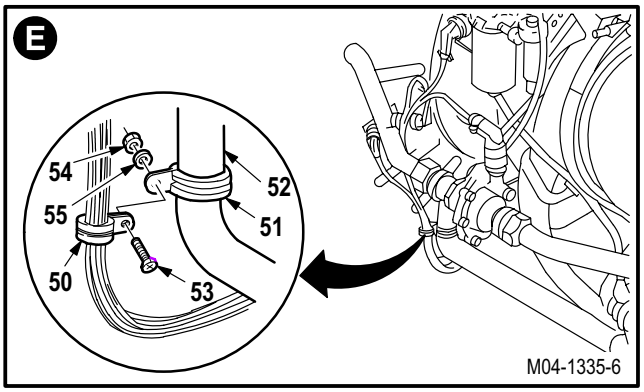
j. **Detach connector P41 (48) from electrical control unit receptacle E1 (49).**




k. **Remove wire harness support clamps (50) and (51) from bleed duct (52).**

(1) Hold screw (53). Remove nut (54) and washer (55).

(2) Remove screw (53) from clamps (51) and (50).

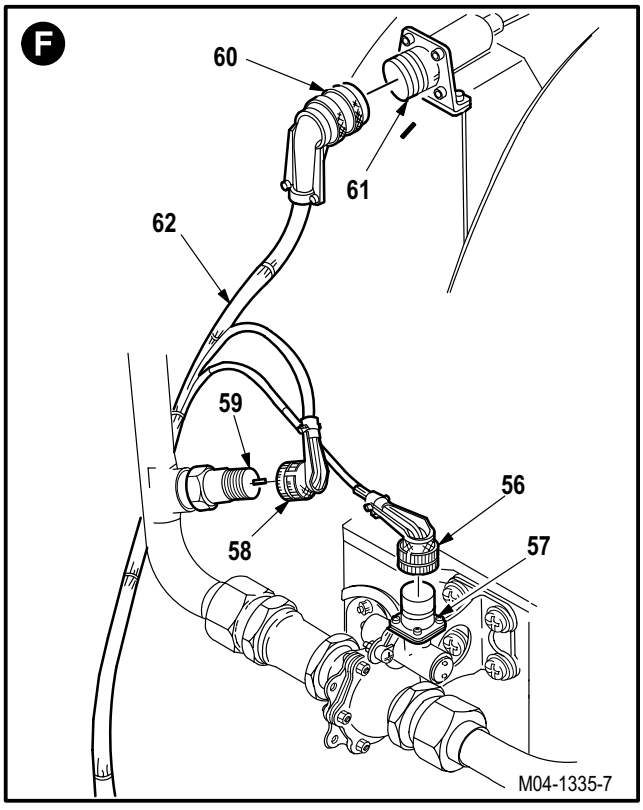



l. **Detach connector P33 (56) from anti-ice valve receptacle L1 (57).**

m. **Detach connector P954 (58) from temperature switch receptacle S127 (59).**

n. **Detach connector P45 (60) from engine instruments receptacle E3 (61).**

o. **Remove wire harness (62) from No. 1 engine.**




4.17.4. Inspection

a. **Check wire harness for broken, bent, or burned pins** (TM 55-2840-248-23)**.**

b. **Check wire harness for worn, chafed, or burned wiring** (TM 55-2840-248-23)**.**

GO TO NEXT PARAGRAPH

## 4.18. ENGINE TEARDOWN - NO. 2 ENGINE WIRING REMOVAL

4.18.1. Description

This task covers: Removal. Inspection.

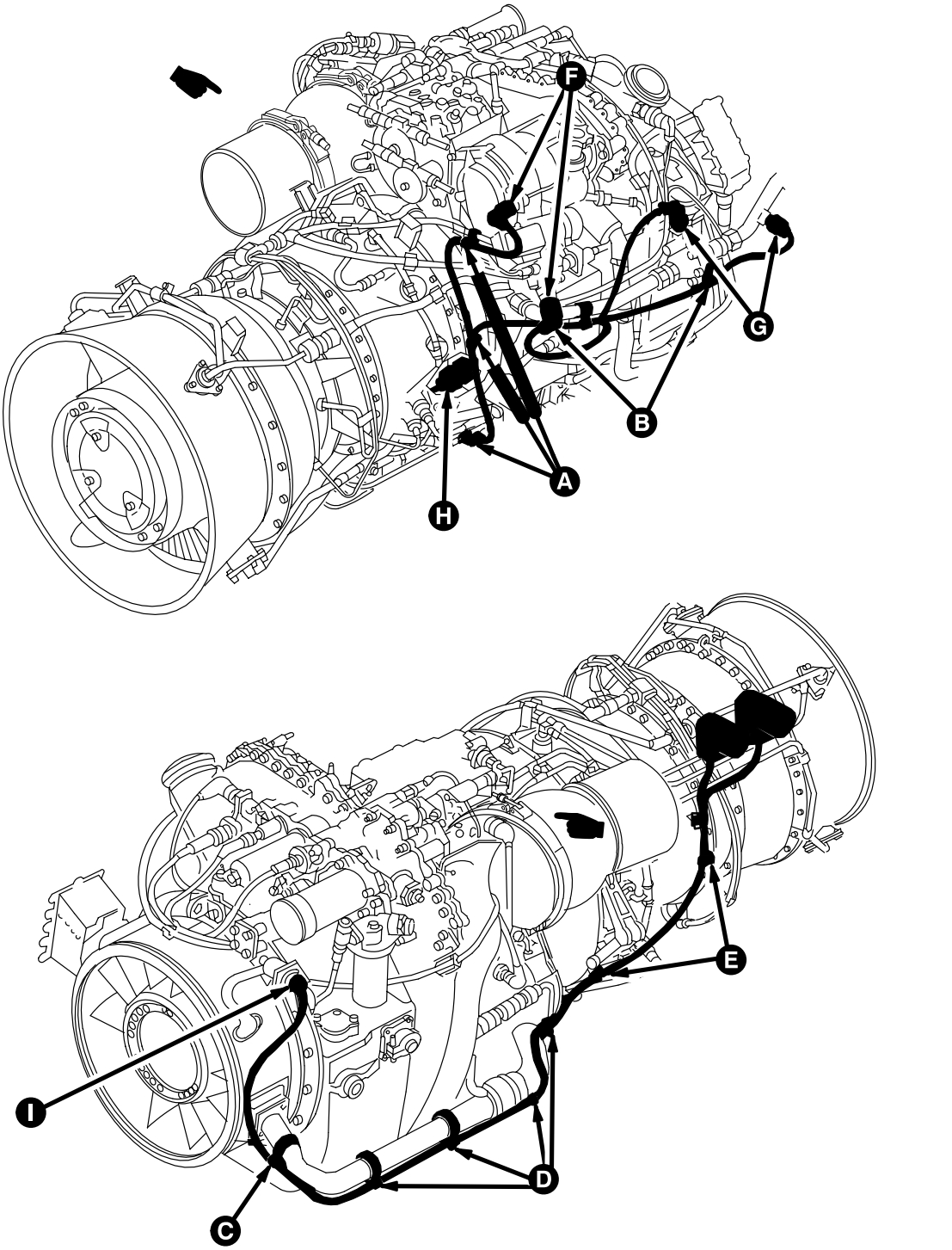
4.18.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

GO TO NEXT PAGE

## 4.18. ENGINE TEARDOWN - NO. 2 ENGINE WIRING REMOVAL - continued

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## 4.18. ENGINE TEARDOWN - NO. 2 ENGINE WIRING REMOVAL - continued

4.18.3. Removal

a. **Remove wire harness support clamp (1) from engine regulator valve tube (2).**

(1) Hold screw (3). Remove nut (4) and washer (5).

(2) Remove screw (3) from clamps (1) and (6).

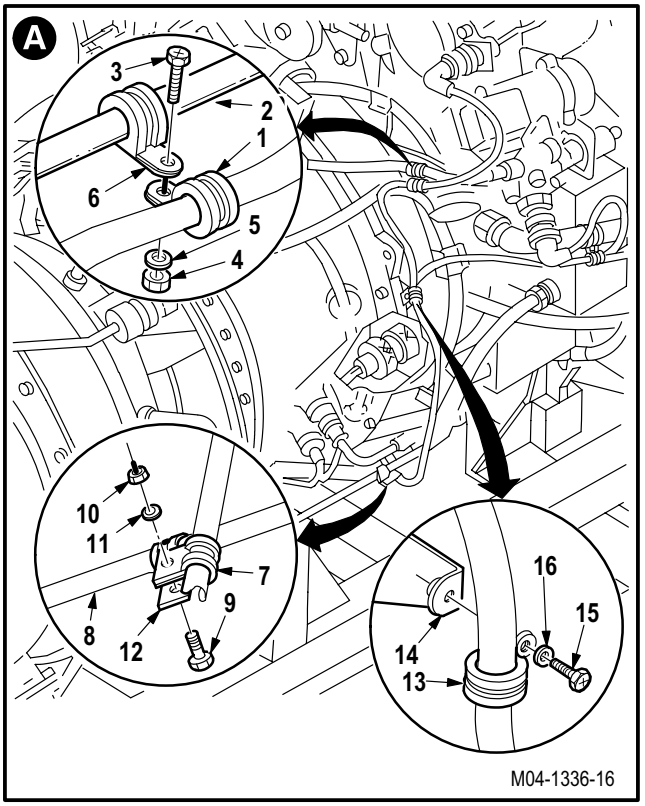
b. **Remove wire harness support clamp (7) from overspeed sensor tube (8).**

(1) Hold screw (9). Remove nut (10) and washer (11).

(2) Remove screw (9) from clamps (7) and (12).

c. **Remove wire harness support clamp (13) from engine clip (14).**

(1) Remove screw (15), washer (16), and clamp (13) from clip (14).




d. **Remove wire harness support clamp (17) from anti-ice tube (18).**

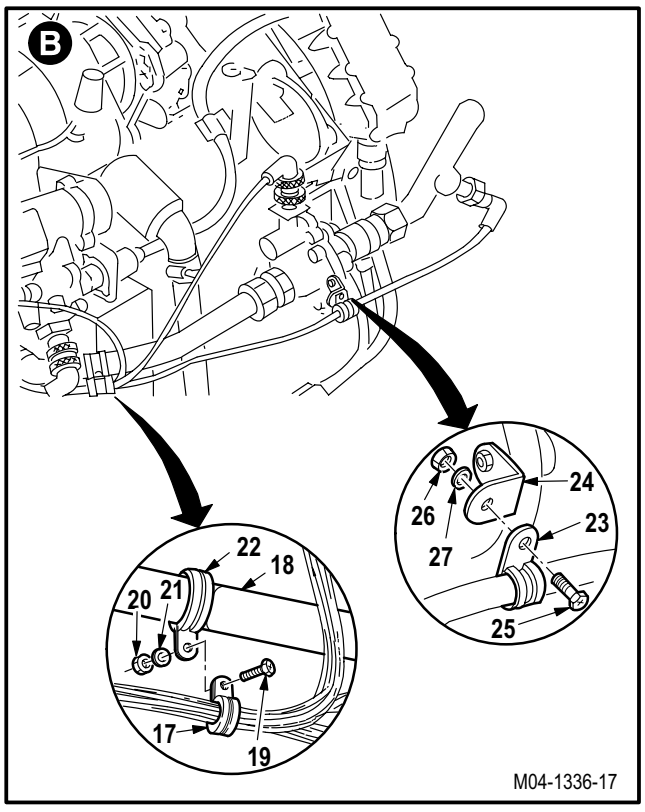
(1) Hold screw (19). Remove nut (20) and washer (21).

(2) Remove screw (19) from clamps (22) and (17).

e. **Remove wire harness support clamp (23) from anti-ice valve clip (24).**

(1) Hold screw (25). Remove nut (26) and washer (27).

(2) Remove screw (25) from clamp (24) and clip (23).

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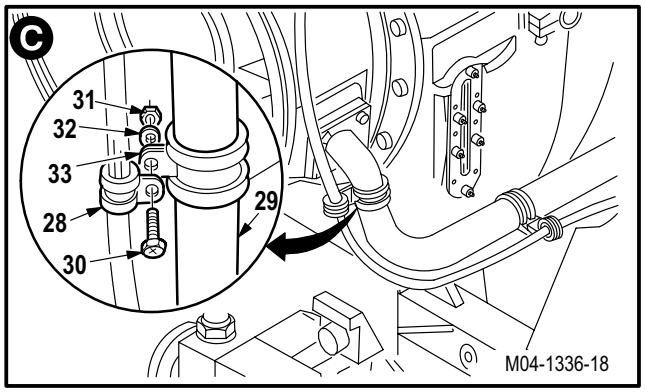
## 4.18. ENGINE TEARDOWN - NO. 2 ENGINE WIRING REMOVAL - continued

f. **Remove wire harness support clamp (28) from anti-ice tube (29).**

(1) Hold screw (30). Remove nut (31) and washer (32).

(2) Remove screw (30) from clamps (33) and (28).




g. **Remove wire harness support clamp (34) from anti-ice tube (29).**

(1) Hold screw (35). Remove nut (36) and washer (37).

(2) Remove screw (35) from clamps (38) and (34).

h. **Remove wire harness support clamp (39) from drain hose (40) and anti-ice tube (29).**

(1) Hold screw (41). Remove nut (42) and washer (43).

(2) Remove screw (41) and spacer (44) from clamps (46), (45), and (39).

i. **Remove wire harness support clamp (47) from drain hose (40).**

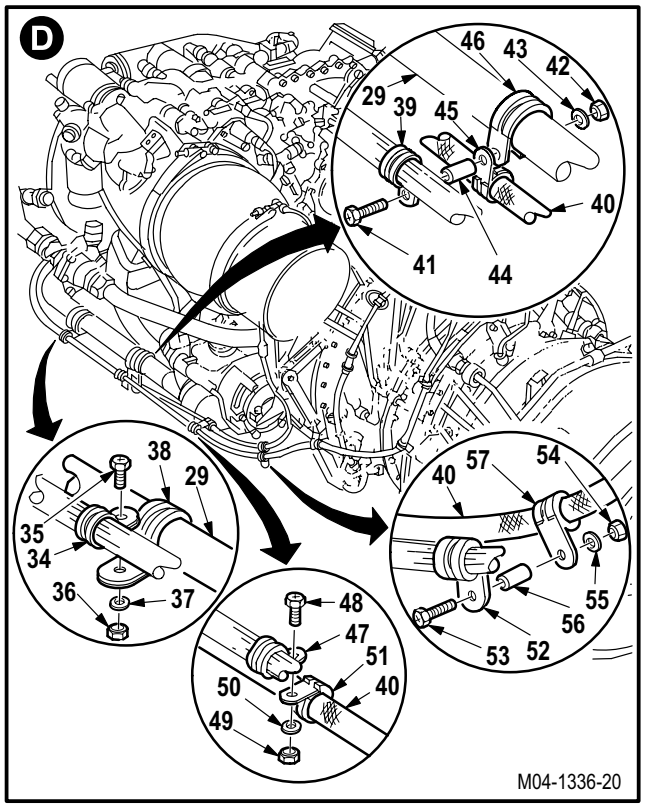
(1) Hold screw (48). Remove nut (49) and washer (50).

(2) Remove screw (48) from clamps (51) and (47).

j. **Remove wire harness support clamp (52) from drain hose (40).**

(1) Hold screw (53). Remove nut (54) and washer (55).

(2) Remove screw (53) and spacer (56) from clamps (57) and (52).

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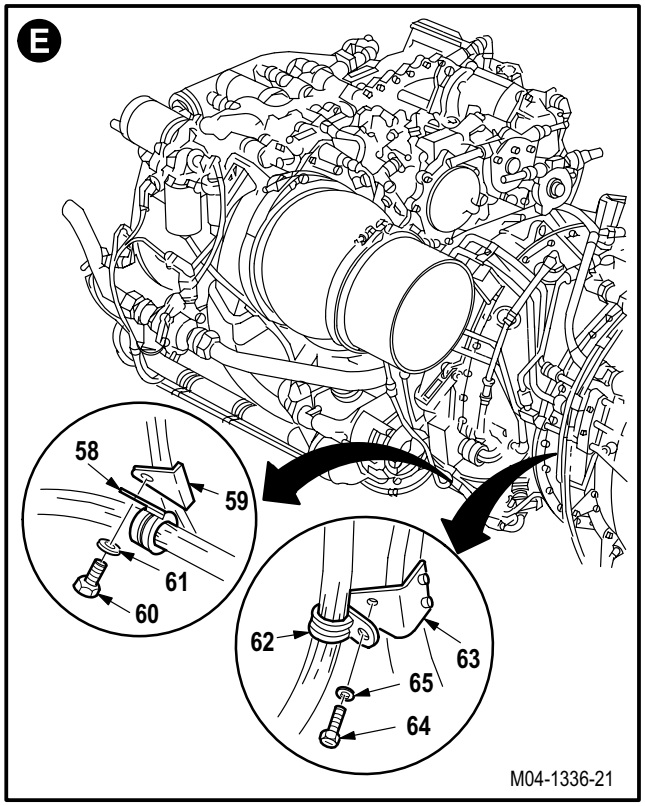
## 4.18. ENGINE TEARDOWN - NO. 2 ENGINE WIRING REMOVAL - continued

k. **Remove wire harness support clamp (58) from engine clip (59).**

(1) Remove screw (60) and washer (61) from clip (59) and clamp (58).

l. **Remove wire harness support clamp (62) from engine clip (63).**

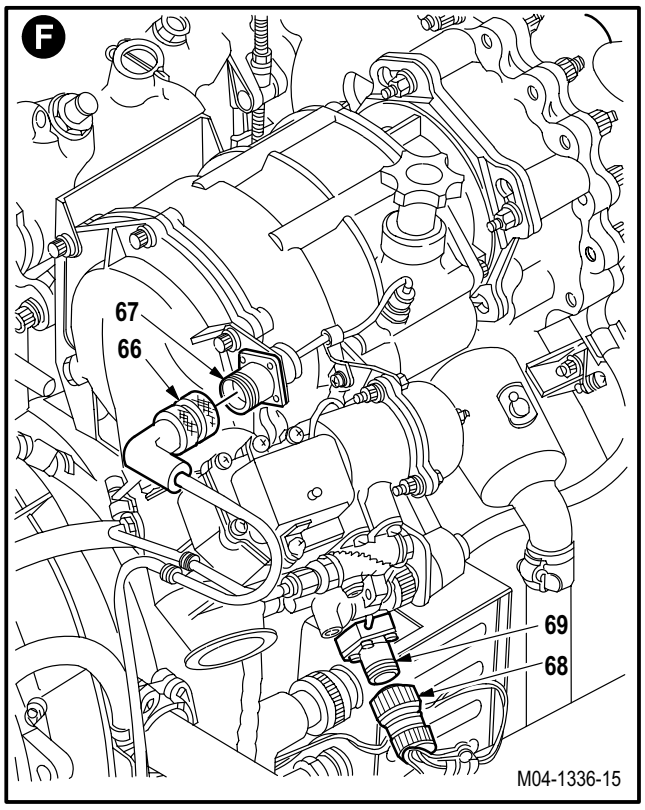
(1) Remove screw (64) and washer (65) from clip (63) and clamp (62).




m. **Detach connector P36 (66) from starter receptacle A4 (67).**

n. **Detach connector P40 (68) from engine starter regulator valve receptacle L4 (69).**

(1) Remove lockwire.

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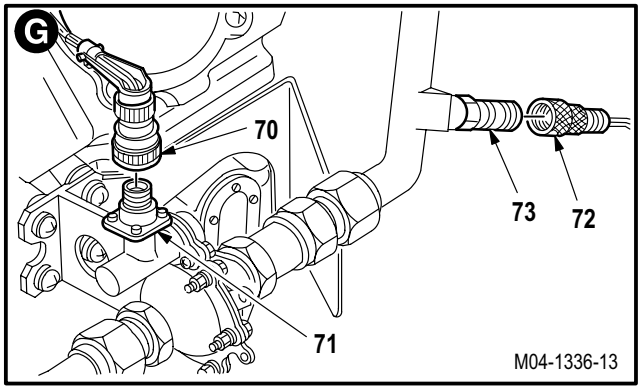
**4.18. ENGINE TEARDOWN - NO. 2 ENGINE WIRING REMOVAL - continued**

o. **Detach connector P34 (70) from anti-ice valve receptacle L2 (71).**

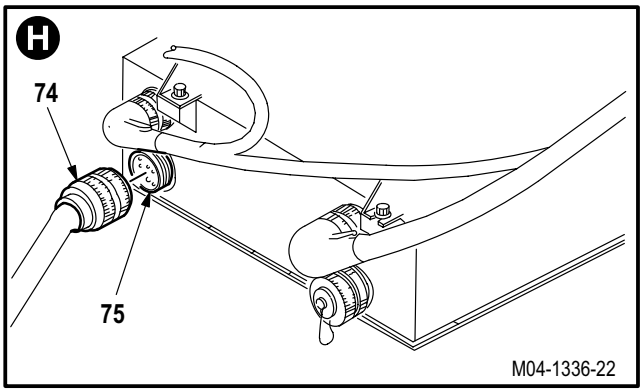
p. **Detach connector P953 (72) from temperature switch receptacle S126 (73).**




**NOTE**

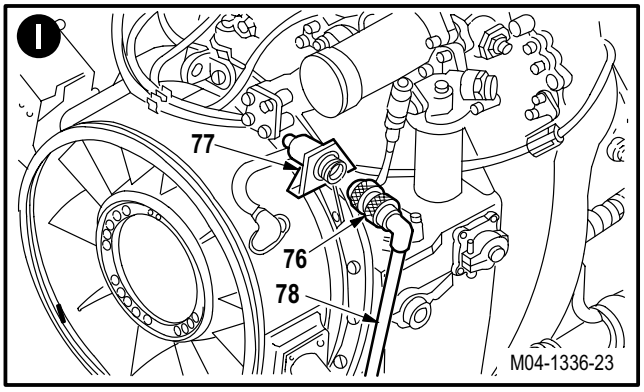
Helicopters with T700-GE-701C engines installed are equipped with a digital electronic control (DEC).

q. **Detach connector P42 (74) from electrical control unit receptacle E1 (75).**




r. **Detach connector P46 (76) from airframe monitoring receptacle E3 (77).**

s. **Remove wire harness assembly (78) from No. 2 engine.**




4.18.4. Inspection

a. **Check wire harness for broken, bent, or burned pins** (TM 55-2840-248-23)**.**

b. **Check wire harness for worn, chafed, or burned wiring** (TM 55-2840-248-23)**.**

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## 4.19. ENGINE TEARDOWN - NO. 1 ENGINE AIR STARTER AND REGULATING VALVE REMOVAL

4.19.1. Description

This task covers: Removal. Inspection.

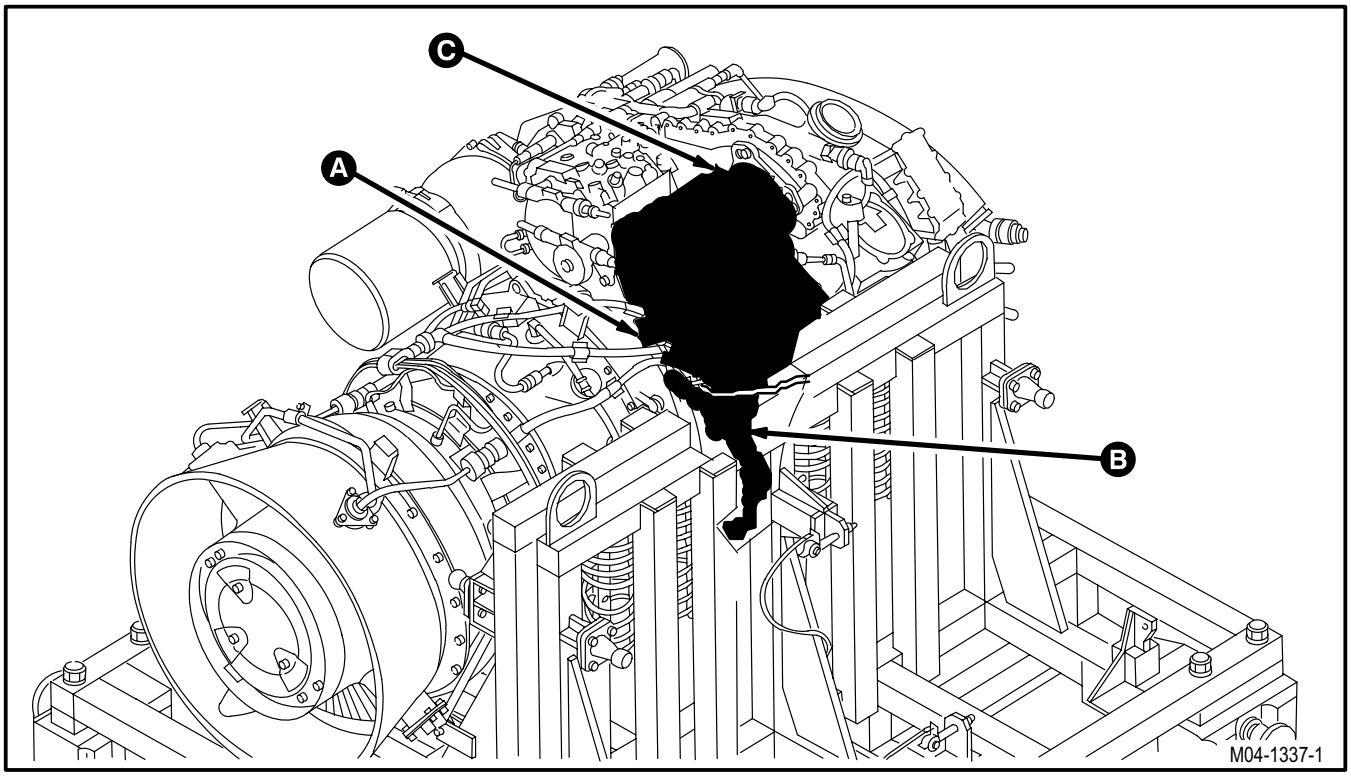
4.19.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**Tools:**

0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)

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## 4.19. ENGINE TEARDOWN - NO. 1 ENGINE AIR STARTER AND REGULATING VALVE REMOVAL - continued

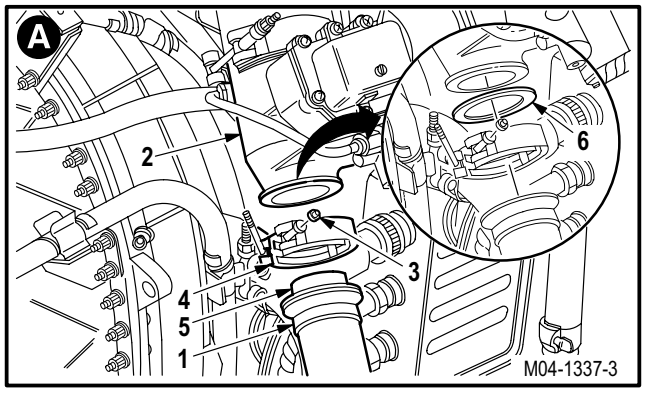
4.19.3. Removal

a. **Remove starter air tube (1) from regulating valve (2).**

(1) Remove nut (3) from coupling (4).

(2) Remove coupling (4) from air starter tube (1) and regulating valve (2).

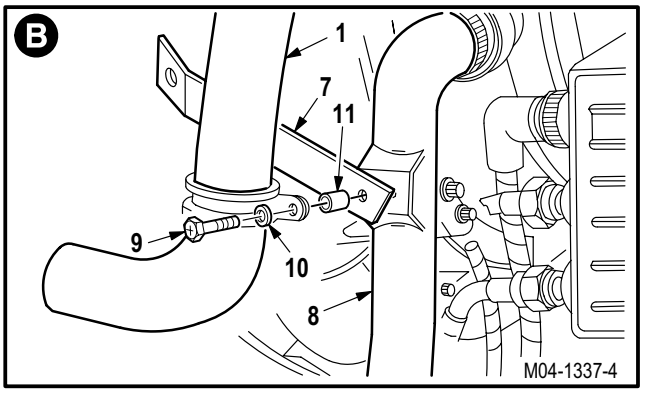
(3) Remove and discard insert (5) or gasket (6) from air starter tube (1).




b. **Remove starter air tube (1) from angle bracket (7) and bleed air tube (8).**

(1) Remove screw (9), washer (10), and spacer (11).

(2) Remove tube (1).



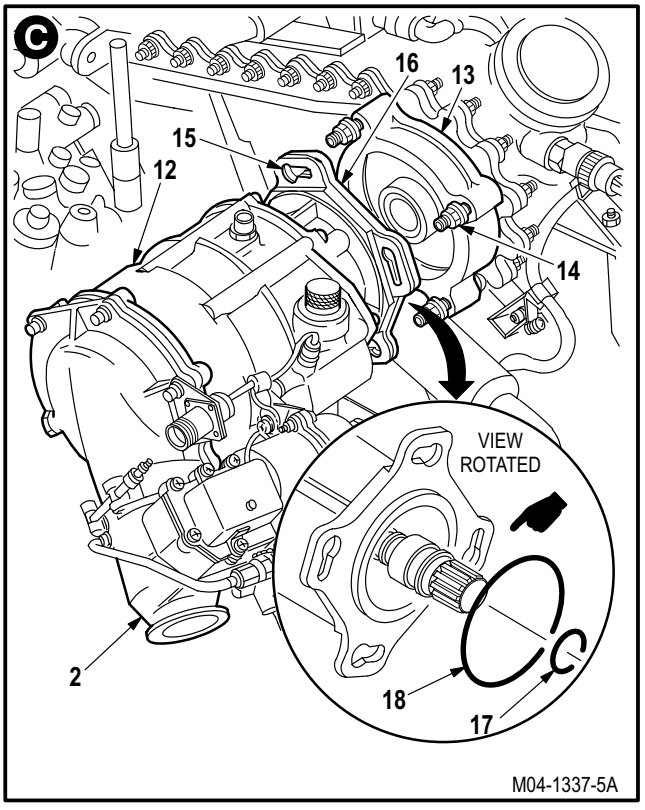

c. **Remove starter (12) with regulating valve (2) from mounting pad (13).**

(1) Loosen four nuts (14). Do not remove nuts.

(2) Turn starter (12) clockwise until nuts (14) aline with holes (15) in starter flange (16).

(3) Pull starter (12) aft until clear of nuts (14).

(4) Remove and discard packings (17) and (18) from starter (12).

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**4.19. ENGINE TEARDOWN - NO. 1 ENGINE AIR STARTER AND REGULATING VALVE REMOVAL - continued**

4.19.4. Inspection

a. **Check air tube for holes, dents, kinks, or abrasions** (para 4.2)**.**

b. **Check starter and valve for cracked or dented housings.** None allowed.

c. **Check starter and valve for corrosion** (para 1.49)**.**

d. **Check output shaft.**

(1) Check output shaft for separation. Replace (para 4.82A).

(2) Check for looseness. None allowed.

(3) Check for distortion. None allowed.

(4) Check for spalling, fretting, flaking, chipping, and splitting. Maximum depth allowable **0.003 INCH**.

(5) Check for corrosion. Maximum depth allowable **0.003 INCH** (para 1.49).

(6) Check spline for wear.

(a) Place two **0.0960 INCH** diameter pins 180 degrees apart on spline.

(b) Measure outside diameter over two pins, diameter shall be between **0.7347** and **0.7365 INCH**. Replace (para 4.82A). Use caliper set.

(7) Check output shaft spline for bare metal spots in dry film lubricant. None allowed.

e. **Check starter oil filler cap spring feature for sticking or binding.** None allowed.

f. **Check starter oil filler cap for bent or broken pin.** None allowed.

g. **Check starter identification plate for legibility, deformation and security of attachment to housing.**

h. **Check solenoid case for damage.** None allowed.

i. **Check valve receptacle for broken, missing, or bent pins.** None allowed.

j. **Check valve for stripped or damaged threads.** None allowed.

k. **Check valve for loose, missing, or damaged hardware.** None allowed.

l. **Check valve mounting flange mating surface for nicks, burrs, and distortion.** None allowed.

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## 4.20. ENGINE TEARDOWN - NO. 2 ENGINE AIR STARTER AND REGULATING VALVE REMOVAL

4.20.1. Description

This task covers: Removal. Inspection.

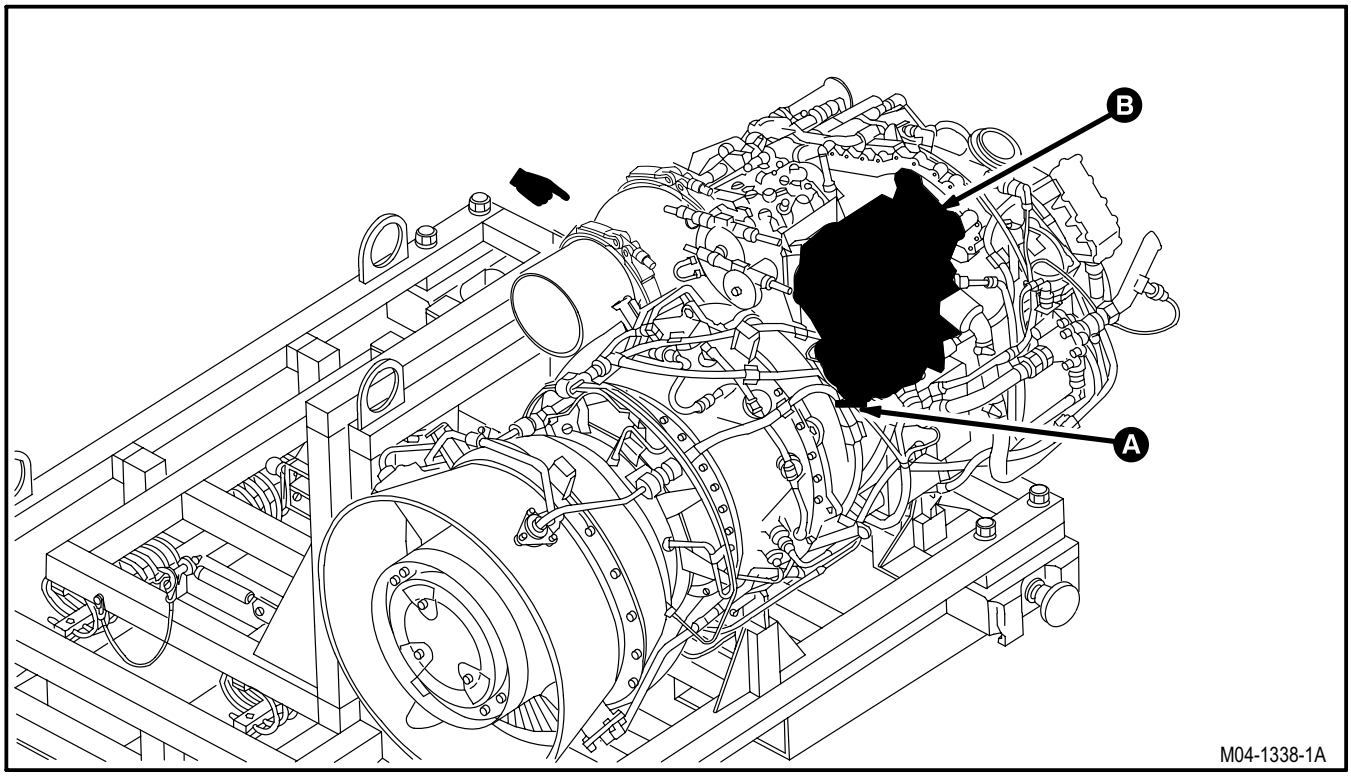
4.20.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**Tools:**

0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)

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## 4.20. ENGINE TEARDOWN - NO. 2 ENGINE AIR STARTER AND REGULATING VALVE REMOVAL - continued

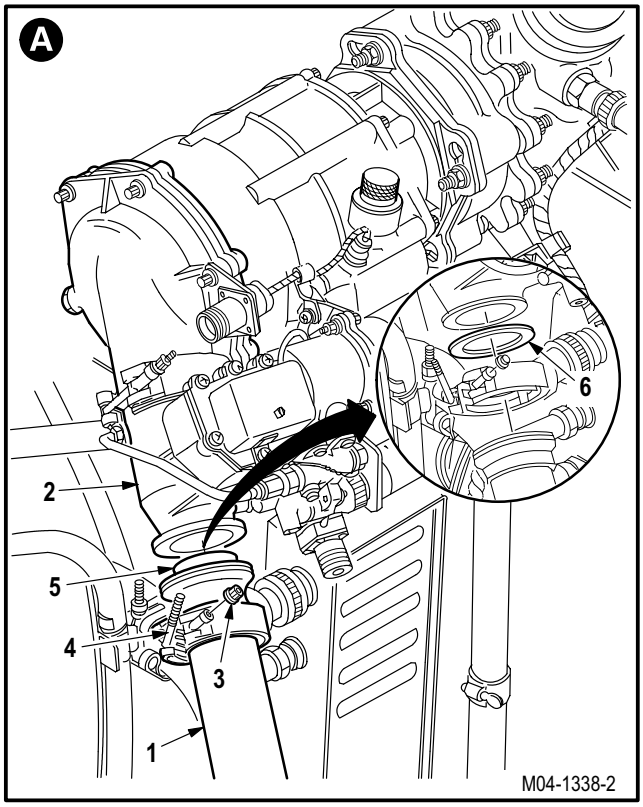
4.20.3. Removal

a. **Remove starter air tube (1) from regulating valve (2).**

(1) Remove nut (3) from coupling (4).

(2) Remove coupling (4) from starter air tube (1) and regulating valve (2).

(3) Remove and discard insert (5) or gasket (6) from starter air tube (1).



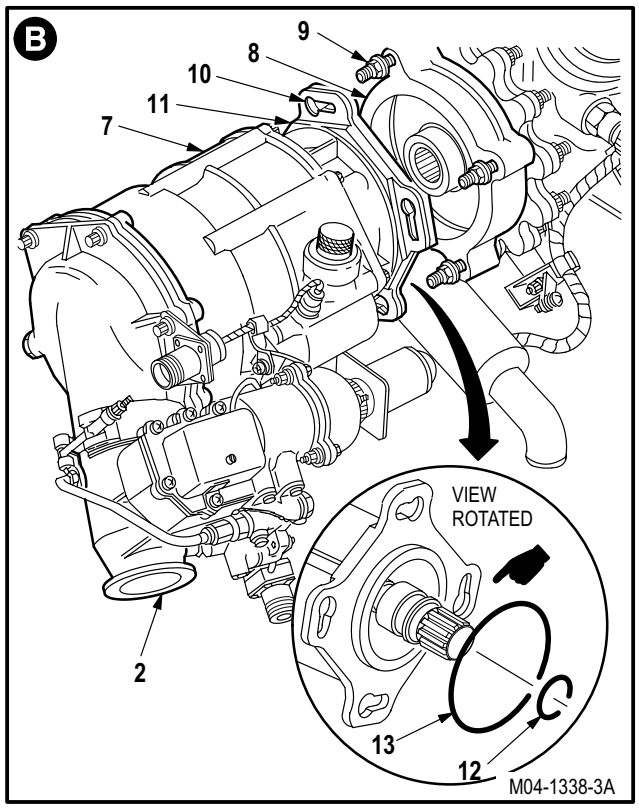

b. **Remove starter (7) with regulating valve (2) from mounting pad (8).**

(1) Loosen four nuts (9). Do not remove nuts.

(2) Turn starter (7) clockwise until nuts (9) aline with holes (10) in starter flange (11).

(3) Pull starter (7) aft until clear of nuts (9).

(4) Remove and discard packings (12) and (13).

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**4.20. ENGINE TEARDOWN - NO. 2 ENGINE AIR STARTER AND REGULATING VALVE REMOVAL - continued**

4.20.4. Inspection

a. **Check air tube for holes, dents, kinks, or abrasions** (para 4.2)**.**

b. **Check starter and valve for cracked or dented housings.** None allowed.

c. **Check starter and valve for corrosion** (para 1.49)**.**

d. **Check output shaft.**

(1) Check output shaft for separation. Replace (para 4.82A).

(2) Check for looseness. None allowed.

(3) Check for distortion. None allowed.

(4) Check for spalling, fretting, flaking, chipping, and splitting. Maximum depth allowable **0.003 INCH**.

(5) Check for corrosion. Maximum depth allowable **0.003 INCH** (para 1.49).

(6) Check spline for wear.

(a) Place two **0.0960 INCH** diameter pins 180 degrees apart on spline.

(b) Measure outside diameter over two pins, diameter shall be between **0.7347** and **0.7365 INCH**. Replace (para 4.82A). Use caliper set.

(7) Check output shaft spline for bare metal spots in dry film lubricant. None allowed.

e. **Check starter oil filler cap spring feature for sticking or binding.** None allowed.

f. **Check starter oil filler cap for bent or broken pin.** None allowed.

g. **Check starter identification plate for legibility, deformation and security of attachment to housing.**

h. **Check solenoid case for damage.** None allowed.

i. **Check valve receptacle for broken, missing, or bent pins.** None allowed.

j. **Check valve for stripped or damaged threads.** None allowed.

k. **Check valve for loose, missing, or damaged hardware.** None allowed.

l. **Check valve mounting flange mating surface for nicks, burrs, and distortion.** None allowed.

GO TO NEXT PARAGRAPH

## 4.21. ENGINE TEARDOWN - NO. 1 ENGINE ANTI-ICE AND BLEED AIR SYSTEM REMOVAL

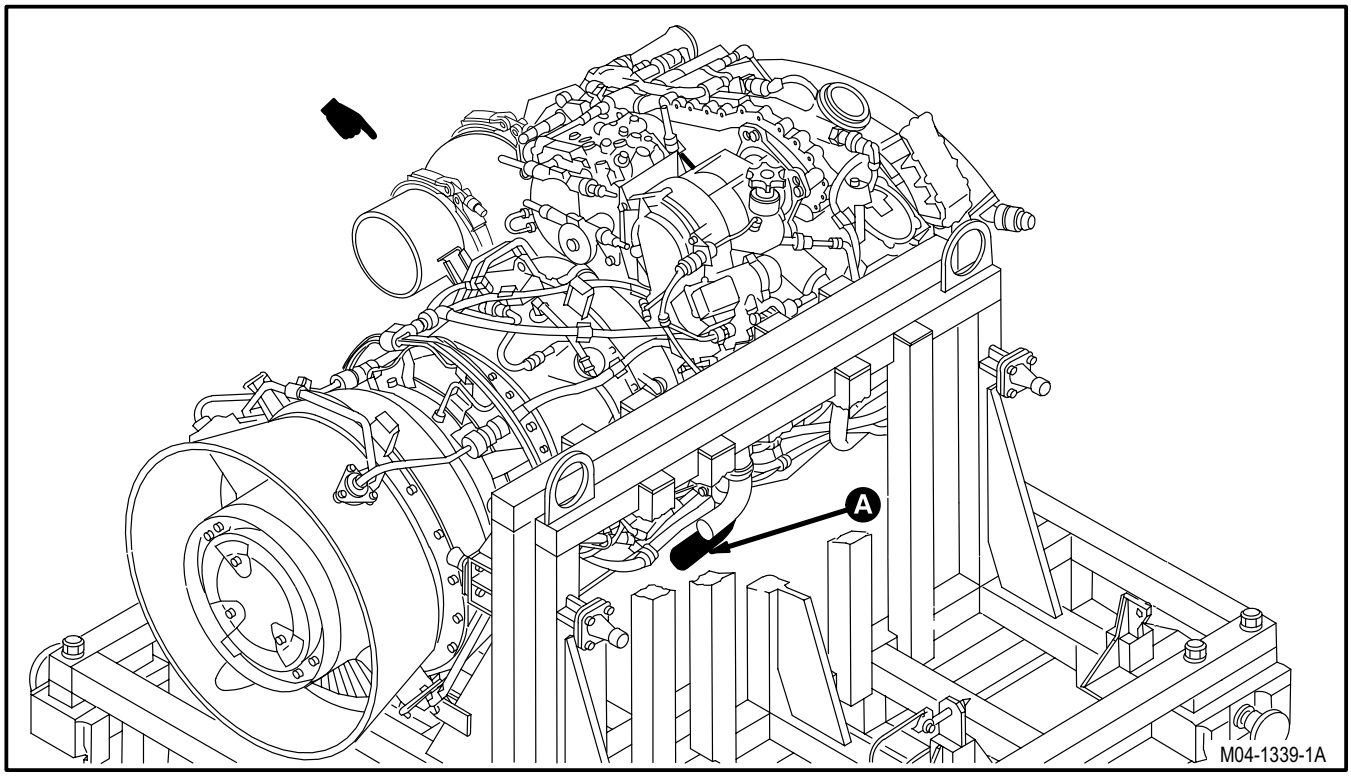
4.21.1. Description

This task covers: Removal. Inspection.

4.21.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

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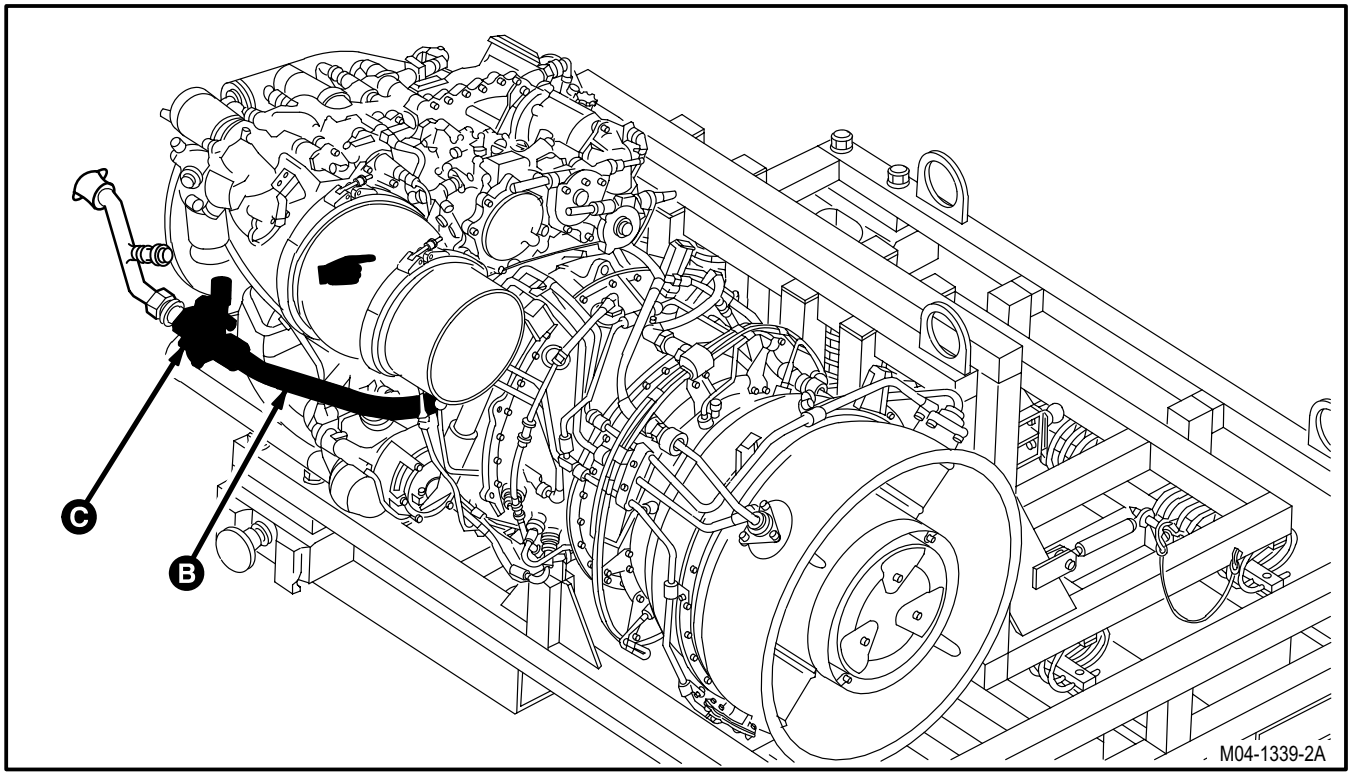
## 4.21. ENGINE TEARDOWN - NO. 1 ENGINE ANTI-ICE AND BLEED AIR SYSTEM REMOVAL - continued




4.21.3. Removal

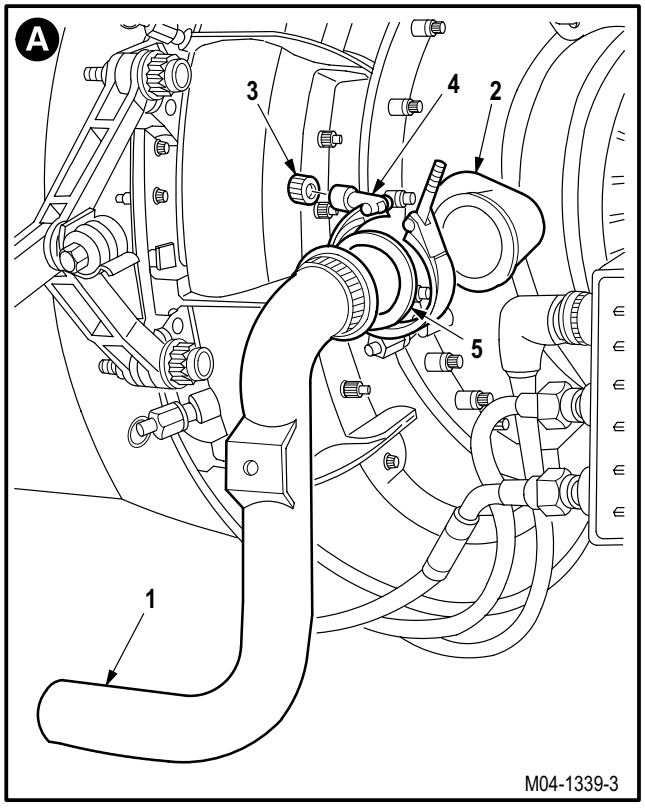
a. **Remove bleed air tube (1) from air port flange (2).**

(1) Remove coupling nut (3).

(2) Remove coupling (4) and gasket (5) from tube (1) and flange (2).

(3) Remove tube (1).

(4) Discard gasket (5).

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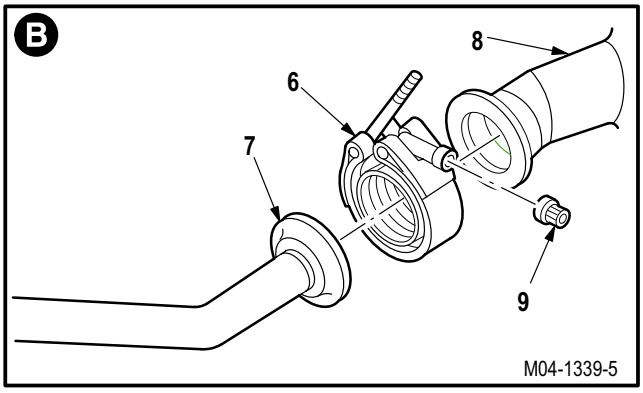
**4.21. ENGINE TEARDOWN - NO. 1 ENGINE ANTI-ICE AND BLEED AIR SYSTEM REMOVAL - continued**

b. **Remove coupling (6) from anti-ice tube flange (7) and port (8).**

(1) Remove coupling nut (9).

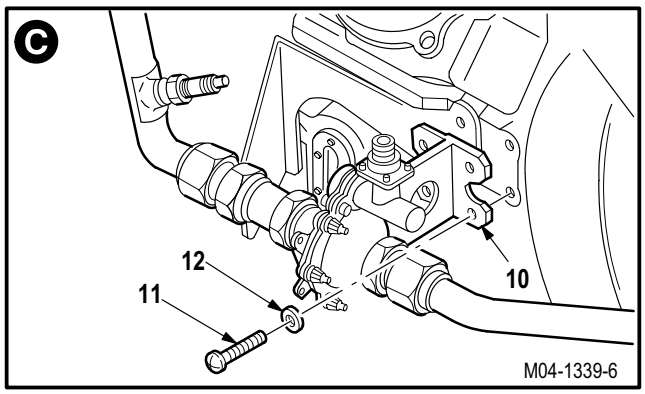
(2) Open coupling (6) and remove from flange (7) and port (8).




c. **Remove anti-ice valve support bracket (10).**

(1) Remove four screws (11) and washers (12).

(2) Remove bracket (10).




4.21.4. Inspection

a. **Check air tube for holes, dents, or abrasions** (para 4.2)**.**

GO TO NEXT PARAGRAPH

## 4.22. ENGINE TEARDOWN - NO. 2 ENGINE ANTI-ICE AND BLEED AIR SYSTEM REMOVAL

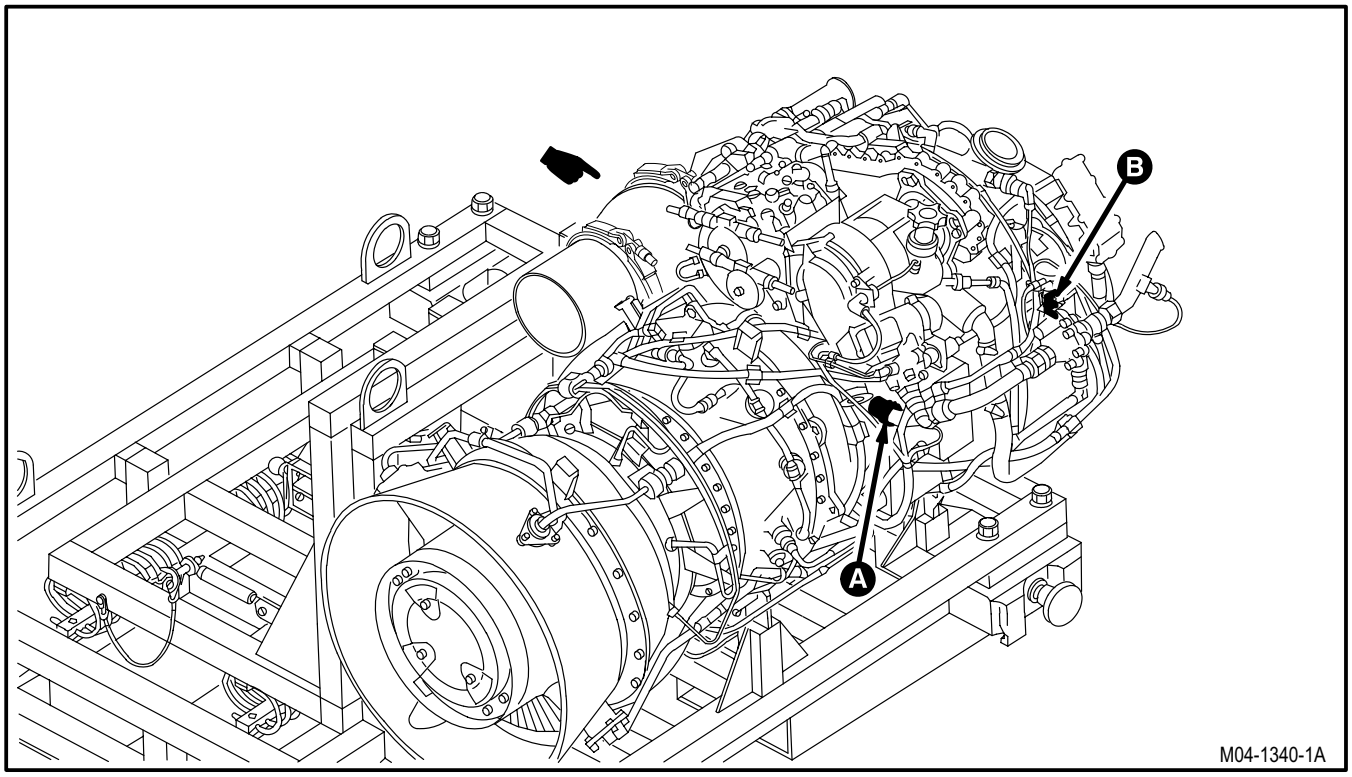
4.22.1. Description

This task covers: Removal. Inspection.

4.22.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

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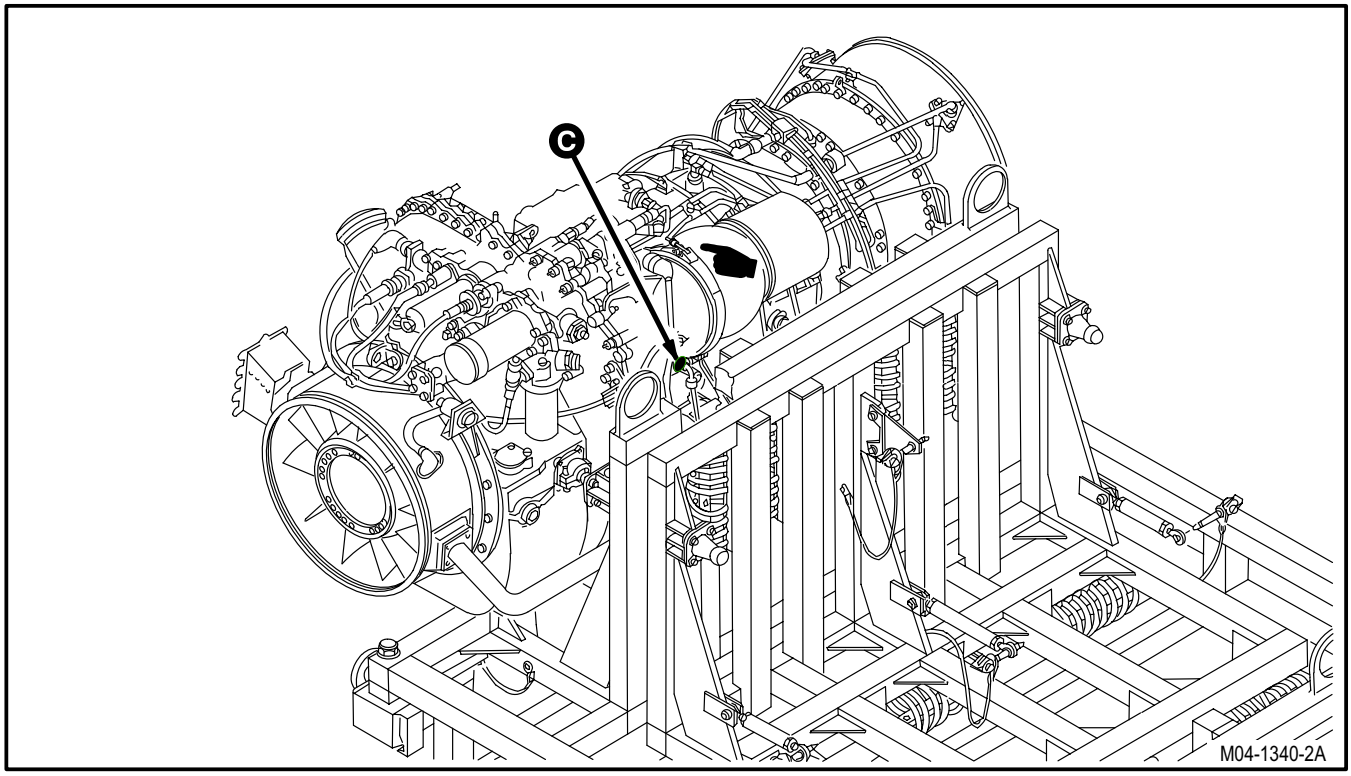
## 4.22. ENGINE TEARDOWN - NO. 2 ENGINE ANTI-ICE AND BLEED AIR SYSTEM REMOVAL - continued

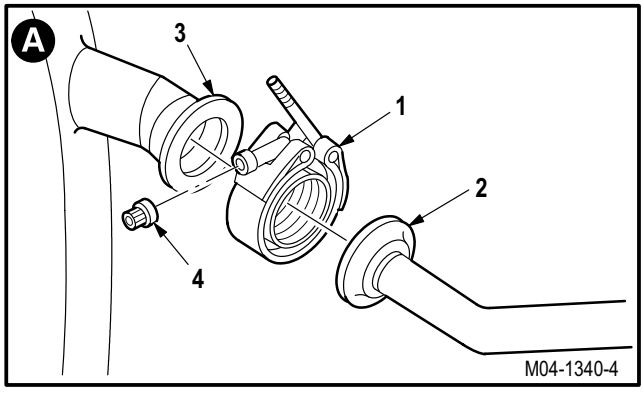



4.22.3. Removal

a. **Remove coupling (1) from anti-ice tube flange (2) and port (3).**

(1) Remove coupling nut (4).

(2) Open coupling (1) and remove from flange (2) and port (3).

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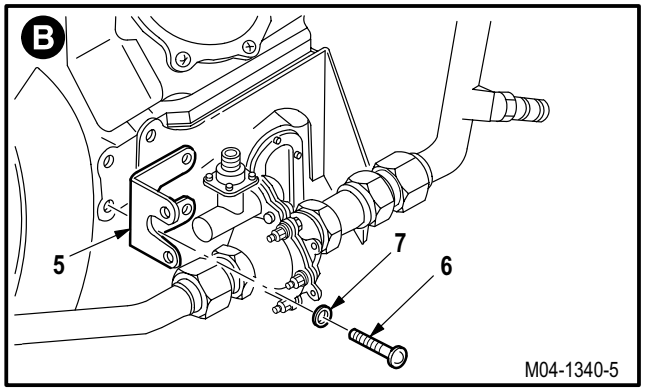
## 4.22. ENGINE TEARDOWN - NO. 2 ENGINE ANTI-ICE AND BLEED AIR SYSTEM REMOVAL - continued

b. **Remove anti-ice valve support bracket (5).**

(1) Remove four screws (6) and washers (7).

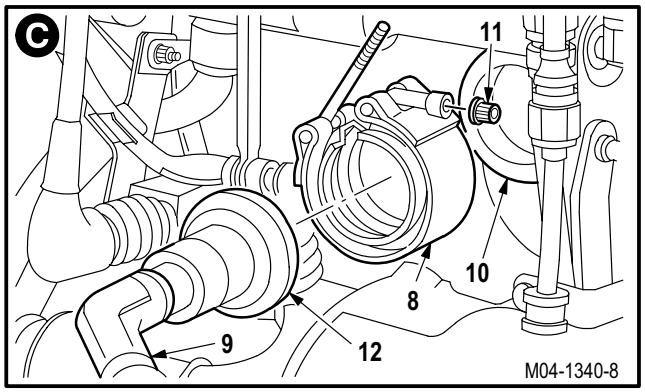
(2) Remove bracket (5).




c. **Remove coupling (8) from cooling door actuator hose (9) and port (10).**

(1) Remove coupling nut (11).

(2) Open coupling (8) and remove from adapter (12) and port (10).




4.22.4. Inspection

a. **Check air tube for holes, dents, or abrasions** (para 4.2)**.**

GO TO NEXT PARAGRAPH

## 4.23. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE BASEPLATE AND SPINDLE GEARBOXES REMOVAL

4.23.1. Description

This task covers: Removal. Cleaning. Inspection.

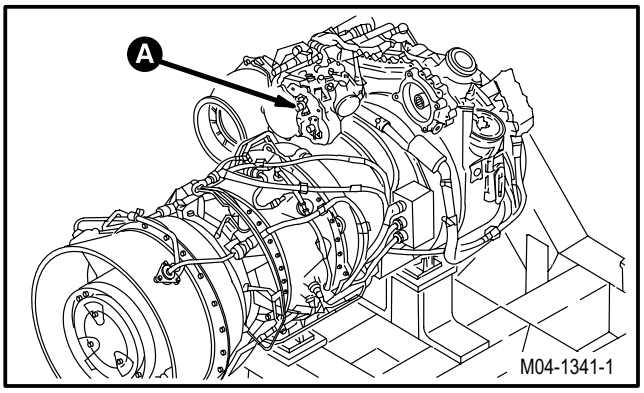
4.23.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine baseplate and gearboxes.



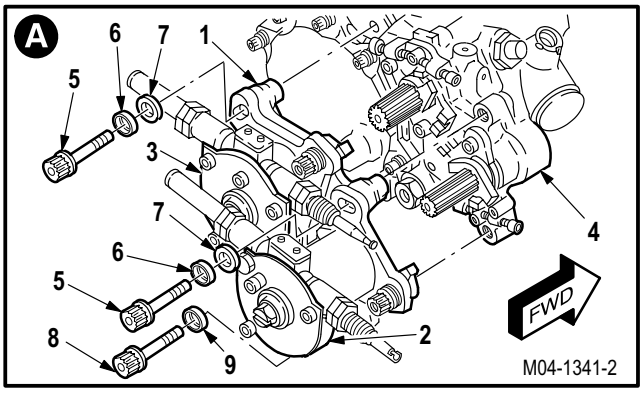

4.23.3. Removal

a. **Remove baseplate (1), load demand spindle gearbox (2), and power available spindle gearbox (3) from hydromechanical unit (HMU) (4).**

(1) Remove two bolts (5), countersunk washers (6), and flat washers (7).

(2) Remove lower bolt (8) and countersunk washer (9).

(3) Slide gearboxes (2) and (3) and base plate (1) aft from HMU (4).

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## 4.23. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE BASEPLATE AND SPINDLE GEARBOXES REMOVAL - continued

4.23.4. Cleaning

a. **Clean outsides of gearboxes and baseplate** (para 1.47)**.**

4.23.5. Inspection

a. **Check gearboxes and baseplate for nicks and scratches.** Maximum depth of **0.015 INCH** allowed. No cracks allowed.

b. **Check gearbox splines for visible nicks.** None allowed.

c. **Check gearboxes and baseplate for corrosion** (para 1.49)**.**

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## 4.24. ENGINE TEARDOWN - NO.1 AND NO. 2 ENGINE SHROUD SUPPORT REMOVAL

4.24.1. Description

This task covers: Removal. Inspection.

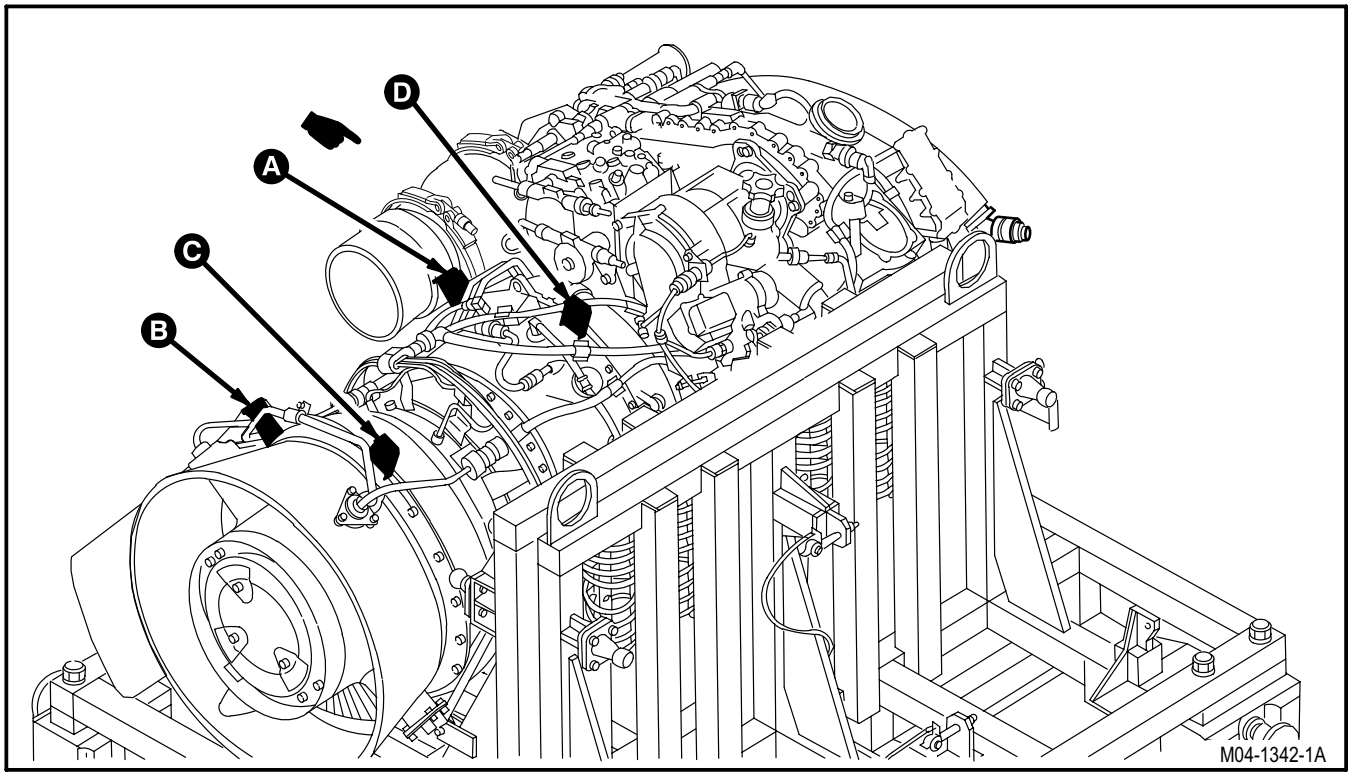
4.24.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine shroud support assembly.

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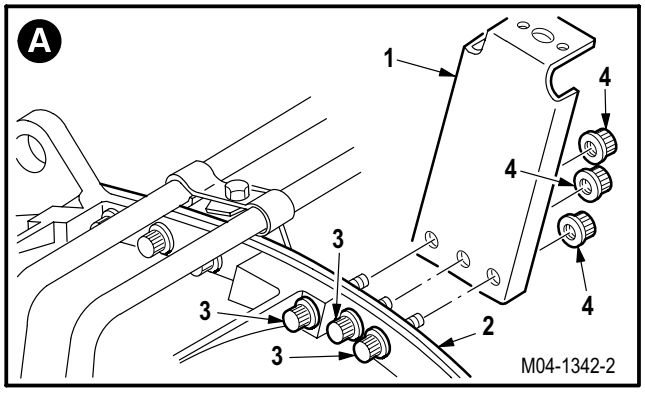
## 4.24. ENGINE TEARDOWN - NO.1 AND NO. 2 ENGINE SHROUD SUPPORT REMOVAL - continued

4.24.3. Removal

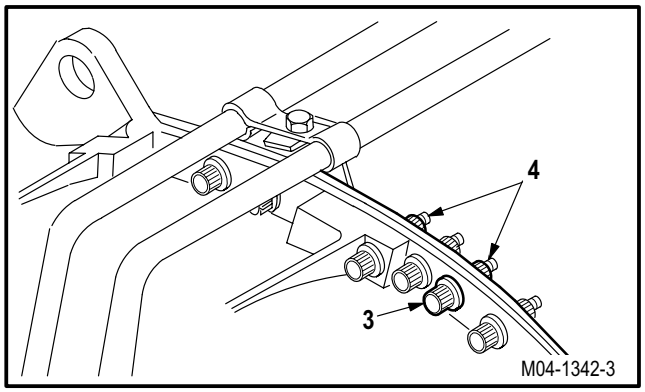
a. **Remove forward left shroud support (1) from diffuser case flange (2).**

(1) Hold three bolts (3). Remove three nuts (4).

(2) Remove support (1) from three bolts (3).



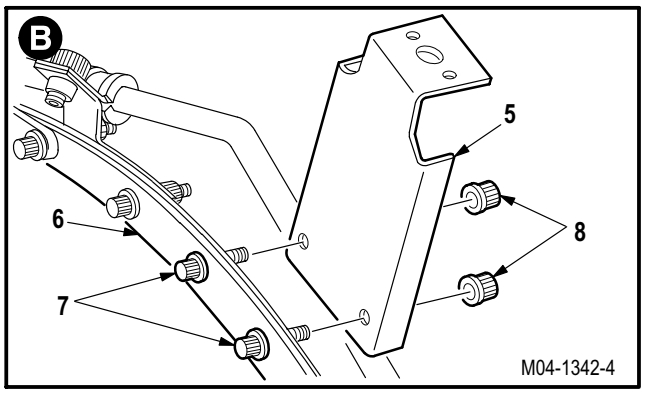

(3) Reinstall three nuts (4) on bolts (3).



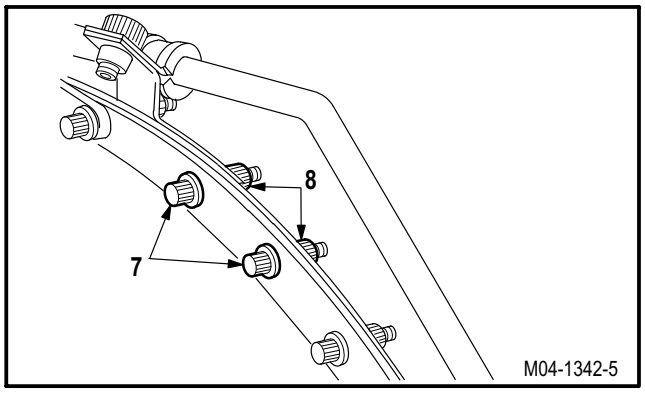

b. **Remove aft left shroud support (5) from power turbine case flange (6).**

(1) Hold two bolts (7). Remove two nuts (8).

(2) Remove support (5) from two bolts (7).




(3) Reinstall two nuts (8) on bolts (7).

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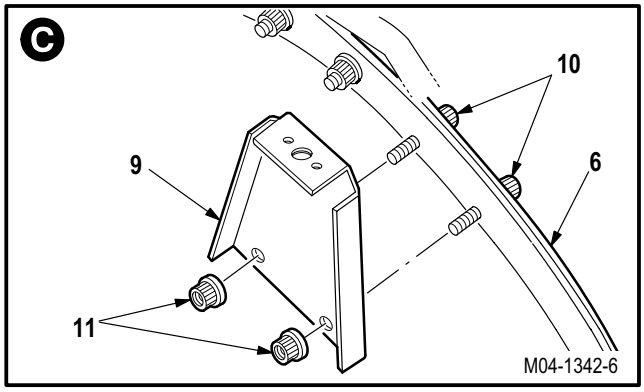
## 4.24. ENGINE TEARDOWN - NO.1 AND NO. 2 ENGINE SHROUD SUPPORT REMOVAL - continued

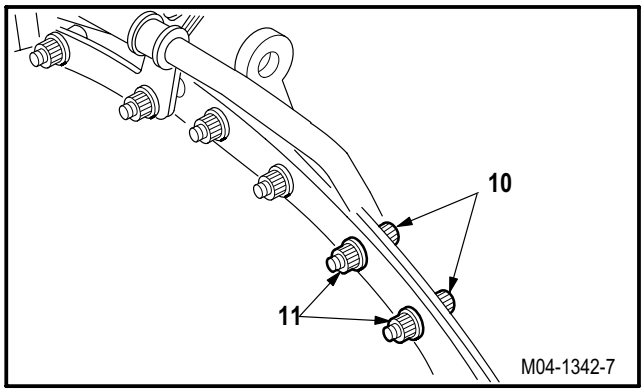
c. **Remove aft right shroud support (9) from power turbine case flange (6).**

(1) Hold two bolts (10). Remove two nuts (11).

(2) Remove support (9) from two bolts (10).




(3) Reinstall two nuts (11) on bolts (10).




d. **Remove forward right shroud support (13) from flange (2).**

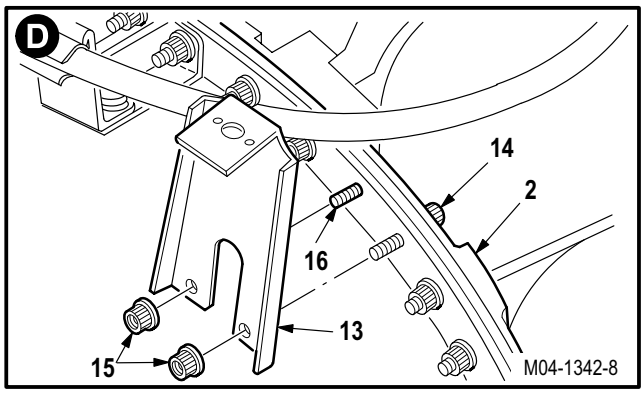
(1) Hold bolt (14). Remove nut (15).

(2) Remove nut (15) from stud (16).

(3) Remove support (13) from bolt (14) and stud (16).

(4) Reinstall nut (15) on bolt (14).

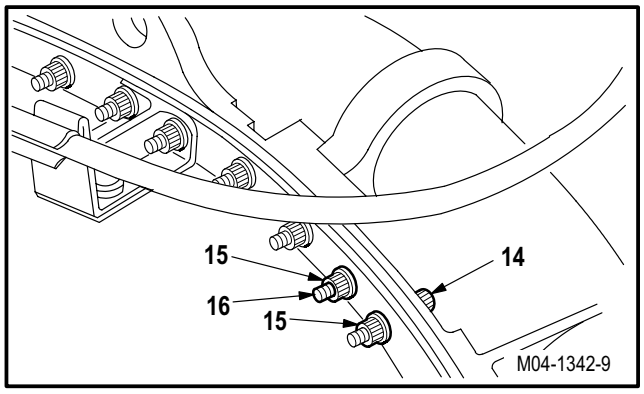
(5) Reinstall nut (15) on stud (16).




4.24.4. Inspection

a. **Check supports for cracks** (TM 1-1500-204-23)**.**

b. **Check supports for corrosion** (para 1.49)**.**

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## 4.25. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM REMOVAL (T700-GE-701 ENGINE)

4.25.1. Description

This task covers: Removal. Inspection.

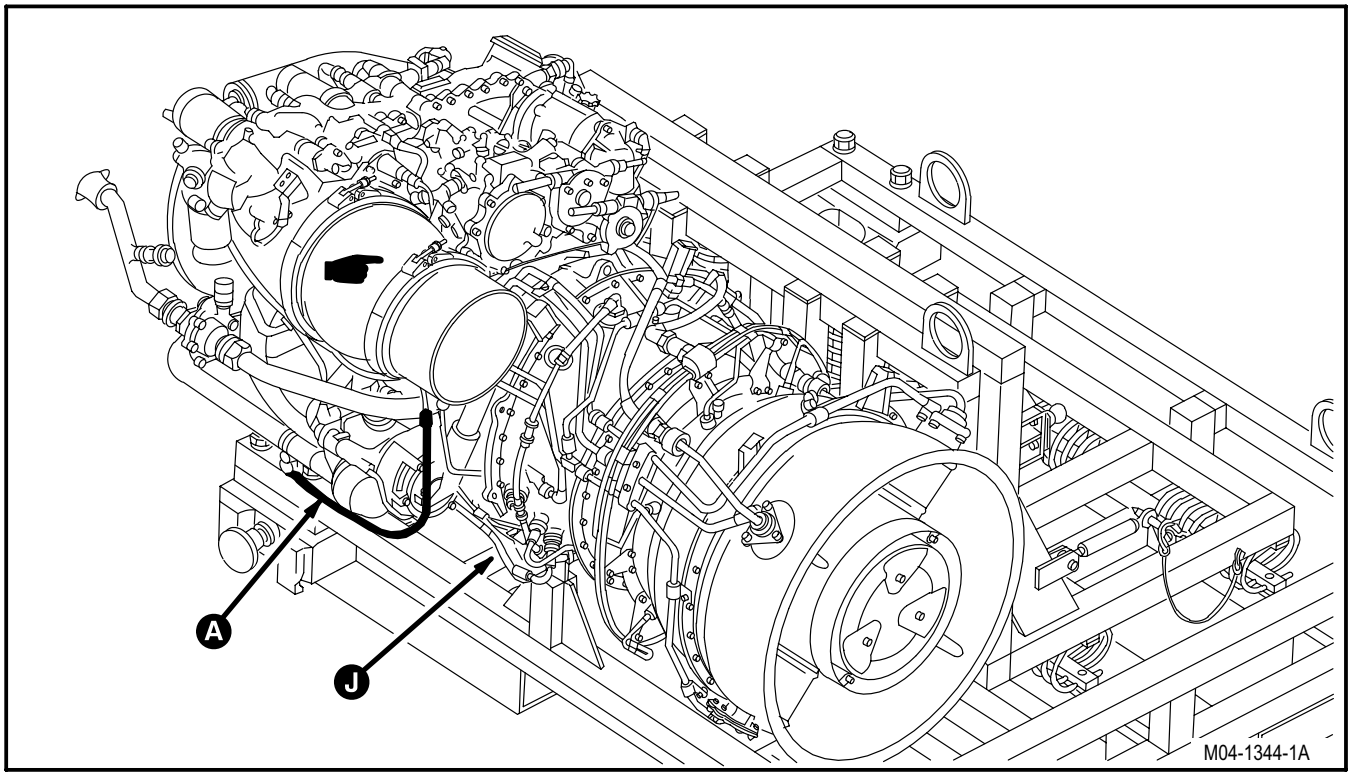
4.25.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine drain system.

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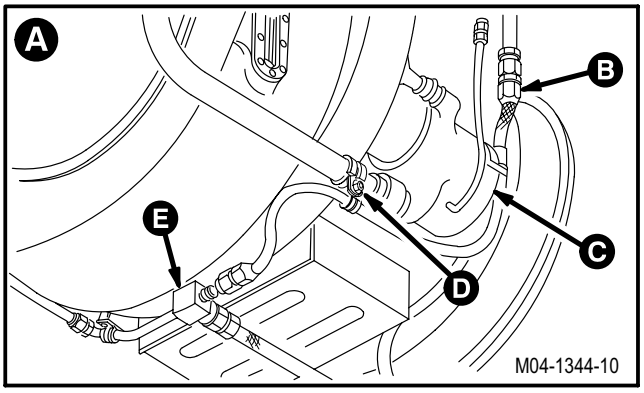
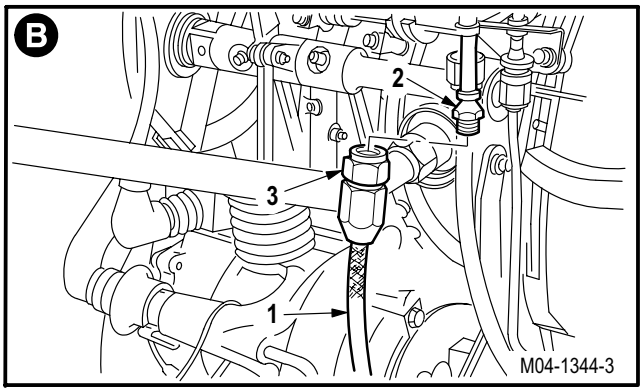
## 4.25. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM REMOVAL (T700-GE-701 ENGINE) - continued




4.25.3. Removal

a. **Remove overspeed drain valve hose (1) from fitting (2).**

(1) Hold fitting (2). Remove nut (3).

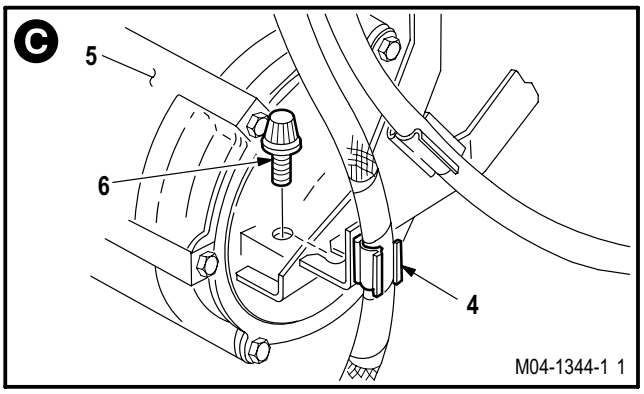



b. **Remove clip (4) from anti-icing valve (5).**

(1) Loosen bolt (6).

(2) Remove clip (4).

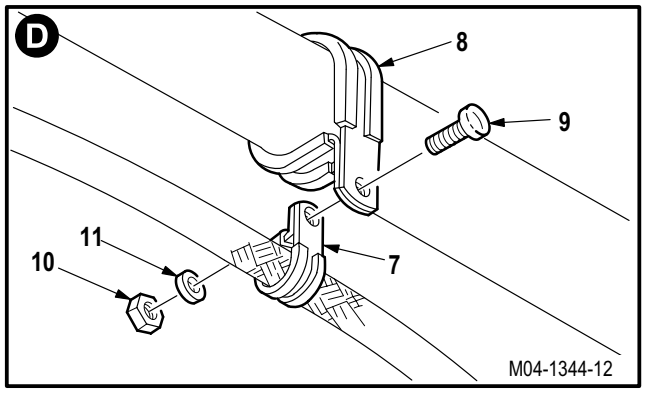
(3) Tighten bolt (6).




c. **Remove overspeed drain valve hose clamp (7) from anti-ice manifold clamp (8).**

(1) Hold screw (9). Remove nut (10) and washer (11).

(2) Remove screw (9).

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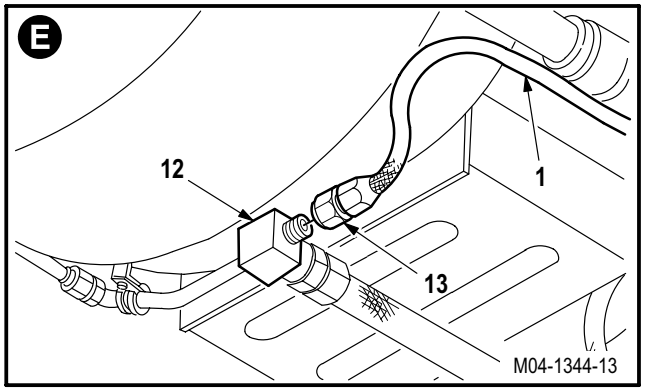
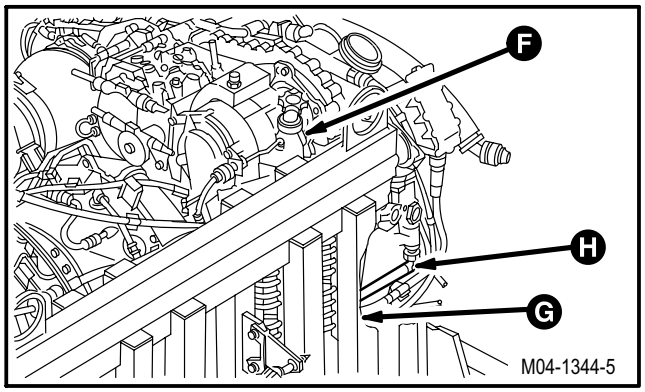
**4.25. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM REMOVAL (T700-GE-701 ENGINE) - continued**

d. **Remove drain hose (1) from drain manifold (12).**

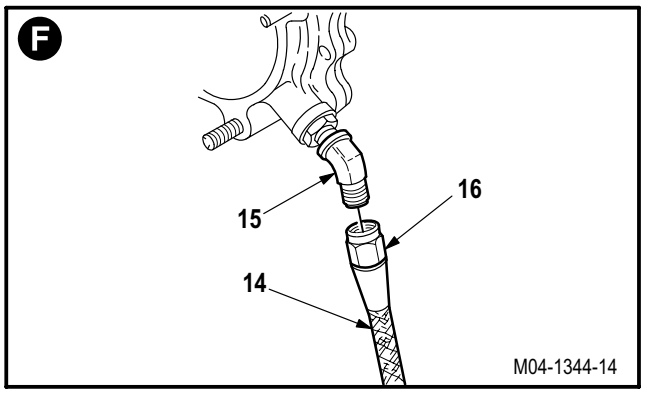
(1) Hold manifold (12). Remove nut (13).



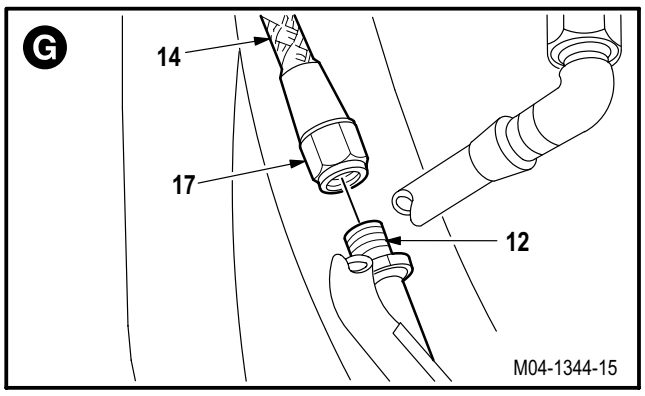

e. **Remove hydromechanical unit (HMU) vent/ drain hose (14) from elbow (15).**

(1) Hold elbow (15). Remove nut (16).




f. **Remove hose (14) from manifold (12).**

(1) Hold manifold (12). Remove nut (17).

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## 4.25. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM REMOVAL (T700-GE-701 ENGINE) - continued

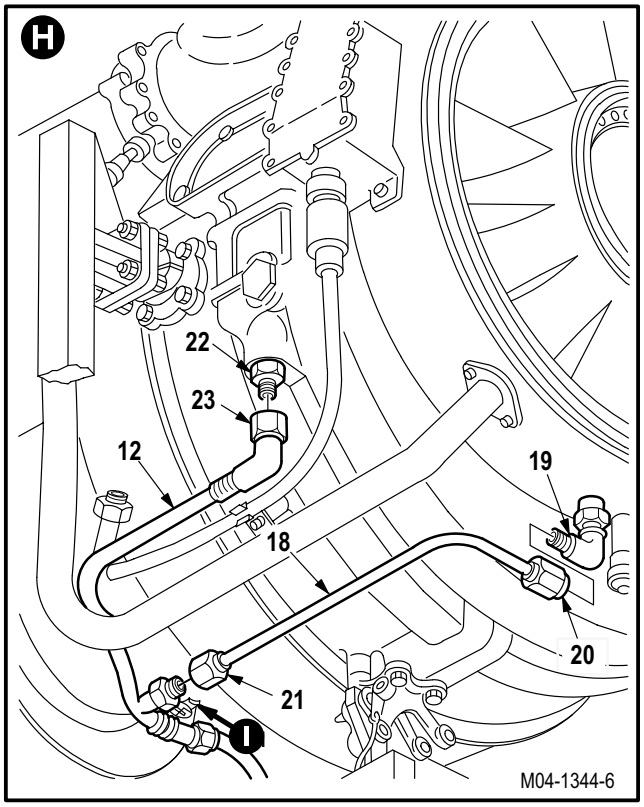
g. **Remove swirl frame drain line (18) from elbow (19) and manifold (12).**

(1) Hold elbow (19). Remove nut (20).

(2) Hold manifold (12). Remove nut (21).

h. **Remove manifold (12) from nipple (22).**

(1) Hold nipple (22). Remove nut (23).



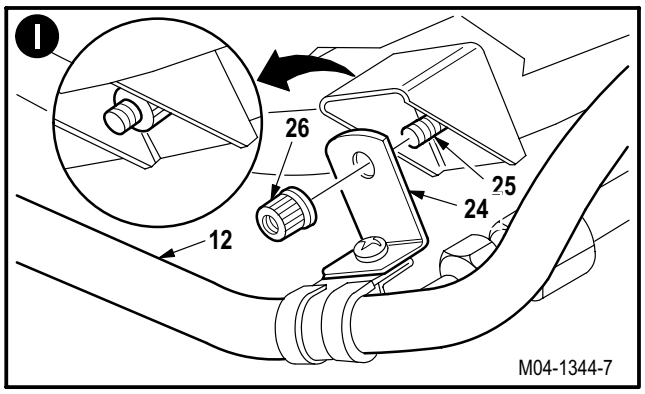

i. **Remove common drain line support clip (24) from main frame mounting stud (25).**

(1) Remove nut (26) from stud (25).

(2) Remove clip (24) from stud (25).

(3) Reinstall nut (26) on stud (25).

(4) Remove manifold (12).




j. **Remove nipple (22) from main frame common drain (27).**

(1) Remove nipple (22).

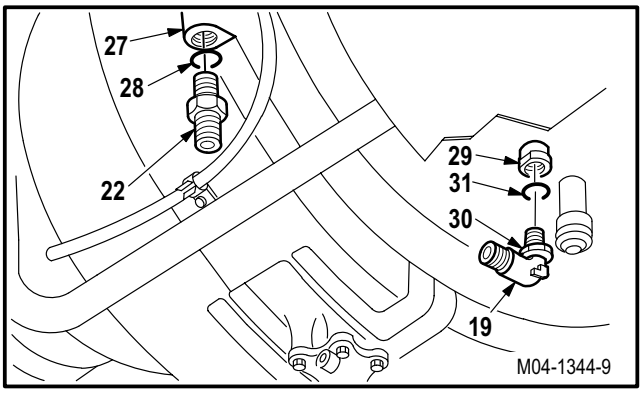
(2) Remove and discard packing (28).

k. **Remove elbow (19) from swirl frame drain (29).**

(1) Hold elbow (19). Loosen nut (30).

(2) Remove elbow (19) from drain (29).

(3) Remove and discard packing (31).

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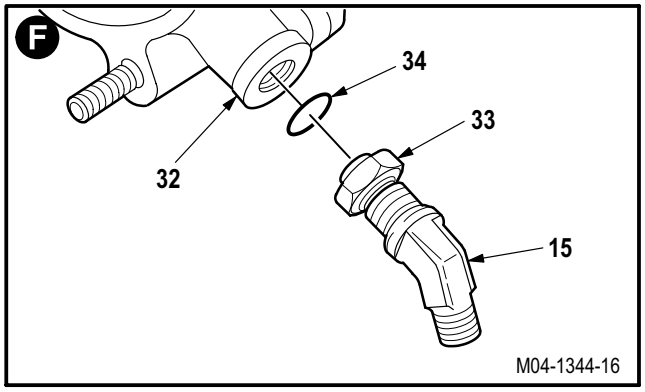
**4.25. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM REMOVAL (T700-GE-701 ENGINE) - continued**

l. **Remove elbow (15) from HMU drain (32).**

(1) Hold elbow (15). Loosen nut (33).

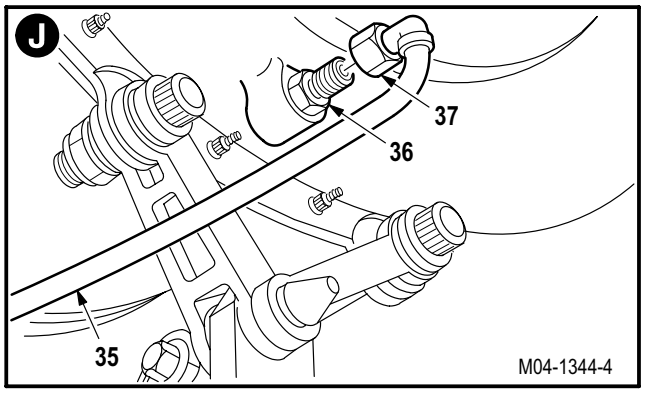
(2) Remove elbow (15) from drain (32).

(3) Remove and discard packing (34).




m. **Remove combustor drain hose (35) from diffuser case union (36).**

(1) Hold union (36). Remove nut (37).



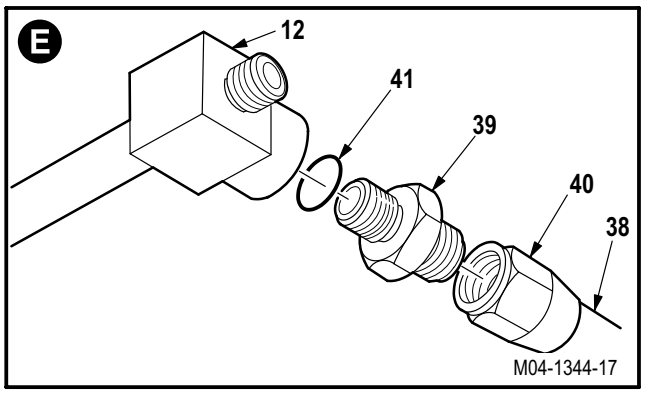

n. **Remove drain hose (38) from nipple (39).**

(1) Hold nipple (39). Remove nut (40).

o. **Remove nipple (39) from manifold (12).**

(1) Hold manifold (12). Remove nipple (39). Use open end wrench.

(2) Remove and discard packing (41).




4.25.4. Inspection

a. **Check drain hoses and lines for holes, cracks, dents, and abrasions** (para 4.2)**.**

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## 4.26. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM REMOVAL (T700-GE-701C ENGINE)

4.26.1. Description

This task covers: Removal. Inspection.

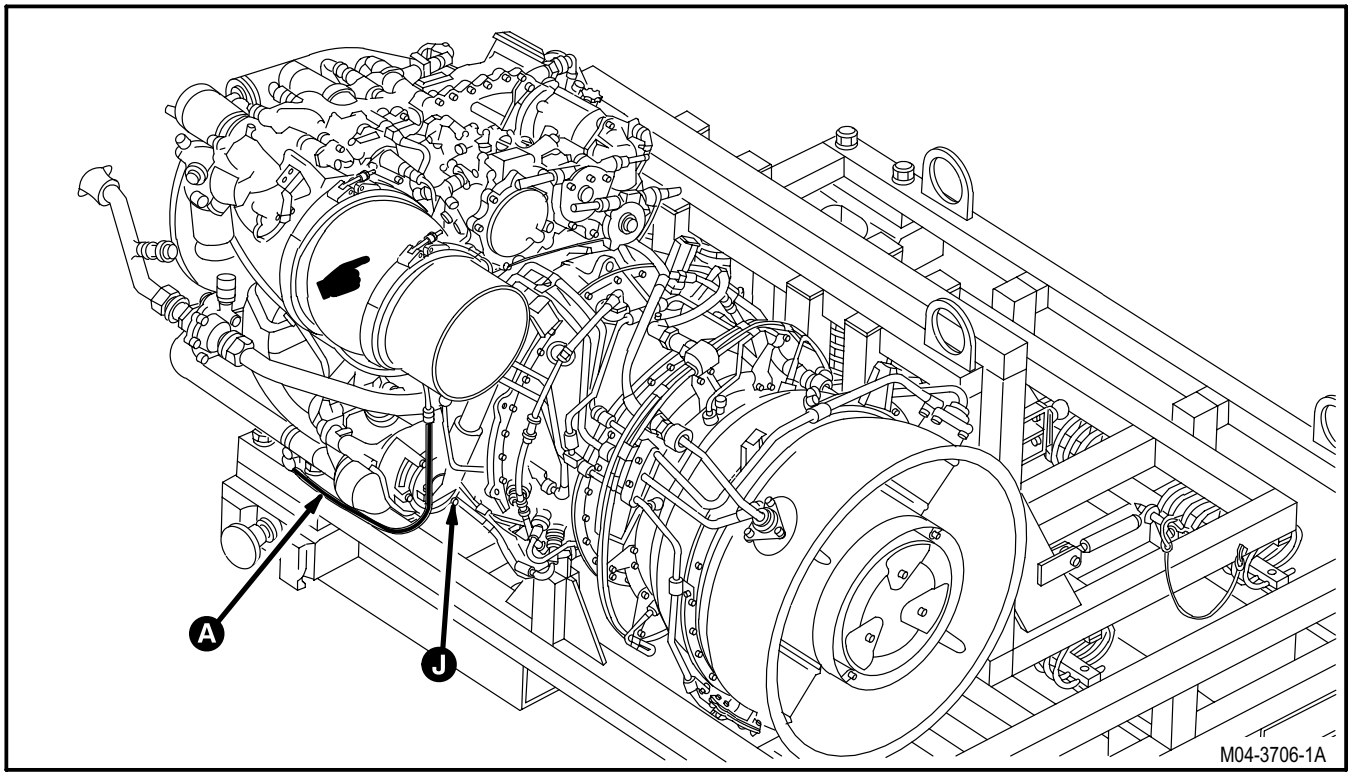
4.26.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine drain system.

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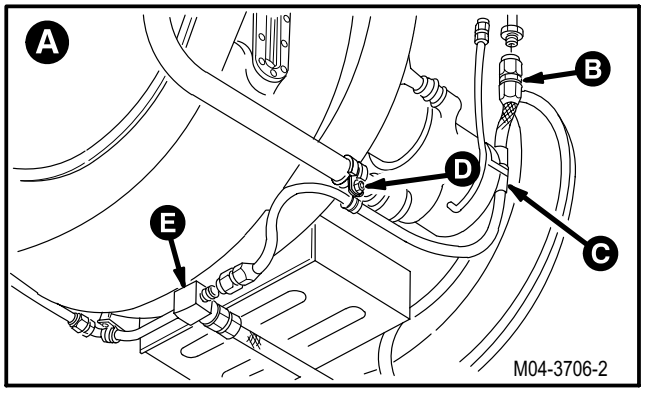
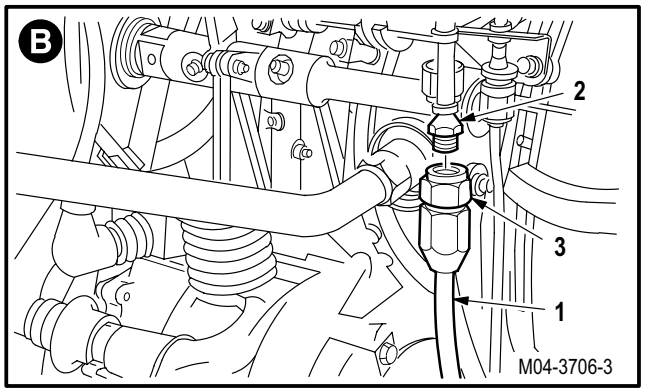
## 4.26. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM REMOVAL (T700-GE-701C ENGINE) - continued




4.26.3. Removal

a. **Remove overspeed drain valve hose (1) from fitting (2).**

(1) Hold fitting (2). Remove nut (3).

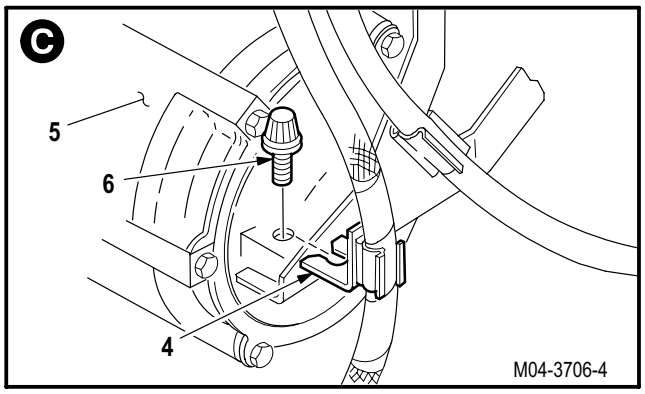



b. **Remove clip (4) from anti-icing valve (5).**

(1) Loosen bolt (6).

(2) Remove clip (4).

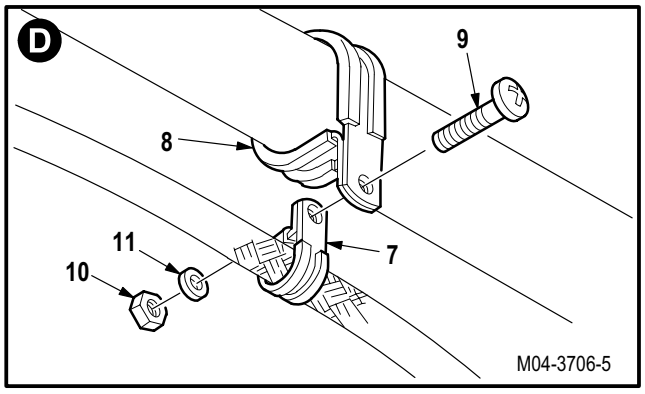
(3) Tighten bolt (6).




c. **Remove overspeed drain valve hose clamp (7) from anti-ice manifold clamp (8).**

(1) Hold screw (9). Remove nut (10) and washer (11).

(2) Remove screw (9).

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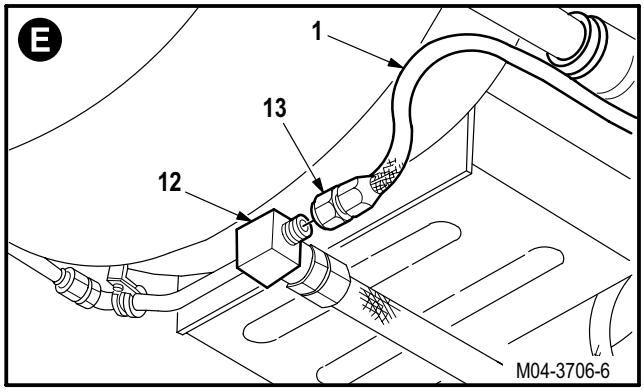
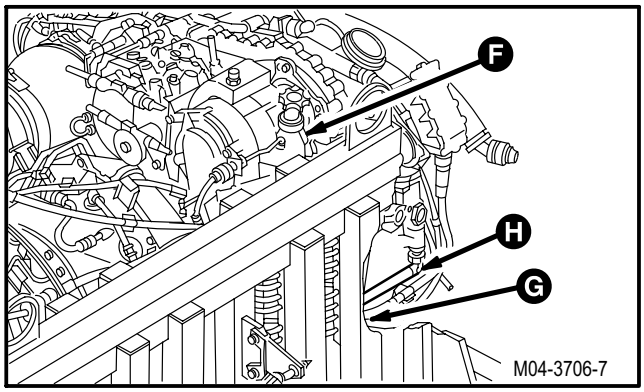
**4.26. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM REMOVAL (T700-GE-701C ENGINE) - continued**

d. **Remove drain hose (1) from drain manifold (12).**

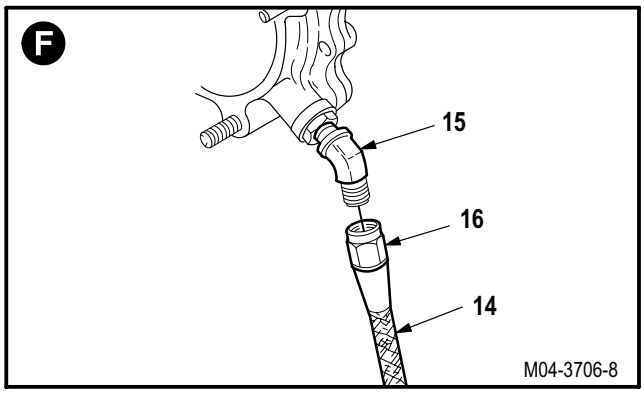
(1) Hold manifold (12). Remove nut (13).



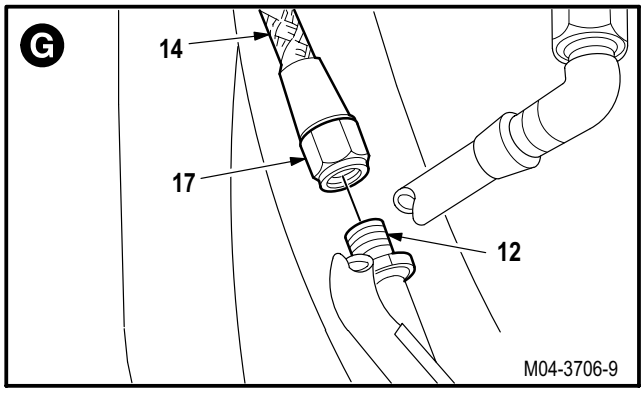

e. **Remove hydromechanical unit (HMU) vent/ drain hose (14) from elbow (15).**

(1) Hold elbow (15). Remove nut (16).




f. **Remove hose (14) from manifold (12).**

(1) Hold manifold (12). Remove nut (17).

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**4.26. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM REMOVAL (T700-GE-701C ENGINE) - continued**

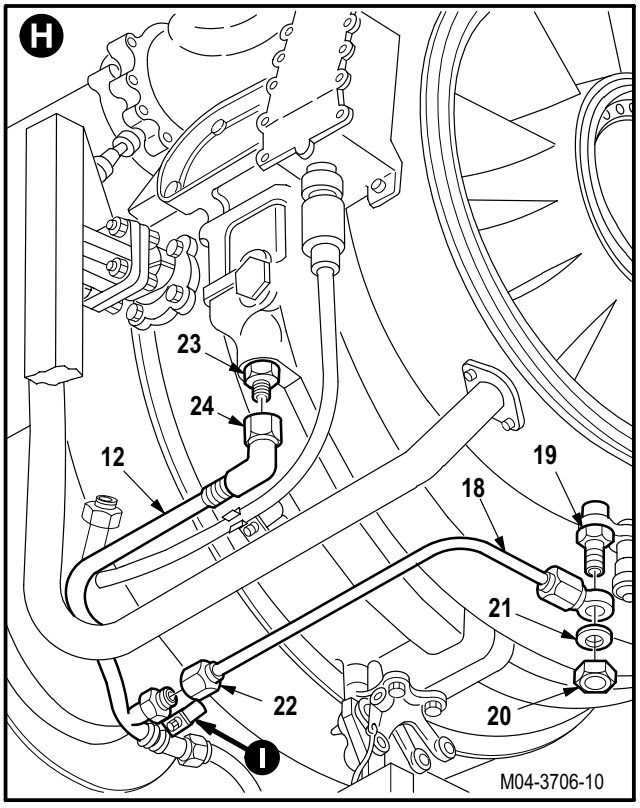
g. **Remove swirl frame drain line (18) from union (19) and manifold (12).**

(1) Hold union (19). Remove nut (20) and washer (21).

(2) Hold manifold (12). Remove nut (22).

h. **Remove manifold (12) from nipple (23).**

(1) Hold nipple (23). Remove nut (24).



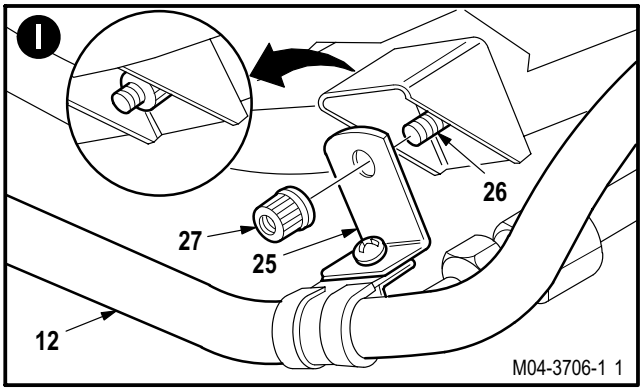

i. **Remove common drain line support clip (25) from main frame mounting stud (26).**

(1) Remove nut (27) from stud (26).

(2) Remove clip (25) from stud (26).

(3) Reinstall nut (27) on stud (26).

(4) Remove manifold (12).




j. **Remove nipple (23) from main frame common drain (28).**

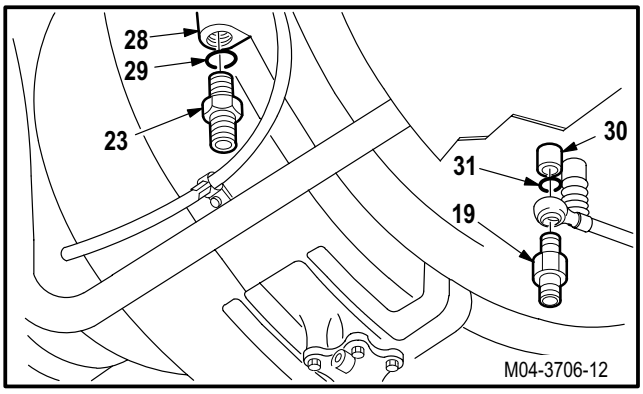
(1) Remove nipple (23).

(2) Remove and discard packing (29).

k. **Remove union (19) from swirl frame drain (30).**

(1) Remove union (19) from drain (30).

(2) Remove and discard packing (31).

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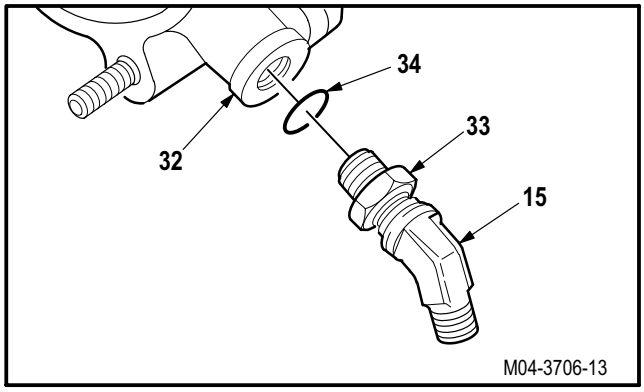
## 4.26. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM REMOVAL (T700-GE-701C ENGINE) - continued

l. **Remove elbow (15) from HMU drain (32).**

(1) Hold elbow (15). Loosen nut (33).

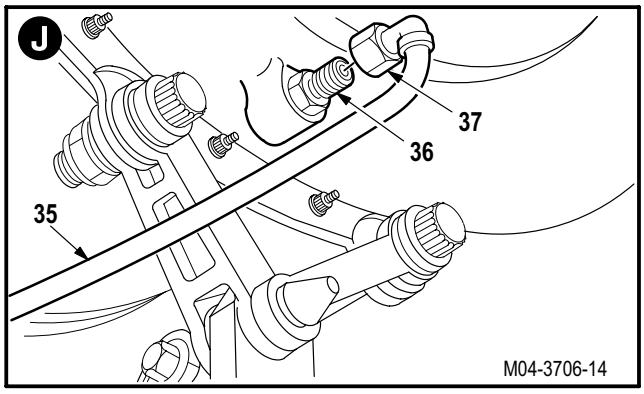
(2) Remove elbow (15) from drain (32).

(3) Remove and discard packing (34).




m. **Remove combustor drain hose (35) from diffuser case union (36).**

(1) Hold union (36). Remove nut (37).



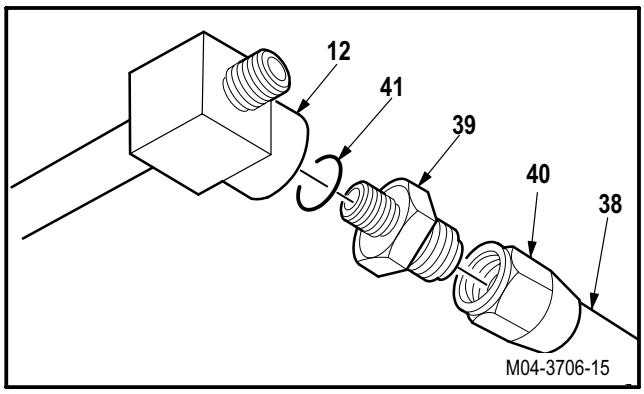

n. **Remove drain hose (38) from nipple (39).**

(1) Hold nipple (39). Remove nut (40).

o. **Remove nipple (39) from manifold (12).**

(1) Hold manifold (12). Remove nipple (39). Use open end wrench.

(2) Remove and discard packing (41).




4.26.4. Inspection

a. **Check drain hoses and lines for holes, cracks, dents, or abrasions** (para 4.2)**.**

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## 4.27. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE OIL CHIP COLLECTOR REMOVAL

4.27.1. Description

This task covers: Removal. Cleaning. Inspection.

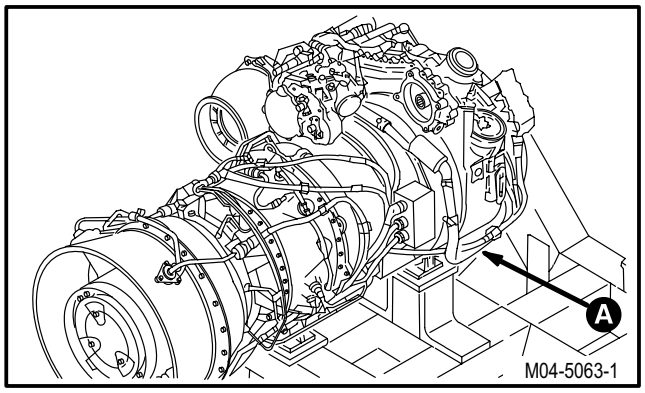
4.27.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**NOTE**

- This task is typical for No. 1 or No. 2 engine oil chip collector.
- All serviceable items shall be retained for installation on new engine (para 4.31).




4.27.3. Removal

a. **Remove probe (1) from chip collector (2).**

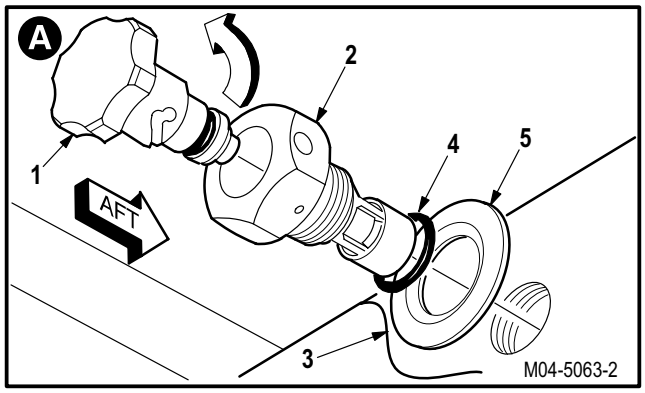
(1) Push in probe and turn counterclockwise.

b. **Remove collector (2) from oil sump (3).**

(1) Remove collector (2).

(2) Remove and discard packing (4).

(3) Remove washer (5) from sump (3).




4.27.4. Cleaning

a. **Clean collector boss on sump** (para 1.47)**.**

4.27.5. Inspection

a. **Check sump for corrosion** (para 1.49)**.**

GO TO NEXT PARAGRAPH

## 4.28. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE REMOVAL FROM HANDLING ADAPTER

4.28.1. Description

This task covers: Removal.

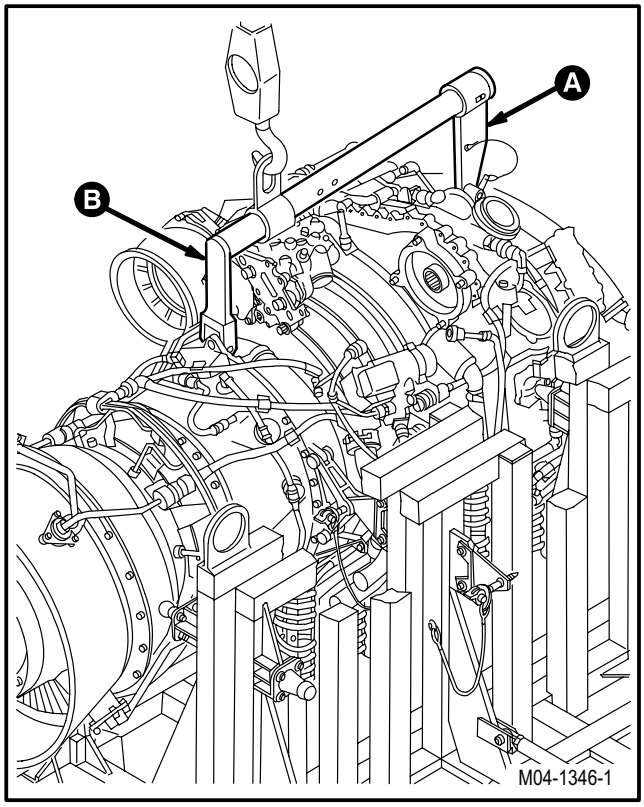
4.28.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine.




4.28.3. Removal

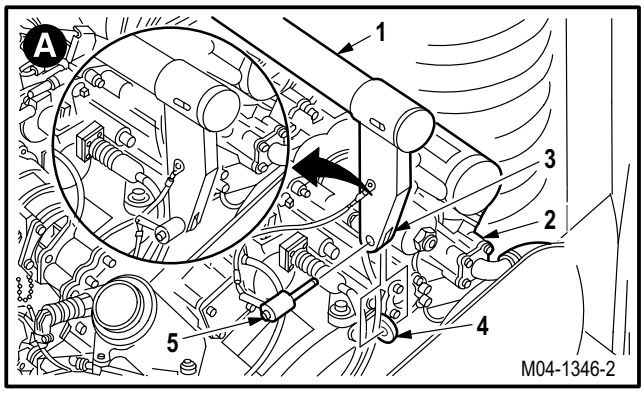
**WARNING**

**If hoisted components are allowed to fall, personnel can suffer injury or death. Keep away from component mounting surfaces and loaded crane boom. If injury occurs, seek medical aid.**

a. **Install engine lifting sling (1) on engine (2).**

(1) Aline forward hanger link (3) with engine front lifting lug (4).

(2) Install pin (5) through forward hanger link (3) and front lifting lug (4).

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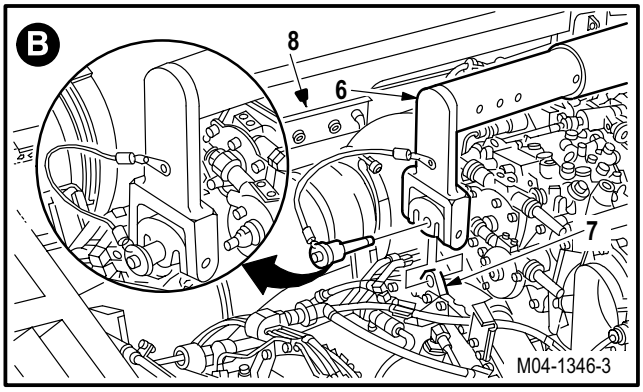
## 4.28. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE REMOVAL FROM HANDLING ADAPTER - continued

(3) Aline aft hanger link (6) with aft lifting lug (7).

(4) Install pin (8) through aft hanger link (6) and aft lifting lug (7).




(5) Position sling lifting eye (9) at pin hole No. 2 (10).

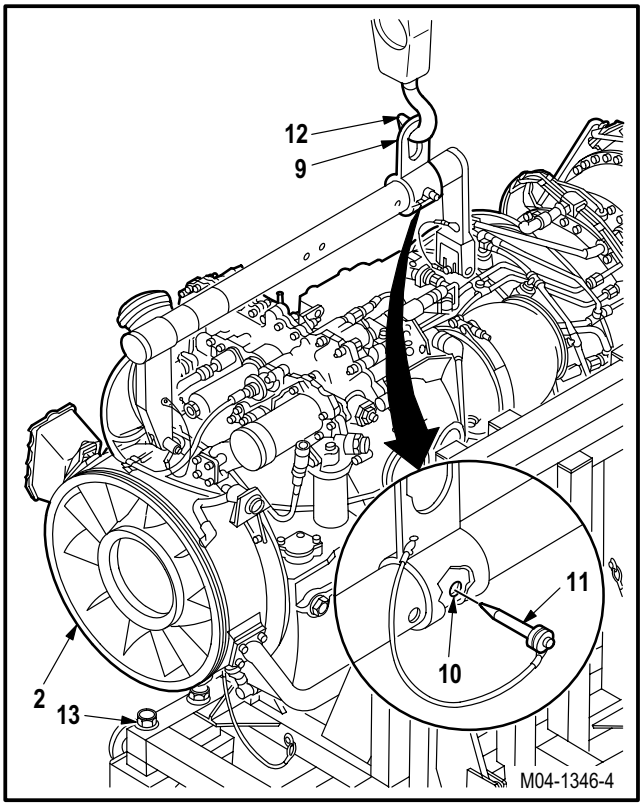
(6) Install pin (11) in pin hole (10).

b. **Connect lifting hook (12) to eye (9).**

c. **Apply tension to hook (12) to relieve weight of engine (2) from handling adapter (13).**

**NOTE**

If removing engine from fixed mount (buildup) side of handling adapter, perform step d. If removing engine from shock mount (transport) side, perform step e.

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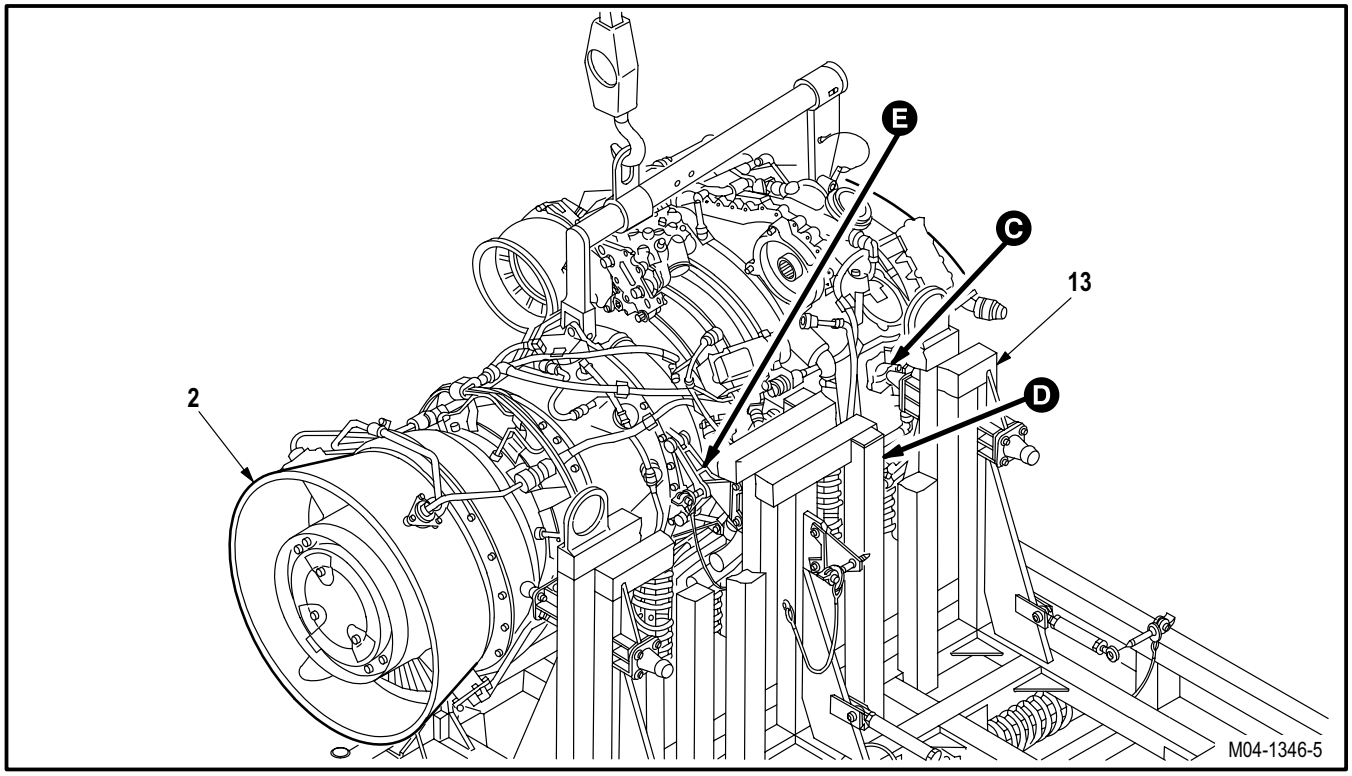
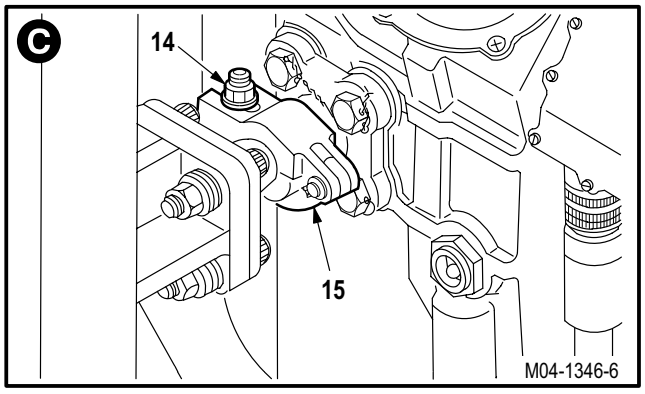
## 4.28. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE REMOVAL FROM HANDLING ADAPTER - continued



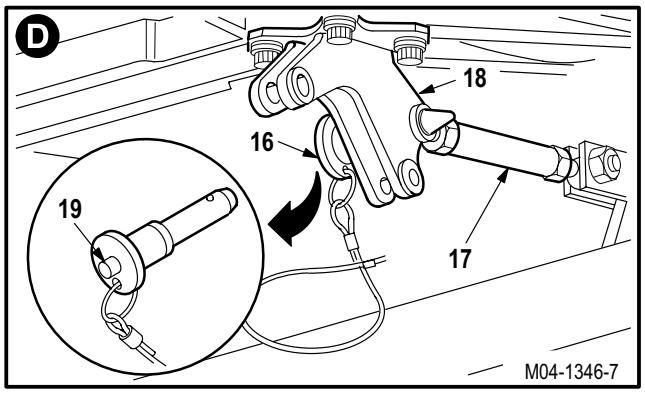

d. **Remove engine (2) from fixed mount (buildup) side of handling adapter (13).**

(1) Loosen nut (14) on forward inboard mount (15).




(2) Remove pin (16) from adapter forward lower support (17) and engine aft lower mount (18).

(a) Push release button (19). Remove pin (16).

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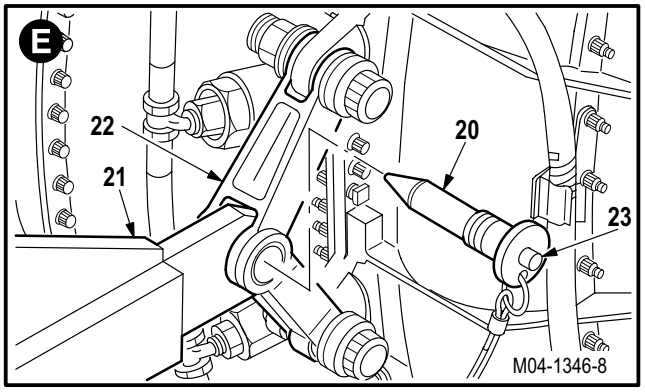
## 4.28. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE REMOVAL FROM HANDLING ADAPTER - continued

(3) Remove pin (20) from adapter aft inboard support (21) and engine aft inboard mount (22).

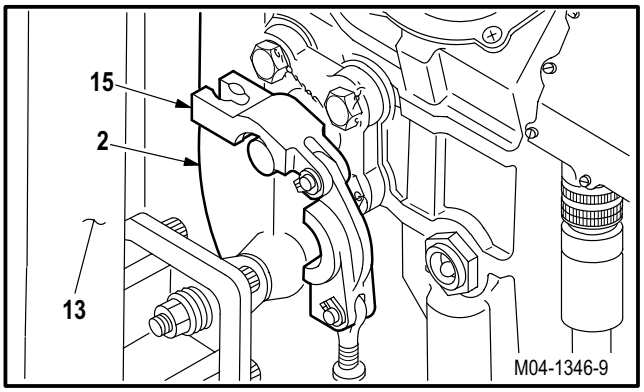
(a) Push release button (23). Remove pin (20).

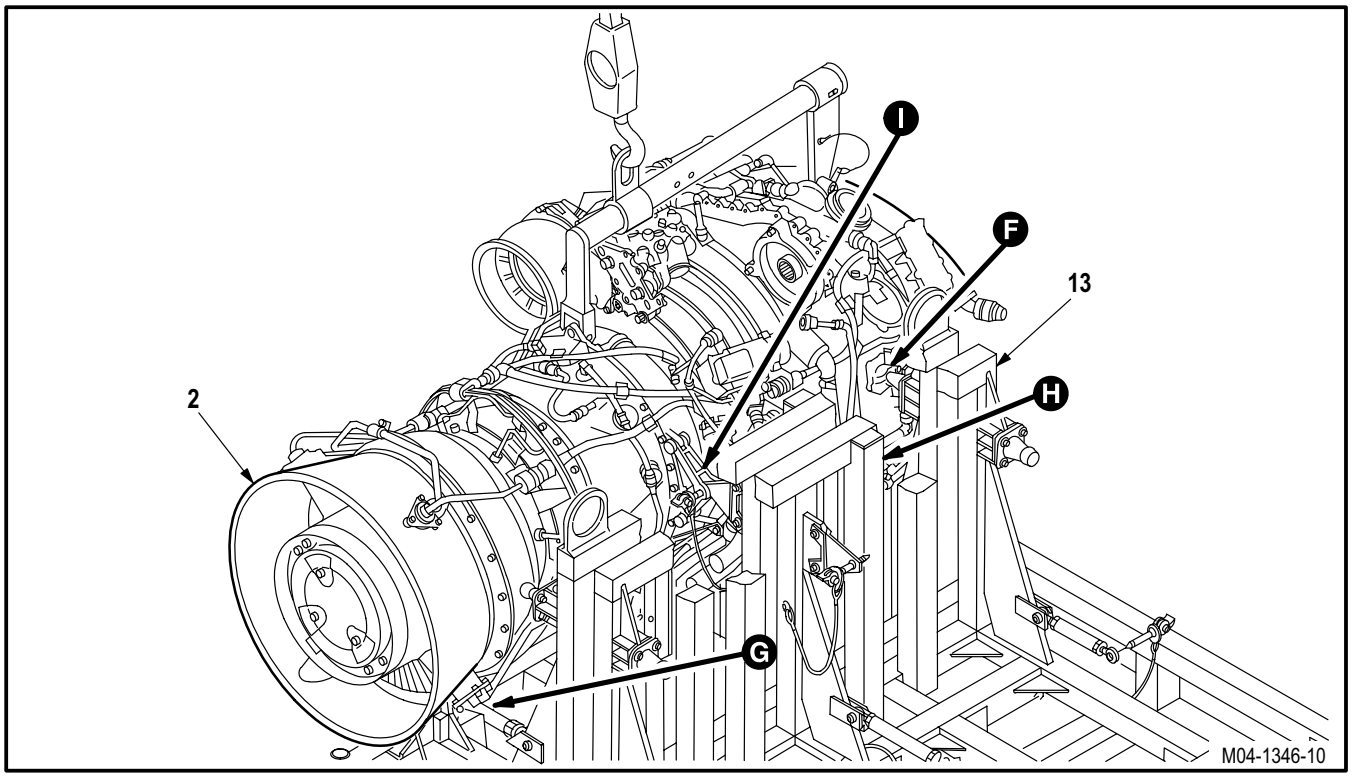



(4) Open engine forward inboard mount (15).

(5) Go to step f.

e. **Remove engine (2) from shock mount (transport) side of handling adapter (13).**

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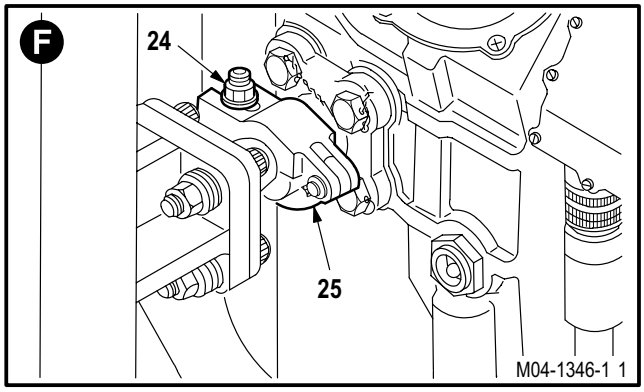
## 4.28. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE REMOVAL FROM HANDLING ADAPTER - continued

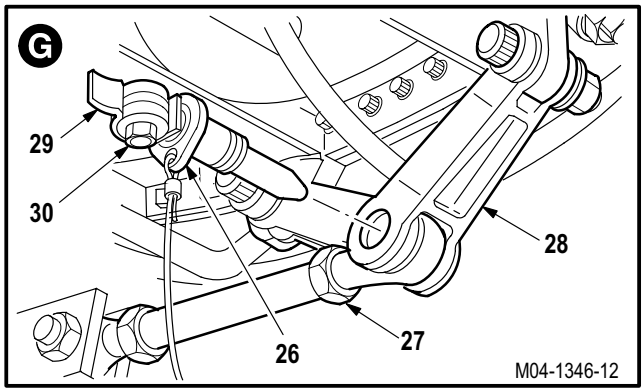
(1) Loosen nut (24) on forward inboard mount (25).




(2) Remove pin (26) from adapter aft lower support (27) and engine aft lower mount (28).

(a) Lift spring clip (29) to unlock pin (26) and turn bolt (30) counter clockwise to its internal stop.

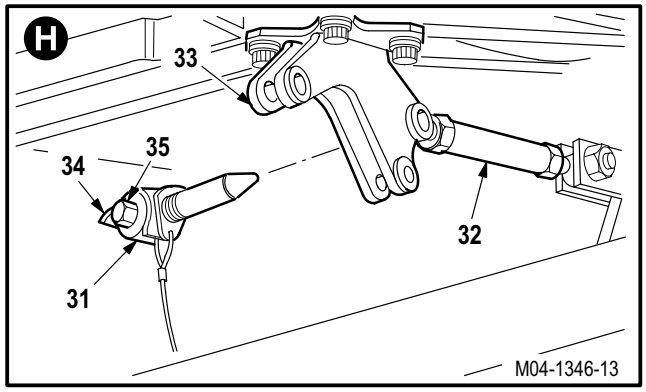
(b) Remove pin (26).




(3) Remove pin (31) from adapter forward lower support (32) and engine lower forward mount (33).

(a) Lift spring clip (34) to unlock pin (31) and turn bolt (35) counter clockwise to its internal stop.

(b) Remove pin (31).

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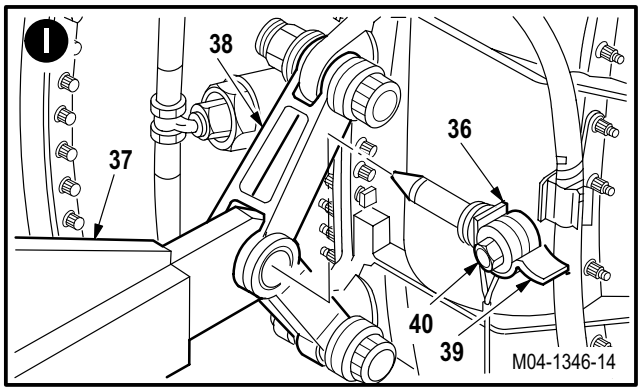
## 4.28. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE REMOVAL FROM HANDLING ADAPTER - continued

(4) Remove pin (36) from adapter aft inboard support (37) and aft inboard engine mount (38).

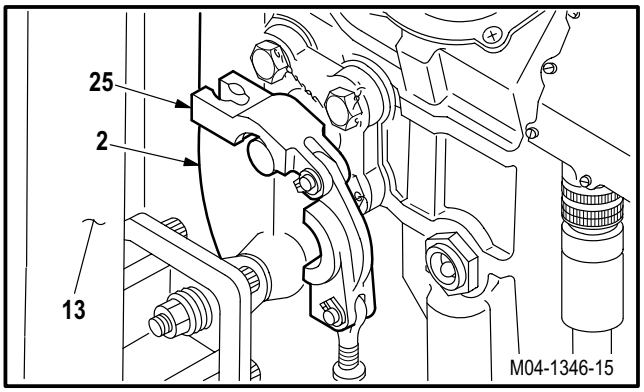
(a) Lift spring clip (39) to unlock pin (36) and turn bolt (40) counter clockwise to its internal stop.

(b) Remove pin (36).




(5) Open engine forward inboard mount (25).

f. **Remove handling adapter (13) from engine (2).**

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## 4.29. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE MOUNT REMOVAL

4.29.1. Description

This task covers: Removal. Cleaning. Inspection.

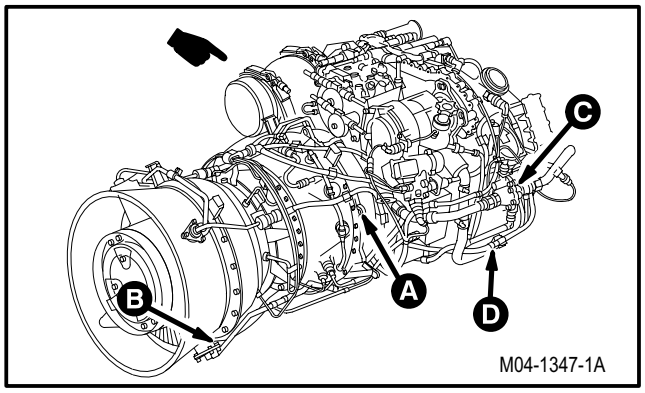
4.29.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.12 | Engine teardown - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine mounts.



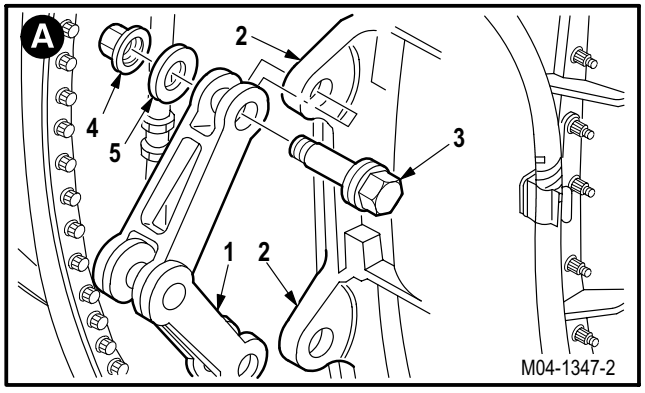

4.29.3. Removal

a. **Remove aft inboard mount (1) from diffuser case (2).**

(1) Hold two bolts (3). Remove two nuts (4) and washers (5).

(2) Remove two bolts (3).

(3) Remove mount (1).

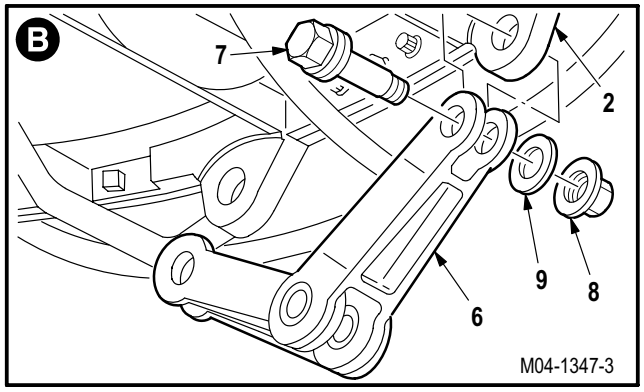



b. **Remove aft lower mount (6) from diffuser case (2).**

(1) Hold two bolts (7). Remove two nuts (8) and washers (9).

(2) Remove two bolts (7).

(3) Remove mount (6).

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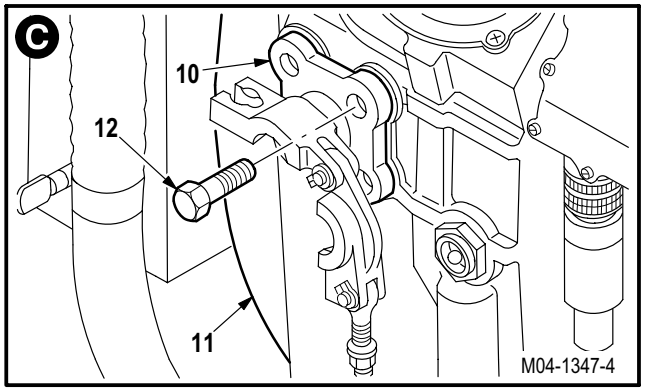
## 4.29. ENGINE TEARDOWN - NO. 1 AND NO. 2 ENGINE MOUNT REMOVAL - continued

c. **Remove forward inboard mount (10) from mainframe (11).**

(1) Remove lockwire from four bolts (12).

(2) Remove four bolts (12).

(3) Remove mount (10).

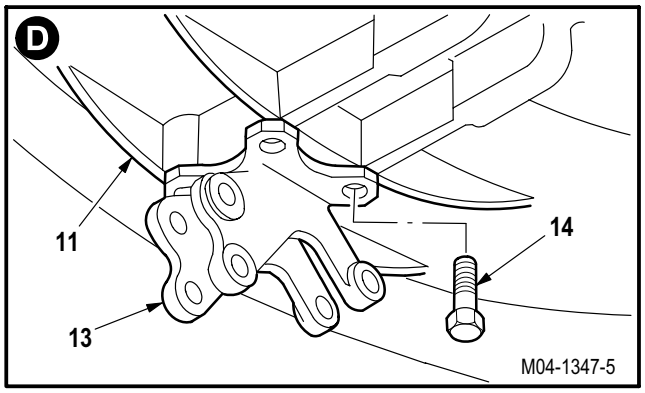



d. **Remove forward lower mount (13) from frame (11).**

(1) Remove lockwire from four bolts (14).

(2) Remove four bolts (14).

(3) Remove mount (13).




4.29.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.29.5. Inspection

a. **Check mounts for cracks.** None allowed.

b. **Check mounts for corrosion** (para 1.49)**.**

END OF TASK

## 4.30. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE

4.30.1. Description

This task covers: Buildup.

4.31. No. 1 and No. 2 Engine Mount Installation
4.32. No. 1 and No. 2 Engine Installation on Handling Adapter
4.33. No. 1 and No. 2 Engine Oil Chip Collector Installation
4.34. No. 1 and No. 2 Engine Drain System Installation (T700-GE-701 Engine)
4.35. No. 1 and No. 2 Engine Drain System Installation (T700-GE-701C Engine)
4.36. No. 1 and No. 2 Engine Shroud Support Installation
4.37. No. 1 and No. 2 Engine Baseplate and Spindle Gearboxes Installation
4.38. No. 1 Engine Air Starter and Regulating Valve Installation
4.39. No. 2 Engine Air Starter and Regulating Valve Installation
4.40. No. 1 Engine Anti-Ice and Bleed Air System Installation
4.41. No. 2 Engine Anti-Ice and Bleed Air System Installation
4.42. No. 1 Engine Wiring Installation
4.43. No. 2 Engine Wiring Installation
4.44. No. 1 and No. 2 Engine Fuel Inlet Hose Installation
4.45. No. 1 and No. 2 Engine Air Inlet Installation
4.46. No. 1 and No. 2 Engine Shroud Seal Ring Installation
4.47. No. 1 and No. 2 Engine Air Duct Installation

GO TO NEXT PAGE

## 4.30. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE - continued

4.30.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 371, App H)
Aircraft mechanic's tool kit (item 376, App H)
Airframe adapter kit (item 25, App H)
Light duty laboratory apron (item 27, App H)
1 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 77, App H)
3/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 97, App H)
7/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 100, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
Adjustable air filtering respirator (item 262, App H)
Engine lifting sling (item 291, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

**Materials/Parts:**

Packing (8)
Gasket (2)
Adhesive (item 14, App F)
Lubricating oil (item 119, App F)
Petrolatum (item 138, App F)
Wire (item 226, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
68B Aircraft Powerplant Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**NOTE**

This task (off helicopter) covers tasks required for installation of accessory items to prepare engine for installation in the helicopter. Tasks are in sequence of installation and may be used for No. 1 and/or No. 2 engine.

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## 4.31. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE MOUNT INSTALLATION

4.31.1. Description

This task covers: Removal. Cleaning. Inspection.

4.31.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine mounts.

4.31.3. Installation

a. **Install aft inboard mount (1) on diffuser case (2).** Torque two nuts (3) to **175 INCH-POUNDS**.

(1) Insert two bolts (4) through mount (1) and case (2).

(2) Install two washers (5) and nuts (3) on two bolts (4).

**NOTE**

Ensure equal space between mount lugs and engine case while torquing nuts.

(3) Hold two bolts (4). Torque nuts (3) to **175 INCH-POUNDS**. Use torque wrench.

b. **Install aft lower mount (6) on diffuser case (2).** Torque two nuts (7) to **175 INCH POUNDS.**

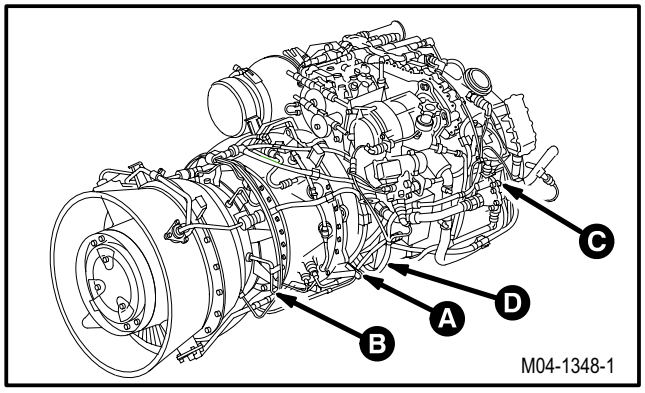
(1) Install two bolts (8) through mount (6) and case (2).

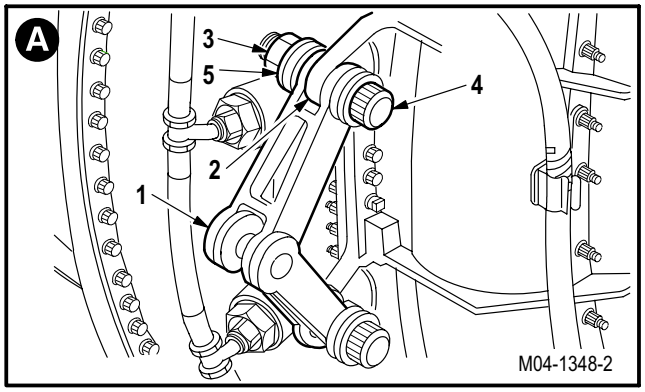
(2) Install two washers (9) and nuts (7) on two bolts (8).

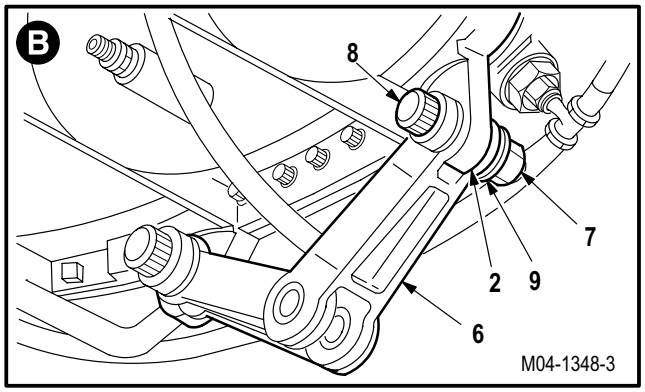
**NOTE**

Ensure equal space between mount lugs and engine case while torquing nuts.

(3) Hold two bolts (8). Torque nuts (7) to **175 INCH-POUNDS**. Use torque wrench.

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## 4.31. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE MOUNT INSTALLATION - continued

c. **Install forward inboard mount (10) on main frame (11).** Torque four bolts (12) to **145 INCH-POUNDS**.

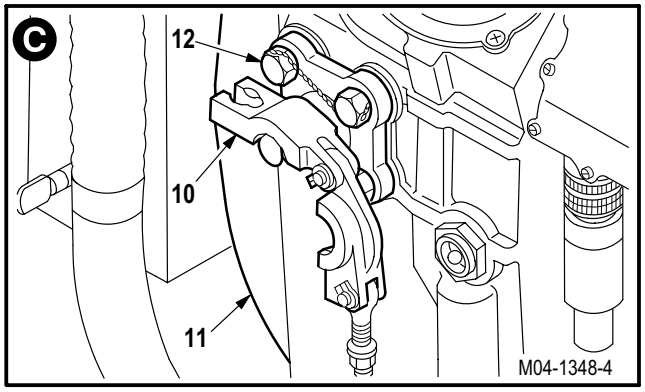
(1) Aline mount (10) on frame (11).

(2) Install four bolts (12).

(3) Torque four bolts (12) to **145 INCH-POUNDS**. Use torque wrench.

(4) Lockwire two upper bolts (12) together. Use wire (item 226, App F).

(5) Lockwire two lower bolts (12) together. Use wire (item 226, App F).




d. **Install forward lower mount (13) on frame (11).** Torque four bolts (14) to **145 INCH-POUNDS**.

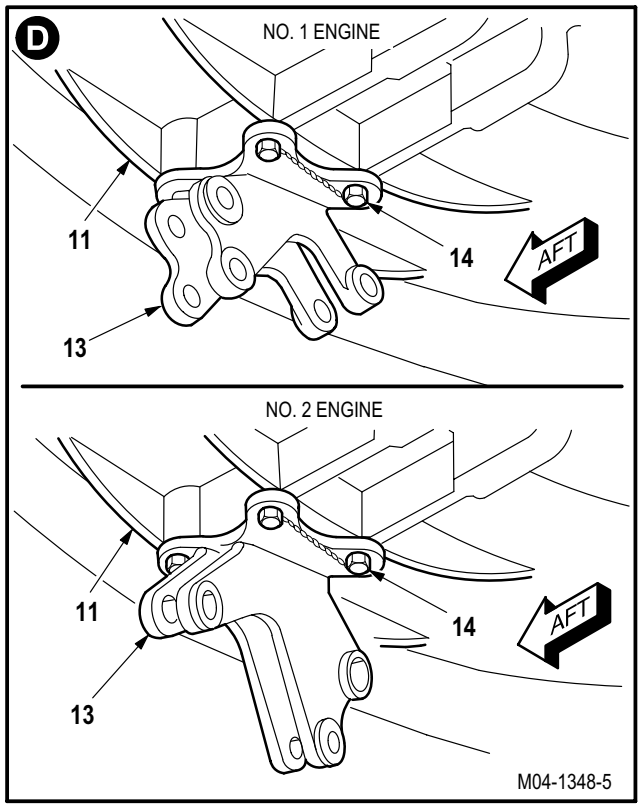
(1) Aline mount (13) on frame (11).

(2) Install four bolts (14).

(3) Torque four bolts (14) to **145 INCH-POUNDS**. Use torque wrench.

(4) Lockwire two bolts (14) together two places. Use wire (item 226, App F).

e. **Inspect (QA).**

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## 4.32. ENGINE BUILDUP - NO. 1 OR NO. 2 ENGINE INSTALLATION ON HANDLING ADAPTER

4.32.1. Description

This task covers: Installation.

4.32.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 or No. 2 engine |

**WARNING**

**If hoisted components are allowed to fall, personnel can suffer injury or death. Keep away from component mounting surfaces and loaded crane boom. If injury occurs, seek medical aid.**

**NOTE**

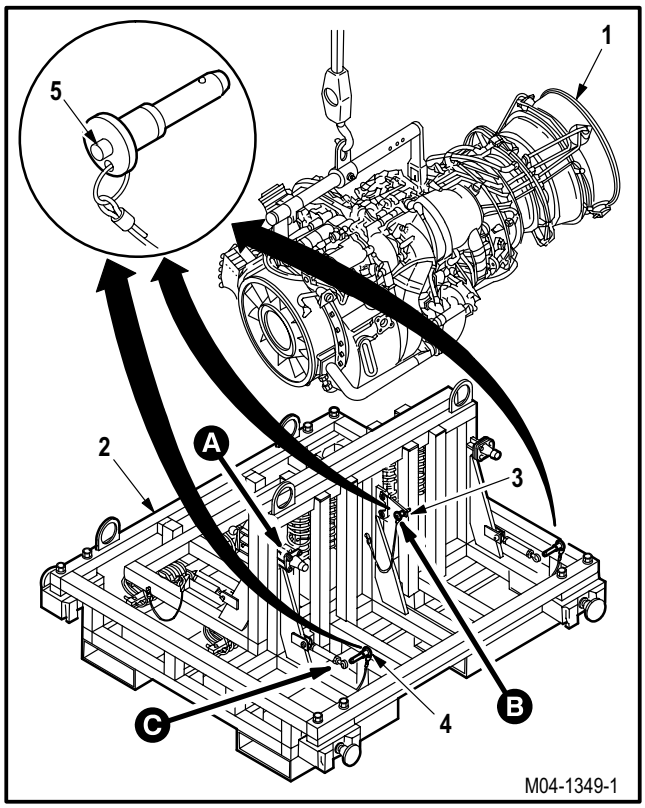
- This task is typical for No. 1 or No. 2 engine.
- If installing engine on fixed mount (buildup) side of handling adapter, perform step a. If installing engine on shock mount (transport) side of handling adapter, perform step b.

4.32.3. Installation

a. **Install engine (1) on fixed mount (buildup) side of handling adapter (2).**

(1) Remove support pins (3) and (4) from handling adapter (2).

(a) Push release button (5) and remove pins (3) and (4) from adapter (2).

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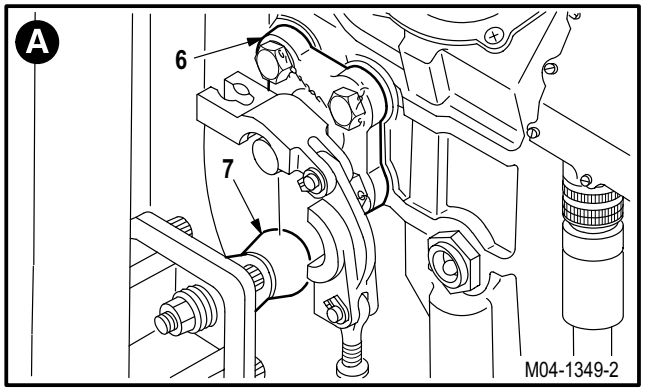
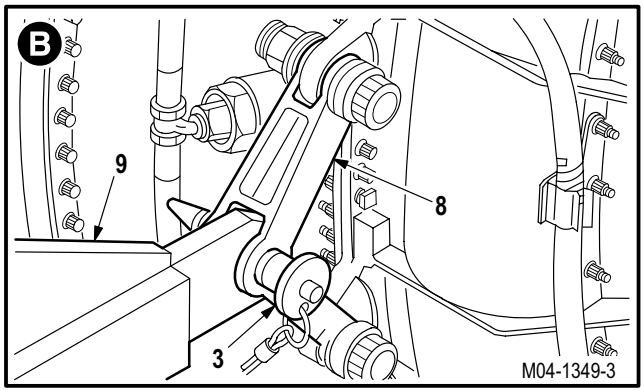
## 4.32. ENGINE BUILDUP - NO. 1 OR NO. 2 ENGINE INSTALLATION ON HANDLING ADAPTER - continued

(2) Aline engine forward inboard mount (6) with adapter forward inboard support (7).



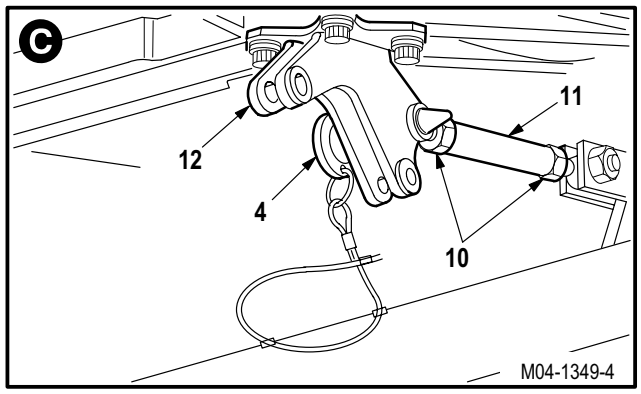

(3) Aline engine aft inboard mount (8) with adapter aft inboard support (9).

(4) Install pin (3) through mount (8) and support (9).




(5) Loosen jam nuts (10) on adapter lower forward support (11). Adjust support (11) to aline with engine lower forward mount (12).

(6) Install pin (4) through support (11) and mount (12). Tighten jam nuts (10).

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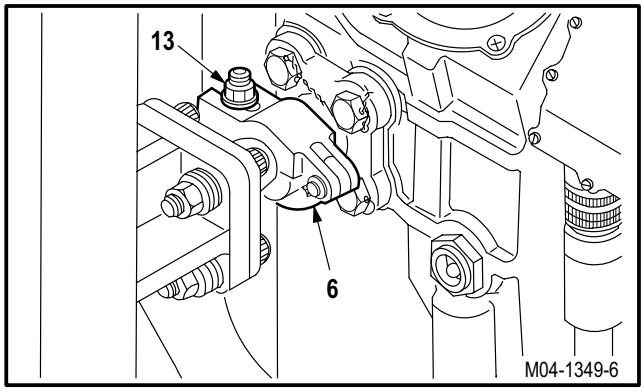
## 4.32. ENGINE BUILDUP - NO. 1 OR NO. 2 ENGINE INSTALLATION ON HANDLING ADAPTER - continued

(7) Close forward inboard mount (6).

(8) Tighten nut (13).

(9) Go to step c.

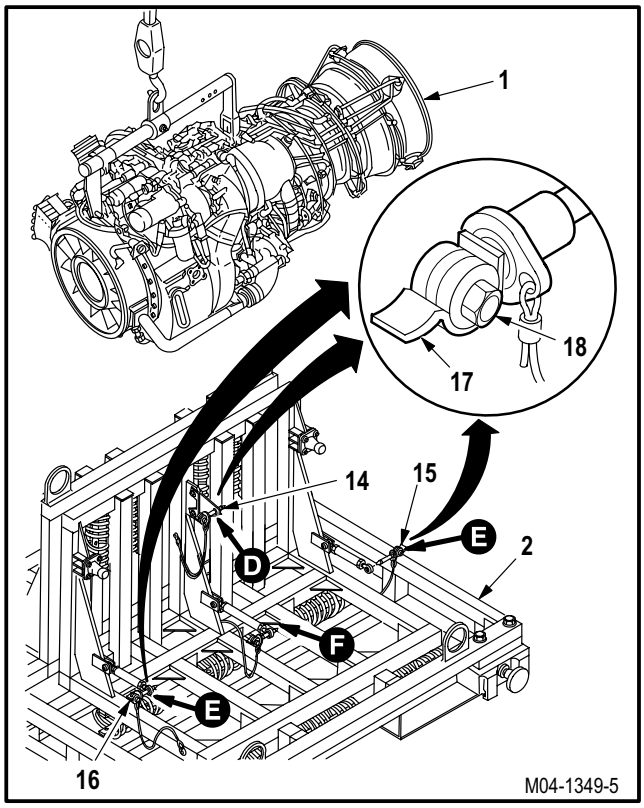



b. **Install engine (1) on shock mount (transport) side of handling adapter (2).**

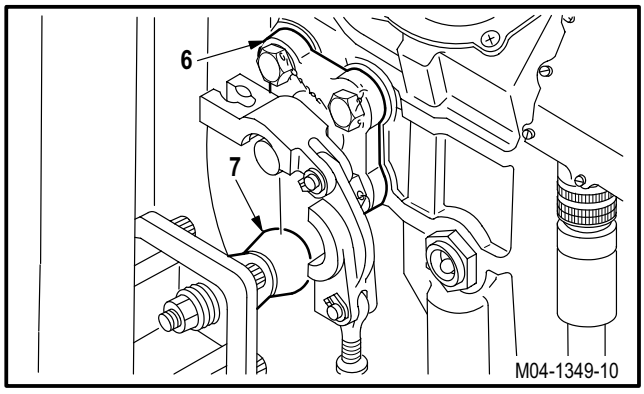
(1) Remove support pins (14), (15), and (16) from handling adapter (2).

(a) Lift spring clip (17) to unlock pins (14), (15), or (16) and turn bolt (18) counterclockwise to its internal stop.

(b) Remove pins (14), (15), and (16) from adapter (2).




(2) Aline engine forward inboard mount (6) with adapter forward inboard support (7).

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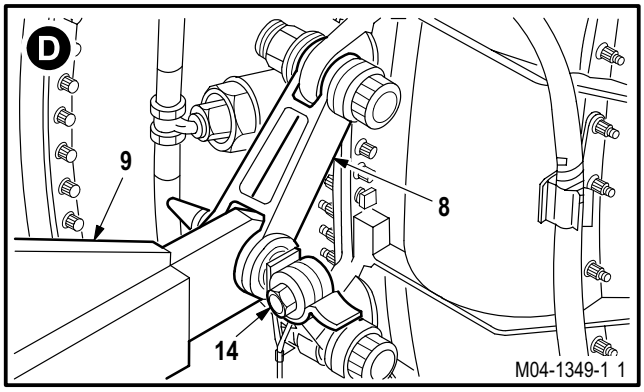
## 4.32. ENGINE BUILDUP - NO. 1 OR NO. 2 ENGINE INSTALLATION ON HANDLING ADAPTER - continued

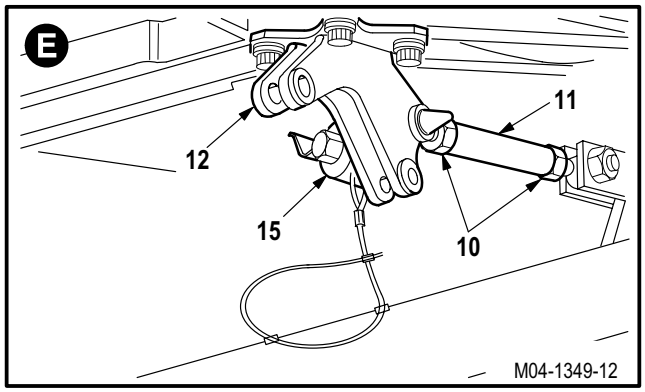
(3) Aline mount (8) with support (9).

(4) Install pin (14) through mount (8) and support (9).



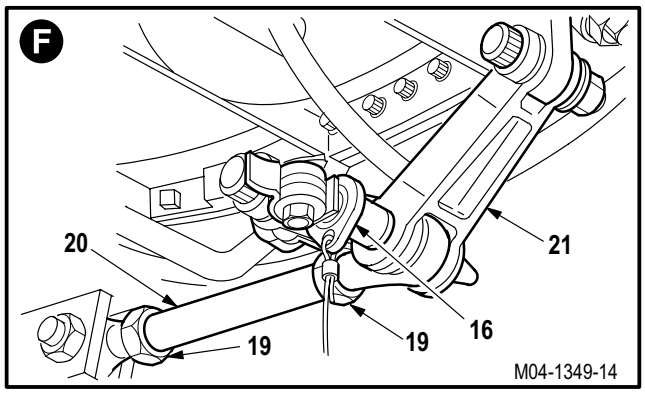

(5) Loosen jam nuts (10) on adapter lower forward support (11). Adjust support (11) to aline with engine lower forward mount (12).

(6) Install pin (15) through support (11) and mount (12). Tighten jam nuts (10).




(7) Loosen jam nuts (19) on adapter aft lower support (20). Adjust support (20) to aline with engine aft lower mount (21).

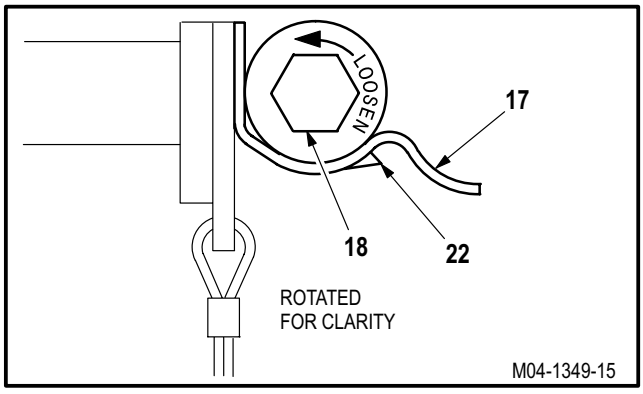
(8) Install pin (16) through support (20) and mount (21). Tighten jam nuts (19).




(9) Lock pins (14), (15), and (16).

(a) Turn bolt (18) clockwise until lock (22) engages with spring clip (17). Use torque wrench.

(b) If torque required to lock pins (14), (15), or (16) is not **55 to 100 INCH-POUNDS**, replace pin.

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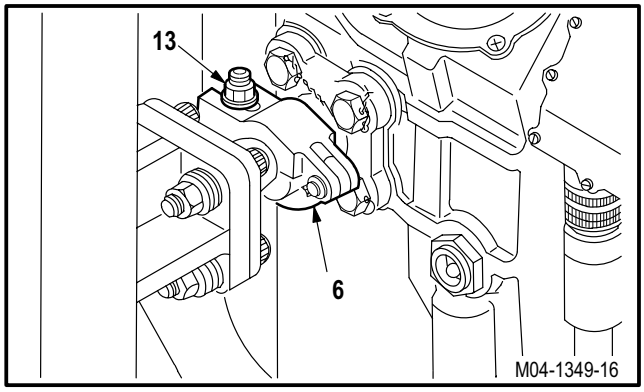
## 4.32. ENGINE BUILDUP - NO. 1 OR NO. 2 ENGINE INSTALLATION ON HANDLING ADAPTER - continued

(10) Close forward inboard mount (6).

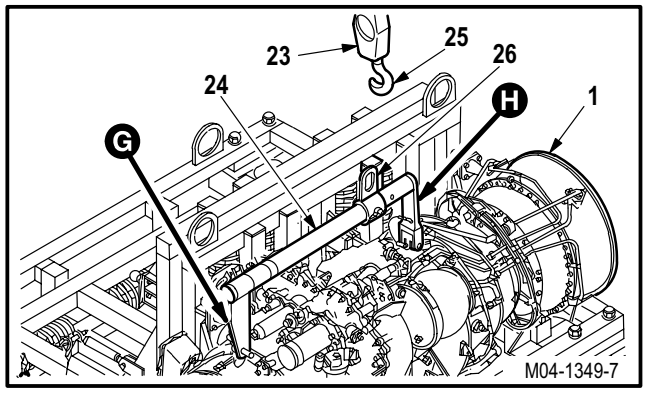
(11) Tighten nut (13).



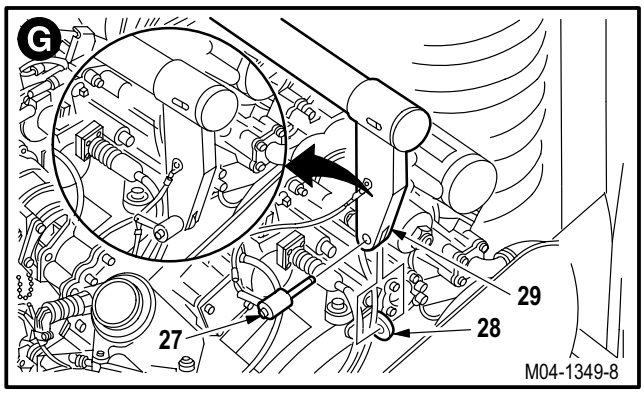

c. **Release tension on lifting cable (23).**

d. **Remove engine lifting sling (24) from engine (1).**

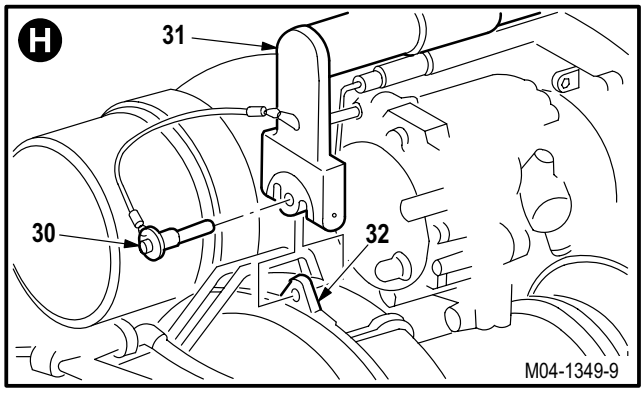
(1) Remove lifting hook (25) from sling lifting eye (26).




(2) Remove pin (27) from forward hanger link (28) and front lifting lug (29).




(3) Remove pin (30) from aft hanger link (31) and aft lifting lug (32).




e. **Inspect (QA).**

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## 4.33. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE OIL CHIP COLLECTOR INSTALLATION

4.33.1. Description

This task covers: Installation.

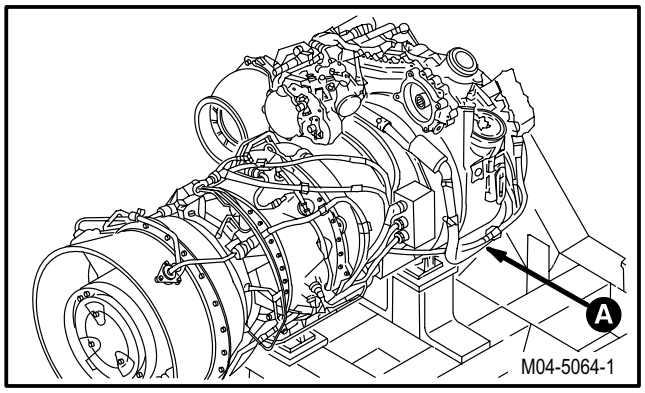
4.33.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine oil chip collector.

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## 4.33. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE OIL CHIP COLLECTOR INSTALLATION - continued

4.33.3. Installation

a. **Install collector (2) on oil sump (3).**

(1) Install washer (5) on sump (3).

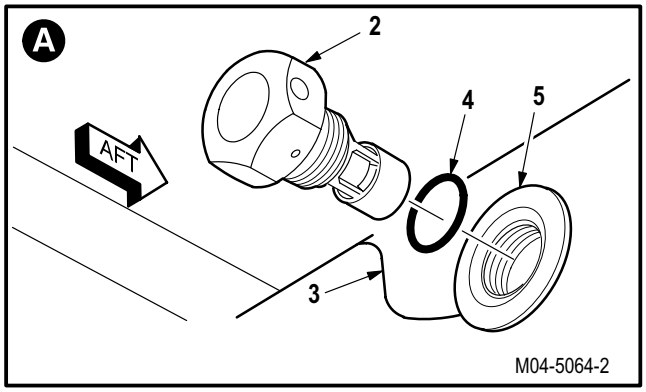
(a) Apply sealant to washer (5) on side opposite countersink. Use adhesive (item 14, App F).

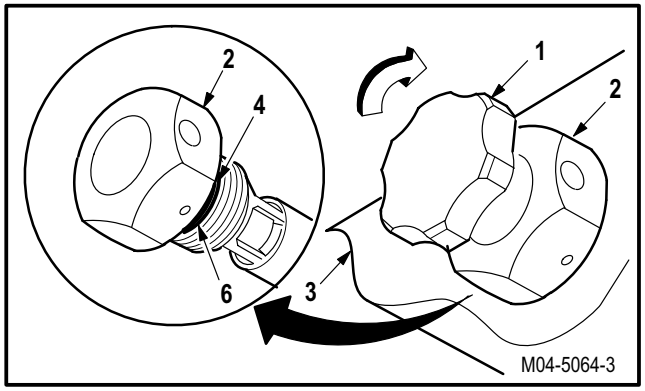
(b) With countersink facing out, aline hole in washer (5) with mounting hole on sump (3). Press in place. Wipe excess sealant with a clean dry rag.

(2) Install new packing (4) on collector (2).

(a) Lubricate packing (4). Use lubricating oil (item 119, App F).

(b) Install packing (4) in collector groove (6).




b. **Torque collector (2) to 60 INCH-POUNDS.** Use crowfoot and torque wrench.

**NOTE**

Probe is properly installed when knurl tips and hex points aline.

c. **Install probe (1) in collector (2).**

(1) Push in probe and turn clockwise.

d. **Inspect (QA).**

GO TO NEXT PARAGRAPH

## 4.34. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701 ENGINE)

4.34.1. Description

This task covers: Installation.

4.34.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine drain system.

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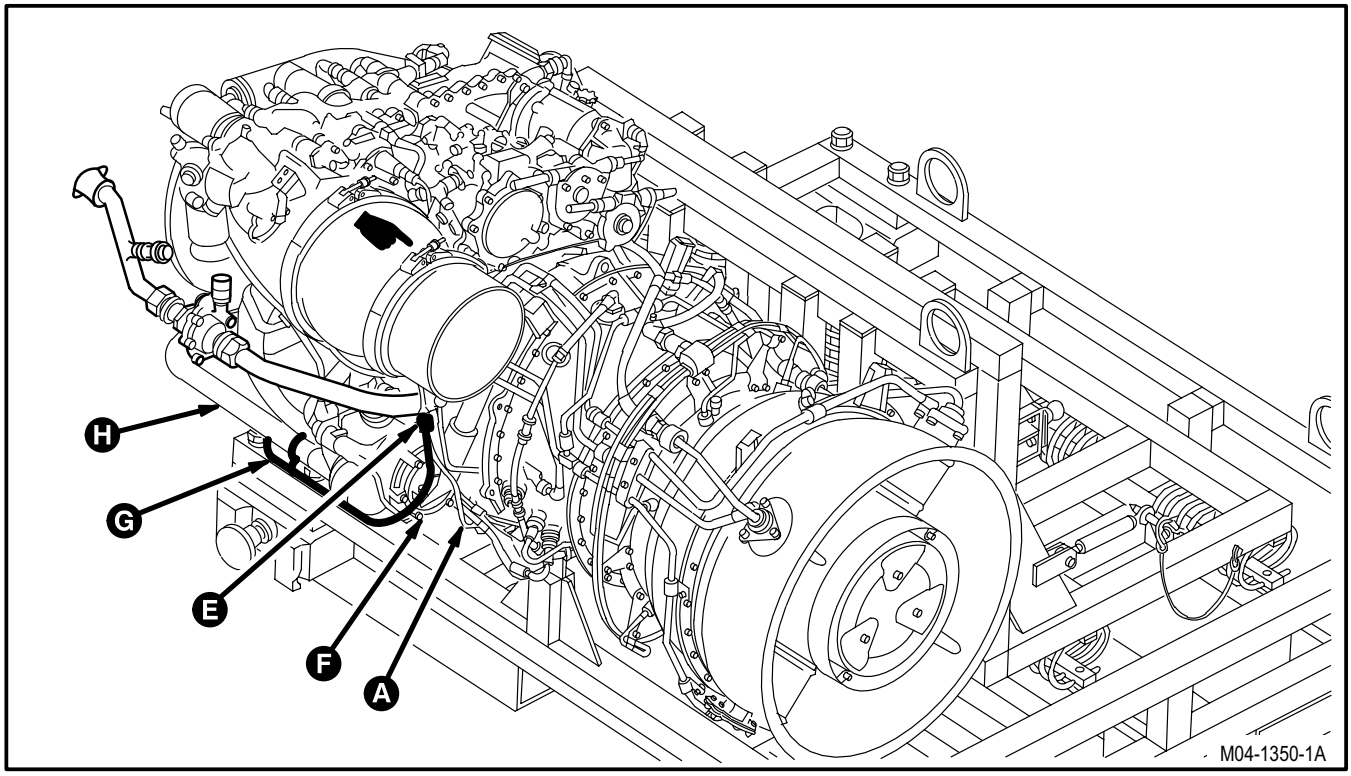
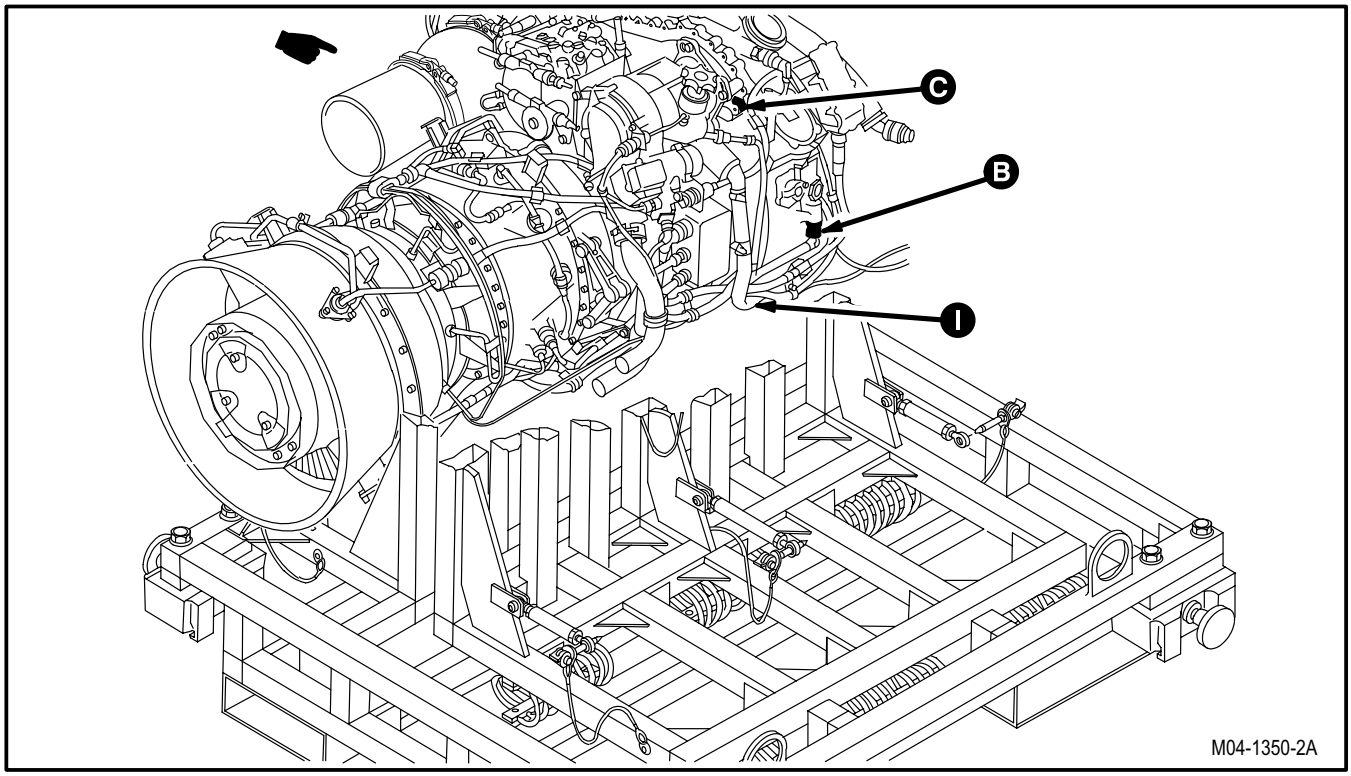
## 4.34. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701 ENGINE) - continued

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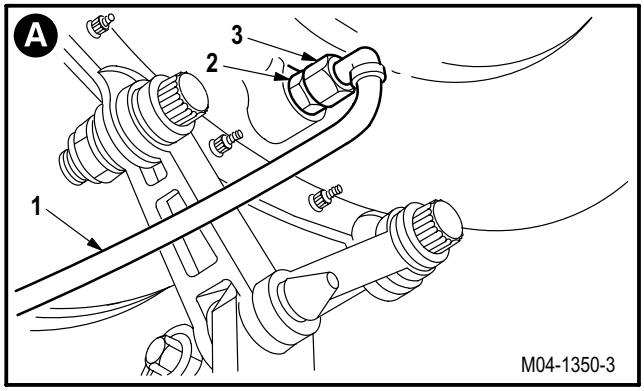
## 4.34. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701 ENGINE) - continued

4.34.3. Installation

a. **Install combustor drain hose (1) on diffuser case union (2).**

(1) Lubricate threaded area of union (2). Use petrolatum (item 138, App F).

(2) Hold union (2). Install nut (3).



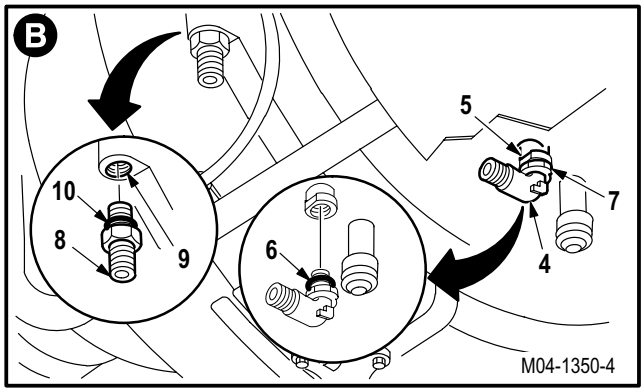

b. **Install elbow (4) in swirl frame drain (5).**

(1) Lubricate new packing (6). Use petrolatum (item 138, App F).

(2) Install packing (6) on elbow (4).

(3) Install elbow (4) in drain (5).

(4) Tighten nut (7).




c. **Install nipple (8) on main frame common drain (9).**

(1) Lubricate new packing (10). Use petrolatum (item 138, App F).

(2) Install packing (10) on nipple (8).

(3) Install nipple (8) in drain (9).

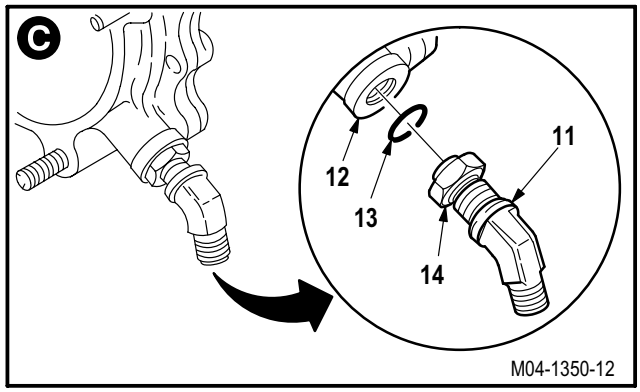
d. **Install elbow (11) on hydromechanical unit (HMU) drain (12).**

(1) Lubricate new packing (13). Use petrolatum (item 138, App F).

(2) Install packing (13) on elbow (11).

(3) Install elbow (11) in drain (12).

(4) Tighten nut (14).

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## 4.34. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701 ENGINE) - continued

e. **Install drain manifold (15) on nipple (8).** Torque nut (16) to **290 INCH-POUNDS**.

(1) Lubricate threaded area of nipple (8). Use petrolatum (item 138, App F).

(2) Hold nipple (8). Install nut (16).

(3) Torque nut (16) to **290 INCH-POUNDS**. Use torque wrench and crowfoot.

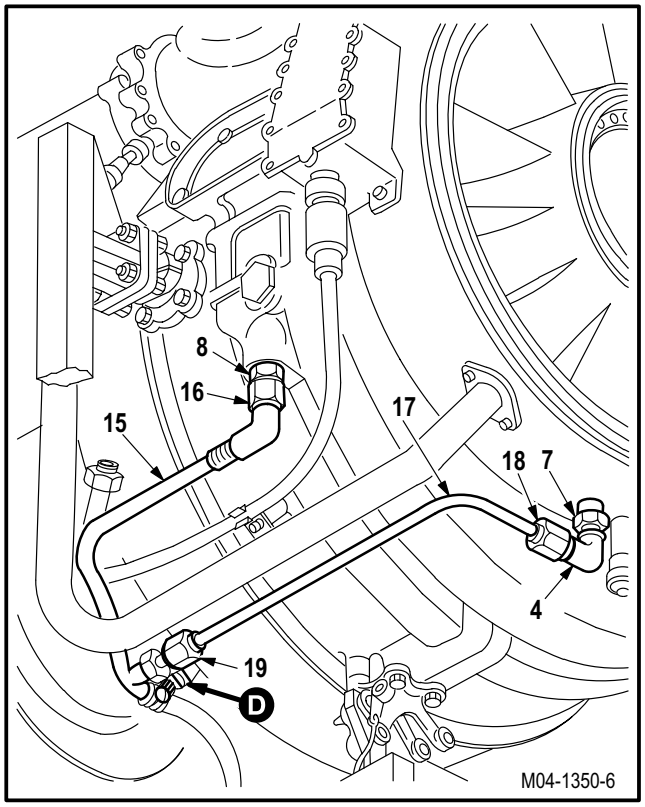
f. **Install swirl frame drain line (17) on manifold (15) and elbow (4).** Torque nuts (18) and (19) to **120 INCH-POUNDS**.

(1) Lubricate threaded area of manifold (15) and elbow (4). Use petrolatum (item 138, App F).

(2) Hold elbow (4). Install nut (18).

(3) Hold manifold (15). Install nut (19).

(4) Torque nuts (18) and (19) to **120 INCH-POUNDS**. Use torque wrench.



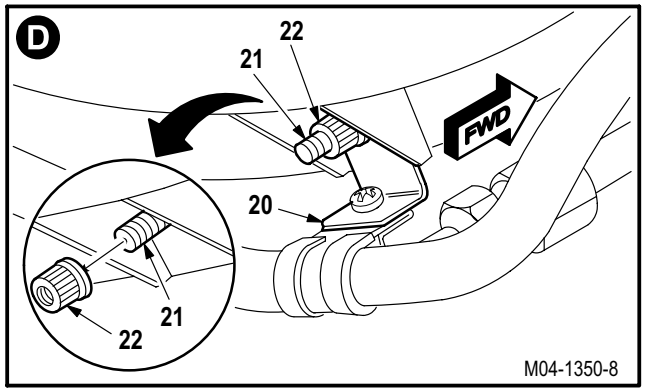

g. **Install common drain line support clip (20) on main frame mounting stud (21).** Torque nut (22) to **22 INCH-POUNDS**.

(1) Remove nut (22) from stud (21).

(2) Position clip (20) on stud (21).

(3) Reinstall nut (22) on stud (21).

(4) Torque nut (22) to **22 INCH-POUNDS**. Use torque wrench.

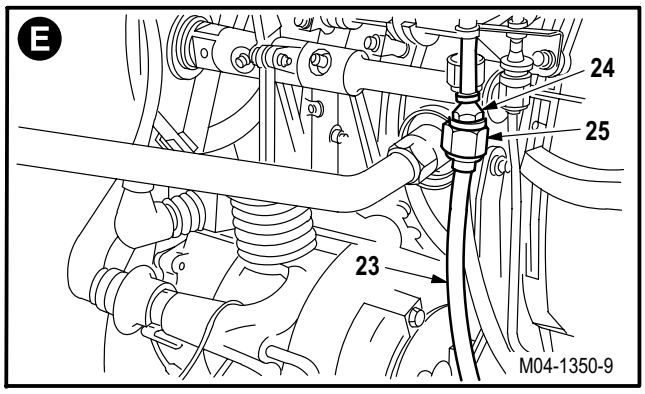



h. **Install overspeed drain valve hose (23) on fitting (24).** Torque nut (25) to **60 INCH-POUNDS**.

(1) Lubricate threaded area of fitting (24). Use petrolatum (item 138, App F).

(2) Hold fitting (24). Install nut (25).

(3) Torque nut (25) to **60 INCH-POUNDS**. Use torque wrench.

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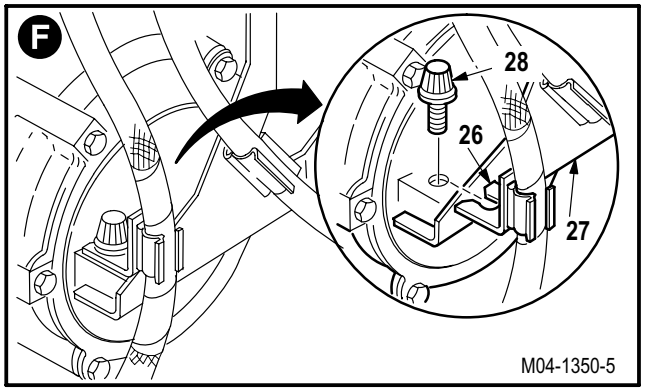
**4.34. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701 ENGINE) - continued**

i. **Install clip (26) on anti-icing valve (27).**

(1) Loosen bolt (28).

(2) Install clip (26) on valve (27).

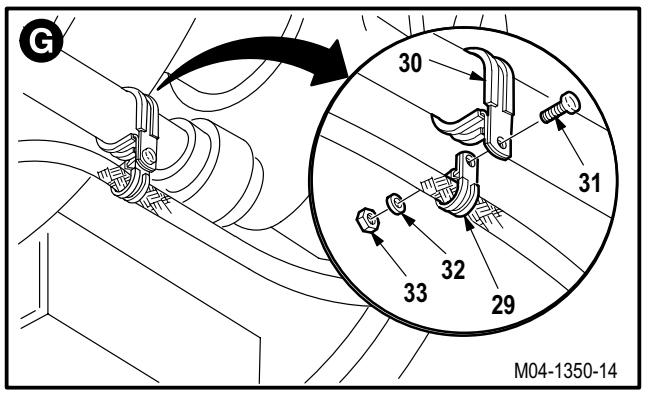
(3) Tighten bolt (28).




j. **Install overspeed drain valve hose clamp (29) on anti-ice manifold clamp (30).**

(1) Install screw (31) through clamps (30) and (29).

(2) Install washer (32) and nut (33) on screw (31).

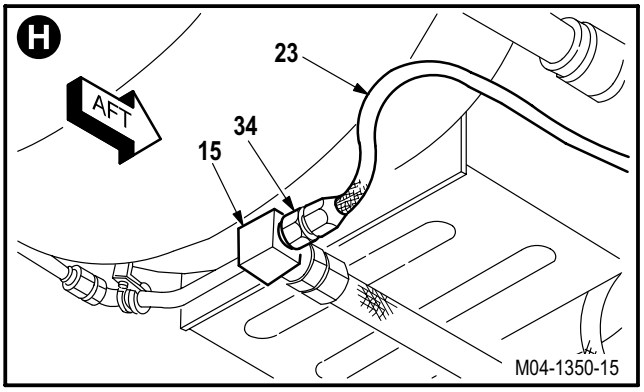



k. **Install drain hose (23) on manifold (15).** Torque nut (34) to **85 INCH-POUNDS**.

(1) Lubricate threaded area of manifold (15). Use petrolatum (item 138, App F).

(2) Hold manifold (15). Install nut (34).

(3) Torque nut (34) to **85 INCH-POUNDS**. Use torque wrench.

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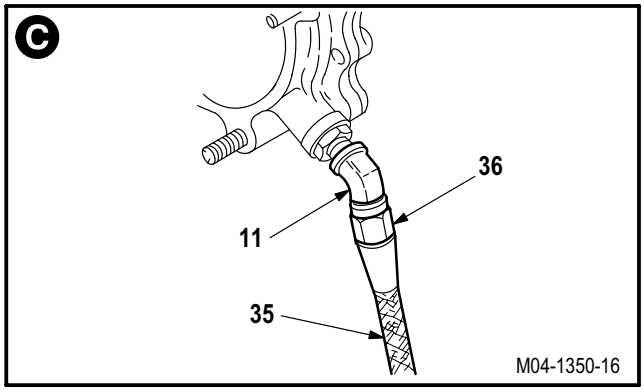
## 4.34. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701 ENGINE) - continued

l. **Install HMU vent/drain hose (35) on elbow (11).**

(1) Lubricate threaded area of elbow (11). Use petrolatum (item 138, App F).

(2) Hold elbow (11). Install nut (36).

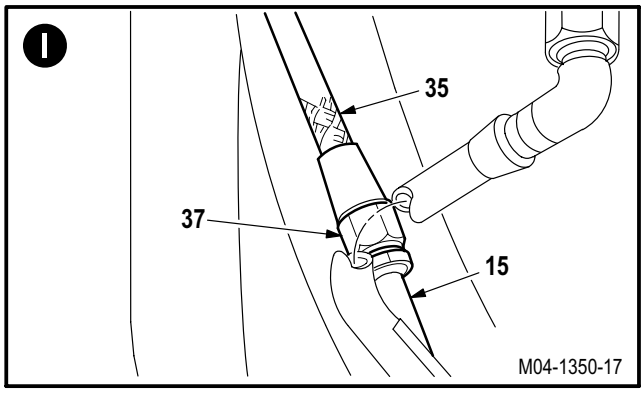



m. **Install hose (35) on drain manifold (15).** Torque nut (37) to **50 INCH-POUNDS**.

(1) Lubricate threaded area of manifold (15). Use petrolatum (item 138, App F).

(2) Hold manifold (15). Install nut (37).

(3) Torque nut (37) to **50 INCH-POUNDS**. Use torque wrench.



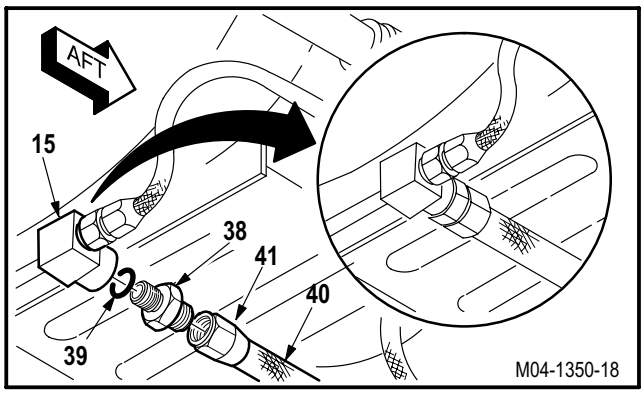

n. **Install nipple (38) on manifold (15).** Torque nipple (38) to **300 INCH-POUNDS**.

(1) Lubricate new packing (39). Use petrolatum (item 138, App F).

(2) Install packing (39) on nipple (38).

(3) Install nipple (38) in manifold (15).

(4) Hold manifold (15). Torque nipple (38) to **300 INCH-POUNDS**. Use torque wrench and crowfoot.




o. **Install drain hose (40) on nipple (38).** Torque nut (41) to **85 INCH-POUNDS**.

(1) Install nut (41) on nipple (38).

(2) Hold nipple (38). Torque nut (41) to **85 INCH-POUNDS**. Use torque wrench and crowfoot.

p. **Inspect (QA).**

GO TO NEXT PARAGRAPH

## 4.35. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701C ENGINE)

4.35.1. Description

This task covers: Installation.

4.35.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine drain system.

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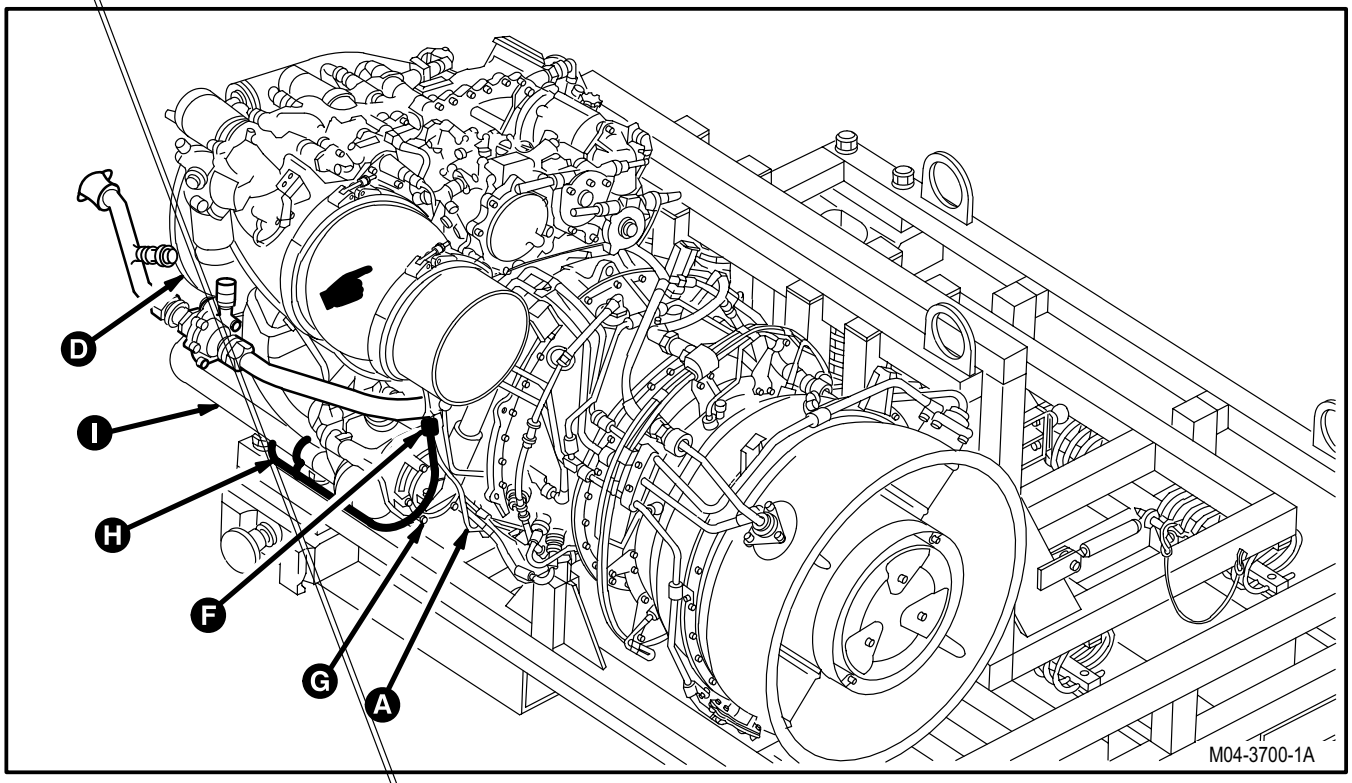
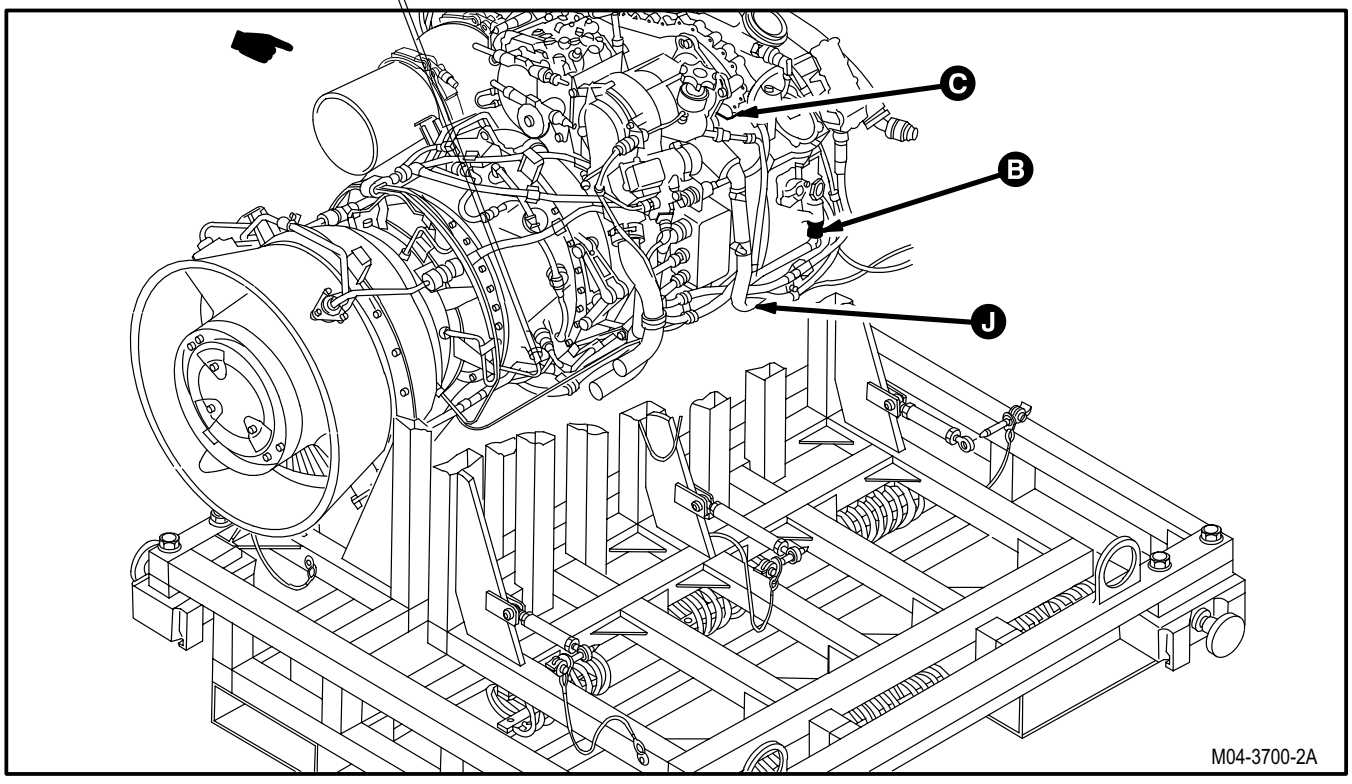
## 4.35. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701C ENGINE) - continued

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## 4.35. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701C ENGINE) - continued

4.35.3. Installation

a. **Install combustor drain hose (1) on diffuser case union (2).**

(1) Lubricate threaded area of union (2). Use petrolatum (item 138, App F).

(2) Hold union (2). Install nut (3).

b. **Install union (4) on swirl frame drain (5).**

(1) Lubricate new packing (6). Use petrolatum (item 138, App F).

(2) Install union (4) through line (7).

(3) Install packing (6) on union (4).

(4) Install union (4) on drain (5).

c. **Install union (8) on main frame common drain (9).**

(1) Lubricate new packing (10). Use petrolatum (item 138, App F).

(2) Install packing (10) on union (8).

(3) Install union (8) on drain (9).

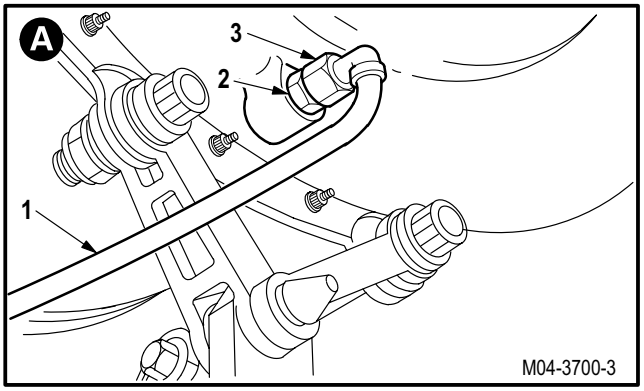
d. **Install elbow (11) on hydromechanical unit (HMU) drain (12).**

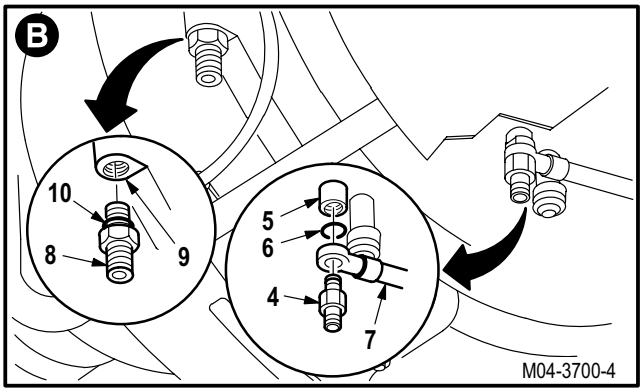
(1) Lubricate new packing (13). Use petrolatum (item 138, App F).

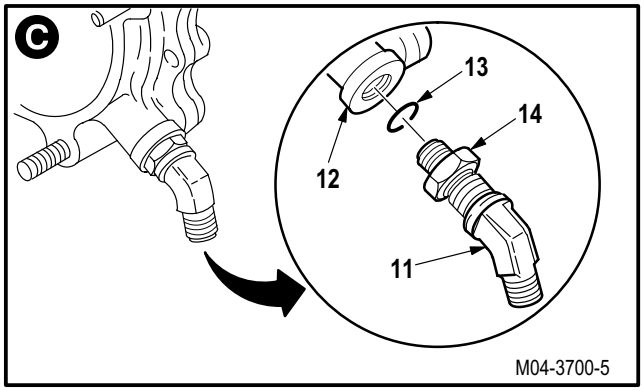
(2) Install packing (13) on elbow (11).

(3) Install elbow (11) on drain (12).

(4) Tighten nut (14).

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## 4.35. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701C ENGINE) - continued

e. **Install drain manifold (15) on union (8).** Torque nut (16) to **290 INCH-POUNDS**.

(1) Lubricate threaded area of union (8). Use petrolatum (item 138, App F).

(2) Hold union (8). Install nut (16).

(3) Torque nut (16) to **290 INCH-POUNDS**. Use torque wrench and crowfoot.

f. **Install swirl frame drain line (17) on manifold (15) and union (4).** Torque nuts (18) and (19) to **120 INCH-POUNDS**.

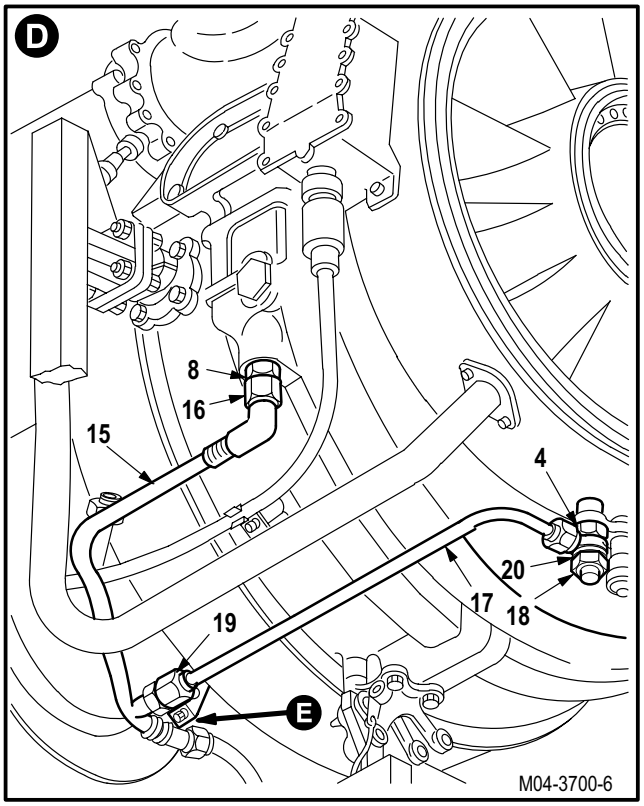
(1) Lubricate threaded area of manifold (15) and union (4). Use petrolatum (item 138, App F).

(2) Install line (17) on union (4).

(3) Hold union (4). Install washer (20) and nut (18).

(4) Hold manifold (15). Install nut (19).

(5) Torque nuts (18) and (19) to **120 INCH-POUNDS**. Use torque wrench.



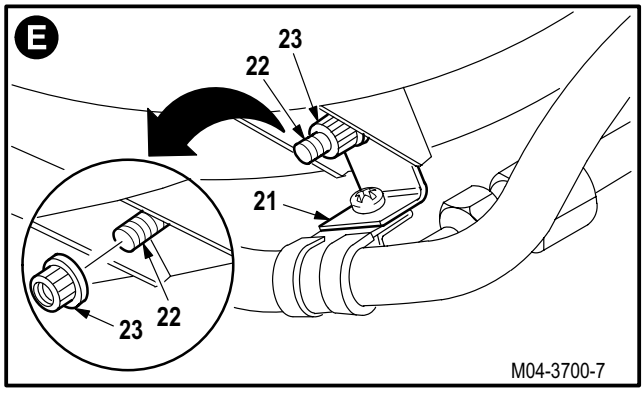

g. **Install common drain line support clip (21) on main frame mounting stud (22).** Torque nut (23) to **22 INCH-POUNDS**.

(1) Remove nut (23) from stud (22).

(2) Position clip (21) on stud (22).

(3) Reinstall nut (23) on stud (22).

(4) Torque nut (23) to **22 INCH-POUNDS**. Use torque wrench.

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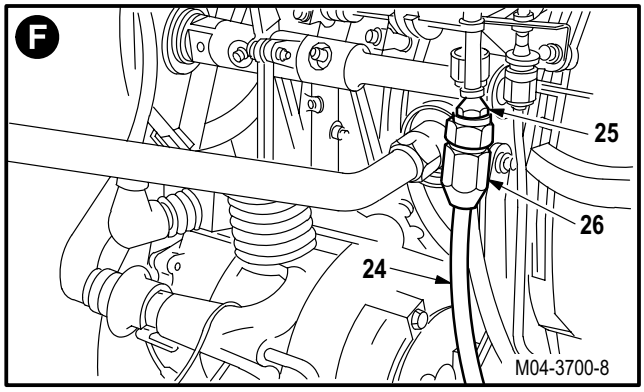
**4.35. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701C ENGINE) - continued**

h. **Install overspeed drain valve hose (24) on fitting (25).** Torque nut (26) to **60 INCH-POUNDS**.

(1) Lubricate threaded area of fitting (25). Use petrolatum (item 138, App F).

(2) Hold fitting (25). Install nut (26).

(3) Torque nut (26) to **60 INCH-POUNDS**. Use torque wrench.

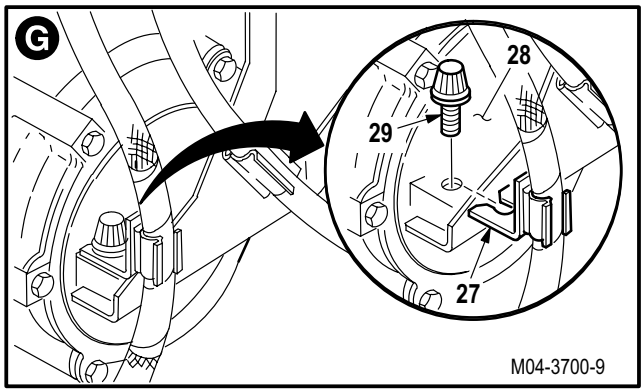



i. **Install clip (27) on anti-icing valve (28).**

(1) Loosen bolt (29).

(2) Install clip (27) on valve (28).

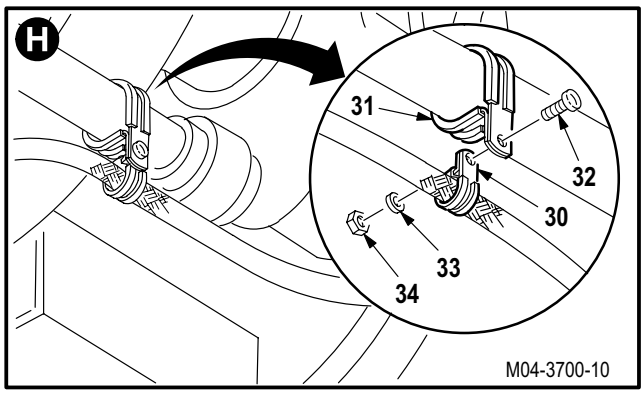
(3) Tighten bolt (29).




j. **Install overspeed drain valve hose clamp (30) on anti-ice manifold clamp (31).**

(1) Insert screw (32) through clamps (31) and (30).

(2) Hold screw (32). Install washer (33) and nut (34).

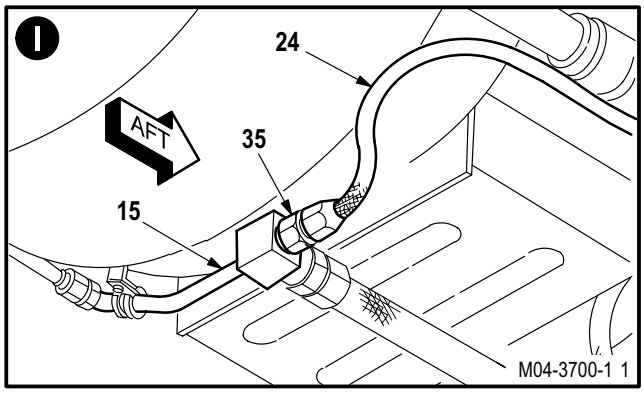



k. **Install drain hose (24) on manifold (15).** Torque nut (35) to **85 INCH-POUNDS**.

(1) Lubricate threaded area of manifold (15). Use petrolatum (item 138, App F).

(2) Hold manifold (15). Install nut (35).

(3) Torque nut (35) to **85 INCH-POUNDS**. Use torque wrench.

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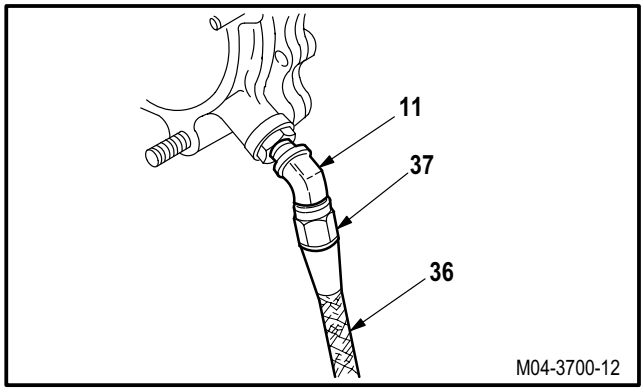
## 4.35. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE DRAIN SYSTEM INSTALLATION (T700-GE-701C ENGINE) - continued

l. **Install HMU vent/drain hose (36) on elbow (11).**

(1) Lubricate threaded area of elbow (11). Use petrolatum (item 138, App F).

(2) Hold elbow (11). Install nut (37).

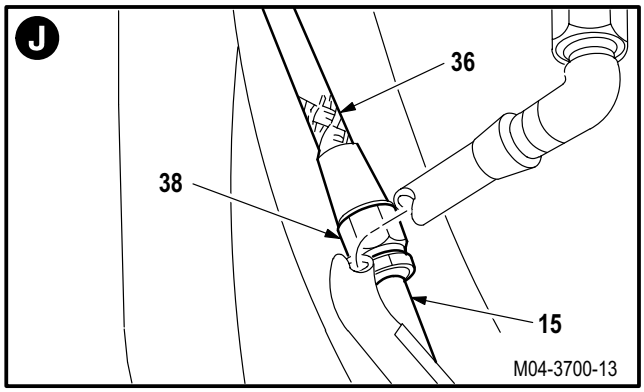



m. **Install hose (36) on manifold (15).** Torque nut (38) to **50 INCH-POUNDS**.

(1) Lubricate threaded area of manifold (15). Use petrolatum (item 138, App F).

(2) Hold manifold (15). Install nut (38).

(3) Torque nut (38) to **50 INCH-POUNDS**. Use torque wrench.



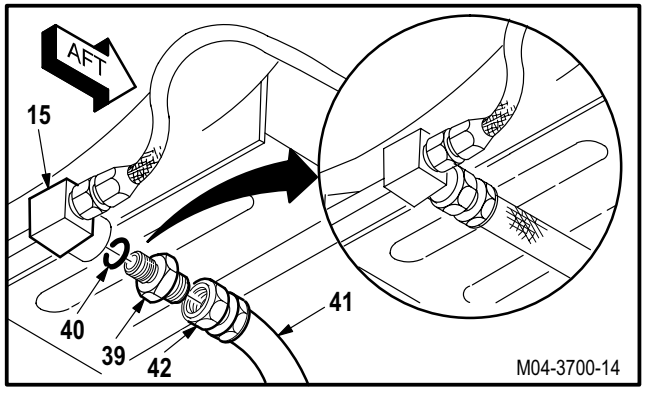

n. **Install nipple (39) on manifold (15).** Torque nipple (39) to **300 INCH-POUNDS**.

(1) Lubricate new packing (40). Use petrolatum (item 138, App F).

(2) Install packing (40) on nipple (39).

(3) Hold manifold (15). Install nipple (39).

(4) Torque nipple (39) to **300 INCH-POUNDS**. Use torque wrench and crowfoot.




o. **Install drain hose (41) on nipple (39).** Torque nut (42) to **85 INCH-POUNDS**.

(1) Install nut (42) on nipple (39).

(2) Hold nipple (39). Torque nut (42) to **85 INCH-POUNDS**. Use torque wrench and crowfoot.

p. **Inspect (QA).**

GO TO NEXT PARAGRAPH

## 4.36. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE SHROUD SUPPORT INSTALLATION

4.36.1. Description

This task covers: Installation.

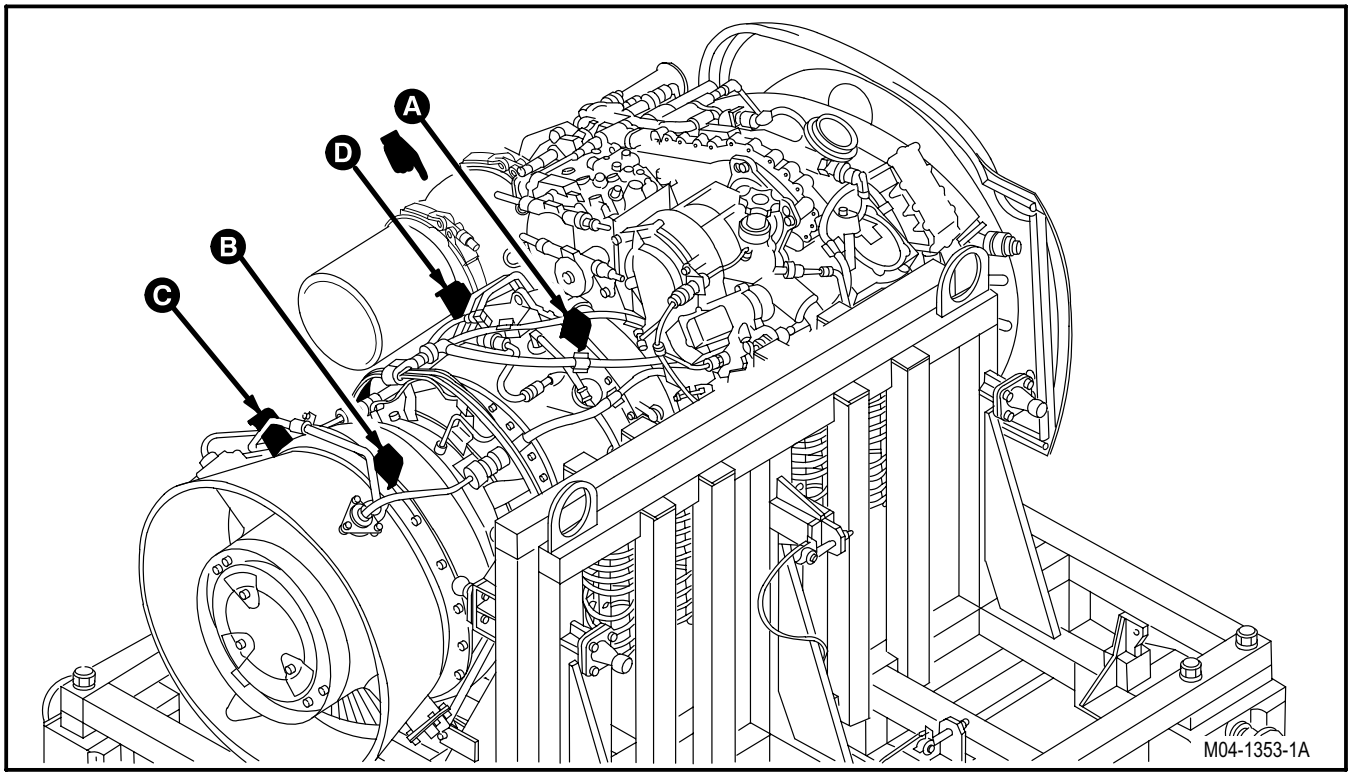
4.36.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine shroud support assembly.

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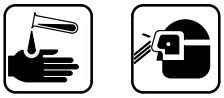
## 4.36. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE SHROUD SUPPORT INSTALLATION - continued

4.36.3. Installation



a. **Install forward right shroud support (1) on diffuser case flange (2).** Torque two nuts (4) to **80 INCH-POUNDS**.

(1) Hold bolt (3). Remove nut (4).

(2) Remove nut (4) from stud (5).

(3) Lubricate threads of bolt (3) and stud (5). Use lubricating oil (item 119, App F).

(4) Position support (1) on bolt (3) and stud (5).

(5) Hold bolt (3). Install nut (4).

(6) Install nut (4) on stud (5).

(7) Hold bolt (3). Torque two nuts (4) to **80 INCH-POUNDS**. Use torque wrench.

b. **Install aft right shroud support (6) on power turbine case flange (7).** Torque two nuts (9) to **80 INCH-POUNDS**.

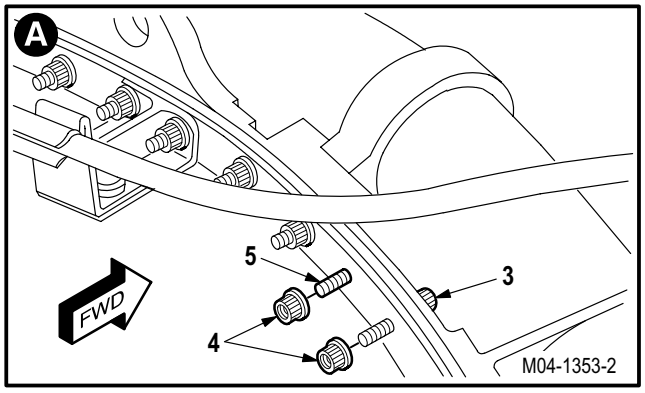
(1) Hold two bolts (8). Remove two nuts (9).

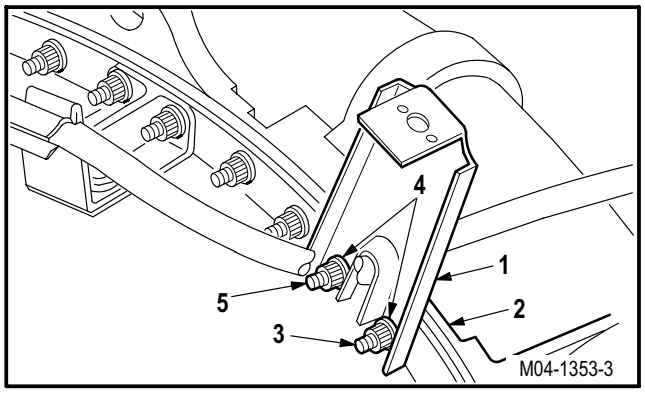
(2) Lubricate threads of bolts (8). Use lubricating oil (item 119, App F).

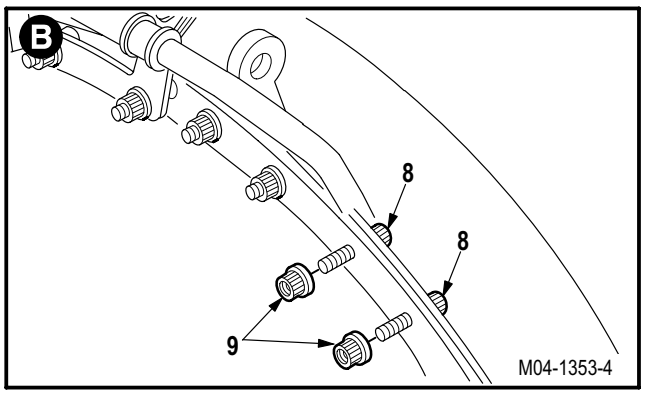
(3) Position support (6) on bolts (8).

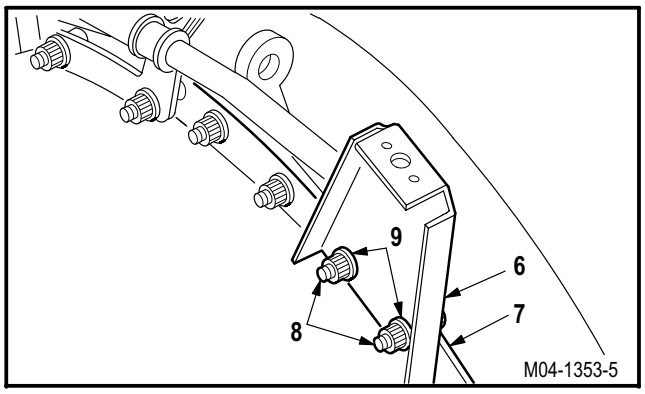
(4) Hold bolts (8). Install nuts (9).

(5) Hold two bolts (8). Torque two nuts (9) to **80 INCH-POUNDS**. Use torque wrench.

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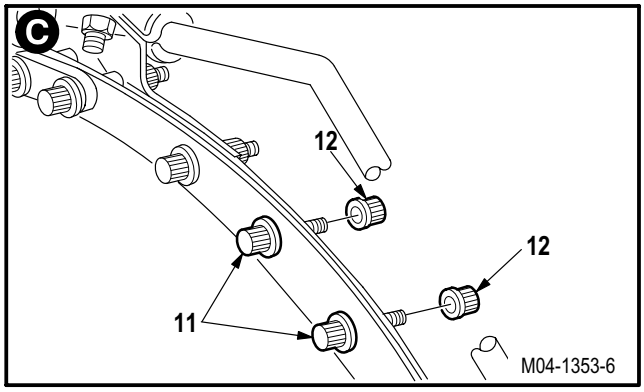
**4.36. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE SHROUD SUPPORT INSTALLATION - continued**

c. **Install aft left shroud support (10) on power turbine case flange (7).** Torque two nuts (12) to **80 INCH-POUNDS**.

(1) Hold two bolts (11). Remove nuts (12).

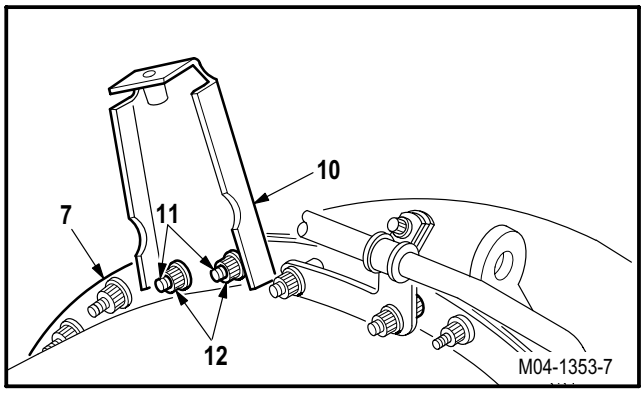
(2) Lubricate threads of bolts (11). Use lubricating oil (item 119, App F).

(3) Position support (10) on bolts (11).




(4) Hold two bolts (11). Install two nuts (12).

(5) Hold two bolts (11). Torque two nuts (12) to **80 INCH-POUNDS**. Use torque wrench.



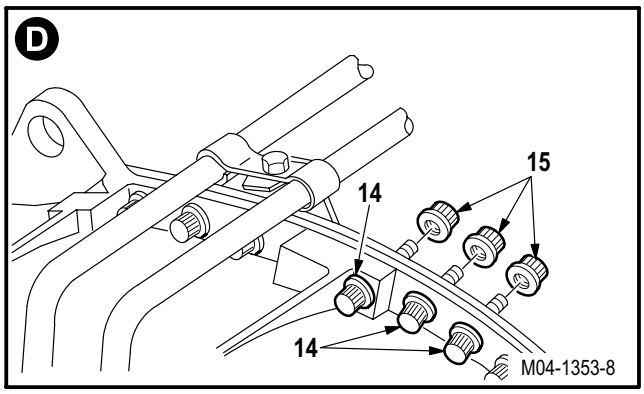

d. **Install forward left shroud support (13) on diffuser case flange (2).** Torque three nuts (15) to **80 INCH-POUNDS**.

(1) Hold three bolts (14). Remove nuts (15).

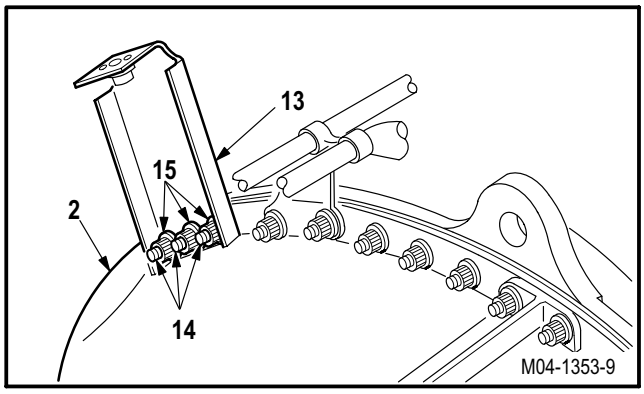
(2) Lubricate threads of bolts (14). Use lubricating oil (item 119, App F).

(3) Position support (13) on bolts (14).

(4) Hold three bolts (14). Torque three nuts (15) to **80 INCH-POUNDS**. Use torque wrench.




e. **Inspect (QA).**

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## 4.37. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE BASEPLATE AND SPINDLE GEARBOXES INSTALLATION

4.37.1. Description

This task covers: Installation.

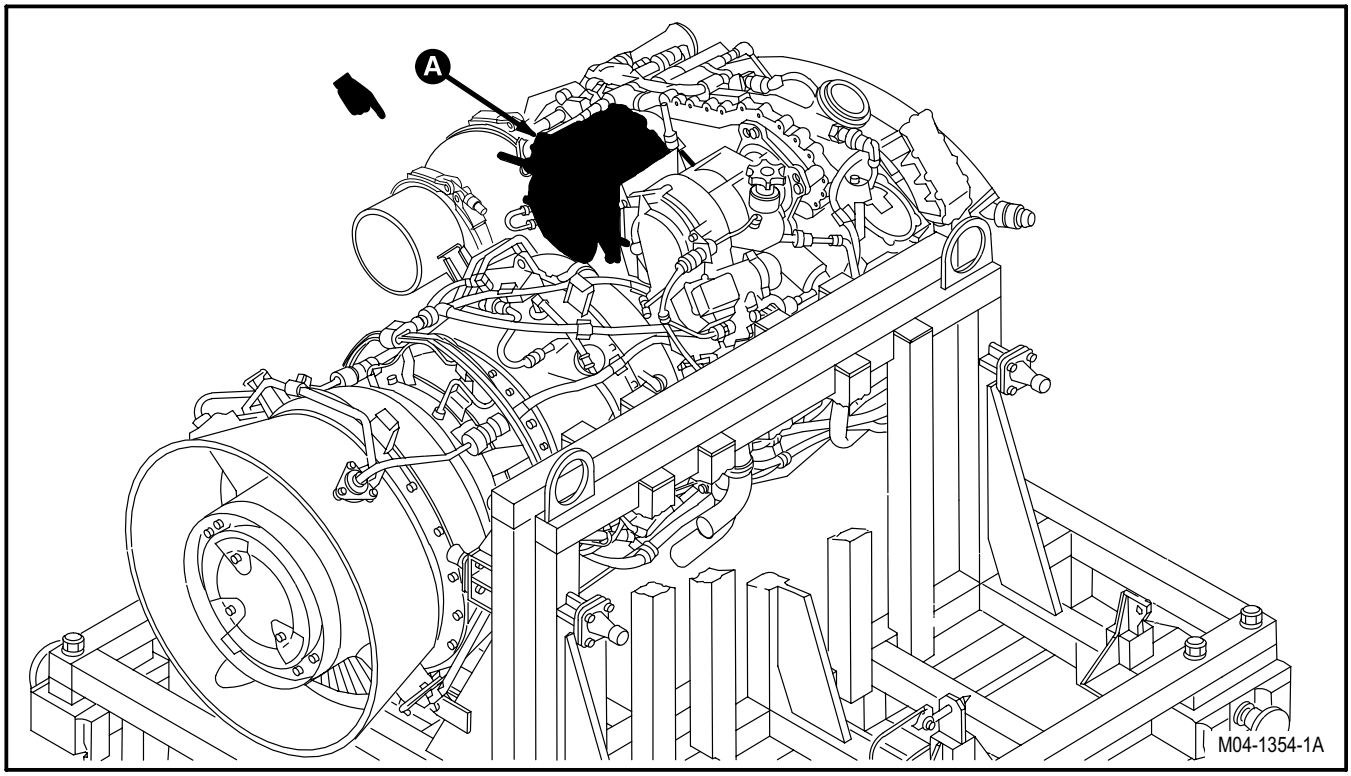
4.37.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine baseplate gearbox.

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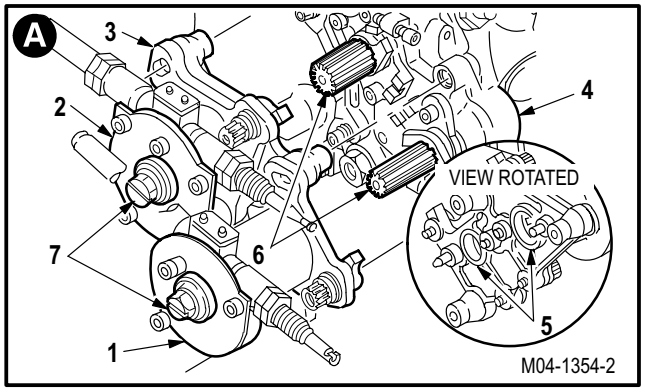
## 4.37. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE BASEPLATE AND SPINDLE GEARBOXES INSTALLATION - continued

4.37.3. Installation

a. **Install load demand spindle gearbox (1), power available spindle gearbox (2), and baseplate (3) on hydromechanical unit (HMU) (4).**

(1) Rotate wide tooth spaces (5) to aline with HMU (4) wide tooth spaces (6). Use common screwdriver in slots (7) on gearboxes (1) and (2).



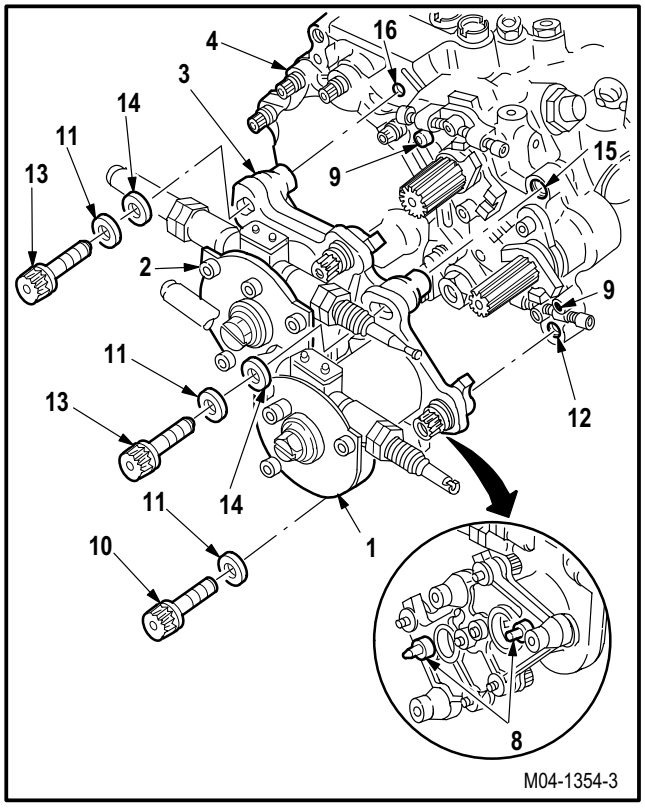

(2) Aline pins (8) on baseplate (3) with holes (9) in HMU (4).

(3) Position baseplate (3) and gearboxes (1) and (2) on HMU (4).

(4) Install lower short bolt (10) through countersunk washer (11) and baseplate (3) into mounting hole (12).

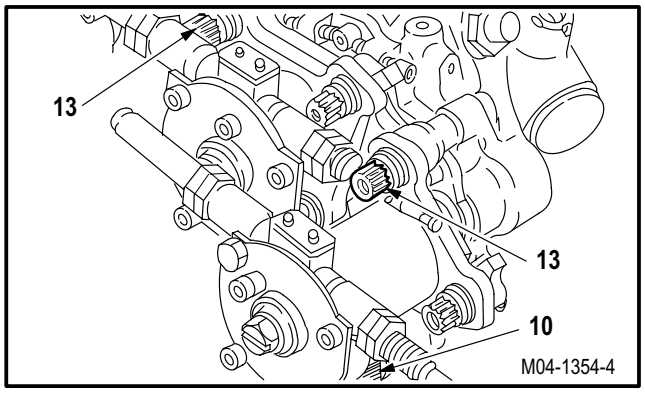
(5) Install long bolt (13) through countersunk washer (11), flat washer (14), and baseplate (3) into mounting hole (15).

(6) Install long bolt (13) through countersunk washer (11), flat washer (14), gearbox (1), and baseplate (3) into mounting hole (16).




b. **Torque bolt (10) and two bolts (13) to 60 INCH-POUNDS.** Use torque wrench.

c. **Inspect (QA).**

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## 4.38. ENGINE BUILDUP - NO. 1 ENGINE AIR STARTER AND REGULATING VALVE INSTALLATION

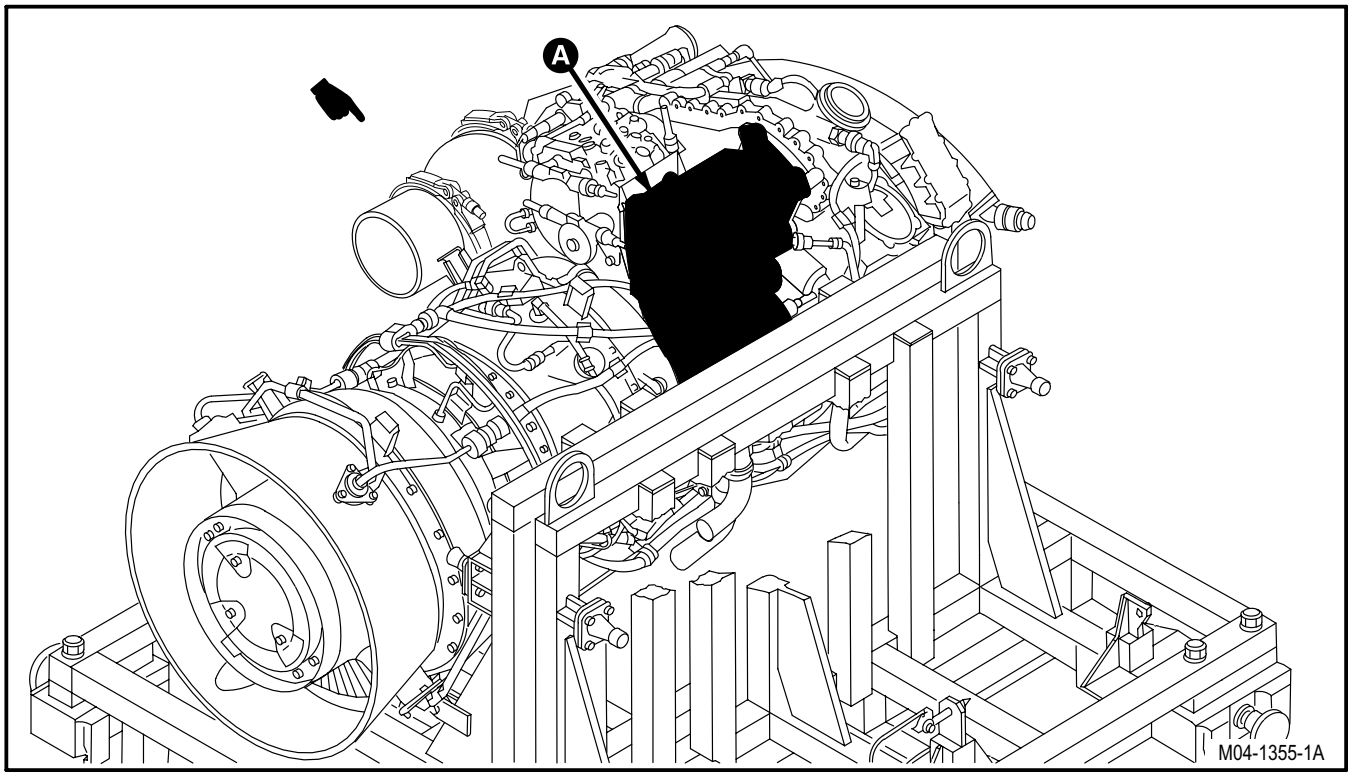
4.38.1. Description

This task covers: Installation.

4.38.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

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## 4.38. ENGINE BUILDUP - NO. 1 ENGINE AIR STARTER AND REGULATING VALVE INSTALLATION - continued

4.38.3. Installation

a. **Install two new packings (1) and (2) on starter (3).**

(1) Lubricate packings (1) and (2). Use petrolatum (item 138, App F).

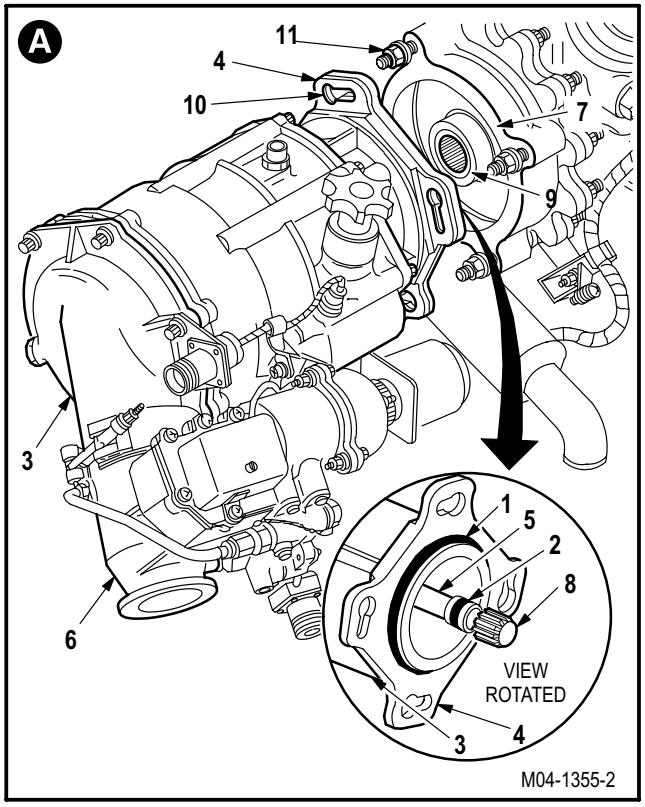
(2) Install packing (1) on starter flange (4).

(3) Install packing (2) on starter shaft (5).

b. **Mount starter (3) with regulating valve (6) on mounting pad (7).** Torque four nuts (11) to **120 INCH-POUNDS**.

(1) Aline starter shaft splines (8) with starter drive pad splines (9).

(2) Aline holes (10) on starter flange (4) with four nuts (11) on mounting pad (7).

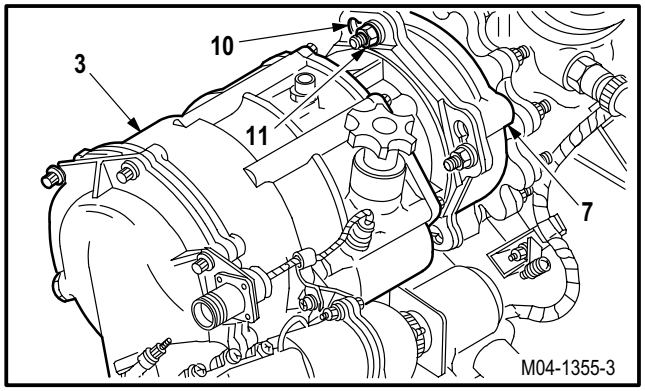



(3) Slide starter (3) forward until flush with mounting pad (7).

(4) Turn starter (3) counterclockwise until seated.

(5) Torque four nuts (11) to **120 INCH-POUNDS**. Use torque wrench.

c. **Inspect (QA).**

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## 4.38. ENGINE BUILDUP - NO. 1 ENGINE AIR STARTER AND REGULATING VALVE INSTALLATION - continued

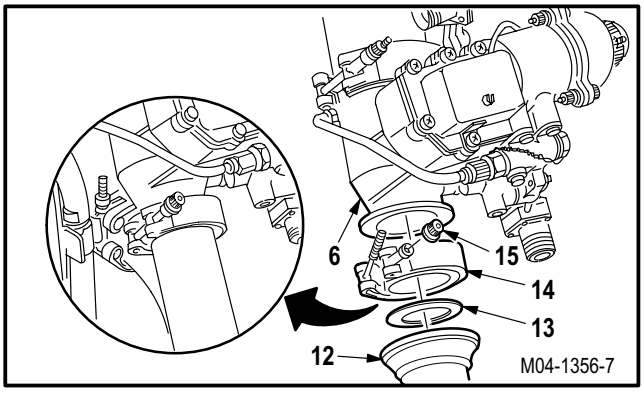
d. **Install starter air tube (12) on regulating valve (6).** Torque coupling nut (15) to **25 INCH-POUNDS**.

(1) Install new gasket (13) in starter air tube (12).

(2) Position coupling (14) on starter air tube (12) and regulating valve (6).

(3) Install nut (15) on coupling (14).

(4) Torque coupling nut (15) to **25 INCH-POUNDS**. Use torque wrench.




e. **Inspect (QA).**

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## 4.39. ENGINE BUILDUP - NO. 2 ENGINE AIR STARTER AND REGULATING VALVE INSTALLATION

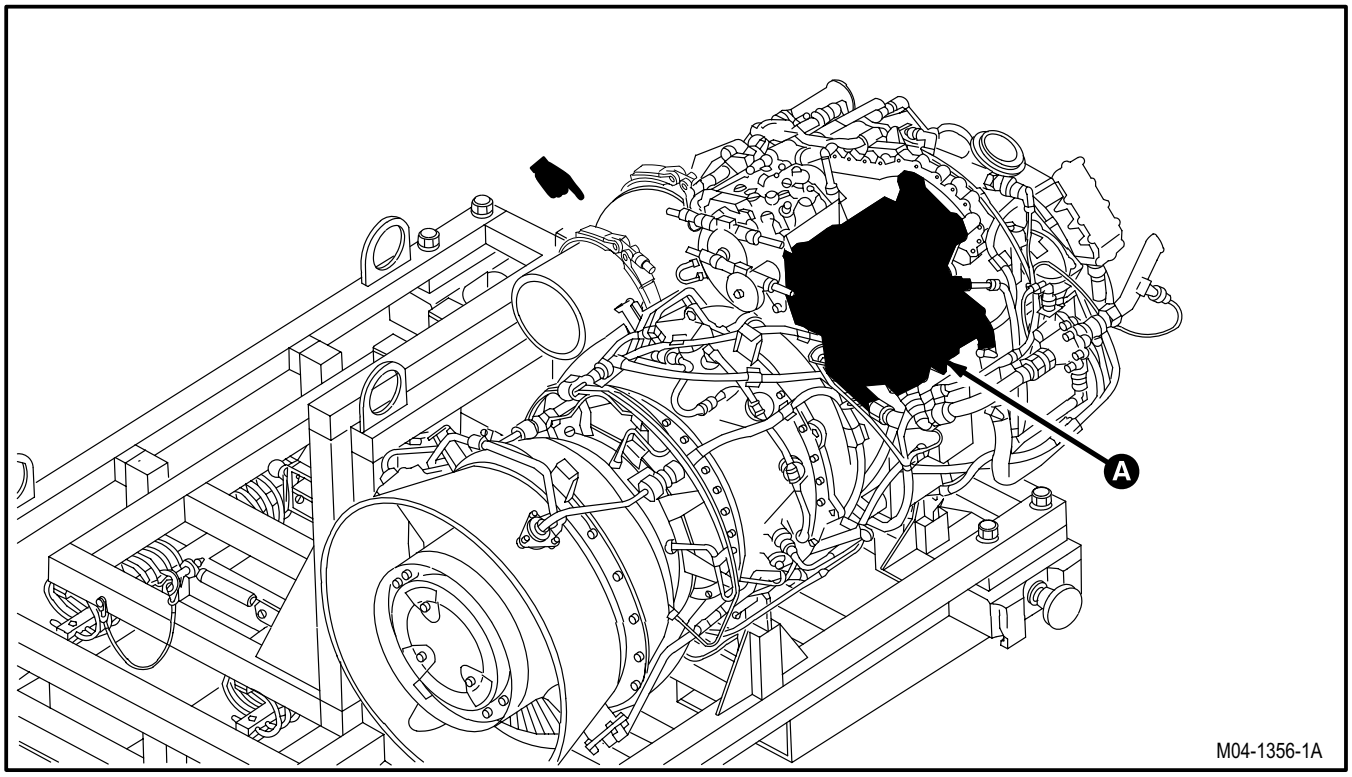
4.39.1. Description

This task covers: Installation.

4.39.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

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## 4.39. ENGINE BUILDUP - NO. 2 ENGINE AIR STARTER AND REGULATING VALVE INSTALLATION - continued

4.39.3. Installation

a. **Install new packings (1) and (2) on starter (3).**

(1) Lubricate packings (1) and (2). Use petrolatum (item 138, App F).

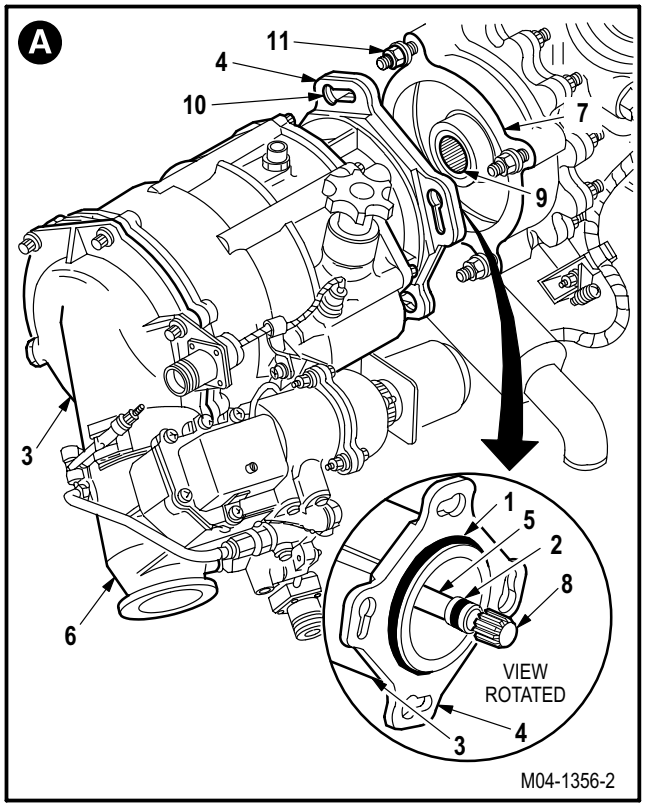
(2) Install packing (1) on starter flange (4).

(3) Install packing (2) on starter shaft (5).

b. **Mount starter (3) with regulating valve (6) on mounting pad (7).** Torque four nuts (11) to **120 INCH-POUNDS**.

(1) Aline starter shaft splines (8) with starter drive pad splines (9).

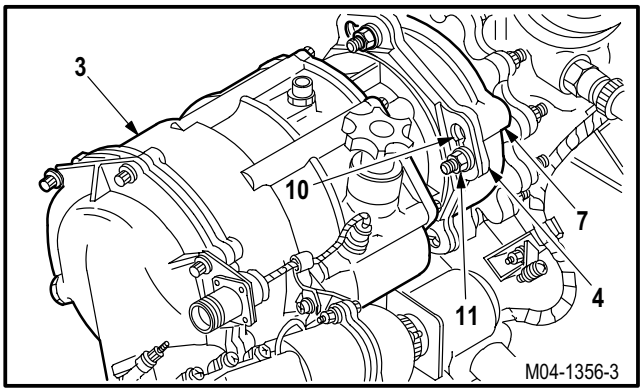
(2) Aline holes (10) on starter flange (4) with four nuts (11) on mounting pad (7).




(3) Slide starter (3) forward until flush with mounting pad (7).

(4) Turn starter (3) counterclockwise until seated.

(5) Torque four nuts (11) to **120 INCH-POUNDS**. Use torque wrench.

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**4.39. ENGINE BUILDUP - NO. 2 ENGINE AIR STARTER AND REGULATING VALVE INSTALLATION - continued**

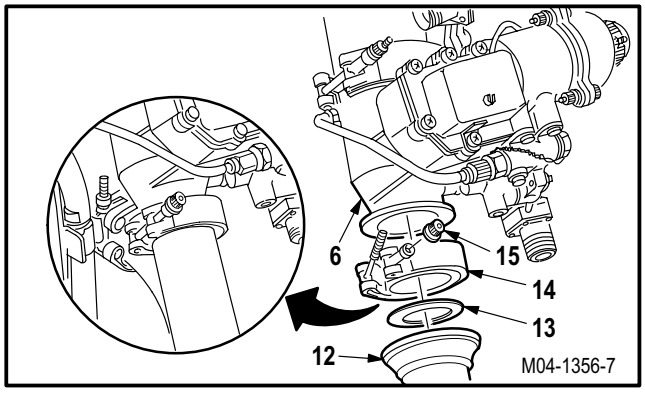
c. **Install starter air tube (12) on regulating valve (6).** Torque coupling nut (15) to **25 INCH-POUNDS**.

(1) Install new gasket (13) in starter air tube (12).

(2) Position coupling (14) on starter air tube (12) and regulating valve (6).

(3) Install nut (15) on coupling (14).

(4) Torque coupling nut (15) to **25 INCH-POUNDS**. Use torque wrench.




d. **Inspect (QA).**

GO TO NEXT PARAGRAPH

## 4.40. ENGINE BUILDUP - NO. 1 ENGINE ANTI-ICE AND BLEED AIR SYSTEM INSTALLATION

4.40.1. Description

This task covers: Installation.

4.40.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

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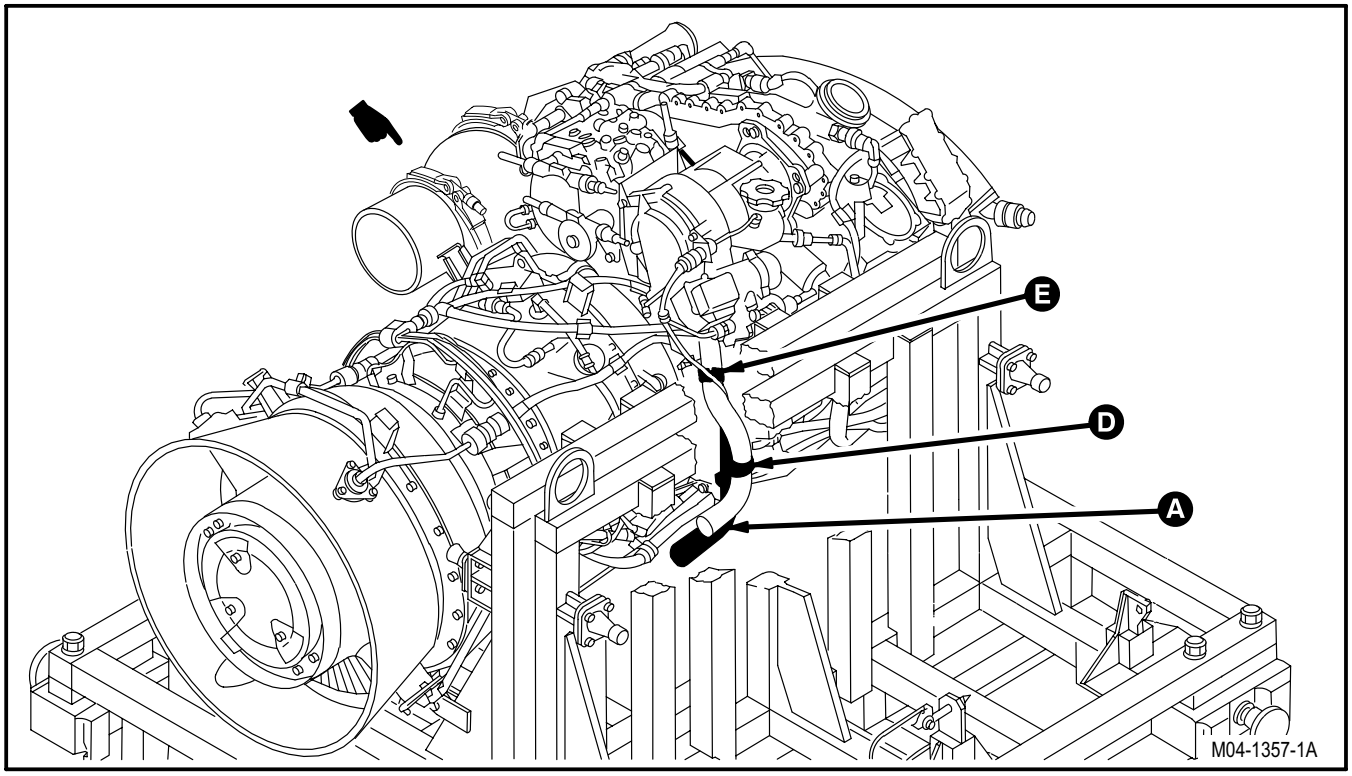
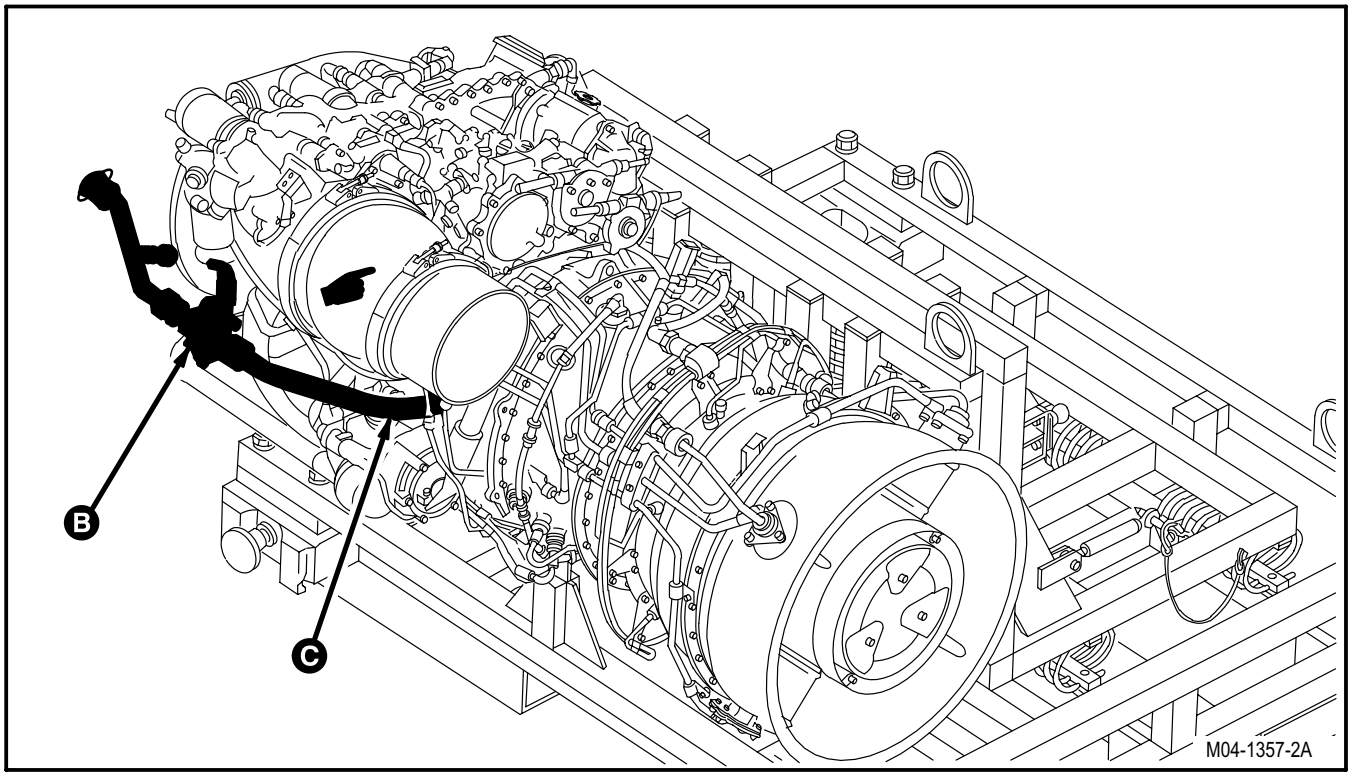
## 4.40. ENGINE BUILDUP - NO. 1 ENGINE ANTI-ICE AND BLEED AIR SYSTEM INSTALLATION - continued

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## 4.40. ENGINE BUILDUP - NO. 1 ENGINE ANTI-ICE AND BLEED AIR SYSTEM INSTALLATION - continued

4.40.3. Installation

a. **Install bleed air tube (1) on air port flange (2).** Torque coupling nut (3) to **25 INCH-POUNDS**.

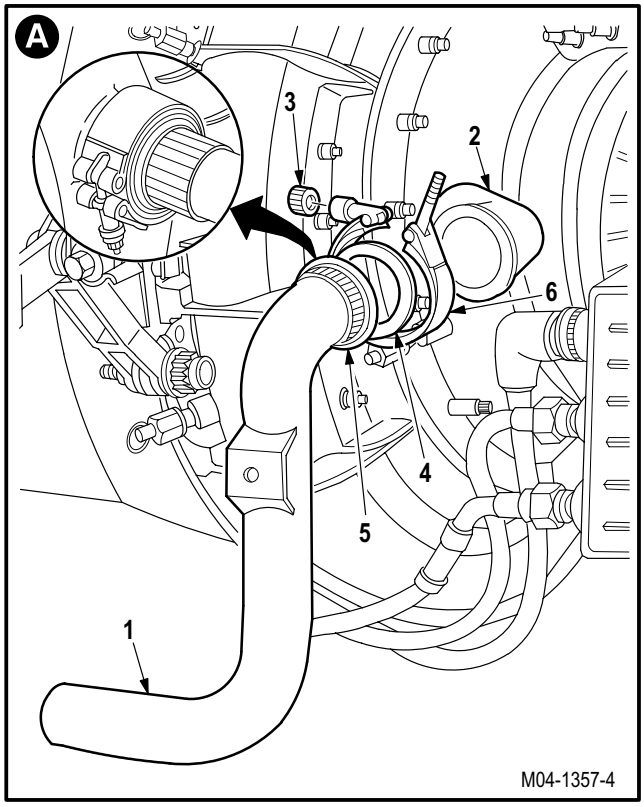
(1) Install compressor orifice (4) on tube flange (5).

(2) Position air tube flange (5) on air port flange (2).

(3) Position coupling (6) around flanges (5) and (2).

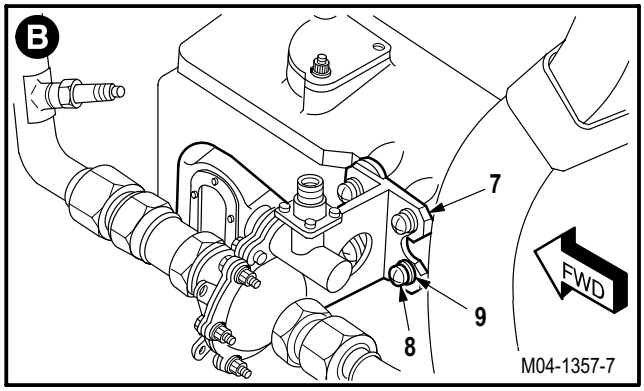
(4) Install coupling nut (3).

(5) Torque coupling nut (3) to **25 INCH-POUNDS**. Use torque wrench.




b. **Install anti-ice valve support bracket (7).**

(1) Install four screws (8) and washers (9).

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## 4.40. ENGINE BUILDUP - NO. 1 ENGINE ANTI-ICE AND BLEED AIR SYSTEM INSTALLATION - continued

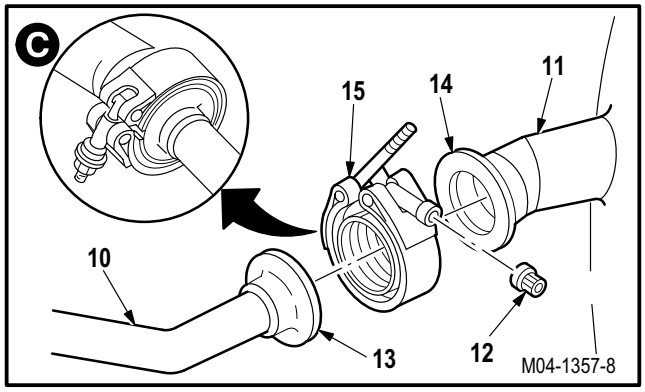
c. **Install anti-ice tube (10) on air port (11).** Torque nut (12) to **25 INCH-POUNDS**.

(1) Position anti-ice tube flange (13) on port flange (14).

(2) Position coupling (15) around flanges (13) and (14).

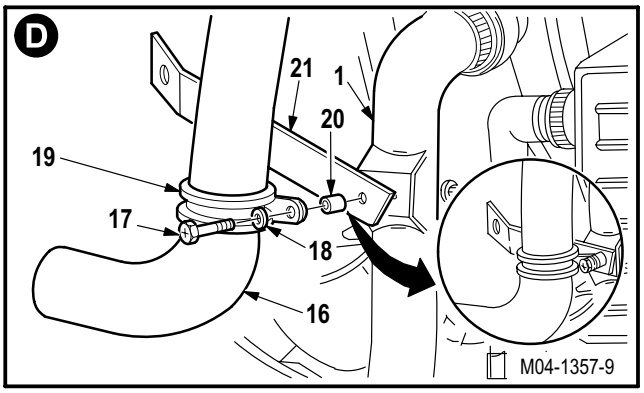
(3) Install coupling nut (12).

(4) Torque nut (12) to **25 INCH-POUNDS**. Use torque wrench.




d. **Install starter air tube (16) on bleed air tube (1).**

(1) Install screw (17) through washer (18), clamp (19), spacer (20), angle bracket (21), and in bleed air tube (1).



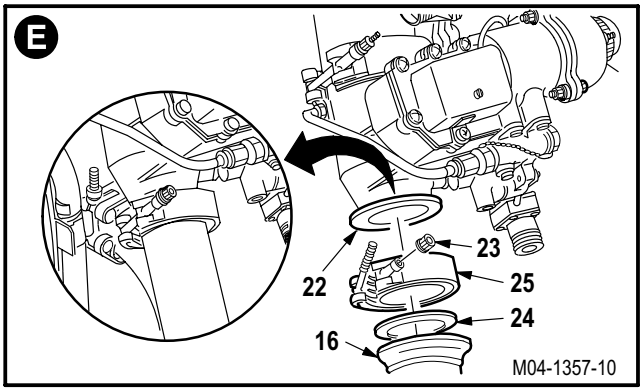

e. **Install starter air tube (16) on regulating valve (22).** Torque coupling nut (23) to **25 INCH-POUNDS**.

(1) Install new gasket (24) on tube (16).

(2) Position coupling (24) on tube (16) and regulating valve (22).

(3) Install nut (23) on coupling (25).

(4) Torque coupling nut (23) to **25 INCH-POUNDS**. Use torque wrench.




f. **Inspect (QA).**

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## 4.41. ENGINE BUILDUP - NO. 2 ENGINE ANTI-ICE AND BLEED AIR SYSTEM INSTALLATION

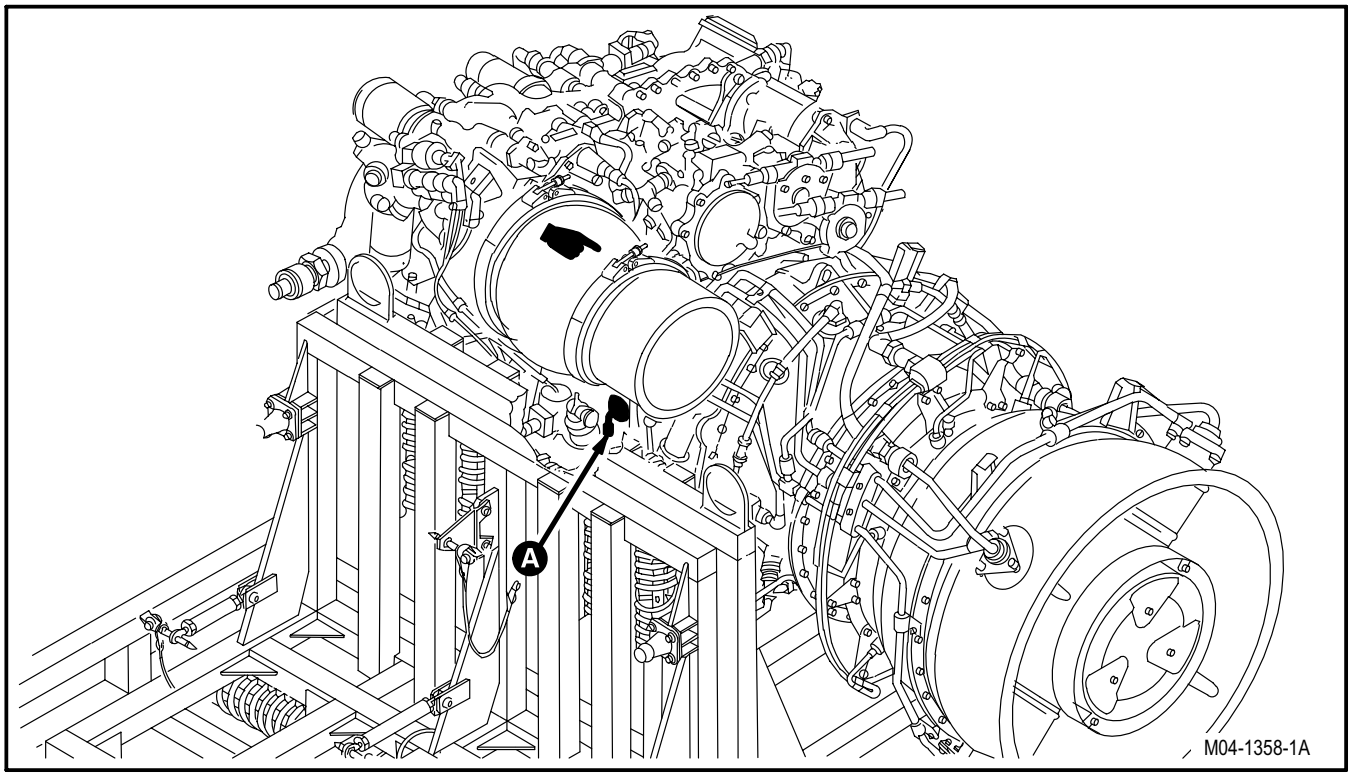
4.41.1. Description

This task covers: Installation.

4.41.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

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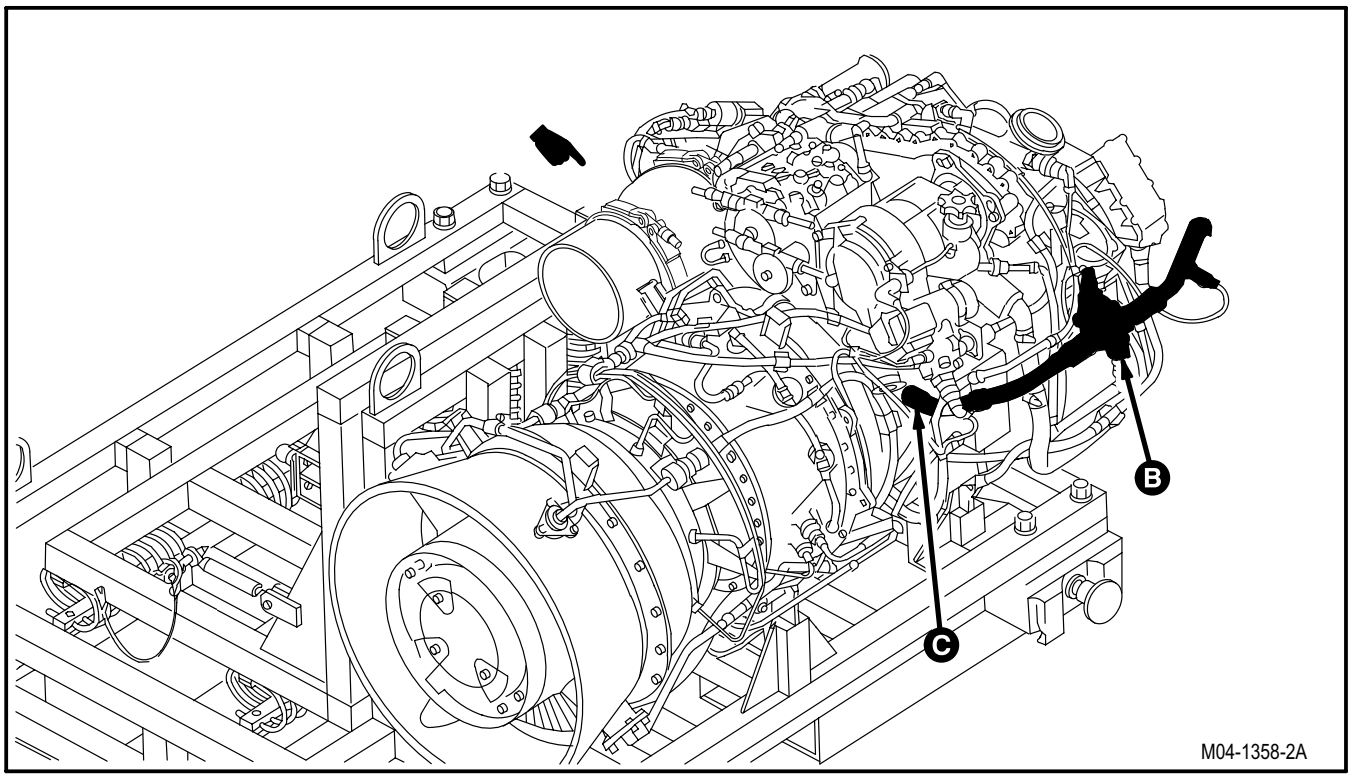
## 4.41. ENGINE BUILDUP - NO. 2 ENGINE ANTI-ICE AND BLEED AIR SYSTEM INSTALLATION - continued

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## 4.41. ENGINE BUILDUP - NO. 2 ENGINE ANTI-ICE AND BLEED AIR SYSTEM INSTALLATION - continued

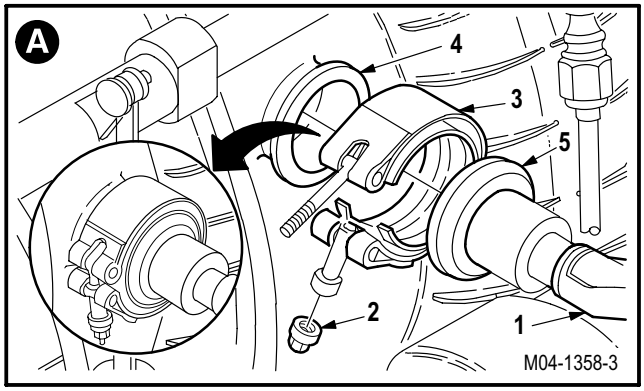
4.41.3. Installation

a. **Install cooling door actuator hose (1).** Torque nut (2) to **25 INCH-POUNDS**.

(1) Position coupling (3) around adapter (4) and flange (5).

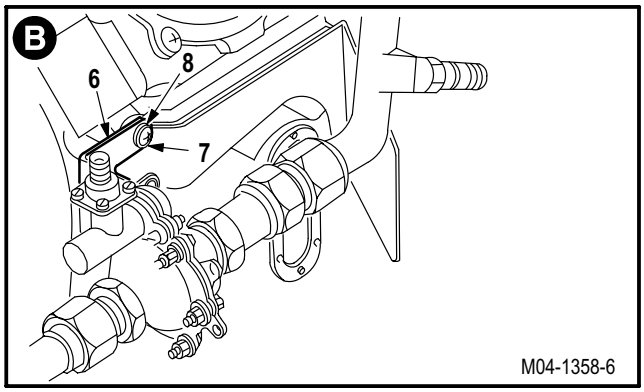
(2) Install coupling nut (2).

(3) Torque nut (2) to **25 INCH-POUNDS**. Use torque wrench.




b. **Install valve support (6).**

(1) Install four screws (7) and washers (8).



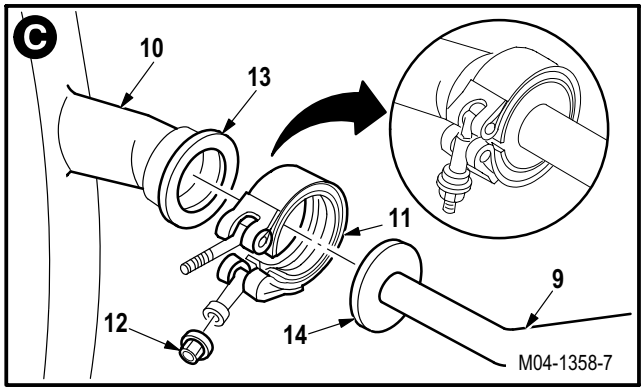

c. **Install coupling (11) on anti-ice tube (9) and port (10).** Torque nut (12) to **25 INCH-POUNDS**.

(1) Position coupling (11) around flanges (13) and (14).

(2) Install coupling nut (12).

(3) Torque nut (12) to **25 INCH-POUNDS**. Use torque wrench.

d. **Inspect (QA).**

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## 4.42. ENGINE BUILDUP - NO. 1 ENGINE WIRING INSTALLATION

4.42.1. Description

This task covers: Installation.

4.42.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

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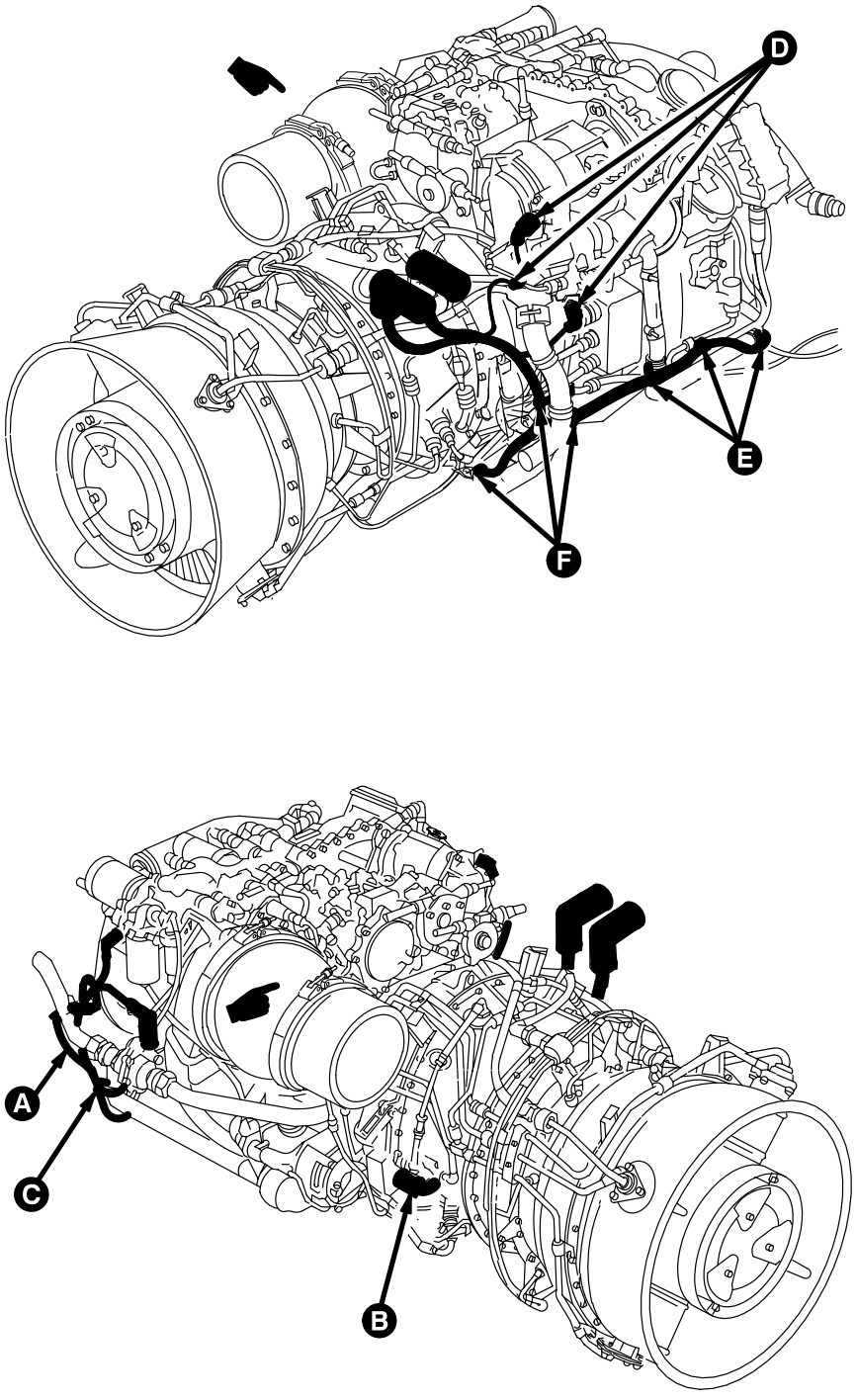
## 4.42. ENGINE BUILDUP - NO. 1 ENGINE WIRING INSTALLATION - continued

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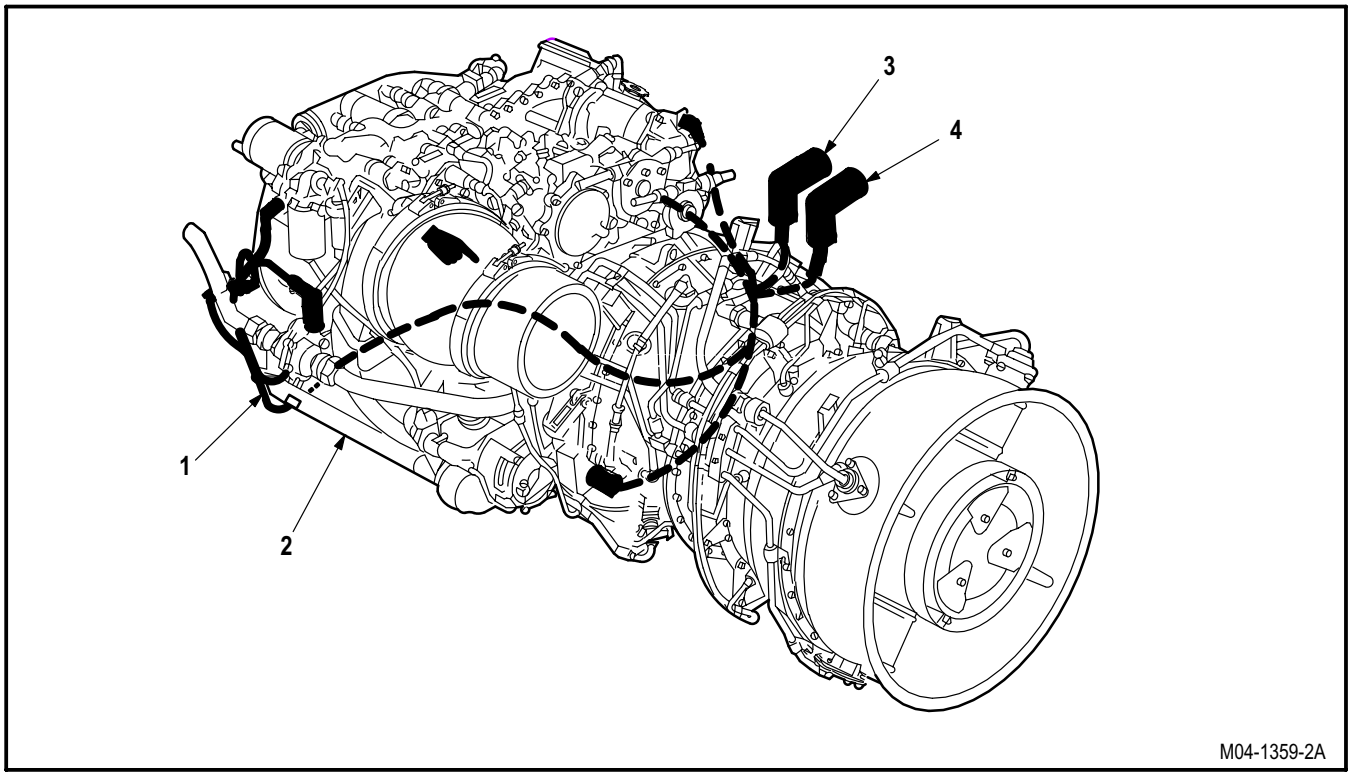
## 4.42. ENGINE BUILDUP - NO. 1 ENGINE WIRING INSTALLATION - continued



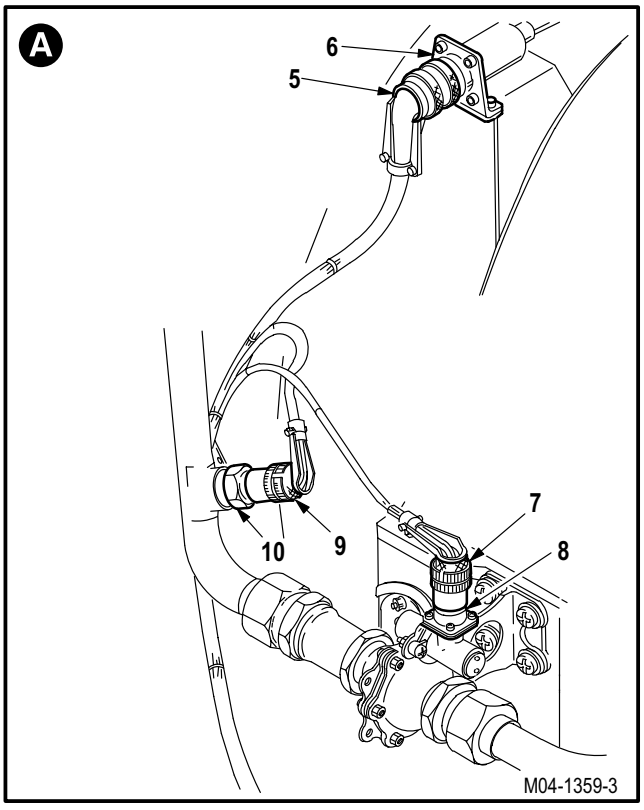

4.42.3. Installation

a. **Place wire harness (1) under front of engine (2) with firewall connectors P21 (3) and P23 (4) on right side of engine (2).**

b. **Attach connector P45 (5) to engine instruments receptacle E3 (6).**

c. **Attach connector P33 (7) to anti-ice valve receptacle L1 (8).**

d. **Attach connector P954 (9) to temperature switch receptacle S127 (10).**

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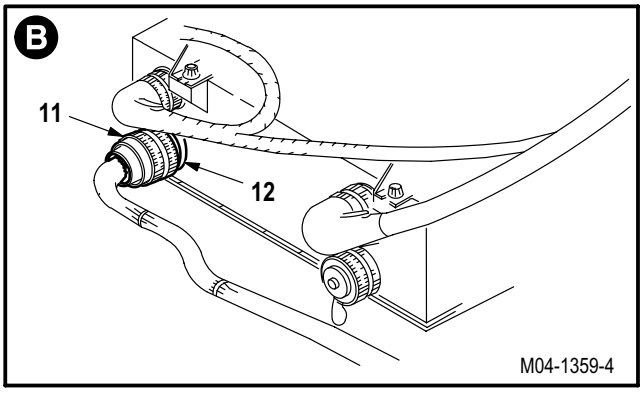
## 4.42. ENGINE BUILDUP - NO. 1 ENGINE WIRING INSTALLATION - continued

**NOTE**

Helicopters with T700-GE-701C engines installed are equipped with a digital electronic control (DEC).

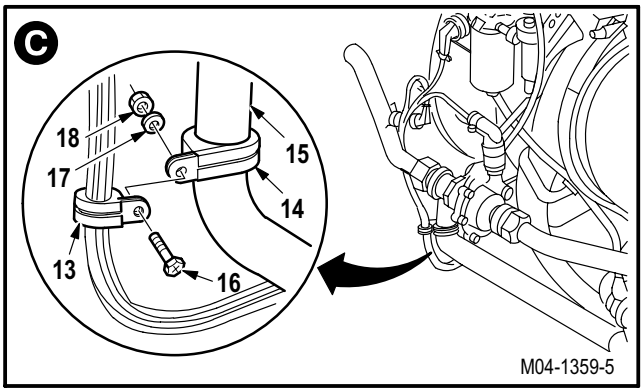
e. **Attach connector P41 (11) to electrical control unit receptacle E1 (12).**




f. **Install wire harness support clamps (13) and (14) on bleed duct (15).**

(1) Install screw (16) through clamps (13) and (14).

(2) Install washer (17) and nut (18) on screw (16).




g. **Attach valve connector P39 (19) to starter regulating receptacle L3 (20).**

(1) Lockwire connector (19) to receptacle (20). Use wire (item 221, App F).

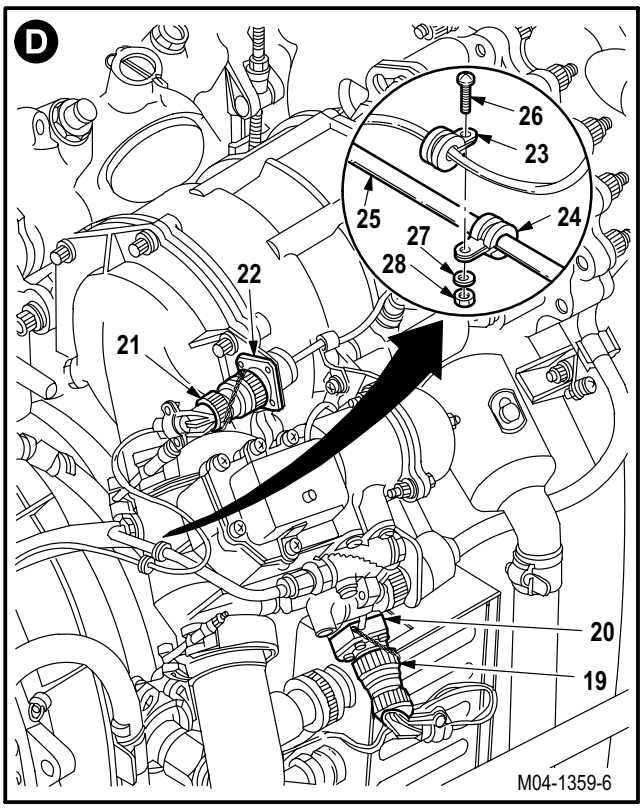
h. **Attach connector P35 (21) to starter receptacle A3 (22).**

(1) Lockwire connector (21) to receptacle (22). Use wire (item 221, App F).

i. **Install wire harness support clamps (23) and (24) on engine regulating valve tube (25).**

(1) Install screw (26) through clamps (23) and (24).

(2) Install washer (27) and nut (28) on screw (26).

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**4.42. ENGINE BUILDUP - NO. 1 ENGINE WIRING INSTALLATION - continued**

j. **Install wire harness support clamps (29) and (30) on sensing tube (31).**

(1) Install screw (32) through clamp (30), spacer (33), and clamp (29).

(2) Install washer (34) and nut (35) on screw (32).

k. **Install wire harness support clamps (36) and (37) on drain manifold (38).**

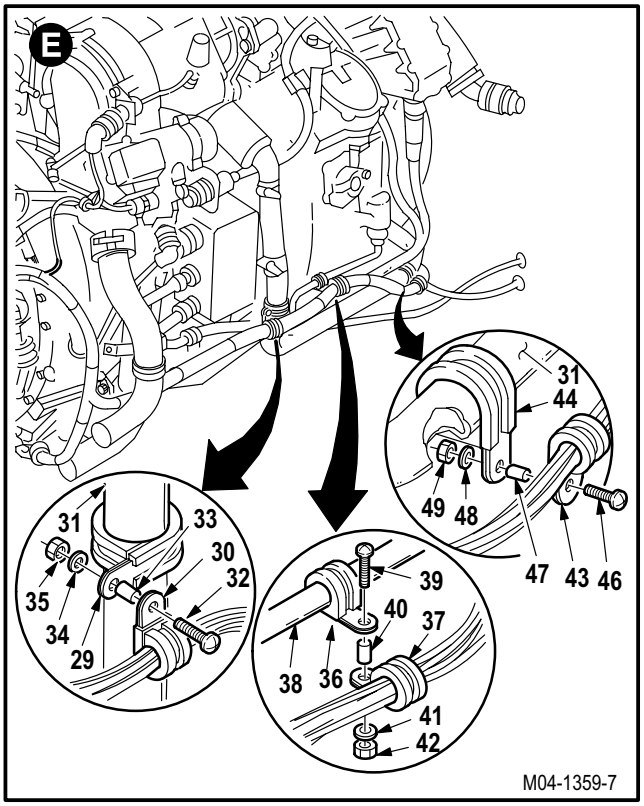
(1) Install screw (39) through clamp (36), spacer (40), and clamp (37).

(2) Install washer (41) and nut (42) on screw (39).

l. **Install wire harness support clamps (43) and (44) on sensing tube (31).**

(1) Install screw (46) through clamp (43), spacer (47), and clamp (44).

(2) Install washer (48) and nut (49) on screw (46).

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## 4.42. ENGINE BUILDUP - NO. 1 ENGINE WIRING INSTALLATION - continued

m. **Install wire harness support clamp (50) on angle bracket (51).**

(1) Install screw (52) through washer (53) and clamp (50).

n. **Install wire harness support clamp (54) and (55) on C-sump seal pressure tube (56).**

(1) Install screw (57) through clamps (54) and (55).

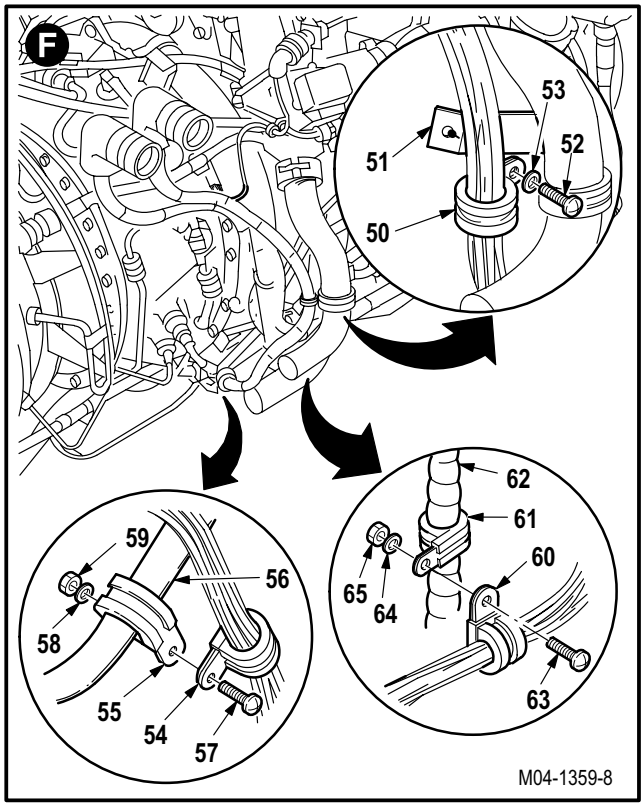
(2) Install washer (58) and nut (59) on screw (57).

o. **Install wire harness support clamps (60) and (61) on wire harness (62).**

(1) Install screw (63) through clamps (60) and (61).

(2) Install washer (64) and nut (65) on screw (63).

p. **Inspect (QA).**

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## 4.43. ENGINE BUILDUP - NO. 2 ENGINE WIRING INSTALLATION

4.43.1. Description

This task covers: Installation.

4.43.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

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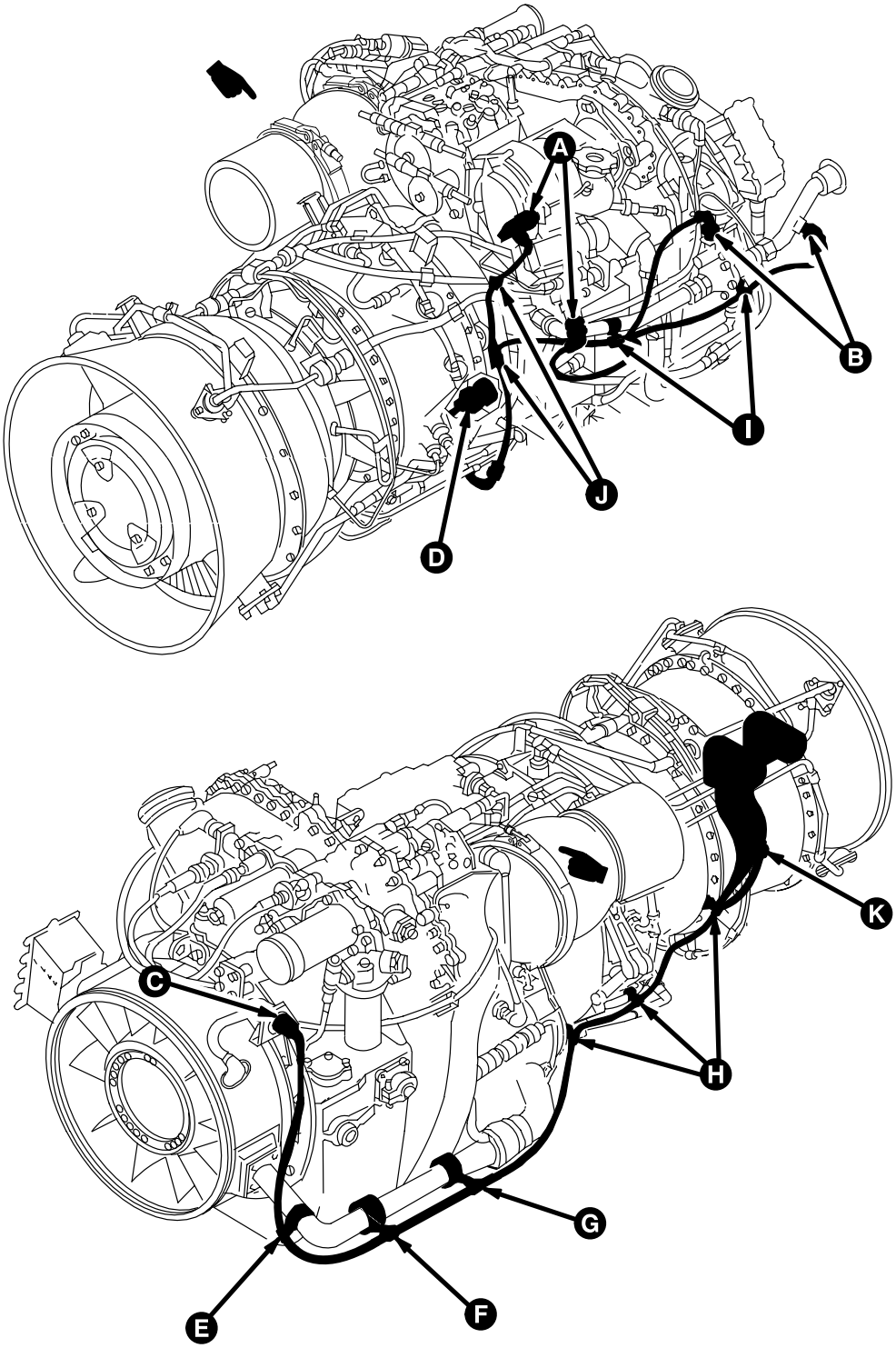
## 4.43. ENGINE BUILDUP - NO. 2 ENGINE WIRING INSTALLATION - continued

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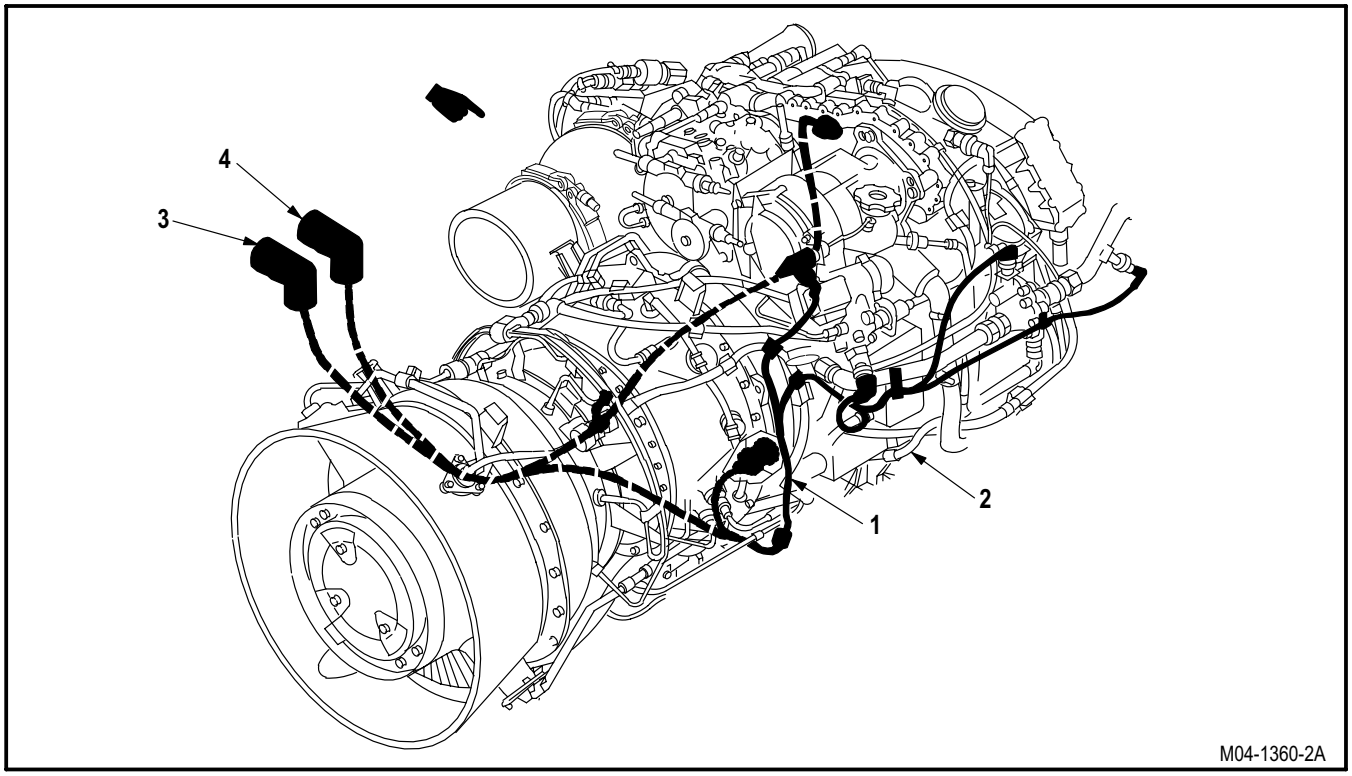
## 4.43. ENGINE BUILDUP - NO. 2 ENGINE WIRING INSTALLATION - continued




4.43.3. Installation

a. **Place wire harness (1) under engine (2) with firewall connectors P22 (3) and P24 (4) on left side of engine (2).**

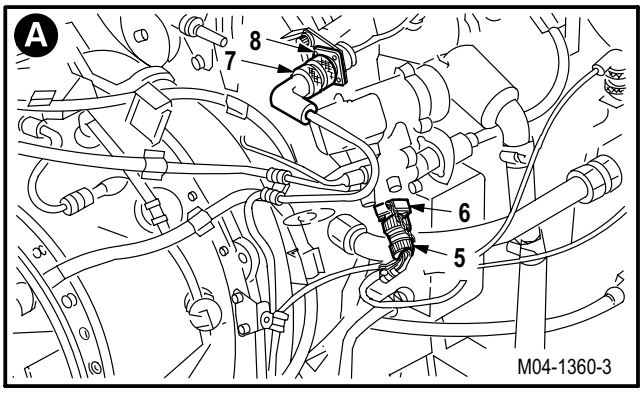
b. **Attach connector P40 (5) to air regulator valve receptacle L4 (6).**

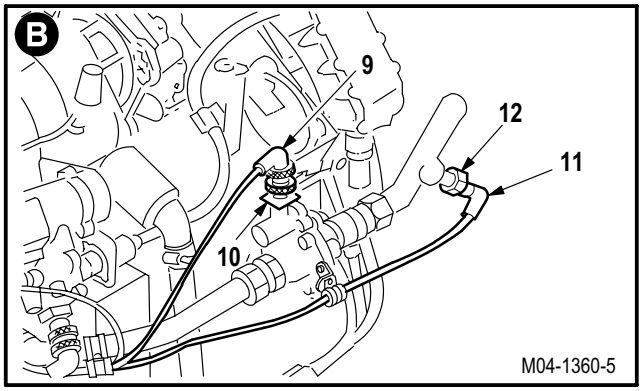
(1) Lockwire connector (5) to receptacle (6). Use wire (item 221, App F).

c. **Attach connector P36 (7) to starter receptacle A4 (8).**

d. **Attach connector P34 (9) to anti-ice valve receptacle L2 (10).**

e. **Attach connector P953 (11) to temperature switch receptacle S126 (12).**

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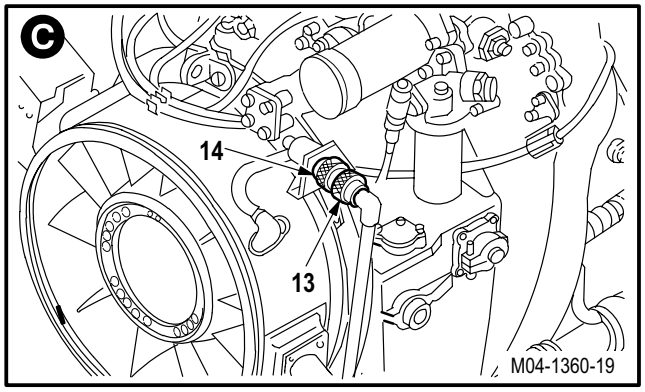
## 4.43. ENGINE BUILDUP - NO. 2 ENGINE WIRING INSTALLATION - continued

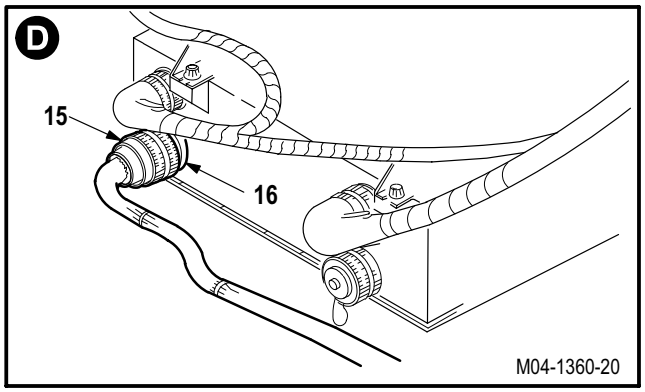
f. **Attach connector P46 (13) to engine instruments receptacle E3 (14).**




**NOTE**

Helicopters with T700-GE-701C engines installed are equipped with a digital electronic control (DEC).

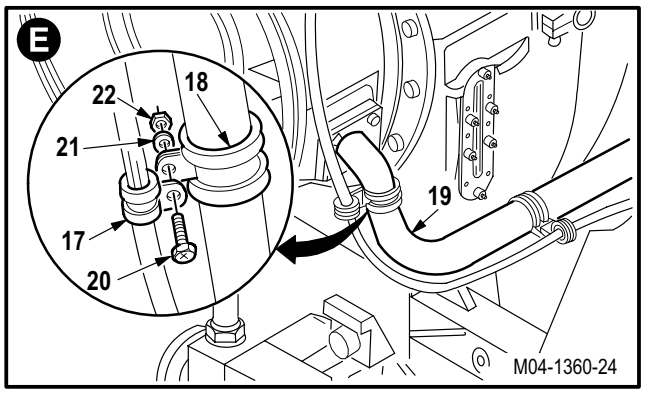
g. **Attach connector P42 (15) to electrical control unit receptacle E1 (16).**




h. **Install wire harness support clamps (17) and (18) on anti-ice tube (19).**

(1) Install screw (20) through clamps (17) and (18).

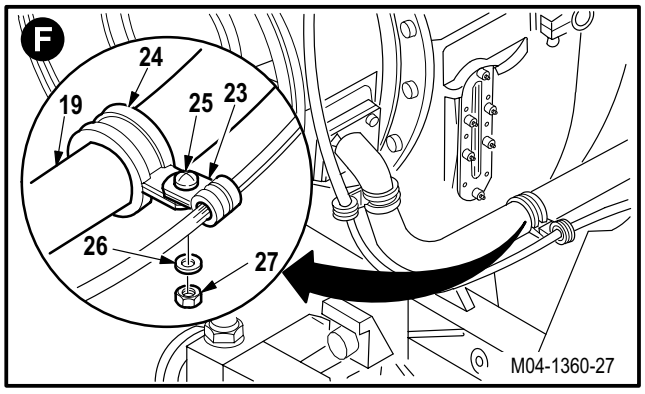
(2) Install washer (21) and nut (22) on screw (20).




i. **Install wire harness support clamps (23) and (24) on anti-ice tube (19).**

(1) Install screw (25) through clamps (23) and (24).

(2) Install washer (26) and nut (27) on screw (25).

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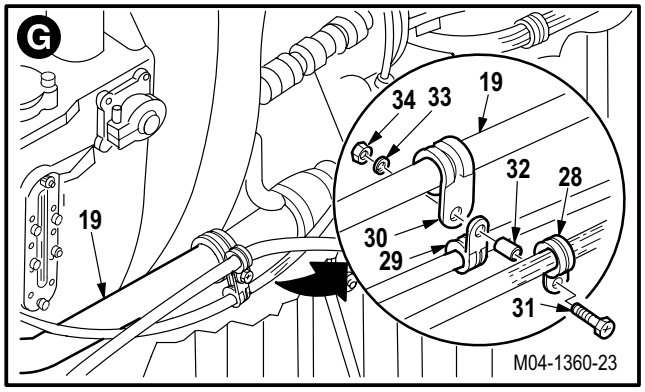
## 4.43. ENGINE BUILDUP - NO. 2 ENGINE WIRING INSTALLATION - continued

j. **Install wire harness support clamps (28), (29), and (30) on anti-ice tube (19).**

(1) Install screw (31) through clamp (28), spacer (32), and clamps (29) and (30).

(2) Install washer (33) and nut (34) on screw (31).




k. **Install wire harness support clamps (35) and (36) on drain hose (37).**

(1) Install screw (38) through clamps (35) and (36).

(2) Install washer (39) and nut (40) on screw (38).

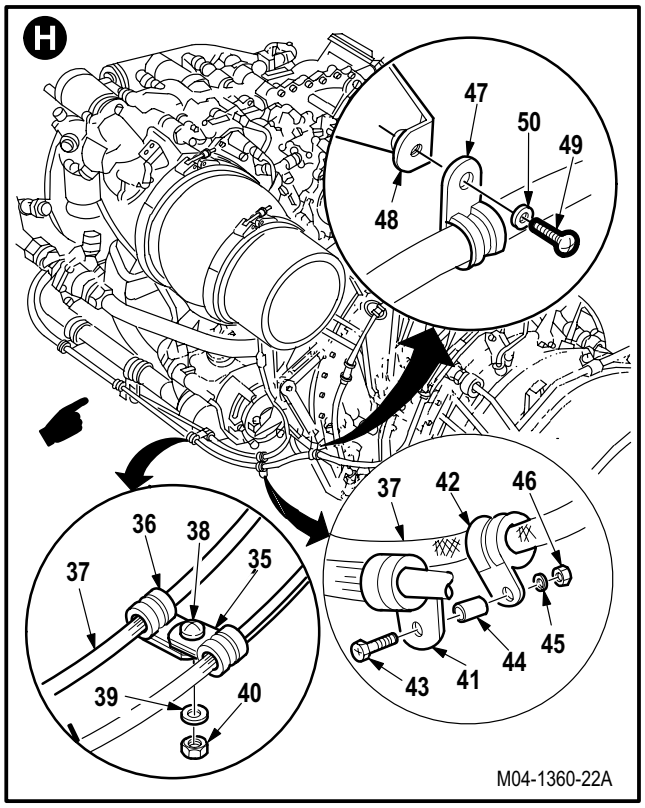
l. **Install wire harness support clamps (41) and (42) on drain hose (37).**

(1) Install screw (43) through clamp (41), spacer (44), and clamp (42).

(2) Install washer (45) and nut (46) on screw (43).

m. **Install wire harness support clamp (47) on engine clip (48).**

(1) Install screw (49) through washer (50) and clamp (47).

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## 4.43. ENGINE BUILDUP - NO. 2 ENGINE WIRING INSTALLATION - continued

n. **Install wire harness support clamp (51) on anti-ice valve (52).**

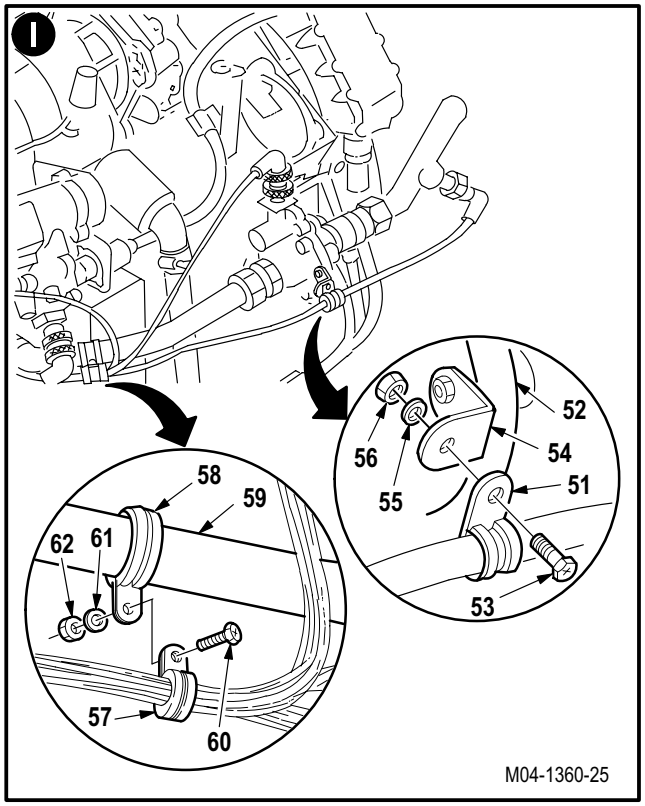
(1) Install screw (53) through clamp (51) and anti-ice valve clip (54).

(2) Install washer (55) and nut (56) on screw (53).

o. **Install wire harness support clamps (57) and (58) on anti-ice tube (59).**

(1) Install screw (60) through clamps (57) and (58).

(2) Install washer (61) and nut (62) on screw (60).




p. **Install wire harness support clamps (63) and (64) on engine regulator valve tube (65).**

(1) Install screw (66) through clamps (63) and (64).

(2) Install washer (67) and nut (68) on screw (66).

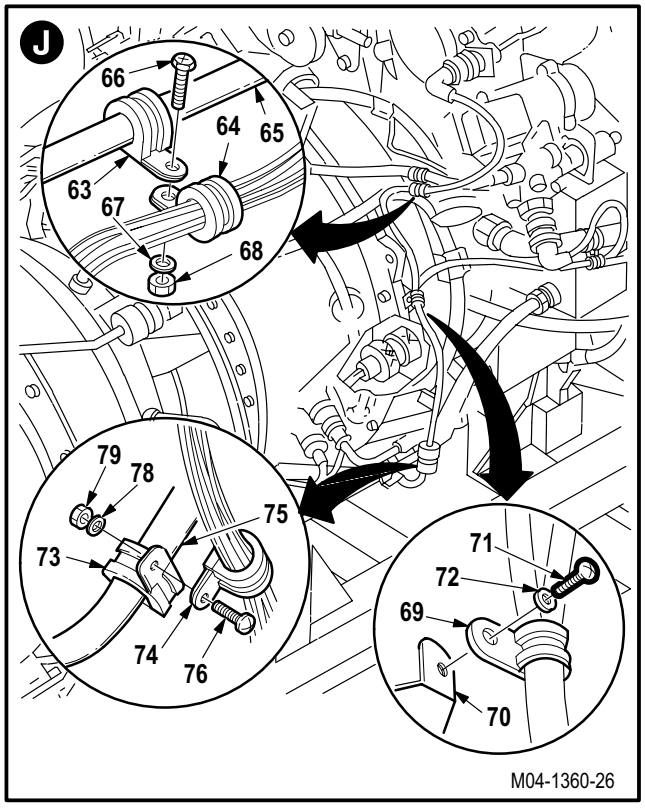
q. **Install wire harness support clamp (69) on engine clip (70).**

(1) Install screw (71) through washer (72) and clamp (69).

r. **Install wire harness support clamp (73) and (74) on overspeed sensor tube (75).**

(1) Install screw (76) through clamps (74) and (73).

(2) Install washer (78) and nut (79) on screw (76).

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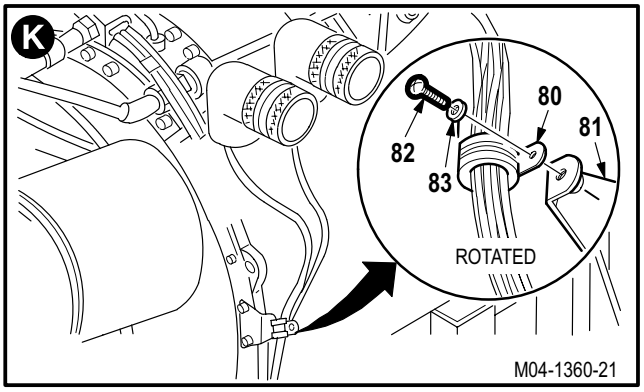
**4.43. ENGINE BUILDUP - NO. 2 ENGINE WIRING INSTALLATION - continued**

s. **Install wire harness support clamp (80) on engine clip (81).**

(1) Install screw (82) through washer (83) and clamp (80).

t. **Inspect (QA).**

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## 4.44. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE FUEL INLET HOSE INSTALLATION

4.44.1. Description

This task covers: Installation.

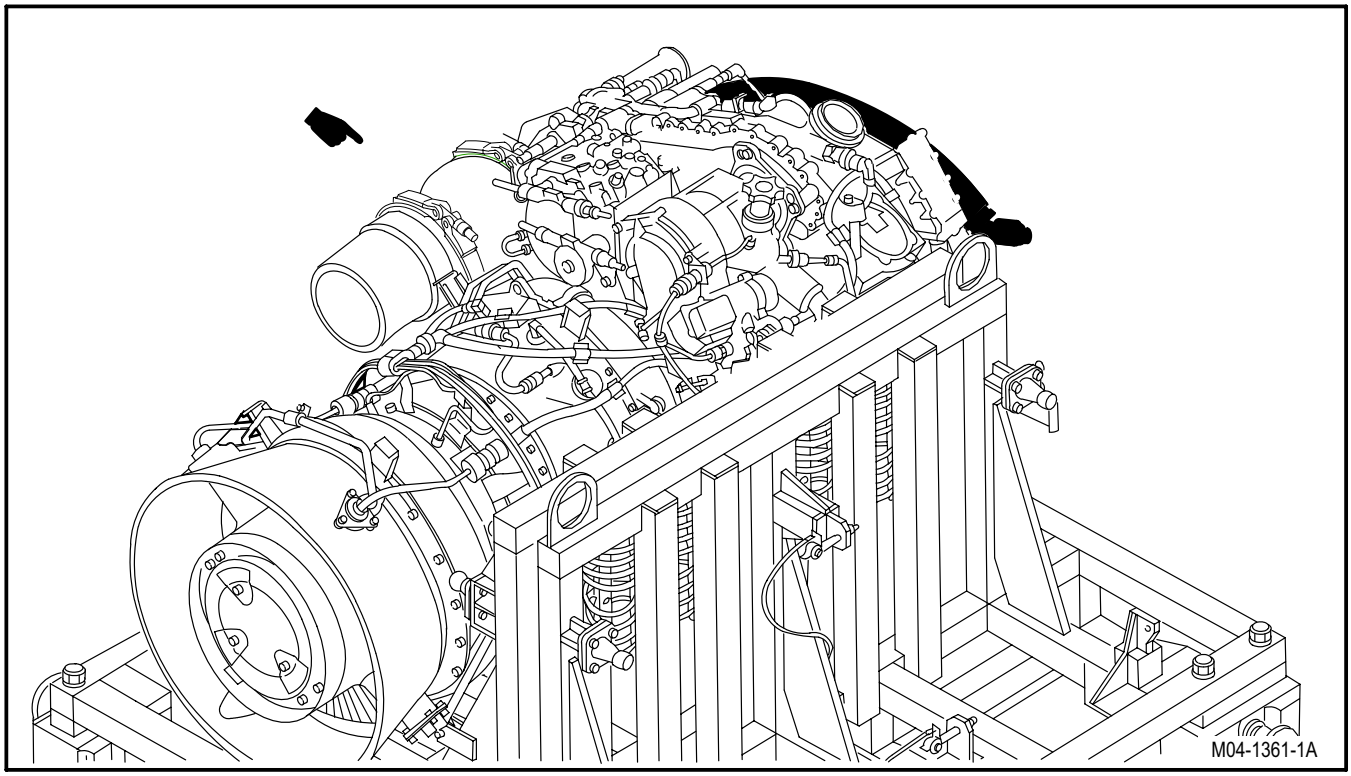
4.44.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine fuel inlet hose.

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## 4.44. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE FUEL INLET HOSE INSTALLATION - continued

4.44.3. Installation

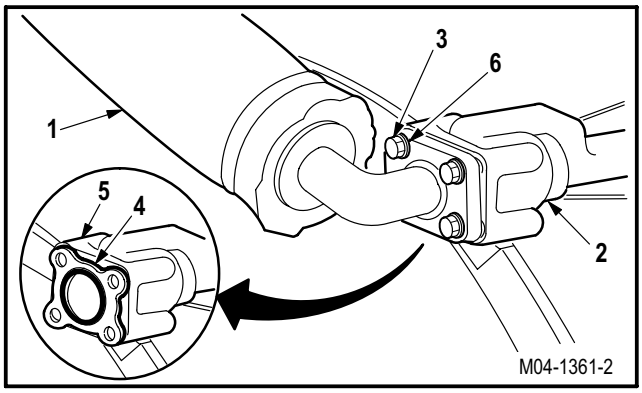
a. **Install fuel inlet hose (1) on fuel boost pump (2).** Torque four bolts (3) to **13 INCH-POUNDS**.

(1) Install new gasket (4) on pump mounting flange (5).

(2) Position inlet hose (1) on pump mounting flange (5).

(3) Install four bolts (3) and washers (6).

(4) Torque four bolts (3) to **13 INCH-POUNDS**. Use torque wrench.




b. **Inspect (QA).**

GO TO NEXT PARAGRAPH

## 4.45. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE AIR INLET INSTALLATION

4.45.1. Description

This task covers: Installation.

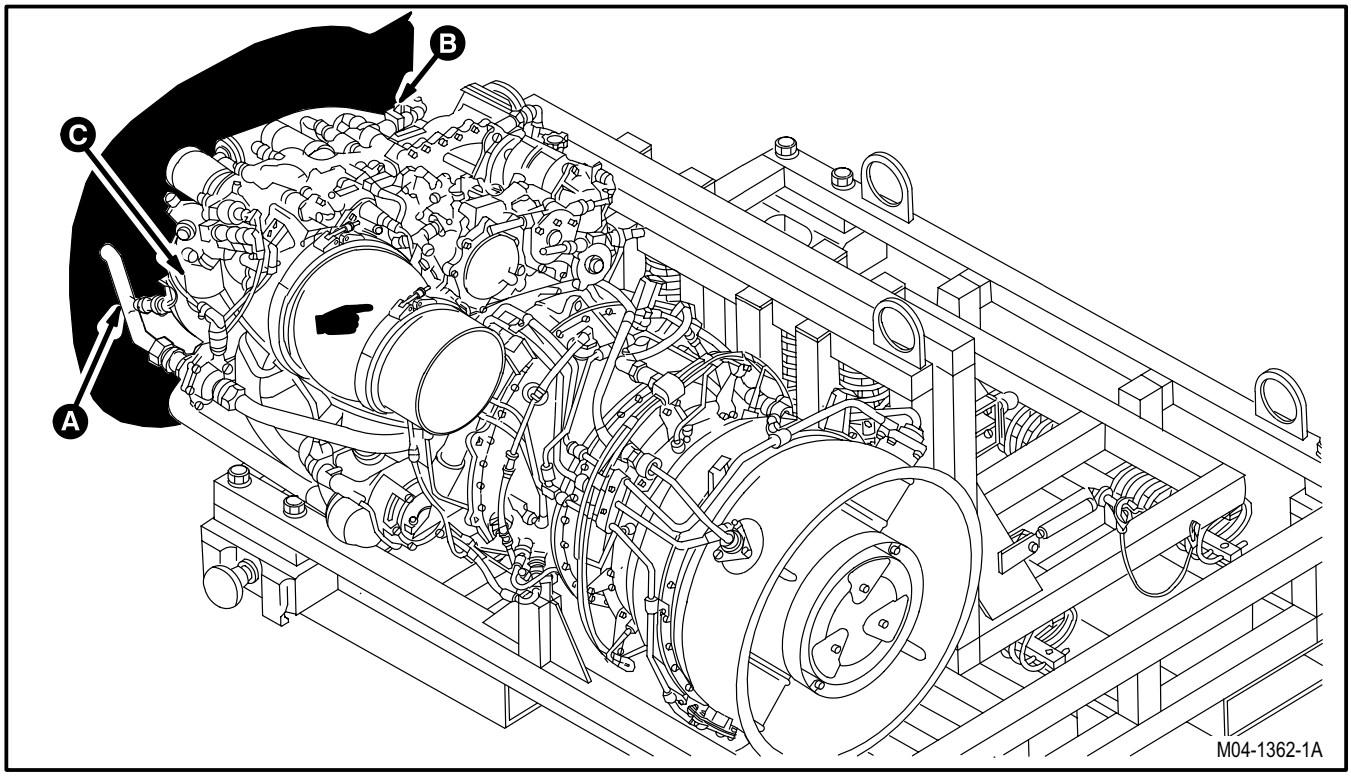
4.45.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine air inlet.

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## 4.45. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE AIR INLET INSTALLATION - continued

4.45.3. Installation

**NOTE**

Inboard coupling hardware (bolt/nut) must face up to permit torque application during installation.

a. **Install air inlet (1) on engine (2).** Torque coupling nuts (12) and (13) alternately to **25 INCH-POUNDS**.

(1) Install new packing (3) in support (4).

(2) Position inlet (1) with support (4) in line with anti-ice air tube (5).

(3) Insert alining pin (6) at top of fairing (1) in hole (7) on engine (2).

(4) Open coupling (8). Place coupling (8) around inlet flange (9) and fairing flange (10).

(5) Position coupling (8) with drain cutout (11) on bottom.

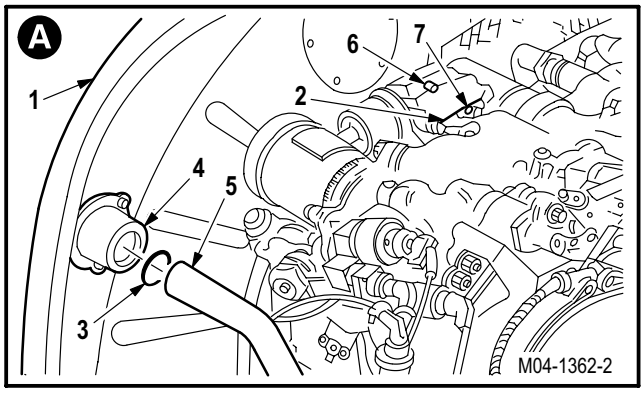
(6) Install nut (12).

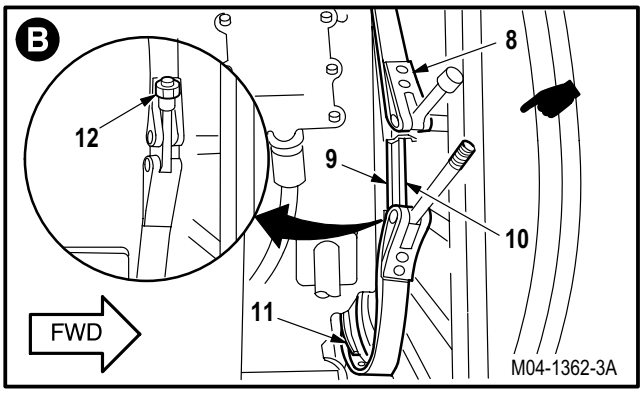
**NOTE**

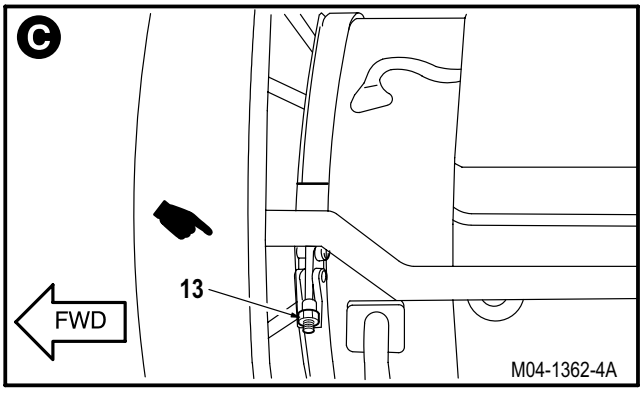
When installing coupling assembly, tighten coupling nut to approximately 70 percent of maximum indicated torque. Tap around outside of coupling with a rubber mallet to distribute band tension. Torque nut to specified value. Do not over torque.

(7) Torque coupling nuts (12) and (13) alternately to **25 INCH-POUNDS**. Use torque wrench.

b. **Inspect (QA).**

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## 4.46. ENGINE BUILD UP - NO. 1 AND NO. 2 ENGINE SHROUD SEAL RING INSTALLATION

4.46.1. Description

This task covers: Installation.

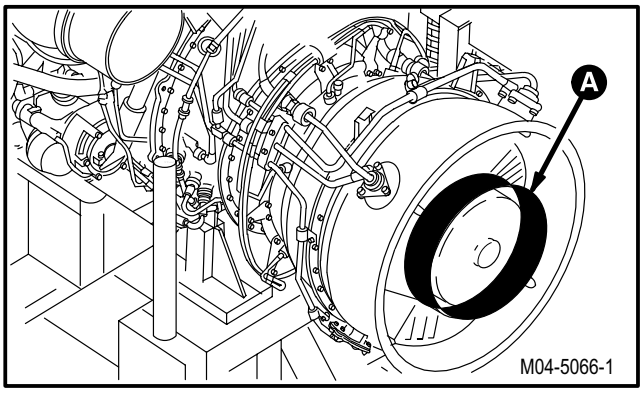
4.46.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 or No. 2 engine shroud seal ring.




4.46.3. Installation

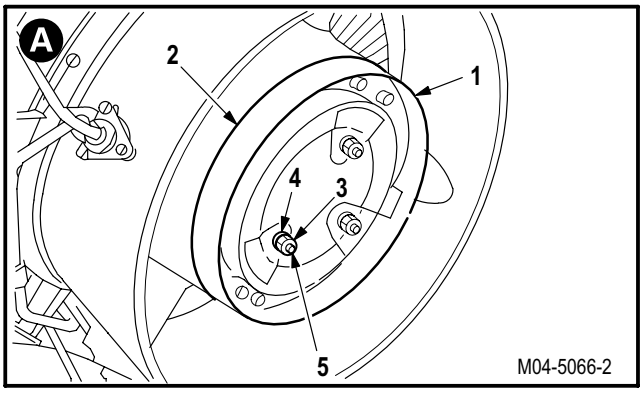
a. **Install ring (1) on C-sump housing (2).** Torque four nuts (3) to **45 INCH-POUNDS**.

(1) Position ring (1) on housing (2).

(2) Install four washers (4) and nuts (3) on studs (5).

(3) Torque four nuts (3) to **45 INCH-POUNDS**. Use torque wrench.

b. **Inspect (QA).**

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## 4.47. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE AIR DUCT INSTALLATION

4.47.1. Description

This task covers: Installation.

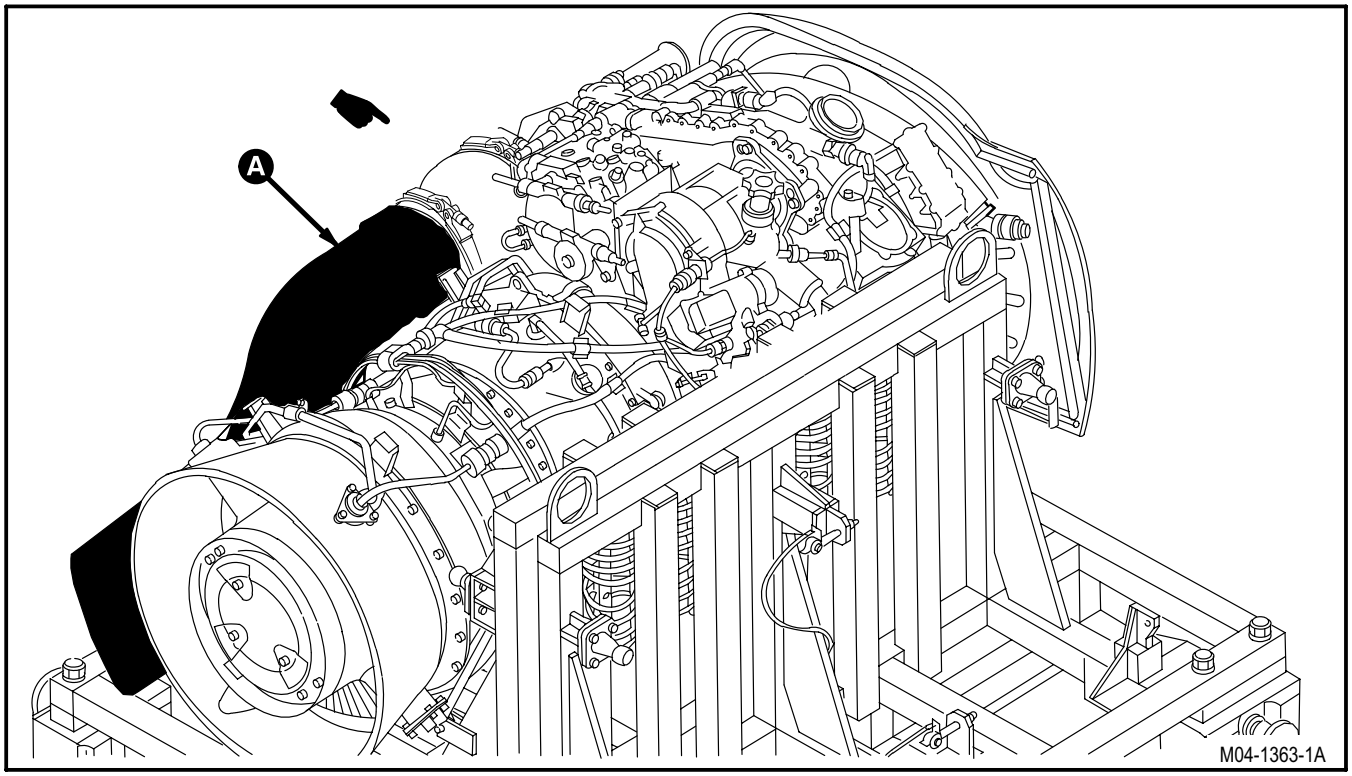
4.47.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.30 | Engine buildup - No. 1 and No. 2 engine |

**NOTE**

This task is typical for No. 1 and No. 2 engine air duct.

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## 4.47. ENGINE BUILDUP - NO. 1 AND NO. 2 ENGINE AIR DUCT INSTALLATION - continued

4.47.3. Installation

**NOTE**

When installing coupling assembly, tighten coupling nut to approximately 70 percent of maximum indicated torque. Tap around outside of coupling with a rubber mallet to distribute band tension. Torque nut to specified value. Do not over torque.

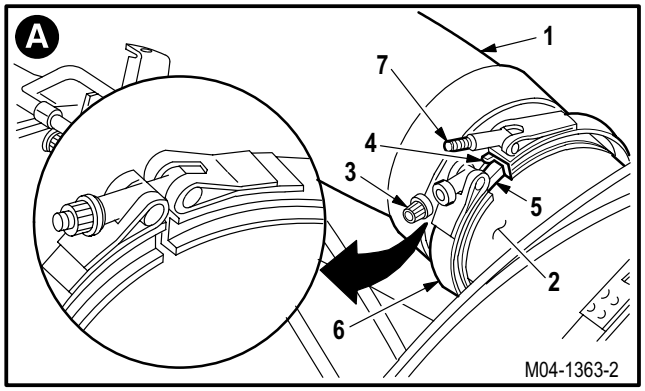
a. **Install air duct (1) on particle separator blower (2).** Torque coupling nut (3) to **35 INCH-POUNDS**.

(1) Position adapter flange (4) on particle separator blower flange (5).

(2) Position coupling (6) around flanges (4) and (5), with tee bolt (7) at top facing inboard.

(3) Install coupling nut (3) on tee bolt (7).

(4) Torque coupling nut (3) to **35 INCH-POUNDS**. Use torque wrench.




b. **Inspect (QA).**

END OF TASK

## 4.48. NO. 1 ENGINE INSTALLATION

4.48.1. Description

This task covers: Installation.

4.49. No. 1 Engine Installation - Install in Nacelle
4.50. No. 1 Engine Installation - Lower Connections
4.51. No. 1 Engine Installation - Upper Connections

4.48.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Airframe adapter kit (item 25, App H)
Light duty laboratory apron (item 27, App H)
Aircraft mounted crane (item 69, App H)
9/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 85, App H)
Chemical protective gloves (item 154, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
Adjustable air filtering respirator (item 262, App H)
Engine lifting sling (item 291, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Materials/Parts:**

Packing (4)
Sealing compound (item 166, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
Two persons to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 6.36 | Engine nose gearbox and quill shaft installed |
| 10.1 | Perform fuel system inspection |

**WARNING**

**Operation of a mix of T700-GE-701 and T700-GE-701C engines on the same AH-64A aircraft is prohibited.**

GO TO NEXT PARAGRAPH

## 4.49. NO. 1 ENGINE INSTALLATION - INSTALL IN NACELLE

4.49.1. Description

This task covers: Installation.

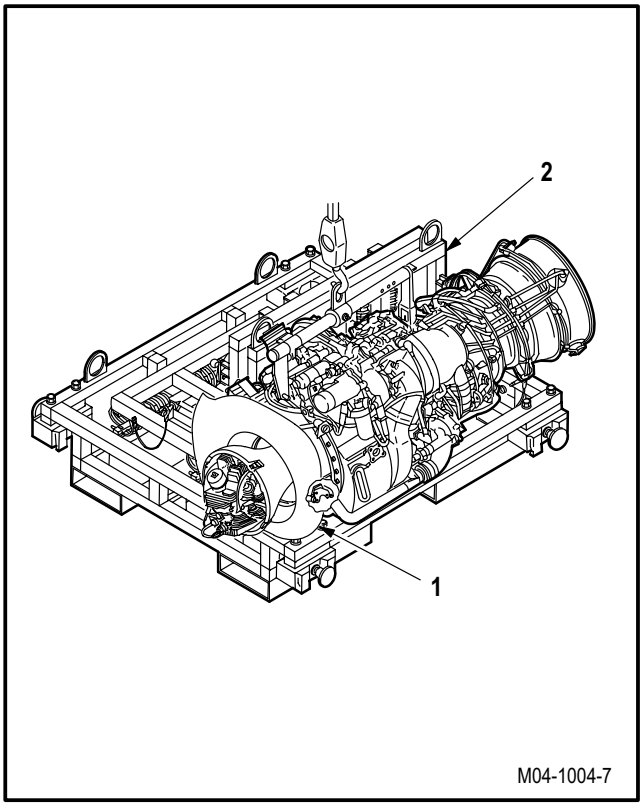
4.49.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.48 | No. 1 engine installation |

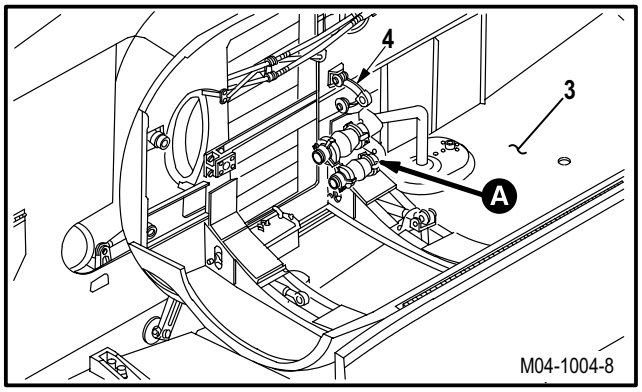
4.49.3. Installation

a. **Remove engine (1) from handling adapter (2)** (para 4.28)**.**




b. **Check nacelle (3) and aft engine support (4) for damage.** None allowed.

c. **Check nacelle (3) for corrosion** (para 1.49)**.**

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## 4.49. NO. 1 ENGINE INSTALLATION - INSTALL IN NACELLE - continued

d. **Install two new packings (5) in air connect housing (6).**

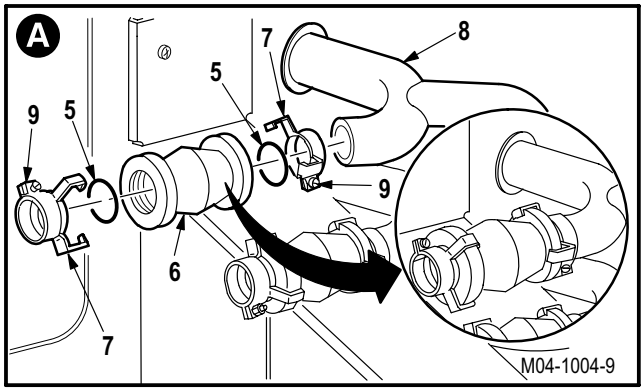
(1) Slide housing (6) and two clamps (7) off air tube (8).

(2) Remove and discard packings (5).

(3) Install new packings (5) at each end of housing (6).

(4) Slide housing (6) and two clamps (7) on air tube (8).

(5) Tighten two screws (9).




e. **Install two new packings (10) in air connect housing (11).**

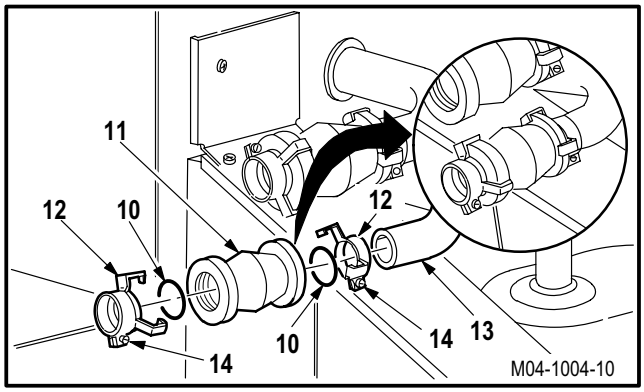
(1) Slide housing (11) and two clamps (12) from air tube (13).

(2) Remove and discard packings (10).

(3) Install new packings (10) at each end of housing (11).

(4) Slide housing (11) and two clamps (12) on air tube (13).

(5) Tighten two screws (14).

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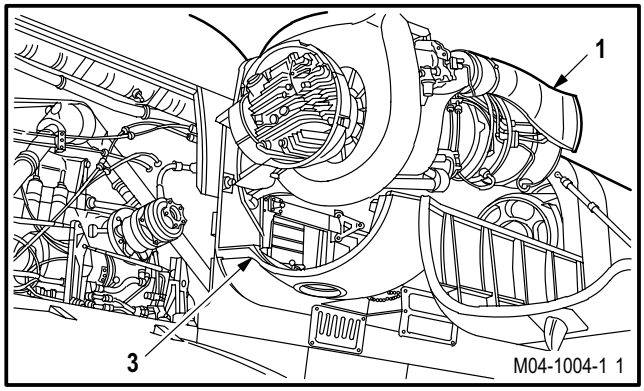
## 4.49. NO. 1 ENGINE INSTALLATION - INSTALL IN NACELLE - continued

**CAUTION**

Do not use engine accessories as hand holds during engine positioning.

f. **Lift engine (1) and position above nacelle (3).** Use crane.




**CAUTION**

When lowering engine into nacelle, ensure that all hoses, electrical plugs, lines, and cables are free and clear of any obstructions.

g. **Lower engine (1) into nacelle (3).**

h. **Inspect (QA).**

GO TO NEXT PARAGRAPH

## 4.50. NO. 1 ENGINE INSTALLATION - LOWER CONNECTIONS

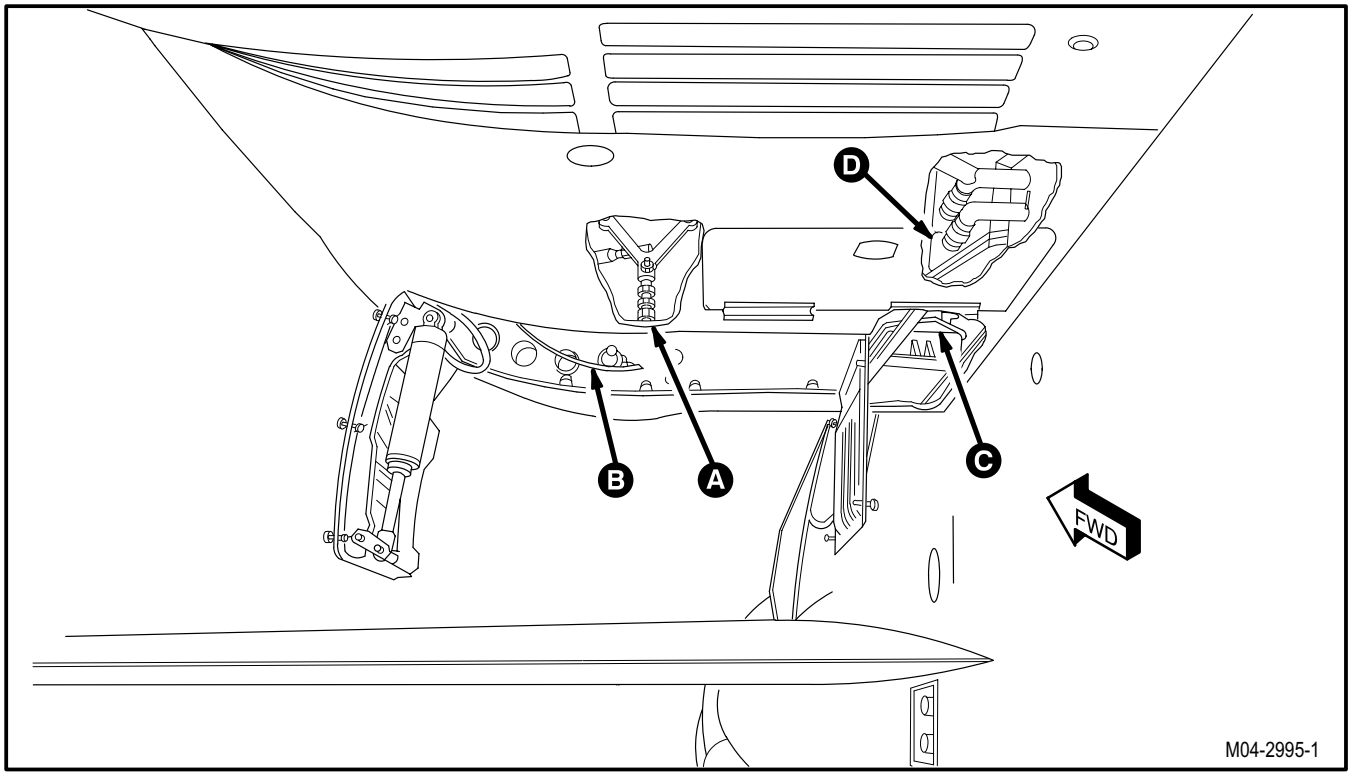
4.50.1. Description

This task covers: Installation.

4.50.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.48 | No. 1 engine installation |

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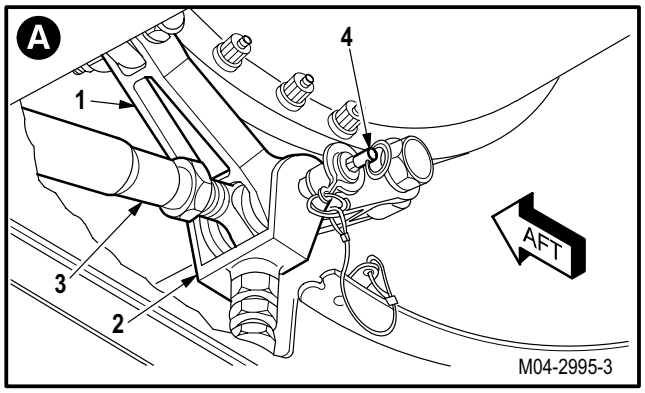
## 4.50. NO. 1 ENGINE INSTALLATION - LOWER CONNECTIONS - continued

4.50.3. Installation

a. **Aline aft lower engine mount (1) with lower link (2) and rod (3).**

b. **Install quick release pin (4) through mount (1), link (2), and rod (3).**



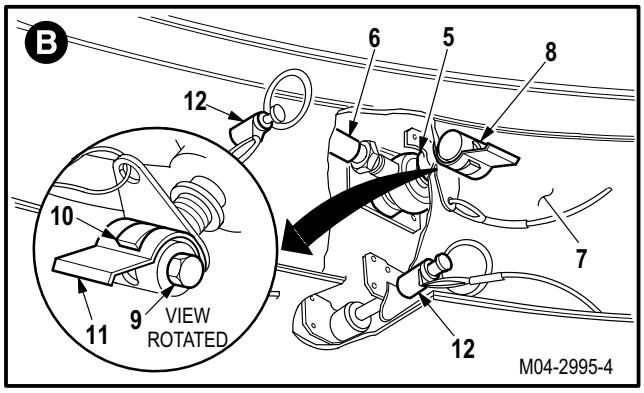

c. **Aline forward lower engine mount (5) with lower rod (6) and nacelle support (7).**

d. **Install support pin (8) through mount (5), rod (6), and support (7).**

(1) Lock pin (8).

(a) Turn bolt (9) clockwise until lock (10) engages with spring clip (11). Use torque wrench.

(b) If torque required to lock pin (8) is not **55 to 100 INCH-POUNDS**, replace pin.



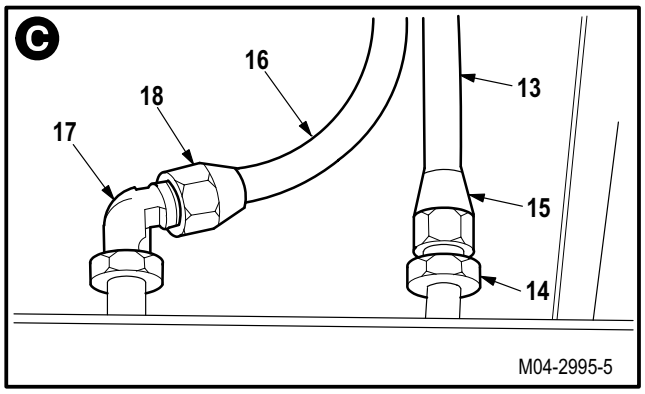

e. **Install two quick release pins (12) through mount (5) and support (7).**

f. **Install drain tube (13) on fitting (14).**

(1) Hold fitting (14). Install nut (15).

g. **Install drain hose (16) on elbow (17).**

(1) Hold elbow (17). Install nut (18).

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## 4.50. NO. 1 ENGINE INSTALLATION - LOWER CONNECTIONS - continued

h. **Install starter air tube (19).**

(1) Loosen screws (20) and (21).

(2) Slide connector (22) on air tube (19) until centered.

(3) Tighten clamp screws (20) and (21).

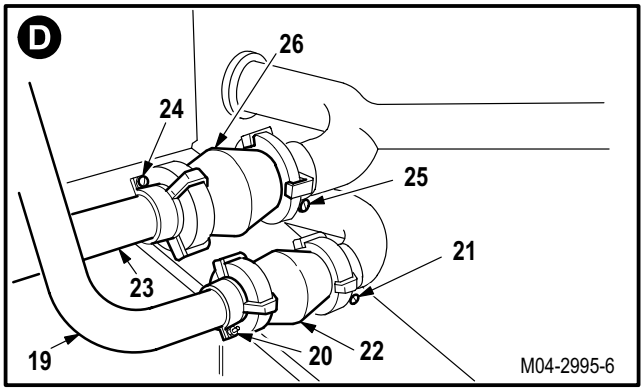
i. **Install bleed air tube (23).**

(1) Loosen screws (24) and (25).

(2) Slide connector (26) on air tube (23) until centered.

(3) Tighten clamp screws (24) and (25).

j. **Inspect (QA).**

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## 4.51. NO. 1 ENGINE INSTALLATION - UPPER CONNECTIONS

4.51.1. Description

This task covers: Installation.

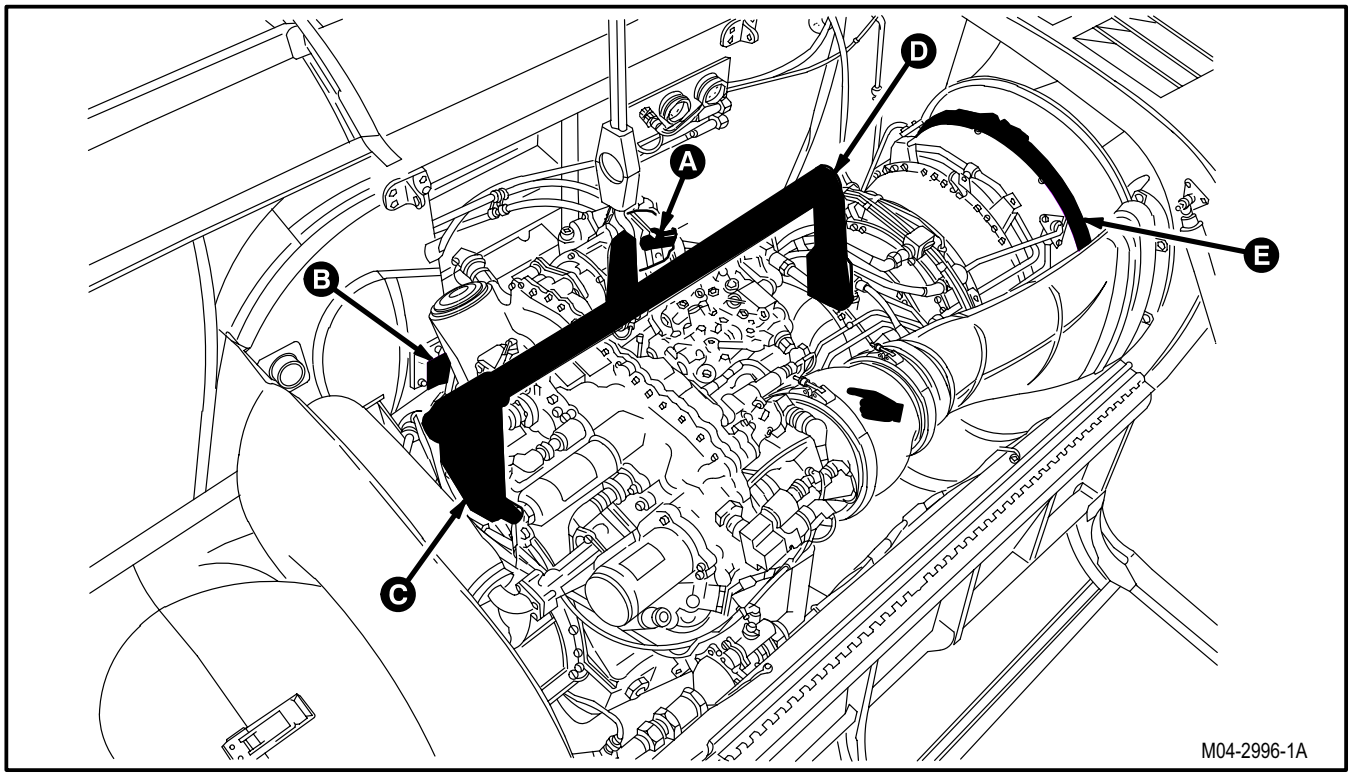
4.51.2. Initial Setup

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.48 | No. 1 engine installation |

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## 4.51. NO. 1 ENGINE INSTALLATION - UPPER CONNECTIONS - continued

4.51.3. Installation

a. **Apply sealing compound to bushings in nacelle support (1) if they are loose.** Use sealing compound (item 166, App F).

b. **Aline aft inboard engine mount (2) with support (1).**

c. **Install support pin (3) through mount (2) and support (1).**

(1) Lock pin (3).

(a) Turn bolt (4) clockwise until lock (5) engages with spring clip (6). Use torque wrench.

(b) If torque required to lock pin (3) is not **55 to 100 INCH-POUNDS**, replace pin.

d. **Close forward inboard engine mount (7).**

(1) Tighten nut (8).

e. **Release tension on lifting cable.**

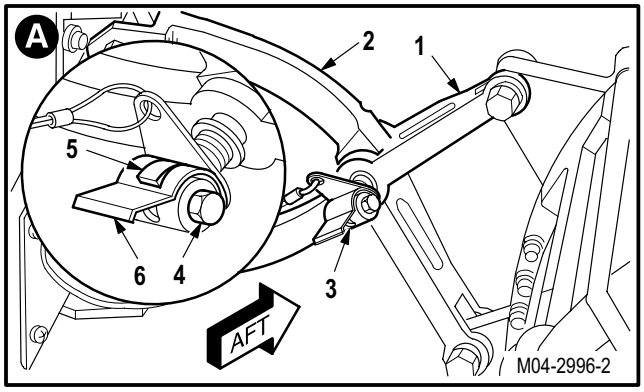
f. **Torque nut (8) to 85 INCH-POUNDS.** Use torque wrench.

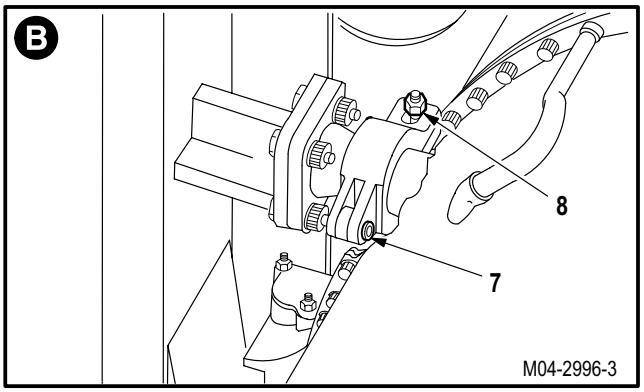
g. **Remove engine sling (9) from engine (10).**

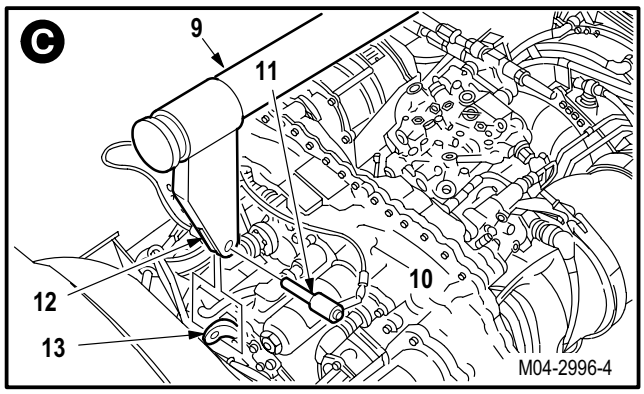
(1) Remove pin (11) from forward hanger link (12) and lifting lug (13).

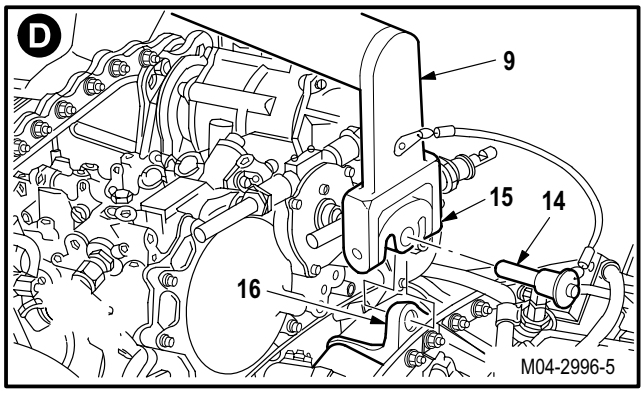
(2) Remove pin (14) from aft hanger link (15) and lifting lug (16).

(3) Remove sling (9). Use aircraft mounted crane.

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## 4.51. NO. 1 ENGINE INSTALLATION - UPPER CONNECTIONS - continued

**CAUTION**

To prevent damage to exhaust system, ensure that the engine seal ring is installed properly before attaching the primary exhaust nozzle.

**NOTE**

When installing coupling assembly, tighten coupling nut to approximately 70 percent of maximum indicated torque. Tap around outside of coupling with a rubber mallet to distribute band tension. Torque nut to specified value. Do not over torque.

h. **Install primary nozzle coupling (17).** Torque nuts (18) and (19) alternately to **55 INCH-POUNDS**.

(1) Slide nozzle (20) forward until alinement pin (21) engages hole in engine flange (22).

(2) Position coupling (17) where flange (22) connects to nozzle (20).

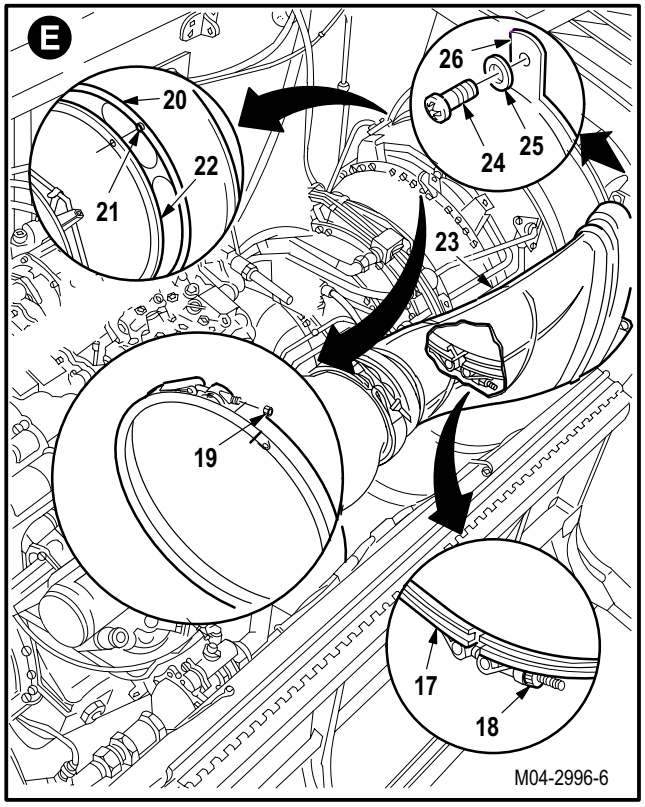
(3) Position coupling (17) with coupling nut (18) at bottom of nozzle (20).

(4) Install upper coupling nut (19).

(5) Torque nuts (18) and (19) alternately to **55 INCH-POUNDS**. Use torque wrench.

i. **Install air duct (23) on nozzle (20).**

(1) Install three screws (24) through washers (25) and flange (26).

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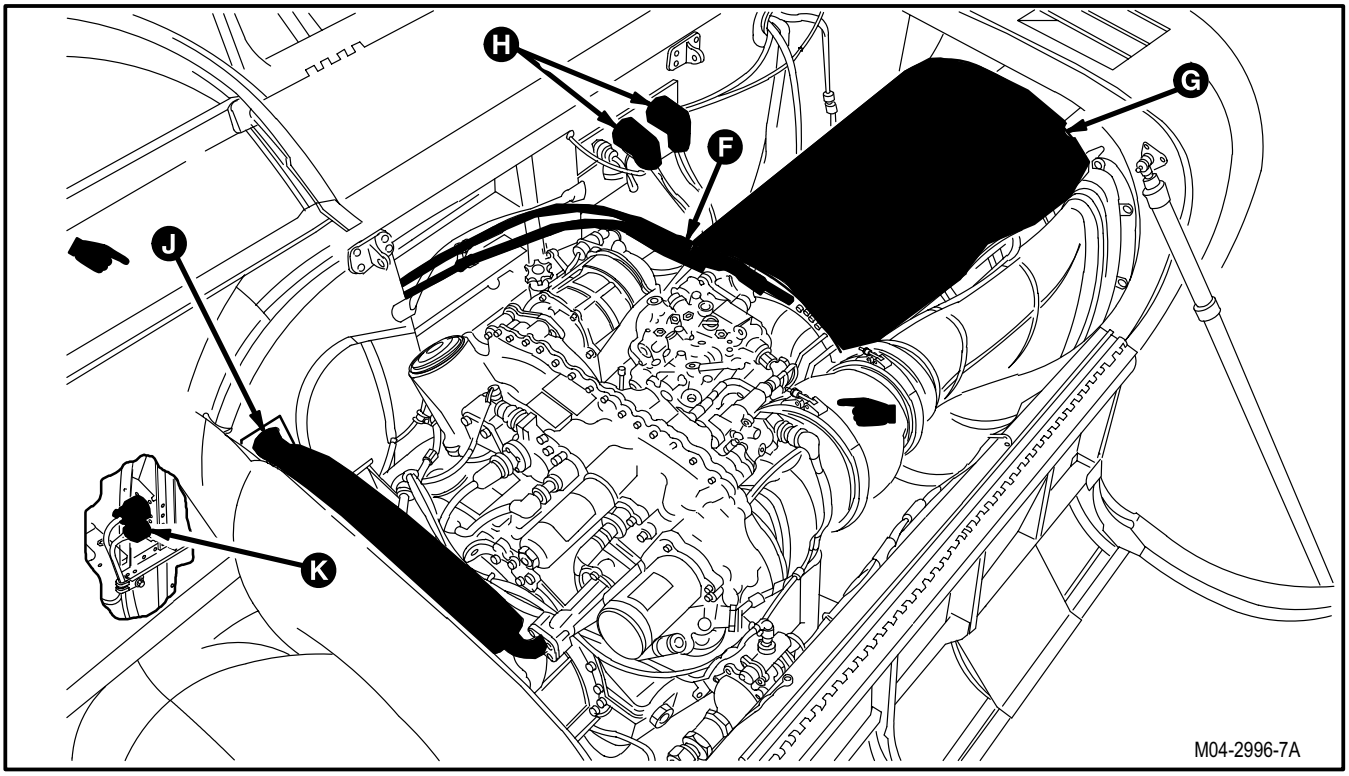
## 4.51. NO. 1 ENGINE INSTALLATION - UPPER CONNECTIONS - continued




j. **Install cable (27) on power available spindle gearbox (28).**

(1) Remove cable (27) from upper clip (29).

(2) Install cable (27) on power available spindle fitting (30).

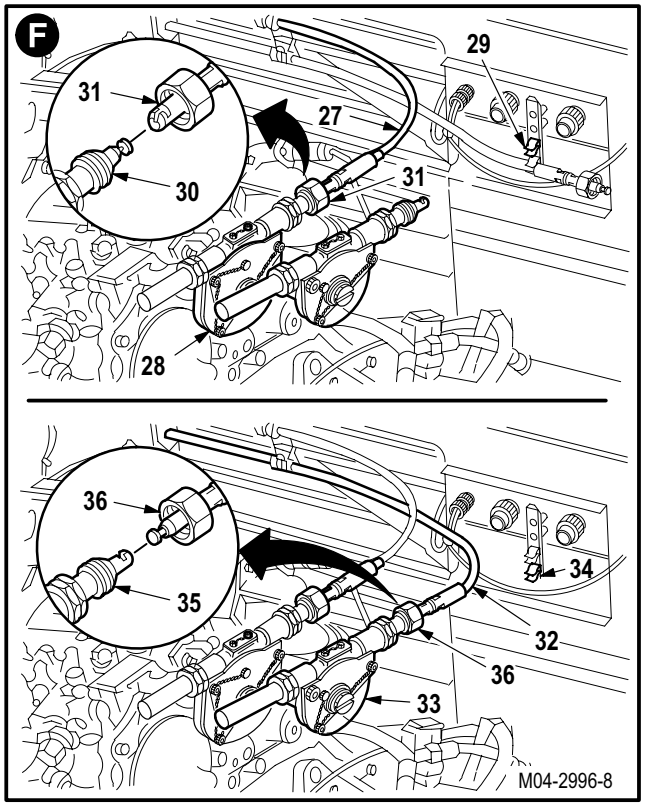
(3) Install coupling nut (31).

k. **Install cable (32) on load demand spindle gearbox (33).**

(1) Remove cable (32) from lower clip (34).

(2) Install cable (32) on load demand spindle fitting (35).

(3) Install coupling nut (36).

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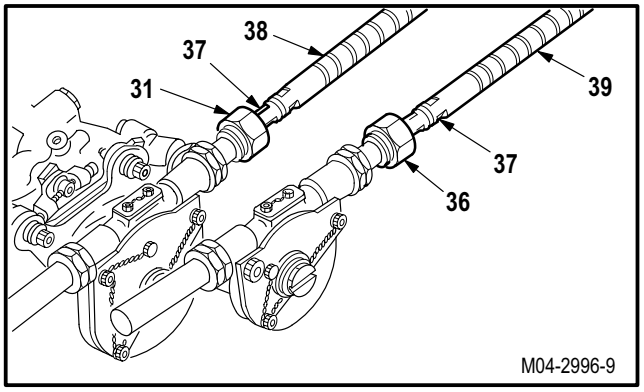
## 4.51. NO. 1 ENGINE INSTALLATION - UPPER CONNECTIONS - continued

l. **Torque coupling nuts (31) and (36) to 70 INCH-POUNDS.**

(1) Hold flats (37) on cable housing (38) and (39).

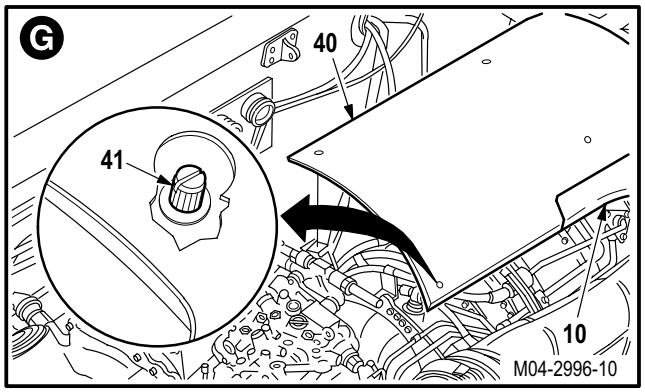
(2) Torque coupling nuts (31) and (36) to **70 INCH-POUNDS**. Use torque wrench.




m. **Install engine shroud (40).**

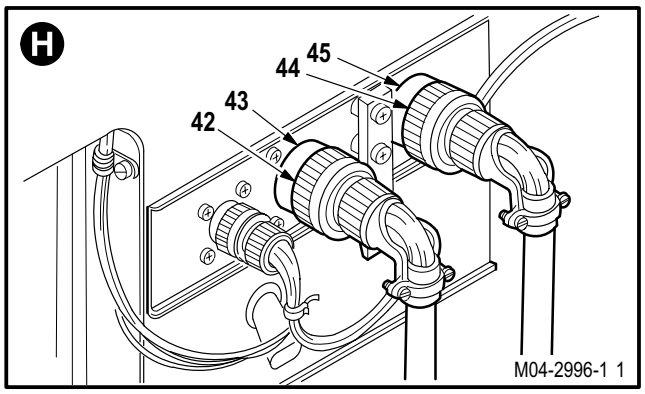
(1) Position shroud (40) on top of engine (10).

(2) Lock four turnlock fasteners (41).




n. **Attach connector P23 (42) to receptacle J23 (43).**

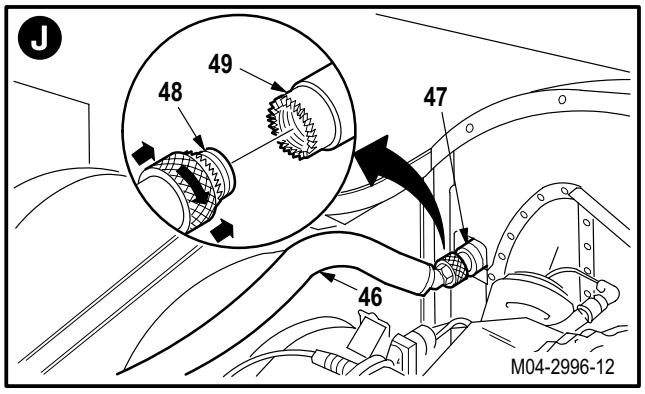
o. **Attach connector P21 (44) to receptacle J21 (45).**




p. **Install fuel hose (46) on breakaway valve (47).**

(1) Aline ratchet sleeve (48) with adapter (49).

(2) Turn sleeve (48) clockwise until locking teeth are fully engaged and seated.

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**4.51. NO. 1 ENGINE INSTALLATION - UPPER CONNECTIONS - continued**

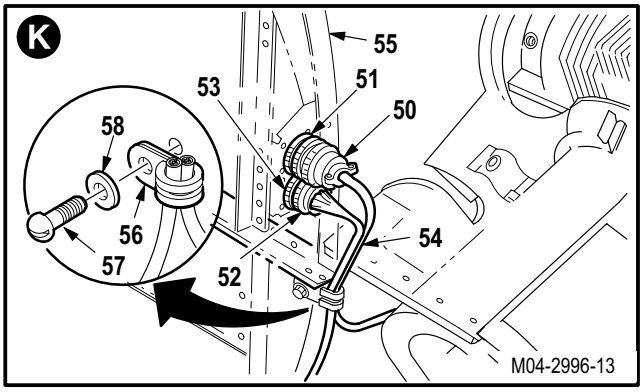
q. **Attach connector P61 (50) to receptacle J61 (51).**

r. **Attach connector P47 (52) to receptacle J47 (53).**

s. **Install wire harness (54) on airframe (55).**

(1) Install clamp (56) on wire harness (54).

(2) Install screw (57) through washer (58) and clamp (56).




t. **Inspect (QA).**

u. **Install No. 1 drive shaft** (para 6.2)**.**

v. **Service No. 1 engine oil system** (para 1.24)**. Observe all safety precautions.**

w. **Prime fuel system** (para 1.23)**. Observe all safety precautions.**

x. **Secure access doors LN1, LN3, and LN4** (para 2.2)**.**

y. **Remove maintenance crane** (para 1.105)**.**

z. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

END OF TASK

## 4.52. NO. 2 ENGINE INSTALLATION

4.52.1. Description

This task covers: Installation.

4.53. No. 2 Engine Installation - Install in Nacelle
4.54. No. 2 Engine Installation - Lower Connections
4.55. No. 2 Engine Installation - Upper Connections

4.52.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
Airframe adapter kit (item 25, App H)
Light duty laboratory apron (item 27, App H)
Aircraft mounted crane (item 69, App H)
9/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 85, App H)
Chemical protective gloves (item 154, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
Adjustable air filtering respirator (item 262, App H)
Engine lifting sling (item 291, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Materials/Parts:**

Packing (4)
Sealing compound (item 166, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
Two persons to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 6.36 | Nose gearbox and quill shaft installed |
| 10.1 | Perform fuel system inspection |

**WARNING**

**Operation of a mix of T700-GE-701 and T700-GE-701C engines on the same AH-64A aircraft is prohibited.**

GO TO NEXT PARAGRAPH

## 4.53. NO. 2 ENGINE INSTALLATION - INSTALL IN NACELLE

4.53.1. Description

This task covers: Installation.

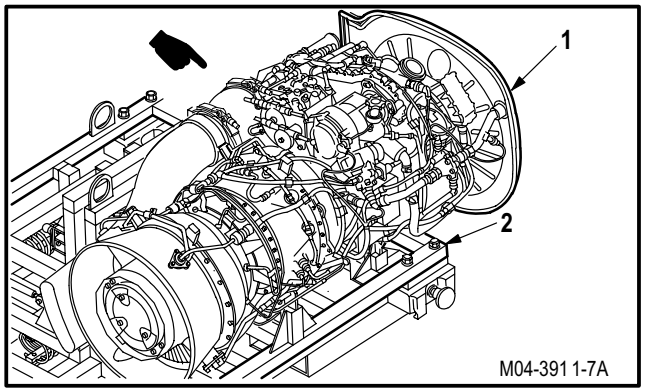
4.53.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.52 | No. 2 engine installation |

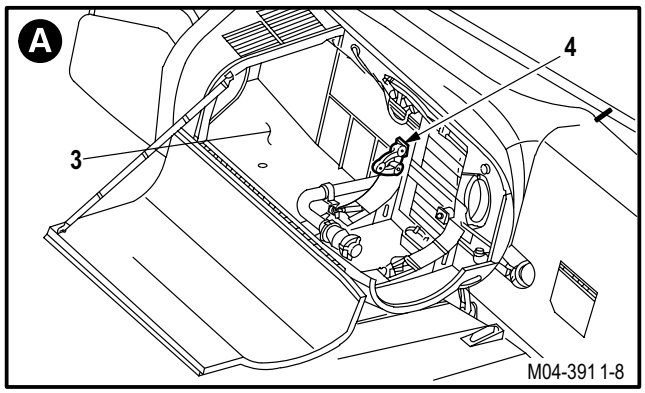
4.53.3. Installation

a. **Remove engine (1) from handling adapter (2)** (para 4.28)**.**




b. **Check nacelle (3) and aft engine support (4) for damage.** None allowed.

c. **Check nacelle (3) for corrosion** (para 1.49)**.**

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**4.53. NO. 2 ENGINE INSTALLATION - INSTALL IN NACELLE - continued**

d. **Install two new packings (5) in air connect housing (6).**

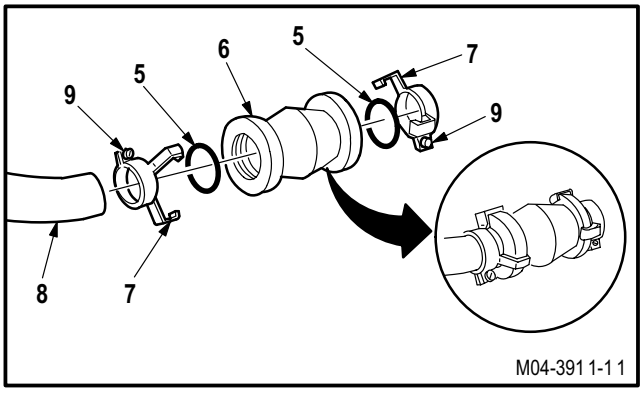
(1) Slide housing (6) and two clamps (7) off air tube (8).

(2) Remove and discard packings (5).

(3) Install new packings (5) at each end of housing (6).

(4) Slide housing (6) and two clamps (7) on air tube (8).

(5) Tighten two screws (9).



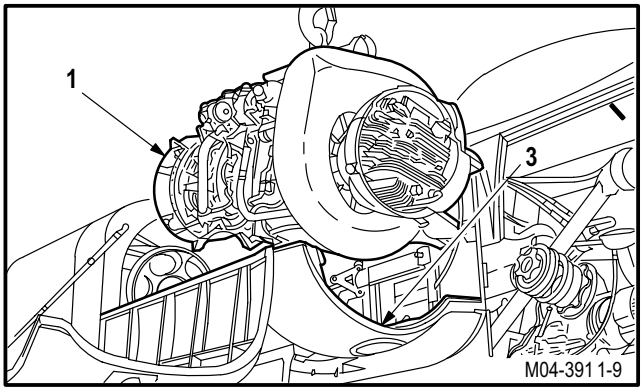

**CAUTION**

Do not use engine accessories as hand holds during engine positioning.

e. **Lift engine (1) and position above nacelle (3).** Use crane.

**CAUTION**

When lowering engine into nacelle, ensure that all hoses, electrical plugs, lines, and cables are free and clear of any obstructions.




f. **Lower engine (1) into nacelle (3).**

g. **Inspect (QA).**

GO TO NEXT PARAGRAPH

## 4.54. NO. 2 ENGINE INSTALLATION - LOWER CONNECTIONS

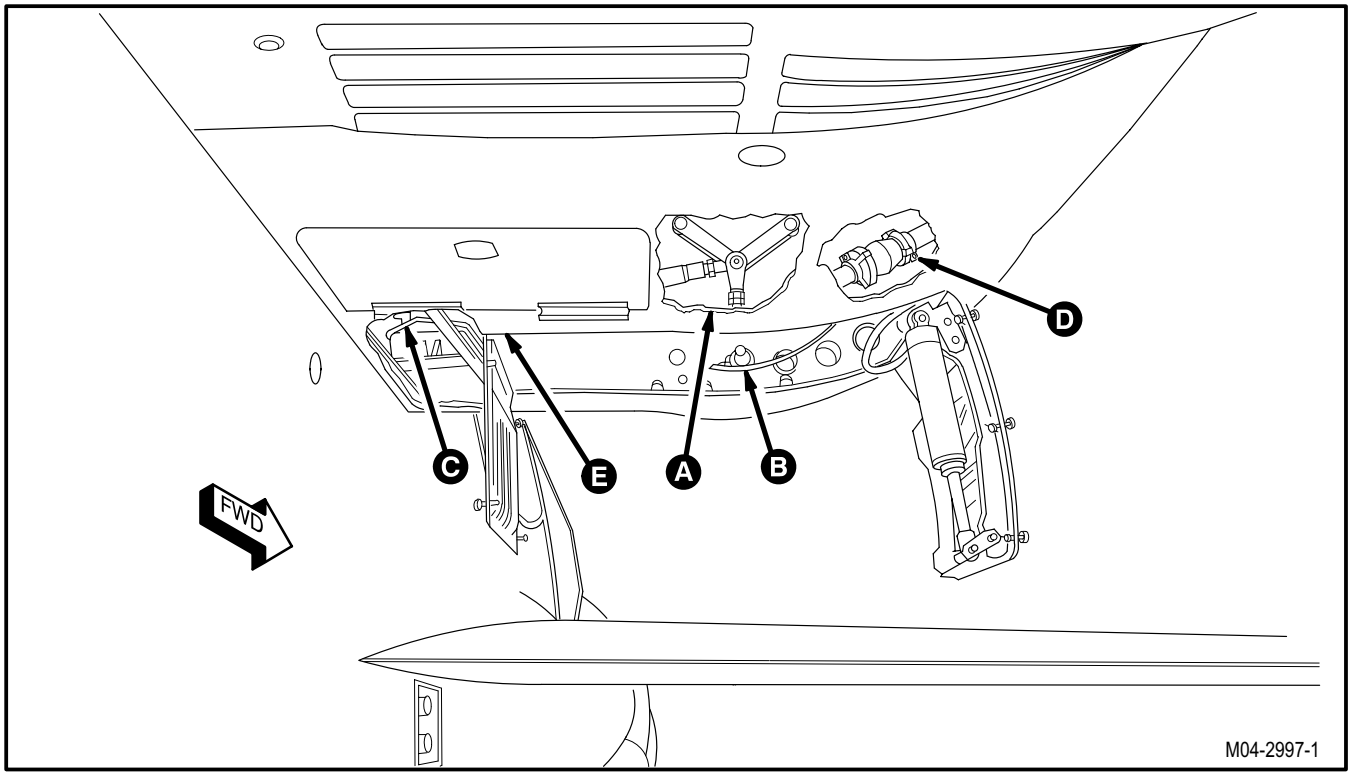
4.54.1. Description

This task covers: Installation.

4.54.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.52 | No. 2 engine installation |

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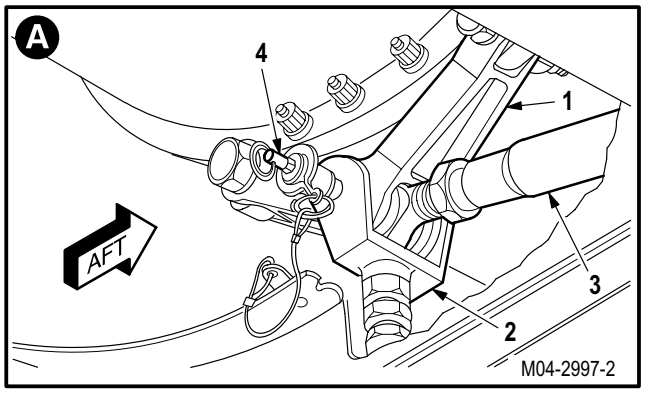
## 4.54. NO. 2 ENGINE INSTALLATION - LOWER CONNECTIONS - continued

4.54.3. Installation

a. **Aline aft lower engine mount (1) with lower link (2) and rod (3).**

b. **Install quick release pin (4) through mount (1), link (2), and rod (3).**



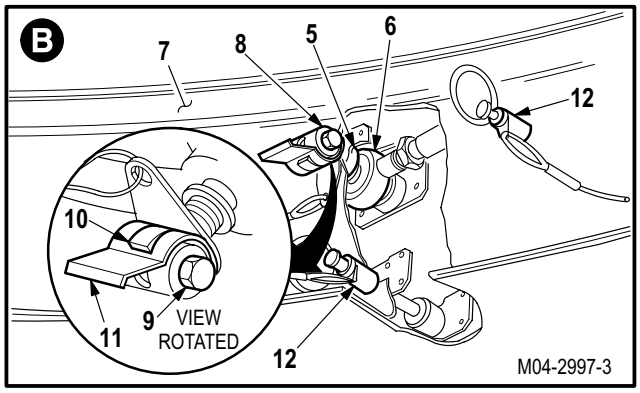

c. **Aline forward lower engine mount (5) with lower rod (6) and nacelle support (7).**

d. **Install support pin (8) through mount (5), rod (6), and support (7).**

(1) Lock pin (8).

(a) Turn bolt (9) clockwise until lock (10) engages with spring clip (11). Use torque wrench.

(b) If torque required to lock pin (8) is not **55 to 100 INCH-POUNDS**, replace pin.



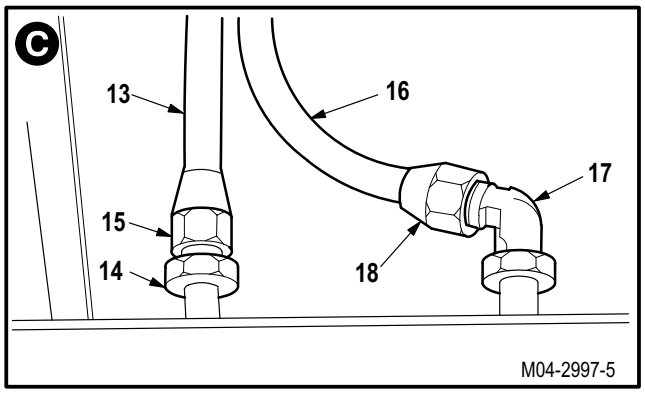

e. **Install two quick release pins (12) through mount (5) and support (7).**

f. **Install drain tube (13) on fitting (14).**

(1) Hold fitting (14). Install hose nut (15).

g. **Install drain hose (16) on elbow (17).**

(1) Hold elbow (17). Install hose nut (18).

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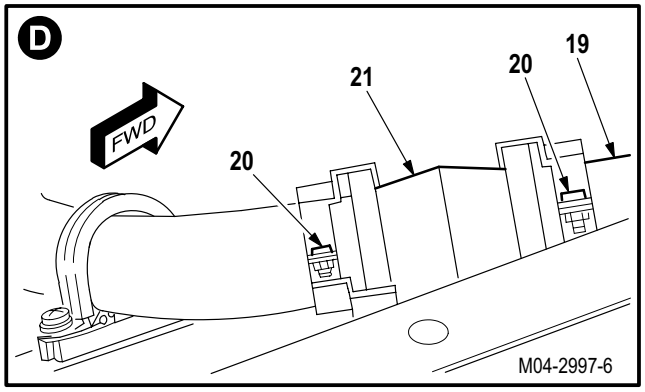
## 4.54. NO. 2 ENGINE INSTALLATION - LOWER CONNECTIONS - continued

h. **Install starter air tube (19).**

(1) Loosen clamp screws (20).

(2) Slide connector (21) on air tube (19) until centered.

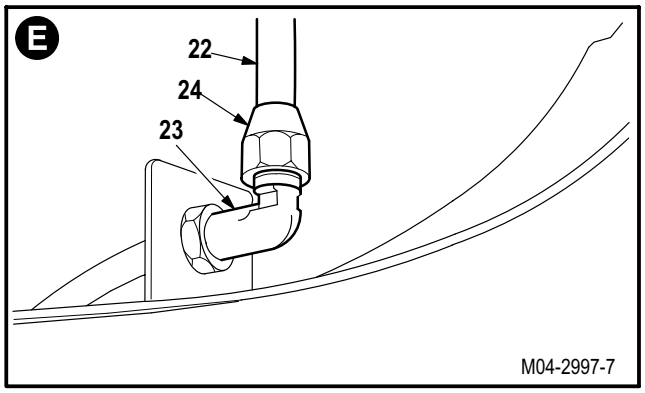
(3) Tighten clamp screws (20).




i. **Install bleed tube (22) on elbow fitting (23).**

(1) Hold elbow (23). Install nut (24).

j. **Inspect (QA).**

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## 4.55. NO. 2 ENGINE INSTALLATION - UPPER CONNECTIONS

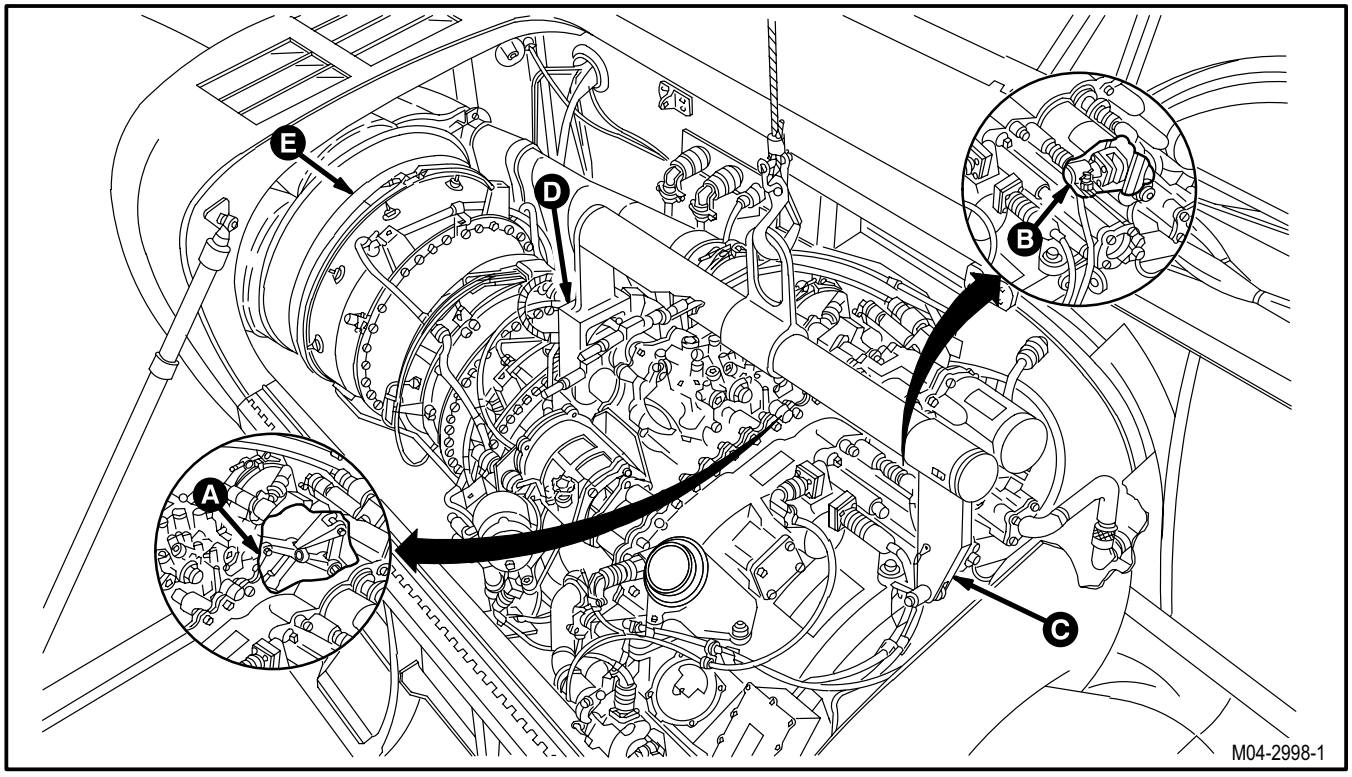
4.55.1. Description

This task covers: Installation.

4.55.2. Initial Setup

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.52 | No. 2 engine installation |

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## 4.55. NO. 2 ENGINE INSTALLATION - UPPER CONNECTIONS - continued

4.55.3. Installation

a. **Apply sealing compound to bushings in nacelle support (1) if they are loose.** Use sealing compound (item 166, App F).

b. **Aline aft inboard engine mount (2) with support (1).**

c. **Install support pin (3) through mount (2) and support (1).**

(1) Lock pin (3).

(a) Turn bolt (4) clockwise until lock (5) engages with spring clip (6). Use torque wrench.

(b) If torque required to lock pin (3) is not **55 to 100 INCH-POUNDS**, replace pin.

d. **Close forward inboard engine mount (7).**

(1) Tighten nut (8).

e. **Release tension on lifting cable.**

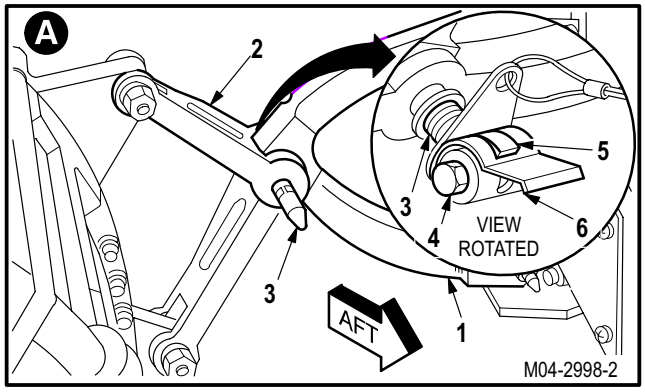
f. **Torque nut (8) to 85 INCH-POUNDS.** Use torque wrench.

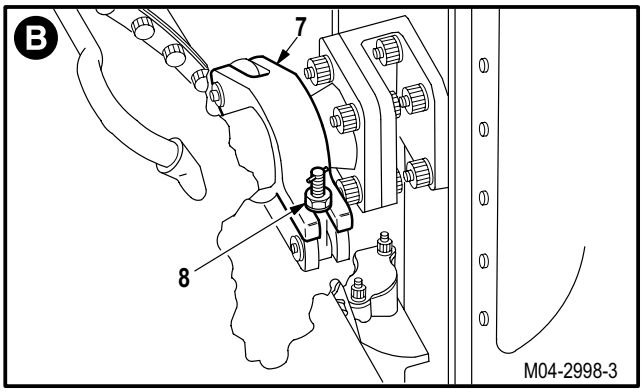
g. **Remove engine sling (9) from engine (10).**

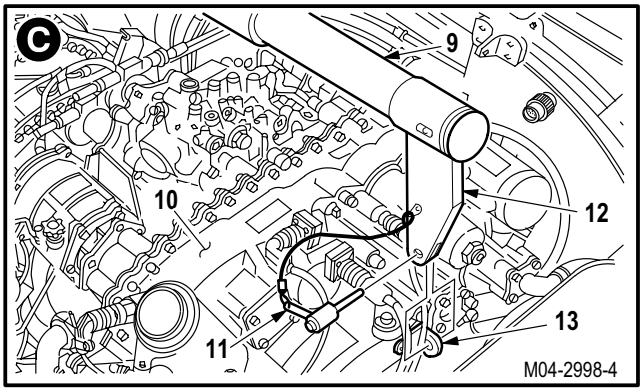
(1) Remove pin (11) from forward hanger link (12) and lifting lug (13).

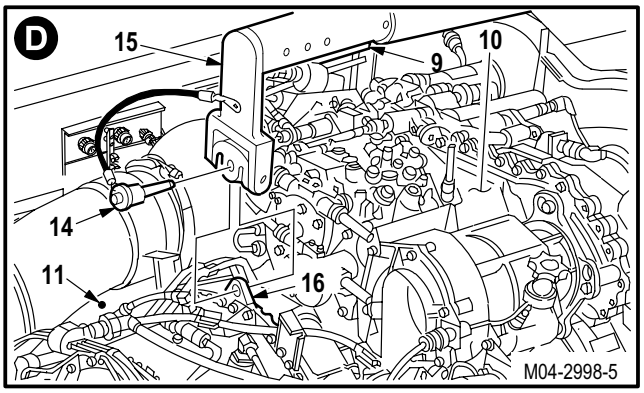
(2) Remove pin (14) from aft hanger link (15) and lifting lug (16).

(3) Remove sling (9). Use aircraft mounted crane.

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## 4.55. NO. 2 ENGINE INSTALLATION - UPPER CONNECTIONS - continued

**CAUTION**

To prevent damage to exhaust system, ensure that the engine seal ring is installed properly before attaching the primary exhaust nozzle.

**NOTE**

When installing coupling assembly, tighten coupling nut to approximately 70 percent of maximum indicated torque. Tap around outside of coupling with a rubber mallet to distribute band tension. Torque nut to specified value. Do not over torque.

h. **Install primary nozzle coupling (17).** Torque nuts (18) and (19) to **55 INCH-POUNDS**.

(1) Slide nozzle (20) forward until alinement pin (21) engages hole in engine flange (22).

(2) Position coupling (17) where engine flange (22) meets nozzle (20).

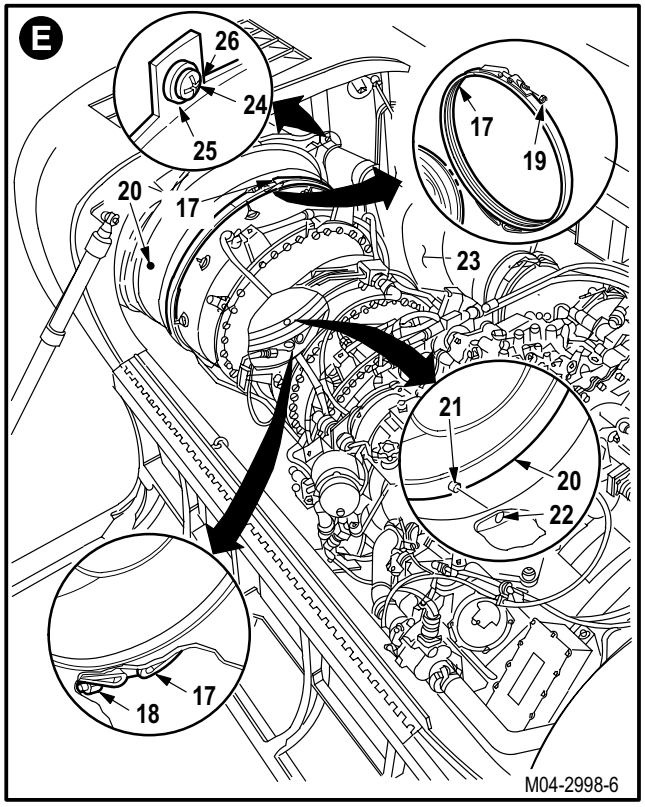
(3) Position coupling (17) with coupling nut (18) at bottom of nozzle (20).

(4) Install upper coupling nut (19).

(5) Torque nuts (18) and (19) alternately to **55 INCH-POUNDS**. Use torque wrench.

i. **Install air duct (23) on nozzle (20).**

(1) Install three screws (24) through washers (25) and flange (26).

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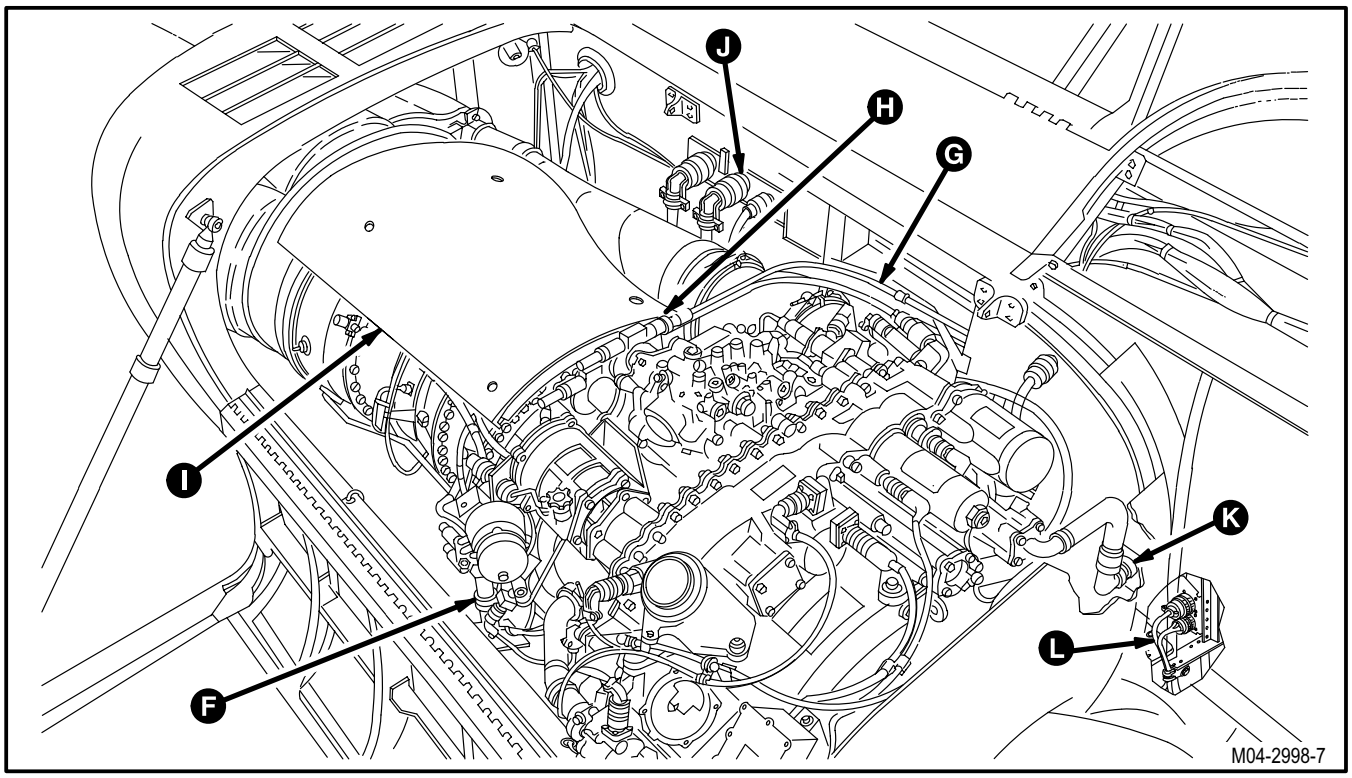
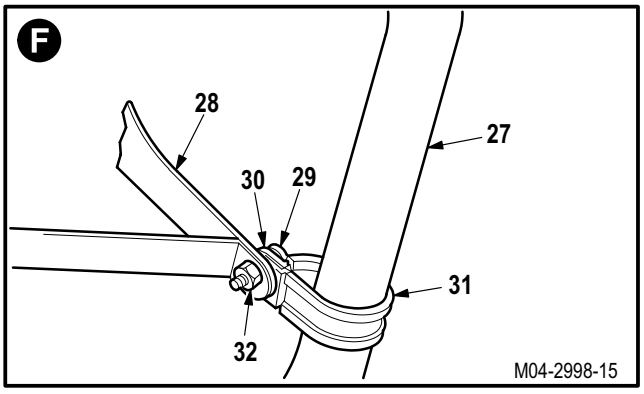
## 4.55. NO. 2 ENGINE INSTALLATION - UPPER CONNECTIONS - continued




j. **Install starter air tube (27) on support (28).**

(1) Install screw (29) through washer (30), clamp (31), and support (28).

(2) Install nut (32) on screw (29).

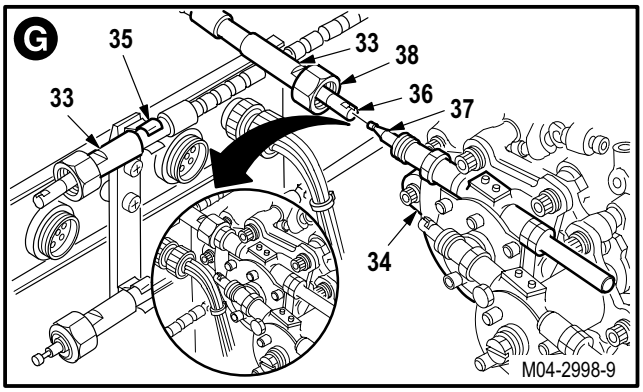



k. **Install cable (33) on power available spindle gearbox (34).**

(1) Remove cable (33) from upper clip (35).

(2) Install cable fitting (36) on gearbox fitting (37).

(3) Install coupling nut (38).

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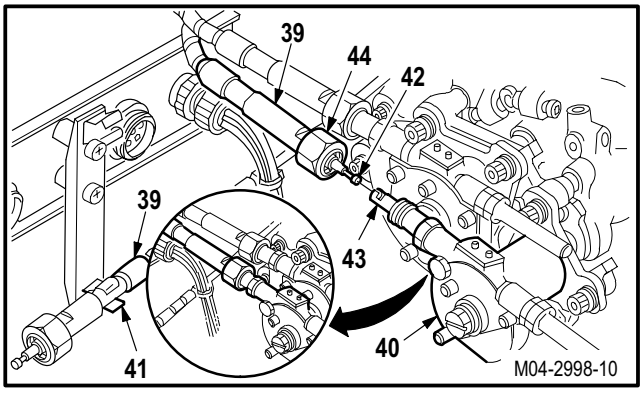
## 4.55. NO. 2 ENGINE INSTALLATION - UPPER CONNECTIONS - continued

l. **Install cable (39) to load demand spindle gearbox (40).**

(1) Remove cable (39) from lower clip (41).

(2) Install cable fitting (42) on gearbox fitting (43).

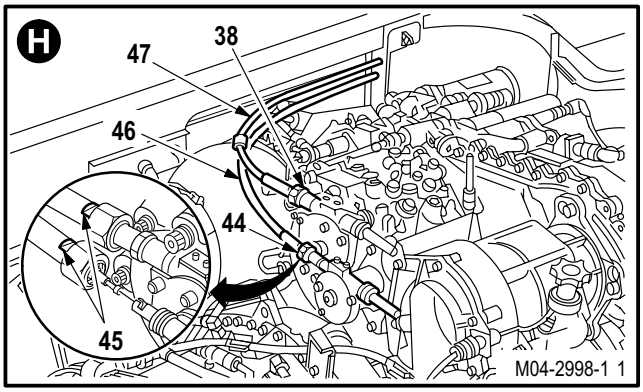
(3) Install coupling nut (44).




m. **Torque coupling nuts (38) and (44) to 70 INCH-POUNDS.**

(1) Hold flats (45) on cable housings (46) and (47).

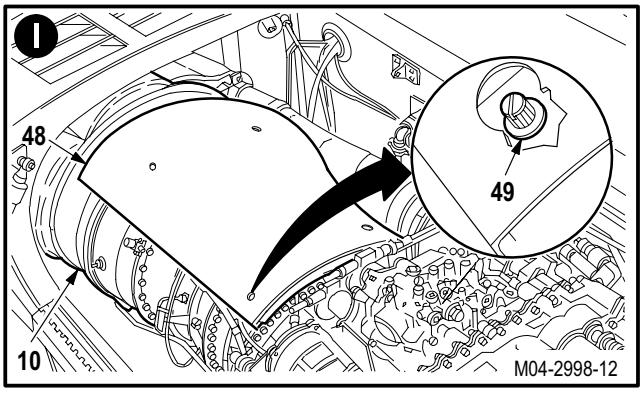
(2) Torque coupling nuts (38) and (44) to **70 INCH-POUNDS**. Use torque wrench.




n. **Install engine shroud (48).**

(1) Position shroud (48) on top of engine (10).

(2) Lock four turnlock fasteners (49).



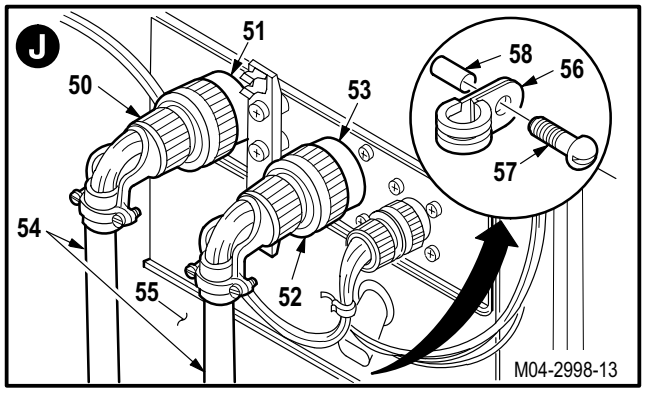

o. **Attach aft connector P22 (50) to receptacle J22 (51).**

p. **Attach connector P24 (52) to receptacle J24 (53).**

q. **Attach wire harness (54) to airframe (55).**

(1) Position clamp (56) on harness (54).

(2) Install screw (57) through clamp (56) and spacer (58) into airframe (55).

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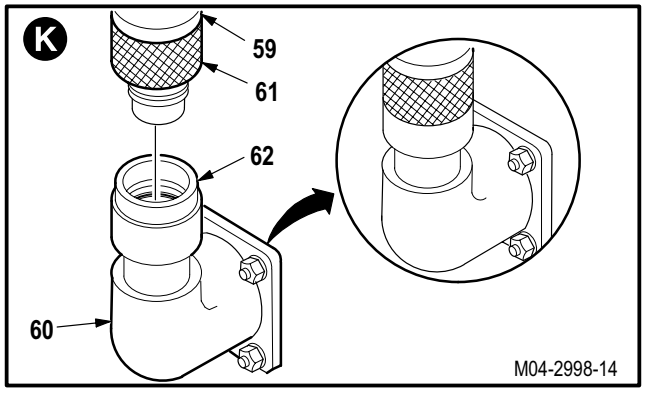
## 4.55. NO. 2 ENGINE INSTALLATION - UPPER CONNECTIONS - continued

r. **Install fuel hose (59) on receptacle (60).**

(1) Aline ratchet sleeve (61) with adapter (62).

(2) Turn sleeve (61) clockwise until locking teeth are fully engaged and seated.



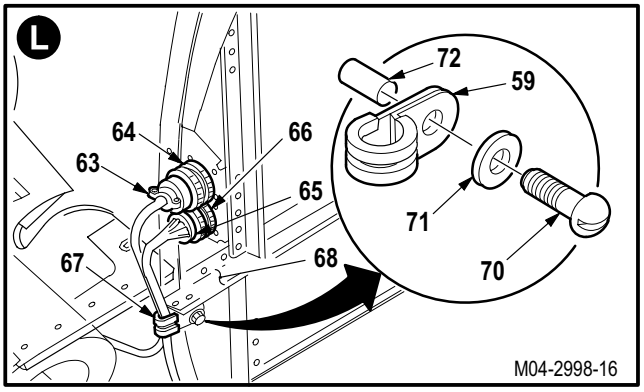

s. **Attach connector P60 (63) to receptacle J60 (64).**

t. **Attach connector P48 (65) to receptacle J48 (66).**

u. **Install wire harness (67) on airframe (68).**

(1) Position clamp (68) on harness (67).

(2) Install screw (70) through washer (71), clamp (69), and spacer (72) into airframe (68).




v. **Inspect (QA).**

w. **Install No. 2 drive shaft** (para 6.2)**.**

x. **Service No. 2 engine oil system** (para 1.24)**.**

y. **Prime fuel system** (para 1.23)**.**

z. **Secure access doors RN1, RN3, and RN4; install panel R200** (para 2.2)**.**

aa. **Remove maintenance crane** (para 1.105)**.**

ab. **Perform power plants maintenance operational check (engine 2)** (TM 1-1520-238-T)**.**

END OF TASK

## 4.56. NO. 1 OR NO. 2 ENGINE AFT INBOARD MOUNT/AFT LOWER MOUNT BUSHING REMOVAL/INSTALLATION (AVIM)

4.56.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.56.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
10-ton hydraulic hand operated arbor press (item 236, App H)
Adjustable air filtering respirator (item 262, App H)

**Materials/Parts:**

Lubricant (item 114, App F)
Sealing compound (item 165, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**NOTE**

This task is typical for No. 1 or No. 2 engine aft inboard or aft lower mounts.

4.56.3. Removal

a. **Remove two aft inboard bushings (1) from mount (2).** Use arbor press.

b. **Remove two aft lower bushings (3) from mount (4).** Use arbor press.

4.56.4. Cleaning

a. **Clean internal bore of aft inboard and lower mounts** (para 1.47)**.**

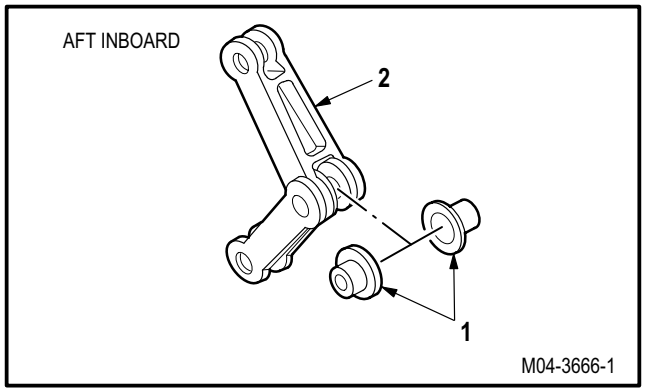
4.56.5. Inspection

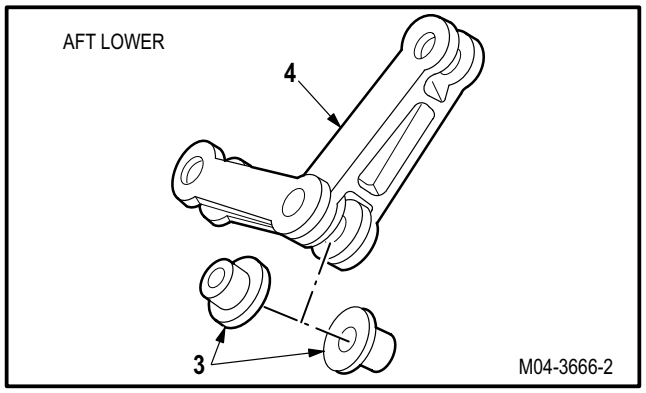
a. **Check mounts for cracks.** None allowed.

b. **Check mounts for corrosion** (para 1.49)**.**

c. **Measure aft inboard link bushing mounting hole inner diameter.**

(1) If diameter exceeds **0.5015 INCH**, replace aft inboard mount.

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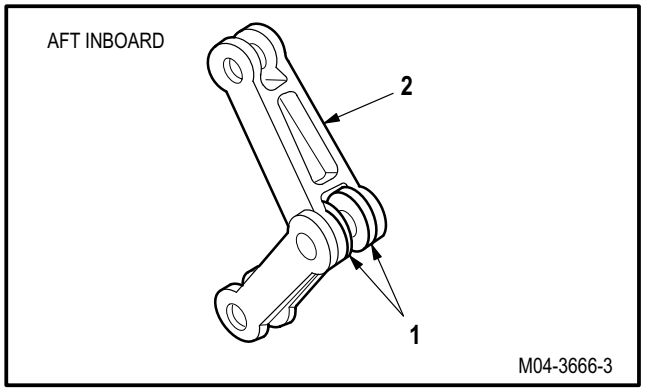
## 4.56. NO. 1 OR NO. 2 ENGINE AFT INBOARD MOUNT/AFT LOWER MOUNT BUSHING REMOVAL/INSTALLATION (AVIM) - continued

d. **Measure aft lower link bushing mounting hole inner diameter.**

(1) If diameter exceeds **0.6990 INCH**, replace aft lower mount.

4.56.6. Installation

a. **Install two bushings (1) in aft inboard mount (2).**




(1) Countersink two new bushings (1), 90 degrees x **0.410 INCH** diameter, flange side (TM 1-1500-204-23).

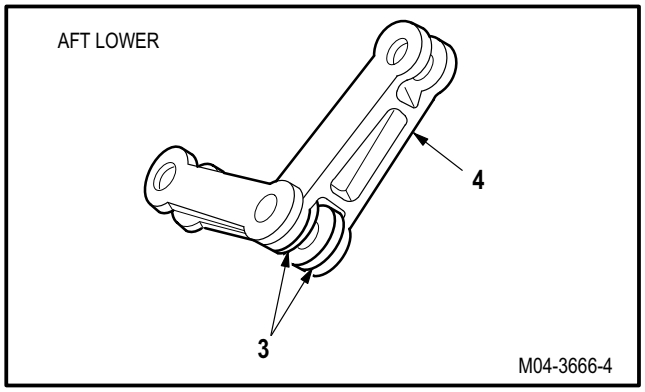
(2) Lightly coat both bushings (1), under the flange and halfway down the sleeve. Use sealing compound (item 165, App F).

(3) Install two bushings (1), one in each link, from the inside, in the straight leg. Use arbor press.

(4) Clean any excess sealant from link and bushing. Allow sealant to dry before assembly.

(5) Ensure links are able to rotate with respect to each other.

b. **Install two bushings (3) in aft lower mount (4).**




(1) Lubricate two bushings (3) with solid film lubricant (item 114, App F).

(2) Install two bushings (3) in mount (4). Use arbor press.

c. **Inspect (QA).**

END OF TASK

# SECTION II. COOLING SYSTEM MAINTENANCE

## 4.57. NO. 1 AND NO. 2 ENGINE LOUVER ACTUATOR REMOVAL/INSTALLATION

4.57.1. Description

This task covers: Removal. Cleaning. Inspection. Installation. Adjustment.

4.57.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Aircraft power unit (item 232, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Materials/Parts:**

Cotter pin
Packing
Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors T250L, T250R, T290L, T290R, and L325 opened |

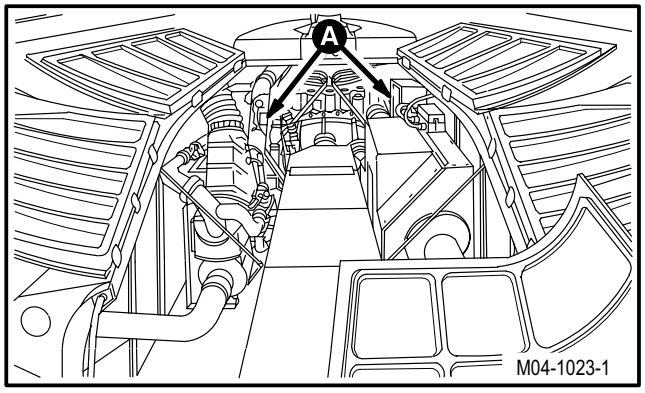
**NOTE**

This task is typical for No. 1 and No. 2 engine louver actuator.

4.57.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot forward circuit breaker panel, open ENG LVR circuit breaker.**

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## 4.57. NO. 1 AND NO. 2 ENGINE LOUVER ACTUATOR REMOVAL/INSTALLATION - continued

c. **Remove air inlet hose (1) from louver actuator (2).**

(1) Hold reducer (3). Remove hose nut (4).

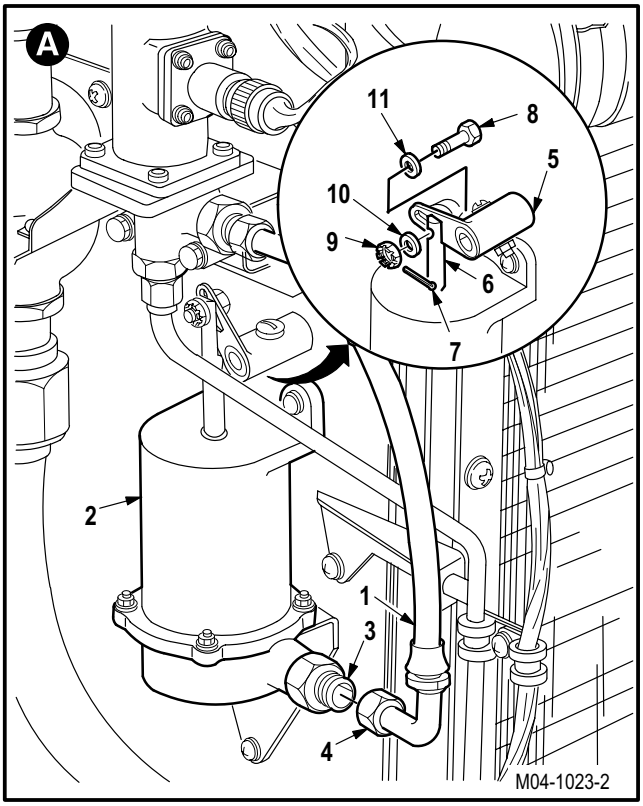
d. **Remove louver arm (5) from actuator shaft (6).**

(1) Remove and discard cotter pin (7).

(2) Hold bolt (8). Remove nut (9) and washer (10).

(3) Remove bolt (8) and washer (11).

(4) Remove arm (5).




e. **Remove actuator (2) from louver (12).**

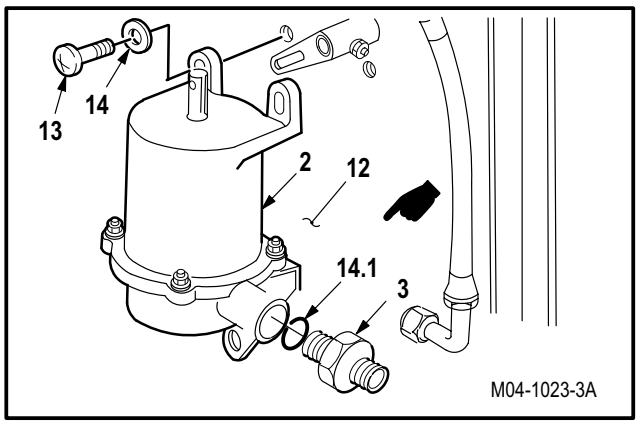
(1) Remove three screws (13) and washers (14).

(2) Remove actuator (2).

f. **Remove reducer (3) from actuator (2).**

(1) Hold actuator (2) remove reducer (3).

(2) Remove and discard packing (14.1).




4.57.4. Cleaning

a. **Clean actuator and mounting surface on louver** (para 1.47)**.**

4.57.5. Inspection

a. **Check actuator mounting surface on louver for cracks.** None allowed.

b. **Check actuator and louver for corrosion** (para 1.49)**.**

c. **Check reducer for stripped threads.** None allowed.

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## 4.57. NO. 1 AND NO. 2 ENGINE LOUVER ACTUATOR REMOVAL/INSTALLATION - continued

4.57.6. Installation

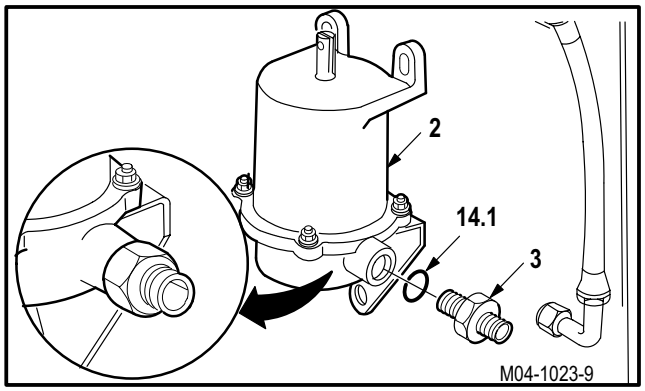
a. **Install reducer (3) on actuator (2).**

(1) Lubricate threads of reducer (3) and new packing (14.1). Use petrolatum (item 138, App F).

(2) Install reducer (3) on actuator (2).

**NOTE**

Do not tighten mounting screws until adjusted.




b. **Install actuator (2) on louver (12).**

(1) Install short screw (13) through washer (14) and actuator lower mount.

(2) Install two long screws (13) through washers (14) and actuator top mounts.

c. **Install arm (5) on shaft (6).**

(1) Install bolt (8) through washer (11), arm (5), and shaft (6).

(2) Hold bolt (8). Install washer (10) and nut (9).

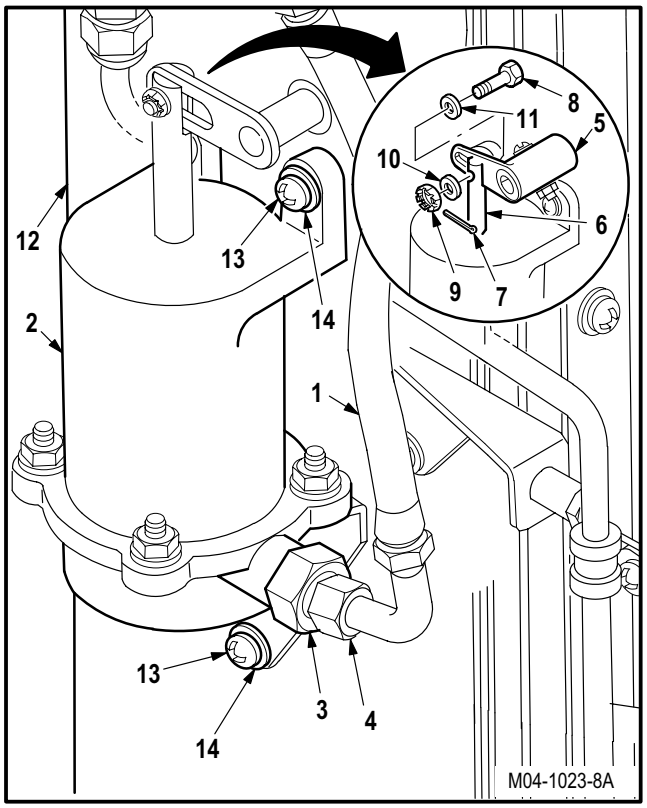
(3) Install new cotter pin (7).

d. **Install air inlet hose (1) on louver actuator (2).** Torque nut (4) to **60 INCH-POUNDS**.

(1) Lubricate threads of reducer (3). Use petrolatum (item 138, App F).

(2) Install nut (4) on reducer (3).

(3) Hold reducer (3). Torque nut (4) to **60 INCH-POUNDS**. Use torque wrench.




e. **Inspect (QA).**

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## 4.57. NO. 1 AND NO. 2 ENGINE LOUVER ACTUATOR REMOVAL/INSTALLATION - continued

4.57.7. Adjustment

a. **Apply external power - air** (para 1.71)**.**

b. **Apply external power - electrical** (para 1.70)**.**

c. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

d. **On pilot forward circuit breaker panel, close ENG LVR circuit breaker.**

e. **Adjust actuator (2).**

(1) Move actuator (2) up or down to fully open louver vanes (15).

**WARNING**

**If FIRE BTL PRI-RES switch is set off-center during this task, extinguish system will discharge. Keep FIRE BTL switch centered. If injury occurs, seek medical aid.**

(2) Pull **ENG FIRE PULL 1** or **2** handle (16).

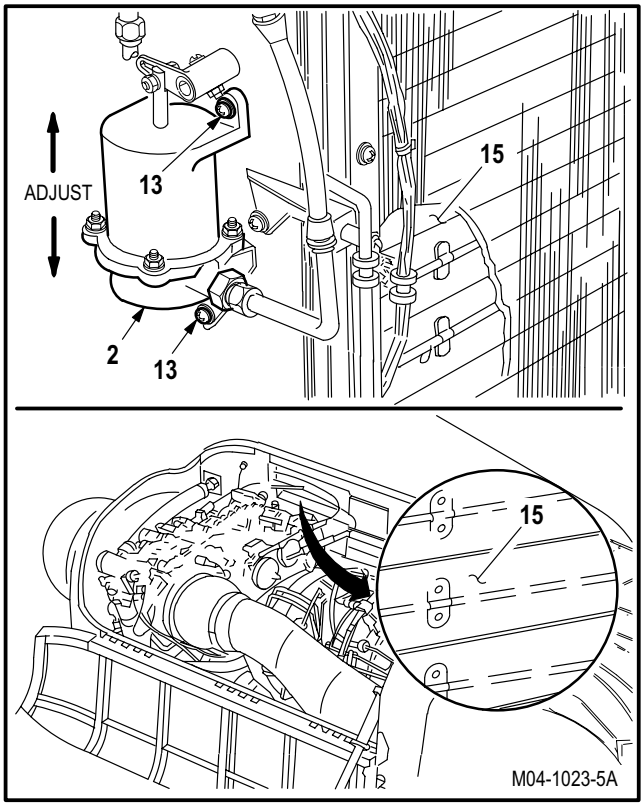
(3) Move actuator (2) up or down to close louver vanes (15).

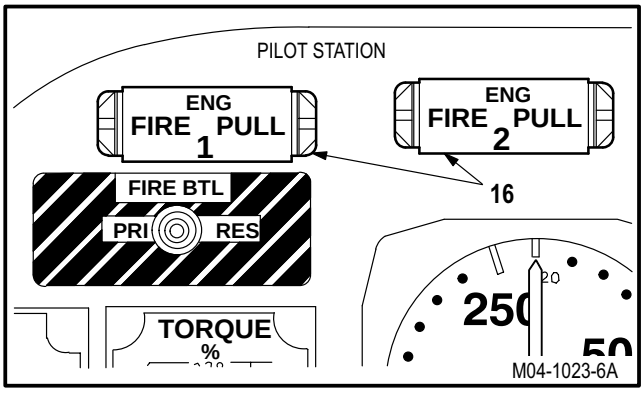
(4) Tighten three actuator mounting screws (13).

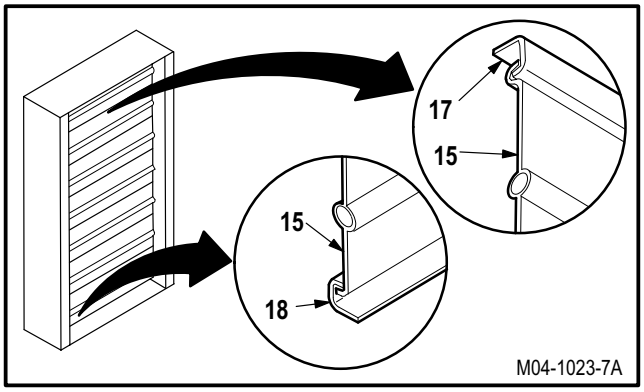
(5) Push **ENG FIRE PULL** handle (16). Louver vanes (15) must open.

(6) Pull and push **ENG FIRE PULL** handle (16) three times.

(7) When handle is pulled, verify that stops (17) and (18) are contacted by closed vanes (15). If louver vanes do not properly close and open, loosen screws (13); repeat adjustment step e.

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**4.57. NO. 1 AND NO. 2 ENGINE LOUVER ACTUATOR REMOVAL/INSTALLATION - continued**

f. **Inspect (QA).**

g. **Remove external power - air** (para 1.71)**.**

h. **Perform fire extinguisher maintenance operational check** (TM 1-1520-238-T)**.**

i. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

j. **Remove external power - electrical** (para 1.70)**.**

END OF TASK

## 4.58. NO. 1 ENGINE LOUVER REMOVAL

4.58.1. Description

This task covers: Removal. Cleaning. Inspection.

4.58.2. Initial Setup

**Tools:**

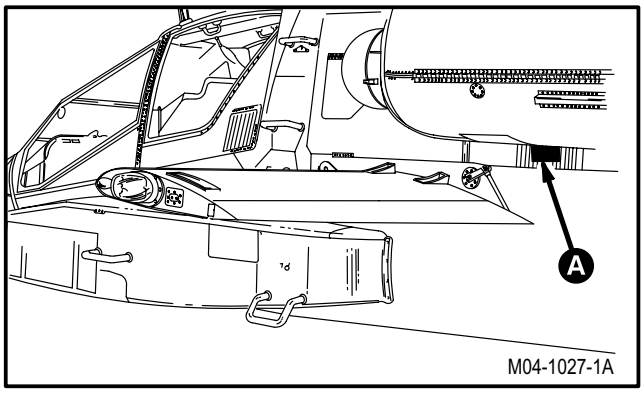
Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer

**Equipment Conditions:**

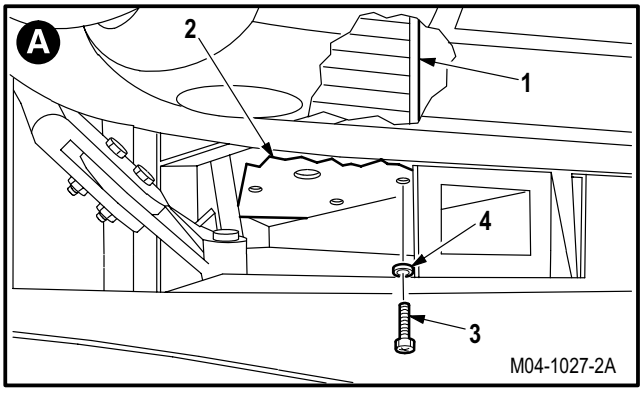
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Fairing L230 removed |
| 4.57 | No. 1 engine louver actuator removed |
| 4.63 | No. 1 engine louver directional control shut-off valve removed |
| 6.85 | Left heat exchanger removed |
| 13.18 | Air duct No. 2 removed |
| 13.44 | Defog shutoff valve removed |




4.58.3. Removal

a. **Remove louver (1) from support (2).**

(1) Remove five screws (3) and washers (4).

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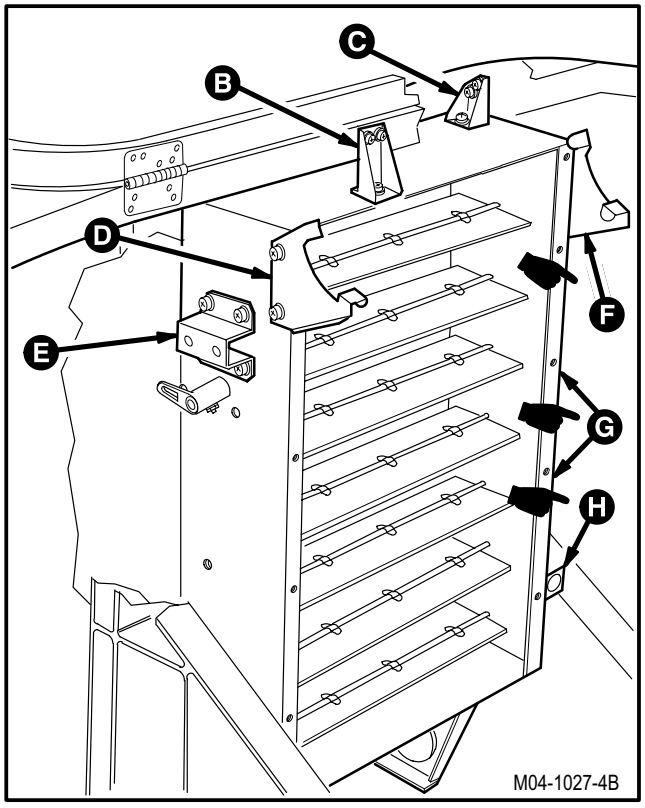
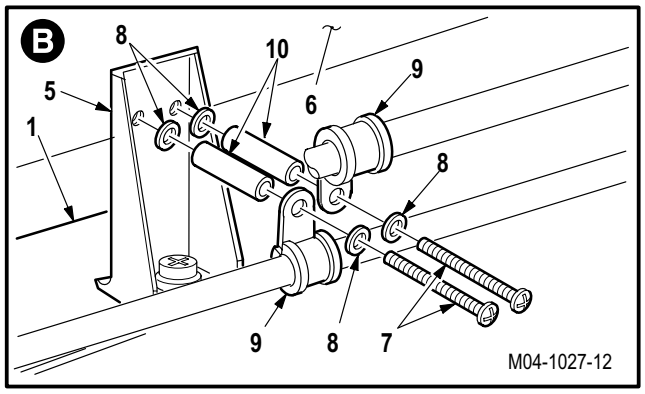
## 4.58. NO. 1 ENGINE LOUVER REMOVAL - continued




b. **Remove mounting bracket (5) from door support (6).**

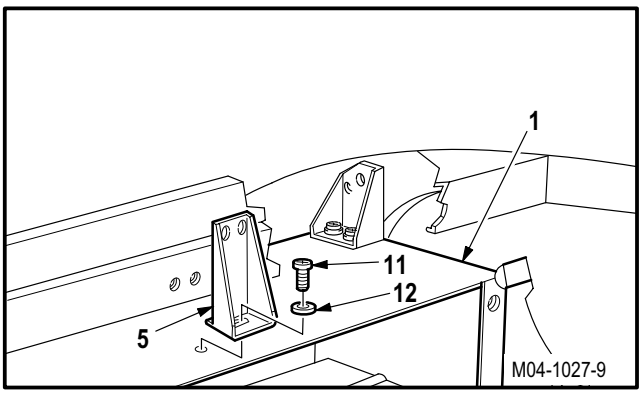
(1) Remove two screws (7), four washers (8), two clamps (9), and spacers (10).




c. **Remove mounting bracket (5) from louver (1).**

(1) Remove screw (11) and washer (12).

(2) Remove bracket (5).

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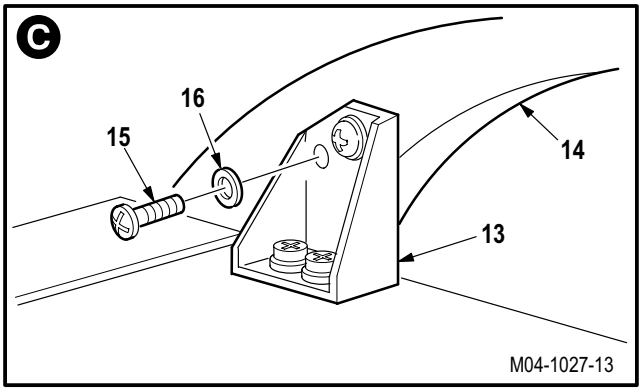
**4.58. NO. 1 ENGINE LOUVER REMOVAL - continued**

d. **Remove mounting bracket (13) from frame (14).**

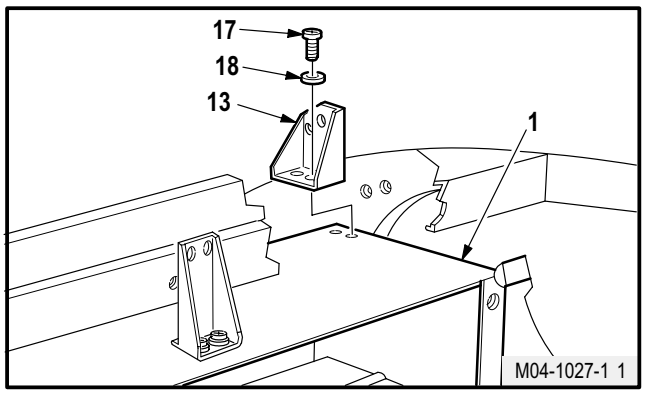
(1) Remove two screws (15) and washers (16).




e. **Remove mounting bracket (13) from louver (1).**

(1) Remove two screws (17) and washers (18).

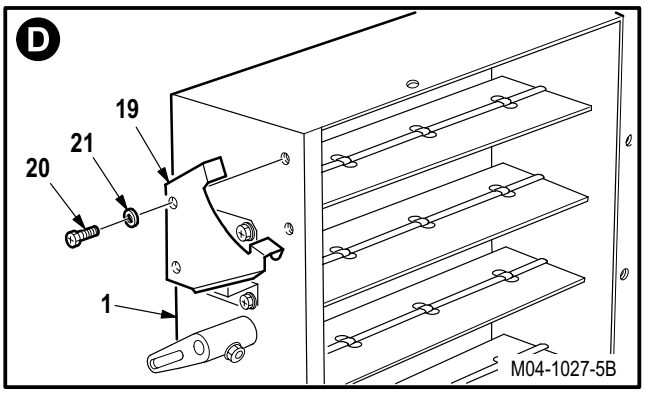
(2) Remove bracket (13).




f. **Remove aft duct bracket (19) from louver (1).**

(1) Remove two screws (20) and washers (21).

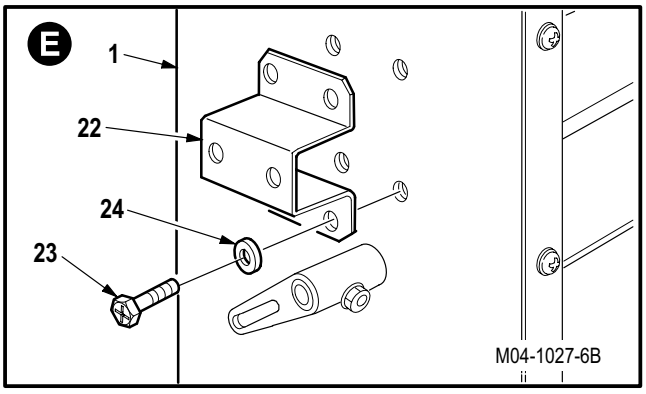
(2) Remove bracket (19).




g. **Remove valve bracket (22) from louver (1).**

(1) Remove four screws (23) and washers (24).

(2) Remove bracket (22).

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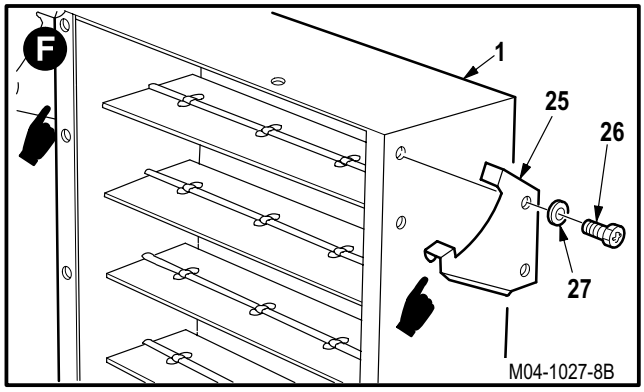
**4.58. NO. 1 ENGINE LOUVER REMOVAL - continued**

h. **Remove forward duct bracket (25) from louver (1).**

(1) Remove two screws (26) and washers (27).

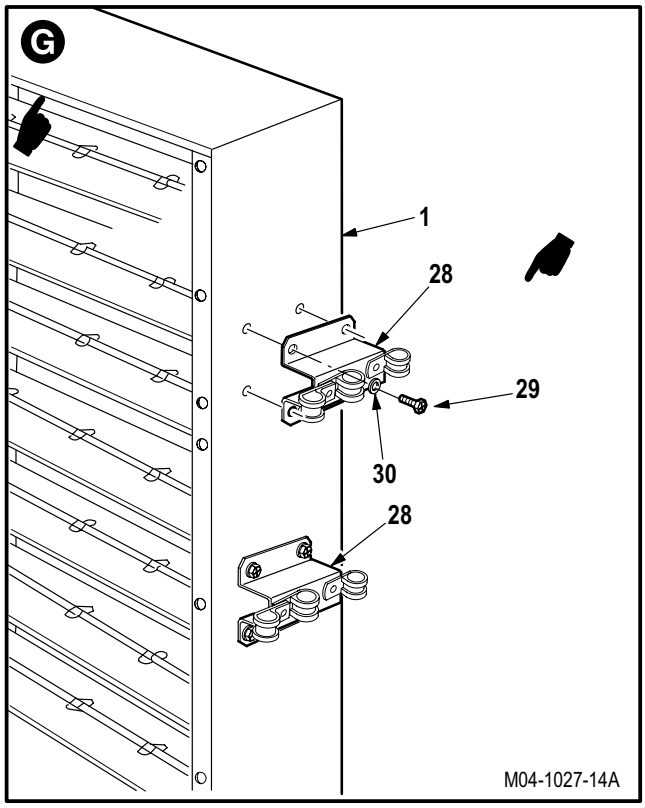
(2) Remove bracket (25).




i. **Remove two forward wire harness brackets (28) from louver (1).**

(1) Remove eight screws (29) and washers (30).

(2) Remove two brackets (28).

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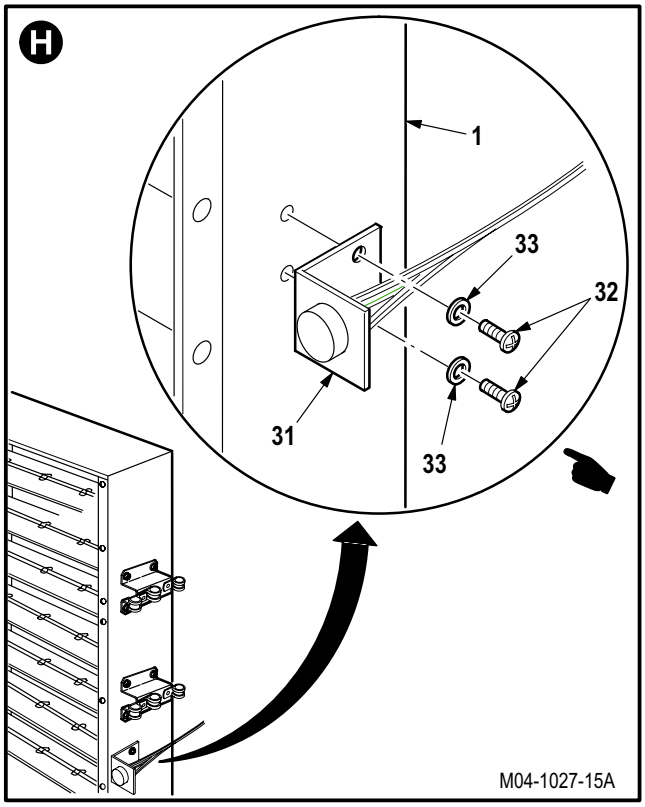
**4.58. NO. 1 ENGINE LOUVER REMOVAL - continued**

j. **Remove connector bracket (31) from louver (1).**

(1) Remove two screws (32) and washers (33).

(2) Remove bracket (31).




k. **Remove forward angle bracket (34) from enclosure (35).**

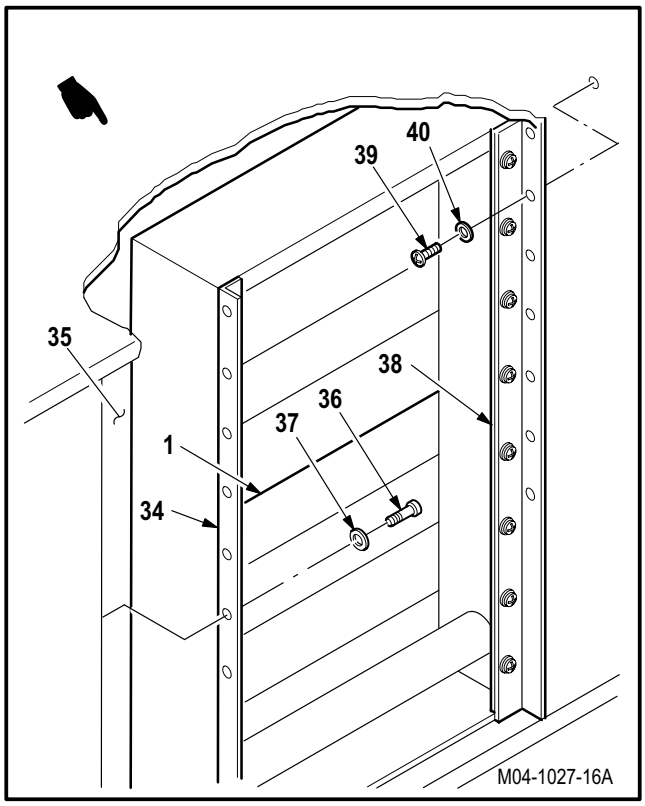
(1) Remove seven screws (36) and washers (37).

(2) Remove bracket (34).

l. **Remove aft angle bracket (38) from enclosure (35).**

(1) Remove seven screws (39) and washers (40).

(2) Remove bracket (38).

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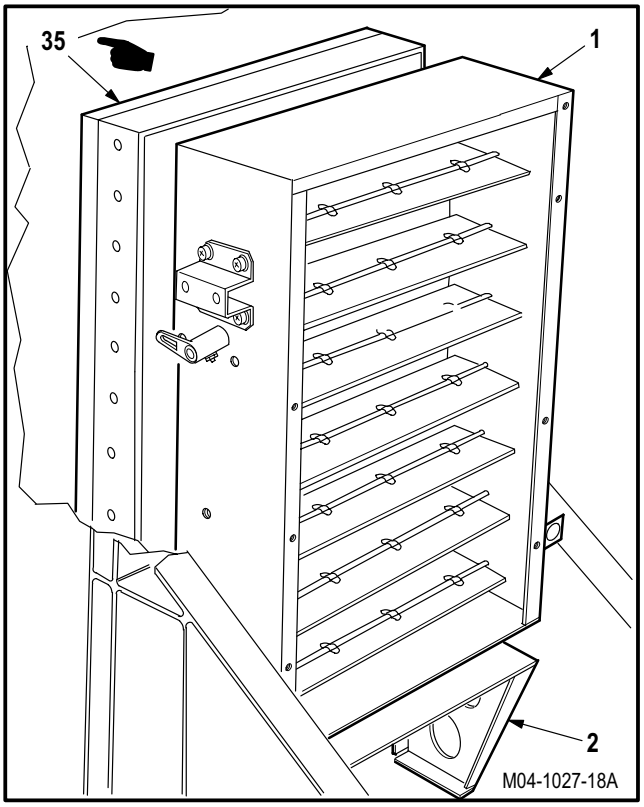
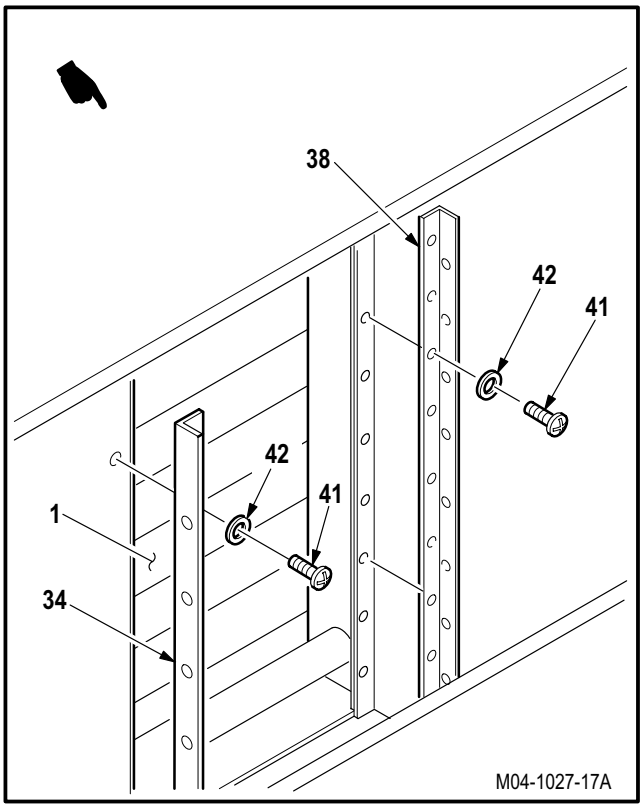
**4.58. NO. 1 ENGINE LOUVER REMOVAL - continued**

m. **Remove louver (1) from support (2) and enclosure (35).**




n. **Remove angle brackets (34) and (38) from louver (1).**

(1) Remove eight screws (41) and washers (42) from each angle bracket.

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**4.58. NO. 1 ENGINE LOUVER REMOVAL - continued**

4.58.4. Cleaning

a. **Clean supports, brackets, frame, and enclosure** (para 1.47)**.**

4.58.5. Inspection

a. **Check brackets, supports, frame, and enclosure for cracks.** None allowed.

b. **Check brackets, supports, frame, and enclosure for corrosion** (para 1.49)**.**

END OF TASK

## 4.59. NO. 1 ENGINE LOUVER INSTALLATION

4.59.1. Description

This task covers: Installation.

4.59.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

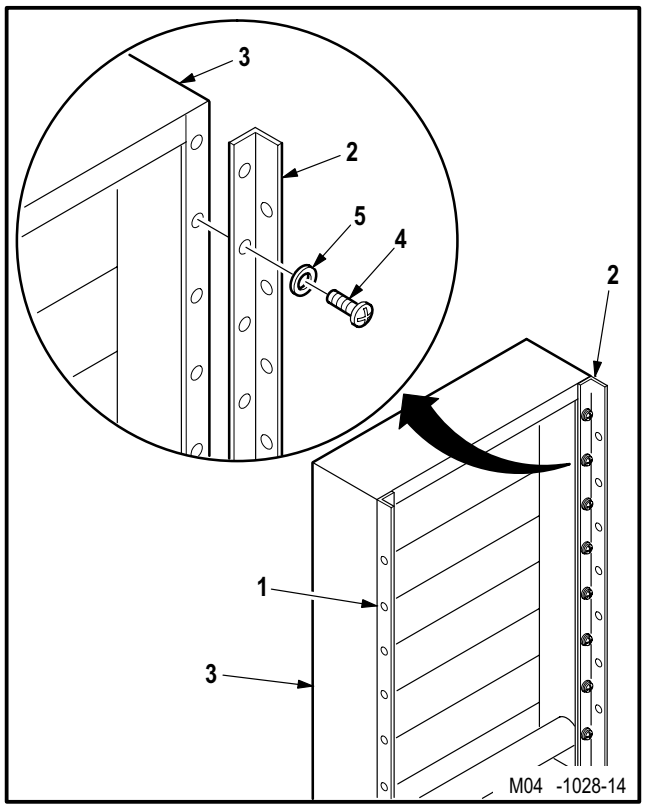
4.59.3. Installation

**NOTE**

- Do not tighten screws mounting louver. These will be tightened after louver is alined in support and enclosure.
- Step a is performed off aircraft prior to starting installation procedure.

a. **Install angle brackets (1) and (2) to louver (3).** Install but do not tighten screws (4).

(1) Install sixteen screws (4) and washers (5). Do not tighten screws (4).

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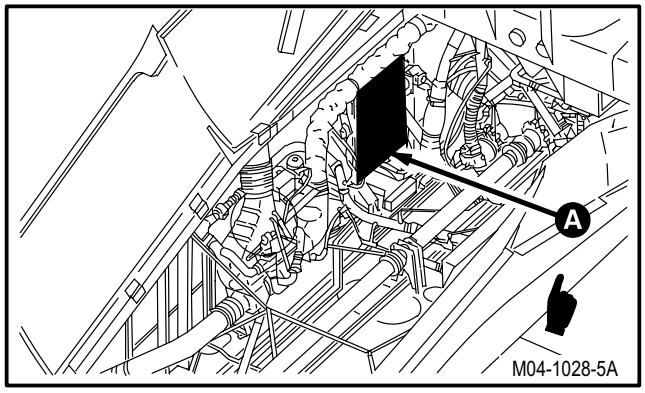
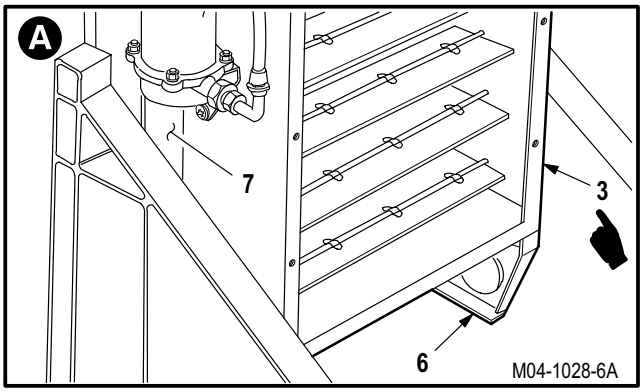
## 4.59. NO. 1 ENGINE LOUVER INSTALLATION - continued

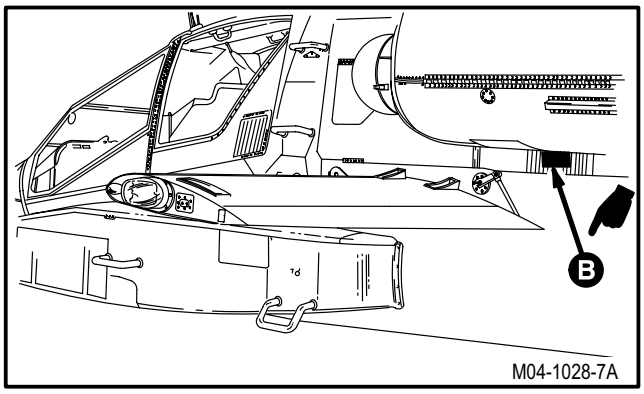


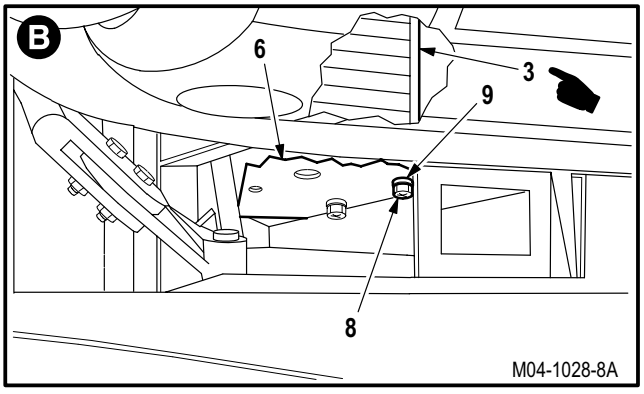

b. **Aline louver (3) to support (6) and enclosure (7).**




c. **Install louver (3) to support (6).**

(1) Install five screws (8) and washers (9). Do not tighten.

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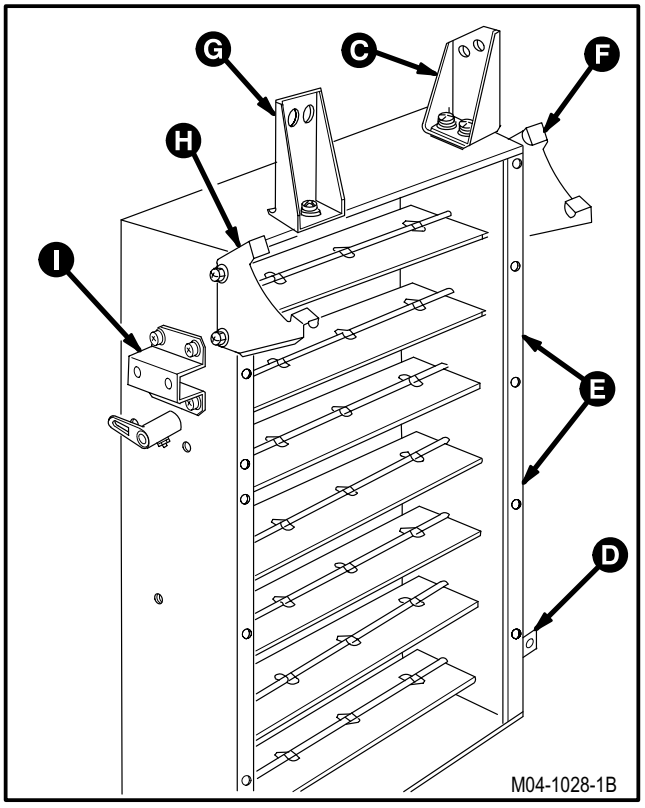
**4.59. NO. 1 ENGINE LOUVER INSTALLATION - continued**

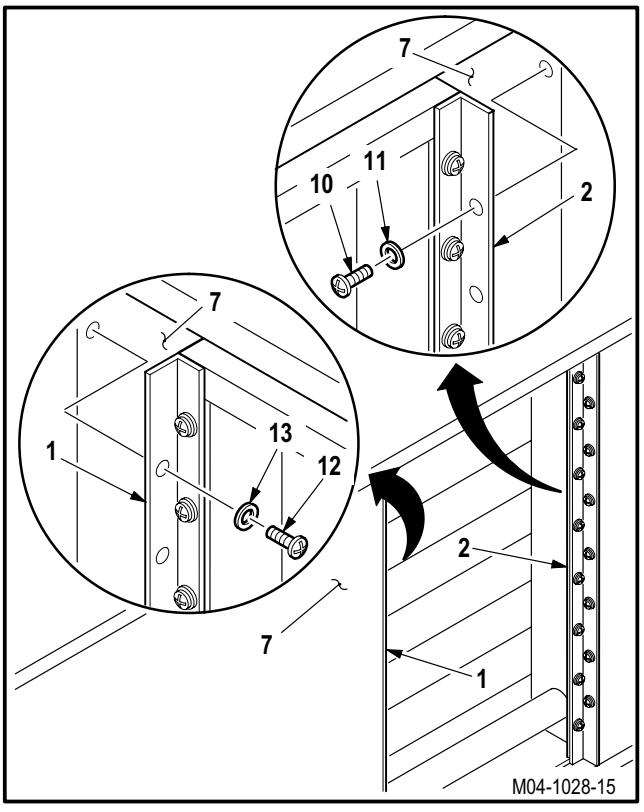



d. **Install aft angle bracket (2) to enclosure (7).**

(1) Install seven screws (10) through seven washers (11), angle bracket (2), and enclosure (7).

e. **Install forward angle bracket (1) to enclosure (7).**

(1) Install seven screws (12) through washers (13), angle bracket (1), and enclosure (7).

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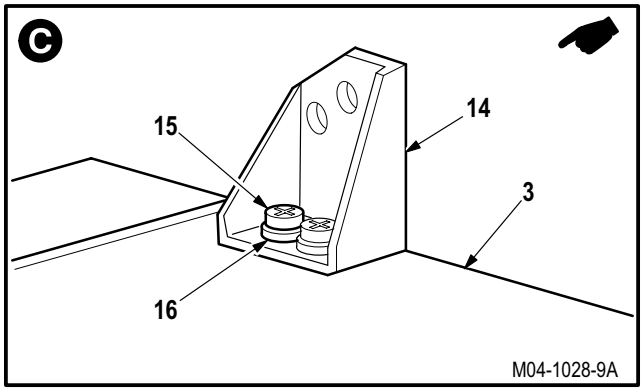
**4.59. NO. 1 ENGINE LOUVER INSTALLATION - continued**

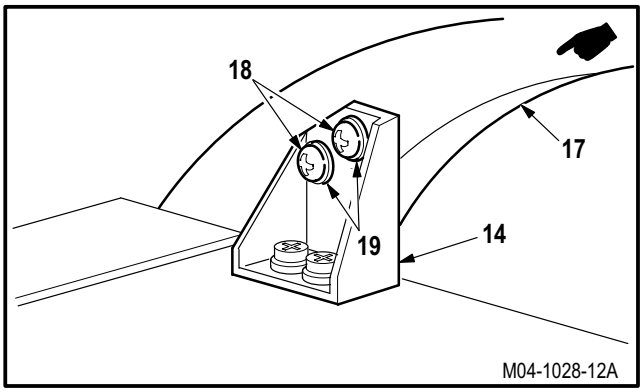
f. **Install mounting bracket (14) to louver (3).** Do not tighten.

(1) Install two screws (15) and washers (16). Do not tighten.



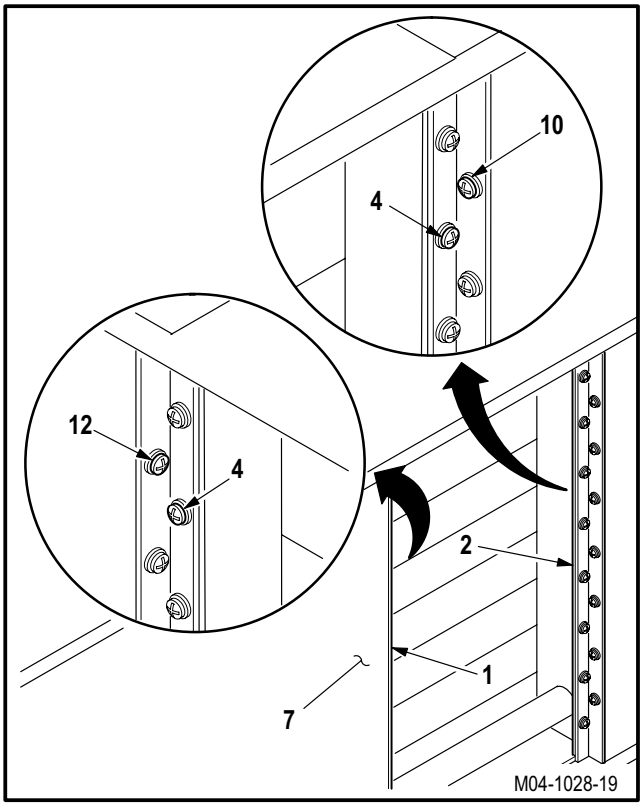

g. **Install mounting bracket (14) to frame (17).** Do not tighten.

(1) Install two screws (18) and washers (19). Do not tighten.




h. **Tighten sixteen screws (4) from angle bracket (1) and (2) to louver (3).**

i. **Tighten seven screws (10) and (12) from angle bracket (1) and (2) to enclosure (3).**

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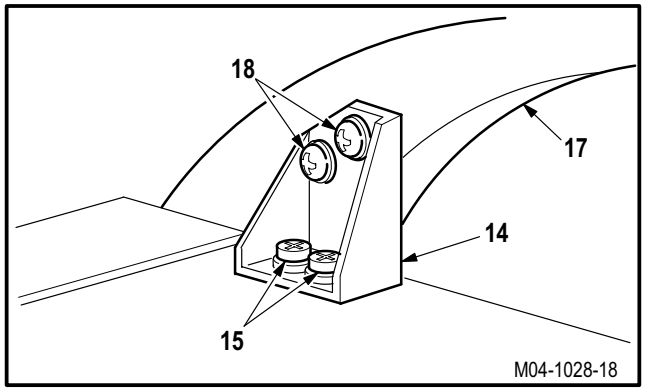
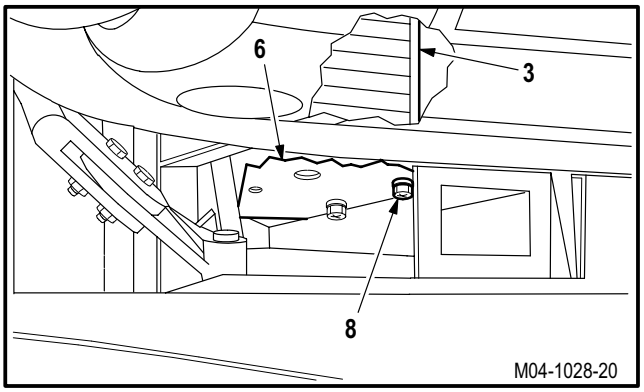
**4.59. NO. 1 ENGINE LOUVER INSTALLATION - continued**

j. **Tighten two screws (18) from mounting bracket (14) to frame (17).**

k. **Tighten two screws (15) from mounting bracket (14) to louver (3).**

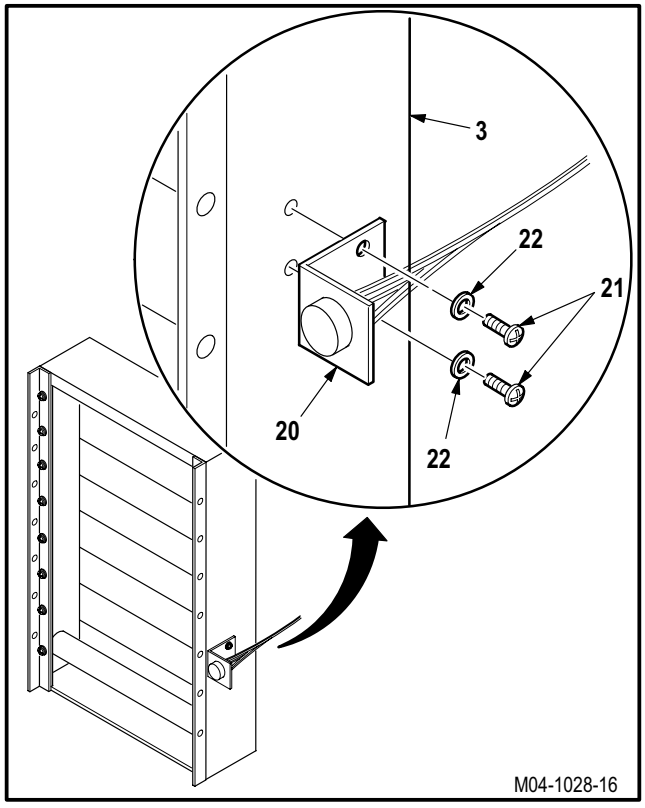



l. **Tighten five screws (8) from support (6) to louver (3).**




m. **Install connector bracket (20) to louver (3).**

(1) Install two screws (21) and washers (22).

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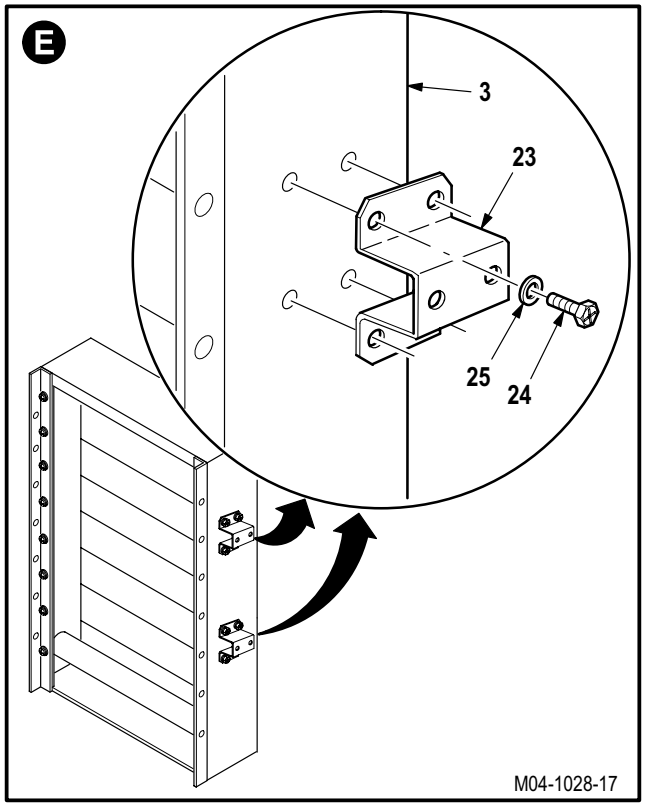
**4.59. NO. 1 ENGINE LOUVER INSTALLATION - continued**

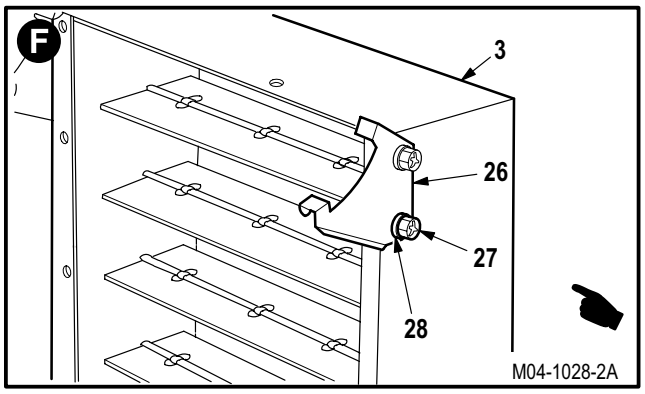
n. **Install two wire harness brackets (23) to louver (3).**

(1) Install eight screws (24) and washers (25).



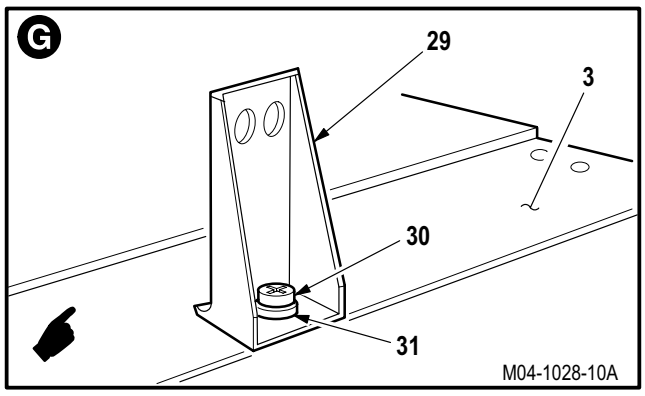

o. **Install duct bracket (26) to forward side of louver (3).**

(1) Install two screws (27) and washers (28).




p. **Install mounting bracket (29) to louver (3).** Do not tighten.

(1) Install screw (30) and washer (31). Do not tighten.

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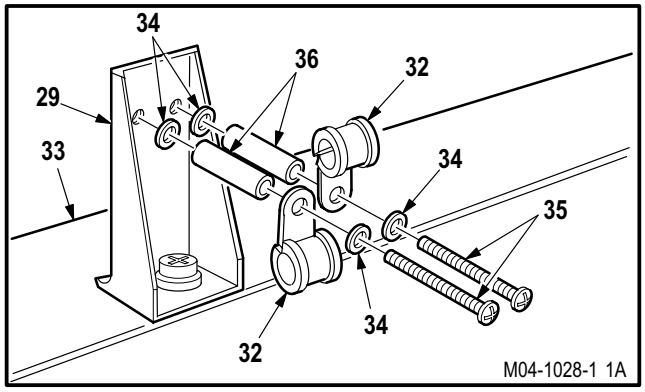
**4.59. NO. 1 ENGINE LOUVER INSTALLATION - continued**

q. **Install clamps (32) and mounting bracket (29) to door frame (33).**

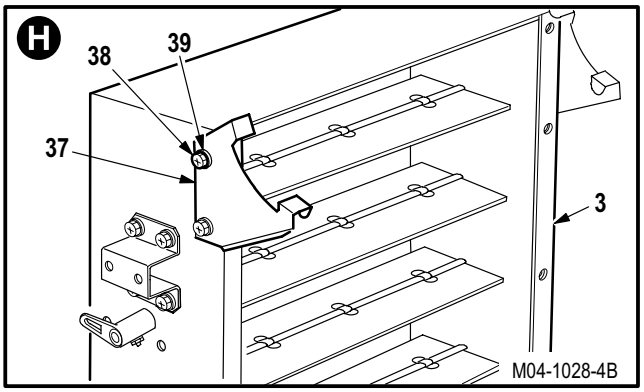
(1) Install forward clamp (32) washer (34), screw (35), and spacer (36). Clamp loop is positioned upward.

(2) Install aft clamp (32), washer (34), screw (35), and spacer (36). Clamp loop is positioned downward.



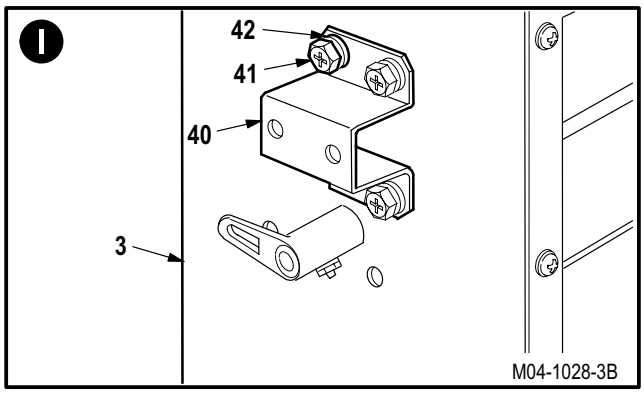

r. **Install aft duct bracket (37) to louver (3).**

(1) Install two screws (38) and washers (39).




s. **Install louver valve bracket (40) to louver (3).**

(1) Install four screws (41) and washers (42).

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**4.59. NO. 1 ENGINE LOUVER INSTALLATION - continued**

t. **Inspect (QA).**

u. **Install No. 1 engine louver directional control shutoff valve** (para 4.63)**.**

v. **Install left heat exchanger** (para 6.86)**.**

w. **Install defog shutoff valve** (para 13.44)**.**

x. **Install ECS air duct No. 2** (para 13.18)**.**

y. **Install No. 1 engine louver actuator** (para 4.57)**.**

z. **Install fairing L230** (para 2.2)**.**

END OF TASK

## 4.60. NO. 2 ENGINE LOUVER REMOVAL

4.60.1. Description

This task covers: Removal. Cleaning. Inspection.

4.60.2. Initial Setup

**Tools:**

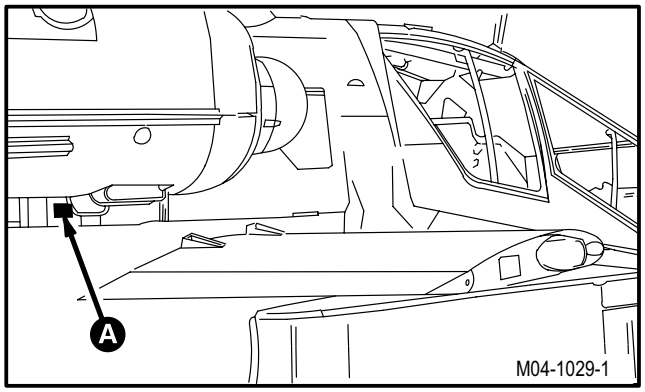
Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer

**Equipment Conditions:**

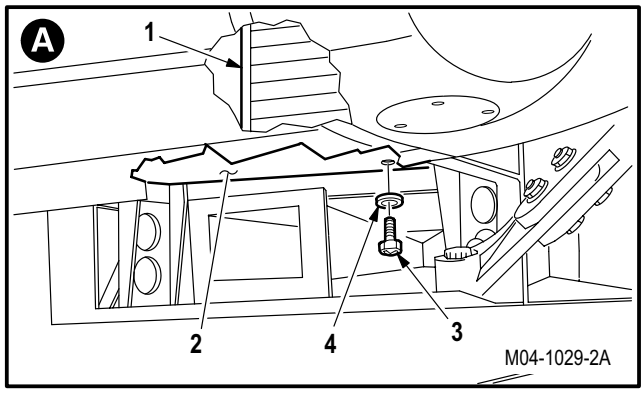
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Fairing R230 removed |
| 4.57 | No. 2 engine louver actuator removed |
| 4.63 | No. 2 engine louver directional control shut-off valve removed |
| 6.85 | Right heat exchanger removed |




4.60.3. Removal

a. **Remove louver (1) from support (2).**

(1) Remove five screws (3) and washers (4).

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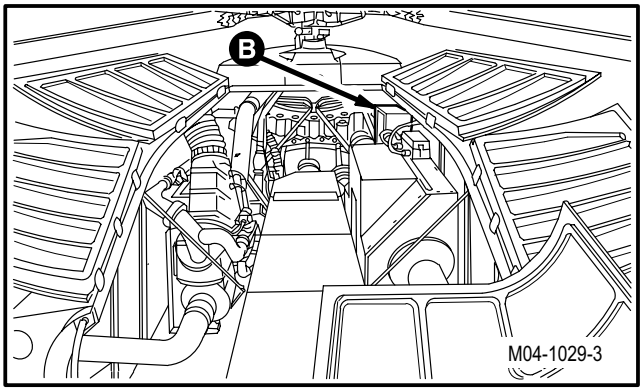
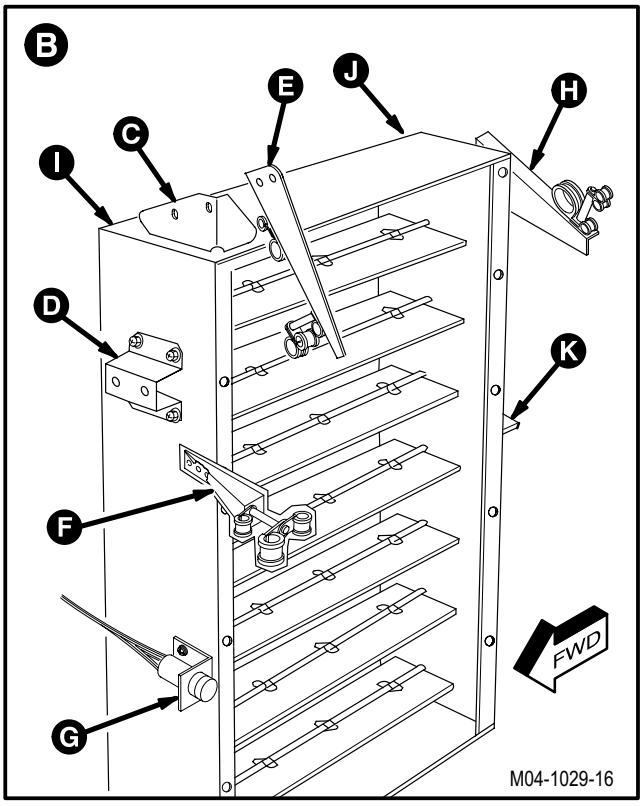
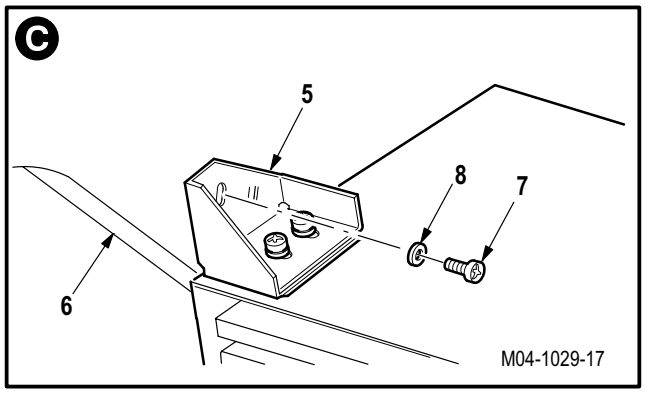
## 4.60. NO. 2 ENGINE LOUVER REMOVAL - continued




b. **Remove support bracket (5) from frame (6).**

(1) Remove two screws (7) and washers (8).

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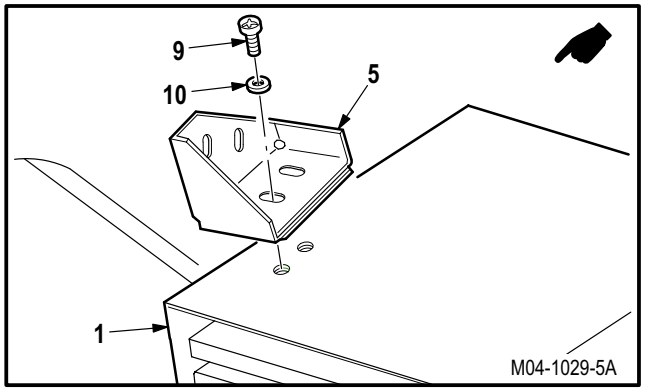
**4.60. NO. 2 ENGINE LOUVER REMOVAL - continued**

c. **Remove bracket (5) from louver (1).**

(1) Remove two screws (9) and washers (10).

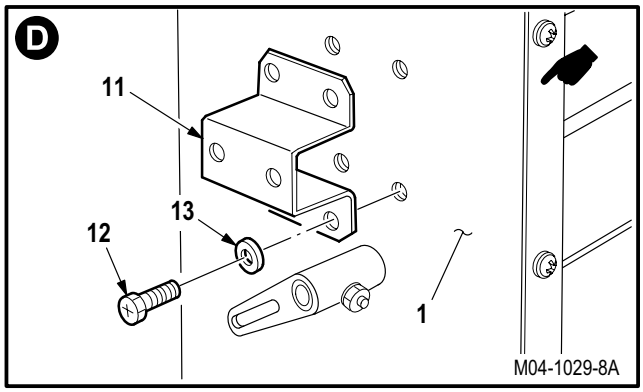
(2) Remove bracket (5).




d. **Remove valve bracket (11) from louver (1).**

(1) Remove four screws (12) and washers (13).

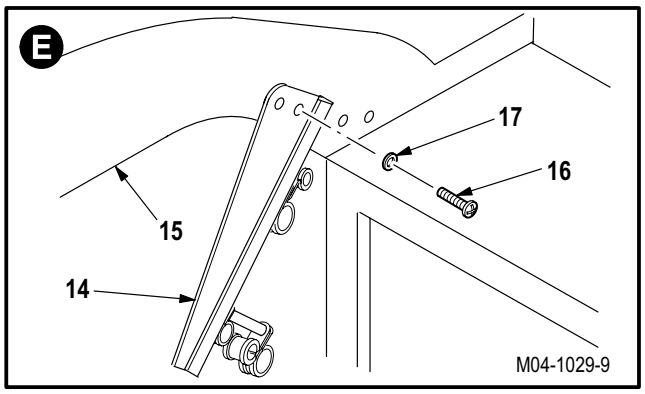
(2) Remove bracket (11).




e. **Remove wire harness bracket (14) from frame (15).**

(1) Remove two screws (16) and washers (17).

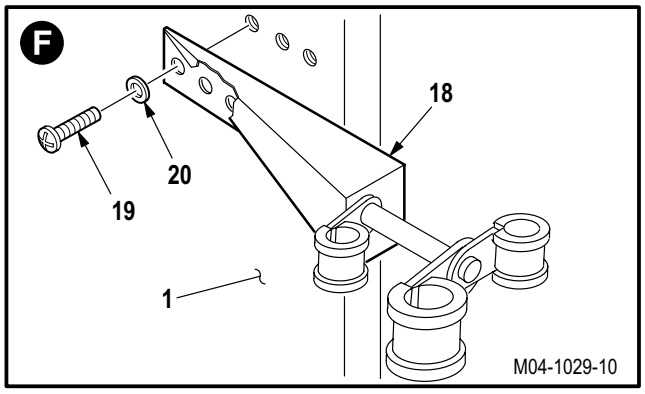
(2) Move bracket (14) build-up upward to clear louver (1) and secure.




f. **Remove wire harness bracket (18) from forward side of louver (1).**

(1) Remove three screws (19) and washers (20).

(2) Move bracket (18) build-up forward to clear louver and secure.

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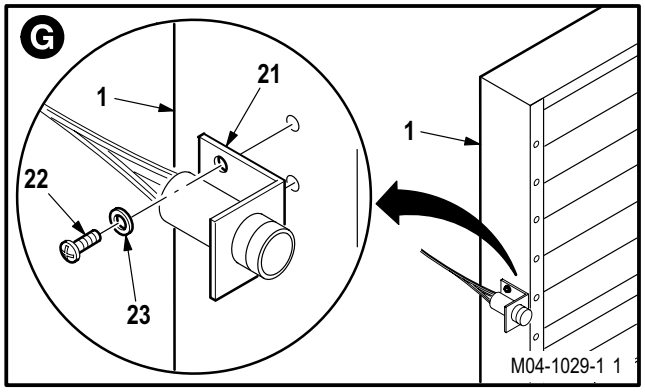
**4.60. NO. 2 ENGINE LOUVER REMOVAL - continued**

g. **Remove connector (J578) bracket (21) from louver (1).**

(1) Remove two screws (22) and washers (23).

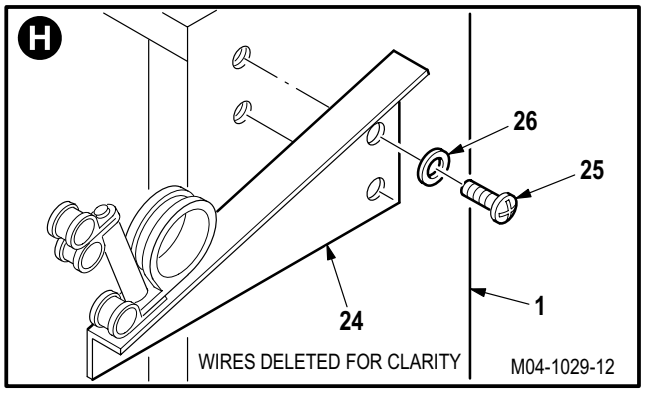
(2) Move bracket (21) build-up to clear louver (1) and secure.




h. **Remove wire harness bracket (24) from aft end of louver (1).**

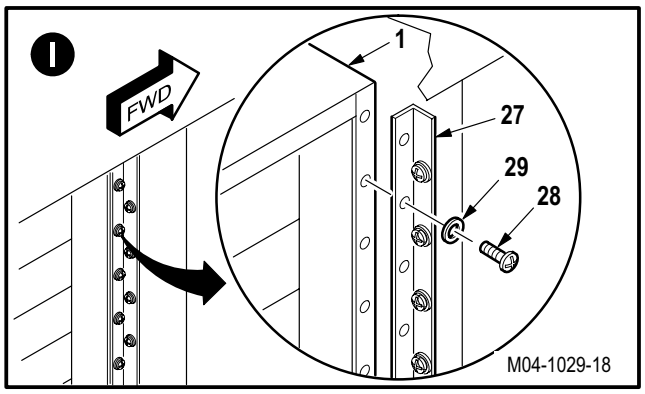
(1) Remove two screws (25) and washers (26).

(2) Move bracket (24) build-up upward to clear louver (1) and secure.



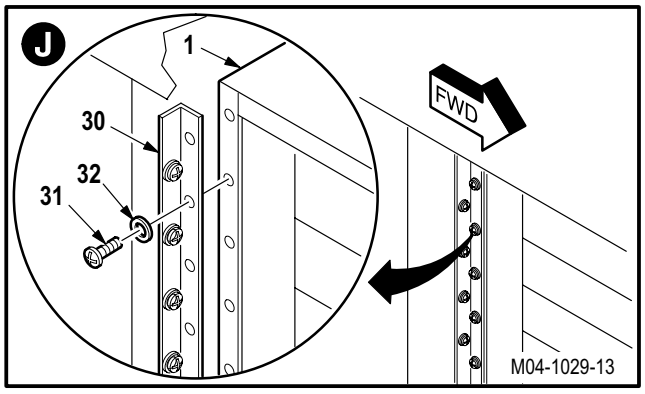

i. **Remove fwd angle (27) from louver(1).**

(1) Remove eight screws (28) and washers (29).




j. **Remove aft angle (30) from louver (1).**

(1) Remove eight screws (31) and washers (32).

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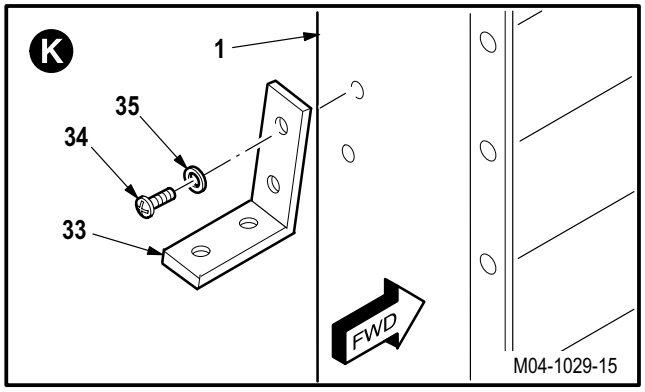
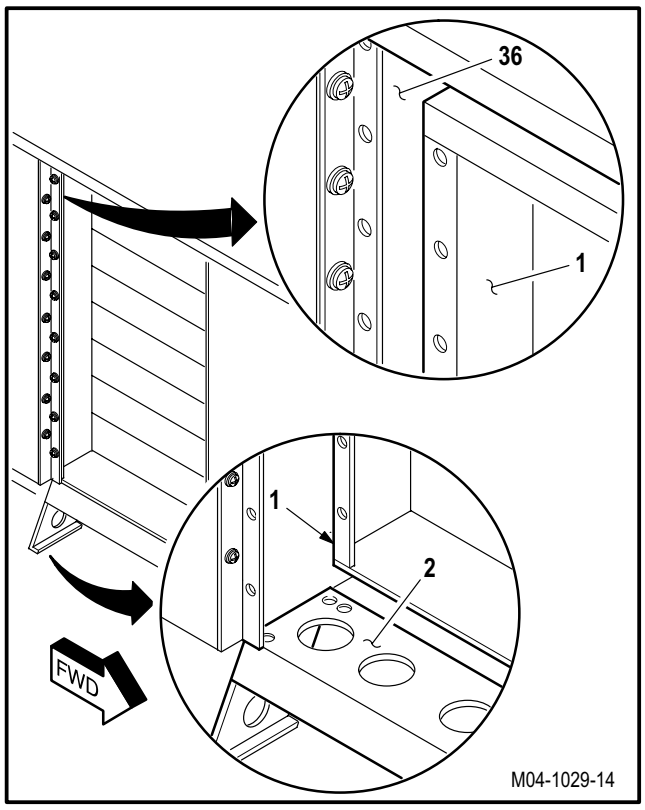
## 4.60. NO. 2 ENGINE LOUVER REMOVAL

k. **Remove aft louver (1) mount bracket (33).**

(1) Remove two screws (34) and washers (35).




l. **Remove louver (1) from enclosure (36) and support (2).**




4.60.4. Cleaning

a. **Clean supports, brackets, enclosure and frame** (para 1.47)**.**

4.60.5. Inspection

a. **Check brackets, supports, enclosure and frame for cracks.** None allowed.

b. **Check brackets, supports, enclosure and frame for corrosion** (para 1.49)**.**

END OF TASK

## 4.61. NO. 2 ENGINE LOUVER INSTALLATION

4.61.1. Description

This task covers: Installation.

4.61.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

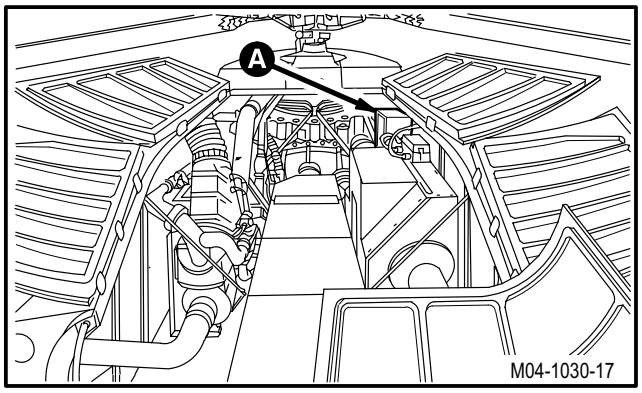
**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

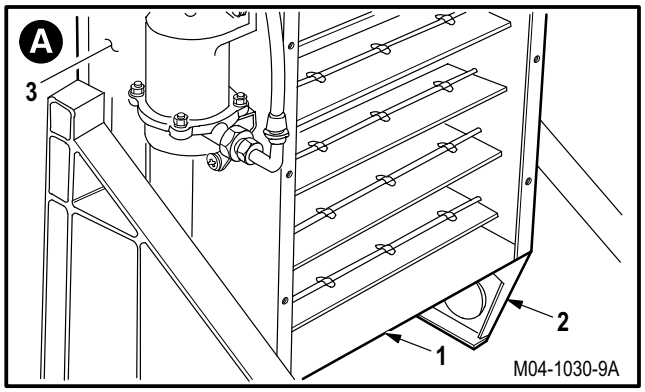
4.61.3. Installation




**NOTE**

Do not tighten screws mounting louver. These will be tightened after louver is alined in support and enclosure.

a. **Aline louver (1) on support (2) and enclosure (3).**

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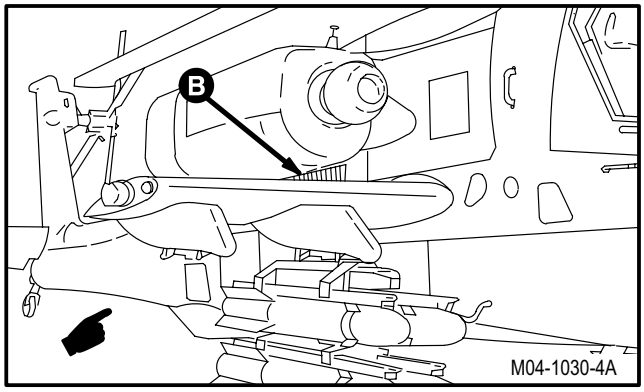
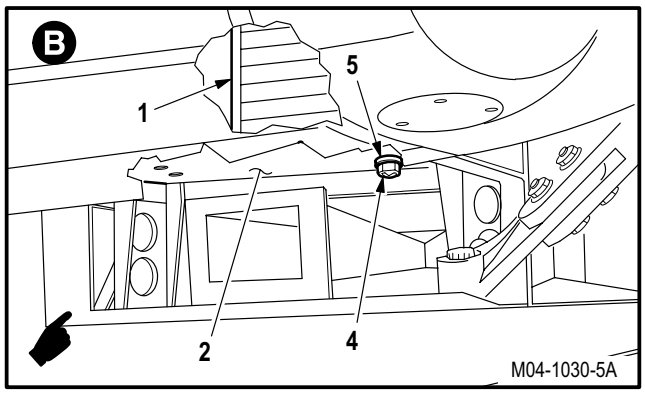
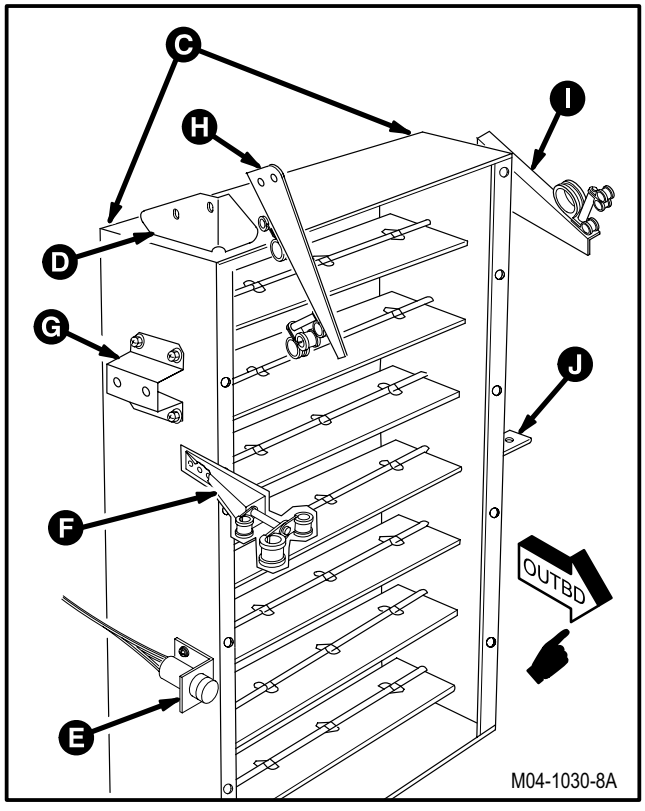
## 4.61. NO. 2 ENGINE LOUVER INSTALLATION - continued




b. **Install louver (1) to support (2).**

(1) Install five screws (4) through washers (5), louver (1), and support (2).

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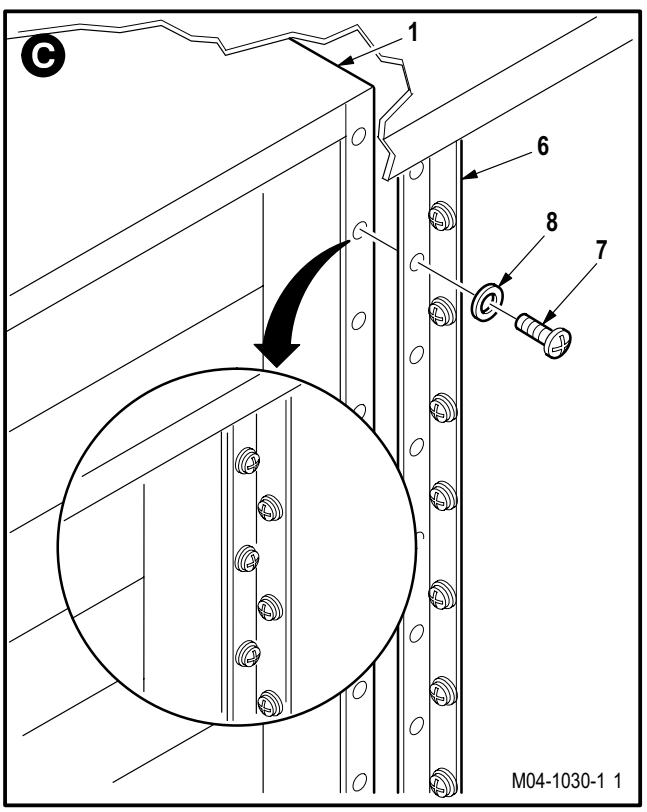
**4.61. NO. 2 ENGINE LOUVER INSTALLATION - continued**

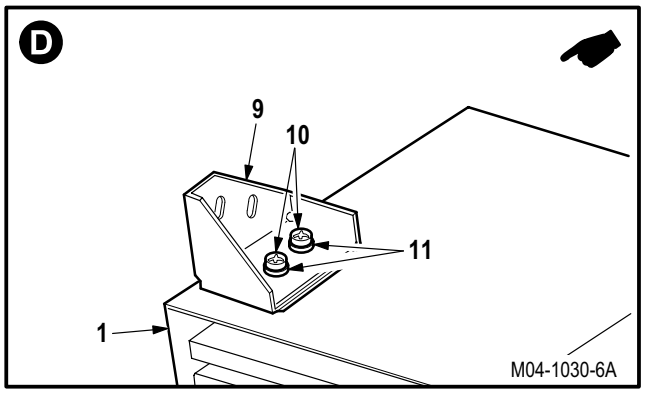
c. **Install louver (1) on angle brackets (6).**

(1) Install 16 screws (7) through washers (8), angle brackets (6), and louver (1).



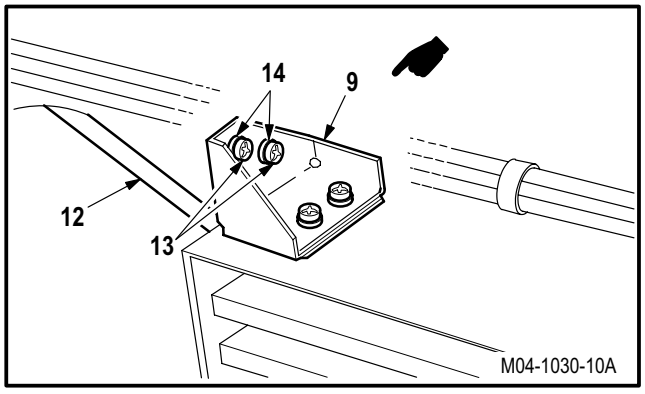

d. **Install mounting bracket (9) on louver (1).**

(1) Install two screws (10) and washers (11).




e. **Install mounting bracket (9) on frame (12).**

(1) Install two screws (13) and washers (14).

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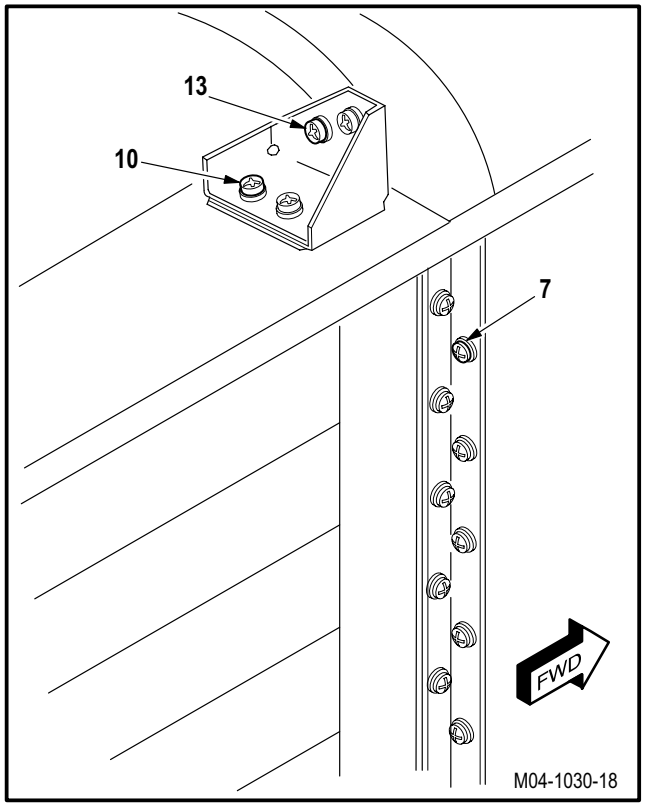
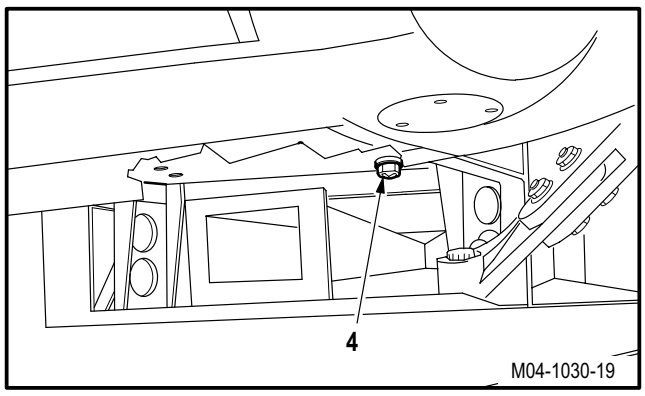
**4.61. NO. 2 ENGINE LOUVER INSTALLATION - continued**

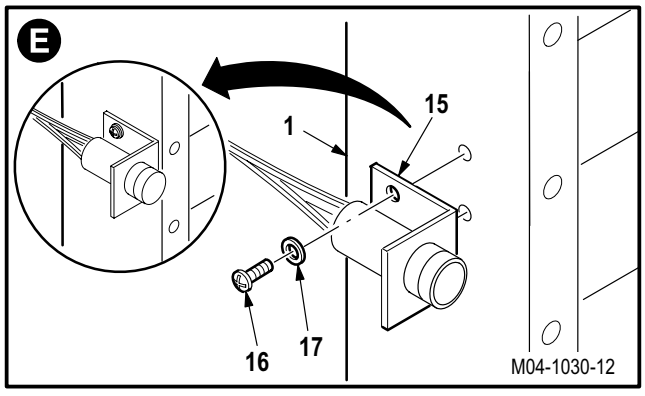
f. **Tighten 16 screws (7), five screws (4), two screws (13), and two screws (10).**




g. **Install connector bracket (15) to louver (1).**

(1) Install two screws (16) through washers (17), bracket (15), and louver (1).

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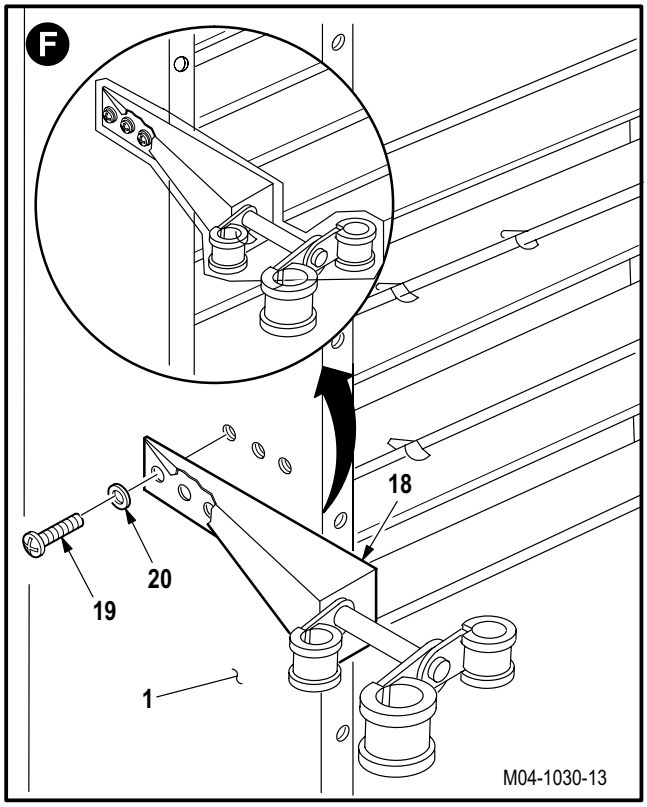
**4.61. NO. 2 ENGINE LOUVER INSTALLATION - continued**

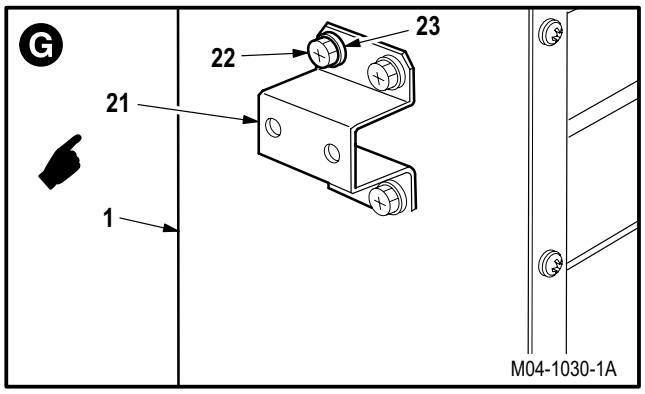
h. **Install wire harness bracket (18) to forward side of louver (1).**

(1) Install three screws (19) through washers (20), bracket (18), and louver (1).




i. **Install valve bracket (21) on louver (1).**

(1) Install four screws (22) and washers (23).

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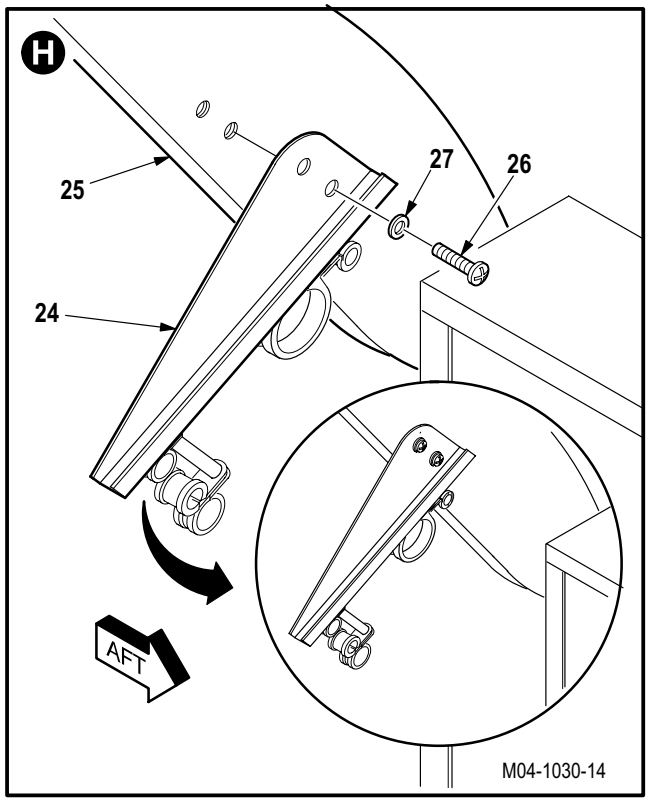
**4.61. NO. 2 ENGINE LOUVER INSTALLATION - continued**

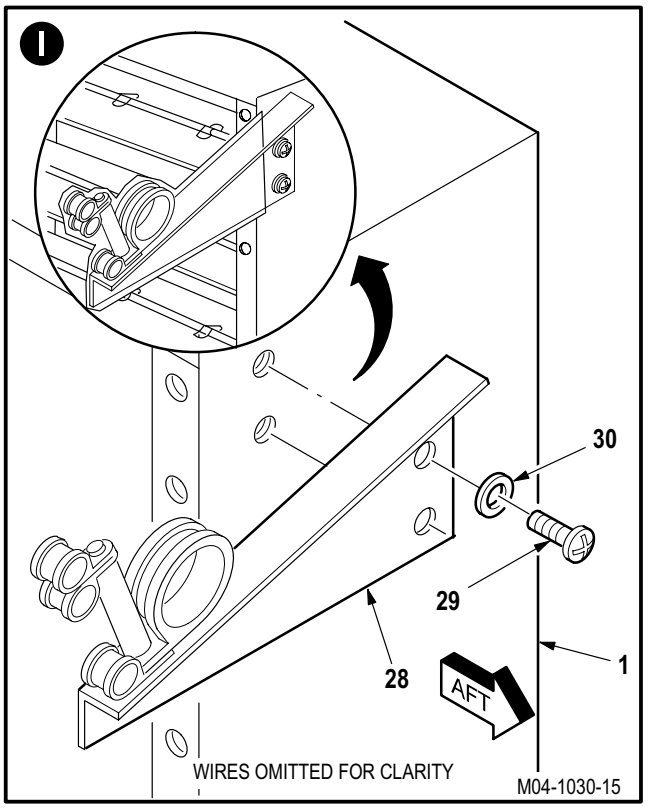
j. **Install wire harness bracket (24) to frame (25).**

(1) Install two screws (26) through washers (27), bracket (24), and frame (25).




k. **Install wire harness bracket (28) to aft side of louver (1).**

(1) Install two screws (29) through washers (30), bracket (28), and louver (1).

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**4.61. NO. 2 ENGINE LOUVER INSTALLATION - continued**

l. **Install aft mount bracket (31) to louver (1).**

(1) Install two screws (32) through washers (33), bracket (31), and louver (1).

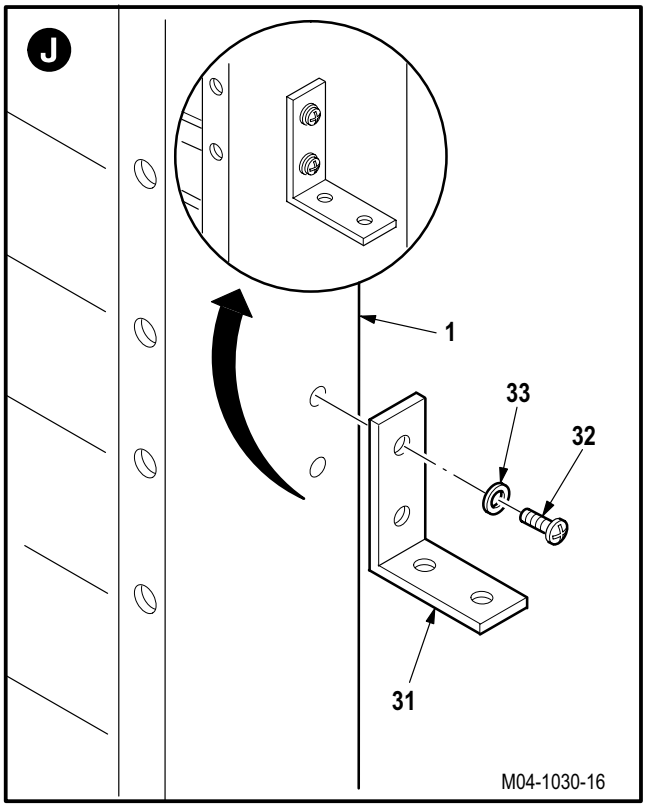
m. **Inspect (QA).**

n. **Install No. 2 engine louver directional control shutoff valve** (para 4.63)**.**

o. **Install right heat exchanger** (para 6.86)**.**

p. **Install No. 2 engine louver actuator** (para 4.57)**.**

q. **Install fairing R230** (para 2.2)**.**




END OF TASK

## 4.62. NO. 1 OR NO. 2 ENGINE LOUVER ACTUATOR HOSE REPLACEMENT

4.62.1. Description

This task covers: Removal. Inspection. Installation.

4.62.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors T250L, T250R, T290L, T290R, and L325 opened |

**Materials/Parts:**

Petrolatum (item 138, App F)

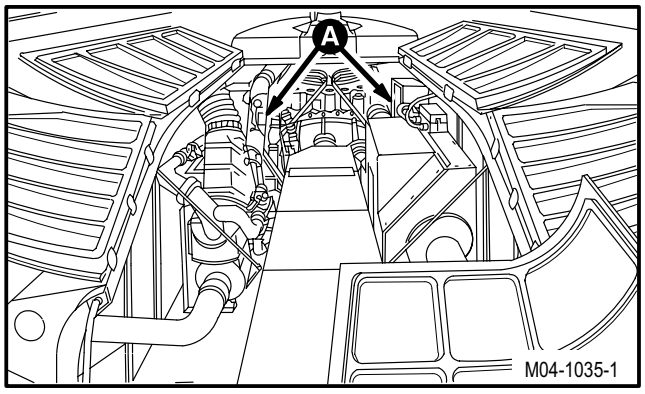
**NOTE**

This task is typical for No. 1 or No. 2 engine louver actuator hoses.

4.62.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot forward circuit breaker panel, open ENG LVR circuit breaker.**

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## 4.62. NO. 1 OR NO. 2 ENGINE LOUVER ACTUATOR HOSE REPLACEMENT - continued

c. **Remove hose (1) from louver actuator (2).**

(1) Hold reducer (3). Remove nut (4).

d. **Remove hose (1) from shutoff valve (5).**

(1) Hold union (6). Remove nut (7).

e. **Remove and discard hose (1).**

4.62.4. Inspection

a. **Check unions for stripped threads.** None allowed.

4.62.5. Installation

a. **Install new hose (1) on shutoff valve (5).** Torque nut (7) to **60 INCH-POUNDS**.

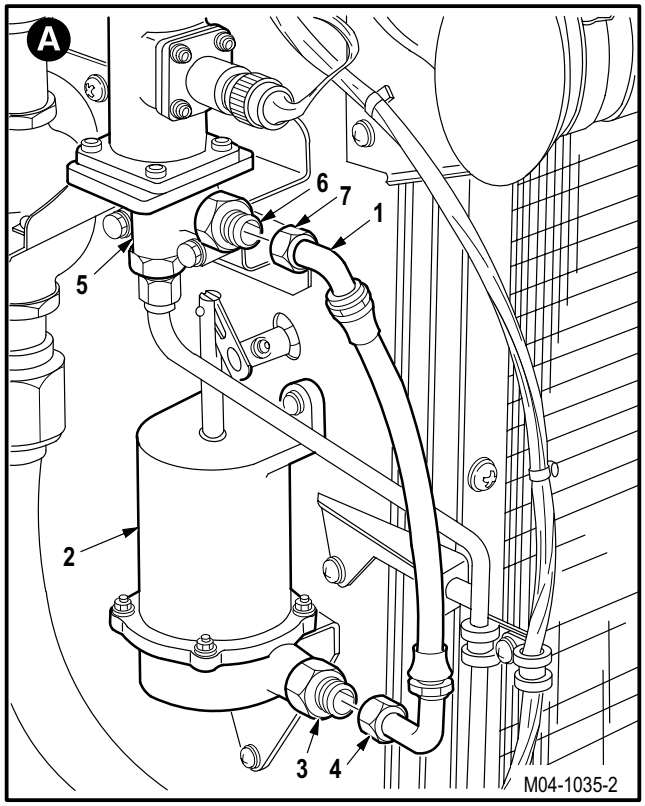
(1) Lubricate threads on union (6). Use petrolatum (item 138, App F).

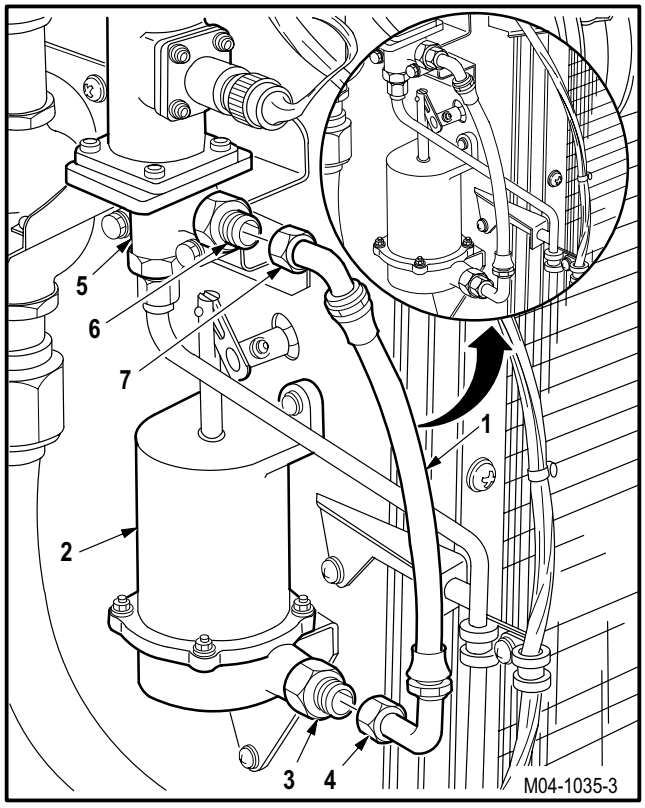
(2) Install nut (7) on union (6). Torque nut (7) to **60 INCH-POUNDS**. Use torque wrench**.**

b. **Install hose (1) on louver actuator (2).** Torque nut (4) to **60 INCH-POUNDS**.

(1) Lubricate threads on reducer (3). Use petrolatum (item 138, App F).

(2) Install nut (4) on reducer (3). Torque nut (4) to **60 INCH-POUNDS**. Use torque wrench**.**

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**4.62. NO. 1 OR NO. 2 ENGINE LOUVER ACTUATOR HOSE REPLACEMENT - continued**

c. **Perform leak check** (para 7.115)**.**

d. **Inspect (QA).**

e. **Perform power plants maintenance operational check (engine 1 or engine 2)** (TM 1-1520-238-T)**.**

f. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

## 4.63. NO. 1 OR NO. 2 ENGINE DIRECTIONAL CONTROL SHUTOFF VALVE REMOVAL/INSTALLATION

4.63.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.63.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors T250L, T250R, T290L, T290R, and L325 opened |

**Materials/Parts:**

Packing (2)
Petrolatum (item 138, App F)

**NOTE**

This task is typical for No. 1 or No. 2 engine directional control shutoff valves.

4.63.3. Removal

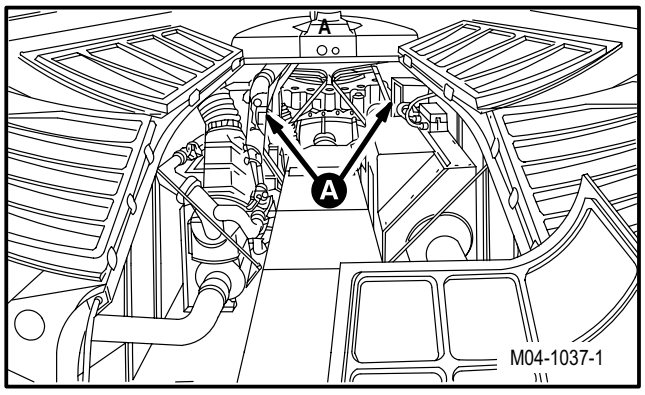
a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

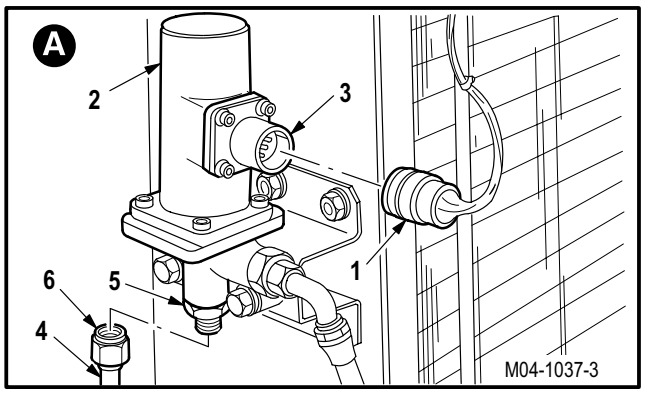
b. **On pilot center circuit breaker panel, open ENG LVR circuit breaker.**

c. **Detach connector P62 (1) from No. 1 shutoff valve (2) receptacle (L11)J1 (3); or detach connector P63 (1) from No. 2 shutoff valve (2) receptacle (L12)J1 (3).**

d. **Remove tube (4) from valve (2).**

(1) Hold union (5). Remove nut (6).

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## 4.63. NO. 1 OR NO. 2 ENGINE DIRECTIONAL CONTROL SHUTOFF VALVE REMOVAL/INSTALLATION - continued

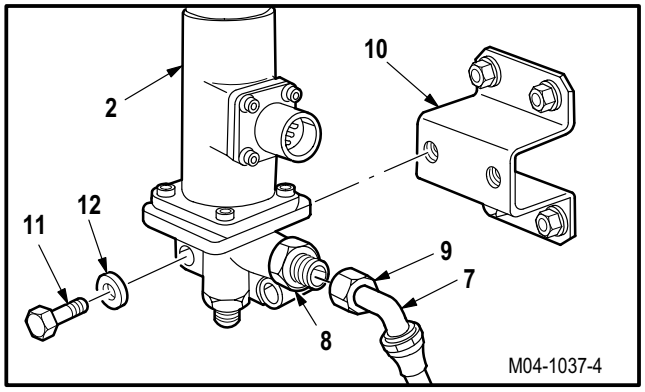
e. **Remove hose (7) from valve (2).**

(1) Hold union (8). Remove nut (9).

f. **Remove valve (2) from mounting bracket (10).**

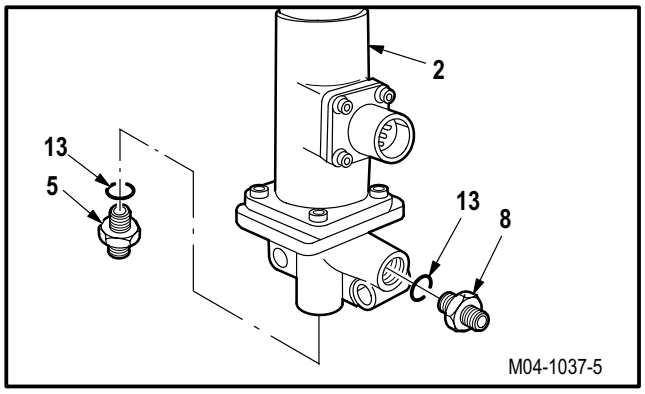
(1) Remove two bolts (11) and washers (12).

(2) Remove valve (2).




g. **Remove unions (5) and (8) from valve (2).**

(1) Remove and discard two packings (13).




4.63.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.63.5. Inspection

a. **Check bracket for cracks and missing or loose hardware.** None allowed.

b. **Check valve for cracks.** None allowed.

c. **Check bracket and valve for corrosion** (para 1.49)**.**

d. **Check connector for damage** (TM 55-1500-323-24)**.**

e. **Check bosses for thread damage** (TM 55-1500-323-24)**.**

f. **Check valve for loose or missing hardware.** None allowed.

g. **Check valve housing for damage.** None allowed.

h. **Check identification placard for security, damage and legibility.**

i. **Check connector for damaged, broken, or bent pins.** None allowed.

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## 4.63. NO. 1 OR NO. 2 ENGINE DIRECTIONAL CONTROL SHUTOFF VALVE REMOVAL/INSTALLATION - continued

4.63.6. Installation

a. **Install two new packings (13) on unions (5) and (8).**

(1) Lubricate packings and threads of unions (5) and (8). Use petrolatum (item 138, App F).

b. **Install two unions (5) and (8) on valve (2).**

c. **Install valve (2) on bracket (10).**

(1) Install two bolts (11) through washers (12) and valve (2) into bracket (10).

d. **Install hose (7) on union (8).**

(1) Lubricate threads of union (8). Use petrolatum (item 138, App F).

(2) Hold union (8). Install nut (9).

e. **Install tube (4) on union (5).**

(1) Lubricate threads of union (5). Use petrolatum (item 138, App F).

(2) Hold union (5). Install nut (6).

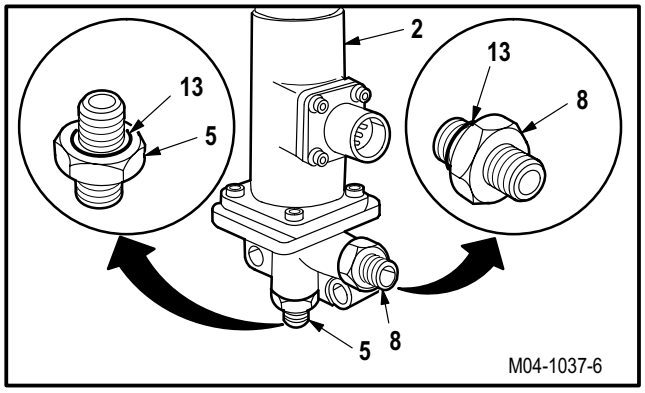
f. **Attach connector P62 (1) to No. 1 shutoff valve (2) receptacle (L11)J1 (3); or attach connector P63 (1) to No. 2 shutoff valve (2) receptacle (L12)J1 (3).**

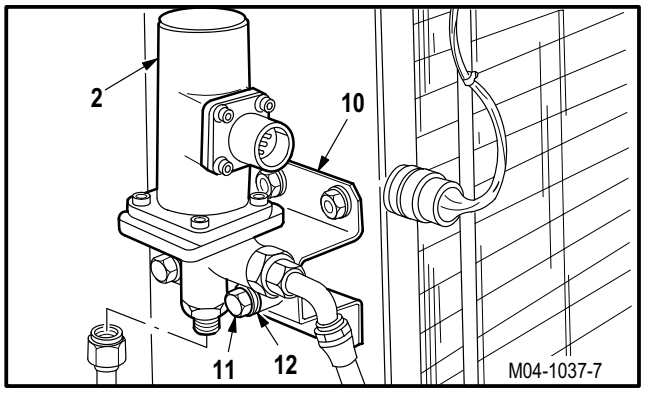
g. **Perform pressurized air system leak check** (para 7.115)..

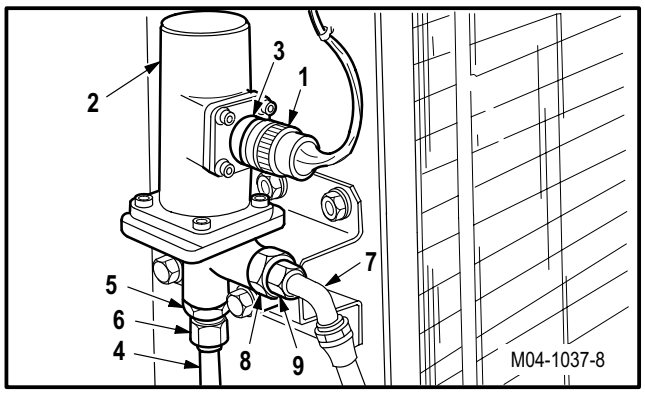
h. **Inspect (QA).**

i. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

j. **Perform power plants maintenance operational check (engine 1 or engine 2)** (TM 1-1520-238-T)**.**




END OF TASK

## 4.64. NO. 1 ENGINE LOUVER SUPPORT REMOVAL/INSTALLATION

4.64.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.64.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

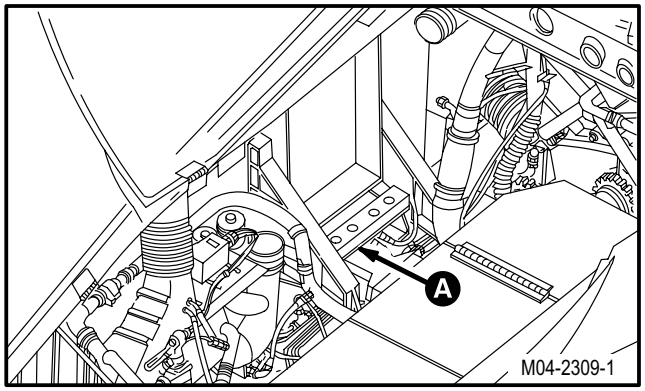
TM 1-1500-204-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.58 | No. 1 engine louver removed |

**Materials/Parts:**

Packing with retainer (4)
Petrolatum (item 138, App F)

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## 4.64. NO. 1 ENGINE LOUVER SUPPORT REMOVAL/INSTALLATION - continued

4.64.3. Removal

a. **Remove louver support (1) from deck (2).**

(1) Remove four screws (3) and packing with retainers (4) from louver support (1).

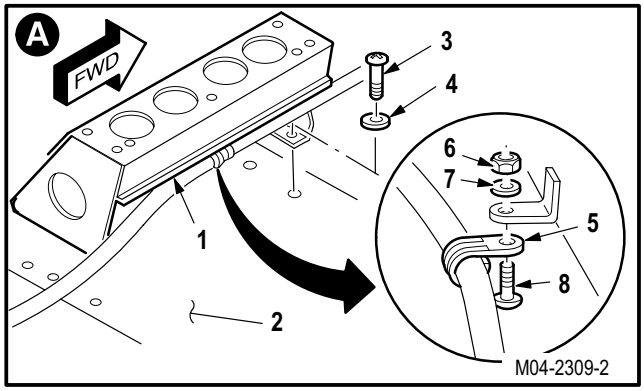
(2) Discard packing with retainers (4).

(3) Slide louver support (1) inboard. Lift from deck (2).

b. **Remove clamp (5) from support (1).**

(1) Remove nut (6) and washer (7) from screw (8).

(2) Remove screw (8) and clamp (5).




4.64.4. Cleaning

a. **Clean louver support and support mounting surface on deck** (para 1.47)**.**

4.64.5. Inspection

a. **Check support mounting surface on deck for cracks** (TM 1-1500-204-23)**.**

b. **Check deck for corrosion** (para 1.49)**.**

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## 4.64. NO. 1 ENGINE LOUVER SUPPORT REMOVAL/INSTALLATION - continued

4.64.6. Installation

a. **Install clamp (5) on support (1).**

(1) Install screw (8) through clamp (5) and support (1).

(2) Install washer (7) and nut (6) on screw (8).

b. **Install louver support (1) on deck (2).**

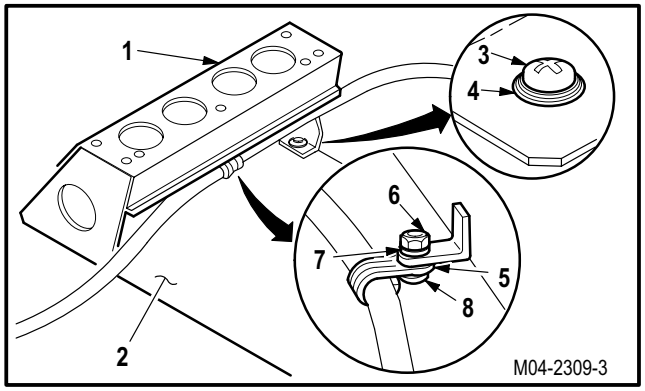
(1) Aline louver support (1) on deck (2).

(2) Lubricate four new packing with retainers (4). Use petrolatum (item 138, App F).

(3) Install four screws (3) through packings with retainers (4), louver support (1), and deck (2).

c. **Inspect (QA).**

d. **Install No. 1 engine louver** (para 4.59)**.**




END OF TASK

## 4.65. NO. 2 ENGINE LOUVER SUPPORT REMOVAL/INSTALLATION

4.65.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.65.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

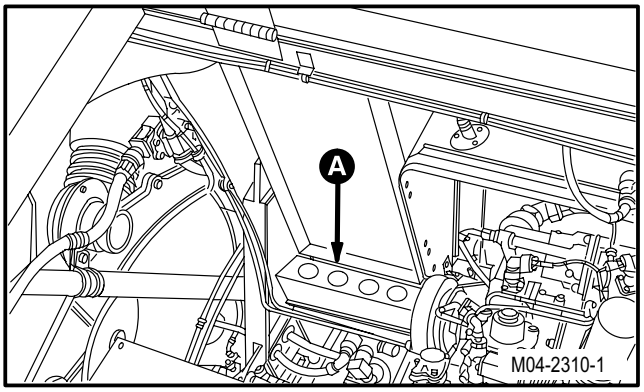
TM 1-1500-204-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.60 | No. 2 engine louver removed |

**Materials/Parts:**

Packing with retainer (4)
Petrolatum (item 138, App F)

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## 4.65. NO. 2 ENGINE LOUVER SUPPORT REMOVAL/INSTALLATION - continued

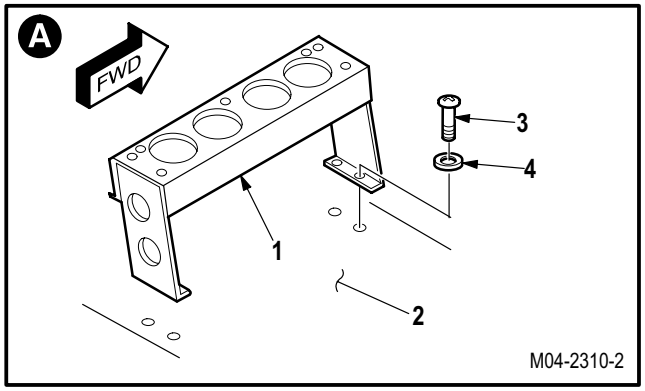
4.65.3. Removal

a. **Remove louver support (1) from deck (2).**

(1) Remove four screws (3) and packing with retainers (4) from louver support (1).

(2) Discard packing with retainers (4).

(3) Slide louver support (1) inboard. Lift from deck (2).




4.65.4. Cleaning

a. **Clean louver support and support mounting surface on deck** (para 1.47)**.**

4.65.5. Inspection

a. **Check support mounting surface on deck for cracks** (TM 1-1500-204-23)**.**

b. **Check deck for corrosion** (para 1.49)**.**

4.65.6. Installation

a. **Install louver support (1) on deck (2).**

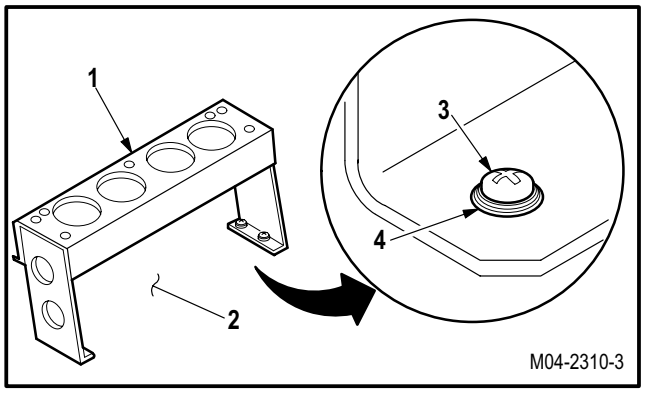
(1) Aline louver support (1) on deck (2).

(2) Lubricate four new packings with retainers (4). Use petrolatum (item 138, App F).

(3) Install four screws (3) through packings with retainers (4), louver support (2), and deck (2).

b. **Inspect (QA).**

c. **Install No. 2 engine louver** (para 4.61)**.**




END OF TASK

## 4.66. NO. 1 OR NO. 2 ENGINE LOUVER DISASSEMBLY/ASSEMBLY (AVIM)

4.66.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly.

4.66.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Push-on nut (14)
Lubricating oil (item 119, App F)

**References:**

TM 1-1500-204-23

4.66.3. Disassembly

a. **Remove remote control lever (1) from louver vane shaft (2).**

(1) Hold screw (3). Remove nut (4) and washer (5).

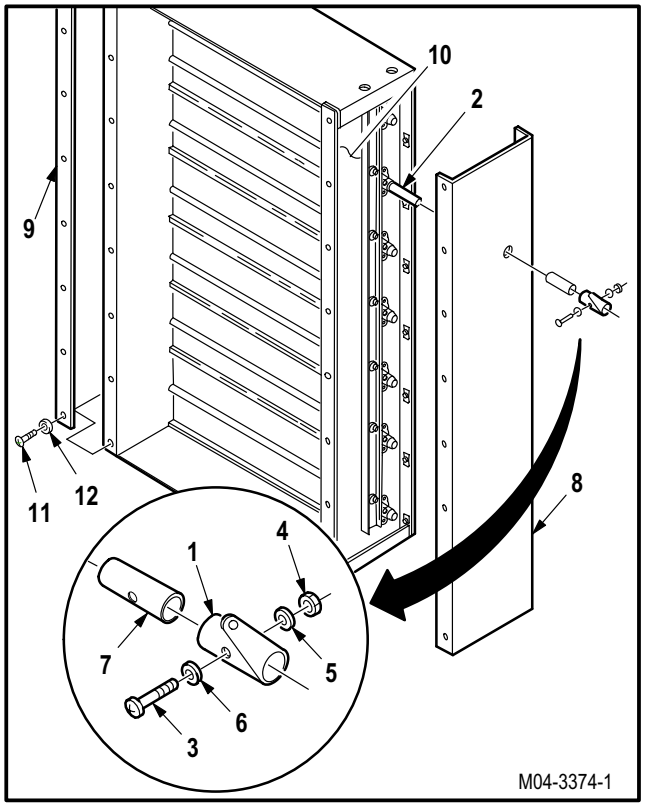
(2) Remove screw (3) and washer (6).

(3) Remove remote control lever (1) and sleeve bushing (7) from louver vane shaft (2).

b. **Remove louver covers (8) and (9) from louver channel (10).**

(1) Remove 32 screws (11) and washers (12).

(2) Remove covers (8) and (9).

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**4.66. NO. 1 OR NO. 2 ENGINE LOUVER DISASSEMBLY/ASSEMBLY (AVIM) - continued**

c. **Remove seven remote control levers (13) from louver vanes (2) and (14).**

(1) Remove and discard seven push-on nuts (15).

(2) Remove seven washers (16) from levers (13).

(3) Remove louver linkage channel (17) from levers (13).

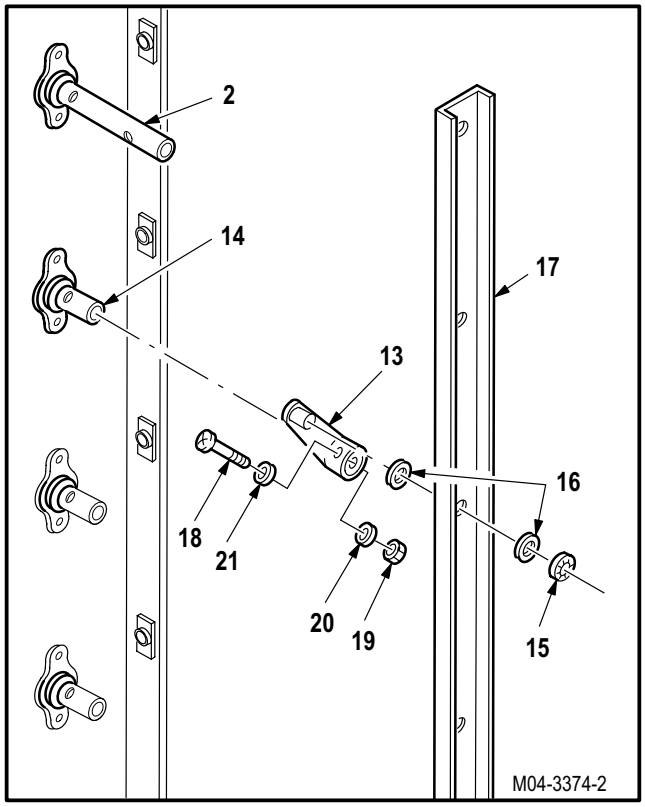
(4) Remove seven washers (16) from levers (13).

(5) Remove seven levers (13) from louver vane shafts (2) and (14).

(a) Hold screw (18). Remove nut (19) and washer (20).

(b) Remove screw (18) and washer (21).

(c) Remove lever (13).

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**4.66. NO. 1 OR NO. 2 ENGINE LOUVER DISASSEMBLY/ASSEMBLY (AVIM) - continued**

d. **Remove louver endplates (22) and (23) from channels (24) and (25).**

(1) Remove four nutplates (26) from endplates (22) and (23) and channel (24) (TM 1-1500-204-23).

(2) Remove four nutplates (27) from endplates (22) and (23) and channel (25) (TM 1-1500-204-23).

(3) Remove rivets (28) from endplates (22) and (23) and channels (24) and (25) (TM 1-1500-204-23).

(4) Remove endplates (22) and (23) from channels (24) and (25).

e. **Remove channels (24) and (25).**

(1) Remove channel (24) from vane shafts (2) and (14).

(2) Remove washer (29) from shaft (2).

(3) Remove washers (29) from six shafts (14).

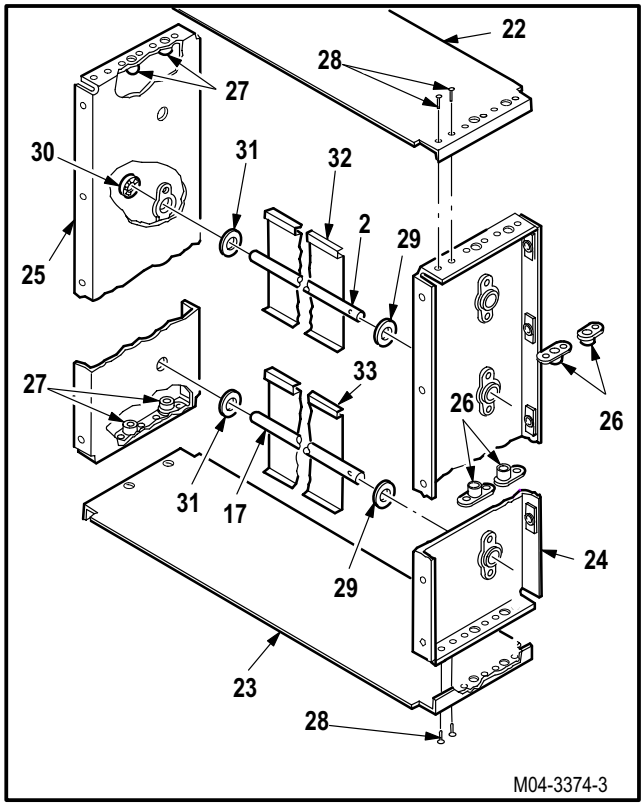
(4) Remove and discard seven push-on nuts (30) from louver channel (25).

(5) Remove channel (25) from vane shafts (2) and (17).

(6) Remove washer (31) from shaft (2).

(7) Remove washers (31) from six shafts (14).

(8) Remove louver vane (32) and six louver vanes (33).

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**4.66. NO. 1 OR NO. 2 ENGINE LOUVER DISASSEMBLY/ASSEMBLY (AVIM) - continued**

4.66.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.66.5. Inspection

a. **Check remote control levers, sleeve bushing, louver covers, flange bushings, vanes, assemblies, and louver linkage channel for cracks.** None allowed.

b. **Check remote control levers, sleeve bushing, louver covers, flange bushings, vanes, assemblies, and louver linkage channel for corrosion** (para 1.49)**.**

c. **Check louver channels for stripped nutplates.** None allowed.

d. **Check louver flange bushing for movement.** Bushings must move freely.

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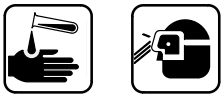
## 4.66. NO. 1 OR NO. 2 ENGINE LOUVER DISASSEMBLY/ASSEMBLY (AVIM) - continued

4.66.6. Assembly



a. **Install louver vane (32) and six louver vanes (33) in louver channels (24) and (25).**

(1) Install one washer (31) on vane shaft (2).

(2) Install one washer (31) on six shafts (14).

**NOTE**

Verify that the vane with longer shaft (2) is positioned in the hole second from the top of louver channels. Longer shaft will extend past channel (24).

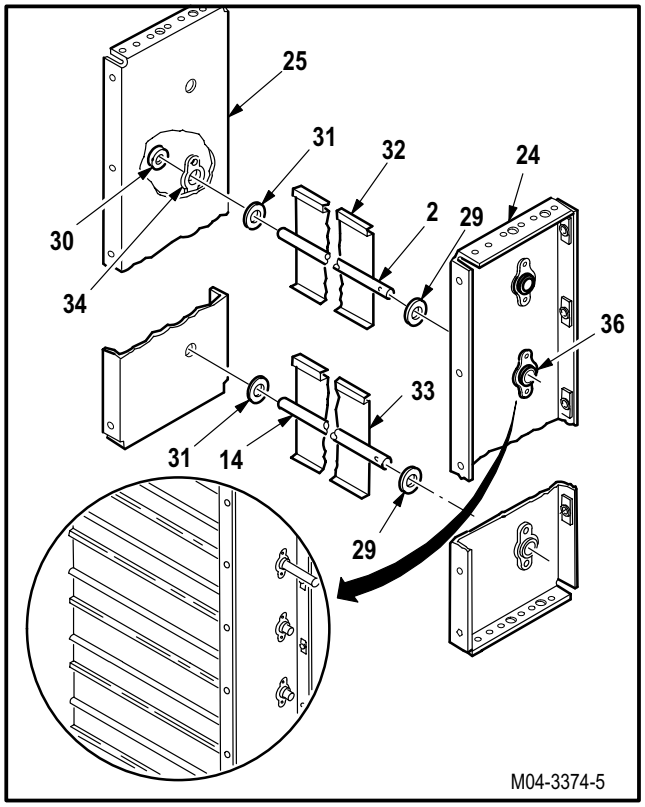
(3) Aline and slide each vane shaft (2) and (14) through louver channel (25) and flange bearings (34).

(4) Hold vanes (32) and (33). Install seven new push-on nuts (30) on vane shafts (2) and (14).

(5) Install one washer (29) on vane shaft (2) and one washer (29) on six shafts (14).

(6) Aline and slide each vane shaft (2) and (14) through channel (24) and flange bearing (36).

(7) Lubricate all flange bearings (36) and (34). Use lubricating oil (item 119, App F).

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## 4.66. NO. 1 OR NO. 2 ENGINE LOUVER DISASSEMBLY/ASSEMBLY (AVIM) - continued

b. **Install two endplates (22) and (23) on channels (24) and (25).**

(1) Aline rivet holes on endplates (22) and (23) with rivet holes on channels (24) and (25). Install rivets (28) through endplates (22) and (23) and channels (24) and (25) (TM 1-1500-204-23).

(2) Install four nutplates (27) on channel (25) and endplates (22) and (23) (TM 1-1500-204-23).

(3) Install four nutplates (26) on channel (24) and endplates (22) and (23) (TM 1-1500-204-23).

c. **Install linkage channel (17).**

(1) Install lever (13) on vane shaft (2).

(2) Aline hole on lever (13) with hole in vane shaft (2).

(3) Install screw (18) through washer (21), lever (13), and shaft (2).

(4) Install washer (20) and nut (19).

(5) Repeat steps c.(2) thru c.(5) for other six levers (13) and shafts (14).

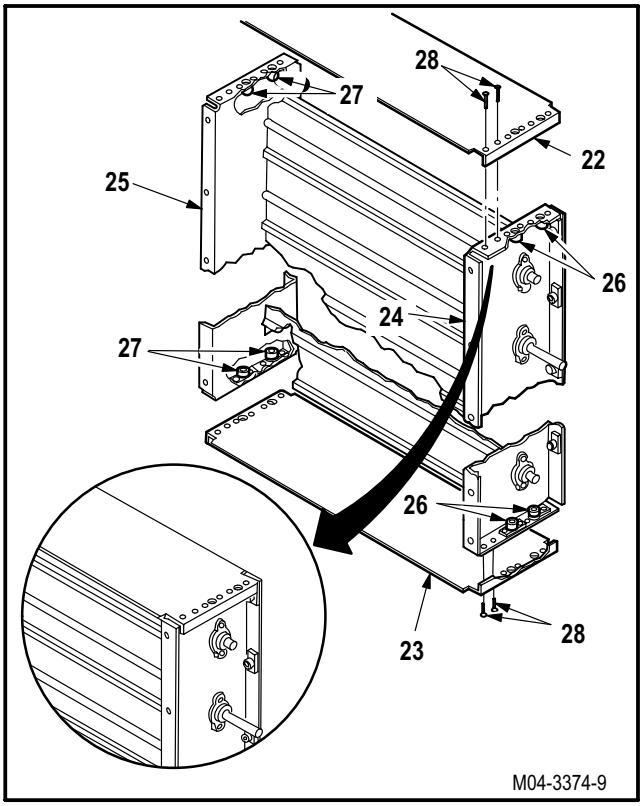
(6) Install seven washers (16) on levers (13).

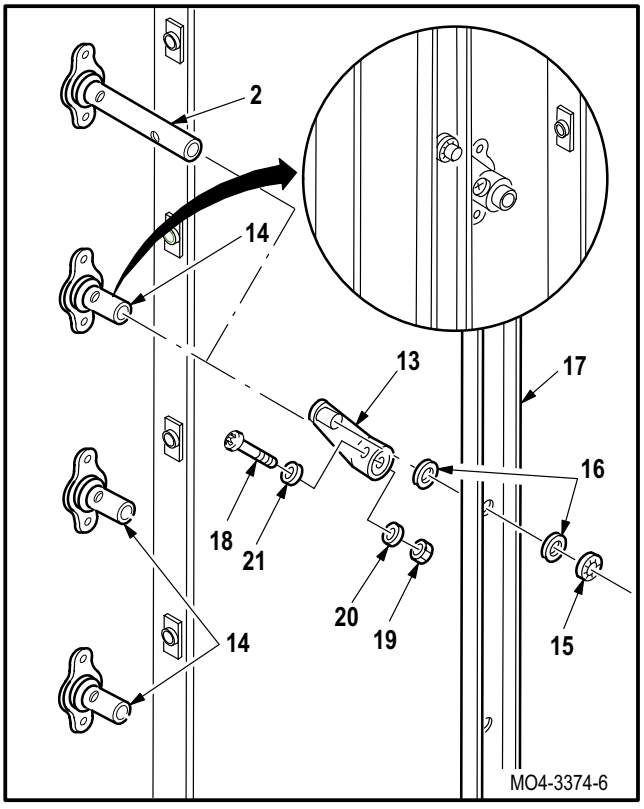
(7) Aline holes in channel (17) with control lever (13).

(8) Install seven washers (16) and new push-on nuts (15) on levers (13).

**NOTE**

Vanes must move without binding or dragging. If binding or dragging occurs, go to paragraph 4.66.3 and repeat steps c. and d. Then go to paragraph 4.66.6 and repeat steps a. and b.

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## 4.66. NO. 1 OR NO. 2 ENGINE LOUVER DISASSEMBLY/ASSEMBLY (AVIM) - continued

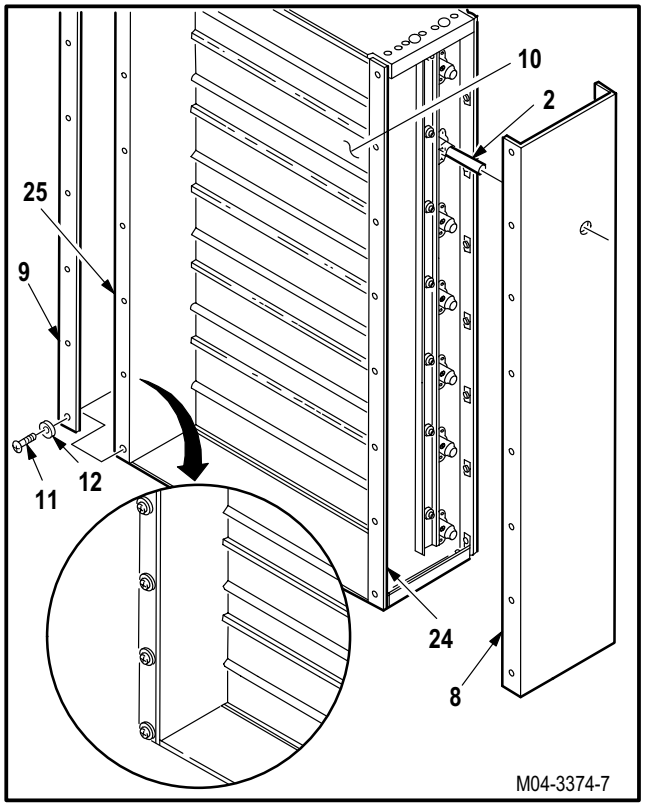
d. **Install covers (8) and (9) on channel (10).**

(1) Aline louver cover (8) with louver vane shaft (2).

(2) Slide cover (8) on vane shaft (2). Aline cover with nutplates on louver channel (24).

(3) Aline cover (9) with nutplates on channel (25).

(4) Install 32 screws (11) through washers (12), louver covers (8) and (9), and channels (24) and (25).




e. **Install lever (1) on shaft (2).**

(1) Insert sleeve bushing (7) into lever (1).

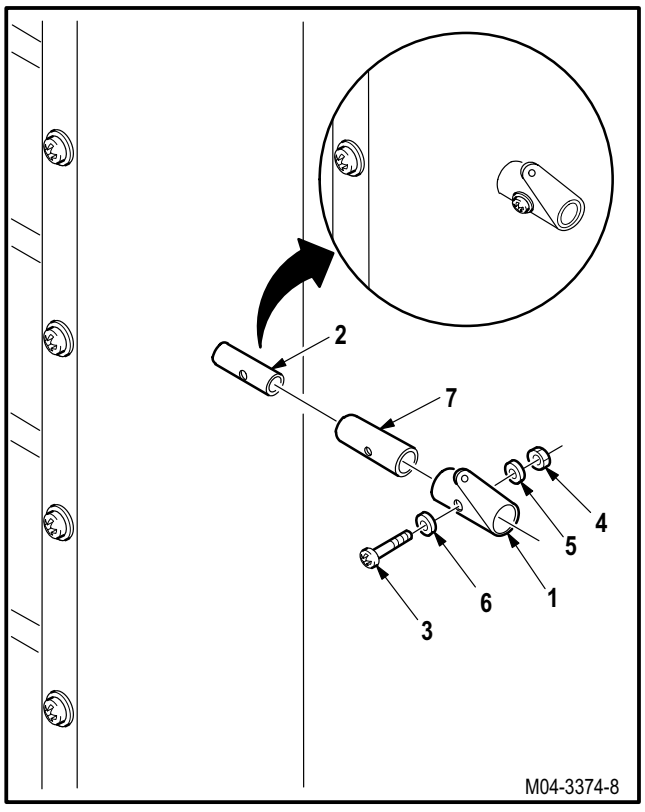
(2) Install bushing (7) and lever (1) on shaft (2).

(3) Aline hole of lever (1) and hole in bushing (7) with hole in vane shaft (2).

(4) Install screw (3) through washer (6), lever (1), bushing (7), and vane shaft (2).

(5) Install washer (5) and nut (4) on screw (3).

f. **Inspect (QA).**




END OF TASK

# SECTION III. AIR SYSTEM MAINTENANCE

## 4.68. NO. 1 OR NO. 2 ANTI-ICE VALVE AND BRACKET REMOVAL/INSTALLATION

4.68.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.68.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 1/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 89, App H)
1 3/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 94, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

**Materials/Parts:**

Packing
Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

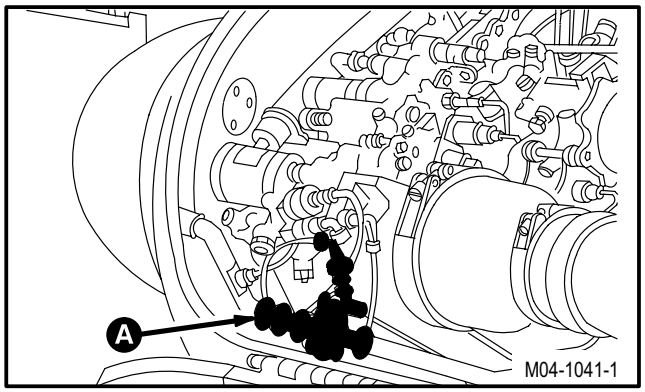
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 or RN1 opened |

4.68.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot aft circuit breaker, open ENG ANTI-ICE circuit breaker.**

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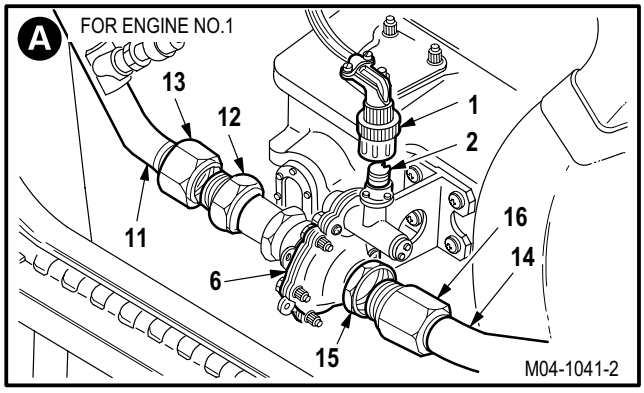
## 4.68. NO. 1 OR NO. 2 ANTI-ICE VALVE AND BRACKET REMOVAL/INSTALLATION - continued

c. **For engine No. 1, detach connector P33 (1) from engine inlet anti-ice valve receptacle L1 (2).**

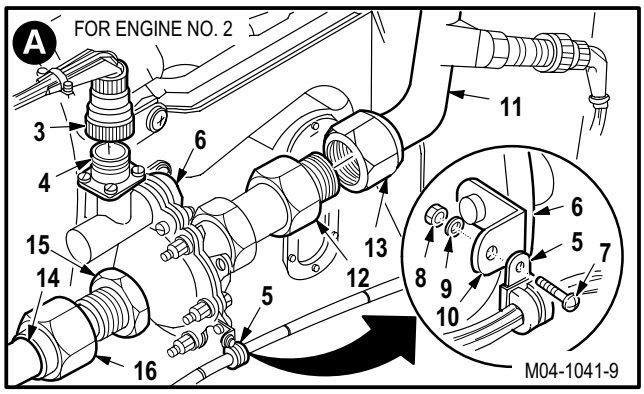



d. **For engine No. 2, detach connector P34 (3) from engine inlet anti-ice valve receptacle L2 (4).**

e. **For engine No. 2, remove wire harness support clamp (5) from engine inlet anti-ice valve (6).**

(1) Hold screw (7). Remove nut (8) and washer (9).

(2) Remove screw (7) from clamp (5) and clip (10).




f. **Remove tube (11) from valve (6).**

(1) Hold union (12). Use crowfoot.

(2) Remove nut (13). Use crowfoot.

g. **Remove tube (14) from valve (6).**

(1) Hold fitting (15). Use crowfoot.

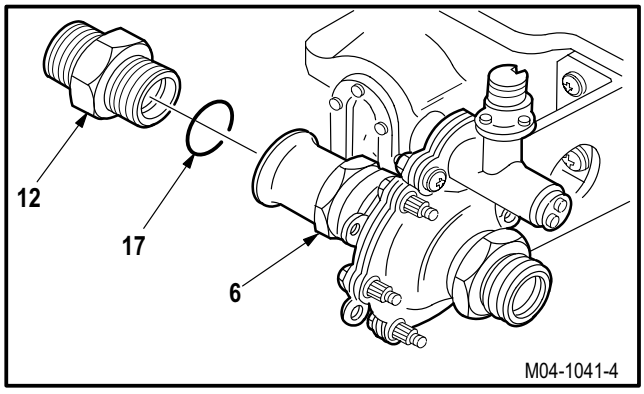
(2) Remove nut (16). Use crowfoot.

h. **Remove union (12) from valve (6).**

(1) Hold valve (6). Use crowfoot.

(2) Remove union (12). Use crowfoot.

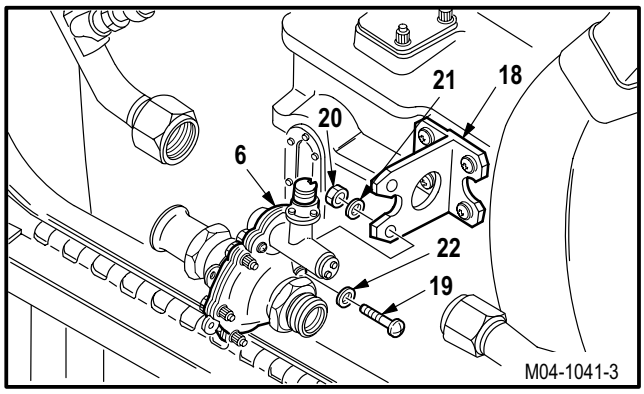
(3) Remove and discard packing (17).




i. **Remove valve (6) from engine inlet anti-ice valve support (18).**

(1) Hold two screws (19). Remove two nuts (20) and washers (21).

(2) Remove two screws (19) and washers (22).

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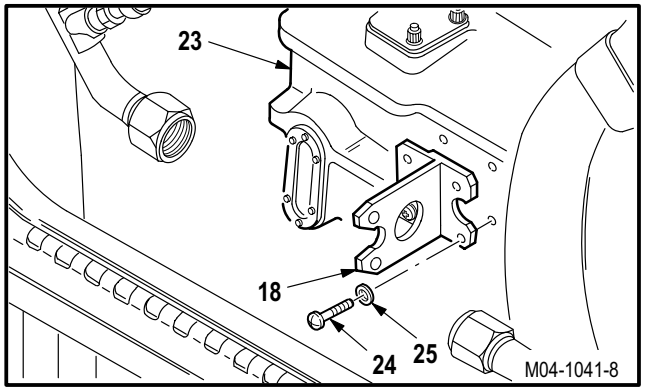
**4.68. NO. 1 OR NO. 2 ANTI-ICE VALVE AND BRACKET REMOVAL/INSTALLATION - continued**

j. **Remove support (18) from engine boss (23).**

(1) Remove four screws (24) and washers (25).

(2) Remove support (18).




4.68.4. Cleaning

a. **Clean boss** (para 1.47)**.**

4.68.5. Inspection

a. **Check boss and support for cracks.** None allowed.

b. **Check boss, support, and valve for corrosion** (para 1.49)**.**

c. **Check anti-ice valve for loose, missing, or damaged hardware.** None allowed.

d. **Check anti-ice valve for cracked or dented housings.** None allowed.

e. **Check anti-ice valve identification plate for damage.** None allowed.

f. **Check anti-ice valve poppets for binding.** None allowed.

g. **Check solenoid case for damage.** None allowed.

h. **Check connector and receptacle for cracks, corrosion, and broken, bent, or damaged pins** (TM 55-1500-323-24)**.**

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## 4.68. NO. 1 OR NO. 2 ANTI-ICE VALVE AND BRACKET REMOVAL/INSTALLATION - continued

4.68.6. Installation

a. **Install new packing (17) on union (12).**

(1) Lubricate packing. Use petrolatum (item 138, App F).

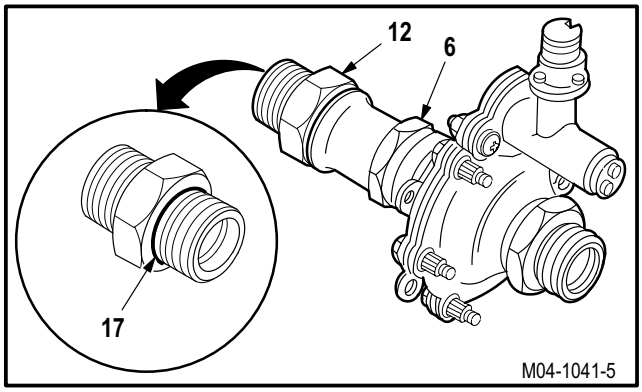
b. **Install union (12) on valve (6).** Torque union (12) to **575 INCH-POUNDS**.

(1) Lubricate threads of union (12). Use petrolatum (item 138, App F).

(2) Install union (12) on valve (6).

(3) Hold valve (6). Use crowfoot.

(4) Torque union (12) to **575 INCH-POUNDS**. Use torque wrench and crowfoot.




c. **Install support (18) on boss (23).**

(1) Aline support (18) on boss (23).

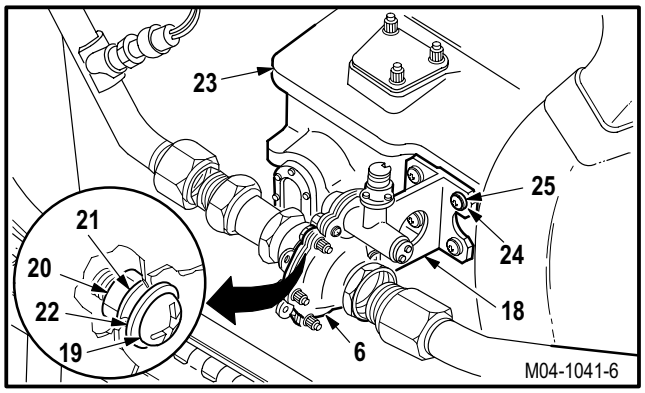
(2) Install four screws (24) and washers (25).

d. **Install valve (6) on support (18).**

(1) Insert two screws (19) through washers (22), support (18), and valve (6).

(2) Hold two screws (19).

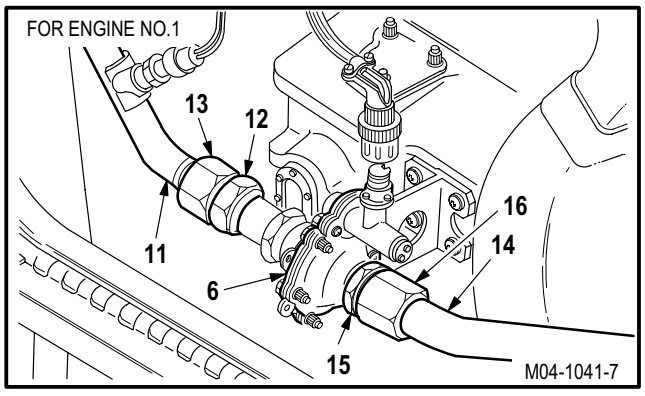
(3) Install two nuts (20) and washers (21).



e. **Install tube (14) on valve (6).** Torque nut (16) to **415 INCH-POUNDS**.

(1) Lubricate threads of fitting (15). Use petrolatum (item 138, App F).

(2) Install nut (16) on fitting (15).

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**4.68. NO. 1 OR NO. 2 ANTI-ICE VALVE AND BRACKET REMOVAL/INSTALLATION - continued**

(3) Hold fitting (15). Use crowfoot.

(4) Torque nut (16) to **415 INCH-POUNDS**. Use torque wrench and crowfoot.

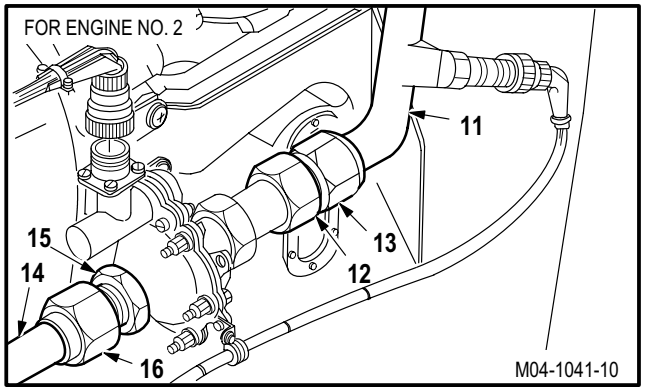
f. **Install tube (11) on valve (6).** Torque nut (13) to **415 INCH-POUNDS**.

(1) Lubricate threads of union (12). Use petrolatum (item 138, App F).

(2) Install nut (13) on union (12).

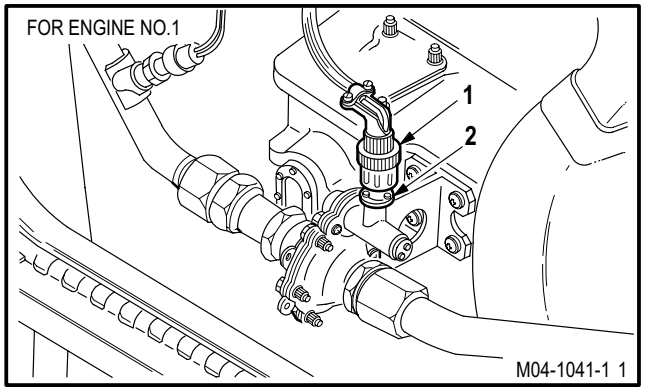
(3) Hold union (12). Use crowfoot.

(4) Torque nut (13) to **415 INCH-POUNDS**. Use crowfoot and torque wrench.




g. **Inspect (QA).**

h. **For engine No. 1, attach connector P33 (1) to receptacle L1 (2).**

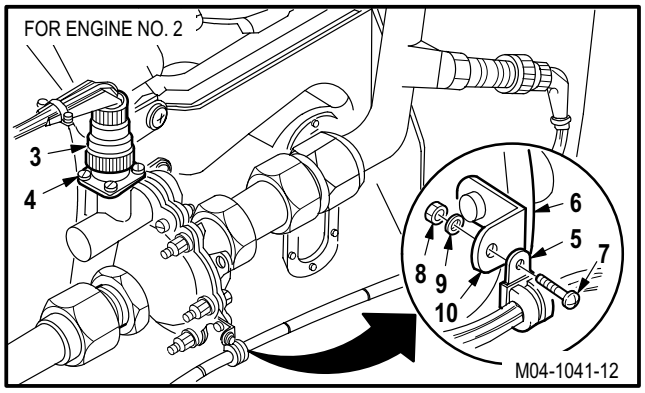



i. **For engine No. 2, attach connector P34 (3) to receptacle L2 (4).**

j. **For No. 2 engine, install wire harness support clamp (5) on valve (6).**

(1) Install screw (7) through clamp (5) and clip (10).

(2) Install washer (9) and nut (8) on screw (7).




k. **Inspect (QA).**

l. **Perform engine anti-ice maintenance operational check** (TM 1-1520-238-T)**.**

m. **Secure access door LN1 or RN1** (para 2.2)**.**

END OF TASK

## 4.69. NO. 1 OR NO. 2 ANTI-ICE THERMOSTATIC SWITCH REMOVAL/INSTALLATION

4.69.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.69.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

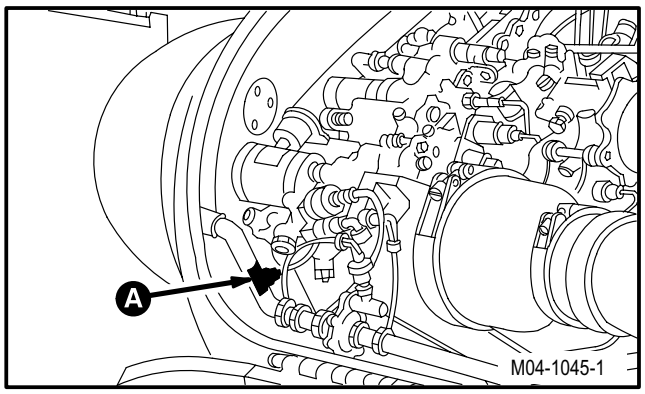
TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 or RN1 opened |

**Materials/Parts:**

Packing
Petrolatum (item 138, App F)

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## 4.69. NO. 1 OR NO. 2 ANTI-ICE THERMOSTATIC SWITCH REMOVAL/INSTALLATION - continued

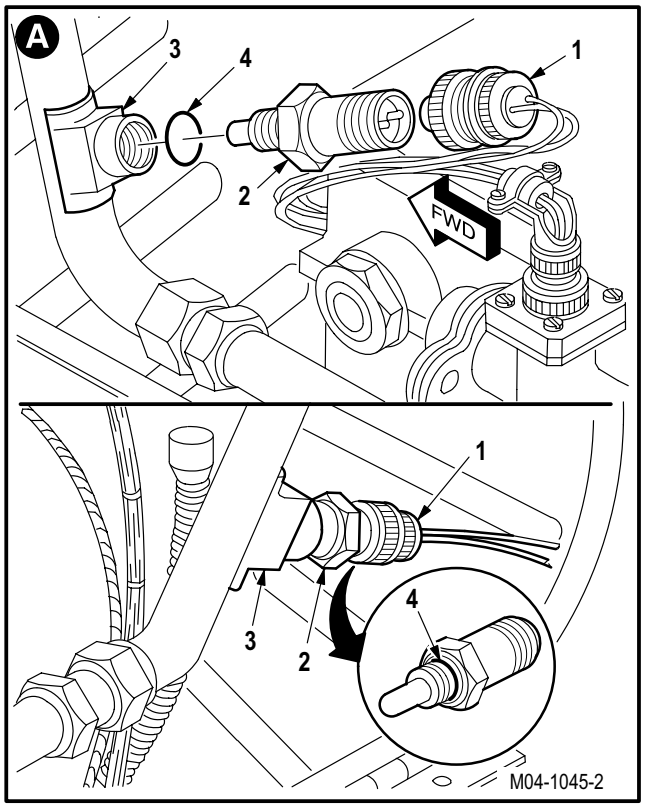
4.69.3. Removal

a. **Remove anti-ice temperature switch (2) from anti-ice tube boss (3).**

(1) Detach connector P954 (1) from switch receptacle (2).

(2) Hold boss (3). Remove switch (2).

(3) Remove and discard packing (4).




4.69.4. Cleaning

a. **Clean boss** (para 1.47)**.**

4.69.5. Inspection

a. **Check boss for cracks and thread damage.** None allowed.

b. **Check boss for corrosion** (para 1.49)**.**

4.69.6. Installation

a. **Install switch (2) in boss (3).**

(1) Lubricate new packing (4). Use petrolatum (item 138, App F).

(2) Install packing (4) on switch (2).

(3) Hold boss (3). Install switch (2).

(4) Attach connector P954 (1) to switch (2).

b. **Inspect (QA).**

c. **Perform engine anti-ice maintenance operational check** (TM 1-1520-238-T)**.**

d. **Secure access door LN1 or RN1** (para 2.2)**.**

END OF TASK

## 4.70. NO. 1 OR NO. 2 ENGINE ANTI-ICE TUBE REMOVAL/INSTALLATION

4.70.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.70.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 1/16 & 1 1/4-inch open end wrench (item 416, App H)
1 1/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 89, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

**Materials/Parts:**

Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

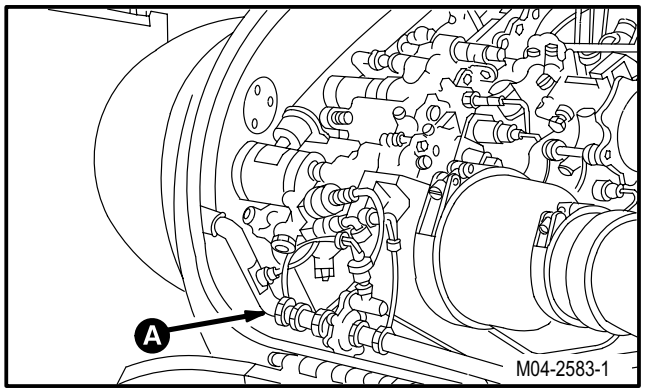
TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.69 | No. 1 or No. 2 engine anti-ice thermostatic switch removed |

**NOTE**

This task is typical for No. 1 or No. 2 engine anti-ice tube.

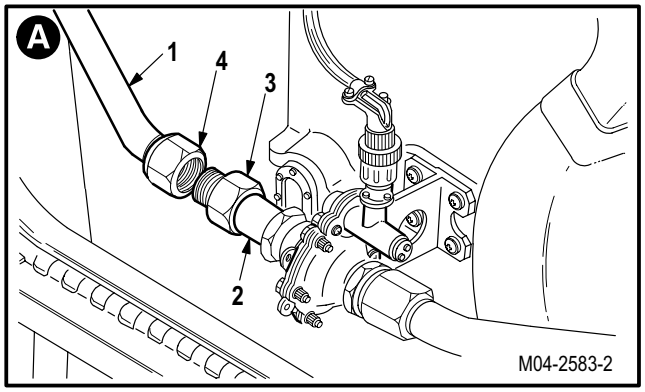



4.70.3. Removal

a. **Remove engine anti-ice tube (1) from valve (2).**

(1) Hold union (3). Use open end wrench.

(2) Remove nut (4). Use crowfoot.

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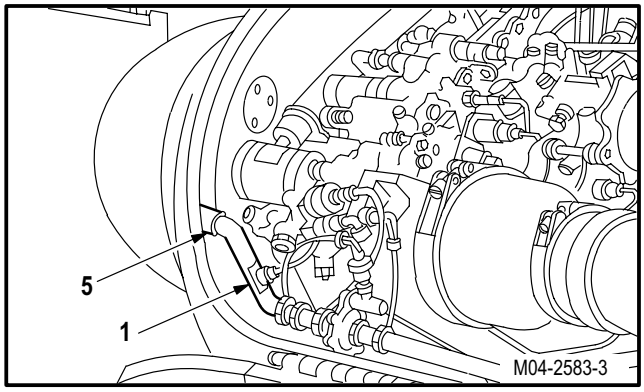
## 4.70. NO. 1 OR NO. 2 ENGINE ANTI-ICE TUBE REMOVAL/INSTALLATION - continued

b. **Remove tube (1) from support (5).**

(1) Swing tube (1) and nut (4) away from valve (2).

(2) Remove tube (1).




4.70.4. Cleaning

a. **Clean union and support** (para 1.47)**.**

4.70.5. Inspection

a. **Check union for damaged threads.** None allowed.

b. **Check support for cracks.** None allowed.

c. **Check seal for cuts, breaks, or nicks.** None allowed.

d. **Check support for corrosion** (para 1.49)**.**

4.70.6. Installation

a. **Install tube (1) in support (5).**

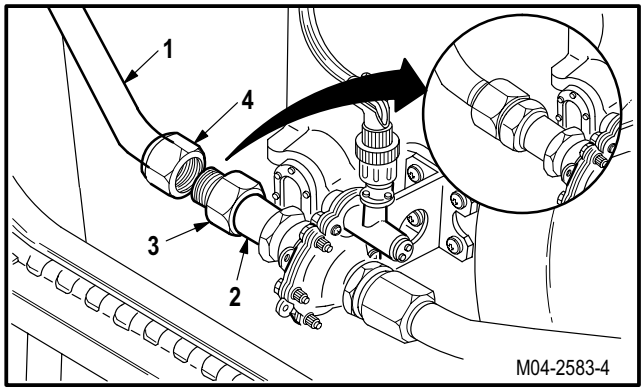
b. **Install tube (1) on valve (2).** Torque nut (4) to **415 INCH-POUNDS**.

(1) Lubricate threads of fitting (3). Use petrolatum (item 138, App F)

(2) Install nut (4) on fitting (3).

(3) Hold fitting (3). Use open end wrench.

(4) Torque nut (4) to **415 INCH-POUNDS**. Use torque wrench and crowfoot.




c. **Inspect (QA).**

d. **Install No. 1 or No. 2 engine anti-ice thermostatic switch** (para 4.69)**.**

END OF TASK

## 4.71. NO. 1 OR NO. 2 ENGINE ANTI-ICE SUPPORT REMOVAL/INSTALLATION

4.71.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.71.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

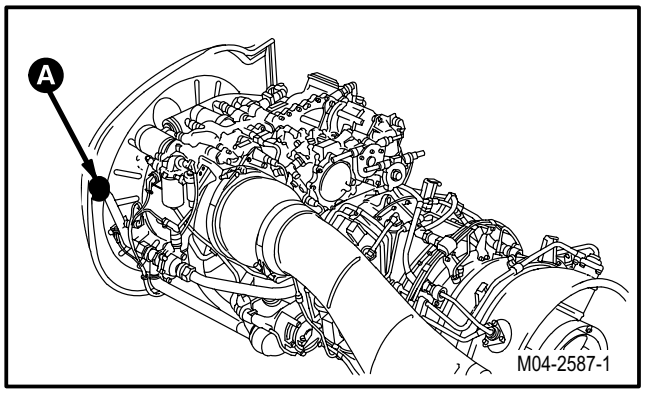
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.70 | No. 1 or No. 2 engine anti-ice tube removed |

**Materials/Parts:**

Gasket
Seal

**NOTE**

This task is typical for No. 1 or No. 2 engine anti-ice support.

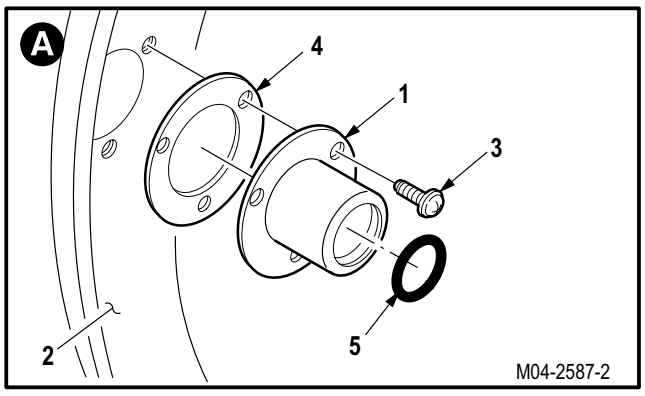



4.71.3. Removal

a. **Remove engine anti-ice tube support (1) from air inlet (2).**

(1) Remove three screws (3).

(2) Remove and discard gasket (4) and seal (5).

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## 4.71. NO. 1 OR NO. 2 ENGINE ANTI-ICE SUPPORT REMOVAL/INSTALLATION - continued

4.71.4. Cleaning

a. **Clean support mounting area on inlet** (para 1.47)**.**

4.71.5. Inspection

a. **Check air inlet for cracks.** None allowed.

4.71.6. Installation

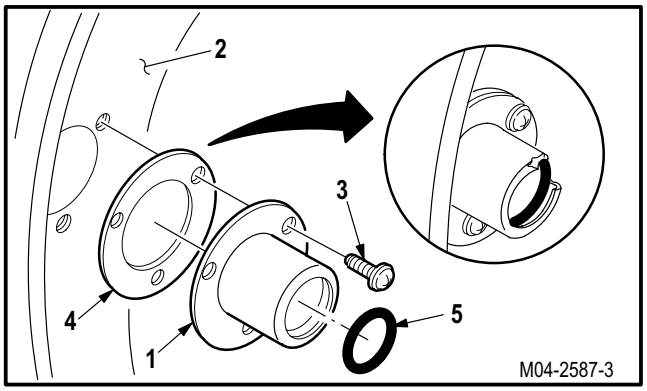
a. **Install support (1) and new gasket (4) on air inlet (2).**

(1) Install three screws (3) through support (1) and gasket (4) into inlet (2).

(2) Install new seal (5) in support (1).

b. **Inspect (QA).**

c. **Install No. 1 or No. 2 engine anti-ice tube** (para 4.70)**.**




END OF TASK

## 4.72. NO. 1 AND NO. 2 ENGINE ANTI-ICE SUPPLY TUBE REMOVAL/INSTALLATION

4.72.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.72.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
1 1/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 89, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 1/16 & 1 1/4-inch open end wrench (item 416, App H)
1 3/8 & 1 7/16-inch open end wrench (item 421, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

**Materials/Parts:**

Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

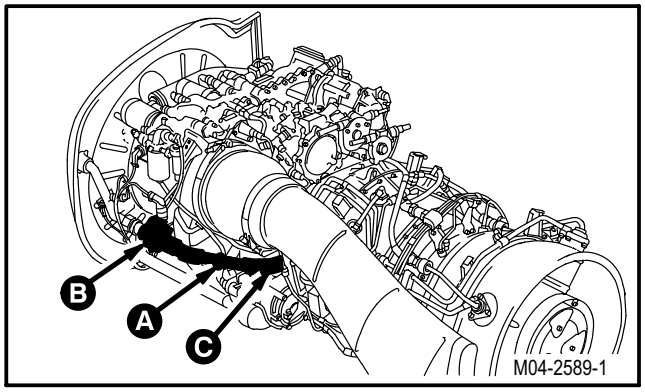
TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 or RN1 opened |

**NOTE**

This task is typical for No. 1 or No. 2 engine anti-ice supply tube.

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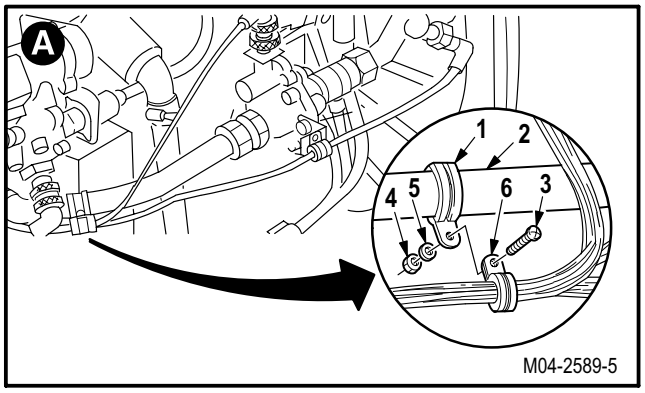
## 4.72. NO. 1 AND NO. 2 ENGINE ANTI-ICE SUPPLY TUBE REMOVAL/INSTALLATION - continued

4.72.3. Removal

a. **For No. 2 engine, remove wire harness support clamp (1) from anti-ice supply tube (2).**

(1) Hold screw (3). Remove nut (4) and washer (5).

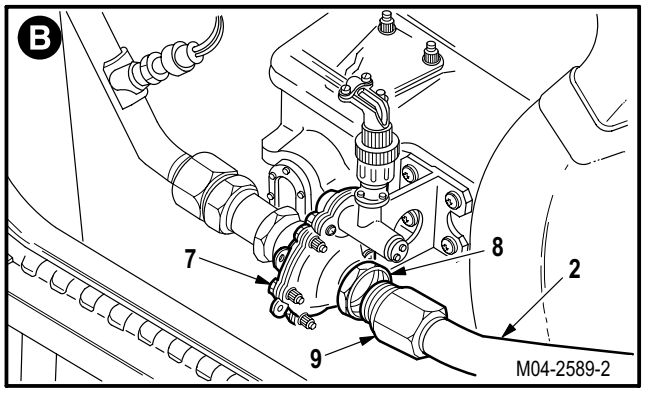
(2) Remove screw (3) from clamps (1) and (6).




b. **Remove tube (2) from valve (7).**

(1) Hold fitting (8). Use open end wrench.

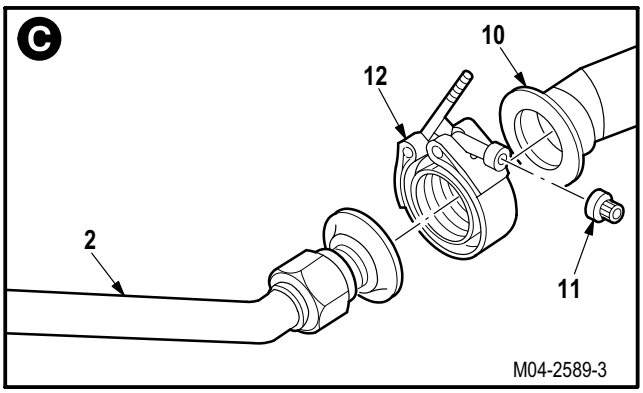
(2) Remove nut (9). Use open end wrench.




c. **Remove tube (2) from adapter flange (10).**

(1) Remove nut (11).

(2) Open and remove coupling (12).




4.72.4. Cleaning

a. **Clean fitting, flange, and coupling** (para 1.47)**.**

4.72.5. Inspection

a. **Check fitting for damaged threads.** None allowed.

b. **Check coupling, flange, and tube for cracks.** None allowed.

c. **Check flange and tube for corrosion** (para 1.49)**.**

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## 4.72. NO. 1 AND NO. 2 ENGINE ANTI-ICE SUPPLY TUBE REMOVAL/INSTALLATION - continued

4.72.6. Installation

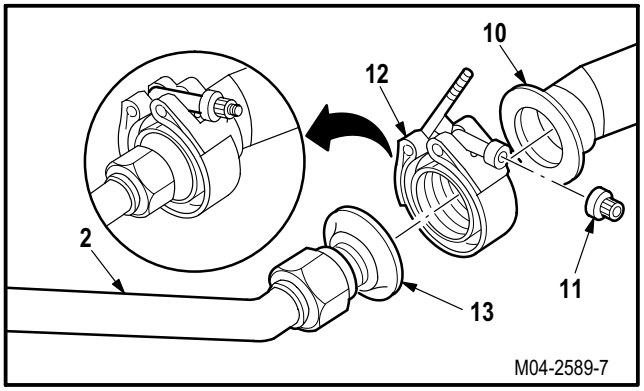
a. **Install tube (2) on flange (10).** Torque nut (11) to **25 INCH-POUNDS**.

(1) Slide coupling (12) on tube (2).

(2) Aline tube flange (13) on adapter flange (10).

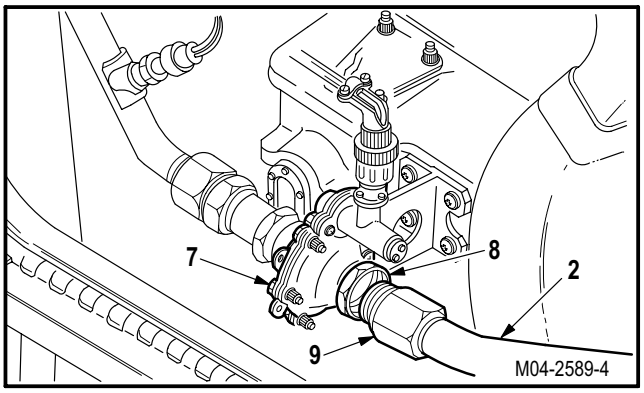
(3) Fit coupling (12) over flanges (10) and (13).

(4) Install nut (11).




(5) Aline nut (9) on fitting (8).

(6) Torque nut (11) to **25 INCH-POUNDS**. Use torque wrench.




b. **Install tube (2) on valve (7).** Torque nut (9) to **415 INCH-POUNDS**.

(1) Lubricate threads of fitting (8). Use petrolatum (item 138, App F).

(2) Install nut (9) on fitting (8).

(3) Hold fitting (8). Use open end wrench.

(4) Torque nut (9) to **415 INCH-POUNDS**. Use torque wrench and crowfoot.

GO TO NEXT PAGE

**4.72. NO. 1 AND NO. 2 ENGINE ANTI-ICE SUPPLY TUBE REMOVAL/INSTALLATION - continued**

c. **For No. 2 engine, install wire harness support clamps (1) and (6) on tube (2).**

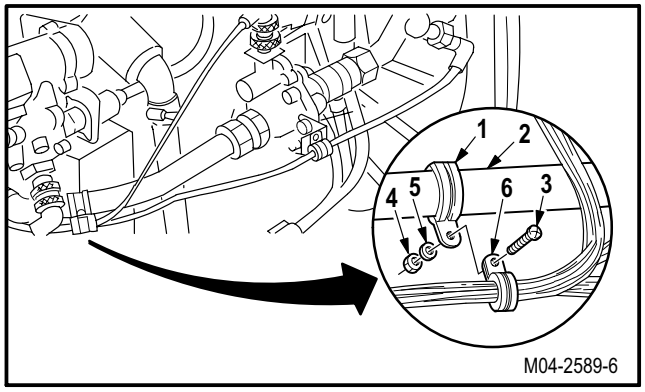
(1) Install screw (3) through clamps (6) and (1).

(2) Install washer (5) and nut (4).

d. **Inspect (QA).**

e. **Perform engine anti-ice maintenance operational check** (TM 1-1520-238-T)**.**

f. **Secure access door LN1 or RN1** (para 2.2)**.**




END OF TASK

## 4.73. NO. 1 OR NO. 2 ENGINE INLET COUPLING REMOVAL/INSTALLATION

4.73.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.73.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Equipment Conditions:**

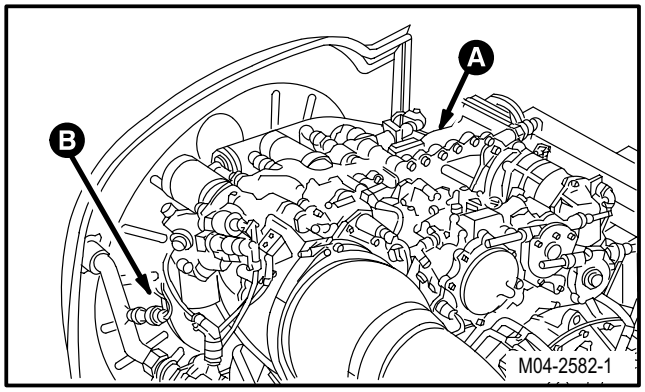
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 or RN1 opened |

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

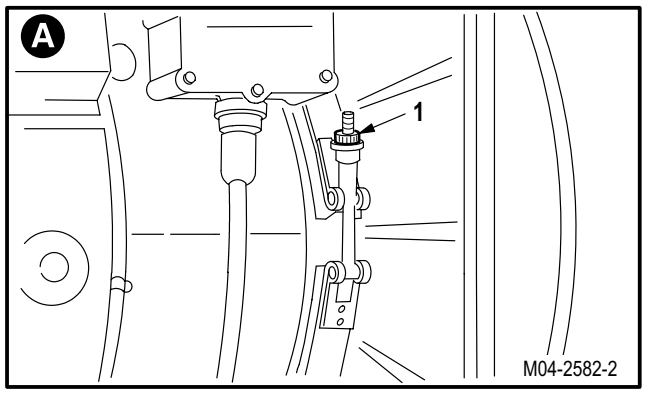
**NOTE**

This task is typical for No. 1 or No. 2 engine inlet coupling.




4.73.3. Removal

a. **Loosen inboard coupling nut (1).**

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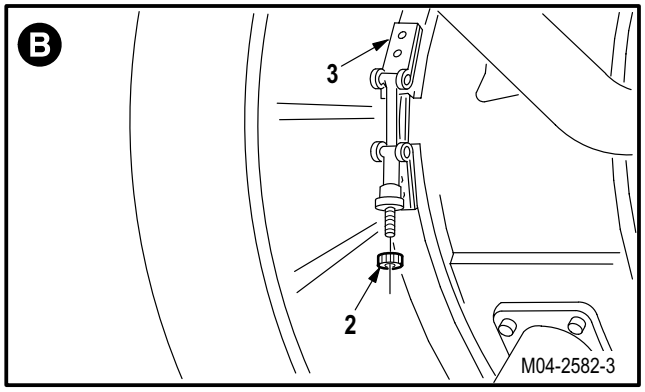
## 4.73. NO. 1 OR NO. 2 ENGINE INLET COUPLING REMOVAL/INSTALLATION - continued

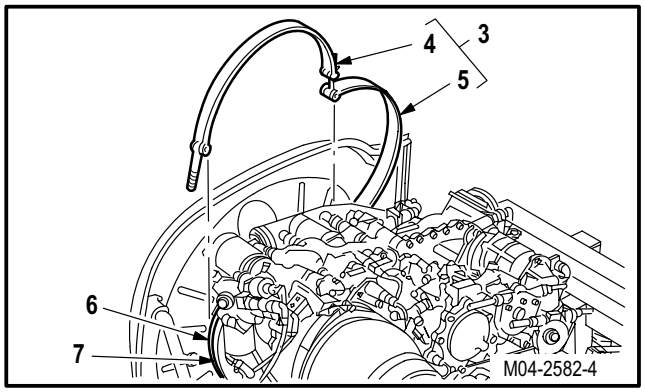
b. **Remove outboard coupling nut (2) from engine inlet coupling (3).**




c. **Remove coupling (3).**

(1) Open outboard end of top coupling half (4).

(2) Slide up bottom coupling half (5) until clear of flanges (6) and (7).



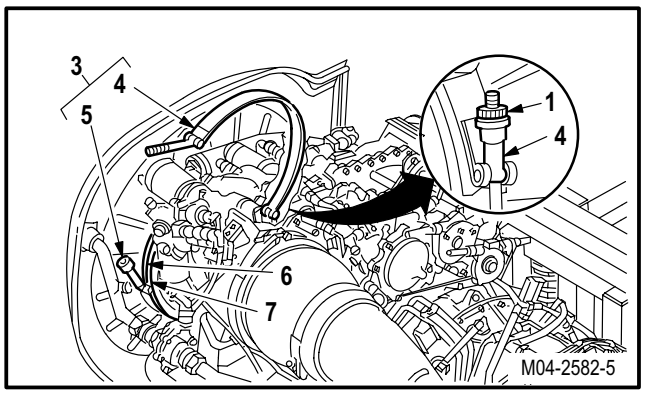

4.73.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.73.5. Inspection

a. **Check flanges and coupling for cracks.** None allowed.

b. **Check flanges and coupling for corrosion** (para 1.49)**.**



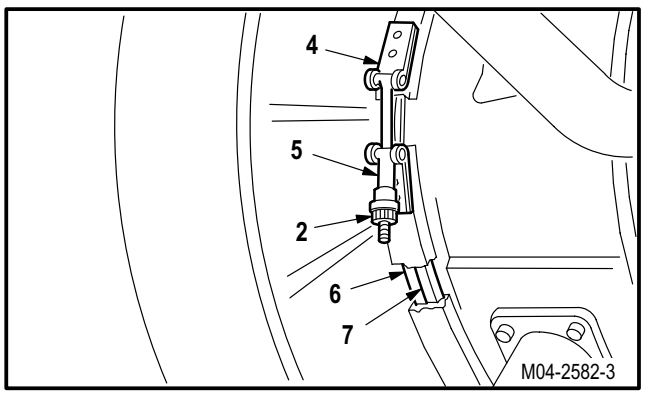

4.73.6. Installation

**NOTE**

When installing coupling assembly, tighten coupling nut to approximately 70 percent of maximum indicated torque. Tap around outside of coupling with a rubber mallet to distribute band tension. Torque nut to specified value. Do not over torque.

a. **Install engine inlet coupling (3).** Torque inboard coupling nut (1) and outboard coupling nut (2) to **35 INCH-POUNDS**.

(1) Slide bottom coupling half (5) over flanges (6) and (7).

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**4.73. NO. 1 OR NO. 2 ENGINE INLET COUPLING REMOVAL/INSTALLATION - continued**

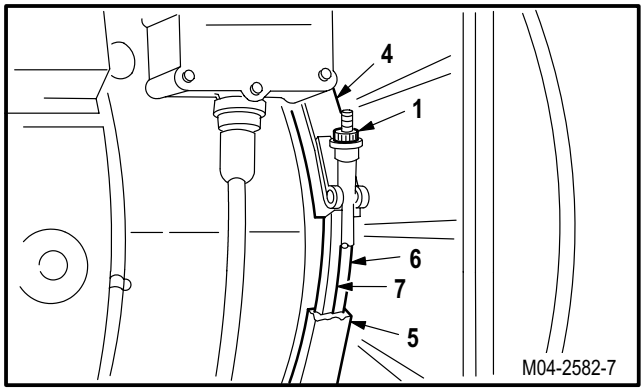
(2) Position inboard nut (1) as shown.

(3) Close outboard end of top coupling half (4).

(4) Aline coupling halves (4) and (5) over flanges (6) and (7).

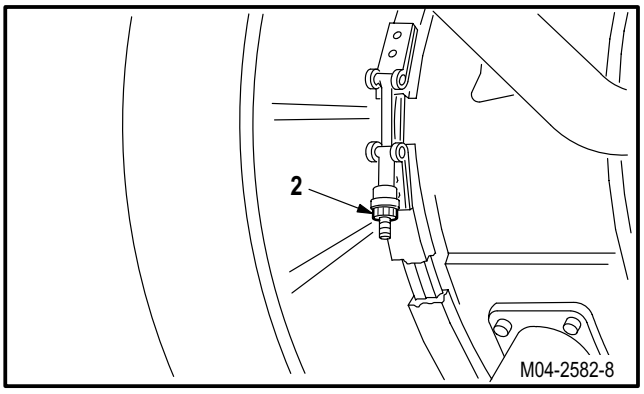
(5) Install outboard nut (2).

(6) Torque nuts (1) and (2) to **35 INCH-POUNDS**. Use torque wrench.




b. **Inspect (QA).**

c. **Secure access doors LN1 or RN1** (para 2.2)**.**




END OF TASK

## 4.74. NO. 1 ENGINE COMPRESSOR BLEED AIR TUBE REMOVAL/INSTALLATION

4.74.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.74.2. Initial Setup

**Tools:**

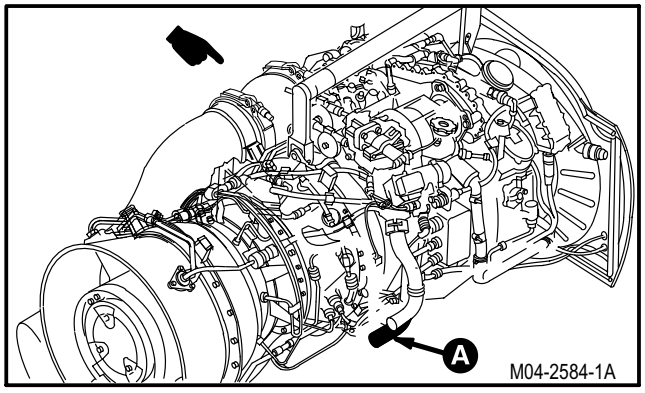
Aircraft mechanic's tool kit (item 376, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed |

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## 4.74. NO. 1 ENGINE COMPRESSOR BLEED AIR TUBE REMOVAL/INSTALLATION - continued

4.74.3. Removal

a. **Remove starter air tube clamp (1) from compressor bleed air tube (2).**

(1) Remove screw (3), washer (4), spacer (5), and angle bracket (6) from tube (2).

b. **Remove tube (2) from bleed air outlet flange (7).**

(1) Remove nut (8).

(2) Open and remove coupling (9).

(3) Remove tube (2).

4.74.4. Cleaning

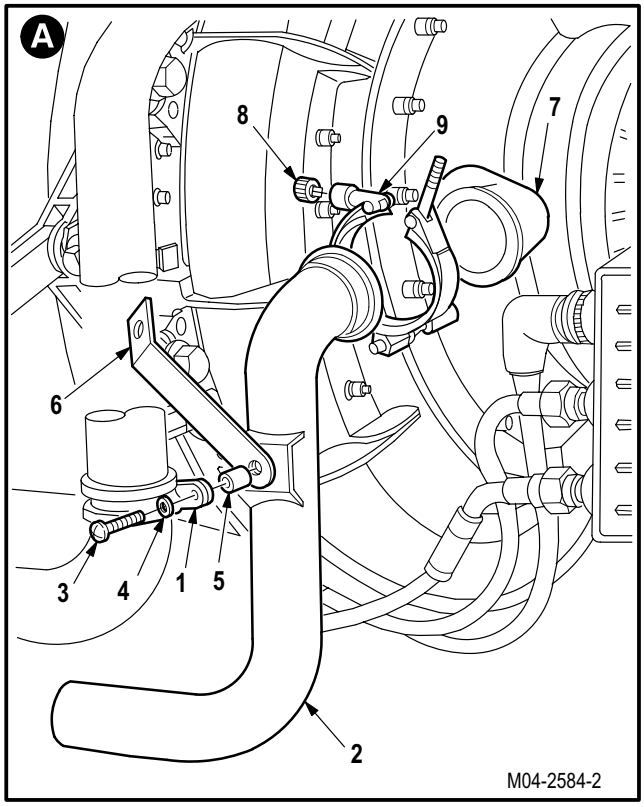
a. **Clean flange and coupling** (para 1.47)**.**

4.74.5. Inspection

a. **Check coupling, flange, and tube for cracks.** None allowed.

b. **Check flange and tube for corrosion** (para 1.49)**.**

c. **Check tube for discoloration around welded areas.** None allowed.

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## 4.74. NO. 1 ENGINE COMPRESSOR BLEED AIR TUBE REMOVAL/INSTALLATION - continued

4.74.6. Installation

a. **Install tube (2) on flange (7).** Torque nut (8) to **25 INCH-POUNDS**.

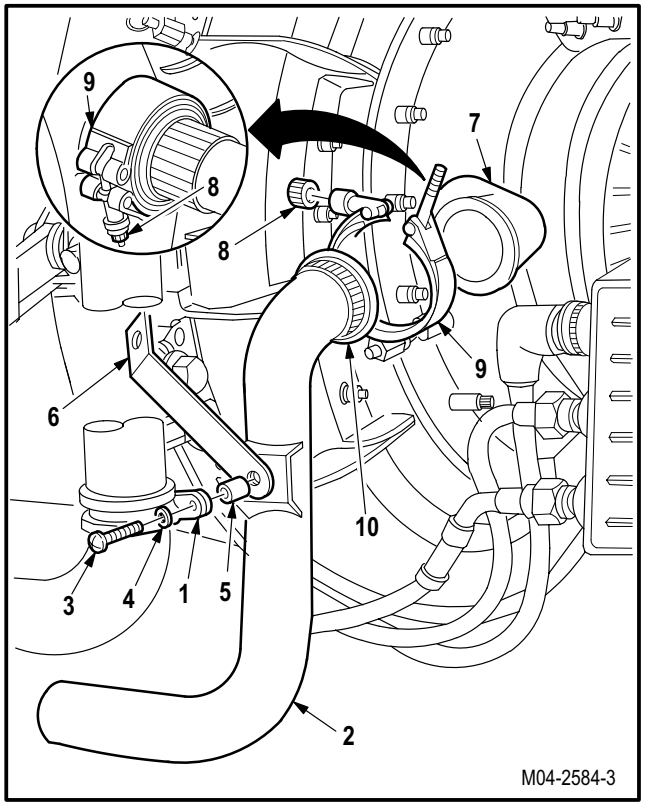
(1) Slide coupling (9) on tube (2).

(2) Aline tube flange (10) on adapter flange (7).

(3) Fit coupling (9) over flanges (7) and (10).

(4) Install nut (8).

(5) Torque nut (8) to **25 INCH-POUNDS**. Use torque wrench.



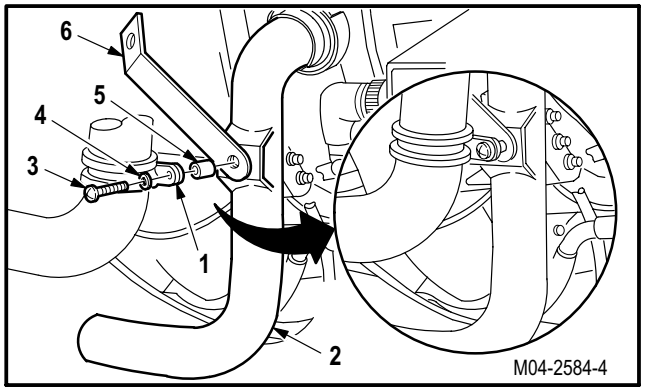

b. **Install starter air tube clamp (1) on tube (2).**

(1) Aline clamp (1) with spacer (5) and angle bracket (6) on tube (2).

(2) Install screw (3) and washer (4).

c. **Inspect (QA).**

d. **Install No. 1 engine** (para 4.48)**.**




END OF TASK

## 4.75. NO. 2 ENGINE COMPRESSOR BLEED AIR HOSE REMOVAL/INSTALLATION

4.75.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.75.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**References:**

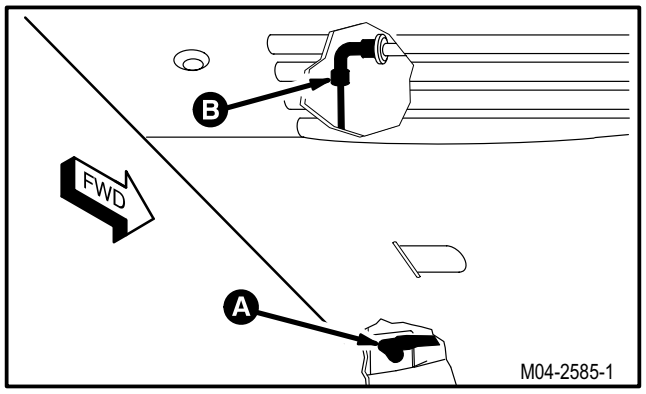
TM 1-1520-238-T

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

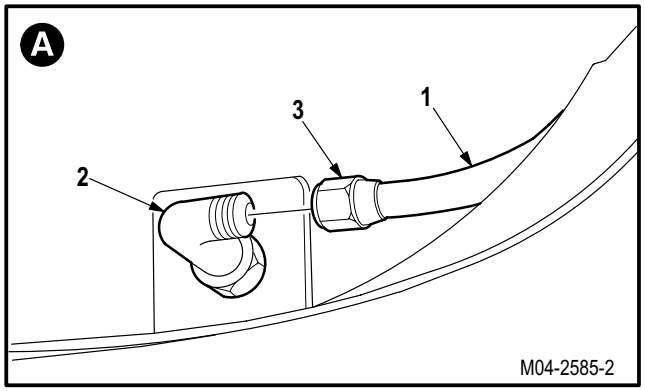
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors RN3 and RN4 removed |




4.75.3. Removal

a. **Remove compressor bleed air hose (1) from lower elbow (2).**

(1) Hold elbow (2). Remove nut (3).

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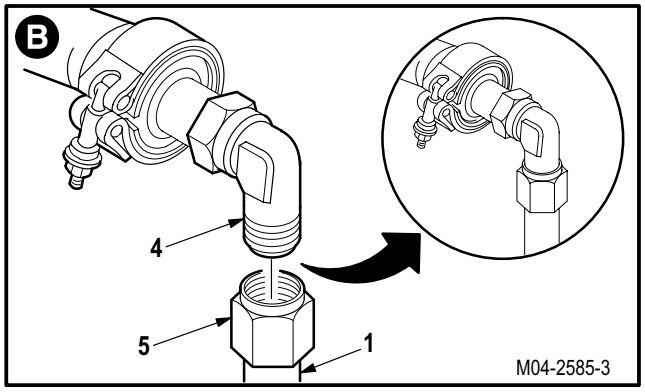
**4.75. NO. 2 ENGINE COMPRESSOR BLEED AIR HOSE REMOVAL/INSTALLATION - continued**

b. **Remove hose (1) from upper elbow (4).**

(1) Hold elbow (4). Remove nut (5).




4.75.4. Cleaning

a. **Clean threads of elbows and hose nuts** (para 1.47)**.**

4.75.5. Inspection

a. **Check elbows and hose nuts for damaged threads.** None allowed.

b. **Check hose for cracks.** None allowed.

c. **Check elbows and hose nuts and hose for corrosion** (para 1.49)**.**

4.75.6. Installation

a. **Install hose (1) on elbow (4).**

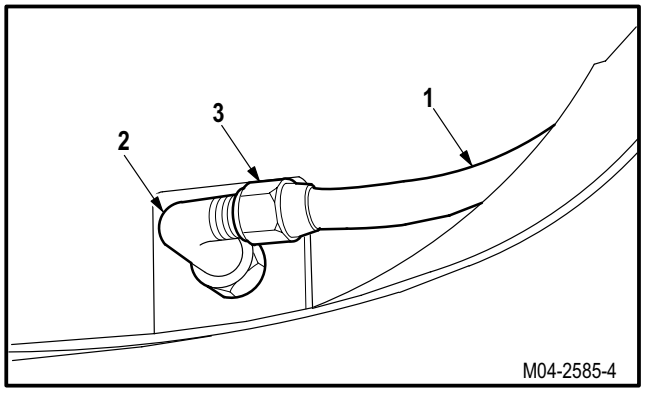
(1) Install nut (5) on elbow (4).

(2) Hold elbow (4). Tighten nut (5).

b. **Install hose (1) on lower elbow (2).**

(1) Install nut (3) on elbow (2).

(2) Hold elbow (2). Tighten nut (3).




c. **Inspect (QA).**

d. **Perform power plant maintenance operational check (engine 2)** (TM 1-1520-238-T)**.**

e. **Install access doors RN3 and RN4** (para 2.2)**.**

END OF TASK

## 4.76. NO. 2 ENGINE COMPRESSOR BLEED AIR ADAPTER AND ELBOW REMOVAL/INSTALLATION

4.76.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.76.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Materials/Parts:**

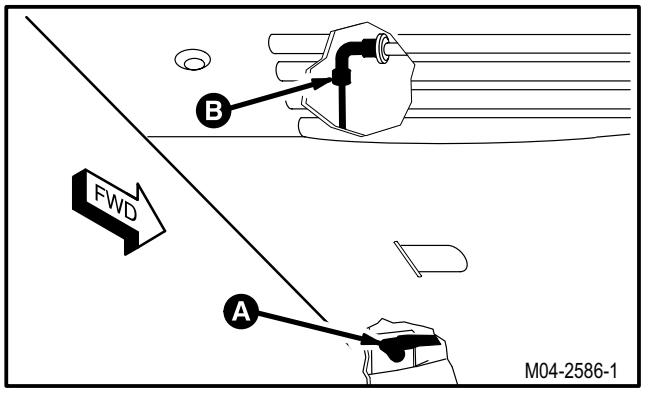
Packing
Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.8 | No. 2 engine removed |

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## 4.76. NO. 2 ENGINE COMPRESSOR BLEED AIR ADAPTER AND ELBOW REMOVAL/INSTALLATION - continued

4.76.3. Removal

a. **Remove from compressor bleed air hose (1) from lower elbow (2).**

(1) Hold elbow (2). Loosen nut (3).

b. **Remove elbow (4) from compressor bleed air adapter (5).**

(1) Hold elbow (4). Removal nut (5).

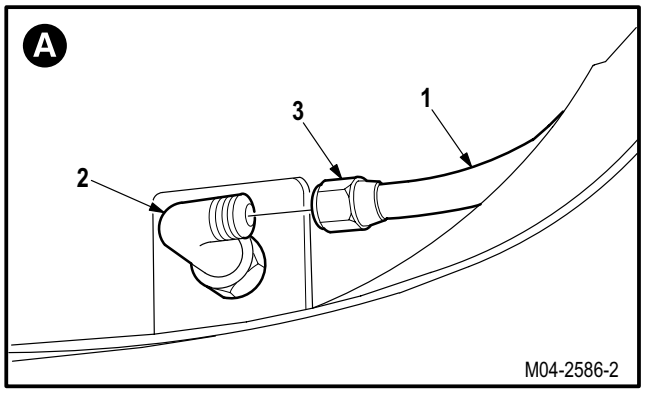
(2) Remove elbow (4).

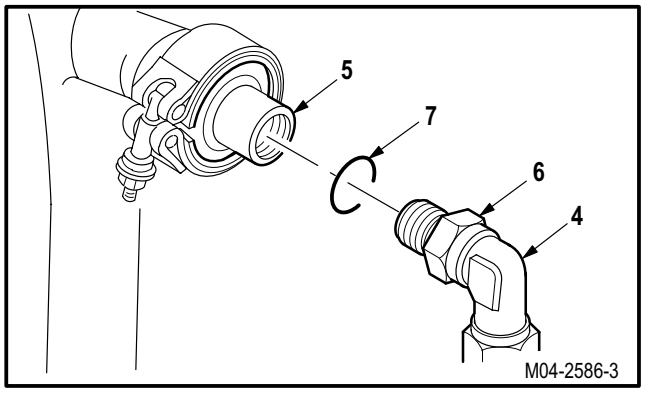
(3) Remove and discard packing (7).

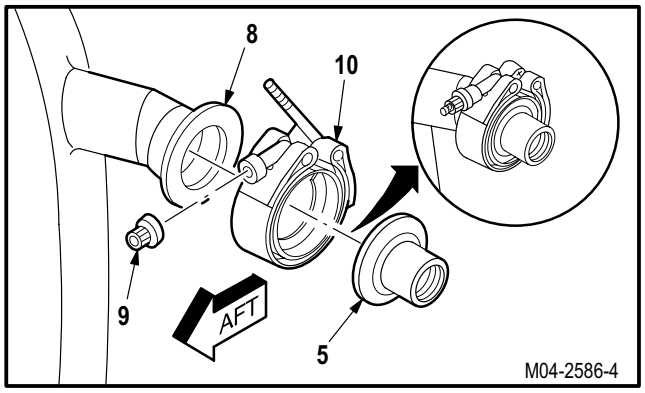
c. **Remove adapter (5) from bleed air outlet flange (8).**

(1) Remove nut (9).

(2) Open and remove coupling (10).




4.76.4. Cleaning

a. **Clean flange and coupling** (para 1.47)**.**

4.76.5. Inspection

a. **Check coupling for cracks.** None allowed.

b. **Check flange for corrosion** (para 1.49)**.**

4.76.6. Installation

a. **Install adapter (5) on bleed air outlet flange (8).** Torque nut (9) to **25 INCH-POUNDS**.

(1) Aline adapter (5) and flange (8).

(2) Fit coupling (10) over adapter (5) and flange (8).

(3) Install nut (9).

(4) Torque nut (9) to **25 INCH-POUNDS**. Use torque wrench.

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## 4.76. NO. 2 ENGINE COMPRESSOR BLEED AIR ADAPTER AND ELBOW REMOVAL/INSTALLATION - continued

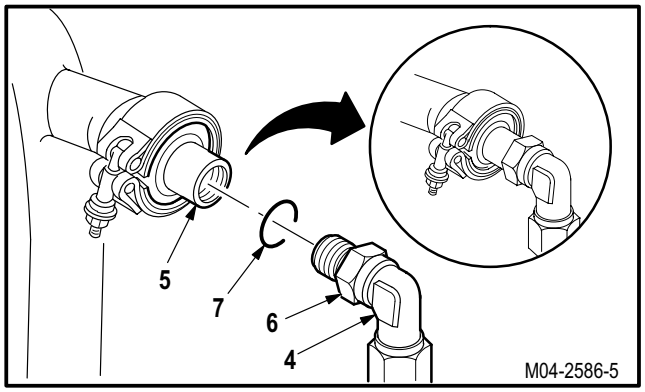
b. **Install elbow (4) on adapter (5).**

(1) Lubricate new packing (7). Use petrolatum (item 138, App F).

(2) Install packing (7) on elbow (4).

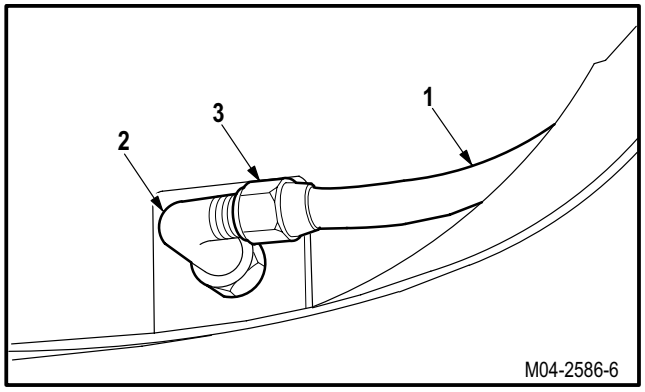
(3) Install elbow (4) on adapter (5) and position elbow to 45 degrees.

(4) Hold elbow (4). Tighten nut (5).




c. **Install hose (1) on elbow (2).**

(1) Hold elbow (2). Install nut (3).




d. **Inspect (QA).**

e. **Install No. 2 engine** (para 4.52)**.**

END OF TASK

## 4.77. NO. 1 ENGINE AIR DUCT REMOVAL/INSTALLATION

4.77.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.77.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Personnel Required:**

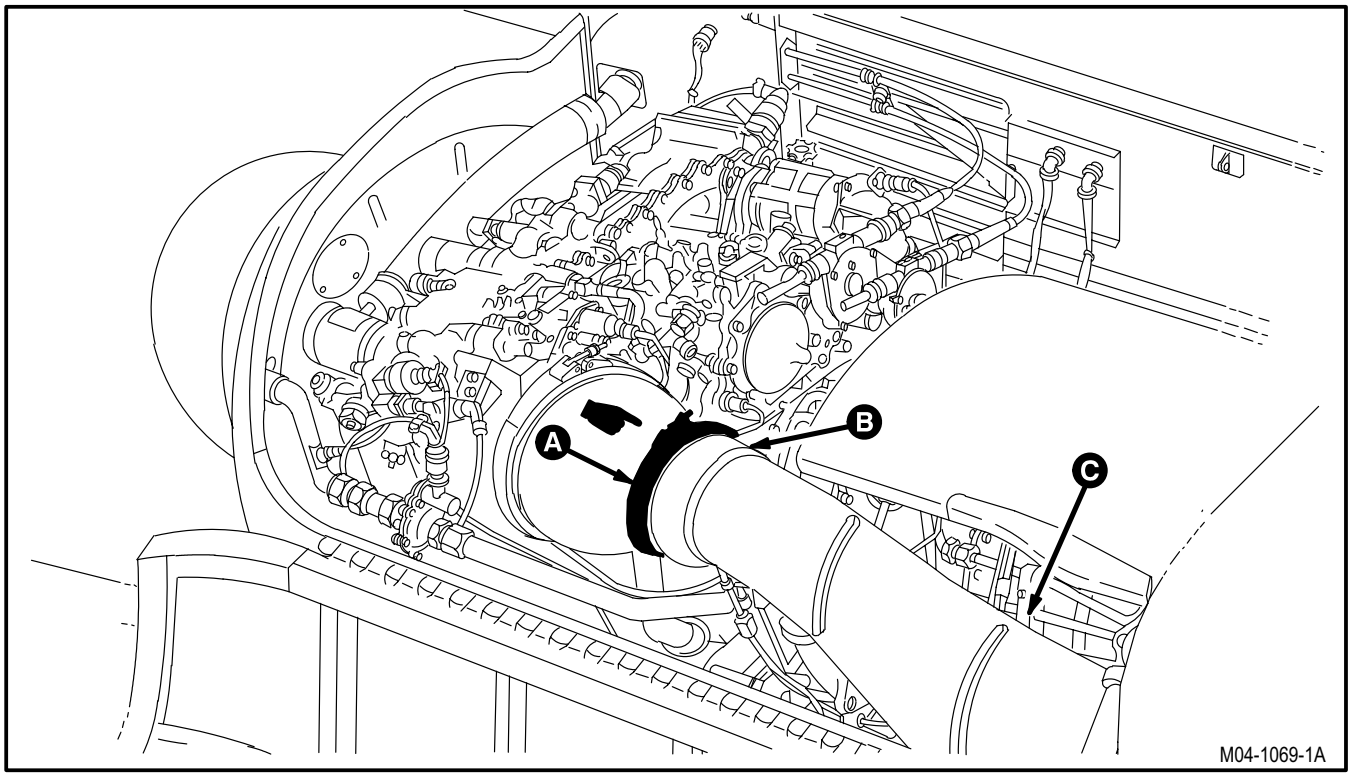
| | |
|---|---|
| 67R | Attack Helicopter Repairer |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

**References:**

TM 1-1520-238-T
TM 1-1500-204-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 opened |
| 4.103 | No. 1 engine shroud removed |

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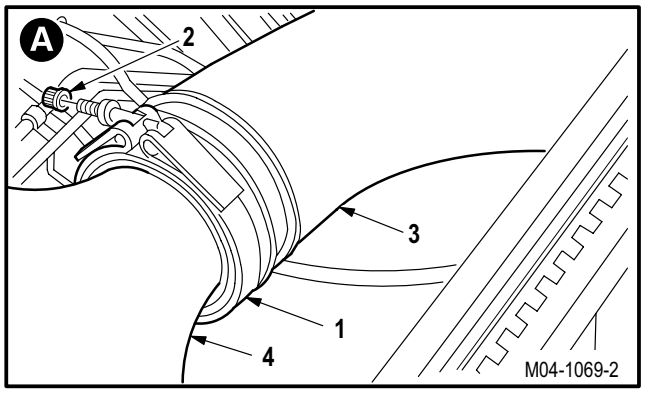
## 4.77. NO. 1 ENGINE AIR DUCT REMOVAL/INSTALLATION - continued

4.77.3. Removal

a. **Remove air duct coupling (1).**

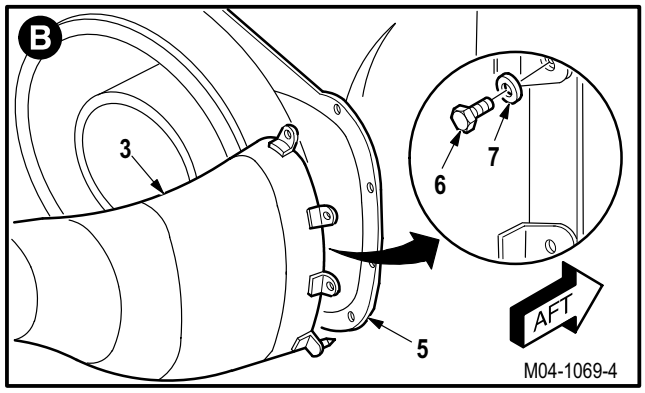
(1) Remove nut (2).

(2) Open and remove coupling (1) from air duct (3) and particle separator blower (4).




b. **Remove duct (3) from primary nozzle (5).**

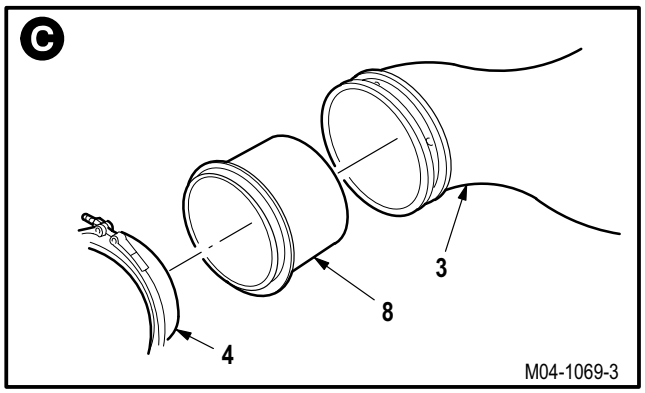
(1) Remove three bolts (6) and washers (7).




c. **Remove duct (3) from blower (4).**

(1) Slide adapter (8) aft. Remove duct (3).

(2) Remove adapter (8) from duct (3).




4.77.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.77.5. Inspection

a. **Check air duct for loose or missing hardware** (TM 1-1500-204-23)**.**

b. **Check blower and adapter for cracks.** None allowed.

c. **Inspect primary nozzle** (para 4.119)**.**

d. **Check for corrosion** (para 1.49)**.**

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## 4.77. NO. 1 ENGINE AIR DUCT REMOVAL/INSTALLATION - continued

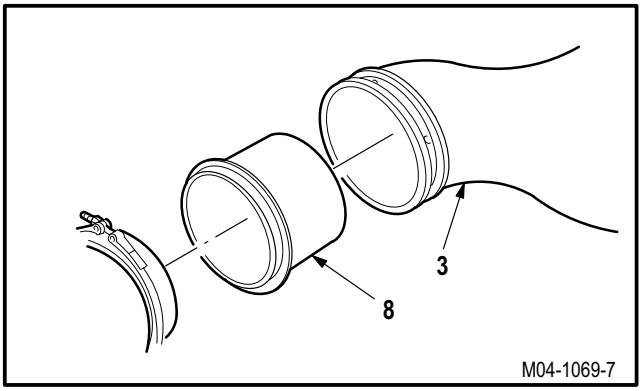
4.77.6. Installation

a. **Install adapter (8) in duct (3).**

b. **Install duct (3) on primary nozzle (5).**

(1) Aline pin (9) at bottom of duct (3) with primary nozzle (5).

(2) Install three bolts (6) through washers (7) and duct (3) into nozzle (5).




**NOTE**

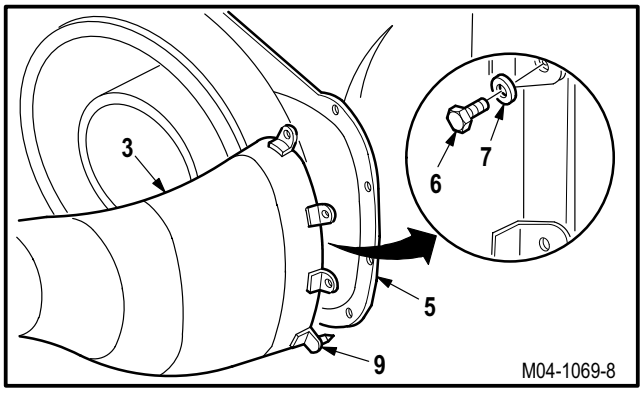
When installing coupling assembly, tighten coupling nut to approximately 70 percent of maximum indicated torque. Tap around outside of coupling with a rubber mallet to distribute band tension. Torque nut to specified value. Do not over torque.

c. **Install duct (3) on blower (4).**

(1) Slide adapter (8) forward until flange (10) alines with flange (11) of blower (4).

(2) Install coupling (1) around flanges (10) and (11) with bolt (12) at top facing inboard.

(3) Install coupling nut (2) on bolt (12).



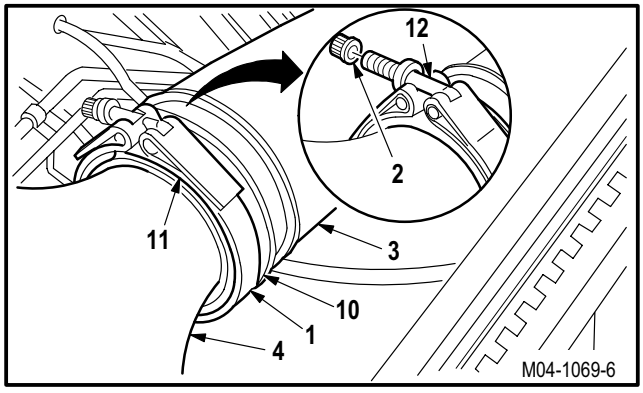

d. **Torque coupling nut (2) to 25 INCH-POUNDS.** Use torque wrench and mallet.

e. **Inspect (QA).**

f. **Install No. 1 engine shroud** (para 4.103)**.**

g. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

h. **Secure access door LN1** (para 2.2)**.**




END OF TASK

## 4.78. NO. 2 ENGINE AIR DUCT REMOVAL/INSTALLATION

4.78.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.78.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Personnel Required:**

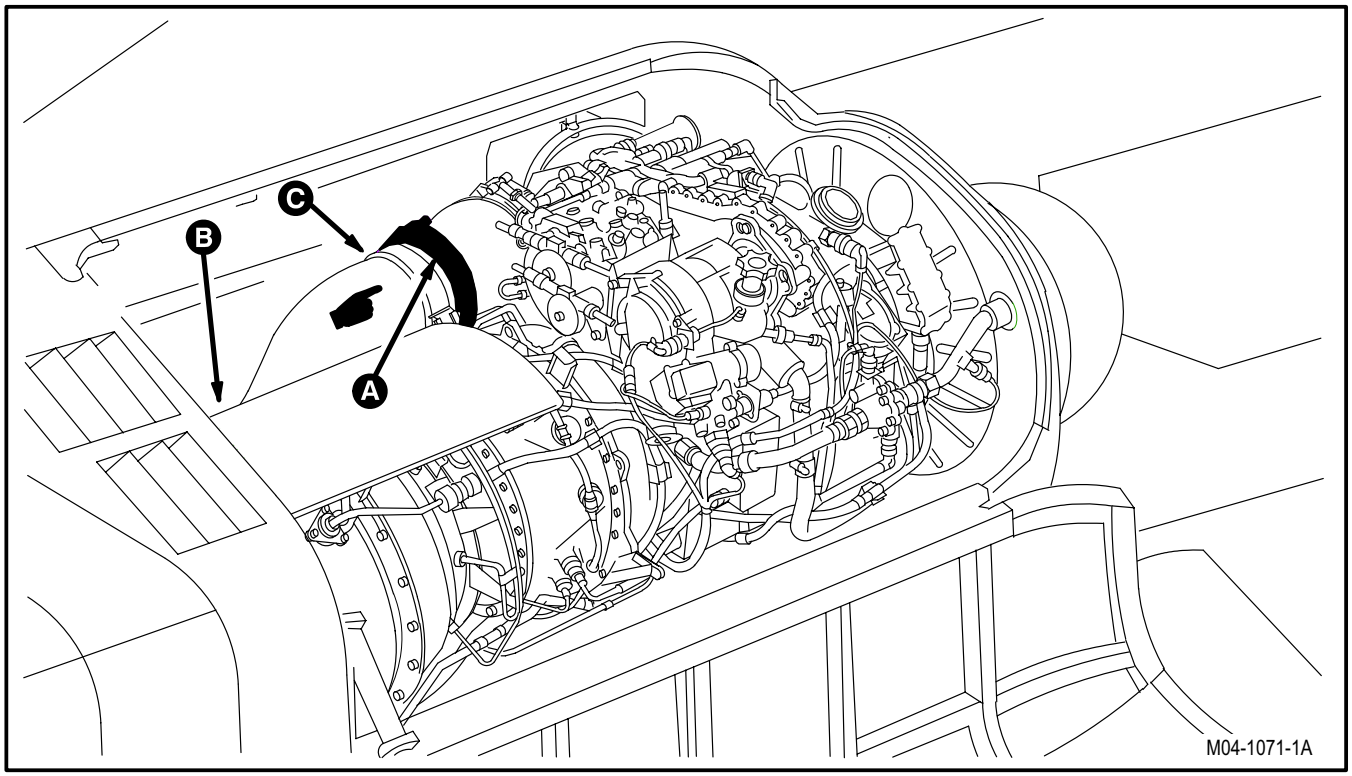
| | |
|---|---|
| 67R | Attack Helicopter Repairer |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

**References:**

TM 1-1520-238-T
TM 1-1500-204-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door RN1 opened |
| 4.103 | No. 2 engine shroud removed |

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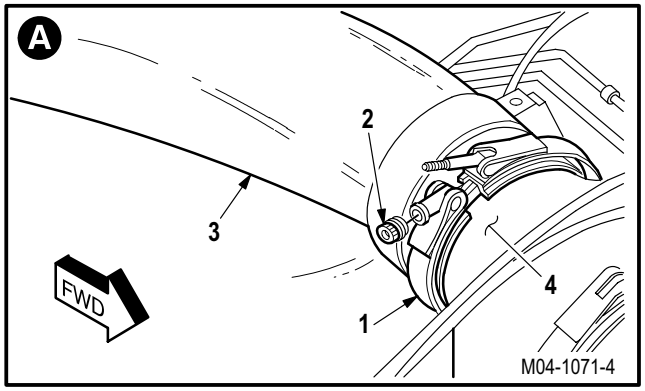
## 4.78. NO. 2 ENGINE AIR DUCT REMOVAL/INSTALLATION - continued

4.78.3. Removal

a. **Remove air duct coupling (1).**

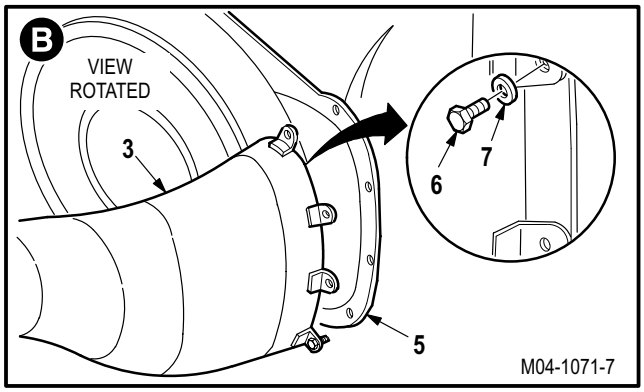
(1) Remove nut (2).

(2) Open and remove coupling (1) from air duct (3) and particle separator blower (4).




b. **Remove duct (3) from primary nozzle (5).**

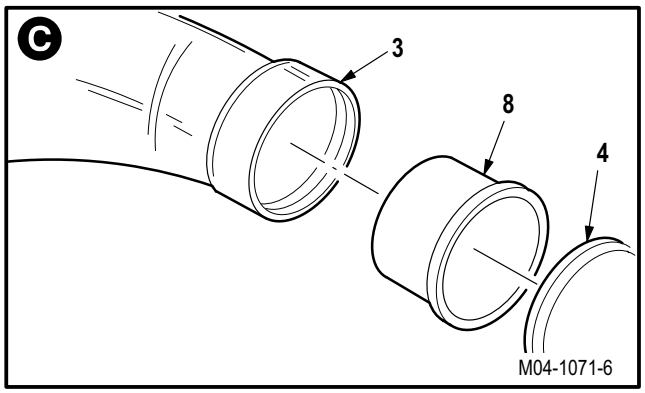
(1) Remove three bolts (6) and washers (7).




c. **Remove duct (3) from blower (4).**

(1) Slide adapter (8) aft. Remove duct (3).

(2) Remove adapter (8) from duct (3).




4.78.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.78.5. Inspection

a. **Check air duct for loose or missing hardware** (TM 1-1500-204-23)**.**

b. **Check blower and adapter for cracks.** None allowed.

c. **Inspect primary nozzle** (para 4.119)**.**

d. **Check for corrosion** (para 1.49)**.**

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## 4.78. NO. 2 ENGINE AIR DUCT REMOVAL/INSTALLATION - continued

4.78.6. Installation

a. **Install adapter (8) in duct (3).**

b. **Install duct (3) on primary nozzle (5).**

(1) Aline pin (9) at bottom of duct (3) with primary nozzle (5).

(2) Install three bolts (6) through washers (7) and duct (3) into nozzle (5).

**NOTE**

When installing coupling assembly, tighten coupling nut to approximately 70 percent of maximum indicated torque. Tap around outside of coupling with a rubber mallet to distribute band tension. Torque nut to specified value. Do not over torque.

c. **Install duct (3) on particle separator blower (4).**

(1) Slide adapter (8) forward until flange (10) alines with flange (11) of blower (4).

(2) Install coupling (1) around flanges (10) and (11) with bolt (12) at top and facing inboard.

(3) Install coupling nut (2) on bolt (12).

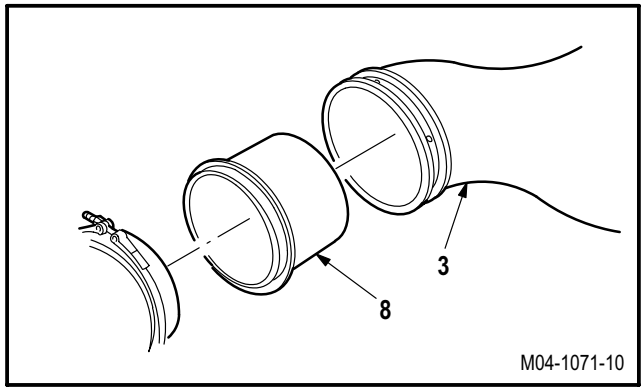
d. **Torque coupling nut (2) to 25 INCH-POUNDS.** Use torque wrench and mallet.

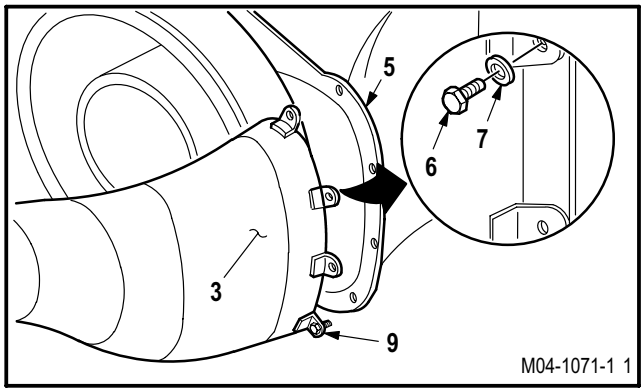
e. **Inspect (QA).**

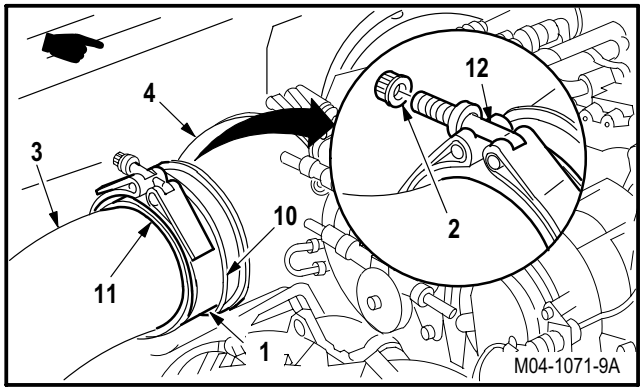
f. **Install No. 2 engine shroud** (para 4.103)**.**

g. **Perform power plants maintenance operational check (engine 2)** (TM 1-1520-238-T)**.**

h. **Secure access door RN1** (para 2.2)**.**




END OF TASK

## 4.79. NO. 1 ENGINE REGULATING VALVE REMOVAL/INSTALLATION

4.79.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.79.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

**Materials/Parts:**

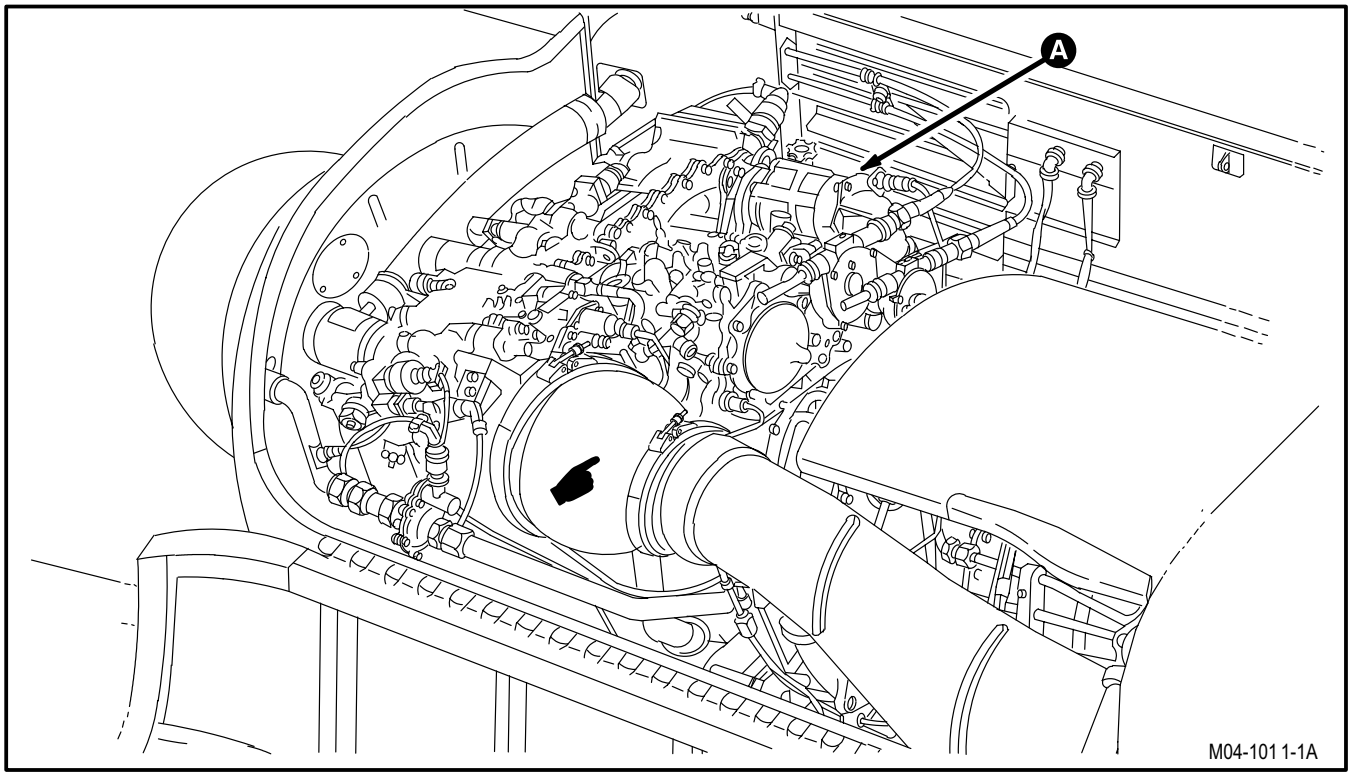
Gasket
Wire (item 226, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 opened |

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## 4.79. NO. 1 ENGINE REGULATING VALVE REMOVAL/INSTALLATION - continued

4.79.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot forward circuit breaker panel, open ENG START circuit breaker.**

c. **Detach connector P39 (1) from engine regulating valve receptacle L3 (2).**

(1) Remove lockwire.

d. **Remove wire harness support clamps (3) and (4) from engine regulating valve tube (5).**

(1) Remove nut (6) and washer (7) from screw (8).

(2) Remove screw (8) from clamps (3) and (4).

e. **Remove lower coupling (9) from regulating valve (10) and starter air tube (11).**

(1) Remove nut (12) from coupling (9).

(2) Remove coupling (9).

f. **Remove and discard insert (13) or gasket (14) from tube (11).**

g. **Remove upper coupling (15) from regulating valve (10) and starter (16).**

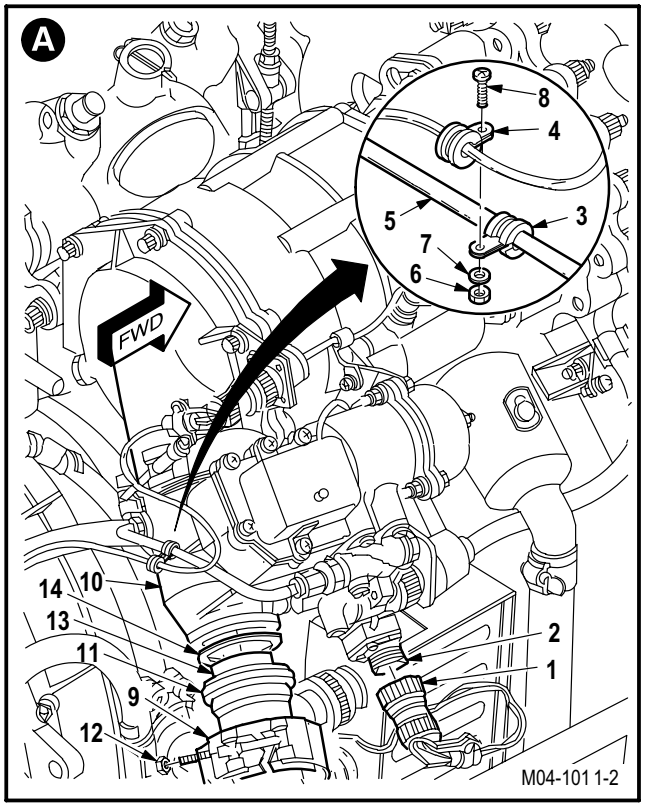
(1) Remove nut (17) from coupling (15).

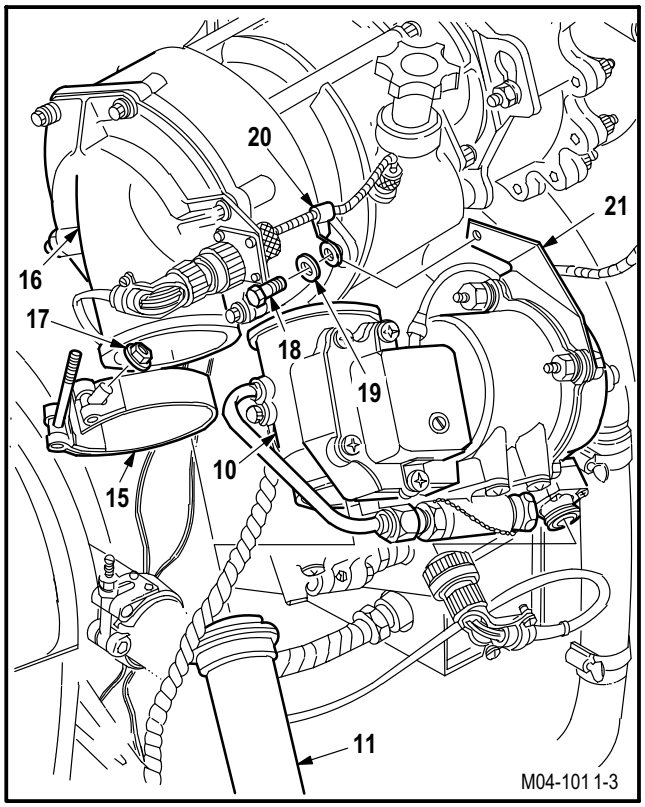
(2) Remove coupling (15).

h. **Remove regulating valve (10) from starter (16).**

(1) Remove bolt (18) and washer (19) from clamp (20), regulating valve support (21), and starter (16).

(2) Slide valve (10) clear of starter (16) and tube (11).

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## 4.79. NO. 1 ENGINE REGULATING VALVE REMOVAL/INSTALLATION - continued

4.79.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.79.5. Inspection

a. **Check starter flange for cracks.** None allowed.

b. **Check regulating valve and starter flange for corrosion** (para 1.49)**.**

d. **Check regulating valve for loose, missing, or damaged hardware.** None allowed.

e. **Check regulating valve for cracked or dented housings.** None allowed.

f. **Check regulating valve connector or receptacle for cracks, corrosion, and broken, bent, or damaged pins** (TM 55-1500-323-24)**.**

g. **Check regulating valve for stripped or damaged threads.** None allowed.

h. **Check identification plate for legibility, deformation, and security of attachment to housing.**

i. **Check solenoid case for damage.** None allowed.

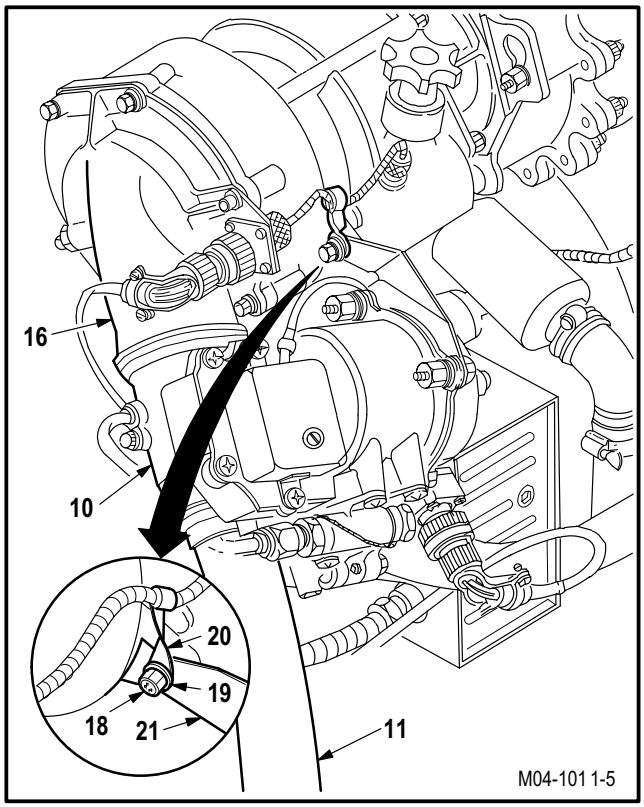
j. **Check starter connector or receptacle for cracks, corrosion, and broken, bent, or damaged pins** (TM 55-1500-323-24)**.**

4.79.6. Installation

a. **Install regulating valve (10) on starter (16).**

(1) Position regulating valve (10) between starter (16) and tube (11).

(2) Install bolt (18) through washer (19), clamp (20), and regulating valve support (21) into starter (16).

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## 4.79. NO. 1 ENGINE REGULATING VALVE REMOVAL/INSTALLATION - continued

b. **Install upper coupling (15) on regulating valve (10) and starter (16).**

(1) Install nut (17) on coupling (15).

c. **Install lower coupling (9) on regulating valve (10) and tube (11).**

(1) Install gasket (14) between tube (11) and regulating valve (10).

(2) Install tube (11) on regulating valve (10).

(3) Position coupling (9) on regulating valve (10) and tube (11).

(4) Install nut (12) on coupling (9).

d. **Torque nut (17) to 25 INCH-POUNDS.** Use torque wrench.

e. **Torque nut (12) to 25 INCH-POUNDS.** Use torque wrench.

f. **Attach connector P39 (1) to regulating valve receptacle L3 (2).**

(1) Lockwire connector (1) to receptacle (2). Use wire (item 226, App F).

g. **Install wire harness support clamps (4) and (3) on engine regulating valve tube (5).**

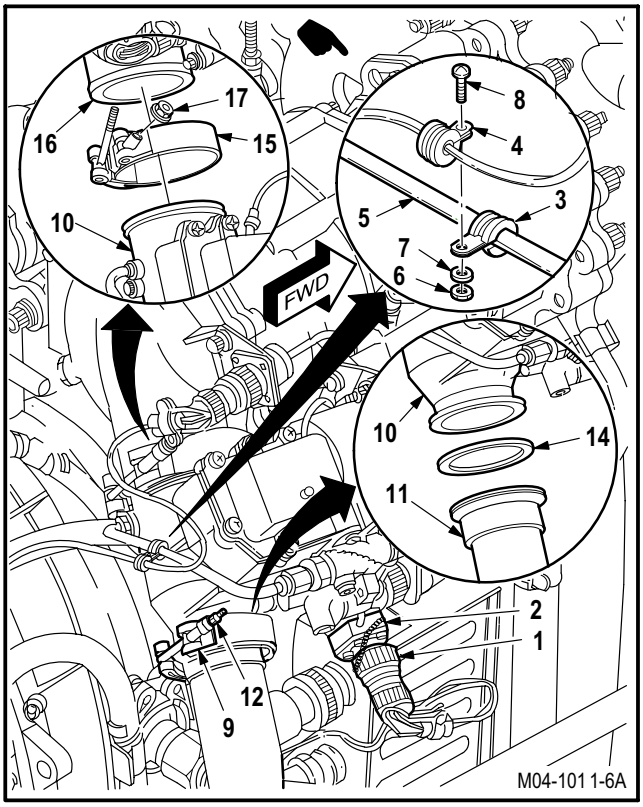
(1) Install screw (8) through clamps (4) and (3).

(2) Install washer (7) and nut (6) on screw (8).

h. **Inspect (QA).**

i. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

j. **Secure access door LN1** (para 2.2)**.**




END OF TASK

## 4.80. NO. 2 ENGINE REGULATING VALVE REMOVAL/INSTALLATION

4.80.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.80.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

**Materials/Parts:**

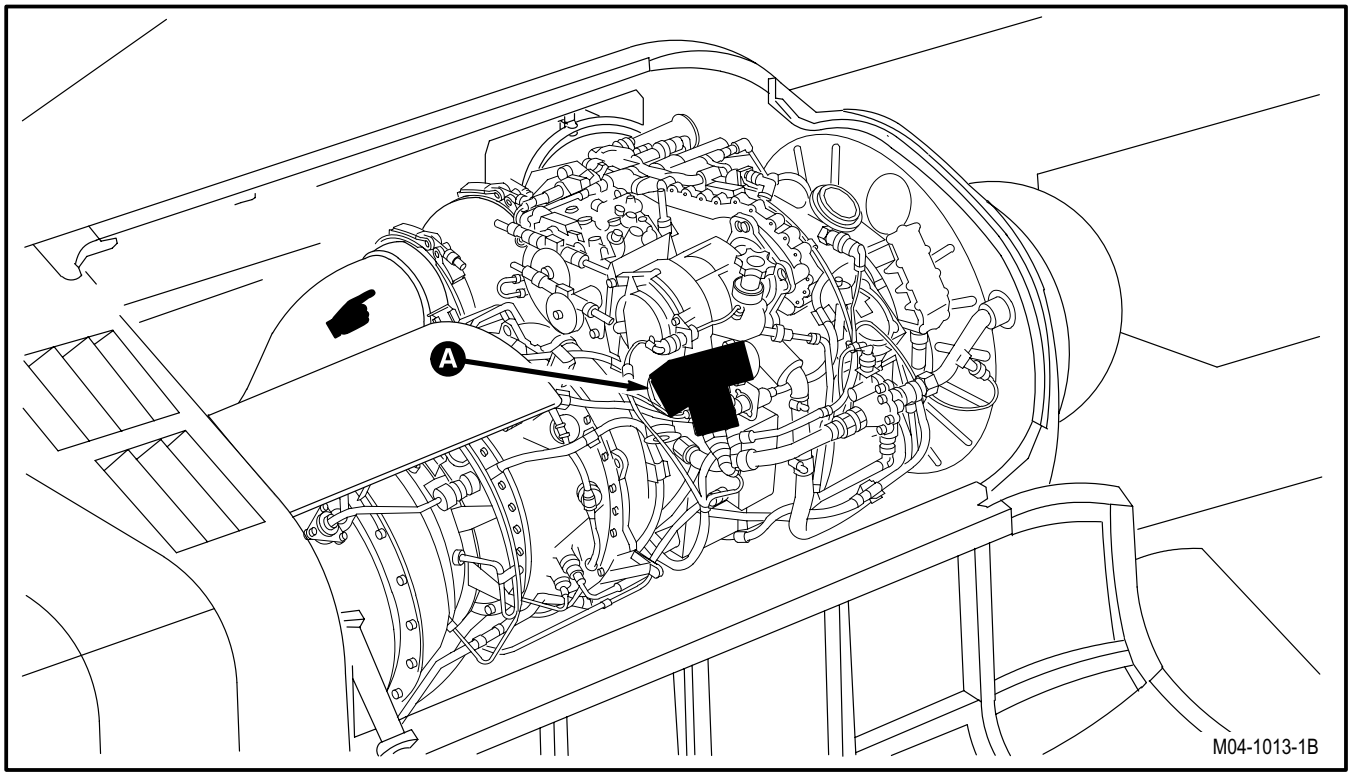
Gasket
Wire (item 226, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door RN1 opened |

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## 4.80. NO. 2 ENGINE REGULATING VALVE REMOVAL/INSTALLATION - continued

4.80.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot forward circuit breaker panel, open ENG START circuit breaker.**

c. **Detach connector P40 (1) from engine regulating valve receptacle L4 (2).**

(1) Remove lockwire.

d. **Remove wire harness support clamps (3) and (4) from engine regulating valve tube (5).**

(1) Remove nut (6) and washer (7) from screw (8).

(2) Remove screw (8) from clamps (3) and (4).

e. **Remove lower coupling (9) from engine regulating valve (10) and starter air tube (11).**

(1) Remove nut (12) from coupling (9).

(2) Remove coupling (9).

f. **Remove insert (13) or gasket (14) from tube (11) and discard.**

g. **Remove upper coupling (15) from regulating valve (10) and starter (16).**

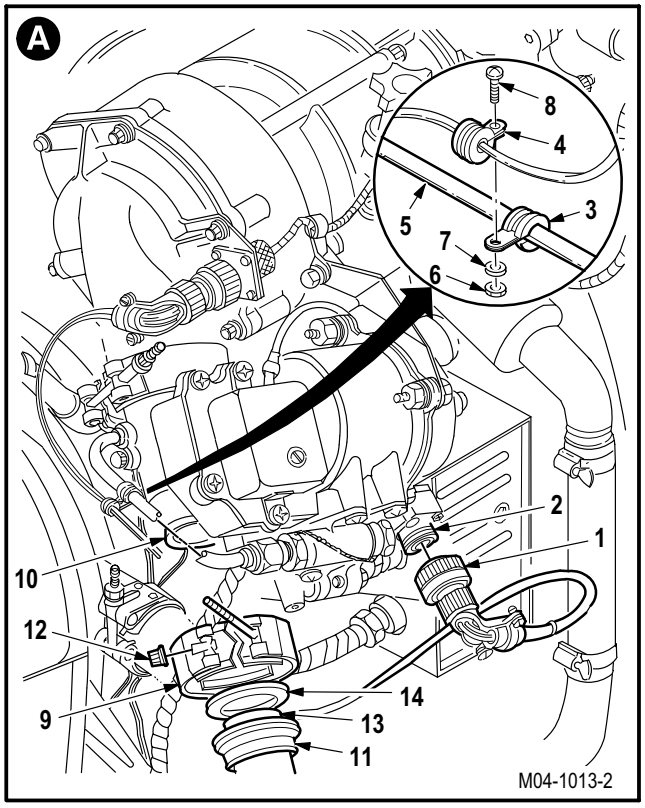
(1) Remove nut (17) from coupling (15).

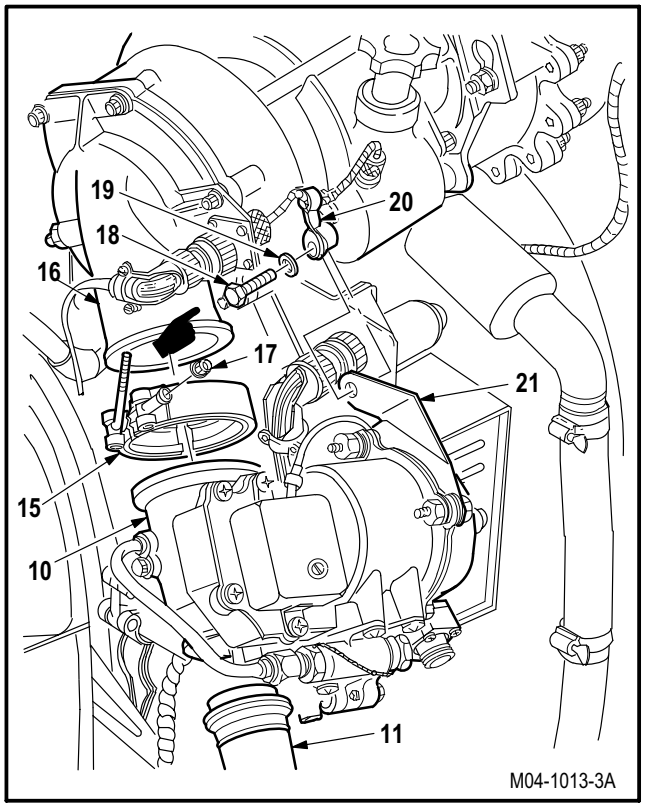
(2) Remove coupling (15).

h. **Remove regulating valve (10) from starter (16).**

(1) Remove bolt (18) and washer (19) from clamp (20), valve support (21), and starter (16).

(2) Slide valve (10) clear of starter (16) and tube (11).

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## 4.80. NO. 2 ENGINE REGULATING VALVE REMOVAL/INSTALLATION - continued

4.80.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.80.5. Inspection

a. **Check starter flange for cracks.** None allowed.

b. **Check regulating valve and starter flange for corrosion** (para 1.49)**.**

d. **Check regulating valve for loose, missing, or damaged hardware.** None allowed.

e. **Check regulator valve for cracked or dented housings.** None allowed.

f. **Check regulating valve connector and receptacle for cracks, corrosion, and broken, bent, or damaged pins** (TM 55-1500-323-24)**.**

g. **Check regulating valve for stripped or damaged threads.** None allowed.

h. **Check identification plate for legibility, deformation, and security of attachment to housing.**

i. **Check solenoid case for damage.** None allowed.

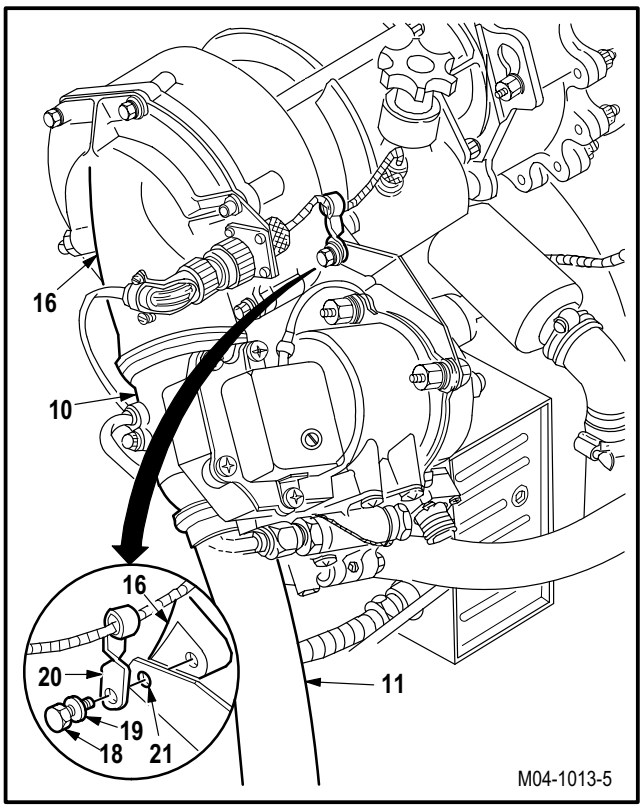
d. **Check starter connector and receptacle for cracks, corrosion, and broken, bent, or damaged pins** (TM 55-1500-323-24)**.**

4.80.6. Installation

a. **Install valve (10) on starter (16).**

(1) Position valve (10) between starter (16) and tube (11).

(2) Install bolt (18) through washer (19), clamp (20), and valve support (21) into starter (16).

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## 4.80. NO. 2 ENGINE REGULATING VALVE REMOVAL/INSTALLATION - continued

b. **Install upper coupling (15) on valve (10) and starter (16).**

(1) Install nut (17) on coupling (15).

c. **Install lower coupling (9) on valve (10) and tube (11).**

(1) Install new gasket (14) between tube (11) and valve (10).

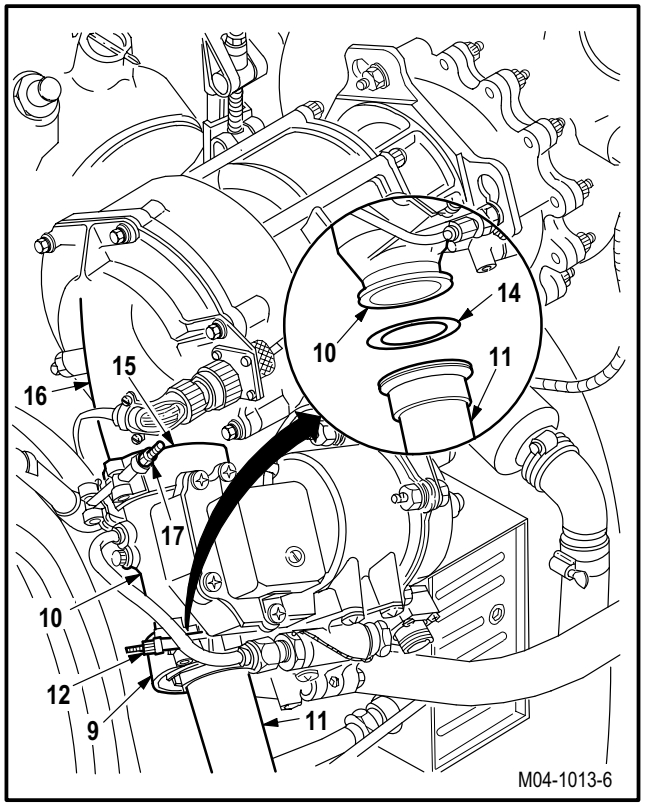
(2) Install tube (11) on valve (10).

(3) Position coupling (9) on valve (10) and tube (11).

(4) Install nut (12) on coupling (9).

d. **Torque nut (17) to 25 INCH-POUNDS.** Use torque wrench.

e. **Torque nut (12) to 25 INCH-POUNDS.** Use torque wrench.




f. **Attach connector P40 (1) to engine regulating valve receptacle L4 (2).**

(1) Lockwire connector (1) to receptacle (2). Use wire (item 226, App F).

g. **Install wire harness support clamp (4) and (3) on engine regulating valve tube (5).**

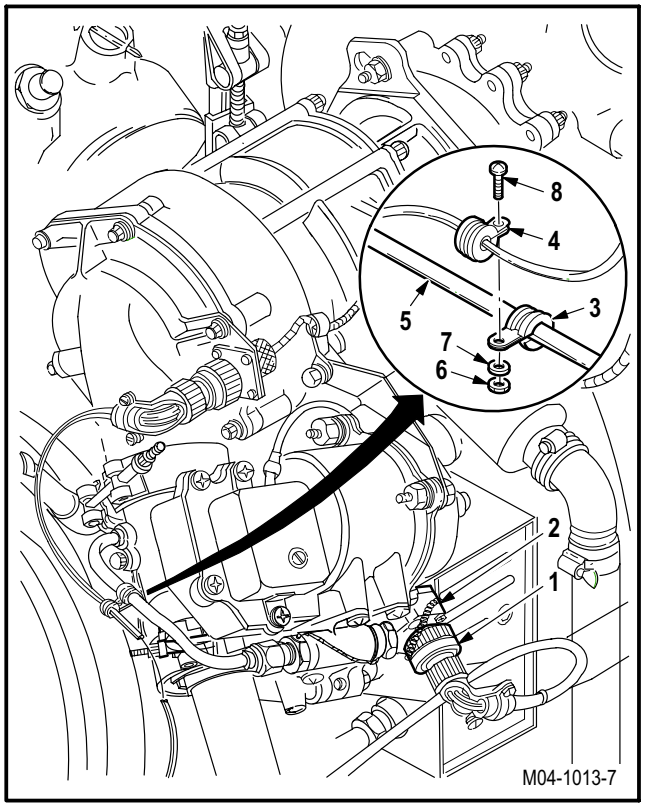
(1) Insert screw (8) through clamps (4) and (3).

(2) Install washer (7) and nut (6) on screw (8).

h. **Inspect (QA).**

i. **Perform power plant maintenance operational check (engine 2)** (TM 1-1520-238-T)**.**

j. **Secure access door RN1** (para 2.2)**.**




END OF TASK

## 4.81. NO. 1 ENGINE AIR STARTER REMOVAL/INSTALLATION

4.81.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.81.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**Materials/Parts:**

Packing (2)
Petrolatum (item 138, App F)

**Personnel Required:**

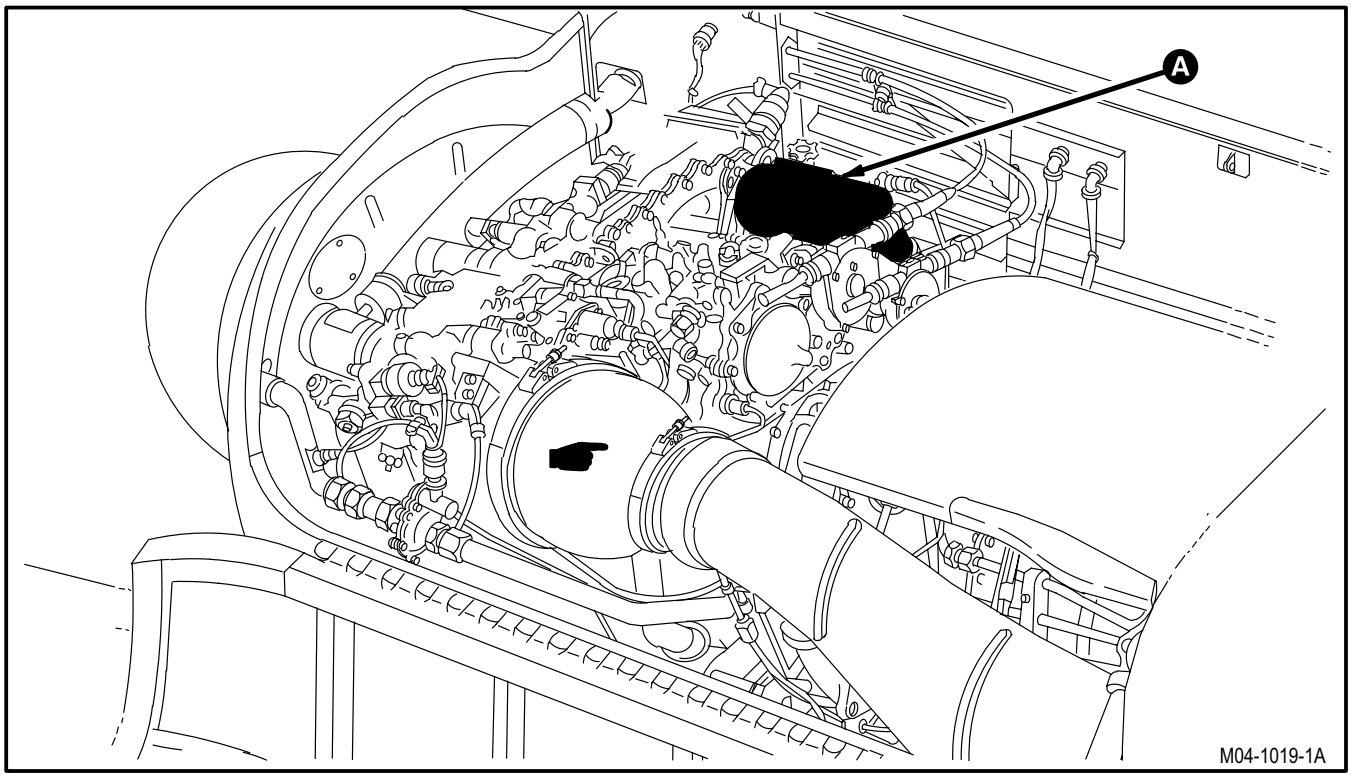
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 opened |
| 4.79 | No. 1 regulating valve removed |

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## 4.81. NO. 1 ENGINE AIR STARTER REMOVAL/INSTALLATION - continued

4.81.3. Removal

a. **Remove starter (1) from engine (2).**

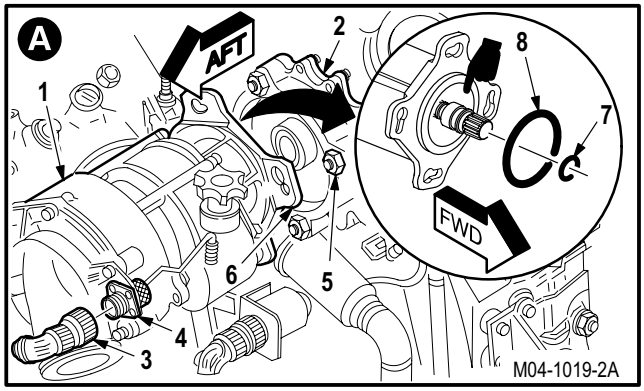
(1) Detach connector P35 (3) from receptacle A3 (4).

(2) Loosen four nuts (5). Do not remove nuts.

(3) Turn starter (1) clockwise until nuts (5) aline with slotted holes in flange (6).

(4) Pull starter (1) aft until clear of nuts (5).

(5) Remove and discard packings (7) and (8) from starter (1).




4.81.4. Cleaning

a. **Wipe starter mounting area with a clean rag.**

4.81.5. Inspection

a. **Check mounting area mating surface flange for nicks, burrs, and distortion.** None allowed.

b. **Check mating engine flange for nicks or scratches.** Maximum depth **0.015 INCH**. No cracks allowed.

c. **Check starter and starter mounting area for corrosion** (para 1.49)**.**

d. **Check starter oil filler cap spring feature for sticking or binding.** None allowed.

e. **Check starter filler cap for bent or broken pin.** None allowed.

f. **Check output shaft.**

(1) Check output shaft for separation. Replace (para 4.82A).

(2) Check for spalling, fretting, flaking, chipping, and splitting. Maximum depth allowable **0.003 INCH**.

GO TO NEXT PAGE

**4.81. NO. 1 ENGINE AIR STARTER REMOVAL/INSTALLATION - continued**

(3) Check for looseness. None allowed.

(4) Check for corrosion. Maximum depth allowable **0.003 INCH** (para 1.49).

(5) Check output spline for wear.

(a) Place two **0.0960 INCH** diameter pins 180 degrees apart on spline.

(b) Measure outside diameter over two pins, diameter shall be between **0.7347** and **0.7365 INCH**. Replace (para 4.82A). Use caliper set.

(6) Check output shaft spline for bare metal spots in dry film lubricant. None allowed.

(7) Check for distortion. None allowed.

g. **Check starter for evidence of leaking.** None allowed.

h. **Check starter for loose, damaged, or missing hardware.** None allowed.

i. **Check starter housing for dents or cracks.** None allowed.

j. **Check mount flanges for scoring or deformation.** None allowed.

k. **Check connector for damaged, bent, or broken pins.** None allowed.

l. **Check identification plate for legibility, deformation, and security of attachment to housing.**

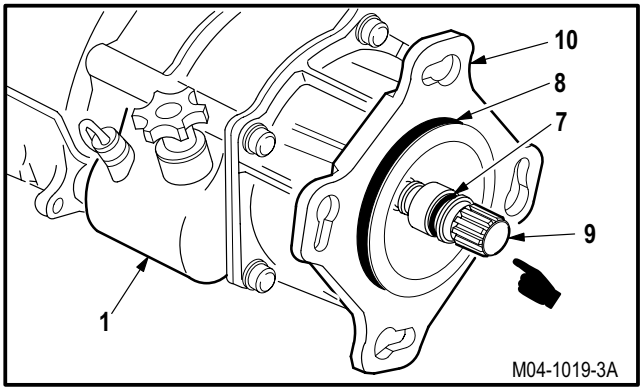
4.81.6. Installation

a. **Install two new packings (7) and (8) on starter (1).**

(1) Lubricate packings (7) and (8). Use petrolatum (item 138, App F).

(2) Install packing (7) on starter shaft (9).

(3) Install packing (8) on starter flange (10).

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**4.81. NO. 1 ENGINE AIR STARTER REMOVAL/INSTALLATION - continued**

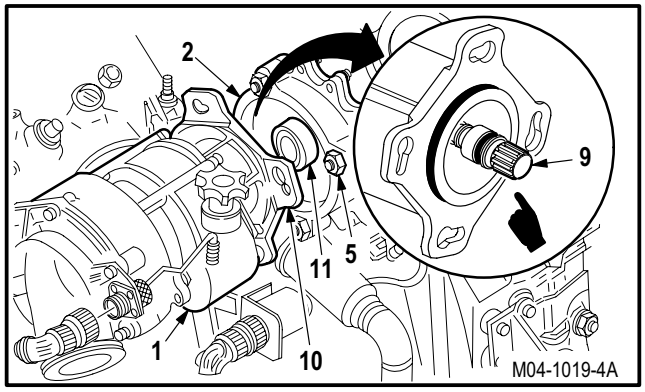
b. **Install starter (1) on engine (2).** Torque four nuts (5) to **120 INCH-POUNDS**.

(1) Aline starter shaft spline (9) with starter drive spline (11).

(2) Aline slotted holes in flange (10) with nuts (5).

(3) Position starter (1) in place on engine (2). Turn starter (1) counterclockwise to seat.

(4) Torque four nuts (5) to **120 INCH-POUNDS**. Use torque wrench.



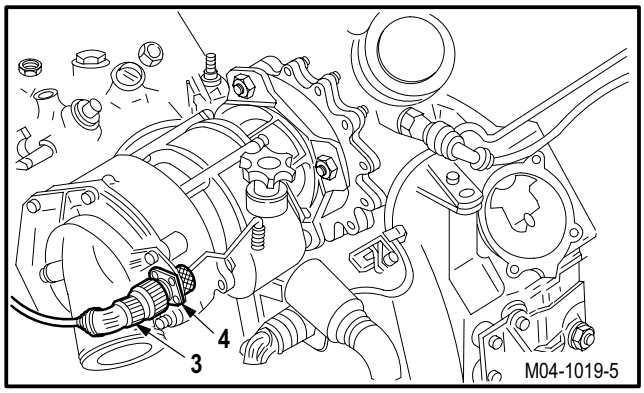

c. **Attach connector P35 (3) to starter receptacle A3 (4).**

d. **Inspect (QA).**

e. **Install No. 1 engine regulating valve** (para 4.79)**.**

f. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

g. **Secure access door LN1** (para 2.2)**.**




END OF TASK

## 4.82. NO. 2 ENGINE AIR STARTER REMOVAL/INSTALLATION

4.82.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.82.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**Materials/Parts:**

Packing (2)
Petrolatum (item 138, App F)

**Personnel Required:**

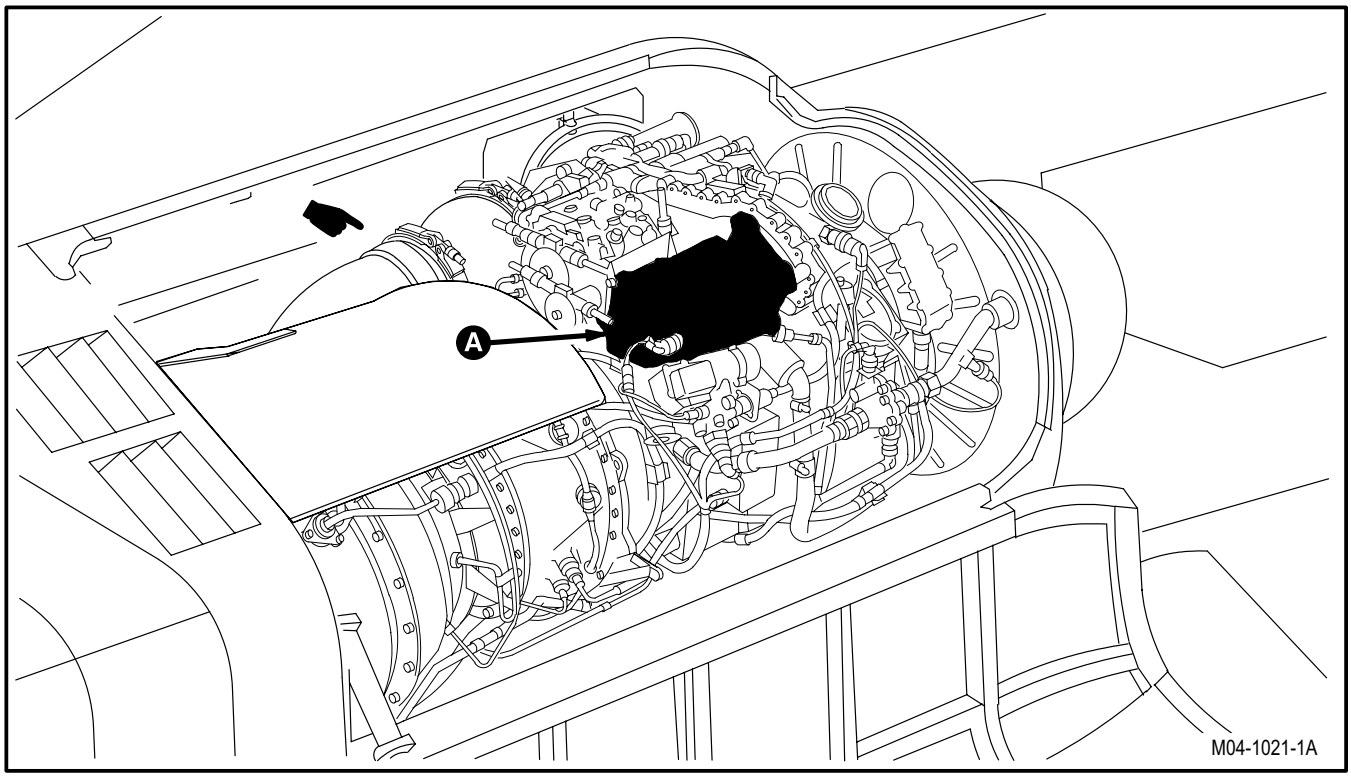
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door RN1 opened |
| 4.80 | No. 2 engine regulating valve removed |

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## 4.82. NO. 2 ENGINE AIR STARTER REMOVAL/INSTALLATION - continued

4.82.3. Removal

a. **Remove starter (1) from engine (2).**

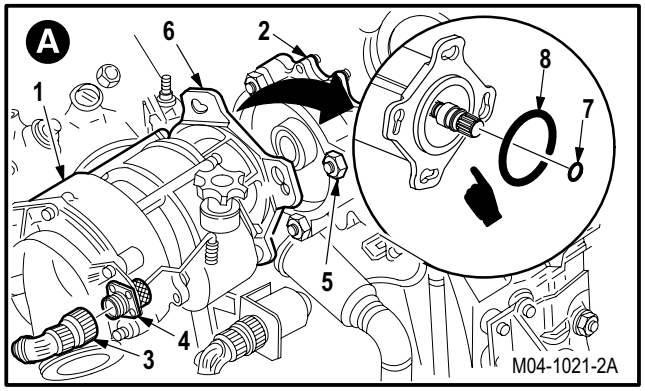
(1) Detach connector P36 (3) from receptacle A4 (4).

(2) Loosen four nuts (5). Do not remove nuts.

(3) Turn starter (1) clockwise until nuts (5) aline with slotted holes in flange (6).

(4) Pull starter (1) aft until clear of nuts (5).

(5) Remove and discard packings (7) and (8) from starter (1).




4.82.4. Cleaning

a. **Wipe starter mounting area with a clean rag.**

4.82.5. Inspection

a. **Check mounting area mating surface flange for nicks, burrs, and distortion.** None allowed.

b. **Check mating engine flange for nicks or scratches.** Maximum depth **0.015 INCH**. No cracks allowed.

c. **Check starter and starter mounting area for corrosion** (para 1.49)**.**

d. **Check starter oil filler cap spring feature for sticking or binding.** None allowed.

e. **Check starter filler cap for bent or broken pin.** None allowed.

f. **Check output shaft.**

(1) Check output shaft for separation. Replace (para 4.82A).

(2) Check for spalling, fretting, flaking, chipping, and splitting. Maximum depth allowable **0.003 INCH**.

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**4.82. NO. 2 ENGINE AIR STARTER REMOVAL/INSTALLATION - continued**

(3) Check for looseness. None allowed.

(4) Check for corrosion. Maximum depth allowable **0.003 INCH** (para 1.49).

(5) Check output spline for wear.

(a) Place two **0.0960 INCH** diameter pins 180 degrees apart on spline.

(b) Measure outside diameter over two pins, diameter shall be between **0.7347** and **0.7365 INCH**. Replace (para 4.82A). Use caliper set.

(6) Check output shaft spline for bare metal spots in dry film lubricant. None allowed.

(7) Check for distortion. None allowed.

g. **Check starter for evidence of leaking.** None allowed.

h. **Check starter for loose, damaged, or missing hardware.** None allowed.

i. **Check starter housing for dents or cracks.** None allowed.

j. **Check mount flanges for scoring or deformation.** None allowed.

k. **Check connector for damaged, bent, or broken pins.** None allowed.

l. **Check identification plate for legibility, deformation, and security of attachment to housing.**

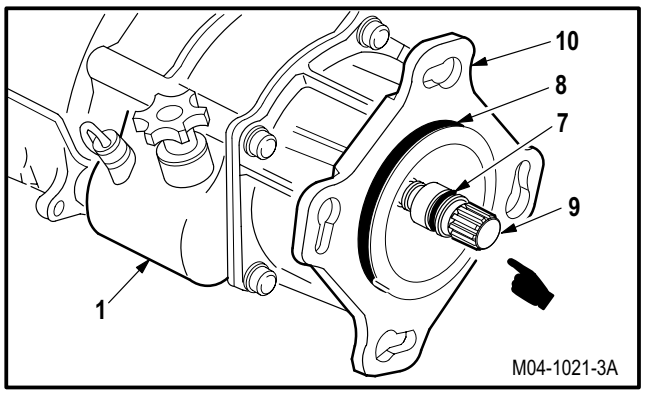
4.82.6. Installation

a. **Install new packings (7) and (8) on starter (1).**

(1) Lubricate new packings (7) and (8). Use petrolatum (item 138, App F).

(2) Install packing (7) on starter shaft (9).

(3) Install packing (8) on starter flange (10).

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**4.82. NO. 2 ENGINE AIR STARTER REMOVAL/INSTALLATION - continued**

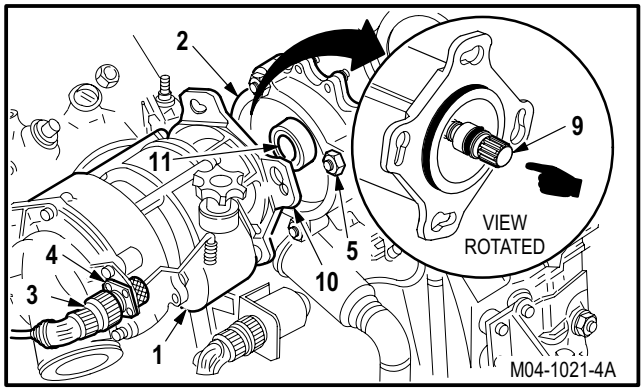
b. **Install starter (1) on engine (2).** Torque four nuts (5) to **120 INCH-POUNDS**.

(1) Aline starter shaft spline (9) with starter drive spline (11).

(2) Aline slotted holes in flange (10) with nuts (5).

(3) Position starter (1) in place on engine (2). Turn starter (1) counterclockwise to seat.

(4) Torque four nuts (5) to **120 INCH-POUNDS**. Use torque wrench.




c. **Attach connector P36 (3) to starter receptacle A4 (4).**

d. **Inspect (QA).**

e. **Install No. 2 engine regulating valve** (para 4.80)**.**

f. **Perform power plants maintenance operational check (engine 2)** (TM 1-1520-238-T)**.**

g. **Secure access door RN1** (para 2.2)**.**

END OF TASK

## 4.82A. ENGINE AIR STARTER OUTPUT SHAFT REPLACEMENT

4.82A.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.82A.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Materials/Parts:**

Packing
Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.81 | No. 1 engine air starter removed |
| | or |
| 4.82 | No. 2 engine air starter removed |

4.82A.3. Removal

**NOTE**

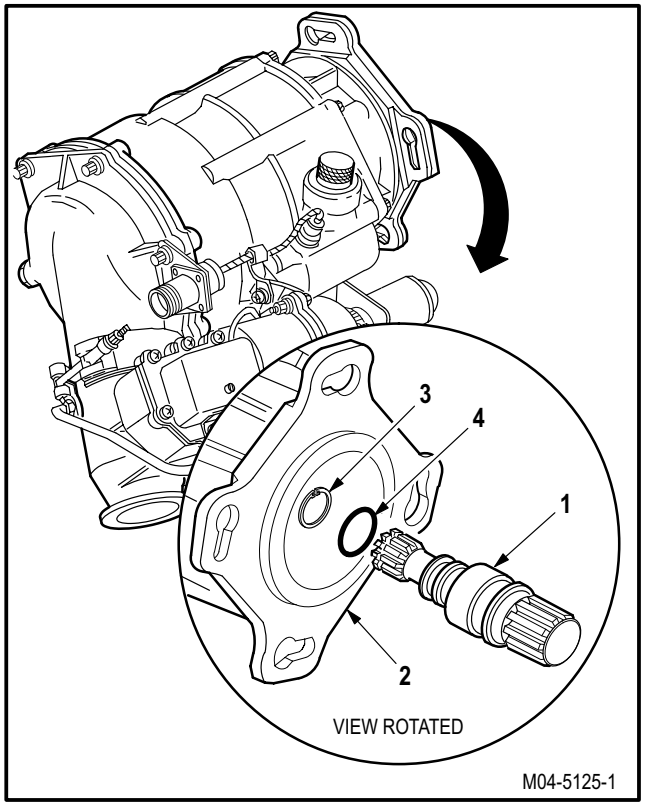
This task is typical for No. 1 or No. 2 engine air starter output shaft.

a. **Remove output shaft (1) from engine air starter (2).**

(1) Using two large flat tip screw drivers, remove shaft (1).

(2) Remove and retain retaining ring (3).

(3) Remove and discard packing (4) from shaft (1).

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## 4.82A. ENGINE AIR STARTER OUTPUT SHAFT REPLACEMENT - continued

4.82A.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.82A.5. Inspection

a. **Check engine air starter output shaft mounting area for corrosion** (para 1.49)**.**

b. **Check engine air starter output shaft mounting area for cracks.** None allowed.

c. **Check removed and attaching parts for damage.** None allowed.

4.82A.6. Installation

a. **Install new packing (4) on new output shaft (1).**

(1) Lubricate packing (4). Use petrolatum (item 138, App F).

(2) Install packing (4) on shaft (1).

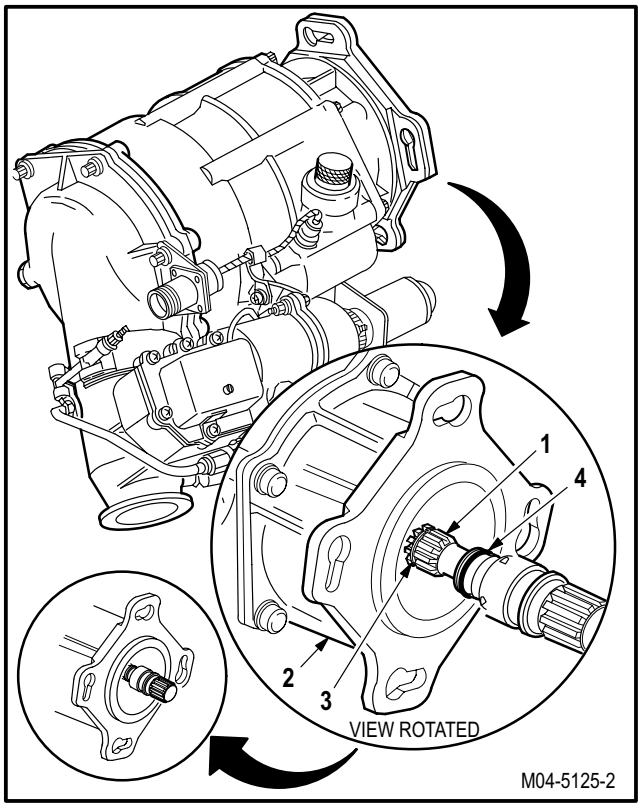
b. **Install output shaft (1) in engine air starter (2).**

(1) Install retaining ring (3) on shaft (1).

(2) Install shaft (1) in starter (2) until retaining ring (3) locks shaft (1) in starter (2).

c. **Inspect (QA).**

d. **Install No. 1 engine air starter** (para 4.81) **or No. 2 engine air starter** (para 4.82)**.**




END OF TASK

## 4.83. ENGINE AIR INLET ASSEMBLY SEAL REPLACEMENT

4.83.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.83.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23

**Materials/Parts:**

Adhesive (item 7, App F)
Adhesive (item 15, App F)
Epoxy primer coating kit (item 78, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.15 | No. 1 and No. 2 engine air inlet removed |

**NOTE**

This task is typical for both No. 1 or No. 2 engine air inlet assemblies.

4.83.3. Disassembly

a. **Remove seals (1), (2), and (3) from air inlet assembly (4).**

(1) Loosen end of seal (1) with a putty knife.

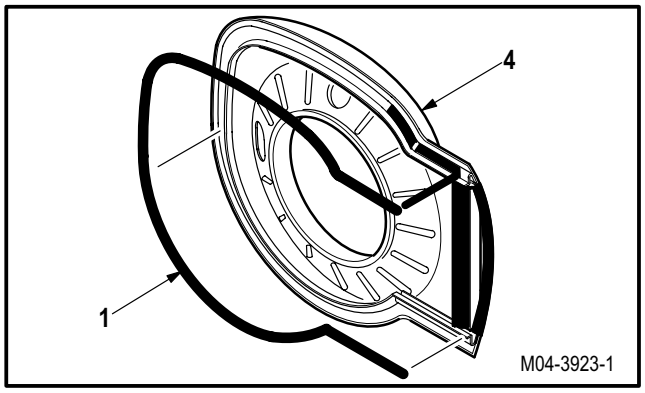
(2) Pull seal (1) free of air inlet (4).

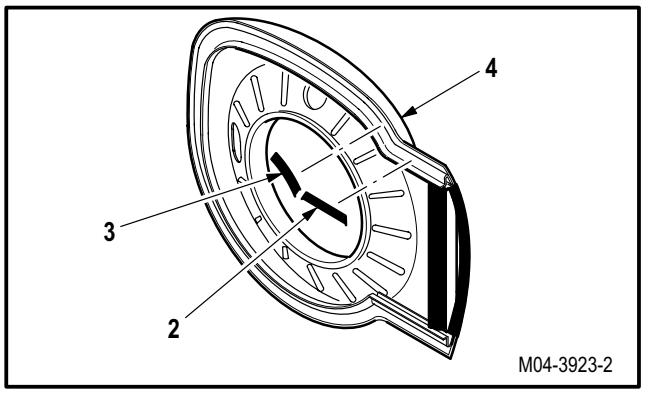
(3) Discard seal (1).

(4) Loosen ends of seals (2) and (3) with a putty knife.

(5) Pull seals (2) and (3) free of air inlet (4).

(6) Discard seals (2) and (3).

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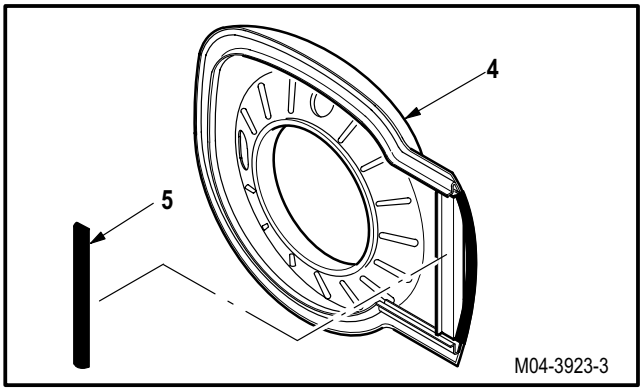
## 4.83. ENGINE AIR INLET ASSEMBLY SEAL REPLACEMENT - continued

b. **Remove seal (5) from air inlet assembly (4).**

(1) Loosen end of seal (5) with a putty knife.

(2) Pull seal (5) free of air inlet (4)

(3) Discard seal (5).

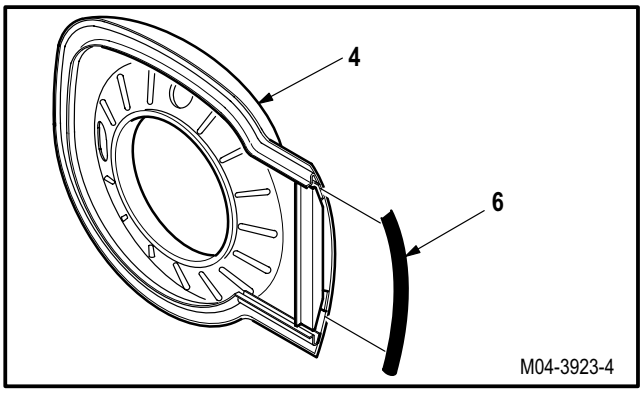



c. **Remove seal (6) from air inlet assembly (4).**

(1) Loosen end of seal (6) with a putty knife.

(2) Pull seal (6) free of air inlet (4).

(3) Discard seal (6).




4.83.4. Cleaning

a. **Remove old adhesive from seal attachment area** (para 1.47)**.**

4.83.5. Inspection

a. **Check air inlet for dents** (para 4.2)**.**

b. **Check inlet for cracks** (para 4.2)**.** All cracks must be repaired (TM 1-1500-204-23).

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## 4.83. ENGINE AIR INLET ASSEMBLY SEAL REPLACEMENT - continued

4.83.6. Assembly

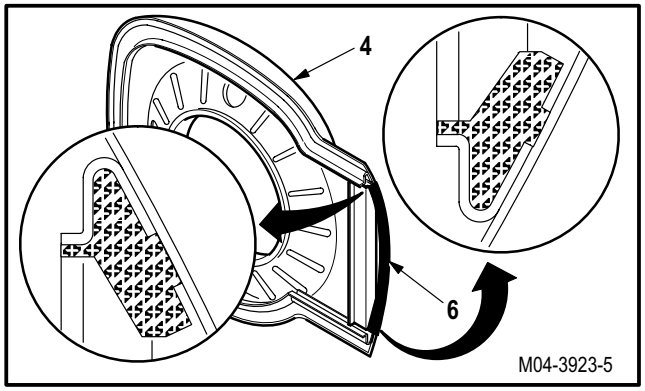
a. **Install new seal (6) on air inlet (4).**

(1) Apply primer to air inlet (4) (TM 1-1500-204-23). Use epoxy primer coating kit (item 78, App F).

(2) Bond seal (6) to air inlet (4). Use adhesive (item 7, App F) (TM 1-1500-204-23).

(3) Fill voids along both edges of seal (6). Use adhesive (item 15, App F) (TM 1-1500-204-23).

(4) Fill voids at both ends of seal (6). Use adhesive (item 15, App F) (TM 1-1500-204-23).



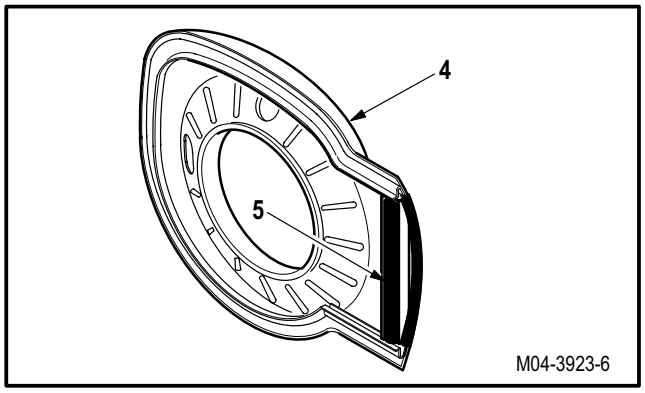

b. **Inspect (QA).**

c. **Install new seal (5) on air inlet (4).**

(1) Apply primer to air inlet (4) (TM 1-1500-204-23). Use epoxy primer coating kit (item 78, App F).

(2) Bond seal (5) to air inlet (4). Use adhesive (item 7, App F) (TM 1-1500-204-23).

(3) Fill void along both edges of seal (5). Use adhesive (item 15, App F) (TM 1-1500-204-23).




d. **Inspect (QA).**

GO TO NEXT PAGE

## 4.83. ENGINE AIR INLET ASSEMBLY SEAL REPLACEMENT - continued

e. **Install new seals (3), (2), and (1) on air inlet (4).**

(1) Apply primer to air inlet (4) (TM 1-1500-204-23). Use epoxy primer coating kit (item 78, App F).

(2) Bond seal (3) to air inlet (4). Use adhesive (item 7, App F) (TM 1-1500-204-23).

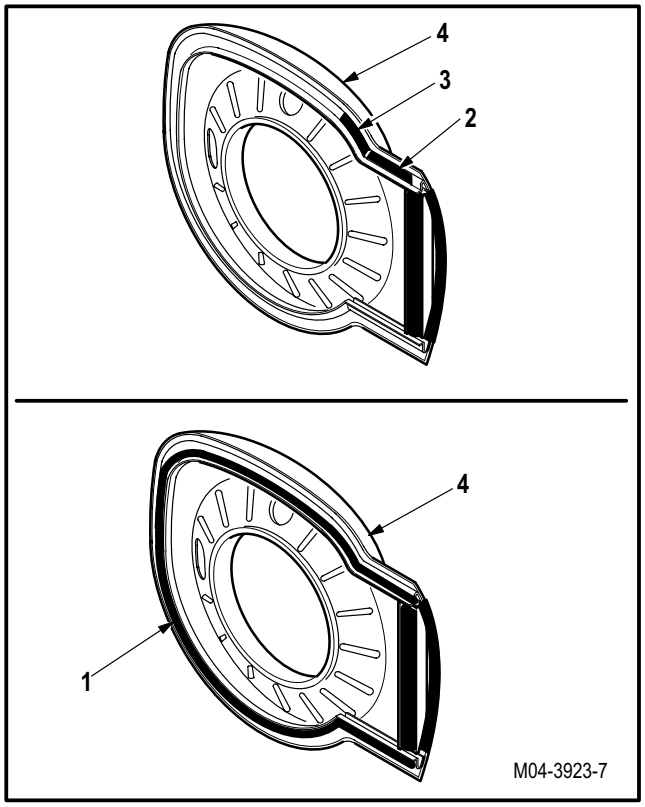
(3) Bond seal (2) to air inlet (4). Use adhesive (item 7, App F) (TM 1-1500-204-23).

(4) Bond seal (1) to air inlet (4). Use adhesive (item 7, App F) (TM 1-1500-204-23).

(5) Fill void along both edges of seal (1). Use adhesive (item 15, App F) (TM 1-1500-204-23).

f. **Inspect (QA).**

g. **Install No. 1 or No. 2 engine air inlet** (para 4.45)**.**




END OF TASK

# SECTION IV. NACELLES MAINTENANCE

## 4.84. NO. 1 OR NO. 2 FORWARD ENGINE MOUNT SUPPORT REMOVAL/INSTALLATION

4.84.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.84.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

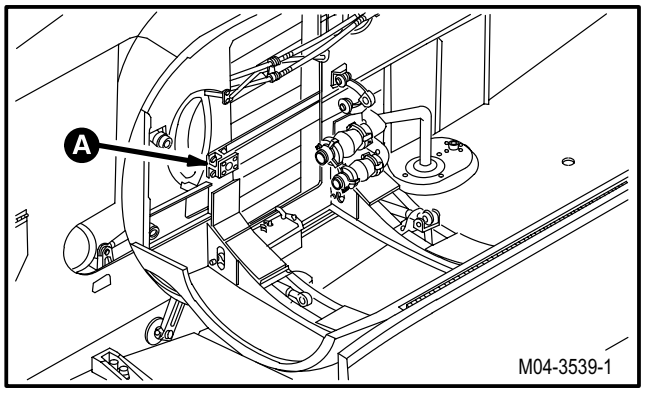
68B Aircraft Powerplant Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |

**NOTE**

This task is typical for No. 1 or No. 2 forward engine mount removal.



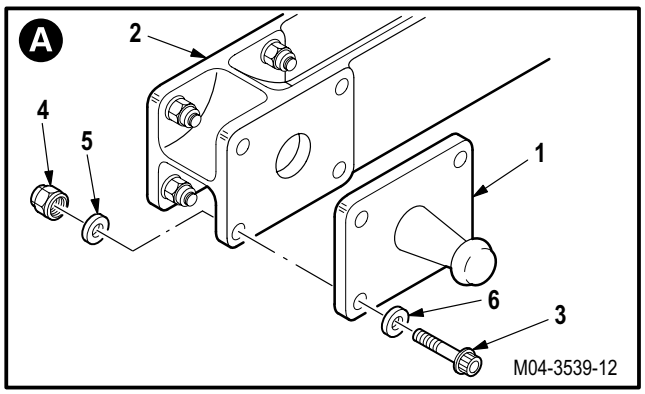

4.84.3. Removal

a. **Remove forward engine support mount (1) from nacelle (2).**

(1) Hold four bolts (3). Remove four nuts (4) and flat washers (5) from bolts (3).

(2) Remove four bolts (3) and recessed washers (6).

(3) Remove support mount (1).

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## 4.84. NO. 1 OR NO. 2 FORWARD ENGINE SUPPORT MOUNT REMOVAL/INSTALLATION - continued

4.84.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag** (para 1.47)**.**

4.84.5. Inspection

a. **Check support mount, attaching area, and hardware for cracks or damage** (para 4.2)**.**

b. **Check support mount and attaching area for corrosion** (para 1.49)**.**

4.84.6. Installation

a. **Install support mount (1) on nacelle (2).**

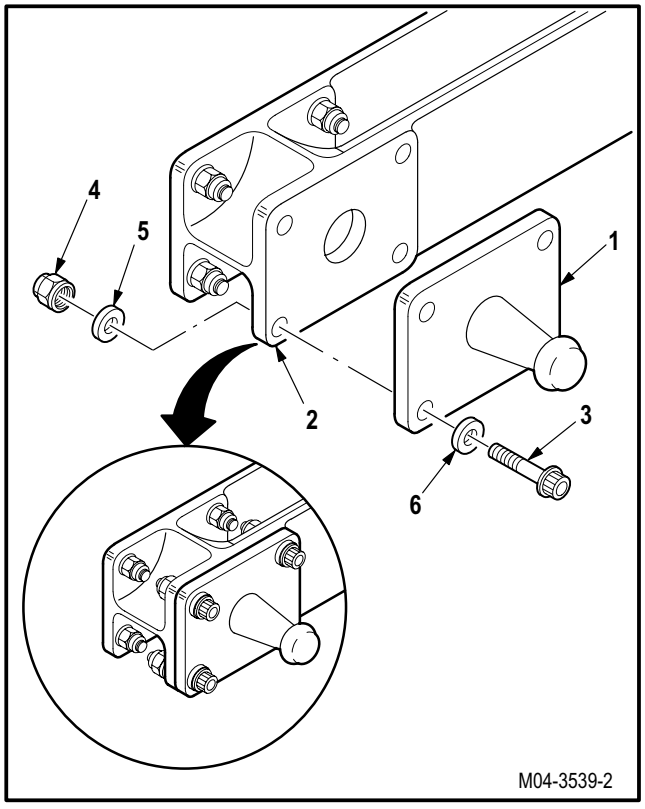
(1) Position support mount (1) in nacelle (2).

(2) Install four bolts (3) through recessed washers (6), mount (1), and nacelle (2).

(3) Install four flat washers (5) and nuts (4) on bolts (3).

b. **Inspect (QA).**

c. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**




END OF TASK

## 4.85. NO. 1 OR NO. 2 AFT ENGINE MOUNT SUPPORT REMOVAL/INSTALLATION

4.85.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.85.2. Initial setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

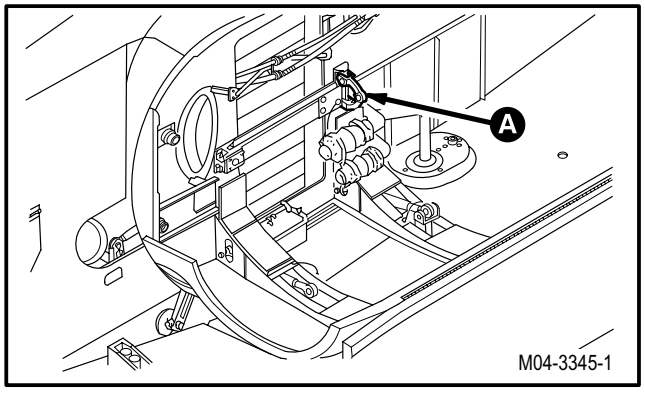
TM 1-1500-204-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |
| 4.77 | No. 1 engine air duct removed or |
| 4.78 | No. 2 engine air duct removed |

**NOTE**

This task is typical for left or right aft engine mount support.

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## 4.85. NO. 1 OR NO. 2 AFT ENGINE MOUNT SUPPORT REMOVAL/INSTALLATION - continued

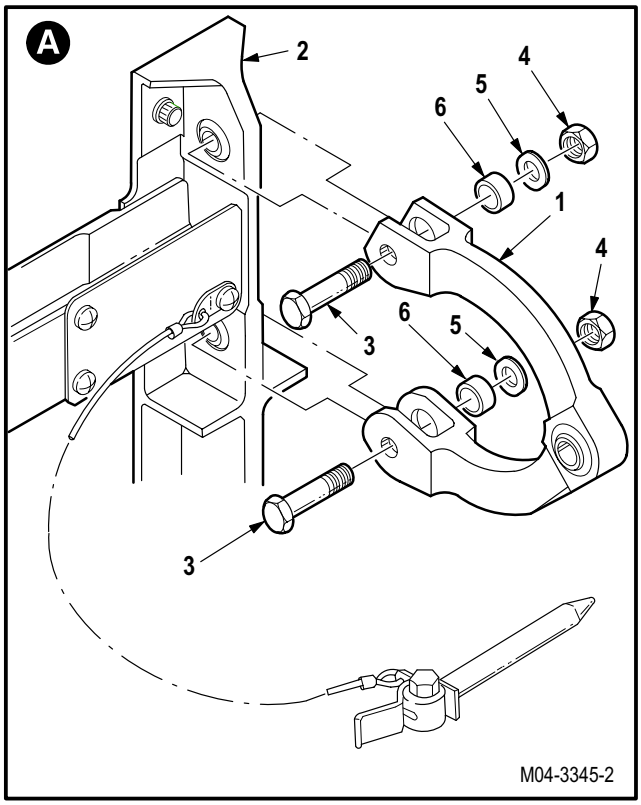
4.85.3. Removal

a. **Remove aft engine mount support (1) from nacelle (2).**

(1) Hold two bolts (3). Remove two nuts (4) and washers (5).

(2) Remove two bolts (3) and bushings (6).

(3) Remove mount (1).




4.85.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag** (para 1.47)**.**

4.85.5. Inspection

a. **Check engine support pin for cracks.** None allowed.

b. **Check pin for corrosion** (para 1.49)**.**

c. **Check pin holes for elongation and surface damage.** None allowed.

d. **Check engine mount for dents.**

(1) Maximum allowable depth is 10 percent of material thickness.

(2) Edge dents maximum allowable depth is **0.100 INCH**.

e. **Check engine mount bearing.**

(1) Maximum allowable radial play is **0.008 INCH**. Replace bearing (para 4.85A).

(2) Check bearing for looseness. None allowed. Replace bearing (para 4.85A).

4.85.6. Repair

a. **All allowable damage to be blended out** (TM 1-1500-204-23)**.**

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## 4.85. NO. 1 OR NO. 2 AFT ENGINE MOUNT SUPPORT REMOVAL/INSTALLATION - continued

4.85.7. Installation

a. **Install mount (1) on nacelle (2).**

(1) Aline holes (7) of mount (1) with holes (8) on nacelle (2).

(2) Install two bolts (3) through mount (1) and nacelle (2).

(3) Install two bushings (6) washers (5) and nuts (4) on bolts (3).

b. **Torque two nuts (4) to 75 INCH-POUNDS.**

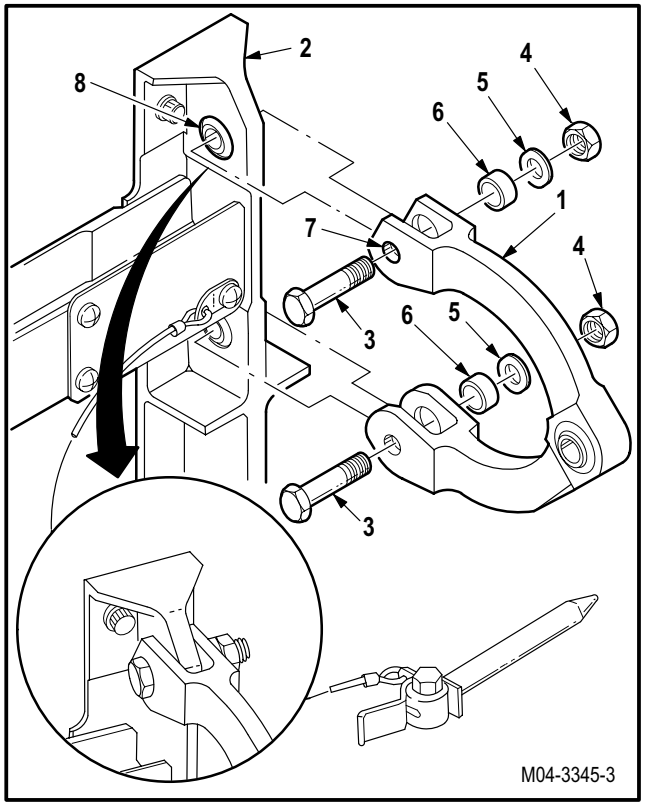
(1) Hold two bolts (3).

(2) Torque two nuts (4) to **75 INCH-POUNDS**. Use torque wrench.

c. **Inspect (QA).**

d. **Install No. 1 engine air duct** (para 4.77) **or No. 2 engine air duct** (para 4.78)**.**

e. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**




END OF TASK

## 4.85A. NO. 1 OR NO. 2 AFT ENGINE MOUNT SUPPORT BEARING REPLACEMENT (AVIM)

4.85A.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.85A.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
0.6300 - 1.0000-inch cylinder gage (item 142, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Electric gun type heater (item 163, App H)
2-ton hydraulic hand operated arbor press (item 235, App H)
Universal puller kit (item 241, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

Brush (item 34, App F)
Carbon dioxide (item 40, App F)
Primer coating (item 147, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23
TM 55-1500-322-24

**Equipment Conditions:**

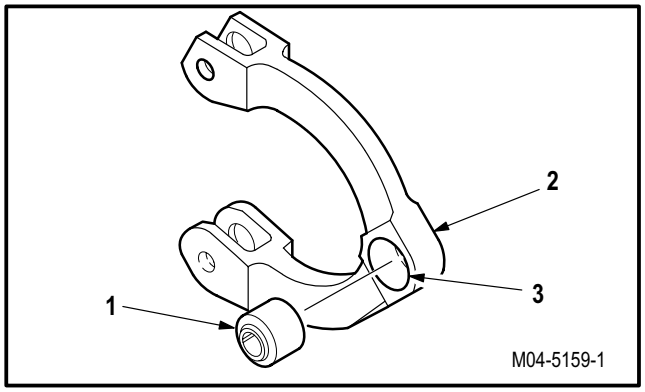
| Ref | Condition |
|---|---|
| 4.85 | No. 1 or No. 2 aft engine mount support removed |

**NOTE**

This task is typical for No. 1 or No. 2 aft engine mount support bearing.

4.85A.3. Removal

a. **Remove and discard bearing (1) from engine mount (2) mating bore (3).** Use puller kit (TM 55-1500-322-24).




4.85A.4. Cleaning

a. **Clean mount** (para 1.47)**.**

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**4.85A. NO. 1 OR NO. 2 AFT ENGINE MOUNT SUPPORT BEARING REPLACEMENT (AVIM) - continued**

4.85A.5. Inspection

a. **Check mount for cracks.** None allowed.

d. **Check engine mount for dents.**

(1) Maximum allowable depth is 10 percent of material thickness.

(2) Edge dents maximum allowable depth is **0.100 INCH**.

c. **Check mount for corrosion** (para 1.49)**.**

d. **Measure ID of mating bore.**

(1) Diameter allowable **0.8113 to 0.8118 INCH**. Use cylinder gage and caliper set.

4.85A.6. Installation

**WARNING**

- **Frostbite or freezing of tissue can occur from improper handling of chilled parts. If a burning sensation is felt, seek medical aid.**
- **Do not use heater or oven near flammables. Fatal explosions may result. Handling hot items presents a serious burn potential. Post warning signs in work area to alert people to high temperature items. If burns occur seek medical aid.**
- **Use proper protective gloves because of extreme temperature involved.**

**CAUTION**

- Do not freeze bearing below -**321** °**F (-196** °**C)**.
- Do not heat ferrous parts over **350** °**F (177** °**C)**.
- Do not allow compounds to enter bearing. Bearing may be damaged.
- Installation by arbor press should be avoided.

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**4.85A. NO. 1 OR NO. 2 AFT ENGINE MOUNT SUPPORT BEARING REPLACEMENT (AVIM) - continued**

a. **Install new bearing (1) in mount (2) bore (3).**

(1) Place bearing (1) in carbon dioxide. Use carbon dioxide (item 40, App F) (dry ice).

(2) If necessary, heat mount (2). Use heater.

(3) Apply primer in bore (3). Use primer coating (item 147, App F) and brush (item 34, App F).

**NOTE**

Installation of bearing shall be accomplished using finger pressure only.

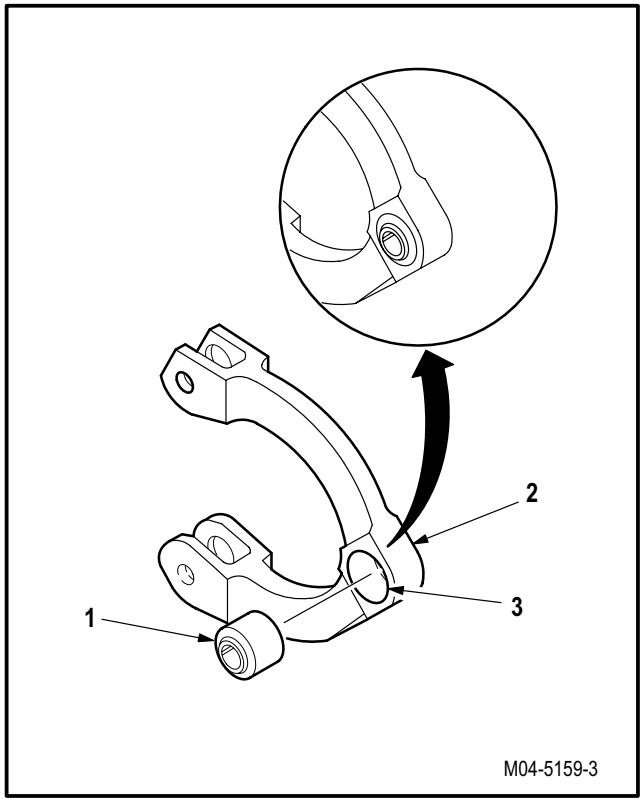
(4) Install frozen bearing (1) manually in bore (3) while primer is still wet (TM 55-1500-322-24).

(5) Apply primer around bore (3) and bearing (1) to form a fillet seal. Use primer coating (item 147, App F) and brush (item 34, App F).

(6) Allow bearing (1) and bore (3) to return to room temperature.

(7) Apply finger pressure to verify bearing (1) does not move.

(8) Ensure ball is free in outer race.




b. **Ring Stake Bearing (1) in bore (3).** Use staking tool.

c. **Inspect (QA).**

d. **Install No. 1 or No. 2 aft engine mount support** (para 4.85)**.**

END OF TASK

## 4.86. ENGINE CONNECTING LINKS REMOVAL/INSTALLATION

4.86.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Adjustment. Installation.

4.86.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
30 - 200 inch-pound 1/4-inch drive click type torque wrench (item 436, App H)

**Materials/Parts:**

Cotter pin
Sealing compound (item 176, App F)
Wire (item 226, App F)

**Personnel Required:**

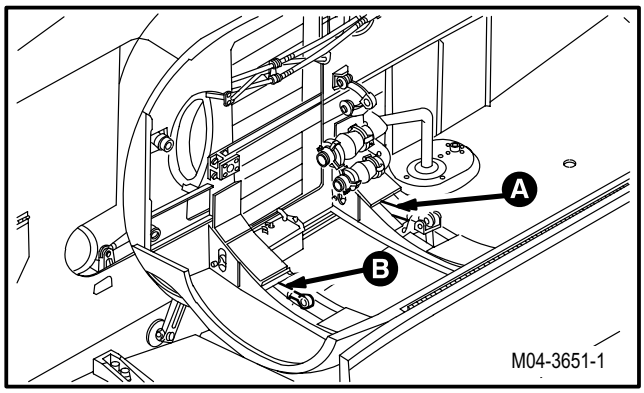
67R Attack Helicopter Repairer
Two persons to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |

**NOTE**

This task typical for No. 1 or No. 2 engine connecting links.




4.86.3. Removal

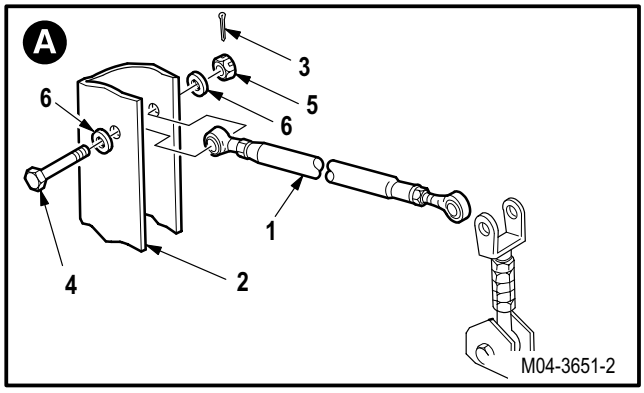
a. **Remove aft connecting link (1) from nacelle (2).**

(1) Remove and discard cotter pin (3) from bolt (4).

(2) Hold bolt (4). Remove nut (5) and teflon washer (6).

(3) Support aft link (1). Remove bolt (4) and teflon washer (6) from nacelle (2).

(4) Remove aft link (1).

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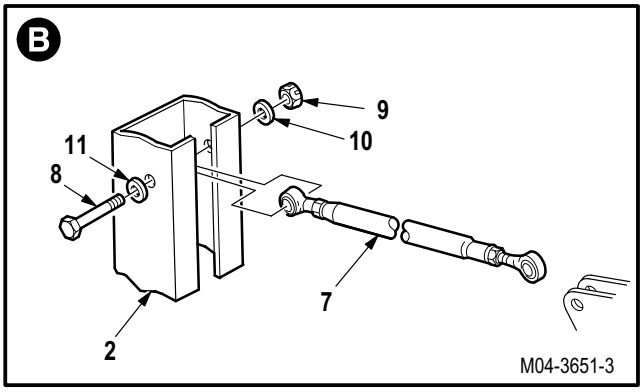
## 4.86. ENGINE CONNECTING LINKS REMOVAL/INSTALLATION - continued

b. **Remove forward link (7) from nacelle (2).**

(1) Hold bolt (8). Remove nut (9) and flat washer (10).

(2) Support forward link (7). Remove bolt (8) and countersunk washer (11).

(3) Remove forward link (7) from nacelle (2).




4.86.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.86.5. Inspection

a. **Check connecting links for cracks.** None allowed.

b. **Check connecting links for corrosion** (para 1.49)**.**

4.86.6. Repair

a. **Repair aft link (1) by replacing rod ends (12) and (13).**

(1) Remove sealing compound from rod ends (12) and (13) and link (1) (para 1.47).

(2) Remove lockwire from nut (14) and washer (15).

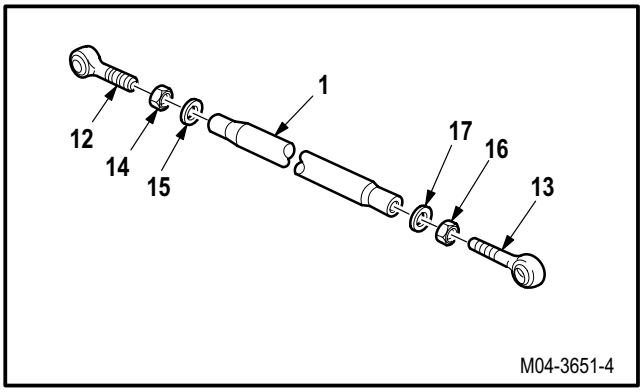
(3) Hold link (1). Loosen nut (14).

(4) Remove rod end (12), washer (15), and nut (14). Discard rod end (12).

(5) Remove lockwire from nut (16) and washer (17).

(6) Hold link (1). Loosen nut (16).

(7) Remove rod end (13), washer (17), and nut (16). Discard rod end (13).

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## 4.86. ENGINE CONNECTING LINKS REMOVAL/INSTALLATION - continued

(8) Install nut (16) and washer (17) on new rod end (13).

(9) Install rod end (13) **0.50 INCH** in link (1).

(10) Install nut (14) and washer (15) on new rod end (12).

(11) Install rod end (12) **0.50 INCH** in link (1).

b. **Repair forward link (7) by replacing rod ends (18) and (19).**

(1) Remove sealing compound from rod ends (18) and (19) and link (7) (para 1.47).

(2) Remove lockwire from nut (20) and washer (21).

(3) Hold link (7). Loosen nut (20).

(4) Remove rod end (18), washer (21), and nut (20). Discard rod end (18).

(5) Remove lockwire from nut (22) and washer (23).

(6) Hold link (7). Loosen nut (22).

(7) Remove rod end (19), washer (23), and nut (22). Discard rod end (19).

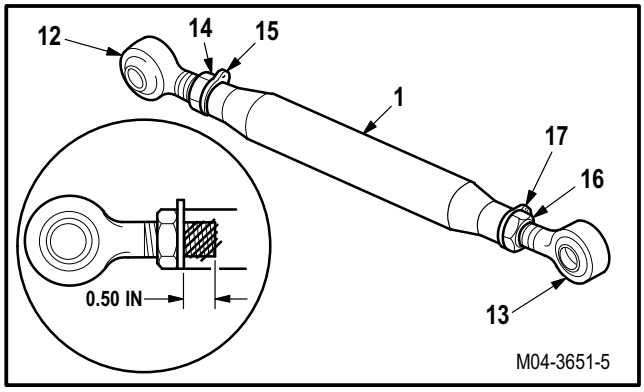
(8) Install nut (22) and washer (23) on new rod end (19).

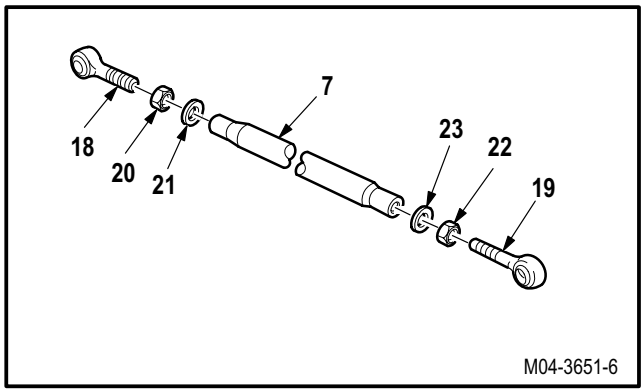
(9) Install rod end (19) **0.50 INCH** in link (7).

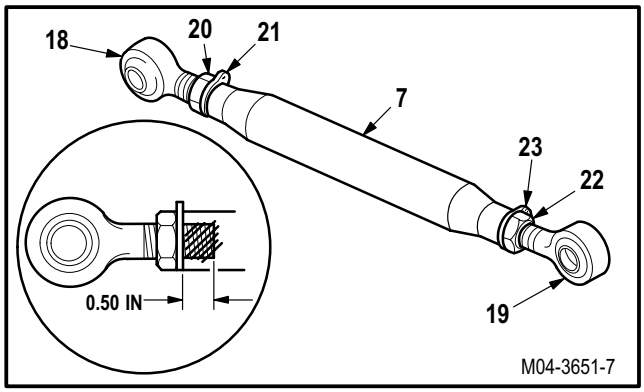
(10) Install nut (20) and washer (21) on new rod end (18).

(11) Install rod end (18) **0.50 INCH** in link (7).

c. **Inspect (QA).**

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## 4.86. ENGINE CONNECTING LINKS REMOVAL/INSTALLATION - continued

4.86.7. Adjustment

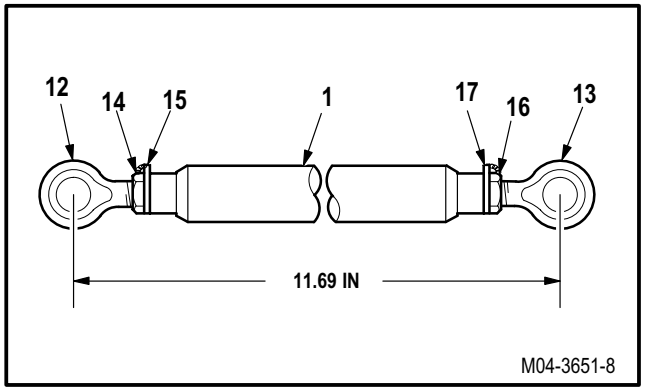
a. **Adjust forward link (1).**

(1) Adjust link (1) to **11.69 INCHES** between center of rod ends (12) and (13).

(2) Hold link (1). Torque small nut (14) to **70 INCH-POUNDS**. Use torque wrench.

(3) Hold link (1). Torque large nut (16) to **100 INCH-POUNDS**. Use torque wrench.

(4) Lockwire nut (14) to washer (15) and nut (16) to washer (17). Use wire (item 226, App F).



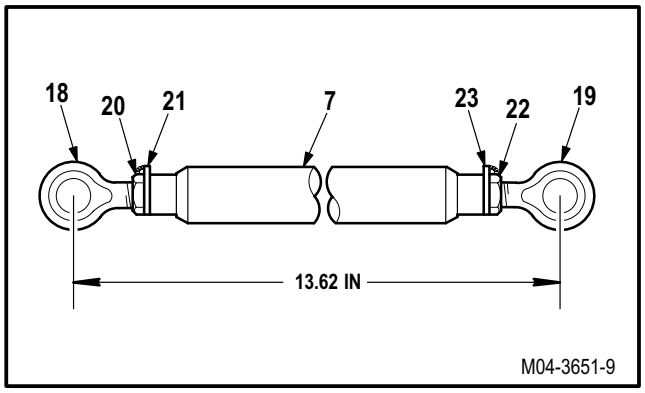

b. **Adjust aft connecting link (7).**

(1) Adjust link (7) to **13.62 INCHES** between center of rod ends (18) and (19).

(2) Hold link (7). Torque small nut (20) to **100 INCH-POUNDS**. Use torque wrench.

(3) Hold link (7). Torque large nut (22) to **145 INCH-POUNDS**. Use torque wrench.

(4) Lockwire nut (20) to washer (21) and nut (22) to washer (23). Use wire (item 226, App F).




c. **Inspect (QA).**

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## 4.86. ENGINE CONNECTING LINKS REMOVAL/INSTALLATION - continued

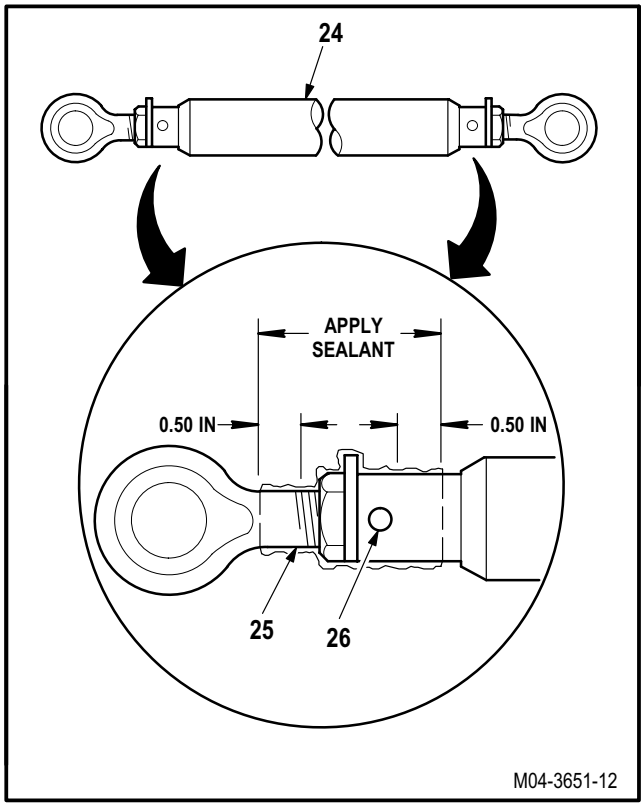
**NOTE**

Step d is typical for both engine connecting links.

d. **Environmentally seal both ends of connecting link (24).**

(1) Apply sealant from **0.50 INCH** past end of threads (25) to **0.50 INCH** past inspection hole (26). Use sealing compound (item 176, App F).

e. **Inspect (QA).**



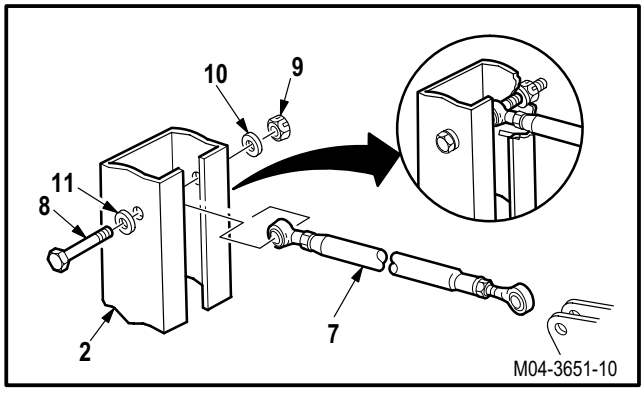

4.86.8. Installation

a. **Install forward link (7) in nacelle (2).**

(1) Aline link (7) with holes in nacelle (2).

(2) Install bolt (8) through countersunk washer (11), nacelle (2), and link (7).

(3) Install flat washer (10) and nut (9) on bolt (8).

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## 4.86. ENGINE CONNECTING LINKS REMOVAL/INSTALLATION - continued

**CAUTION**

Torquing of bolt (4) will result in damage to teflon washer (6).

b. **Install aft link (1) in nacelle (2).**

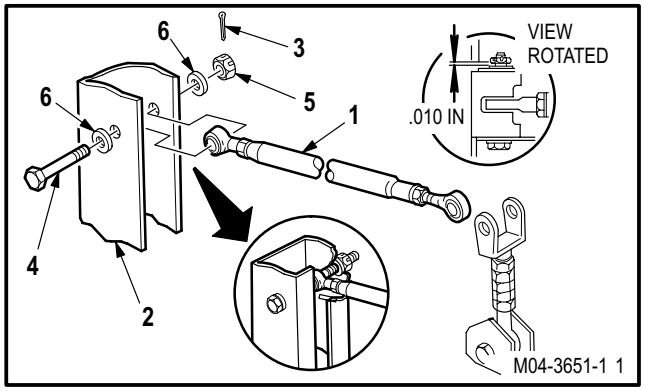
(1) Aline aft link (1) with holes in nacelle (2).

(2) Install bolt (4) through teflon washer (6), nacelle (2), and aft link (1).

(3) Install teflon washer (6) and nut (5).

(4) Tighten nut (5) leaving a **0.010 INCH** gap between teflon washer (6) and nut (5).

(5) Install new cotter pin (3) in bolt (4).




c. **Inspect (QA).**

d. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**

END OF TASK

## 4.87. LINK ASSEMBLY AFT ENGINE MOUNT REMOVAL/INSTALLATION

4.87.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.87.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**References:**

TM 1-1520-238-T

**Materials/Parts:**

Cotter pin
Wire (item 226, App F)

**Personnel Required:**

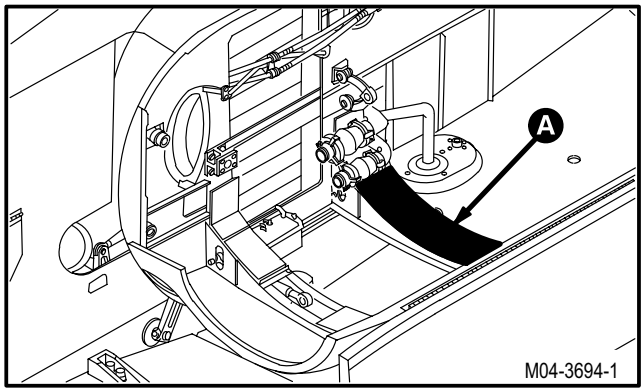
| | |
|---|---|
| 67R | Attack Helicopter Repairer<br>Two persons to assist |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |

**NOTE**

This task is typical for engine No. 1 or engine No. 2 aft engine mount link assembly.

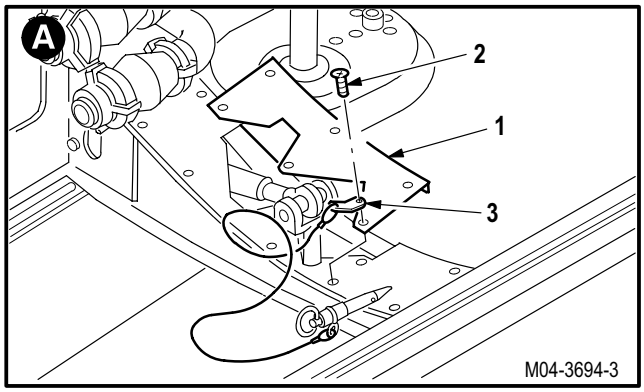



4.87.3. Removal

a. **Remove radiation shield (1).**

(1) Remove six screws (2) and support pin assembly (3).

(2) Remove shield (1).

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## 4.87. LINK ASSEMBLY AFT ENGINE MOUNT REMOVAL/INSTALLATION - continued

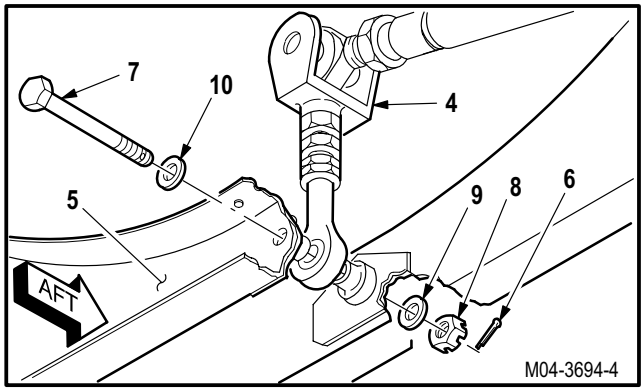
b. **Remove aft link assembly (4) from nacelle (5).**

(1) Remove and discard cotter pin (6) from bolt (7).

(2) Hold bolt (7). Remove nut (8) and teflon washer (9).

(3) Support link (4). Remove bolt (7) and washer (10) from nacelle (5).

(4) Remove link (4).




4.87.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.87.5. Inspection

a. **Check engine support pins, heat shield, rod assembly, link assembly, and aft lower engine mount for cracks.** None allowed.

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

4.87.6. Repair

**NOTE**

Rod end and nut have left handed threads.

a. **Remove and discard clevis (11) and/or rod end (12).**

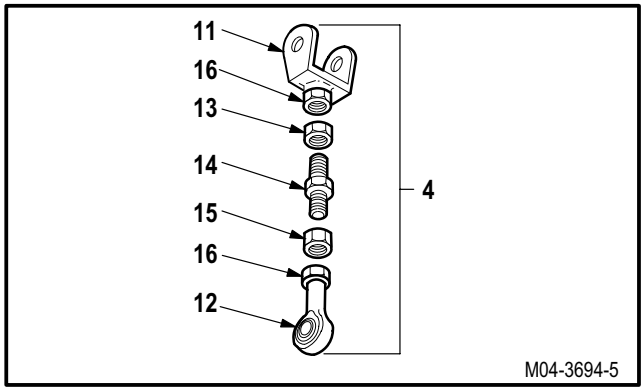
(1) Remove lockwire from nut (13), turn buckle (14), and nut (15).

(2) Hold clevis flat (16). Loosen nut (13).

(3) Remove clevis (11) and nut (13).

(4) Hold rod end flat (16). Loosen nut (15).

(5) Remove rod end (12) and nut (15).

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## 4.87. LINK ASSEMBLY AFT ENGINE MOUNT REMOVAL/INSTALLATION - continued

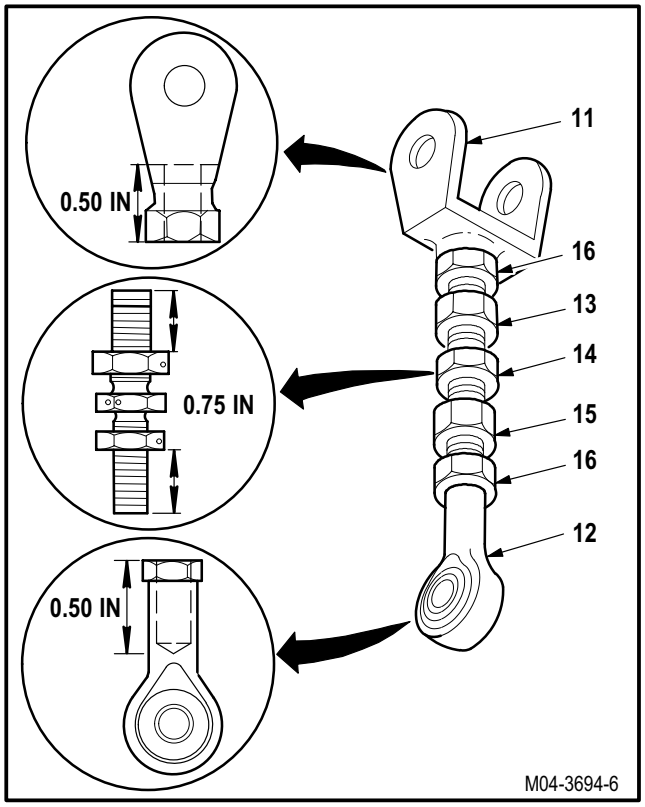
b. **Install new clevis (11) and/or rod end (12).**

(1) Install nut (13) **0.75 INCH** on turnbuckle (14).

(2) Install nut (15) **0.75 INCH** on turnbuckle (14).

(3) Install clevis (11) **0.50 INCH** on turnbuckle (14).

(4) Install rod end (12) **0.50 INCH** on turnbuckle (14).

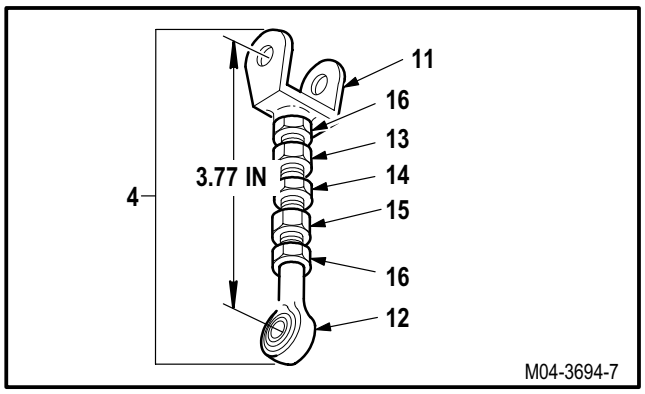



c. **Adjust aft link assembly (4) to 3.77 INCHES between clevis (11) and rod end (12).**

(1) Measure distance from center of clevis (11) hole to center of rod end (12) hole.

(2) Hold clevis (11) and rod end (12).

(3) Rotate turnbuckle (14) to adjust link assembly to **3.77 INCHES**.




4.87.7. Installation

a. **Install aft link assembly (4) in nacelle (5).**

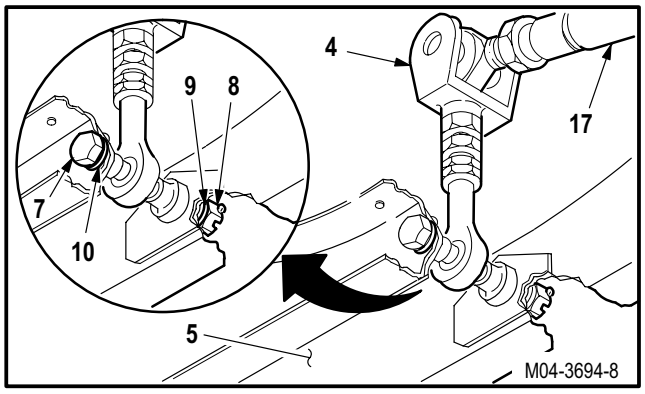
(1) Aline link (4) with holes in nacelle (5).

(2) Install bolt (7) through washer (10), nacelle (5), and link assembly (4).

(3) Install teflon washer (9) and nut (8) on bolt (7).

(4) Loosely install nut (8).

b. **Position rod assembly (17) in clevis (4).**

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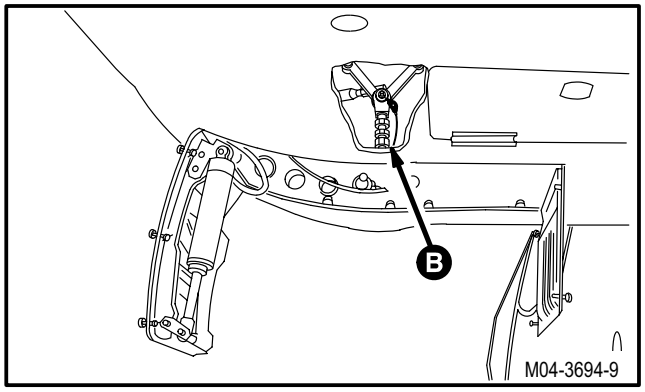
## 4.87. LINK ASSEMBLY AFT ENGINE MOUNT REMOVAL/INSTALLATION - continued

c. **Position No. 1 engine** (para 4.49) **or No. 2 engine** (para 4.53) **in nacelle.**

d. **Connect No. 1 engine** (para 4.50) **or No. 2 engine** (para 4.54) **forward lower engine mount.**

e. **Connect No. 1 engine** (para 4.51) **or No. 2 engine** (para 4.55) **forward inboard engine mount and aft inboard engine mount.**

f. **Lower No. 1 engine** (para 4.51) **or No. 2 engine** (para 4.55) **until full load is on supports.**

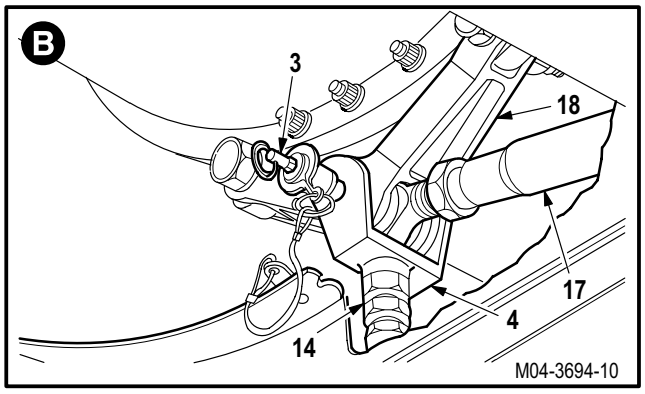



g. **Adjust aft link assembly (4).**

(1) Adjust turnbuckle (14) until aft lower engine mount (18) is alined with rod assembly (17).

**NOTE**

When installing support pin ensure a positive retention with a slip fit condition exists. Support pin must install freely with no contact to aft lower engine mount support.




(2) Insert support pin (3) through clevis (4), aft lower engine mount (18), and rod assembly (17).

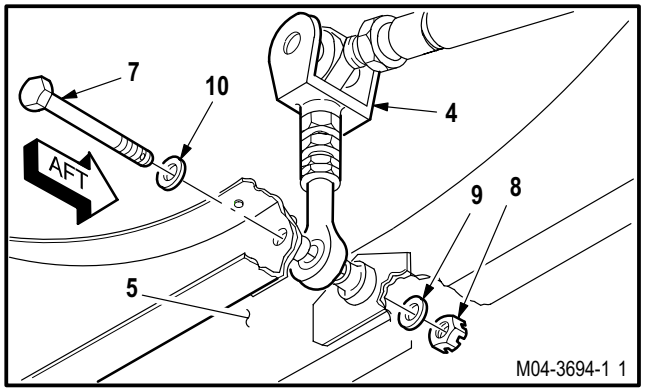
h. **Remove No. 1 engine** (para 4.3) **or No. 2 engine** (para 4.8)**.**

i. **Remove aft link assembly (4) from nacelle (5).**

(1) Hold bolt (7). Remove nut (8) and teflon washer (9).

(2) Support link (4). Remove bolt (7) and washer (10) from nacelle (5).

(3) Remove link (4).

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## 4.87. LINK ASSEMBLY AFT ENGINE MOUNT REMOVAL/INSTALLATION - continued

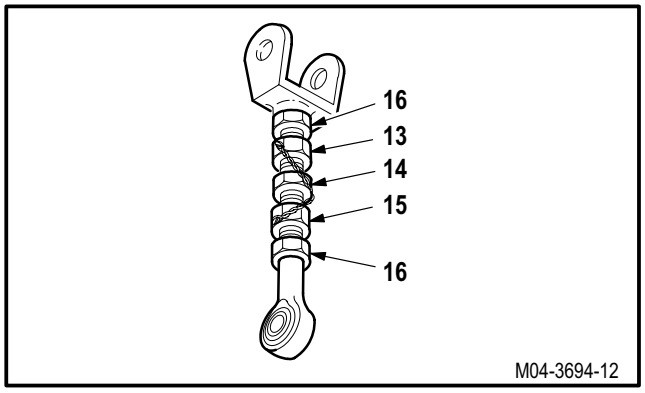
**NOTE**

Ensure clevis and rod end are alined within 0 degrees to 30 degrees of each other.

j. **Torque nuts (13) and (15) to 35 INCH-POUNDS.**

(1) Hold rod end flat (16). Torque nut (15) **35 INCH-POUNDS**. Use torque wrench.

(2) Hold clevis flat (16). Torque nut (13) **35 INCH-POUNDS**. Use torque wrench.




k. **Lockwire nut (13), turnbuckle (14), and nut (15).** Use wire (item 226, App F).

**CAUTION**

Torquing of bolt (7) will result in damage to teflon washer (9).

l. **Install aft link assembly (4) in nacelle (5).**

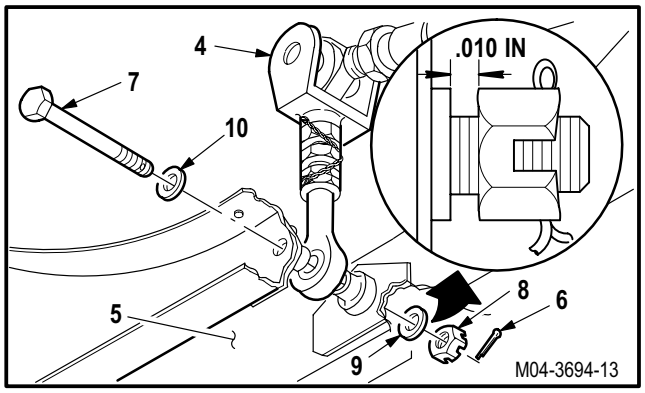
(1) Aline link (4) with holes in nacelle (5).

(2) Install bolt (7) through washer (10), nacelle (5), and link assembly (4).

(3) Install teflon washer (9) and nut (8) on bolt (7).

(4) Tighten nut (8) leaving **0.010 INCH** gap between teflon washer (9) and nut (8).

(5) Install new cotter pin (6) in bolt (7).

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## 4.87. LINK ASSEMBLY AFT ENGINE MOUNT REMOVAL/INSTALLATION - continued

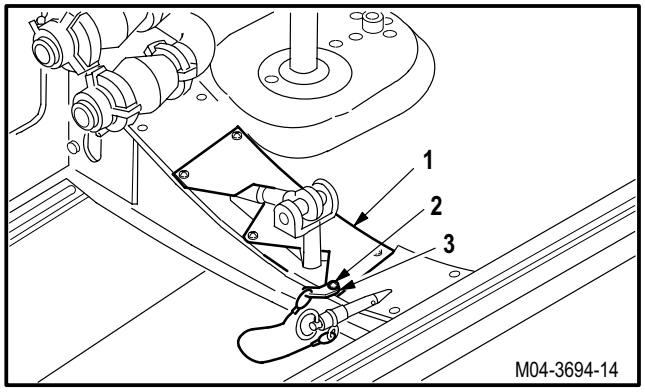
m. **Install radiation shield (1).**

(1) Position shield (1) in nacelle (5).

(2) Install support pin assembly (3) and six screws (2).

n. **Inspect (QA).**

o. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**




END OF TASK

## 4.88. NO. 1 OR NO. 2 ENGINE QUICK RELEASE PINS REPLACEMENT

4.88.1. Description

This task covers: Removal. Installation.

4.88.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)

**References:**

TM 1-1500-204-23

**Equipment Conditions:**

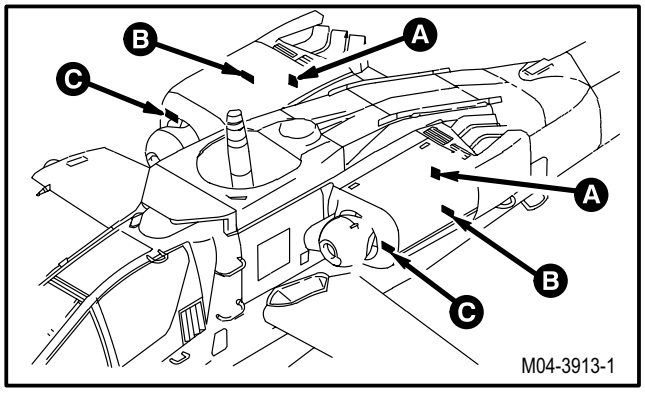
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed |
| | or |
| 4.8 | No. 2 engine removed |

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**NOTE**

This task is typical for left or right engine quick release pins.



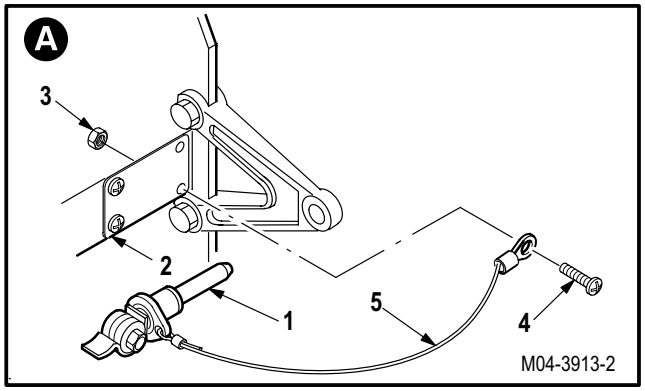

4.88.3. Removal

a. **Remove quick release pin (1) from nacelle (2).**

(1) Remove nut (3) from screw (4).

(2) Remove screw (4) from lanyard (5) and nacelle (2).

(3) Remove and discard pin (1) and lanyard (5).

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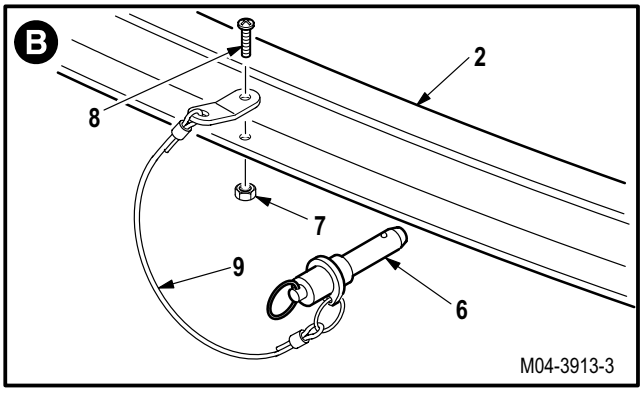
## 4.88. NO. 1 OR NO. 2 ENGINE QUICK RELEASE PINS REPLACEMENT - continued

b. **Remove quick release pin (6) from nacelle (2).**

(1) Remove nut (7) from screw (8).

(2) Remove screw (8) from lanyard (9) and nacelle (2).

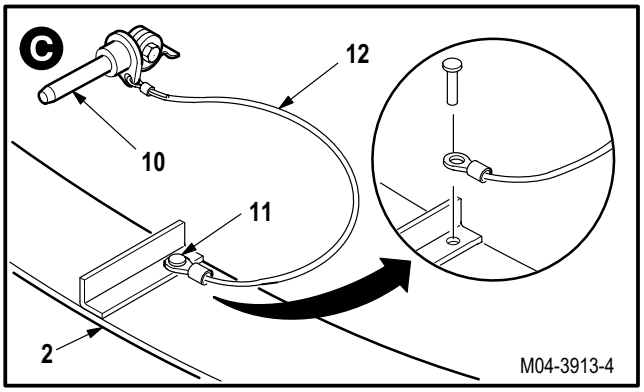
(3) Remove and discard pin (6) and lanyard (9).




c. **Remove quick release pin (10) from nacelle (2).**

(1) Remove rivet (11) from lanyard (12) and nacelle (2) (TM 1-1500-204-23).

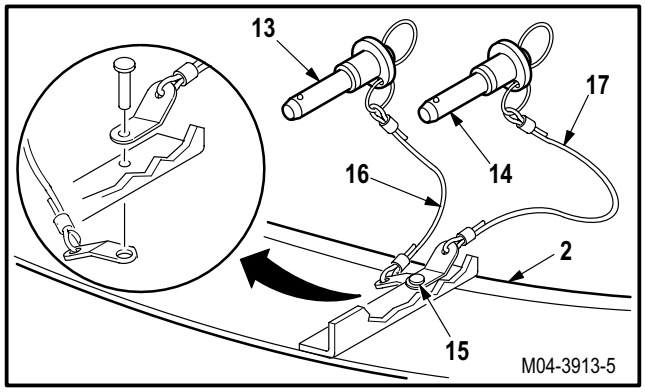
(2) Remove and discard pin (10) and lanyard (12).




d. **Remove quick release pins (13) and (14) from nacelle (2).**

(1) Remove rivet (15) from lanyards (16), (17), and nacelle (2) (TM 1-1500-204-23).

(2) Remove and discard pins (13) and (14), and lanyards (16) and (17).

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## 4.88. NO. 1 OR NO. 2 ENGINE QUICK RELEASE PINS REPLACEMENT - continued

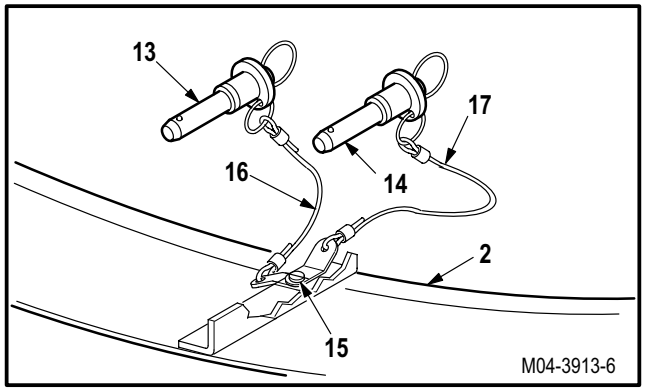
4.88.4. Installation

a. **Install new quick release pins (13) and (14) on nacelle (2).**

(1) Position pin (13) and lanyard (16) on nacelle (2).

(2) Position pin (14) and lanyard (17) on nacelle (2).

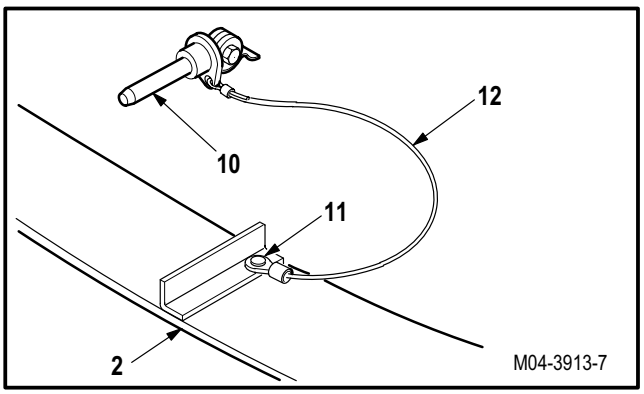
(3) Install rivet (15) through lanyard (17), nacelle (2) and lanyard (16) (TM 1-1500-204-23).




b. **Install new quick release pin (10) on nacelle (2).**

(1) Position pin (10) and lanyard (12) on nacelle (2).

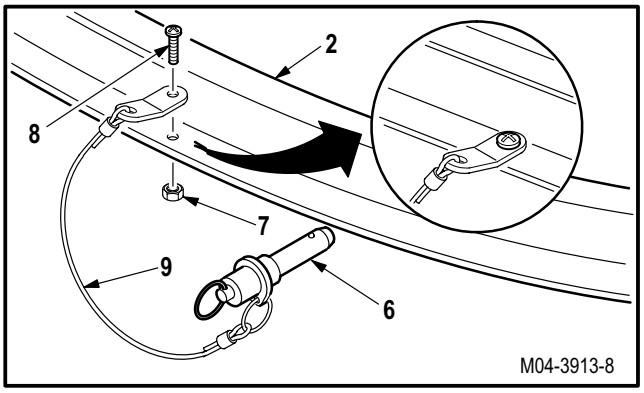
(2) Install rivet (11) through lanyard (12) and nacelle (2) (TM 1-1500-204-23).




c. **Install new quick release pin (6) on nacelle (2).**

(1) Install screw (8) through lanyard (9) and nacelle (2).

(2) Install nut (7) on screw (8).




d. **Install new quick release pin (1) on nacelle (2) wall.**

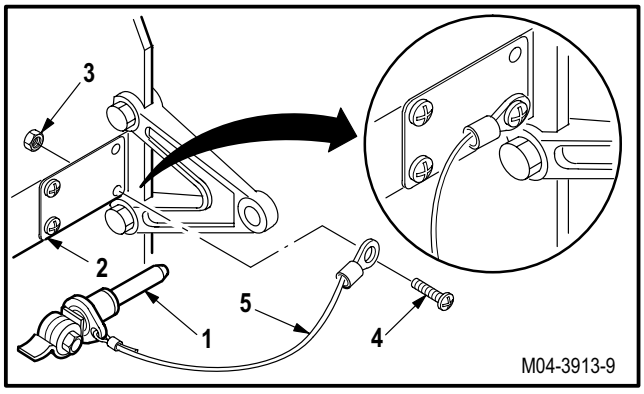
(1) Install screw (4) through lanyard (5) and nacelle (2).

(2) Install nut (3) on screw (4).

e. **Inspect (QA).**

f. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**

END OF TASK



## 4.89. NO. 1 ACTUATING CYLINDER REMOVAL/INSTALLATION

4.89.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.89.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Materials/Parts:**

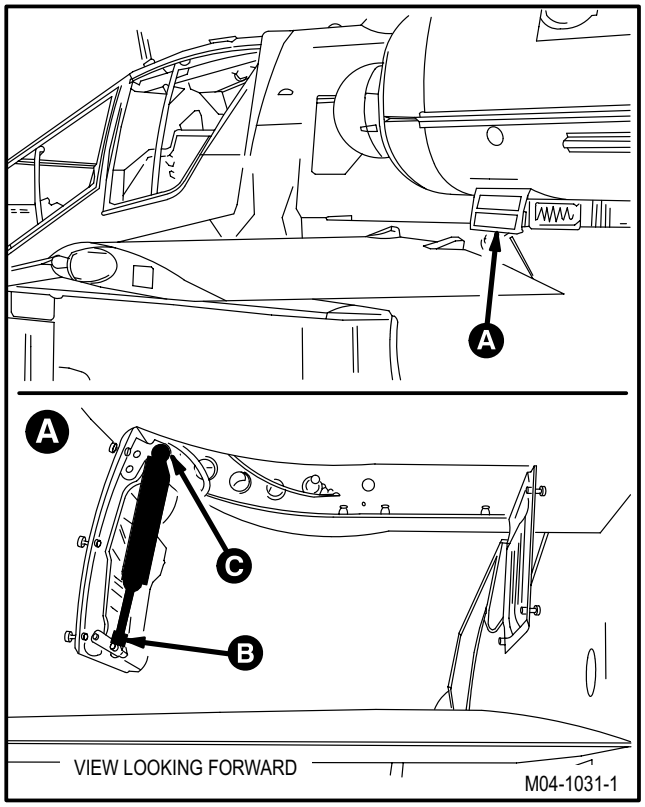
Cotter pin (2)
Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN3 and LN4 opened |

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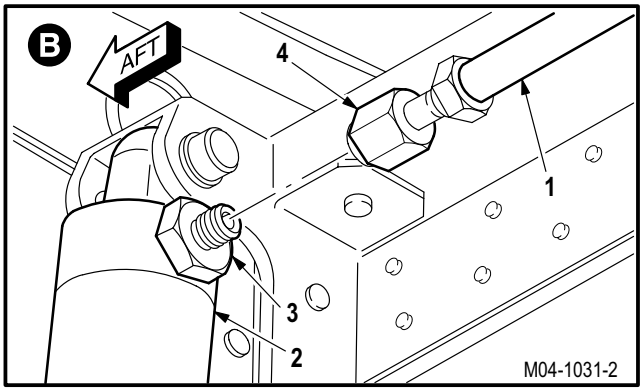
## 4.89. NO. 1 ACTUATING CYLINDER REMOVAL/INSTALLATION - continued

4.89.3. Removal

a. **Remove air hose (1) from actuator (2).**

(1) Hold nipple (3). Remove nut (4).

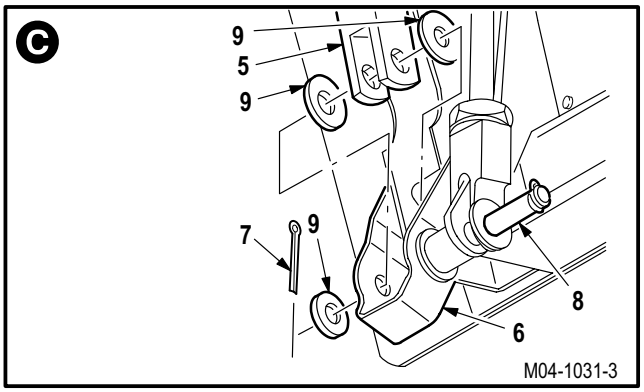



b. **Remove clevis (5) from idler (6).**

(1) Remove and discard aft cotter pin (7).

(2) Pull pin (8) slowly forward until clevis (5) and three washers (9) are clear.

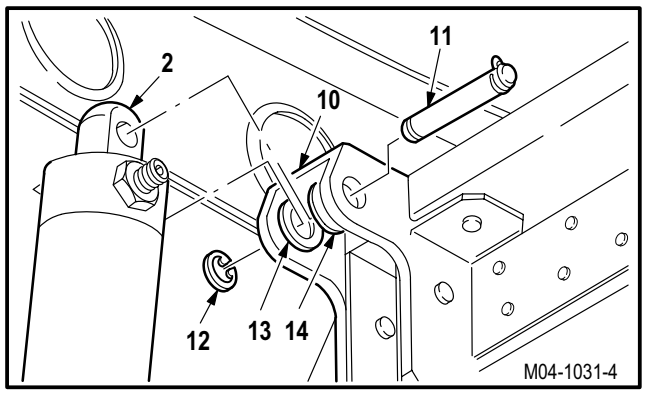
(3) Push pin (8) aft until seated in idler (6).




c. **Remove actuator (2) from bracket (10).**

(1) Hold pin (11). Remove retaining ring (12).

(2) Remove pin (11), spacer (13), and spacer (14).

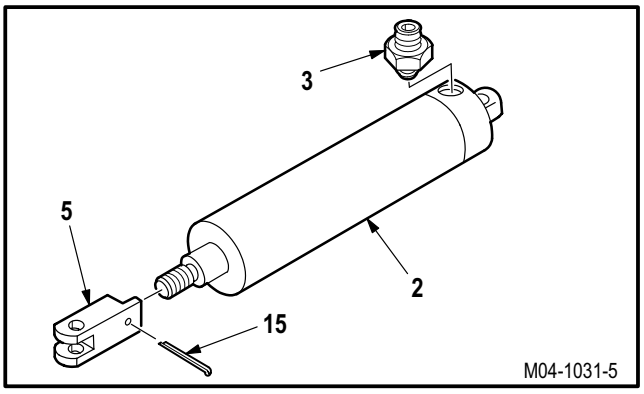



d. **Remove nipple (3) from actuator (2).**

e. **Remove clevis (5) from actuator (2).**

(1) Remove and discard cotter pin (15).

(2) Remove clevis (5).

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## 4.89. NO. 1 ACTUATING CYLINDER REMOVAL/INSTALLATION - continued

4.89.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.89.5. Inspection

a. **Check actuator, clevis, and nipple for cracks and stripped threads.** None allowed.

b. **Check actuator, clevis, and nipple for corrosion** (para 1.49)**.**

4.89.6. Installation

a. **Install clevis (5) on actuator (2).**

(1) Install new cotter pin (15) through clevis (5) and rod (16).

b. **Lubricate tapered threads of union (3).** Use petrolatum (item 138, App F).

c. **Install tapered end of nipple (3) in actuator (2).**

d. **Install actuator clevis end (5) in idler (6).**

(1) Pull pin (8) forward until clear of idler (6).

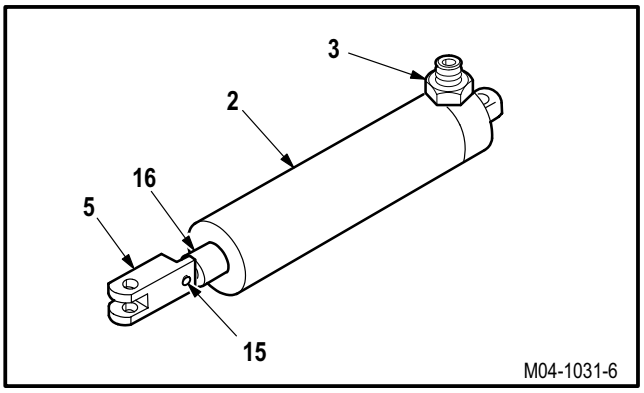
(2) Position and hold clevis (5) in idler (6).

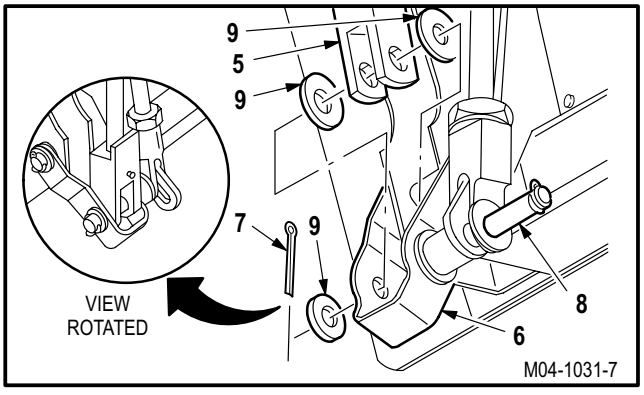
(3) Install clevis (5) in idler (6) with one washer (9) on each side.

(4) Push pin (8) through washers (9) and clevis (5) until seated in idler (6).

(5) Install washer (9) on pin (8) aft of idler (6).

(6) Install new cotter pin (7) in pin (8).

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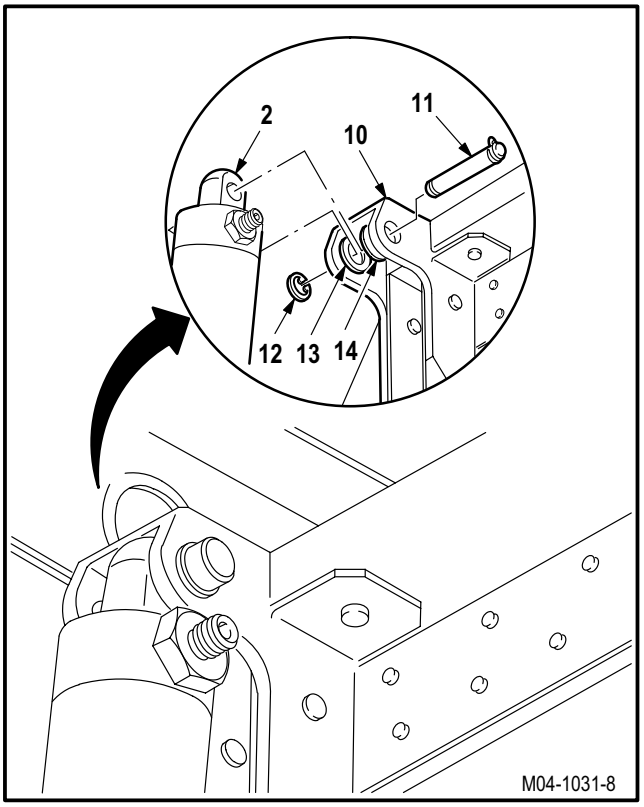
## 4.89. NO. 1 ACTUATING CYLINDER REMOVAL/INSTALLATION - continued

e. **Install actuator (2) in bracket (10).**

(1) Position and hold actuator (2) in bracket (10).

(2) Install pin (11) through bracket (10), spacer (14), actuator (2), spacer (13), and bracket (10).

(3) Install ring (12) on pin (11).



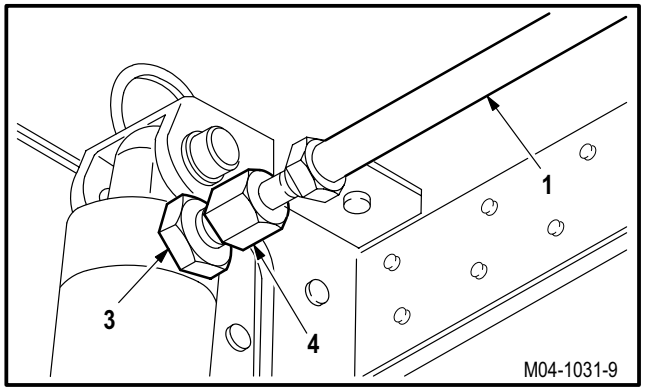

f. **Install air hose (1) on nipple (3).**

(1) Lubricate threads on nipple (3). Use petrolatum (item 138, App F).

(2) Hold nipple (3). Install nut (4).

g. **Inspect (QA).**

h. **Secure access doors LN3 and LN4** (para 2.2)**.**




END OF TASK

## 4.90. NO. 2 ACTUATING CYLINDER REMOVAL/INSTALLATION

4.90.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.90.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Personnel Required:**

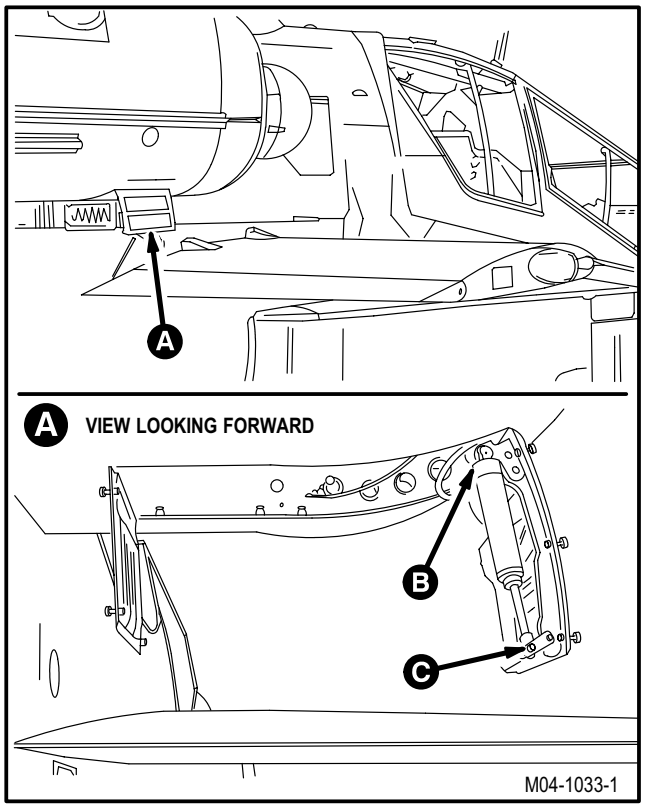
67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Cotter pin (2)
Petrolatum (item 138, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors RN3 and RN4 opened |

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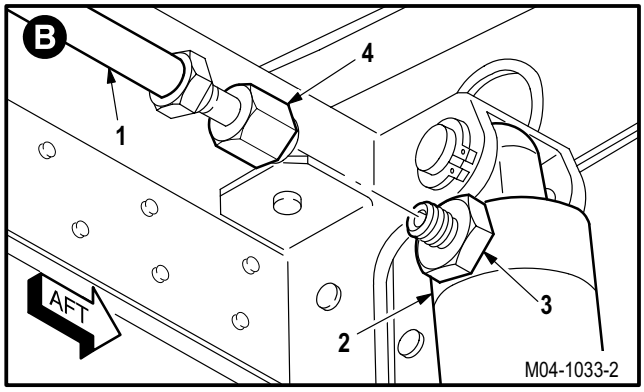
## 4.90. NO. 2 ACTUATING CYLINDER REMOVAL/INSTALLATION - continued

4.90.3. Removal

a. **Remove air hose (1) from actuator (2).**

(1) Hold nipple (3). Remove nut (4).

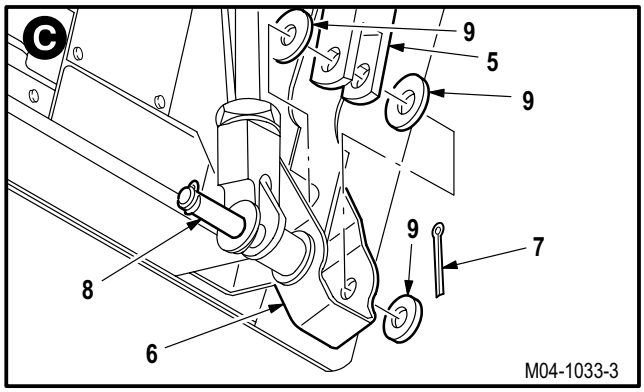



b. **Remove clevis (5) from idler (6).**

(1) Remove and discard aft cotter pin (7).

(2) Pull pin (8) slowly forward until clevis (5) and three washers (9) are free.

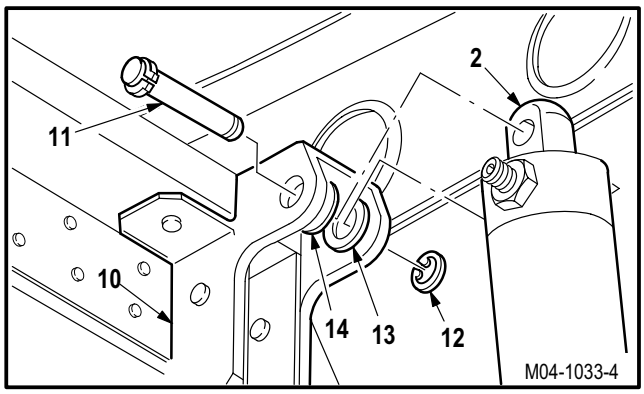
(3) Push pin (8) aft until seated in idler (6).




c. **Remove actuator (2) from bracket (10).**

(1) Hold pin (11). Remove retaining ring (12).

(2) Remove pin (11) and spacers (13) and (14).

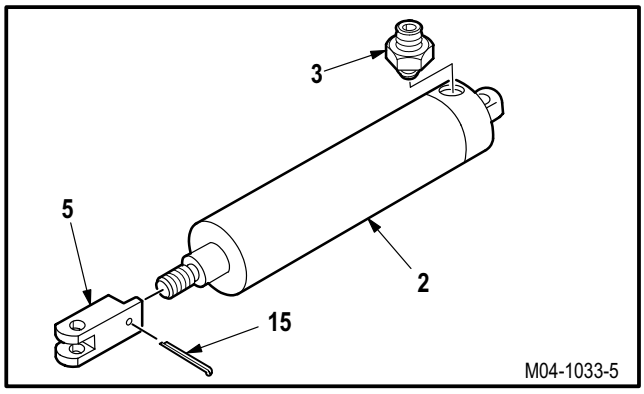



d. **Remove nipple (3) from actuator (2).**

e. **Remove clevis (5) from actuator (2).**

(1) Remove and discard cotter pin (15).

(2) Remove clevis (5).

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## 4.90. NO. 2 ACTUATING CYLINDER REMOVAL/INSTALLATION - continued

4.90.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.90.5. Inspection

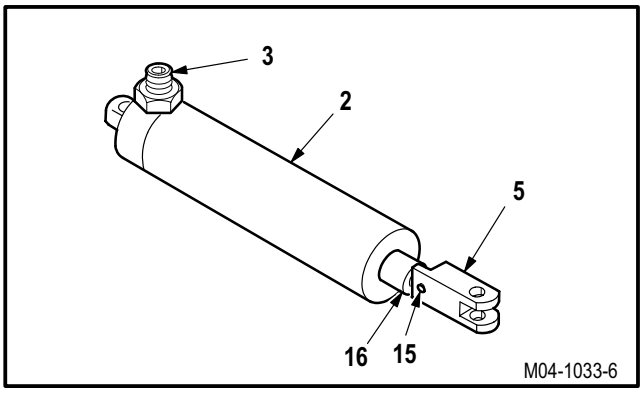
a. **Check actuator, clevis, and nipple for cracks and stripped threads.** None allowed.

b. **Check actuator, clevis, and nipple for corrosion** (para 1.49)**.**

4.90.6. Installation

a. **Install clevis (5) on actuator (2).**

(1) Install new cotter pin (15) through clevis (5) and rod (16).



b. **Lubricate tapered threads of nipple (3).** Use petrolatum (item 138, App F).

c. **Install tapered end of nipple (3) in actuator (2).**

d. **Install clevis (5) in idler (6).**

(1) Pull pin (8) forward until clear of idler (6).

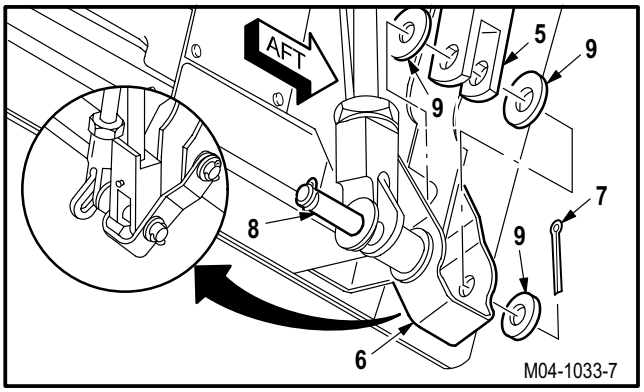
(2) Position and hold clevis (5) in idler (6).

(3) Install clevis (5) in idler (6) with one washer (9) on each side.

(4) Push pin (8) through washers (9) and clevis (5) until seated in idler (6).

(5) Install washer (9) on pin (8) aft of idler (6).

(6) Install new cotter pin (7) in pin (8).

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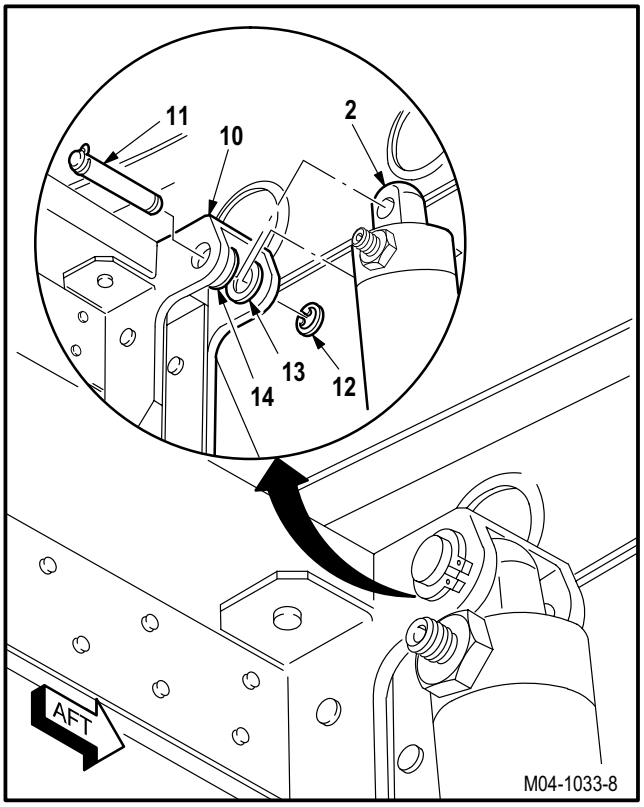
## 4.90. NO. 2 ACTUATING CYLINDER REMOVAL/INSTALLATION - continued

e. **Install actuator (2) in bracket (10).**

(1) Position and hold actuator (2) in bracket (10).

(2) Install pin (11) through bracket (10), spacer (14), actuator (2), and spacer (13).

(3) Install ring (12) on pin (11).



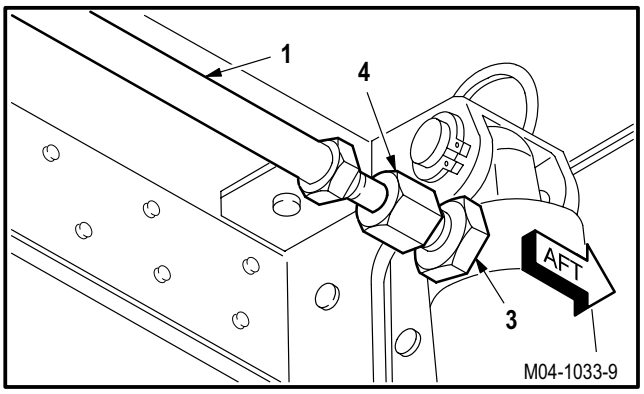

f. **Install air hose (1) on nipple (3).**

(1) Lubricate threads of nipple (3). Use petrolatum (item 138, App F).

(2) Hold nipple (3). Install nut (4).

g. **Inspect (QA).**

h. **Secure access doors RN3 and RN4** (para 2.2)**.**




END OF TASK

## 4.91. LEFT OR RIGHT ACTUATING CYLINDER FLEXIBLE AIR HOSE REPLACEMENT

4.91.1. Description

This task covers: Removal. Installation.

4.91.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Materials/Parts:**

Petrolatum (item 138, App F)

**Personnel Required:**

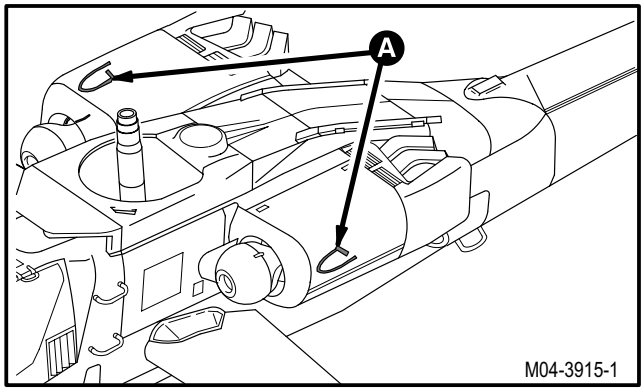
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN3 and LN4 or RN3 and RN4 opened |

**NOTE**

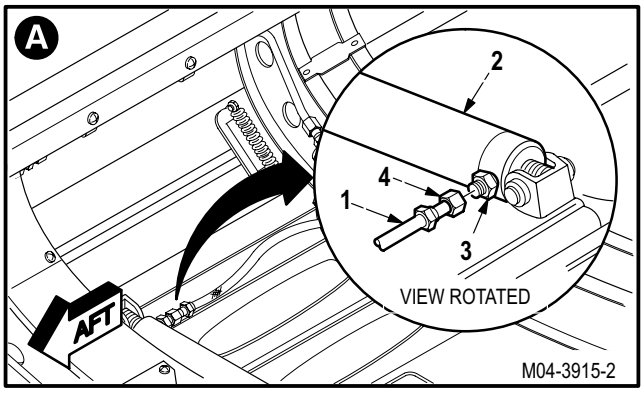
This task is typical for both right or left flexible air hose.




4.91.3. Removal

a. **Remove air hose (1) from actuator (2).**

(1) Hold nipple (3). Remove nut (4).

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## 4.91. LEFT OR RIGHT ACTUATING CYLINDER FLEXIBLE AIR HOSE REPLACEMENT - continued

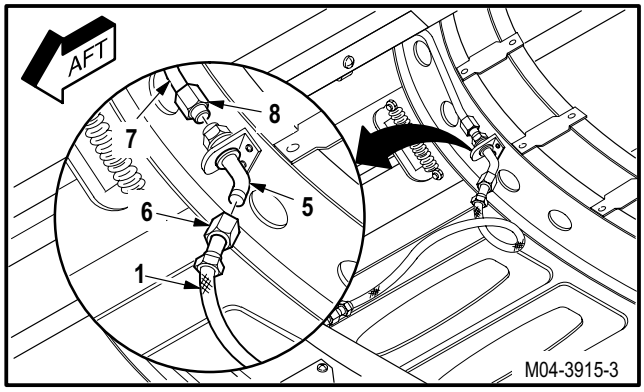
b. **Remove hose (1) from elbow (5).**

(1) Hold elbow (5). Remove nut (6).

(2) Remove and discard hose (1).

c. **Remove air tube (7) from elbow (5).**

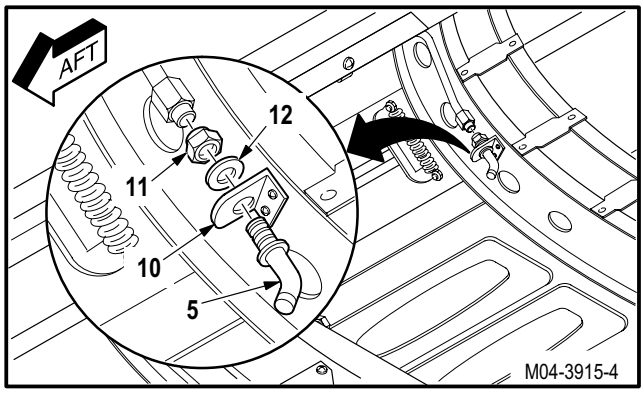
(1) Hold elbow (5). Remove nut (8).




d. **Remove elbow (5) from bracket (10).**

(1) Hold elbow (5). Remove nut (11) and washer (12).

(2) Remove elbow (5) from bracket (10).

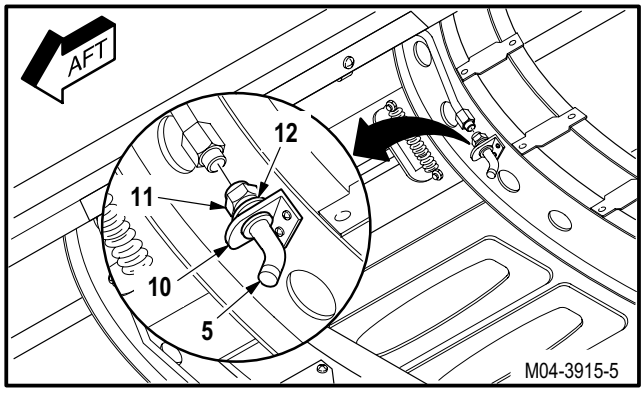



4.91.4. Installation

a. **Install elbow (5) on bracket (10).**

(1) Install elbow (5) through bracket (10) and washer (12).

(2) Install nut (11) on elbow (5).




b. **Install tube (7) on elbow (5).**

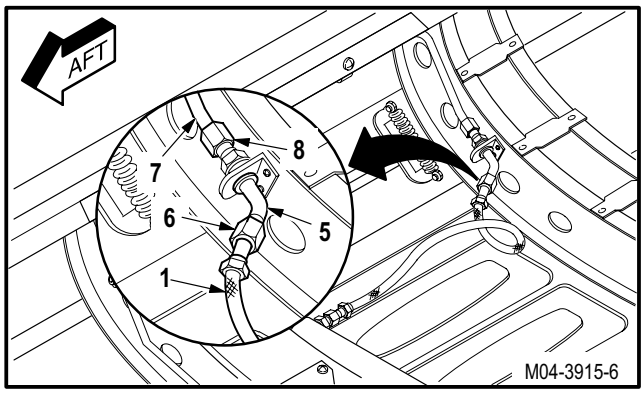
(1) Lubricate threads of elbow (5). Use petrolatum (item 138, App F).

(2) Hold elbow (5). Install nut (8).

c. **Install new hose (1) to elbow (5).**

(1) Lubricate threads of elbow (5). Use petrolatum (item 138, App F).

(2) Hold elbow (5). Install nut (6).

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## 4.91. LEFT OR RIGHT ACTUATING CYLINDER FLEXIBLE AIR HOSE REPLACEMENT - continued

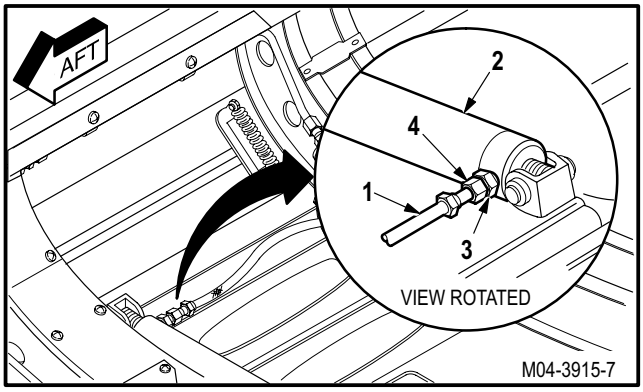
d. **Install hose (1) on actuator (2).**

(1) Lubricate threads of nipple (3). Use petrolatum (item 138, App F).

(2) Hold nipple (3). Install nut (4).

e. **Inspect (QA).**

f. **Secure access doors LN3 and LN4 or RN3 and RN4** (para 2.2)**.**




END OF TASK

## 4.92. LEFT ACTUATING CYLINDER AIR TUBE REPLACEMENT

4.92.1. Description

This task covers: Removal. Installation.

4.92.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Materials/Parts:**

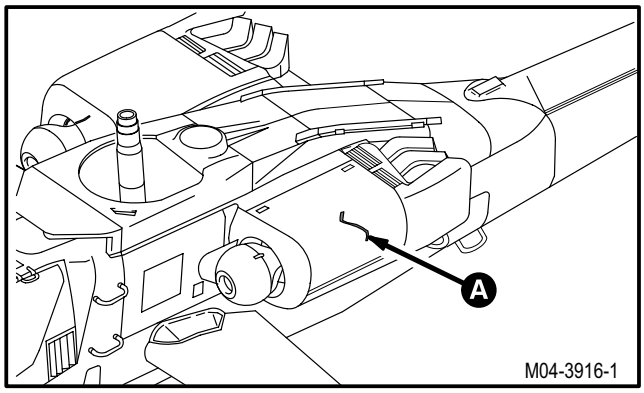
Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.94 | Left nacelle radiation shield removed |




4.92.3. Removal

a. **Remove air tube (1) from elbow (2).**

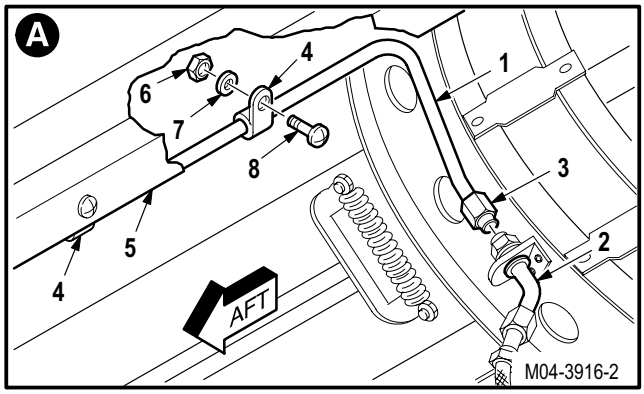
(1) Hold elbow (2). Remove nut (3).

b. **Remove two clamps (4) from nacelle (5).**

(1) Remove two nuts (6), washers (7), and clamps (4) from screws (8).

(2) Remove screws (8) from nacelle (5).

(3) Remove clamps (4) from tube (1).

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## 4.92. LEFT ACTUATING CYLINDER AIR TUBE REPLACEMENT - continued

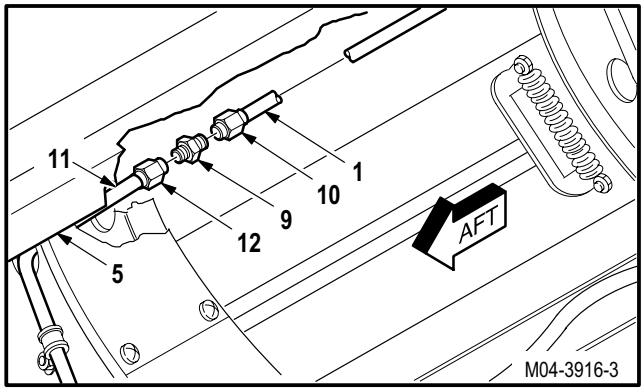
c. **Remove tube (1) from nipple (9).**

(1) Hold nipple (9). Remove nut (10).

(2) Remove and discard tube (1) from nacelle (5).

d. **Remove nipple (9) from tube (11).**

(1) Hold nut (12). Remove nipple (9).




e. **Remove two clamps (13) from nacelle (5).**

(1) Remove two nuts (14) and washers (15) from screws (16).

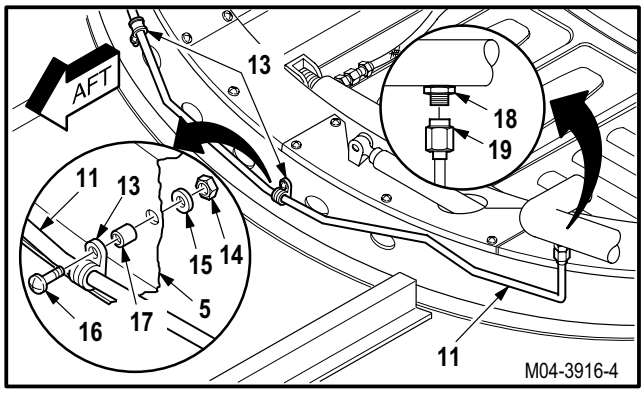
(2) Remove two screws (16), spacers (17), and clamps (13) from nacelle (5).

(3) Remove clamps (13) from tube (11).

f. **Remove tube (11) from union (18).**

(1) Hold union (18). Remove nut (19).

(2) Remove and discard tube (11).

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## 4.92. LEFT ACTUATING CYLINDER AIR TUBE REPLACEMENT - continued

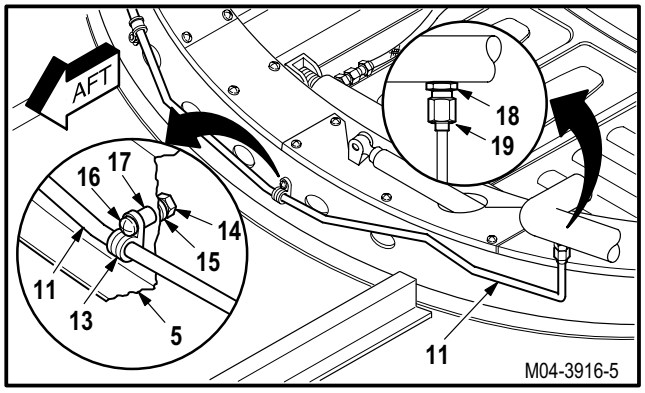
4.92.4. Installation

a. **Install new tube (11) on union (18).**

(1) Lubricate threads of union (18). Use petrolatum (item 138, App F).

(2) Position tube (11) in nacelle (5).

(3) Hold union (18). Install nut (19).




b. **Install two clamps (13) in nacelle (5).**

(1) Install clamps (13) on tube (11).

(2) Install screws (16) through clamps (13), spacers (17), and nacelle (5).

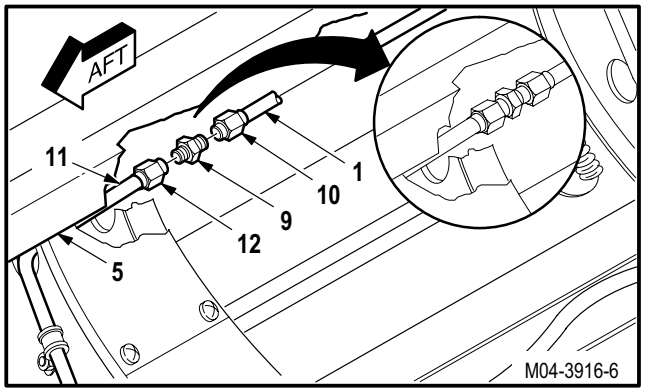
(3) Install washers (15) and nuts (14) on screws (16).

c. **Install nipple (9) on tube (11).**

(1) Lubricate threads of nipple (9). Use petrolatum (item 138, App F).

(2) Install nipple (9) on tube (11).

(3) Hold nut (12). Install nipple (9).




d. **Install new tube (1) on nipple (9).**

(1) Lubricate threads of nipple (9). Use petrolatum (item 138, App F).

(2) Position tube (1) in nacelle (5).

(3) Hold nipple (9). Install nut (10).

GO TO NEXT PAGE

## 4.92. LEFT ACTUATING CYLINDER AIR TUBE REPLACEMENT - continued

e. **Install two clamps (4) in nacelle (5).**

(1) Install clamps (4) on tube (1).

(2) Install screws (8) through nacelle (5).

(3) Install clamps (4), washers (7), and nuts (6) on screws (8).

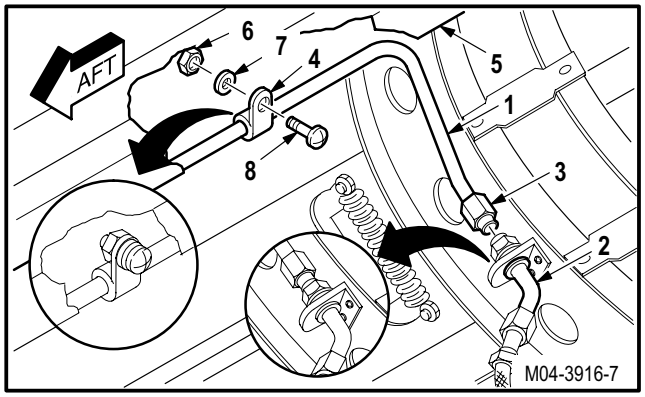
f. **Install tube (1) on elbow (2).**

(1) Lubricate threads of elbow (2). Use petrolatum (item 138, App F).

(2) Hold elbow (2). Install nut (3).

g. **Inspect (QA).**

h. **Install left nacelle radiation shield** (para 4.94)**.**




END OF TASK

## 4.93. RIGHT ACTUATING CYLINDER AIR TUBE REPLACEMENT

4.93.1. Description

This task covers: Removal. Installation.

4.93.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Materials/Parts:**

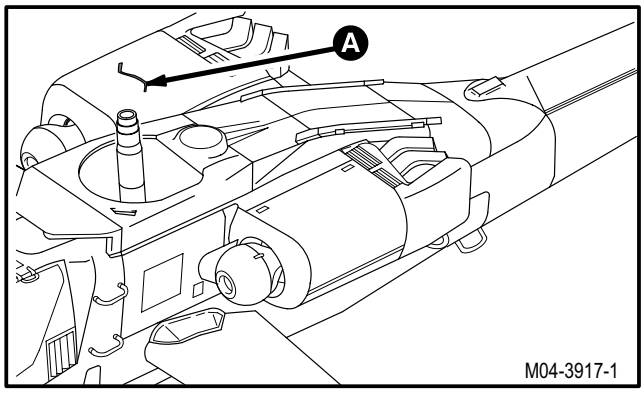
Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door RN1 opened |




4.93.3. Removal

a. **Remove air tube (1) from elbow (2).**

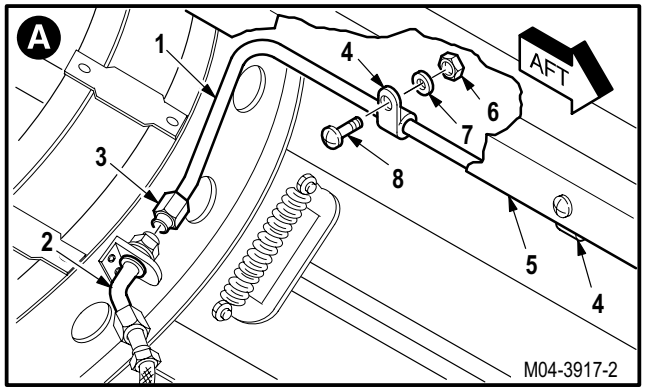
(1) Hold elbow (2). Remove nut (3).

b. **Remove two clamps (4) from nacelle (5).**

(1) Remove two nuts (6), washers (7), and clamps (4) from screws (8).

(2) Remove screws (8) from nacelle (5).

(3) Remove clamps (4) from tube (1).

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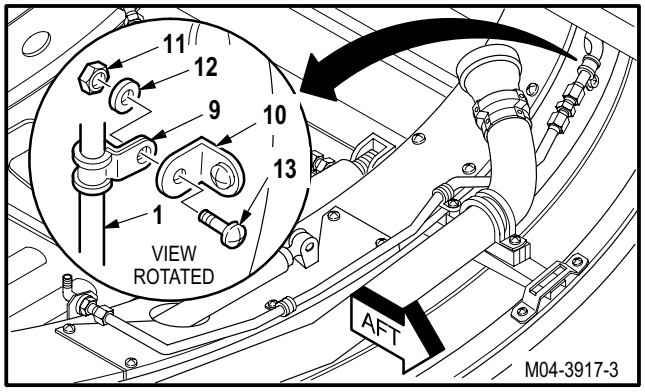
## 4.93. RIGHT ACTUATING CYLINDER AIR TUBE REPLACEMENT - continued

c. **Remove clamp (9) from bracket (10).**

(1) Remove nut (11) and washer (12) from screw (13).

(2) Remove screw (13) from bracket (10) and clamp (9).

(3) Remove clamp (9) from tube (1).



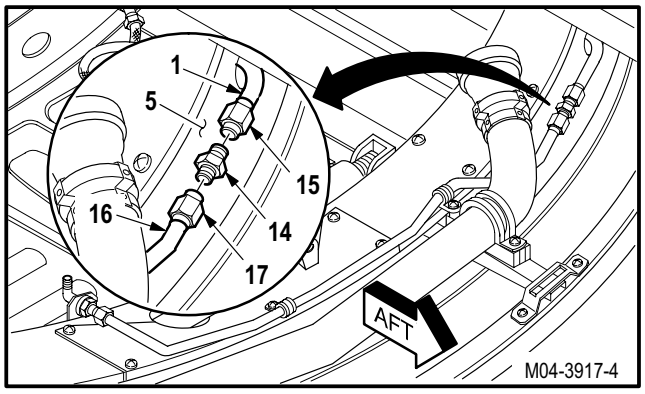

d. **Remove tube (1) from nipple (14).**

(1) Hold nipple (14). Remove nut (15).

(2) Remove and discard tube (1).

e. **Remove nipple (14) from air tube (16).**

(1) Hold nut (17). Remove nipple (14).




f. **Remove clamp (18) from bracket (19).**

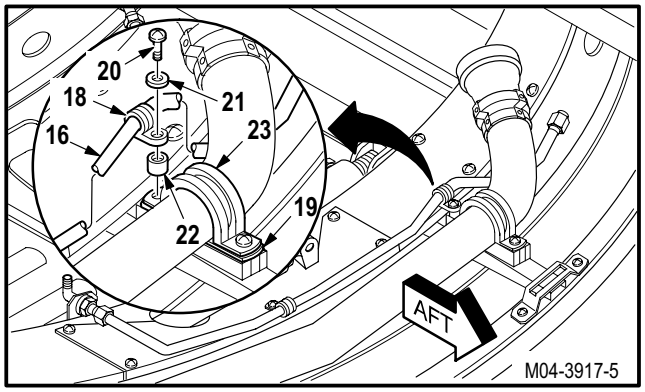
(1) Remove screw (20), washer (21), clamp (18), spacer (22), from clamp (23) and bracket (19).

(2) Remove clamp (18) from tube (16).

g. **Remove clamp (24) from nacelle (5).**

(1) Remove screw (25), washer (26), and clamp (24) from nacelle (5).

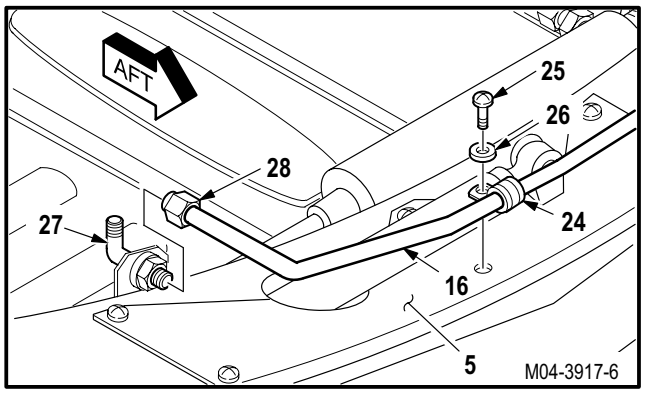
(2) Remove clamp (24) from tube (16).




h. **Remove tube (16) from elbow (27).**

(1) Hold elbow (27). Remove nut (28).

(2) Remove and discard tube (16).

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## 4.93. RIGHT ACTUATING CYLINDER AIR TUBE REPLACEMENT - continued

4.93.4. Installation

a. **Install new tube (16) on elbow (27).**

(1) Lubricate threads of elbow (27). Use petrolatum (item 138, App F).

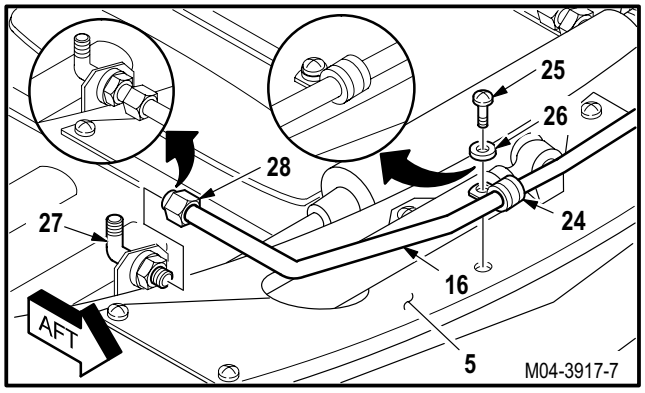
(2) Position tube (16) in nacelle (5).

(3) Hold elbow (27). Install nut (28).

b. **Install clamp (24) in nacelle (5).**

(1) Install clamp (24) on tube (16).

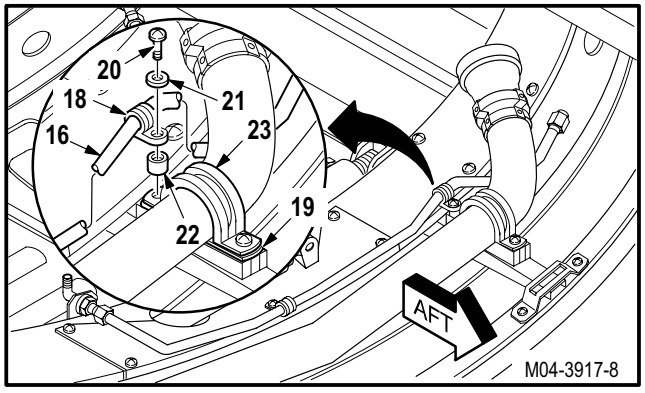
(2) Install screw (25) through washer (26) and clamp (24) in nacelle (5).




c. **Install clamp (18) on bracket (19).**

(1) Install clamp (18) on tube (16).

(2) Install screw (20) through washer (21), clamp (18), spacer (22), clamp (23), and bracket (19).

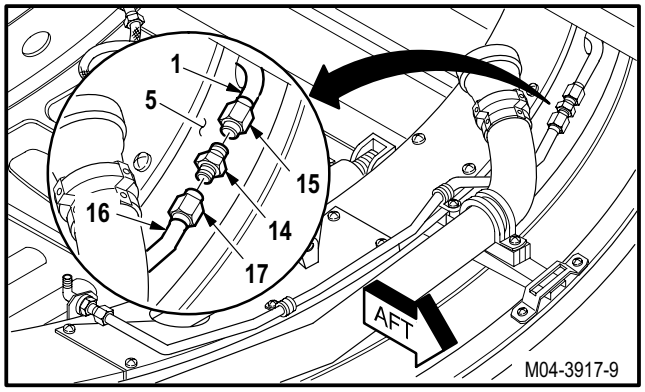



d. **Install nipple (14) on air tube (16).**

(1) Lubricate threads of nipple (14). Use petrolatum (item 138, App F).

(2) Install nipple (14) on tube (16).

(3) Hold nut (17). Tighten nipple (14).




e. **Install new tube (1) on nipple (14).**

(1) Lubricate threads of nipple (14). Use petrolatum (item 138, App F).

(2) Position tube (1) in nacelle (5).

(3) Hold nipple (14). Install nut (15).

GO TO NEXT PAGE

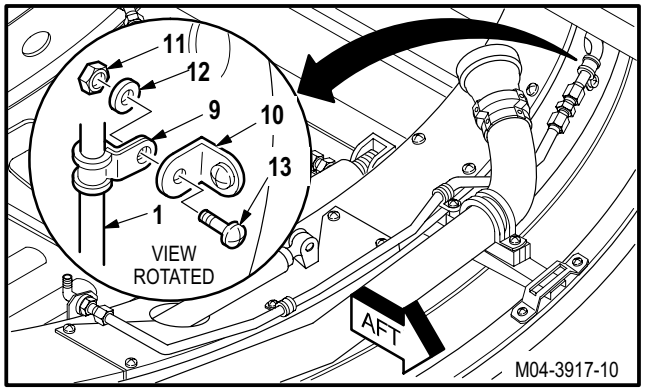
## 4.93. RIGHT ACTUATING CYLINDER AIR TUBE REPLACEMENT - continued

f. **Install clamp (9) on bracket (10).**

(1) Install clamp (9) on tube (1).

(2) Install screw (13) through bracket (10) and clamp (9).

(3) Install washer (12) and nut (11) on screw (13).

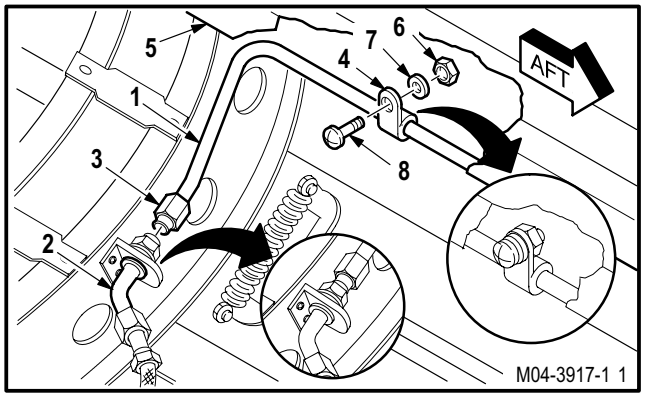



g. **Install two clamps (4) in nacelle (5).**

(1) Install two clamps (4) on tube (1).

(2) Install screws (8) through nacelle (5).

(3) Install clamps (4), washers (7), and nuts (6) on screws (8).




h. **Install tube (1) on elbow (2).**

(1) Lubricate threads of elbow (2). Use petrolatum (item 138, App F).

(2) Hold elbow (2). Install nut (3).

i. **Inspect (QA).**

j. **Secure access door RN1** (para 2.2)**.**

END OF TASK

## 4.94. LEFT OR RIGHT NACELLE ENGINE GUARD/RADIATION SHIELD REPLACEMENT

4.94.1. Description

This task covers: Removal. Installation.

4.94.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

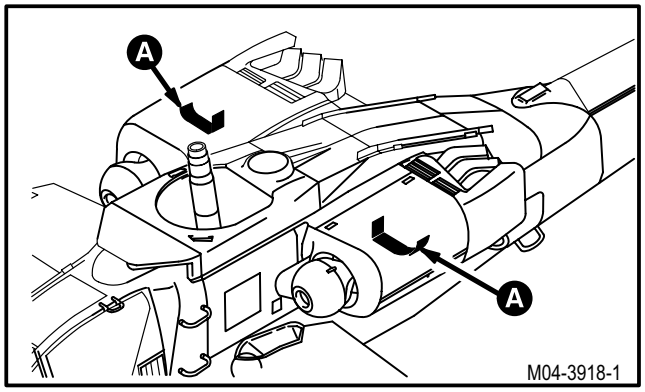
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |

**NOTE**

This task is typical for both left or right nacelle engine guard/radiation shields.



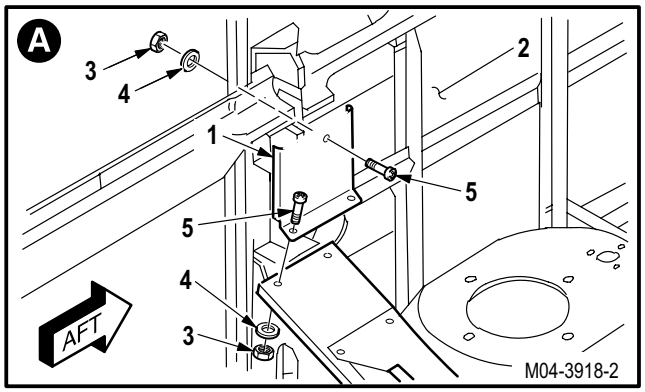

4.94.3. Removal

a. **Remove engine guard (1) from nacelle (2).**

(1) Remove three nuts (3) and washers (4) from screws (5).

(2) Remove three screws (5) from guard (1) and nacelle (2).

(3) Remove and discard guard (1).

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## 4.94. LEFT OR RIGHT NACELLE ENGINE GUARD/RADIATION SHIELD REPLACEMENT - continued

b. **Remove radiation shield (6) from nacelle (2).**

(1) Remove six screws (7) from nacelle (2) and shield (6).

(2) Remove and discard shield (6).

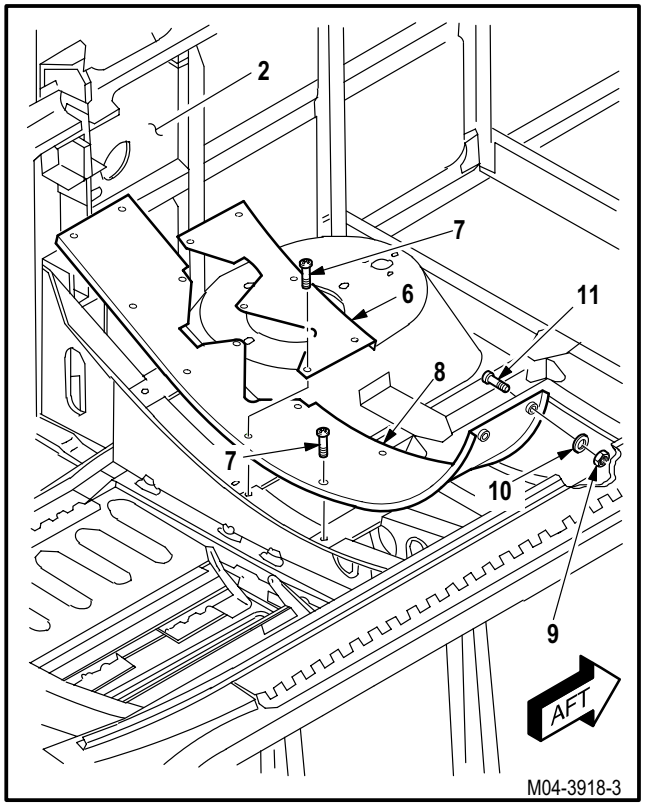
c. **Remove radiation shield (8) from nacelle (2).**

(1) Remove four screws (7) from nacelle (2) and shield (8).

(2) Remove two nuts (9) and washers (10) from screws (11).

(3) Remove two screws (11) from nacelle (2) and shield (8).

(4) Remove and discard shield (8).




4.94.4. Installation

a. **Install new shield (8) on nacelle (2).**

(1) Position shield (8) in nacelle (2).

(2) Install two screws (11) through shield (8) and nacelle (2).

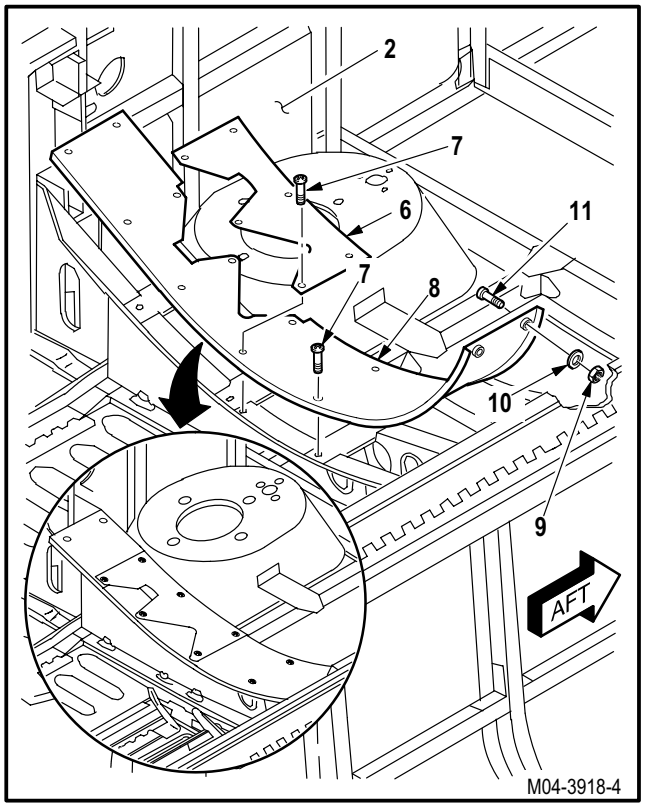
(3) Install two washers (10) and nuts (9) on screws (11).

(4) Install four screws (7) through radiation shield (8) and nacelle (2).

b. **Install new shield (6) on nacelle (2).**

(1) Position shield (6) in nacelle (2).

(2) Install six screws (7) through shield (6) and nacelle (2).

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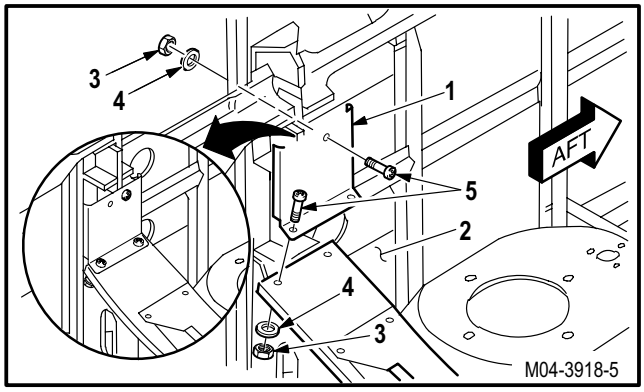
## 4.94. LEFT OR RIGHT NACELLE ENGINE GUARD/RADIATION SHIELD REPLACEMENT - continued

c. **Install new guard (1) on nacelle (2).**

(1) Position guard (1) in nacelle (2).

(2) Install three screws (5) through guard (1) and nacelle (2).

(3) Install three washers (4) and nuts (3) on screws (5).




d. **Inspect (QA).**

e. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**

END OF TASK

## 4.95. RIGHT NACELLE RADIATION SHIELDS REPLACEMENT

4.95.1. Description

This task covers: Removal. Installation.

4.95.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)

**References:**

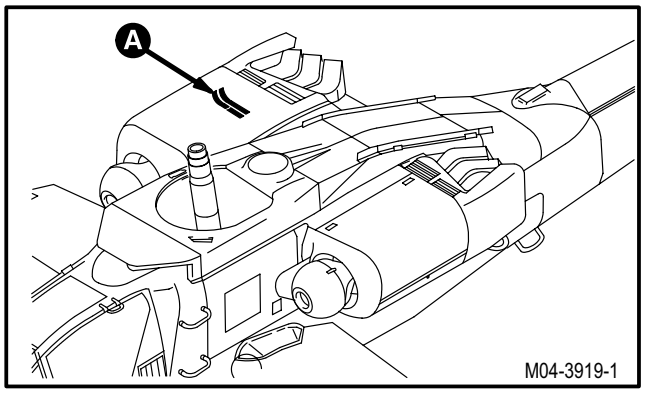
TM 1-1500-204-23

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.8 | No. 2 engine removed |

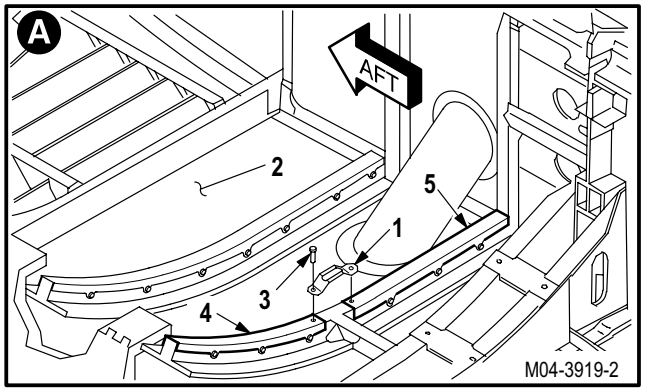



4.95.3. Removal

a. **Remove radiation shield (1) from nacelle (2).**

(1) Remove two rivets (3) from shield (1), shield (4), shield (5), and nacelle (2) (TM 1-1500-204-23).

(2) Remove and discard shield (1).

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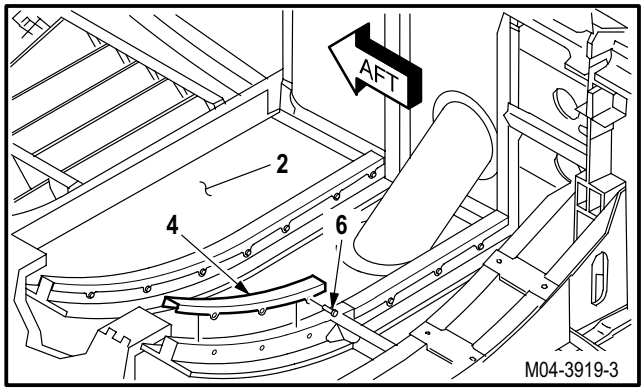
## 4.95. RIGHT NACELLE RADIATION SHIELDS REPLACEMENT - continued

b. **Remove radiation shield (4) from nacelle (2).**

(1) Remove three rivets (6) from shield (4) and nacelle (2) (TM 1-1500-204-23).

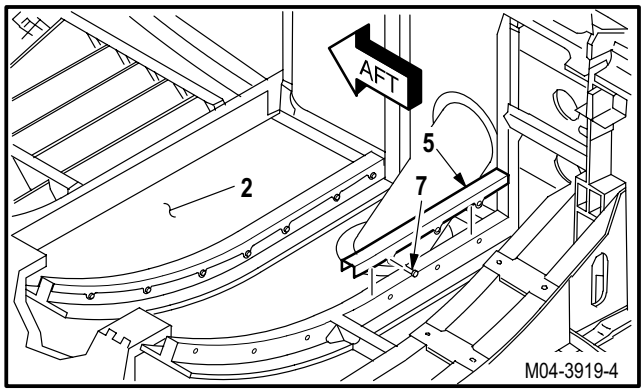
(2) Remove and discard shield (4).




c. **Remove radiation shield (5) from nacelle (2).**

(1) Remove four rivets (7) from shield (5) and nacelle (2) (TM 1-1500-204-23).

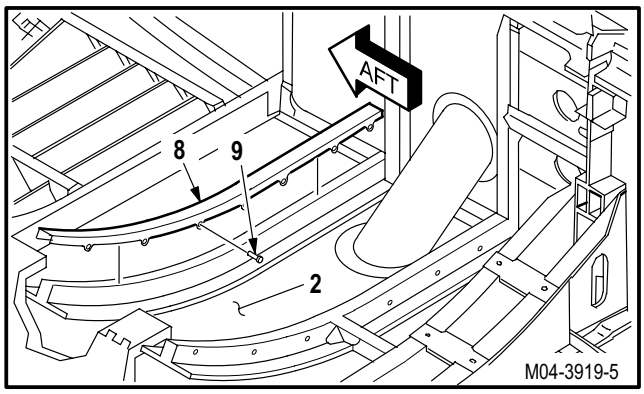
(2) Remove and discard shield (5).




d. **Remove radiation shield (8) from nacelle (2).**

(1) Remove eight rivets (9) from shield (8) and nacelle (2) (TM 1-1500-204-23).

(2) Remove and discard shield (8).

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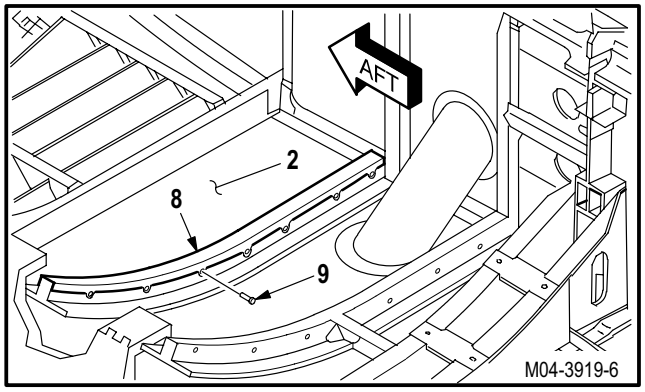
## 4.95. RIGHT NACELLE RADIATION SHIELDS REPLACEMENT - continued

4.95.4. Installation

a. **Install new shield (8) in nacelle (2).**

(1) Position shield (8) in nacelle (2).

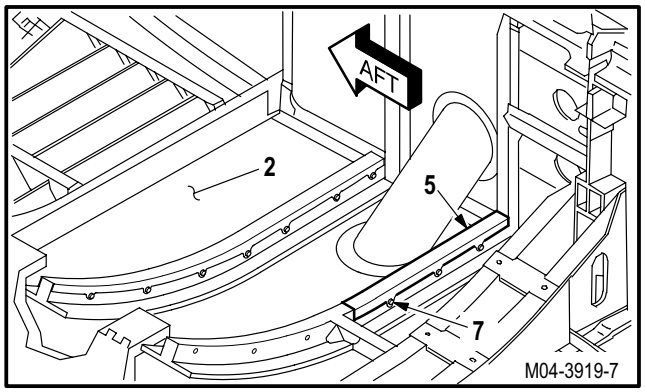
(2) Install eight rivets (9) through shield (8) and nacelle (2) (TM 1-1500-204-23).




b. **Install new shield (5) in nacelle (2).**

(1) Position shield (5) in nacelle (2).

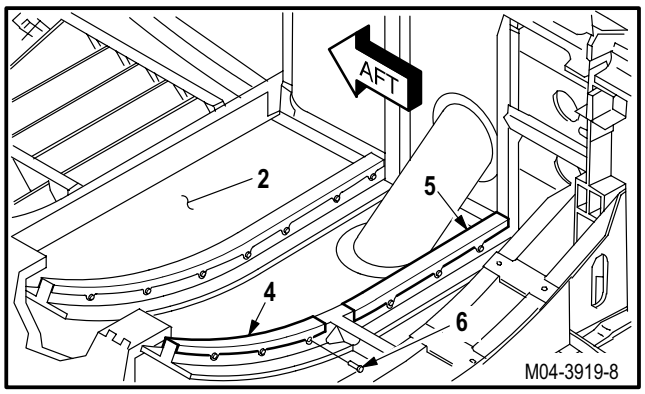
(2) Install four rivets (7) through shield (5) and nacelle (2) (TM 1-1500-204-23).




c. **Install new shield (4) in nacelle (2).**

(1) Position shield (4) in nacelle (2).

(2) Install three rivets (6) through shield (4) and nacelle (2) (TM 1-1500-204-23).



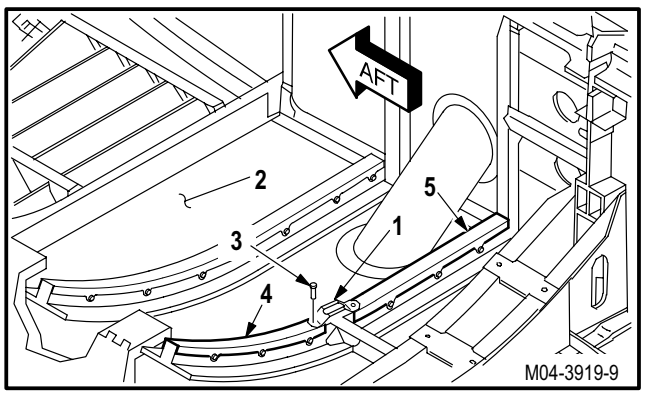

d. **Install new shield (1) in nacelle (2).**

(1) Position shield (1) in nacelle (2).

(2) Install two rivets (3) through shield (1), shield (4), shield (5), and into nacelle (2) (TM 1-1500-204-23).

e. **Inspect (QA).**

f. **Install No. 2 engine** (para 4.52)**.**




END OF TASK

## 4.96. LEFT NACELLE RADIATION SHIELDS REPLACEMENT

4.96.1. Description

This task covers: Removal. Installation.

4.96.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)

**References:**

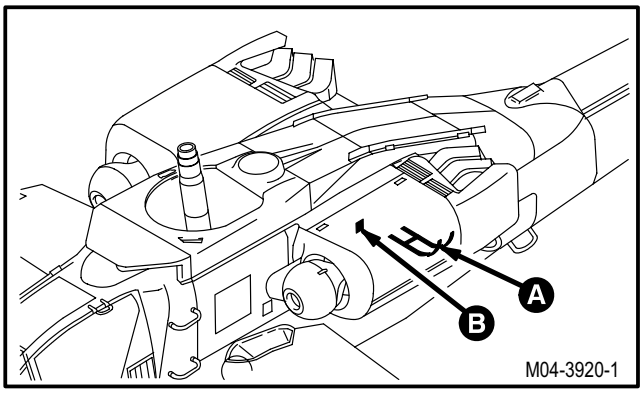
TM 1-1500-204-23

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed |

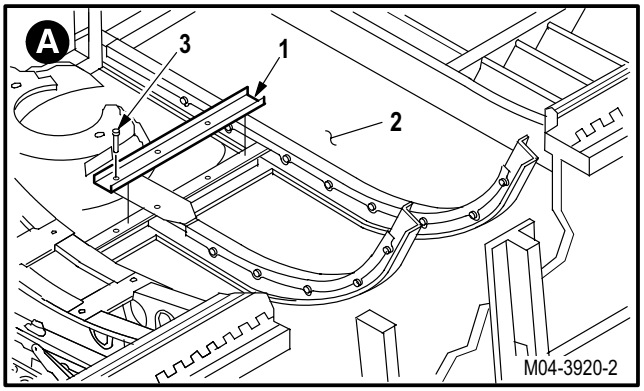



4.96.3. Removal

a. **Remove radiation shield (1) from nacelle (2).**

(1) Remove four rivets (3) from shield (1) and nacelle (2) (TM 1-1500-204-23).

(2) Remove and discard shield (1).

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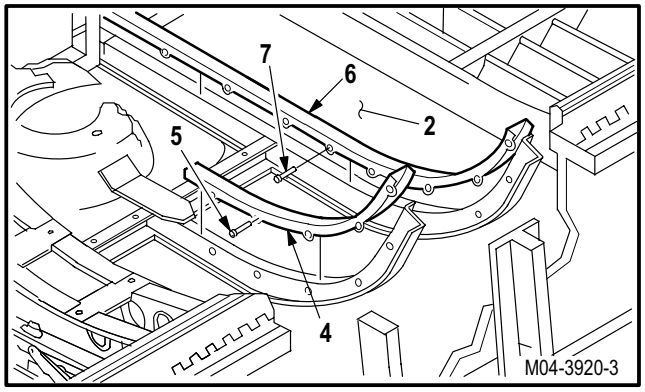
## 4.96. LEFT NACELLE RADIATION SHIELDS REPLACEMENT - continued

b. **Remove radiation shield (4) from nacelle (2).**

(1) Remove five rivets (5) from nacelle (2) and shield (4) (TM 1-1500-204-23).

(2) Remove and discard shield (4).




c. **Remove radiation shield (6) from nacelle (2).**

(1) Remove eight rivets (7) from shield (6) and nacelle (2) (TM 1-1500-204-23).

(2) Remove and discard shield (6).

d. **Remove radiation shield (8) from nacelle (2).**

(1) Remove two nuts (9) from screws (10).

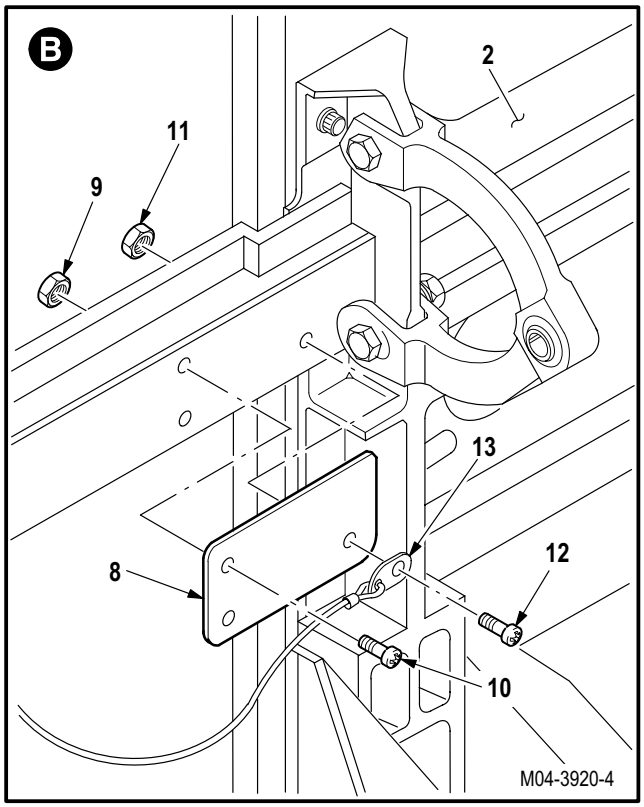
(2) Remove two screws (10) from nacelle (2) and shield (8).

(3) Remove nut (11) from screw (12).

(4) Remove screw (12) from shield (8) and lanyard (13).

(5) Remove lanyard (13) and shield (8).

(6) Discard shield (8).

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## 4.96. LEFT NACELLE RADIATION SHIELDS REPLACEMENT - continued

4.96.4. Installation

a. **Install new shield (8) in nacelle (2).**

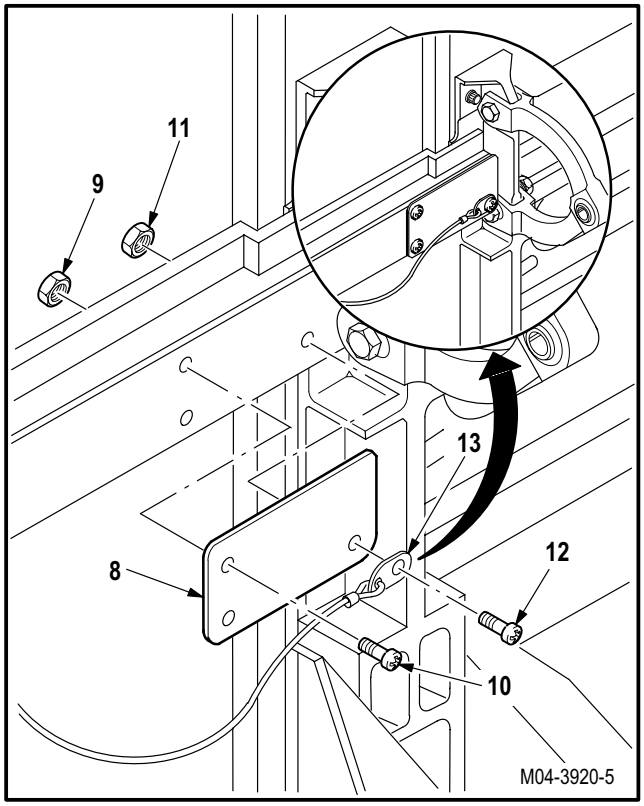
(1) Position shield (8) and lanyard (13) in nacelle (2).

(2) Install screw (12) through lanyard (13) shield (8), and nacelle (2).

(3) Install nut (11) on screw (12).

(4) Install two screws (10) through shield (8) and nacelle (2).

(5) Install two nuts (9) on screws (10).




b. **Install new shield (6) in nacelle (2).**

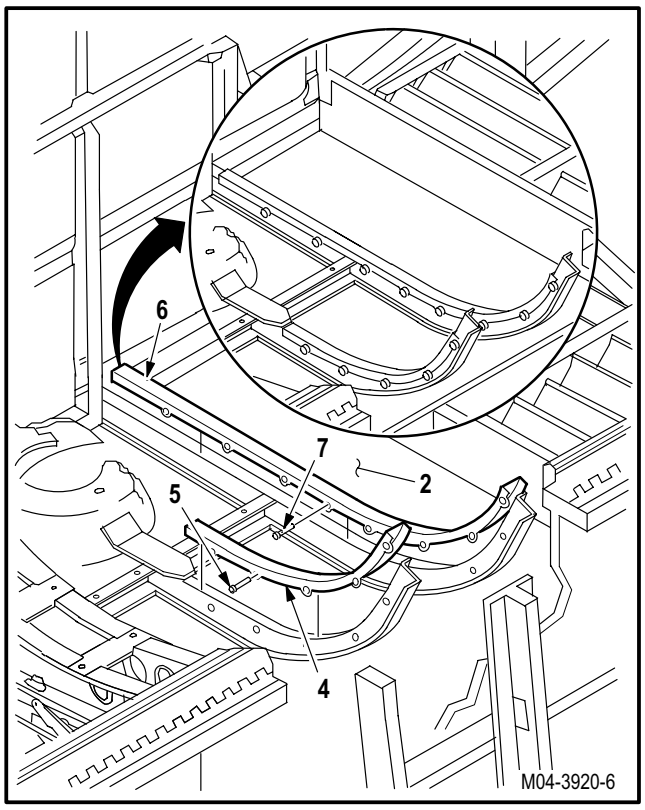
(1) Position shield (6) in nacelle (2).

(2) Install eight rivets (7) through shield (6) and nacelle (2) (TM 1-1500-204-23).

c. **Install new shield (4) in nacelle (2).**

(1) Position shield (4) in nacelle (2).

(2) Install five rivets (5) through shield (4) and nacelle (2) (TM 1-1500-204-23).

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## 4.96. LEFT NACELLE RADIATION SHIELDS REPLACEMENT - continued

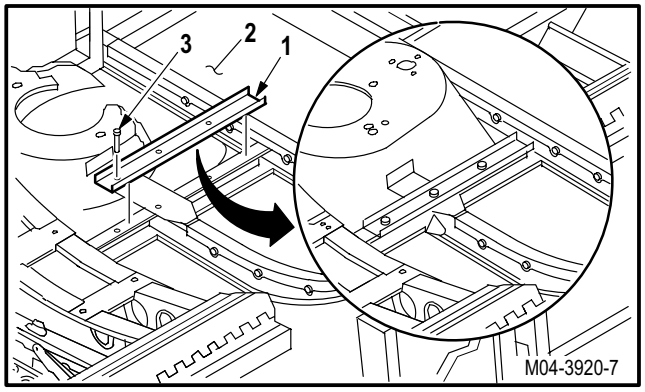
d. **Install new shield (1) in nacelle (2).**

(1) Position shield (1) in nacelle (2).

(2) Install four rivets (3) through shield (1) and nacelle (2) (TM 1-1500-204-23).

e. **Inspect (QA).**

f. **Install No. 1 engine** (para 4.48)**.**




END OF TASK

# SECTION V. ENGINES MAINTENANCE

## 4.97. NO. 1 ENGINE FUEL PRESSURE SWITCH REPLACEMENT

4.97.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.97.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 opened |

**Materials/Parts:**

Packing
Petrolatum (item 138, App F)

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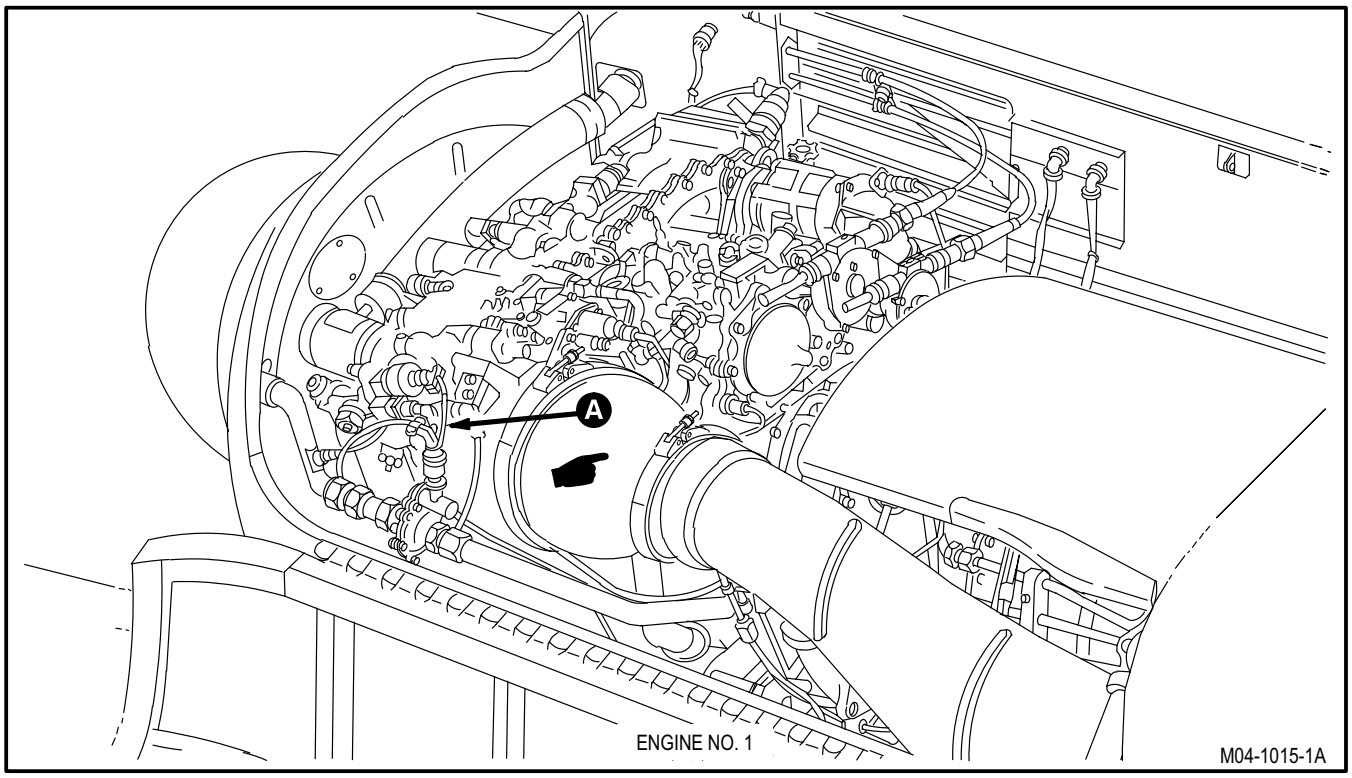
## 4.97. NO. 1 ENGINE FUEL PRESSURE SWITCH REPLACEMENT - continued

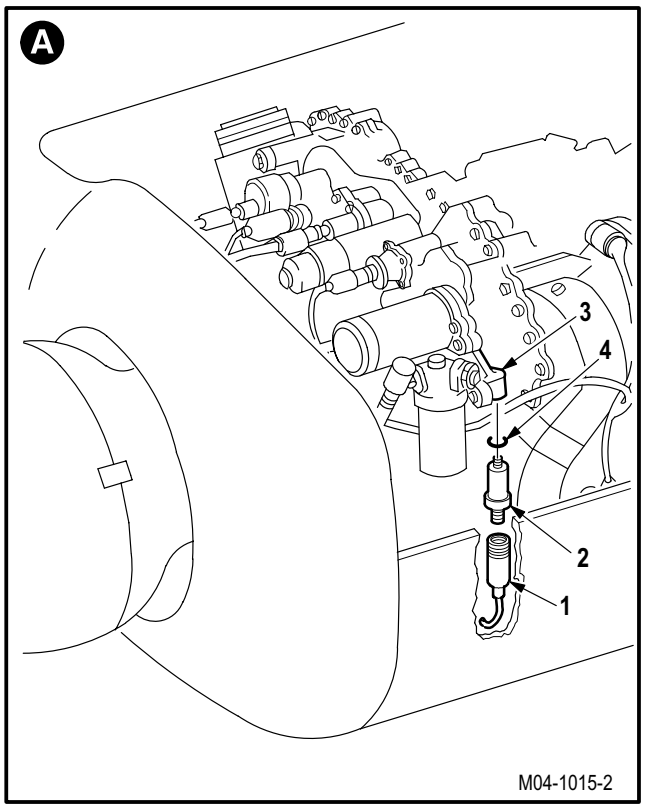



4.97.3. Removal

a. **Detach connector P45 (1) from pressure switch (2).**

b. **Remove switch (2) from gearbox housing boss (3).**

(1) Remove and discard switch (2) and packing (4).




4.97.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

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## 4.97. NO. 1 ENGINE FUEL PRESSURE SWITCH REPLACEMENT - continued

4.97.5. Inspection

a. **Check gearbox housing boss for thread damage.** Damage not to exceed 50 percent of one thread.

b. **Check connector for damage** (TM 55-1500-323-24)**.**

4.97.6. Installation

a. **Install switch (2) in boss (3).**

(1) Install new packing (4) on switch (2).

(a) Lubricate packing (4) and threads of pressure switch (2). Use petrolatum (item 138, App F).

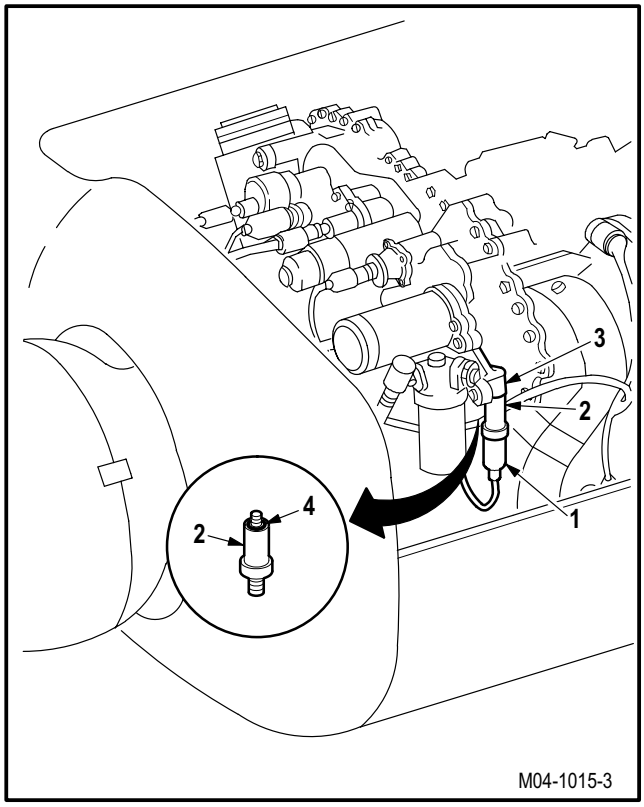
(2) Install switch (2) in boss (3).

b. **Attach connector P45 (1) to switch (2).**

c. **Inspect (QA).**

d. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

e. **Secure access door LN1** (para 2.2)**.**




END OF TASK

## 4.98. NO. 2 ENGINE FUEL PRESSURE SWITCH REPLACEMENT

4.98.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.98.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

**Materials/Parts:**

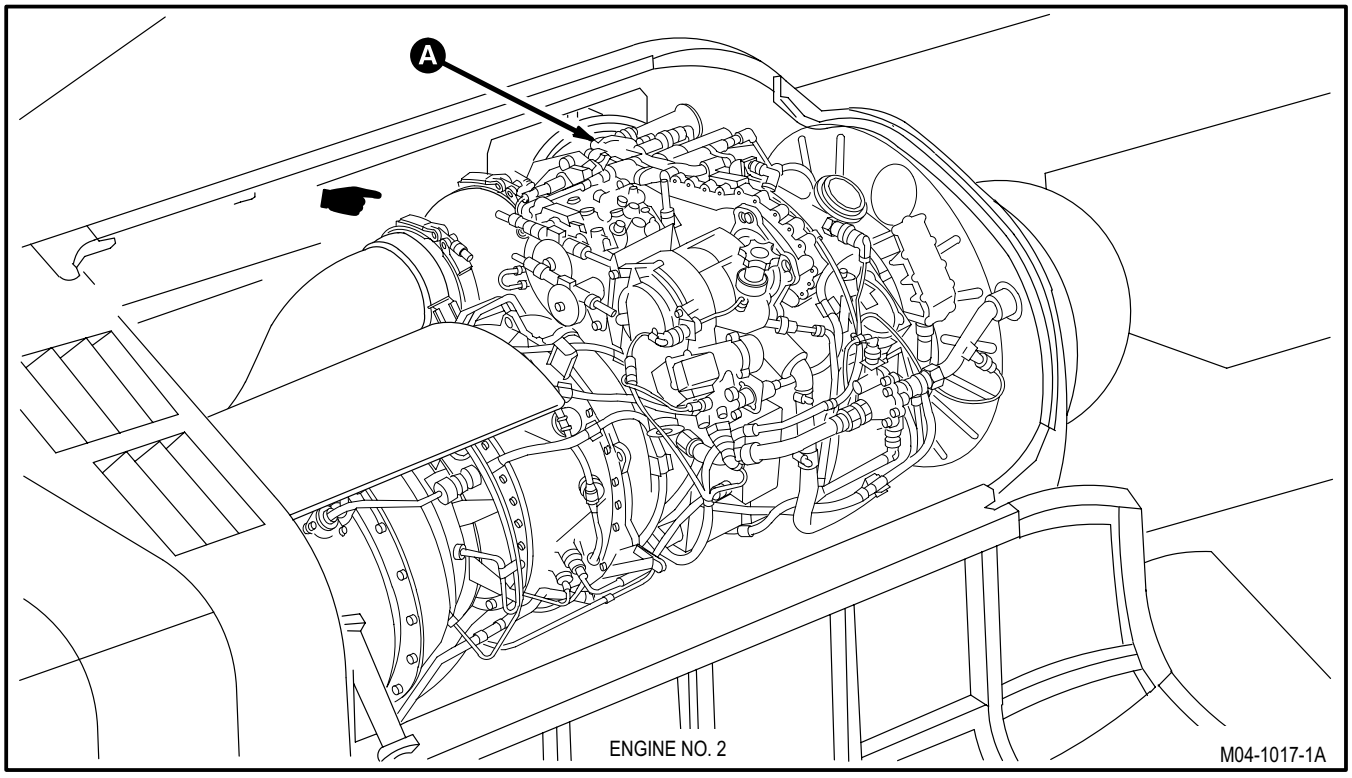
Packing
Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door RN1 opened |

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## 4.98. NO. 2 ENGINE FUEL PRESSURE SWITCH REPLACEMENT - continued

4.98.3. Removal

a. **Detach connector P46 (1) from pressure switch (2).**

b. **Remove switch (2) from gear box housing boss (3).**

(1) Remove and discard switch (2) and packing (4).

4.98.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.98.5. Inspection

a. **Check gearbox housing boss for thread damage.** Damage not to exceed 50 percent of one thread.

b. **Check connector for damage** (TM 55-1500-323-24)**.**

4.98.6. Installation

a. **Install switch (2) in boss (3).**

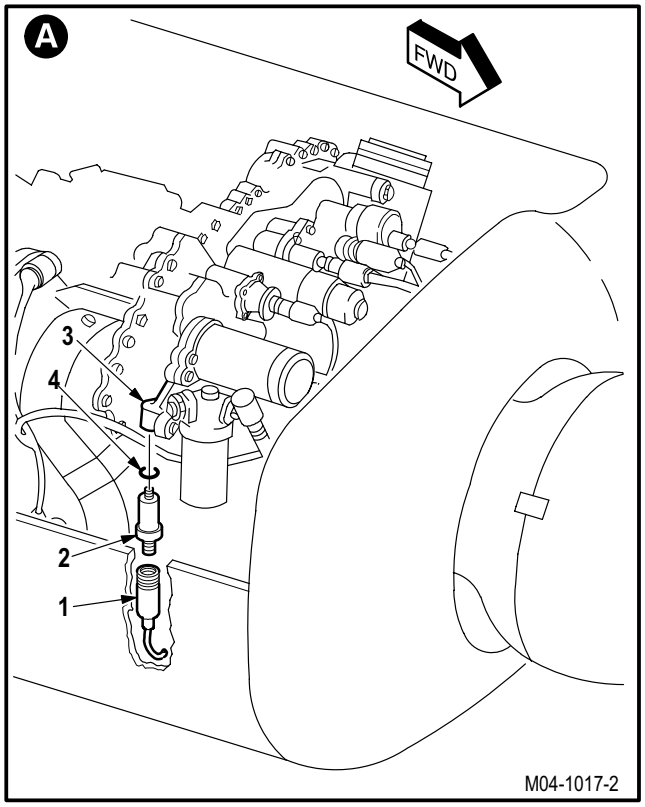
(1) Install new packing (4) on switch (2).

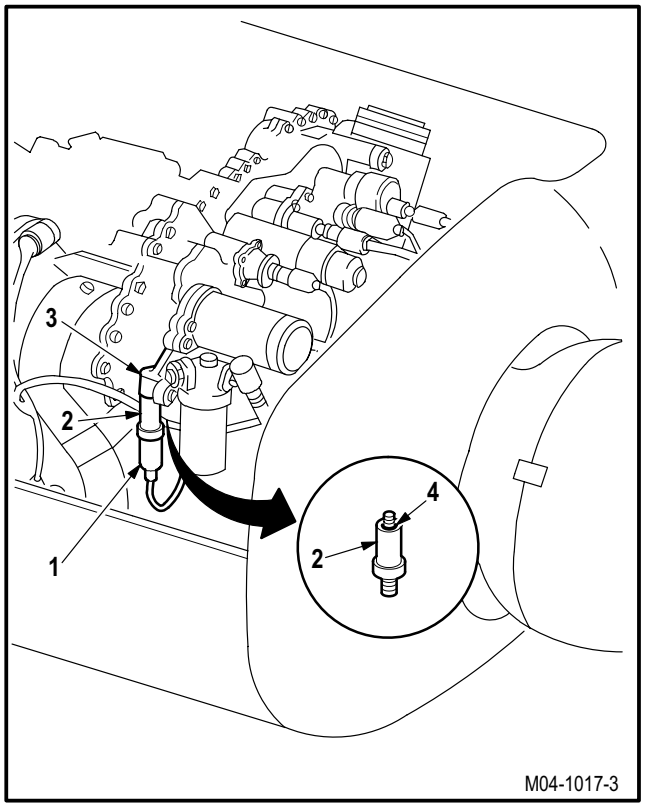
(a) Lubricate packing (4) and threads of switch (2). Use petrolatum (item 138, App F).

(2) Install switch (2) in boss (3).

b. **Attach connector P46 (1) to switch (2).**

c. **Inspect (QA).**

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**4.98. NO. 2 ENGINE FUEL PRESSURE SWITCH REPLACEMENT - continued**

d. **Perform power plants maintenance operational check (engine 2)** (TM 1-1520-238-T)**.**

e. **Secure access door RN1** (para 2.2)**.**

**Deleted paragraphs 4.99 and 4.100.**

**Pages 4-325 through 4-330 deleted.**

END OF TASK

## 4.101. NO. 1 OR NO. 2 ENGINE OIL CHIP COLLECTOR REMOVAL/INSTALLATION

4.101.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.101.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
3/4 x 3/8-inch drive open end socket wrench crowfoot attachment (item 97, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 200 inch-pound 1/4-inch drive click type torque wrench (item 436, App H)

**Materials/Parts:**

Packing
Adhesive (item 14, App F)
Lubricating oil (item 119, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

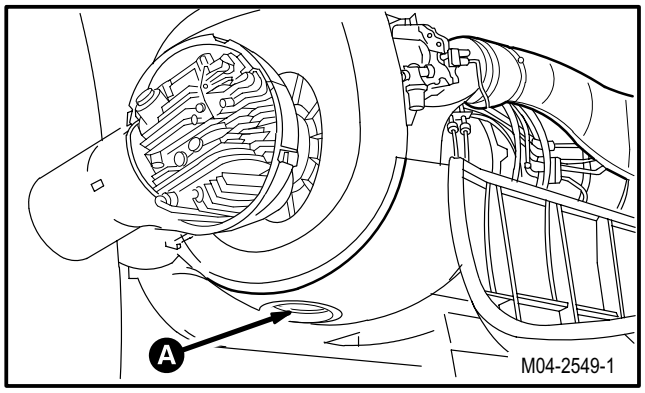
TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN2 or RN2 opened |
| 1.24 | Engine oil system drained |

**NOTE**

This task is typical for No. 1 or No. 2 engine oil chip collector.




4.101.3. Removal

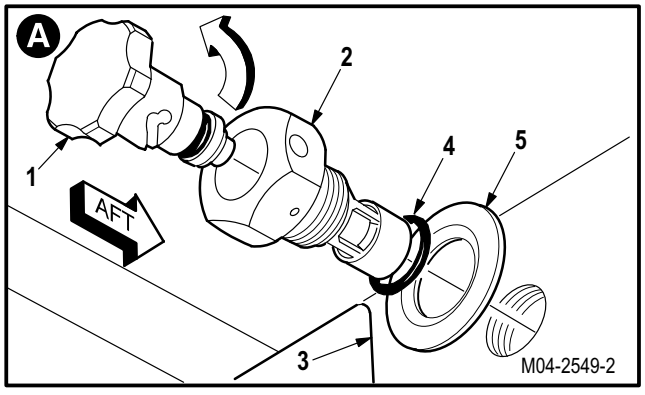
a. **Remove probe (1) from chip collector (2).**

(1) Push in probe and turn counterclockwise.

b. **Remove collector (2) from oil sump (3).**

(1) Remove and discard packing (4).

(2) Remove washer (5) from sump (3).

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## 4.101. NO. 1 OR NO. 2 ENGINE OIL CHIP COLLECTOR REMOVAL/INSTALLATION - continued

4.101.4. Cleaning

a. **Clean collector boss on sump** (para 1.47)**.**

4.101.5. Inspection

a. **Check sump for corrosion** (para 1.49)**.**

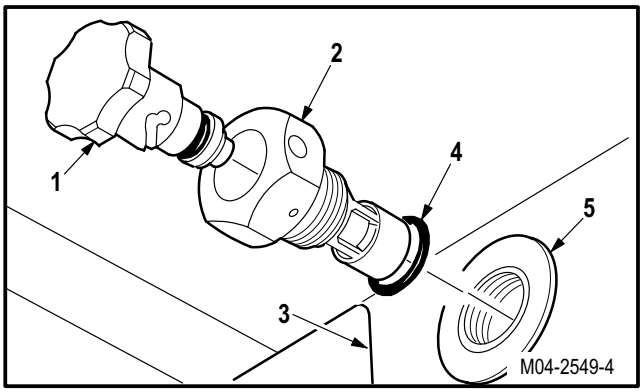
4.101.6. Installation

a. **Install collector (2) in oil sump (3).** Torque collector (2) to **130 INCH-POUNDS**.

(1) Install washer (5) on sump (3).

(a) Apply sealant to washer (5) on side opposite the countersink. Use adhesive (item 14, App F).

(b) With countersink facing out, aline hole in washer (5) with collector (2) mounting hole. Press in place. Wipe excess sealant with a clean dry rag.




(2) Install new packing (4) on collector (2).

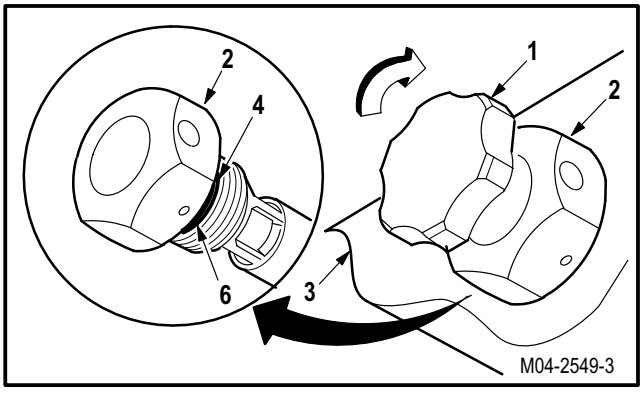
(a) Lubricate packing (4). Use lubricating oil (item 119, App F).

(b) Install packing (4) in collector groove (6).

(3) Torque collector (2) to **130 INCH-POUNDS**. Use crowfoot and torque wrench.

**NOTE**

Probe is properly installed when knurl tips and hex points aline.




b. **Install probe (1) in collector (2).**

(1) Push and turn probe clockwise.

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**4.101. NO. 1 OR NO. 2 ENGINE OIL CHIP COLLECTOR REMOVAL/INSTALLATION - continued**

c. **Service No. 1 or No. 2 engine oil system** (para 1.24)**.**

d. **Inspect (QA).**

e. **Secure access door LN2 or RN2** (para 2.2)**.**

f. **Perform power plants maintenance operational check (engine 1 or engine 2)** (TM 1-1520-238-T)**.**

END OF TASK

## 4.102. NO. 1 AND NO. 2 ENGINE WATER WASH COUPLING HALF REMOVAL/INSTALLATION

4.102.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.102.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
7/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 100, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
30 - 200 inch-pound 1/4-inch drive click type torque wrench (item 436, App H)

**Materials/Parts:**

Packing
Petrolatum (item 138, App F)

**Personnel Required:**

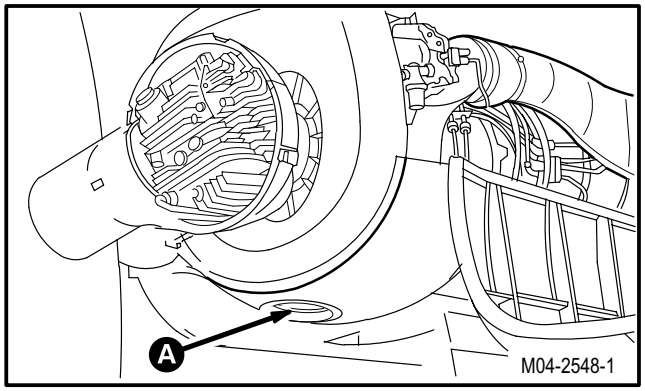
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN2 or RN2 opened |

**NOTE**

This task is typical for No. 1 or No. 2 engine water wash coupling half.

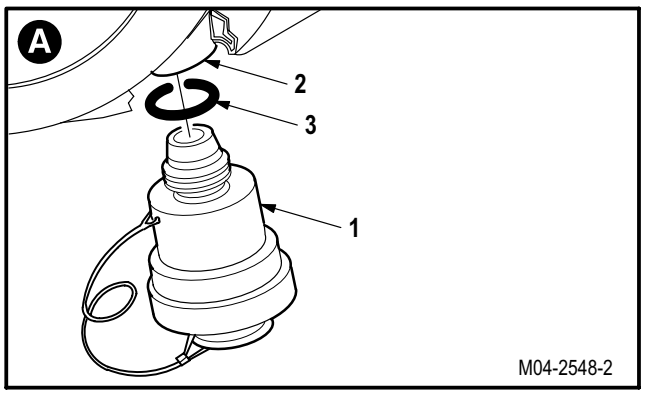



4.102.3. Removal

a. **Remove coupling half (1) from swirl frame (2).**

(1) Unscrew coupling half (1) from swirl frame (2).

(2) Remove and discard packing (3).

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## 4.102. NO. 1 AND NO. 2 ENGINE WATER WASH COUPLING HALF REMOVAL/INSTALLATION - continued

4.102.4. Cleaning

a. **Clean coupling boss on frame** (para 1.47)**.**

4.102.5. Inspection

a. **Check boss on frame for damaged threads.** None allowed.

b. **Check frame for corrosion** (para 1.49)**.**

4.102.6. Installation

a. **Install coupling half (1) in frame (2).** Torque coupling half (1) to **130 INCH-POUNDS**.

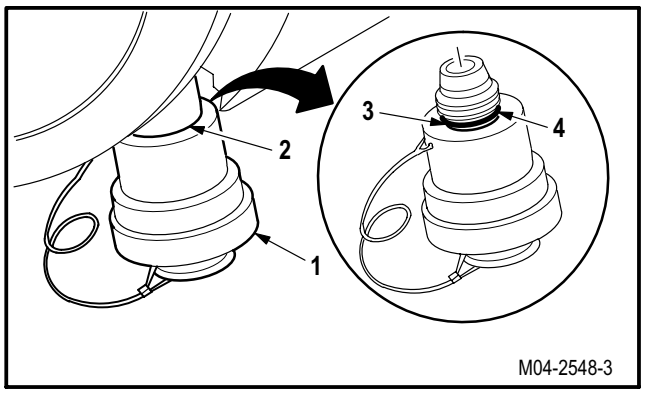
(1) Install packing (3) on coupling half (1).

(a) Lubricate new packing (3). Use petrolatum (item 138, App F).

(b) Install packing (3) in coupling half groove (4).

(2) Install coupling half (1).

(3) Torque coupling half (1) to **130 INCH-POUNDS**. Use crowfoot and torque wrench.




b. **Inspect (QA).**

c. **Secure access door LN2 or RN2** (para 2.2)**.**

END OF TASK

## 4.103. NO. 1 OR NO. 2 ENGINE SHROUD ASSEMBLY REMOVAL/INSTALLATION

4.103.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.103.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

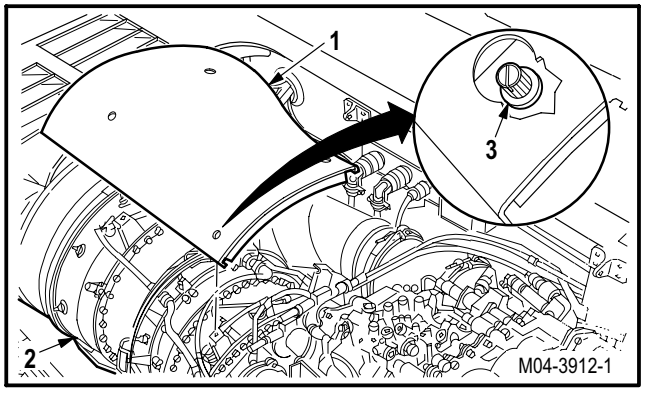
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 or RN1 opened |

4.103.3. Removal

a. **Remove engine shroud (1) from engine (2).**

(1) Release four turnlock fasteners (3).




4.103.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.103.5. Inspection

a. **Check shroud for cracks, loose, or missing hardware.** None allowed.

b. **Check shroud for corrosion** (para 1.49)**.**

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## 4.103. NO. 1 OR NO. 2 ENGINE SHROUD ASSEMBLY REMOVAL/INSTALLATION - continued

4.103.6. Repair

a. **Remove damaged fastener (3).**

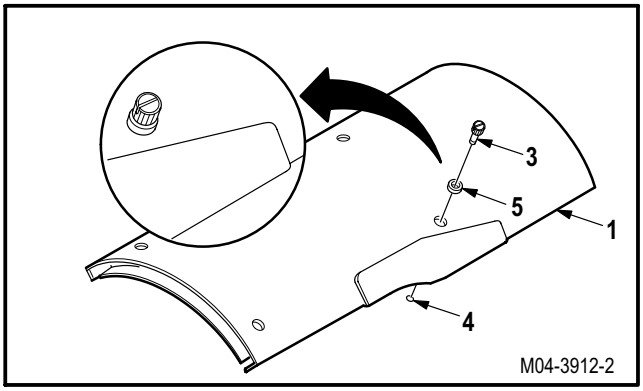
(1) Remove retaining ring (4) from fastener (3).

(2) Remove fastener (3) and washer (5) from shroud (1).

b. **Install new fastener (3).**

(1) Install fastener (3) through washer (5) and shroud (1).

(2) Install retaining ring (4) on fastener (3).




4.103.7. Installation

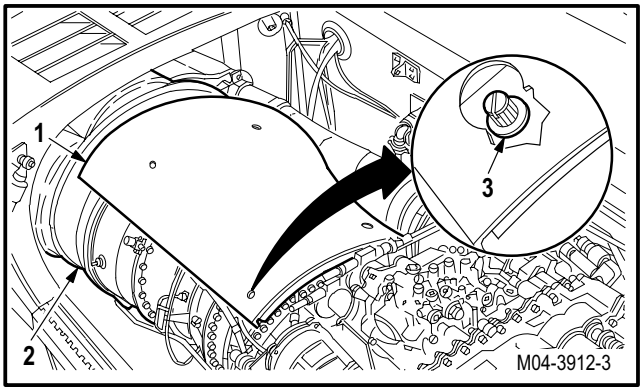
a. **Install shroud (1) on engine (2).**

(1) Position shroud (1) on engine (2).

(2) Lock four fasteners (3).

b. **Inspect (QA).**

c. **Secure access door LN1 or RN1** (para 2.2)**.**




END OF TASK

## 4.104. ENGINE SHROUD SEAL RING REMOVAL/INSTALLATION

4.104.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.104.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 371, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**Personnel Required:**

68B Aircraft Powerplant Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

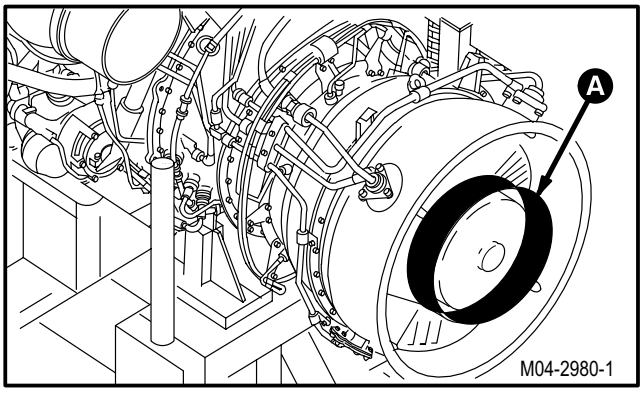
TM 55-2840-248-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |

**NOTE**

This task is typical for No. 1 or No. 2 engine shroud seal ring.

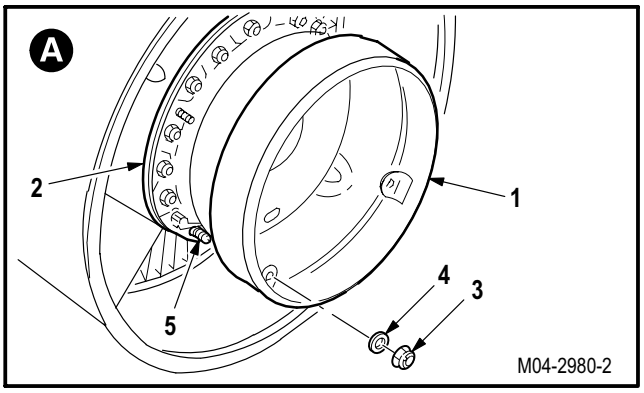



4.104.3. Removal

a. **Remove ring (1) from C-sump housing (2).**

(1) Remove four nuts (3) and washers (4) from studs (5).

(2) Remove ring (1).

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## 4.104. ENGINE SHROUD SEAL RING REMOVAL/INSTALLATION - continued

4.104.4. Cleaning

a. **Clean housing** (TM 55-2840-248-23)**.**

4.104.5. Inspection

a. **Check housing for cracks and studs for stripped threads** (TM 55-2840-248-23)**.**

b. **Check seal ring for corrosion** (para 1.47)**.**

4.104.6. Installation

a. **Install ring (1) on C-sump housing (2).** Torque four nuts (3) to **45 INCH-POUNDS**.

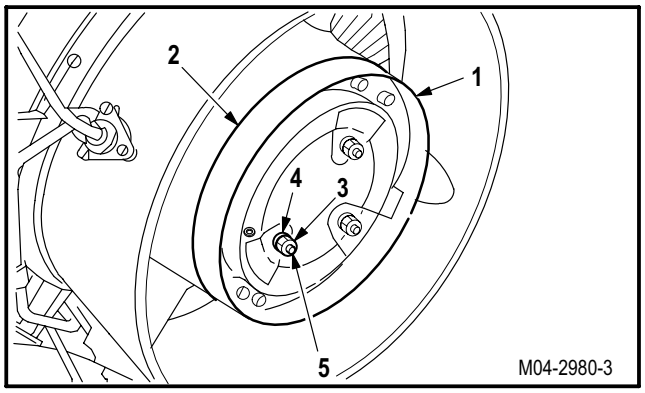
(1) Position ring (1) on housing (2).

(2) Install four washers (4) and nuts (3) on studs (5).

(3) Torque four nuts (3) to **45 INCH-POUNDS**. Use torque wrench.

b. **Inspect (QA).**

c. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**




END OF TASK

## 4.105. NO. 1 AND NO. 2 ENGINE GEARBOX DRAIN HOSE REMOVAL/INSTALLATION

4.105.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.105.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
9/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 85, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Personnel Required:**

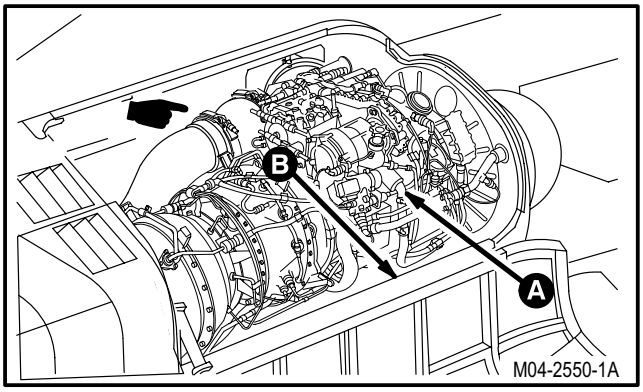
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

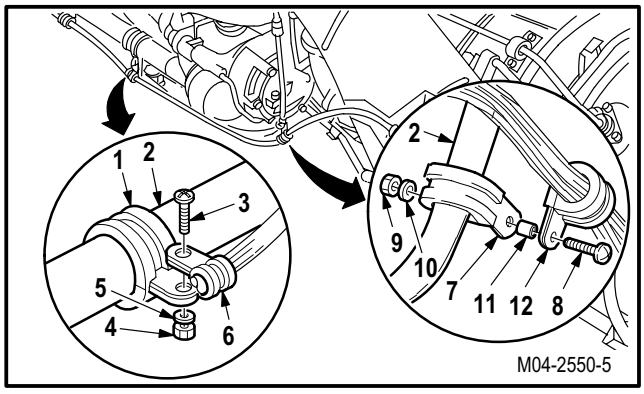
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN1, LN3, and LN4 or RN1, RN3, and RN4 opened |

**NOTE**

This is typical for No. 1 or No. 2 engine gearbox drain hose.




4.105.3. Removal

a. **Remove wire harness support clamp (1) from hydromechanical unit (HMU) drain hose (2).**

(1) Hold screw (3). Remove nut (4) and washer (5).

(2) Remove screw (3) from clamps (1) and (6).

(3) Remove clamp (1).

b. **Remove wire harness support clamp (7) from hose (2).**

(1) Hold screw (8). Remove nut (9) and washer (10).

(2) Remove screw (8) from clamp (7), spacer (11), and clamp (12).

(3) Remove clamp (7).

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**4.105. NO. 1 AND NO. 2 ENGINE GEARBOX DRAIN HOSE REMOVAL/INSTALLATION - continued**

c. **Remove hose (2) from vent drain elbow (13).**

(1) Hold elbow (13). Remove nut (14).

d. **Remove hose (2) from manifold (15).**

(1) Hold adapter (16). Remove nut (17).

4.105.4. Cleaning

a. **Clean elbow and adapter** (para 1.47)**.**

4.105.5. Inspection

a. **Check elbow for damaged threads.** None allowed.

b. **Check adapter for damaged threads or looseness.** None allowed.

c. **Check elbow and adapter for corrosion** (para 1.49)**.**

4.105.6. Installation

a. **Install hose (2) on manifold (15).** Torque nut (17) to **50 INCH-POUNDS**.

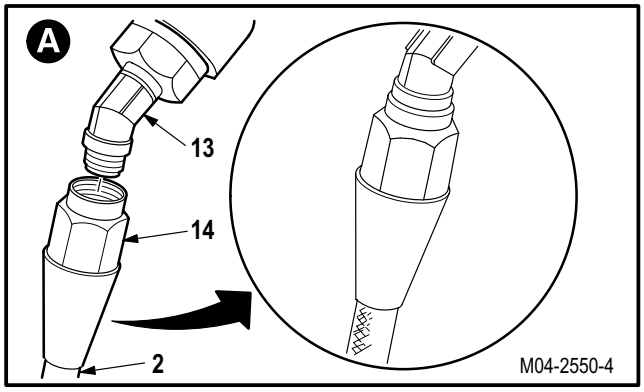
(1) Hold adapter (16). Install nut (17) on adapter (16).

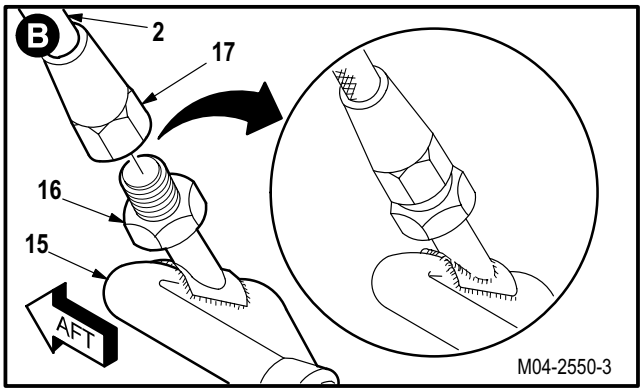
(2) Torque nut (17) to **50 INCH-POUNDS**. Use crowfoot and torque wrench.

b. **Install hose (2) on elbow (13).** Torque nut (14) to **85 INCH-POUNDS**.

(1) Hold elbow (13). Install nut (14) on elbow (13).

(2) Torque nut (14) to **85 INCH-POUNDS**. Use crowfoot and torque wrench.

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**4.105. NO. 1 AND NO. 2 ENGINE GEARBOX DRAIN HOSE REMOVAL/INSTALLATION - continued**

c. **Install clamp (1) on hose (2).**

(1) Install screw (3) through clamps (6) and (1).

(2) Install washer (5) and nut (4).

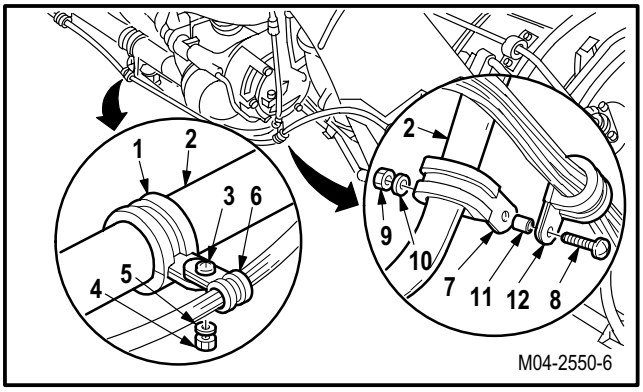
d. **Install clamp (7) on hose (2).**

(1) Install screw (8) through clamp (12), spacer (11), and clamp (7).

(2) Install washer (10) and nut (9).

e. **Inspect (QA).**

f. **Secure access doors LN1, LN3, and LN4 or RN1, RN3, and RN4** (para 2.2)**.**




END OF TASK

## 4.106. NO. 1 ENGINE OVERSPEED DRAIN VALVE HOSE REMOVAL/INSTALLATION

4.106.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.106.2. Initial Setup

**Tools:**

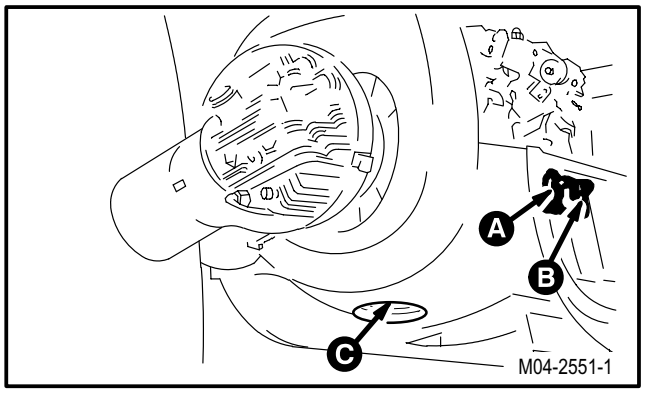
Aircraft mechanic's tool kit (item 376, App H)
9/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 85, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

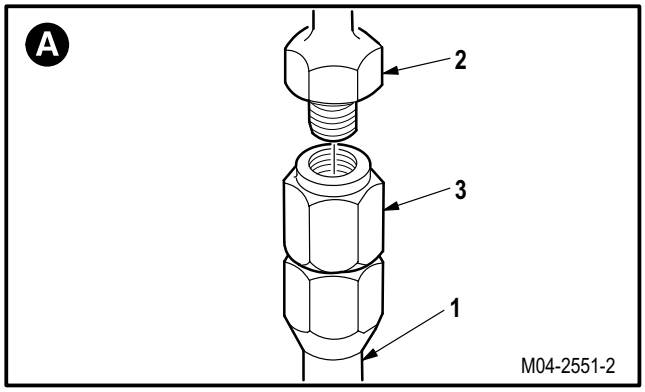
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN1 and LN3 opened |




4.106.3. Removal

a. **Remove overspeed drain valve hose (1) from fitting (2).**

(1) Hold fitting (2). Remove nut (3).

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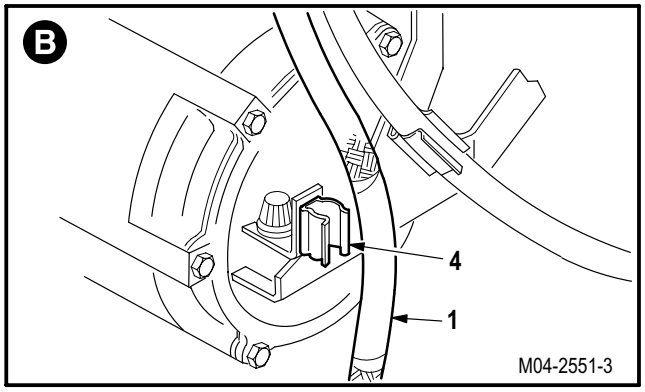
## 4.106. NO. 1 ENGINE OVERSPEED DRAIN VALVE HOSE REMOVAL/INSTALLATION - continued

b. **Remove hose (1) from clip (4).**



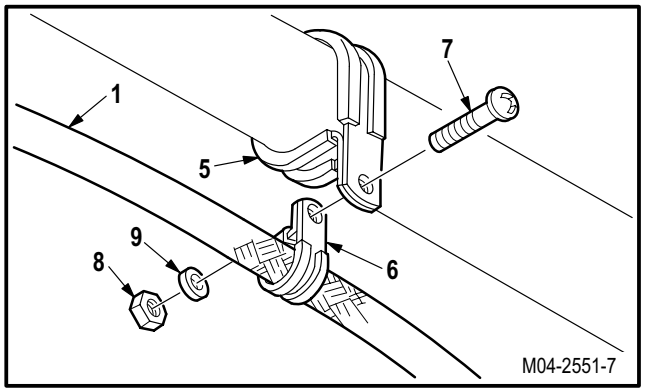

c. **Remove clamp (5) from hose (1) and clamp (6).**

(1) Hold screw (7). Remove nut (8) and washer (9).

(2) Remove screw (7) and clamp (5).

d. **Remove hose (1) from engine drain manifold (10).**

(1) Hold manifold (10). Remove nut (11).




4.106.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.106.5. Inspection

a. **Check nuts, tube nut, outlet union, and common drain union for damaged threads.** None allowed.

b. **Check engine clip for cracks.** None allowed.

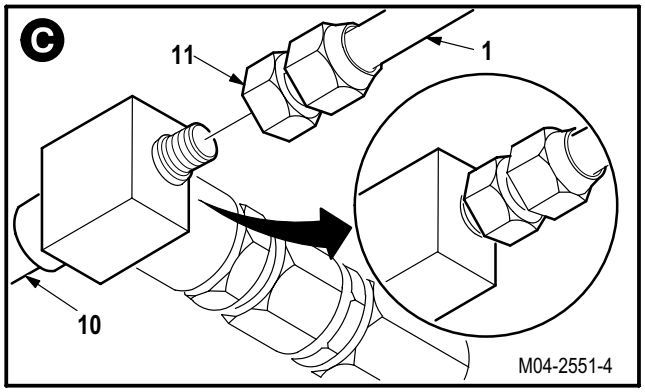
c. **Check nuts, tube nut, outlet union, common drain union, and engine clip for corrosion** (para 1.49)**.**

4.106.6. Installation

a. **Install hose (1) on manifold (10).** Torque nut (11) to **85 INCH-POUNDS**.

(1) Hold manifold (10). Install nut (11).

(2) Torque nut (11) to **85 INCH-POUNDS**. Use crowfoot and torque wrench.

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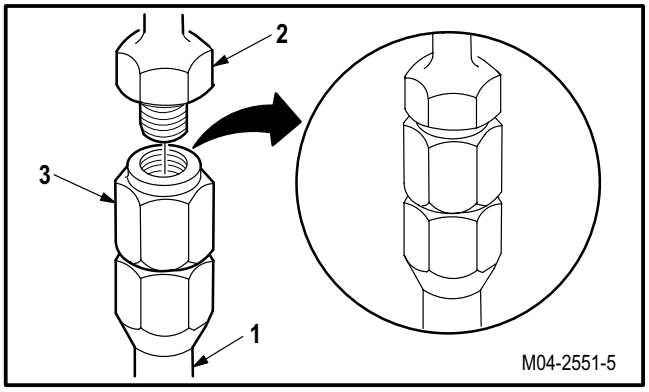
**4.106. NO. 1 ENGINE OVERSPEED DRAIN VALVE HOSE REMOVAL/INSTALLATION - continued**

b. **Install hose (1) on fitting (2).** Torque nut (3) to **60 INCH-POUNDS**.

(1) Hold fitting (2). Install nut (3).

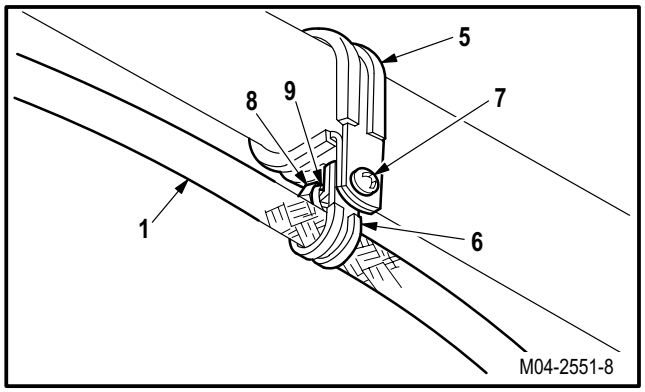
(2) Torque nut (3) to **60 INCH-POUNDS**. Use crowfoot and torque wrench.




c. **Install hose (1) and clamp (6) on clamp (5).**

(1) Install screw (7) through clamps (5) and (6).

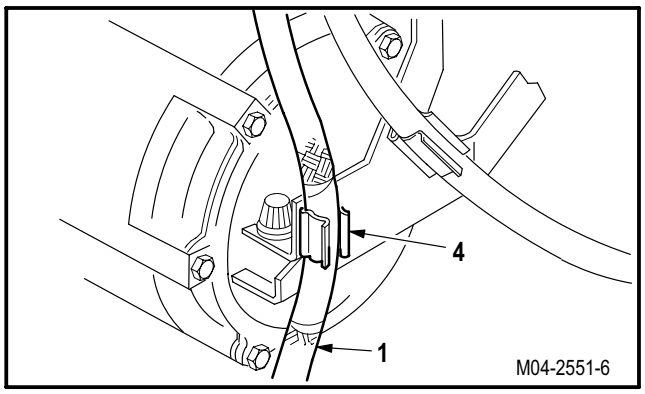
(2) Hold screw (7). Install washer (9) and nut (8).




d. **Install hose (1) in clip (4).**

e. **Inspect (QA).**

f. **Secure access doors LN1 and LN3** (para 2.2)**.**




END OF TASK

## 4.107. NO. 2 ENGINE OVERSPEED DRAIN VALVE HOSE REMOVAL/INSTALLATION

4.107.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.107.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
9/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 85, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

Do not install removed engine in handling adapter.

4.107.3. Removal

a. **Remove No. 2 engine from nacelle** (para 4.8)**.**

b. **Remove wire harness support clamp (1) from overspeed drain valve hose (2).**

(1) Hold screw (3). Remove nut (4) and washer (5).

(2) Remove screw (3) from clamps (1) and (6).

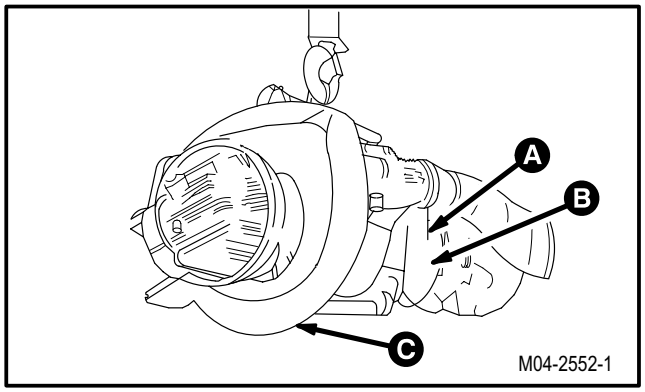
(3) Remove clamp (1).

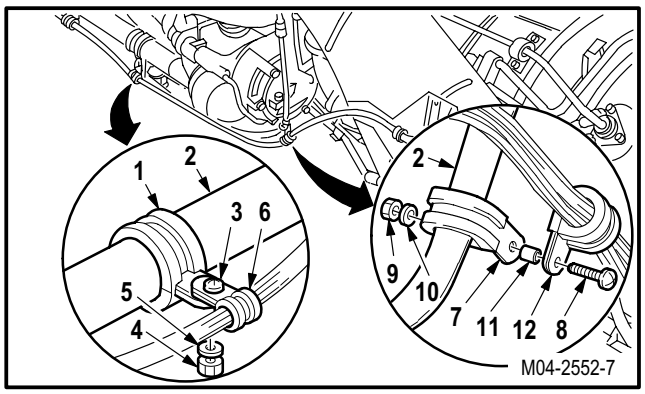
c. **Remove wire harness support clamp (7) from hose (2).**

(1) Hold screw (8). Remove nut (9) and washer (10).

(2) Remove screw (8) from clamp (7), spacer (11), and clamp (12).

(3) Remove clamp (7).

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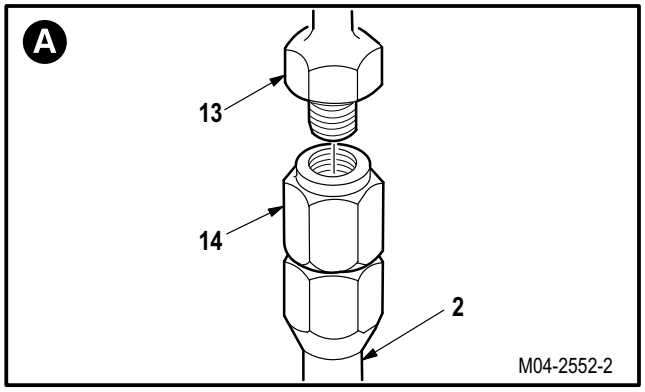
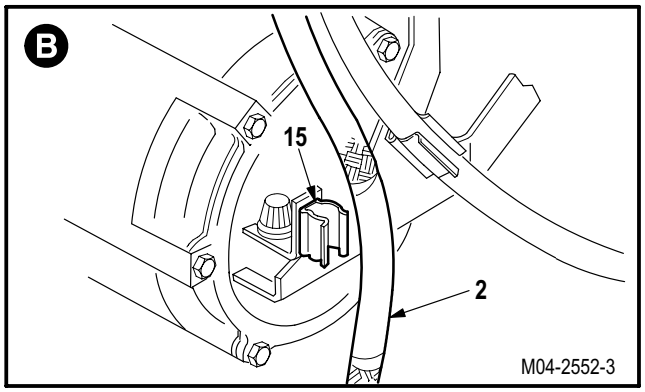
## 4.107. NO. 2 ENGINE OVERSPEED DRAIN VALVE HOSE REMOVAL/INSTALLATION - continued

d. **Remove overspeed drain valve hose (2) from fitting (13).**

(1) Hold fitting (13). Remove nut (14).

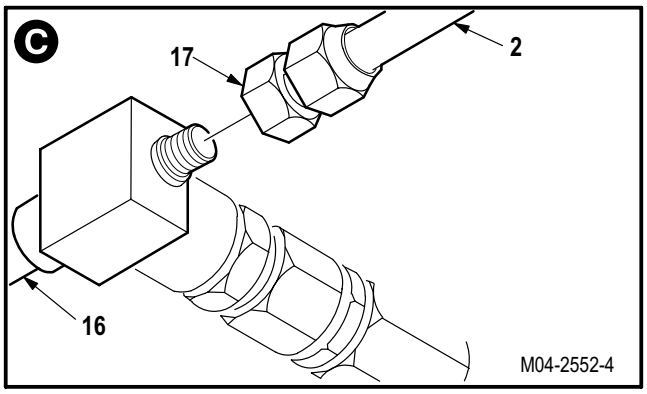



e. **Remove hose (2) from clip (15).**




f. **Remove hose (2) from engine drain manifold (16).**

(1) Hold manifold (16). Remove nut (17).




4.107.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.107.5. Inspection

a. **Check nuts, tube nut, outlet union, and common drain union for damaged threads.** None allowed.

b. **Check engine clip for cracks.** None allowed.

c. **Check nuts, tube nut, outlet union, common drain union, and engine clip for corrosion** (para 1.49)**.**

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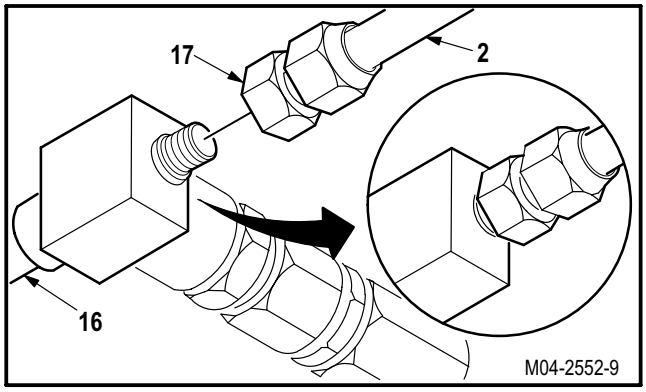
## 4.107. NO. 2 ENGINE OVERSPEED DRAIN VALVE HOSE REMOVAL/INSTALLATION - continued

4.107.6. Installation

a. **Install hose (2) on manifold (16).** Torque nut (17) to **85 INCH-POUNDS**.

(1) Hold manifold (16). Install nut (17).

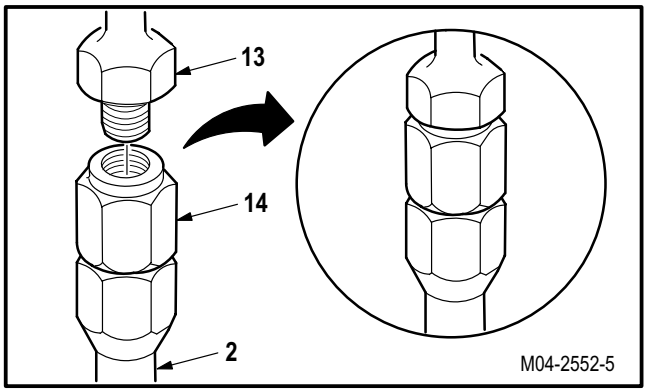
(2) Torque nut (17) to **85 INCH-POUNDS**. Use crowfoot and torque wrench.



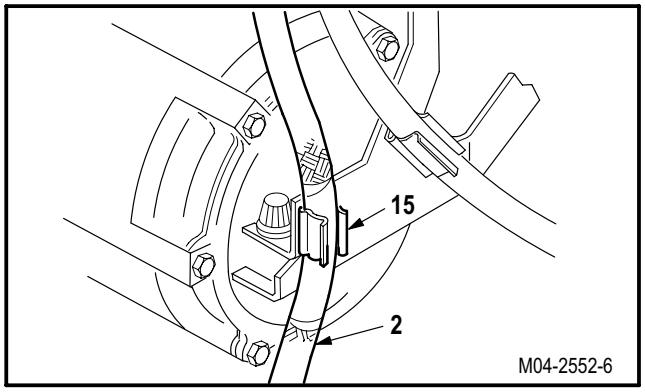

b. **Install hose (2) on fitting (13).** Torque nut (14) to **60 INCH-POUNDS**.

(1) Hold fitting (13). Install nut (14).

(2) Torque nut (14) to **60 INCH-POUNDS**. Use crowfoot and torque wrench.




c. **Install hose (2) in clip (15).**




d. **Install clamps (1) and (6) on hose (2).**

(1) Install screw (3) through clamps (6) and (1).

(2) Install washer (5) and nut (4).

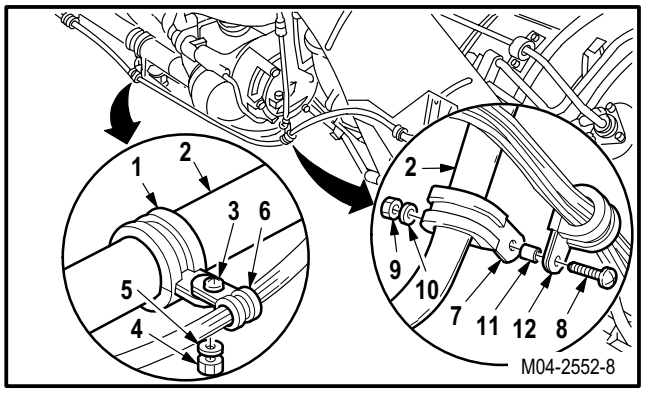
e. **Install clamps (7) and (12) on hose (2).**

(1) Install screw (8) through clamp (12), spacer (11), and clamp (7).

(2) Hold screw (8). Install washer (10) and nut (9).

f. **Inspect (QA).**

g. **Install No. 2 engine in nacelle** (para 4.53)**.**




END OF TASK

## 4.108. NO. 1 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION

4.108.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.108.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 77, App H)
9/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 85, App H)
7/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 100, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

**Materials/Parts:**

Packing (2)
Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

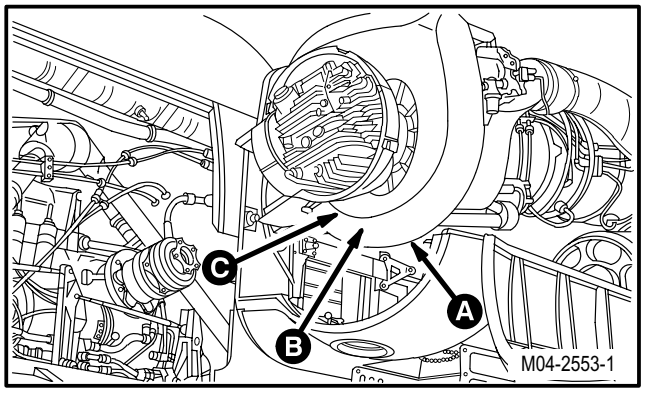
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

4.108.3. Removal

**NOTE**

Do not install removed engine in handling adapter.

a. **Remove No. 1 engine** (para 4.3)**.**

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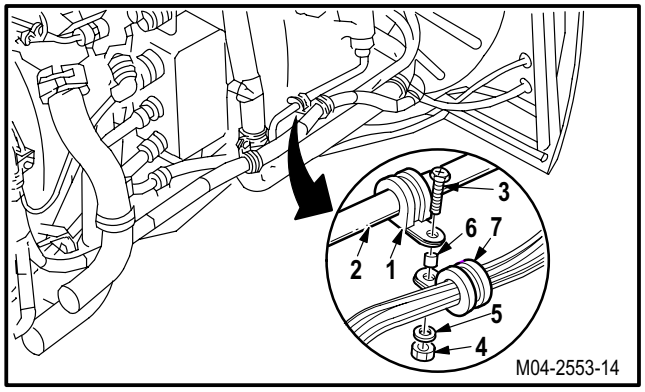
## 4.108. NO. 1 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION - continued

b. **Remove wire harness support clamp (1) from drain manifold (2).**

(1) Hold screw (3). Remove nut (4) and washer (5).

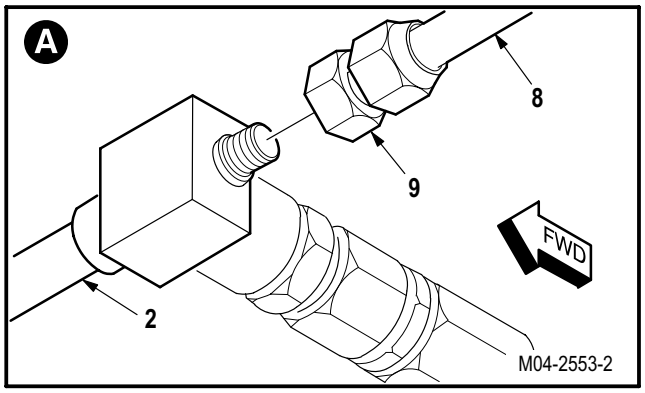
(2) Remove screw (3) from clamp (1), spacer (6), and clamp (7).

(3) Remove clamp (1).




c. **Remove pressure and overspeed unit drain hose (8) from drain manifold (2).**

(1) Hold manifold (2). Remove nut (9).



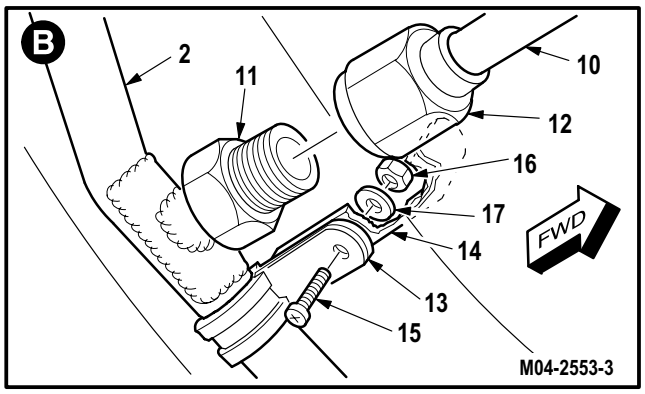

d. **Remove swirl frame drain tube (10) from manifold (2).**

(1) Hold adapter (11). Remove nut (12).

e. **Remove clamp (13) from engine clip (14) and manifold (2).**

(1) Hold screw (15). Remove nut (16) and washer (17).

(2) Remove screw (15) and clamp (13).

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**4.108. NO. 1 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION - continued**

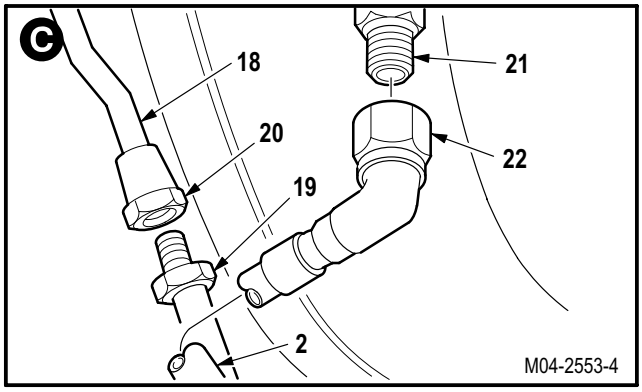
f. **Remove hydromechanical unit (HMU) drain hose (18) from manifold (2).**

(1) Hold adapter (19). Remove nut (20).

g. **Remove manifold (2) from common drain nipple (21).**

(1) Hold nipple (21). Use open end wrench.

(2) Remove nut (22).




h. **Remove drain hose (23) from manifold (2).**

(1) Hold nipple (24). Use open end wrench.

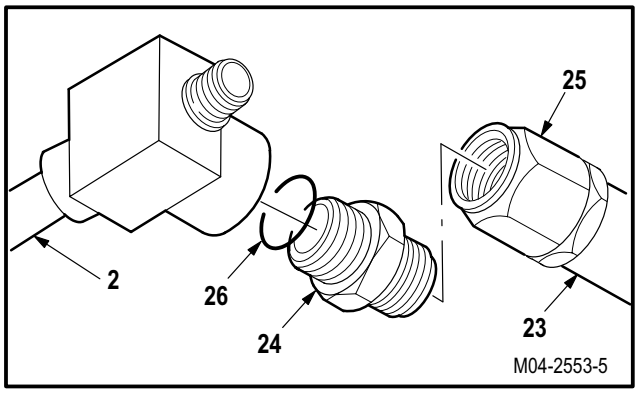
(2) Remove nut (25).

i. **Remove outlet nipple (24) from manifold (2).**

(1) Hold manifold (2).

(2) Remove nipple (24). Use open end wrench.

(3) Remove and discard packing (26).




4.108.4. Cleaning

a. **Clean hose nuts, tube nuts, outlet nipple, and common drain nipple** (para 1.47)**.**

4.108.5. Inspection

a. **Check hose nuts, tube nut, outlet nipple, and common drain nipple for damaged threads.** None allowed.

b. **Check engine clip for cracks.** None allowed.

c. **Check hose nuts, tube nut, outlet nipple, common drain nipple, and engine clip for corrosion** (para 1.49)**.**

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## 4.108. NO. 1 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION - continued

4.108.6. Installation

a. **Install nipple (24) on manifold (2).** Torque nipple (24) to **300 INCH-POUNDS**.

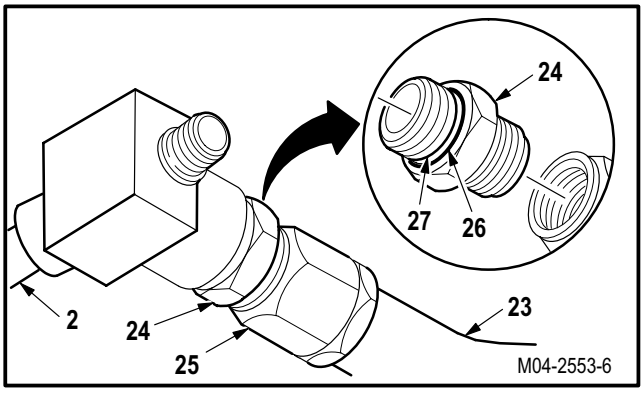
(1) Lubricate new packing (26). Use petrolatum (item 138, App F).

(2) Install packing (26) in nipple groove (27).

(3) Install nipple (24) on manifold (2).

(4) Hold manifold (2).

(5) Torque nipple (24) to **300 INCH-POUNDS**. Use crowfoot and torque wrench.



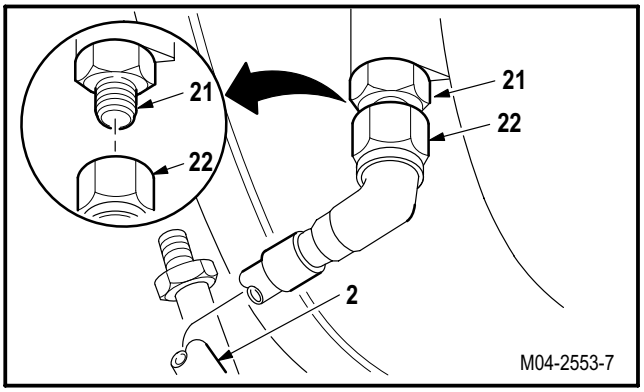

b. **Install drain hose (23) on manifold (2).**

(1) Hold nipple (24). Use open end wrench.

(2) Install nut (25).

c. **Install manifold (2) on nipple (21).**

(1) Hold nipple (21). Install nut (22) on nipple (21).

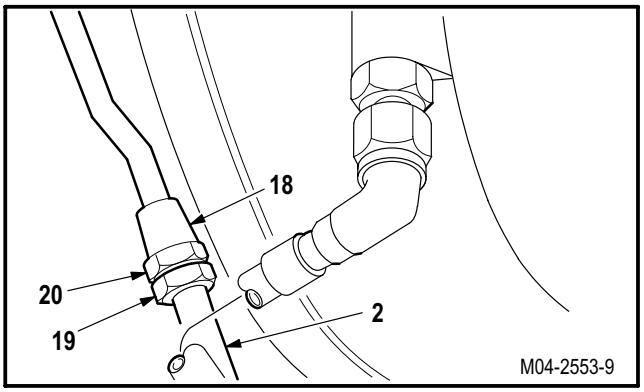



**CAUTION**

Do not twist hoses. Twisted hoses may collapse or crack when connected.

d. **Install HMU drain hose (18) on manifold (2).**

(1) Hold adapter (19). Install nut (20).

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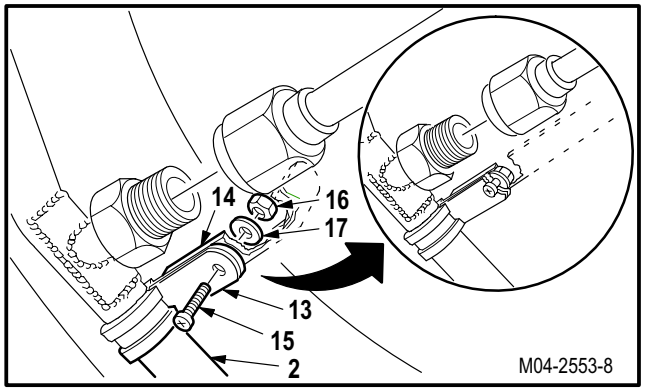
**4.108. NO. 1 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION - continued**

e. **Install clamp (13) on manifold (2) and clip (14).**

(1) Install clamp (13) on manifold (2).

(2) Insert screw (15) through clamp (13) and clip (14).

(3) Install washer (17) and nut (16) on screw (15).

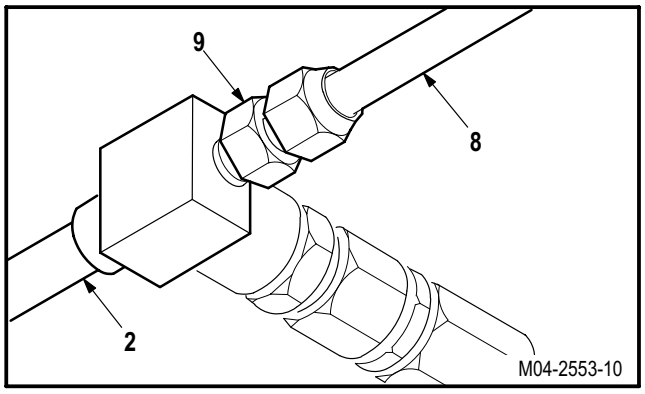



f. **Install hose (8) on manifold (2).**

(1) Install nut (9).

g. **Install tube (10) on manifold (2).**

(1) Install nut (12) on adapter (11).




h. **Torque nut (9) to 85 INCH-POUNDS.**

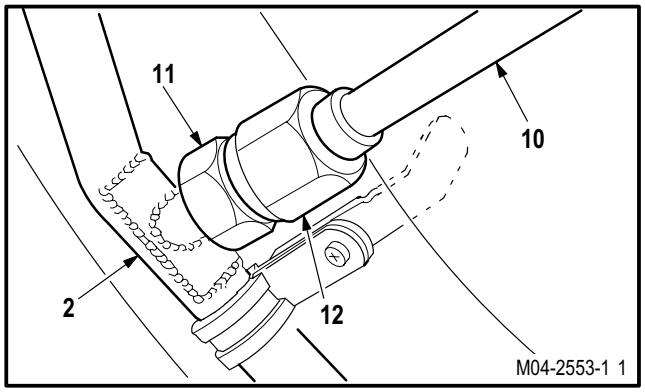
(1) Hold manifold (2). Use open end wrench.

(2) Torque nut (9) to **85 INCH-POUNDS**. Use torque wrench and crowfoot.

i. **Torque nut (12) to 120 INCH-POUNDS.**

(1) Hold adapter (11). Use open end wrench.

(2) Torque nut (12) to **120 INCH-POUNDS**. Use crowfoot and torque wrench.




j. **Torque nut (22) to 290 INCH-POUNDS.**

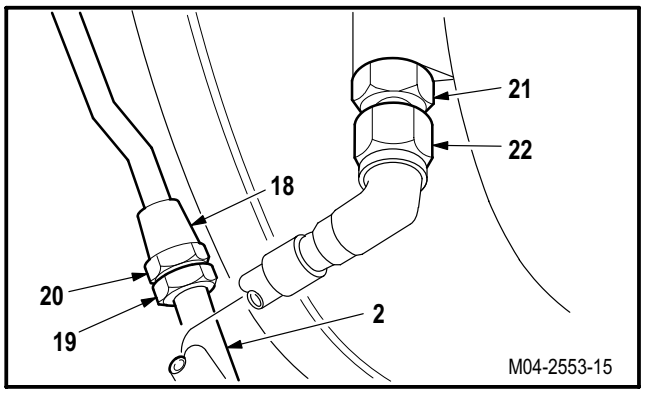
(1) Hold nipple (21). Use open end wrench.

(2) Torque nut (22) to **290 INCH-POUNDS**. Use crowfoot and torque wrench.

k. **Torque nut (20) to 50 INCH-POUNDS.**

(1) Hold manifold (2). Use open end wrench.

(2) Torque nut (20) to **50 INCH-POUNDS**. Use torque wrench and crowfoot.

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**4.108. NO. 1 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION - continued**

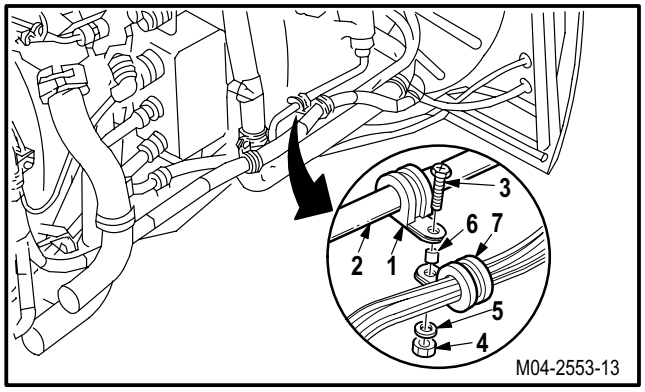
l. **Install clamp (1) on manifold (2).**

(1) Install screw (3) through clamp (1), spacer (6), and clamp (7).

(2) Install washer (5) and nut (4).

m. **Inspect (QA).**

n. **Install No. 1 engine** (para 4.48)**.**




END OF TASK

## 4.109. NO. 2 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION

4.109.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.109.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 77, App H)
9/16 x 1/4-inch drive open end box socket wrench crowfoot attachment (item 85, App H)
7/8 x 3/8-inch drive open end socket wrench crowfoot attachment (item 100, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

**Materials/Parts:**

Packing
Petrolatum (item 138, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

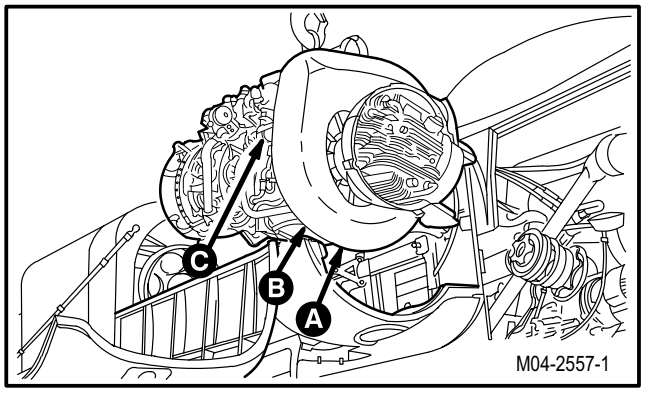
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

4.109.3. Removal

**NOTE**

Do not install removed engine in handling adapter.

a. **Remove No. 2 engine** (para 4.8)**.**

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## 4.109. NO. 2 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION - continued

b. **Remove drain hose (1) from engine drain manifold (2).**

(1) Hold nipple (3). Use open end wrench.

(2) Remove nut (4).

c. **Remove nipple (3) from manifold (2).**

(1) Hold manifold (2).

(2) Remove nipple (3). Use open end wrench.

(3) Remove and discard packing (5).

d. **Remove pressure and overspeed unit drain hose (6) from manifold (2).**

(1) Hold manifold (2). Remove nut (8).

e. **Remove swirl frame drain tube (9) from manifold (2).**

(1) Hold adapter (10). Remove nut (11).

f. **Remove clamp (12) from engine clip (13) and manifold (2).**

(1) Hold screw (14). Remove nut (15) and washer (16).

(2) Remove screw (14) and clamp (12).

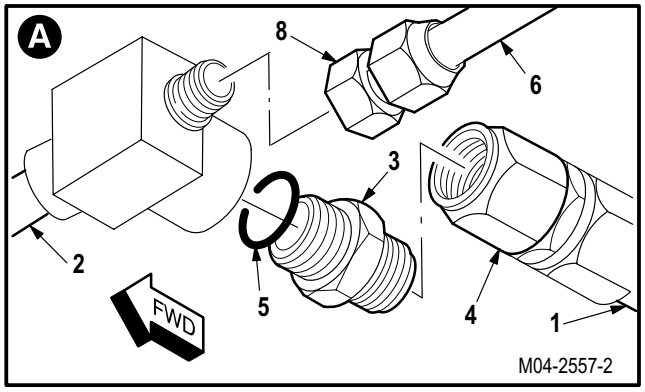
g. **Remove manifold (2) from common drain nipple (17).**

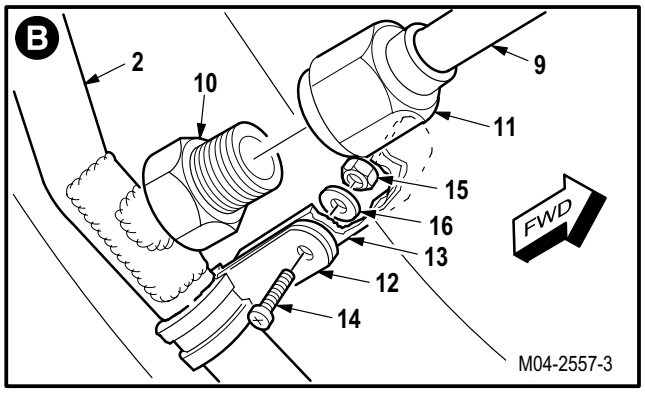
(1) Hold nipple (17). Use open end wrench.

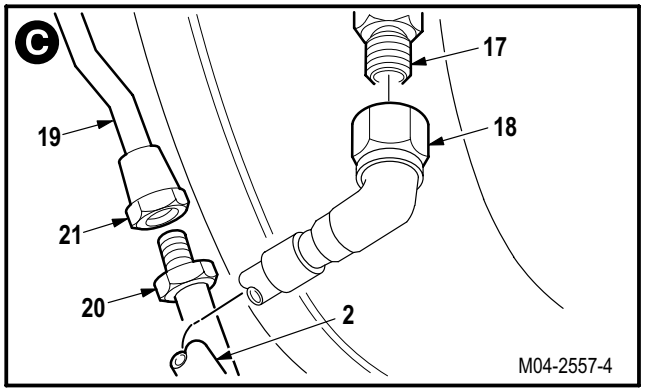
(2) Remove nut (18).

h. **Remove hydromechanical unit (HMU) drain hose (19) from manifold (2).**

(1) Hold adapter (20). Remove nut (21).

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## 4.109. NO. 2 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION - continued

4.109.4. Cleaning

a. **Clean hose nuts, tube nut, outlet nipple, and common drain nipple** (para 1.47)**.**

4.109.5. Inspection

a. **Check hose nuts, tube nut, outlet nipple, and common drain nipple for damaged threads.** None allowed.

b. **Check engine clip for cracks.** None allowed.

c. **Check hose nuts, tube nut, outlet nipple, common drain nipple, and engine clip for corrosion** (para 1.49)**.**

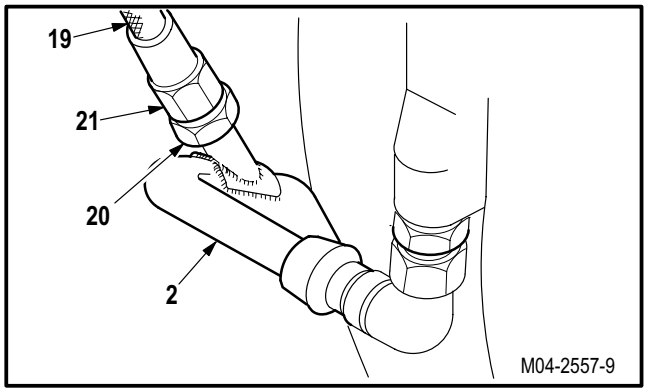
4.109.6. Installation

**CAUTION**

Do not twist hoses. Twisted hoses may collapse or crack when connected.

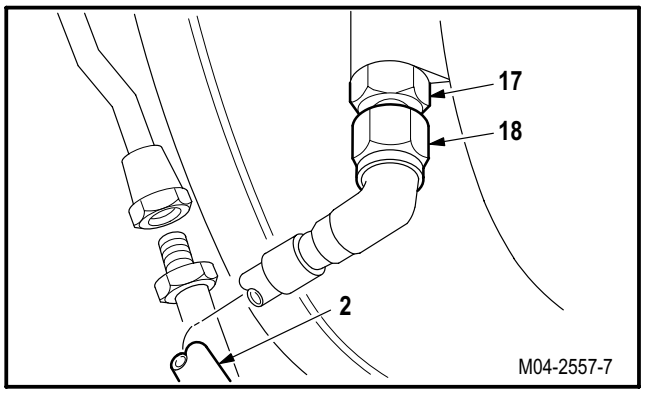
a. **Install hose (19) on manifold (2).**

(1) Install nut (21) on adapter (20).




b. **Install manifold (2) on nipple (17).**

(1) Hold nipple (17). Install nut (18).

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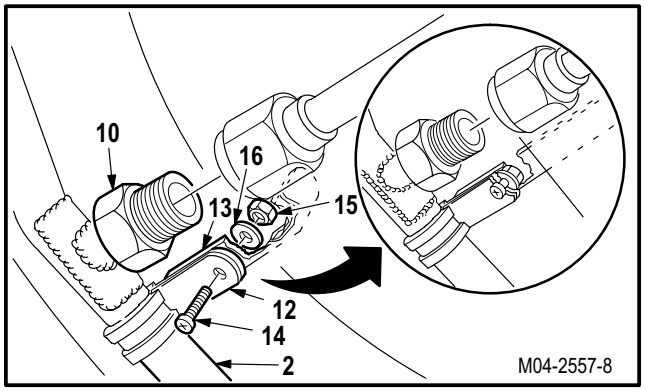
## 4.109. NO. 2 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION - continued

c. **Install clamp (12) on manifold (2) and clip (13).**

(1) Install clamp (12) on manifold (2) below adapter (10).

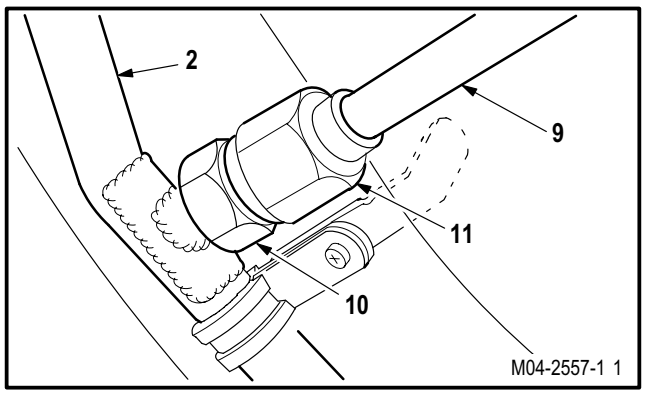
(2) Install screw (14) through clamp (12) and clip (13).

(3) Install washer (16) and nut (15) on screw (14).




d. **Install tube (9) on manifold (2).**

(1) Install nut (11) on adapter (10).




e. **Install hose (6) on manifold (2).**

(1) Install nut (8) on manifold (2).

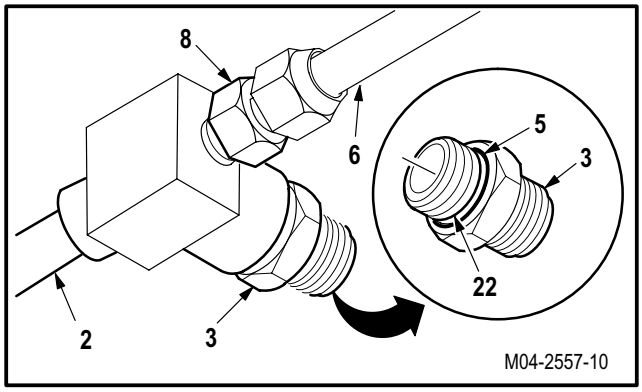
f. **Install nipple (3) in manifold (2).** Torque nipple (3) to **300 INCH-POUNDS**.

(1) Lubricate new packing (5). Use petrolatum (item 138, App F).

(2) Install packing (5) in nipple groove (22).

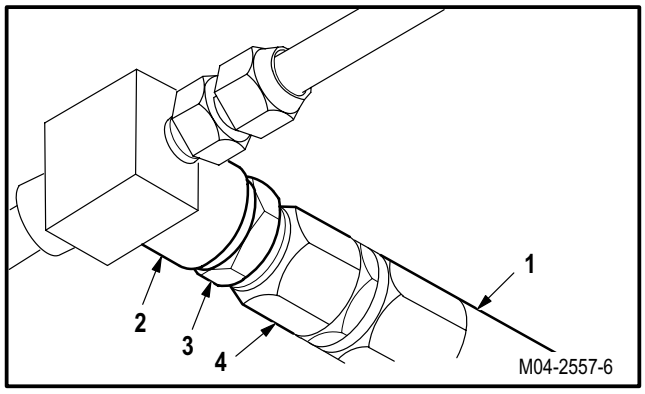
(3) Hold manifold (2). Install nipple (3).

(4) Hold manifold (2). Torque nipple (3) to **300 INCH-POUNDS**. Use crowfoot and torque wrench.




g. **Install hose (1) on manifold (2).**

(1) Install nut (4) on outlet nipple (3).

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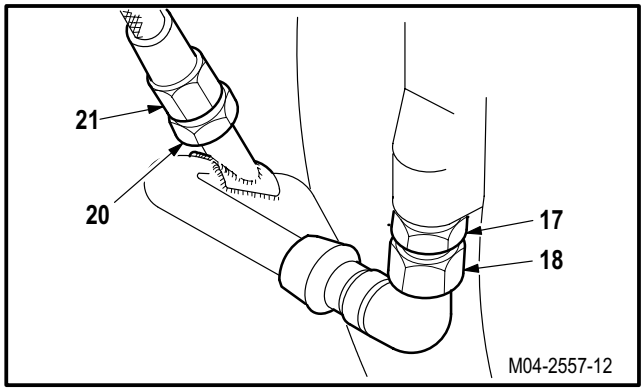
## 4.109. NO. 2 ENGINE DRAIN MANIFOLD REMOVAL/INSTALLATION - continued

h. **Torque nut (21) to 50 INCH-POUNDS.**

(1) Hold adapter (20). Use open end wrench.

(2) Torque nut (21) to **50 INCH-POUNDS**. Use crowfoot and torque wrench.




i. **Torque nut (18) to 290 INCH-POUNDS.**

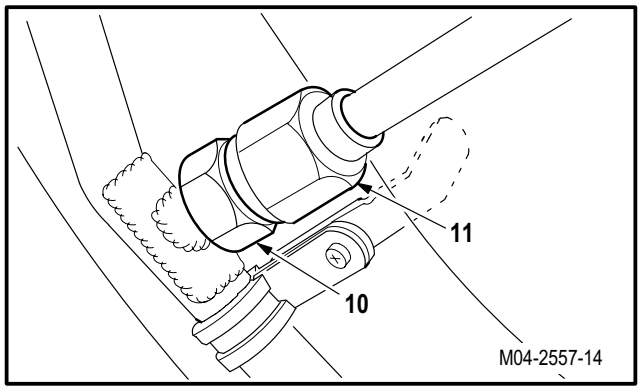
(1) Hold nipple (17). Use open end wrench.

(2) Torque nut (18) to **290 INCH-POUNDS**. Use crowfoot and torque wrench.

j. **Torque nut (11) to 120 INCH-POUNDS.**

(1) Hold adapter (10). Use open end wrench.

(2) Torque nut (11) to **120 INCH-POUNDS**. Use crowfoot and torque wrench.




k. **Torque nut (8) to 85 INCH-POUNDS.**

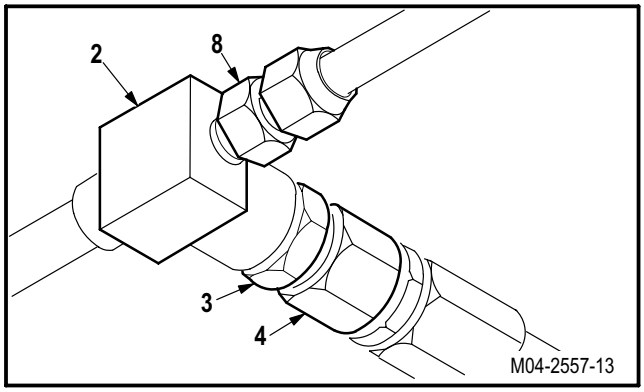
(1) Hold manifold (2). Use open end wrench.

(2) Torque nut (8) to **85 INCH-POUNDS**. Use crowfoot and torque wrench.

l. **Torque nut (4) to 85 INCH-POUNDS.**

(1) Hold nipple (3). Use open end wrench.

(2) Torque nut (4) to **85 INCH-POUNDS**. Use crowfoot and torque wrench.




m. **Inspect (QA).**

n. **Install No. 2 engine** (para 4.53)**.**

END OF TASK

## 4.110. NO. 1 OR NO. 2 ENGINE DRAIN MANIFOLD SUPPORT CLIP REPLACEMENT

4.110.1. Description

This task covers: Removal. Installation.

4.110.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Personnel Required:**

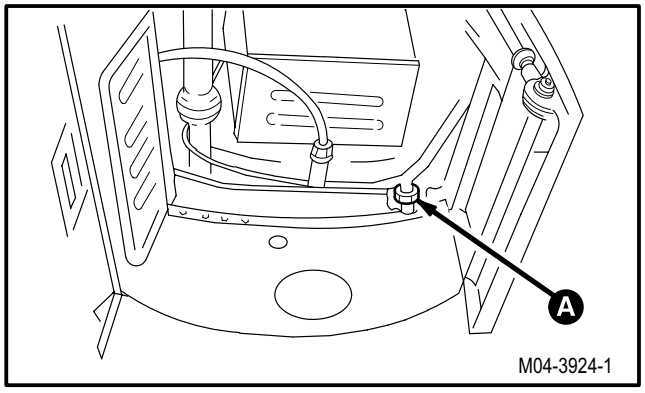
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN3 and LN4 or RN3 and RN4 opened |

**NOTE**

This task typical for engine No. 1 or No. 2 drain manifold support clips.




4.110.3. Removal

a. **Remove drain manifold clamp (1) from drain manifold clip (2).**

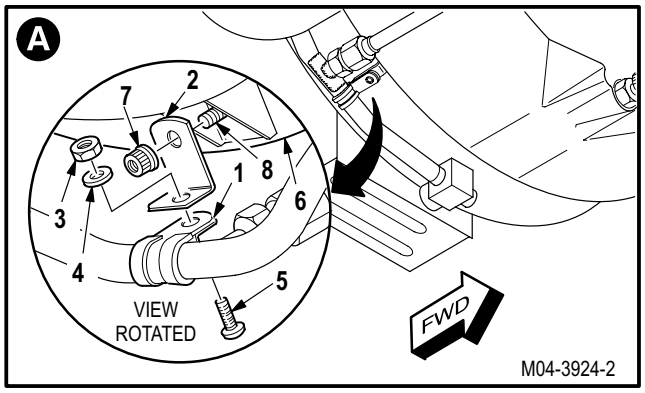
(1) Remove nut (3) and washer (4) from screw (5).

(2) Remove screw (5) from clamp (1) and clip (2).

b. **Remove clip (2) from engine (6).**

(1) Remove nut (7) from stud (8).

(2) Remove and discard clip (2).

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## 4.110. NO. 1 OR NO. 2 ENGINE DRAIN MANIFOLD SUPPORT CLIP REPLACEMENT - continued

4.110.4. Installation

a. **Install new clip (2) on engine (6).** Torque nut (7) to **23 INCH-POUNDS**.

(1) Position clip (2) on stud (8).

(2) Install nut (7) on stud (8).

(3) Torque nut (7) to **23 INCH-POUNDS**. Use torque wrench.

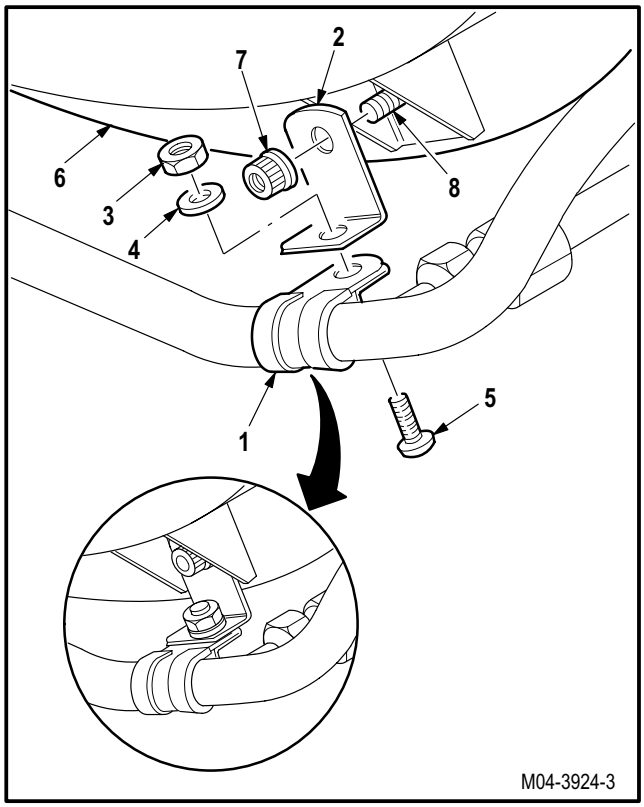
b. **Install clamp (1) on clip (2).**

(1) Install screw (5) through clamp (1) and clip (2).

(2) Install washer (4) and nut (3) on screw (5).

c. **Inspect (QA).**

d. **Secure access doors LN3 and LN4 or RN3 and RN4** (para 2.2)**.**




END OF TASK

## 4.111. NO. 1 OR NO. 2 ENGINE COMBUSTER DRAIN HOSE REPLACEMENT

4.111.1. Description

This task covers: Removal. Installation.

4.111.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

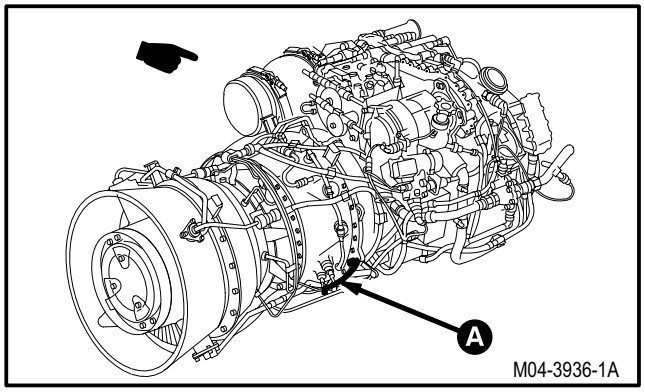
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN3 and LN4 or RN3 and RN4 opened |

**NOTE**

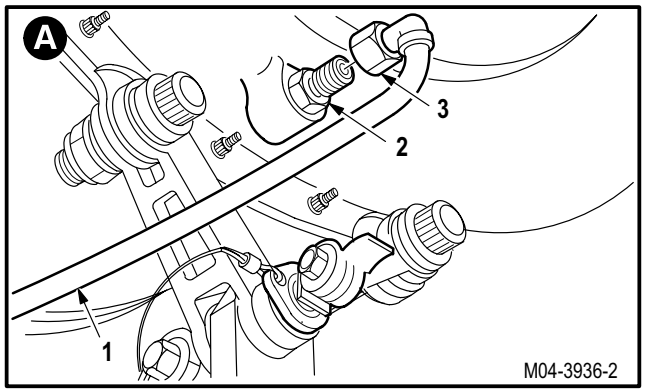
This task is typical for both No. 1 or No. 2 engine combuster drain hose.




4.111.3. Removal

a. **Remove combuster drain hose (1) from diffuser case union (2).**

(1) Hold union (2). Remove nut (3).

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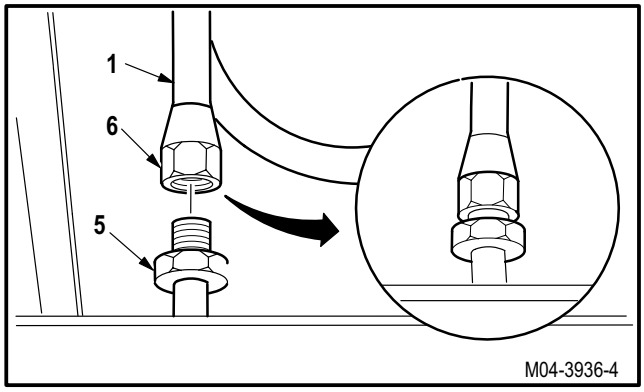
**4.111. NO. 1 OR NO. 2 ENGINE COMBUSTER DRAIN HOSE REPLACEMENT - continued**

b. **Remove hose (1) from fitting (5).**

(1) Hold fitting (5). Remove nut (6).

(2) Remove drain hose (1).



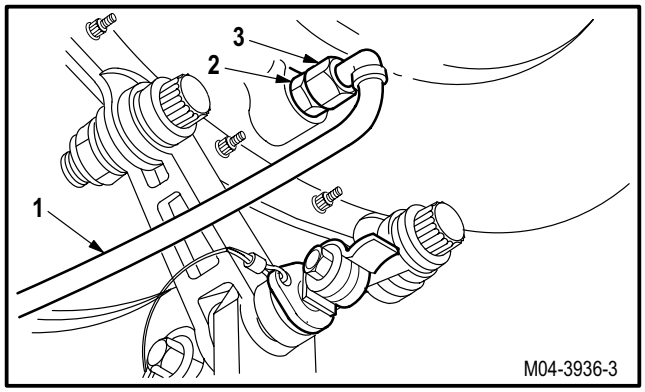

4.111.4. Installation

a. **Install hose (1) on fitting (5).**

(1) Hold fitting (5). Install nut (6).

b. **Install hose (1) on diffuser case union (2).**

(1) Hold union (2). Install nut (3).




c. **Inspect (QA).**

d. **Secure access doors LN3 and LN4 or RN3 and RN4** (para 2.2)**.**

END OF TASK

## 4.112. NO. 1 OR NO. 2 ENGINE DRAIN HOSE REPLACEMENT

4.112.1. Description

This task covers: Removal. Installation.

4.112.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
1 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 77, App H)
1 & 1 1/8-inch open end wrench (item 417, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

**Personnel Required:**

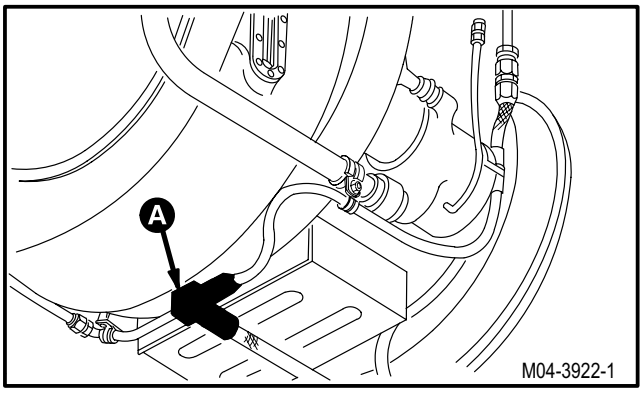
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN3 and LN4 or RN3 and RN4 opened |

**NOTE**

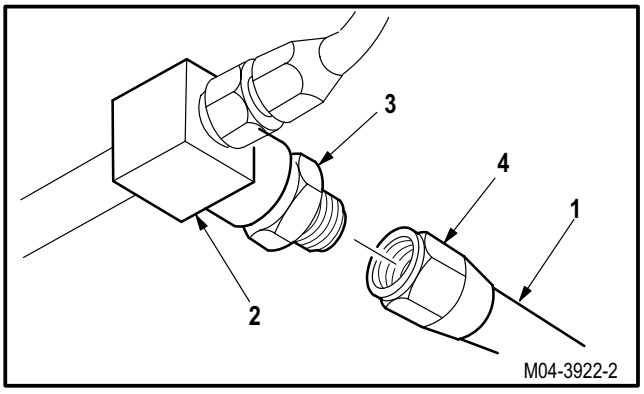
This task is typical for both No. 1 or No. 2 engine drain hose.




4.112.3. Removal

a. **Remove engine drain hose (1) from engine common drain (2).**

(1) Hold nipple (3). Remove nut (4). Use open end wrench.

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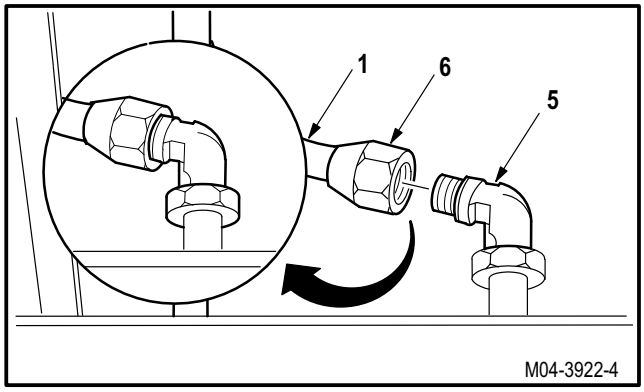
**4.112. NO. 1 OR NO. 2 ENGINE DRAIN HOSE REPLACEMENT - continued**

b. **Remove hose (1) from elbow (5).**

(1) Hold elbow (5). Remove nut (6).

(2) Remove drain hose (1).




4.112.4. Installation

a. **Install hose (1) on elbow (5).**

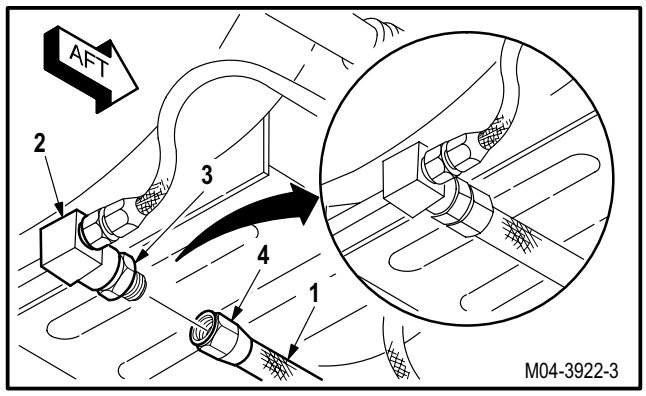
(1) Hold elbow (5). Install nut (6).

b. **Install hose (1) on common drain (2).** Torque nut (4) to **85 INCH-POUNDS**.

(1) Install nut (4) on nipple (3).

(2) Hold nipple (3).

(3) Torque nut (4) to **85 INCH-POUNDS**. Use torque wrench and crowfoot.




c. **Inspect (QA).**

d. **Secure access doors LN3 and LN4 or RN3 and RN4** (para 2.2)**.**

END OF TASK

## 4.113. NO. 1 AND NO. 2 ENGINE SWIRL FRAME DRAIN TUBE REMOVAL/INSTALLATION (T700-GE-701 ENGINE)

4.113.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.113.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**Personnel Required:**

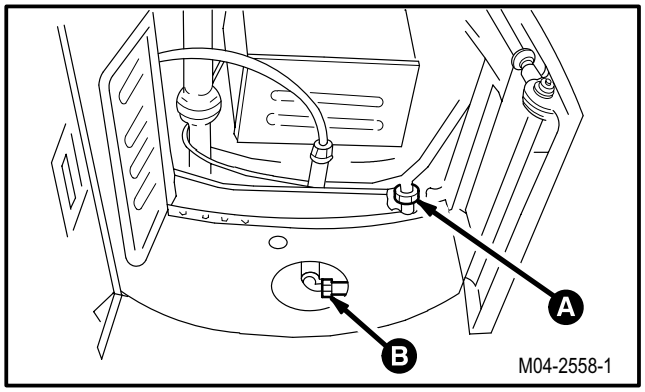
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN2, LN3, and LN4 or RN2, RN3, and RN4 opened |

**NOTE**

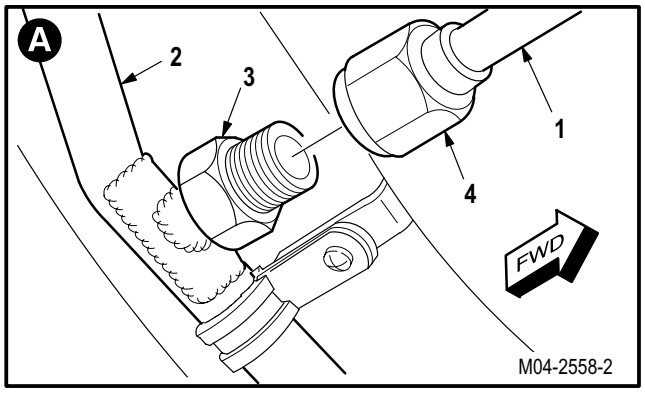
This task is typical for No. 1 or No. 2 engine swirl drain tube.




4.113.3. Removal

a. **Remove swirl frame drain tube (1) from manifold (2).**

(1) Hold adapter (3). Remove nut (4).

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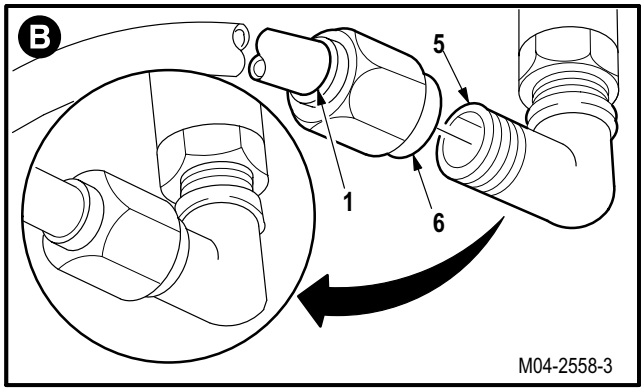
**4.113. NO. 1 AND NO. 2 ENGINE SWIRL FRAME DRAIN TUBE REMOVAL/INSTALLATION (T700-GE-701 ENGINE) - continued**

b. **Remove tube (1) from swirl frame elbow (5).**

(1) Hold elbow (5). Remove nut (6).




4.113.4. Cleaning

a. **Clean adapter and elbow** (para 1.47)**.**

4.113.5. Inspection

a. **Check adapter for damaged threads or looseness.** None allowed.

b. **Check elbow for damaged threads.** None allowed.

c. **Check adapter and elbow for corrosion** (para 1.49)**.**

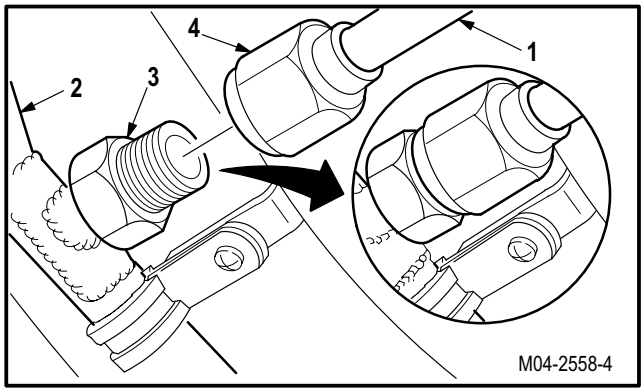
4.113.6. Installation

a. **Install tube (1) on elbow (5).**

(1) Hand tighten nut (6) on elbow (5).

b. **Install tube (1) on manifold (2).**

(1) Hand tighten nut (4) on adapter (3).




c. **Torque nut (6) to 120 INCH-POUNDS.**

(1) Hold elbow (5). Torque nut (6) to **120 INCH-POUNDS**. Use torque wrench.

d. **Torque nut (4) to 120 INCH-POUNDS.**

(1) Hold adapter (3). Torque nut (4) to **120 INCH-POUNDS**. Use torque wrench.

e. **Inspect (QA).**

f. **Secure access doors LN2, LN3, and LN4 or RN2, RN3, and RN4** (para 2.2)**.**

END OF TASK

## 4.114. NO. 1 AND NO. 2 ENGINE SWIRL FRAME DRAIN TUBE REMOVAL/INSTALLATION (T700-GE-701C ENGINE)

4.114.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.114.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**Personnel Required:**

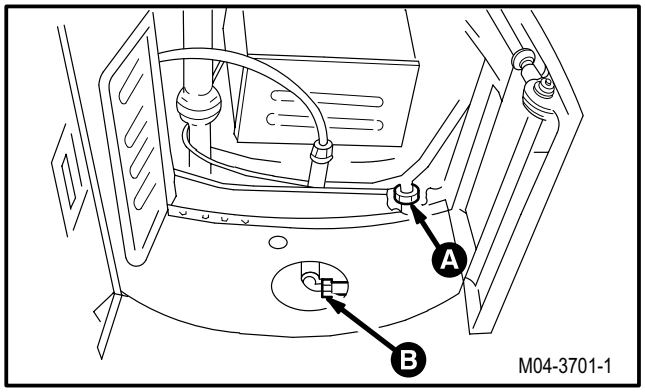
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN2, LN3, and LN4 or RN2, RN3, and RN4 opened |

**NOTE**

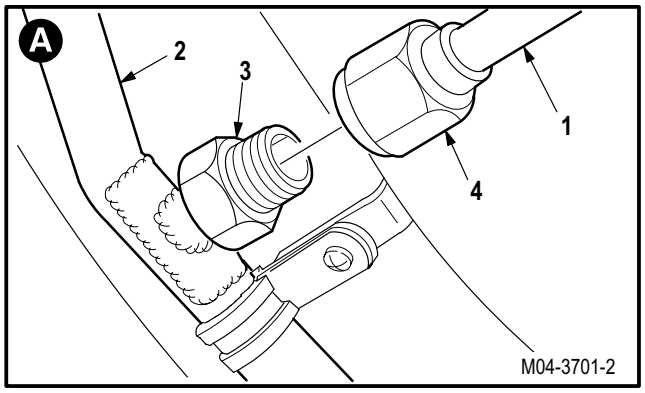
This task is typical for No. 1 or No. 2 engine swirl drain tube.




4.114.3. Removal

a. **Remove swirl frame drain tube (1) from manifold (2).**

(1) Hold adapter (3). Remove nut (4).

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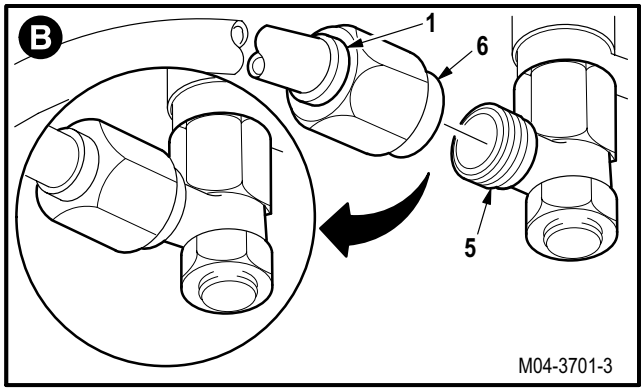
## 4.114. NO. 1 AND NO. 2 ENGINE SWIRL FRAME DRAIN TUBE REMOVAL/INSTALLATION (T700-GE-701C ENGINE) - continued

b. **Remove tube (1) from swirl frame connector (5).**

(1) Hold connector (5). Remove nut (6).




4.114.4. Cleaning

a. **Clean adapter and connector** (para 1.47)**.**

4.114.5. Inspection

a. **Check adapter for damaged threads or looseness.** None allowed.

b. **Check connector for damaged threads.** None allowed.

c. **Check adapter and connector for corrosion** (para 1.49)**.**

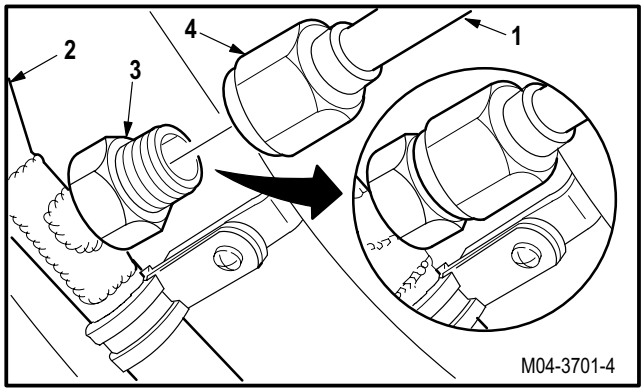
4.114.6. Installation

a. **Install tube (1) on connector (5).**

(1) Hand tighten nut (6) on connector (5).

b. **Install tube (1) on manifold (2).**

(1) Hand tighten nut (4) on adapter (3).




c. **Torque nut (6) to 120 INCH-POUNDS.**

(1) Hold connector (5). Torque nut (6) to **120 INCH-POUNDS**. Use torque wrench.

d. **Torque nut (4) to 120 INCH-POUNDS.**

(1) Hold adapter (3). Torque nut (4) to **120 INCH-POUNDS**. Use torque wrench.

e. **Inspect (QA).**

f. **Secure access doors LN2, LN3, and LN4 or RN2, RN3, and RN4** (para 2.2)**.**

END OF TASK

## 4.115. NO. 1 AND NO. 2 ENGINE AFT INBOARD MOUNT REMOVAL/INSTALLATION

4.115.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.115.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

**Personnel Required:**

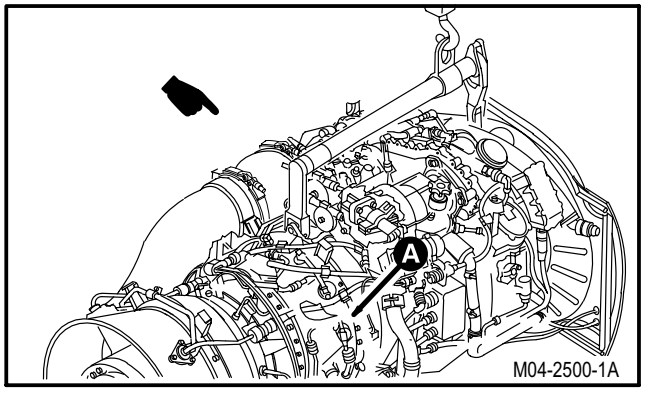
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |

**NOTE**

- This task is typical for No. 1 or No. 2 aft inboard mount.
- Do not install removed engine in handling adapter.



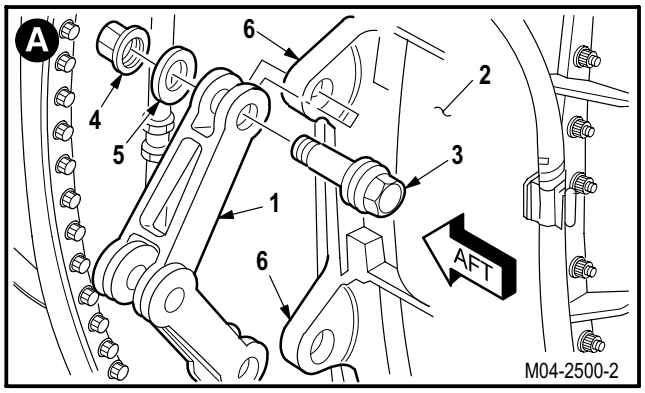

4.115.3. Removal

a. **Remove aft inboard mount (1) from engine (2).**

(1) Hold two bolts (3). Remove two nuts (4) and washers (5).

(2) Remove two bolts (3) from mount (1) and lugs (6).

(3) Remove mount (1).

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## 4.115. NO. 1 AND NO. 2 ENGINE AFT INBOARD MOUNT REMOVAL/INSTALLATION - continued

4.115.4. Cleaning

a. **Clean removed and attaching parts and surfaces** (para 1.47)**.**

4.115.5. Inspection

a. **Check lugs and mounts for cracks.** None allowed.

b. **Check lugs and mounts for corrosion** (para 1.49)**.**

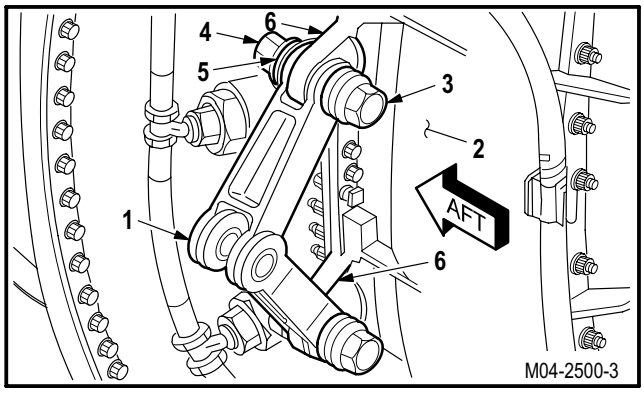
4.115.6. Installation

a. **Install aft inboard mount (1) on diffuser case (2).**

(1) Position mount (1) on lug (6).

(2) Install two bolts (3) through mount (1) and lug (6).

(3) Install two washers (5) and nuts (4) on bolts (5).




**NOTE**

Ensure equal spacing between mount lugs and engine case while torquing nuts.

b. **Torque two nuts (4) to 175 INCH-POUNDS**.

(1) Hold two bolts (3) torque nuts (4) to **175 INCH-POUNDS**. Use torque wrench.

c. **Inspect (QA).**

d. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**

END OF TASK

## 4.116. NO. 1 AND NO. 2 ENGINE AFT LOWER MOUNT REMOVAL/INSTALLATION

4.116.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.116.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

**Personnel Required:**

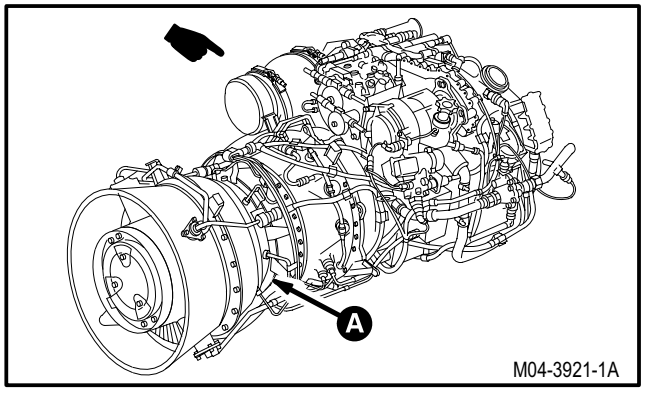
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |

**NOTE**

This task is typical for No. 1 or No. 2 aft lower engine mount.



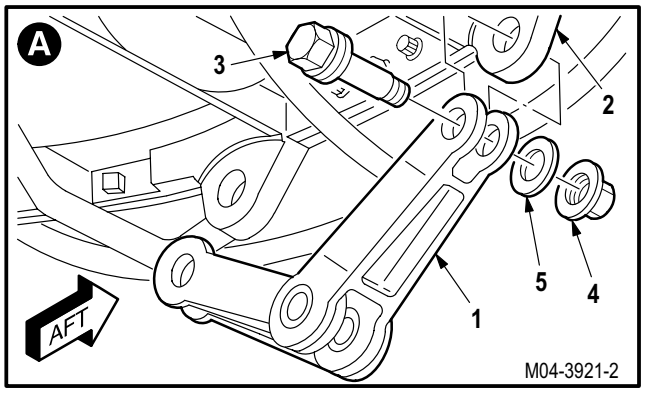

4.116.3. Removal

a. **Remove aft lower mount (1) from diffuser case (2).**

(1) Hold two bolts (3). Remove two nuts (4) and washers (5).

(2) Remove two bolts (3) from mount (1) and case (2).

(3) Remove mount (1).

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**4.116. NO. 1 AND NO. 2 ENGINE AFT LOWER MOUNT REMOVAL/INSTALLATION - continued**

4.116.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.116.5. Inspection

a. **Check mounts for cracks.** None allowed.

b. **Check mounts for corrosion** (para 1.49)**.**

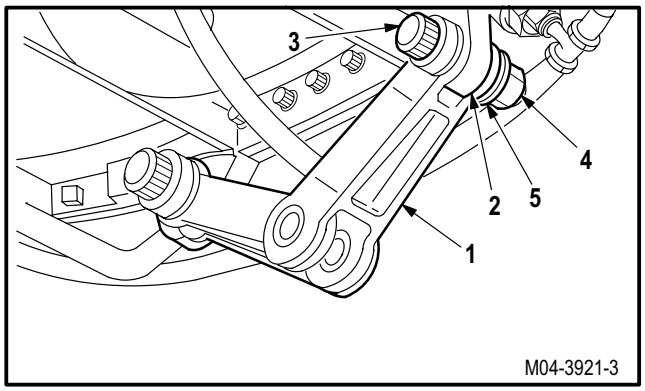
4.116.6. Installation

a. **Install aft lower mount (1) on diffuser case (2).**

(1) Position mount (1) on lug (2).

(2) Install two bolts (3) through mount (1) and lug (2).

(3) Install two washers (5) and nuts (4) on bolts (3).




**NOTE**

Ensure equal spacing between mount lugs and engine case while torquing nuts.

b. **Torque two nuts (4) to 175 INCH-POUNDS.**

(1) Hold bolts (3) torque nuts (4) to **175 INCH-POUNDS**. Use torque wrench.

c. **Inspect (QA).**

d. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**

END OF TASK

## 4.117. NO. 1 AND NO. 2 ENGINE FORWARD INBOARD MOUNT REMOVAL/INSTALLATION

4.117.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.117.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

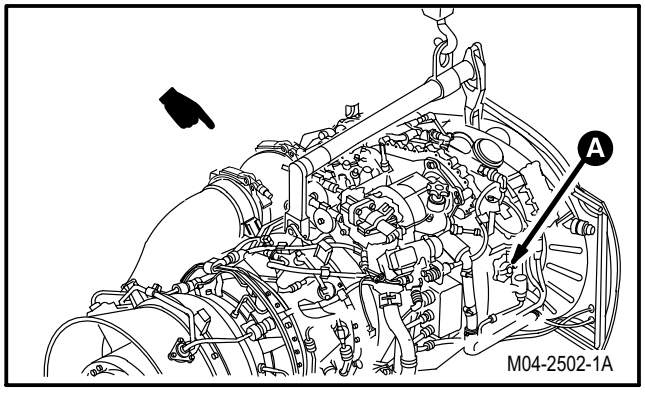
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |

**Materials/Parts:**

Wire (item 226, App F)

**NOTE**

- This task is typical for No.1 or No. 2 engine forward inboard mount.
- Do not install removed engine in handling adapter.



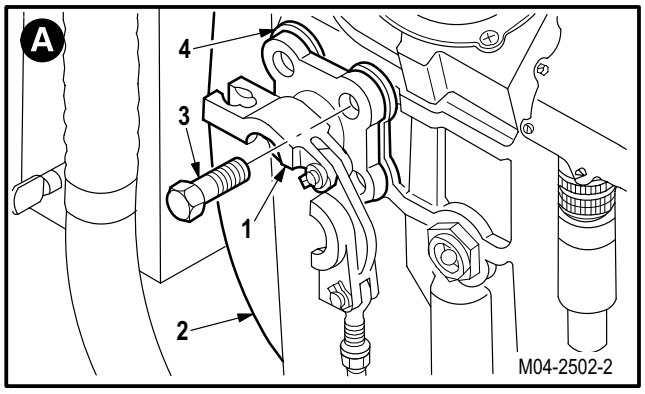

4.117.3. Removal

a. **Remove mount (1) from engine (2).**

(1) Remove lockwire from bolts (3).

(2) Remove four bolts (3) from engine boss (4).

(3) Remove mount (1).

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## 4.117. NO. 1 AND NO. 2 ENGINE FORWARD INBOARD MOUNT REMOVAL/INSTALLATION - continued

4.117.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.117.5. Inspection

a. **Check boss and mount for cracks.** None allowed.

b. **Check boss and mount for corrosion** (para 1.49)**.**

4.117.6. Installation

a. **Install mount (1) on engine (2).** Torque four bolts (3) to **145 INCH-POUNDS**.

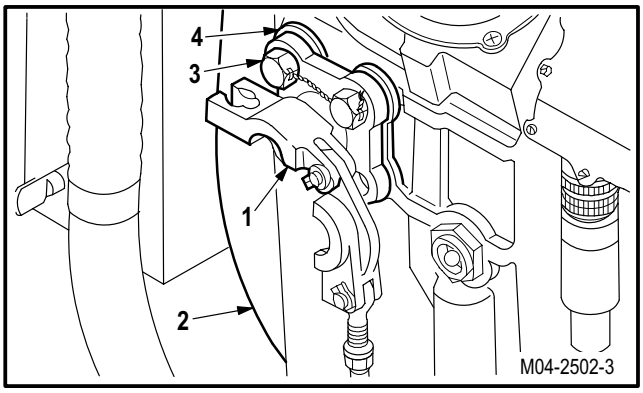
(1) Position mount (1) on boss (4).

(2) Install four bolts (3) through mount (1) and boss (4).

(3) Torque four bolts (3) to **145 INCH-POUNDS**. Use torque wrench.

(4) Lockwire two upper bolts bolts (3) together. Use wire (item 226, App F).

(5) Lockwire two lower bolts bolts (3) together. Use wire (item 226, App F).




b. **Inspect (QA).**

c. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**

END OF TASK

## 4.118. NO. 1 AND NO. 2 ENGINE FORWARD LOWER MOUNT REMOVAL/INSTALLATION

4.118.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.118.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

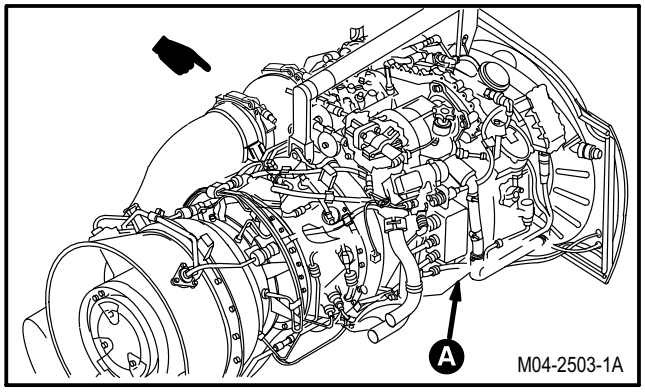
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |

**Materials/Parts:**

Wire (item 226, App F)

**NOTE**

This task is typical for No. 1 or No. 2 engine forward lower mount.



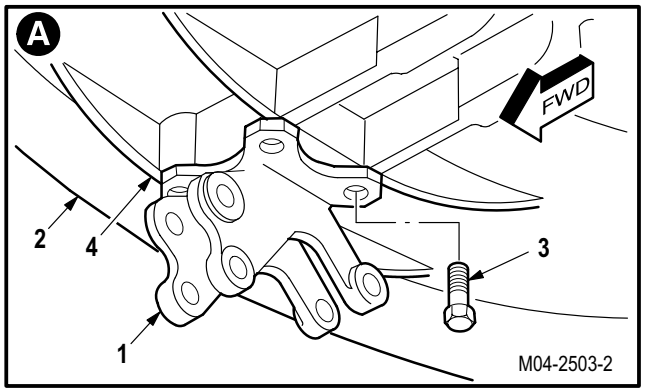

4.118.3. Removal

a. **Remove mount (1) from engine (2).**

(1) Remove lockwire from bolts (3).

(2) Remove four bolts (3) from engine boss (4).

(3) Remove mount (1).

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## 4.118. NO. 1 AND NO. 2 ENGINE FORWARD LOWER MOUNT REMOVAL/INSTALLATION - continued

4.118.4. Cleaning

a. **Clean boss and mount** (para 1.47)**.**

4.118.5. Inspection

a. **Check boss and mount for cracks.** None allowed.

b. **Check boss and mount for corrosion** (para 1.49)**.**

4.118.6. Installation

a. **Install mount (1) on engine (2).** Torque four bolts (3) to **145 INCH-POUNDS**.

(1) Position mount (1) on boss (4).

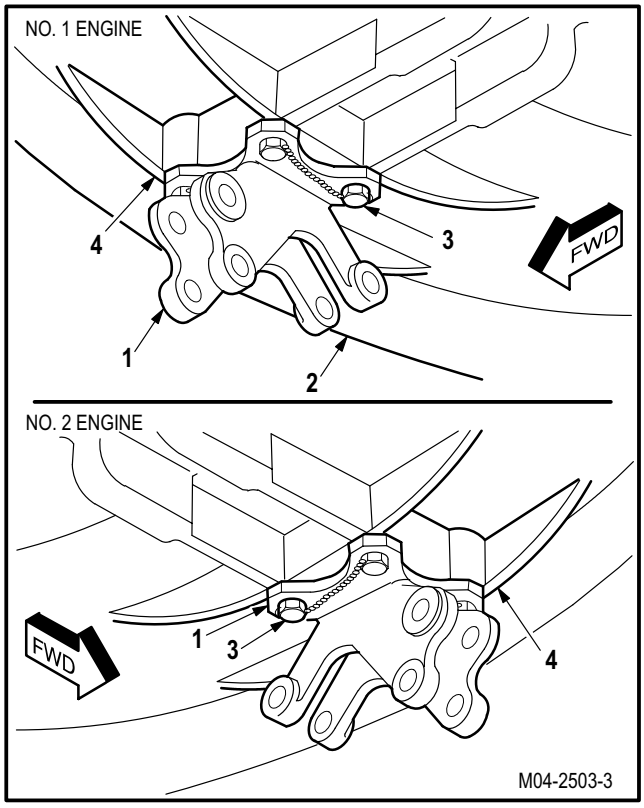
(2) Install four bolts (3) through mount (1) and boss (4).

(3) Torque four bolts (3) to **145 INCH-POUNDS**. Use torque wrench.

(4) Lockwire two bolts (3) together two places. Use wire (item 226, App F).

b. **Inspect (QA).**

c. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**




END OF TASK

# SECTION VI. EXHAUST SYSTEM MAINTENANCE

## 4.119. NO. 1 AND NO. 2 ENGINE PRIMARY EXHAUST NOZZLE REMOVAL/INSTALLATION

4.119.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.119.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
3-piece spatula set (item 337, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.3 | No. 1 engine removed or |
| 4.8 | No. 2 engine removed |

**Materials/Parts:**

Tape (item 204, App F)

**NOTE**

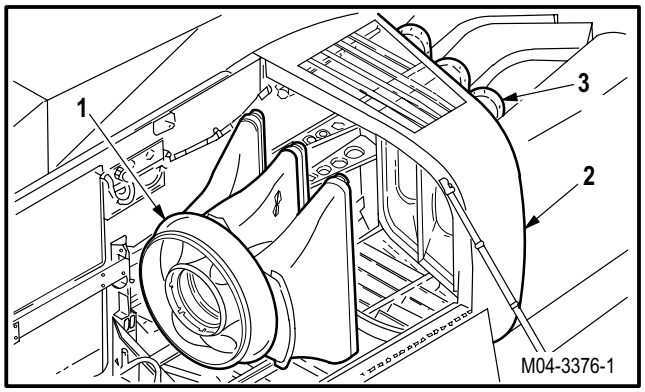
This task is typical for No. 1 or No. 2 primary exhaust nozzle.

4.119.3. Removal

a. **Remove primary nozzle (1) from nacelle (2).**

(1) Move primary nozzle (1) forward until it clears secondary nozzle (3).

(2) Remove primary nozzle (1) from nacelle (2).

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**4.119. NO. 1 AND NO. 2 ENGINE PRIMARY EXHAUST NOZZLE REMOVAL/INSTALLATION - continued**

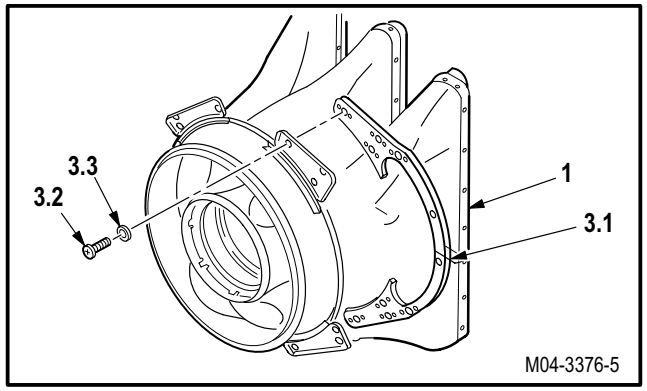
**NOTE**

Step a applies to primary exhaust nozzles with removable flange support assemblies.

a. **Remove flange support assembly (3.1) from primary nozzle (1).**

(1) Remove six screws (3.2) and washers (3.3) from flange support assembly (3.1) and primary nozzle (1).

(2) Remove flange support assembly (3.1) from primary nozzle (1).




4.119.4. Cleaning

a. **Clean primary nozzle and attaching parts** (para 1.47)**.**

4.119.5. Inspection

**NOTE**

Primary exhaust nozzle blankets are to be removed with no replacement when found to be damaged beyond repair limits.

a. **Check primary exhaust nozzle at spot welded leading edges of insulated blankets.** Check for spot weld failures which allow any aft rollback of blanket leading edge.

(1) If roll-back is less than **4.0 INCHES**, repair.

(2) If tears or holes are less than **2.0 INCHES**, repair.

(3) If insulation blanket damage exceeds repair criteria, remove nozzle blanket.

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**4.119. NO. 1 AND NO. 2 ENGINE PRIMARY EXHAUST NOZZLE REMOVAL/INSTALLATION - continued**

**NOTE**

- Step (1) only applies to primary exhaust nozzles without removable flange support assemblies.
- Step (2) only applies to primary exhaust nozzles with removable flange support assemblies.

b. **Check primary exhaust nozzle for holes in nozzle ducts.**

(1) Holes may be patched by aircraft certified welder using 0.020 STL CRES SH 321 (AMS5510) or material from unserviceable nozzle (TM 1-1500-204-23).

(2) Holes may be patched by aircraft certified welder using 0.020 NKL SH 625 (AMS5599) or material from unserviceable nozzle (TM 1-1500-204-23).

(3) Patches not to exceed **20 SQUARE INCHES** on any nozzle duct.

c. **Check primary exhaust nozzle for cracks in nozzle ducts.**

(1) No intersecting cracks allowed. Remove damaged material and inspect/repair hole in accordance with step b.

(a) Nozzles containing cracks within allowable limits (less than 4.0 inches in length) shall be inspected before and after flight to check for initiation of new cracks and to monitor growth of any existing cracks. Growth of cracks will be monitored by measuring length of crack(s) before and after each flight and by flight time.

(b) Aircraft logbook entries shall be made to document data on initiation of crack, crack growth and flight time.

(c) Copies of DA Form 2408-13 of Aircraft Corrective Maintenance Record (ACRM) will be mailed to the point of contact at U.S. Army Aviation and Missile Command, Directorate of Engineering.

(2) Cracks exceeding **4.0 INCHES** in length may be repaired by aircraft certified welder (TM 1-1500-204-23). Nozzle material is STL CRES SH 321 (AMS5510) or NKL SH 625 (AMS5599). All cracks in nozzles should be repaired at next scheduled maintenance.

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## 4.119. NO. 1 AND NO. 2 ENGINE PRIMARY EXHAUST NOZZLE REMOVAL/INSTALLATION - continued

4.119.6. Repair

**CAUTION**

- Do not pry on nozzle while attempting to “POP” spot welds.
- The parent metal must not be affected as an abrasion may cause stress risers or pin hole burn-through.

a. **Remove nozzle blanket (4) if beyond repair limits.** There is no harm done if blanket is damaged during removal.

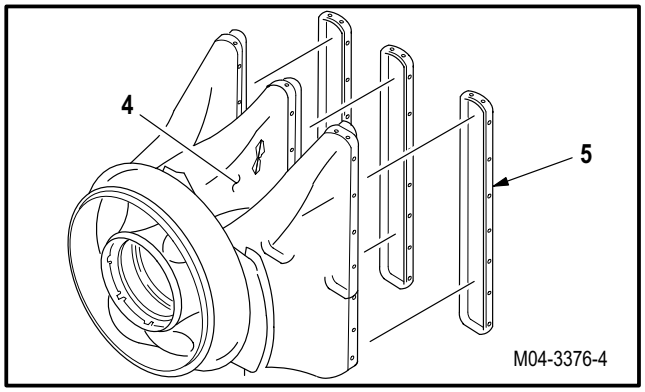
(1) Remove three retainers (5) on aft nozzle openings with a non-metallic pry. Use spatula set

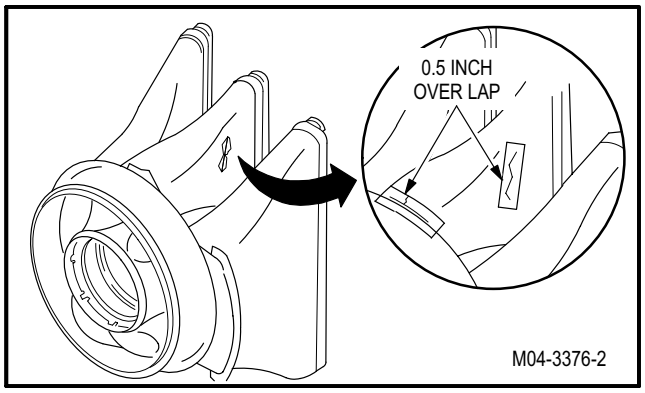
(2) Remove blanket with non-matellic pry.

(3) Remove raised metal sharp edges from welds.

b. **Repair holes, tears, or roll-back on insulation blanket.**

(1) Apply tape to overlap damaged area at least **0.50 INCH**. Use tape (item 204, App F).

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## 4.119. NO. 1 AND NO. 2 ENGINE PRIMARY EXHAUST NOZZLE REMOVAL/INSTALLATION - continued

4.119.7. Installation

**NOTE**

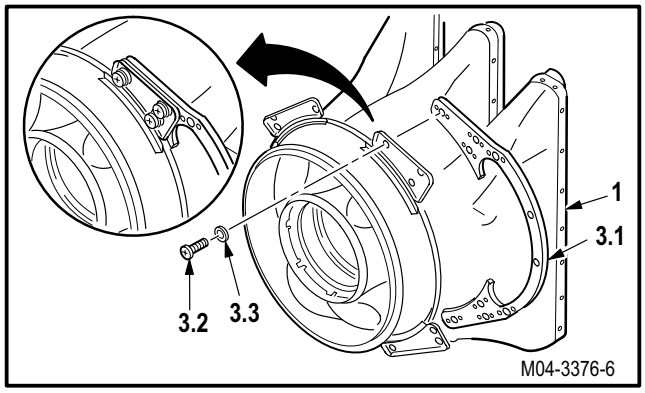
Step a. applies to primary exhaust nozzles with removable flange support assemblies.

a. **Install flange support assembly (3.1) on primary nozzle (1).**

(1) Determine correct side to install flange support assembly.

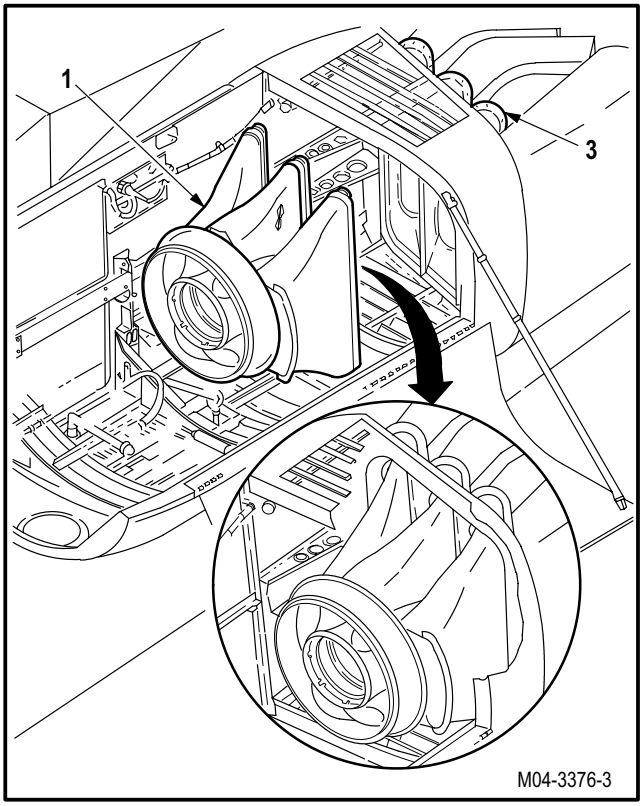
(2) Aline flange support assembly (3.1) on primary nozzle (1).

(3) Install six screws (3.2) and washers (3.3) through flange support assembly (3.1) and primary nozzle (1).




b. **Install nozzle (1) on nozzle (3).**

(1) Move nozzle (1) aft to nozzle (3) until nozzle (1) alines with nozzle (3).




c. **Inspect (QA).**

d. **Install No. 1 engine** (para 4.48) **or No. 2 engine** (para 4.52)**.**

END OF TASK

## 4.120. NO. 1 AND NO. 2 ENGINE OUTBOARD SECONDARY NOZZLE REMOVAL/INSTALLATION

4.120.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.120.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Cotter pin
Epoxy primer coating kit (item 77, App F)
Lubricating oil (item 118, App F)
Polyurethane coating (item 140, App F)
Wire (item 226, App F)

**References:**

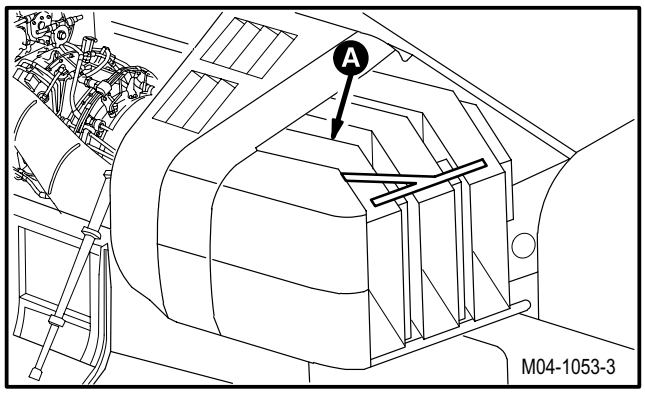
TM 55-1500-345-23

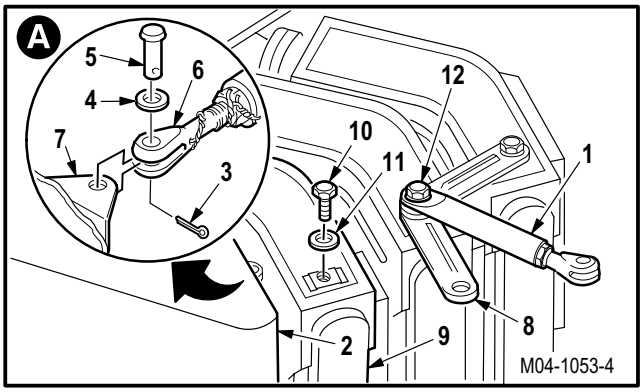
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

This task is typical for No. 1 or No. 2 engine outboard secondary nozzle.




4.120.3. Removal

a. **Remove strut (1) from fairing (2).**

(1) Remove and discard cotter pin (3).

(2) Remove washer (4) and pin (5) from clevis (6) and lug (7).

b. **Remove strut (8) from outboard secondary nozzle (9).**

(1) Remove bolt (10) and washer (11).

c. **Move struts (1) and (8) clear of nozzle (9).**

(1) Loosen bolt (12).

(2) Swing struts (1) and (8) aft to clear.

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## 4.120. NO. 1 AND NO. 2 ENGINE OUTBOARD SECONDARY NOZZLE REMOVAL/INSTALLATION - continued

**WARNING**

**Fuel deposits on nozzles may be toxic. Use care to prevent cuts from fins and flanges. If injury occurs, flush skin with water and seek medical aid.**

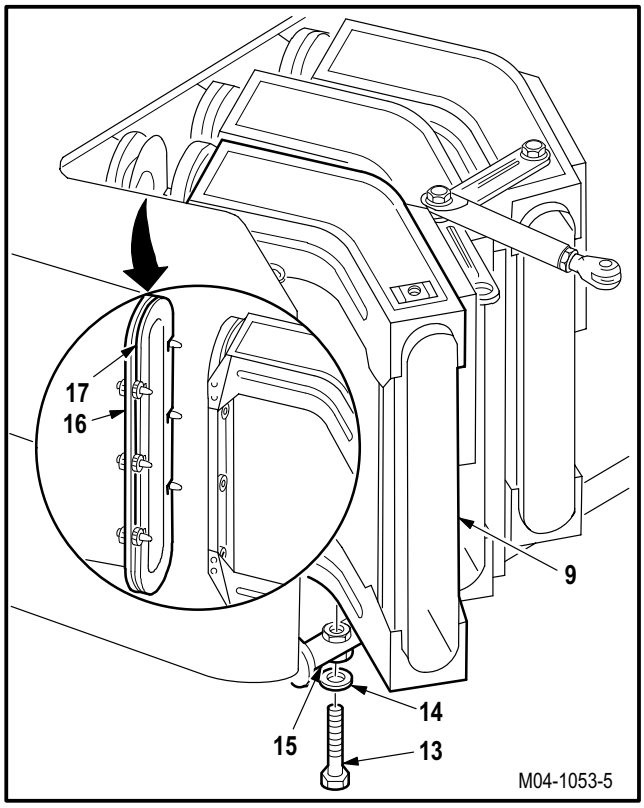
d. **Remove nozzle (9).**

(1) Remove lockwire from bolt (13).

(2) Remove bolt (13) and washer (14) from strut (15) and nozzle (9).

(3) Slide nozzle (9) aft from support (16) and strut (15).

(4) Remove shims (17) (if installed).




4.120.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

4.120.5. Inspection

a. **Check aft face of support for cracks; loose, bent, or missing pins; and torn or cracked gasket.** None allowed.

b. **Check nozzle mounting area on strut for cracks, bending, and loose or missing spacers.** None allowed.

c. **Check support, strut, and nozzle support bushings for corrosion** (para 1.49)**.**

d. **Check forward inlet portion of nozzle for cracks.**

(1) Cracks or holes no longer than **2.0 INCHES** and limited to **1.0 INCH** either side of weld bead may be repaired (para 4.134).

e. **Check nozzle support bushings for cracks, pitting, wear, or loose rivets.** None allowed.

f. **Check nozzle fairing for chaffing.**

g. **Check nozzle assembly for chipped paint.**

(1) Touch up bare spots as required. Use epoxy primer coating (item 77, App F) and polyurethane coating (item 140, App F) (TM 55-1500-345-23).

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## 4.120. NO. 1 AND NO. 2 ENGINE OUTBOARD SECONDARY NOZZLE REMOVAL/INSTALLATION - continued

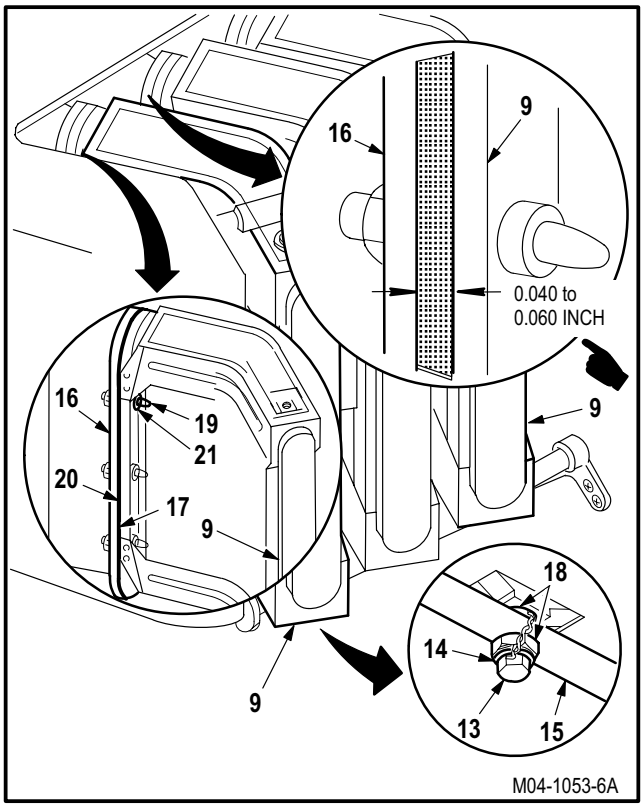
4.120.6. Repair

a. **Repair bushing damage on strut (15) by replacing damaged spacers (18)** (para 4.123)**.**

b. **Repair pin damage on support (16) by replacing damaged pins (19)** (para 4.132)**.**

c. **Repair gasket damage on support (16) by replacing gasket (20).**

d. **Repair nozzle support bushing damage on support (16) by replacing nozzle support bushings (21)** (para 4.128)**.**




4.120.7. Installation

a. **Lubricate six pins (19).** Use lubricating oil (item 118, App F).

**NOTE**

- To provide installation clearance for pin, it is permissible to cut away fins locally, but not to exceed two fins and not longer than **2.5 INCHES**.
- Minimum clearance from outboard structure shall be **0.06 INCHES**.

b. **Install nozzle (9) on strut (15) and support (16).**

(1) Position nozzle (9) on strut (15).

(2) Aline nozzle (9) just aft of pins (19).

(3) Slide nozzle (9) forward until seated on gasket (20) while positioning aft lower mounting hole of nozzle (9) over strut (15) and install bolt (13) and washer (14).

(4) Adjust threaded spacer (18) up or down to equalize the gap around upper and lower nozzle (9) face.

(5) Lockwire bolt (13) to spacer (18) and strut (15). Use wire (item 226, App F).

(6) Measure gap between nozzle (9) forward face and support (16) aft face. Install shims (17) (if required) to obtain a gap of 0.040 to 0.060 inch.

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## 4.120. NO. 1 AND NO. 2 ENGINE OUTBOARD SECONDARY NOZZLE REMOVAL/INSTALLATION - continued

c. **Install strut (8) on nozzle (9).**

(1) Swing strut (8) forward over nozzle (9).

(2) Install bolt (10) and washer (11).

d. **Install strut (1) on fairing (2).**

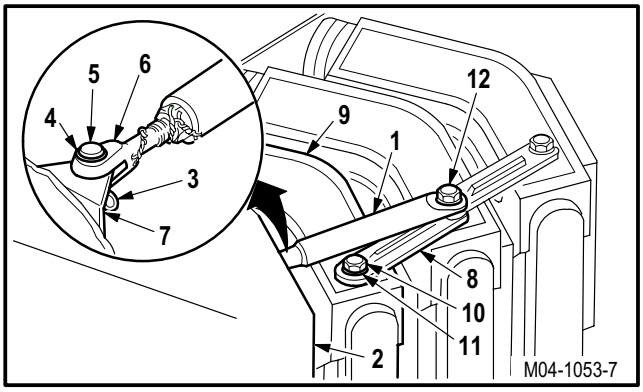
(1) Swing strut (1) forward over lug (7).

(2) Install pin (5) through washer (4), clevis (6), and lug (7).

(3) Install new cotter pin (3).

e. **Tighten bolt (12).**

f. **Inspect (QA).**




END OF TASK

## 4.121. NO. 1 AND NO. 2 ENGINE INBOARD SECONDARY NOZZLE REMOVAL/INSTALLATION

4.121.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.121.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 55-1500-345-23

**Materials/Parts:**

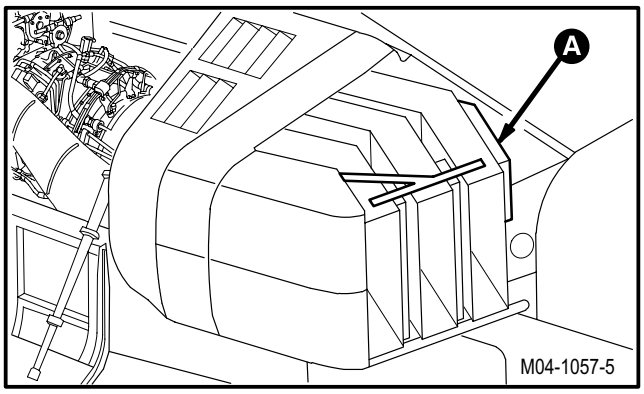
Epoxy primer coating kit (item 77, App F)
Lubricating oil (item 118, App F)
Polyurethane coating (item 140, App F)
Wire (item 226, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

This task is typical for No. 1 or No. 2 inboard secondary nozzle.




4.121.3. Removal

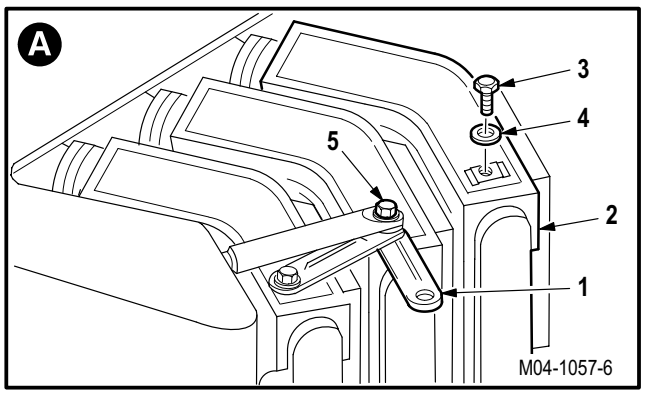
a. **Remove strut (1) from inboard secondary nozzle (2).**

(1) Remove bolt (3) and washer (4).

b. **Move strut (1) clear of nozzle (2).**

(1) Loosen bolt (5).

(2) Swing strut (1) aft to clear.

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## 4.121. NO. 1 AND NO. 2 ENGINE INBOARD SECONDARY NOZZLE REMOVAL/INSTALLATION - continued

**WARNING**

**Fuel deposits on nozzles may be toxic. Use care to prevent cuts from fins and flanges. If injury occurs, flush skin with water and seek medical aid.**

c. **Remove nozzle (2).**

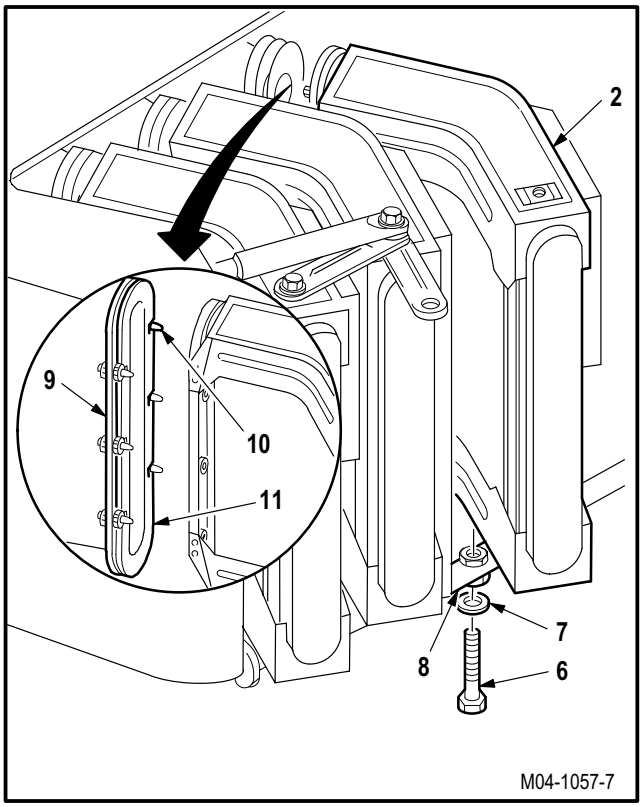
(1) Remove lockwire from bolt (6).

(2) Remove bolt (6) and washer (7) from strut (8), and nozzle (2).

(3) Slide nozzle (2) aft from support (9) and strut (8) until clear of pins (10).

(4) Lift nozzle (2) straight up to remove.

(5) Remove shims (11) (if installed).




4.121.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

4.121.5. Inspection

a. **Check aft face of support for cracks; loose, bent, or missing pins; and torn or cracked gasket.** None allowed.

b. **Check nozzle mounting area on strut for cracks, bending, and loose or missing spacers.** None allowed.

c. **Check support, strut, and nozzle support bushings for corrosion** (para 1.49)**.**

d. **Check forward inlet portion of nozzle for cracks.**

(1) Cracks or holes no longer than **2.0 INCHES** and limited to **1.0 INCH** either side of weld bead may be repaired (para 4.134).

e. **Check nozzle assembly for chipped paint.**

(1) Touch up bare spots as required. Use epoxy primer coating (item 77, App F) and polyurethane coating (item 140, App F) (TM 55-1500-345-23).

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## 4.121. NO. 1 AND NO. 2 ENGINE INBOARD SECONDARY NOZZLE REMOVAL/INSTALLATION - continued

f. **Check nozzle support bushings for cracks, pitting, wear, or loose rivets.** None allowed.

4.121.6. Repair

a. **Repair bushing damage on strut (8) by replacing damaged spacers (12)** (para 4.123)**.**

b. **Repair support (9) by replacing damaged pins (10)** (para 4.132)**.**

c. **Repair seal damage on support (9) by replacing seal (13).**

d. **Repair nozzle support bushing damage on support (9) by replacing nozzle support bushings (14)** (para 4.128)**.**

4.121.7. Installation

a. **Lubricate six pins (10).** Use lubricating oil (item 118, App F).

**NOTE**

Minimum clearance from inboard structure shall be **0.06 INCHES**.

b. **Install nozzle (2) on strut (8) and support (9).**

(1) Lower nozzle (2) straight down, clear of pins (10), and on strut (8).

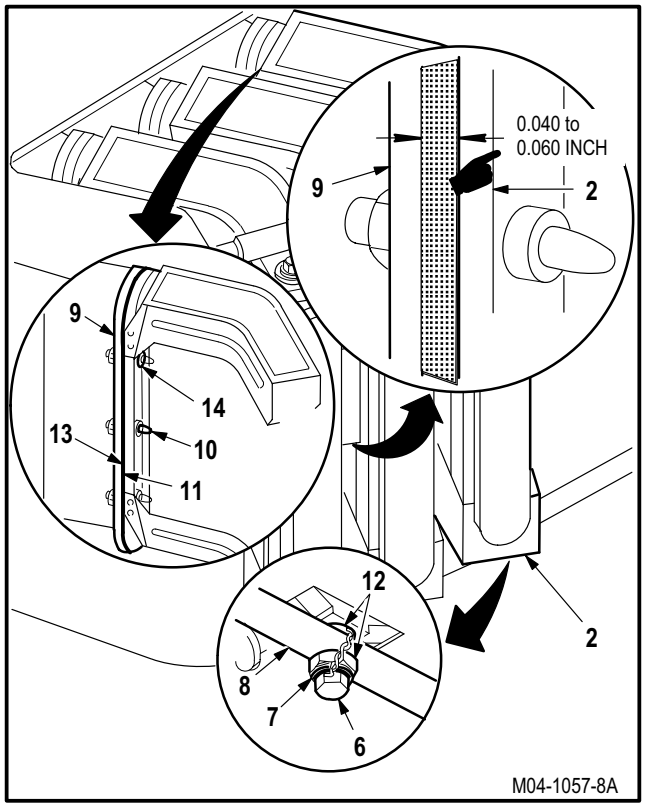
(2) Aline nozzle (2) just aft of pins (10).

(3) Slide nozzle (2) forward until seated on gasket (13) while positioning aft lower mounting hole of nozzle (2) over strut (8) and install bolt (6) and washer (7).

(4) Adjust threaded spacer (12) up or down to equalize the gap around upper and lower nozzle (2) face.

(5) Lockwire bolt (6) to spacer (12) and strut (8). Use wire (item 226, App F).

(6) Measure gap between nozzle (2) forward face and support (9) aft face. Install shims (11) (if required) to obtain a gap of 0.040 to 0.060 inch.

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**4.121. NO. 1 AND NO. 2 ENGINE INBOARD SECONDARY NOZZLE REMOVAL/INSTALLATION - continued**

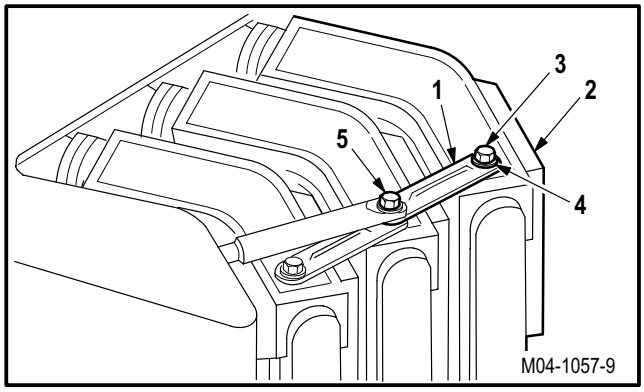
c. **Install strut (1) on nozzle (2).**

(1) Swing strut (1) forward over nozzle (2).

(2) Install bolt (3) and washer (4).

d. **Tighten bolt (5).**

e. **Inspect (QA).**




END OF TASK

## 4.122. NO. 1 AND NO. 2 ENGINE CENTER SECONDARY NOZZLE REMOVAL/INSTALLATION

4.122.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.122.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 55-1500-345-23

**Materials/Parts:**

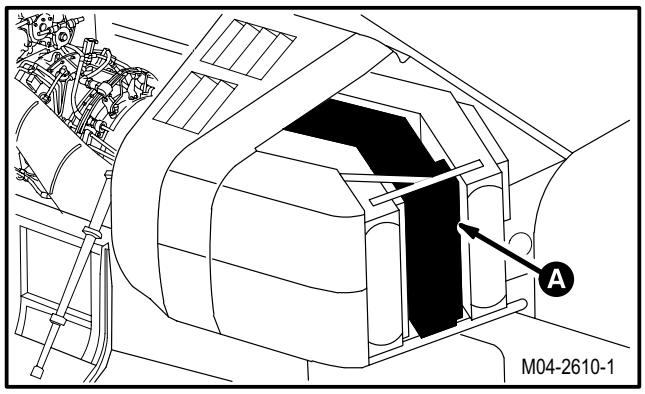
Epoxy primer coating kit (item 77, App F)
Lubricating oil (item 118, App F)
Polyurethane coating (item 140, App F)
Wire (item 226, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

This task is typical for No. 1 or No. 2 center secondary nozzle.




4.122.3. Removal

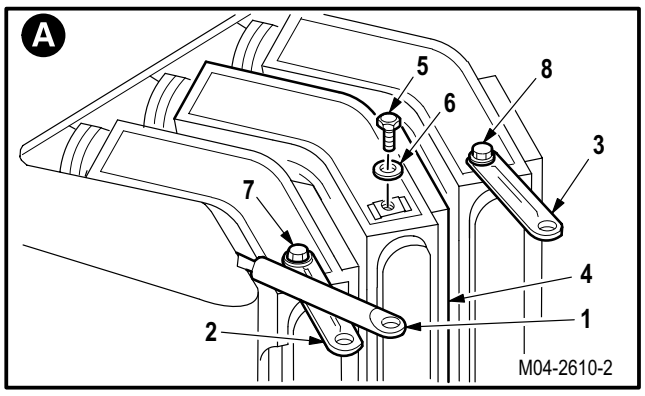
a. **Remove struts (1), (2), and (3) from engine center secondary nozzle (4).**

(1) Remove bolt (5) and washer (6).

b. **Move struts (1), (2), and (3) clear of nozzle (4).**

(1) Loosen bolts (7) and (8).

(2) Swing struts (1), (2), and (3) aft to clear.

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## 4.122. NO. 1 AND NO. 2 ENGINE CENTER SECONDARY NOZZLE REMOVAL/INSTALLATION - continued

**WARNING**

**Fuel deposits on nozzles may be toxic. Use care to prevent cuts from fins and flanges. If injury occurs, flush skin with water and seek medical aid.**

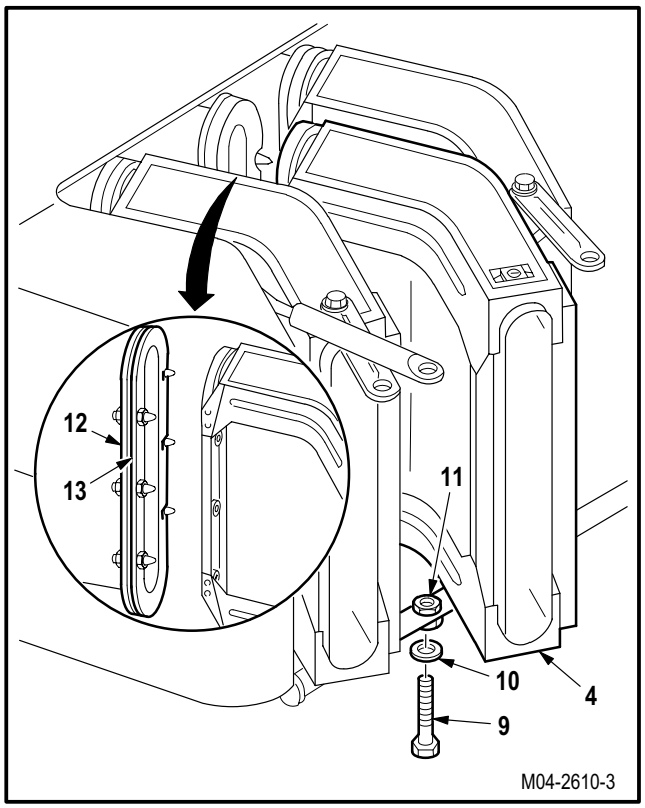
c. **Remove nozzle (4).**

(1) Remove lockwire from bolt (9).

(2) Remove bolt (9) and washer (10) from strut (11) and nozzle (4).

(3) Slide nozzle (4) aft from support (12) and strut (11).

(4) Remove shims (13) (if installed).




4.122.4. Cleaning

a. **Clean removed and attaching parts or surfaces** (para 1.47)**.**

4.122.5. Inspection

a. **Check aft face of support for cracks; loose, bent, or missing pins; and torn or cracked gasket.** None allowed.

b. **Check nozzle mounting area on strut for cracks, bending, and loose or missing spacers.** None allowed.

c. **Check support, strut, and nozzle support bushings for corrosion** (para 1.49)**.**

d. **Check forward inlet portion of nozzle for cracks.**

(1) Cracks or holes no longer than **2.0 INCHES** and limited to **1.0 INCH** either side of weld bead may be repaired (para 4.134).

e. **Check nozzle support bushings for cracks, pitting, wear, or loose rivets.** None allowed.

f. **Check nozzle assembly for chipped paint.**

(1) Touch up bare spots as required. Use epoxy primer coating (item 77, App F) and polyurethane coating (item 140, App F) (TM 55-1500-345-23).

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## 4.122. NO. 1 AND NO. 2 ENGINE CENTER SECONDARY NOZZLE REMOVAL/INSTALLATION - continued

4.122.6. Repair

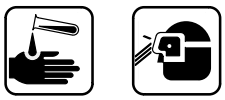
a. **Repair bushing damage on strut (11) by replacing damaged spacers (14)** (para 4.123)**.**

b. **Repair pin damage on support (12) by replacing damaged pins (15)** (para 4.132)**.**

c. **Repair gasket damage on support (12) by replacing gasket (16).**

d. **Repair nozzle support bushing damage on support (12) by replacing nozzle support bushings (17)** (para 4.128)**.**

4.122.7. Installation



a. **Lubricate six pins (15).** Use lubricating oil (item 118, App F).

b. **Install nozzle (4) on strut (11) and support (12).**

(1) Position nozzle (4) on strut (11).

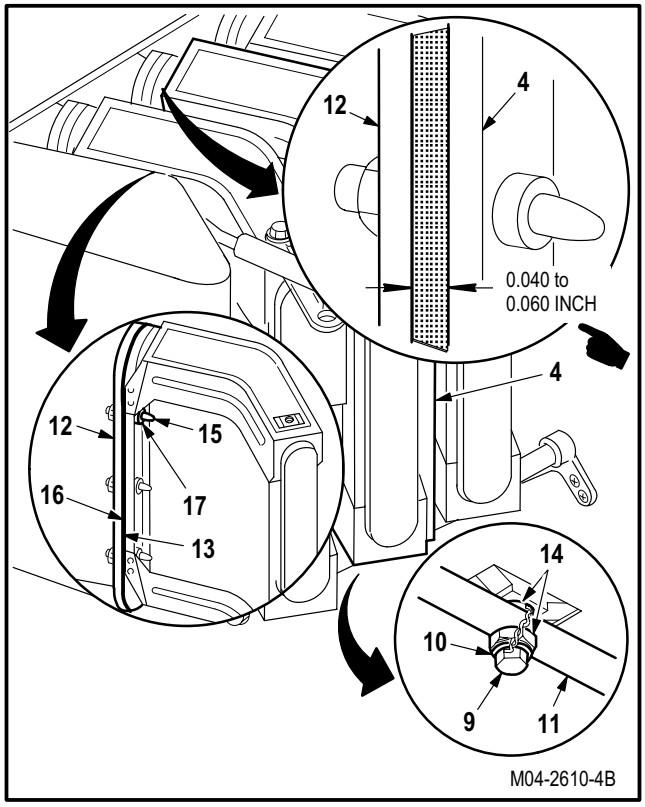
(2) Aline nozzle (4) just aft of pins (15).

(3) Slide nozzle (4) forward until seated on gasket (16) while positioning aft lower mounting hole of nozzle (4) over strut (11) and install bolt (9) and washer (10).

(4) Adjust threaded spacer (14) up or down to equalize the gap around upper and lower nozzle (4) face.

(5) Lockwire bolt (9) to spacer (14) and strut (11). Use wire (item 226, App F).

(6) Measure gap between nozzle (4) forward face and support (12) aft face. Install shims (13) (if required) to obtain a gap of **0.040** to **0.060 INCH**.

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**4.122. NO. 1 AND NO. 2 ENGINE CENTER SECONDARY NOZZLE REMOVAL/INSTALLATION - continued**

**NOTE**

Shim quantity should not exceed three per nozzle.

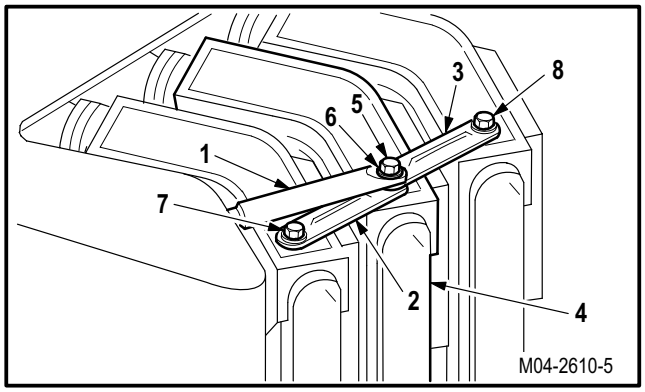
c. **Install struts (1), (2), and (3) on nozzle (4).**

(1) Swing struts (1), (2), and (3) forward over nozzle (4).

(2) Install bolt (5) and washer (6).

d. **Tighten bolts (7) and (8).**

e. **Inspect (QA).**




END OF TASK

## 4.123. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE STRUCTURAL SUPPORT REMOVAL/INSTALLATION

4.123.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.123.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Materials/Parts:**

Wire (item 226, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

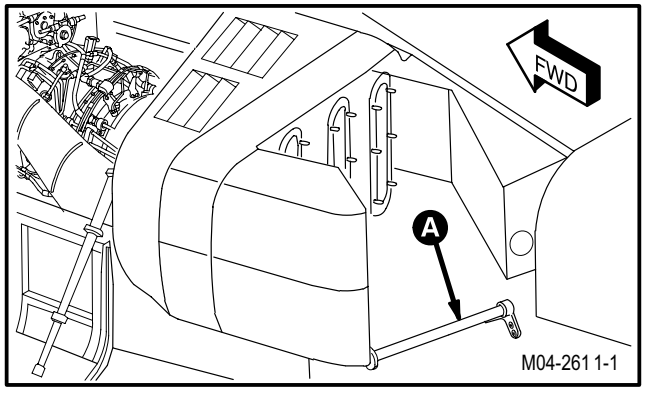
TM 1-1500-204-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.120 | No. 1 or No. 2 engine outboard secondary nozzle removed |
| 4.121 | No. 1 or No. 2 engine inboard secondary nozzle removed |
| 4.122 | No. 1 or No. 2 engine center secondary nozzle removed |

**NOTE**

This task is typical for No. 1 or No. 2 secondary nozzle structural support.

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## 4.123. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE STRUCTURAL SUPPORT REMOVAL/INSTALLATION - continued

4.123.3. Removal

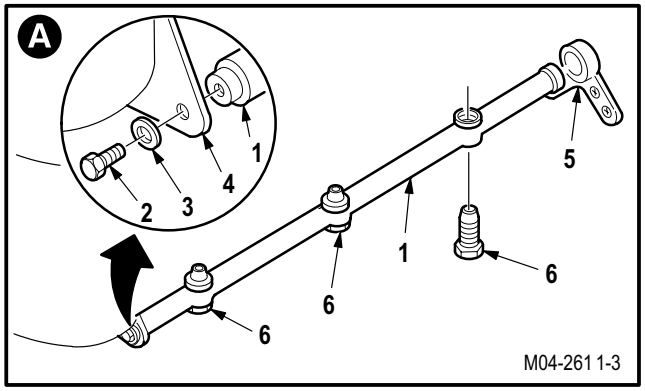
a. **Remove strut (1).**

(1) Remove bolt (2) and washer (3) from lug (4) and strut (1).

(2) Swing strut (1) clear of lug (4).

(3) Slide strut (1) out of support (5).

b. **Remove three adjustable spacers (6) from strut (1).**




4.123.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.123.5. Inspection

a. **Check lug, support, and spacers for cracks or bending.** None allowed.

b. **Check strut and spacers for damaged threads.** None allowed.

c. **Check strut for loose or missing rivets** (TM 1-1500-204-23)**.** None allowed.

d. **Check lug, support, and spacers for corrosion** (para 1.49)**.**

4.123.6. Installation

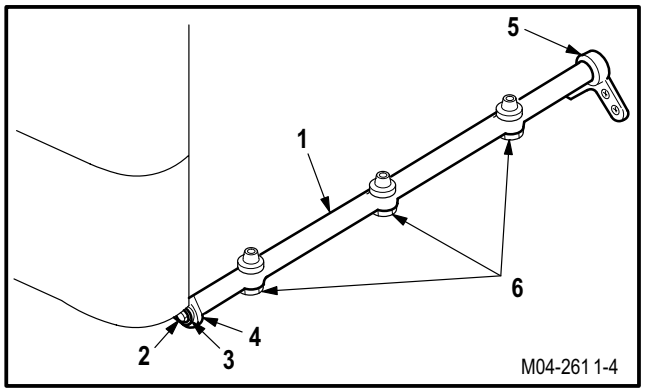
a. **Install three spacers (6) in strut (1).**

b. **Install strut (1).**

(1) Install strut (1) in support (5).

(2) Swing lug (4) outboard and aline free end of strut (1) on lug (4).

(3) Install bolt (2) and washer (3).

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## 4.123. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE STRUCTURAL SUPPORT REMOVAL/INSTALLATION - continued

**NOTE**

Lower support strut nozzle bolts will not be lockwired until spacers are adjusted.

c. **Install No. 1 and No. 2 engine center secondary nozzle** (para 4.122)**.**

d. **Install No. 1 or No. 2 engine inboard secondary nozzle** (para 4.121)**.**

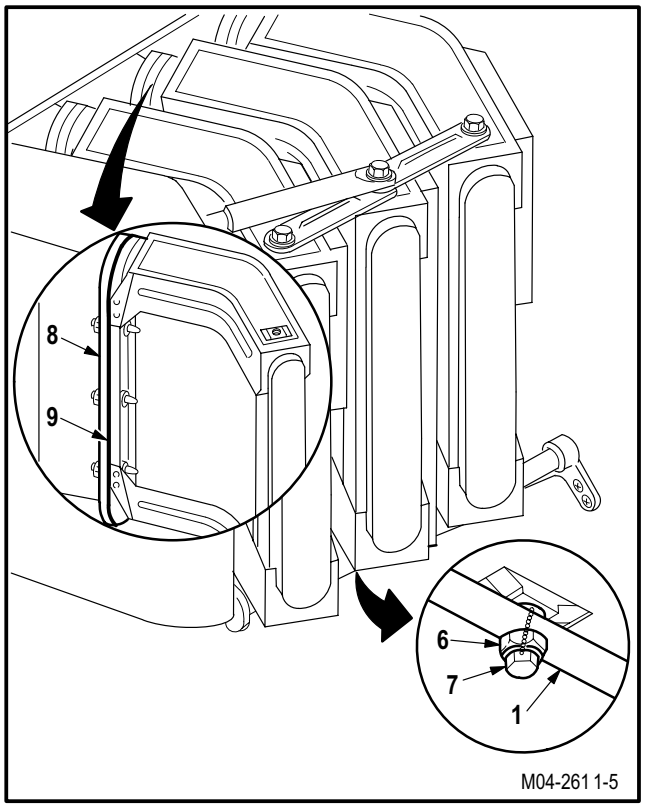
e. **Install No. 1 or No. 2 engine outboard secondary nozzle** (para 4.120)**.**

f. **Loosen three lower support strut nozzle bolts (7).**

g. **Adjust three spacers (6) in or out of strut (1) to aline three support seals (8) on mating nozzle flanges (9).**

h. **Lockwire bolts (7) to spacers (6) and strut (1).** Use wire (item 226, App F).

i. **Inspect (QA).**




END OF TASK

## 4.124. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE UPPER SUPPORT STRUT AND CLEVIS REMOVAL/INSTALLATION

4.124.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.124.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

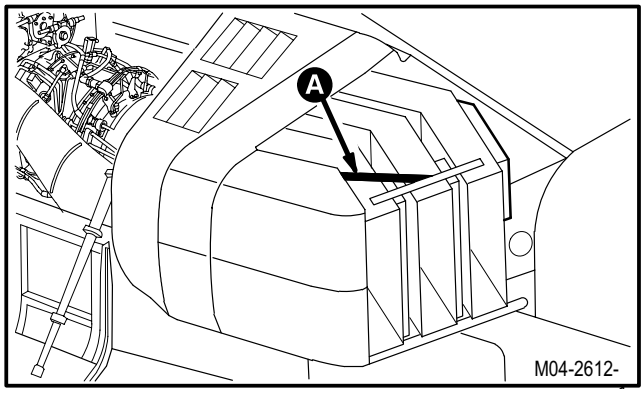
Cotter Pin
Wire (item 226, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

This task is typical for No. 1 or No. 2 secondary nozzle upper support strut.




4.124.3. Removal

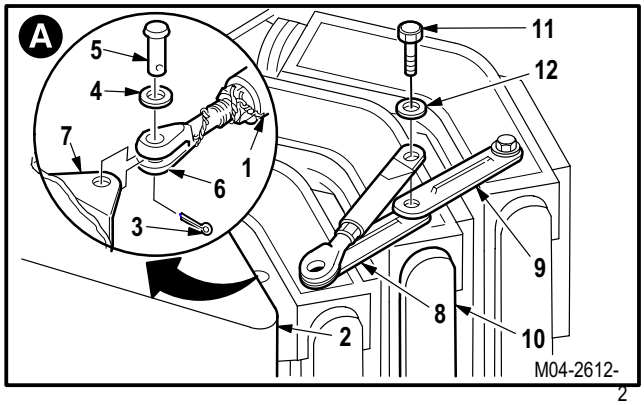
a. **Remove secondary nozzle upper support strut (1) from fairing (2).**

(1) Remove and discard cotter pin (3).

(2) Remove washer (4) and pin (5) from clevis (6) and lug (7).

b. **Remove strut (1) from struts (8) and (9) and nozzle (10).**

(1) Remove bolt (11) and washer (12).

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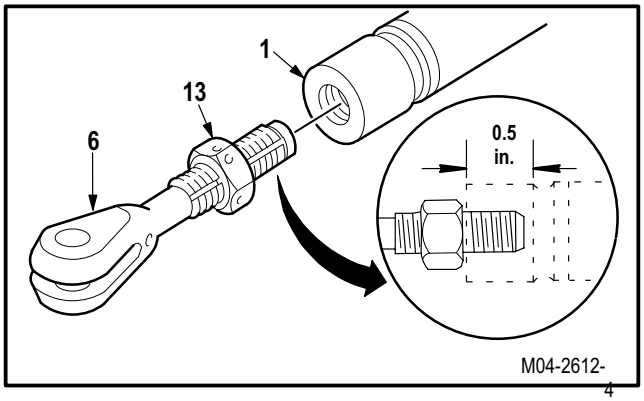
**4.124. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE UPPER SUPPORT STRUT AND CLEVIS REMOVAL/INSTALLATION - continued**

c. **Remove clevis (6) from strut (1).**

(1) Remove lockwire.

(2) Hold clevis (6). Loosen nut (13).

(3) Remove clevis (6) and nut (13) from strut (1).




4.124.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.124.5. Inspection

a. **Check upper strut mounting area on struts for cracks, bends, and loose or missing bushings.** None allowed.

b. **Check lug and clevis for cracks or bending.** None allowed.

c. **Check struts and lug for corrosion** (para 1.49)**.**

4.124.6. Repair

a. **Repair bushing damage on struts (8) and (9) by replacing bushings (14)** (para 4.127)**.**

4.124.7. Installation

a. **Install clevis (6) on strut (1).**

(1) Install nut (13) on clevis (6).

(2) Install clevis (6) **0.5 INCH** in strut (1).

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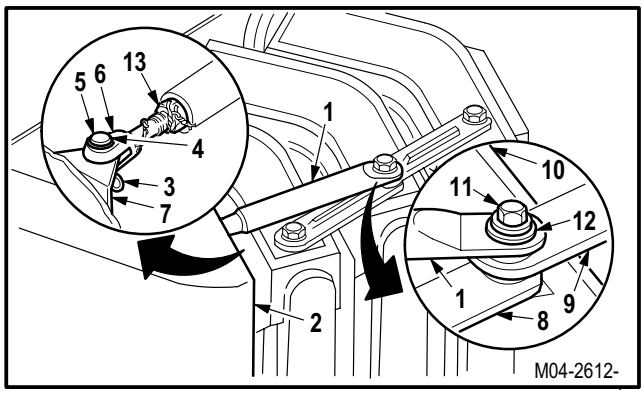
## 4.124. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE UPPER SUPPORT STRUT AND CLEVIS REMOVAL/INSTALLATION - continued

**NOTE**

Sloped side of strut must face up.




b. **Install strut (1) on struts (8) and (9) and nozzle (10).**

(1) Aline strut (1) over struts (8) and (9) and nozzle (10) as shown.

(2) Install bolt (11) and washer (12).

c. **Adjust clevis (6).**

(1) Aline clevis (6) over lug (7).

(2) Install pin (5) through washer (4), clevis (6), and lug (7). If pin (5) can be installed go to step d. If not, remove pin (5) and perform step c(3).

(3) Turn clevis (6) into or out of strut (1) until pin holes in clevis (6) and lug (7) can be alined without forcing. Then repeat step c(2).

d. **Install strut (1) on fairing (2).**

(1) Install new cotter pin (3) through pin (5).

e. **Tighten bolt (11) on strut (1).**

f. **Tighten clevis nut (13).**

(1) Hold clevis (6).

g. **Lockwire nut (13) to clevis (6).** Use wire (item 226, App F).

h. **Inspect (QA).**

END OF TASK

## 4.125. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE INTERMEDIATE SUPPORT STRUT REMOVAL/INSTALLATION

4.125.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.125.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

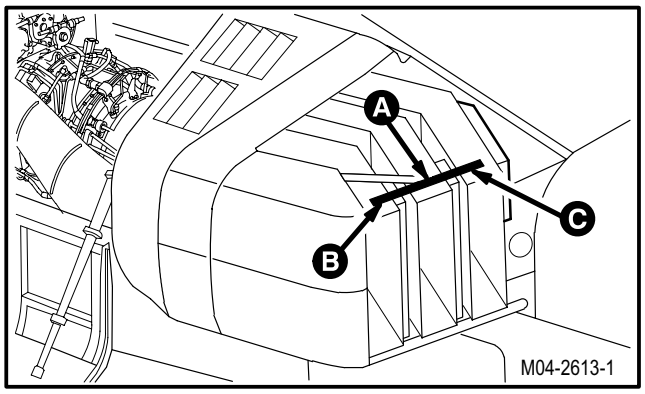
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

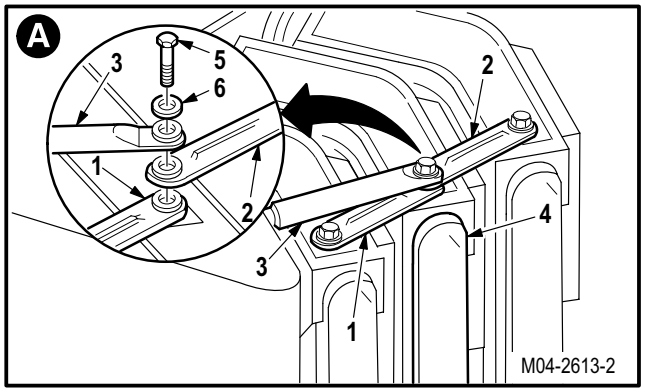
This task is typical for No. 1 or No. 2 secondary nozzle intermediate support strut.




4.125.3. Removal

a. **Remove secondary nozzle intermediate support struts (1) and (2) from strut (3) and nozzle (4).**

(1) Remove bolt (5) and washer (6).

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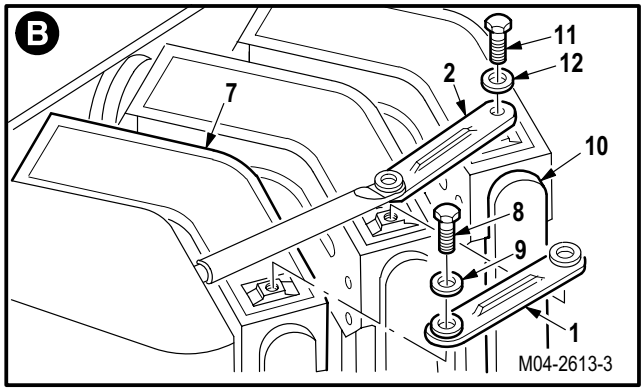
## 4.125. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE INTERMEDIATE SUPPORT STRUT REMOVAL/INSTALLATION - continued

b. **Remove strut (1) from nozzle (7).**

(1) Remove bolt (8) and washer (9).

c. **Remove strut (2) from nozzle (10).**

(1) Remove bolt (11) and washer (12).




4.125.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

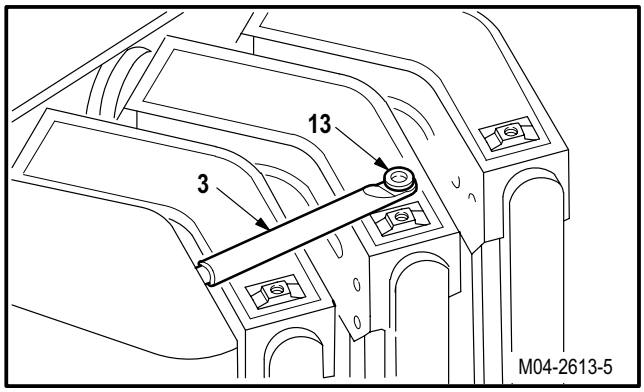
4.125.5. Inspection

a. **Check intermediate strut mounting area on strut for cracks, bending, and loose or missing bushing.** None allowed.

b. **Check strut for corrosion** (para 1.49)**.**

4.125.6. Repair

a. **Repair bushing damage on strut (3) by replacing bushing (13)** (para 4.127)**.**

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## 4.125. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE INTERMEDIATE SUPPORT STRUT REMOVAL/INSTALLATION - continued

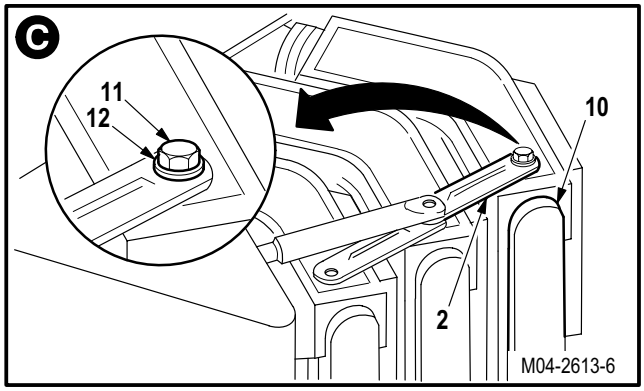
4.125.7. Installation

**NOTE**

Sloped sides of struts must face up.

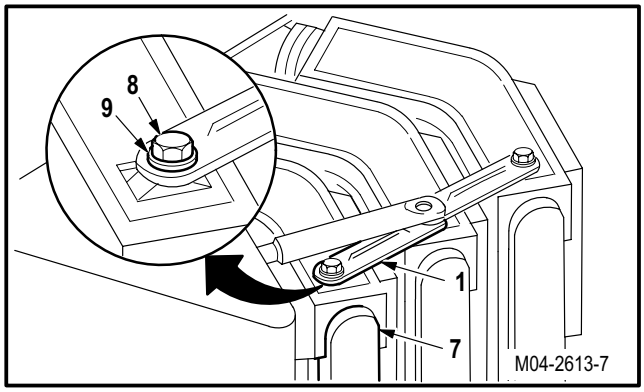
a. **Install strut (2) on nozzle (10).**

(1) Install bolt (11) and washer (12). Do not tighten bolt (11).




b. **Install strut (1) on nozzle (7).**

(1) Install bolt (8) and washer (9). Do not tighten bolt (8).

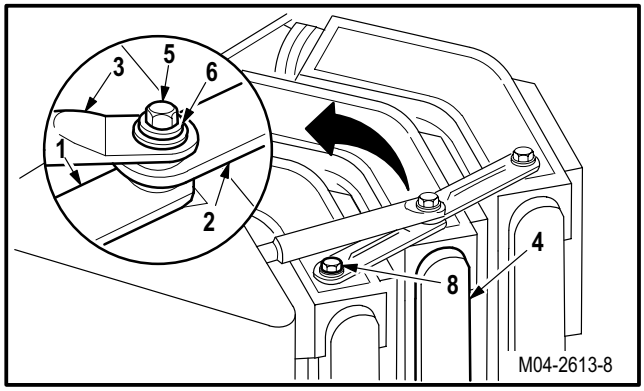



c. **Install struts (1) and (2) to strut (3) and nozzle (4).**

(1) Aline struts (1) and (2) over nozzle (4) as shown.

(2) Aline strut (3) over struts (1) and (2).

(3) Install bolt (5) and washer (6).




d. **Tighten bolts (8) and (11).**

e. **Inspect (QA).**

END OF TASK

## 4.126. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE SUPPORT REMOVAL/INSTALLATION

4.126.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.126.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

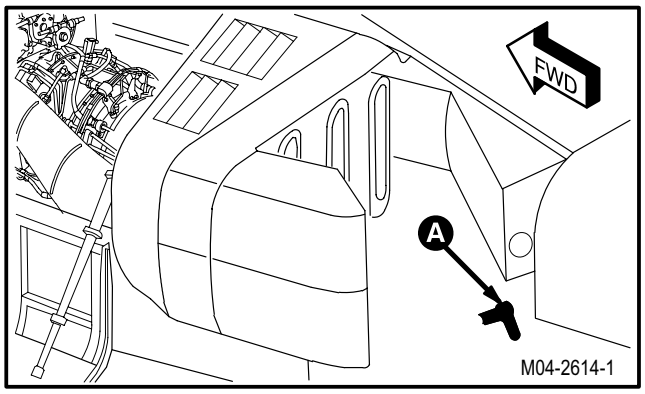
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.123 | No. 1 or No. 2 engine secondary nozzle lower support strut removed |

**NOTE**

This task is typical for No. 1 or No. 2 secondary nozzle support.

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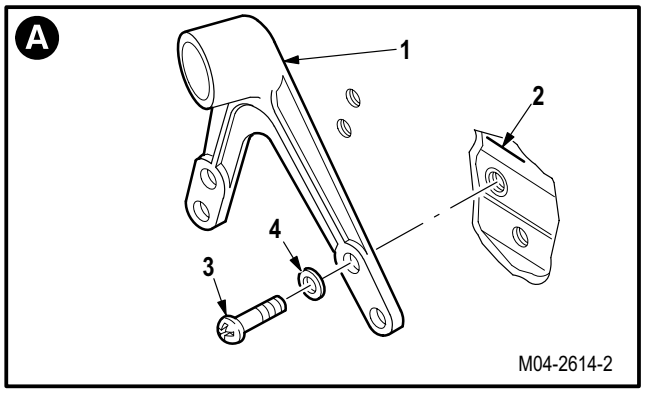
## 4.126. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE SUPPORT REMOVAL/INSTALLATION - continued

4.126.3. Removal

a. **Remove secondary nozzle aft strut support (1) from longeron (2).**

(1) Remove four screws (3) and washers (4) from support (1) and longeron (2).

(2) Remove support (1).




4.126.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.126.5. Inspection

a. **Check longeron for corrosion** (para 1.49)**.**

4.126.6. Installation

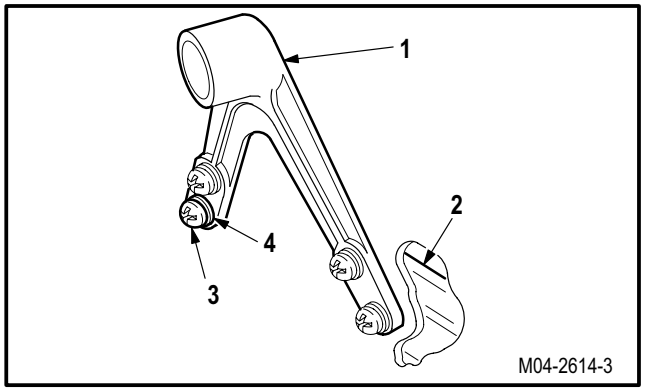
a. **Install secondary nozzle aft strut support (1) on longeron (2).**

(1) Position support (1) on longeron (2).

(2) Install four screws (3) and washers (4).

b. **Inspect (QA).**

c. **Install No. 1 or No. 2 engine secondary nozzle lower support strut** (para 4.123)**.**




END OF TASK

## 4.127. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE UPPER AND INTERMEDIATE SUPPORT STRUT BUSHING REPLACEMENT (AVIM)

4.127.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.127.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
2-ton hydraulic hand operated arbor press (item 235, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

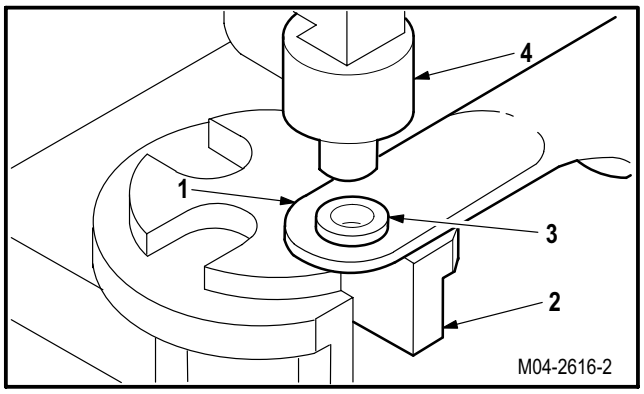
**NOTE**

This task is typical for all upper nozzle strut bushings.

4.127.3. Removal

a. **Place strut (1) in arbor press (2).**

b. **Position bushing (3), flange down, under press ram (4).**

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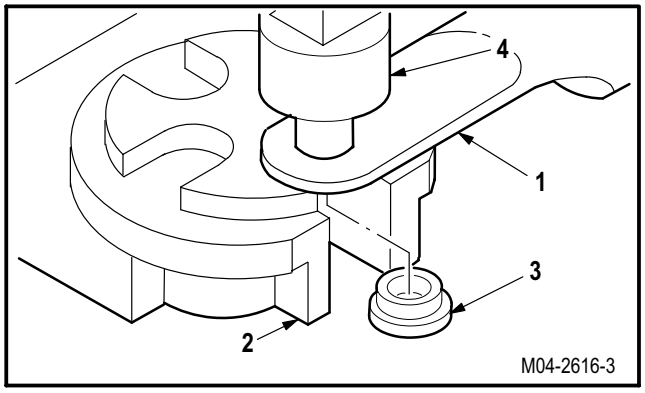
**4.127. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE UPPER AND INTERMEDIATE SUPPORT STRUT BUSHING REPLACEMENT (AVIM) - continued**

c. **Press bushing (3) from strut (1).** Use arbor press.

(1) Discard bushing (3).




4.127.4. Cleaning

a. **Clean strut in area of removed bushing** (para 1.47)**.**

4.127.5. Inspection

a. **Check strut for cracks and bending.** None allowed.

b. **Check strut for corrosion** (para 1.49)**.**

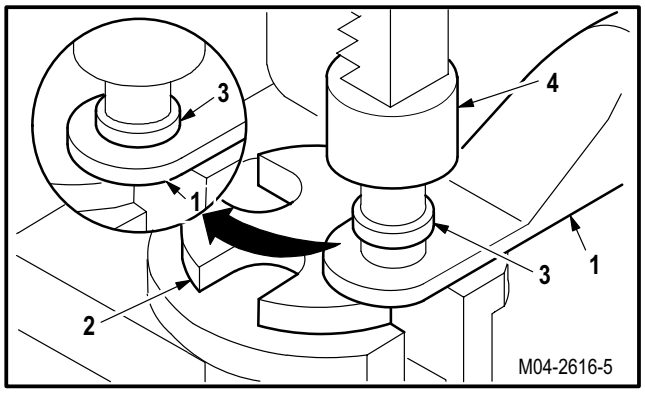
4.127.6. Installation

a. **Position strut (1) on arbor press (2).**

b. **Position bushing (3) with flange side up over hole in strut (1) and under press ram (4).**

c. **Press bushing (3) into strut (1).** Apply steady pressure until bushing bottoms in strut. Use arbor press.

d. **Inspect (QA).**




END OF TASK

## 4.128. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE SUPPORT BUSHING REPLACEMENT (AVIM)

4.128.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.128.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)

**References:**

TM 1-1500-204-23

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**NOTE**

This task is typical for all nozzle support bushings.

4.128.3. Removal

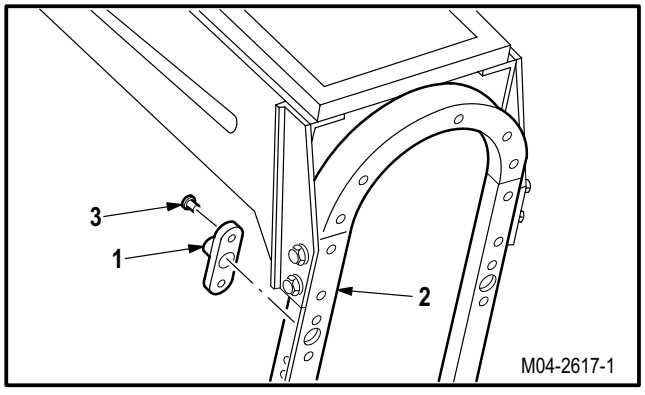
**WARNING**

**Fuel deposits on nozzles may be toxic. Use care to prevent cuts from fins and flanges. If injury occurs, flush skin with water and seek medical aid.**

a. **Remove nozzle support pin bushing (1) from flange (2).**

(1) Remove rivets (3) (TM 1-1500-204-23).

(2) Remove and discard bushing (1).

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## 4.128. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE SUPPORT BUSHING REPLACEMENT (AVIM) - continued

4.128.4. Cleaning

a. **Clean flange** (para 1.47)**.**

4.128.5. Inspection

a. **Check flange and nozzle body for cracks and burning.** None allowed.

b. **Check flange and body for corrosion** (para 1.49)**.**

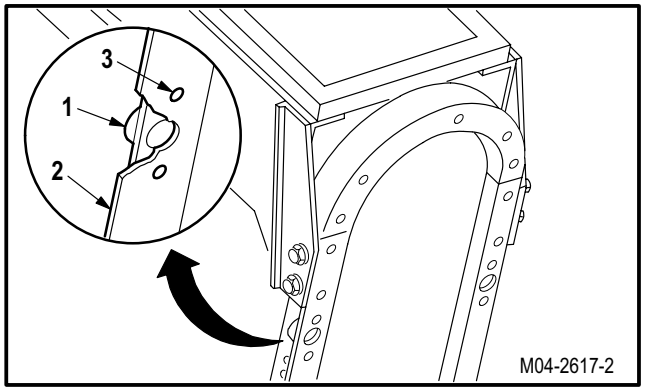
4.128.6. Installation

a. **Install new bushing (1) on flange (2).**

(1) Position bushing (1) on flange (2).

(2) Install rivets (3) (TM 1-1500-204-23).

b. **Inspect (QA).**




END OF TASK

## 4.129. NO. 1 AND NO. 2 ENGINE OUTBOARD AND CENTER SECONDARY NOZZLE VERTICAL HEAT SHIELD AND SUPPORT BRACKET REMOVAL/INSTALLATION

4.129.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.129.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23

**Materials/Parts:**

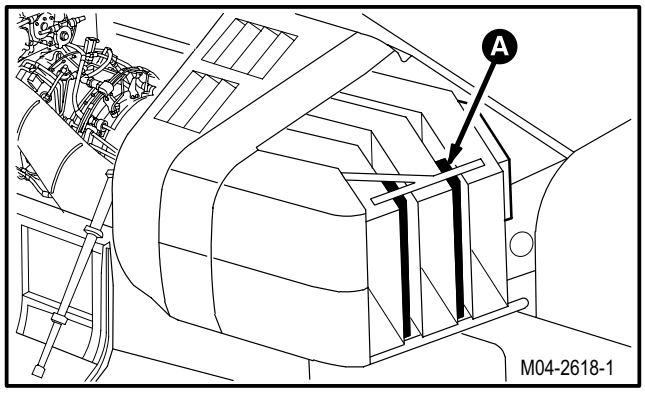
Insulation (table D-164, App D)
Adhesive (item 14, App F)
Epoxy primer coating kit (item 78, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

This task is typical for No. 1 or No. 2 outboard and center secondary nozzle vertical heat shield.



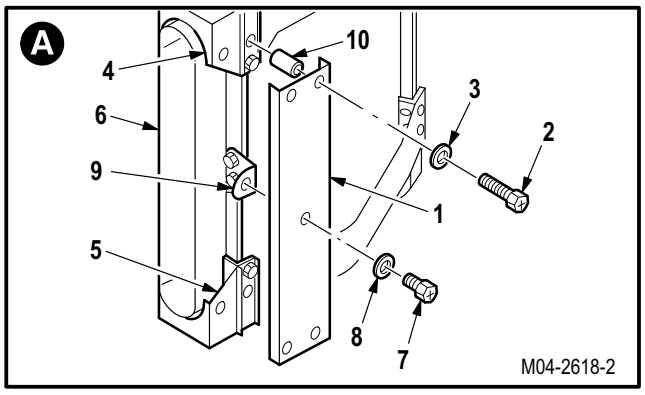

4.129.3. Removal

a. **Remove secondary nozzle vertical heat shield (1).**

(1) Remove four corner screws (2) and washers (3) from shield (1), horizontal shields (4) and (5), and nozzle (6).

(2) Remove screw (7) and washer (8) from shield (1) and shield support bracket (9).

(3) Remove four spacers (10) from under shield (1).

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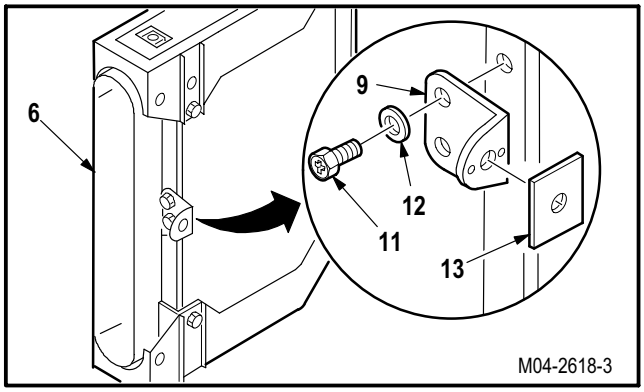
**4.129. NO. 1 AND NO. 2 ENGINE OUTBOARD AND CENTER SECONDARY NOZZLE VERTICAL HEAT SHIELD AND SUPPORT BRACKET REMOVAL/INSTALLATION - continued**

b. **Remove shield support bracket (9).**

(1) Remove two screws (11) and washers (12) from bracket (9) and nozzle (6).

c. **Remove and discard insulation (13).**




4.129.4. Cleaning

a. **Clean outside of shields, nozzle, and bracke** (para 1.47)**.**

4.129.5. Inspection

a. **Check shields, nozzle, and bracket for stripped, bent, or loose nutplates.** None allowed.

b. **Check shields, nozzle, and bracket for corrosion** (para 1.49)**.**

c. **Check shields, nozzle, and bracket for cracks.** None allowed.

4.129.6. Repair

a. **Repair nutplate damage by replacing defective nutplates.**

(1) Coat mounting surface of new nutplates being installed. Use epoxy primer coating kit (item 78, App F).

(2) Allow coated areas to cure **1 HOUR**.

(3) Install new nutplates (TM 1-1500-204-23).

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## 4.129. NO. 1 AND NO. 2 ENGINE OUTBOARD AND CENTER SECONDARY NOZZLE VERTICAL HEAT SHIELD AND SUPPORT BRACKET REMOVAL/INSTALLATION - continued

4.129.7. Installation

a. **Install bracket (9).**

(1) Center bracket (9) on edge of nozzle (6).

(2) Install two screws (11) and washers (12).

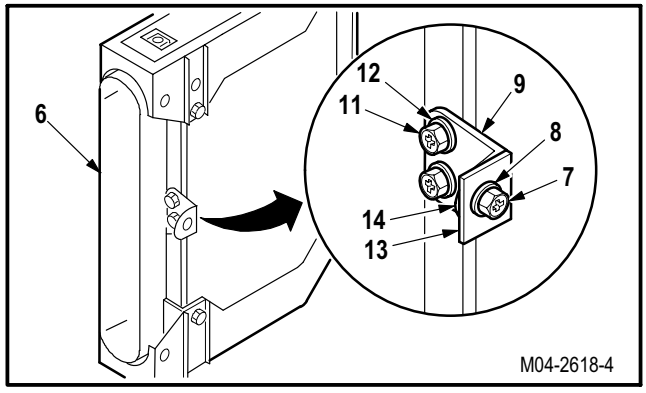
(3) Clean outer bracket flange (14) (para 1.47).

(4) Apply a thin coat of sealant to flange (14). Use adhesive (item 14, App F).

(5) Secure new insulation (13) to flange (14). Use washer (8) and screw (7).

(6) Allow sealant to cure until insulation (13) cannot be lifted.

(7) Remove screw (7) and washer (8).




b. **Install shield (1).**

(1) Aline shield center hole (15) with flange (14).

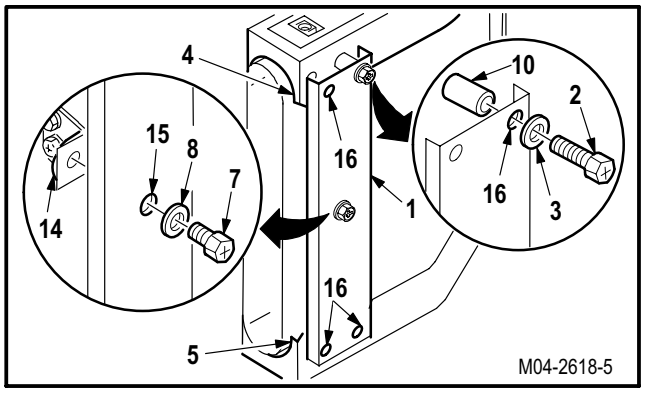
(2) Install screw (7) through washer (8) and center hole (15) into flange (14). Do not tighten screw.

(3) Aline four holes (16) with shields (4) and (5).

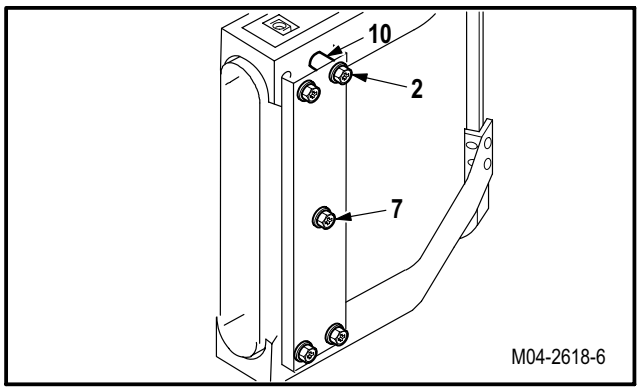
(4) Install four screws (2) through washers (3), shield (1), and spacers (10) into shields (4) and (5). Do not tighten screws.

(5) Tighten screw (7).

(6) Tighten four screws (2).




c. **Inspect (QA).**




END OF TASK

## 4.130. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE HORIZONTAL HEAT SHIELD AND SHIELD PANEL REMOVAL/INSTALLATION

4.130.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.130.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

Insulation (table D-164, App D)
Adhesive (item 14, App F)
Epoxy primer coating kit (item 78, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.120 | No. 1 or No. 2 engine outboard secondary nozzle removed or |
| 4.121 | No. 1 or No. 2 engine inboard secondary nozzle removed or |
| 4.122 | No. 1 or No. 2 engine center secondary nozzle removed |
| 4.129 | No. 1 or No. 2 engine outboard or center secondary nozzle vertical heat shield removed or |
| 4.131 | No. 1 or No. 2 engine inboard secondary nozzle heat shield removed |

**NOTE**

This task is typical for No. 1 or No. 2 secondary nozzle upper and lower horizontal heat shield.

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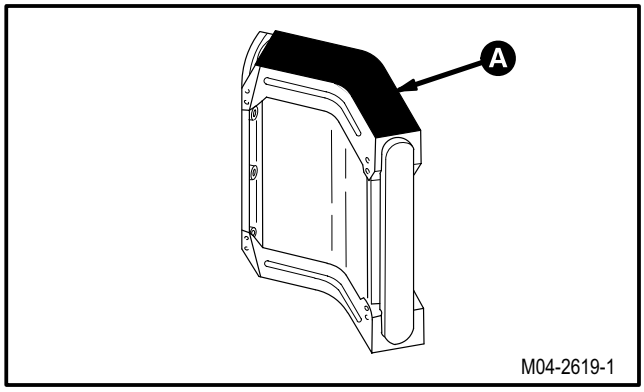
## 4.130. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE HORIZONTAL HEAT SHIELD AND SHIELD PANEL REMOVAL/INSTALLATION - continued

4.130.3. Removal

**WARNING**

**Fuel deposits on nozzles may be toxic. Use care to prevent cuts from fins and flanges. If injury occurs, flush skin with water and seek medical aid.**

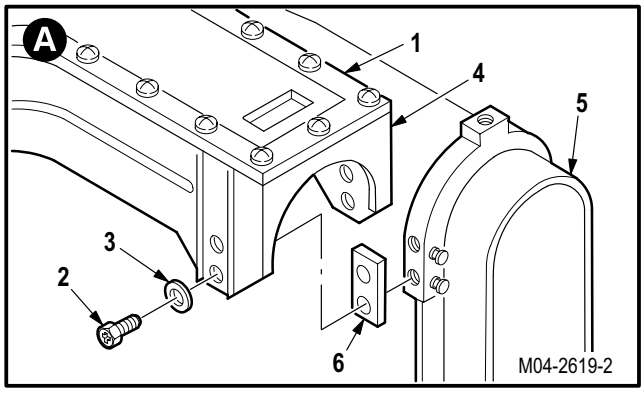



a. **Remove secondary nozzle upper or lower horizontal heat shield (1).**

(1) Remove eight screws (2) and washers (3) from support (4) and nozzle (5).

(2) Lift shield (1) up to remove from nozzle (5).

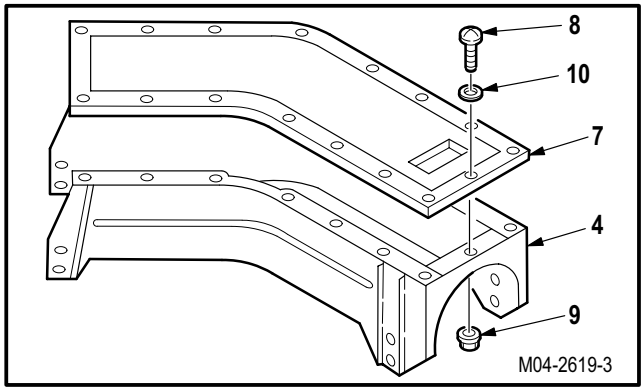
(3) Remove and discard four pieces of insulation (6).




b. **Remove shield panel (7) from support (4).**

(1) Hold 16 screws (8). Remove 16 nuts (9).

(2) Remove 16 screws (8) and washers (10).




4.130.4. Cleaning

a. **Clean outside of nozzle, panel, and support** (para 1.47)**.**

4.130.5. Inspection

a. **Check nozzle and support for stripped, bent, or loose nutplates** (TM 1-1500-204-23)**.**

b. **Check nozzle, panel, and support for corrosion** (para 1.49)**.**

c. **Check nozzle, panel, and support for cracks.** None allowed.

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## 4.130. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE HORIZONTAL HEAT SHIELD AND SHIELD PANEL REMOVAL/INSTALLATION - continued

4.130.6. Repair

a. **Repair nutplate damage by replacing defective nutplates.**

(1) Coat mounting surface of new nutplates being installed. Use epoxy primer coating kit (item 78, App F).

(2) Allow coated surfaces to cure **1 HOUR**.

(3) Install new nutplates (TM 1-1500-204-23).

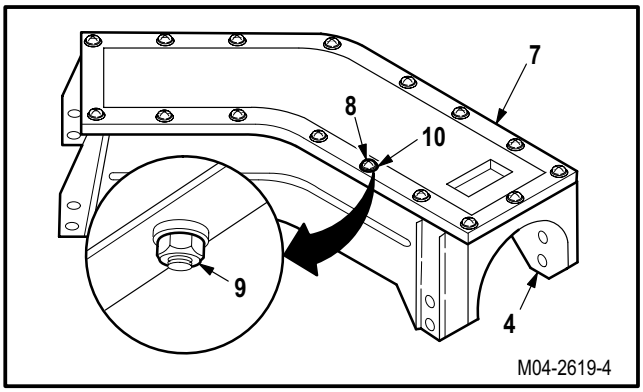
4.130.7. Installation

a. **Install panel (7) on support (4).** Torque 16 nuts (9) to **10 INCH-POUNDS**.

(1) Install 16 screws (8) and washers (10) through panel (7) and support (4).

(2) Hold 16 screws (8). Install 16 nuts (9).

(3) Torque 16 nuts (9) to **10 INCH-POUNDS**. Use torque wrench.

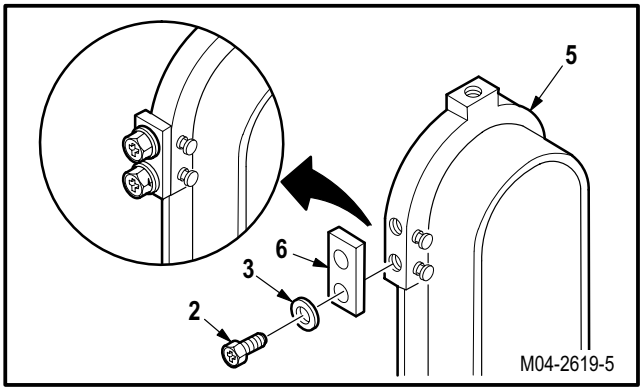


b. **Install four pieces of insulation (6).**

(1) Clean insulation mounting surface (para 1.47).

(2) Apply thin coat of sealant to insulation mounting surface. Use adhesive (item 14, App F).

(3) Secure new insulation (6) to nozzle (5). Install two screws (2) and washers (3).

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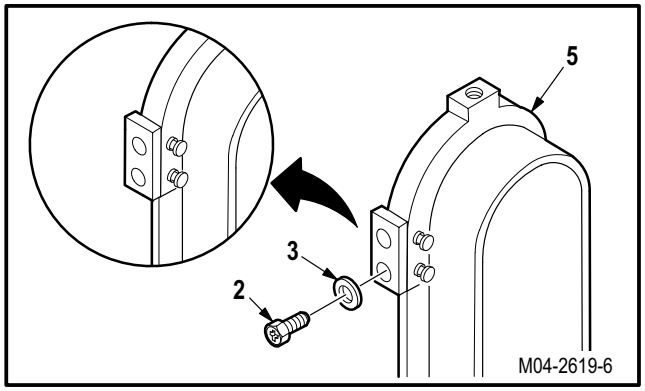
## 4.130. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE HORIZONTAL HEAT SHIELD AND SHIELD PANEL REMOVAL/INSTALLATION - continued

**NOTE**

Observe container for sealant cure time.

(4) Allow sealant to cure.

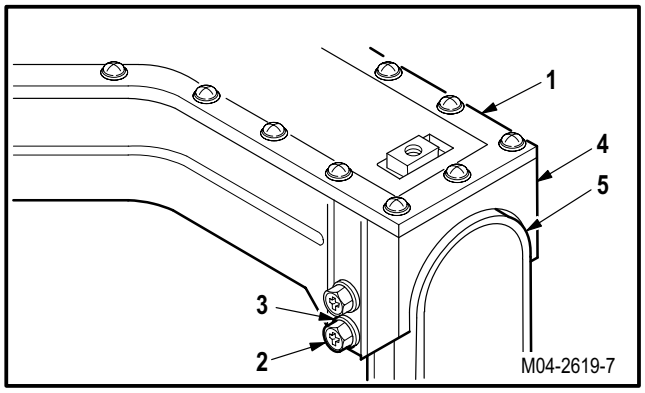
(5) Remove two screws (2) and washers (3) from nozzle (5).




c. **Install upper or lower shield (1).**

(1) Slide shield (1) onto nozzle (5).

(2) Install eight screws (2) and washers (3) through support (4) and nozzle (5).




d. **Inspect (QA).**

e. **Install outboard or center nozzle vertical heat shield** (para 4.129)**.**

f. **Install inboard nozzle heat shield** (para 4.131)**.**

g. **Install No. 1 or No. 2 engine outboard secondary nozzle** (para 4.120)**.**

h. **Install No. 1 or No. 2 engine inboard secondary nozzle** (para 4.121)**.**

i. **Install No. 1 or No. 2 engine center secondary nozzle** (para 4.122)**.**

END OF TASK

## 4.131. NO. 1 AND NO. 2 ENGINE INBOARD SECONDARY NOZZLE HEAT SHIELD AND SUPPORT BRACKET REMOVAL/INSTALLATION

4.131.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.131.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23

**Equipment Conditions:**

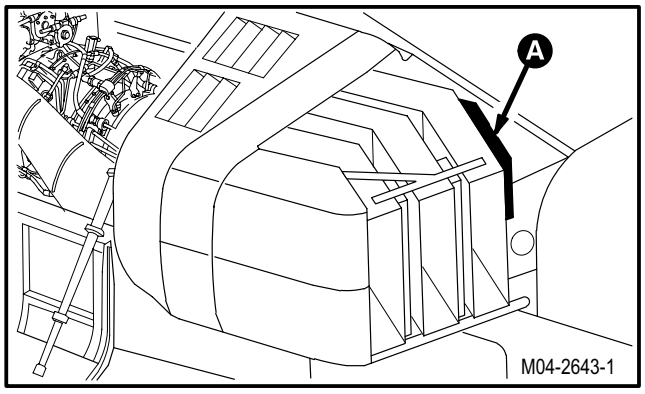
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.121 | No. 1 or No. 2 engine inboard secondary nozzle removed |

**Materials/Parts:**

Insulation (table D-164, App D)
Adhesive (item 14, App F)
Epoxy primer coating kit (item 78, App F)

**NOTE**

This task is typical for No. 1 or No. 2 engine inboard secondary nozzle heat shield and support bracket.



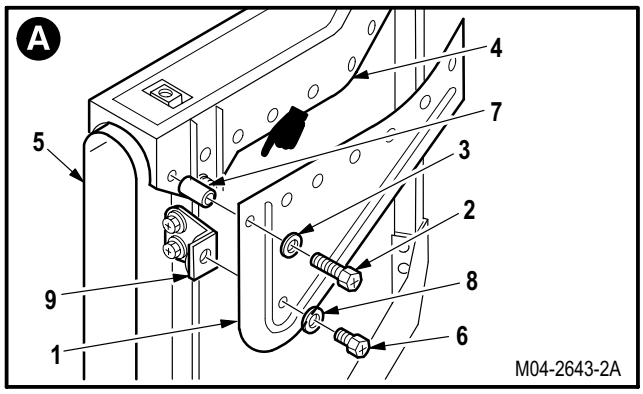

4.131.3. Removal

a. **Remove inboard secondary nozzle heat shield (1).**

(1) Remove seven upper screws (2) and washers (3) from shield (1), spacers (7), horizontal shield (4), and nozzle (5).

(2) Remove screw (6) and washer (8) from shield (1) and shield support bracket (9).

(3) Remove seven spacers (7) from under shield (1).

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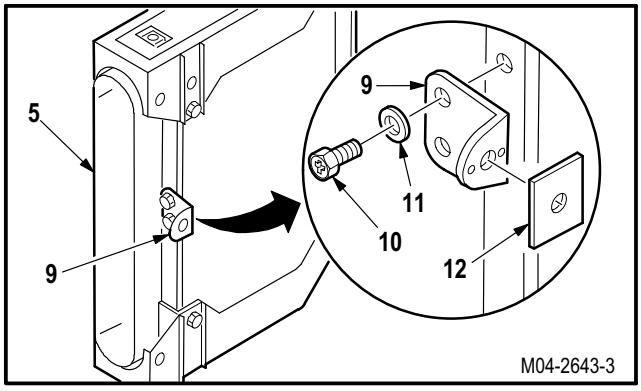
## 4.131. NO. 1 AND NO. 2 ENGINE INBOARD SECONDARY NOZZLE HEAT SHIELD AND SUPPORT BRACKET REMOVAL/INSTALLATION - continued

b. **Remove shield support bracket (9).**

(1) Remove two screws (10) and washers (11) from bracket (9) and nozzle (5).

c. **Remove and discard insulation (12).**




4.131.4. Cleaning

a. **Clean outside of shields, nozzle, and bracket** (para 1.47)**.**

4.131.5. Inspection

a. **Check shields, nozzle, and bracket for stripped, bent, or loose nutplates** (TM 1-1500-204-23)**.**

b. **Check shields, nozzle, and bracket for corrosion** (para 1.49)**.**

c. **Check shields, nozzle, and bracket for cracks.** None allowed.

4.131.6. Repair

a. **Repair nutplate damage by replacing defective nutplates.**

(1) Coat mounting surface of new nutplates being installed. Use epoxy primer coating kit (item 78, App F).

(2) Allow coated areas to cure **1 HOUR**.

(3) Install new nutplates (TM 1-1500-204-23).

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## 4.131. NO. 1 AND NO. 2 ENGINE INBOARD SECONDARY NOZZLE HEAT SHIELD AND SUPPORT BRACKET REMOVAL/INSTALLATION - continued

4.131.7. Installation

a. **Install bracket (9).**

(1) Aline bracket (9) on upper edge of nozzle (5).

(2) Install two washers (11) and screws (10).

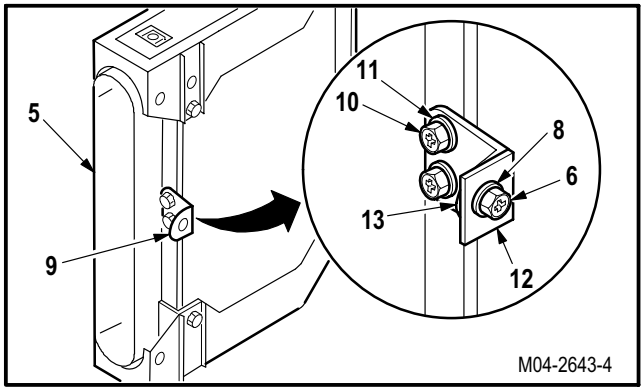
(3) Clean outer bracket flange (13) (para 1.47).

(4) Apply a thin coat of sealant to flange (13). Use adhesive (item 14, App F).

(5) Secure new insulation (12) to flange (13). Use washer (8) and screw (6).

(6) Allow sealant to cure until insulation (12) cannot be lifted.

(7) Remove screw (6) and washer (8).




b. **Install shield (1).**

(1) Position shield (1) lower hole (14) over flange (13).

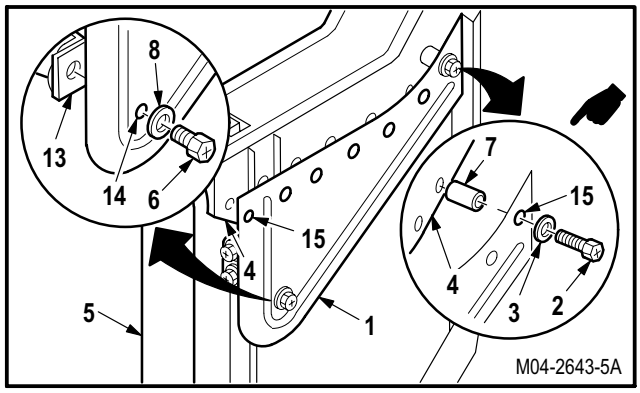
(2) Install screw (6) through washer (8) and shield (1). Do not tighten screw (6).

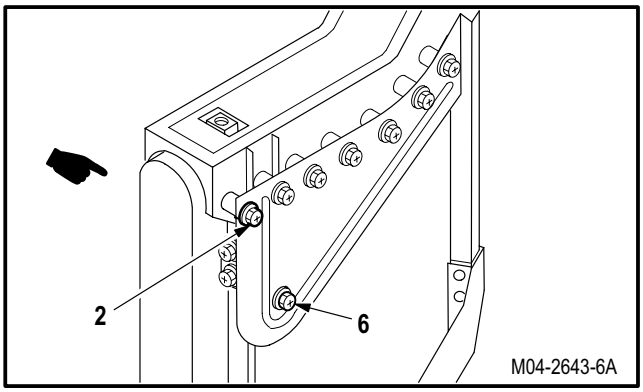
(3) Aline holes (15) with shield (4).

(4) Install seven screws (2) through washers (3), shield (1), and spacers (7) into shield (4). Do not tighten screws (2).

(5) Tighten screw (6).

(6) Tighten seven screws (2).




c. **Inspect (QA).**

d. **Install No. 1 or No. 2 engine inboard secondary nozzle** (para 4.121)**.**

END OF TASK

## 4.132. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE PIN REPLACEMENT

4.132.1. Description

This task covers: Removal. Installation.

4.132.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

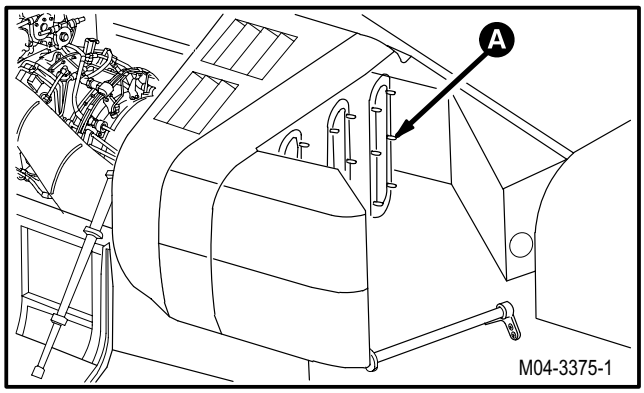
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.120 | No. 1 or No. 2 engine outboard secondary nozzle removed or |
| 4.121 | No. 1 or No. 2 engine inboard secondary nozzle removed or |
| 4.122 | No. 1 or No. 2 engine center secondary nozzle removed |

**NOTE**

This task is typical for all No. 1 or No. 2 secondary nozzle pins.

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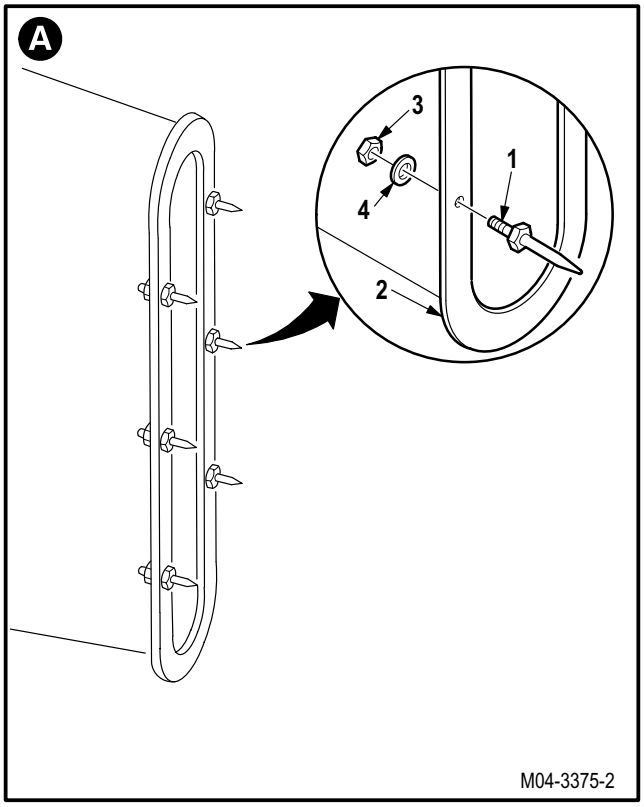
## 4.132. NO. 1 AND NO. 2 ENGINE SECONDARY NOZZLE PIN REPLACEMENT - continued

4.132.3. Removal

a. **Remove secondary nozzle support pin (1) from support (2).**

(1) Hold pin (1). Remove nut (3) and washer (4).

(2) Remove and discard pin (1).




4.132.4. Installation

a. **Install new pin (1) on support (2).**

(1) Install pin (1) through support assembly (2).

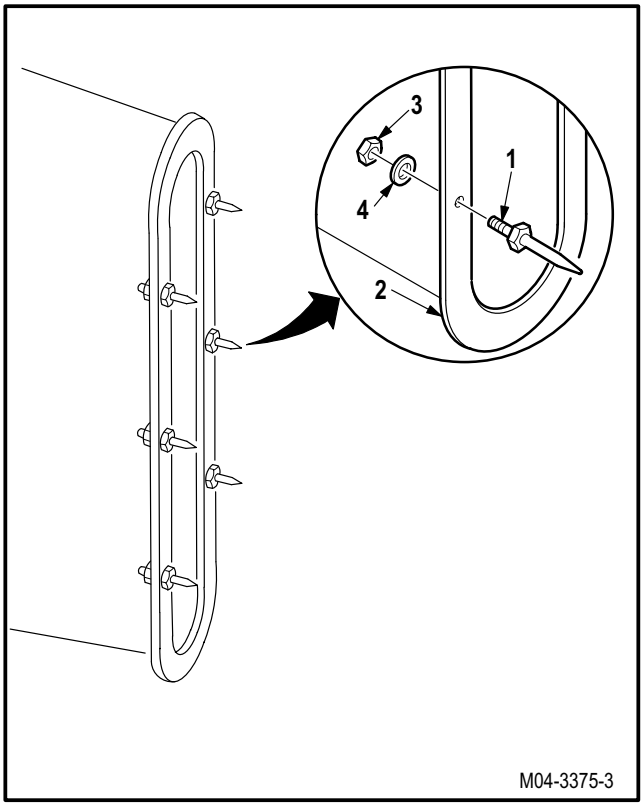
(2) Hold pin (1). Install washer (4) and nut (3) on pin (1).

b. **Inspect (QA).**

c. **Install No. 1 or No. 2 engine center secondary nozzle** (para 4.122)**.**

d. **Install No. 1 or No. 2 engine outboard secondary nozzle** (para 4.120)**.**

e. **Install No. 1 or No. 2 engine inboard secondary nozzle** (para 4.121)**.**




END OF TASK

## 4.133. SECONDARY NOZZLE FRAME REMOVAL/INSTALLATION

4.133.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.133.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
2-ton hydraulic hand operated arbor press (item 235, App H)

**References:**

TM 1-1500-204-23

**Materials/Parts:**

Bushing
Rivets (4)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.129 | No. 1 or No. 2 engine secondary nozzle vertical heat shield removed |
| 4.130 | No. 1 or No. 2 engine secondary nozzle horizontal heat shield removed |

**Personnel Required:**

| | |
|---|---|
| 67R | Attack Helicopter Repairer |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

**NOTE**

This task is typical for all secondary nozzle frames.

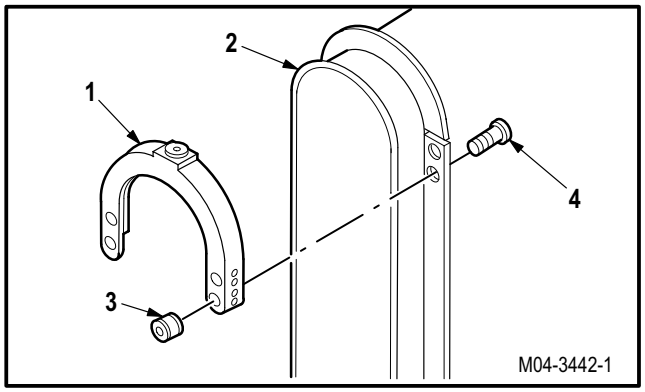
4.133.3. Removal

a. **Remove frame (1) from secondary nozzle (2).**

(1) Remove four pin collars (3) from pin rivets (4) (TM 1-1500-204-23).

(2) Remove four pin rivets (4) from nozzle (2) and frame (1).

(3) Remove frame (1).




4.133.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

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## 4.133. SECONDARY NOZZLE FRAME REMOVAL/INSTALLATION - continued

4.133.5. Inspection

a. **Check frame for cracks.** Check nutplates for stripped threads. None allowed.

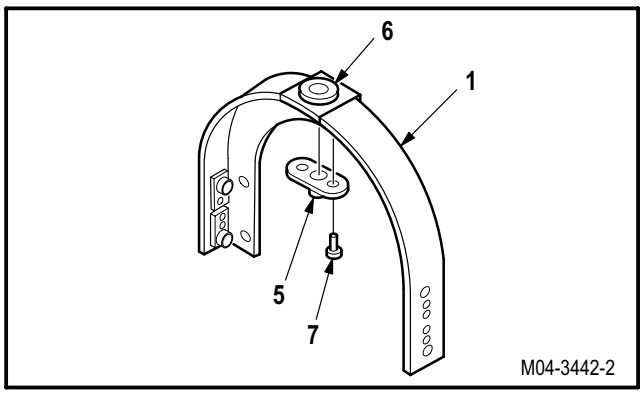
b. **Check frame for corrosion** (para 1.49)**.**

4.133.6. Repair

a. **Repair frame (1) by replacing bushing (6).** Use arbor press.

(1) Remove nutplate (5) from frame (1).

(a) Remove two rivets (7) from nutplate (5) and frame (1) (TM 1-1500-204-23).

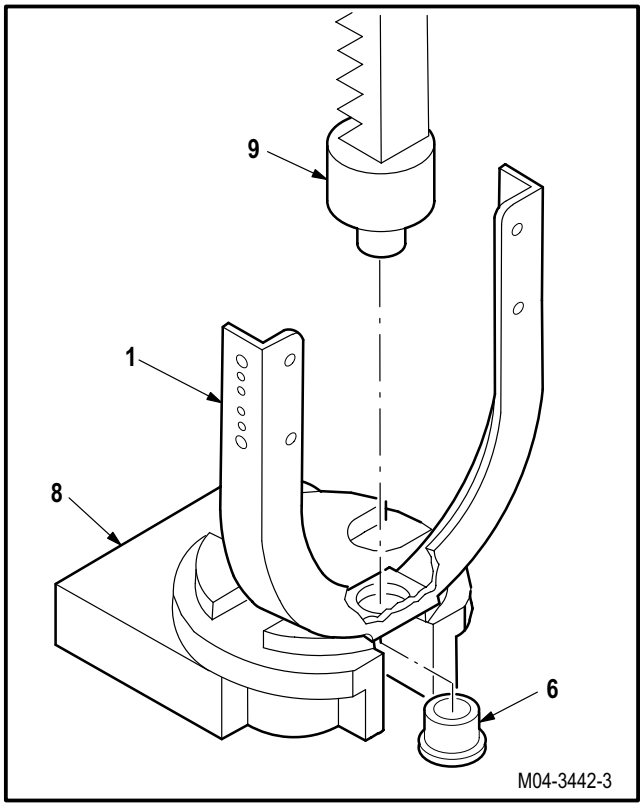



(2) Place frame (1) in arbor press (8).

(3) Position bushing (6) flange down, under press ram (9).

(4) Press bushing (6) from frame (1).

(5) Discard bushing (6).

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## 4.133. SECONDARY NOZZLE FRAME REMOVAL/INSTALLATION - continued

(6) Reposition frame (1) in arbor press (8).

(7) Aline new bushing (6), flange up, with press ram (9) and hole in nozzle frame (1).

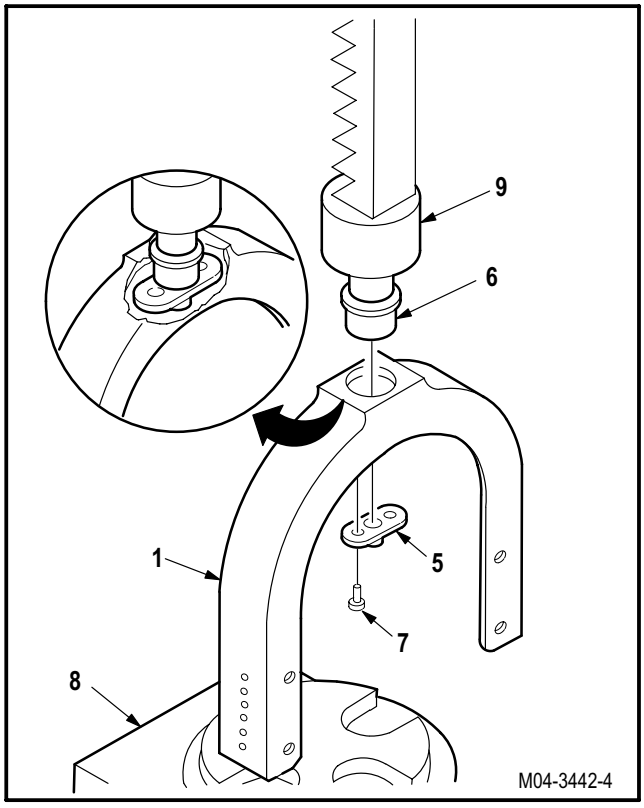
(8) Press bushing (6) in nozzle frame (1). Apply steady pressure until bushing (6) bottoms in frame (1).

b. **Install nutplate (5) on frame (1) .**

(1) Position nutplate (5) on frame (1).

(2) Install two rivets (7) through nutplate (5) and frame (1) (TM 1-1500-204-23).

c. **Inspect (QA).**




4.133.7. Installation

a. **Install frame (1) on secondary nozzle (2).**

(1) Aline holes of frame (1) with holes in nozzle (2).

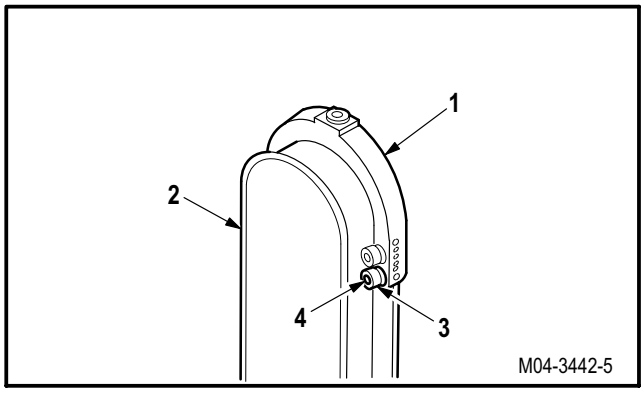
(2) Install four pin rivets (4) through frame (1) and nozzle (2).

(3) Install four pin collars (3) on pin rivets (4), (TM 1-1500-204-23).

b. **Inspect (QA).**

c. **Install No. 1 or No. 2 engine secondary nozzle horizontal heat shield** (para 4.130)**.**

d. **Install No. 1 or No. 2 engine secondary nozzle vertical heat shield** (para 4.129)**.**




END OF TASK

## 4.134. NO. 1 OR NO. 2 ENGINE SECONDARY NOZZLE CRACK REPAIR (AVIM)

4.134.1. Description

This task covers: Repair.

4.134.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Fluorescent inspection kit (item 138, App H)
Pneumatic die hand grinder (item 157, App H)
Adjustable air filtering respirator (item 262, App H)
Pneumatic blind riveter (item 269, App H)

**Materials/Parts:**

Doubler (figure D-264, App D)
Rivet (NAS 1398D4) (as required)
Corrosion resistant coating (item 66, App F)
Polyurethane coating (item 140, App F)
Primer coating (item 147, App F)
Remover (item 150, App F)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23
TM 55-1500-335-23
TM 55-1500-345-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.120 | No. 1 or No. 2 engine outboard secondary nozzle or |
| 4.121 | No. 1 or No. 2 engine inboard secondary nozzle or |
| 4.122 | No. 1 or No. 2 engine center secondary nozzle removed |
| 4.129 | No. 1 or No. 2 engine outboard and center secondary nozzle vertical heat shield and support bracket removed |
| 4.130 | No. 1 or No. 2 engine secondary nozzle horizontal heat shield and shield panel removed |
| 4.131 | No. 1 or No. 2 engine inboard secondary nozzle heat shield and support bracket removed |

4.134.3. Repair

a. **Remove paint from inside surface of affected area on nozzle.** Use remover (item 150, App F).

b. **Transfer hole locations to be drilled onto exterior surface of nozzle.** Use dividers.

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**4.134. NO. 1 OR NO. 2 ENGINE SECONDARY NOZZLE CRACK REPAIR (AVIM) - continued**

**CAUTION**

- To prevent damage to the cooling fins, all drilling must be performed from the exterior of the nozzle.
- To prevent damage to cooling fins, stop drill hole locations may be deviated as required.

c. **Stop drill cracks from outside surface of nozzle** (TM 1-1500-204-23)**.**

d. **Grind weld bead flush, 2.30 INCHES long, with inside surface of nozzle.** Use grinder.

e. **Perform fluorescent penetrant test on crack and weld areas.** Use fluorescent inspection kit (TM 55-1500-335-23).

f. **Remove three existing rivets from angle and nozzle** (TM 1-1500-204-23)**.**

g. **Fabricate doubler** (figure D-264, App D)**.**

**CAUTION**

To prevent damage to the cooling fins, all drilling must be performed from the exterior of the nozzle.

h. **Position doubler in place and match drill three existing holes through doubler for rivet installation.**

**CAUTION**

To prevent damage to cooling fins and to prevent rivets from falling through stop drill holes and cracks, rivet spacing may be deviated as required.

(1) Transfer remaining hole locations to be drilled to exterior surface of nozzle. Use dividers.

(2) Drill remaining holes through nozzle and doubler. Use #30 drill bit.

(3) Remove doubler and deburr holes.

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**4.134. NO. 1 OR NO. 2 ENGINE SECONDARY NOZZLE CRACK REPAIR (AVIM) - continued**

(4) Apply chemical coating to doubler (TM 55-1500-345-23). Use corrosion resistant coating (item 66, App F).

(5) Apply primer to doubler and allow to dry for **1 HOUR** at a minimum temperature of 65 °F (18 °C). (TM 55-1500-345-23). Use primer coating (item 147, App F).

i. **Position doubler on nozzle and install rivets as required** (TM 1-1500-204-23)**.** Use riveter.

j. **Touch up rivets with primer.** Use primer coating (item 147, App F).

k. **Apply coating over rework area as necessary** (TM 55-1500-345-23)**.** Use polyurethane coating (item 140, App F).

l. **Inspect (QA).**

m. **Install No. 1 or No. 2 engine inboard secondary nozzle heat shield and support bracket** (para 4.131)**.**

n. **Install No. 1 or No. 2 engine secondary nozzle horizontal heat shield and shield panel** (para 4.130)**.**

o. **Install No. 1 or No. 2 engine outboard and center secondary nozzle vertical heat shield and support bracket** (para 4.129)**.**

p. **Install No. 1 or No. 2 engine center secondary nozzle** (para 4.122)**.**

q. **Install No. 1 or No. 2 engine inboard secondary nozzle** (para 4.121)**.**

r. **Install No. 1 or No. 2 engine outboard secondary nozzle** (para 4.120)**.**

END OF TASK

# SECTION VII. IGNITION SYSTEM MAINTENANCE

(REFER TO TM 55-2840-248-23)

# SECTION VIII. POWER CONTROLS MAINTENANCE

## 4.135. ENGINE TURBINE SPEED CONTROL UNIT REPLACEMENT

4.135.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.135.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

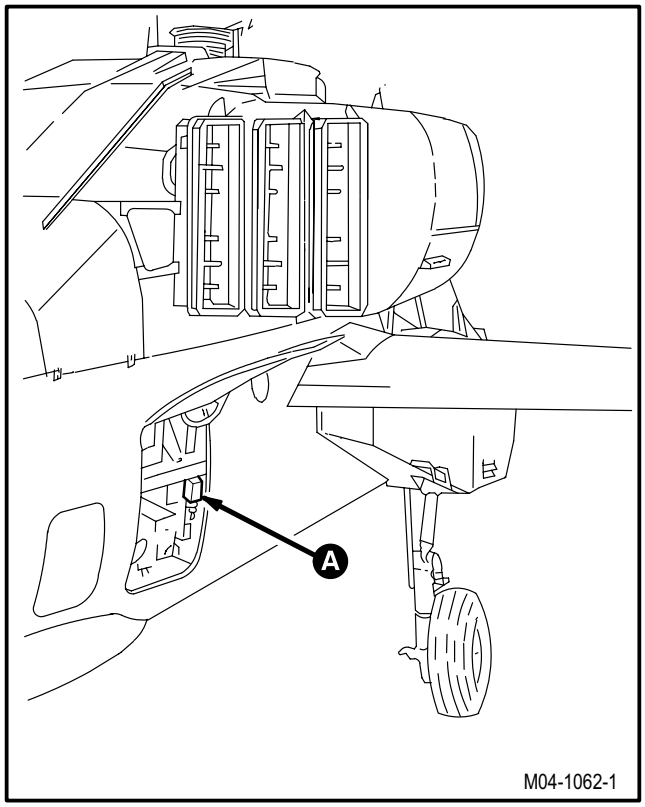
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door R295 opened |

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## 4.135. ENGINE TURBINE SPEED CONTROL UNIT REPLACEMENT - continued

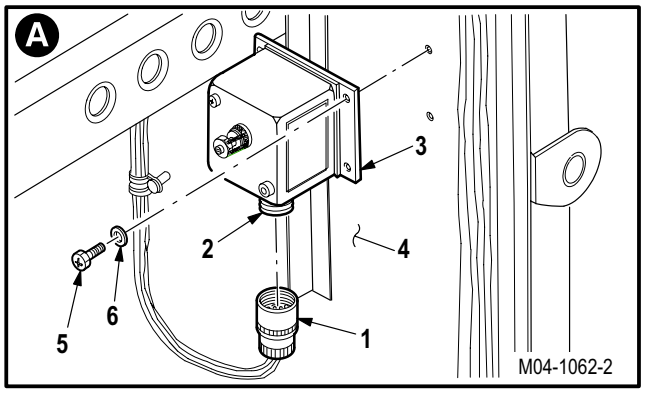
4.135.3. Removal

a. **Detach connector P54 (1) from speed control receptacle J1 (2).**

b. **Remove speed control unit (3) from electronics bay forward bulkhead (4).**

(1) Remove four screws (5) and washers (6).

(2) Remove control unit (3).




4.135.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.135.5. Inspection

a. **Check speed control mounting area for cracks.** None allowed.

b. **Check connector P54 for bent or missing pins** (TM 55-1500-323-24)**.**

4.135.6. Installation

a. **Install control unit (3) on bulkhead (4).**

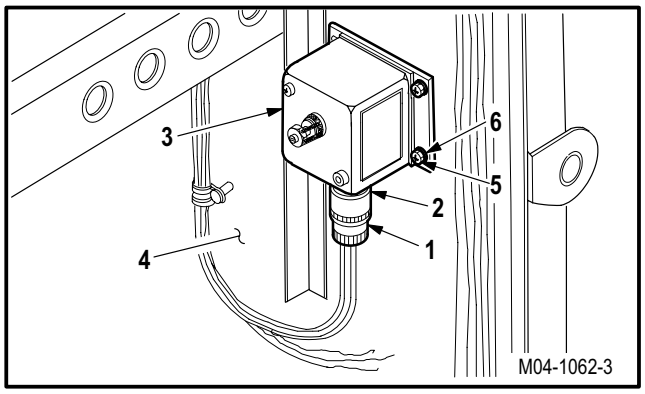
(1) Install four screws (5) and washers (6).

b. **Attach connector P54 (1) to receptacle J1 (2).**

c. **Inspect (QA).**

d. **Adjust control unit** (para 4.136, T-700-GE-701 engine) **or** (para 4.137, T-700-GE-701C engine)**.**

e. **Secure access door R295** (para 2.2)**.**




END OF TASK

## 4.136. ENGINE TURBINE SPEED CONTROL UNIT ADJUSTMENT (T700-GE-701 ENGINE)

4.136.1. Description

This task covers: Adjustment.

4.136.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 371, App H)

**Materials/Parts:**

Wire (item 222, App F)

**Personnel Required:**

| | |
|---|---|
| 68B | Aircraft Powerplant Repairer |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |
| 152FG | Maintenance Test Pilot |

**References:**

TM 1-1520-238-CL
TM 1-1520-238-MTF
TM 1-1520-238-T

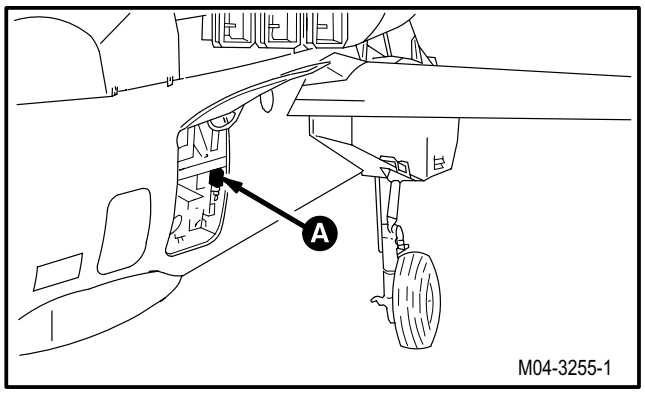
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door R295 opened |
| 1.134 | Maintenance headset connected |
| TM 1-1520-238-CL | Engines No. 1 and No. 2 running |

4.136.3. Adjustment

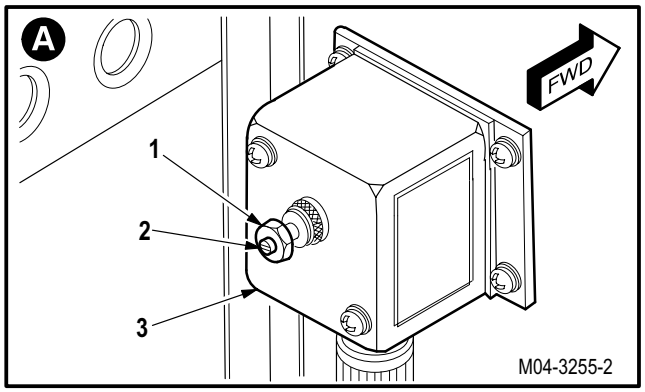
a. **On pilot aft circuit breaker panel, open ECS AFT FAN circuit breaker.**

b. **On pilot ENGINE INST DIM/TEST panel, rotate DIM control to full BRT.**




c. **Remove lockwire from nut (1).**

d. **Hold $N_p$ adjustment screw (2).** Loosen nut (2) on turbine speed control unit (3).

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## 4.136. ENGINE TURBINE SPEED CONTROL UNIT ADJUSTMENT (T700-GE-701 ENGINE) - continued

**CAUTION**

$N_p$ adjustment unit is very sensitive. To prevent damage to power plants, adjustments shall be made very slowly at pilot's direction.

**NOTE**

To increase $N_P$ speed, turn $N_P$ adjustment screw clockwise. To decrease $N_P$ speed, turn $N_P$ adjustment screw counterclockwise.

e. **Slowly adjust screw (2) on control unit (3) as required to obtain 100% $N_p$.**

f. **Hold screw (2).** Tighten nut (1).

g. **Observe TGT indicator for following condition:**

(1) If TGT temperature is steady, go to step h.

(2) If TGT temperature is fluctuating, go to step i.

h. **Increase collective for approximately 30% dual engine torque indication and observe TGT indicator for following condition:**

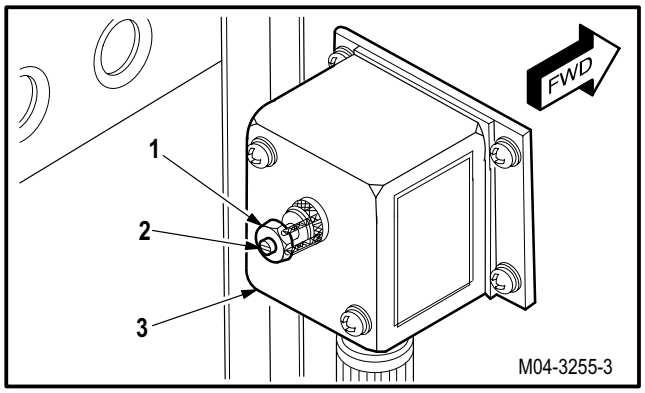
(1) If TGT temperature is steady, go to step j.

(2) If TGT temperature is fluctuating, go to step i.

i. **Adjust turbine speed control for both minimum TGT fluctuation and ENG RTR indications from 99% to 101% Nr.** Go to step h.

j. **Hold screw (2).** Tighten nut (1).

k. **Lockwire nut (1) to control unit (3).** Use wire (item 222, App F).

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**4.136. ENGINE TURBINE SPEED CONTROL UNIT ADJUSTMENT (T700-GE-701 ENGINE) - continued**

l. **Inspect (QA).**

m. **On pilot aft circuit breaker panel, close ECS AFT FAN circuit breaker.**

n. **Perform engine 1 and engine 2 chop operational check** (TM 1-1520-238-MTF)**.**

o. **If maintenance test flight is not required, shut down engines** (TM 1-1520-238-CL)**.**

p. **Disconnect maintenance headset** (para 1.134)**.**

q. **Secure access door R295** (para 2.2)**.**

END OF TASK

## 4.137. ENGINE TURBINE SPEED CONTROL UNIT ADJUSTMENT (T700-GE-701C ENGINE)

4.137.1. Description

This task covers: Adjustment.

4.137.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 371, App H)

**Materials/Parts:**

Wire (item 222, App F)

**Personnel Required:**

68B Aircraft Powerplant Repairer
67R3F Attack Helicopter Repairer/Technical Inspector
152FG Maintenance Test Pilot

**References:**

TM 1-1520-238-CL
TM 1-1520-238-MTF
TM 1-1520-238-T

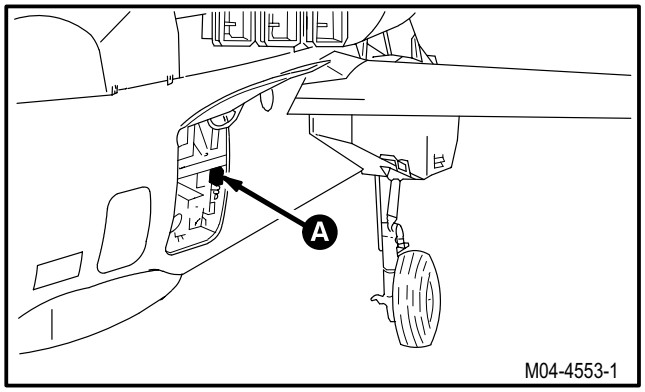
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door R2995 opened |
| 1.134 | Maintenance headset connected |
| TM 1-1520-238-CL | Engines No. 1 and No.2 running |

4.137.3. Adjustment

a. **On pilot's aft circuit breaker panel, open ECS AFT FAN circuit breaker.**

b. **On pilot ENGINE INST DIM/TEST panel, set switch to TST.**



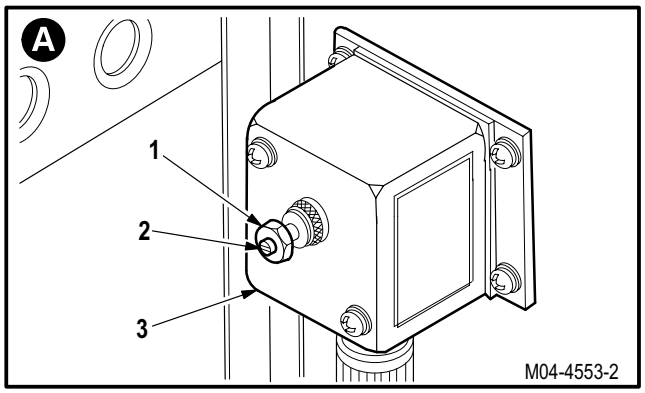

c. **Remove lockwire from nut (1).**

d. **Hold $N_P$ adjustment screw (2).**

(1) Loosen lock nut (1) on turbine speed control unit (3).

**CAUTION**

$N_P$ adjustment unit is very sensitive. To prevent damage to power plants, adjustments shall be made very slowly at pilot's direction.

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## 4.137. ENGINE TURBINE SPEED CONTROL UNIT ADJUSTMENT (T700-GE-701C ENGINE) - continued

**NOTE**

- To increase $N_P$ speed, turn $N_P$ adjustment screw clockwise. To decrease $N_P$ speed, turn $N_P$ adjustment screw counterclockwise.
- The engine 101% RPM can be checked by monitoring the Main Rotor Indicator for illumination or flickering illumination of the 102% light segment.
- Step e is used to confirm available RPM will illuminate the 100% $N_R$ and $N_P$ segments fully and may cause the 102% segments to flicker illuminate or illuminate fully.

e. **Slowly adjust $N_P$ adjustment screw (2) on control unit (3) until ENG RTR indicator flickers at 102% $N_P$ .**

**NOTE**

Step f checks the ability of the engine turbine speed control unit to reduce engine RPM ($N_P$).

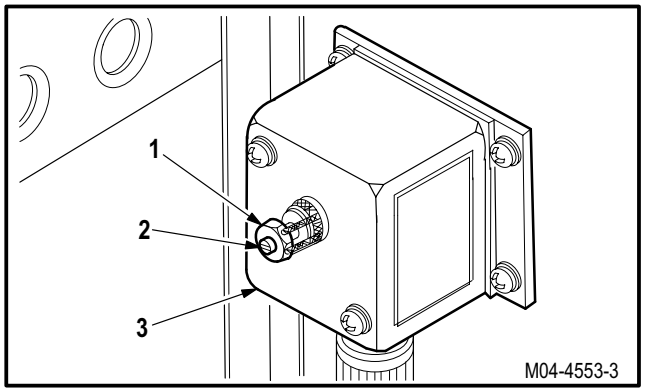
f. **Slowly adjust screw (2) on control unit (3) until ENG RTR indicator 98% $N_P$ light extinguishes.**

g. **Slowly adjust screw (2) on control unit (3) until ENG RTR indicator flickers at 102% $N_P$ .**

h. **Adjust screw (2) on control unit (3) an additional 1/8th turn in clockwise direction.**

i. **Hold screw (2). Tighten nut (1).**

j. **Lockwire nut (1) to control unit (3).** Use wire (item 222, App F).

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**4.137. ENGINE TURBINE SPEED CONTROL UNIT ADJUSTMENT (T700-GE-701C ENGINE) - continued**

k. **Inspect (QA).**

l. **On pilot's aft circuit breaker panel, close ECS AFT FAN circuit breaker.**

m. **Perform engine 1 and engine 2 chop operational check** (TM 55-1520-238-MTF)**.**

n. **Disconnect maintenance headset** (para 1.134)**.**

o. **Secure access door R295** (para 2.2)**.**

END OF TASK

## 4.138. EMERGENCY POWER CHECK PANEL REMOVAL/INSTALLATION

4.138.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.138.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

**Equipment Conditions:**

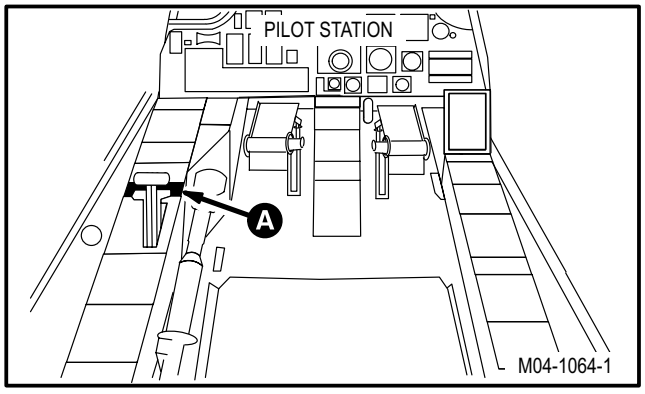
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

4.138.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **Open ENG START circuit breaker on pilot forward circuit breaker panel.**

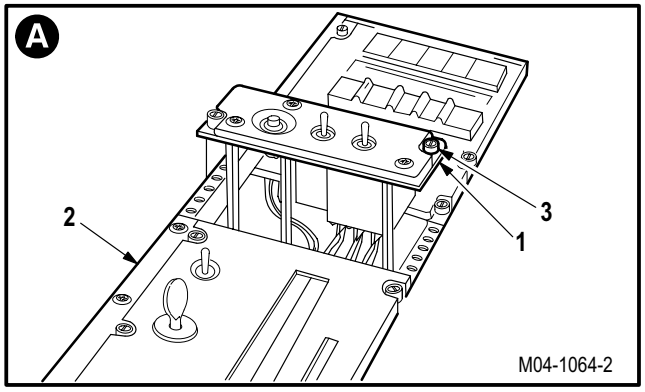
c. **Open LT PRI circuit breaker on pilot center circuit breaker panel.**




d. **Remove emergency power check panel (1) from left console (2).**

(1) Unlock two turnlock fasteners (3).

(2) Lift panel (1) from console (2).

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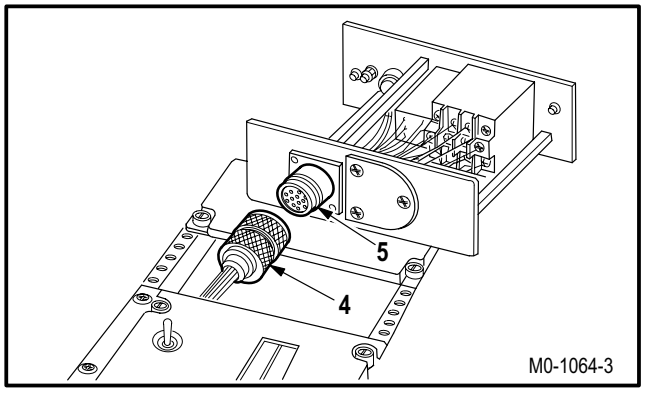
## 4.138. EMERGENCY POWER CHECK PANEL REMOVAL/INSTALLATION - continued

e. **Detach connector P175 (4) from panel receptacle J1 (5).**




4.138.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.138.5. Inspection

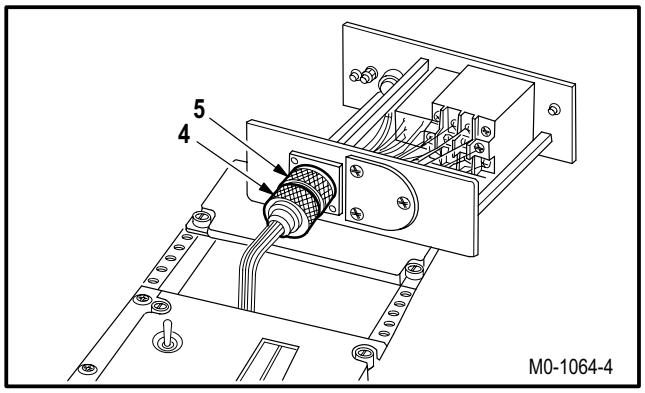
a. **Check panel for cracks.** None allowed.

b. **Check panel for corrosion** (para 1.49)**.**

c. **Check connector P175 for bent or missing pins** (TM 55-1500-323-24)**.**

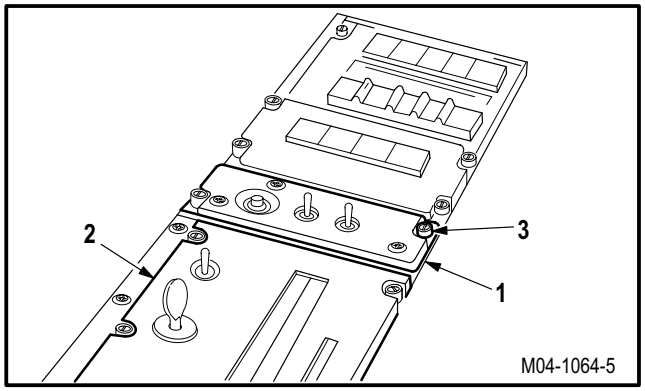
4.138.6. Installation

a. **Attach connector P175 (4) to receptacle J1 (5).**




b. **Install panel (1) in console (2).**

(1) Lock two turnlock fasteners (3).




c. **Inspect (QA).**

d. **Perform power plants maintenance operational check (engine No. 1)** (TM 1-1520-238-T)**.**

END OF TASK

## 4.139. EMERGENCY POWER CHECK PANEL DISASSEMBLY/ASSEMBLY (AVIM)

4.139.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly.

4.139.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Ohmmeter (item 218, App H)
Adjustable air filtering respirator (item 262, App H)
5-watt electric soldering iron (item 333, App H)

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**Materials/Parts:**

Sealing compound (item 167, App F)
Solder (item 189, App F)

**References:**

TM 55-1500-323-24

4.139.3. Disassembly

a. **Remove light indicating panel (1) from panel (2).**

(1) Remove three screws (3).

(2) Remove panel (1).

b. **Remove component board (4) from three posts (5).**

(1) Remove three screws (6), lockwashers (7), and washers (8).

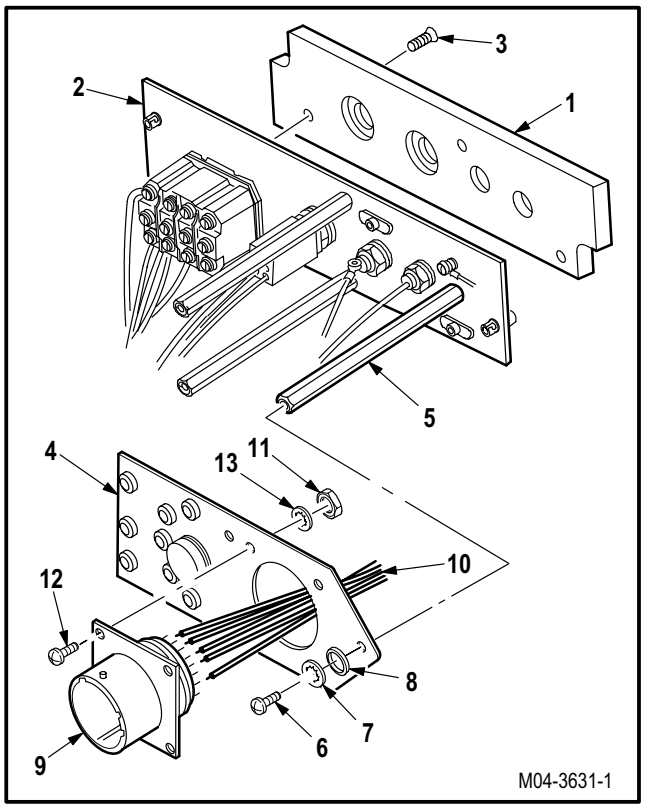
(2) Remove board (4).

c. **Remove receptacle J1 (9) from component board (4).**

(1) Identify and depin wires (10) from receptacle (9) (TM 55-1500-323-24).

(2) Hold four nuts (11). Remove four screws (12).

(3) Remove four nuts (11), washers (13), and receptacle (9).

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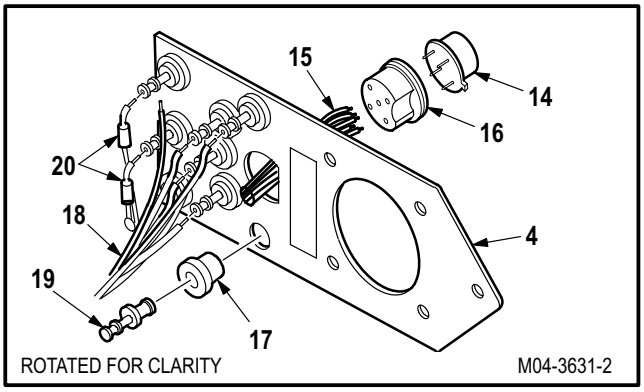
## 4.139. EMERGENCY POWER CHECK PANEL DISASSEMBLY/ASSEMBLY (AVIM) - continued

d. **Remove relay (14) from component board (4).**

(1) Identify and depin wire leads (15) from relay socket (16) (TM 55-1500-323-24).

(2) Remove socket (16) from component board (4).

(3) Remove relay (14) from socket (16).



**WARNING**

**Soldering iron can cause severe burns to personnel and start fires. Observe all safety precautions when using soldering iron. If injury occurs, seek medical aid.**

e. **Remove eight insulators (17) from component board (4).**

(1) Identify and desolder wires (18) from terminals (19). Use soldering iron (TM 55-1500-323-24).

(2) Identify and desolder two resistors (20) from terminals (19). Use soldering iron (TM 55-1500-323-24).

(3) Remove terminals (19) from insulators (17).

(4) Remove insulators (17).

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## 4.139. EMERGENCY POWER CHECK PANEL DISASSEMBLY/ASSEMBLY (AVIM) - continued

f. **Remove three posts (5) from panel (2).**

(1) Remove three screws (21).

(2) Remove posts (5).

g. **Remove switch (22) from panel (2).**

(1) Identify and depin wires (23) from switch (22) (TM 55-1500-323-24).

(2) Remove nut (24).

(3) Remove switch (22).

(4) Remove tab ring (25), washer (26), and nut (24) from switch (22).

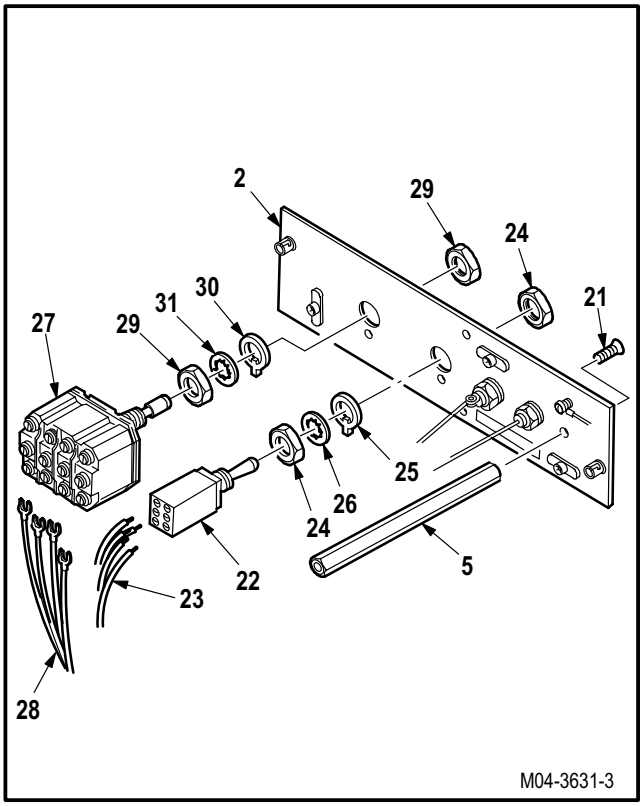
h. **Remove switch (27) from panel (2).**

(1) Identify and detach wires (28) from switch (27) (TM 55-1500-323-24).

(2) Remove nut (29).

(3) Remove switch (27).

(4) Remove tab ring (30), washer (31), and nut (29) from switch (27).

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## 4.139. EMERGENCY POWER CHECK PANEL DISASSEMBLY/ASSEMBLY (AVIM) - continued

i. **Remove lamp (32) and lamp holder (33) from panel (2).**

(1) Identify and desolder wire (34) from lamp holder (33). Use soldering iron (TM 55-1500-323-24).

(2) Remove nut (35), lockwasher (36), wire lead (37), and washer (38).

(3) Remove lamp (32), lamp holder (33), and washer (39).

j. **Remove wire lead (40) from connector (41).**

(1) Remove screw (42) and washer (43) from connector (41).

(2) Remove wire lead (40).

k. **Remove connector (41) from panel (2).**

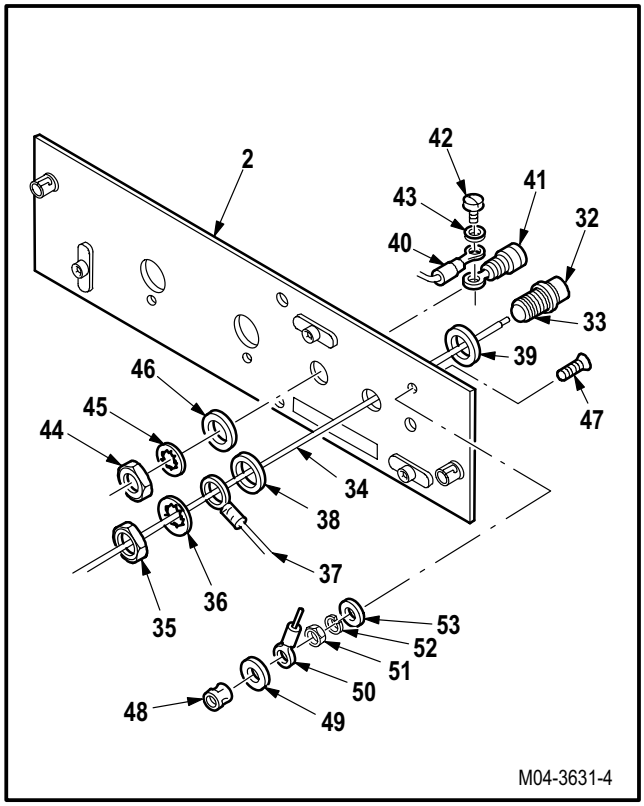
(1) Remove nut (44), lockwasher (45), and washer (46).

(2) Remove connector (41).

l. **Remove ground screw (47) from panel (2).**

(1) Hold screw (47). Remove nut (48), washer (49), wire lead (50), nut (51), lockwasher (52), and washer (53).

(2) Remove screw (47).

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## 4.139. EMERGENCY POWER CHECK PANEL DISASSEMBLY/ASSEMBLY (AVIM) - continued

4.139.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.139.5. Inspection

a. **Check removed and attaching parts for damage.**

b. **Check connectors and terminals for damage** (TM 55-1500-323-24)**.**

c. **Check wires for wear, cuts, breaks, burned insulation, and other contamination** (TM 55-1500-323-24)**.**

d. **Check removed and attaching parts for corrosion** (para 1.49)**.**

4.139.6. Assembly

a. **Install lead (50) on panel (2).**

(1) Install screw (47) on panel (2).

(2) Install washer (53), lockwasher (52), nut (51), wire lead (50), washer (49), and nut (48).

b. **Perform electrical bond check** (TM 55-1500-323-24)**.**

(1) Bond shall be **0.1 OHM** or less. Use ohmmeter.

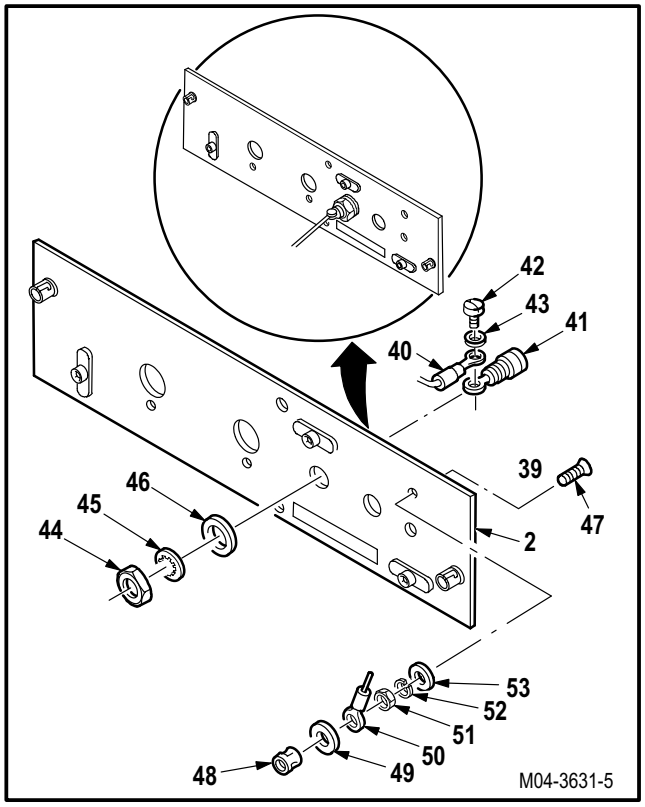
c. **Install connector (41) on panel (2).**

(1) Install connector (41) through panel (2).

(2) Install washer (46), lockwasher (45), and nut (44).

d. **Install wire (40) on connector (41).**

(1) Install screw (42) through washer (43), lead (40), and connector (41).

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## 4.139. EMERGENCY POWER CHECK PANEL DISASSEMBLY/ASSEMBLY (AVIM) - continued

**WARNING**

**Soldering iron can cause severe burns to personnel and start fires. Observe all safety precautions when using soldering iron. If injury occurs, seek medical aid.**

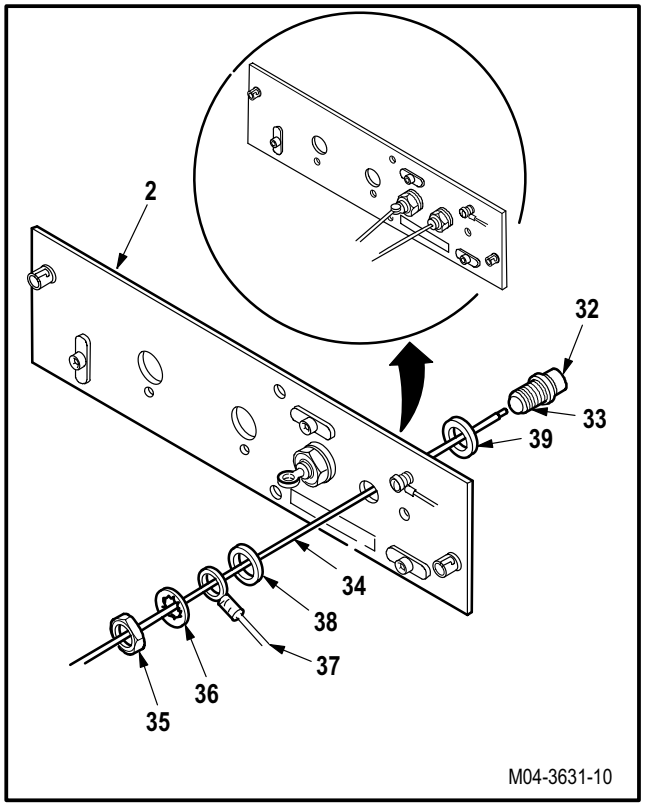
e. **Install lamp (32) and lamp holder (33) on panel (2).**

(1) Install lamp (32) in lamp holder (33).

(2) Install lamp holder (33) through washer (39) and panel (2).

(3) Install washer (38), wire lead (37), lockwasher (36), and nut (35).

(4) Solder identified wire (34). Use soldering iron and solder (item 189, App F) (TM 55-1500-323-24).

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## 4.139. EMERGENCY POWER CHECK PANEL DISASSEMBLY/ASSEMBLY (AVIM) - continued

f. **Install switch (27) on panel (2).**

(1) Install nut (29), washer (31), and tab ring (30) on switch (27).

(2) Install switch (27) through panel (2).

(3) Install nut (29).

(4) Attach identified wires (28) to switch (27) (TM 55-1500-323-24).

g. **Install switch (22) on panel (2).**

(1) Install nut (24), washer (26), and tab ring (25) on switch (22).

(2) Install switch (22) through panel (2).

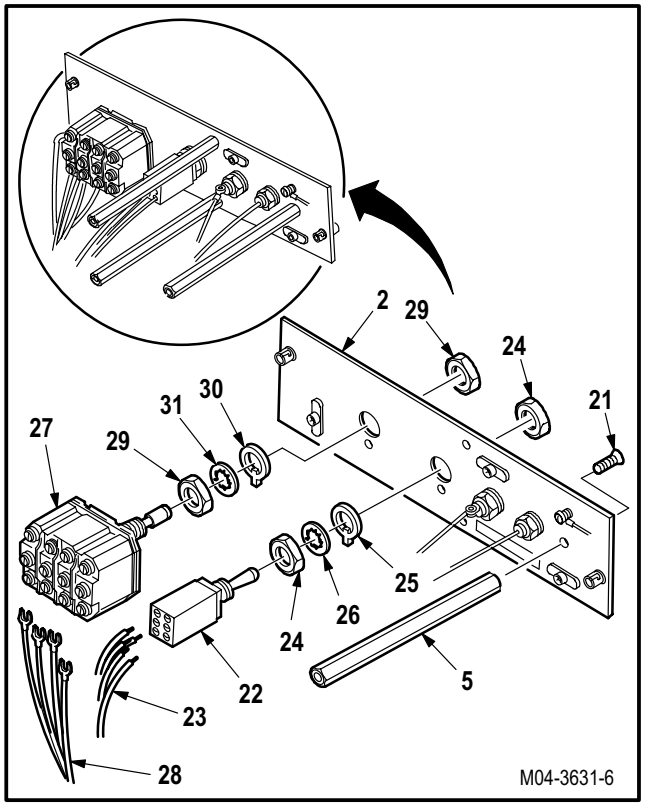
(3) Install nut (24).

(4) Attach identified wires (23) to switch (22) (TM 55-1500-323-24).

h. **Install three posts (5) on panel (2).**

(1) Apply sealing compound to three screws (21). Use sealing compound (item 167, App F).

(2) Install screws (21) through panel (2) and posts (5).

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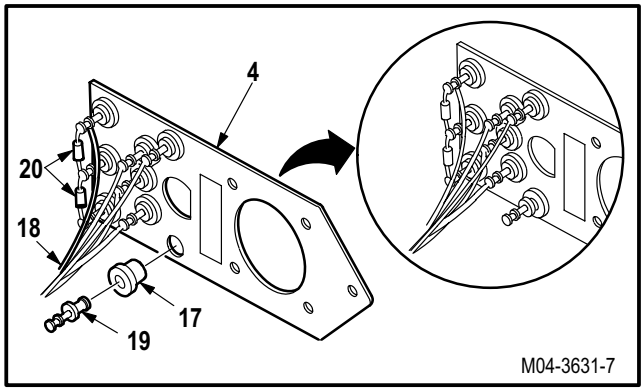
## 4.139. EMERGENCY POWER CHECK PANEL DISASSEMBLY/ASSEMBLY (AVIM) - continued

i. **Install eight insulators (17) into component board (4).**

(1) Hand press insulators (17) into component board (4).

(2) Install eight terminals (19) into insulators (17).

(3) Solder identified wires (18) to terminals (19). Use soldering iron and solder (item 189, App F) (TM 55-1500-323-24).



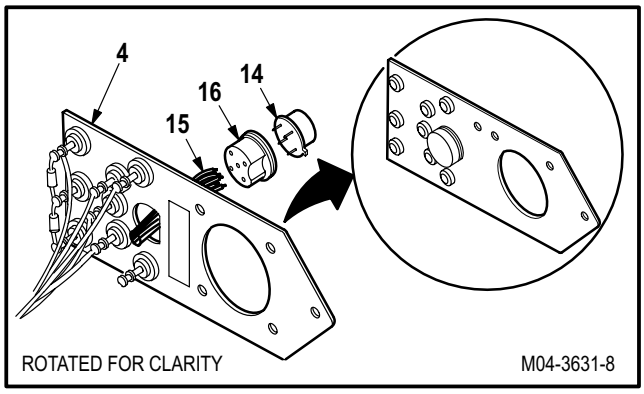

j. **Solder two resistors (20) to terminals (19).** Use soldering iron and solder (item 189, App F) (TM 55-1500-323-24).

k. **Install relay (14) on component board (4).**

(1) Hand press socket (16) into component board (4).

(2) Install relay (14) into relay socket (16).

(3) Pin identified wires (15) in socket (16) (TM 55-1500-323-24).

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## 4.139. EMERGENCY POWER CHECK PANEL DISASSEMBLY/ASSEMBLY (AVIM) - continued

l. **Install receptacle J1 (9) into component board (4).**

(1) Install four screws (12), through receptacle (9), component board (4), washers (13), and nuts (11).

(2) Pin identified wires (10) in receptacle (9) (TM 55-1500-323-24).

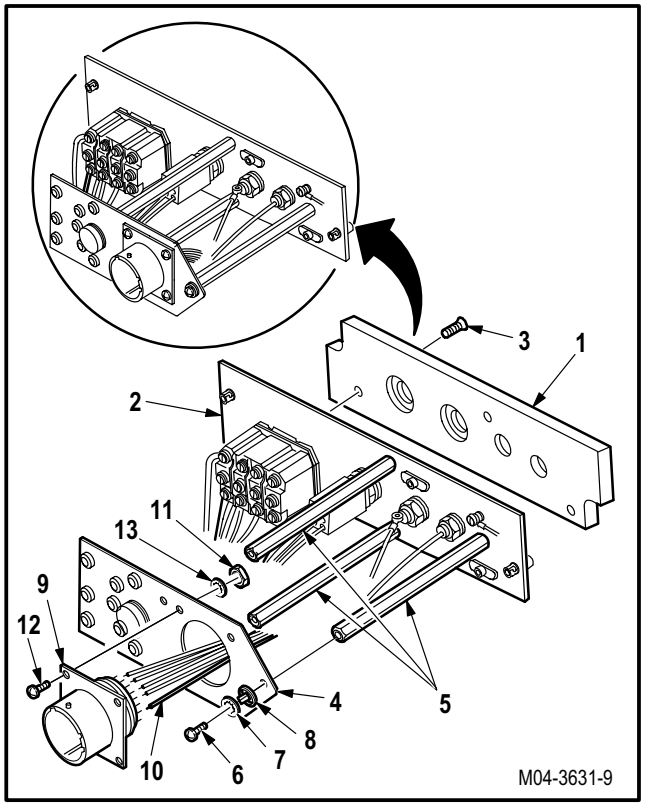
m. **Install component board (4) on three posts (5).**

(1) Install three screws (6) through lockwashers (7), washers (8), component board (4) into posts (5).

n. **Install panel (1) on panel (2).**

(1) Install three screws (3).

o. **Inspect (QA).**




END OF TASK

## 4.140. NO. 1 ENGINE POWER AVAILABLE SPINDLE GEARBOX REMOVAL/INSTALLATION

4.140.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.140.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
5/16 x 3/8-inch drive torque wrench adapter (item 21, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

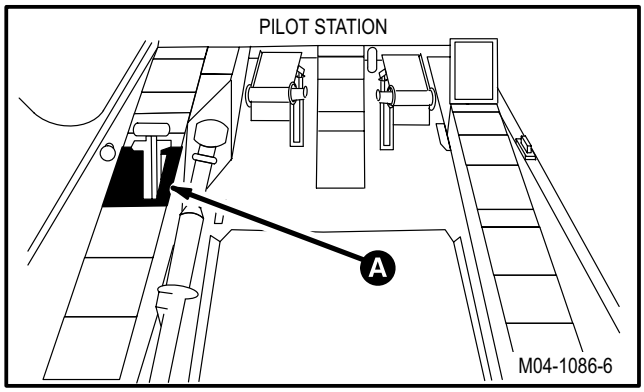
TM 1-1520-238-T

**Equipment Conditions:**

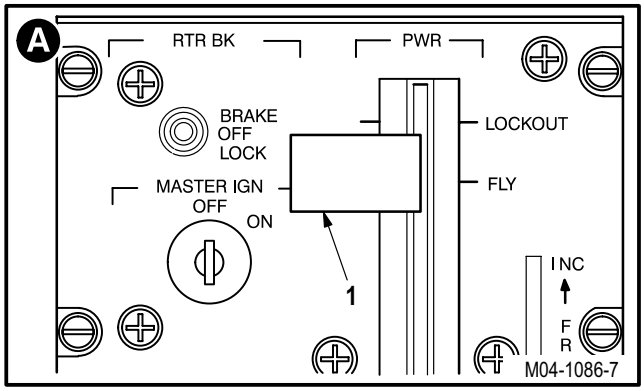
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 opened |
| 4.143 | No. 1 engine load demand spindle gearbox removed |

4.140.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**




b. **Set pilot No. 1 PWR lever (1) to FLY.**

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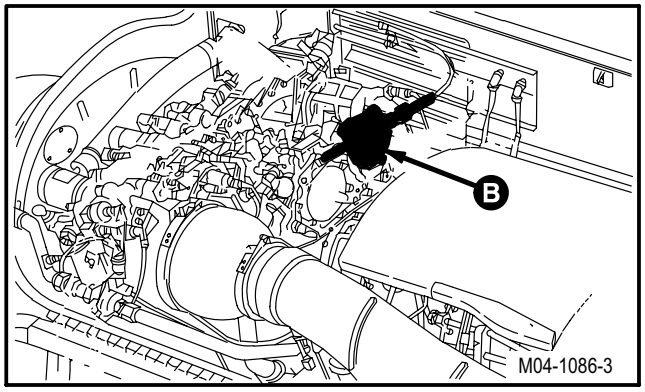
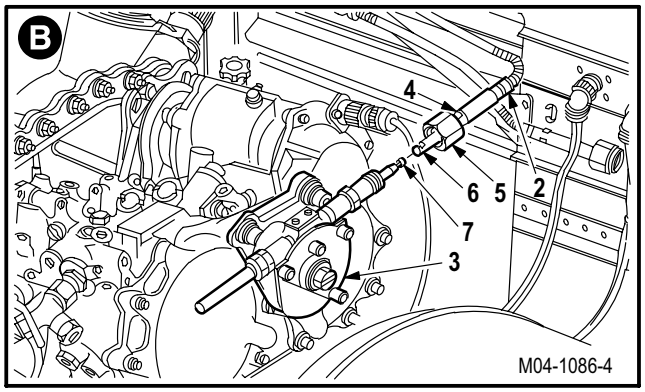
## 4.140. NO. 1 ENGINE POWER AVAILABLE SPINDLE GEARBOX REMOVAL/INSTALLATION - continued




c. **Remove cable (2) from power available spindle gearbox (3).**

(1) Hold cable flats (4). Remove coupling nut (5).

(2) Remove cable fitting (6) from spindle gearbox fitting (7).

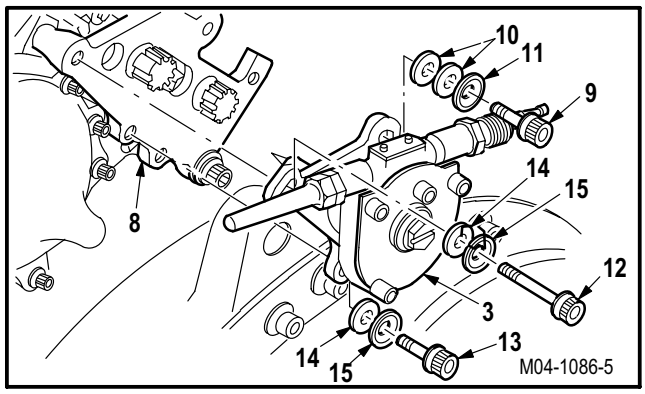



d. **Remove gearbox (3) from baseplate (8).**

(1) Remove bolt (9), two flat washers (10), and countersunk washer (11).

(2) Remove bolts (12) and (13), two flat washers (14), and two countersunk washers (15).

(3) Remove gearbox (3).

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## 4.140. NO. 1 ENGINE POWER AVAILABLE SPINDLE GEARBOX REMOVAL/INSTALLATION - continued

4.140.4. Cleaning

a. **Clean baseplate** (para 1.47)**.**

4.140.5. Inspection

a. **Check cable for cracked, bent, or loose fitting.** None allowed.

b. **Check cable for binding.** None allowed.

c. **Check baseplate for nicks and scratches.** Maximum depth not to exceed **0.015 INCH**.

d. **Check splines for visible cracks and wear.** None allowed.

e. **Check cable fitting and exposed baseplate for corrosion** (para 1.49)**.**

4.140.6. Installation

a. **Install gearbox (3) on baseplate (8).** Torque bolts (9), (12), and (13) to **60 INCH-POUNDS**.

(1) Aline pins (16) and (17) with holes (18) and (19).

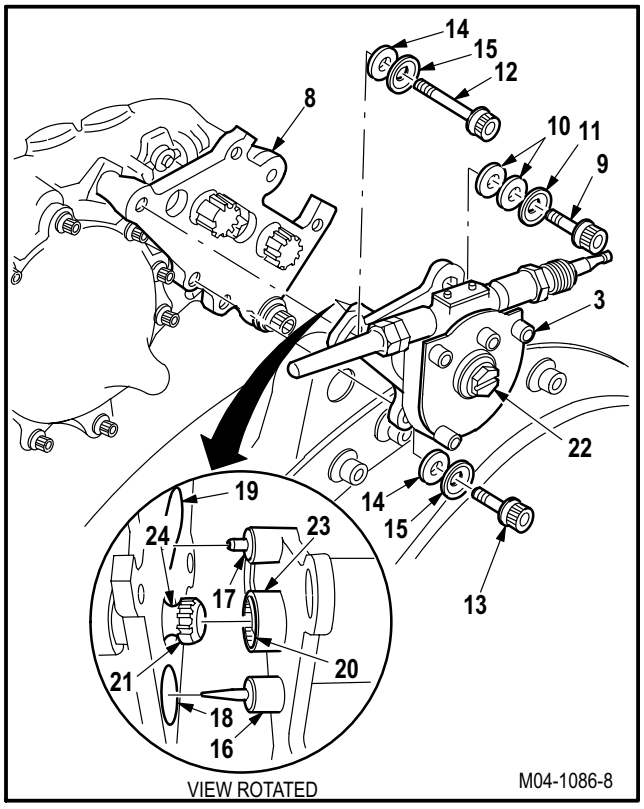
(2) Aline hub wide tooth space (20) with spline wide tooth (21). Rotate slot (22) to aline.

(3) Slide hub (23) on spline (24).

(4) Install long bolt (12), bolt (13), two countersunk washers (15), and flat washers (14).

(5) Install bolt (9), countersunk washer (11), and two flat washers (10).

(6) Torque bolts (9), (12), and (13) to **60 INCH-POUNDS**. Use torque wrench and torque wrench adapter.

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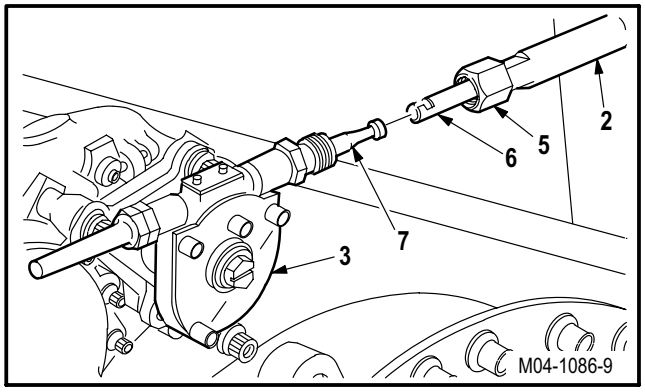
## 4.140. NO. 1 ENGINE POWER AVAILABLE SPINDLE GEARBOX REMOVAL/INSTALLATION - continued

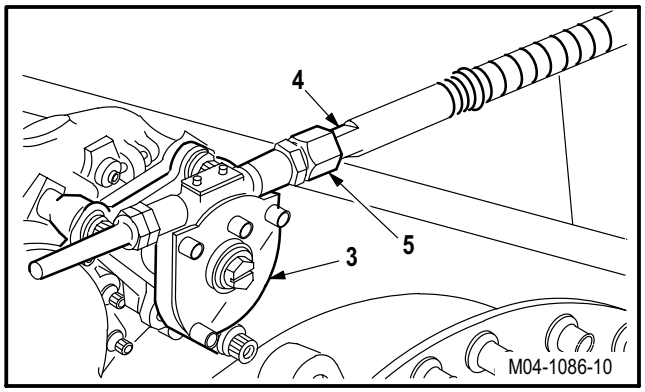
b. **Install cable (2) on gearbox (3).** Torque coupling nut (5) to **70 INCH-POUNDS**.

(1) Install cable fitting (6) on gearbox fitting (7).




(2) Install coupling nut (5) on gearbox (3).

(3) Hold cable flats (4). Torque coupling nut (5) to **70 INCH-POUNDS**. Use torque wrench and torque wrench adapter.




c. **Inspect (QA).**

d. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

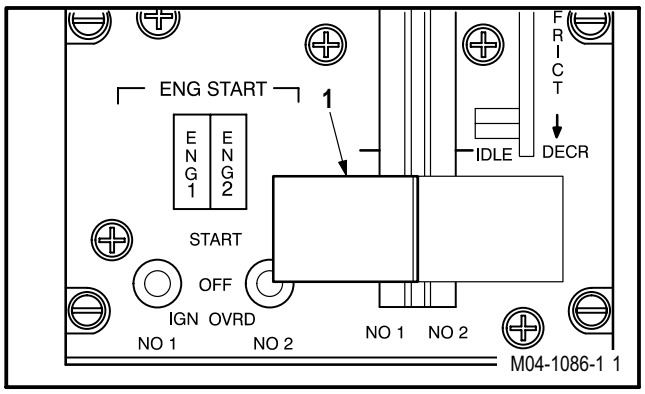
e. **Set pilot No. 1 PWR lever (1) to OFF.**

f. **Install No. 1 engine load demand spindle gearbox** (para 4.143)**.**

g. **Perform No. 1 engine power available spindle system rigging check** (para 4.186)**.**

h. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

i. **Secure access door LN1** (para 2.2)**.**




END OF TASK

## 4.141. NO. 2 ENGINE POWER AVAILABLE SPINDLE GEARBOX REMOVAL/INSTALLATION

4.141.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.141.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
5/16 x 3/8-inch drive torque wrench adapter (item 21, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

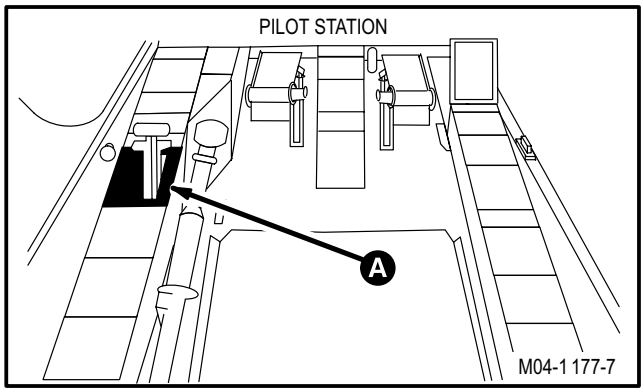
TM 1-1520-238-T

**Equipment Conditions:**

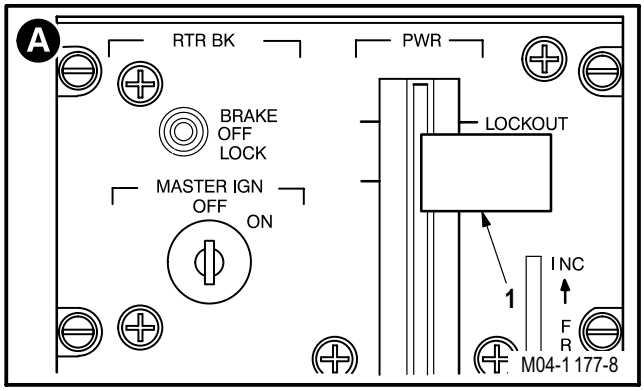
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door RN1 opened |
| 4.144 | No. 2 engine load demand spindle gearbox removed |

4.141.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**




b. **Set pilot No. 2 PWR lever (1) to FLY.**

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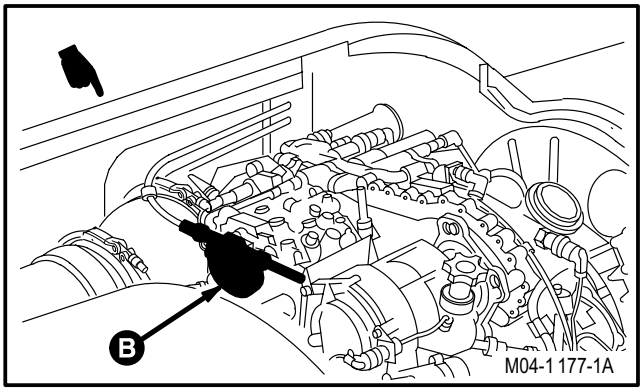
## 4.141. NO. 2 ENGINE POWER AVAILABLE SPINDLE GEARBOX REMOVAL/INSTALLATION - continued




4.141.4. Removal

a. **Remove cable (2) from power available spindle gearbox (3).**

(1) Hold cable flats (4). Remove coupling nut (5).

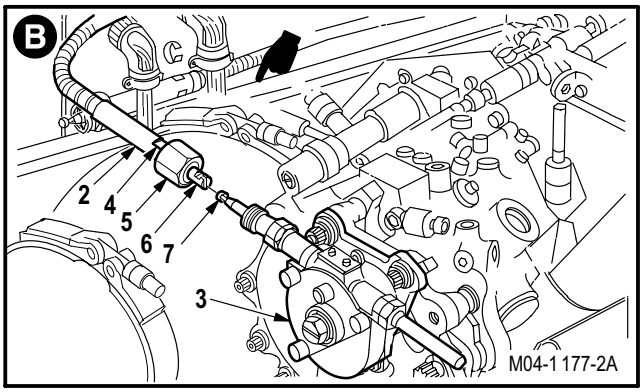
(2) Remove cable fitting (6) from gearbox fitting (7).

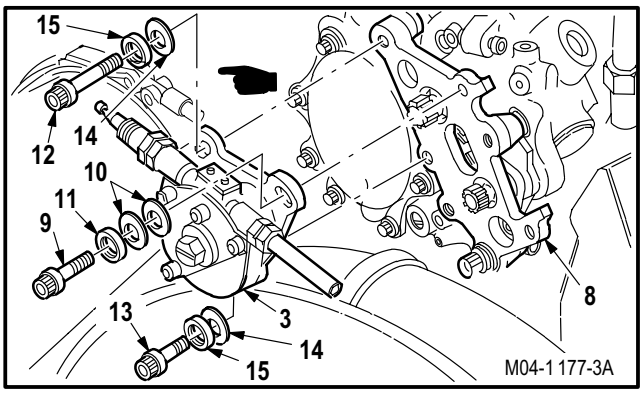
b. **Remove gearbox (3) from baseplate (8).**

(1) Remove bolt (9), two flat washers (10), and countersunk washer (11).

(2) Remove bolts (12) and (13), two flat washers (14), and two countersunk washers (15).

(3) Remove gearbox (3).




4.141.5. Cleaning

a. **Clean baseplate** (para 1.47)**.**

4.141.6. Inspection

a. **Check cable for cracked, bent, or loose fitting.** None allowed.

b. **Check cable for binding.** None allowed.

c. **Check baseplate for nicks and scratches.** Maximum depth not to exceed **0.015 INCH**.

d. **Check splines for visible nicks and wear.** None allowed.

e. **Check cable fitting and exposed baseplate for corrosion** (para 1.49)**.**

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## 4.141. NO. 2 ENGINE POWER AVAILABLE SPINDLE GEARBOX REMOVAL/INSTALLATION - continued

4.141.7. Installation

a. **Install gearbox (3) on baseplate (8).** Torque bolts (9), (12), and (13) to **60 INCH-POUNDS**.

(1) Aline pins (16) and (17) with holes (18) and (19).

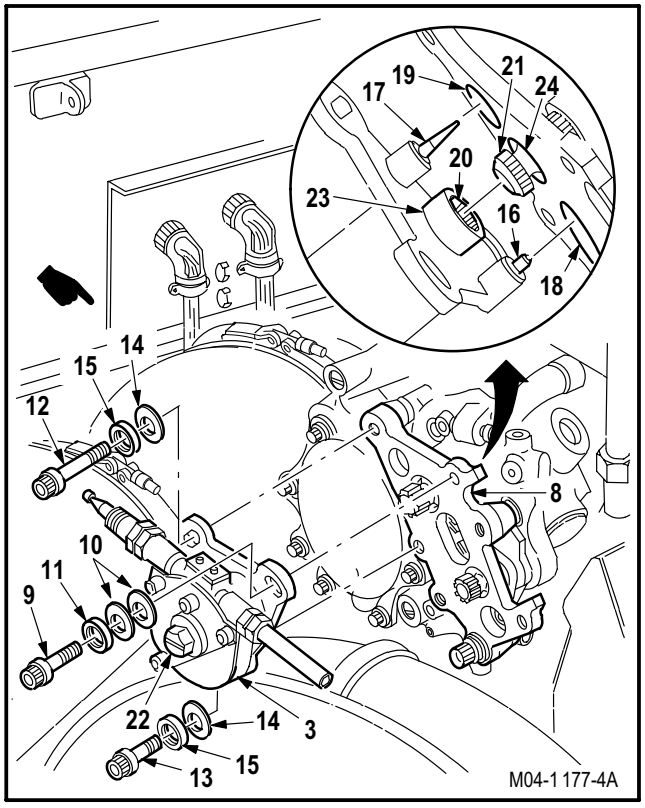
(2) Aline hub wide tube space (20) with spline wide tooth (21). Rotate slot (22) to aline.

(3) Slide hub (23) on spline (24).

(4) Install long bolt (12), bolt (13), two countersunk washers (15), and two flat washers (14).

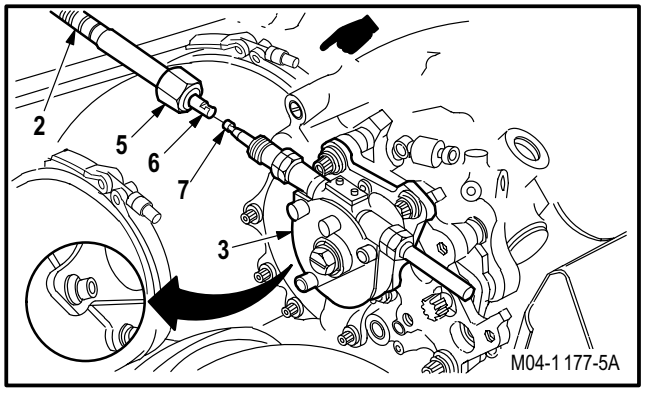
(5) Install bolt (9), countersunk washer (11), and two flat washers (10).

(6) Torque bolts (9), (12), and (13) to **60 INCH-POUNDS**. Use torque wrench and torque wrench adapter.



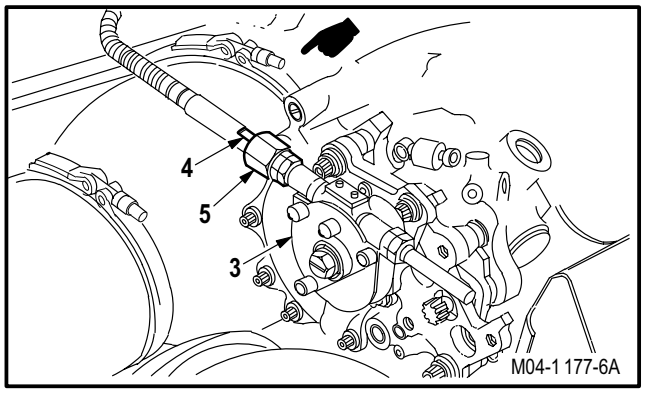

b. **Install cable (2) on gearbox (3).** Torque coupling nut (5) to **70 INCH-POUNDS**.

(1) Install cable fitting (6) on gearbox fitting (7).




(2) Install coupling nut (5) on gearbox (3).

(3) Hold cable flats (4). Torque coupling nut (5) to **70 INCH-POUNDS**. Use torque wrench and torque wrench adapter.




c. **Inspect (QA).**

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**4.141. NO. 2 ENGINE POWER AVAILABLE SPINDLE GEARBOX REMOVAL/INSTALLATION - continued**

d. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

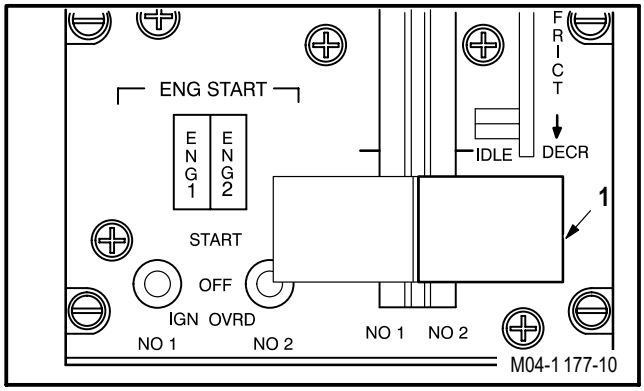
e. **Set pilot No. 2 PWR lever (1) to OFF.**

f. **Install No. 2 engine load demand spindle gearbox** (para 4.144)**.**

g. **Perform No. 2 engine power available spindle system rigging check** (para 4.187)**.**

h. **Perform power plants maintenance operational check (engine 2)** (TM 1-1520-238-T)**.**

i. **Secure access door RN1** (para 2.2)**.**




END OF TASK

## 4.141A. NO. 1 OR NO. 2 ENGINE POWER AVAILABLE SPINDLE GEARBOX MAIN SLEEVE AND RUNOUT TUBE REMOVAL/INSTALLATION

4.141A.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.141A.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 or RN1 opened |
| 4.9 | Engine shroud removed |
| 4.140 | Cable removed from No. 1 engine power available spindle gearbox<br>or |
| 4.141 | Cable removed from No. 2 engine power available spindle gearbox |

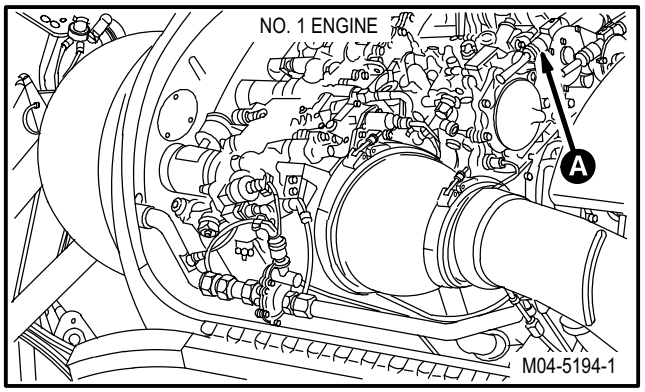
**Personnel Required:**

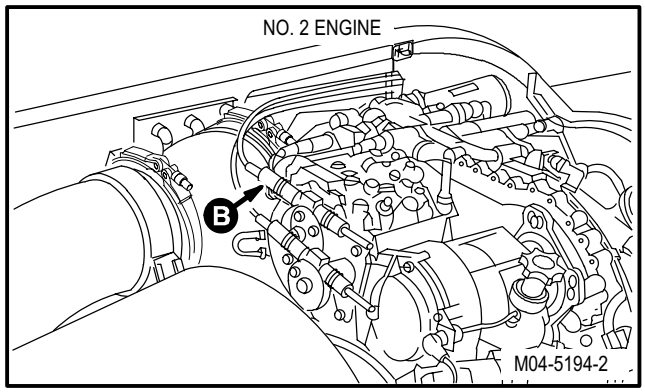
| | |
|---|---|
| 67R | Attack Helicopter Repairer |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

4.141A.3. Removal

**NOTE**

This task is typical for No. 1 or No. 2 engine power available spindle gearbox fitting and runout tube removal and installation. Engine No. 1 shown, engine No. 2 opposite.

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**4.141A. NO. 1 OR NO. 2 ENGINE POWER AVAILABLE SPINDLE GEARBOX MAIN SLEEVE AND RUNOUT TUBE REMOVAL/INSTALLATION - continued**

a. **Remove main sleeve (1) from power available spindle gearbox (2).** Hold gearbox (2) at hex-nut shaped area (3).

b. **Remove runout tube (4) from gearbox (2).** Hold gearbox (2) at hex-nut shaped area (5).

4.141A.4. Cleaning

a. **Clean removed parts and attaching area** (para 1.47)**.**

4.141A.5. Inspection

a. **Check attaching areas on gearbox for the following:**

(1) Stripped or damaged threads. None allowed.

(2) Cracks. None allowed.

(3) Corrosion (para 1.49).

4.141A.6. Installation

a. **Install runout tube (4) on gearbox (2).** Hold gearbox (2) at hex-nut shaped area (5) and tighten tube (4).

b. **Install main sleeve (1) on gearbox (2).** Hold gearbox (2) at hex-nut shaped area (3) and tighten sleeve (1).

c. **Inspect (QA).**

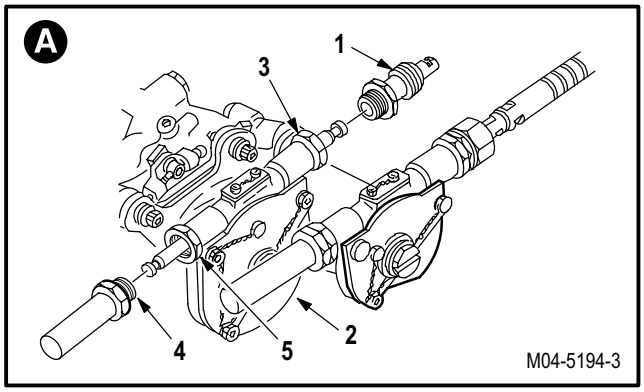
d. **Install cable on No. 1 or No. 2 engine power available spindle gearbox** (para 4.140 or para 4.141)**.**

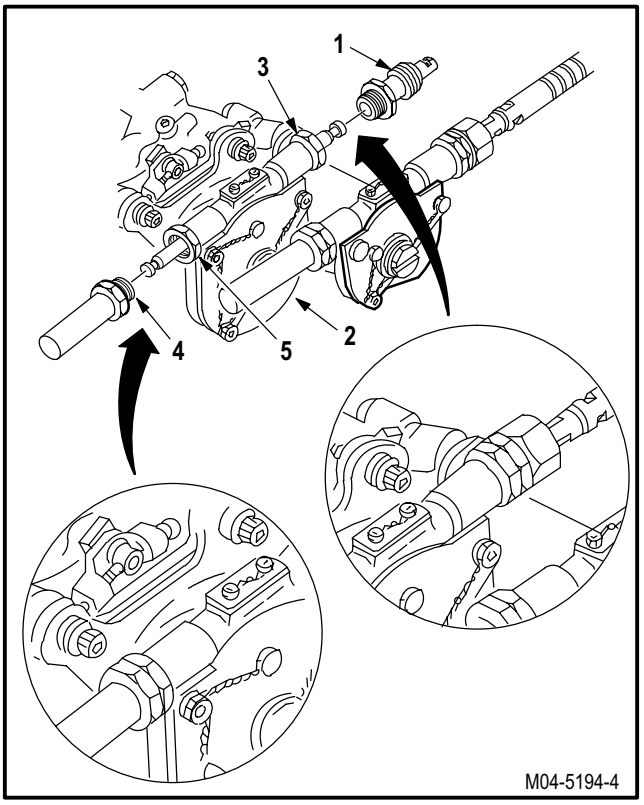
e. **Perform No. 1 or No. 2 engine power available spindle system rigging check** (para 4.186 or para 4.187)**.**

f. **Perform power plants maintenance operational check (engine 1 or engine 2)** (TM 1-1520-238-T)**.**

g. **Install engine shroud** (para 4.51)**.**

h. **Secure access door LN1 or RN1** (para 2.2)**.**




END OF TASK

## 4.142. NO. 1 AND NO. 2 ENGINE POWER CONTROL SPINDLE GEARBOX BASEPLATE REMOVAL/INSTALLATION

4.142.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.142.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 or RN1 opened |
| 4.140 | No. 1 engine power available spindle gearbox removed or |
| 4.141 | No. 2 engine power available spindle gearbox removed |

**NOTE**

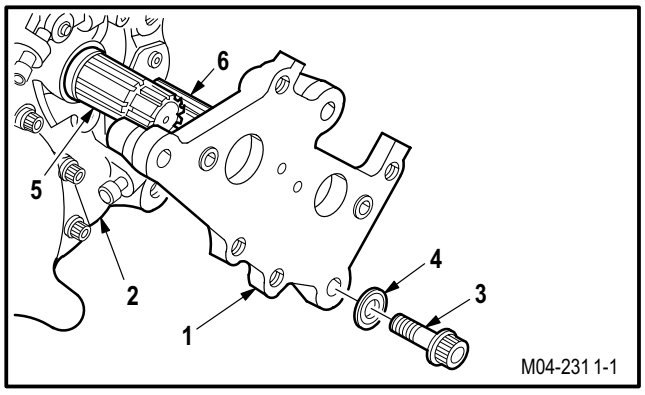
This task is typical for No. 1 or No. 2 engine gearbox baseplate.

4.142.3. Removal

a. **Remove baseplate (1) from hydromechanical unit (HMU) (2).**

(1) Remove bolt (3) and washer (4).

(2) Remove baseplate (1).

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## 4.142. NO. 1 AND NO. 2 ENGINE POWER CONTROL SPINDLE GEARBOX BASEPLATE REMOVAL/INSTALLATION - continued

4.142.4. Cleaning

a. **Clean exposed HMU** (para 1.47)**.**

4.142.5. Inspection

a. **Check exposed HMU for bent shafts or cracked shaft splines.** None allowed.

b. **Check exposed HMU for corrosion** (para 1.49)**.**

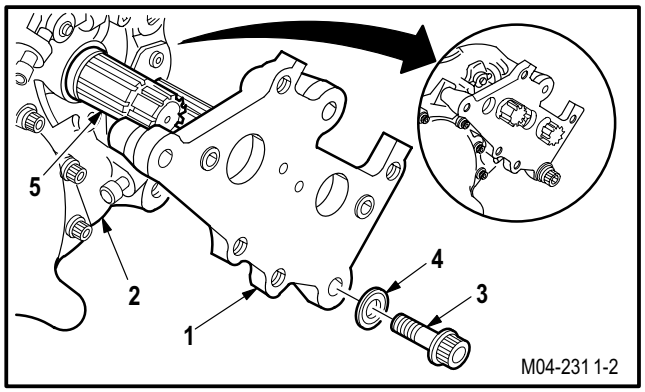
4.142.6. Installation

a. **Install baseplate (1) on HMU (2).** Torque bolt (3) to **60 INCH-POUNDS**.

(1) Aline baseplate (1) with face of HMU (2).

(2) Install bolt (3) and washer (4).

(3) Torque bolt (3) to **60 INCH-POUNDS**. Use torque wrench.




b. **Inspect (QA).**

c. **Install No. 1 engine power available spindle gearbox** (para 4.140)**.**

d. **Install No. 2 engine power available spindle gearbox** (para 4.141)**.**

e. **Perform power plants maintenance operational check (engine No. 1 and engine No. 2)** (TM 1-1520-238-T)**.**

f. **Secure access doors LN1 or RN1** (para 2.2)**.**

END OF TASK

## 4.143. NO. 1 ENGINE LOAD DEMAND SPINDLE GEARBOX REMOVAL/INSTALLATION

4.143.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.143.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Aircraft power unit (item 232, App H)
5/16 x 3/8-inch drive torque wrench adapter (item 21, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

**References:**

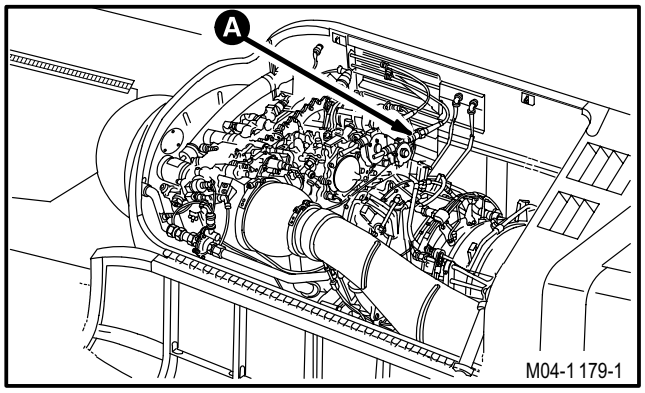
TM 1-1520-238-T

**Personnel Required:**

| | |
|---|---|
| 67R | Attack Helicopter Repairer |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 opened |
| 4.5 | Engine shroud removed |

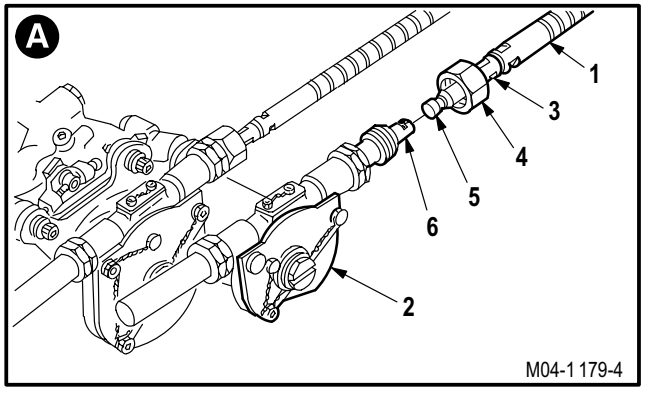



4.143.3. Removal

a. **Remove cable (1) from load demand spindle gearbox (2).**

(1) Hold cable flats (3). Remove coupling nut (4).

(2) Remove cable fitting (5) from gearbox fitting (6).

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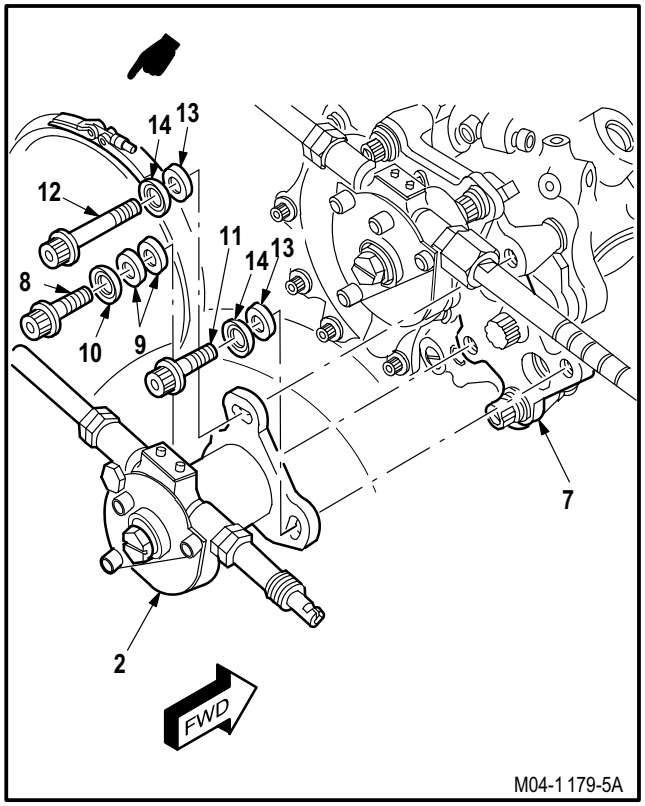
**4.143. NO. 1 ENGINE LOAD DEMAND SPINDLE GEARBOX REMOVAL/INSTALLATION - continued**

b. **Remove gearbox (2) from baseplate (7).**

(1) Remove bolt (8), two flat washers (9), and countersunk washer (10).

(2) Remove bolts (11) and (12), two flat washers (13), and two countersunk washers (14).

(3) Remove gearbox (2).




4.143.4. Cleaning

a. **Clean baseplate** (para 1.47)**.**

4.143.5. Inspection

a. **Check cable for cracked, bent, or loose fitting.** None allowed.

b. **Check cable for binding.** None allowed.

c. **Check cable fitting and exposed baseplate for corrosion** (para 1.49)**.**

d. **Check baseplate for nicks or scratches.** Maximum depth not to exceed **0.015 INCH**.

e. **Check splines for visible nicks or wear.** None allowed.

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## 4.143. NO. 1 ENGINE LOAD DEMAND SPINDLE GEARBOX REMOVAL/INSTALLATION - continued

4.143.6. Installation

a. **Install gearbox (2) on baseplate (7).** Torque bolts (8), (11), and (12) to **60 INCH-POUNDS**.

(1) Aline pins (15) and (16) with holes (17) and (18).

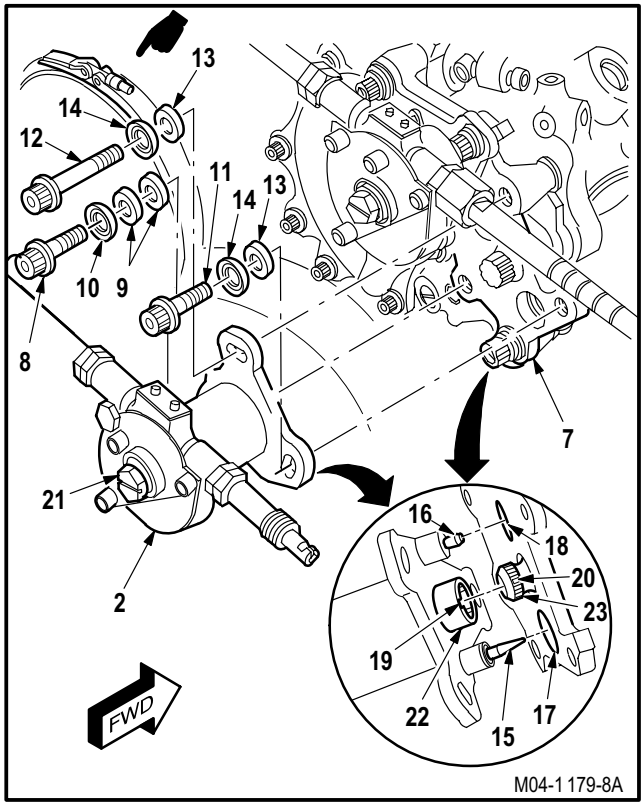
(2) Aline hub wide tooth space (19) with spline wide tooth (20). Rotate slot (21) to aline.

(3) Slide hub (22) on spline (23).

(4) Install long bolt (12), bolt (11), two countersunk washers (14), and two flat washers (13).

(5) Install bolt (8), countersunk washer (10), and two flat washers (9).

(6) Torque bolts (8), (11), and (12) to **60 INCH-POUNDS**. Use torque wrench and torque wrench adapter.

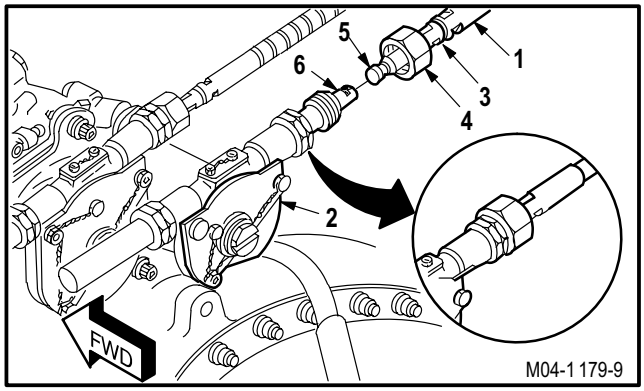



b. **Install cable (1) on gearbox (2).** Torque coupling nut (4) to **70 INCH-POUNDS**.

(1) Install cable fitting (5) on gearbox fitting (6).

(2) Install coupling nut (4) on gearbox (2).

(3) Hold cable flats (3). Torque coupling nut (4) to **70 INCH-POUNDS**. Use torque wrench and torque wrench adapter.

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**4.143. NO. 1 ENGINE LOAD DEMAND SPINDLE GEARBOX REMOVAL/INSTALLATION - continued**

c. **Inspect (QA).**

d. **Perform No. 1 engine load demand spindle rigging check** (para 4.184)**.**

e. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

f. **Install engine shroud** (para 4.51)**.**

g. **Secure access door LN1** (para 2.2)**.**

END OF TASK

## 4.144. NO. 2 ENGINE LOAD DEMAND SPINDLE GEARBOX REMOVAL/INSTALLATION

4.144.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.144.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
5/16 x 3/8-inch drive torque wrench adapter (item 21, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

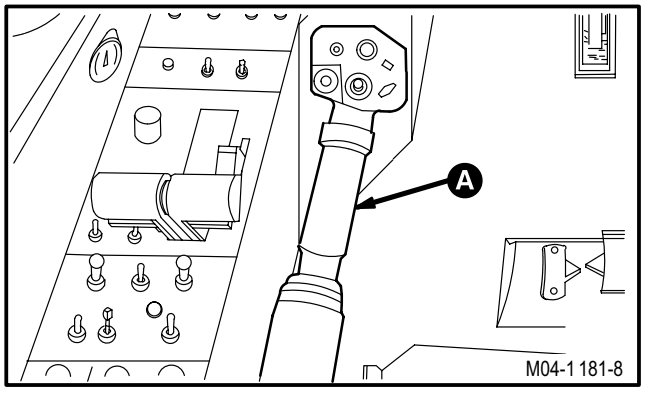
TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door RN1 opened |
| 4.9 | Engine shroud removed |
| 1.73 | External power application - hydraulic (utility) |

4.144.3. Removal

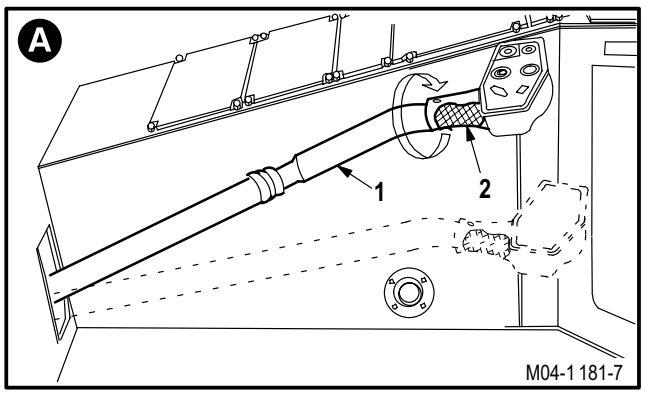
a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**




b. **Set collective stick (1) to full up.**

(1) Rotate grip (2) counterclockwise to lock.

c. **Remove external power - hydraulic (utility)** (para 1.72)**.**

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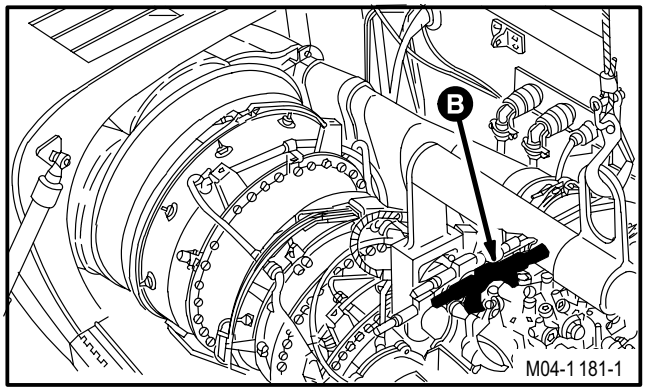
## 4.144. NO. 2 ENGINE LOAD DEMAND SPINDLE GEARBOX REMOVAL/INSTALLATION - continued




d. **Remove cable (3) from load demand spindle gearbox (4).**

(1) Hold cable flats (5). Remove coupling nut (6).

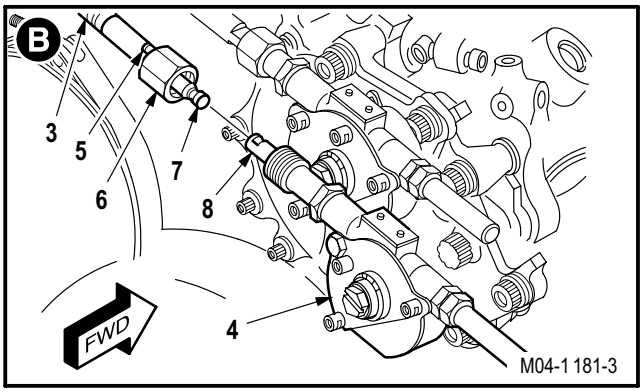
(2) Remove cable fitting (7) from gearbox fitting (8).

e. **Remove gearbox (4) from baseplate (9).**

(1) Remove bolt (10), two flat washers (11), and countersunk washer (12).

(2) Remove bolts (13) and (14), two flat washers (15), and two countersunk washers (16).

(3) Remove gearbox (4).




4.144.4. Cleaning

a. **Clean baseplate** (para 1.47)**.**

4.144.5. Inspection

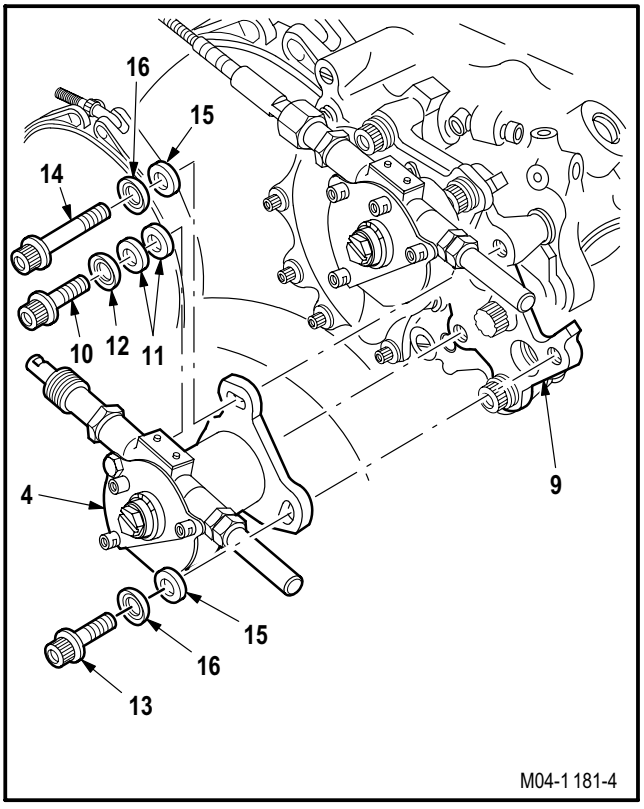
a. **Check cable for cracked, bent, or loose fitting.** None allowed.

b. **Check cable for binding.** None allowed.

c. **Check cable fitting and exposed baseplate for corrosion** (para 1.49)**.**

d. **Check baseplate for nicks and scratches.** Maximum depth not to exceed **0.015 INCH**.

e. **Check splines for visible nicks or wear.** None allowed.

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## 4.144. NO. 2 ENGINE LOAD DEMAND SPINDLE GEARBOX REMOVAL/INSTALLATION - continued

4.144.6. Installation

a. **Install gearbox (4) on baseplate (9).** Torque bolts (10), (13), and (14) to **60 INCH-POUNDS**.

(1) Aline pins (17) and (18) with holes (19) and (20).

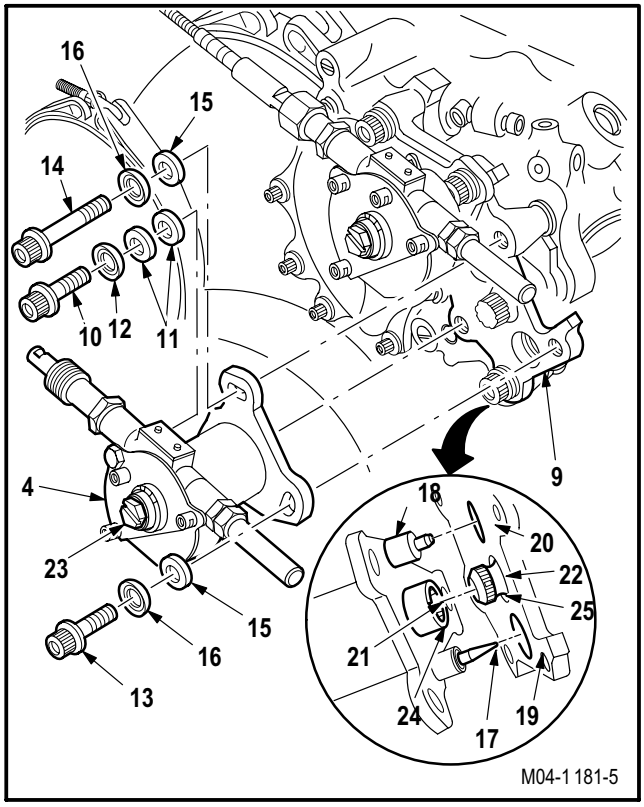
(2) Aline hub wide tooth space (21) with spline wide tooth (22). Rotate slot (23) to aline.

(3) Slide hub (24) on spline (25).

(4) Install long bolt (14), bolt (13), two countersunk washers (16), and two flat washers (15).

(5) Install bolt (10), countersunk washer (12), and two flat washers (11).

(6) Torque bolts (10), (13), and (14) to **60 INCH-POUNDS**. Use torque wrench and torque wrench adapter.



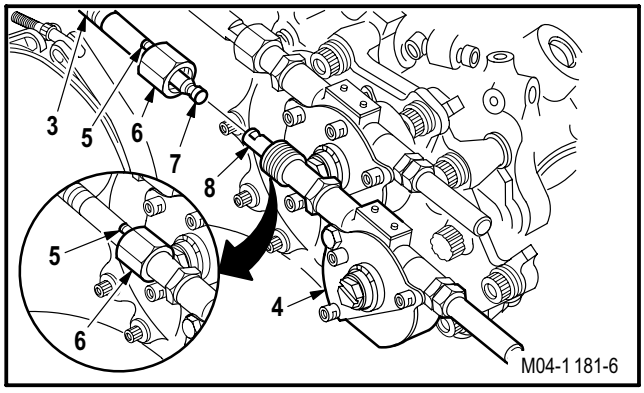

b. **Install cable (3) on gearbox (4).** Torque coupling nut (6) to **70 INCH-POUNDS**.

(1) Install cable fitting (7) on gearbox fitting (8).

(2) Install coupling nut (6).

(3) Hold cable flats (5). Torque coupling nut (6) to **70 INCH-POUNDS**. Use torque wrench and torque wrench adapter.

c. **Inspect (QA).**

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**4.144. NO. 2 ENGINE LOAD DEMAND SPINDLE GEARBOX REMOVAL/INSTALLATION - continued**

d. **Perform No. 2 engine load demand spindle rigging check** (para 4.184)**.**

e. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

f. **Install engine shroud** (para 4.55)**.**

g. **Secure access door RN1** (para 2.2)**.**

END OF TASK

## 4.144A. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE GEARBOX MAIN SLEEVE AND RUNOUT TUBE REMOVAL/INSTALLATION

4.144A.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.144A.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door RN1 or LN1 opened |
| 4.9 | Engine shroud removed |
| 4.143 | Cable removed from No. 1 engine load demand spindle gearbox<br>or |
| 4.144 | Cable removed from No. 2 engine load demand spindle gearbox |

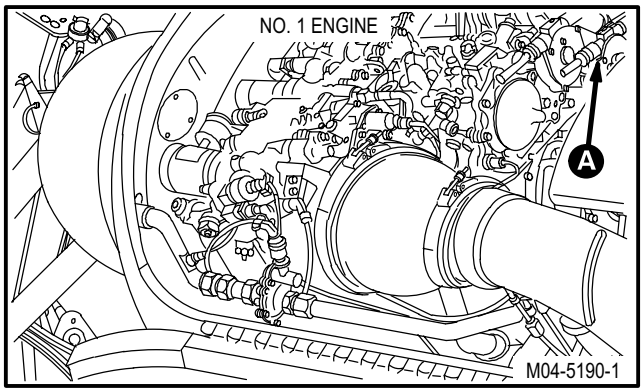
**Personnel Required:**

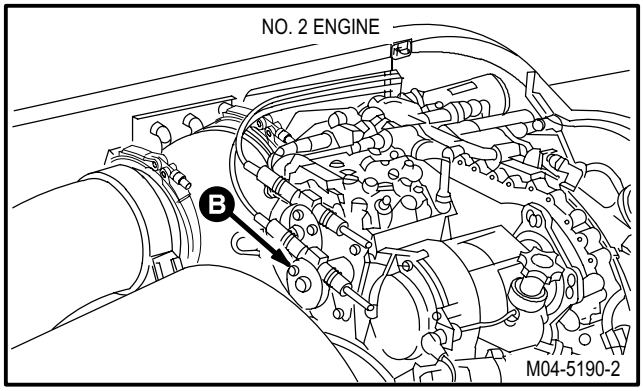
| | |
|---|---|
| 67R | Attack Helicopter Repairer |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

4.144A.3. Removal

**NOTE**

This task is typical for No. 1 or No. 2 engine load demand spindle gearbox fitting and runout tube removal and installation. Engine No. 1 shown, engine No. 2 opposite.

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## 4.144A. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE GEARBOX MAIN SLEEVE AND RUNOUT TUBE REMOVAL/INSTALLATION - continued

a. **Remove main sleeve (1) from load demand spindle gearbox (2).** Hold gearbox (2) at hex-nut shaped area (3).

b. **Remove runout tube (4) from gearbox (2).** Hold gearbox (2) at hex-nut shaped area (5).

4.144A.4. Cleaning

a. **Clean removed parts and attaching area** (para 1.47)**.**

4.144A.5. Inspection

a. **Check attaching areas on gearbox for the following:**

(1) Stripped or damaged threads. None allowed.

(2) Cracks. None allowed.

(3) Corrosion (para 1.49).

4.144A.6. Installation

a. **Install runout tube (4) on gearbox (2).** Hold gearbox (2) at hex-nut shaped area (5) and tighten tube (4).

b. **Install main sleeve (1) on gearbox (2).** Hold gearbox (2) at hex-nut shaped area (3) and tighten sleeve (1).

c. **Inspect (QA).**

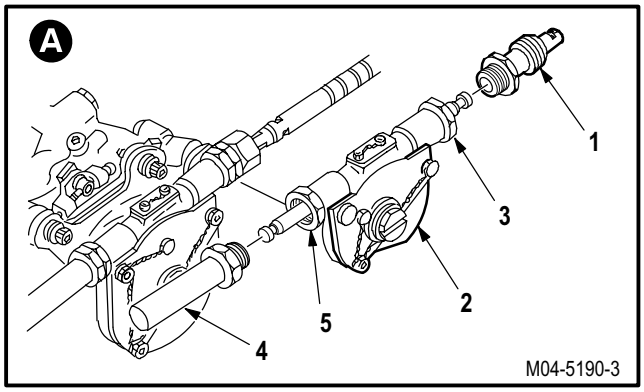
d. **Install cable on No. 1 or No. 2 engine load demand spindle gearbox** (para 4.143 or para 4.144)**.**

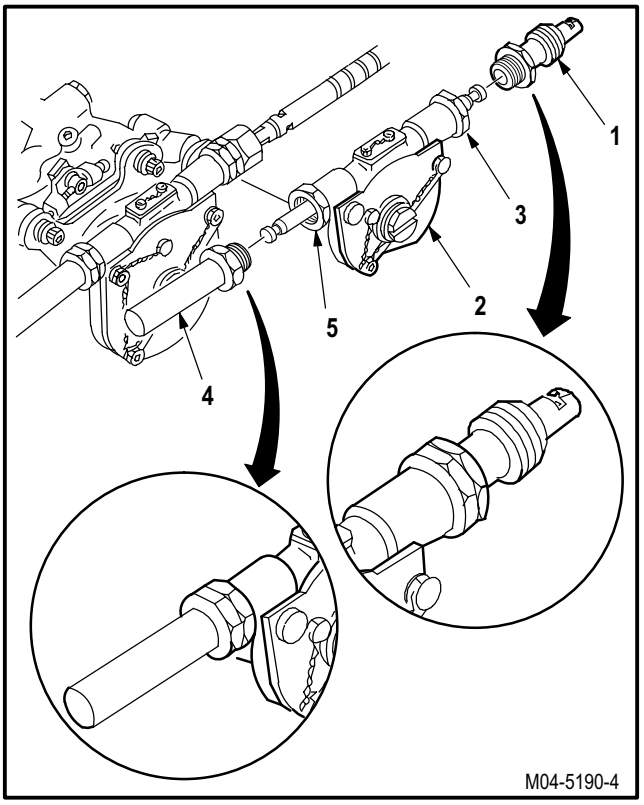
e. **Perform No. 1 engine or No. 2 engine load demand spindle rigging check** (para 4.184)**.**

f. **Perform power plants maintenance operational check (engine 1 or engine 2)** (TM 1-1520-238-T)**.**

g. **Install engine shroud** (para 4.51)**.**

h. **Secure access door LN1 or RN1** (para 2.2)**.**




END OF TASK

## 4.145. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL

4.145.1. Description

This task covers: Removal. Cleaning. Inspection.

4.145.2. Initial Setup

**Tools:**

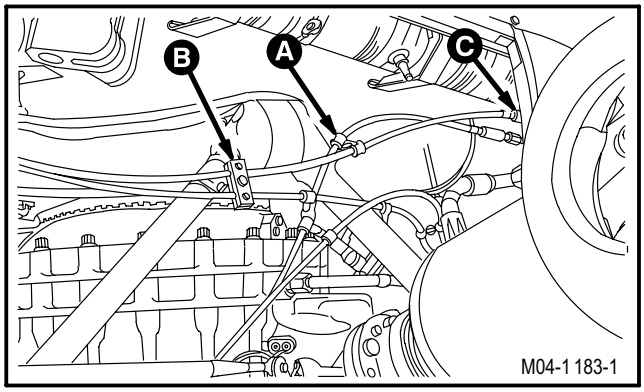
Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access panels L200 and L160 and pilot left console panels PL1 and PL3 removed |
| 9.30 | Transformer-rectifier No. 1 removed |
| 10.54 | Pilot FUEL panel removed |
| 9.62 | Pilot EXT LT/INTR LT panel removed |



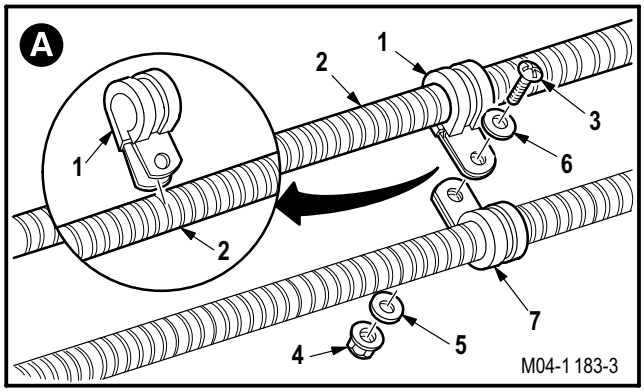

4.145.3. Removal

a. **Remove clamp (1) from center cable (2).**

(1) Hold screw (3). Remove nut (4) and washer (5).

(2) Remove screw (3) and washer (6) from clamps (1) and (7).

(3) Remove clamp (1).

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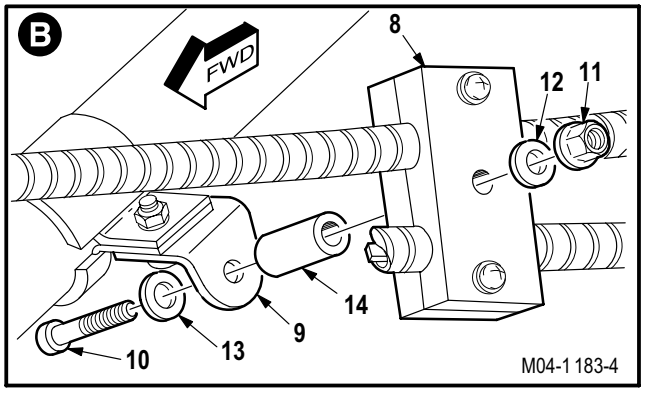
## 4.145. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL - continued

b. **Remove clamp (8) from bracket (9).**

(1) Hold screw (10). Remove nut (11) and washer (12).

(2) Remove screw (10), washer (13), spacer (14), and clamp (8) from bracket (9).

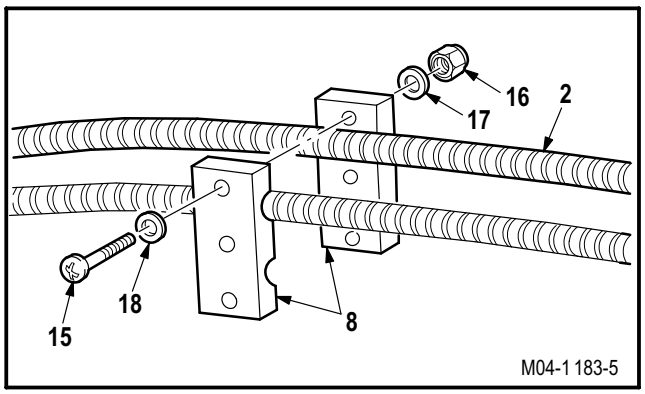


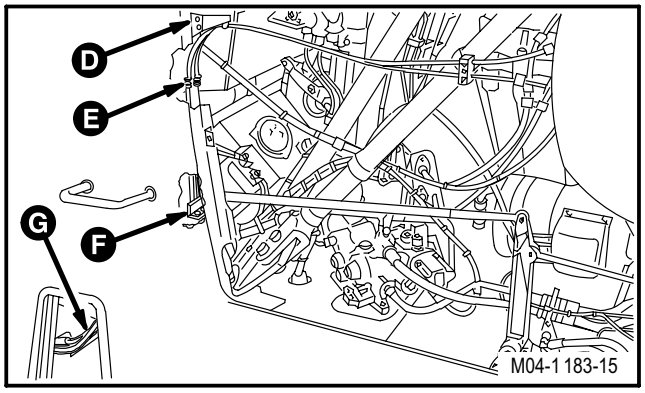

c. **Remove clamp (8) from cable (2).**

(1) Hold two screws (15). Remove two nuts (16) and washers (17).

(2) Remove two screws (15) and washers (18) from clamp (8).

(3) Remove clamp (8).



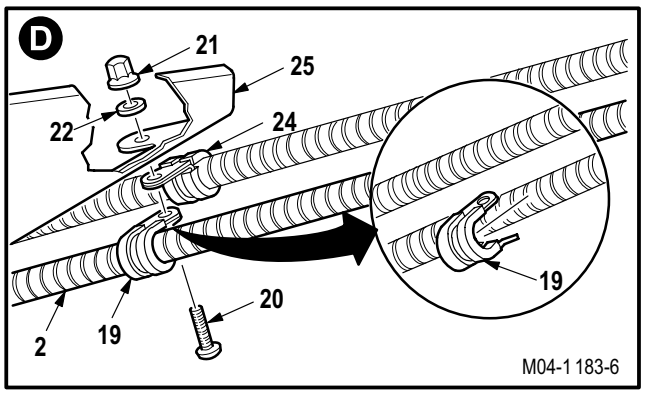




d. **Remove clamp (19) from cable (2).**

(1) Hold screw (20). Remove nut (21) and washer (22).

(2) Remove screw (20) and clamps (19) and (24) from bracket (25).

(3) Remove clamp (19).

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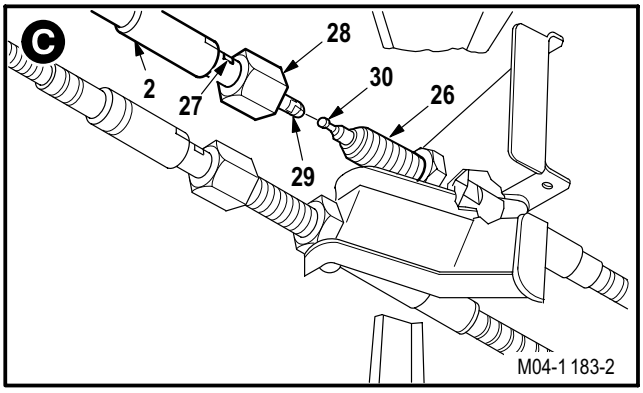
## 4.145. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL - continued

e. **Remove cable (2) from aft cable (26).**

(1) Hold cable (2) at flats (27). Remove coupling nut (28) from cable (26).

(2) Detach cable (2) connector (29) from cable (26) connector (30).

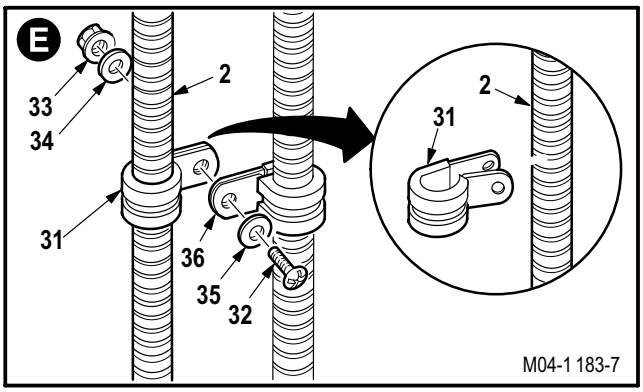



f. **Remove clamp (31) from cable (2).**

(1) Hold screw (32). Remove nut (33) and washer (34).

(2) Remove screw (32) and washer (35) from clamps (31) and (36).

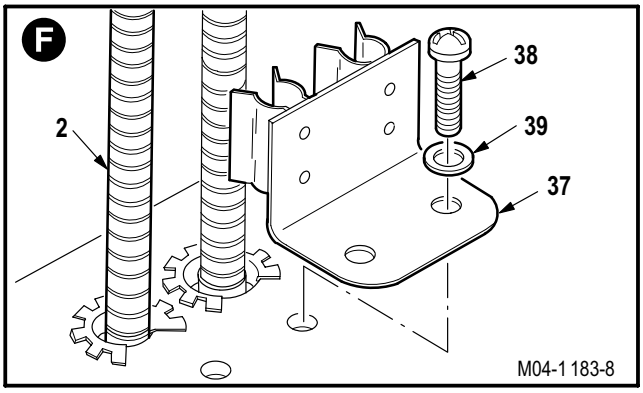
(3) Remove clamp (31).




g. **Remove bracket (37) from cable (2).**

(1) Remove two screws (38) and washers (39).

(2) Remove bracket (37).

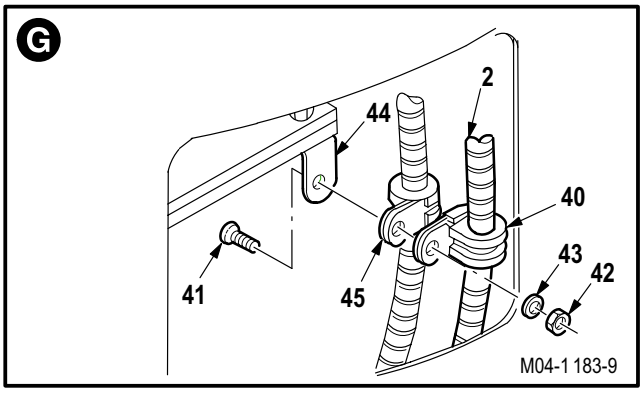



h. **Remove clamp (40) from cable (2).**

(1) Hold screw (41). Remove nut (42) and washer (43).

(2) Remove screw (41) from bracket (44) and clamps (45) and (40).

(3) Remove clamp (40).

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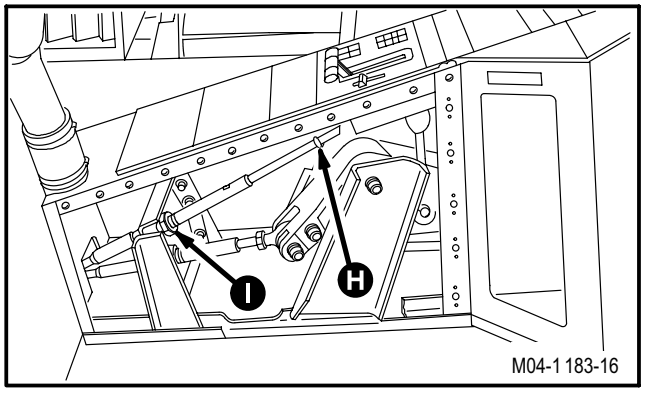
## 4.145. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL - continued



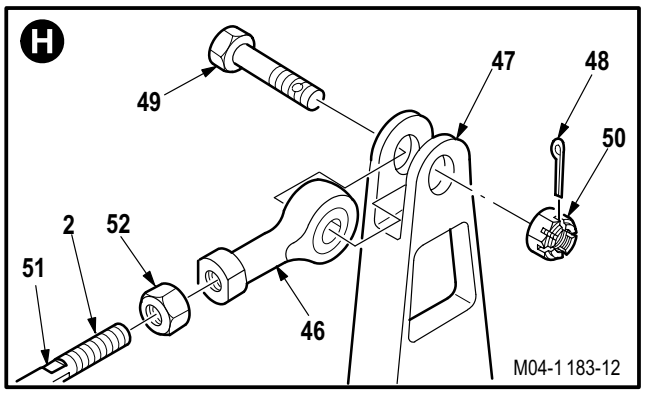

i. **Remove rod end (46) from bellcrank (47).**

(1) Remove and discard cotter pin (48).

(2) Hold bolt (49). Remove nut (50).

(3) Remove bolt (49) from rod end (46) and bellcrank (47).

(4) Remove rod end (46).




j. **Remove rod end (46) from cable (2).**

(1) Hold cable (2) at flats (51). Loosen nut (52).

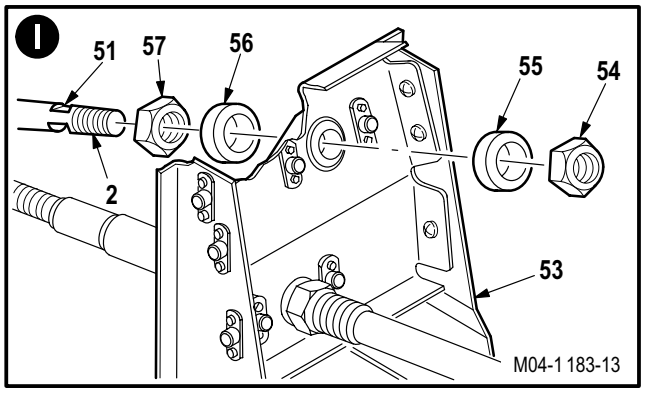
(2) Remove rod end (46) and nut (52) from cable (2).

k. **Remove cable (2) from bracket (53).**

(1) Hold cable (2) at flats (51). Remove nut (54) and spacer (55) from cable (2).

(2) Pull cable (2) aft until free of bracket (53).

(3) Remove spacer (56) and nut (57).

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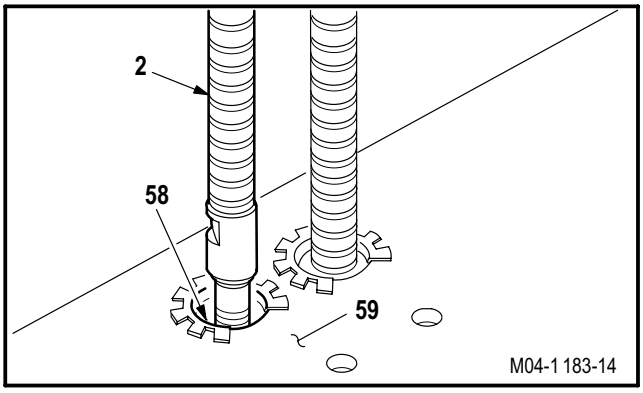
**4.145. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL - continued**

l. **Remove cable (2) through hole (58) in transmission deck (59).**




4.145.4. Cleaning

a. **Clean rod end, cable support, and support bracket** (para 1.47)**.**

4.145.5. Inspection

a. **Check rod end for thread damage and bearing surface scars.** None allowed.

b. **Check cable support and support bracket for cracks.** None allowed.

c. **Check cable for kinks, dents, and chaffing.** None allowed.

d. **Check rod end cable support and support bracket for corrosion** (para 1.49)**.**

END OF TASK

## 4.146. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION

4.146.1. Description

This task covers: Installation.

4.146.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Flight control rigging kit (item 267, App H)
0.0 - 10.0-pound weighing scale (item 272, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**References:**

TM 1-1520-238-T

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

Engine power available spindle (PAS) cables cannot be intermixed with cables manufactured by different vendors on the same engine. Cables that have a metallic exterior (Controlex) cannot be mixed with cables that have a black tubing exterior (Cablecraft) on the same engine. One side can be Controlex and the other side can be Cablecraft. Cables must be replaced with same exact part number. If exact part is not available, all No. 1 engine PAS cables (three cables) or No. 2 engine PAS cables (three cables) must be replaced with new cables (Cablecraft).

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## 4.146. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued

4.146.3. Installation

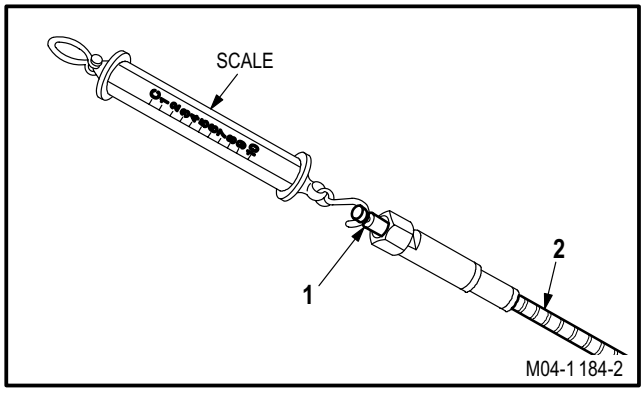
a. **Check cable ribbon (1) friction load.**

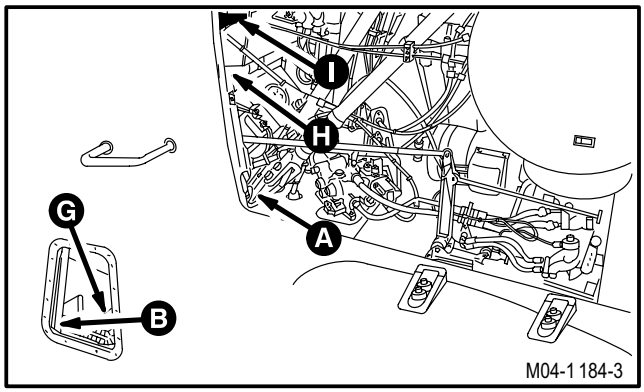
(1) Place cable (2) on flat surface. Ensure cable (2) is not bent or twisted.

(2) Slide ribbon (1) **2.5 INCHES** in and out of cable (2). There should be no binding, stiffness, or jamming.

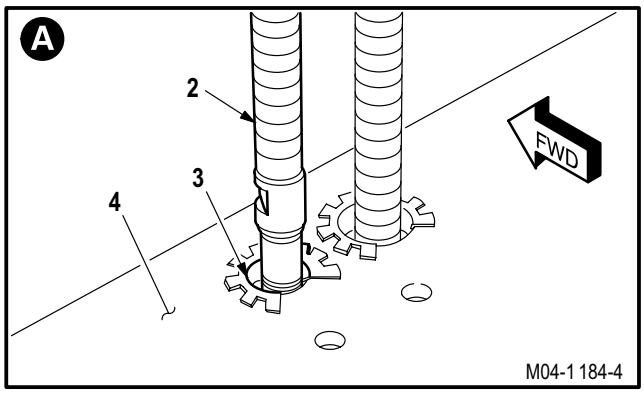
(3) Check friction load of ribbon (1). Load not to exceed **1.5 POUNDS**. Use scale.

(4) If ribbon movement is rough or friction load exceeds **1.5 POUNDS**, replace cable.

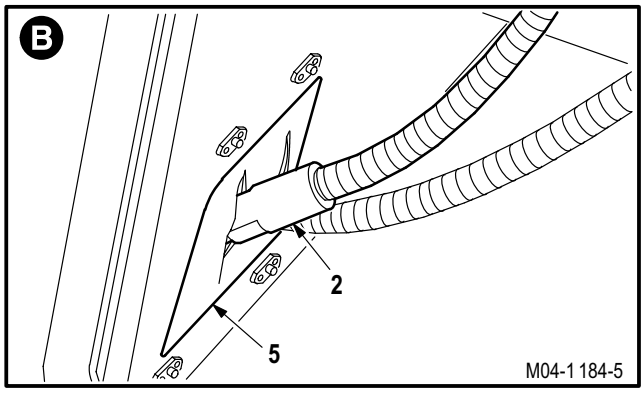



b. **Guide threaded end of center cable (2) through hole (3) in forward left transmission deck (4).**




c. **Guide cable (2) through seal (5) on pilot station bulkhead.**

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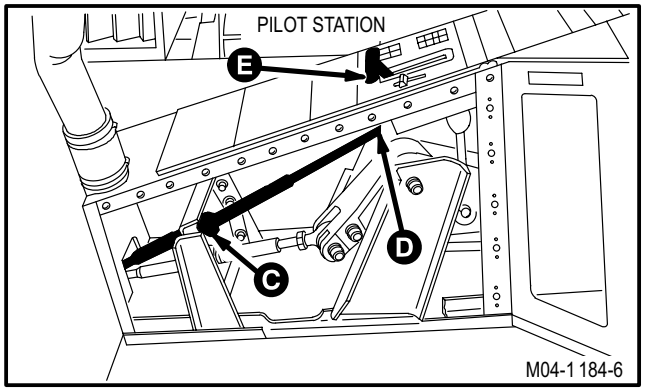
## 4.146. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued

d. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**




e. **Install cable (2) thru bracket (6).**

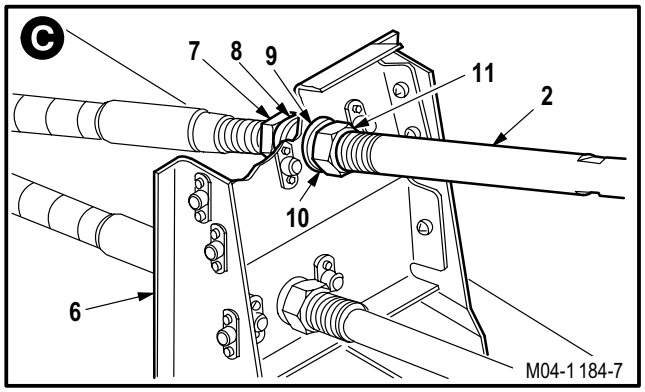
(1) Center nut (7) on threaded area of cable (2).

(2) Install spacer (8) on cable (2).

(3) Slide cable (2) through bearing (9) on bracket (6).

(4) Install spacer (10) on cable (2).

(5) Install nut (11) on cable (2) and tighten until spacer (10) contacts bearing (9).

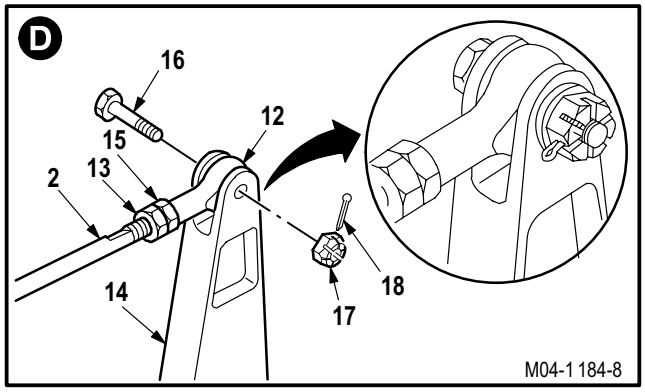



f. **Install rod end (12) on cable (2).** Torque nut (13) to **20 INCH-POUNDS**.

(1) Install nut (13) on cable (2) so **0.5 INCH** of threaded cable end is exposed.

(2) Install rod end (12) **0.5 INCH** on cable (2) and aline with bellcrank (14).

(3) Hold rod end (12) at flats (15). Torque nut (13) to **20 INCH-POUNDS**. Use torque wrench.




g. **Install rod end (12) on bellcrank (14).** Torque nut (17) **14 to 18 INCH-POUNDS**.

(1) Install bolt (16) through bellcrank (14) and rod end (12).

(2) Install nut (17) on bolt (16).

(3) Hold bolt (16). Torque nut (17) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (18).

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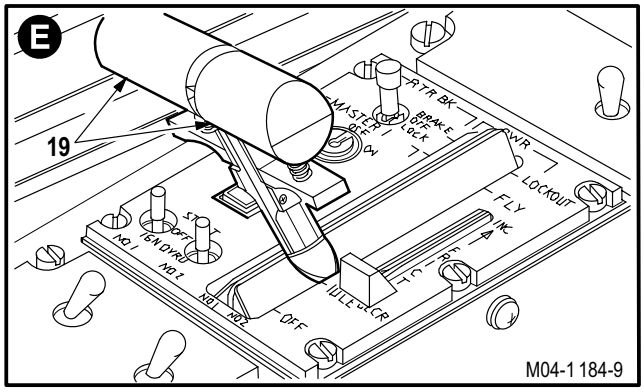
**4.146. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued**

h. **Set pilot power levers (19) to IDLE.**

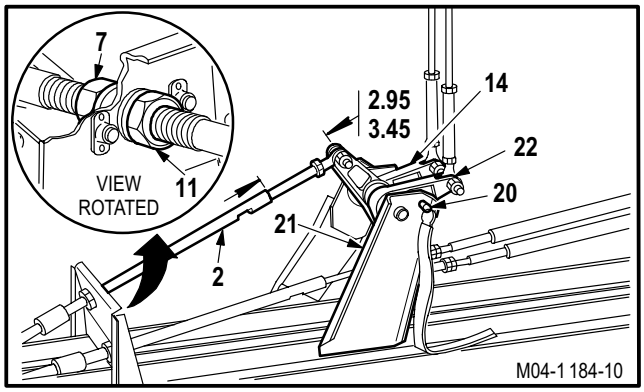



i. **Adjust cable (2) travel to 2.95 - 3.45 INCHES.**

(1) Install rig pin (20) through bracket (21) and bellcranks (22) and (14).

(2) Adjust nuts (7) and (11) to get correct travel.

(3) Hand tighten nuts (7) and (11).

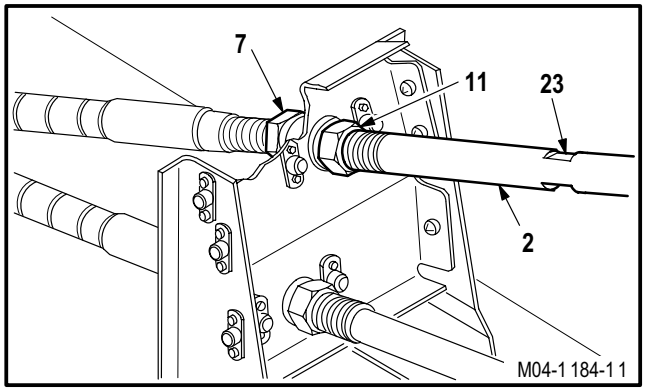



j. **Torque nuts (7) and (11) to 90 INCH-POUNDS.**

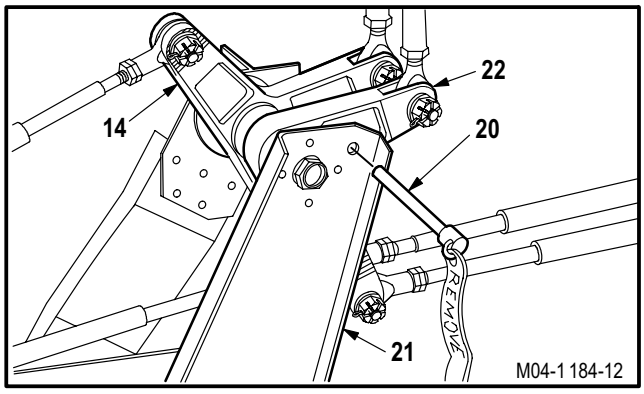
(1) Hold cable (2) at flats (23). Torque nuts (7) and (11) to **90 INCH-POUNDS**. Use torque wrench.

k. **Inspect (QA).**

(1) Verify cable (2) travel is **2.95 - 3.45 INCHES**.




l. **Remove rig pin (20) from bracket (21) and bellcranks (14) and (22).**

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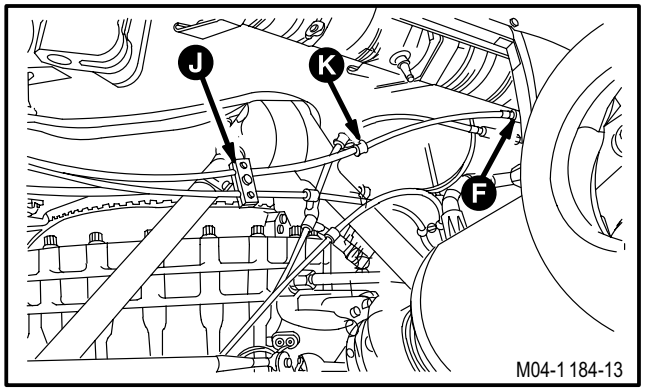
## 4.146. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued

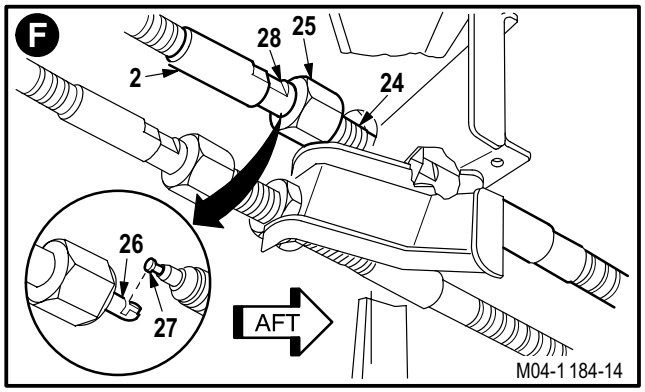



m. **Install cable (2) to aft cable (24).** Torque coupling nut (25) to **70 INCH-POUNDS**.

(1) Attach cable (2) connector (26) to cable (24) connector (27).

(2) Install coupling nut (25) on cable (24).

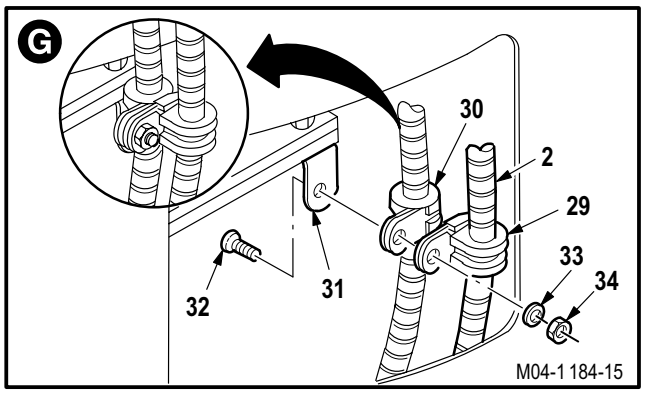
(3) Hold cable (2) at flats (28). Torque nut (25) to **70 INCH-POUNDS**. Use torque wrench.




n. **Install clamps (29) and (30) on bracket (31).**

(1) Position clamp (29) on cable (2).

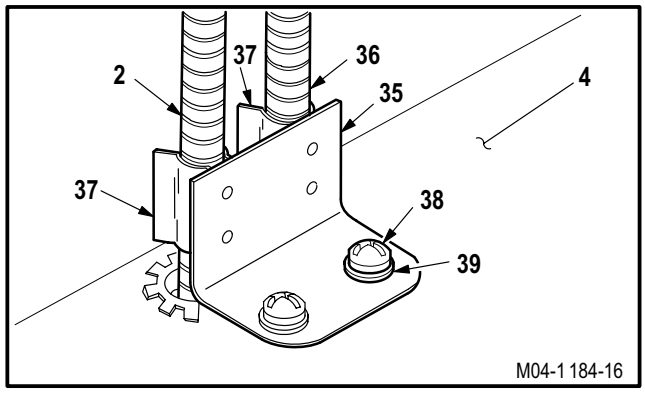
(2) Install screw (32) through bracket (31), clamps (30) and (29), washer (33), and nut (34).




o. **Install bracket (35) on deck (4).**

(1) Install cables (2) and (36) in clips (37).

(2) Install two screws (38) through washers (39) and bracket (35) on deck (4).

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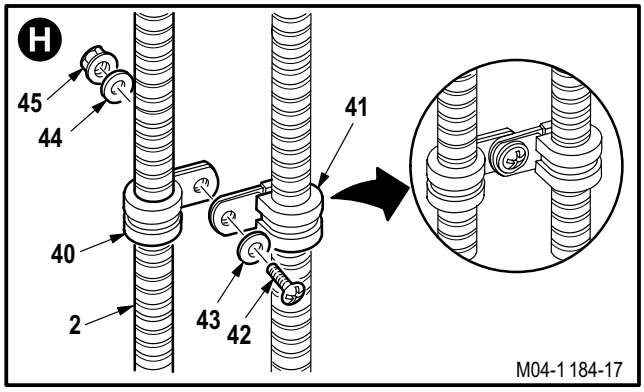
## 4.146. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued

p. **Install clamp (40) on clamp (41).**

(1) Position clamp (40) on cable (2).

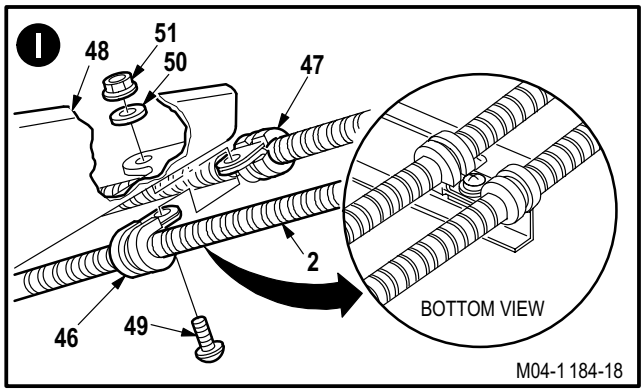
(2) Install screw (42) through washer (43), clamps (41) and (40), washer (44), and nut (45).




q. **Install clamps (46) and (47) on bracket (48).**

(1) Position clamp (46) on cable (2).

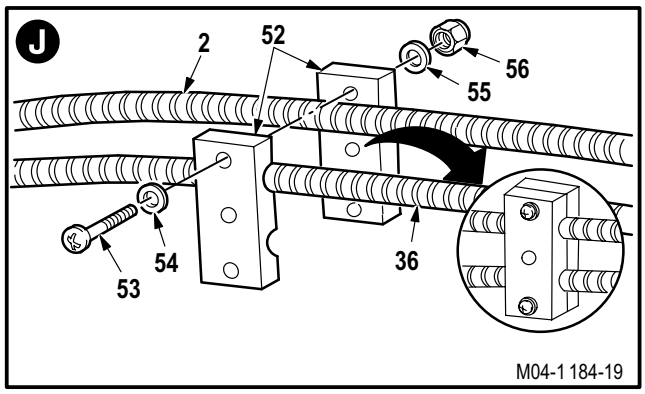
(2) Install screw (49) through clamps (46) and (47), bracket (48), washer (50), and nut (51).




r. **Install clamp (52) on cables (2) and (36).**

(1) Position clamp (52) on cables (2) and (36).

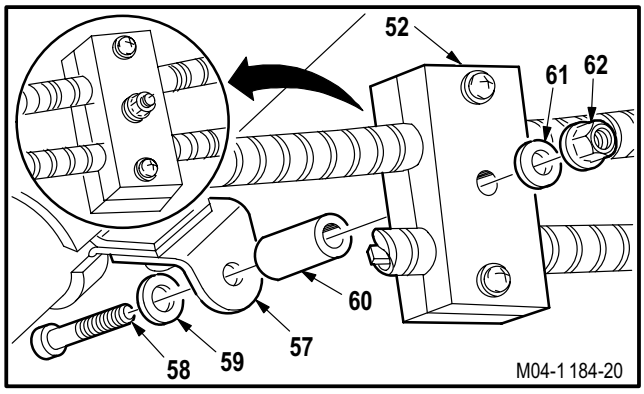
(2) Install two screws (53) through washers (54), clamp (52), washers (55), and nuts (56).




s. **Install clamp (52) on bracket (57).**

(1) Install screw (58) through washer (59), bracket (57), spacer (60), and clamp (52).

(2) Install washer (61) and nut (62).

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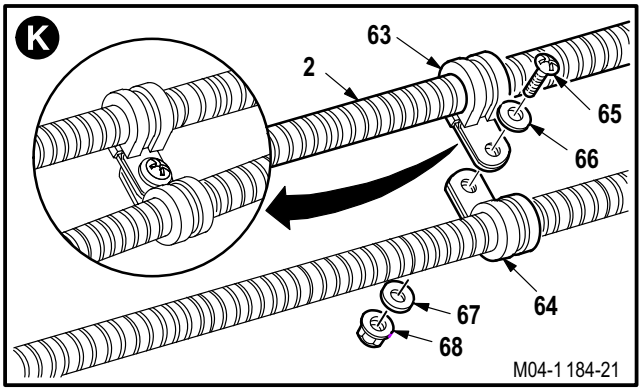
**4.146. NO. 1 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued**

t. **Install clamp (63) on clamp (64).**

(1) Position clamp (63) on cable (2).

(2) Install screw (65) through washer (66), clamps (63) and (64), washer (67), and nut (68).




u. **Inspect (QA).**

v. **Perform No. 1 engine power available spindle system rigging check** (para 4.186)**.**

w. **Install transformer-rectifier No. 1** (para 9.30)**.**

x. **Install pilot FUEL control panel** (para 10.54)**.**

y. **Install pilot EXT LT/INTR LT panel** (para 9.62)**.**

z. **Install pilot left console panels PL1, PL3, and access panels L160 and L200** (para 2.2)**.**

aa. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

END OF TASK

## 4.147. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL

4.147.1. Description

This task covers: Removal. Cleaning. Inspection.

4.147.2. Initial Setup

**Tools:**

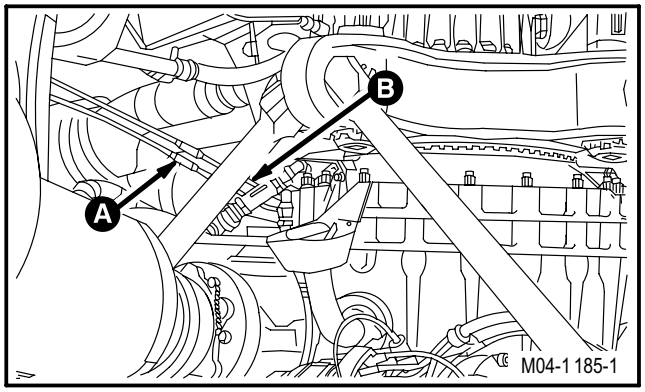
Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access panels L200, L160 and console panels PL1 and PL3 removed; doors T250L, T250R, T290L, T290R, and L325 opened |
| 9.30 | Transformer-rectifier No. 1 removed |
| 10.54 | Pilot FUEL panel removed |
| 9.62 | Pilot EXT LT/INTR LT panel removed |




4.147.3. Removal

a. **Remove center cable (1) from aft cable (2).**

(1) Hold aft cable (2) at flats (3). Remove coupling nut (4) from cable (1).

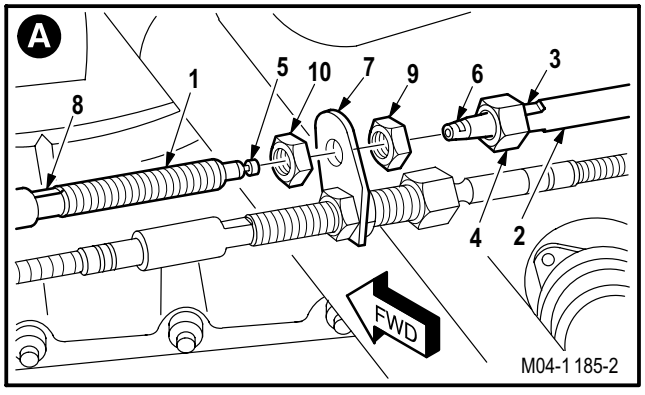
(2) Remove fitting (5) from fitting (6).

b. **Remove cable (1) from bracket (7).**

(1) Hold cable (1) at flats (8). Remove nut (9) from cable (1).

(2) Remove cable (1) from bracket (7).

(3) Remove nut (10) from cable (1).

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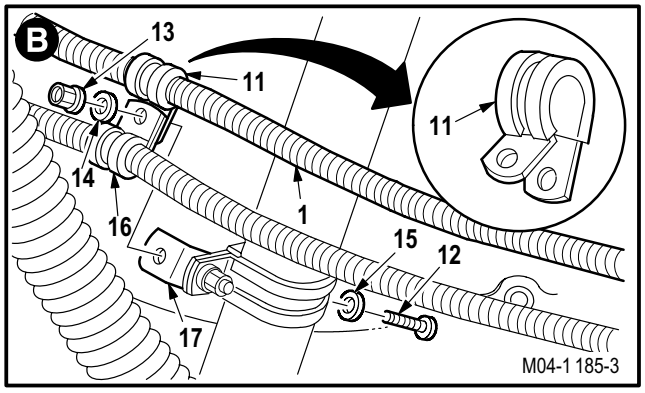
## 4.147. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL - continued

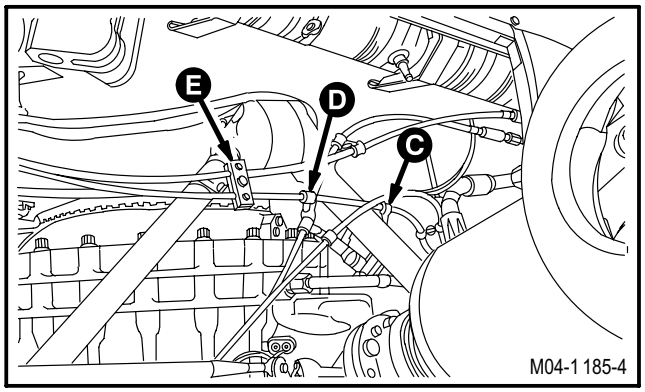
c. **Remove clamp (11) from cable (1).**

(1) Hold screw (12). Remove nut (13) and washer (14).

(2) Remove screw (12) and washer (15) from clamps (11) and (16), and bracket (17).

(3) Remove clamp (11).



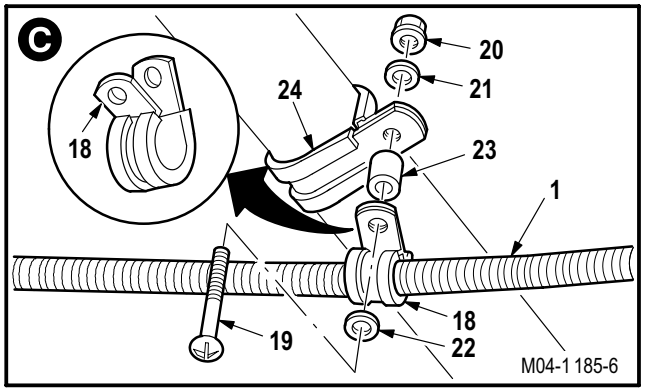




d. **Remove clamp (18) from cable (1).**

(1) Hold screw (19). Remove nut (20) and washer (21).

(2) Remove screw (19) and washer (22) from clamp (18), spacer (23), and clamp (24).

(3) Remove clamp (18).

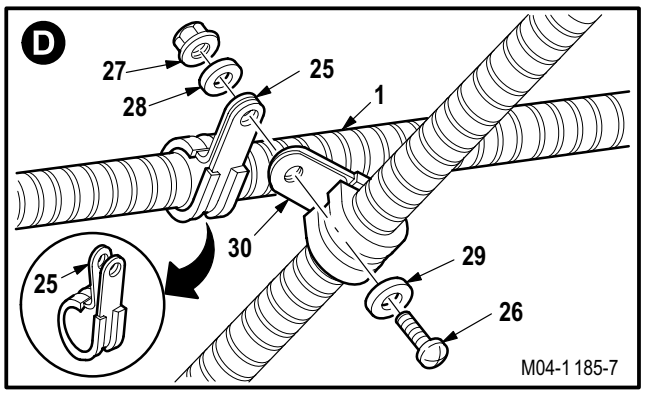



e. **Remove clamp (25) from cable (1).**

(1) Hold screw (26). Remove nut (27) and washer (28).

(2) Remove screw (26) and washer (29) from clamps (25) and (30).

(3) Remove clamp (25).

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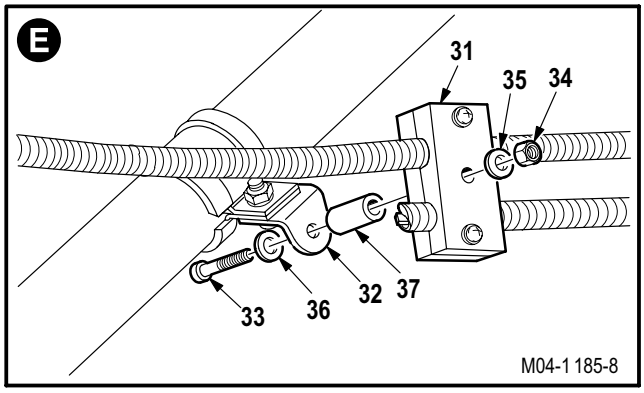
## 4.147. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL - continued

f. **Remove clamp (31) from bracket (32).**

(1) Hold screw (33). Remove nut (34) and washer (35).

(2) Remove screw (33), washer (36), spacer (37), and clamp (31) from bracket (32).

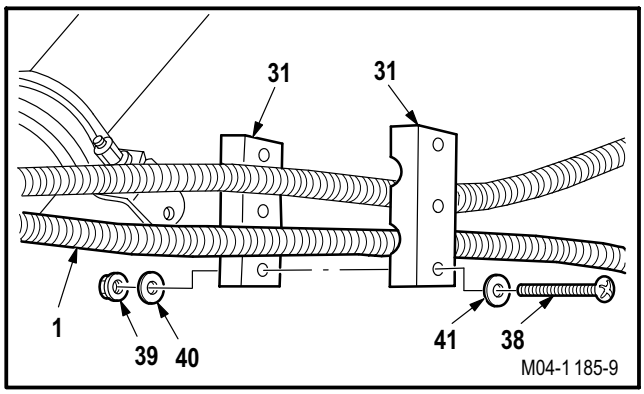


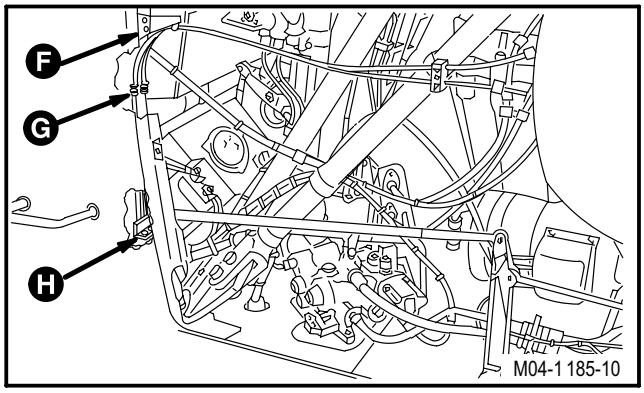

g. **Remove clamp (31) from cable (1).**

(1) Hold two screws (38). Remove two nuts (39) and washers (40).

(2) Remove two screws (38) and washers (41) from clamp (31).

(3) Remove clamp (31).



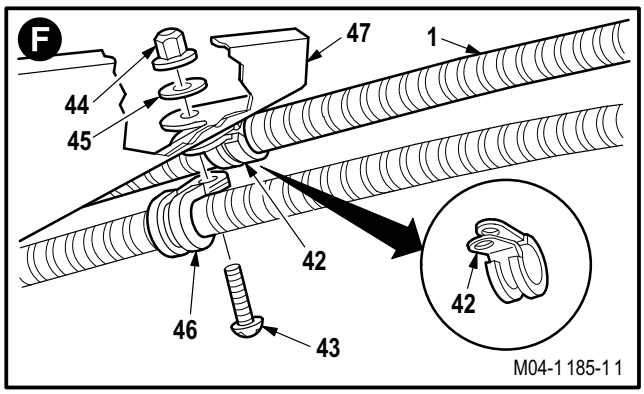




h. **Remove clamp (42) from cable (1).**

(1) Hold screw (43). Remove nut (44) and washer (45).

(2) Remove screw (43) and clamps (42) and (46) from bracket (47).

(3) Remove clamp (42).

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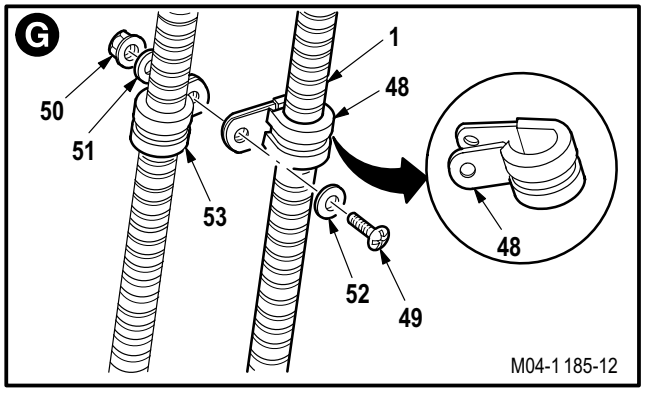
## 4.147. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL - continued

i. **Remove clamp (48) from cable (1).**

(1) Hold screw (49). Remove nut (50) and washer (51).

(2) Remove screw (49) and washer (52) from clamps (48) and (53).

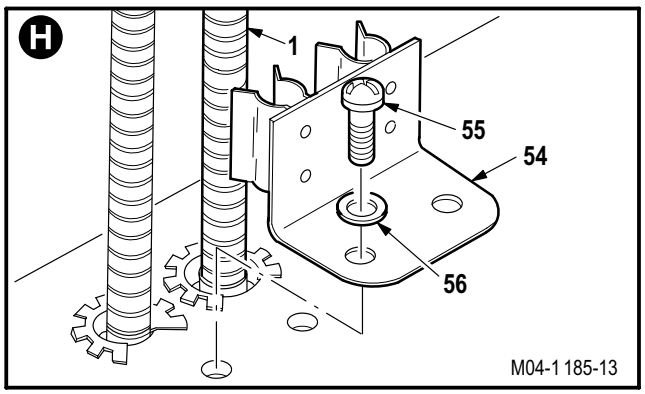
(3) Remove clamp (48).

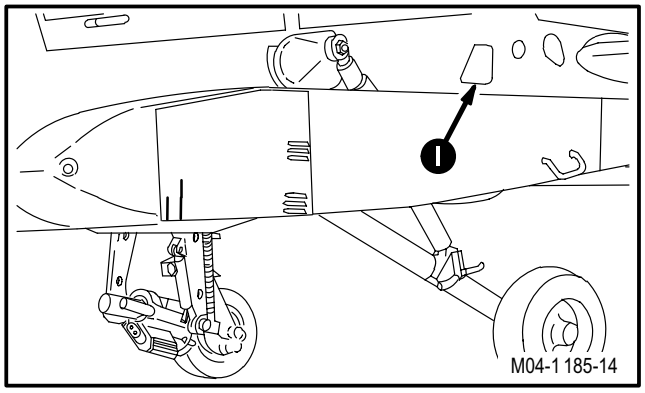



j. **Remove bracket (54) from cable (1).**

(1) Remove two screws (55) and washers (56).

(2) Remove bracket (54).



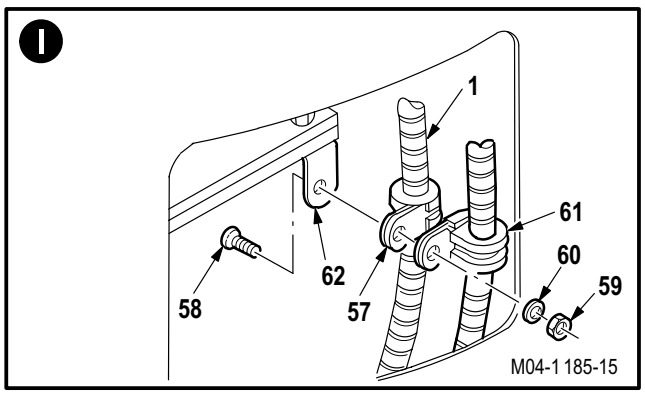




k. **Remove clamp (57) from cable (1).**

(1) Hold screw (58). Remove nut (59) and washer (60).

(2) Remove screw (58) from bracket (62) and clamps (57) and (61).

(3) Remove clamp (57).

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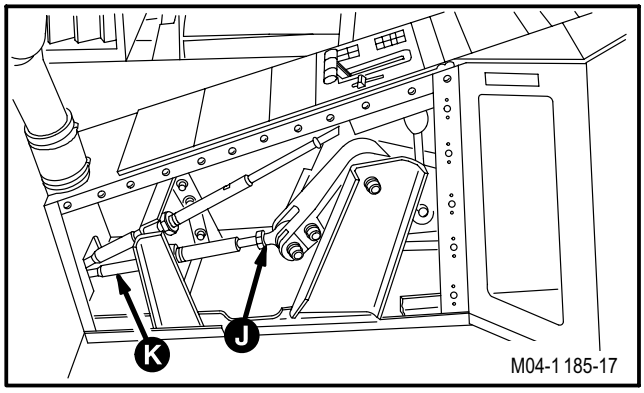
## 4.147. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL - continued



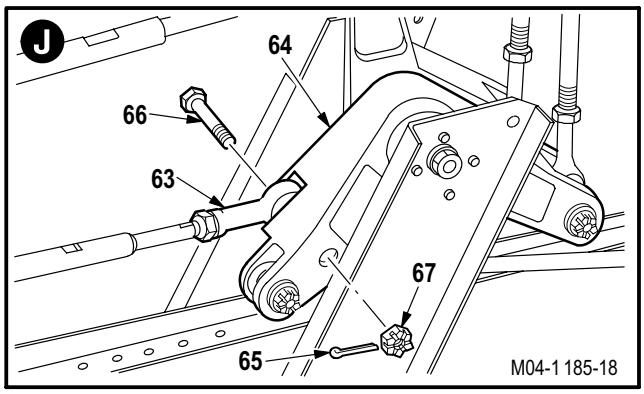

l. **Remove rod end (63) from bellcrank (64).**

(1) Remove and discard cotter pin (65).

(2) Hold bolt (66). Remove nut (67).

(3) Remove bolt (66) from rod end (63) and bellcrank (64).

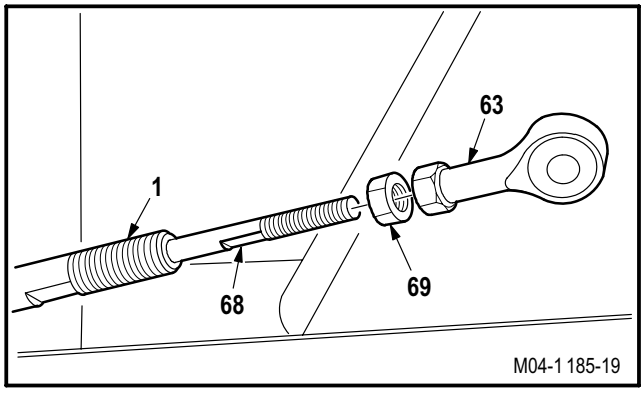
(4) Remove rod end (63).




m. **Remove rod end (63) from cable (1).**

(1) Hold cable (1) at flats (68). Loosen nut (69).

(2) Remove rod end (63) and nut (69) from cable (1).

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**4.147. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE REMOVAL - continued**

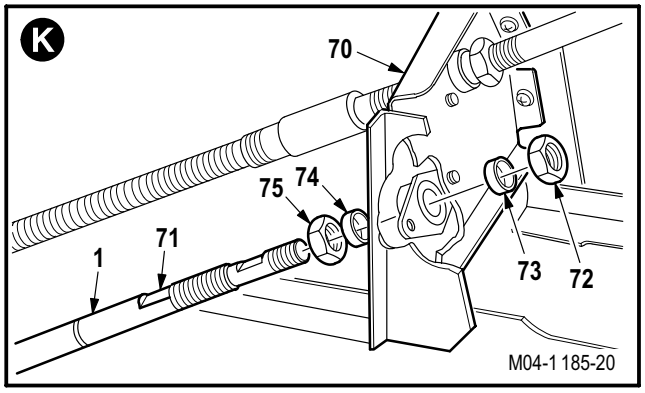
n. **Remove cable (1) from bracket (70).**

(1) Hold cable (1) at flats (71). Remove nut (72) and spacer (73) from cable (1).

(2) Pull cable (1) aft until free of bracket (70).

(3) Remove spacer (74) and nut (75).

o. **Remove cable (1) from helicopter through transmission deck.**




4.147.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.147.5. Inspection

a. **Check rod end for thread damage and bearing surface scars.** None allowed.

b. **Check cable support and support bracket for cracks.** None allowed.

c. **Check cable for nicks, kinks, and dents.** None allowed.

d. **Check rod end, cable support, and support bracket for corrosion** (para 1.49)**.**

END OF TASK

## 4.148. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION

4.148.1. Description

This task covers: Installation.

4.148.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
7/8 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 86, App H)
Flight control rigging kit (item 267, App H)
0.0 - 10.0-pound weighing scale (item 272, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

Cotter pin

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

Engine power available spindle (PAS) cables cannot be intermixed with cables manufactured by different vendors on the same engine. Cables that have a metallic exterior (Controlex) cannot be mixed with cables that have a black tubing exterior (Cablecraft) on the same engine. One side can be Controlex and the other side can be Cablecraft. Cables must be replaced with same exact part number. If exact part is not available, all No. 1 engine PAS cables (three cables) or No. 2 engine PAS cables (three cables) must be replaced with new cables (Cablecraft).

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## 4.148. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued

4.148.3. Installation

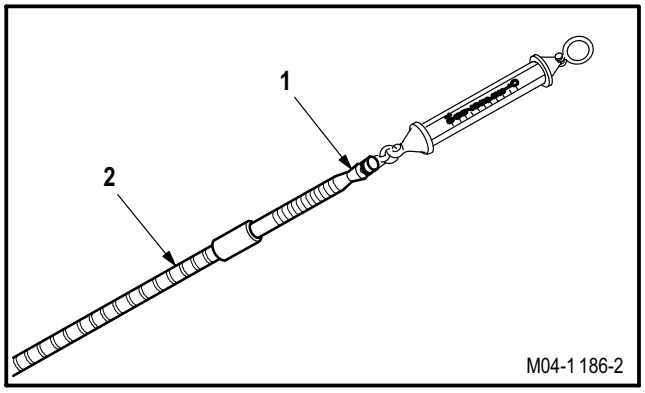
a. **Check cable ribbon (1) friction load.**

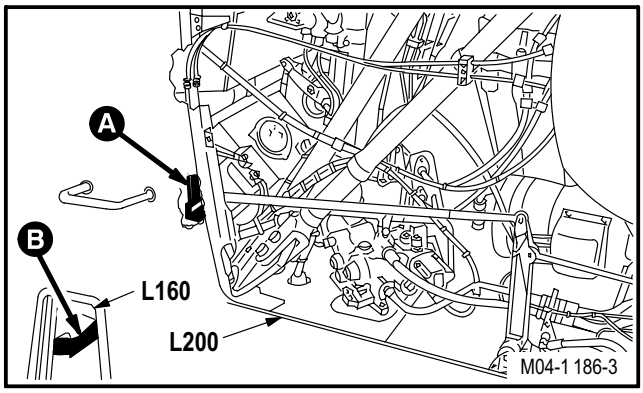
(1) Place cable (2) on flat surface. Ensure cable (2) is not bent or twisted.

(2) Slide ribbon (1) **2.5 INCHES** in and out of cable (2). There should be no binding, stiffness, or jamming.

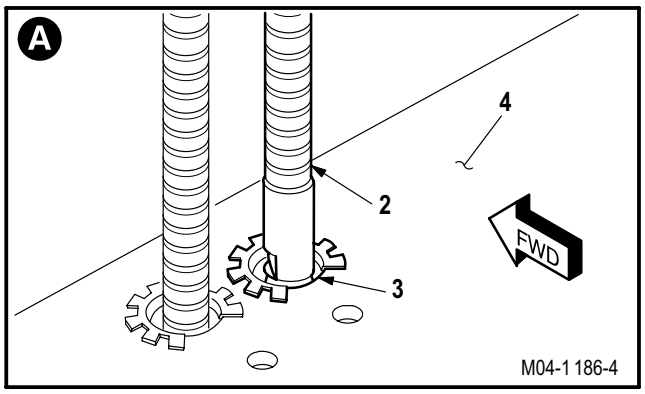
(3) Check friction load of ribbon (1). Load not to exceed **1.5 POUNDS**. Use scale.

(4) If ribbon movement is rough or friction load exceeds **1.5 POUNDS**, replace cable.

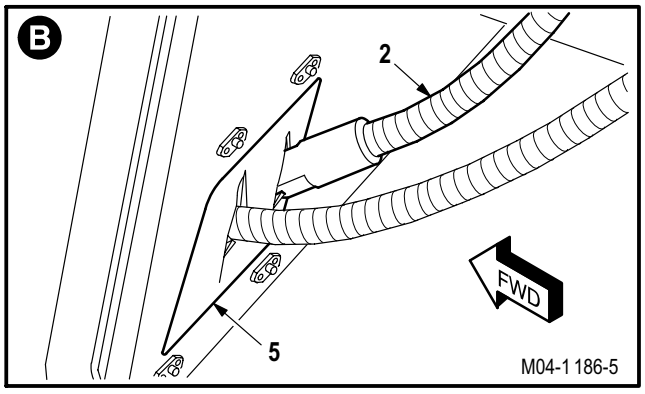



b. **Install threaded end of center cable (2) through hole (3) in forward left transmission deck (4).**




c. **Install cable (2) through seal (5) on pilot station bulkhead.**

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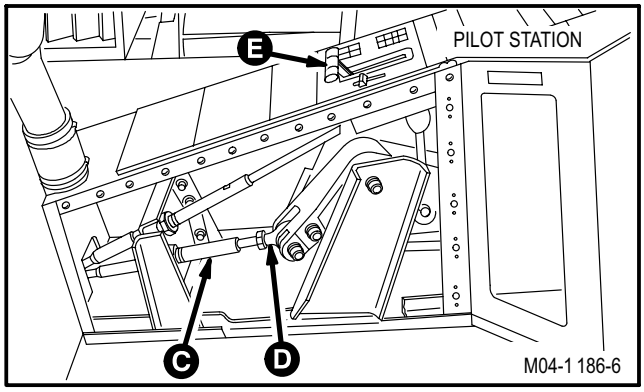
## 4.148. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued

d. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**




e. **Install cable (2) on bracket (6).**

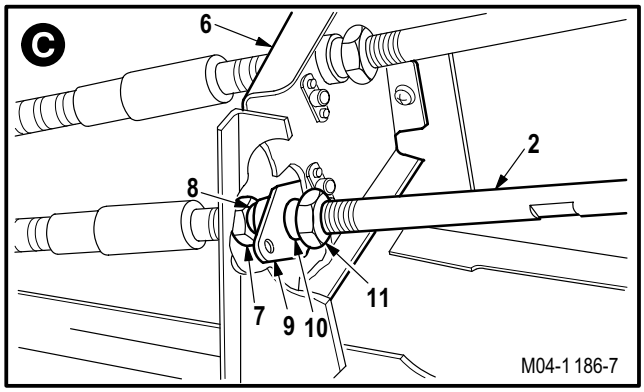
(1) Center nut (7) on threaded area of cable (2).

(2) Install spacer (8) on cable (2).

(3) Slide cable (2) through bearing (9) on bracket (6).

(4) Install spacer (10) on cable (2).

(5) Install nut (11) on cable (2). Tighten until spacer (10) contacts bearing (9).




f. **Install rod end (12) on cable (2).** Torque nut (13) to **20 INCH-POUNDS**.

(1) Install nut (13) on cable (2) so **0.5 INCH** of cable end is exposed.

(2) Install rod end (12) **0.5 INCH** on cable (2) and aline with bellcrank (14).

(3) Hold rod end (12) at flats (15). Torque nut (13) to **20 INCH-POUNDS**. Use torque wrench.

g. **Install rod end (12) on bellcrank (14).** Torque nut (16) **14 to 18 INCH-POUNDS**.

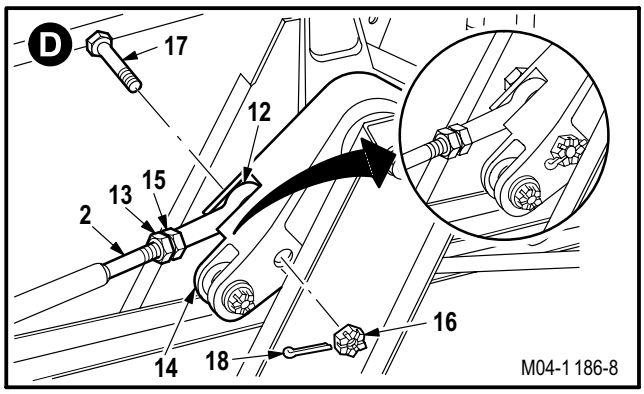
(1) Install bolt (17) through bellcrank (14) and rod end (12).

(2) Install nut (16) on bolt (17).

(3) Hold bolt (17). Torque nut (16) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (18).

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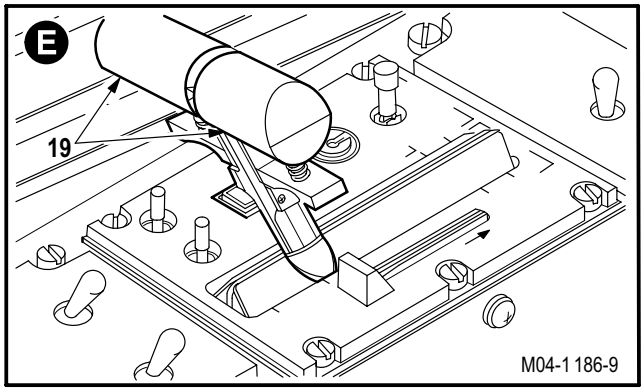
## 4.148. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued

h. **Set pilot power levers (19) to IDLE.**




i. **Adjust cable (2) travel to 4.25 - 4.75 INCHES.**

(1) Install rig pin (20) through bracket (21) and bellcranks (14) and (22).

(2) Adjust nuts (7) and (11) to get correct travel.

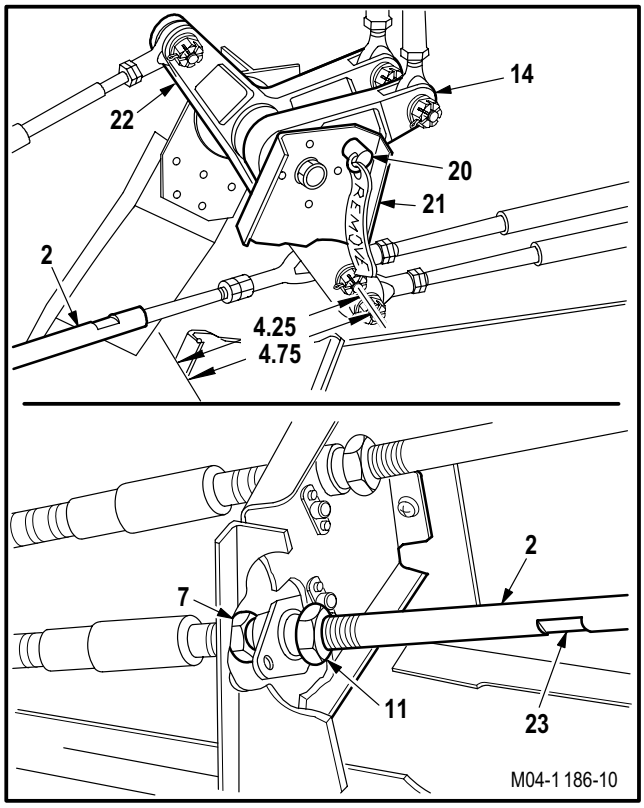
(3) Hand tighten nuts (7) and (11).

j. **Torque nuts (7) and (11) to 90 INCH-POUNDS.**

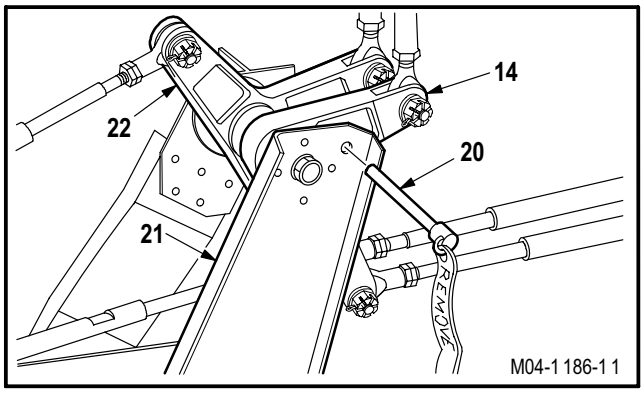
(1) Hold cable (2) at flats (23). Torque nuts (7) and (11) to **90 INCH-POUNDS**. Use torque wrench.

k. **Inspect (QA).**

(1) Verify cable (2) travel is **4.25 - 4.75 INCHES**.




l. **Remove rig pin (20) from bracket (21) and bellcranks (14) and (22).**

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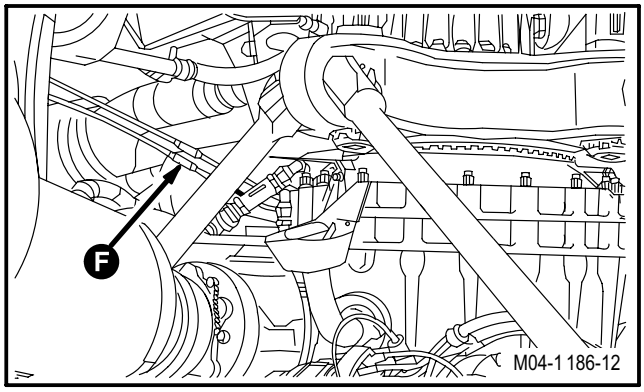
## 4.148. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued




m. **Install cable (2) on bracket (24).**

(1) Install nut (25) in center of threaded area of cable (2).

(2) Install cable (2) through bracket (24).

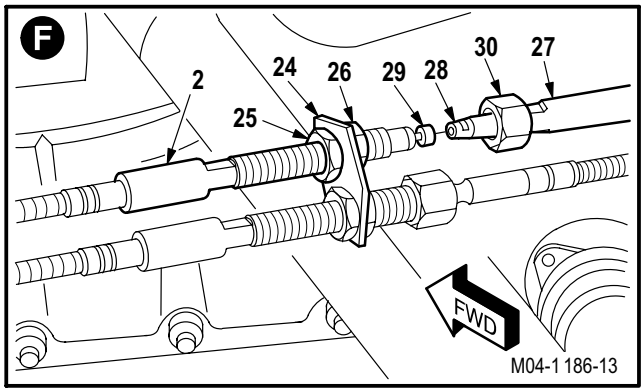
(3) Install nut (26) three turns on cable (2).

n. **Install cable (2) on aft cable (27).**

(1) Adjust nuts (25) and (26) as needed to aline center cable (2) with cable (27).

(2) Install cable fitting (28) to cable fitting (29).

(3) Install coupling nut (30) on cable (2).



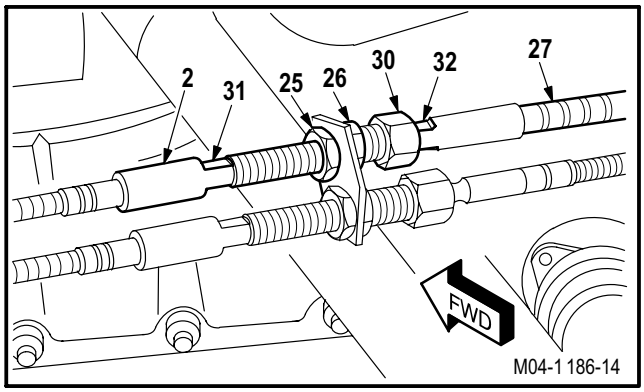

o. **Torque nuts (25) and (26) to 90 INCH-POUNDS.**

(1) Hold center cable (2) at flats (31). Torque nuts (25) and (26) to **90 INCH-POUNDS**. Use crowfoot and torque wrench.

p. **Torque coupling nut (30) to 70 INCH-POUNDS.**

(1) Hold cable (27) at flats (32). Torque nut (30) to **70 INCH-POUNDS**. Use torque wrench.

q. **Inspect (QA).**

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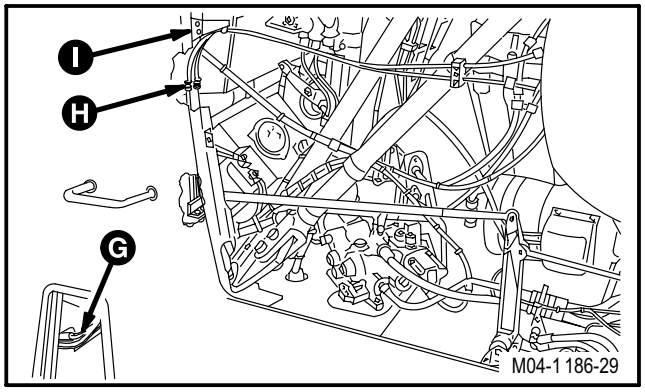
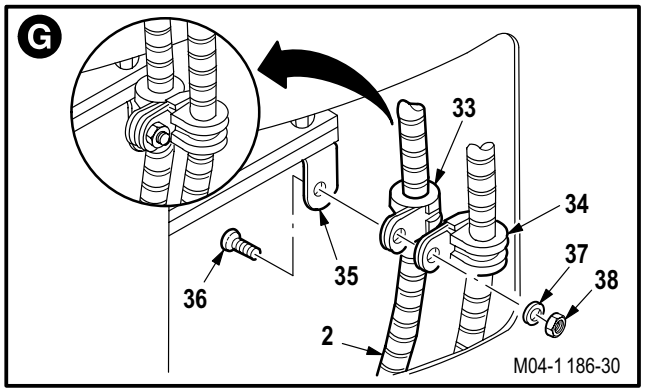
## 4.148. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued

r. **Install clamps (33) and (34) on bracket (35).**

(1) Position clamp (33) on cable (2).

(2) Install screw (36) through bracket (35), clamps (33) and (34), washer (37), and nut (38).

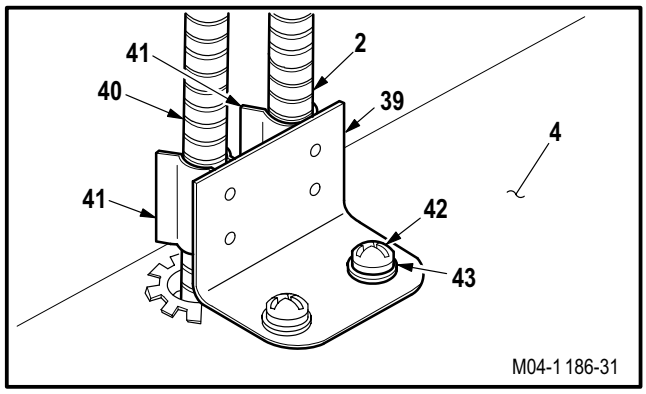



s. **Install bracket (39) on deck (4).**

(1) Install cable (2) and cable (40) in clips (41).

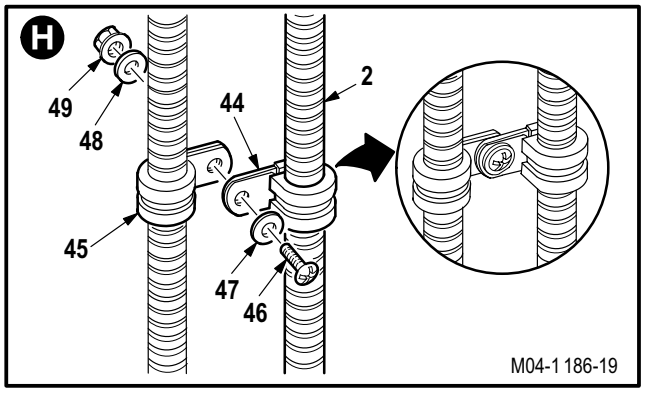
(2) Install two screws (42) through washers (43) and bracket (39) on deck (4).




t. **Install clamp (44) on clamp (45).**

(1) Position clamp (44) on cable (2).

(2) Install screw (46) through washer (47), clamps (44) and (45), washer (48), and nut (49).

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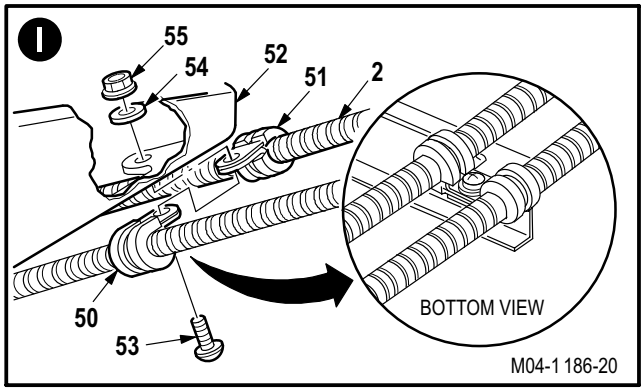
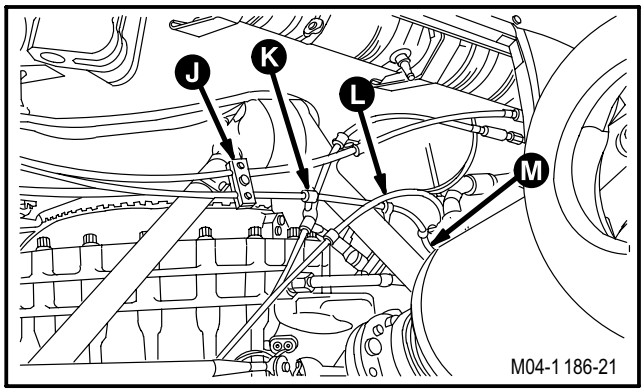
**4.148. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued**

u. **Install clamps (50) and (51) on bracket (52).**

(1) Position clamp (51) on cable (2).

(2) Install screw (53) through clamps (50) and (51), bracket (52), washer (54), and nut (55).

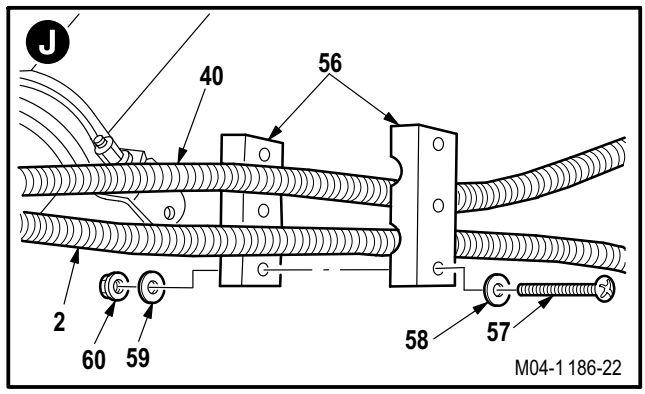



v. **Install clamp (56) on cable (2) and cable (40).**

(1) Position clamp (56) on cables (2) and (40).

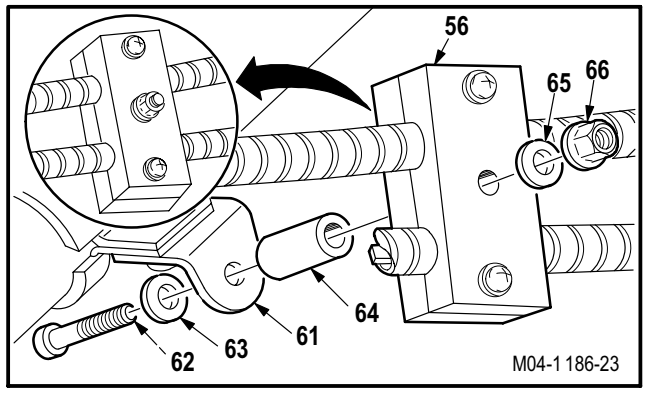
(2) Install two screws (57) through washers (58), clamp (56), washers (59), and nuts (60).




w. **Install clamp (56) on bracket (61).**

(1) Install screw (62) through washer (63), bracket (61), spacer (64), and clamp (56).

(2) Install washer (65) and nut (66).

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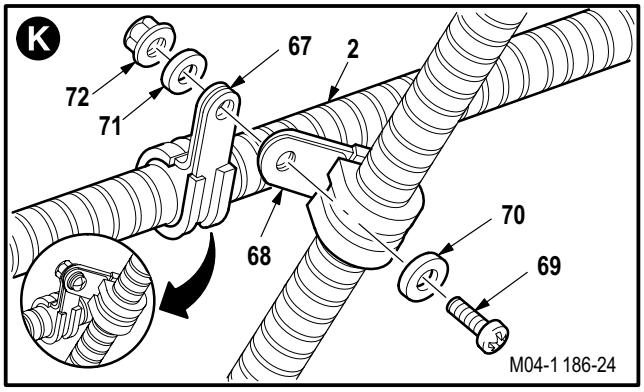
**4.148. NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE INSTALLATION - continued**

x. **Install clamp (67) on clamp (68).**

(1) Position clamp (67) on cable (2).

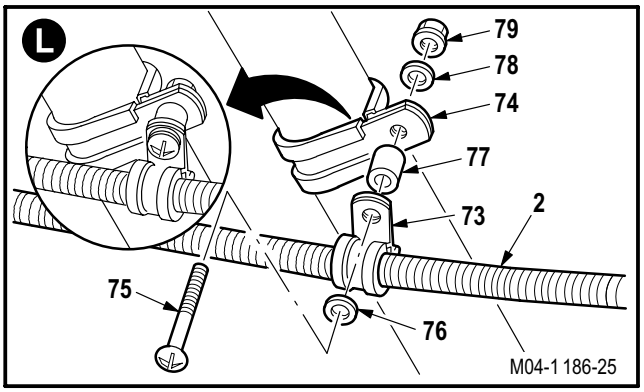
(2) Install screw (69) through washer (70), clamps (68) and (67), washer (71), and nut (72).




y. **Install clamp (73) on clamp (74).**

(1) Position clamp (72) on cable (2).

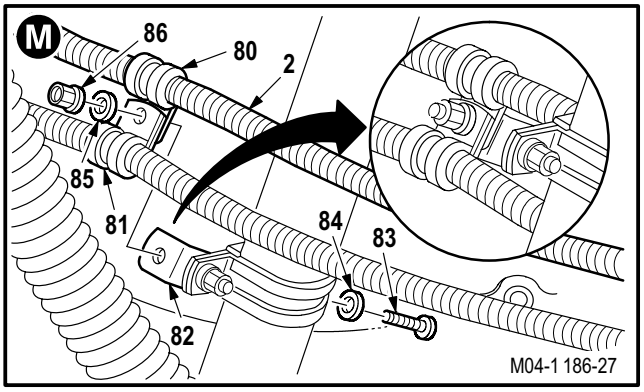
(2) Install screw (75) through washer (76), clamp (73), spacer (77), clamp (74), washer (78), and nut (79).




z. **Install clamps (80) and (81) on bracket (82).**

(1) Position clamp (80) on cable (2).

(2) Install screw (83) through washer (84), bracket (82), clamps (80) and (81), washer (85) and nut (86).




aa. **Perform No. 2 engine power available spindle system rigging check** (para 4.187)**.**

ab. **Install transformer-rectifier No. 1** (para 9.30)**.**

ac. **Install pilot FUEL control panel** (para 10.54)**.**

ad. **Install pilot EXT LT/INTR LT panel** (para 9.62)**.**

ae. **Install access panels L160 and L200, console panels PL1 and PL3; secure doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

af. **Inspect (QA).**

ag. **Perform power plants maintenance operational check (engine 2)** (TM 1-1520-238-T)**.**

END OF TASK

## 4.149. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE REMOVAL

4.149.1. Description

This task covers: Removal. Cleaning. Inspection.

4.149.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

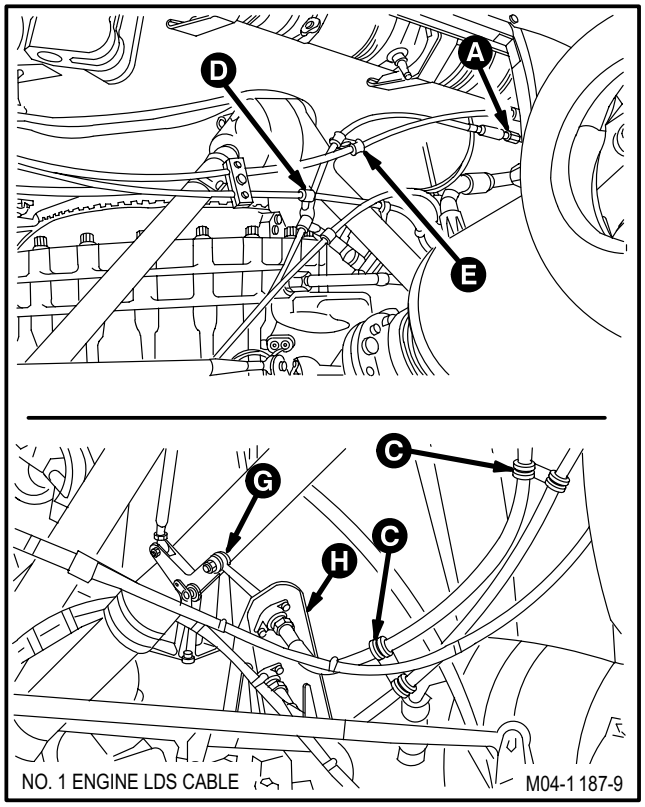
67R Attack Helicopter Repairer

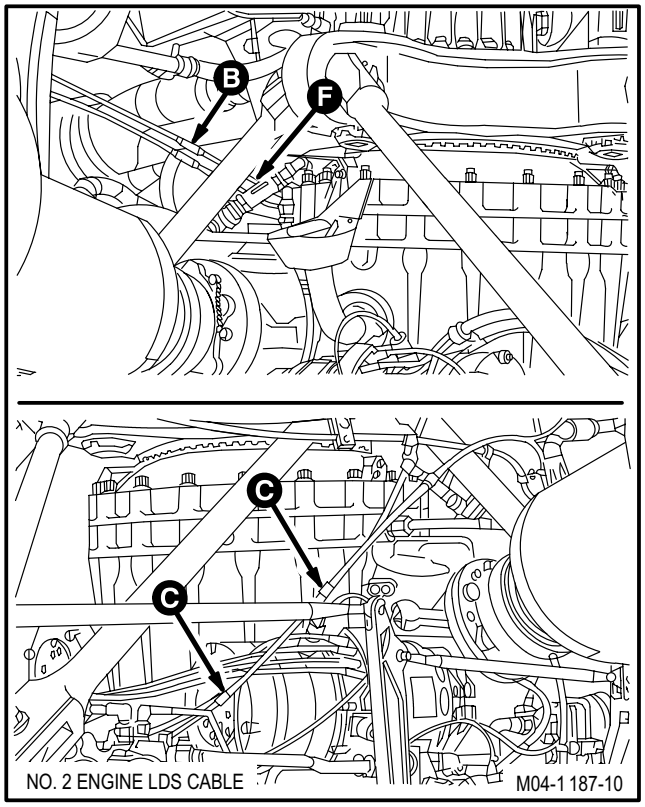
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access panel L200 removed for No. 1 engine or access panel R200 removed; doors RN1, T250R, T250L, T290R, T290L, and L325 opened for No. 2 engine |
| 1.72 | External power application - hydraulic (primary) |

**NOTE**

This task is typical for No. 1 or No. 2 engine load demand spindle forward cable, except as noted.

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## 4.149. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE REMOVAL - continued

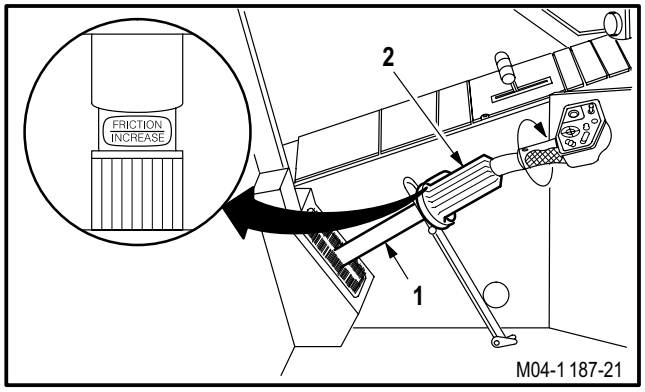
4.149.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **Set collective stick (1) to full up.**

(1) Rotate friction lock (2) counterclockwise to lock.

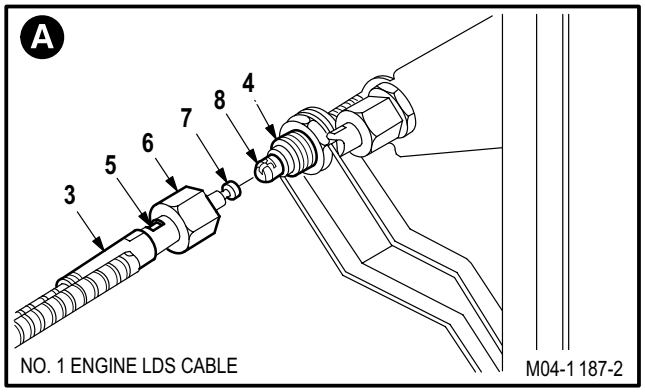
c. **Remove external power - hydraulic (primary)** (para 1.72)**.**




d. **On No. 1 engine, remove engine load demand spindle forward cable (3) from aft cable (4).**

(1) Hold cable (3) at flats (5). Remove coupling nut (6).

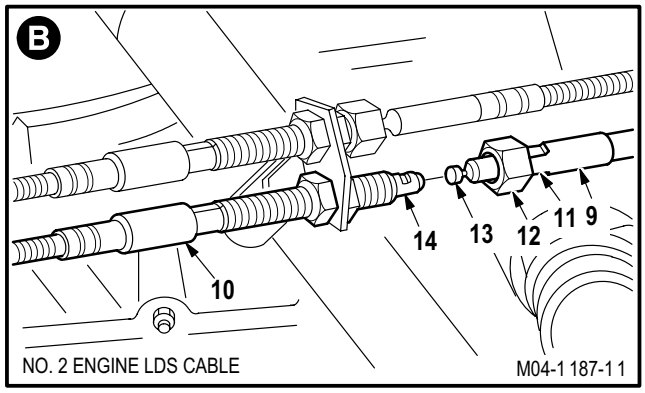
(2) Remove fitting (7) from fitting (8).




e. **On No. 2 engine, remove engine load demand spindle aft cable (9) from forward cable (10).**

(1) Hold cable (9) at flats (11). Remove coupling nut (12).

(2) Remove fitting (13) from fitting (14).

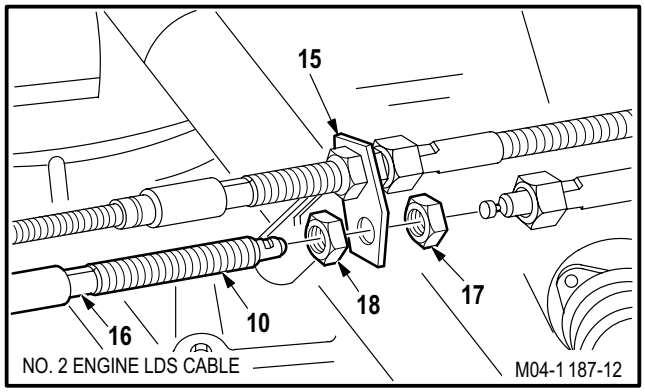



f. **On No. 2 engine, remove cable (10) from support bracket (15).**

(1) Hold cable (10) at flats (16). Remove nut (17) from cable (10).

(2) Remove cable (10) from bracket (15).

(3) Remove nut (18) from cable (10).

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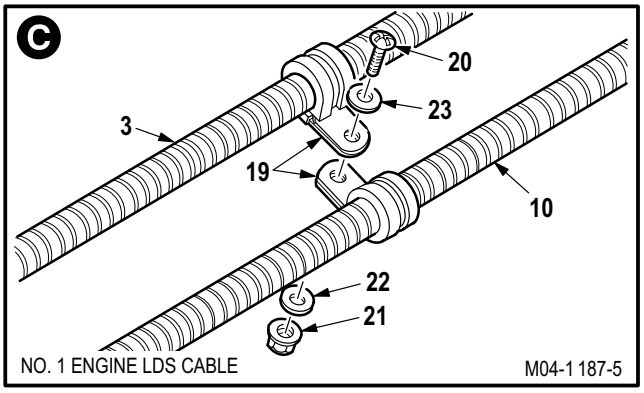
**4.149. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE REMOVAL - continued**

g. **On No. 1 and No. 2 engine, remove two clamps (19) from cable (3) and cable (10).**

(1) Hold screw (20). Remove nut (21) and washer (22).

(2) Remove screw (20) and washer (23).

(3) Remove clamps (19) from cables (3) and (10).

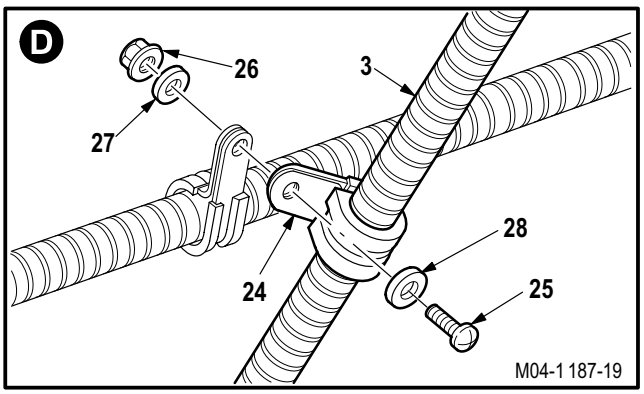



h. **On No. 1 engine, remove clamp (24) from cable (3).**

(1) Hold screw (25). Remove nut (26) and washer (27).

(2) Remove screw (25) and washer (28).

(3) Remove clamp (24) from cable (3).

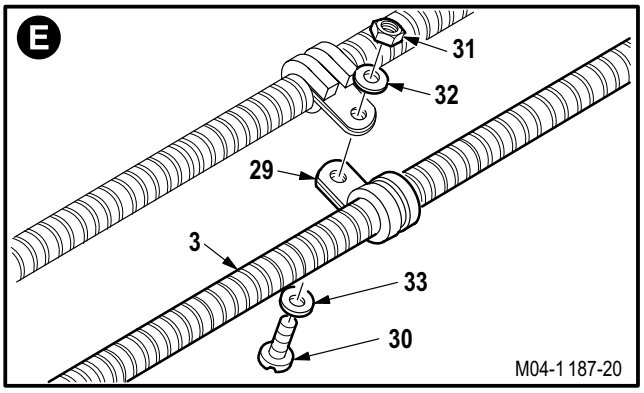



i. **On No. 1 engine, remove clamp (29) from cable (3).**

(1) Hold screw (30). Remove nut (31) and washer (32).

(2) Remove screw (30) and washer (33).

(3) Remove clamp (29) from cable (3).

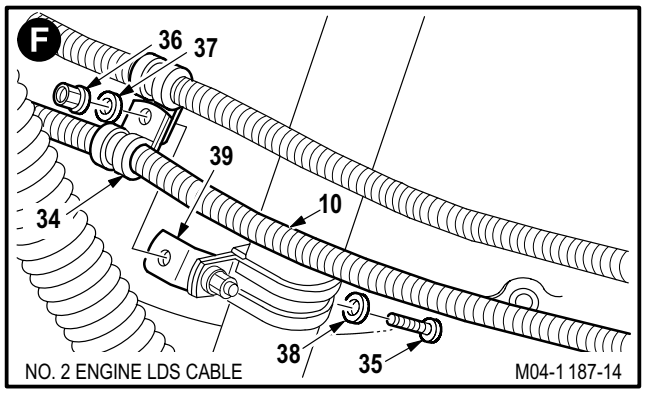



j. **On No. 2 engine, remove clamp (34) from cable (10).**

(1) Hold screw (35). Remove nut (36) and washer (37).

(2) Remove screw (35) and washer (38) from clamp (34) and bracket (39).

(3) Remove clamp (34) from cable (10).

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## 4.149. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE REMOVAL - continued

k. **Remove rod end (40) from bellcrank (41).**

(1) Remove and discard cotter pin (42).

(2) Hold bolt (43). Remove nut (44).

(3) Remove bolt (43) from bellcrank (41) and rod end (40).

l. **Remove rod end (40) from cable (3) (No. 1 engine) or cable (10) (No. 2 engine).**

(1) Hold rod end (40). Loosen nut (45).

(2) Remove rod end (40) and nut (45) from cable (3) or (10).

m. **Remove cable (3) (No. 1 engine) or cable (10) (No. 2 engine) from cable support (46).**

(1) Hold cable (3) or (10) at flats (47). Remove nut (48) and spacer (49).

(2) Pull cable (3) or (10) outboard until free of support (46).

(3) Remove spacer (50) and nut (51).

(4) Remove cable (3) or (10).

4.149.4. Cleaning

a. **Clean rod end, cable support, and support bracket** (para 1.47)**.**

4.149.5. Inspection

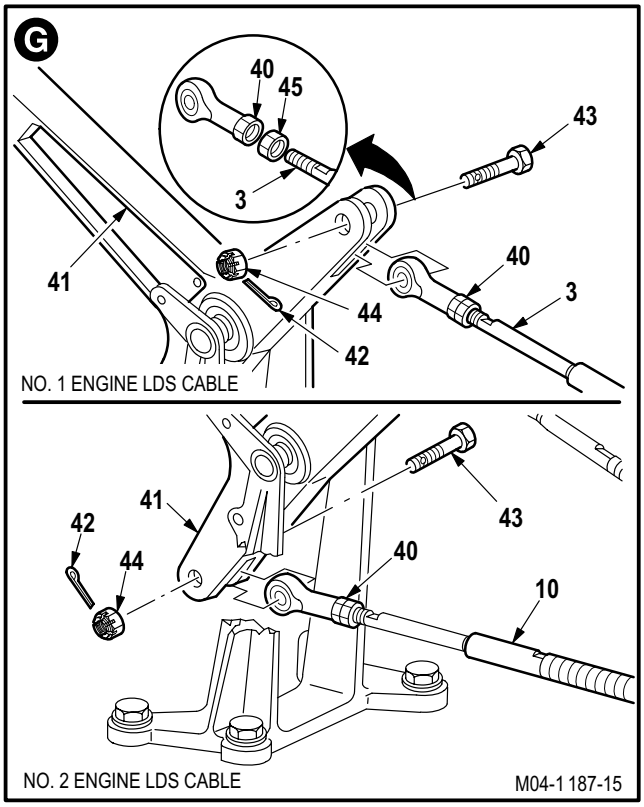
a. **Check rod end for thread damage and bearing surface scars.** None allowed.

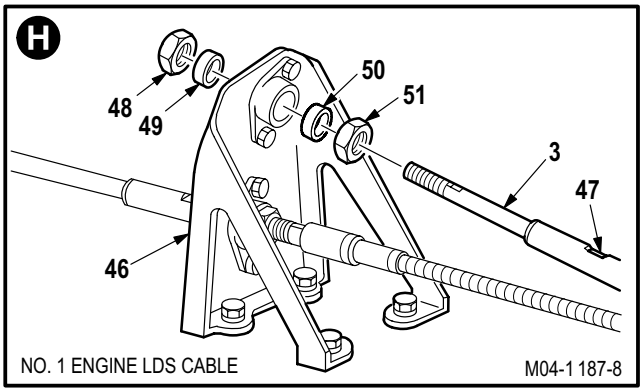
b. **Check cable support and support bracket for cracks.** None allowed.

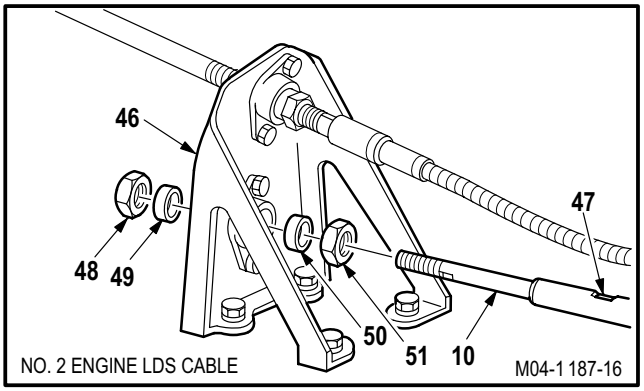
c. **Check cable for kinks, dents, and chaffing.** None allowed.

d. **Check rod end, cable support, and support bracket for corrosion** (para 1.49)**.**

END OF TASK



## 4.150. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE INSTALLATION

4.150.1. Description

This task covers: Installation. Adjustment.

4.150.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
3/8 x 1/4-inch drive socket wrench adapter (item 7, App H)
Light duty laboratory apron (item 27, App H)
7/8 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 86, App H)
Chemical protective gloves (item 154, App H)
Industrial goggles (item 156, App H)
Rigging pin set (item 224, App H) (p/o item 390, App H)
0.0 - 10.0-pound weighing scale (item 272, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

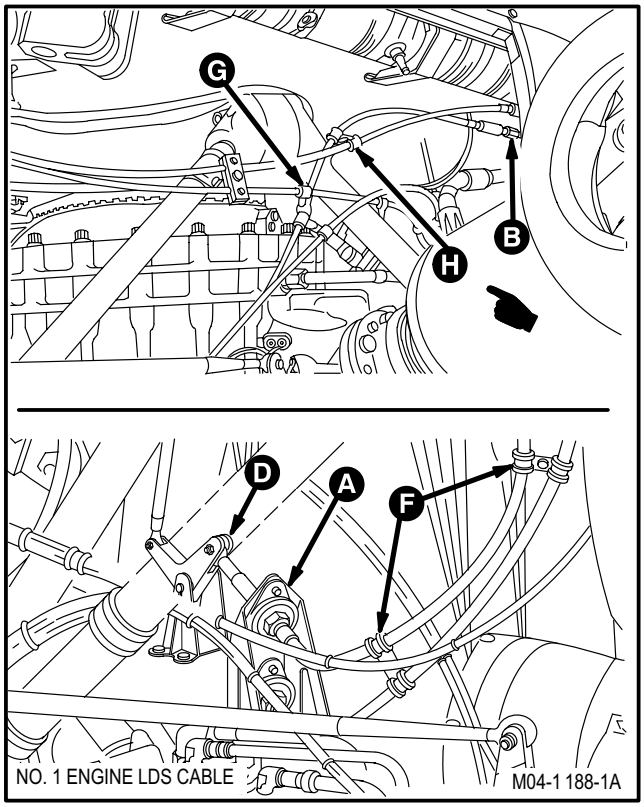
Cotter pin (3)
Seal (1)
Sealing compound (item 166, App F)
Silicone compound (item 186, App F)

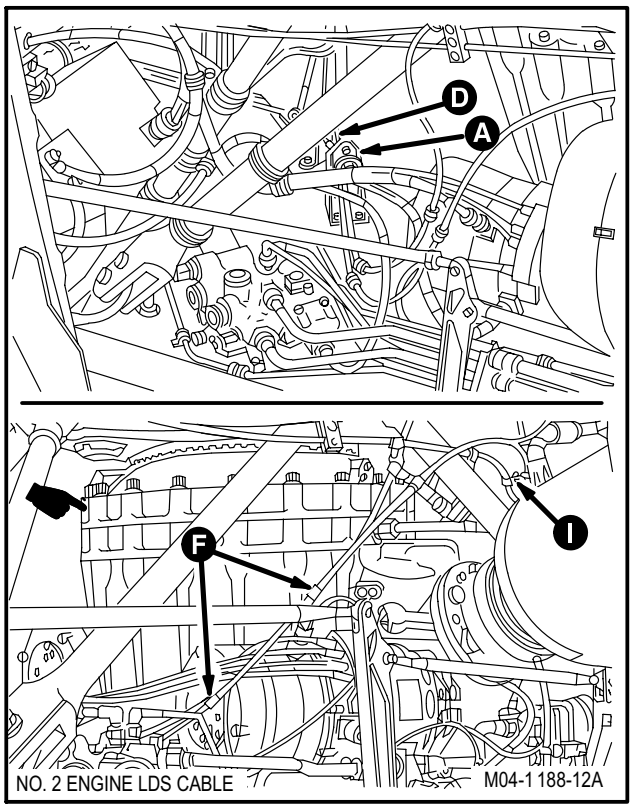
**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

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## 4.150. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE INSTALLATION - continued

**NOTE**

- This task is typical for No. 1 or No. 2engine load demand spindle forward cable, except as noted.
- The engine load demand spindle (LDS) cables cannot be intermixed with cables manufactured by different vendors. Cables that have a metallic exterior (Controlex) cannot be intermixed with cables that have a black tubing exterior (Cablecraft). Cable must be replaced with same exact part number. If exact part is not available, all No. 1 and No. 2 engine LDS cables (four cables) must be replaced with new cables (Cablecraft).

4.150.3. Installation

**NOTE**

Friction load check is not required when installing cables with black tubing exterior (Cablecraft) and rod end seal. If installing cables having rod end seal, go to step g.

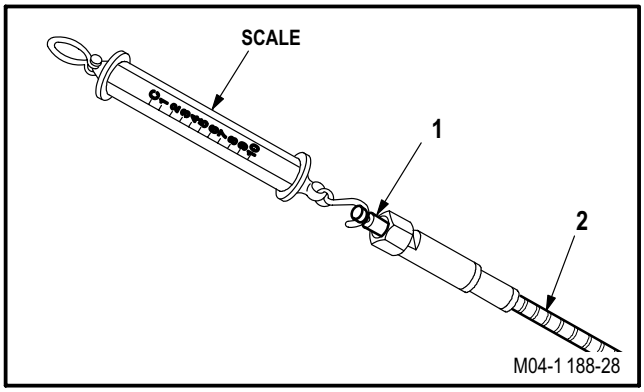
a. **Check cable ribbon (1) friction load.**

(1) Place engine load demand spindle forward cable (2) on flat surface. Ensure cable (2) is not bent or twisted.

(2) Slide ribbon (1) **2.50 INCHES** in and out of cable (2). There should be no binding, stiffness, or jamming.

(3) Check friction load of ribbon (1). Load not to exceed **1.5 POUNDS**. Use scale.

(4) If ribbon movement is rough or friction load exceeds **1.5 POUNDS**, replace cable.

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## 4.150. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE INSTALLATION - continued

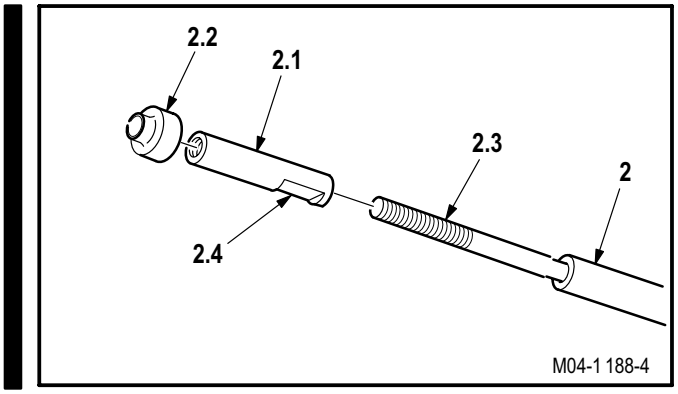
**NOTE**

If installing cable that appears to have water intrusion or seal damage, proceed to step b to dry cable. If installing new cable with zero flight hours or serviceable cable, drying cable is not required; proceed to step f.

b. **Remove support tube (2.1) from cable (2).**

(1) Place cable (2) on clean flat surface.

(2) Remove support tube (2.1) and seal (2.2) (if installed) from cable (2). Use wrench flats (2.4).




c. **Remove all moisture from cable.**

(1) Suspend cable with sliding rod (2.3) end downward.

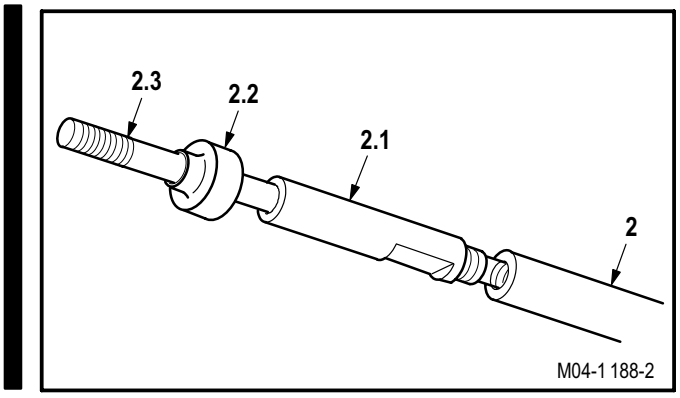
(2) Cycle cable until all water droplets are gone.

(3) Heat cable to **220**° ±**5** °**F** for **3 HOURS** to ensure all moisture is removed.

d. **Clean cable sliding rod (2.3) end and support tube (2.1).**

(1) Extend cable sliding rod (2.3) to full travel.

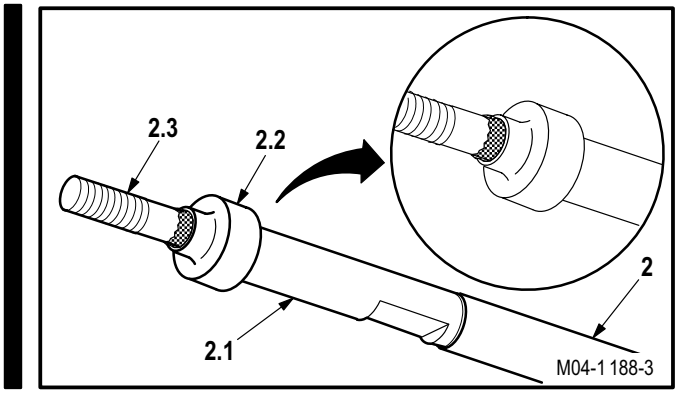
(2) Clean cable sliding rod (2.3) and support tube (2.1). Use clean rag.




e. **Install support tube (2.1).** Torque to **100 INCH-POUNDS**.

(1) Install support tube (2.1) on cable (2). Apply sealing compound (item 166, App F) on support tube (2.1) threads. Torque to **100 INCH-POUNDS**. Use torque wrench.

(2) Install new seal (2.2) on support tube (2.1) until seal is fully seated against support tube (2.1).

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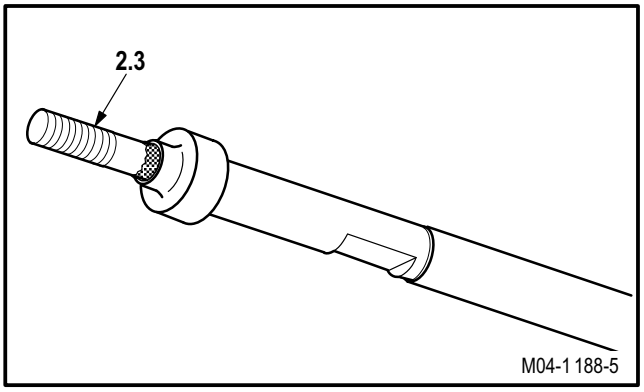
## 4.150. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE INSTALLATION - continued

**NOTE**

Do not apply silicone compound to support tube.

f. **Lubricate sliding rod (2.3) end at seal contact area.** Use silicone compound (item 186, App F).




g. **Install engine LDS forward cable (2) on support (3).**

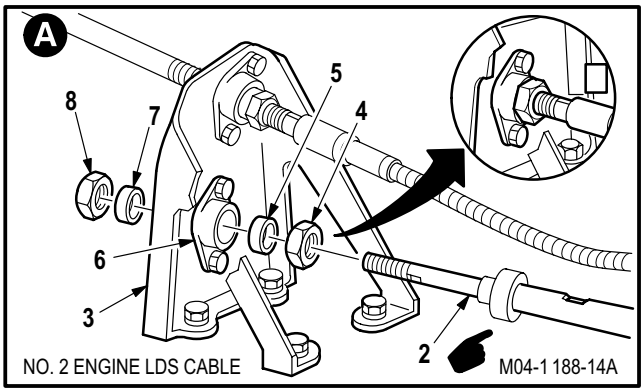
(1) Center nut (4) on threaded area of cable (2).

(2) Install spacer (5) on cable (2).

(3) Slide cable (2) through support bearing (6).

(4) Install spacer (7) on cable (2).

(5) Install nut (8) on cable (2) and tighten until spacer (7) contacts bearing (6).

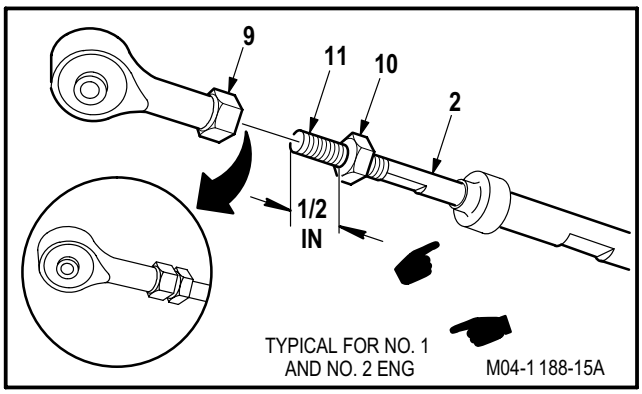



h. **Install rod end (9) on cable (2).** Torque nut (10) to **20 INCH-POUNDS**.

(1) Install nut (10) on cable (2) so **0.50 INCH** of threaded cable end is exposed.

(2) Install rod end (9) **0.50 INCH** on cable threads (11).

(3) Hold rod end (9). Torque nut (10) to **20 INCH-POUNDS**. Use torque wrench, crowfoot, and adapter.

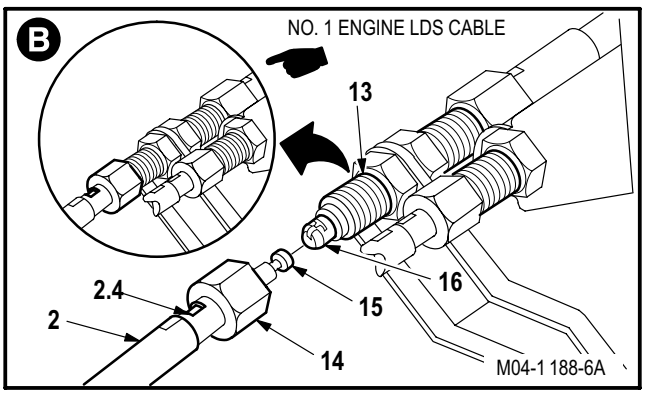



i. **On No. 1 engine, install cable (2) on aft cable (13).** Torque coupling nut (14) to **70 INCH-POUNDS**.

(1) Install fitting (15) on fitting (16).

(2) Install coupling nut (14) on cable (13).

(3) Hold cable (2) at flats (2.4). Torque nut (14) to **70 INCH-POUNDS**. Use torque wrench, crowfoot, and adapter.

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**4.150. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE INSTALLATION - continued**

j. **On No. 2 engine, install cable (2) on support bracket (18).** Torque coupling nut (19) to **70 INCH-POUNDS** and nuts (20) and (21) to **90 INCH-POUNDS**.

(1) Install nut (20) on cable (2).

(2) Install cable (2) through bracket (18).

(3) Install nut (21) three turns on cable (2).

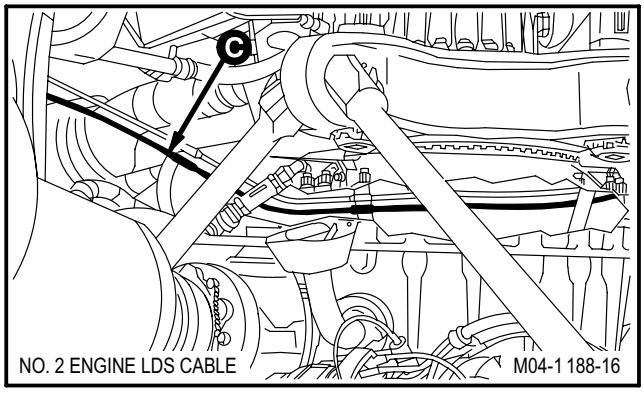
(4) Adjust nuts (20) and (21) to aline fitting (15) with fitting (16).

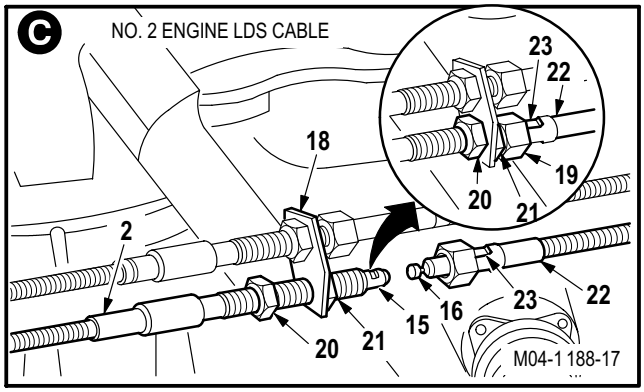
(5) Install fitting (16) on fitting (15).

(6) Install coupling nut (19) on cable (2).

(7) Torque nuts (20) and (21) to **90 INCH-POUNDS**. Use torque wrench, crowfoot, and adapter.

(8) Hold aft cable (22) at flats (23). Torque coupling nut (19) to **70 INCH-POUNDS**. Use torque wrench, crowfoot, and adapter.



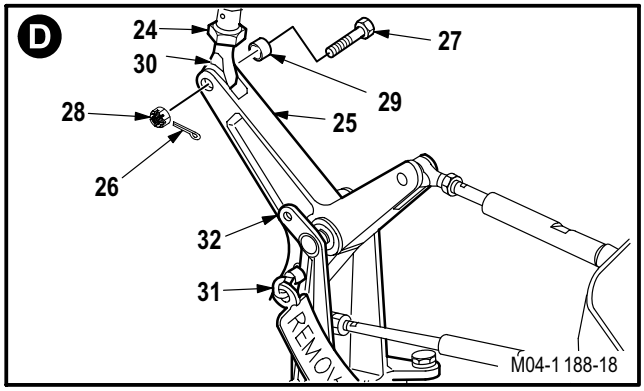

k. **Inspect (QA).**

l. **Remove rod (24) from bellcrank (25).**

(1) Remove and discard cotter pin (26).

(2) Hold bolt (27). Remove nut (28).

(3) Remove bolt (27) and bushing (29) from bellcrank (25) and rod end (30).




m. **Install -5 rigging pin (31).**

(1) Aline lower hole in bellcrank (25) with lower hole in bracket (32).

(2) Install -5 rig pin in bracket (32) and bellcrank (25).

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## 4.150. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE INSTALLATION - continued

4.150.4. Adjustment

a. **Adjust No. 1 engine load demand spindle cable (2) travel length.**

(1) Aline rod end (9) to bellcrank (25) and install bolt (33).

(2) Obtain travel length of **2.39 INCHES** between center of bolt (33) and shoulder of cable (2), by adjusting nuts (4) and (8) at cable support (3).

(3) Remove bolt (33).

b. **Adjust No. 2 engine cable (2) travel length.**

(1) Aline rod end (9) to bellcrank (25) and install bolt (33).

(2) Obtain travel length of **4.23 INCHES** between center of bolt (33) and shoulder of cable (2), by adjusting nuts (4) and (8) at cable support (3).

(3) Remove bolt (33).

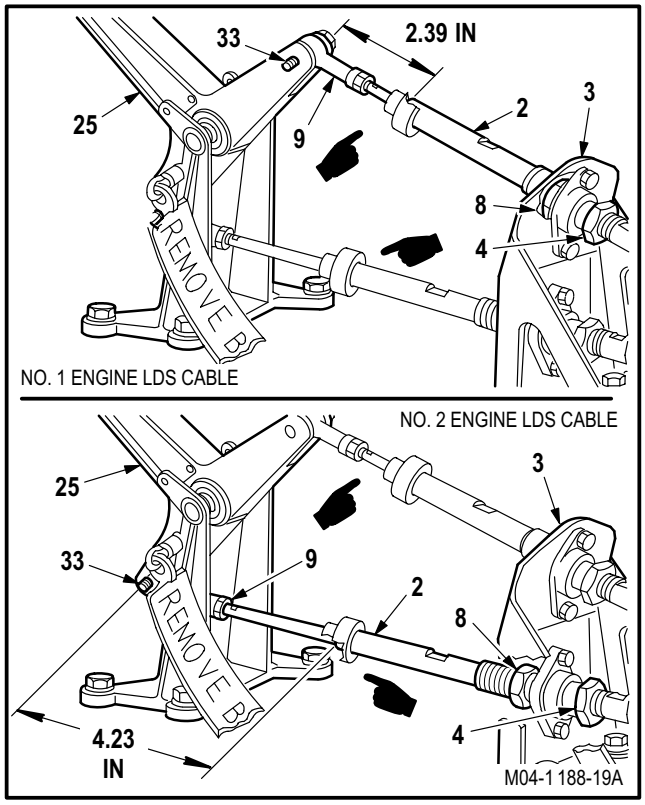
c. **Set LDS gearbox (34) in ZERO DEGREE position and install rigging pin (35).**

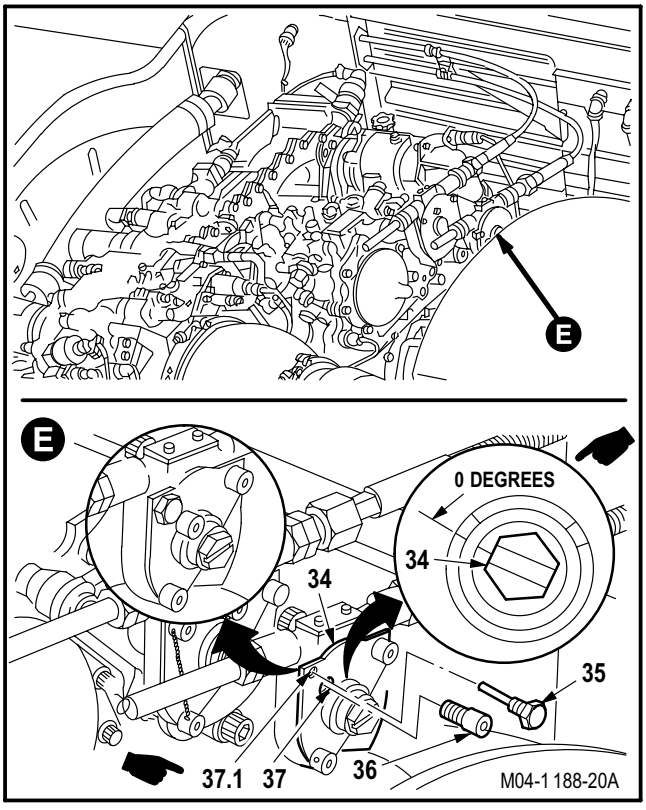
(1) Remove lockwire from spindle cover cap screws.

(2) Remove rigging pin (35) from rigging pin set.

(3) Remove cap screw (36). Install in rigging pin stowage hole (37.1).

(4) Rotate gearbox (34) to **ZERO DEGREES** position. Install rigging pin (35) in hole (37).

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## 4.150. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE INSTALLATION - continued

d. **Install rod end (9) on bellcrank (25).** Torque nut (38) **14 to 18 INCH-POUNDS**.

(1) Aline rod end (9) with bellcrank (25) by adjusting nuts (4) and (8) at cable support (3).

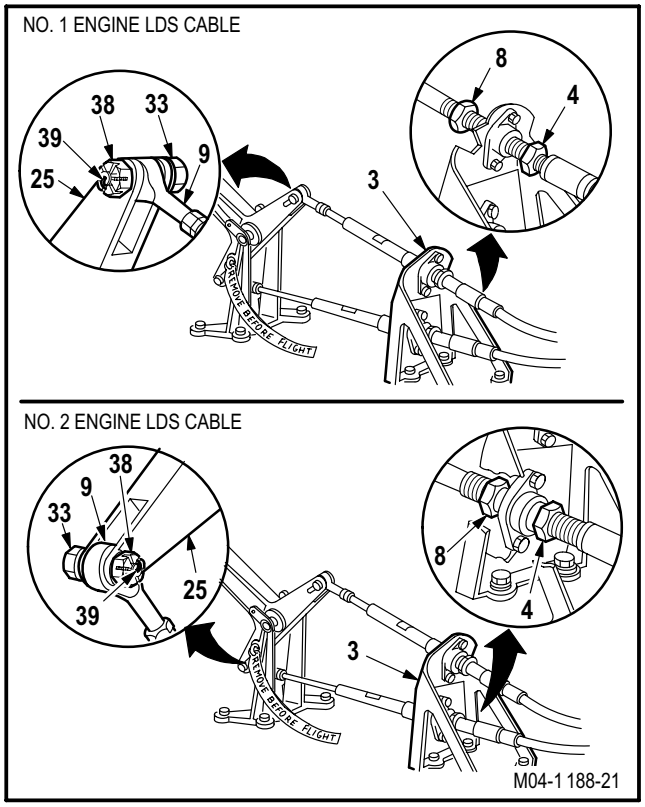
(2) Install bolt (33) thru bellcrank (25) and rod end (9).

(3) Hold bolt (33). Install nut (38). Torque nut (38) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (39).

e. **Torque nuts (4) and (8) to 90 INCH-POUNDS.** Use torque wrench, crowfoot and adapter.




f. **Check operation of cable (2).**

(1) Remove -5 rigging pin (31) from bellcrank (25) and bracket (32).

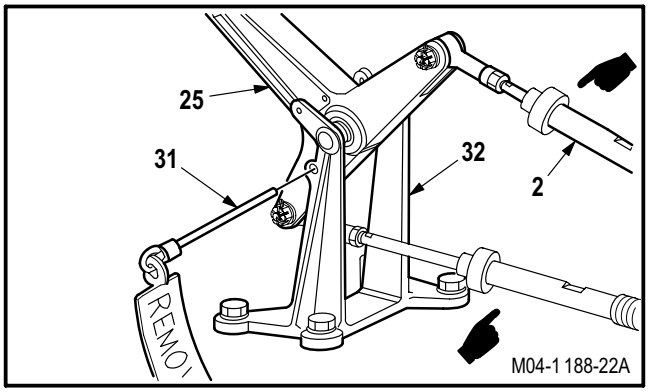
(2) Remove cap screw (36) from gearbox rigging pin stowage hole (37.1).

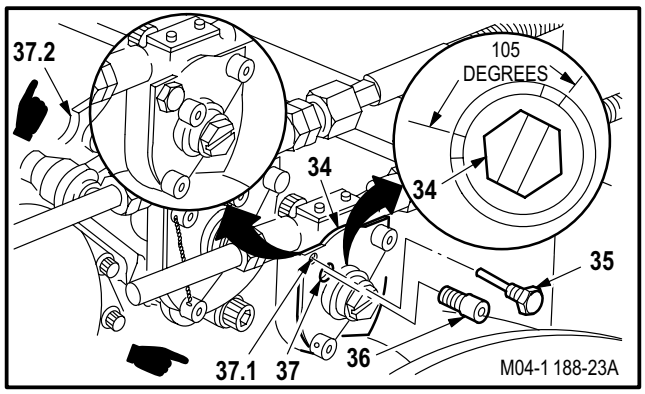
(3) Remove rigging pin (35) from gearbox (34) and install in stowage hole (37.1).

(4) Install cap screw (36) into hole (37).

(5) Rotate bellcrank (25) several times through complete cycles to ensure smooth operation.

(6) When gearbox (34) is at **105 DEGREE** stop, rotate bellcrank (25) counterclockwise to verify hydromechanical unit (HMU) (37.2) opens fully.

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## 4.150. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE INSTALLATION - continued

g. **Install rod (24) on bellcrank (25).** Torque nut (28) **14 to 18 INCH-POUNDS**.

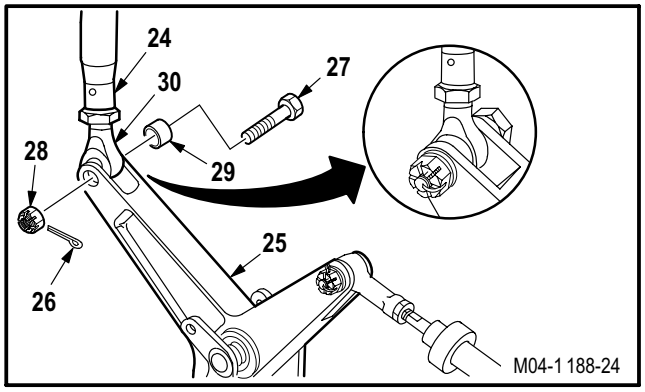
(1) Aline rod end (30) to bellcrank (25).

(2) Install bolt (27) through bushing (29), bellcrank (25) and rod end (30).

(3) Hold bolt (27). Install nut (28). Torque nut (28) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (26).

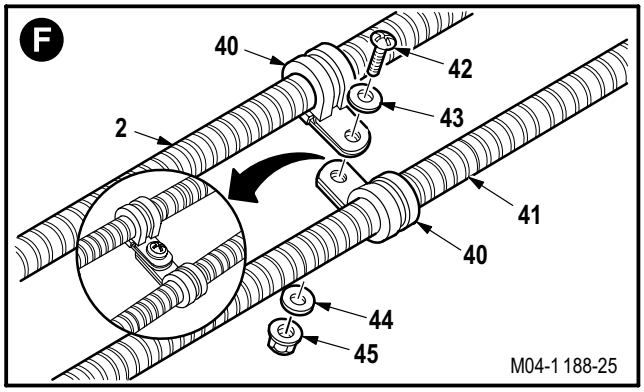



h. **On No. 1 and No. 2 engine install two clamps (40) on cables (2) and (41).**

(1) Position clamps (40) on cable (2) and cable (41).

(2) Install screw (42) through washer (43) and two clamps (40).

(3) Hold screw (42). Install washer (44) and nut (45).

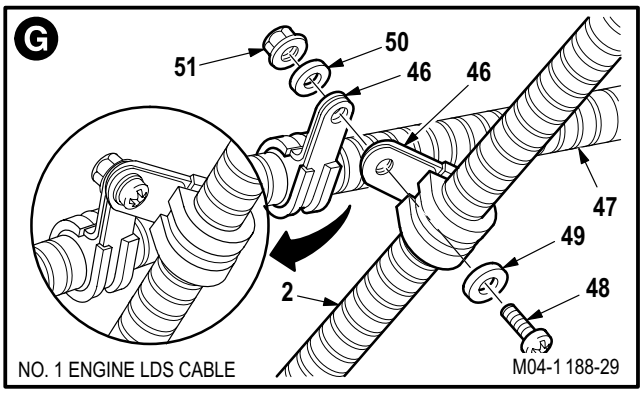



i. **On No. 1 engine, install two clamps (46) on cables (2) and (47).**

(1) Position clamps (46) on cables (2) and (47).

(2) Install screw (48) through washer (49) and two clamps (46).

(3) Hold screw (48). Install washer (50) and nut (51).

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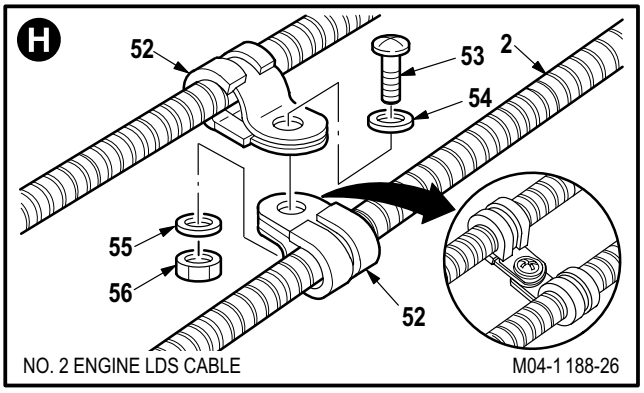
**4.150. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE FORWARD CABLE INSTALLATION - continued**

j. **On No. 1 engine, install clamp (52) on cable (2).**

(1) Position clamps (52) on cable (2).

(2) Install screw (53) through washer (54) and two clamps (52).

(3) Hold screw (53). Install washer (55) and nut (56).

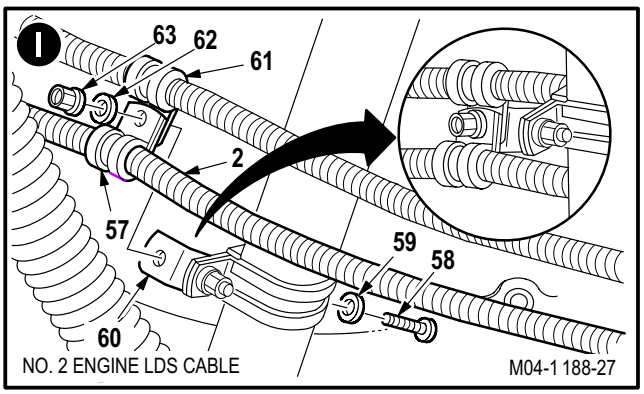



k. **On No. 2 engine, install clamp (57) on cable (2).**

(1) Position clamp (57) on cable (2).

(2) Install screw (58) through washer (59), bracket (60), and clamps (61) and (57).

(3) Hold screw (58). Install washer (62) and nut (63).




l. **Inspect (QA).**

m. **Perform No. 1 or No. 2 load demand spindle rigging check** (para 4.184)**.**

n. **Install access panel L200 for No. 1 engine; secure access panel R200 and doors RN1, T250L, T250R, T290L, T290R, and L325 for No. 2 engine** (para 2.2)**.**

END OF TASK

## 4.151. COLLECTIVE SERVOCYLINDER ENGINE CONTROL ROD REMOVAL/INSTALLATION

4.151.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.151.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

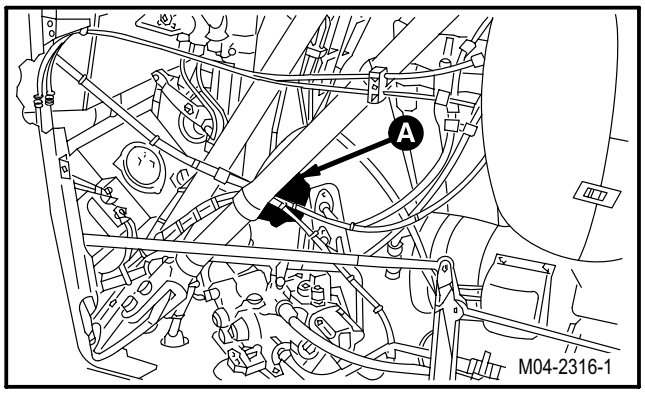
TM 1-1520-238-T

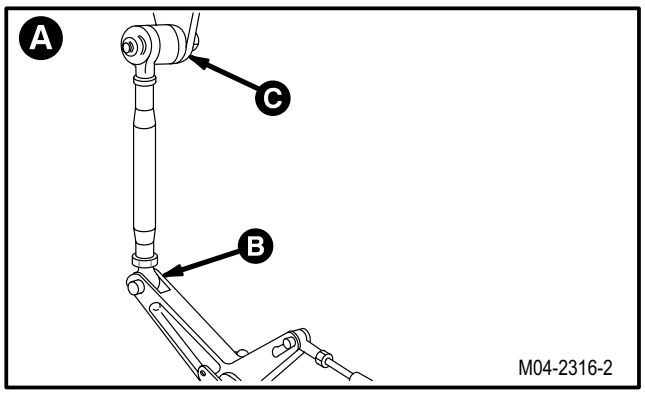
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access panel L200 removed |

**Materials/Parts:**

Cotter pin (2)

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## 4.151. COLLECTIVE SERVOCYLINDER ENGINE CONTROL ROD REMOVAL/INSTALLATION - continued

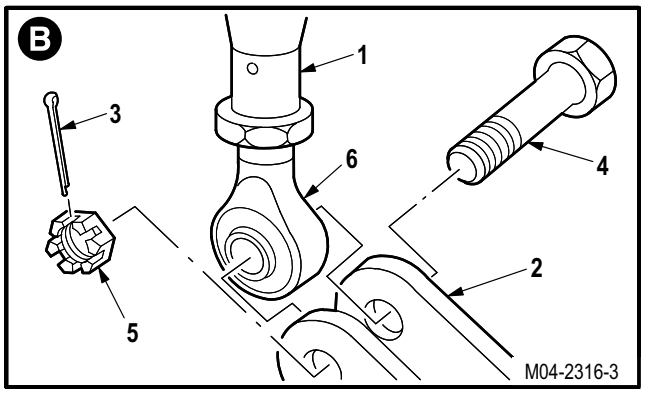
4.151.3. Removal

a. **Remove collective servocylinder engine control rod (1) from bellcrank (2).**

(1) Remove and discard cotter pin (3).

(2) Hold bolt (4). Remove nut (5).

(3) Remove bolt (4) from bellcrank (2) and rod end (6).



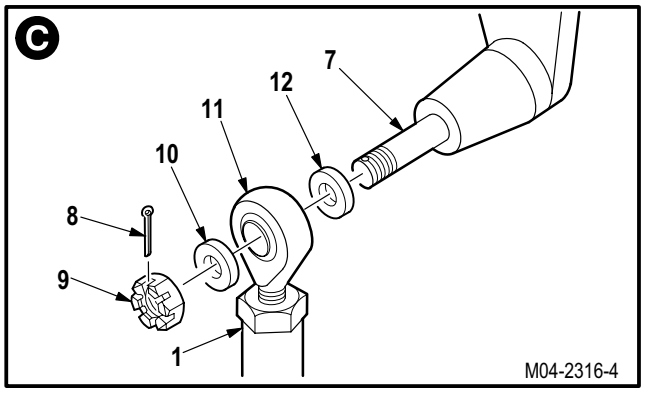

b. **Remove rod (1) from collective servocylinder adapter (7).**

(1) Remove and discard cotter pin (8).

(2) Remove nut (9) and washer (10).

(3) Remove rod end (11) from adapter (7).

(4) Remove washer (12).




4.151.4. Cleaning

a. **Clean bellcrank and adapter** (para 1.47)**.**

4.151.5. Inspection

a. **Check bellcrank and adapter for cracks.** None allowed.

b. **Check adapter for damaged threads.** None allowed.

c. **Check bellcrank and adapter for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

## 4.151. COLLECTIVE SERVOCYLINDER ENGINE CONTROL ROD REMOVAL/INSTALLATION - continued

4.151.6. Installation

a. **Install rod (1) on adapter (7).** Torque nut (9) **14 to 18 INCH-POUNDS**.

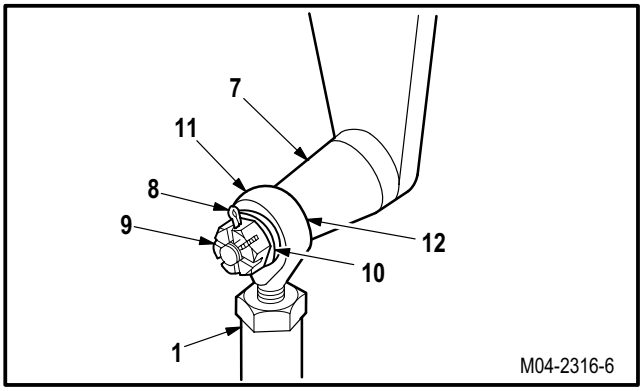
(1) Install washer (12) on adapter (7).

(2) Slide rod end (11) on adapter (7).

(3) Install washer (10) and nut (9) on adapter (7). Torque nut (9) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (8).




b. **Install servocylinder (1) on bellcrank (2).** Torque nut (5) **14 to 18 INCH-POUNDS**.

(1) Hold open end of bellcrank (2) full down.

(2) Aline rod end (6) to bellcrank (2).

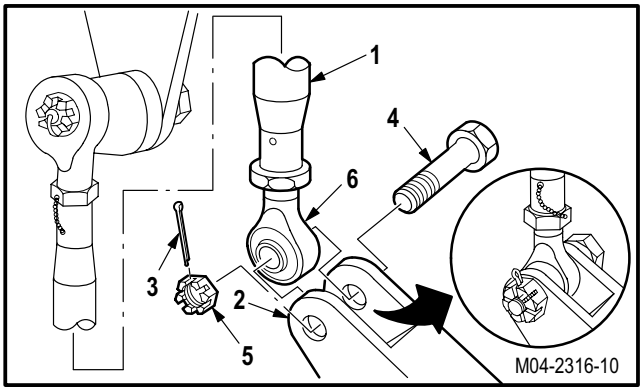
(3) Install bolt (4) through bellcrank (2) and rod end (6).

(4) Check fit of self-retaining bolt (4) (para 11.1).

(5) Install nut (5) on bolt (4). Torque nut (5) to **14 INCH-POUNDS**. Use torque wrench.

(6) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(7) Install new cotter pin (3).

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**4.151. COLLECTIVE SERVOCYLINDER ENGINE CONTROL ROD REMOVAL/INSTALLATION - continued**

c. **Inspect (QA).**

d. **Perform load demand spindle rigging check** (para 4.184)**.**

e. **Perform power plants maintenance operational check (engine 1 and engine 2)** (TM 1-1520-238-T)**.**

f. **Secure access panel L200** (para 2.2)**.**

END OF TASK

## 4.152. COLLECTIVE SERVOCYLINDER ENGINE CONTROL ROD DISASSEMBLY/ASSEMBLY

4.152.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly.

4.152.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.151 | Collective servocylinder engine control rod removed |

4.152.3. Disassembly

a. **Remove rod end (1) from collective servocylinder engine control rod (2).**

(1) Remove lockwire from jamnut (3).

(2) Hold control rod (2). Loosen jamnut (3).

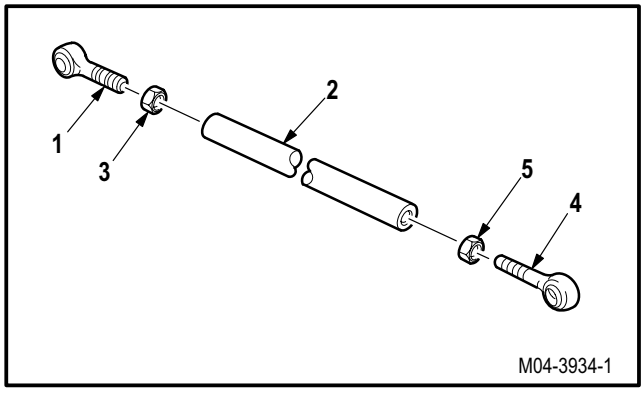
(3) Remove rod end (1).

b. **Remove rod end (4) from control rod (2).**

(1) Remove lockwire from jamnut (5).

(2) Hold control rod (2). Loosen jamnut (5).

(3) Remove rod end (4).




4.152.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.152.5. Inspection

a. **Check rod for cracks or damaged threads.** None allowed.

b. **Check rod ends for damaged threads.** None allowed.

GO TO NEXT PAGE

## 4.152. COLLECTIVE SERVOCYLINDER ENGINE CONTROL ROD DISASSEMBLY/ASSEMBLY - continued

4.152.6. Assembly

**NOTE**

Nuts should be finger tight only. Final adjustment and torquing of rod ends and lockwire will be performed during rigging.

a. **Install rod end (4) on control rod (2).**

(1) Install jamnut (5) on rod end (4).

(2) Install rod end (4) **0.50 INCHES** in control rod (2).

b. **Install rod end (1) on control rod (2).**

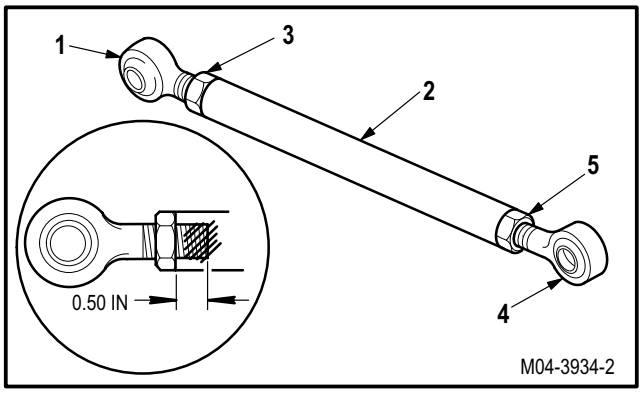
(1) Install jamnut (3) on rod end (1).

(2) Install rod end (1) **0.50 INCHES** in control rod (2).

c. **Inspect (QA).**

d. **Install collective servocylinder engine control rod** (para 4.151)**.**

e. **Perform No. 1 and No. 2 engine load demand spindle rigging** (para 4.185)**.**




END OF TASK

## 4.153. COLLECTIVE SERVOCYLINDER ENGINE CONTROL ROD ADAPTER REMOVAL/INSTALLATION

4.153.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.153.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.151 | Collective servocylinder engine control rod removed |

**Materials/Parts:**

Cotter pin

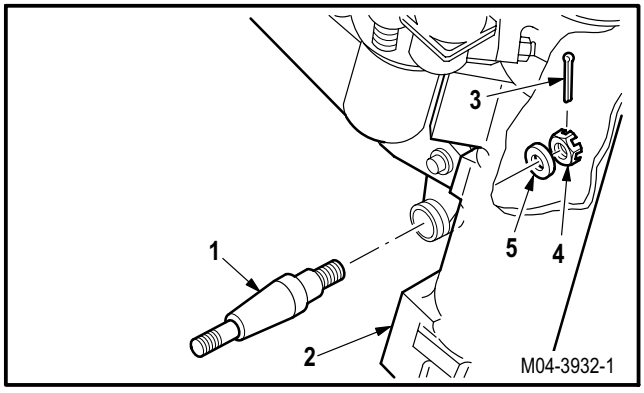
4.153.3. Removal

a. **Remove control rod adapter (1) from collective servocylinder (2).**

(1) Remove and discard cotter pin (3) from nut (4).

(2) Remove nut (4) and washer (5) from adapter (1).

(3) Remove adapter (1).




4.153.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.153.5. Inspection

a. **Check servocylinder and adapter for cracks.** None allowed.

b. **Check adapter for damaged threads.** None allowed.

c. **Check servocylinder and adapter for corrosion** (para 1.49)**.**

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## 4.153. COLLECTIVE SERVOCYLINDER ENGINE CONTROL ROD ADAPTER REMOVAL/INSTALLATION - continued

4.153.6. Installation

a. **Install adapter (1) on servocylinder (2).** Torque nut (4) **30 to 40 INCH-POUNDS**.

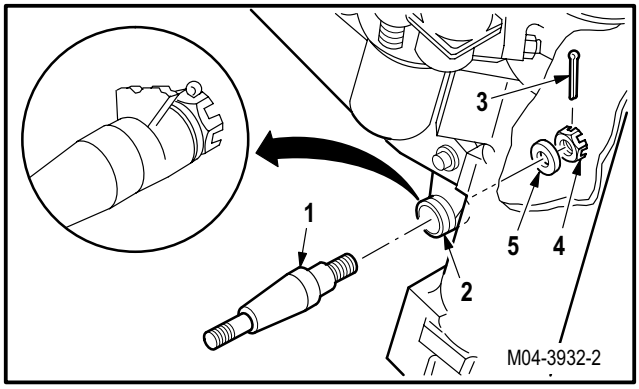
(1) Position adapter (1) on servocylinder (2).

(2) Install washer (5) and nut (4).

(3) Hold adapter (1). Torque nut (4) to **30 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **40 INCH-POUNDS**.

(5) Install new cotter pin (3).




b. **Inspect (QA).**

c. **Install collective servocylinder engine control rod** (para 4.151)**.**

END OF TASK

## 4.154. ENGINE LOAD DEMAND SPINDLE BELLCRANK REMOVAL/INSTALLATION

4.154.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.154.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

Cotter pin (4)

**Personnel Required:**

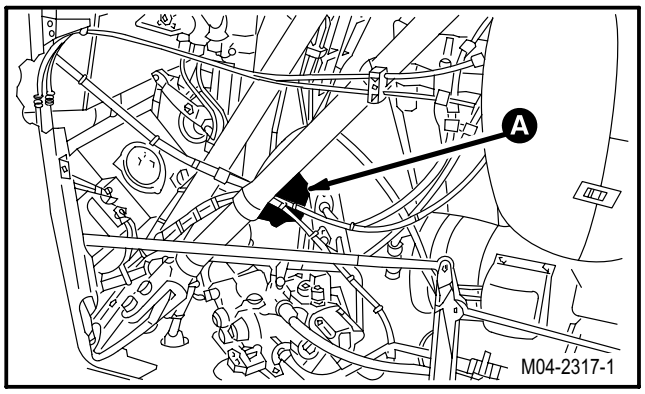
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

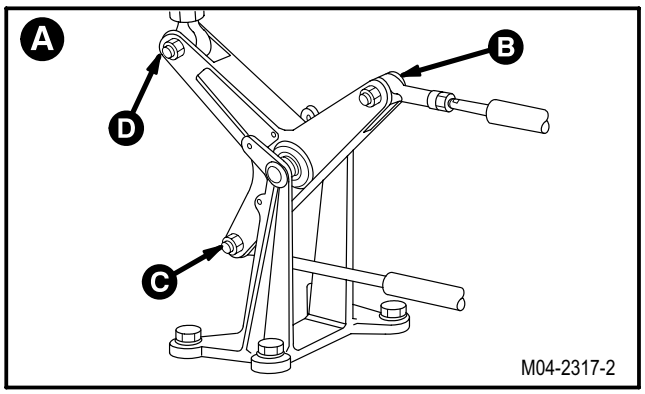
**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access panel L200 opened |

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## 4.154. ENGINE LOAD DEMAND SPINDLE BELLCRANK REMOVAL/INSTALLATION - continued

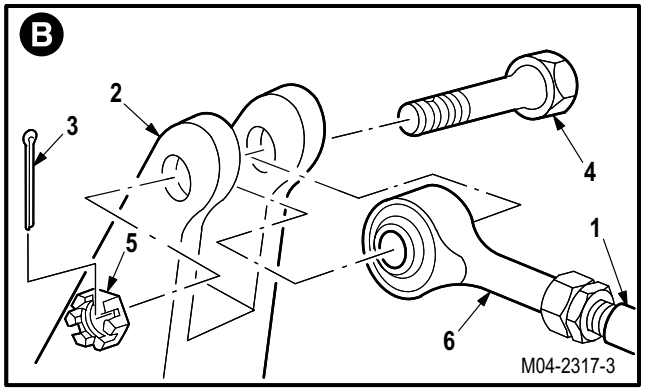
4.154.3. Removal

a. **Remove No. 1 engine load demand spindle (LDS) forward cable (1) from LDS bellcrank (2).**

(1) Remove and discard cotter pin (3).

(2) Hold bolt (4). Remove nut (5).

(3) Remove bolt (4) from bellcrank (2) and rod end (6).

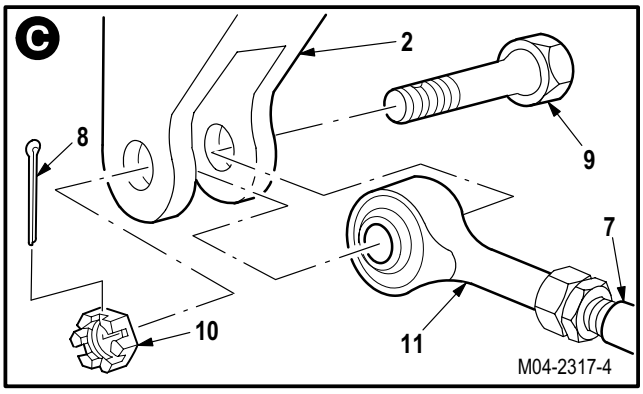



b. **Remove No. 2 engine LDS forward cable (7) from bellcrank (2).**

(1) Remove and discard cotter cotter pin (8).

(2) Hold bolt (9). Remove nut (10).

(3) Remove bolt (9) from bellcrank (2) and rod end (11).

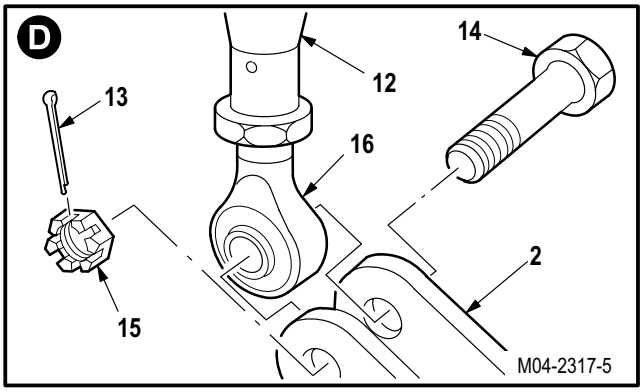



c. **Remove collective servocylinder engine control rod (12) from bellcrank (2).**

(1) Remove and discard cotter pin (13).

(2) Hold bolt (14). Remove nut (15).

(3) Remove bolt (14) from bellcrank (2) and rod end (16).

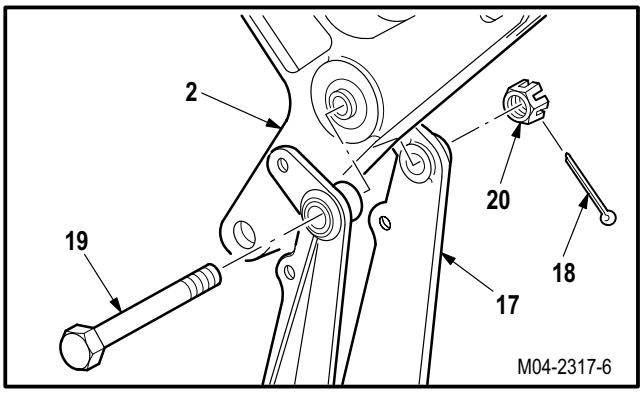



d. **Remove bellcrank (2) from support (17).**

(1) Remove and discard cotter pin (18).

(2) Hold bolt (19). Remove nut (20).

(3) Remove bolt (19) from support (17) and bellcrank (2).

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## 4.154. ENGINE LOAD DEMAND SPINDLE BELLCRANK REMOVAL/INSTALLATION - continued

4.154.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.154.5. Inspection

a. **Check removed and attaching parts for cracks.** None allowed.

b. **Check removed and attaching parts for corrosion** (para 1.49)**.**

4.154.6. Installation

a. **Install bellcrank (2) on support (17).** Torque nut (20) **65 to 80 INCH-POUNDS**.

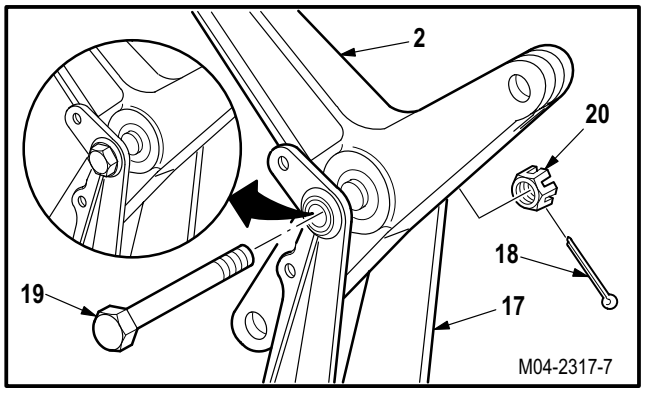
(1) Position bellcrank (2) in support (17).

(2) Install bolt (19) through support (17) and bellcrank (2).

(3) Install nut (20) on bolt (19). Torque nut (20) to **65 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **80 INCH-POUNDS**.

(5) Install new cotter pin (18).

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## 4.154. ENGINE LOAD DEMAND SPINDLE BELLCRANK REMOVAL/INSTALLATION - continued

b. **Install control rod (12) on bellcrank (2).** Torque nut (15) **14 to 18 INCH-POUNDS**.

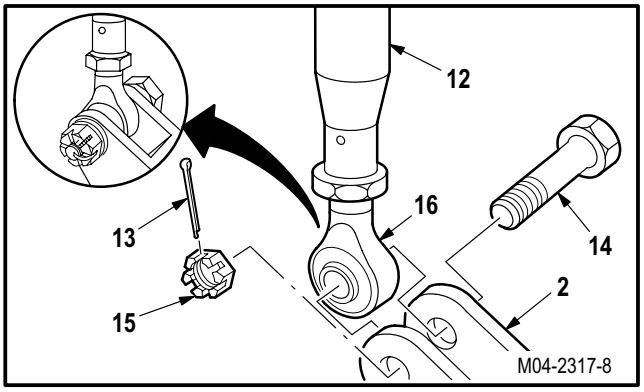
(1) Position rod end (16) in bellcrank (2).

(2) Install bolt (14) through bellcrank (2) and rod end (16).

(3) Install nut (15) on bolt (14). Torque nut (15) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (13).




c. **Install cable (7) on bellcrank (2).** Torque nut (10) **14 to 18 INCH-POUNDS**.

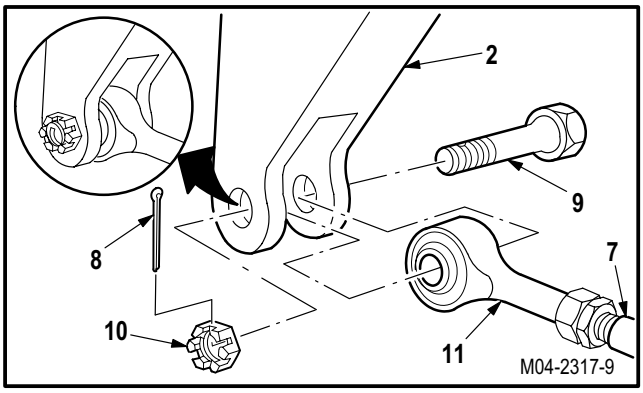
(1) Position rod end (11) in bellcrank (2).

(2) Install bolt (9) through bellcrank (2) and rod end (11).

(3) Install nut (10) on bolt (9). Torque nut (10) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (8).

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## 4.154. ENGINE LOAD DEMAND SPINDLE BELLCRANK REMOVAL/INSTALLATION - continued

d. **Install cable (1) on bellcrank (2).** Torque nut (5) **14 to 18 INCH-POUNDS**.

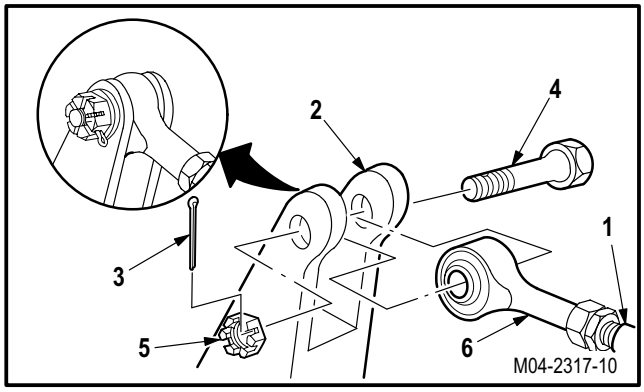
(1) Aline rod end (6) on bellcrank (2).

(2) Install bolt (4) through bellcrank (2) and rod end (6).

(3) Install nut (5) on bolt (4). Torque nut (5) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (3).




e. **Inspect (QA).**

f. **Perform No. 1 and No. 2 engine load demand spindle rigging check** (para 4.184)**.**

g. **Perform power plants maintenance operational check (engine 1 and engine 2)** (TM 1-1520-238-T)**.**

h. **Secure access panel L200** (para 2.2)**.**

END OF TASK

## 4.155. ENGINE LOAD DEMAND SPINDLE BELLCRANK REPAIR (AVIM)

4.155.1. Description

This task covers: Removal. Cleaning. Installation.

4.155.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Industrial goggles (item 156, App H)
10-ton hydraulic hand operated arbor press (item 236, App H)
Universal puller kit (item 241, App H)

**Materials/Parts:**

Primer coating (item 147, App F)
Sealing compound (item 166, App F)

**References:**

TM 55-1500-322-24

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

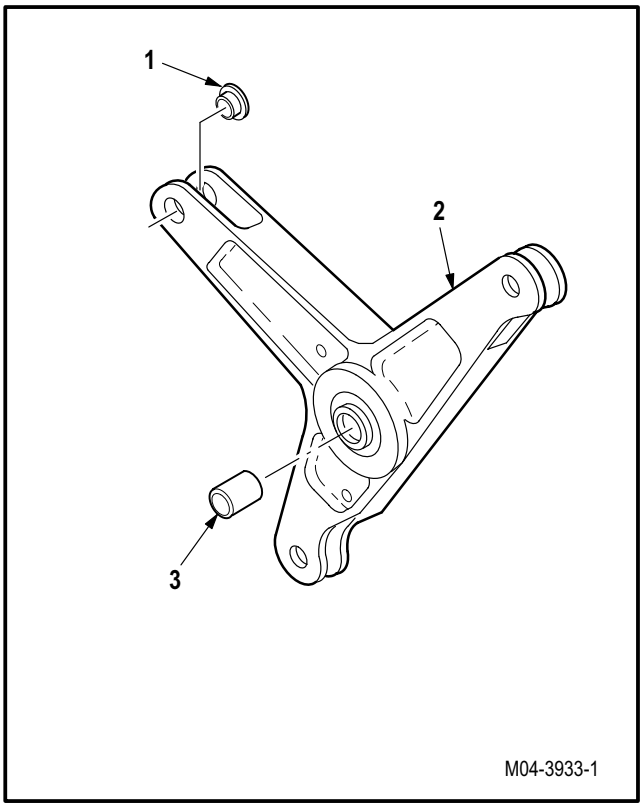
4.155.3. Removal

a. **Remove bushing (1) from bellcrank (2)** (TM 55-1500-322-24)**.** Use arbor press and puller kit.

b. **Remove bearing (3) from bellcrank (2)** (TM 55-1500-322-24)**.** Use arbor press and puller kit.

4.155.4. Cleaning

a. **Clean bellcrank bushing and bearing mounting holes** (para 1.47)**.**

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## 4.155. ENGINE LOAD DEMAND SPINDLE BELLCRANK REPAIR (AVIM) - continued

4.155.5. Inspection

a. **Check bellcrank bushing and bearing mounting holes for corrosion** (para 1.49)**.**

b. **Measure bushing mounting hole inner diameter.**

(1) If diameter exceeds **0.3778 INCH**, replace bellcrank.

c. **Measure bearing mounting hole inner diameter.**

(1) If diameter exceeds **0.8744 INCH**, replace bellcrank.

4.155.6. Installation

a. **Install bearing (3) in bellcrank (2)** (TM 55-1500-322-24)**.**

(1) Apply compound to bearing mounting hole (4). Use sealing compound (item 166, App F).

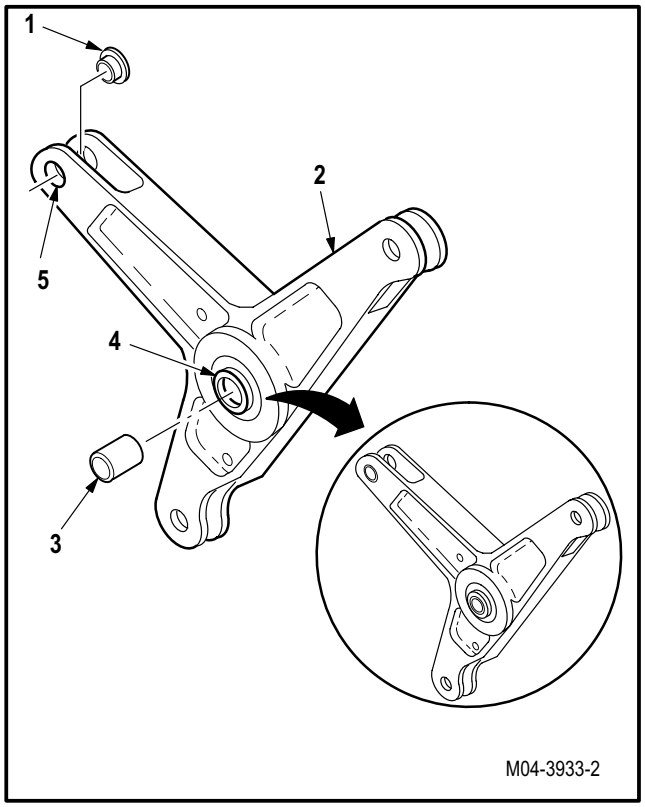
(2) Install bearing (3) in bellcrank (2). Use arbor press and puller kit.

b. **Install bushing (1) in bellcrank (2)** (TM 55-1500-322-24)**.**

(1) Apply primer bushing mounting hole (5). Use primer coating (item 147, App F).

(2) Install bushing (1) in bellcrank (2). Use arbor press and puller kit.

c. **Inspect (QA).**




END OF TASK

## 4.156. ENGINE LOAD DEMAND SPINDLE BELLCRANK SUPPORT REMOVAL/INSTALLATION

4.156.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.156.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**References:**

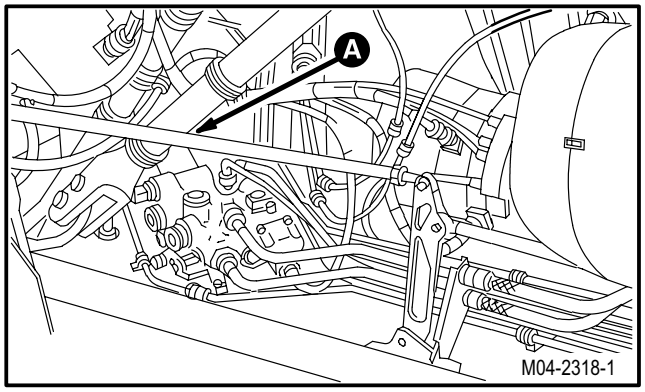
TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.154 | Engine load demand spindle bellcrank removed |

**Personnel Required:**

| | |
|---|---|
| 67R | Attack Helicopter Repairer |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

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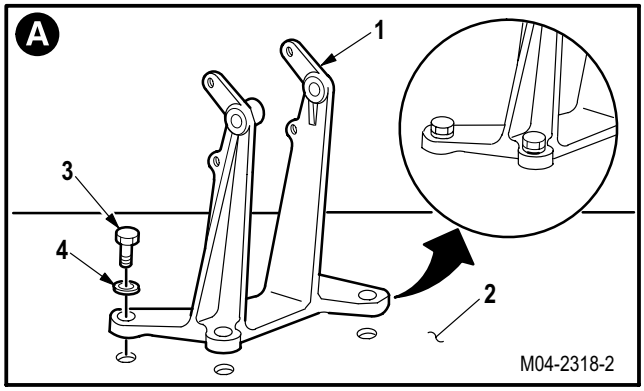
## 4.156. ENGINE LOAD DEMAND SPINDLE BELLCRANK SUPPORT REMOVAL/INSTALLATION - continued

4.156.3. Removal

a. **Remove support (1) from deck (2).**

(1) Remove four bolts (3) and washers (4) from support (1) and deck (2).

(2) Remove support (1).




4.156.4. Cleaning

a. **Clean support mounting area on deck** (para 1.47)**.**

4.156.5. Inspection

a. **Check support for cracks.** None allowed.

b. **Check support mounting area on deck for cracks.** None allowed.

c. **Check deck and support for corrosion** (para 1.49)**.**

4.156.6. Installation

a. **Install support (1) on deck (2).**

(1) Install four bolts (3) through washers (4) and support (1) into deck (2).

b. **Inspect (QA).**

c. **Install engine load demand spindle bellcrank** (para 4.154)**.**

END OF TASK

## 4.157. ENGINE LOAD DEMAND SPINDLE CABLE SUPPORT REMOVAL/INSTALLATION

4.157.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.157.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
7/8 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 86, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

Cotter pin (2)

**Personnel Required:**

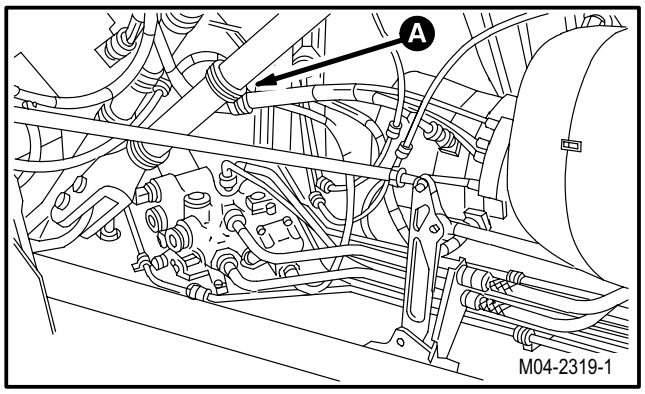
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

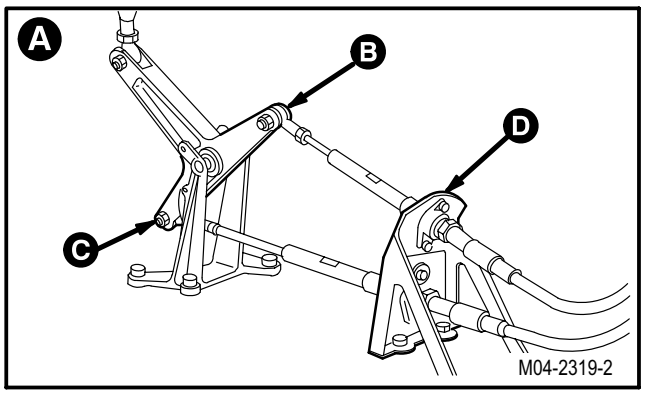
**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access panel L200 removed |

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## 4.157. ENGINE LOAD DEMAND SPINDLE CABLE SUPPORT REMOVAL/INSTALLATION - continued

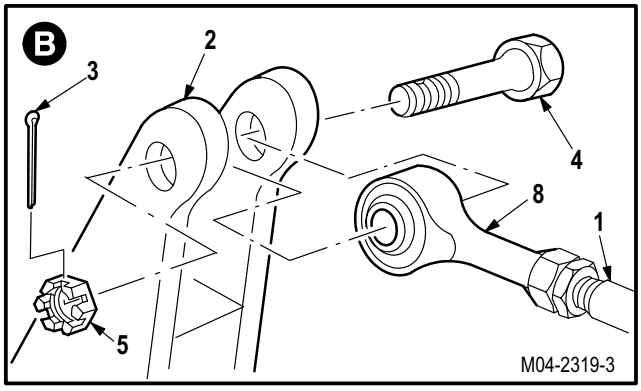
4.157.3. Removal

a. **Remove No. 1 engine load demand spindle (LDS) forward cable (1) from bellcrank (2).**

(1) Remove and discard cotter pin (3).

(2) Hold bolt (4). Remove nut (5).

(3) Remove bolt (4) from bellcrank (2) and rod end (8).

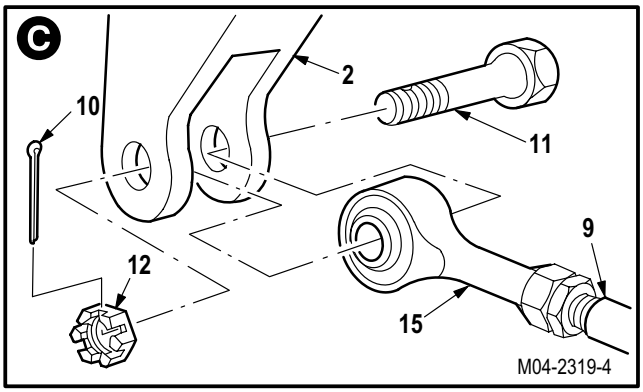



b. **Remove No. 2 engine LDS forward cable (9) from bellcrank (2).**

(1) Remove and discard cotter pin (10).

(2) Hold bolt (11). Remove nut (12).

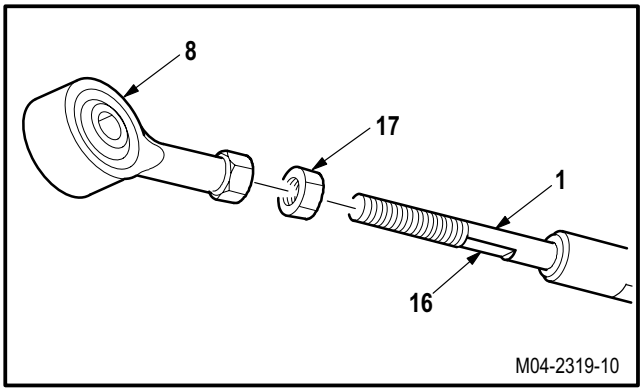
(3) Remove bolt (11) from bellcrank (2) and rod end (15).




c. **Remove rod end (8) from cable (1).**

(1) Hold cable flats (16). Loosen nut (17).

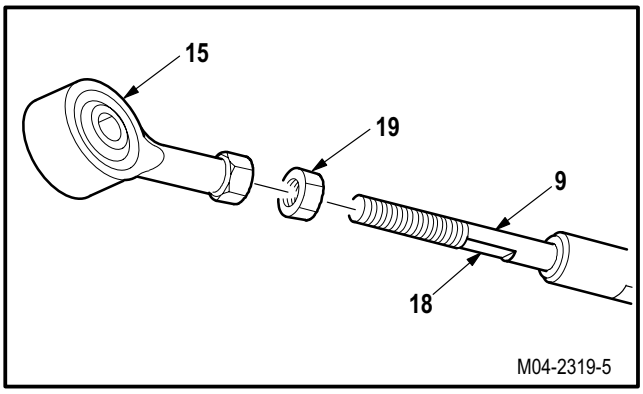
(2) Remove rod end (8) and nut (17) from cable (1).




d. **Remove rod end (15) from cable (9).**

(1) Hold cable flats (18). Loosen nut (19).

(2) Remove rod end (15) and nut (19) from cable (9).

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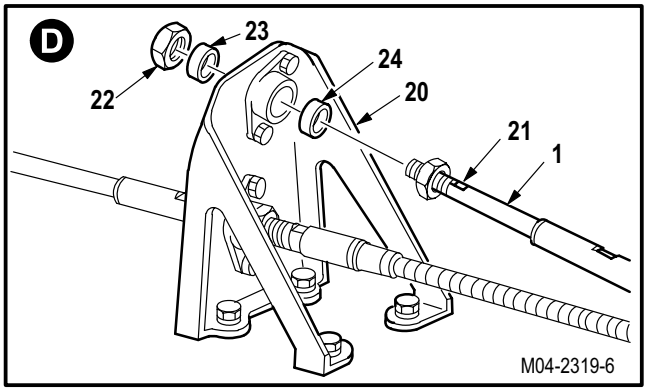
## 4.157. ENGINE LOAD DEMAND SPINDLE CABLE SUPPORT REMOVAL/INSTALLATION - continued

e. **Remove cable (1) from LDS cable load support (20).**

(1) Hold cable flats (21). Remove nut (22) and spacer (23) from cable (1).

(2) Pull cable (1) from support (20).

(3) Remove spacer (24).

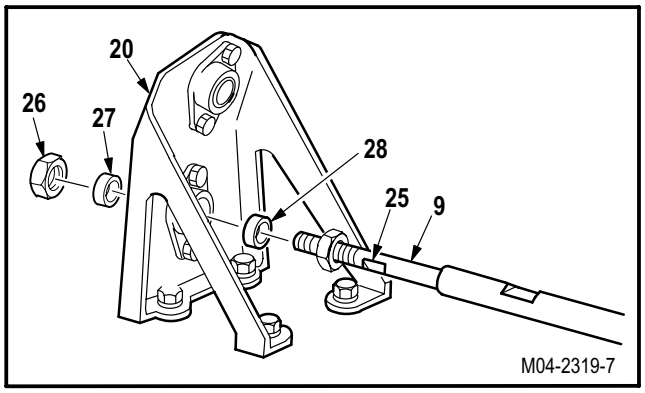



f. **Remove cable (9) from support (20).**

(1) Hold cable flats (25). Remove nut (26) and spacer (27) from cable (9).

(2) Pull cable (9) from support (20).

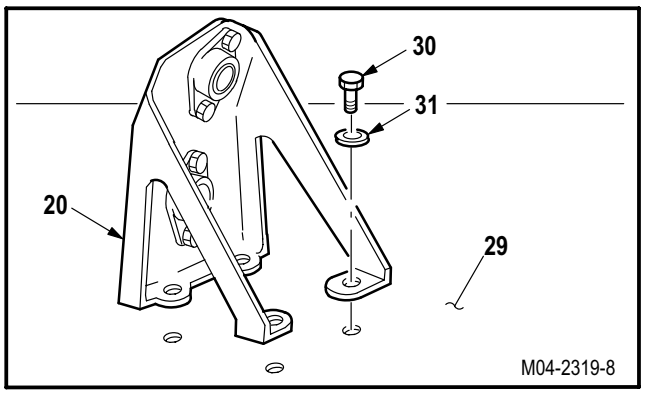
(3) Remove spacer (28).




g. **Remove support (20) from transmission deck (29).**

(1) Remove four bolts (30) and washers (31) from support (20) and deck (29).

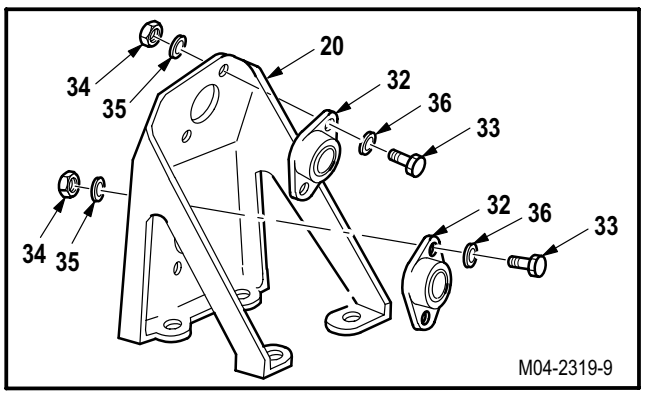
(2) Remove support (20).




h. **Remove two retainers (32) from support (20).**

(1) Hold four bolts (33). Remove four nuts (34) and washers (35).

(2) Remove four bolts (33) and washers (36) from retainers (32) and support (20).

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## 4.157. ENGINE LOAD DEMAND SPINDLE CABLE SUPPORT REMOVAL/INSTALLATION - continued

4.157.4. Cleaning

a. **Clean retainers and support mounting area on deck** (para 1.47)**.**

4.157.5. Inspection

a. **Check retainers for rough bearing surfaces and cracks** (para 4.2)**.**

b. **Check support mounting area on deck and support for cracks** (para 4.2)**.**

c. **Check retainers and deck for corrosion** (para 1.49)**.**

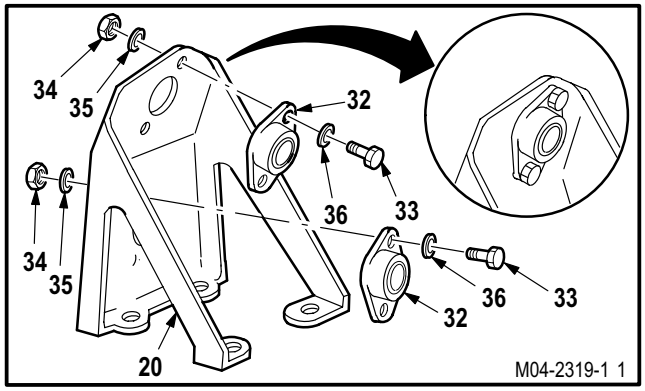
4.157.6. Installation

a. **Install two retainers (32) on support (20).**

(1) Position two retainers (32) on aft face of support (20).

(2) Install four bolts (33) through washers (36), two retainers (32), and support (20).

(3) Install four washers (35) and nuts (34) on bolts (33).



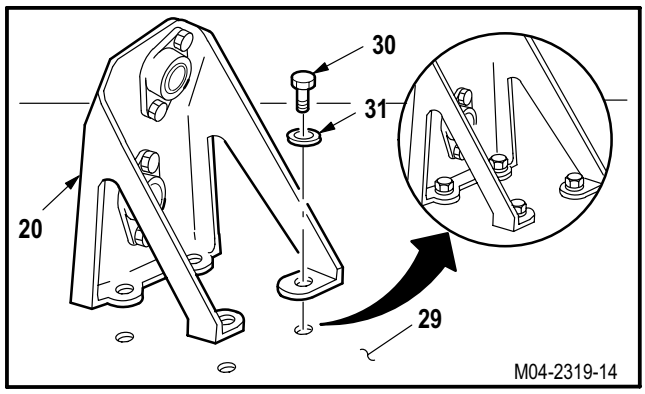

**NOTE**

Support legs must face aft.

b. **Install support (20) on deck (29).**

(1) Position support (20) on deck (29).

(2) Install four bolts (30) and washers (31) through support (20) and deck (29).

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## 4.157. ENGINE LOAD DEMAND SPINDLE CABLE SUPPORT REMOVAL/INSTALLATION - continued

c. **Install cable (9) in support (20).** Torque nuts (37) and (26) to **90 INCH-POUNDS**.

(1) Center nut (37) on threaded area of cable (9).

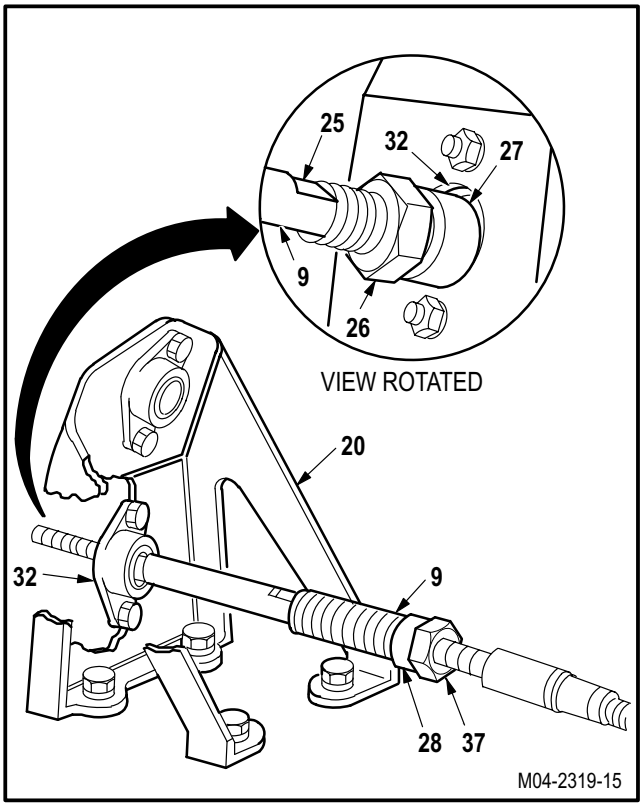
(2) Install spacer (28) on cable (9).

(3) Install cable (9) through lower retainer (32).

(4) Install spacer (27) on cable (9).

(5) Hand tighten nut (26) until spacer (27) just contacts retainer (32).

(6) Hold cable flats (25). Torque nuts (37) and (26) to **90 INCH-POUNDS**. Use torque wrench and crowfoot.




d. **Install cable (1) in support (20).** Torque nuts (38) and (22) to **90 INCH-POUNDS**.

(1) Center nut (38) on threaded area of cable (1).

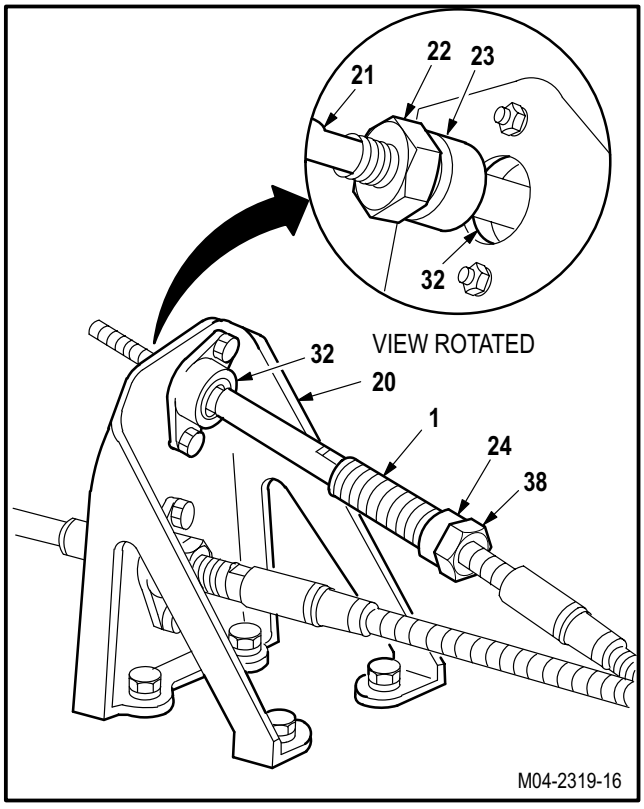
(2) Install spacer (24) on cable (1).

(3) Install cable (1) through upper retainer (32).

(4) Install spacer (23) on cable (1).

(5) Hand tighten nut (22) until spacer (23) just contacts retainer (32).

(6) Hold cable flats (21). Torque nuts (38) and (22) to **90 INCH-POUNDS**. Use torque wrench and crowfoot.

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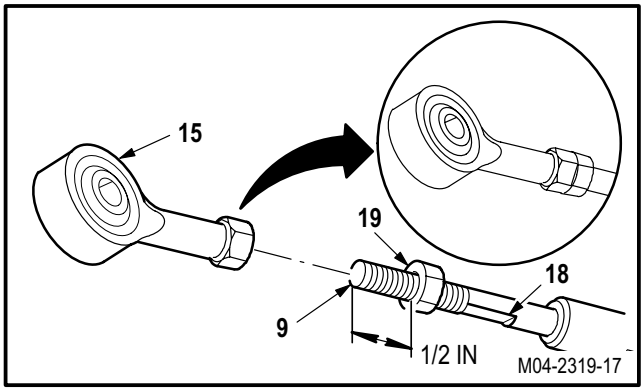
## 4.157. ENGINE LOAD DEMAND SPINDLE CABLE SUPPORT REMOVAL/INSTALLATION - continued

e. **Install rod end (15) on cable (9).** Torque nut (19) to **20 INCH-POUNDS**.

(1) Install nut (19) on cable (9) so **0.5 INCH** of threaded cable is exposed.

(2) Install rod end (15) **0.5 INCH** on cable (9). Aline as shown.

(3) Hold cable flats (18). Torque nut (19) to **20 INCH-POUNDS**. Use torque wrench.

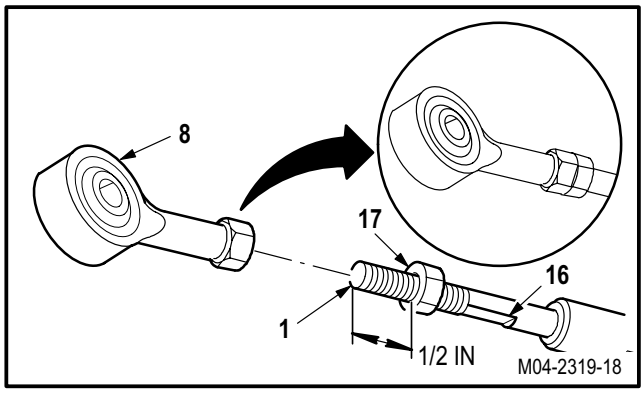



f. **Install rod end (8) on cable (1).** Torque nut (17) to **20 INCH-POUNDS**.

(1) Install nut (17) on cable (1) so **0.5 INCH** of threaded cable is exposed.

(2) Install rod end (8) **0.5 INCH** on cable (1). Aline as shown.

(3) Hold cable flats (16). Torque nut (17) to **20 INCH-POUNDS**. Use torque wrench.




g. **Install cable (9) on bellcrank (2).** Torque nut (12) **14 to 18 INCH-POUNDS**.

(1) Aline rod end (15) in bellcrank (2).

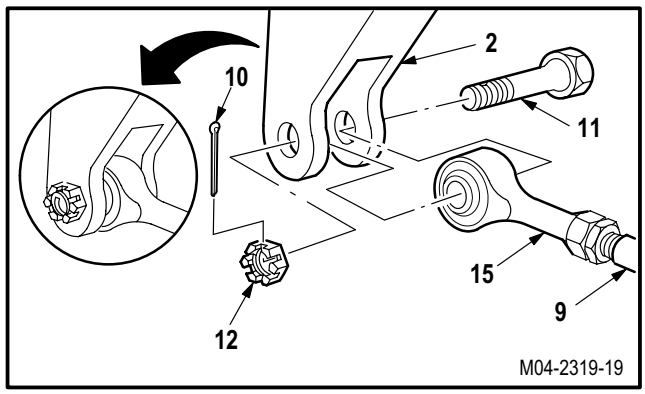
(2) Install bolt (11) through bellcrank (2) and rod end (15).

(3) Install nut (12) on bolt (11).

(4) Hold bolt (11). Torque nut (12) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (10).

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**4.157. ENGINE LOAD DEMAND SPINDLE CABLE SUPPORT REMOVAL/INSTALLATION - continued**

h. **Install cable (1) on bellcrank (2).** Torque nut (5) **14 to 18 INCH-POUNDS**.

(1) Aline rod end (8) in bellcrank (2).

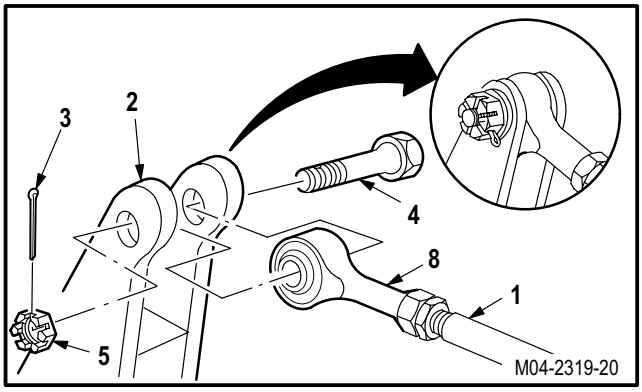
(2) Install bolt (4) through bellcrank (2) and rod end (8).

(3) Install nut (5) on bolt (4).

(4) Hold bolt (4). Torque nut (5) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (3).




i. **Inspect (QA).**

j. **Perform No. 1 and No. 2 engine load demand spindle rigging check** (para 4.184)**.**

k. **Perform power plants maintenance operational check (engine 1 and engine 2)** (TM 1-1520-238-T)**.**

l. **Install access panel L200** (para 2.2)**.**

END OF TASK

## 4.158. NO. 1 ENGINE POWER AVAILABLE SPINDLE CABLE REMOVAL (PILOT TO CPG)

4.158.1. Description

This task covers: Removal. Cleaning. Inspection.

4.158.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer

**References:**

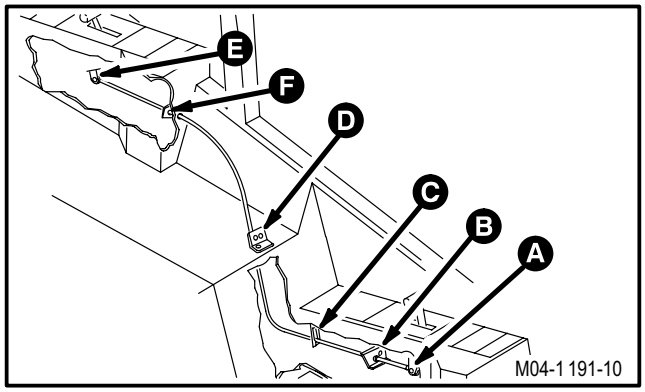
TM 9-1090-208-23-1

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Console panels PL1, PL3, PL5, CL1, and CL3 removed |
| TM 9-1090-208-23-1 | Aerial rocket control and display panel removed. Area weapon, gun turret, and flexible chute removed |

4.158.3. Removal

a. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**



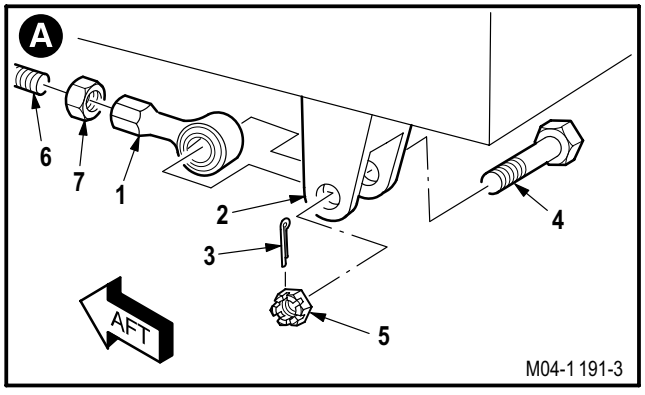

b. **Remove rod end (1) from CPG No. 1 power lever (2).**

(1) Remove and discard cotter pin (3).

(2) Hold bolt (4). Remove nut (5).

(3) Remove bolt (4) from rod end (1) and power lever (2).

(4) Remove rod end (1).




c. **Remove rod end (1) from cable (6).**

(1) Hold rod end (1). Loosen nut (7).

(2) Remove rod end (1) and nut (7) from cable (6).

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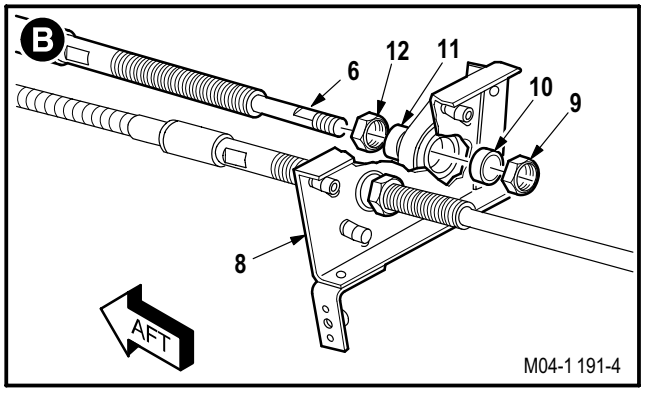
## 4.158. NO. 1 ENGINE POWER AVAILABLE SPINDLE CABLE REMOVAL (PILOT TO CPG) - continued

d. **Remove cable (6) from bracket (8).**

(1) Hold cable (6). Remove nut (9) and spacer (10).

(2) Pull cable (6) out of bracket (8).

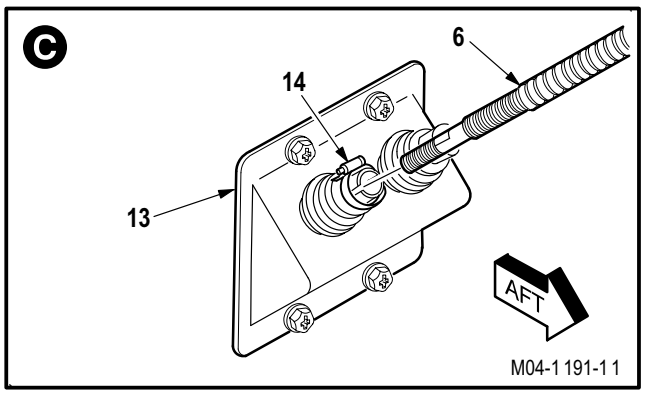
(3) Remove spacer (11) and nut (12) from cable (6).




e. **Remove cable (6) from seal (13).**

(1) Loosen clamp (14).

(2) Remove cable (6).

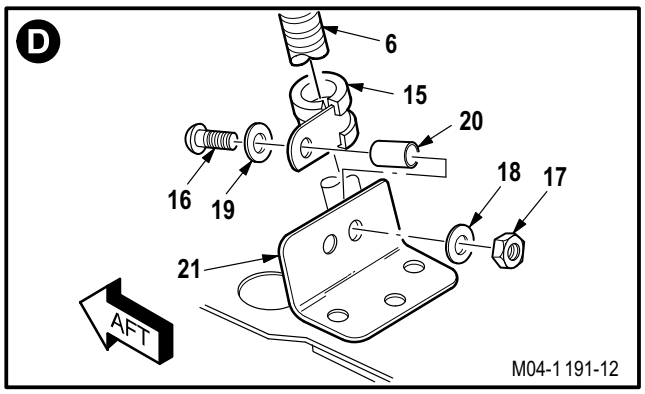



f. **Remove clamp (15) from cable (6).**

(1) Hold screw (16). Remove nut (17) and washer (18).

(2) Remove screw (16), washer (19), clamp (15), and spacer (20) from bracket (21).

(3) Remove clamp (15).

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## 4.158. NO. 1 ENGINE POWER AVAILABLE SPINDLE CABLE REMOVAL (PILOT TO CPG) - continued

g. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

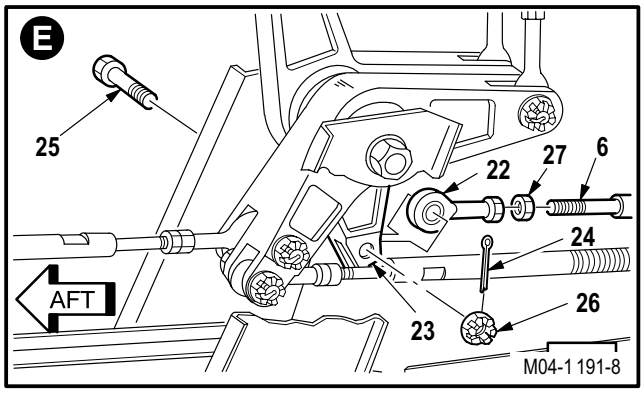
h. **Remove rod end (22) from pilot No. 1 power lever (23).**

(1) Remove and discard cotter pin (24).

(2) Hold bolt (25). Remove nut (26).

(3) Remove bolt (25) from rod end (22) and power lever (23).

(4) Remove rod end (22).




i. **Remove rod end (22) from cable (6).**

(1) Hold rod end (22). Loosen nut (27).

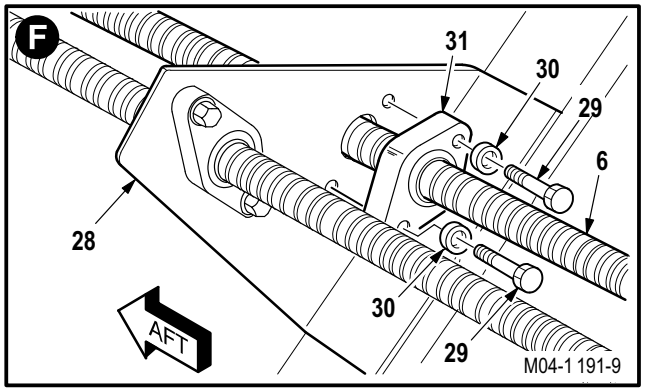
(2) Remove rod end (22) and nut (27) from cable (6).

j. **Remove cable (6) from bracket (28).**

(1) Remove two bolts (29) and washers (30) from retainer (31).\

(2) Remove cable (6) from bracket (28).

(3) Remove cable (6) and retainer (31).




4.158.4. Cleaning

a. **Clean rod end, cable support, and support bracket** (para 1.47)**.**

4.158.5. Inspection

a. **Check rod end for thread damage and bearing surface scars.** None allowed.

b. **Check cable support and support bracket for cracks.** None allowed.

c. **Check rod end, cable support, and support bracket for corrosion** (para 1.49)**.**

END OF TASK

## 4.159. NO. 1 ENGINE POWER AVAILABLE SPINDLE CABLE INSTALLATION (PILOT TO CPG)

4.159.1. Description

This task covers: Installation.

4.159.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0.0 - 10.0-pound weighing scale (item 272, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 9-1090-208-23-1

**Equipment Conditions:**

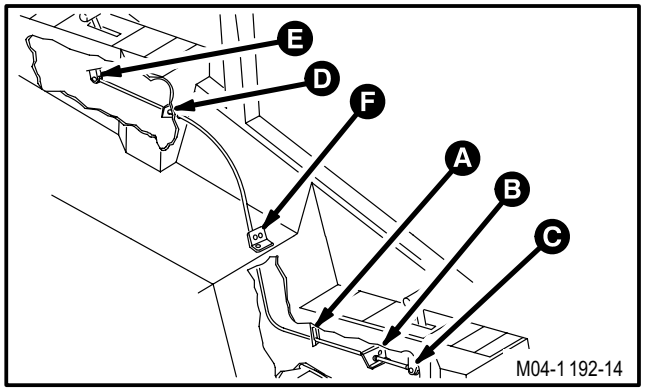
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**Materials/Parts:**

Cotter pin (2)

**NOTE**

Engine power available spindle (PAS) cables cannot be intermixed with cables manufactured by different vendors on the same engine. Cables that have a metallic exterior (Controlex) cannot be mixed with cables that have a black tubing exterior (Cablecraft) on the same engine. One side can be Controlex and the other side can be Cablecraft. Cables must be replaced with same exact part number. If exact part is not available, all No. 1 engine PAS cables (three cables) or No. 2 engine PAS cables (three cables) must be replaced with new cables (Cablecraft).

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## 4.159. NO. 1 ENGINE POWER AVAILABLE SPINDLE CABLE INSTALLATION (PILOT TO CPG) - continued

4.159.3. Installation

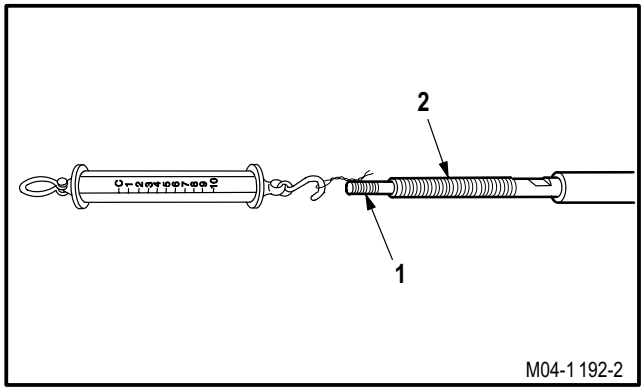
a. **Check cable ribbon (1) friction load.**

(1) Place cable (2) on flat surface. Ensure cable (2) is not bent or twisted.

(2) Slide ribbon (1) **2.5 INCHES** in and out of cable (2). There should be no binding, stiffness, or jamming.

(3) Check friction load of ribbon (1). Load not to exceed **1.5 POUNDS**. Use scale.

(4) If ribbon movement is rough or friction load exceeds **1.5 POUNDS**, replace cable.




b. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

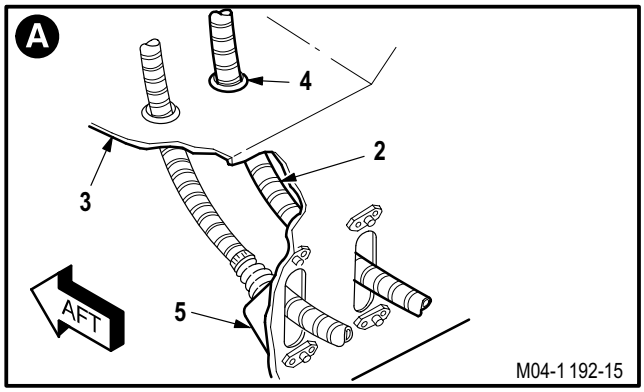
**CAUTION**

To prevent damage to cable, avoid sharp bends which could result in kinking of cable.

c. **Route cable (2) through pilot floor (3).**

(1) Install cable (2) through pilot floor (3).

(2) Position grommet (4) around cable (2) in pilot floor (3).



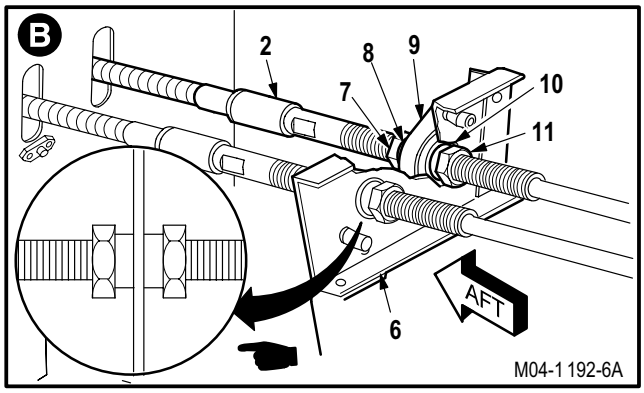

d. **Route cable (2) through seal (5).**

e. **Route cable (2) through bracket (6).**

(1) Install nut (7) and spacer (8) on cable (2).

(2) Route cable (2) through bearing (9).

(3) Install spacer (10) and nut (11) on cable (2).

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**4.159. NO. 1 ENGINE POWER AVAILABLE SPINDLE CABLE INSTALLATION (PILOT TO CPG) - continued**

f. **Install nut (13) rod end (12) on cable (2).** Torque nut (13) to **20 INCH-POUNDS**.

(1) Install nut (13) on cable (2).

(2) Install rod end (12) on cable (2) to depth of **0.50 INCH**.

(3) Hold rod end (12). Torque nut (13) to **20 INCH-POUNDS**. Use torque wrench.

g. **Install rod end (12) on CPG No. 1 power lever (14).** Torque nut (15) **14 to 18 INCH-POUNDS**.

(1) Install bolt (16) through power lever (14) and rod end (12).

(2) Install nut (15) on bolt (16).

(3) Hold bolt (16). Torque nut (15) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (17).

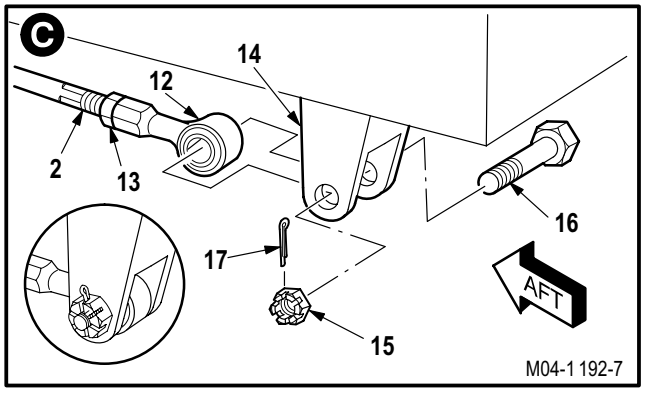
h. **Adjust cable (2) travel to obtain 5.90 INCHES of travel.** Torque nuts (7) and (11) to **90 INCH-POUNDS**.

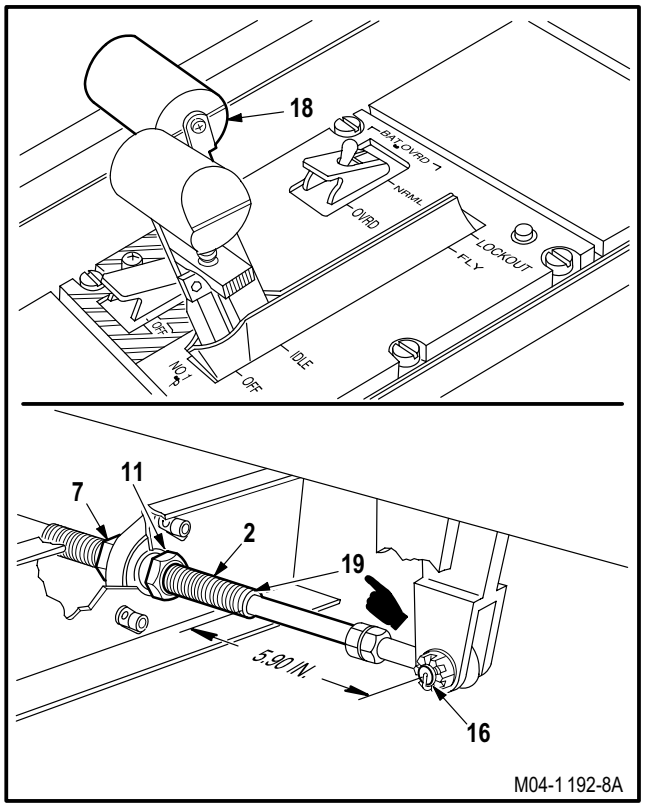
(1) Set CPG No. 1 power lever (18) to **IDLE**.

(2) Measure cable travel from center of bolt (16) to shoulder (19) of cable (2).

(3) Adjust nuts (7) and (11) to obtain **5.90 INCHES** of travel.

(4) Torque nuts (7) and (11) to **90 INCH-POUNDS**. Use torque wrench.

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**4.159. NO. 1 ENGINE POWER AVAILABLE SPINDLE CABLE INSTALLATION (PILOT TO CPG) - continued**

i. **Tighten clamp (20) on seal (5) and cable (2).**

j. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

k. **Install cable (2) on bracket (21).**

(1) Route cable (2) through bracket (21) and retainer (22).

(2) Aline retainer (22) with two holes in bracket (21).

(3) Install two bolts (23) and washers (24) through retainer (22) in bracket (21).

l. **Install nut (26) and rod end (25) on cable (2).** Torque nut (26) to **20 INCH-POUNDS**.

(1) Install nut (26) on cable (2).

(2) Install rod end (25) on cable (2) to a depth of **0.50 INCH**.

(3) Aline rod end (25) with bellcrank (27).

(4) Hold rod end (25). Torque nut (26) to **20 INCH-POUNDS**. Use torque wrench.

m. **Install rod end (25) on bellcrank (27).** Torque nut (28) **14 to 18 INCH-POUNDS**.

(1) Set pilot No. 1 power lever (29) to **IDLE**.

(2) Install bolt (30) through bellcrank (27) and rod end (25).

(3) Hold bolt (30). Install nut (28).

(4) Torque nut (28) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (31).

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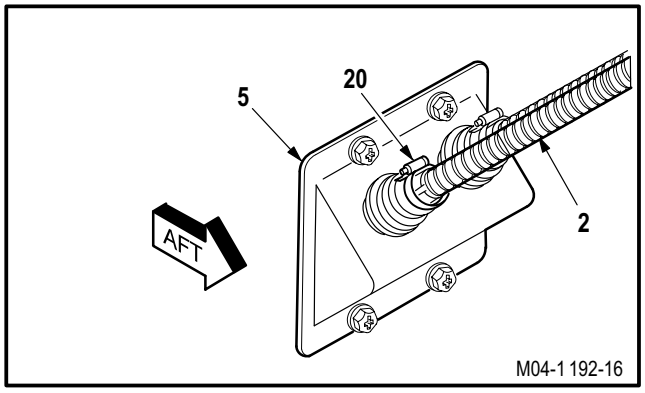
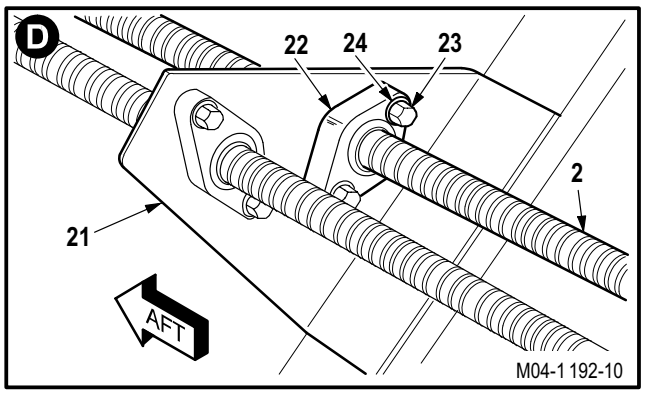
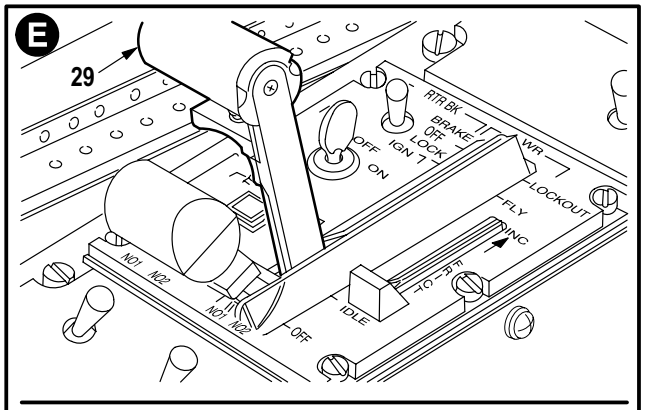
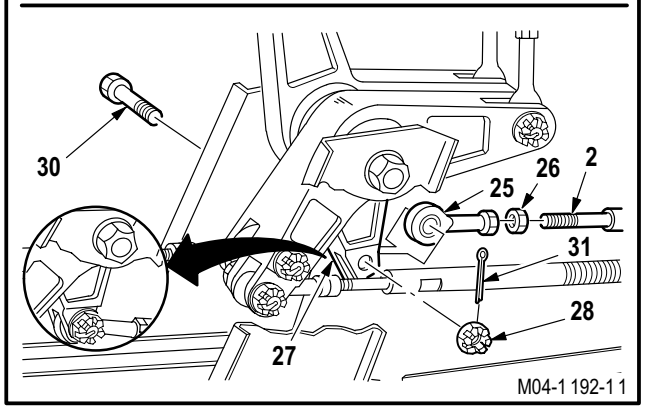


**4.159. NO. 1 ENGINE POWER AVAILABLE SPINDLE CABLE INSTALLATION (PILOT TO CPG) - continued**

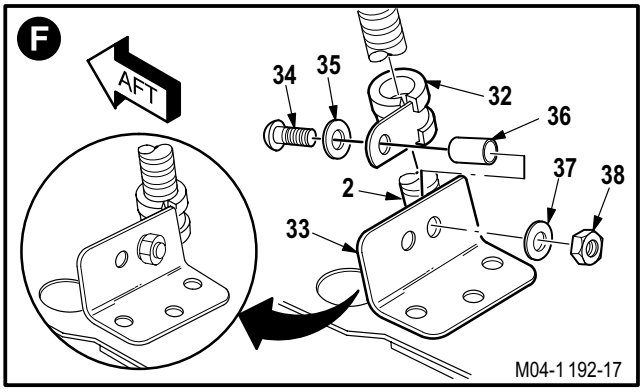
n. **Install clamp (32) on bracket (33).**

(1) Install clamp (32) on cable (2).

(2) Aline clamp (32) with bracket (33).

(3) Install screw (34) through washer (35), clamp (32), spacer (36), and bracket (33).

(4) Install washer (37) and nut (38) on screw (34).




o. **Inspect (QA).**

p. **Perform No. 1 engine power available spindle system rigging check** (para 4.186)**.**

q. **Install gun turret assembly, area weapon, flexible chute, and aerial rocket control** (TM 9-1090-208-23-1)**.**

r. **Install console panels PL1, PL3, PL5, CL1, and CL3** (para 2.2)**.**

END OF TASK

## 4.160. NO. 2 ENGINE POWER AVAILABLE SPINDLE CABLE REMOVAL (PILOT TO CPG)

4.160.1. Description

This task covers: Removal. Cleaning. Inspection.

4.160.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer

**References:**

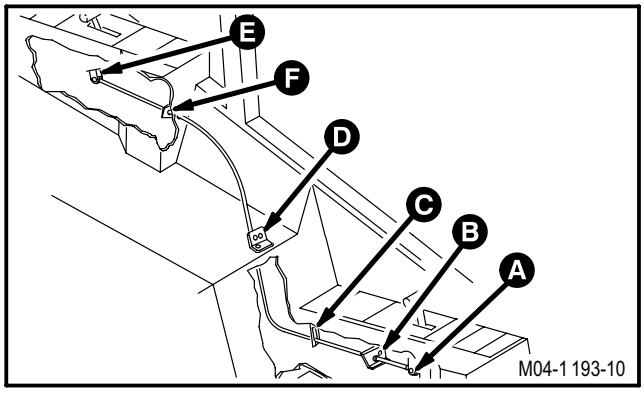
TM 9-1090-208-23-1

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Console panels PL1, PL3, PL5, CL1, and CL3 removed |
| TM 9-1090-208-23-1 | Aerial rocket control and display panel removed. Area weapon, gun turret, and ammunition feed chute removed |

4.160.3. Removal

a. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**



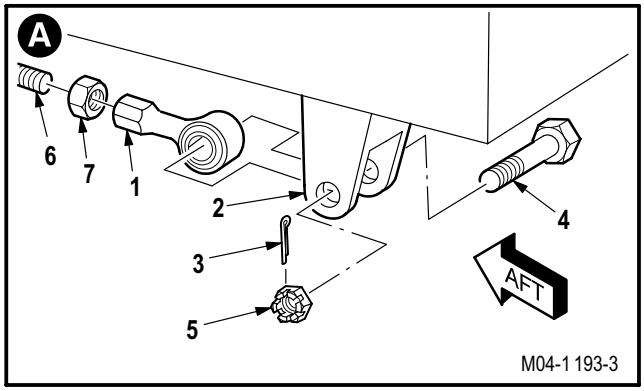

b. **Remove rod end (1) from CPG No. 2 power lever (2).**

(1) Remove and discard cotter pin (3).

(2) Hold bolt (4). Remove nut (5).

(3) Remove bolt (4) from rod end (1) and power lever (2).

(4) Remove rod end (1).




c. **Remove rod end (1) from cable (6).**

(1) Hold rod end (1). Loosen nut (7).

(2) Remove rod end (1) and nut (7) from cable (6).

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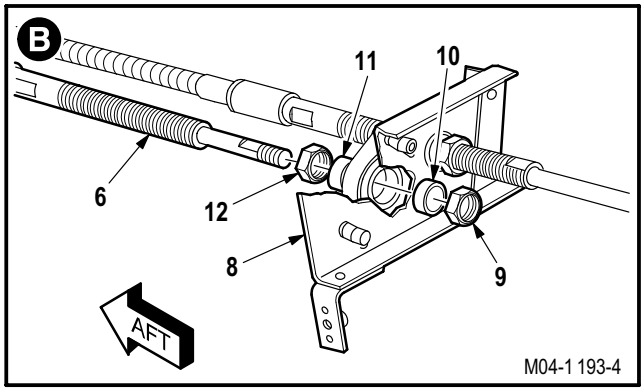
## 4.160. NO. 2 ENGINE POWER AVAILABLE SPINDLE CABLE REMOVAL (PILOT TO CPG) - continued

d. **Remove cable (6) from bracket (8).**

(1) Hold cable (6). Remove nut (9). Remove spacer (10).

(2) Pull cable (6) out of bracket (8).

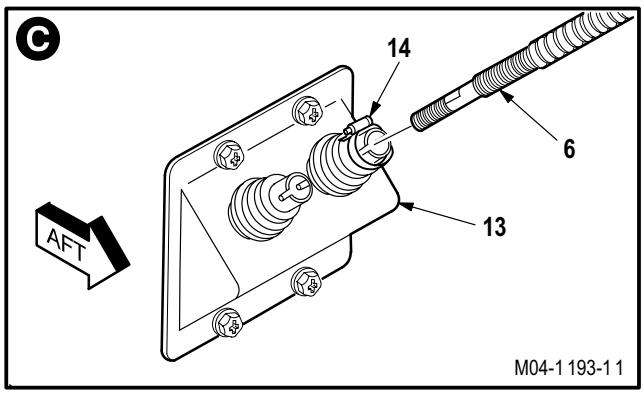
(3) Remove spacer (11) and nut (12) from cable (6).




e. **Remove cable (6) from seal (13).**

(1) Loosen clamp (14).

(2) Remove cable (6).



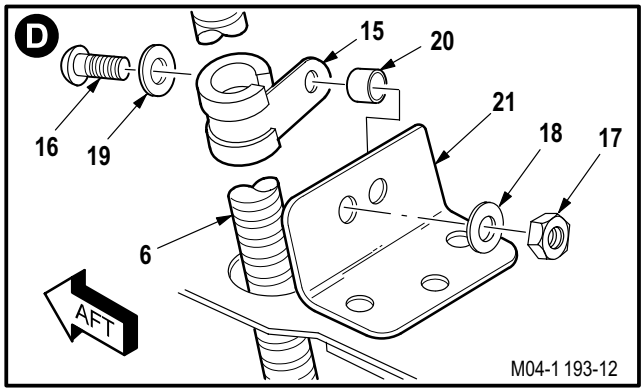

f. **Remove clamp (15) from cable (6).**

(1) Hold screw (16). Remove nut (17) and washer (18).

(2) Remove screw (16), washer (19), clamp (15), and spacer (20) from bracket (21).

(3) Remove clamp (15).

g. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

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## 4.160. NO. 2 ENGINE POWER AVAILABLE SPINDLE CABLE REMOVAL (PILOT TO CPG) - continued

h. **Remove rod end (22) from pilot No. 2 power lever (23).**

(1) Remove and discard cotter pin (24).

(2) Hold bolt (25). Remove nut (26).

(3) Remove bolt (25) from rod end (22) and power lever (23).

(4) Remove rod end (22).

i. **Remove rod end (22) from cable (6).**

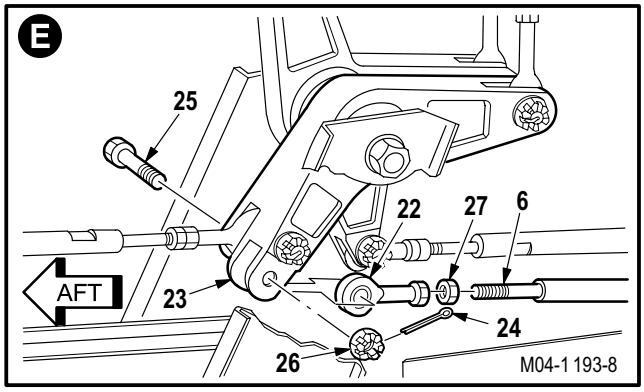
(1) Hold rod end (22). Loosen nut (27).

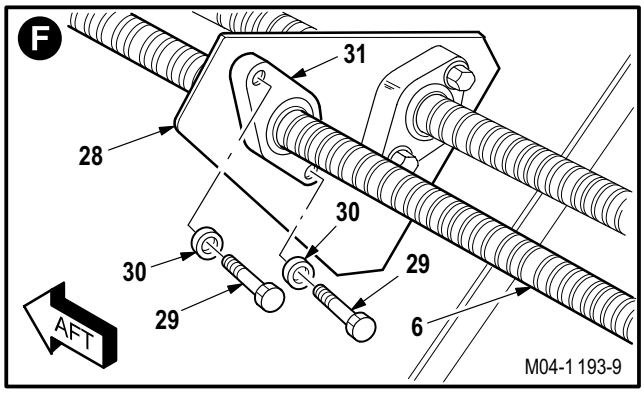
(2) Remove rod end (22) and nut (27) from cable (6).

j. **Remove cable (6) from bracket (28).**

(1) Remove two bolts (29) and washers (30) from retainer (31).

(2) Remove cable (6) and retainer (31).




4.160.4. Cleaning

a. **Clean rod end, cable support, and support bracket** (para 1.47)**.**

4.160.5. Inspection

a. **Check rod end for thread damage and bearing surface scars.** None allowed.

b. **Check cable support and support bracket for cracks.** None allowed.

c. **Check rod end, cable support, and support bracket for corrosion** (para 1.49)**.**

END OF TASK

## 4.161. NO. 2 ENGINE POWER AVAILABLE SPINDLE CABLE INSTALLATION (PILOT TO CPG)

4.161.1. Description

This task covers: Installation.

4.161.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0.0 - 10.0-pound weighing scale (item 272, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 9-1090-208-23-1

**Equipment Conditions:**

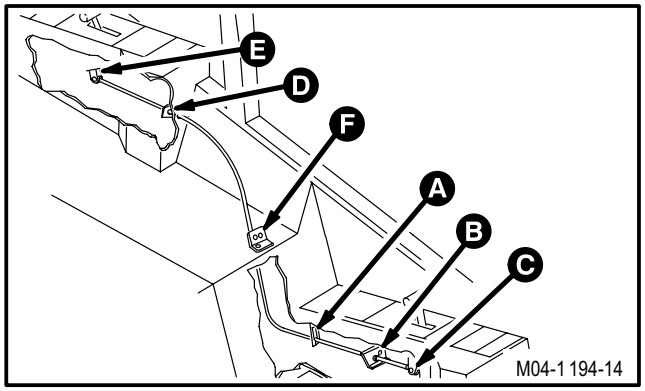
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**Materials/Parts:**

Cotter pin (2)

**NOTE**

Engine power available spindle (PAS) cables cannot be intermixed with cables manufactured by different vendors on the same engine. Cables that have a metallic exterior (Controlex) cannot be mixed with cables that have a black tubing exterior (Cablecraft) on the same engine. One side can be Controlex and the other side can be Cablecraft. Cables must be replaced with same exact part number. If exact part is not available, all No. 1 engine PAS cables (three cables) or No. 2 engine PAS cables (three cables) must be replaced with new cables (Cablecraft).

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## 4.161. NO. 2 ENGINE POWER AVAILABLE SPINDLE CABLE INSTALLATION (PILOT TO CPG) - continued

4.161.3. Installation

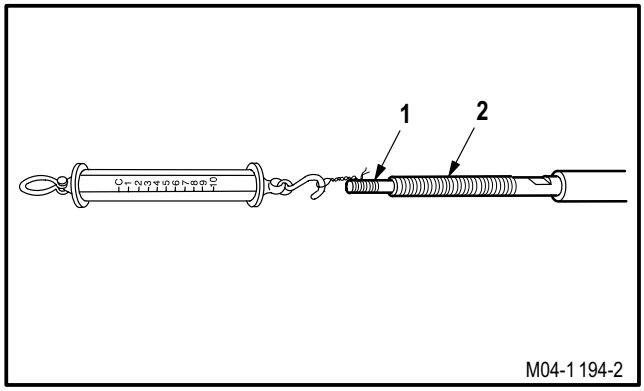
a. **Check cable ribbon (1) friction load.**

(1) Place cable (2) on flat surface. Ensure cable (2) is not bent or twisted.

(2) Slide ribbon (1) **2.5 INCHES** in and out of cable (2). There should be no binding, stiffness, or jamming.

(3) Check friction load of ribbon (1). Load not to exceed **1.5 POUNDS**. Use scale.

(4) If ribbon movement is rough or friction load exceeds **1.5 POUNDS**, replace cable.




b. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

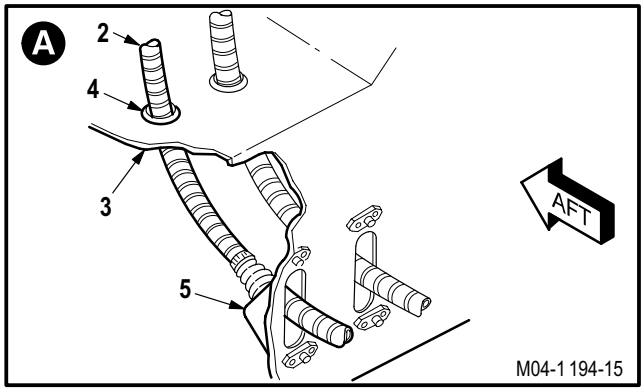
**CAUTION**

To prevent damage to cable, avoid sharp bends which could result in kinking of cable.

c. **Route cable (2) through pilot floor (3).**

(1) Install cable (2) through pilot floor (3).

(2) Install new grommet (4) around cable (2) in pilot floor (3).



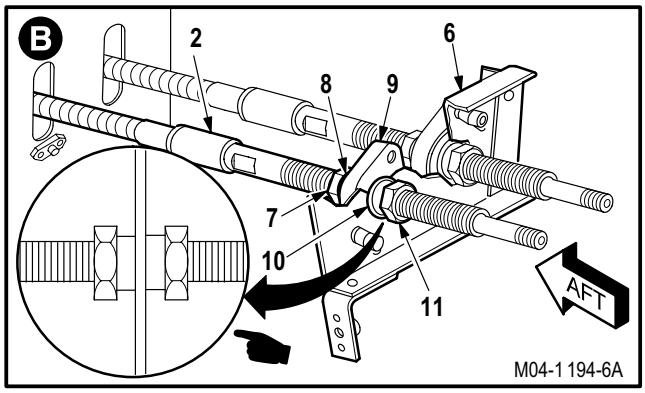

d. **Route cable (2) through seal (5).**

e. **Route cable (2) through bracket (6).**

(1) Install nut (7) and spacer (8) on cable (2).

(2) Route cable (2) through bearing (9).

(3) Install spacer (10) and nut (11) on cable (2).

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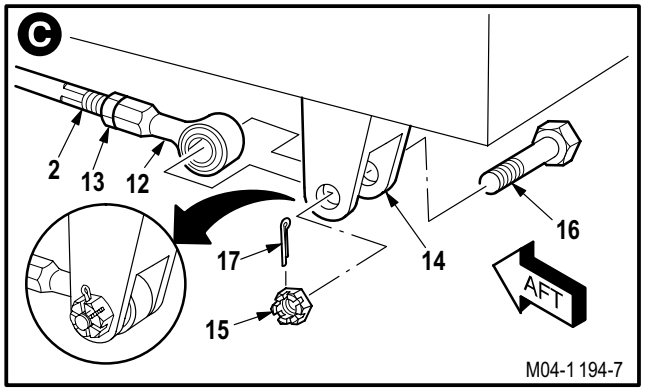
**4.161. NO. 2 ENGINE POWER AVAILABLE SPINDLE CABLE INSTALLATION (PILOT TO CPG) - continued**

f. **Install nut (13) and rod end (12) on cable (2).** Torque nut (13) to **20 INCH-POUNDS**.

(1) Install nut (13) on cable (2).

(2) Install rod end (12) on cable (2) to a depth of **0.50 INCH**.

(3) Hold rod end (12). Torque nut (13) to **20 INCH-POUNDS**. Use torque wrench.




g. **Install rod end (12) on CPG No. 2 power lever (14).** Torque nut (15) **14 to 18 INCH-POUNDS**.

(1) Install bolt (16) through power lever (14) and rod end (12).

(2) Install nut (15) on bolt (16).

(3) Hold bolt (16). Torque nut (15) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (17).

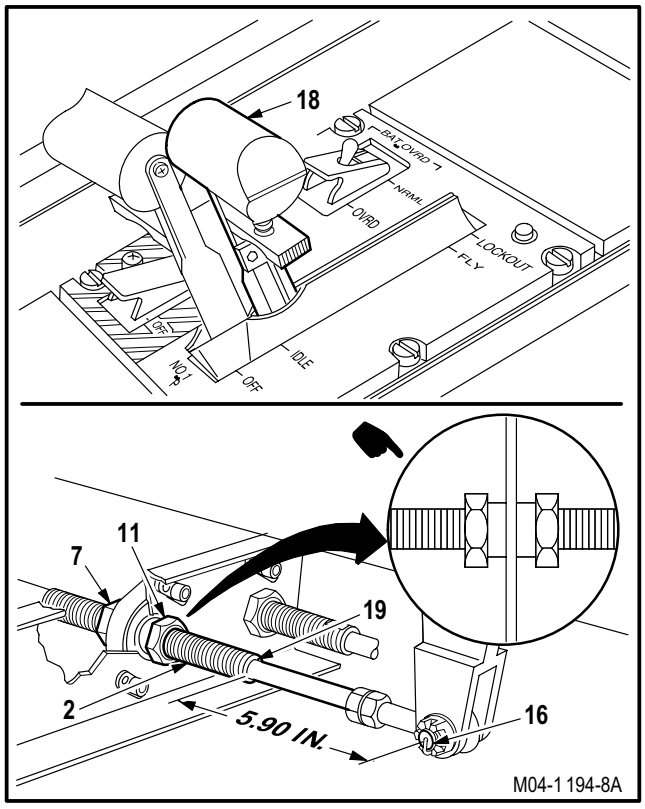
h. **Adjust cable (2) travel to obtain 5.90 INCHES of travel.** Torque nuts (7) and (11) to **90 INCH-POUNDS**.

(1) Set CPG No. 2 power lever (18) to **IDLE**.

(2) Measure cable travel from center of bolt (16) to shoulder (19) of cable (2).

(3) Adjust nuts (7) and (11) to obtain **5.90 INCHES** of travel.

(4) Torque nuts (7) and (11) to **90 INCH-POUNDS**. Use torque wrench.

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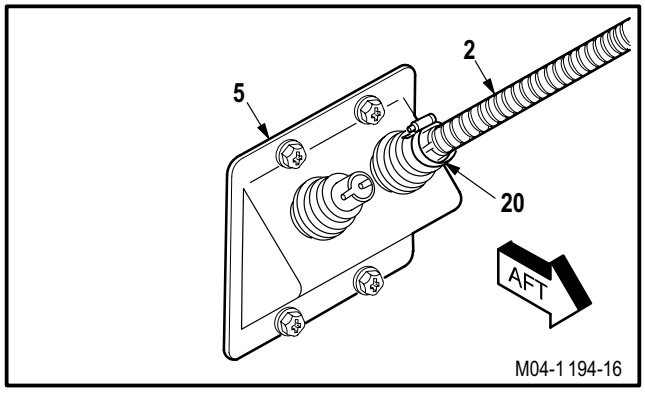
## 4.161. NO. 2 ENGINE POWER AVAILABLE SPINDLE CABLE INSTALLATION (PILOT TO CPG) - continued

i. **Tighten clamp (20) on seal (5) and cable (2).**



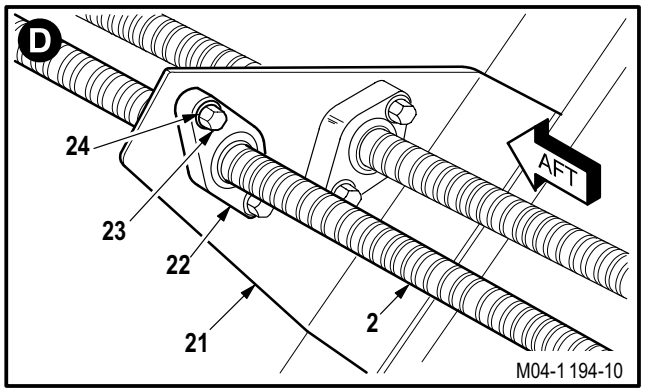

j. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

k. **Install cable (2) on bracket (21).**

(1) Route cable (2) through bracket (21) and retainer (22).

(2) Aline retainer (22) with two holes in bracket (21).

(3) Install two bolts (23) and washers (24) through retainer (22) and bracket (21).




l. **Install nut (26) and rod end (25) on cable (2).** Torque nut (26) to **20 INCH-POUNDS**.

(1) Install nut (26) on cable (2).

(2) Install rod end (25) on cable (2) to a depth of **0.50 INCH**.

(3) Aline rod end (25) with bellcrank (27).

(4) Hold rod end (25). Torque nut (26) to **20 INCH-POUNDS**. Use torque wrench.

m. **Install rod end (25) on bellcrank (27).** Torque nut (28) **14 to 18 INCH-POUNDS**.

(1) Set pilot No. 2 power lever (29) to **IDLE**.

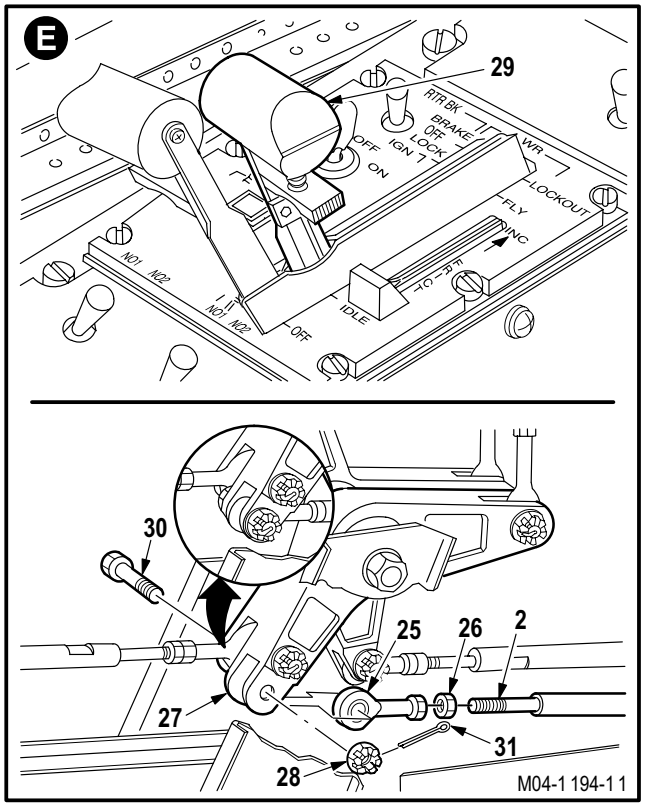
(2) Install bolt (30) through bellcrank (27) and rod end (25).

(3) Hold bolt (30). Install nut (28).

(4) Hold bolt (30). Torque nut (28) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (31).

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**4.161. NO. 2 ENGINE POWER AVAILABLE SPINDLE CABLE INSTALLATION (PILOT TO CPG) - continued**

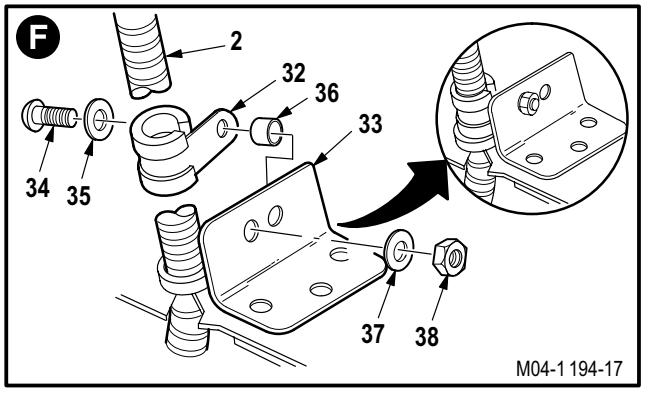
n. **Install clamp (32) on bracket (33).**

(1) Install clamp (32) on cable (2).

(2) Aline clamp (32) with bracket (33).

(3) Install screw (34) through washer (35), clamp (32), spacer (36), and bracket (33).

(4) Install washer (37) and nut (38) on screw (34).




o. **Inspect (QA).**

p. **Perform No. 2 engine power available spindle system rigging check** (para 4.187)**.**

q. **Install gun turret assembly, area weapon, flexible chute, and aerial rocket control** (TM 9-1090-208-23-1)**.**

r. **Install console panels PL1, PL3, PL5, CL1, and CL3** (para 2.2)**.**

END OF TASK

## 4.162. PILOT POWER AVAILABLE SPINDLE BELLCRANKS REMOVAL/INSTALLATION

4.162.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.162.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0.001 - 0.200-inch dial indicator (item 176, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**References:**

TM 1-1500-204-23

**Materials/Parts:**

Cotter pin (5)

**Personnel Required:**

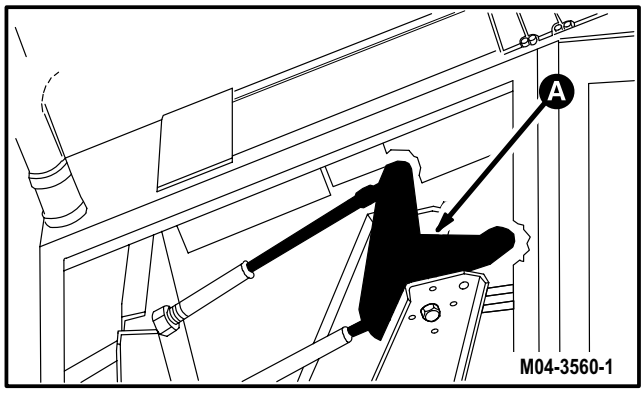
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 9.62 | EXT LT/INTR LT panel removed |
| 10.54 | Pilot FUEL panel removed |
| 4.166 | Pilot power quadrant removed |
| 2.2 | Console panel PL5 removed |

**WARNING**

**To prevent injury to personnel, ensure that CPG power quadrant levers do not move during procedure. If injury occurs, seek medical aid.**

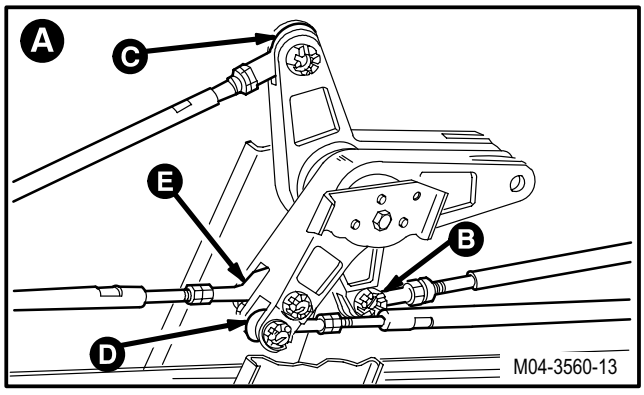



4.162.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **Check for radial play with bolt in bellcrank clevis hole.** Not to exceed **0.004 INCH**. Use dial indicator (TM 1-1500-204-23).

c. **Check for radial play in ball bearing.** Not to exceed **0.004 INCH**. Use dial indicator (TM 1-1500-204-23).

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## 4.162. PILOT POWER AVAILABLE SPINDLE BELLCRANKS REMOVAL/INSTALLATION - continued

**NOTE**

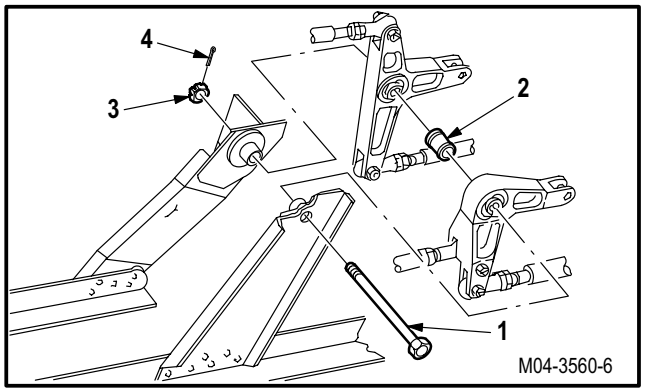
To remove No. 2 bellcrank, go to step h.

d. **Remove bolt (1), spacer (2), and nut (3).**

(1) Remove and discard cotter pin (4).

(2) Hold bolt (1). Remove nut (3).

(3) Remove bolt (1) and spacers (2).

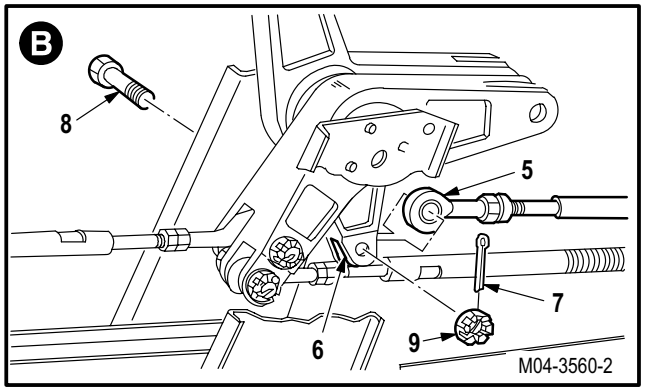



e. **Remove forward rod end (5) from No. 1 bellcrank (6).**

(1) Remove and discard cotter pin (7).

(2) Hold bolt (8). Remove nut (9).

(3) Remove bolt (8).



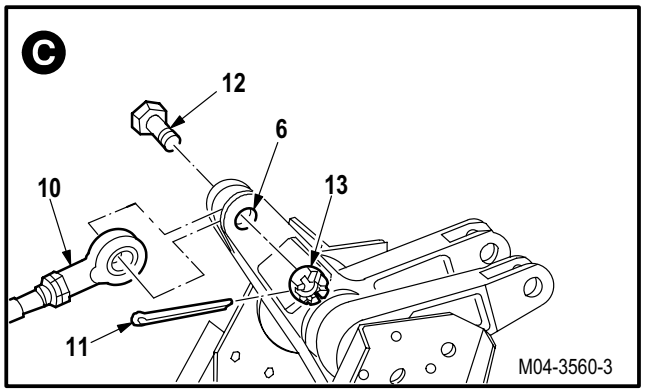

f. **Remove aft rod end (10) from bellcrank (6).**

(1) Remove and discard cotter pin (11).

(2) Hold bolt (12). Remove nut (13).

(3) Remove bolt (12).

g. **Remove bellcrank (6).**

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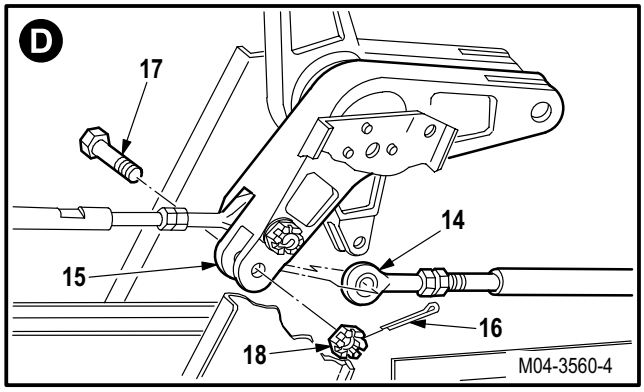
**4.162. PILOT POWER AVAILABLE SPINDLE BELLCRANKS REMOVAL/INSTALLATION - continued**

h. **Remove forward rod end (14) from No. 2 bellcrank (15).**

(1) Remove and discard cotter pin (16).

(2) Hold bolt (17). Remove nut (18).

(3) Remove bolt (17).



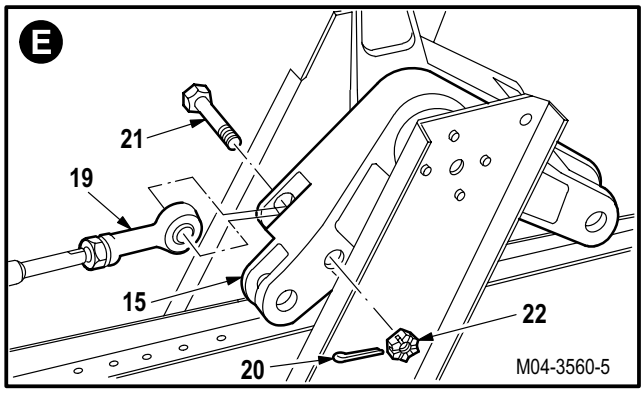

i. **Remove aft rod end (19) from bellcrank (15).**

(1) Remove and discard cotter pin (20).

(2) Hold bolt (21). Remove nut (22).

(3) Remove bolt (21).

j. **Remove bellcrank (15).**




4.162.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.162.5. Inspection

a. **Check bellcranks for cracks and corrosion.** None allowed.

b. **Check bellcranks for damage.** Up to **0.015 INCH** maximum must be blended out (TM 1-1500-204-23).

c. **Check bellcranks for corrosion** (para 1.49)**.**

4.162.6. Installation

**NOTE**

For No. 2 bellcrank installation, go to step d.

a. **Perform self-retaining bolt fit check** (para 11.1)**.**

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**4.162. PILOT POWER AVAILABLE SPINDLE BELLCRANKS REMOVAL/INSTALLATION - continued**

b. **Install forward rod end (5) on bellcrank (6).** Torque nut (9) **14 to 18 INCH-POUNDS**.

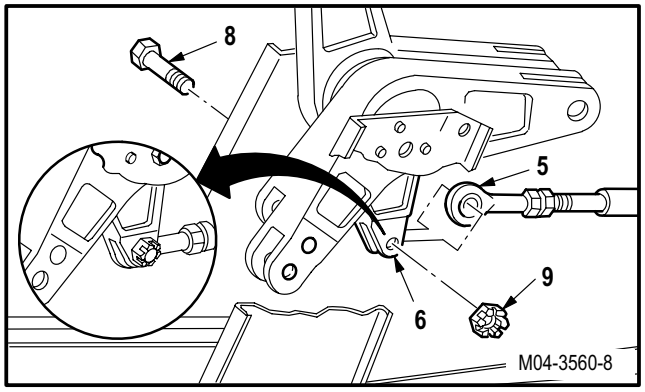
(1) Aline rod end (5) with bellcrank (6).

(2) Install bolt (8) through bellcrank (6) and rod end (5).

(3) Install nut (9) on bolt (8).

(4) Hold bolt (8). Torque nut (9) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.




c. **Install aft rod end (10) on bellcrank (6).** Torque nut (13) **14 to 18 INCH-POUNDS**.

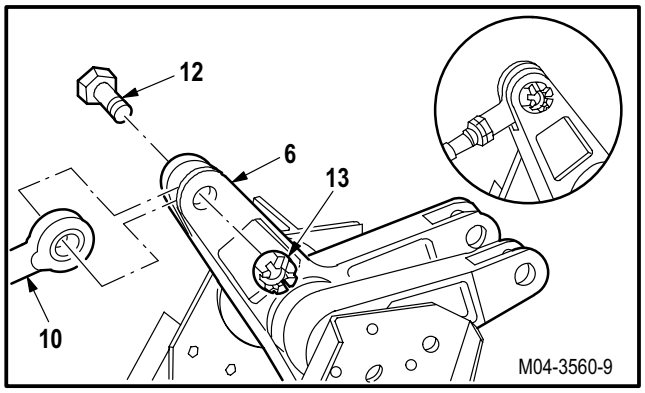
(1) Aline rod end (10) with bellcrank (6).

(2) Install bolt (12) through bellcrank (6) and rod end (10).

(3) Install nut (13) on bolt (12).

(4) Hold bolt (12). Torque nut (13) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.




**NOTE**

For No. 1 bellcrank installation, go to step g.

d. **Perform self-retaining bolt fit check** (para 11.1)**.**

GO TO NEXT PAGE

**4.162. PILOT POWER AVAILABLE SPINDLE BELLCRANKS REMOVAL/INSTALLATION - continued**

e. **Install forward rod end (14) on bellcrank (15).** Torque nut (18) **14 to 18 INCH-POUNDS**.

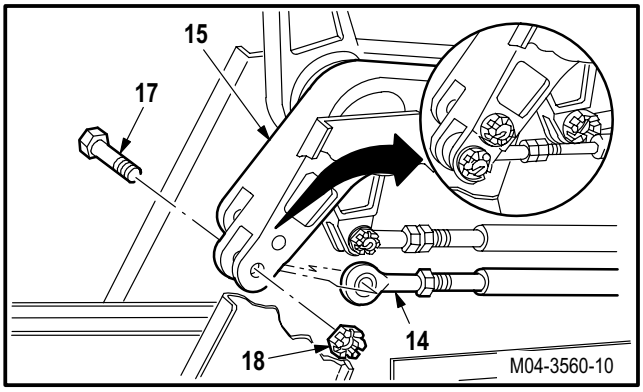
(1) Aline rod end (14) with bellcrank (15).

(2) Install bolt (17) through bellcrank (15) and rod end (14).

(3) Install nut (18) on bolt (17).

(4) Hold bolt (17). Torque nut (18) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.




f. **Install aft rod end (19) on bellcrank (15).** Torque nut (22) **14 to 18 INCH-POUNDS**.

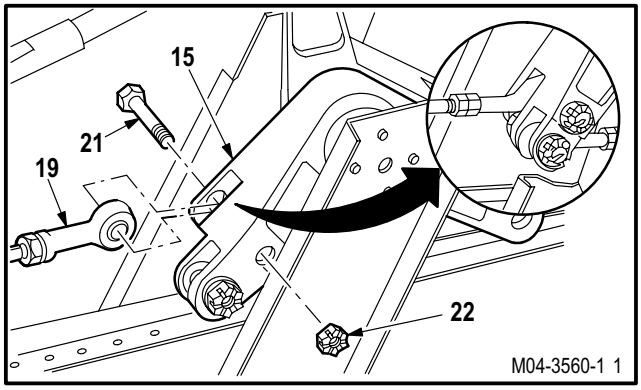
(1) Aline rod end (19) with bellcrank (15).

(2) Install bolt (21) through bellcrank (15) and rod end (19).

(3) Install nut (22) on bolt (21).

(4) Hold bolt (21). Torque nut (22) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.




g. **Perform self-retaining bolt fit check** (para 11.1)**.**

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## 4.162. PILOT POWER AVAILABLE SPINDLE BELLCRANKS REMOVAL/INSTALLATION - continued

h. **Install bellcranks (6) and (15).** Torque nut (3) **30 to 40 INCH-POUNDS**.

(1) Aline bellcrank (15) with inboard support (23).

(2) Install bolt (1) through inboard support (23) and bellcrank (15).

(3) Install spacer (2) on bolt (1) against bellcrank (15).

(4) Aline bellcrank (6) between spacer (2) and outboard support (24).

(5) Install bolt (1) through bellcrank (6) and outboard support (24).

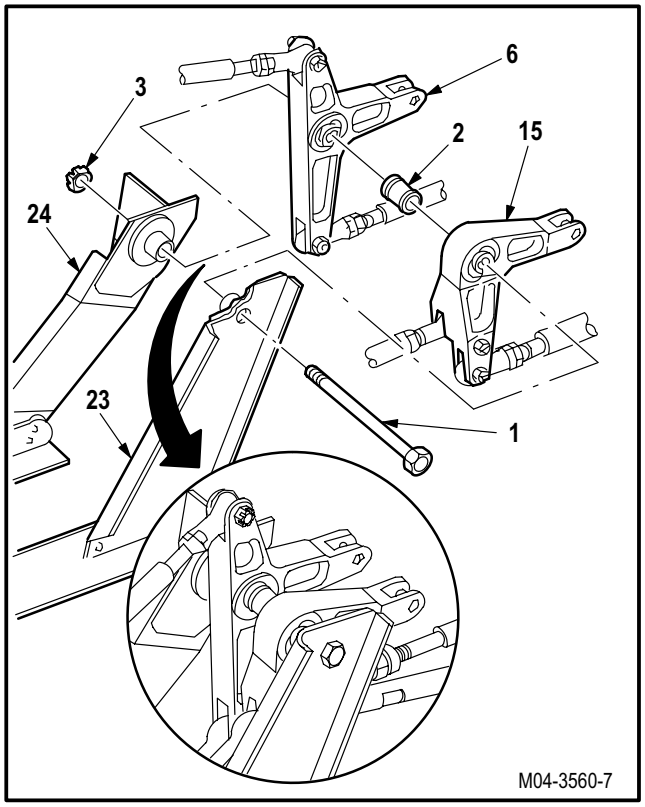
(6) Install nut (3) on bolt (1).

(7) Hold bolt (1). Torque nut (3) to **30 INCH-POUNDS**. Use torque wrench.

(8) Increase torque to aline cotter pin hole, but do not exceed **40 INCH-POUNDS**.

i. **Check radial play with bolt in bellcrank clevis hole.** Not to exceed **0.004 INCH**. Use dial indicator (TM 1-1500-204-23).

j. **Check radial play in ball bearing.** Not to exceed **0.004 INCH**. Use dial indicator (TM 1-1500-204-23).

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**4.162. PILOT POWER AVAILABLE SPINDLE BELLCRANKS REMOVAL/INSTALLATION - continued**

k. **Install new cotter pins (4), (7), (11), (16), and (20) in nuts (3), (9), (13), (18), and (22).**

l. **Inspect (QA).**

m. **Install pilot power quadrant** (para 4.166)**.**

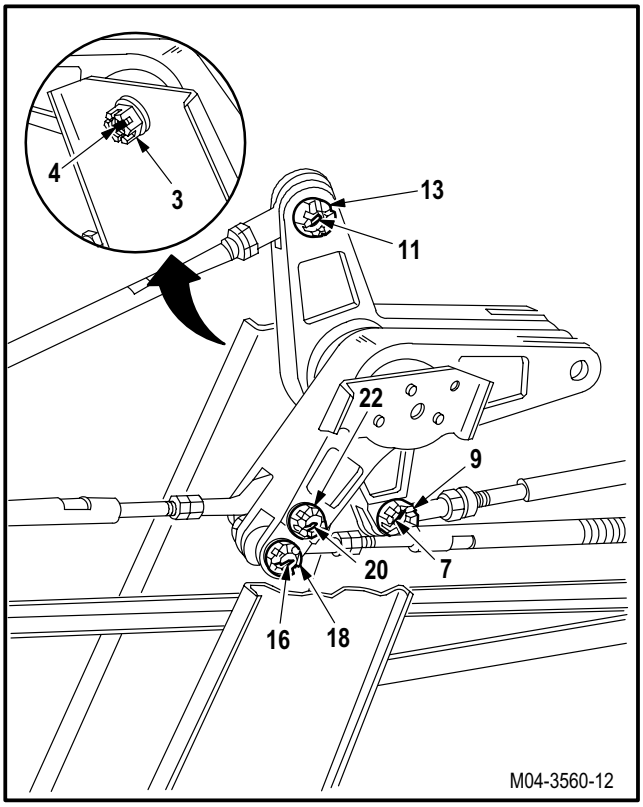
n. **Install pilot FUEL panel** (para 10.54)**.**

o. **Install pilot EXT LT/INTR LT panel** (para 9.62)**.**

p. **Install console panel PL5** (para 2.2)**.**

q. **Perform No. 1 power available spindle (PAS) rigging procedure** (para 4.182)**.**

r. **Perform No. 2 power available spindle (PAS) rigging procedure** (para 4.183)**.**




END OF TASK

## 4.163. NO. 1 AND NO. 2 POWER AVAILABLE SPINDLE CABLE SUPPORT BRACKET REMOVAL/INSTALLATION (PILOT TO CPG)

4.163.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.163.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

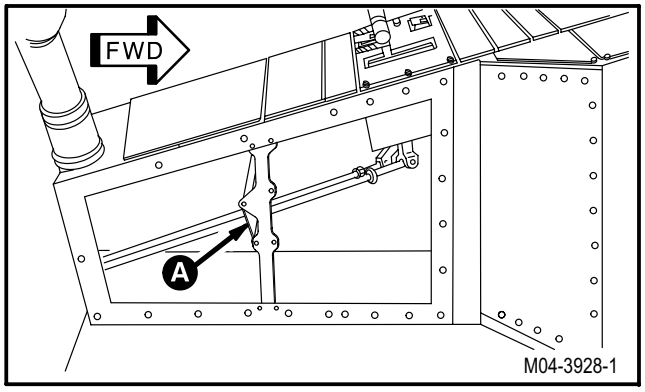
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.158 | No. 1 engine power available spindle cable (pilot to CPG) removed |
| 4.160 | No. 2 engine power available spindle cable (pilot to CPG) removed |



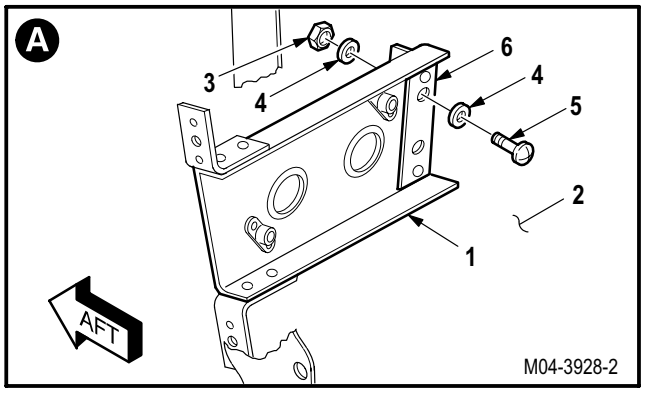

4.163.3. Removal

a. **Remove support bracket (1) from airframe (2).**

(1) Remove two nuts (3) and washers (4) from screws (5).

(2) Remove two screws (5) and washers (4) from support bracket (1) and bracket (6).

(3) Remove support bracket (1).

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## 4.163. NO. 1 AND NO. 2 POWER AVAILABLE SPINDLE CABLE SUPPORT BRACKET REMOVAL/INSTALLATION (PILOT TO CPG) - continued

4.163.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.163.5. Inspection

a. **Check support bracket for cracks.** None allowed.

b. **Check support bracket for corrosion** (para 1.49)**.**

c. **Check support bracket for damaged nut plates** (TM 1-1500-204-23)**.** None allowed.

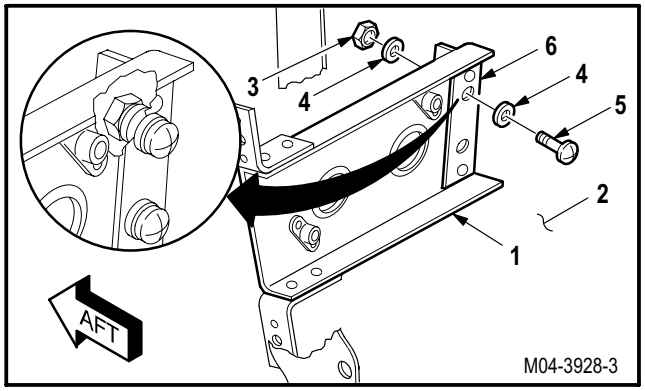
4.163.6. Installation

a. **Install support bracket (1) on airframe (2).**

(1) Position support bracket (1).

(2) Install two screws (5) through washers (4), bracket (6), and support bracket (1).

(3) Install two washers (4) and nuts (3) on two screws (5).




b. **Inspect (QA).**

c. **Install No. 1 engine power available spindle cable (pilot to CPG)** (para 4.159)**.**

d. **Install No. 2 engine power available spindle cable (pilot to CPG)** (para 4.161)**.**

END OF TASK

## 4.164. NO. 1 OR NO. 2 POWER AVAILABLE SPINDLE CABLE CONNECTING LINKS REMOVAL/INSTALLATION

4.164.1. Description

This task covers: Removal. Cleaning. Inspection. Installation

4.164.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

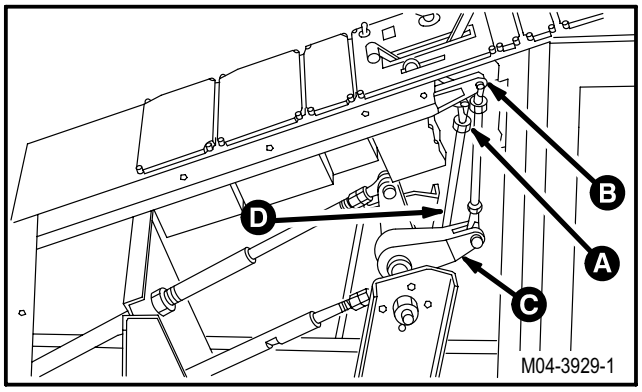
Cotter pin (4)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Console panels PL1 and PL3 removed |




4.164.3. Removal

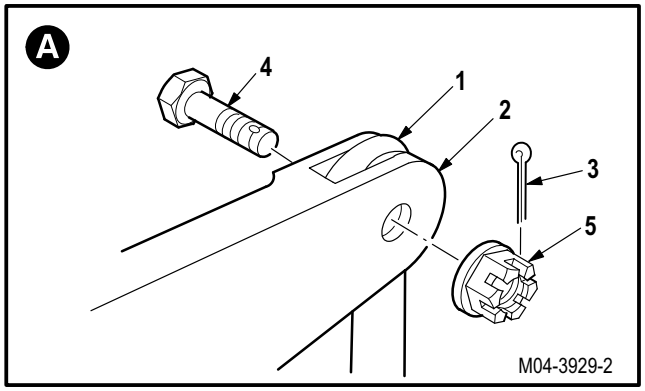
a. **Remove rod end (1) from No. 1 power lever (2).**

(1) Position power lever (2) in **LOCKOUT** position.

(2) Remove and discard cotter pin (3).

(3) Hold bolt (4). Remove nut (5).

(4) Remove bolt (4) from power lever (2) and rod end (1).

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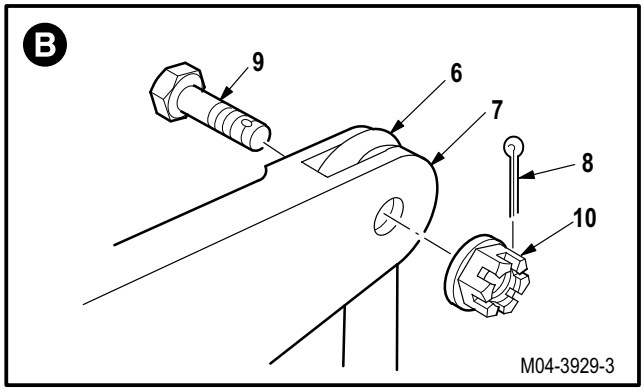
## 4.164. NO. 1 OR NO. 2 POWER AVAILABLE SPINDLE CABLE CONNECTING LINKS REMOVAL/INSTALLATION - continued

b. **Remove rod end (6) from No. 2 power lever (7).**

(1) Remove and discard cotter pin (8).

(2) Hold bolt (9). Remove nut (10).

(3) Remove bolt (9) from power lever (7) and rod end (6).

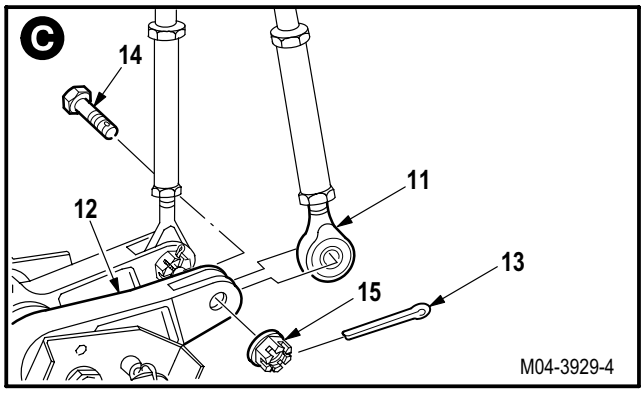



c. **Remove No. 2 rod end (11) from bellcrank (12).**

(1) Remove and discard cotter pin (13).

(2) Hold bolt (14). Remove nut (15).

(3) Remove bolt (14) from bellcrank (12) and rod (11).

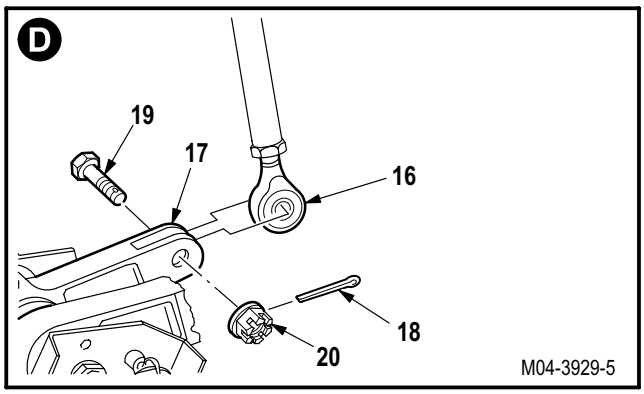



d. **Remove No. 1 rod end (16) from bellcrank (17).**

(1) Remove and discard cotter pin (18).

(2) Hold bolt (19). Remove nut (20).

(3) Remove bolt (19) from bellcrank (17) and rod (16).




4.164.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.164.5. Inspection

a. **Check connecting links for cracks.** None allowed.

b. **Check connecting links for corrosion** (para 1.49)**.**

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## 4.164. NO. 1 OR NO. 2 POWER AVAILABLE SPINDLE CABLE CONNECTING LINKS REMOVAL/INSTALLATION - continued

4.164.6. Installation

**NOTE**

Nuts (15) and (20) should be finger tight only if rigging is to be performed.

a. **Install No. 1 rod end (16) on bellcrank (17).** Torque nut (20) **14 to 18 INCH-POUNDS**.

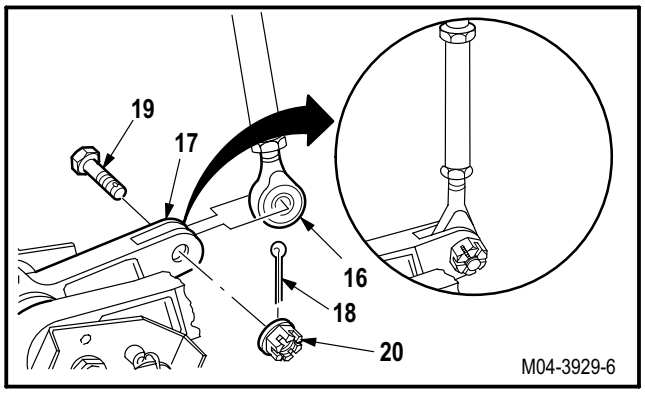
(1) Install bolt (19) through bellcrank (17) and rod end (16).

(2) Install nut (20) on bolt (19).

(3) Hold bolt (19). Torque nut (20) **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (18).




b. **Install No. 2 rod end (11) on bellcrank (12).** Torque nut (15) **14 to 18 INCH-POUNDS**.

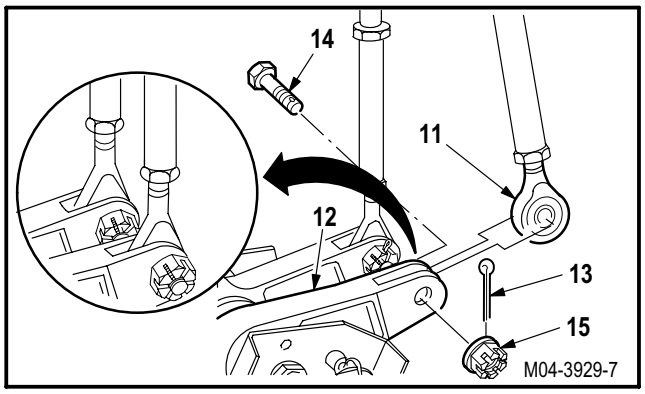
(1) Install bolt (14) through bellcrank (12) and rod (11).

(2) Install nut (15) on bolt (14).

(3) Hold bolt (14). Torque nut (15) **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (13).

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## 4.164. NO. 1 OR NO. 2 POWER AVAILABLE SPINDLE CABLE CONNECTING LINKS REMOVAL/INSTALLATION - continued

c. **Install rod end (1) on No. 1 power lever (2).** Torque nut (5) **14 to 18 INCH-POUNDS**.

(1) Position power lever (2) to **LOCKOUT**.

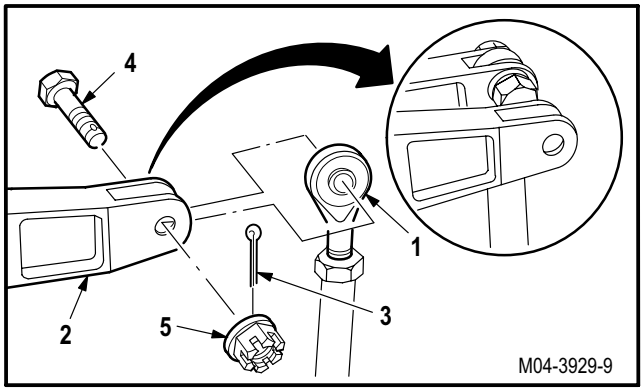
(2) Install bolt (4) through power lever (2) and rod end (1).

(3) Install nut (5) on bolt (4).

(4) Hold bolt (4). Torque nut (5) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (3).




d. **Install rod end (6) on No. 2 power lever (7).** Torque nut (10) **14 to 18 INCH-POUNDS**.

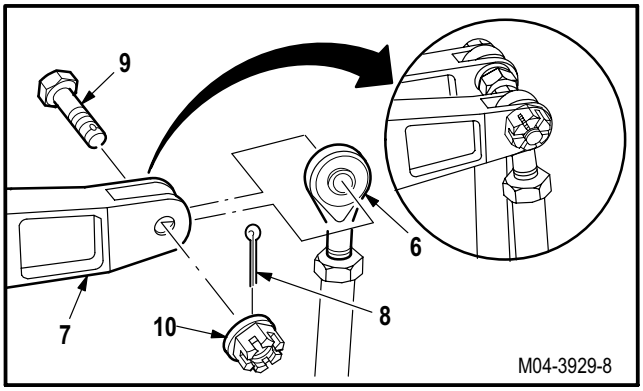
(1) Install bolt (9) through power lever (7) and rod end (6).

(2) Install nut (10) on bolt (9).

(3) Hold bolt (9). Torque nut (10) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (8).




e. **Inspect (QA).**

f. **Perform No. 1 engine power available spindle rigging procedure** (para 4.182) **or No. 2 engine power available spindle rigging procedure** (para 4.183)**.**

g. **Install console panels PL1 and PL3** (para 2.2)**.**

END OF TASK

## 4.165. NO. 1 OR NO. 2 POWER AVAILABLE SPINDLE CABLE CONNECTING LINKS DISASSEMBLY/ASSEMBLY

4.165.1. Description

This task covers: Disassembly. Assembly.

4.165.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.164 | No. 1 or No. 2 power available spindle cable connecting links removed |

4.165.3. Disassembly

a. **Remove rod end (1) from connecting link (2).**

(1) Remove lockwire from jamnut (3) and link (2).

(2) Hold link (2). Loosen jamnut (3).

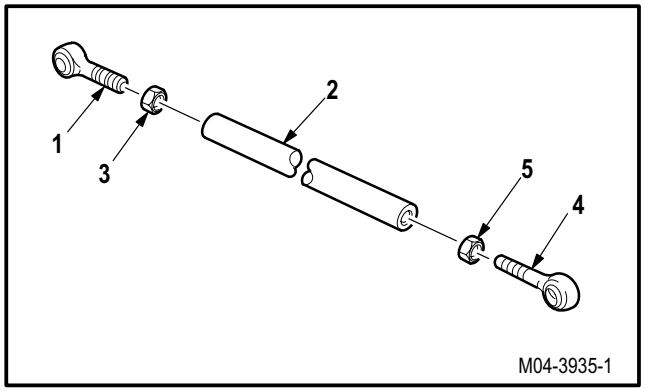
(3) Remove rod end (1) and jamnut (3).

b. **Remove rod end (4) from link (2).**

(1) Remove lockwire from jamnut (5) and link (2).

(2) Hold link (2). Loosen jamnut (5).

(3) Remove rod end (4) and jamnut (5).




4.165.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

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## 4.165. NO. 1 OR NO. 2 POWER AVAILABLE SPINDLE CABLE CONNECTING LINKS DISASSEMBLY/ASSEMBLY - continued

4.165.5. Inspection

a. **Check rod for cracks or damaged threads.** None allowed.

b. **Check rod ends for damaged threads.** None allowed.

4.165.6. Assembly

**NOTE**

Jamnuts should be finger tight only. Final adjustment and torquing of rod ends and lockwire will be performed during rigging.

a. **Install rod end (4) on link (2).**

(1) Install jamnut (5) on rod end (4).

(2) Install rod end (4) **0.50 INCHES** in link (2).

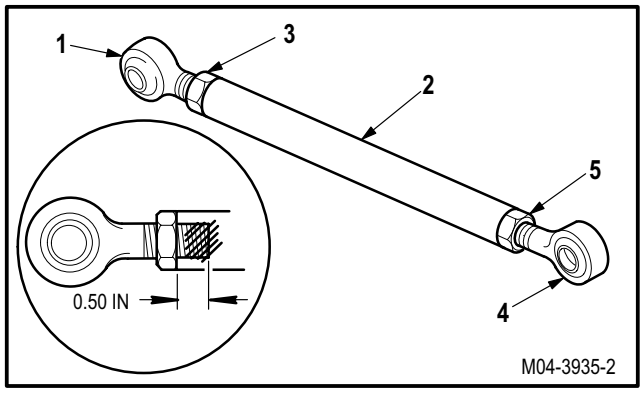
b. **Install rod end (1) on link (2).**

(1) Install jamnut (3) on rod end (1).

(2) Install rod end (1) **0.50 INCHES** in link (2).

c. **Inspect (QA).**

d. **Install No. 1 or No. 2 power available spindle cable connecting link** (para 4.164)**.**




END OF TASK

## 4.166. PILOT POWER QUADRANT REMOVAL/INSTALLATION

4.166.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.166.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
7/8 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 86, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

**Materials/Parts:**

Cotter pin (2)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Console panels PL1 and PL3 removed |

**NOTE**

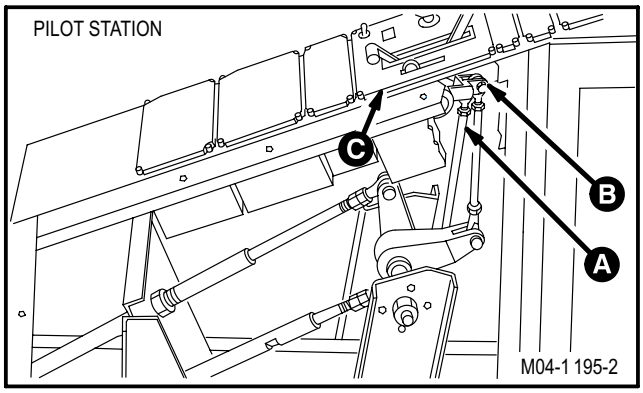
This task is typical for removal of both pilot power quadrants (P/N 53065-11 and P/N C82051-1). P/N 53065-11 is illustrated.

4.166.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot forward circuit breaker panel, open EMER HYD, RTR BRK, and LT ENG START circuit breakers.**

c. **On pilot center circuit breaker panel, open LT PRI circuit breaker.**

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## 4.166. PILOT POWER QUADRANT REMOVAL/INSTALLATION - continued

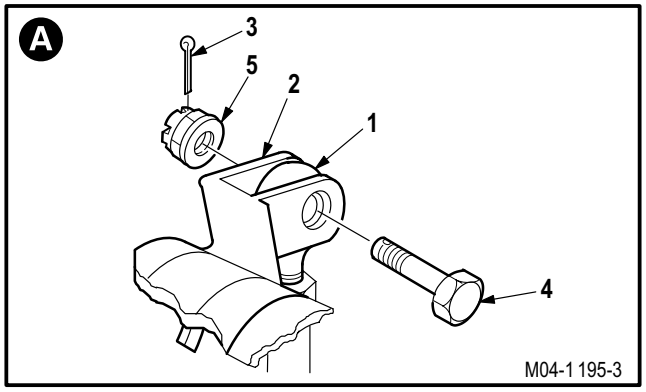
d. **Remove rod end (1) from No. 1 power lever (2).**

(1) Set power lever (2) to **LOCKOUT**.

(2) Remove and discard cotter pin (3).

(3) Hold bolt (4). Remove nut (5).

(4) Remove bolt (4) from power lever (2) and rod end (1).

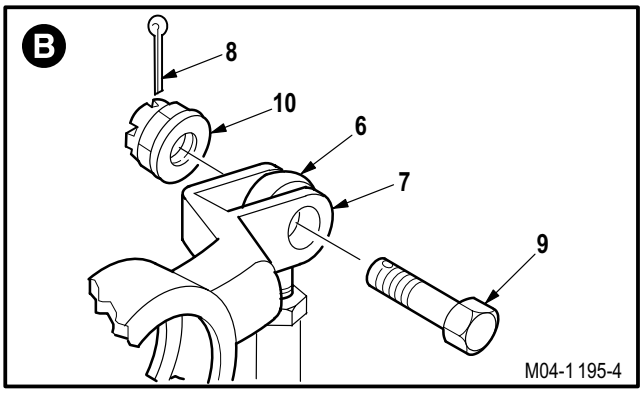



e. **Remove rod end (6) from No. 2 power lever (7).**

(1) Remove and discard cotter pin (8).

(2) Hold bolt (9). Remove nut (10).

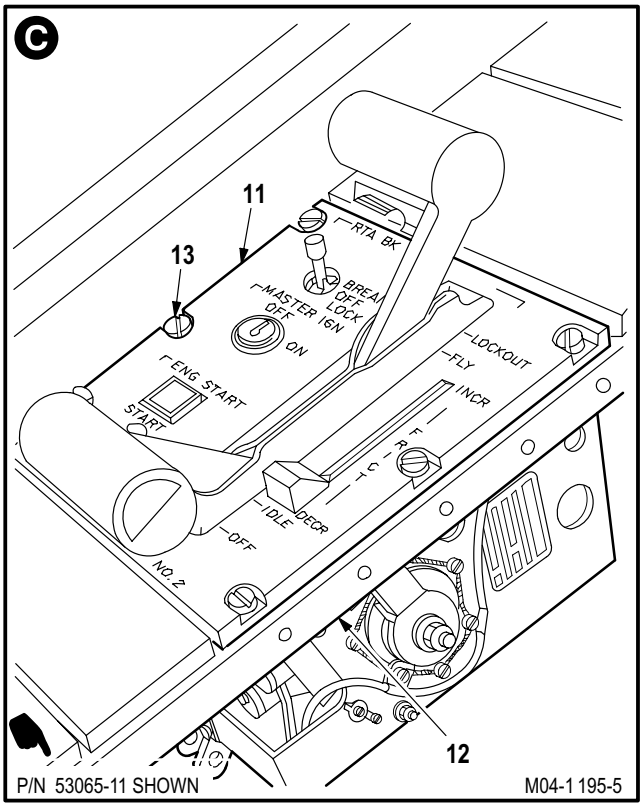
(3) Remove bolt (9) from power lever (7) and rod end (6).




f. **Remove power quadrant (11) from console (12).**

(1) Unlock six quarter turn fasteners (13).

(2) Lift power quadrant (11) from console (12).

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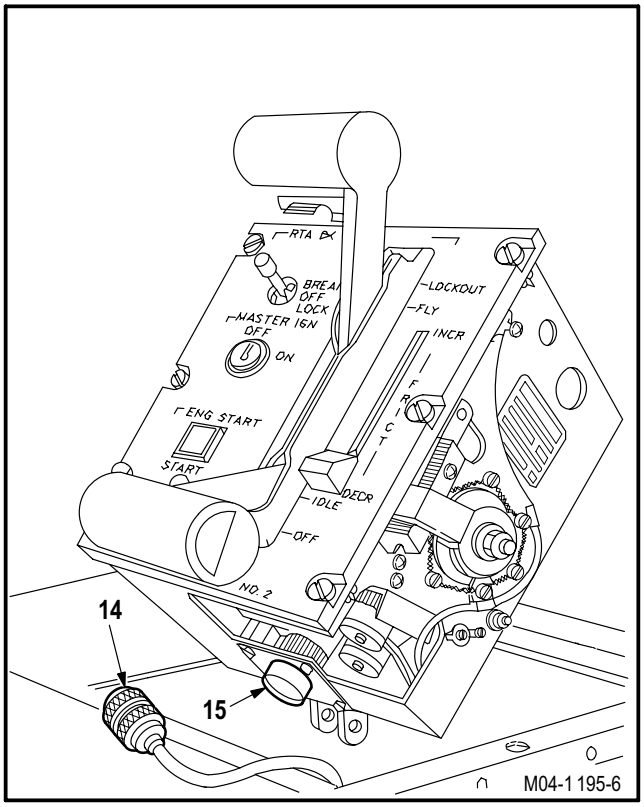
## 4.166. PILOT POWER QUADRANT REMOVAL/INSTALLATION - continued

g. **Detach connector P173 (14) from receptacle J1 (15).**




4.166.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.166.5. Inspection

a. **Check power quadrant for cracks.** None allowed.

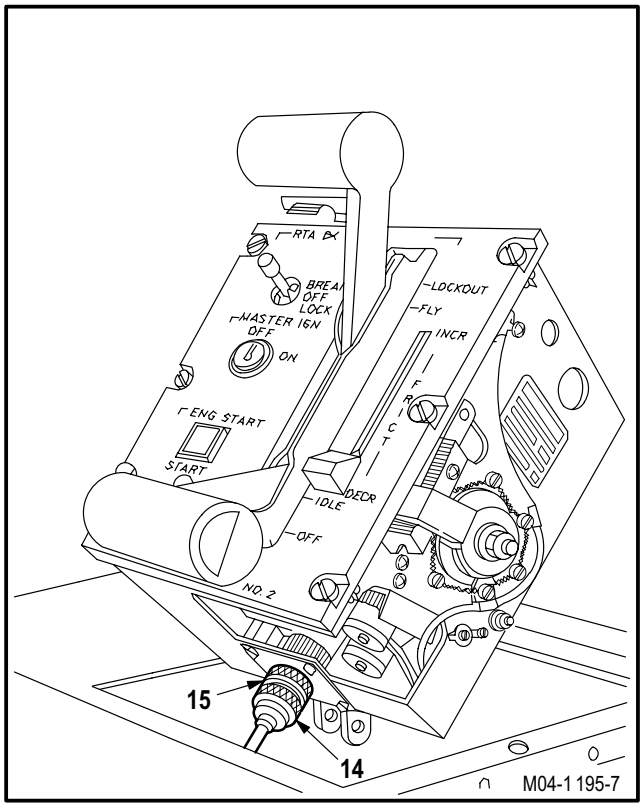
b. **Check connector P173 and receptacle J1 for damage** (TM 55-1500-323-24)**.**

c. **Check power quadrant for corrosion** (para 1.49)**.**

4.166.6. Installation

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **Attach connector P173 (14) to power quadrant receptacle J1 (15).**

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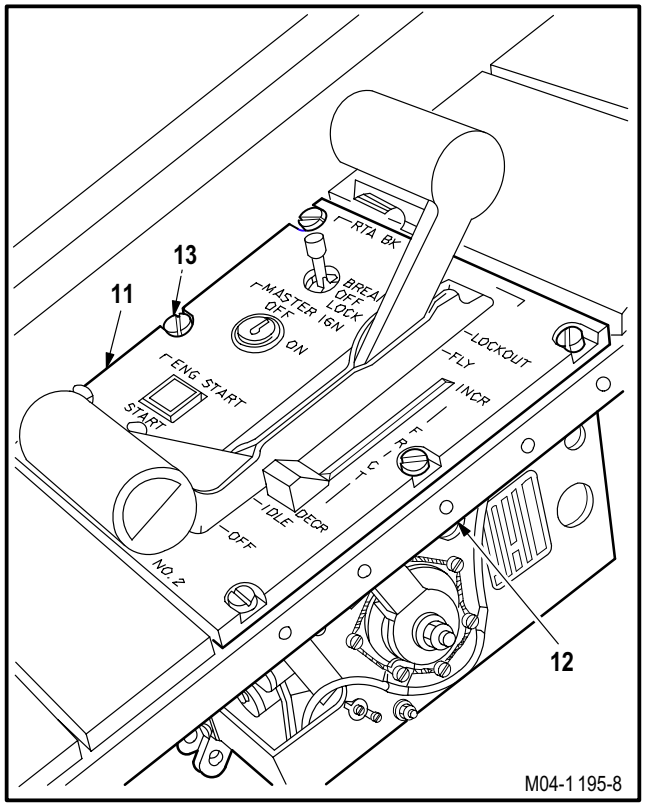
## 4.166. PILOT POWER QUADRANT REMOVAL/INSTALLATION - continued

c. **Install quadrant (11) in console (12).**

(1) Lock six quarter turn fasteners (13).




d. **Install rod end (1) on No. 1 power lever (2).** Torque nut (5) **14 to 18 INCH-POUNDS**.

(1) Set No. 1 power lever (2) to **LOCKOUT**.

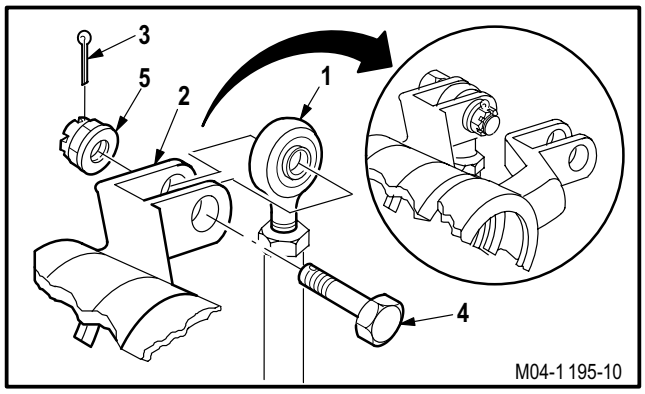
(2) Install bolt (4) through power lever (2) and rod end (1).

(3) Install nut (5) pon bolt (4).

(4) Hold bolt (4). Torque nut (5) to **14 INCH-POUNDS**. Use torque wrench and crowfoot.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (3).

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**4.166. PILOT POWER QUADRANT REMOVAL/INSTALLATION - continued**

e. **Install rod end (6) on No. 2 power lever (7).** Torque nut (10) **14 to 18 INCH-POUNDS**.

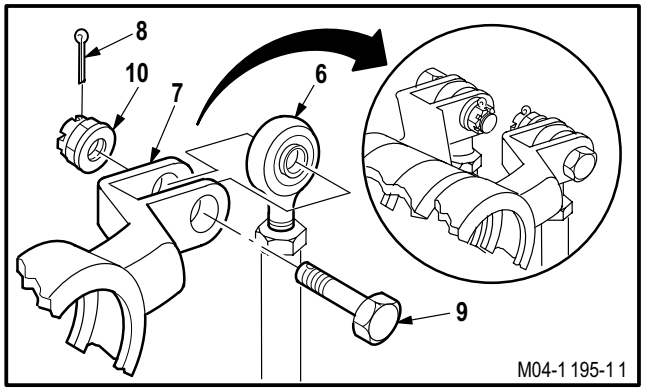
(1) Install bolt (9) through power lever (7) and rod end (6).

(2) Install nut (10) on bolt (9)..

(3) Hold bolt (9). Torque nut (10) to **14 INCH-POUNDS**. Use torque wrench and crowfoot.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (8).




f. **Inspect (QA).**

g. **Perform power plants maintenance operational check (engine 1 and engine 2)** (TM 1-1520-238-T)**.**

h. **Install panels PL1 and PL3** (para 2.2)**.**

END OF TASK

## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM)

4.167.1. Description

This task covers: Disassembly. Cleaning. Inspection. Repair. Assembly. Adjustment.

4.167.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Electric gun type heater (item 163, App H)
10-ton hydraulic hand operated arbor press (item 236, App H)
0.0 - 50.0-pound weighing scale (item 273, App H)

**Materials/Parts:**

Wax pencil (item 137, App F)
Primer coating (item 147, App F)
Wire (item 226, App F)

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**References:**

TM 55-1500-322-24
TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.188 | Pilot power quadrant light indicating panel removed |

**NOTE**

This task is applicable to disassembly and assembly of pilot power quadrant P/N 53065-11 only.

4.167.3. Disassembly

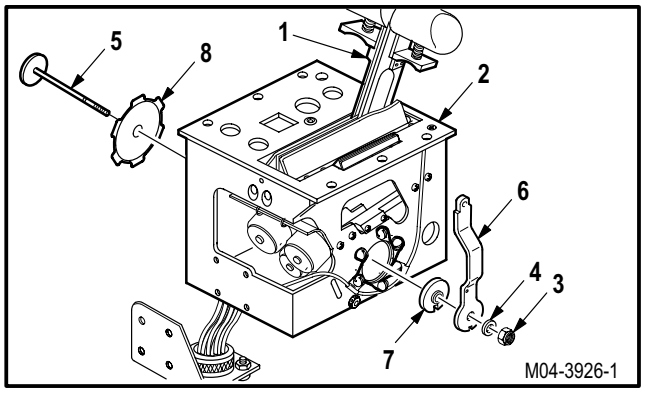
a. **Remove power lever assembly (1) from power quadrant (2).**

(1) Remove nut (3) and washer (4) from friction lever shaft (5).

(2) Remove friction lever (6) and friction lever hub (7) from shaft (5) and quadrant (2).

(3) Remove shaft (5) and quadrant friction disk (8) from lever assembly (1).

(4) Remove disk (8) from shaft (5).

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

**NOTE**

Power lever handle has spring tension from the trigger release spring. To prevent loss of spring, hold spring while removing handle.

(5) Remove left power handle (9) from power lever (10).

(a) Hold handle (9). Remove screw (11).

(b) Hold spring (12). Remove handle (9).

(6) Remove right power handle (13) from power lever (14).

(a) Hold handle (13). Remove screw (15).

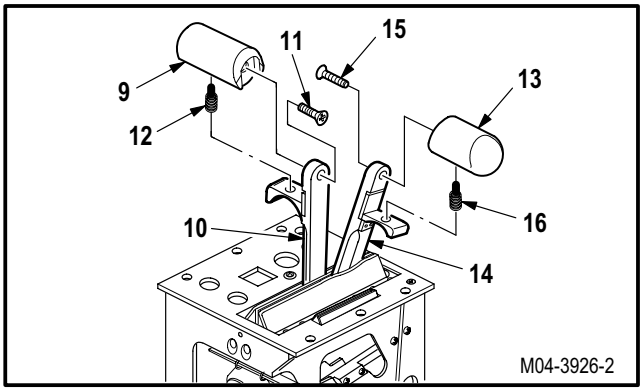
(b) Hold spring (16). Remove handle (13).

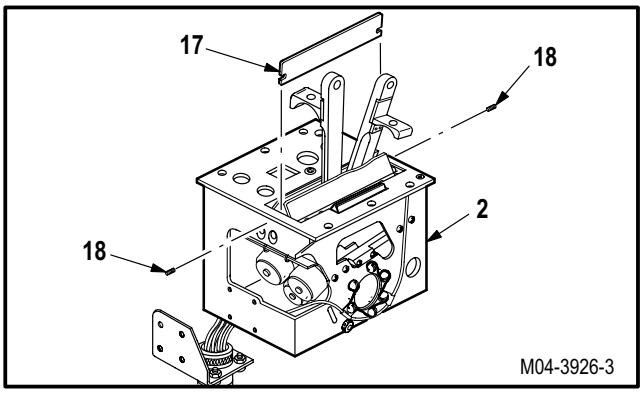
(7) Remove seal separator (17) from quadrant (2).

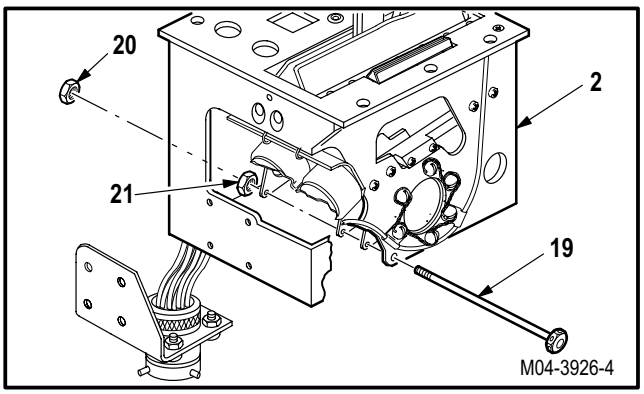
(a) Loosen two set screws (18). Remove separator (17).

(8) Remove bolt (19) from quadrant (2).

(a) Remove bolt (19) from nut (20), jam nut (21), and quadrant (2).



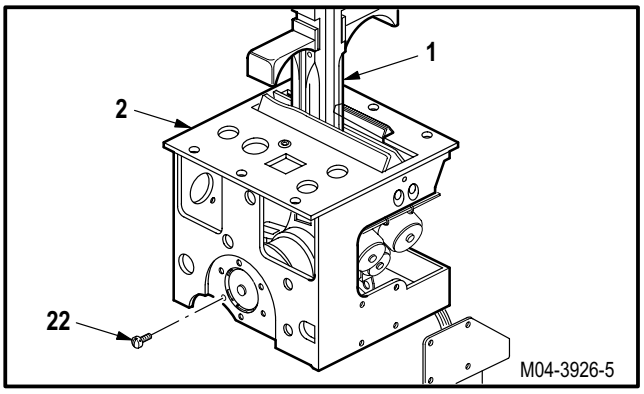




(9) Remove six screws (22) holding lever assembly (1) on left side of quadrant (2).

(a) Remove lockwire.

(b) Remove six screws (22).

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

(10) Remove four screws (23) holding lever assembly (1) on right side of quadrant (2).

(a) Remove lockwire.

(b) Remove four screws (23).

(11) Remove two screws (24) holding lever assembly (1) on right side of quadrant (2).

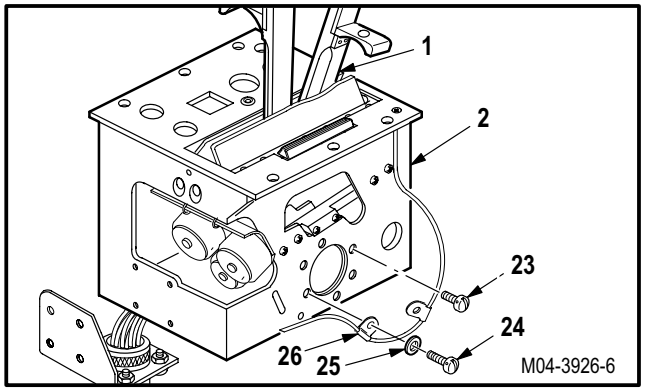
(a) Remove lockwire.

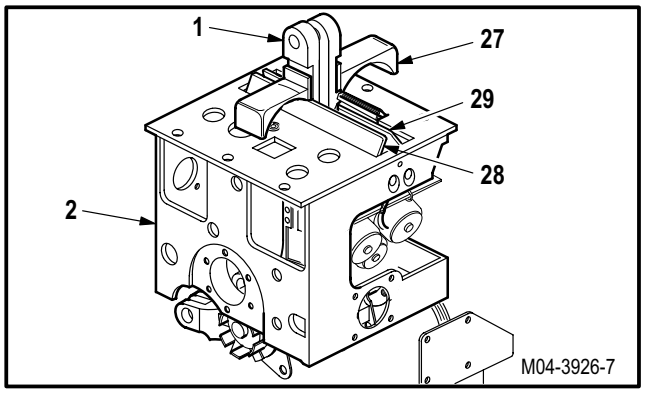
(b) Remove two screws (24), washers (25), and wire clamps (26) from quadrant (2).

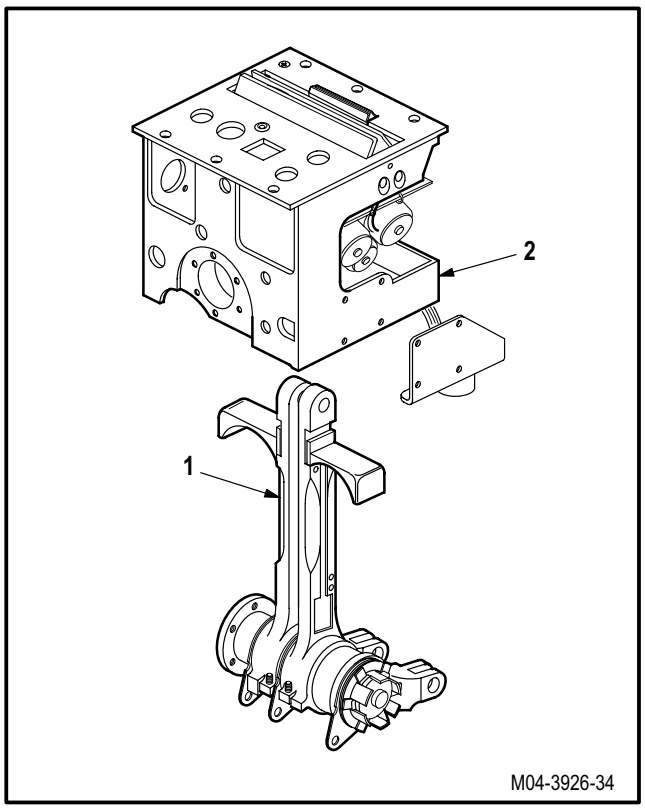
(12) Remove lever assembly (1) from quadrant (2).

(a) Slide lever assembly (1) out of quadrant (2) until trigger releases (27) contact left and right rubber seals (28) and (29).

(b) Rotate lever assembly (1) 90 degrees counterclockwise and remove from quadrant (2).




b. **Remove pilot power quadrant ignition lock switch** (para 4.192)**.**

c. **Remove pilot power quadrant panel - RTR BRK switch** (para 4.189)**.**

d. **Remove pilot power quadrant panel - ENG START ADVISORY switch** (para 4.190)**.**

e. **Remove pilot power quadrant panel - No. 1 and No. 2 ENG IGN OVRD switches** (para 4.191)**.**

f. **Remove pilot power quadrant panel - No. 1 engine interlock switch** (para 4.193)**.**

g. **Remove pilot power quadrant panel - No. 2 engine interlock switch** (para 4.194)**.**

h. **Disassemble power lever assembly (1).**

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

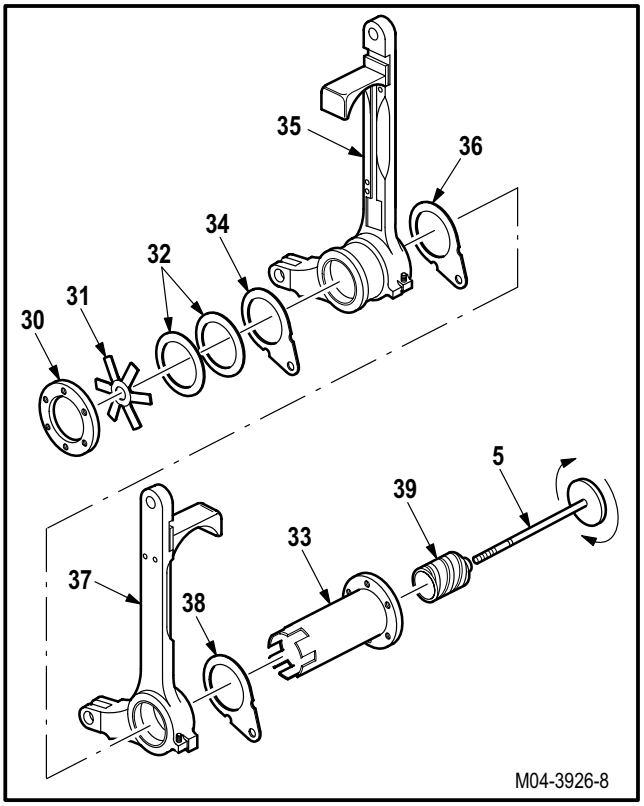
(1) Remove support flange (30) tension washer (31) and two flat washers (32) from power lever shaft (33).

(2) Remove friction disk (34) and left lever (35) from lever shaft (33).

(3) Remove friction disk (36), right lever (37), and friction disk (38) from lever shaft (33).

(4) Remove quadrant hub (39) from lever shaft (33).

(a) Using splined end of shaft (5), rotate quadrant hub (39) clockwise.




**NOTE**

The following step is typical for right or left power levers.

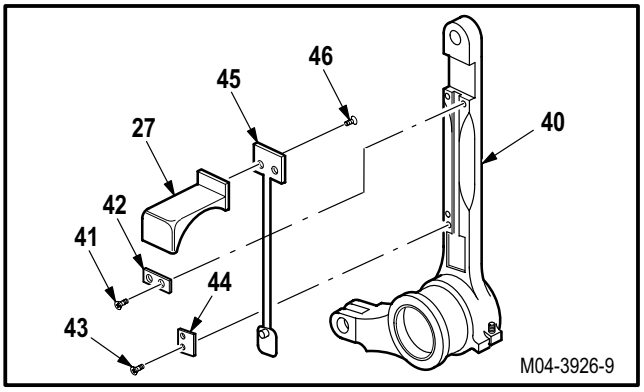
(5) Remove trigger release (27) from power lever (40).

(a) Remove two screws (41) and upper retaining plate (42) from lever (40).

(b) Remove two screws (43) and lower retaining plate (44) from lever (40).

(c) Remove bar (45) from lever (40).

(d) Remove two screws (46) from bar (45) and trigger release (27).

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

i. **Remove left seal retainer (47) from quadrant (2).**

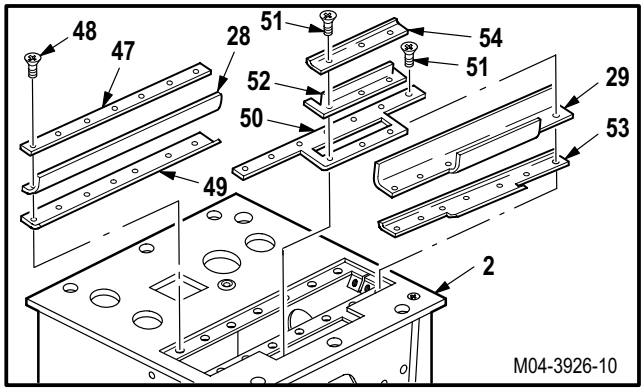
(1) Remove seven screws (48) from retainer (47) and quadrant (2).

(2) Remove retainer (47), rubber seal (28), and seal support (49).

j. **Remove right seal retainer (50) from quadrant (2).**

(1) Remove ten screws (51) from retainer (50) and quadrant (2).

(2) Remove retainer (50), rubber seals (29) and (52), and seal supports (53) and (54).




k. **Remove forward support plate (55) from quadrant (2).**

(1) Remove two screws (56) from plate (55) and stop mechanism (57).

(2) Remove two locknuts (58) from screws (59).

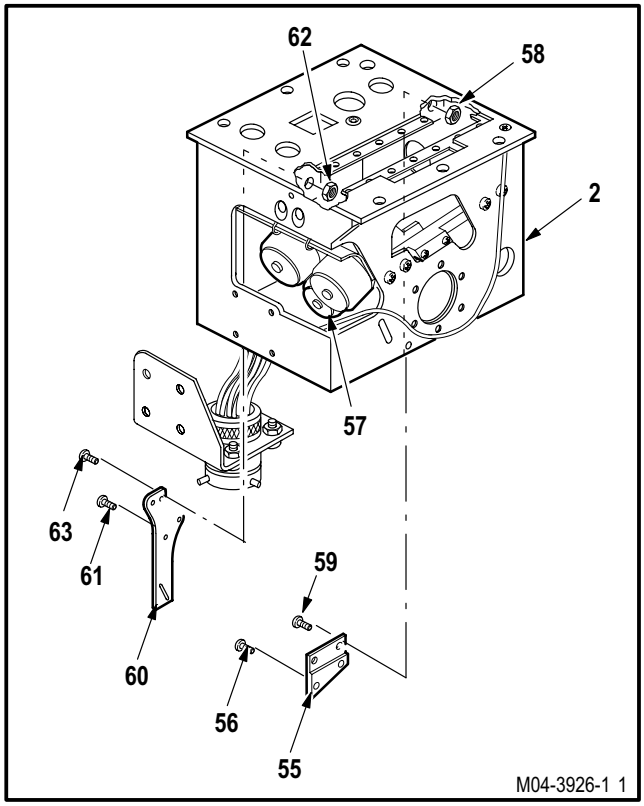
(3) Remove two screws (59) and plate (55) from quadrant (2).

l. **Remove aft support plate (60) from quadrant (2).**

(1) Remove two screws (61) from plate (60) and stop mechanism (57).

(2) Remove two locknuts (62) from screws (63).

(3) Remove two screws (63) and plate (60) from quadrant (2).

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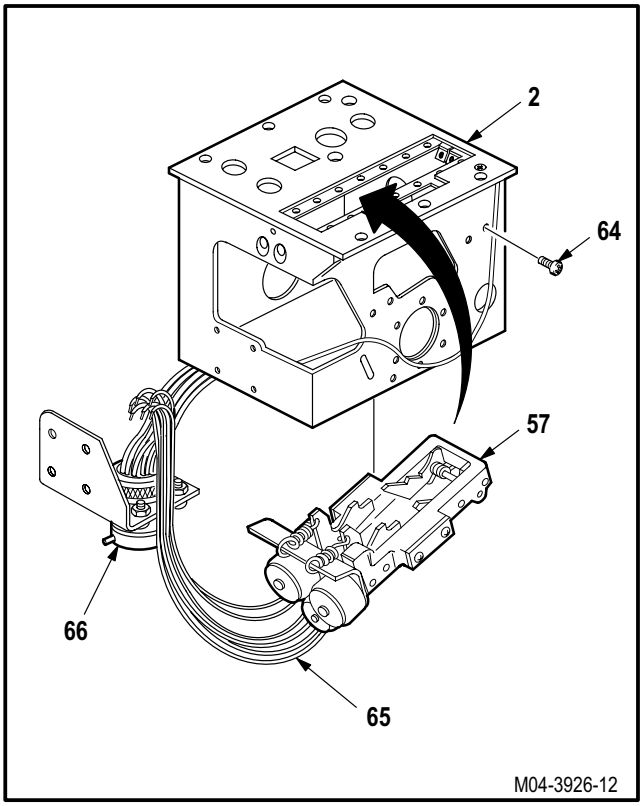
## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

m. **Remove stop mechanism (57) from quadrant (2).**

(1) Remove four screws (64) from quadrant (2) and stop mechanism (57).

(2) Remove stop mechanism (57) from quadrant (2).

(3) Identify and depin six wires (65) from connector J1 (66) (TM 55-1500-323-24).

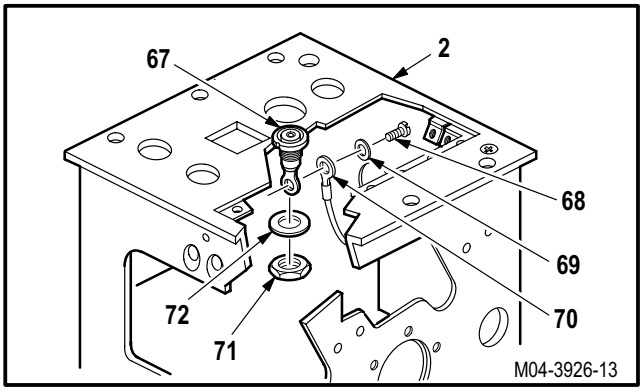



n. **Remove light indicating panel connector (67) from quadrant (2).**

(1) Remove screw (68), washer (69), and wire end (70) from connector (67).

(2) Remove nut (71) and washer (72) from connector (67).

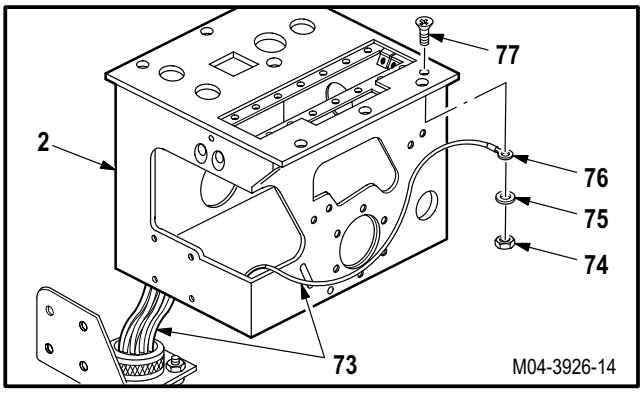
(3) Remove connector (67) from quadrant (2).




o. **Remove wire harness (73) and connector J1 (66) from quadrant (2).**

(1) Remove locknut (74), washer (75), and ground wire end (76) from screw (77).

(2) Remove screw (77) from quadrant (2).

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**4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued**

p. **Remove wire harness (73) from connector J1 (66).**

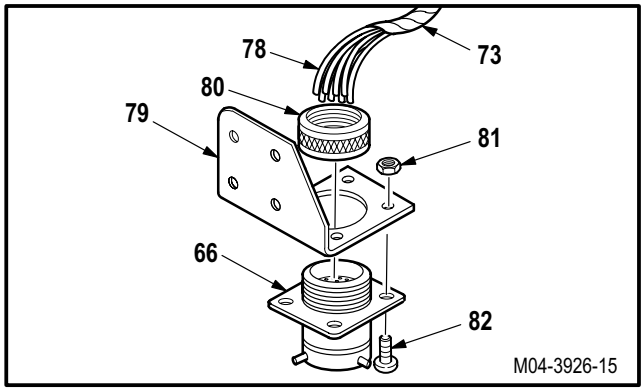
(1) Identify and depin eight wires (78) from connector (66) (TM 55-1500-323-24).

q. **Remove connector J1 (66) from angle bracket (79).**

(1) Remove connector backshell (80) from connector (66).

(2) Remove four nuts (81) from screws (82).

(3) Remove four screws (82) and connector (66) from angle bracket (79).




4.167.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.167.5. Inspection

a. **Check housing assembly for cracks.** None allowed.

b. **Check levers for cracks.** None allowed.

c. **Check bushings in left and right levers for damage** (TM 55-1500-322-24)**.**

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

4.167.6. Repair

**WARNING**

**Do not place heater near flammable material or allow heater to contact skin: severe burns can result. Wear protective equipment. If injury occurs, seek medical aid.**

a. **Remove two bushings (83) from left power lever (35)** (TM 55-1500-322-24)**.**

(1) Heat area of power lever (35) surrounding bushings (83). Use heater.

(2) Press bushings (83) out of left power lever (35). Use arbor press.

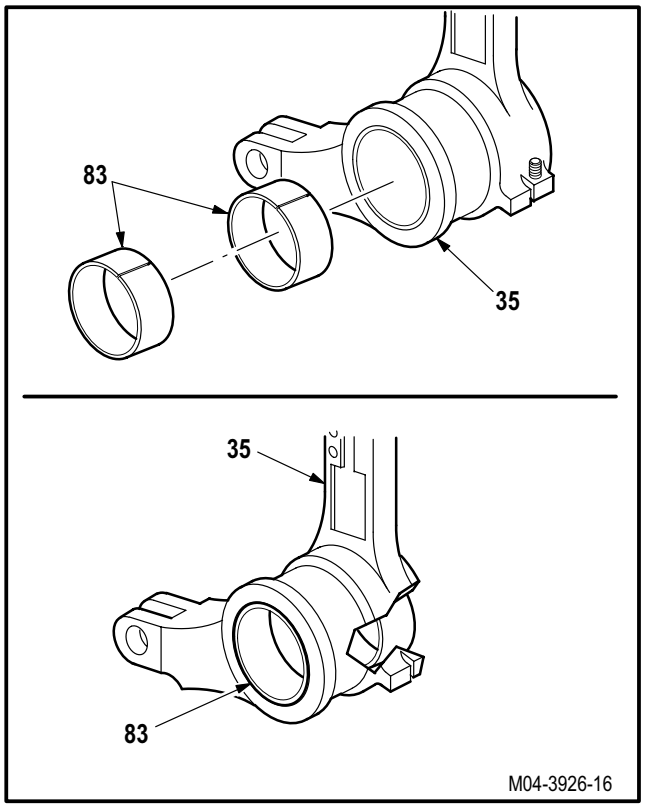
b. **Install two bushings (83) in left power lever (35)** (TM 55-1500-322-24)**.**

(1) Heat area of power lever (35) surrounding bushings (83). Use heater.

(2) Apply primer to outer edge of bushings (83). Use primer coating (item 147, App F).

(3) Press bushing (83) in left side of left power lever (35). Use arbor press.

(4) Press bushing (83) in right side of left power lever (35). Use arbor press.

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

c. **Remove bushing (84) from right power lever (37)** (TM 55-1500-322-24)**.**

(1) Heat area of power lever (37) surrounding bushing (84). Use heater.

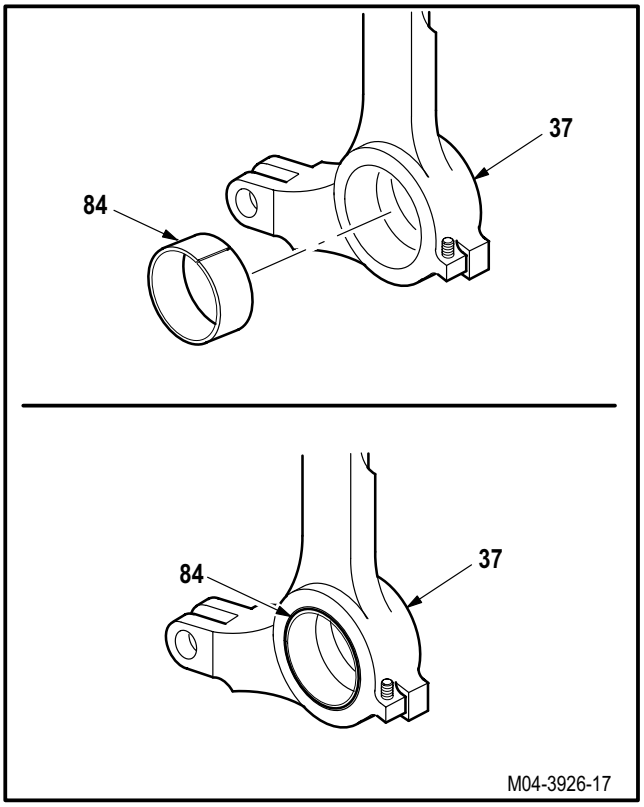
(2) Press bushing (84) out of right power lever (37). Use arbor press.

d. **Install bushing (84) in right power lever (37)** (TM 55-1500-322-24)**.**

(1) Heat area of power lever (37) surrounding bushing (84). Use heater.

(2) Apply primer to outer edge of bushing (84). Use primer coating (item 147, App F).

(3) Press bushing (84) in right power lever (37). Use arbor press.




4.167.7. Installation

a. **Install connector J1 (66) on angle bracket (79).**

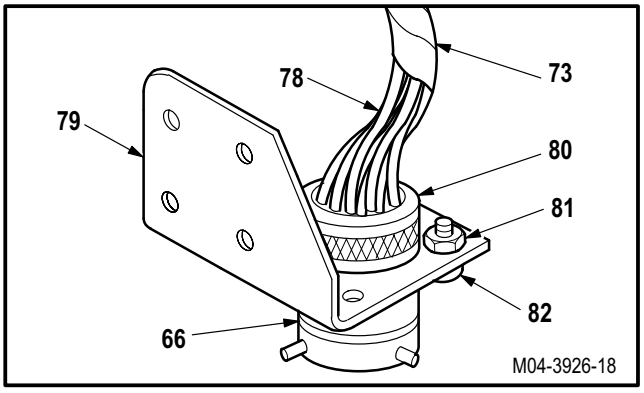
(1) Install four screws (82) through connector (66) and angle bracket (79).

(2) Install four nuts (81) on screws (82).

(3) Install connector backshell (80) on connector (66).

b. **Install wire harness (73) in connector J1 (66).**

(1) Pin identified wires (78) in connector (66) (TM 55-1500-323-24).

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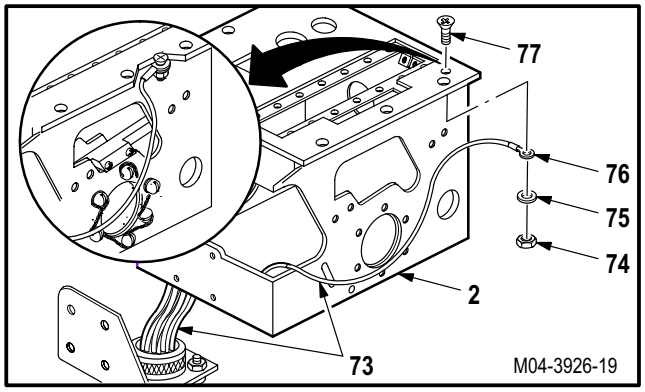
## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

c. **Install wire harness (73) and connector J1 (66) in quadrant (2).**

(1) Install screw (77) through quadrant (2), ground wire end (76), and washer (75).

(2) Install locknut (74) on screw (77).

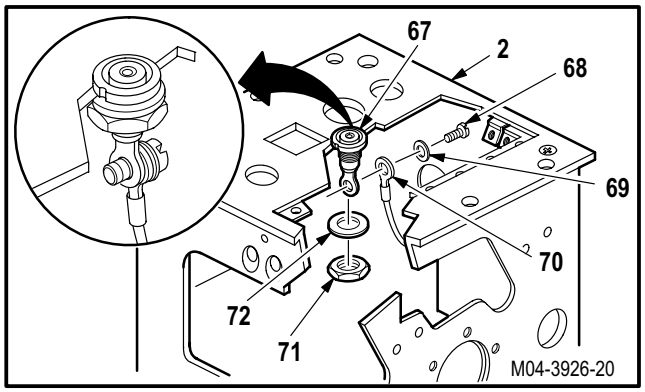



d. **Install light indicating panel connector (67) in quadrant (2).**

(1) Position connector (67) in quadrant (2).

(2) Install washer (72) and nut (71) on connector (67).

(3) Install screw (68) through washer (69) and wire end (70) into connector (67).




**CAUTION**

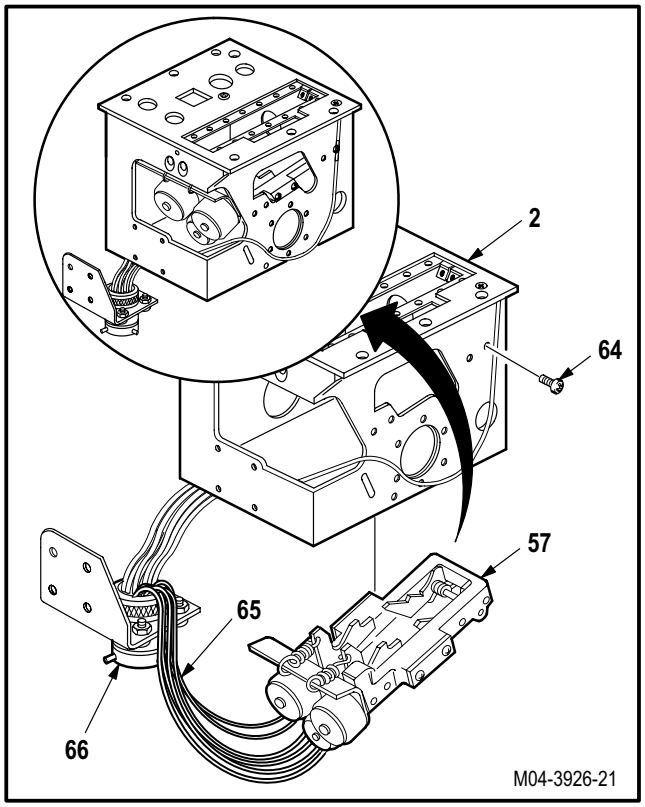
To prevent damage to stop mechanism, screws must be tightened evenly with no excessive torque on any one screw.

e. **Install stop mechanism (57) in quadrant (2).**

(1) Pin six identified wires (65) in connector J1 (66) (TM 55-1500-323-24).

(2) Position stop mechanism (57) in quadrant (2).

(3) Install four screws (64) through quadrant (2) into stop mechanism (57).

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

f. **Install aft support plate (60) in quadrant (2).**

(1) Install two screws (63) through plate (60) and quadrant (2).

(2) Install two locknuts (62) on screws (63).

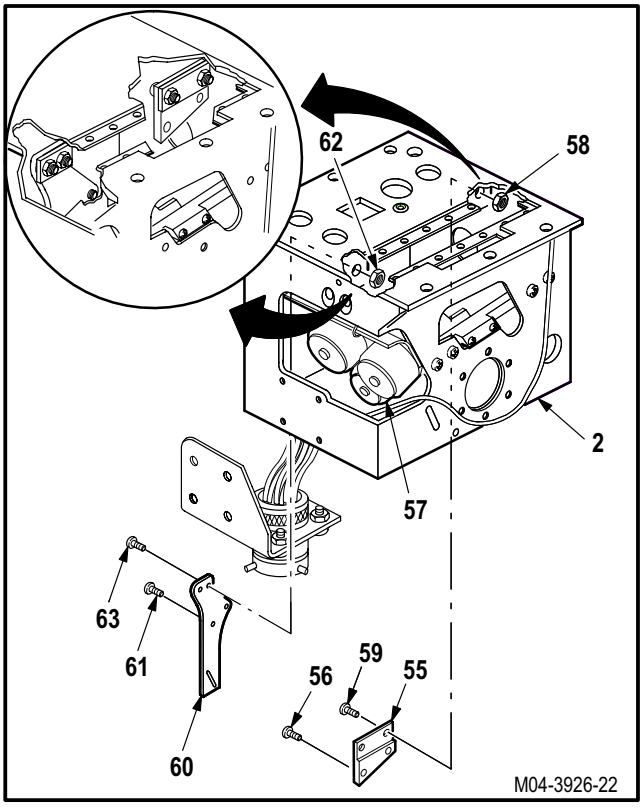
(3) Install two screws (61) through plate (60) and into stop mechanism (57).

g. **Install forward support plate (55) in quadrant (2).**

(1) Install two screws (59) through plate (55) and quadrant (2).

(2) Install two locknuts (58) on screws (59).

(3) Install two screws (56) through plate (55) and into stop mechanism (57).




h. **Install right seal retainer (50) on quadrant (2).**

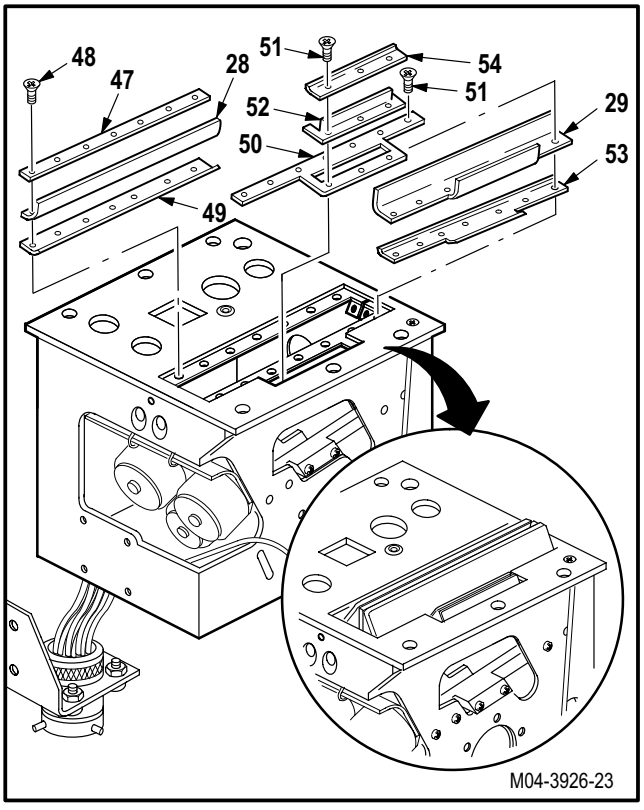
(1) Position seal supports (53) and (54), rubber seals (29) and (52), and retainer (50) on quadrant (2).

(2) Install ten screws (51) through retainer (50), rubber seals (29) and (52), and seal supports (53) and (54) into quadrant (2).

i. **Install left seal retainer (47) on quadrant (2).**

(1) Position seal support (49), rubber seal (28), and retainer (47) on quadrant (2).

(2) Install seven screws (48) through retainer (47), rubber seal (28), and seal support (49) into quadrant (2).

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

j. **Install pilot power quadrant ignition lock switch** (para 4.192)**.**

k. **Assemble power lever assembly (1).**

**NOTE**

The following step is typical for left or right power levers.

(1) Install trigger release (27) on power lever (40).

(a) Install two screws (46) through bar (45) into trigger release (27).

(b) Install bar (45) on lever (40).

(c) Install two screws (43) through lower retaining plate (44) into lever (40).

(d) Install two screws (41) through upper retaining plate (42) into lever (40).

(2) Install quadrant hub (39) in lever shaft (33).

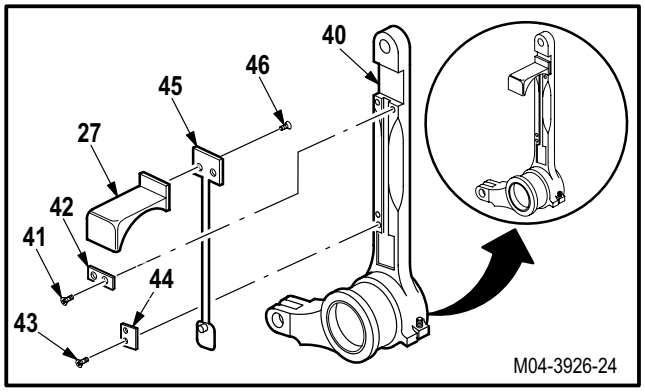
(a) Install hub (39) in lever shaft (33) by turning counterclockwise.

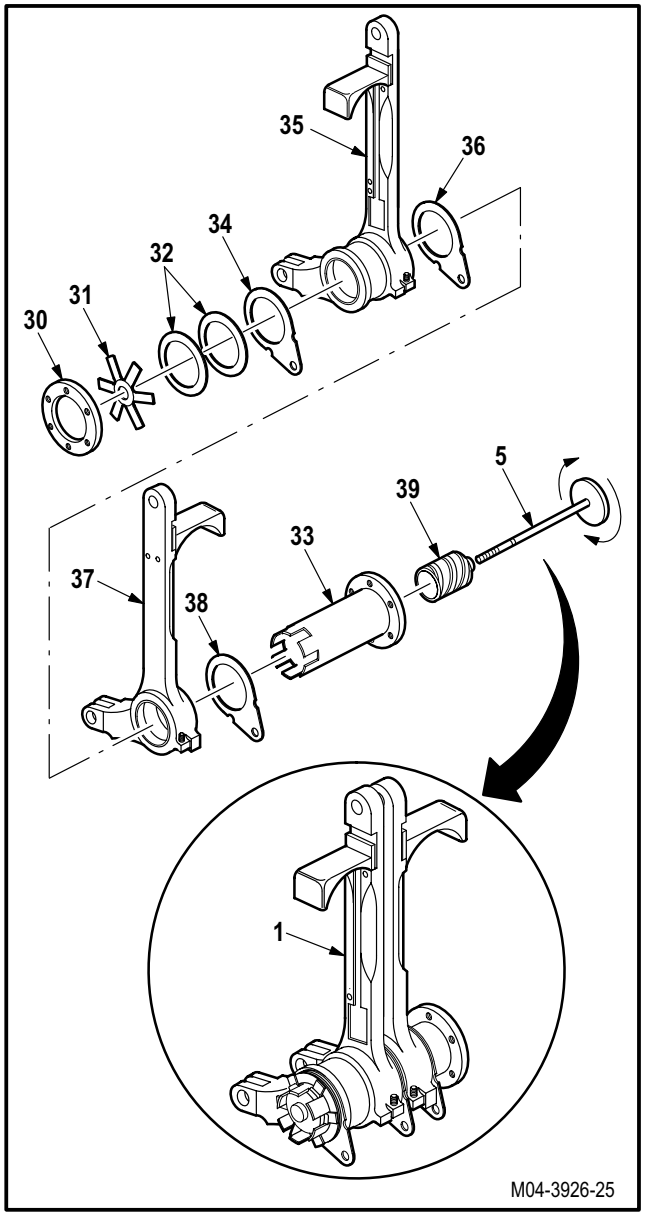
(b) Using splined end of shaft (5), rotate hub (39) until recessed **0.25 INCH** inside lever shaft (33).

(3) Install friction disk (38), right lever (37), and friction disk (36) on lever shaft (33).

(4) Install left lever (35) and friction disk (34) on lever shaft (33).

(5) Install two flat washers (32), tension washer (31), and support flange (30) on power lever shaft (33).

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

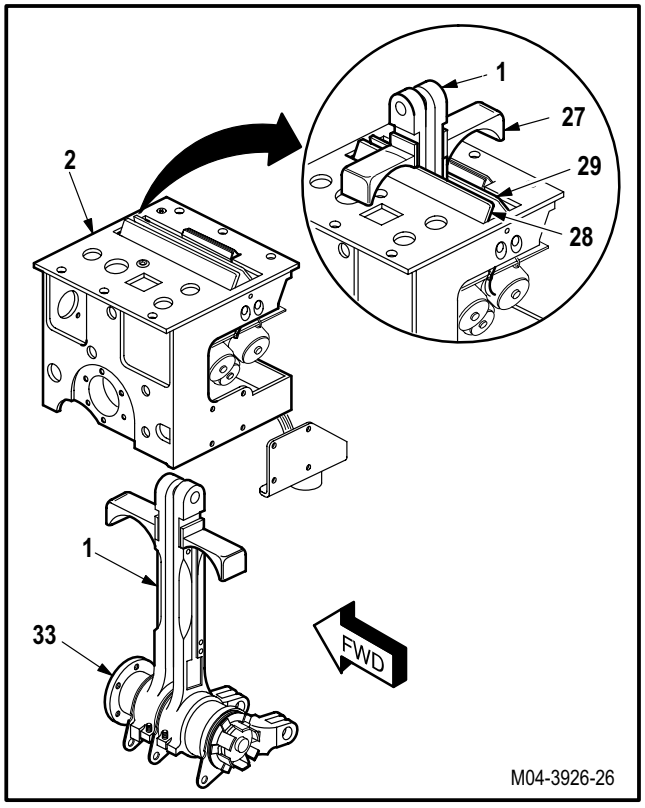
l. **Install power lever assembly (1) in power quadrant (2).**

(1) Install power lever assembly (1) in power quadrant (2).

(a) With lever shaft flange (33) facing forward, slide lever assembly (1) in quadrant (2) until trigger releases (27) clear left and right rubber seals (28) and (29).

(b) Rotate lever assembly (1) 90 degrees clockwise.

(c) Position lever assembly (1) in quadrant (2).

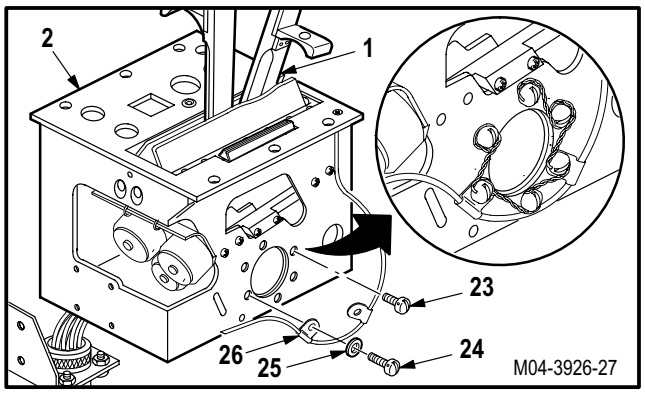



(2) Install two screws (24) attaching lever assembly (1) to left side of power quadrant (2).

(a) Install screw (24) through washer (25), wire clamp (26), and power quadrant (2) into lever shaft (33).

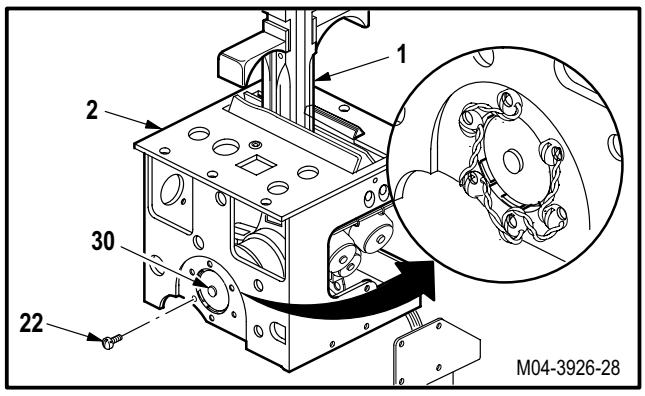
(3) Install four screws (23) through quadrant (2) and into lever shaft (33).

(4) Lockwire four screws (23) and two screws (24) together. Use wire (item 226, App F).




(5) Install six screws (22) through power quadrant (2) into support flange (30).

(6) Lockwire six screws (22) together. Use wire (item 226, App F).

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

(7) Install bolt (19) in power quadrant (2).

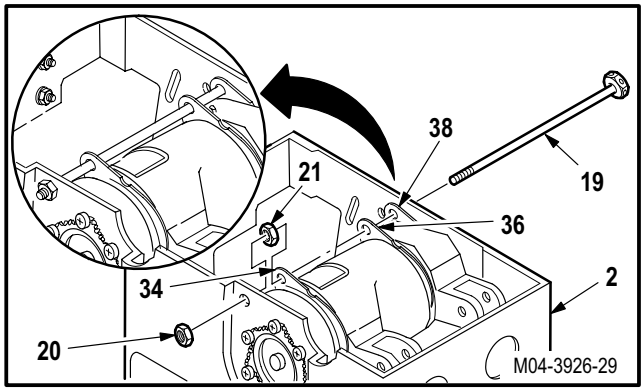
(a) Install bolt (19) through right side of power quadrant (2) and friction disks (38), (36), and (34).

(b) Install jam nut (21) on bolt (19).

(c) Push bolt through left side of quadrant (2).

(d) Install nut (20) on bolt (19).

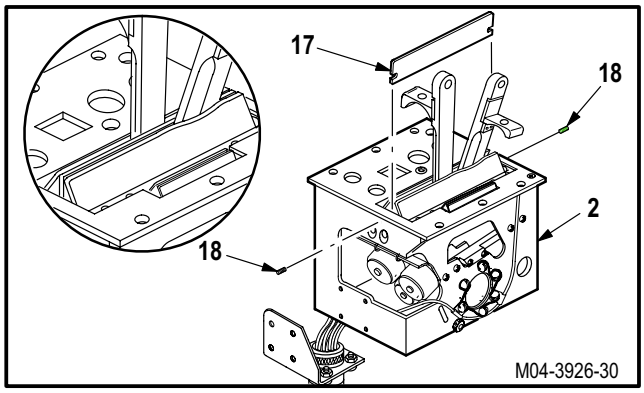
(e) Tighten jam nut (21) against inside of quadrant (2).




(8) Install seal separator (17) in power quadrant (2).

(a) Position separator (17) in quadrant (2).

(b) Tighten two set screws (18).




(9) Install friction disk (8) on shaft (5).

(10) Install shaft (5) through lever assembly (1).

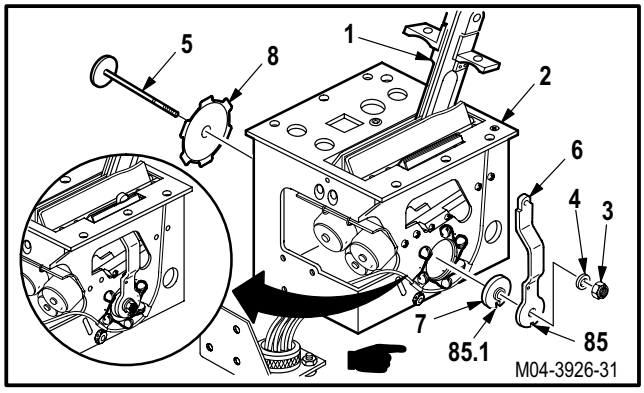
(11) Temporarily install friction lever (6) on shaft (5) in fully decreased friction position and make reference mark on quadrant (2) adjacent to notch (85). Use wax pencil (item 137, App F).

(12) Remove friction lever (6) from shaft (5).

(13) Install friction lever hub (7) on friction lever shaft (5) with bottom notch (85.1) alined with reference mark on quadrant (2).

(14) Install friction lever (6) on shaft (5) and quadrant (2).

(15) Install washer (4) and nut (3) on shaft (5).

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## 4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

4.167.8. Adjustment

a. **Adjust power lever (10) friction to 9 POUNDS.**

(1) Set left power lever (10) to **FLY**, and right power lever (14) to **IDLE**.

(2) Lock friction lever (6) in full forward position.

(3) Attach scale to left power lever (10) through screw hole (86). Check friction.

(a) If friction is more than **9 POUNDS**, loosen nut (3).

(b) If friction is less than **9 POUNDS**, tighten nut (3).

(4) Repeat step a(3) until power lever friction is adjusted to **9 POUNDS**.

**NOTE**

Power lever handle has spring tension from the trigger release spring. To prevent loss of spring, hold spring while installing handle.

(5) Install right power handle (13) on power lever (14).

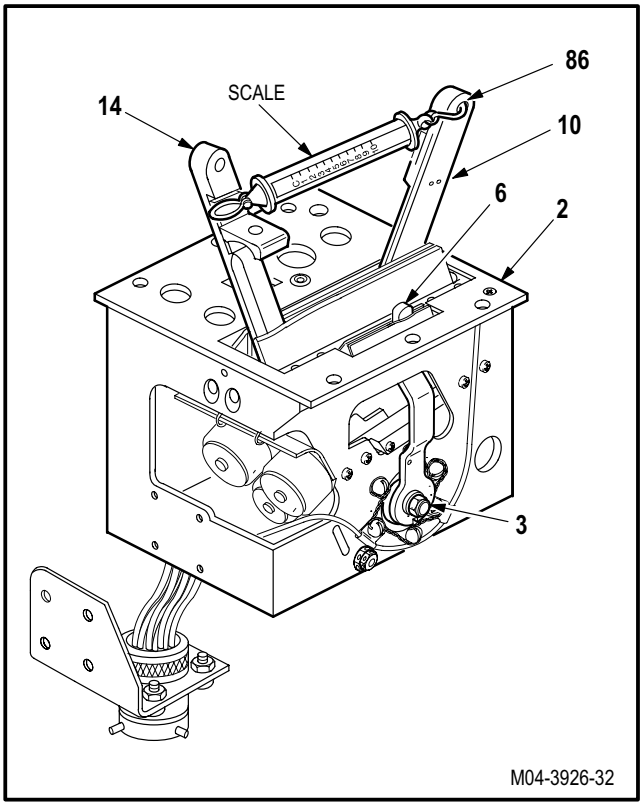
(a) Hold spring (16). Install handle (13) on lever (14).

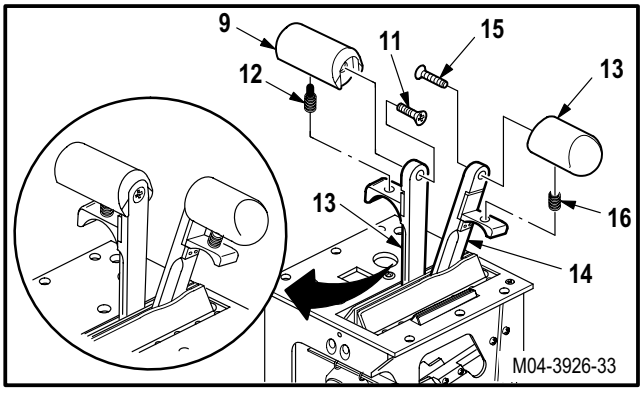
(b) Hold handle (13). Install screw (15).

(6) Install left power handle (9) on power lever (13).

(a) Hold spring (12). Install handle (9) on lever (13).

(b) Hold handle (9). Install screw (11).

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**4.167. PILOT POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued**

b. **Inspect (QA).**

c. **Install pilot power quadrant panel - No. 2 engine interlock switch** (para 4.194)**.**

d. **Install pilot power quadrant panel - No. 1 engine interlock switch** (para 4.193)**.**

e. **Install pilot power quadrant panel - No. 1 and No. 2 ENG IGN OVRD switches** (para 4.191)**.**

f. **Install pilot power quadrant panel - ENG START ADVISORY switch** (para 4.190)**.**

g. **Install pilot power quadrant panel - RTR BRK switch** (para 4.189)**.**

h. **Install pilot power quadrant light indicating panel** (para 4.188)**.**

END OF TASK

## 4.168. CPG POWER QUADRANT REMOVAL/INSTALLATION

4.168.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.168.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

**Materials/Parts:**

Cotter pin (2)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Console panels CL1 and CL3 removed |

4.168.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **On pilot forward circuit breaker panel, open EMER HYD and THROT SOL circuit breakers.**

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

d. **On CPG circuit breaker panel, open PRI LT circuit breaker.**

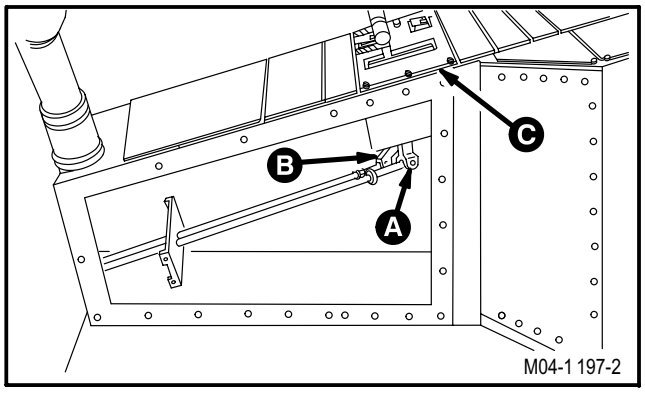
e. **Remove rod end (1) from No. 2 power lever (2).**

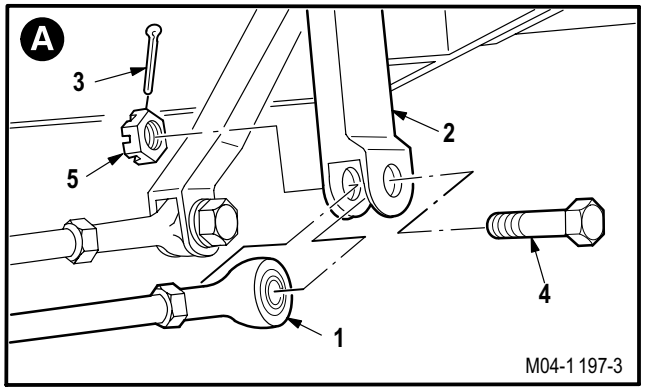
(1) Set power lever (2) to **IDLE**.

(2) Remove and discard cotter pin (3).

(3) Hold bolt (4). Remove nut (5).

(4) Remove bolt (4) from power lever (2) and rod end (1).

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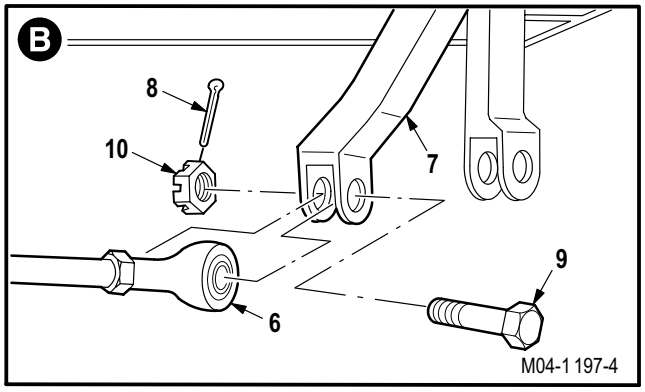
**4.168. CPG POWER QUADRANT REMOVAL/INSTALLATION - continued**

f. **Remove rod end (6) from No. 1 power lever (7).**

(1) Remove and discard cotter pin (8).

(2) Hold bolt (9). Remove nut (10).

(3) Remove bolt (9) from power lever (7) and rod end (6).

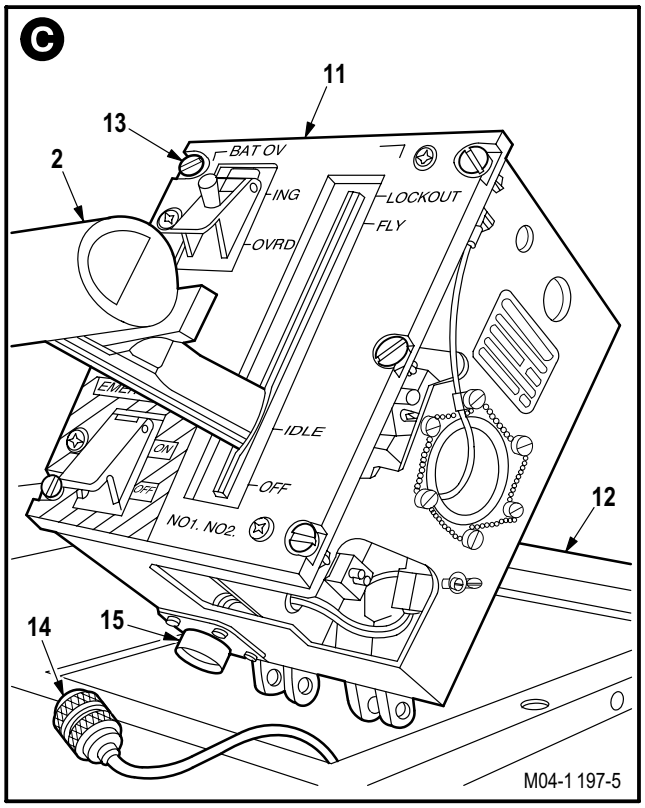



g. **Remove power quadrant (11) from console (12).**

(1) Unlock six turnlock fasteners (13).

(2) Lift quadrant (11) from console (12).

h. **Detach connector P190 (14) from receptacle J1 (15).**




4.168.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.168.5. Inspection

a. **Check power quadrant for cracks.** None allowed.

b. **Check connector P190 and receptacle J1 for damage** (TM 55-1500-323-24)**.**

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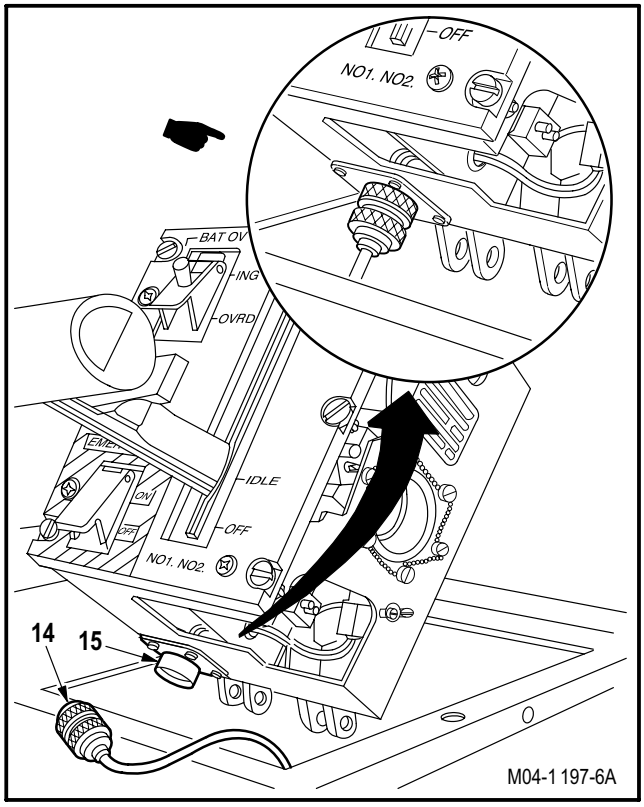
## 4.168. CPG POWER QUADRANT REMOVAL/INSTALLATION - continued

4.168.6. Installation

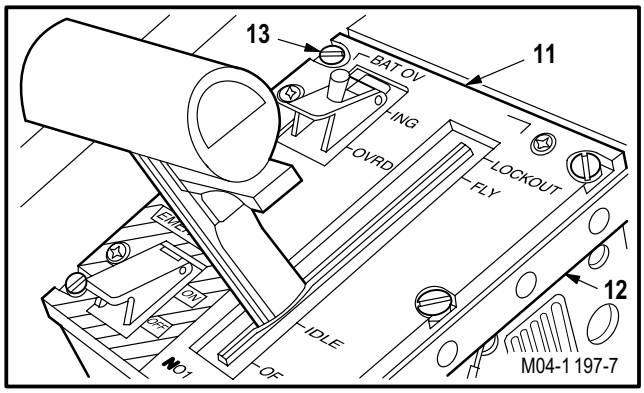
a. **Attach connector P190 (14) to receptacle J1 (15).**




b. **Install quadrant (11) in console (12).**

(1) Aline quadrant (11) in console (12).

(2) Lock six turnlock fasteners (13).

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**4.168. CPG POWER QUADRANT REMOVAL/INSTALLATION - continued**

c. **Install rod end (6) on power lever (7).** Torque nut (10) **14 to 18 INCH-POUNDS**.

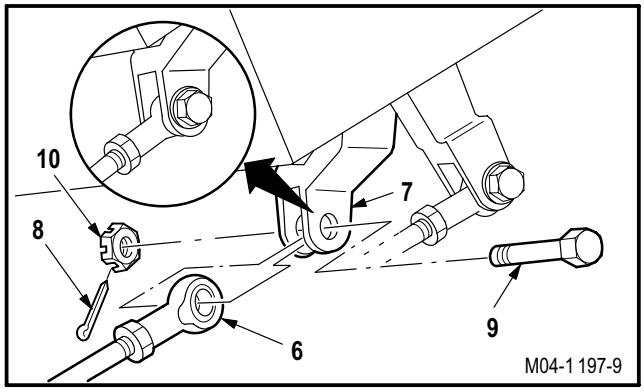
(1) Set No. 1 power lever (7) to **IDLE**.

(2) Install bolt (9) through power lever (7) and rod end (6).

(3) Hold bolt (9). Install nut (10). Torque nut (10) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (8).



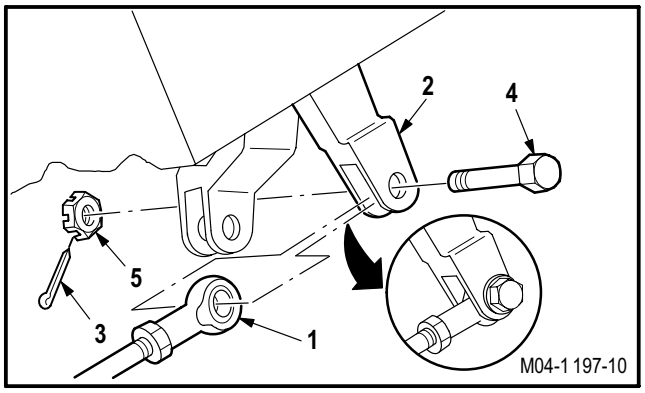

d. **Install rod end (1) on power lever (2).** Torque nut (5) **14 to 18 INCH-POUNDS**.

(1) Install bolt (4) through power lever (2) and rod end (1).

(2) Hold bolt (4). Install nut (5). Torque nut (5) to **14 INCH-POUNDS**. Use torque wrench.

(3) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(4) Install new cotter pin (3).




e. **Inspect (QA).**

f. **Install console panels CL1 and CL3** (para 2.2)**.**

g. **Perform power plants maintenance operational check (engine 1 and engine 2)** (TM 1-1520-238-T)**.**

END OF TASK

## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM)

4.169.1. Description

This task covers: Disassembly. Cleaning. Inspection. Repair. Assembly.

4.169.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Industrial faceshield (item 129, App H)
Chemical protective gloves (item 154, App H)
Electric gun type heater (item 163, App H)
10-ton hydraulic hand operated arbor press (item 236, App H)

**Materials/Parts:**

Primer coating (item 147, App F)
Wire (item 226, App F)

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**References:**

TM 55-1500-322-24
TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.196 | CPG power quadrant - No. 1 engine out disable switch removed |
| 4.197 | CPG power quadrant - No. 2 engine out disable switch removed |
| 4.198 | CPG power quadrant lever release switch removed |
| 4.199 | CPG BAT OVRD switch removed |
| 4.200 | CPG EMER HYD PWR switch removed |

4.169.3. Disassembly

a. **Remove ground wire end (1) from power quadrant (2).**

(1) Remove locknut (3), washer (4), and ground wire end (1) from screw (5).

(2) Remove screw (5) from quadrant (2).

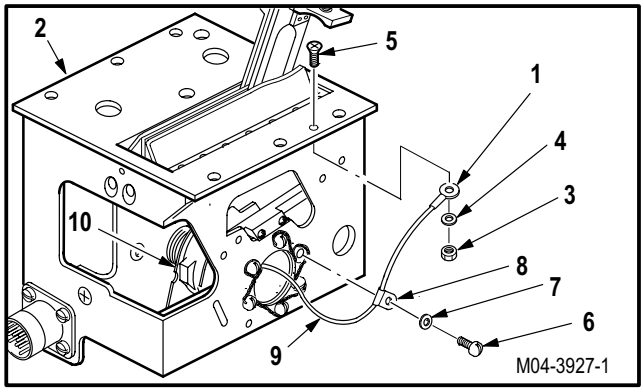
(3) Remove screw (6) from quadrant (2).

(a) Remove lockwire from screw (6).

(b) Remove screw (6), washer (7), and wire clamp (8) from quadrant (2).

(4) Remove ground wire (9) from lever assembly (10).

b. **Remove power lever assembly (10) from power quadrant (2).**

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## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

**NOTE**

Power lever handle has spring tension from the trigger release spring. To prevent loss of spring, hold spring while removing handle.

(1) Remove left power handle (11) from power lever (12).

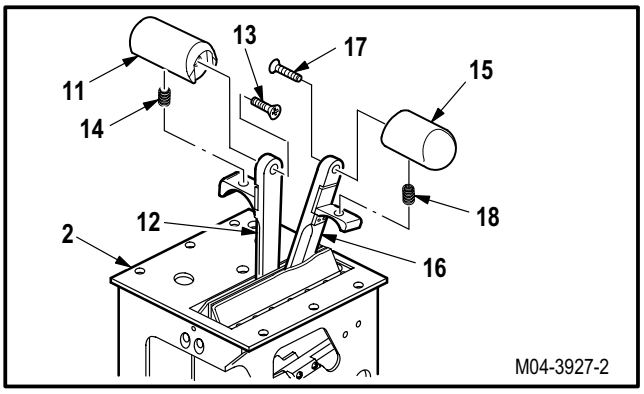
(a) Hold handle (11). Remove screw (13).

(b) Hold spring (14). Remove handle (11) from lever (12).

(2) Remove right power handle (15) from power lever (16).

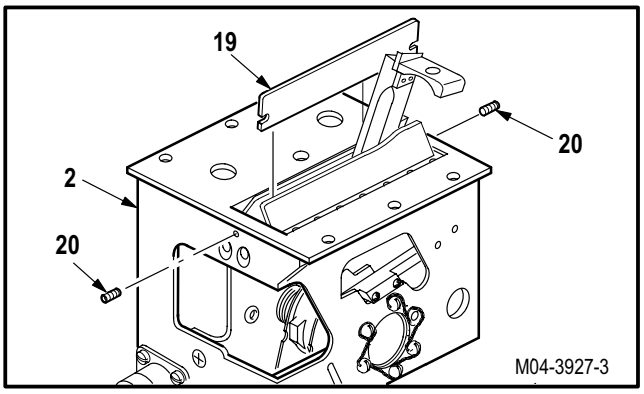
(a) Hold handle (15). Remove screw (17).

(b) Hold spring (18). Remove handle (15) from lever (16).




(3) Remove seal separator (19) from power quadrant (2).

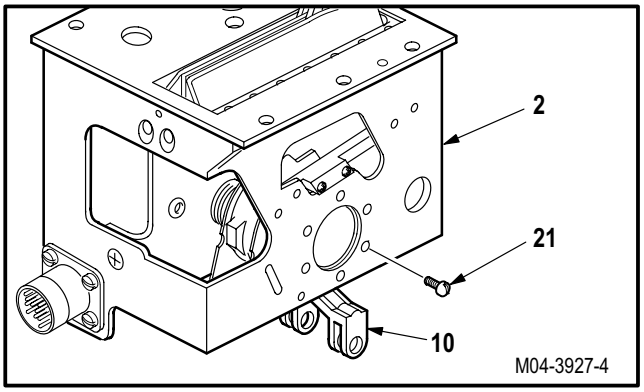
(a) Loosen two set screws (20) and remove separator (19).




(4) Remove five screws (21) while holding lever assembly (10) on right side of power quadrant (2).

(a) Remove lockwire from five screws (21).

(b) Remove five screws (21).

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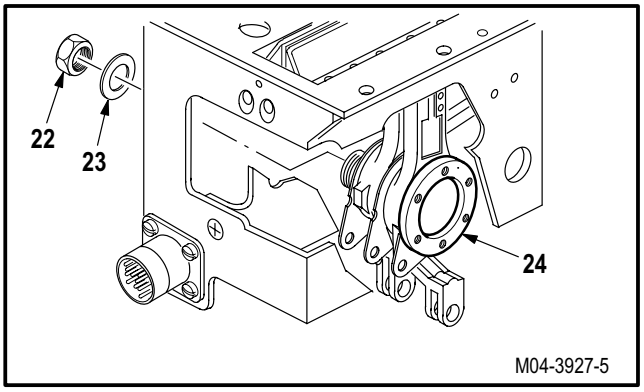
## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

(5) Remove locknut (22) and washer (23) from power lever shaft (24).




(6) Remove shaft support plate (25) from quadrant (2).

(a) Remove two locknuts (26) and washers (27) from screws (28).

(b) Remove two screws (28) from forward end of support plate (25) and quadrant (2).

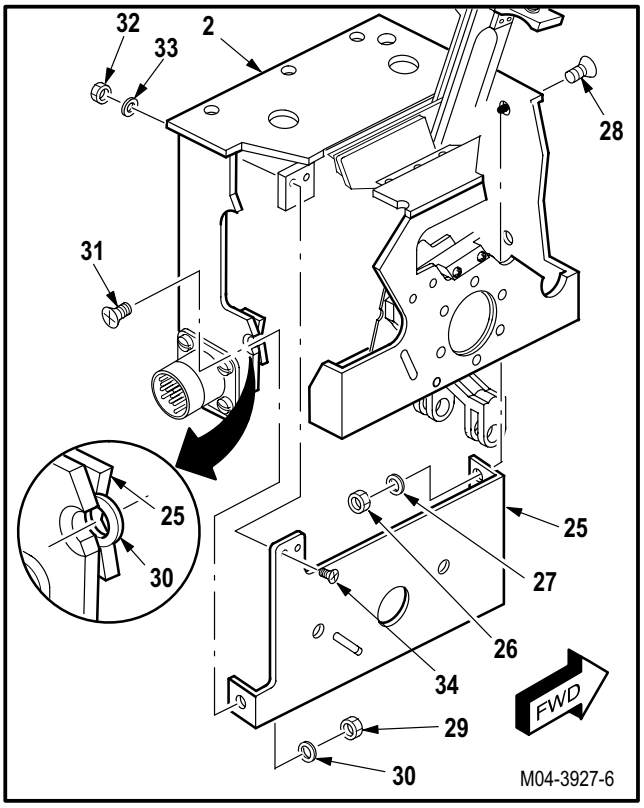
(c) Remove locknut (29) and washer (30) from screw (31).

(d) Remove screw (31) from aft end of support plate (25), washer (30), and quadrant (2).

(e) Remove two locknuts (32) and washers (33) from screws (34).

(f) Remove two screws (34) from support plate (25) and quadrant (2).

(g) Remove support plate (25) from quadrant (2).

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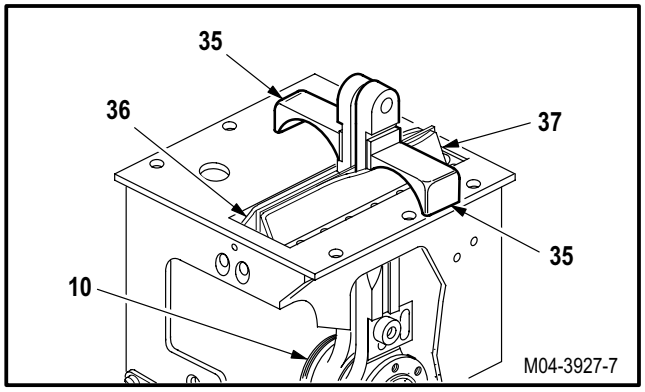
## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

(7) Remove power lever assembly (10) from quadrant (2).

(a) Slide lever assembly (10) out of quadrant (2) until trigger releases (35) contact left and right rubber seals (36) and (37).

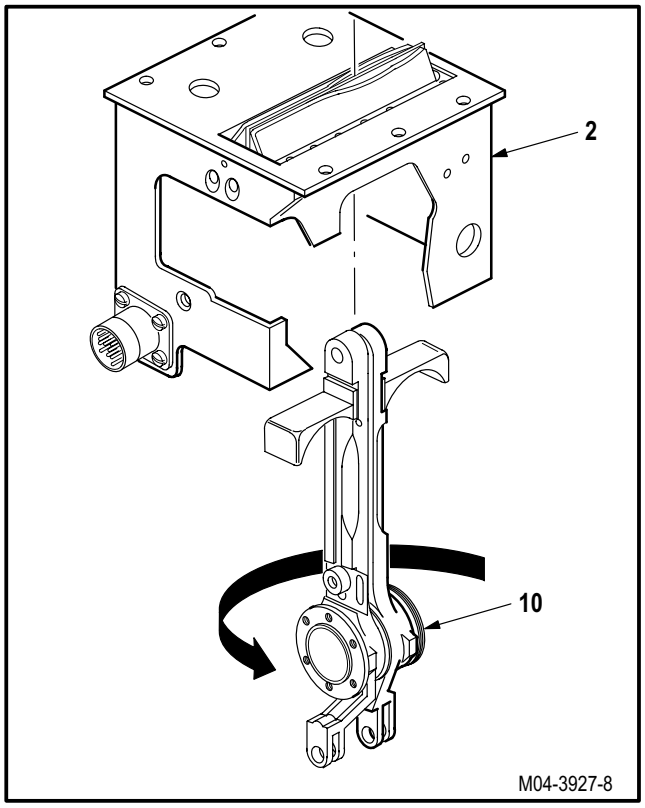
(b) Rotate lever assembly (10) 90 degrees counterclockwise and remove from quadrant (2).




c. **Disassemble power lever assembly (10).**

**NOTE**

The lever assembly may have one or more shims installed. During disassembly record the number of shims removed.

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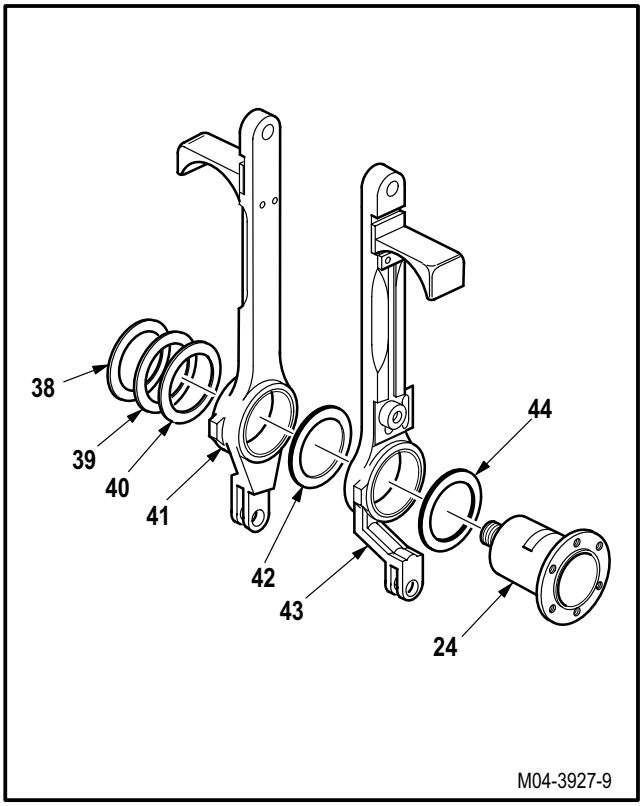
## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

d. **Remove flat washer (38) and shims (39) from power lever shaft (24).**

(1) Remove fiber spacer (40) and left lever (41) from power lever shaft (24).

(2) Remove fiber spacer (42), right lever (43), and fiber spacer (44) from power lever shaft (24).




**NOTE**

The following step is typical for right or left power levers.

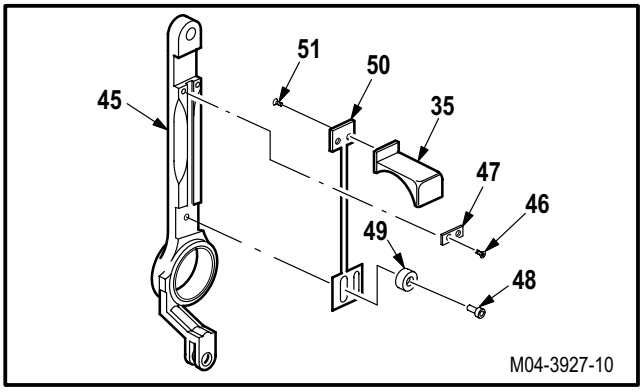
(3) Remove trigger release (35) from power lever (45).

(a) Remove two screws (46) and upper retaining plate (47) from lever (45).

(b) Remove screw (48) and guide (49) from lever (45).

(c) Remove bar (50) from lever (45).

(d) Remove two screws (51) from bar (50) and trigger release (35).

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## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

e. **Remove left seal retainer (52) from quadrant (2).**

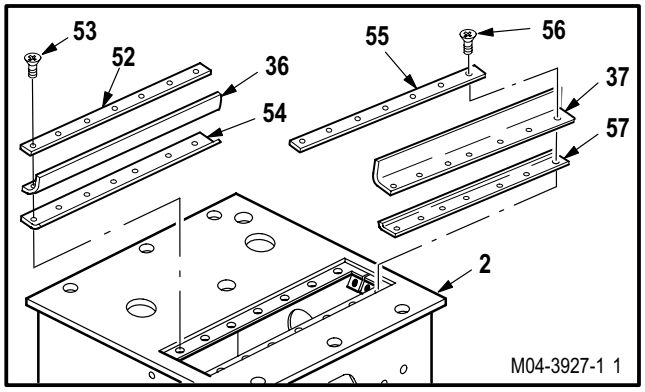
(1) Remove seven screws (53) from retainer (52) and quadrant (2).

(2) Remove retainer (52), rubber seal (36), and seal support (54).

f. **Remove right seal retainer (55) from quadrant (2).**

(1) Remove seven screws (56) from retainer (55) and quadrant (2).

(2) Remove retainer (55), rubber seal (37), and seal support (57).

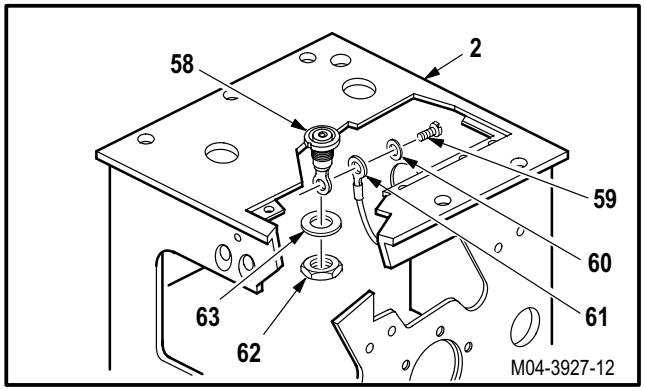



g. **Remove light indicating panel connector (58) from quadrant (2).**

(1) Remove screw (59), washer (60), and wire end (61) from connector (58).

(2) Remove nut (62) and washer (63) from connector (58).

(3) Remove connector (58).




h. **Remove wire harness (64) from connector J1 (65).**

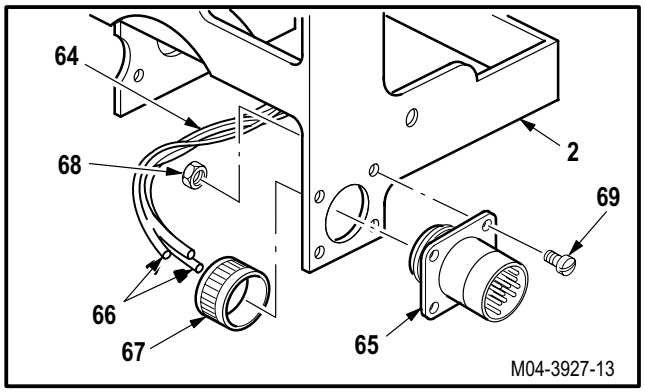
(1) Identify and depin wires (66) from connector (65) (TM 55-1500-323-24).

i. **Remove connector J1 (65) from quadrant (2).**

(1) Remove connector backshell (67) from connector (65).

(2) Remove four nuts (68) from screws (69).

(3) Remove four screws (69) and connector (65) from quadrant (2).

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**4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued**

4.169.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.169.5. Inspection

a. **Check housing assembly and levers for cracks.** None allowed.

b. **Check bushings in left and right levers for damage** (TM 55-1500-322-24)**.**

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## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

4.169.6. Repair

**WARNING**

**Do not place heater near flammable material or allow heater to contact skin: severe burns can result. Wear protective equipment. If injury occurs, seek medical aid.**

a. **Remove bushing (70) from left power lever (41)** (TM 55-1500-322-24)**.**

(1) Heat area of power lever (41) surrounding bushing (70). Use heater.

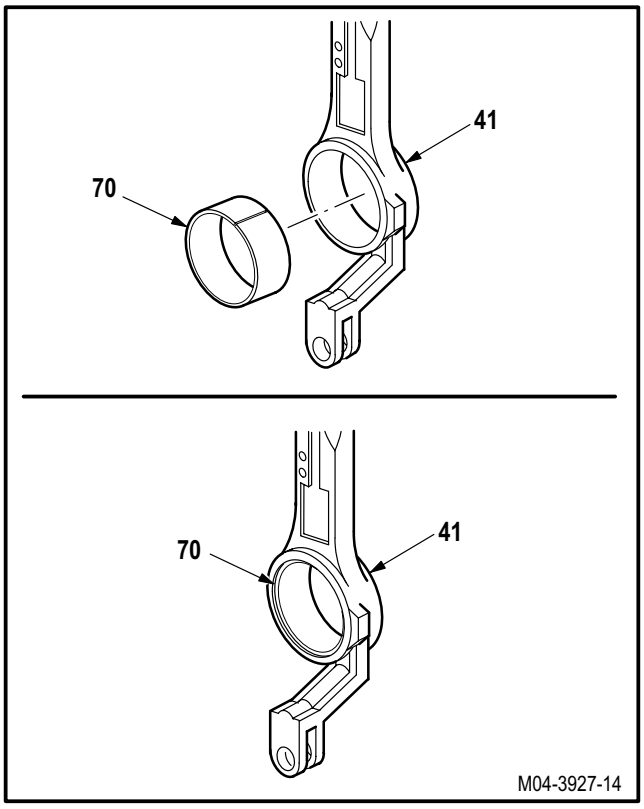
(2) Press bushing (70) out of left power lever (41). Use arbor press.

b. **Install bushing (70) in left power lever (41)** (TM 55-1500-322-24)**.**

(1) Heat area of power lever (41) surrounding bushing (70). Use heater.

(2) Apply primer to outer edge of bushing (70). Use primer coating (item 147, App F).

(3) Press bushing (70) in left power lever (41). Use arbor press.

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## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

c. **Remove bushing (71) from right power lever (43)** (TM 55-1500-322-24)**.**

(1) Heat area of power lever (43) surrounding bushing (71). Use heater.

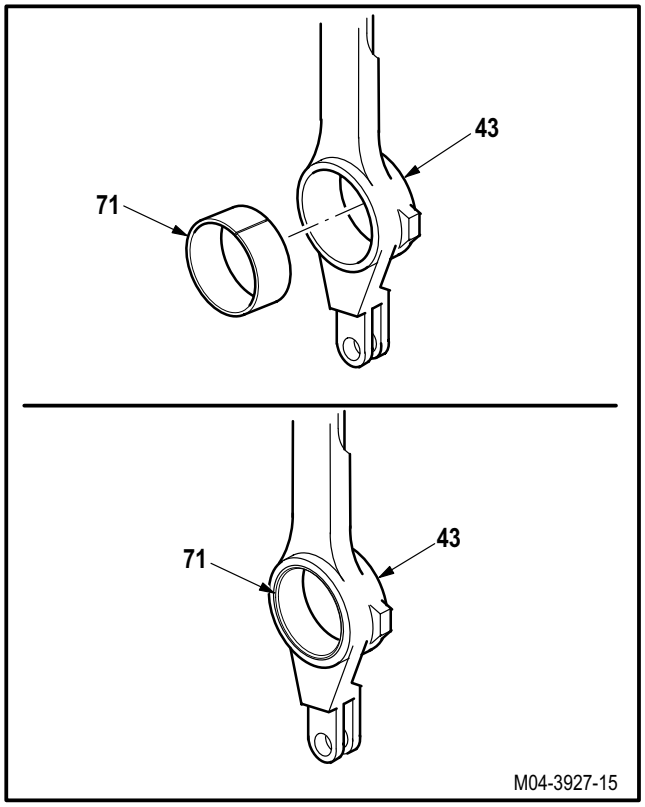
(2) Press bushing (71) out of right power lever (43). Use arbor press.

d. **Install bushing (71) in right power lever (43)** (TM 55-1500-322-24)**.**

(1) Heat area of power lever (43) surrounding bushing (71). Use heater.

(2) Apply primer to outer edge of bushing (71). Use primer coating (item 147, App F).

(3) Press bushing (71) in right power lever (43). Use arbor press.




4.169.7. Assembly

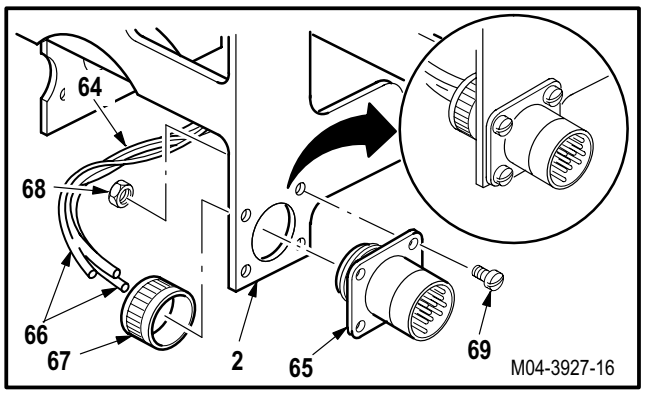
a. **Install connector J1 (65) in quadrant (2).**

(1) Position connector (65) on power quadrant (2).

(2) Install four screws (69) through connector (65) and quadrant (2).

(3) Install four nuts (68) on screws (69).

(4) Install connector backshell (67) on connector (65).




b. **Install wire harness (64) in connector J1 (65).**

(1) Pin identified wires (66) in connector (65) (TM 55-1500-323-24).

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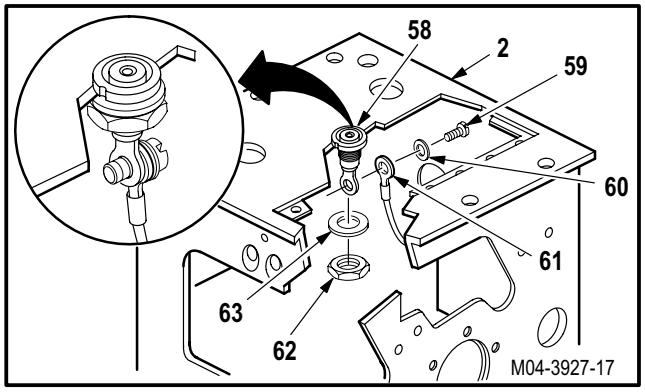
**4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued**

c. **Install light indicating panel connector (58) in quadrant (2).**

(1) Install connector (58) in quadrant (2).

(2) Install washer (63) and nut (62) on connector (58).

(3) Install screw (59) through washer (60) and wire end (61) into connector (58).




d. **Install right seal retainer (55) in quadrant (2).**

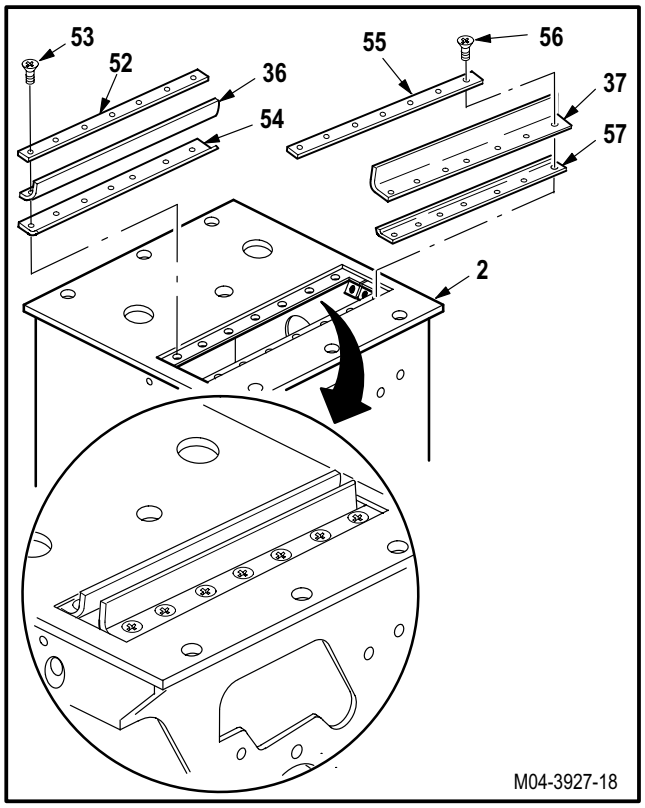
(1) Position seal support (57), rubber seal (37), and retainer (55) on quadrant (2).

(2) Install seven screws (56) through retainer (55), rubber seal (37), and seal support (57) into quadrant (2).

e. **Install left seal retainer (52) in quadrant (2).**

(1) Position seal support (54), rubber seal (36), and retainer (52) on quadrant (2).

(2) Install seven screws (53) through retainer (52), rubber seal (37), and seal support (56) into quadrant (2).

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## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

f. **Assemble power lever assembly (10).**

**NOTE**

The following step is typical for right or left power levers.

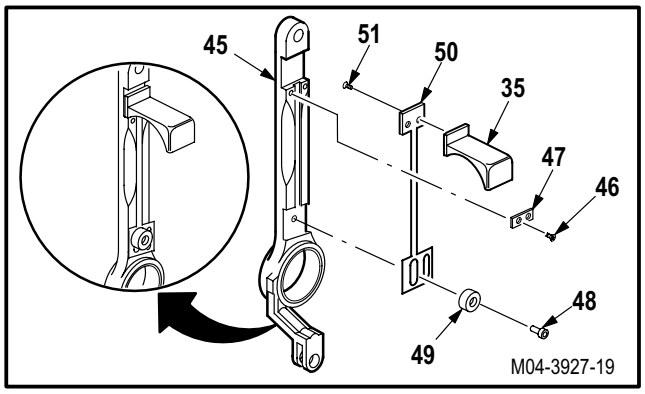
(1) Install trigger release (35) in power lever (45).

(a) Install two screws (51) through bar (50) into trigger release (35).

(b) Install bar (50) on lever (45).

(c) Install screw (48) through guide (49) into lever (45).

(d) Install two screws (46) through upper retaining plate (47) into lever (45).



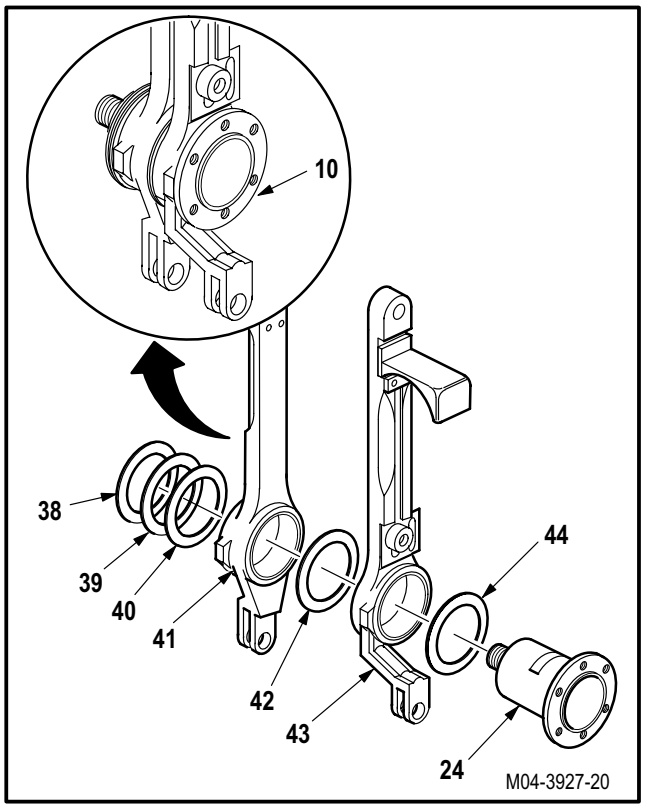

**NOTE**

The lever assembly may have had one or more shims installed. Install same number of shims recorded during disassembly.

(2) Install fiber spacer (44), right lever (43), and fiber spacer (42) on power lever shaft (24).

(3) Install fiber spacer (40) and left lever (41) on power lever shaft (24).

(4) Install flat washer (38) and shims (39) on power lever shaft (24).

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## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

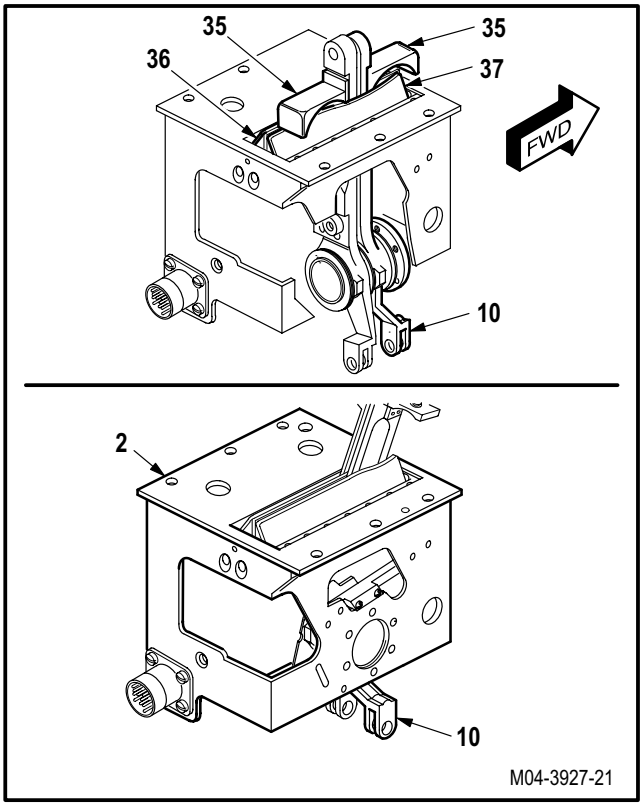
g. **Install power lever assembly (10) in power quadrant (2).**

(1) Install power lever assembly (10) in power quadrant (2).

(a) With power lever shaft flange facing forward, slide lever assembly (10) in quadrant (2) until trigger releases (35) clear left and right rubber seals (36) and (37).

(b) Rotate lever assembly (10) 90 degrees counterclockwise.

(c) Position lever assembly (10) in quadrant (2).




(2) Install shaft support plate (25) in quadrant (2).

(a) Install two screws (34) through quadrant (2) and support plate (25).

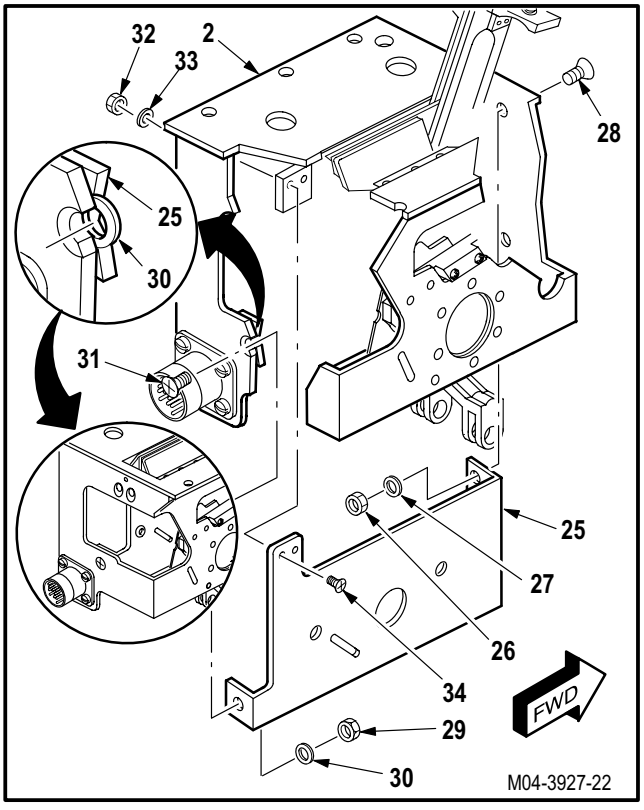
(b) Install two washers (33) and locknuts (32) on screws (34).

(c) Install screw (31) through aft end of quadrant (2), washer (30), and support plate (25).

(d) Install washer (30) and locknut (29) on screw (31).

(e) Install two screws (28) through forward end of quadrant (2) and support plate (25).

(f) Install two washers (27) and locknuts (26) on screws (28).

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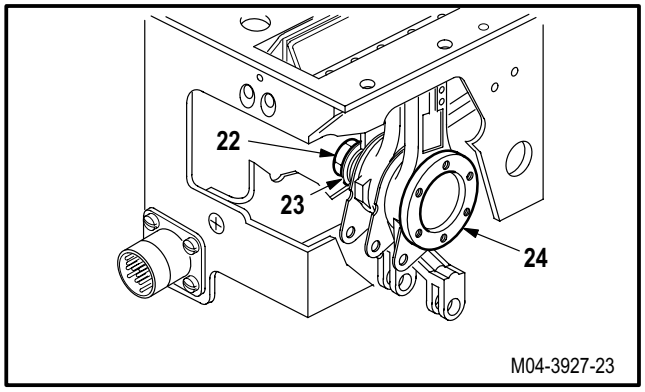
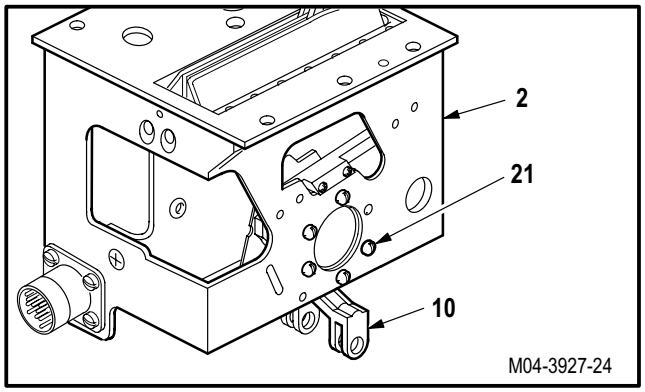
## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

(3) Install washer (23) and locknut (22) on power lever shaft (24).



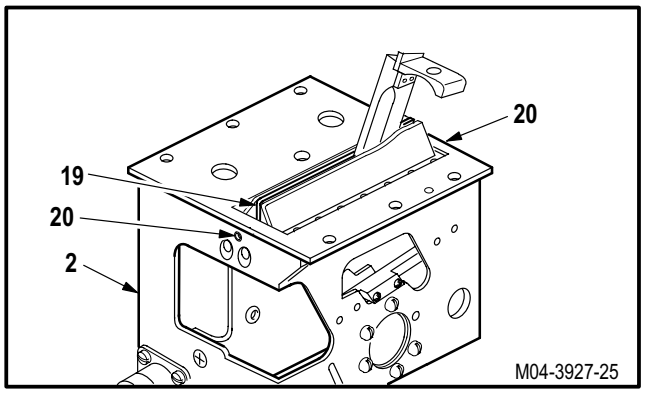

(4) Install five screws (21) attaching lever assembly (10) to right side of power quadrant (2).




(5) Install seal separator (19) in power quadrant (2).

(a) Position seal separator (19) in power quadrant (2).

(b) Tighten two set screws (20).

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## 4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued

**NOTE**

Power lever handle has spring tension from the trigger release spring. To prevent loss of spring, hold spring while installing handle.

(6) Install right power handle (15) on power lever (16).

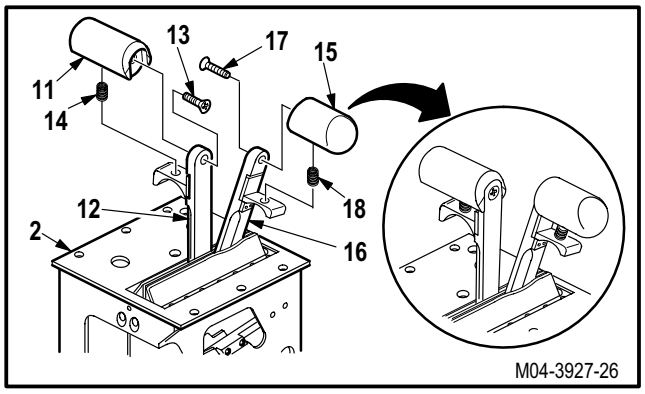
(a) Position spring (18) and handle (15) on lever (16).

(b) Install screw (17) through lever (16) and handle (15).

(7) Install left power handle (11) on power lever (12).

(a) Position spring (14) and handle (11) on lever (12).

(b) Install screw (13) through lever (12) and handle (11).




h. **Install ground wire end (1) on quadrant (2).**

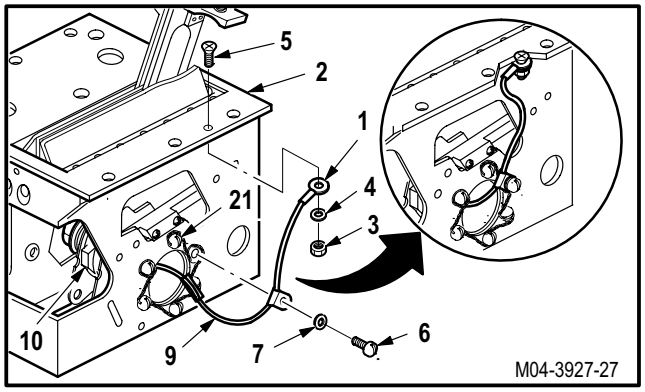
(1) Install ground wire (9) through lever assembly (10).

(2) Install screw (6) through washer (7) and wire clamp (8) into power quadrant (2).

(3) Lockwire five screws (21) and one screw (6) together. Use wire (item 226, App F).

(4) Install screw (5) through quadrant (2).

(5) Install ground wire end (1), washer (4), and locknut (3) on screw (5).

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**4.169. CPG POWER QUADRANT DISASSEMBLY/ASSEMBLY (AVIM) - continued**

i. **Inspect (QA).**

j. **Install CPG EMER HYD PWR switch** (para 4.200)**.**

k. **Install CPG BAT OVRD switch** (para 4.199)**.**

l. **Install CPG power quadrant lever release switch** (para 4.198)**.**

m. **Install CPG power quadrant - No. 2 engine out disable switch** (para 4.197)**.**

n. **Install CPG power quadrant - No. 1 engine out disable switch** (para 4.196)**.**

END OF TASK

## 4.170. NO. 1 ENGINE POWER AVAILABLE SPINDLE AFT CABLE REMOVAL

4.170.1. Description

This task covers: Removal. Cleaning. Inspection.

4.170.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

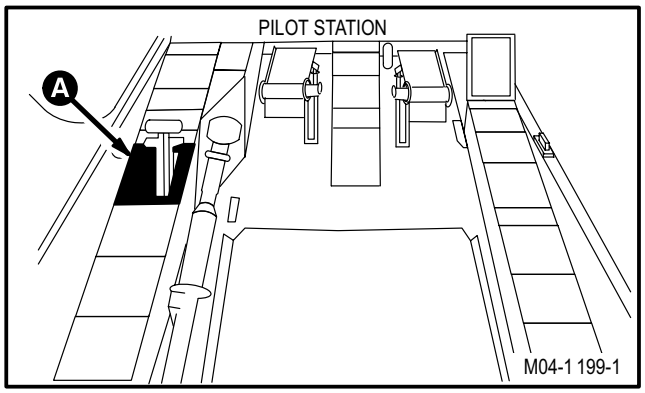
67R Attack Helicopter Repairer

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access panel L200 removed; door LN1 opened |
| 1.70 | External power application - electrical |

4.170.3. Removal

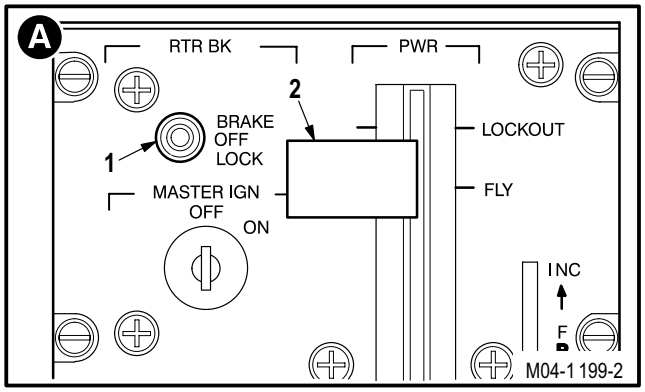
a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**




b. **Set RTR BK switch (1) to OFF.**

c. **Set pilot No. 1 PWR lever (2) to FLY.**

d. **Remove external power - electrical** (para 1.70)**.**

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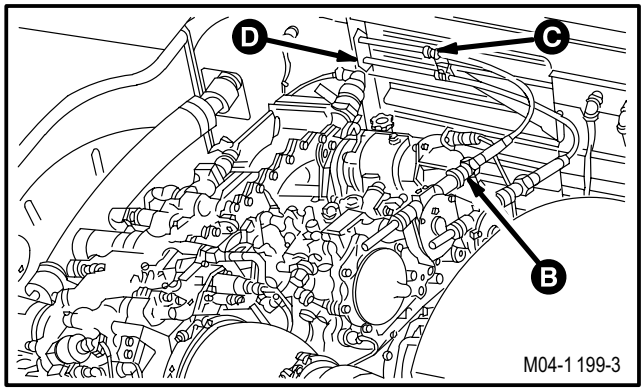
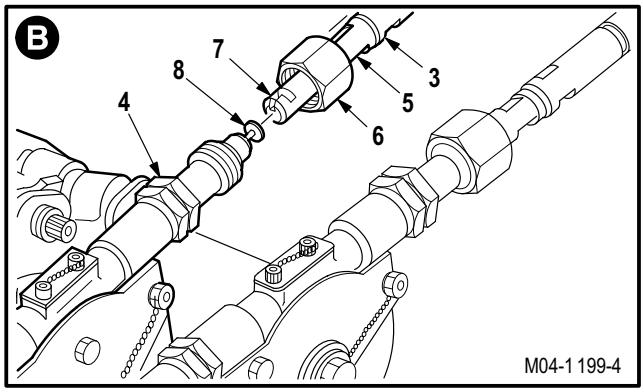
## 4.170. NO. 1 ENGINE POWER AVAILABLE SPINDLE AFT CABLE REMOVAL - continued




e. **Remove aft cable (3) from power available spindle gearbox (4).**

(1) Hold cable (3) on flats (5). Remove coupling nut (6).

(2) Remove fitting (7) from gearbox fitting (8).

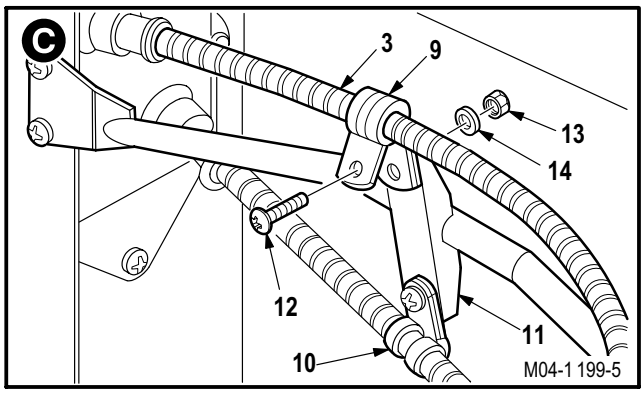



f. **Remove clamps (9) and (10) from support (11).**

(1) Hold two screws (12). Remove nuts (13) and washers (14).

(2) Remove screws (12).

(3) Remove top clamp (9) from cable (3).

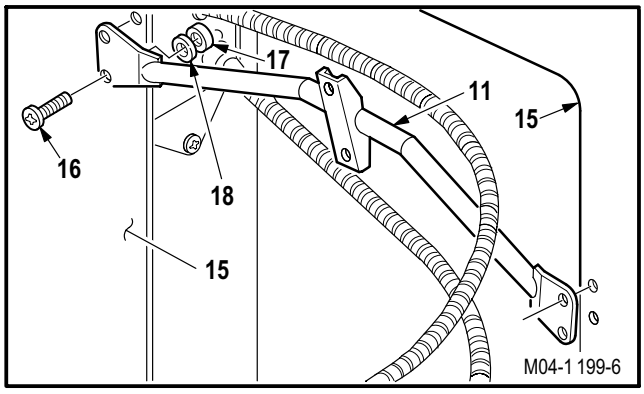



g. **Remove support (11) from firewall (15).**

(1) Hold four screws (16). Remove four nuts (17) and washers (18).

(2) Remove four screws (16).

(3) Remove support (11).

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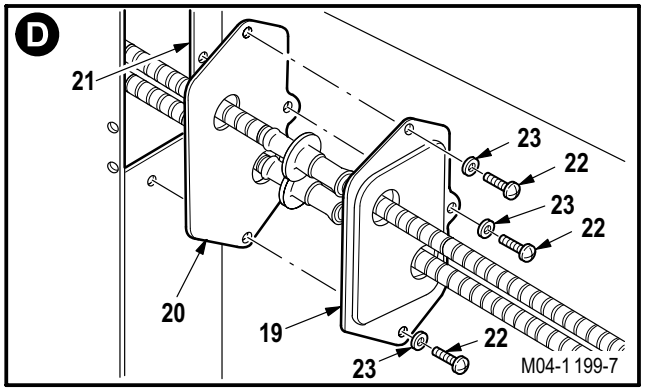
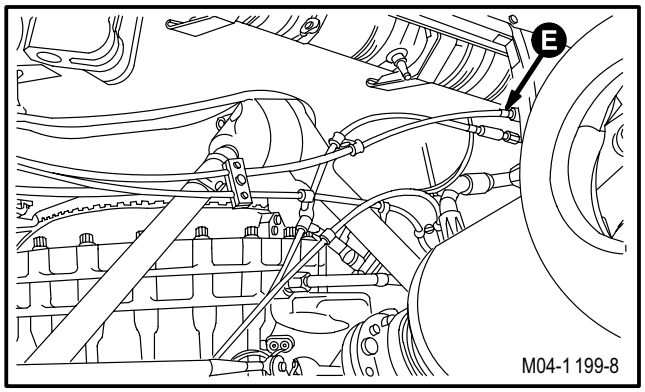
## 4.170. NO. 1 ENGINE POWER AVAILABLE SPINDLE AFT CABLE REMOVAL - continued

h. **Remove seal retainer (19) and firewall plate (20) from louver enclosure (21).**

(1) Remove three screws (22) and washers (23).

(2) Remove retainer (19) and plate (20).

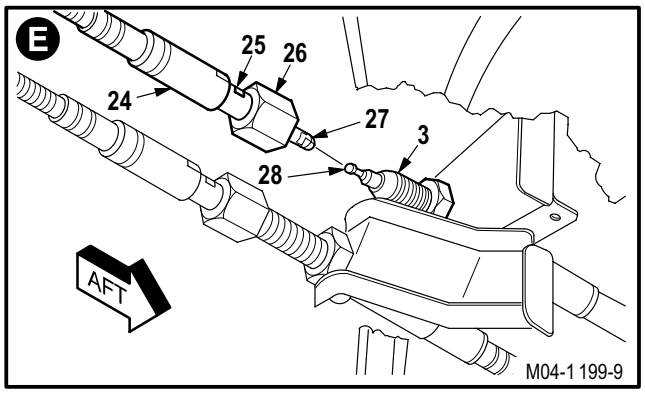



i. **Remove forward cable (24) from cable (3).**

(1) Hold cable flats (25). Remove coupling nut (26).

(2) Remove fitting (27) from aft fitting (28).

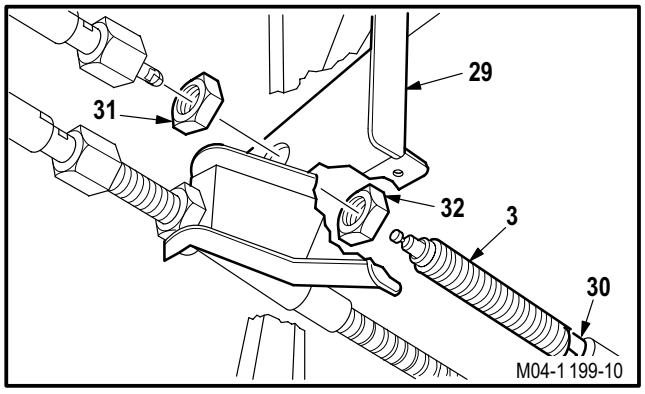



j. **Remove cable (3) from support (29).**

(1) Hold cable flats (30). Remove nut (31).

(2) Pull cable (3) out of support (29).

(3) Remove nut (32) from cable (3).

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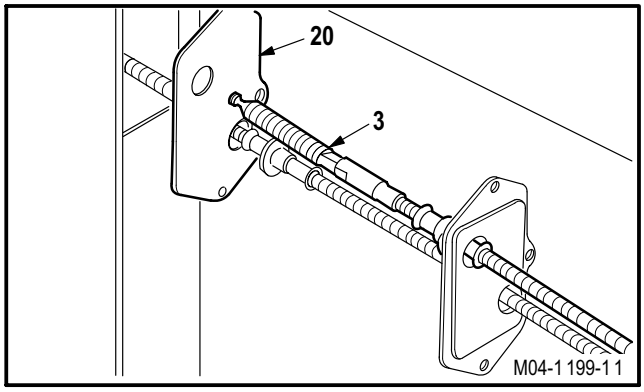
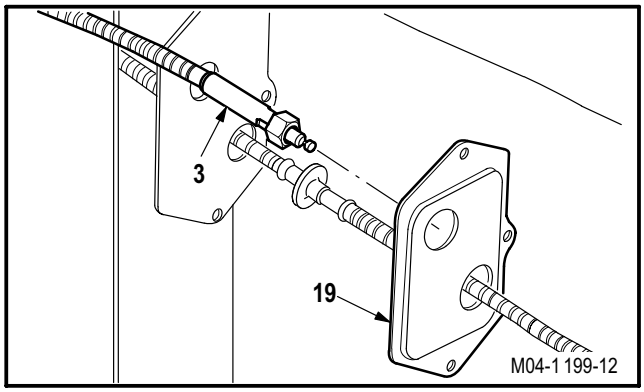
**4.170. NO. 1 ENGINE POWER AVAILABLE SPINDLE AFT CABLE REMOVAL - continued**

k. **Pull cable (3) aft from plate (20).**




l. **Pull cable (3) forward from retainer (19).**




4.170.4. Cleaning

a. **Clean supports, firewall plates, and seal retainer** (para 1.47)**.**

4.170.5. Inspection

a. **Check supports, firewall plate, and seal retainer for cracks and bending.** None allowed.

b. **Check supports, firewall plate, and seal retainer for corrosion** (para 1.49)**.**

END OF TASK

## 4.171. NO. 1 ENGINE POWER AVAILABLE SPINDLE AFT CABLE INSTALLATION

4.171.1. Description

This task covers: Installation.

4.171.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
7/8 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 86, App H)
0.0 - 10.0-pound weighing scale (item 272, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**References:**

TM 1-1520-238-T

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

Engine power available spindle (PAS) cables cannot be intermixed with cables manufactured by different vendors on the same engine. Cables that have a metallic exterior (Controlex) cannot be mixed with cables that have a black tubing exterior (Cablecraft) on the same engine. One side can be Controlex and the other side can be Cablecraft. Cables must be replaced with same exact part number. If exact part is not available, all No. 1 engine PAS cables (three cables) or No. 2 engine PAS cables (three cables) must be replaced with new cables (Cablecraft).

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## 4.171. NO. 1 ENGINE POWER AVAILABLE SPINDLE AFT CABLE INSTALLATION - continued

4.171.3. Installation

**NOTE**

Cables must be installed in a specific direction. Cable end with orange band and laser etched with ”ENG END” must be installed on the engine. Cable end without any markings is installed on gearbox.

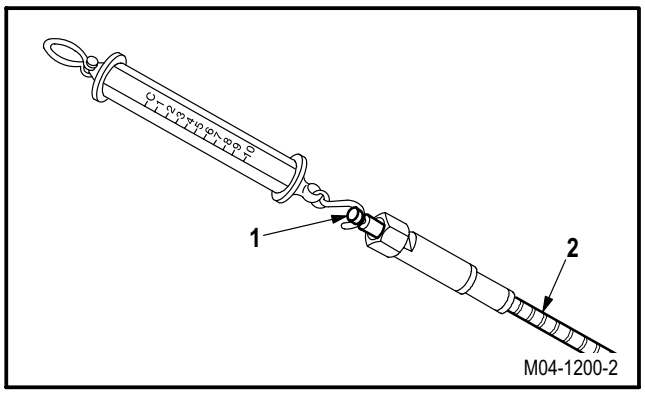
a. **Check cable ribbon (1) friction load.**

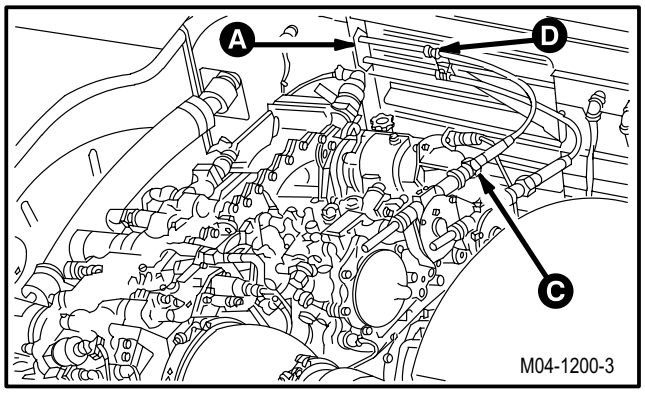
(1) Place cable (2) on flat surface. Ensure cable (2) is not bent or twisted.

(2) Slide ribbon (1) **2.5 INCHES** in and out of cable (2). There should be no binding, stiffness, or jamming.

(3) Check friction load of ribbon (1). Load not to exceed **1.5 POUNDS**. Use scale.

(4) If ribbon movement is rough or friction load exceeds **1.5 POUNDS**, replace cable.



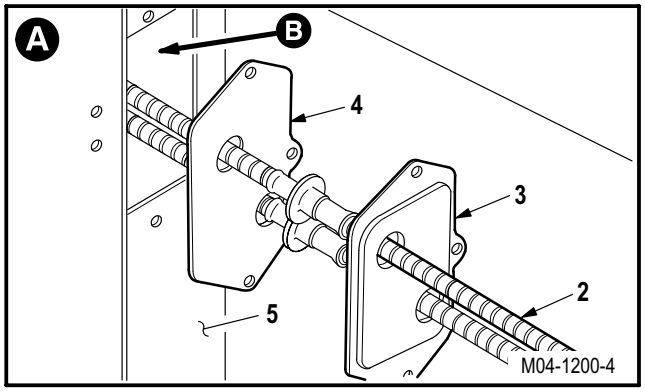




b. **Install aft cable (2) through seal retainer (3), firewall plate (4), and louver enclosure (5).**

(1) Install coupling nut end of cable (2) aft through retainer (3).

(2) Pull cable (2) through retainer (3).

(3) Install threaded end of cable (2) forward through plate (4) and louver enclosure (5).

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## 4.171. NO. 1 ENGINE POWER AVAILABLE SPINDLE AFT CABLE INSTALLATION - continued

c. **Install cable (2) on support (6).**

(1) Center nut (7) on threaded area of cable (2).

(2) Install cable (2) through support (6).

(3) Install nut (8) three turns on cable (2).

d. **Install forward cable (9) on cable (2).** Torque nuts (7) and (8) to **90 INCH-POUNDS** and nut (12) to **70 INCH-POUNDS**.

(1) Aline cable (2) and cable (9) by adjusting nuts (7) and (8).

(2) Install fitting (10) on fitting (11).

(3) Install coupling nut (12) on cable (2).

(4) Hold cable flats (13). Torque nuts (7) and (8) to **90 INCH-POUNDS**. Use torque wrench and crowfoot.

(5) Hold cable flats (14). Torque coupling nut (12) to **70 INCH-POUNDS**. Use torque wrench and crowfoot.

e. **Install retainer (3) and firewall plate (4) on louver enclosure (5).**

(1) Aline retainer (3) and firewall plate (4) on louver enclosure (5).

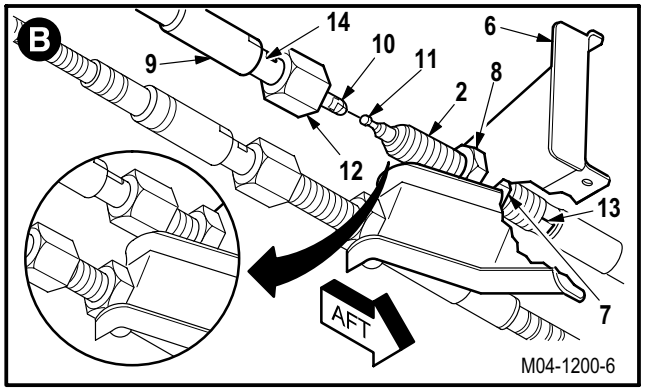
(2) Install three screws (15) through washers (16), retainer (3) and plate (4) in enclosure (5).

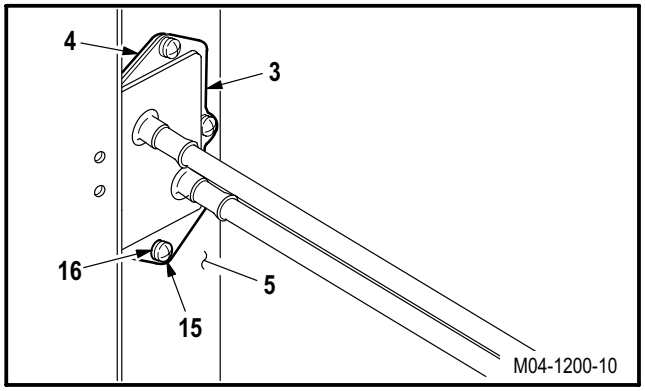
f. **Install cable (2) on gearbox (17).** Torque nut (20) to **70 INCH-POUNDS**.

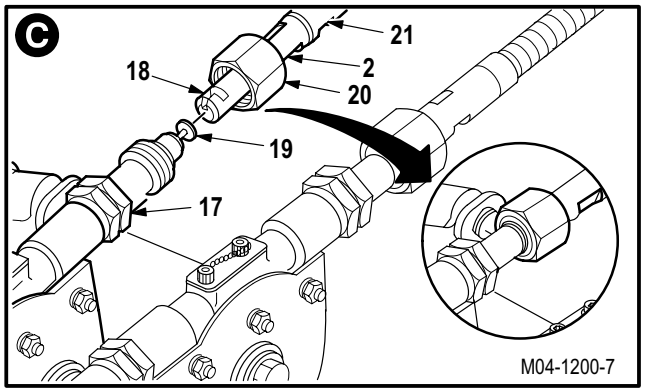
(1) Install fitting (18) on gearbox fitting (19).

(2) Install coupling nut (20) on gearbox (17).

(3) Hold cable flats (21). Torque coupling nut (20) to **70 INCH-POUNDS**. Use torque wrench and crowfoot.

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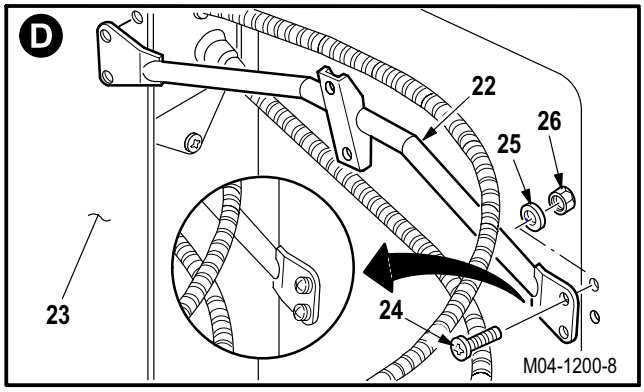
## 4.171. NO. 1 ENGINE POWER AVAILABLE SPINDLE AFT CABLE INSTALLATION - continued

g. **Install support (22) on firewall (23).**

(1) Aline support (22) on firewall (23).

(2) Install four screws (24) through support (22) and firewall (23).

(3) Hold four screws (24). Install four washers (25) and nuts (26).

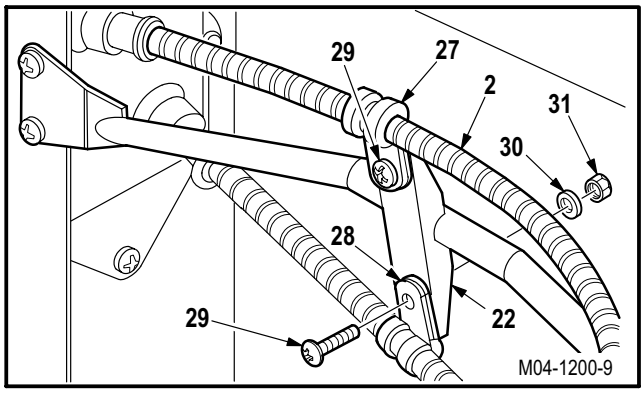



h. **Install clamps (27) and (28) on support (22).**

(1) Install clamp (27) on cable (2).

(2) Install two screws (29) through clamps (27) and (28) and support (22).

(3) Hold two screws (29). Install two washers (30) and nuts (31).




i. **Inspect (QA).**

j. **Perform No. 1 engine power available spindle system rigging check** (para 4.186)**.**

k. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

l. **Install panel L200** (para 2.2)**.**

END OF TASK

## 4.172. NO. 1 ENGINE POWER CONTROL GEARBOX AFT CABLE SUPPORT REMOVAL/INSTALLATION

4.172.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.172.2. Initial Setup

**Tools:**

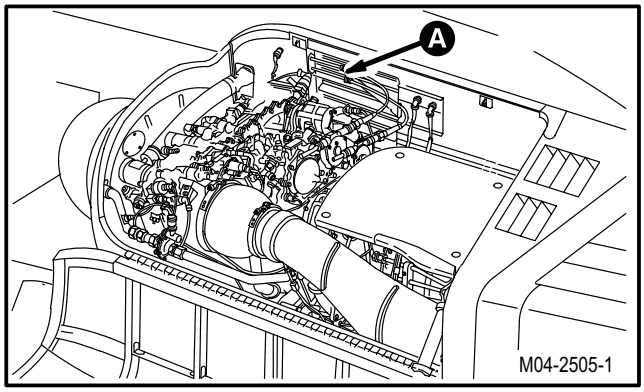
Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 opened |



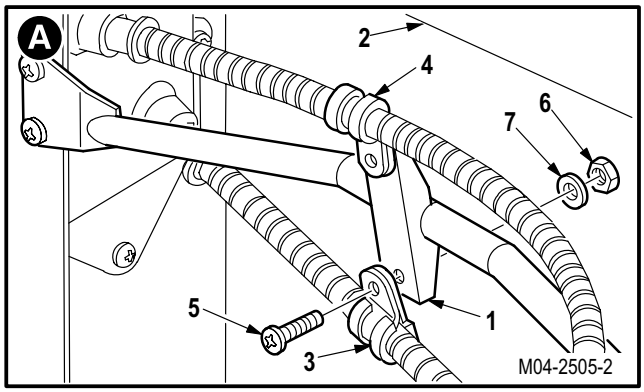

4.172.3. Removal

a. **Remove aft cable support (1) from firewall (2).**

(1) Remove clamps (3) and (4) from support (1).

(a) Hold two screws (5). Remove two nuts (6) and washers (7).

(b) Remove two screws (5).

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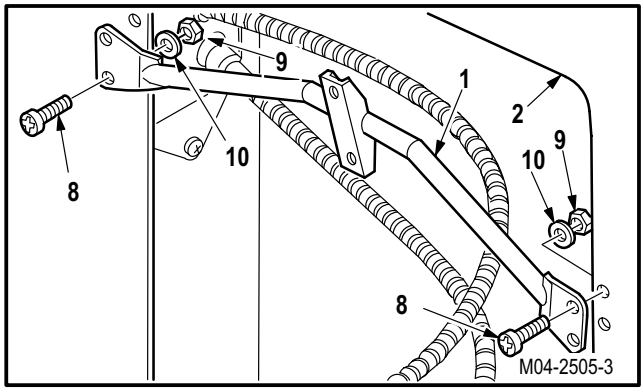
## 4.172. NO. 1 ENGINE POWER CONTROL GEARBOX AFT CABLE SUPPORT REMOVAL/INSTALLATION - continued

(2) Hold four screws (8). Remove nuts (9) and washers (10).

(3) Remove four screws (8).

(4) Remove support (1).




4.172.4. Cleaning

a. **Clean support mounting area on firewall** (para 1.47)**.**

4.172.5. Inspection

a. **Check firewall for cracks.** None allowed.

b. **Check firewall for corrosion** (para 1.49)**.**

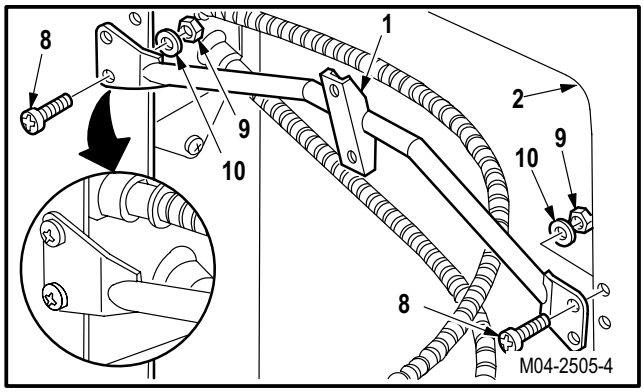
4.172.6. Installation

a. **Install support (1) on firewall (2).**

(1) Position support (1) on firewall (2).

(2) Install four screws (8) through support (1) and firewall (2).

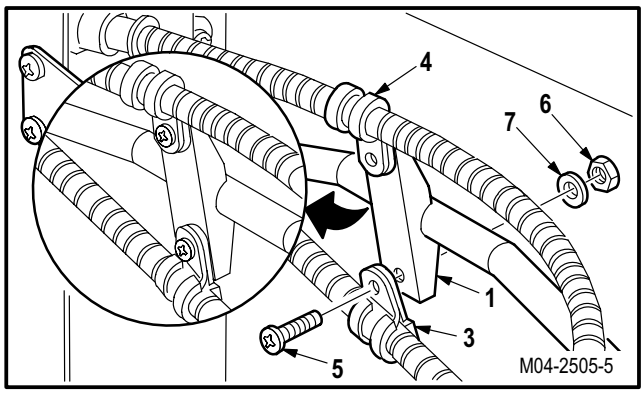
(3) Install four washers (10) and nuts (9) on four screws (8).




(4) Install clamps (4) and (3) on support (1).

(a) Install two screws (5) through clamps (4) and (3) and support (1).

(b) Install two washers (7) and nuts (6) on two screws (5).




b. **Inspect (QA).**

c. **Secure access door LN1** (para 2.2)**.**

END OF TASK

## 4.173. NO. 2 ENGINE POWER AVAILABLE SPINDLE AFT CABLE REMOVAL

4.173.1. Description

This task covers: Removal. Cleaning. Inspection.

4.173.2. Initial Setup

**Tools:**

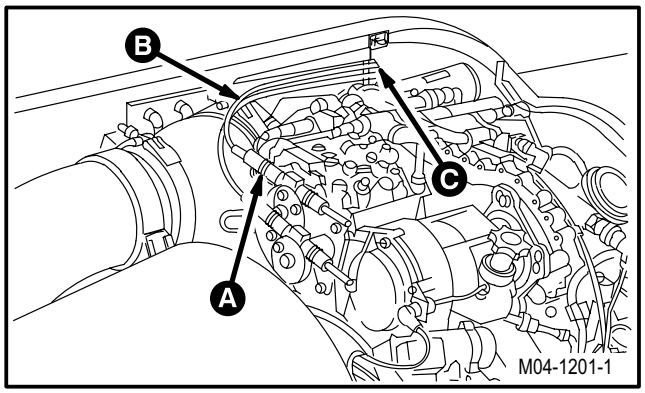
Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access panel R200 removed; doors RN1, T250L, T250R, T290L, T290R, and L325 opened |

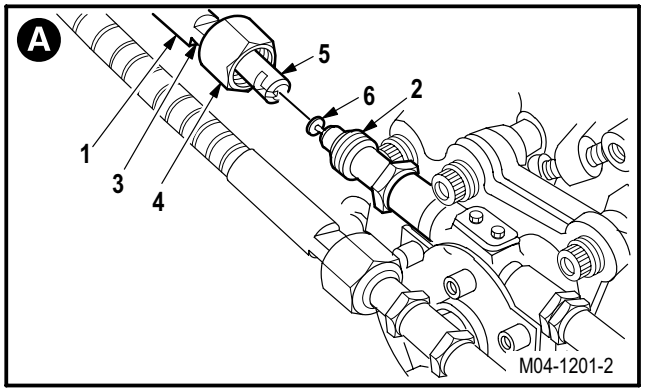



4.173.3. Removal

a. **Remove aft cable (1) from gearbox (2).**

(1) Hold cable flats (3). Remove coupling nut (4).

(2) Remove fitting (5) from gearbox fitting (6).

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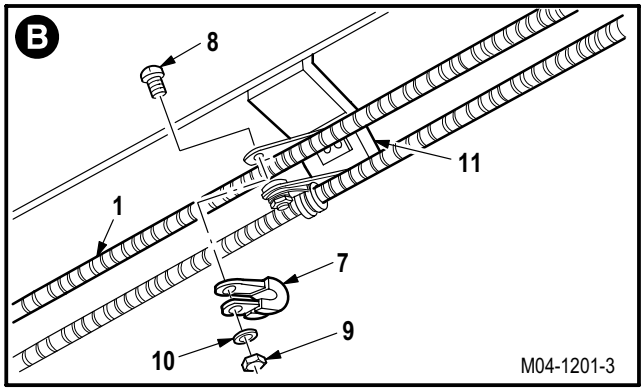
**4.173. NO. 2 ENGINE POWER AVAILABLE SPINDLE AFT CABLE REMOVAL - continued**

b. **Remove clamp (7) from cable (1).**

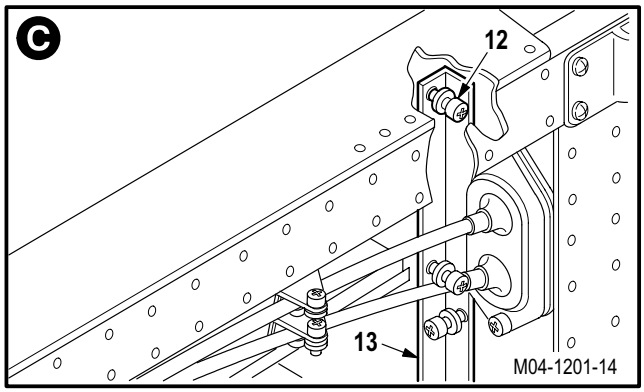
(1) Hold screw (8). Remove nut (9) and washer (10).

(2) Remove screw (8).

(3) Remove clamp (7) from cable (1) and bracket (11).



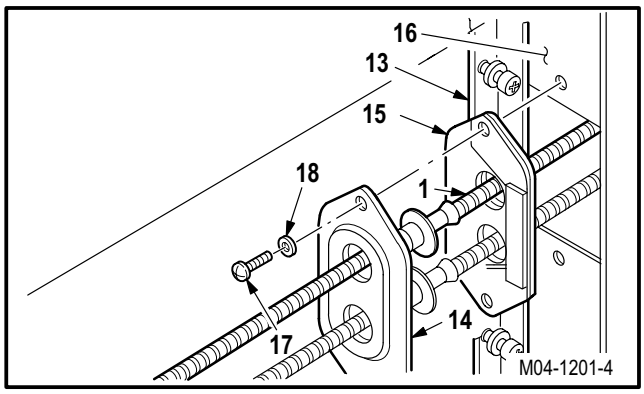

c. **Loosen top nine screws (12) on angle (13).**




d. **Remove seal (14) and firewall plate (15) from louver enclosure (16).**

(1) Remove two screws (17) and washers (18).

(2) Slide seal (14) and plate (15) out from under angle (13).

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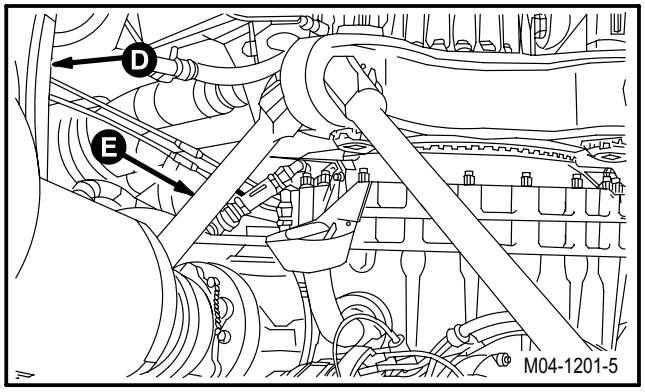
## 4.173. NO. 2 ENGINE POWER AVAILABLE SPINDLE AFT CABLE REMOVAL - continued

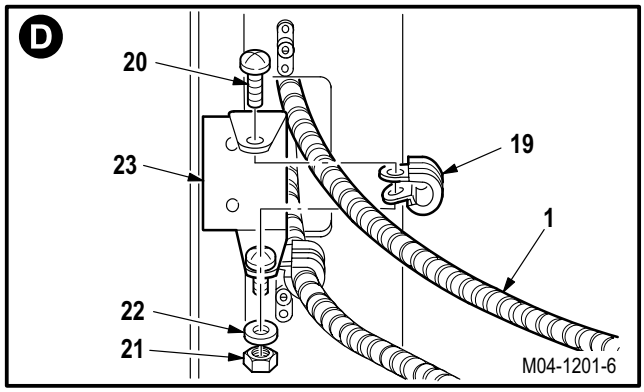



e. **Remove clamp (19) from cable (1).**

(1) Hold screw (20). Remove nut (21) and washer (22).

(2) Remove screw (20).

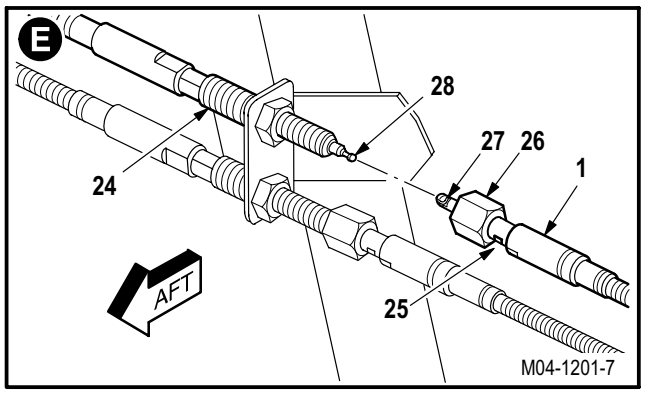
(3) Remove clamp (19) from cable (1) and support (23).



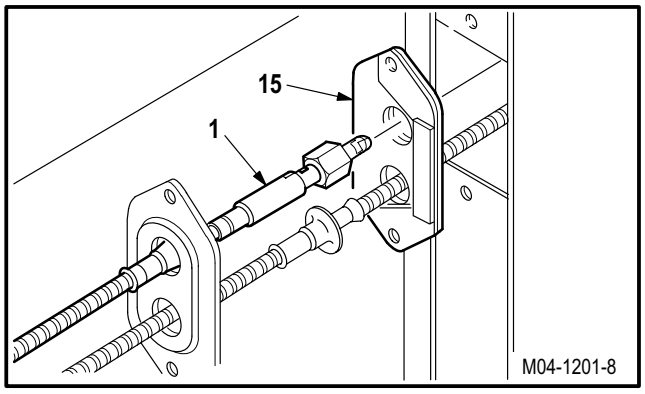

f. **Remove cable (1) from forward cable (24).**

(1) Hold cable flats (25). Remove coupling nut (26).

(2) Remove fitting (27) from fitting (28).




g. **Pull cable (1) aft from plate (15).**

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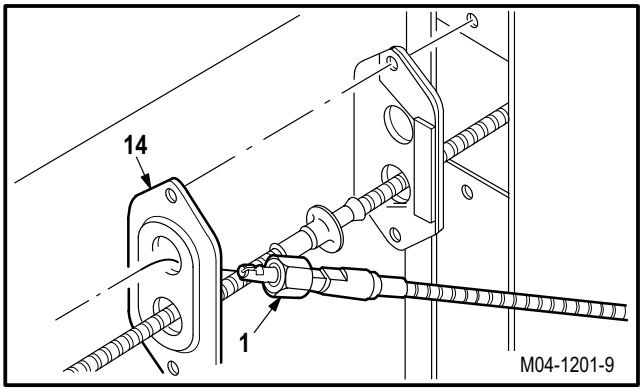
**4.173. NO. 2 ENGINE POWER AVAILABLE SPINDLE AFT CABLE REMOVAL - continued**

h. **Pull cable (1) forward from seal (14).**

i. **Remove cable (1).**




4.173.4. Cleaning

a. **Clean supports, firewall plates, and seal retainer seal, and firewall plate** (para 1.47)**.**

4.173.5. Inspection

a. **Check clamp bracket, support, retainer seal, and firewall plate for cracks and bending.** None allowed.

b. **Check clamp bracket, support, retainer seal, and firewall plate for corrosion** (para 1.49)**.**

END OF TASK

## 4.174. NO. 2 ENGINE POWER AVAILABLE SPINDLE AFT CABLE INSTALLATION

4.174.1. Description

This task covers: Installation.

4.174.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
7/8 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 86, App H)
0.0 - 10.0-pound weighing scale (item 272, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**References:**

TM 1-1520-238-T

**Personnel Required:**

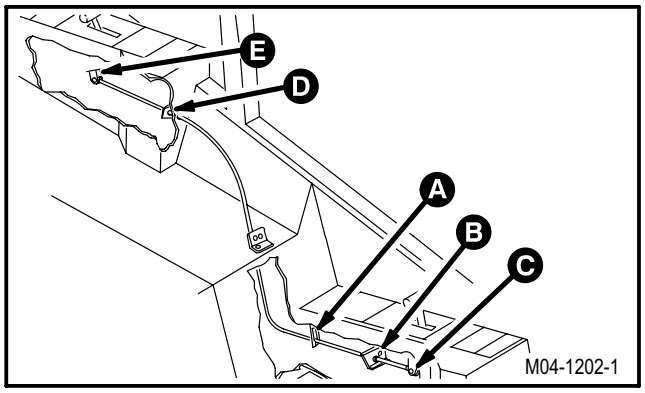
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

Engine power available spindle (PAS) cables cannot be intermixed with cables manufactured by different vendors on the same engine. Cables that have a metallic exterior (Controlex) cannot be mixed with cables that have a black tubing exterior (Cablecraft) on the same engine. One side can be Controlex and the other side can be Cablecraft. Cables must be replaced with same exact part number. If exact part is not available, all No. 1 engine PAS cables (three cables) or No. 2 engine PAS cables (three cables) must be replaced with new cables (Cablecraft).



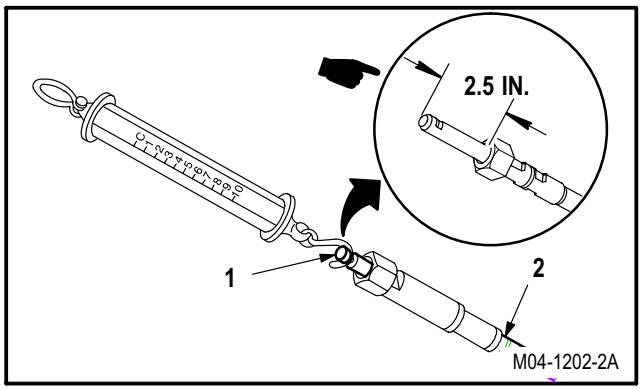

4.174.3. Installation

a. **Check cable ribbon (1) friction load.**

(1) Place aft cable (2) on flat surface. Ensure cable (2) is not bent or twisted.

(2) Slide ribbon (1) **2.5 INCHES** in and out of cable (2). There should be no binding, stiffness, or jamming.

(3) Check friction load of ribbon (1). Load not to exceed **1.5 POUNDS**. Use scale.

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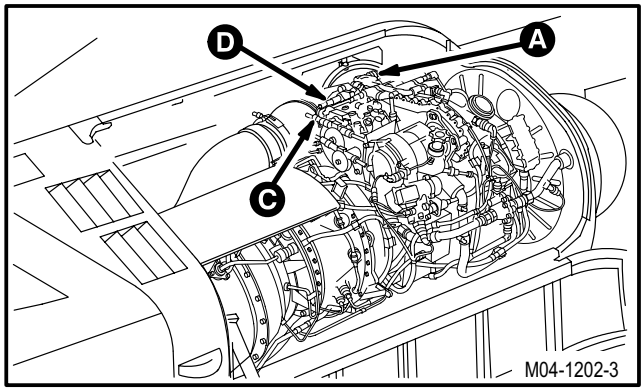
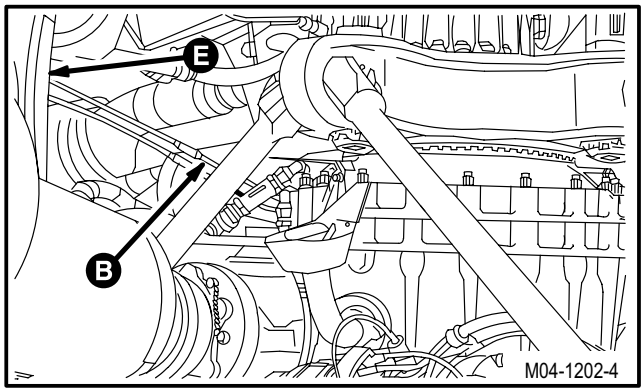
## 4.174. NO. 2 ENGINE POWER AVAILABLE SPINDLE AFT CABLE INSTALLATION - continued

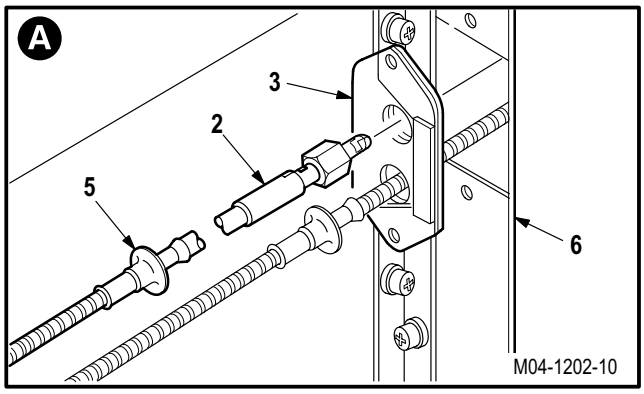
(4) If ribbon movement is rough or friction load exceeds **1.5 POUNDS**, replace cable.



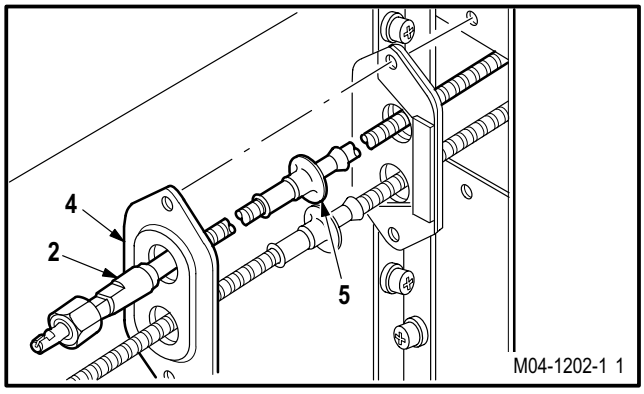




b. **Install cable (2) through firewall plate (3) and seal retainer (4).**

(1) Install end of cable (2) (5) forward through plate (3) and louver enclosure (6).




(2) Install end of cable (2) located nearest to fire-seal (5) aft through seal (4).

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## 4.174. NO. 2 ENGINE POWER AVAILABLE SPINDLE AFT CABLE INSTALLATION - continued

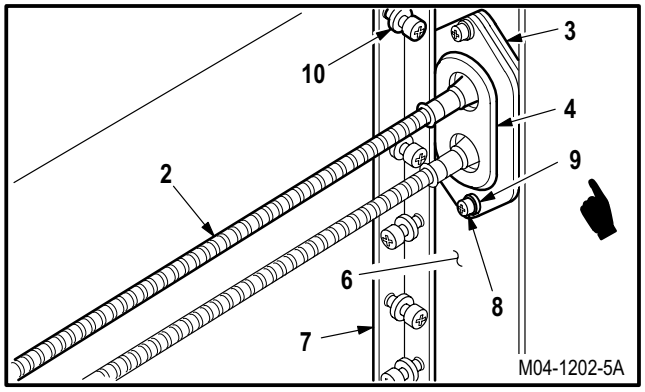
c. **Install firewall plate (3) and seal (4) on louver enclosure (6).**

(1) Install plate (3) and seal (4) between angle (7) and louver (6).

(2) Aline plate (3) and seal (4) with louver (6).

(3) Install two screws (8) through washers (9), seal (4), and plate (3) in enclosure (6).

(4) Tighten nine screws (10) on angle (7).

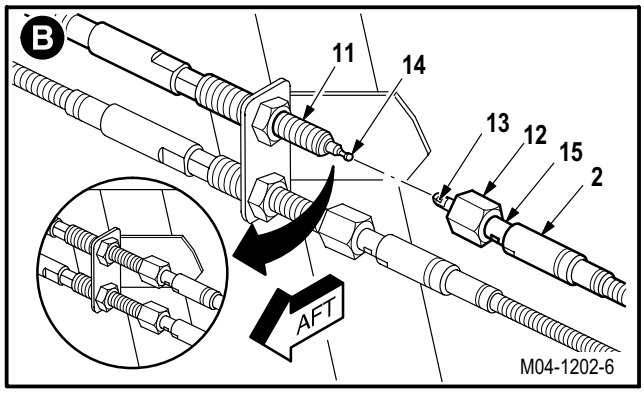



d. **Install cable (2) on forward cable (11).** Torque nut (12) to **70 INCH-POUNDS**.

(1) Install fitting (13) on fitting (14).

(2) Install nut (12) on cable (11).

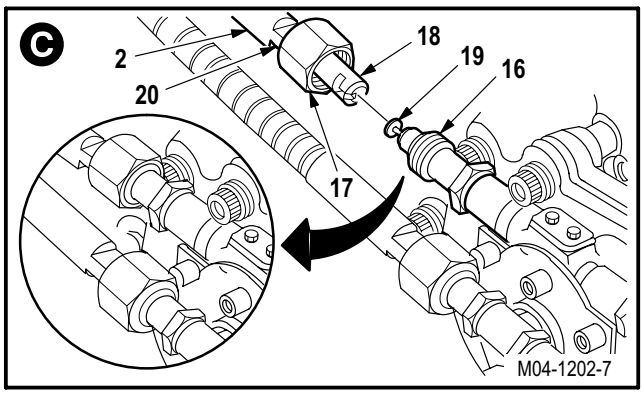
(3) Hold cable (2) at flats (15). Torque nut (12) to **70 INCH-POUNDS**. Use torque wrench and crowfoot.




e. **Install cable (2) on power available spindle gearbox (16).** Torque nut (17) to **70 INCH-POUNDS**.

(1) Install fitting (18) on gearbox fitting (19).

(2) Hold cable (2) at flats (20). Torque nut (17) to **70 INCH-POUNDS**. Use torque wrench and crowfoot.

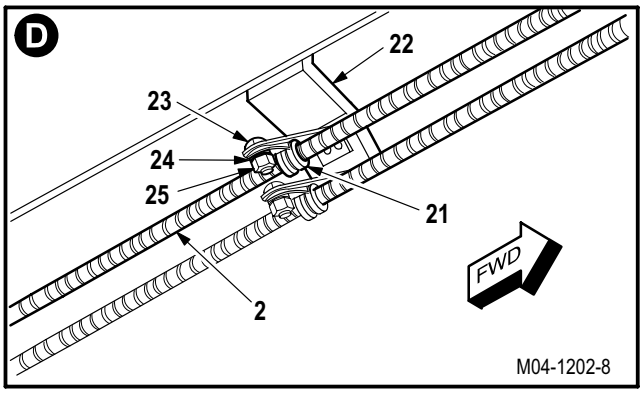



f. **Install clamp (21) on bracket (22).**

(1) Install clamp (21) on cable (2).

(2) Install screw (23) through bracket (22) and clamp (21).

(3) Hold screw (23). Install washer (24) and nut (25).

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**4.174. NO. 2 ENGINE POWER AVAILABLE SPINDLE AFT CABLE INSTALLATION - continued**

g. **Install clamp (26) on bracket (27).**

(1) Install clamp (26) on cable (2).

(2) Install screw (28) through bracket (27) and clamp (26).

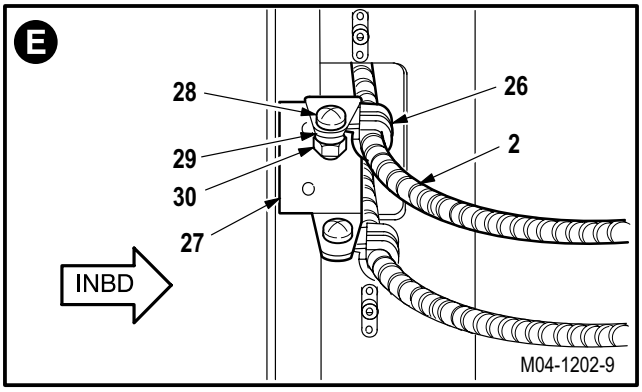
(3) Hold screw (28). Install washer (29) and nut (30).

h. **Inspect (QA).**

i. **Perform No. 2 engine power available spindle system rigging check** (para 4.187)**.**

j. **Perform power plants maintenance operational check (engine 2)** (TM 1-1520-238-T)**.**

k. **Install access panel R200; secure doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**




END OF TASK

## 4.175. NO. 1 AND NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE SUPPORT REMOVAL/INSTALLATION

4.175.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.175.2. Initial Setup

**Tools:**

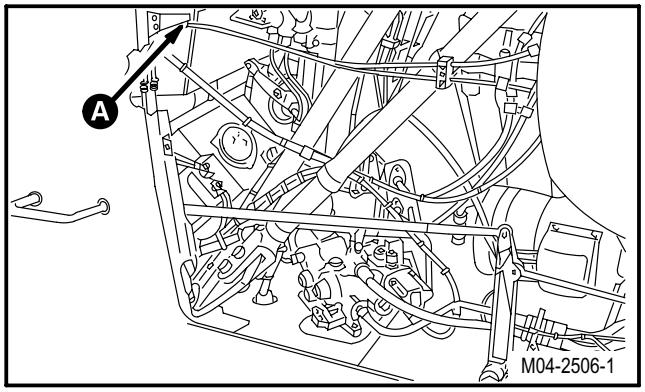
Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door L200 removed |

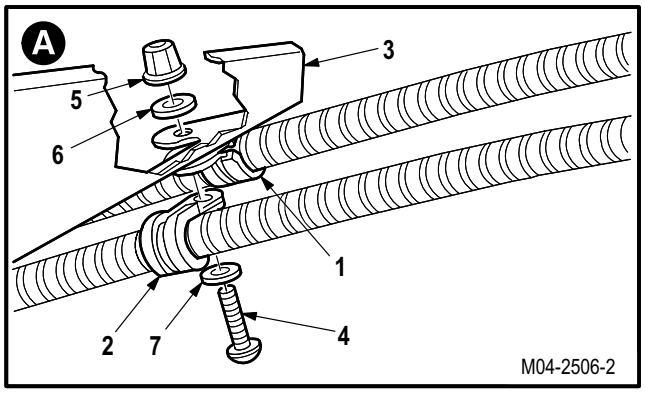



4.175.3. Removal

a. **Remove clamps (1) and (2) from center cable support (3).**

(1) Hold screw (4). Remove nut (5) and washer (6).

(2) Remove screw (4) and washer (7).

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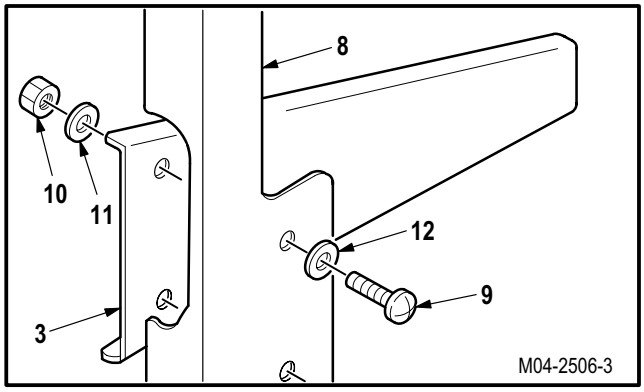
## 4.175. NO. 1 AND NO. 2 ENGINE POWER AVAILABLE SPINDLE CENTER CABLE SUPPORT REMOVAL/INSTALLATION - continued

b. **Remove support (3) from frame (8).**

(1) Hold two screws (9). Remove two nuts (10) and washers (11).

(2) Remove two screws (9) and washers (12).




4.175.4. Cleaning

a. **Clean support mounting area on frame** (para 1.47)**.**

4.175.5. Inspection

a. **Check support mounting area on frame for cracks.** None allowed.

b. **Check frame for corrosion** (para 1.49)**.**

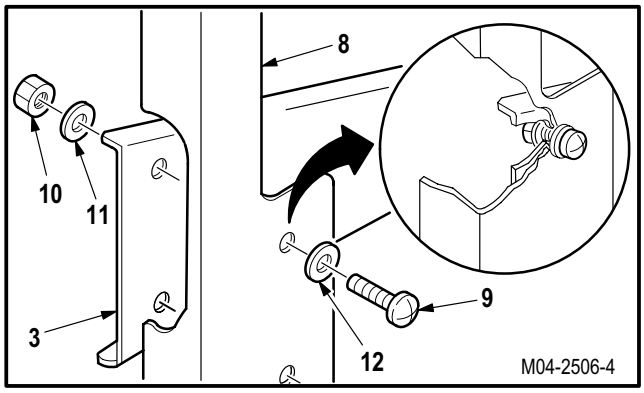
4.175.6. Installation

a. **Install support (3) on frame (8).**

(1) Position support (3) on frame (8).

(2) Install two screws (9) through washers (12), support (3), and frame (8).

(3) Install two washers (11) and nuts (10) on screws (9).




b. **Install clamps (1) and (2) on support (3).**

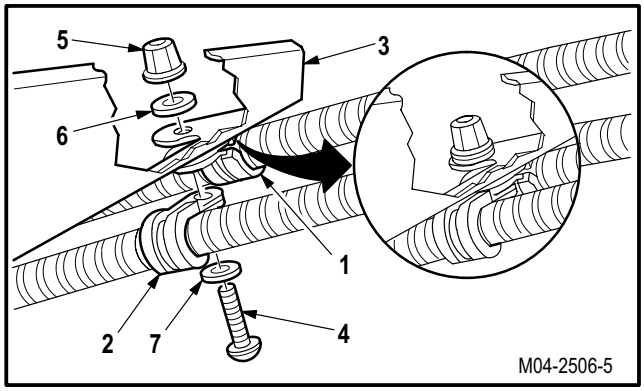
(1) Aline clamps (1) and (2) under support (3).

(2) Install screw (4) through washer (7), clamps (1) and (2), and support (3).

(3) Install washer (6) and nut (5) on screw (4).

c. **Inspect (QA).**

d. **Secure access door L200** (para 2.2)**.**




END OF TASK

## 4.176. NO. 1 ENGINE LOAD DEMAND SPINDLE AFT CABLE REMOVAL

4.176.1. Description

This task covers: Removal. Cleaning. Inspection.

4.176.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 opened; panel L200 removed |
| 1.72 | External power application - hydraulic (primary) |

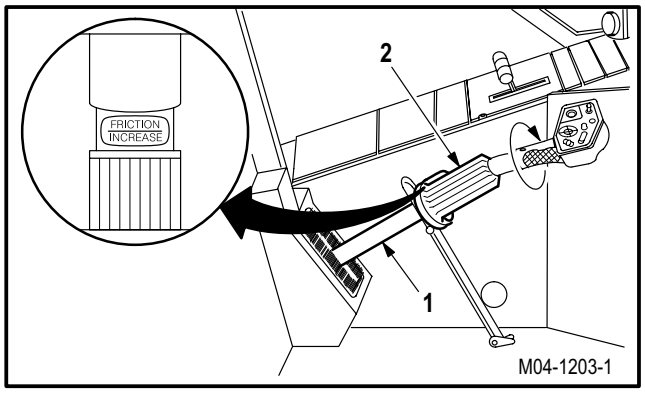
4.176.3. Removal

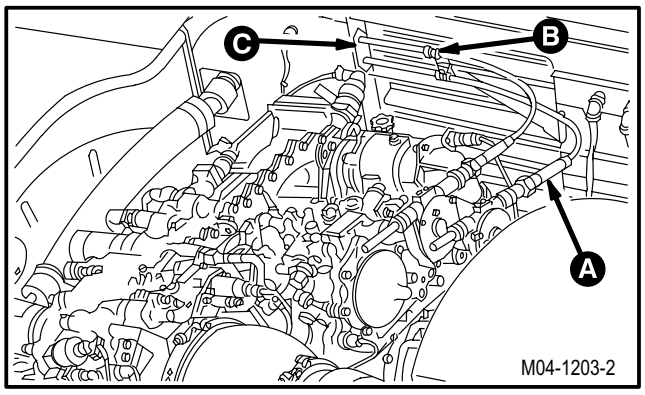
a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **Set collective stick (1) to full up.**

(1) Rotate friction lock (2) counterclockwise to lock.

c. **Remove external power - hydraulic (primary)** (para 1.72)**.**

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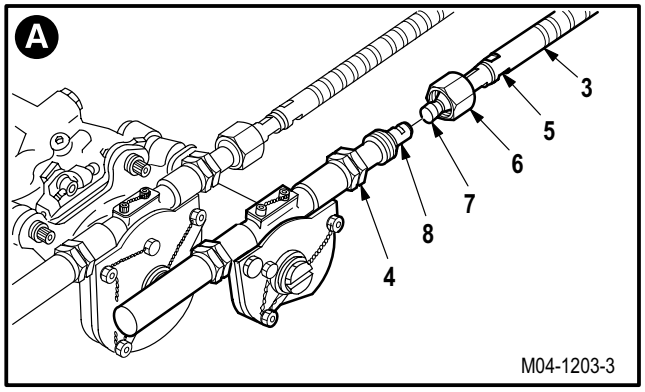
## 4.176. NO. 1 ENGINE LOAD DEMAND SPINDLE AFT CABLE REMOVAL - continued

d. **Remove aft cable (3) from gearbox (4).**

(1) Hold cable flats (5). Remove coupling nut (6).

(2) Remove aft cable fitting (7) from gearbox fitting (8).

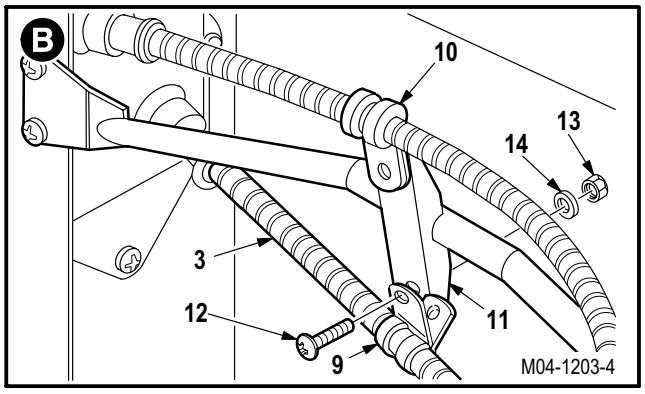



e. **Remove clamps (9) and (10) from support (11).**

(1) Hold two screws (12). Remove two nuts (13) and washers (14).

(2) Remove two screws (12).

(3) Remove clamp (9) from cable (3).

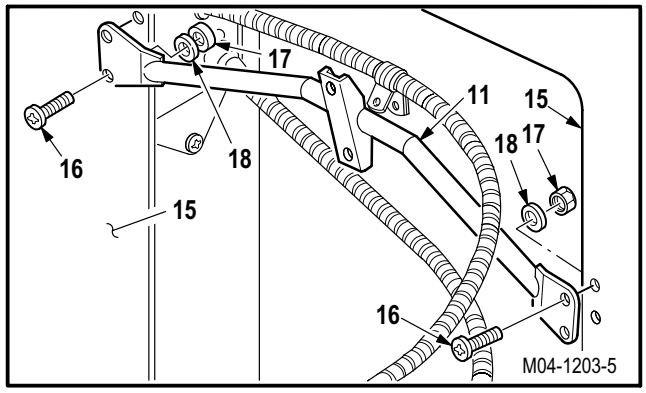



f. **Remove support (11) from firewall (15).**

(1) Hold four screws (16). Remove four nuts (17) and washers (18).

(2) Remove four screws (16) from support (11).

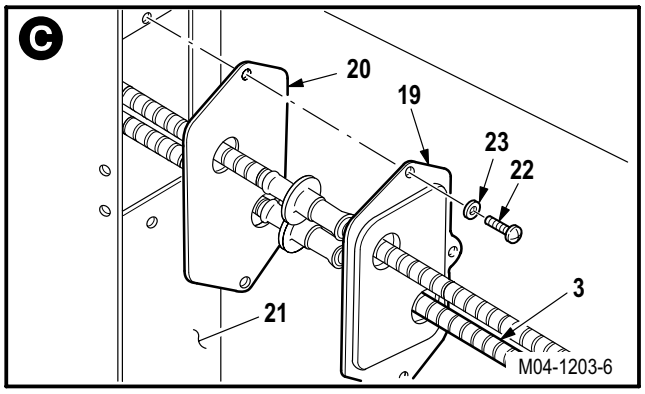
(3) Remove support (11).




g. **Remove retainer seal (19) and firewall plate (20) from louver enclosure (21).**

(1) Remove three screws (22) and washers (23).

(2) Slide seal (19) and firewall plate (20) aft on cable (3).

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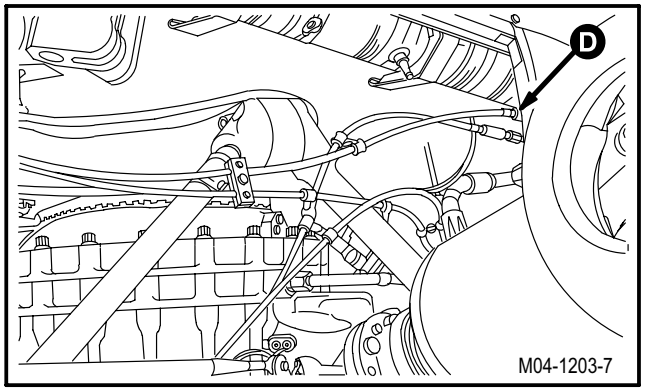
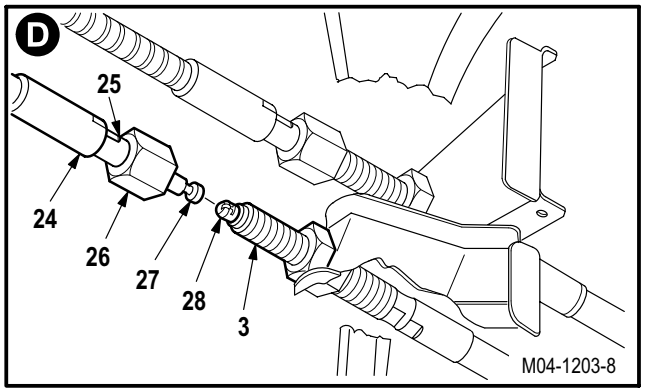
## 4.176. NO. 1 ENGINE LOAD DEMAND SPINDLE AFT CABLE REMOVAL - continued




h. **Remove forward cable (24) from cable (3).**

(1) Hold cable flats (25). Remove coupling nut (26).

(2) RTemove forward cable fitting (27) from aft cable fitting (28).

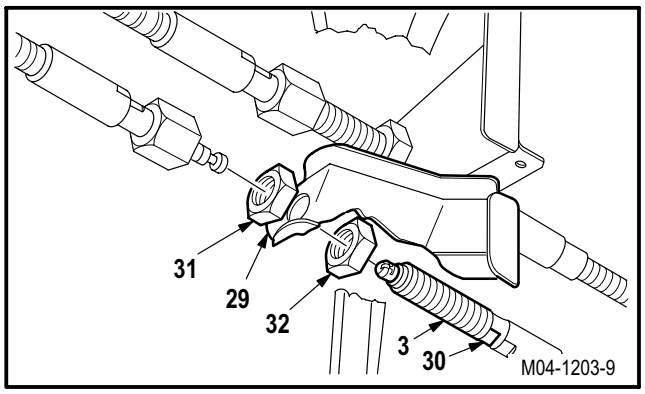



i. **Remove cable (3) from support (29).**

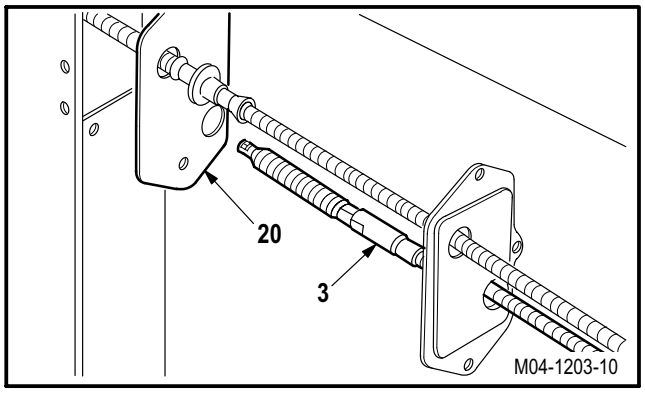
(1) Hold cable flats (30). Remove nut (31).

(2) Remove cable (3) from bracket (29).

(3) Remove nut (32) from cable (3).




j. **Pull cable (3) aft from firewall plate (20).**

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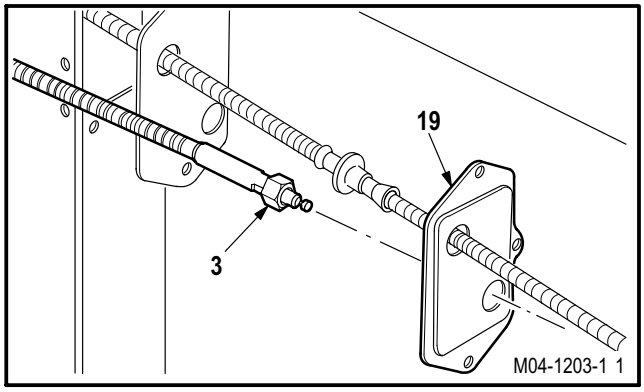
**4.176. NO. 1 ENGINE LOAD DEMAND SPINDLE AFT CABLE REMOVAL - continued**

k. **Pull cable (3) forward from seal (19).**




4.176.4. Cleaning

a. **Clean supports, firewall plates, and seal retainer** (para 1.47)**.**

4.176.5. Inspection

a. **Check support, firewall plate, and retainer seal for cracks and bending.** None allowed.

b. **Check support, firewall plate, and retainer seal for corrosion** (para 1.49)**.**

END OF TASK

## 4.177. NO. 1 ENGINE LOAD DEMAND SPINDLE AFT CABLE INSTALLATION

4.177.1. Description

This task covers: Installation.

4.177.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0.0 - 10.0-pound weighing scale (item 272, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
7/8 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 86, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

The engine load demand spindle (LDS) cables cannot be intermixed with cables manufactured by different vendors. Cables that have a metallic exterior (Controlex) cannot be intermixed with cables that have a black tubing exterior (Cablecraft). Cable must be replaced with same exact part number. If exact part is not available, all No. 1 and No. 2 engine LDS cables (four cables) must be replaced with new cables (Cablecraft).

4.177.3. Installation

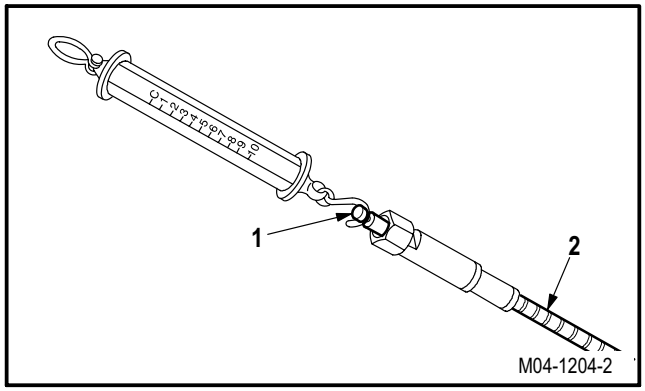
a. **Check cable ribbon (1) friction load.**

(1) Place cable (2) on flat surface. Ensure cable (2) is not bent or twisted.

(2) Slide ribbon (1) **2.5 INCHES** in and out of cable (2). There should be no binding, stiffness, or jamming.

(3) Check friction load of ribbon (1). Load not to exceed **1.5 POUNDS**. Use scale.

(4) If ribbon movement is rough or friction load exceeds **1.5 POUNDS**, replace cable.

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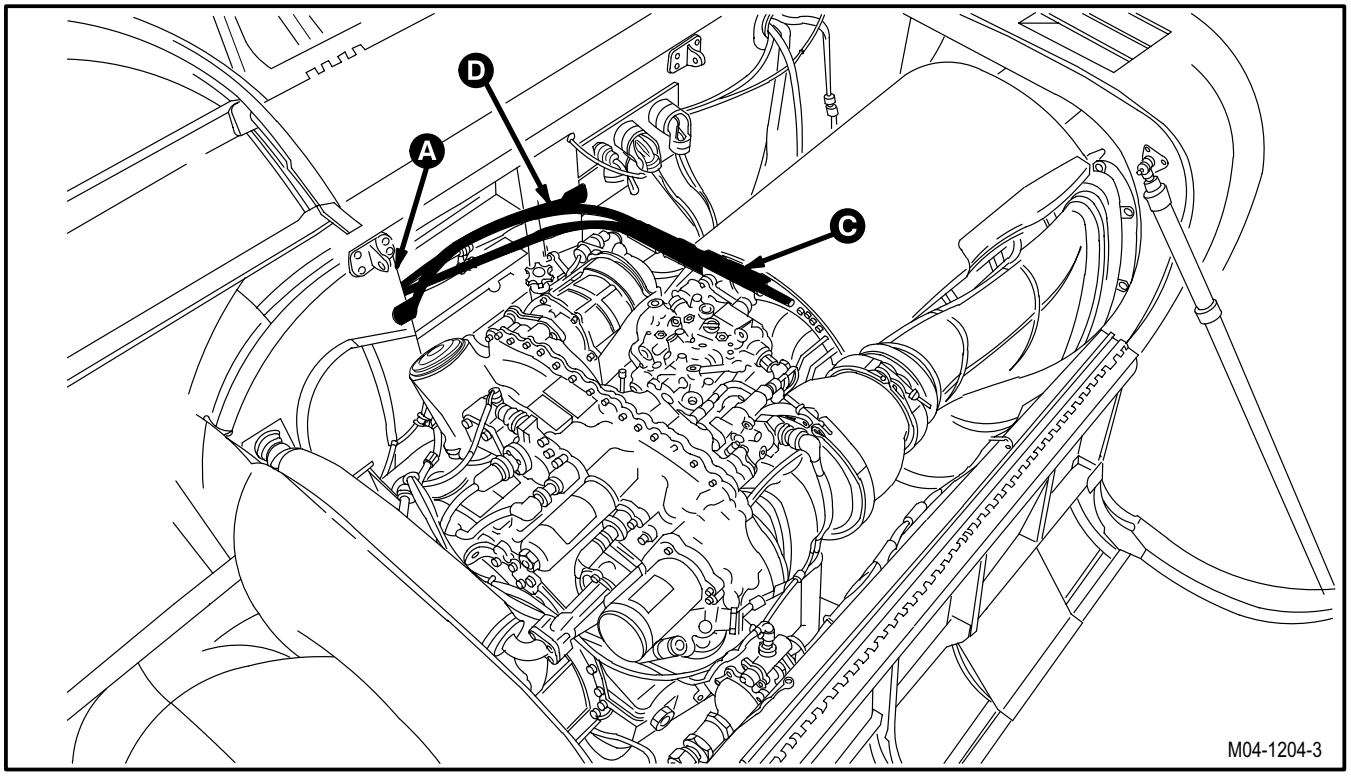
## 4.177. NO. 1 ENGINE LOAD DEMAND SPINDLE AFT CABLE INSTALLATION - continued

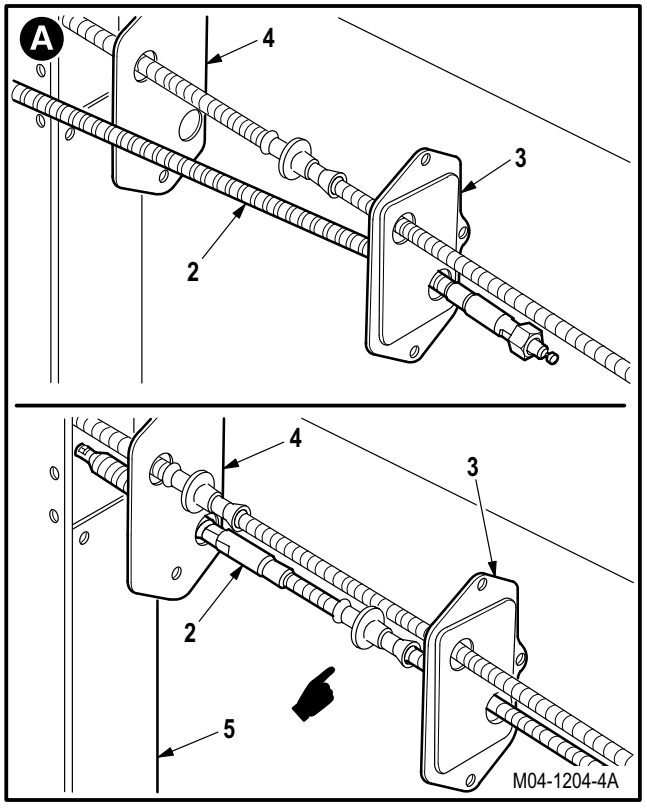



b. **Install aft cable (2) aft through seal retainer (3) and forward firewall plate (4).**

(1) Install coupling nut end of cable (2) aft through seal (3).

(2) Pull cable (2) aft through seal (3).

(3) Install threaded end of cable (2) forward through plate (4) and louver enclosure (5).

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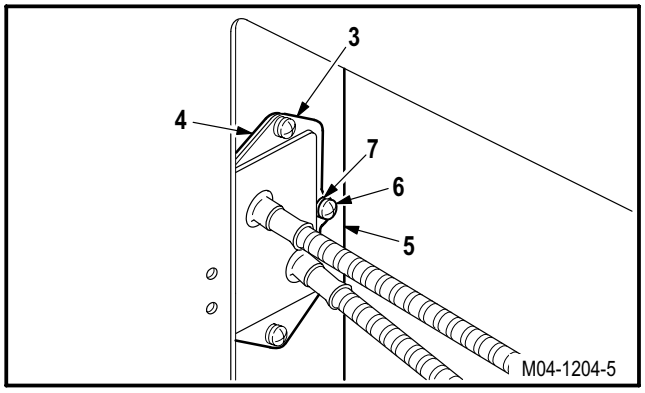
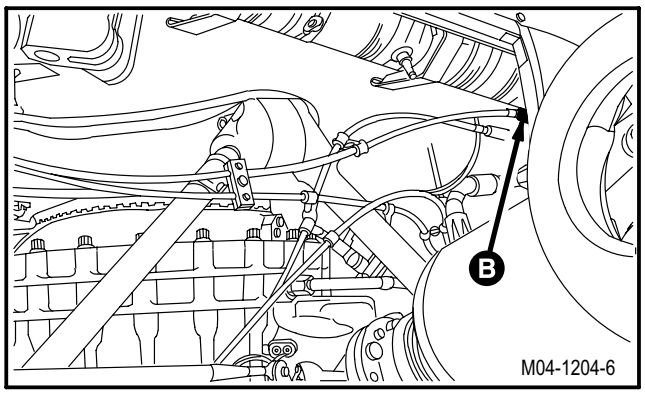
**4.177. NO. 1 ENGINE LOAD DEMAND SPINDLE AFT CABLE INSTALLATION - continued**

c. **Install seal (3) and firewall plate (4) on louver enclosure (5).**

(1) Install three screws (6) through washers (7), seal (3) and plate (4) in enclosure (5).



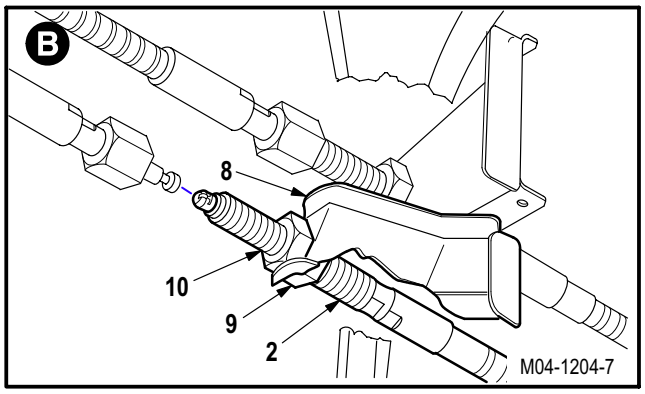




d. **Install cable (2) on support (8).**

(1) Center nut (9) on threaded end of cable (2).

(2) Install cable (2) through support (8).

(3) Install nut (10) on cable (2).

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## 4.177. NO. 1 ENGINE LOAD DEMAND SPINDLE AFT CABLE INSTALLATION - continued

e. **Install forward cable (11) on aft cable (2).** Torque nuts (9) and (10) to **90 INCH-POUNDS**.

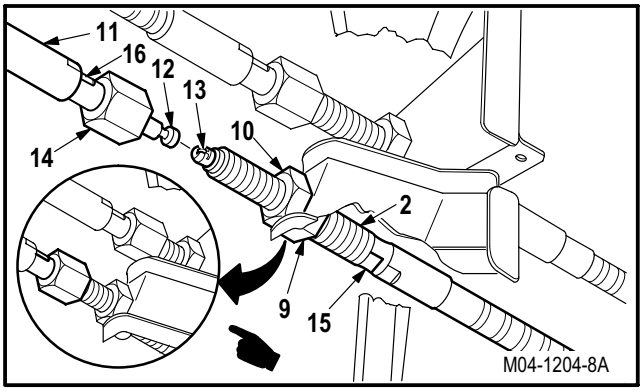
(1) Adjust nuts (9) and (10) to aline cable (2) with cable (11).

(2) Install cable fitting (12) on cable fitting (13).

(3) Install coupling nut (14) on cable (2).

(4) Hold cable (2) at flats (15). Torque nuts (9) and (10) to **90 INCH-POUNDS**. Use torque wrench and crowfoot.

(5) Hold cable (11) at flats (16). Torque nut (14) to **70 INCH-POUNDS**. Use torque wrench and crowfoot.

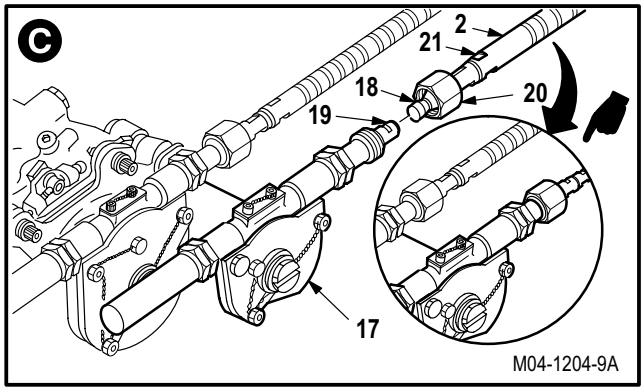



f. **Install cable (2) on gearbox (17).** Torque coupling nut (20) to **70 INCH-POUNDS**.

(1) Install cable fitting (18) on gearbox fitting (19).

(2) Install coupling nut (20) on gearbox (17).

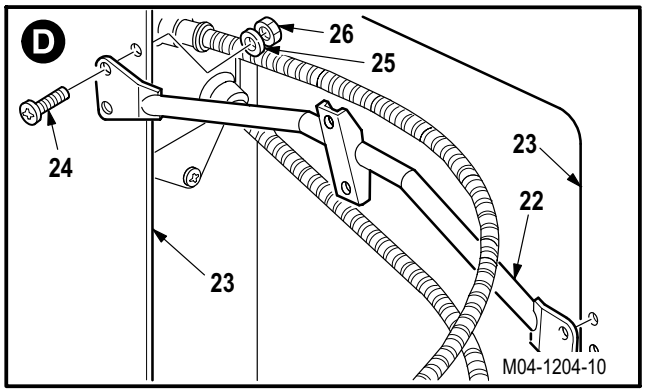
(3) Hold cable (2) at flats (21). Torque nut (20) to **70 INCH-POUNDS**. Use torque wrench and crowfoot.




g. **Install support (22) on firewall (23).**

(1) Install four screws (24) through support (22) and firewall (23).

(2) Install four washers (25) and nuts (26) on screws (24).

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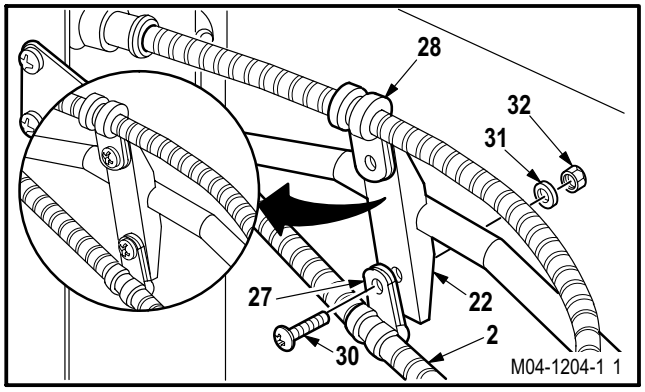
**4.177. NO. 1 ENGINE LOAD DEMAND SPINDLE AFT CABLE INSTALLATION - continued**

h. **Install clamps (27) and (28) on support (22).**

(1) Install clamp (27) on cable (2).

(2) Install two screws (30) through clamps (27) and (28) and support (22).

(3) Hold two screws (30). Install two washers (31) and nuts (32).




i. **Inspect (QA).**

j. **Perform No. 1 and No. 2 engine load demand spindle rigging check** (para 4.184)**.**

k. **Install panel L200** (para 2.2)**.**

END OF TASK

## 4.178. NO. 2 ENGINE LOAD DEMAND SPINDLE AFT CABLE REMOVAL

4.178.1. Description

This task covers: Removal. Cleaning. Inspection.

4.178.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

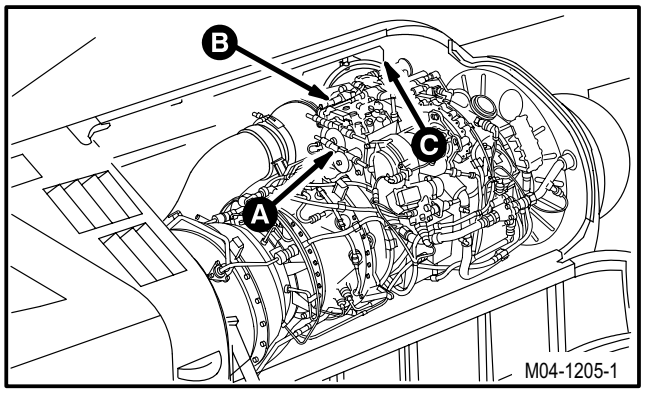
67R Attack Helicopter Repairer

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access panel R200 removed; doors RN1, T250L, T250R, T290L, T290R, and L325 opened |
| 1.72 | External power application - hydraulic (primary) |

4.178.3. Removal

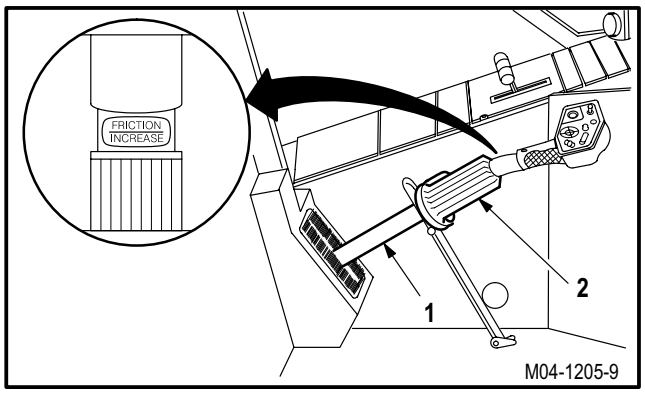
a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**




b. **Set collective stick (1) to full up.**

(1) Rotate friction lock (2) counterclockwise to lock.

c. **Remove external power - hydraulic (primary)** (para 1.72)**.**

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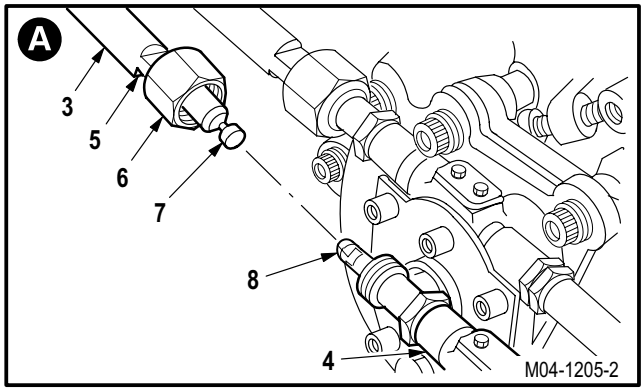
## 4.178. NO. 2 ENGINE LOAD DEMAND SPINDLE AFT CABLE REMOVAL - continued

d. **Remove aft cable (3) from gearbox (4).**

(1) Hold cable flats (5). Remove coupling nut (6).

(2) Remove cable fitting (7) from gearbox fitting (8).

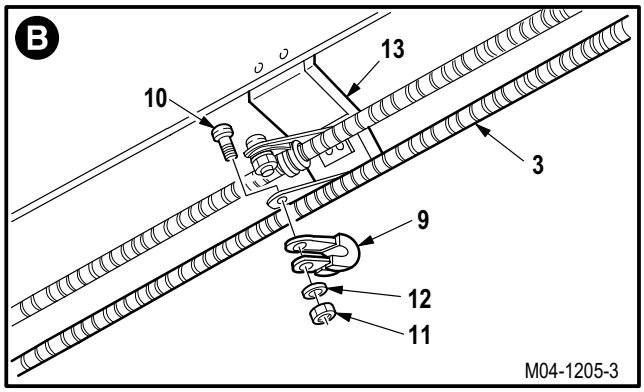



e. **Remove clamp (9) from bracket (13).**

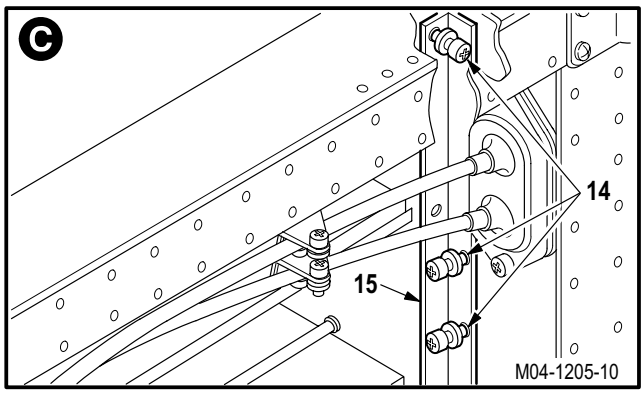
(1) Hold screw (10). Remove nut (11) and washer (12).

(2) Remove screw (10) from clamp (9) and bracket (13).

(3) Remove clamp (9) from cable (3).



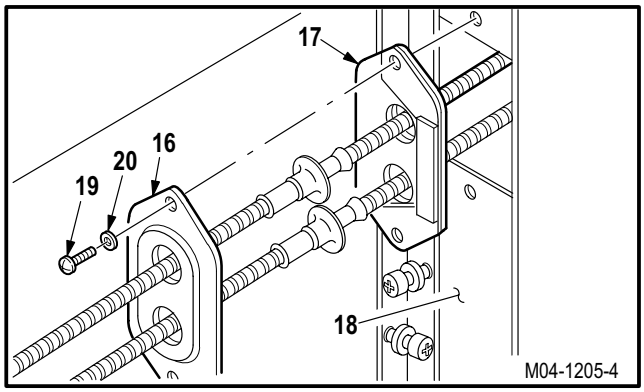

f. **Loosen top nine screws (14) on angle (15).**




g. **Remove retainer seal (16) and firewall plate (17) from louver enclosure (18).**

(1) Remove two screws (19) and washers (20).

(2) Remove seal (16) and firewall plate (17).

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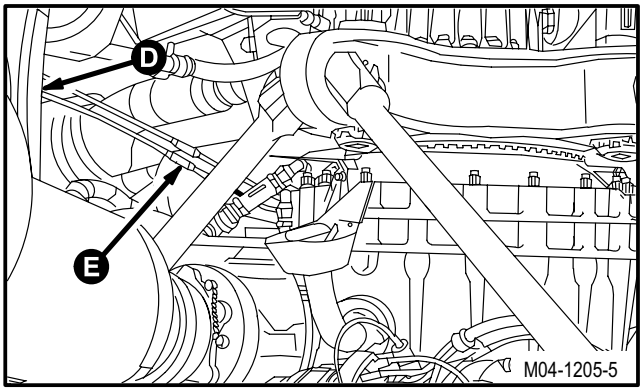
## 4.178. NO. 2 ENGINE LOAD DEMAND SPINDLE AFT CABLE REMOVAL - continued

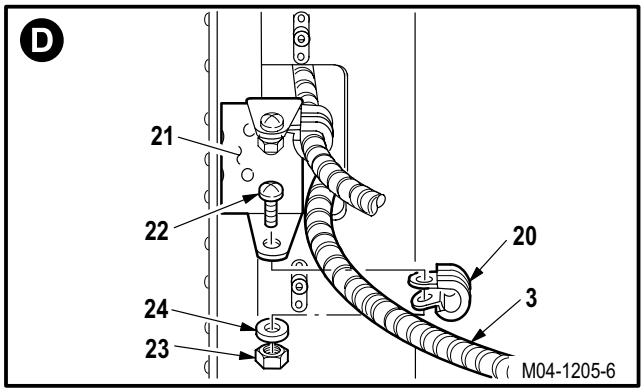



h. **Remove clamp (20) from support (21).**

(1) Hold screw (22). Remove nut (23) and washer (24).

(2) Remove screw (22) from clamp (20) and support (21).

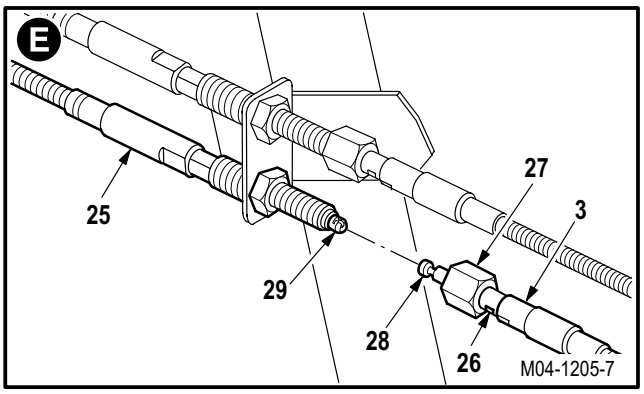
(3) Remove clamp (20) from cable (3).




i. **Remove cable (3) from forward cable (25).**

(1) Hold cable flats (26). Remove coupling nut (27) from cable (25).

(2) Remove aft cable fitting (28) from forward cable fitting (29).

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**4.178. NO. 2 ENGINE LOAD DEMAND SPINDLE AFT CABLE REMOVAL - continued**

j. **Remove cable (3) from seal (16) and firewall plate (17).**

(1) Pull cable (3) aft until clear of firewall plate (17).

(2) Pull cable (3) forward until clear of seal (16).

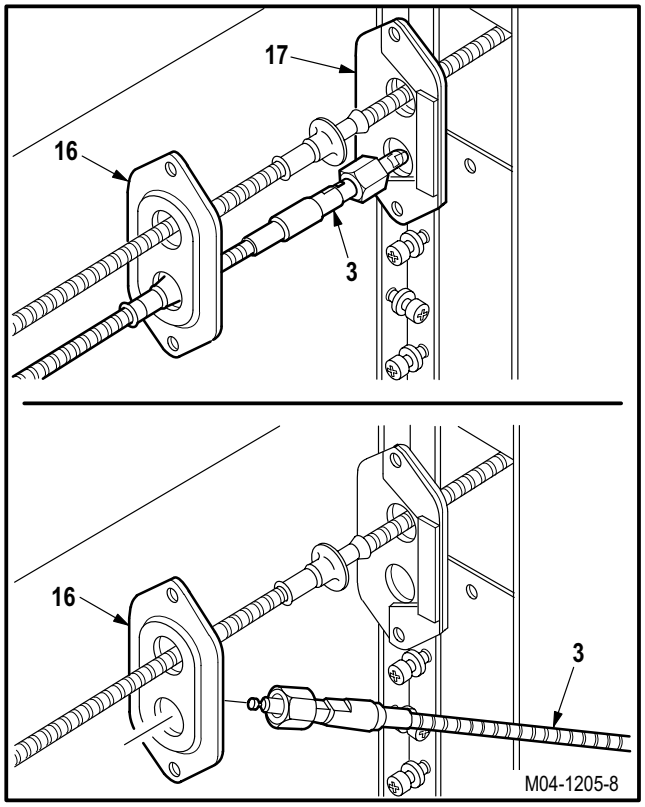
4.178.4. Cleaning

a. **Clean supports, firewall plates, and seal retainer** (para 1.47)**.**

4.178.5. Inspection

a. **Check supports, firewall plate and seal retainer for cracks and bending.** None allowed.

b. **Check supports, firewall plate and seal retainer for corrosion** (para 1.49)**.**




END OF TASK

## 4.179. NO. 2 ENGINE LOAD DEMAND SPINDLE AFT CABLE INSTALLATION

4.179.1. Description

This task covers: Installation.

4.179.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0.0 - 10.0-pound weighing scale (item 272, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
7/8 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 86, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

The engine load demand spindle (LDS) cables cannot be intermixed with cables manufactured by different vendors. Cables that have a metallic exterior (Controlex) cannot be intermixed with cables that have a black tubing exterior (Cablecraft). Cable must be replaced with same exact part number. If exact part is not available, all No. 1 and No. 2 engine LDS cables (four cables) must be replaced with new cables (Cablecraft).

4.179.3. Installation

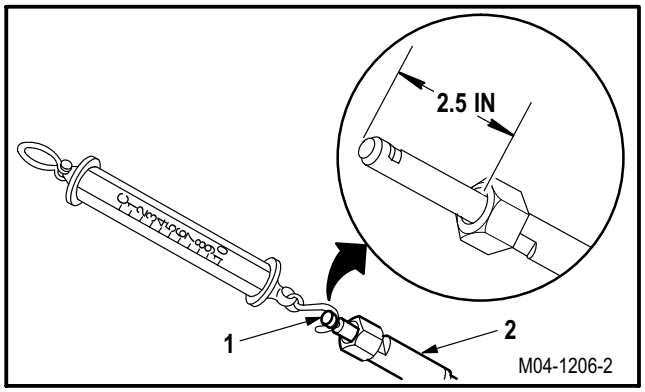
a. **Check cable ribbon (1) friction load.**

(1) Place cable (2) on flat surface. Ensure cable (2) is not bent or twisted.

(2) Slide ribbon (1) **2.5 INCHES** in and out of cable (2). There should be no binding, stiffness, or jamming.

(3) Check friction load of ribbon (1). Load not to exceed **1.5 POUNDS**. Use scale.

(4) If ribbon movement is rough or friction load exceeds **1.5 POUNDS**, replace cable.

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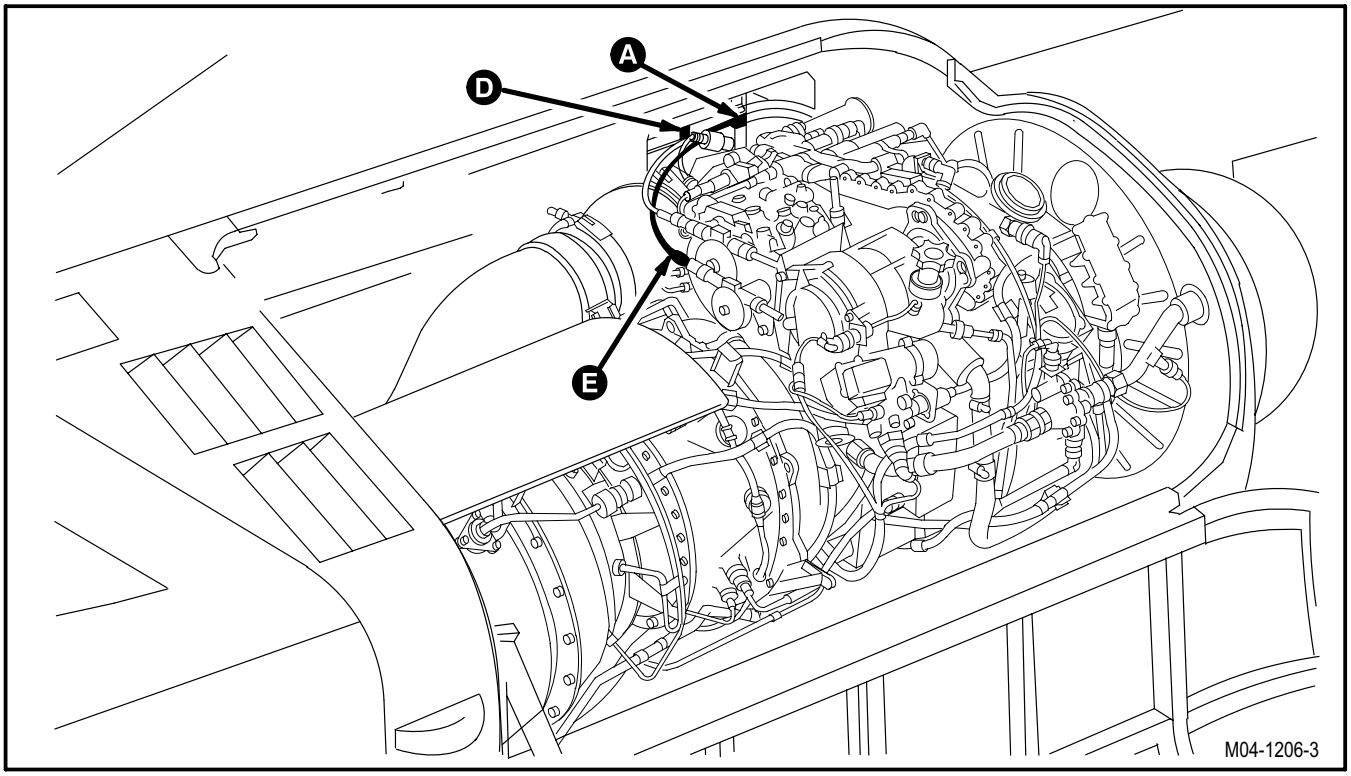
## 4.179. NO. 2 ENGINE LOAD DEMAND SPINDLE AFT CABLE INSTALLATION - continued

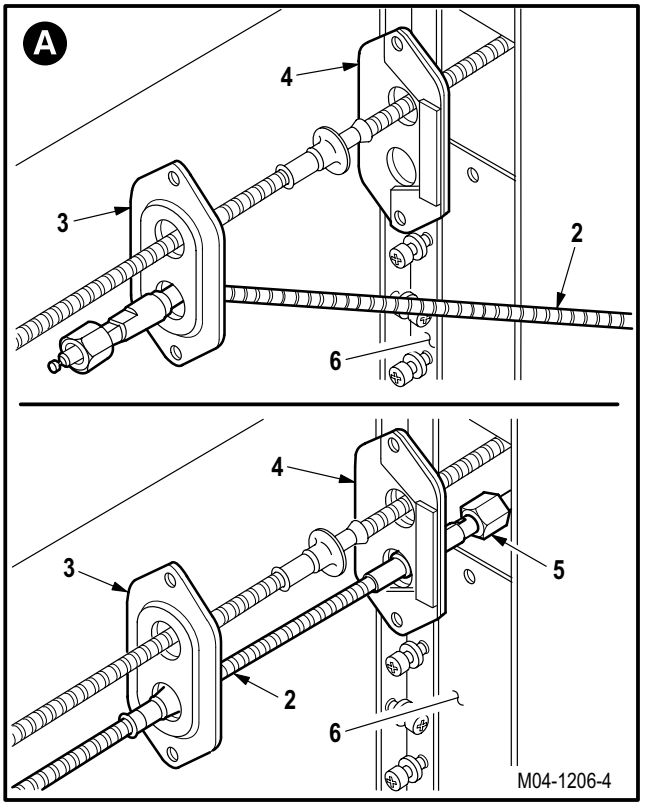



b. **Install aft cable (2) aft through seal retainer (3) and forward firewall plate (4).**

(1) Install end of cable (2) aft through seal (3).

(2) Pull cable (2) aft through seal (3).

(3) Install coupling nut (5) forward through firewall plate (4) and louver enclosure (6).

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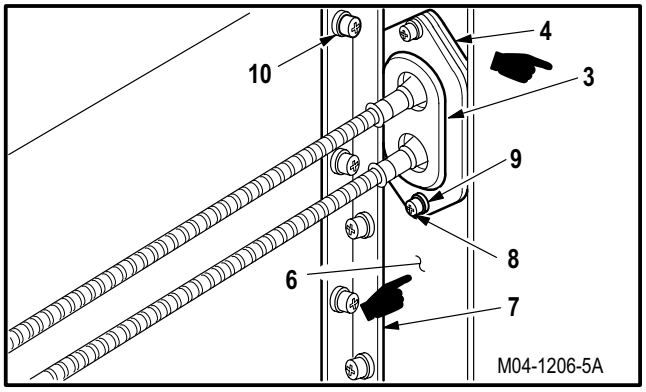
## 4.179. NO. 2 ENGINE LOAD DEMAND SPINDLE AFT CABLE INSTALLATION - continued

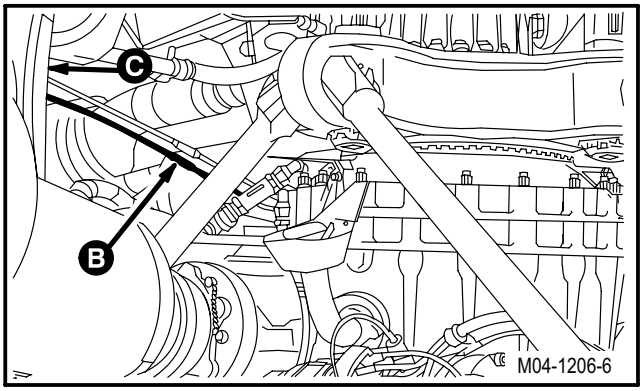
c. **Install seal (3) and firewall plate (4) on louver enclosure (6).**

(1) Install seal (3) and plate (4) between angle (7) and enclosure (6).

(2) Install two screws (8) through washers (9), seal (3), and plate (4) in enclosure (6).

(3) Tighten top nine screws (10) on angle (7).



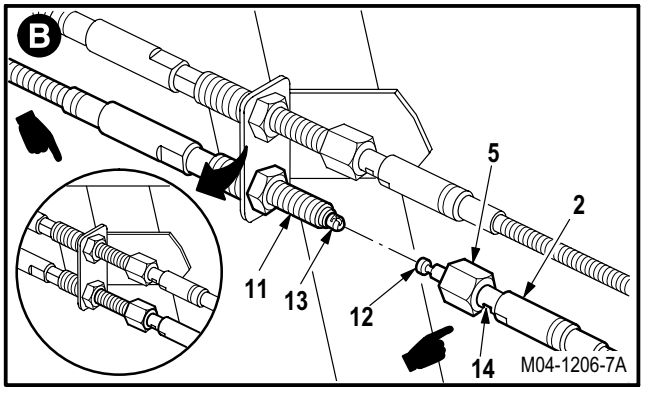




d. **Install cable (2) on forward cable (11).** Torque coupling nut (5) to **70 INCH-POUNDS**.

(1) Install cable fitting (12) on forward cable fitting (13).

(2) Install coupling nut (5) on forward cable (11).

(3) Hold cable (2) at flats (14). Torque nut (5) to **70 INCH-POUNDS**. Use torque wrench and crowfoot.

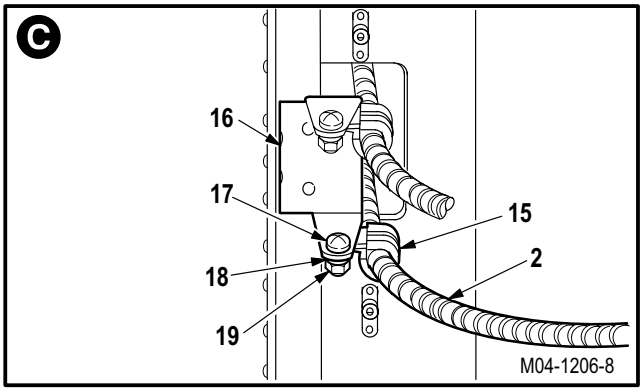



e. **Install clamp (15) on support (16).**

(1) Install clamp (15) on cable (2).

(2) Install screw (17) through support (16) and clamp (15).

(3) Hold screw (17). Install washer (18) and nut (19).

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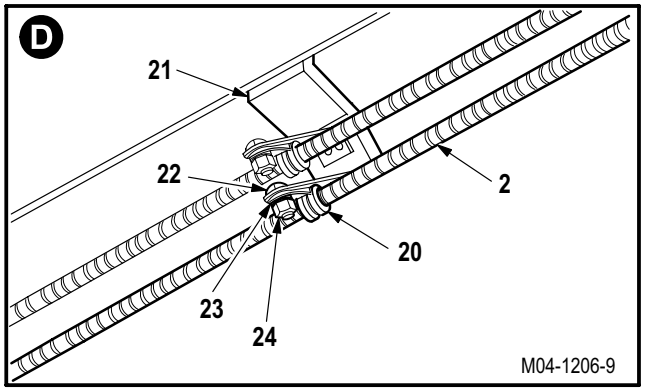
**4.179. NO. 2 ENGINE LOAD DEMAND SPINDLE AFT CABLE INSTALLATION - continued**

f. **Install clamp (20) on bracket (21).**

(1) Install clamp (20) on cable (2).

(2) Install screw (22) through bracket (21) and clamp (20).

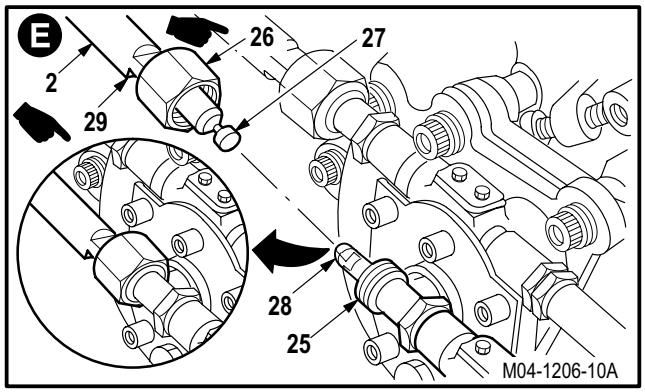
(3) Hold screw (22). Install washer (23) and nut (24).




g. **Install cable (2) on gearbox (25).** Torque nut (26) to **70 INCH-POUNDS**.

(1) Install cable fitting (27) on gearbox fitting (28).

(2) Install coupling nut (26) on gearbox (25). Hold cable flats (29). Torque nut (26) to **70 INCH-POUNDS**. Use torque wrench and crowfoot.




h. **Inspect (QA).**

i. **Perform No. 1 and No. 2 engine load demand spindle rigging check** (para 4.184)**.**

j. **Secure access panel R200; install doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

## 4.180. NO. 1 ENGINE LOAD DEMAND SPINDLE/POWER AVAILABLE SPINDLE AFT CABLE SPRING TENSION CLIP REMOVAL/INSTALLATION

4.180.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.180.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)

**References:**

TM 1-1500-204-23

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

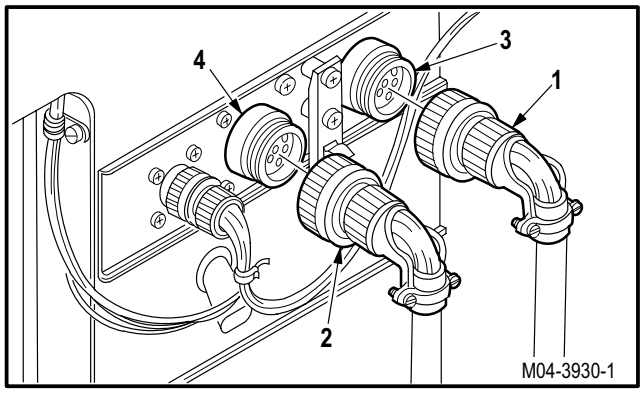
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door LN1 opened |

4.180.3. Removal

a. **Detach connectors P21 (1) and P23 (2).**

(1) Detach connector P21 (1) from receptacle J21 (3).

(2) Detach connector P23 (2) from receptacle J23 (4).

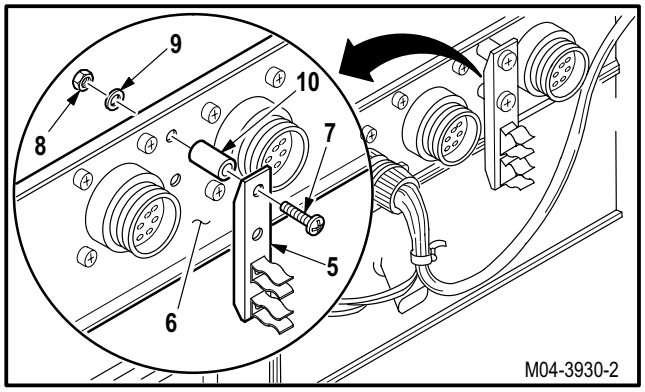



b. **Remove spring tension clip (5) from nacelle firewall channel (6).**

(1) Hold two screws (7). Remove nuts (8) and washers (9).

(2) Remove two screws (7) from channel (6), spacers (10), and clip assembly (5).

(3) Remove clip (5) and spacer (10).

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## 4.180. NO. 1 ENGINE LOAD DEMAND SPINDLE/POWER AVAILABLE SPINDLE AFT CABLE SPRING TENSION CLIP REMOVAL/INSTALLATION - continued

4.180.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.180.5. Inspection

a. **Check spring tension clip assembly for cracks.** None allowed.

b. **Check spring tension clip assembly for corrosion** (para 1.49)**.**

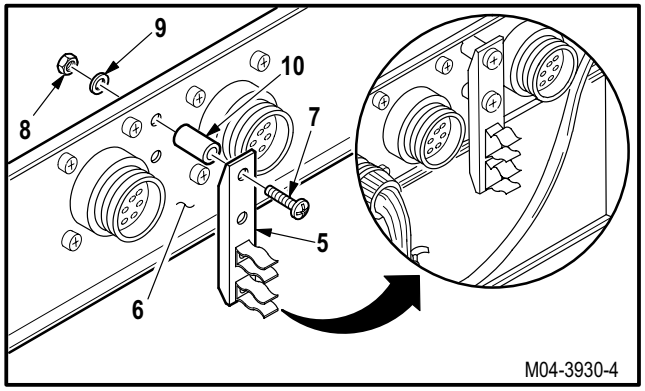
c. **Check spring tension clip assembly for loose or missing rivets** (TM 1-1500-204-23)**.** None allowed.

4.180.6. Installation

a. **Install spring tension clip assembly (5) on nacelle firewall channel (6).**

(1) Install two screws (7) through clip assembly (5), spacers (10), and channel (6).

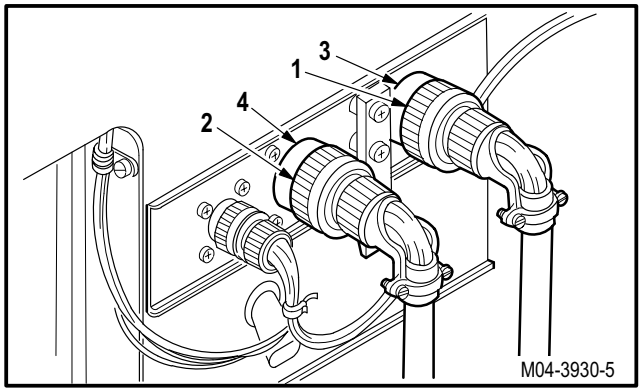
(2) Install two washers (9) and nuts (8) on screws (9).




b. **Attach connectors P23 (2) and P21 (1).**

(1) Attach connector P23 (2) to receptacle J23 (4).

(2) Attach connector P21 (1) to receptacle J21 (3).




c. **Inspect (QA).**

d. **Secure access door LN1** (para 2.2)**.**

END OF TASK

## 4.181. NO. 2 ENGINE LOAD DEMAND SPINDLE/POWER AVAILABLE SPINDLE AFT CABLE SPRING TENSION CLIP REMOVAL/INSTALLATION

4.181.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

4.181.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)

**References:**

TM 1-1500-204-23

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

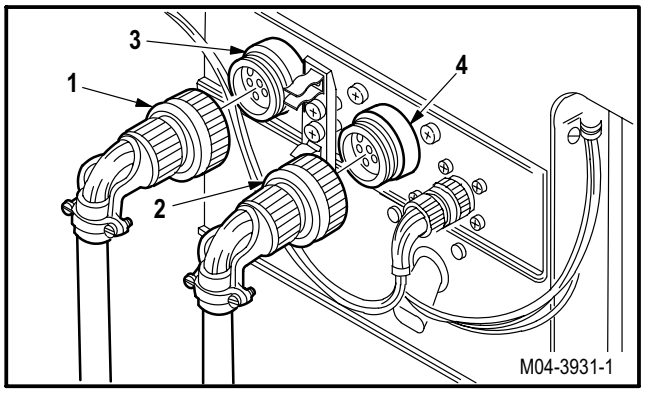
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access door RN1 opened |

4.181.3. Removal

a. **Detach connector P22 (1) and P24 (2).**

(1) Detach connector P22 (1) from receptacle J22 (3).

(2) Detach connector P24 (2) from receptacle J24 (4).

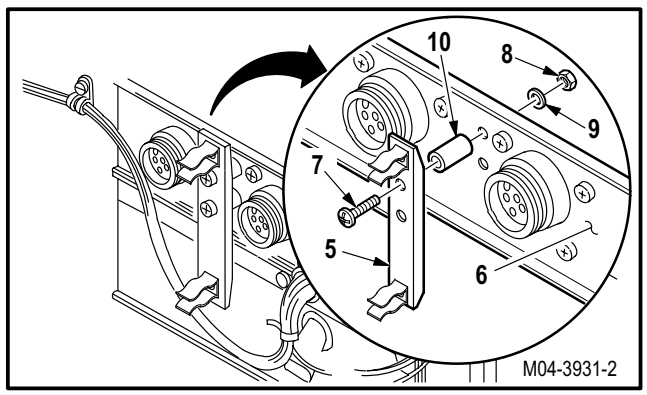



b. **Remove spring tension clip (5) from nacelle firewall channel (6).**

(1) Hold two screws (7). Remove nuts (8) and washers (9).

(2) Remove two screws (7) from channel (6), spacers (10), and clip assembly (5).

(3) Remove clip (5) and spacer (10).

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## 4.181. NO. 2 ENGINE LOAD DEMAND SPINDLE/POWER AVAILABLE SPINDLE AFT CABLE SPRING TENSION CLIP REMOVAL/INSTALLATION - continued

4.181.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

4.181.5. Inspection

a. **Check spring tension clip assembly for cracks.** None allowed.

b. **Check spring tension clip assembly for corrosion** (para 1.49)**.**

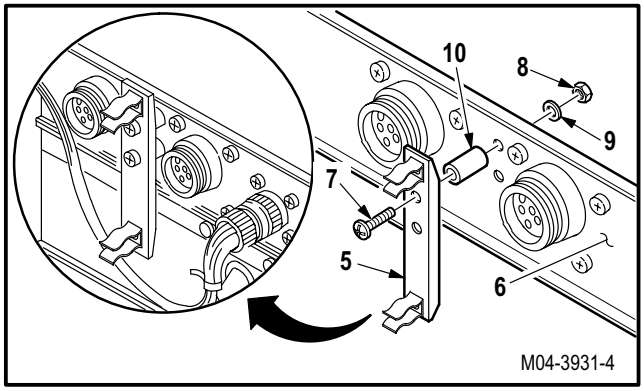
c. **Check spring tension clip assembly for loose or missing rivets** (TM 1-1500-204-23)**.** None allowed.

4.181.6. Installation

a. **Install spring tension clip assembly (5) on nacelle firewall channel (6).**

(1) Install two screws (7) through clip assembly (5), spacers (10), and channel (6).

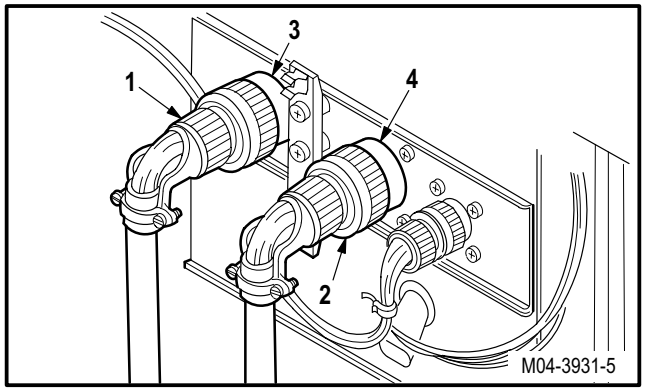
(2) Install two washers (9) and nuts (8) on screws (7).




b. **Attach connectors P24 (2) and P22 (1).**

(1) Attach connector P24 (2) to receptacle J24 (4).

(2) Attach connector P22 (1) to receptacle J22 (3).




c. **Inspect (QA).**

d. **Secure access door RN1** (para 2.2)**.**

END OF TASK

## 4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE

4.182.1. Description

This task covers: Rigging.

4.182.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
3/4 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 81, App H)
#51 twist drill (item 119, App H)
Flight control rigging kit (item 267, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

Cotter pin (3)
Wire (item 226, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

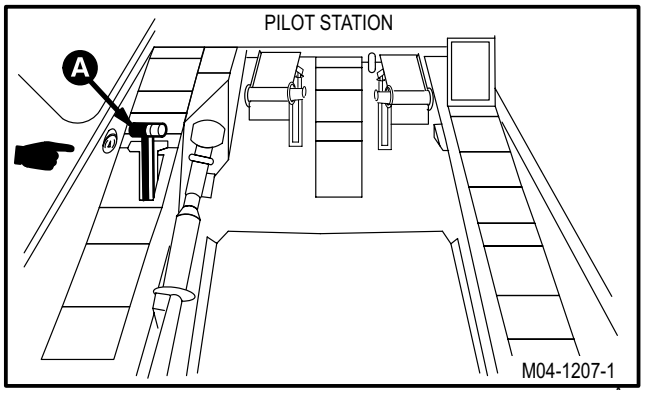
TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.103 | No. 1 engine shroud assembly removed |
| 9.62 | Pilot EXT LT/INTR LT panel removed |
| 10.54 | Pilot FUEL panel removed |
| 9.81 | CPG INTR LT panel removed |
| 10.62 | CPG FUEL panel removed |
| 2.2 | Console panels CL1, CL3, PL1, and PL3 removed |

**NOTE**

- This task is typical for both Hamilton Standard and Woodward hydromechanical units (HMUs).
- Hamilton Standard HMUs require a hardened steel rig pin **0.065 - 0.069 INCH** diameter. Use twist drill as a PAS gearbox rig pin. Woodward HMUs use the standard rig pin supplied with the load demand spindle (LDS) gearbox.




4.182.3. Rigging

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

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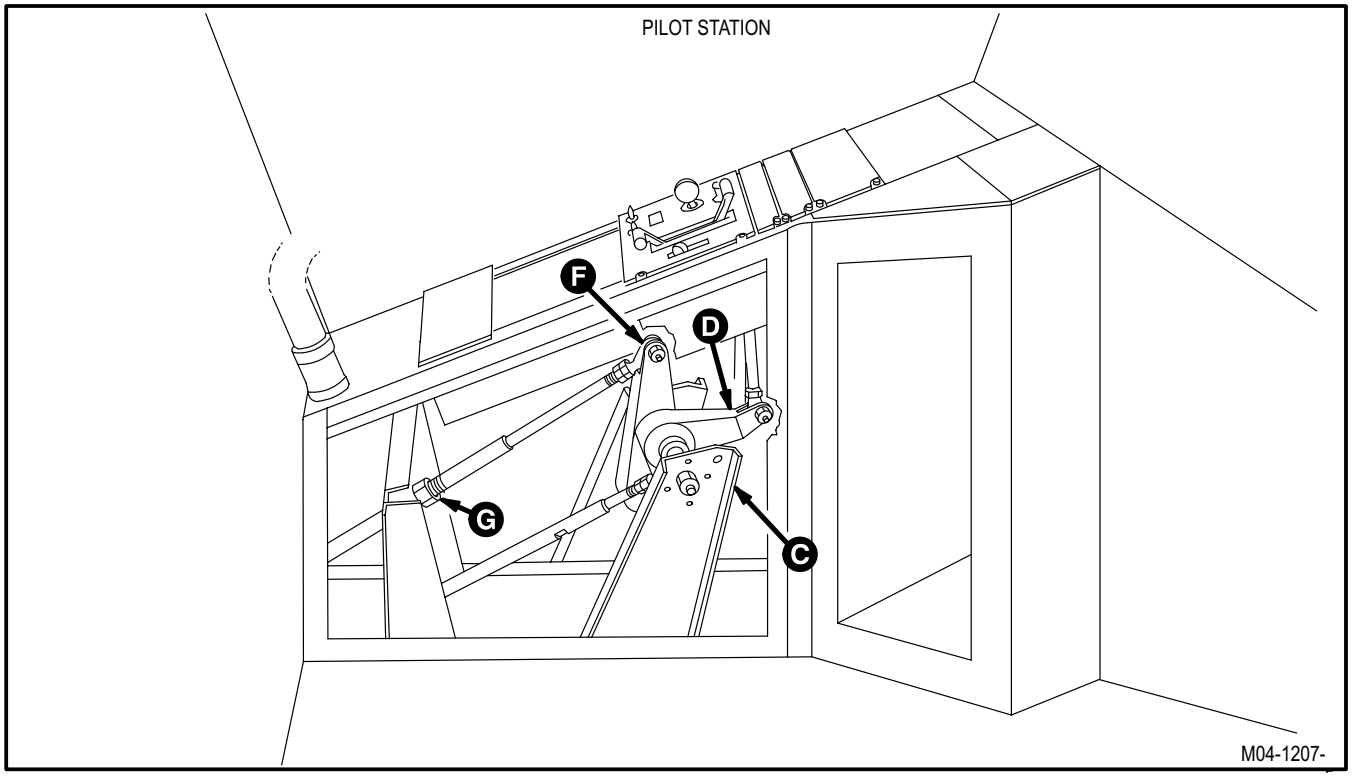
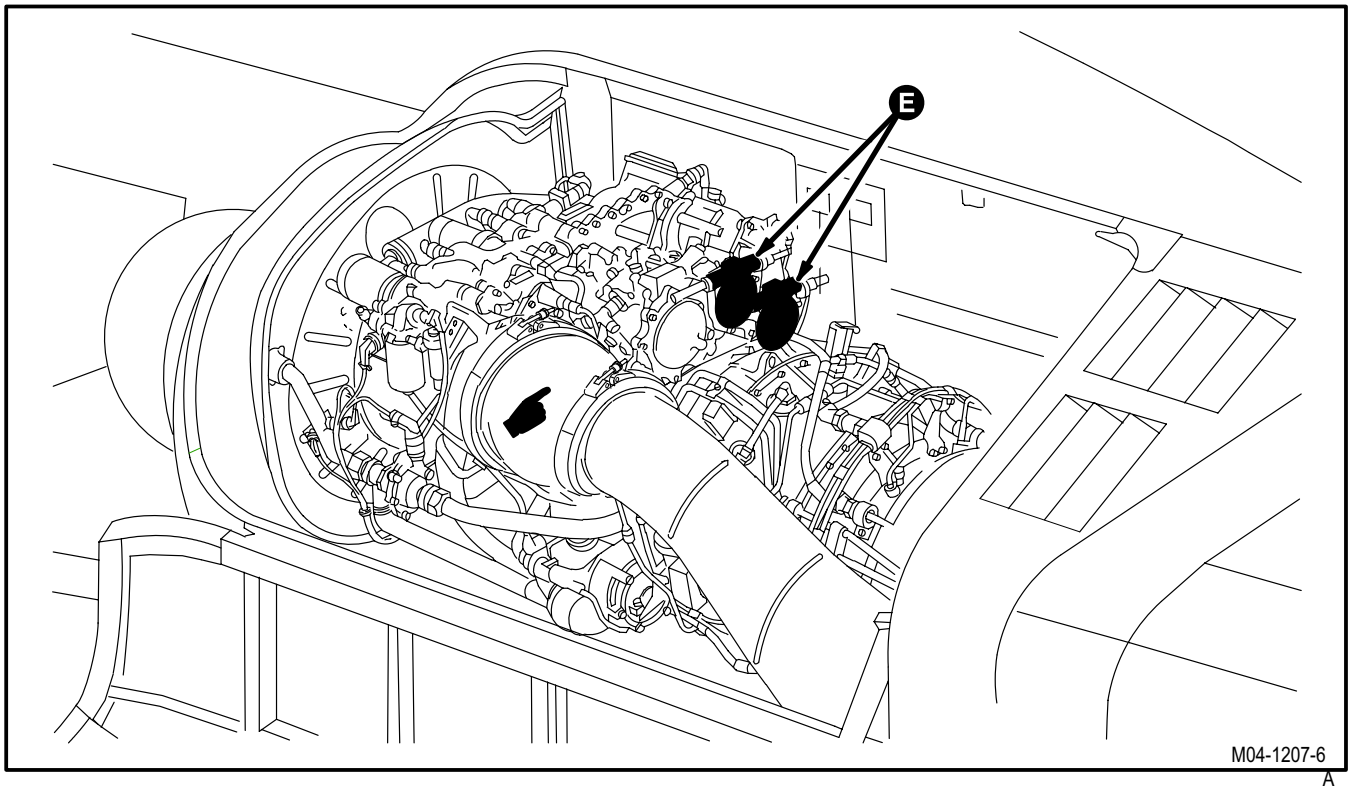
## 4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued

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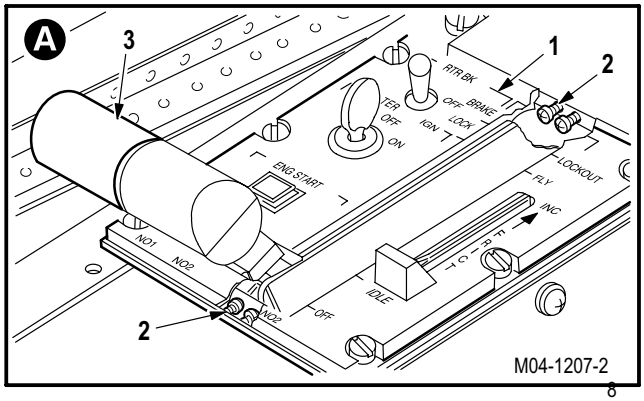
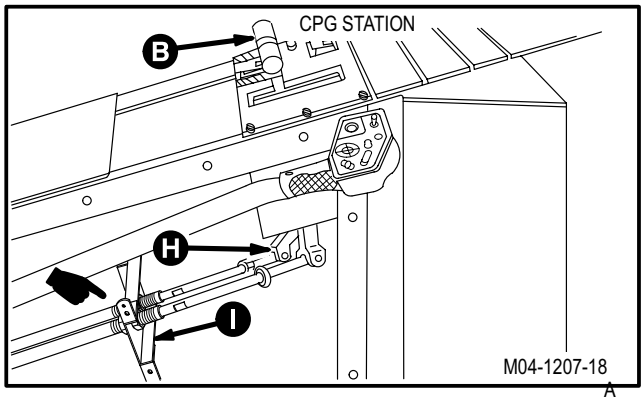
## 4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued

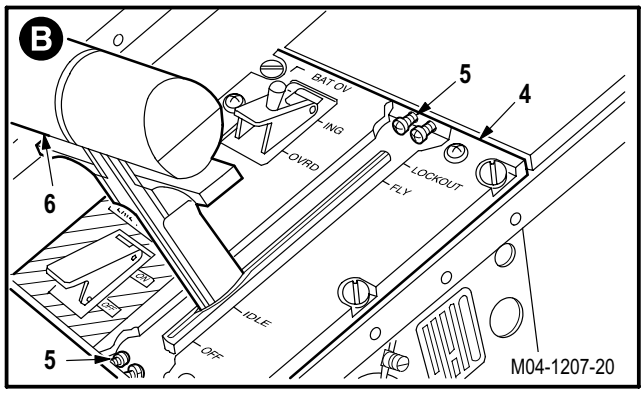
b. **At pilot power quadrant (1), set two stop screws (2) completely in for maximum No. 1 power lever (3) travel.**



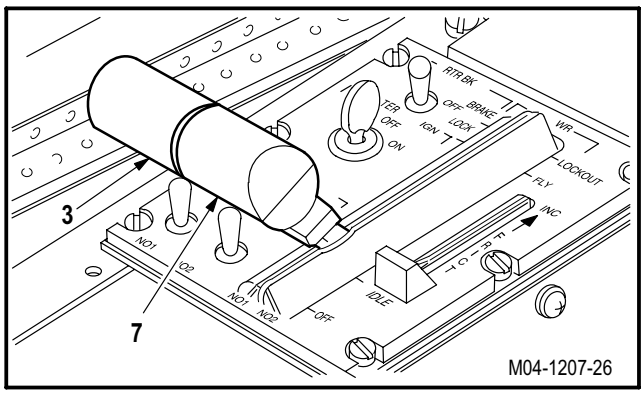

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**




d. **At CPG power quadrant (4), set two stop screws (5) completely in for maximum No. 1 power lever (6) travel.**




e. **Set pilot No. 1 power lever (3) and No. 2 power lever (7) to IDLE.**

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## 4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued

f. **Install -3 rig pin (8) fully in bracket (9) and bellcranks (10) and (11).**

**NOTE**

If bellcrank does not aline, go to step g. If bellcrank alines, go to step l.

g. **Adjust No. 1 power quadrant connnecting link (12) to aline with bellcrank (11).**

(1) Remove and discard cotter pin (13).

(2) Hold bolt (14). Remove nut (15).

(3) Remove bolt (14) from bellcrank (11) and link (12).

(4) Remove lockwire from link (12).

(5) Loosen two jam nuts (16) at ends of link (12).

(6) Adjust length of link (12) as needed. Aline link rod end (17) with bellcrank (11).

h. **Install link (12) on bellcrank (11).** Torque nut (15) **14 to 18 INCH-POUNDS**. Torque two jam nuts (16) to **25 INCH-POUNDS**.

(1) Install bolt (14) through bellcrank (11) and rod end (17).

(2) Install nut (15) on bolt (14).

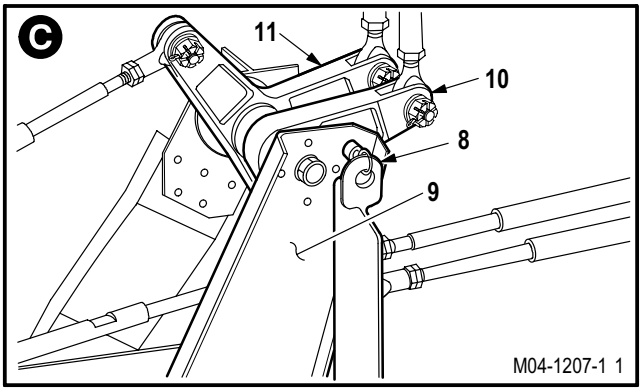
(3) Hold bolt (14). Torque nut (15) to **14 INCH-POUNDS**. Use torque wrench.

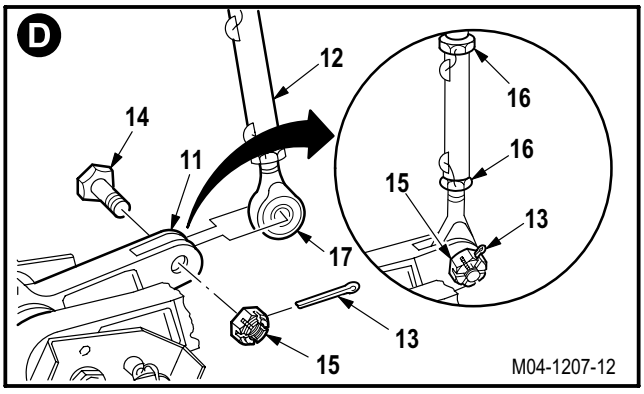
(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (13).

(6) Torque two jam nuts (16) to **25 INCH-POUNDS**. Use torque wrench.

(7) Lockwire two jam nuts (16) to link (12). Use wire (item 226, App F).

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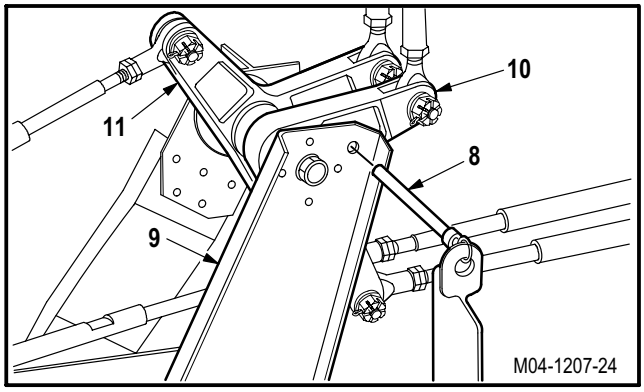
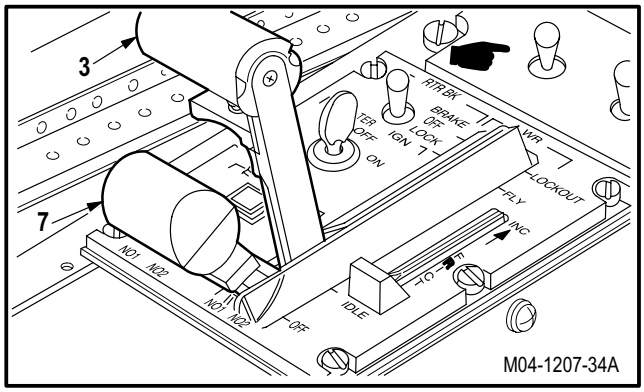
**4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

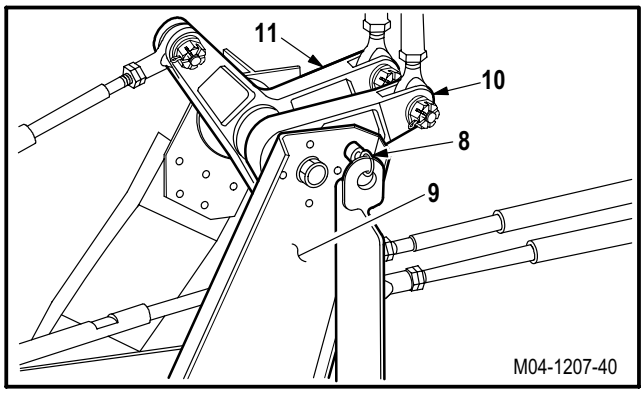
i. **Remove -3 rig pin (8) from bracket (9) and bellcranks (10) and (11).**



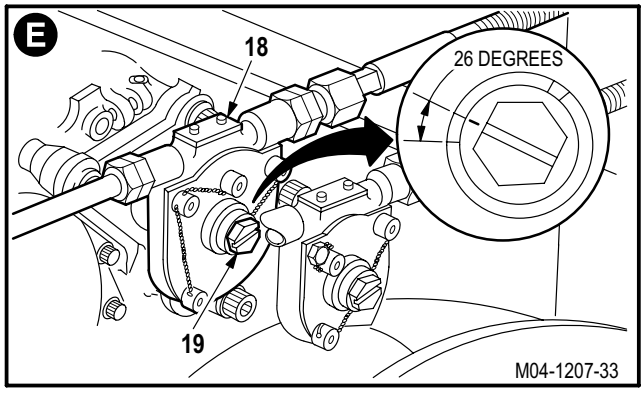

j. **Move power levers (3) and (7) to OFF, IDLE, FLY, LOCKOUT, and back to IDLE.**




k. **Install -3 rig pin (8) fully in bracket (9) and bellcranks (10) and (11).**




l. **At PAS gearbox (18), verify pinion shaft (19) is at 26 degree position.**

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## 4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued

m. **Remove rig pin (20) from LDS gearbox (21).**

(1) Remove lockwire from rig pin (20).

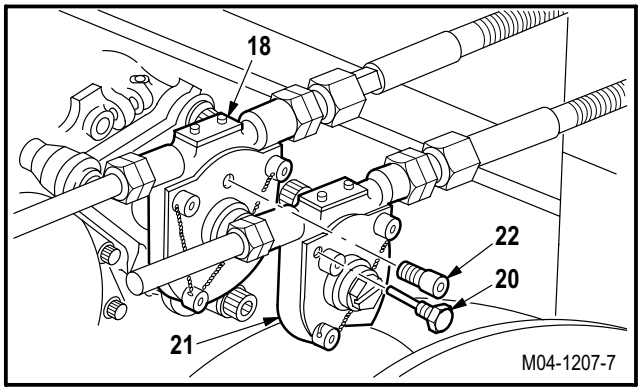
(2) Remove rig pin (20).

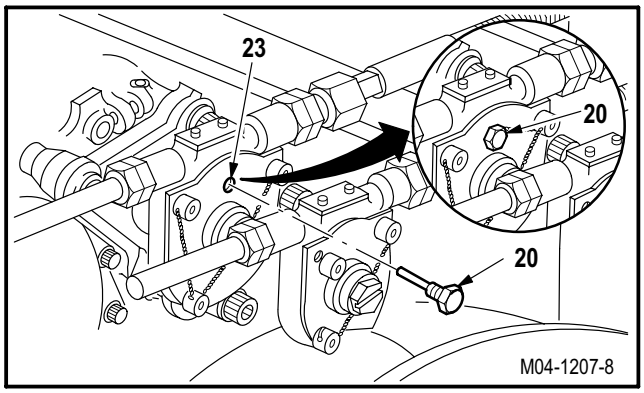
n. **Remove cap screw (22) from gearbox (18).**

(1) Remove lockwire from screw (22).

(2) Remove cap screw (22).

o. **Install rig pin (20) in PAS gearbox rig pin hole (23).**

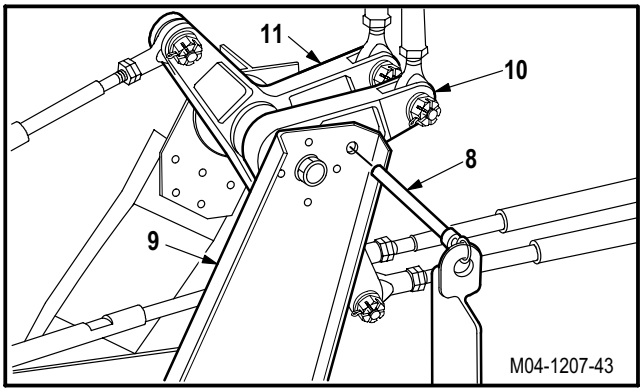



**NOTE**

Rig pin must bottom and lock gearbox pinion in position. If rig pin bottoms and locks, go to step w. If rig pin does not bottom and lock, go to step p.

p. **In pilot station, remove rig pin (8) from bracket (9) and bellcranks (10) and (11).**



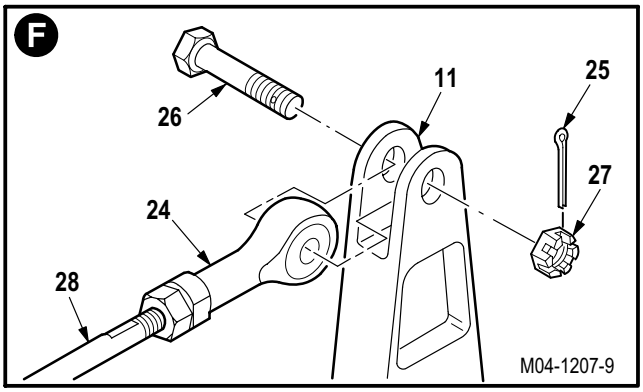

q. **Position bellcrank (11) to remove cable rod end (24).**

(1) Remove and discard cotter pin (25).

(2) Hold bolt (26). Remove nut (27).

(3) Remove bolt (26) from bellcrank (11) and rod end (24).

r. **Move cable (28) as required until rig pin (20) can be installed in rig pin hole (23).**




**NOTE**

Check that pin bottoms and locks gearbox pinion in position.

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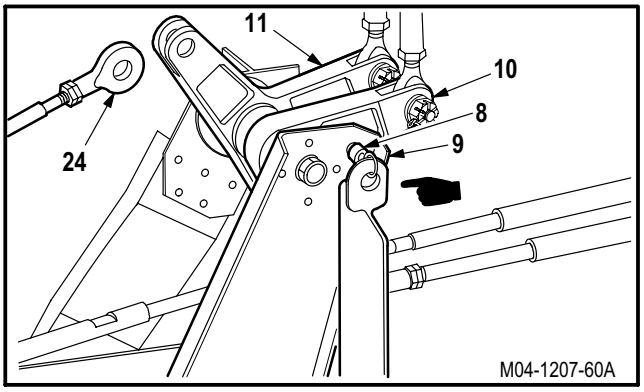
**4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

s. **Install -3 rig pin (8) fully in bracket (9) and bellcranks (10) and (11).**

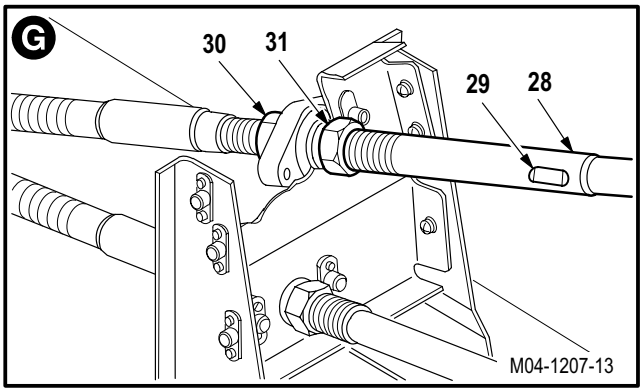



t. **Adjust cable (28).**

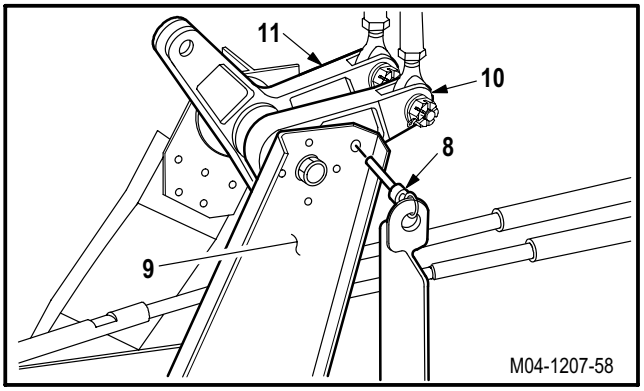
(1) If rod end (24) requires forward movement, hold cable flats (29). Loosen nut (30). Tighten nut (31) to aline rod end (24) with bellcrank (11).

(2) If rod end (24) requires aft movement, hold cable flats (29). Loosen nut (31). Tighten nut (30) to aline rod end (24) to bellcrank (11).

(3) Hold cable flats (29). Torque nuts (30) and (31) to **90 INCH-POUNDS**. Use torque wrench and crowfoot.




u. **In pilot station, remove rig pin (8) from bellcranks (11) and (10) and bracket (9).**

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**4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

v. **Install cable rod end (24) on bellcrank (11).** Torque nut (27) **14 to 18 INCH-POUNDS**.

(1) Position rod end (24) in bellcrank (11).

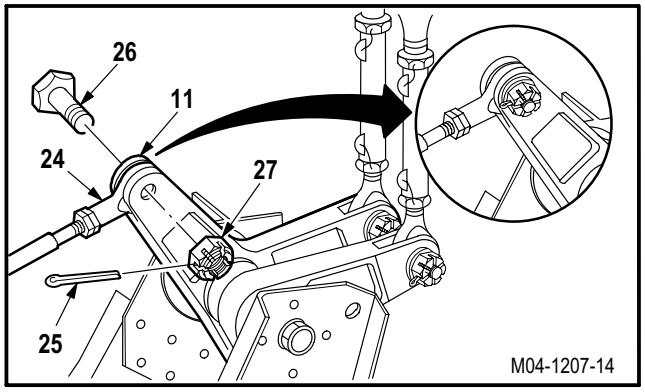
(2) Install bolt (26) through bellcrank (11) and rod end (24).

(3) Check fit of self-retaining bolt (para 11.1).

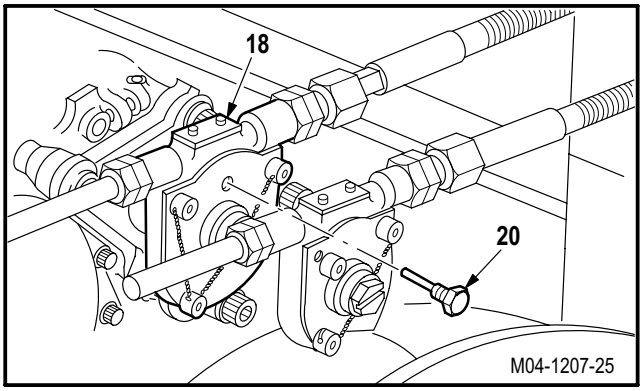
(4) Hold bolt (26). Install nut (27). Torque nut (27) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

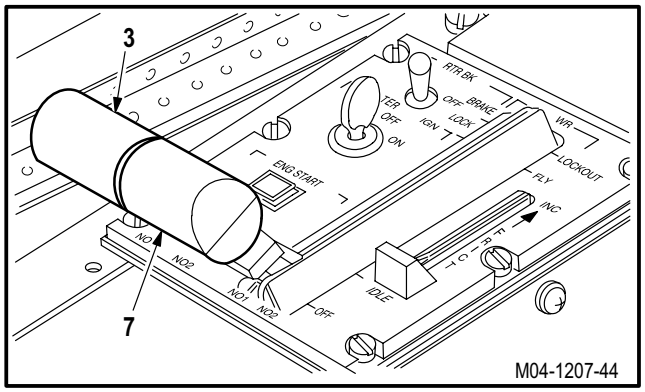
(6) Install new cotter pin (25).




w. **Remove rig pin (20) from gearbox (18).**




x. **Set power levers (3) and (7) to OFF position.**

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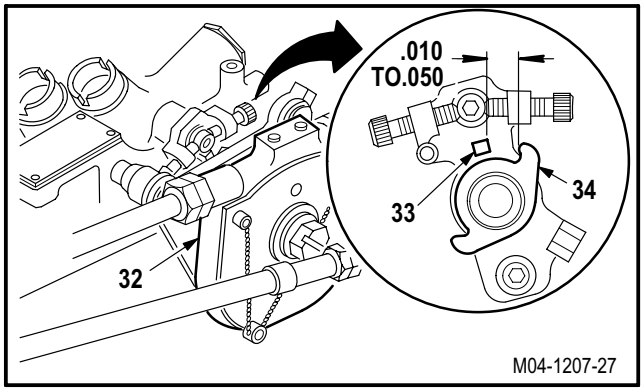
**4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

y. **At HMU spindle gearbox (32), obtain 0.010 to 0.050 INCH gap between spindle stop (33) and spindle cam (34).** Use gap setting gage.

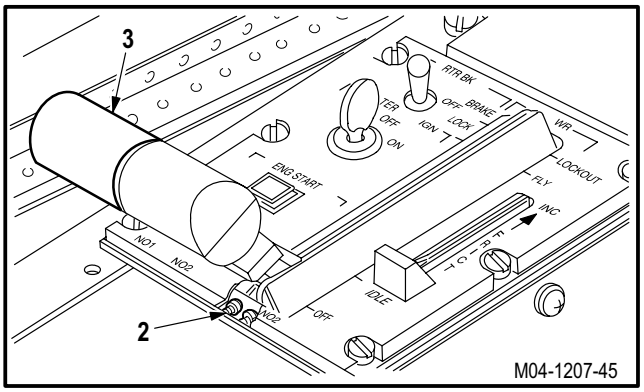



**NOTE**

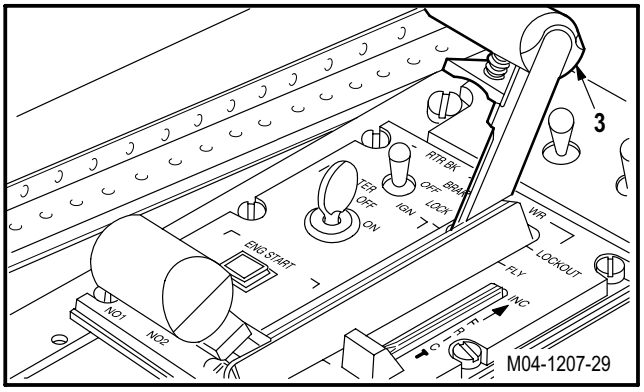
If **0.010 to 0.050 INCH** clearance cannot be obtained, go to step b and repeat procedures.

z. **Adjust power lever (3) OFF stop screw (2).**

(1) With power lever (3) in **OFF** position, adjust screw (2) until it touches power lever (3).



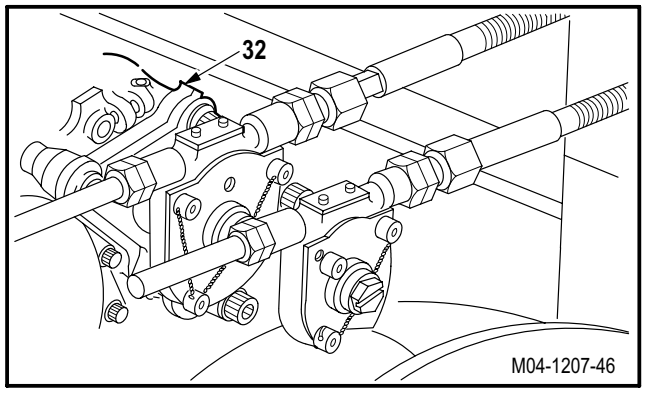

aa. **Set power lever (3) to LOCKOUT position.**




**NOTE**

If Hamilton Standard HMU is installed, perform step ab. If Woodward HMU is installed, perform step ac.

ab. **Verify lockout by audible click from Hamilton Standard HMU (32).**

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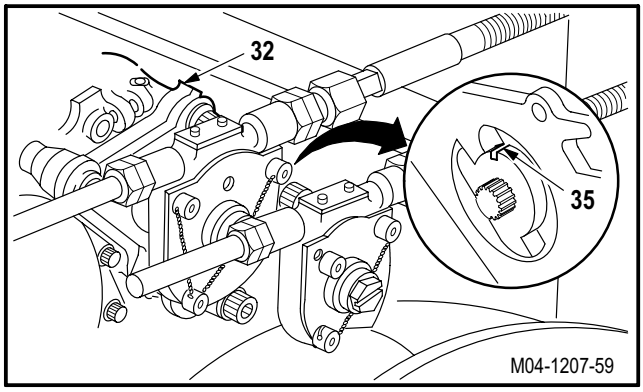
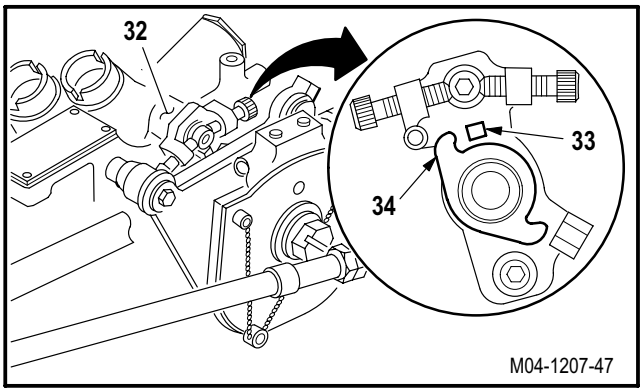
**4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

ac. **Verify lockout by ensuring scribed line (35) on Woodward HMU (32) is fully visible.**




ad. **At HMU (32), verify that spindle cam (34) does not contact spindle stop (33).**

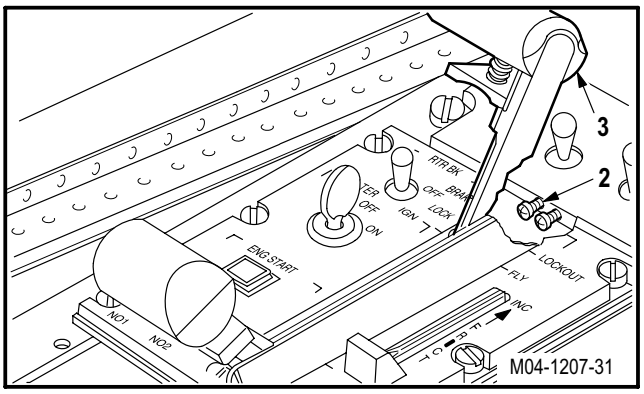



**NOTE**

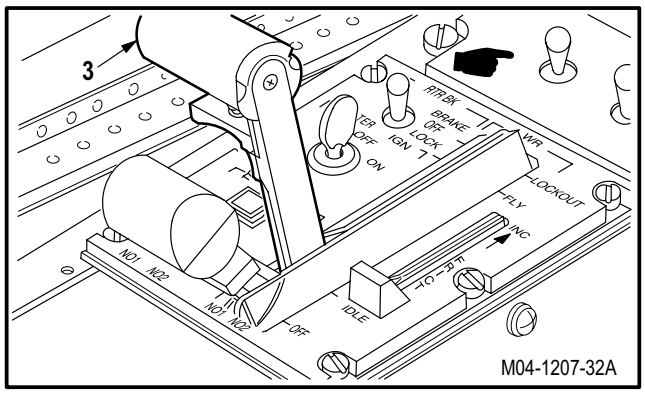
If Woodward HMU is installed, spindle cam is allowed to contact spindle stop.

ae. **Adjust power lever (3) maximum stop screw (2).**

(1) With power lever (3) in **LOCKOUT** position, adjust screw (2) until it touches power lever (3).




af. **Set power lever (3) to IDLE.**

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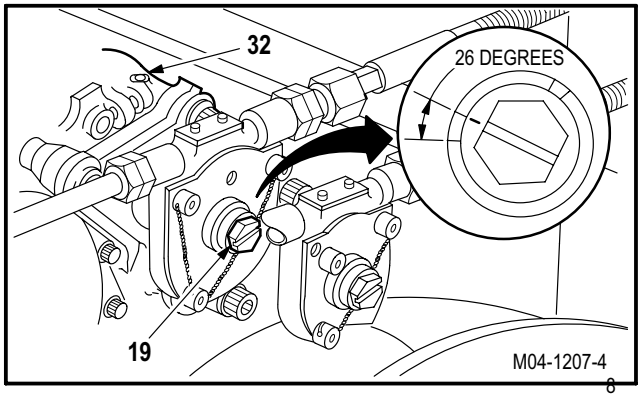
**4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

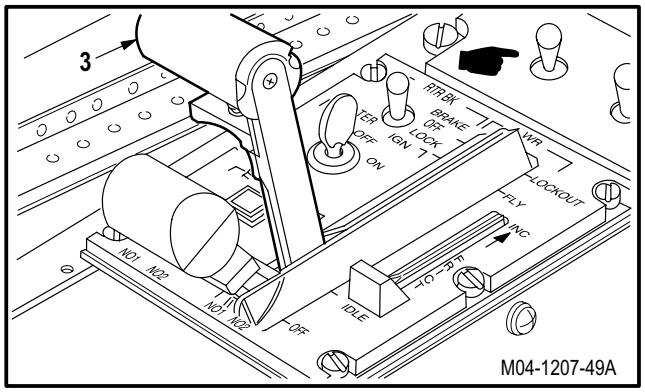
ag. **Verify pinion shaft (19) is in 26 degree (IDLE) position.**




**NOTE**

On Hamilton Standard HMUs, an audible click is heard when power lever is moved to **IDLE** from **LOCKOUT**.

ah. **Move power lever (3) to OFF, IDLE, FLY, LOCK-OUT, and back to IDLE position.**

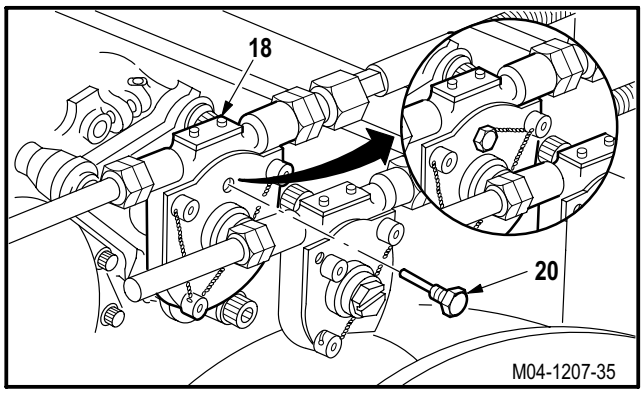



ai. **Install rig pin (20) in gearbox (18).**

**NOTE**

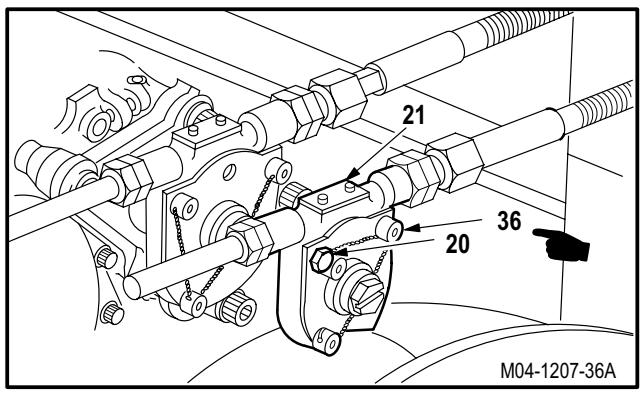
If rig pin cannot be installed, repeat steps f. thru ai.

aj. **Remove rig pin (20) from gearbox (18).**




ak. **Stow rig pin (20) in gearbox (21).**

(1) Lockwire rig pin (20) to cap screw (36). Use wire (item 226, App F).

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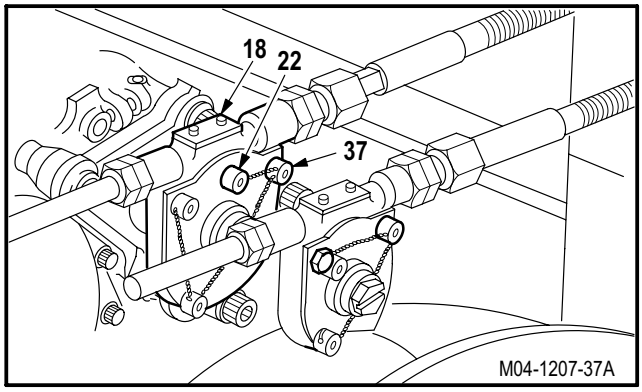
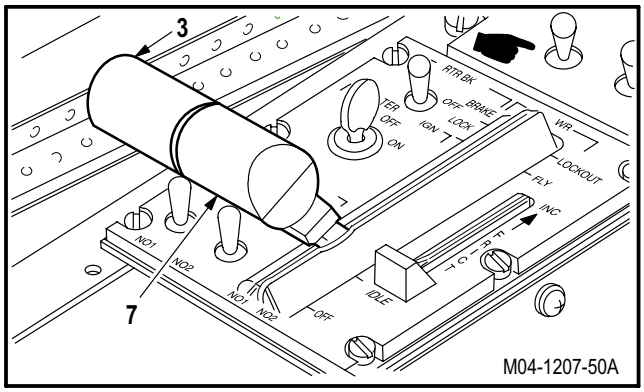
**4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

al. **Install cap screw (22) in gearbox (18).**

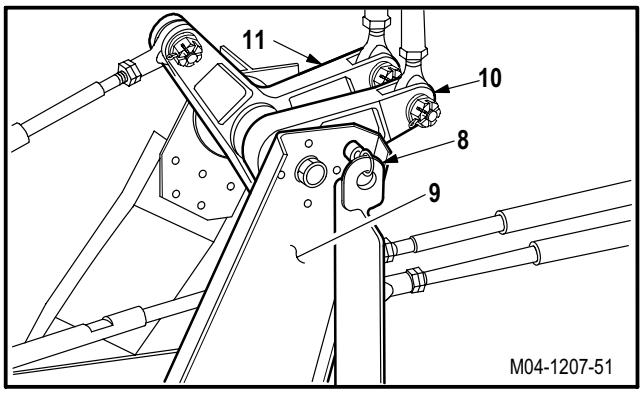
am. **Lockwire cap screws (22) and (37) together.** Use wire (item 226, App F).




an. **Set pilot power levers (3) and (7) to IDLE.**



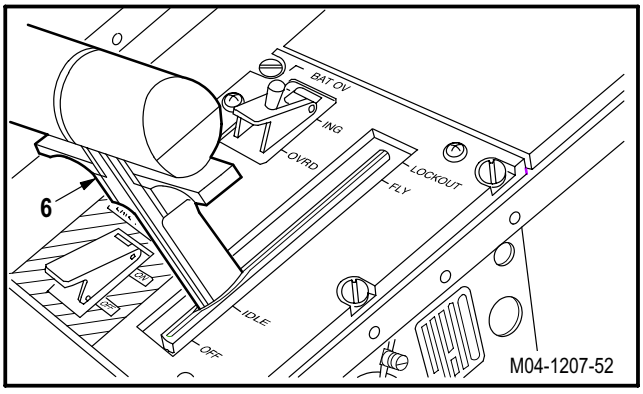

ao. **At pilot station, install -3 rig pin (8) fully in bracket (9) and bellcranks (10) and (11).**




ap. **Verify power lever (6) is in IDLE position.**

**NOTE**

If CPG power lever alines with **IDLE** position, go to step ax.

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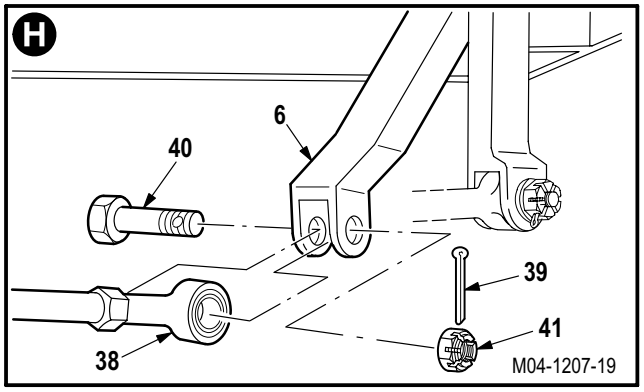
**4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

aq. **Remove cable rod end (38) from power lever (6).**

(1) Remove and discard cotter pin (39).

(2) Hold bolt (40). Remove nut (41).

(3) Remove bolt (40) from power lever (6) and rod end (38).

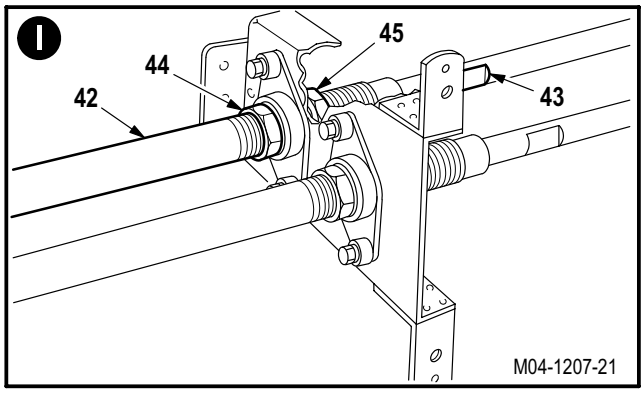



ar. **Adjust cable (42).**

(1) If rod end (38) requires forward movement, hold cable flats (43). Loosen nut (44). Tighten nut (45) to aline rod end (38) with power lever (6).

(2) If rod end (38) requires aft movement, hold cable flats (43). Loosen nut (45). Tighten nut (44) to aline rod end (38) with power lever (6).

(3) Hold cable flats (43). Torque nuts (44) and (45) to **90 INCH-POUNDS**. Use torque wrench and crowfoot.




as. **Install rod end (38) on power lever (6).** Torque nut (41) **14 to 18 INCH-POUNDS**.

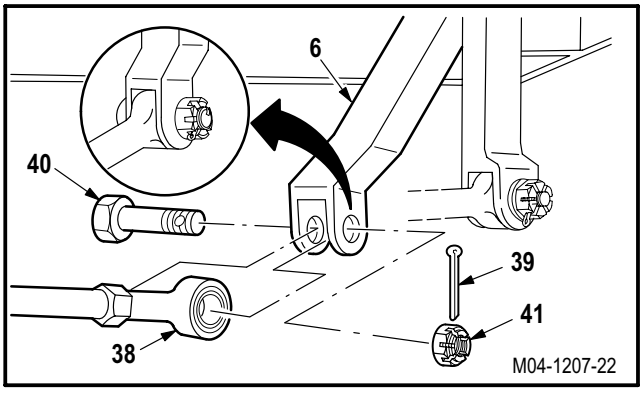
(1) Position rod end (38) in power lever (6).

(2) Install bolt (40) through power lever (6) and rod end (38).

(3) Hold bolt (40). Install nut (41).Torque nut (41) to **14 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (39).

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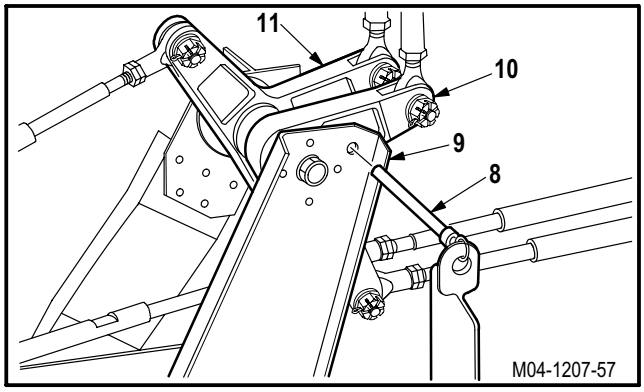
**4.182. NO. 1 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

at. **In pilot station, remove rig pin (8) from bracket (9) and bellcranks (10) and (11).**

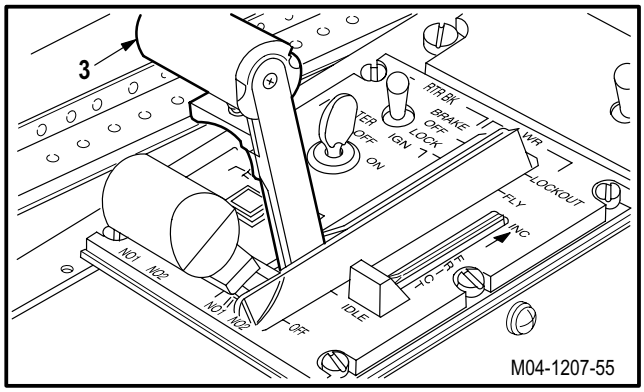



au. **Move power lever (3) to OFF, IDLE, FLY, LOCKOUT, and back to IDLE position.**

av. **When power lever (3) is moved, verify power lever (6) moves to OFF, IDLE, FLY, LOCKOUT, and back to IDLE position.**

**NOTE**

If rig pin was removed in step at, go to step ax.




aw. **In pilot station, remove rig pin (8) from bracket (9) and bellcranks (10) and (11).**

ax. **Inspect (QA).**

ay. **Install CPG FUEL panel** (para 10.62)**.**

az. **Install CPG INTR LT panel** (para 9.81)**.**

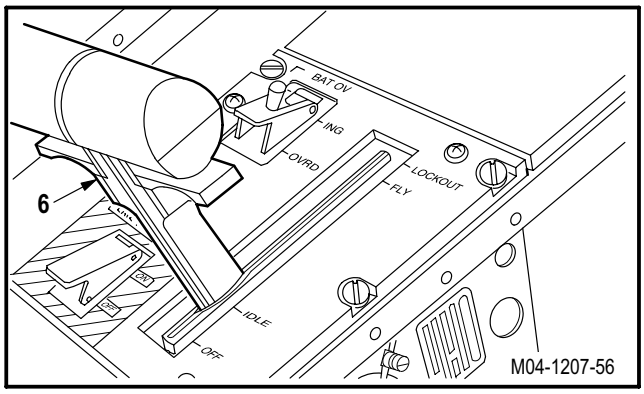
ba. **Install pilot FUEL panel** (para 10.54)**.**

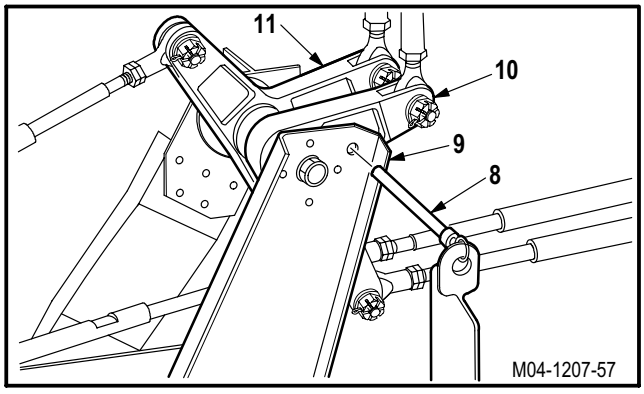
bb. **Install pilot EXT LT/INTR LT panel** (para 9.62)**.**

bc. **Perform power plants maintenance operational check (engine 1)** (TM 1-1520-238-T)**.**

bd. **Install No. 1 engine shroud assembly** (para 4.103)**.**

be. **Install console panels CL1, CL3, PL1, and PL3** (para 2.2)**.**




END OF TASK

## 4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE

4.183.1. Description

This task covers: Rigging.

4.183.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
3/4 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 81, App H)
#51 twist drill (item 119, App H)
Flight control rigging kit (item 267, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

Cotter pin (3)
Wire (item 226, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

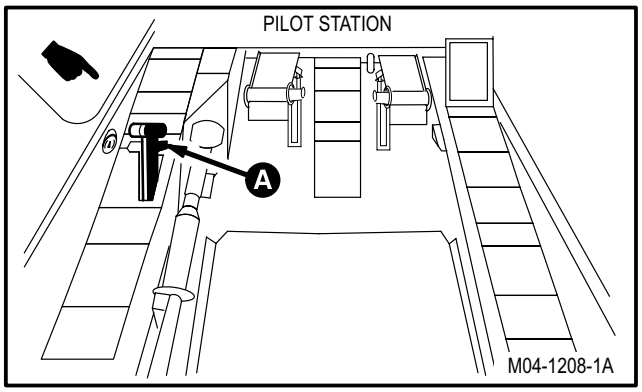
TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.103 | No. 1 engine shroud removed |
| 9.62 | Pilot EXT LT/INTR LT panel removed |
| 10.54 | Pilot FUEL panel removed |
| 9.81 | CPG INTR LT panel removed |
| 10.62 | CPG FUEL panel removed |
| 2.2 | Console panels CL1, CL3, PL1, and PL3 removed |

**NOTE**

- This task is typical for both Hamilton Standard and Woodward hydromechanical units (HMUs).
- Hamilton Standard HMUs require a hardened steel rig pin **0.065 - 0.069 INCH** diameter. Use twist drill as a PAS gearbox rig pin. Woodward HMUs use the standard rig pin supplied with the load demand spindle (LDS) gearbox.




4.183.3. Rigging

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

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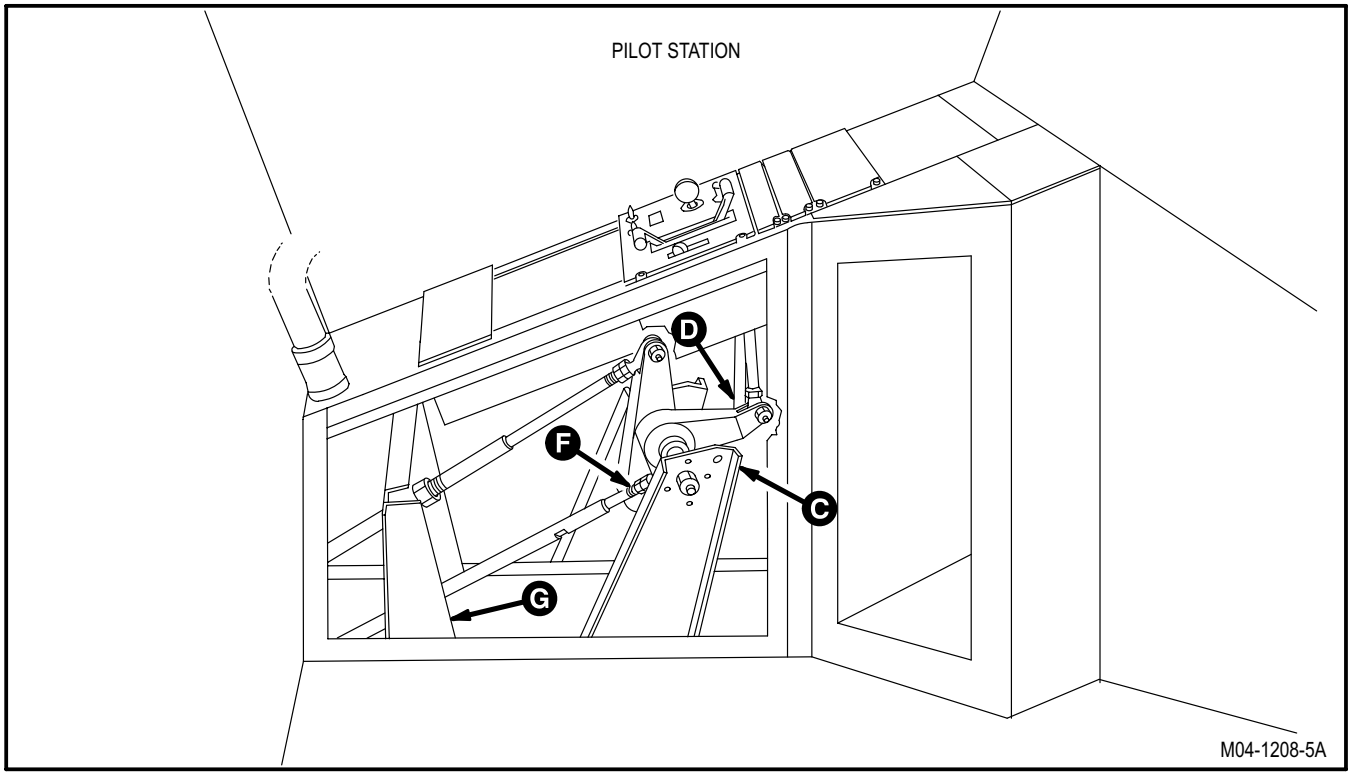
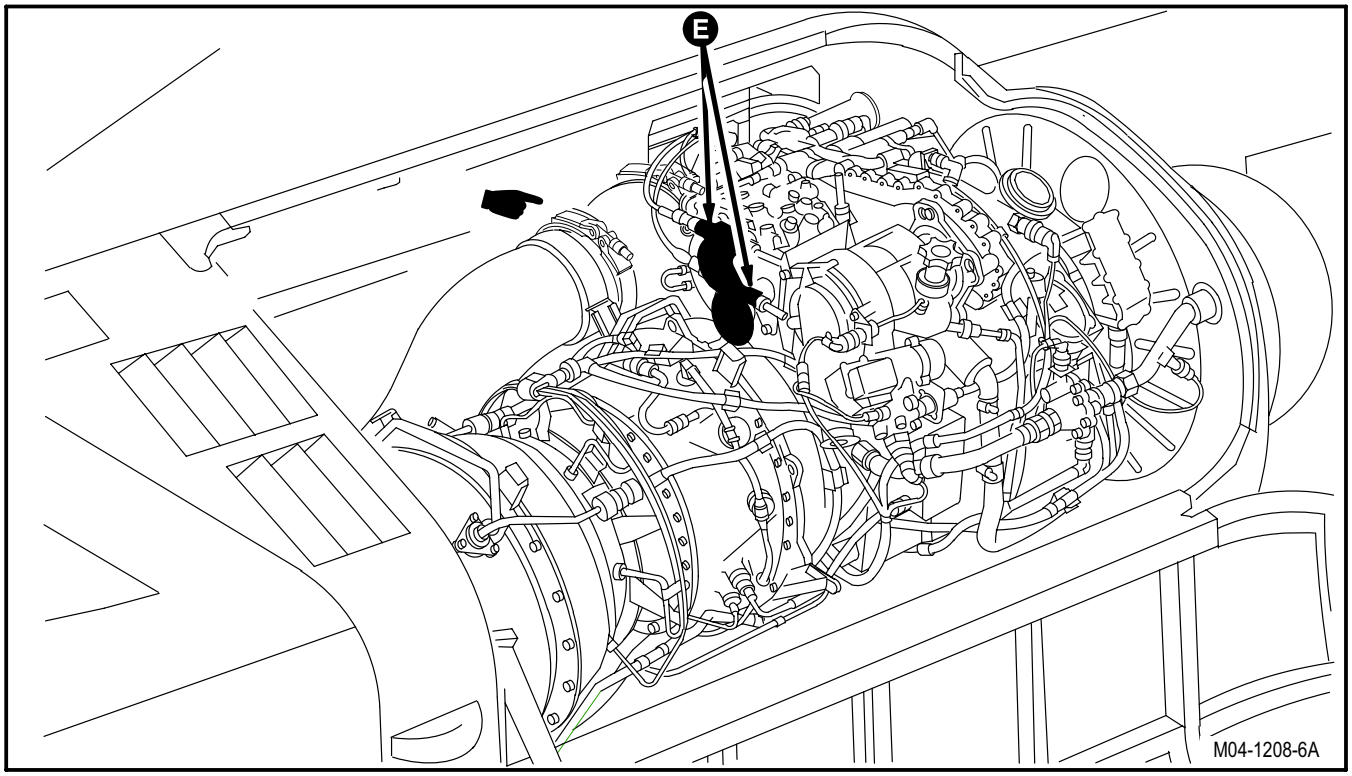
## 4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued

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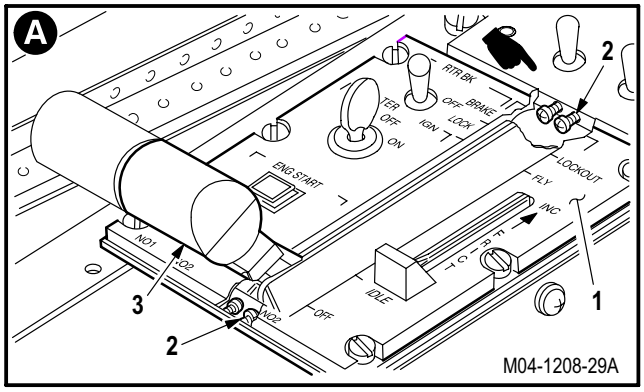
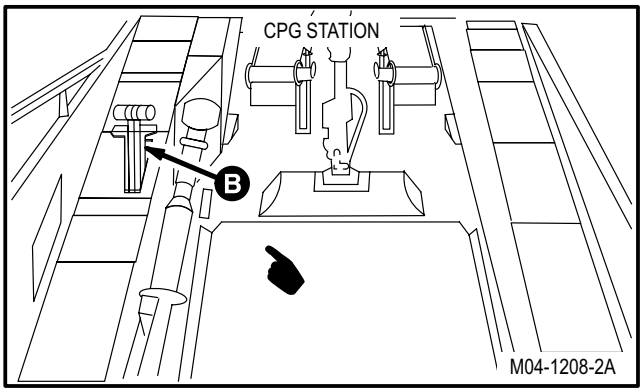
## 4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued

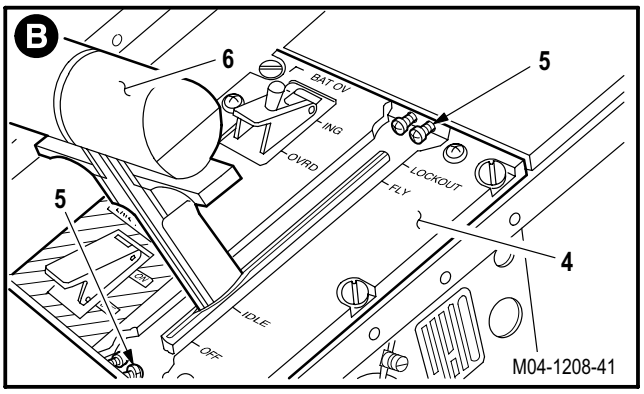
b. **At pilot power quadrant (1), set two stop screws (2) completely in for maximum No. 2 power lever (3) travel.**



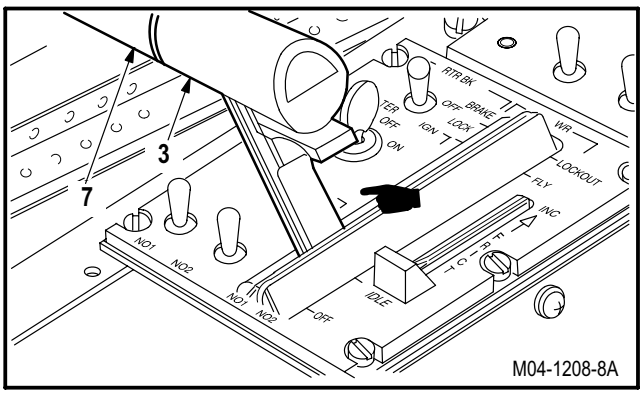

c. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**




d. **At CPG power quadrant (4), set two stop screws (5) completely in for maximum No. 2 power lever (6) travel.**




e. **Set pilot No. 2 power lever (3) and No. 1 power lever (7) to IDLE.**

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**4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

f. **Install -3 rig pin (8) fully in bracket (9) and bellcranks (10) and (11).**

**NOTE**

If bellcrank does not aline, go to step g. If bellcrank does aline, go to step l.

g. **Adjust No. 2 power quadrant connecting link (12) to aline with bellcrank (10).**

(1) Remove and discard cotter pin (13).

(2) Hold bolt (14). Remove nut (15).

(3) Remove bolt (14) from bellcrank (10) and link (12).

(4) Remove lockwire from link (12).

(5) Loosen two jam nuts (16) at ends of link (12).

(6) Adjust length of link (12) as needed. Aline link rod end (17) with bellcrank (10).

h. **Install link (12) on bellcrank (11).** Torque nut (15) **14 to 18 INCH-POUNDS**. Torque two jam nuts (16) to **25 INCH-POUNDS**.

(1) Install bolt (14) through bellcrank (11) and rod end (17).

(2) Install nut (15) on bolt (14).

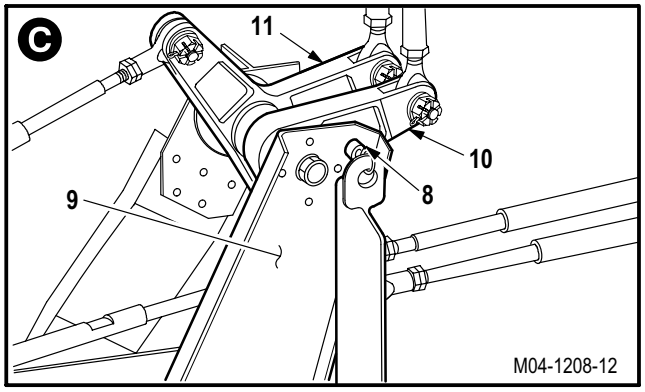
(3) Hold bolt (14). Torque nut (15) to **14 INCH-POUNDS**. Use torque wrench.

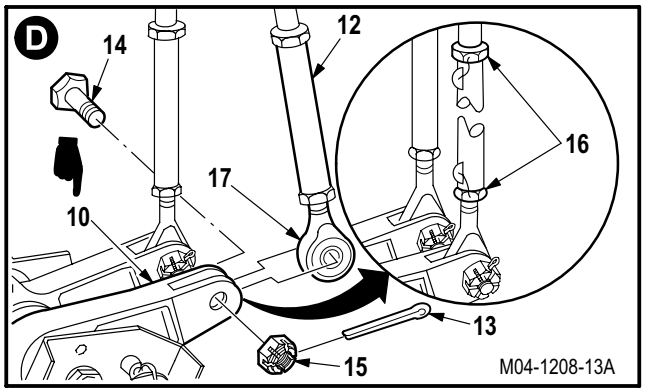
(4) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(5) Install new cotter pin (13).

(6) Torque two jam nuts (16) to **25 INCH-POUNDS**. Use torque wrench.

(7) Lockwire two jam nuts (16) to link (12). Use wire (item 226, App F).

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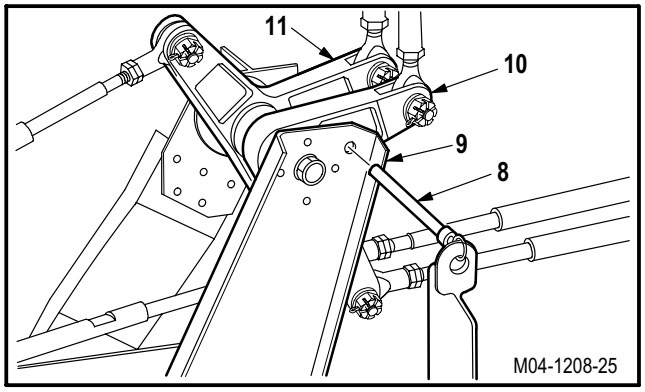
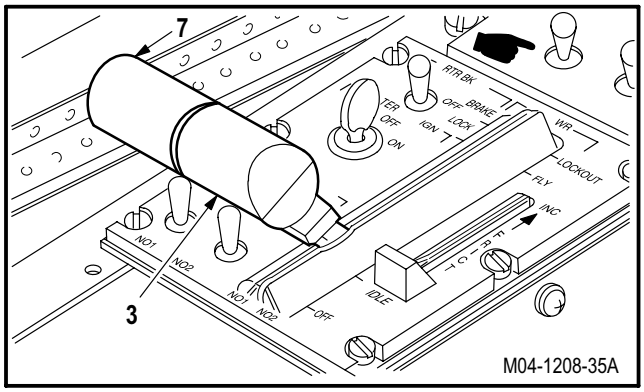
**4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

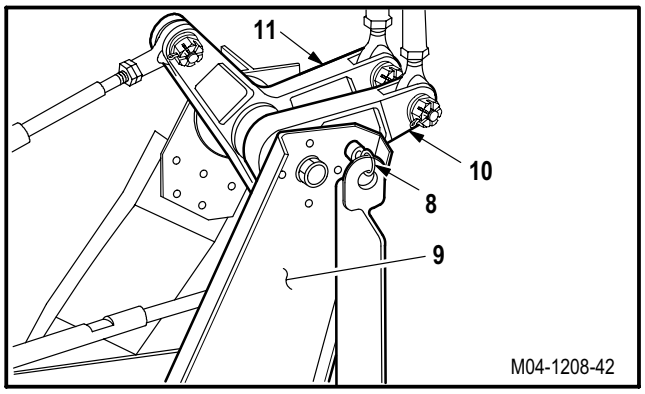
i. **Remove -3 rig pin (8) from bracket (9) and bellcranks (10) and (11).**



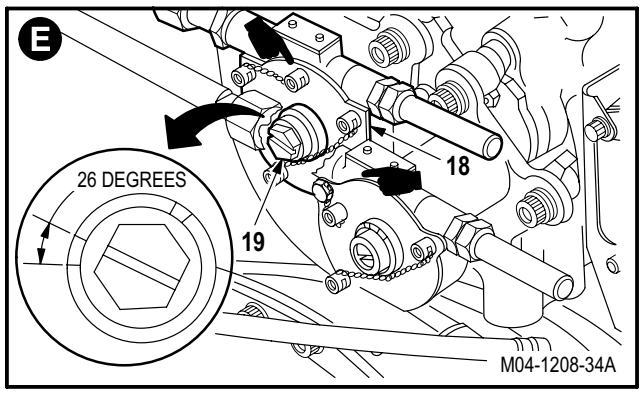

j. **Move power levers (3) and (7) to OFF, IDLE, FLY, LOCKOUT, and back to IDLE.**




k. **Install -3 rig pin (8) fully in bracket (9) and bellcranks (10) and (11).**




l. **At PAS gearbox (18), verify pinion shaft (19) is at 26 degree position.**

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**4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

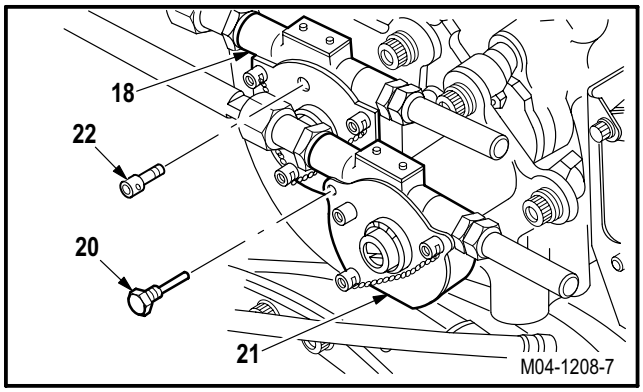
m. **Remove rig pin (20) from LDS gearbox (21).**

(1) Remove lockwire and rig pin (20).

n. **Remove cap screw (22) from gearbox (18).**

(1) Remove lockwire from cap screw (22).

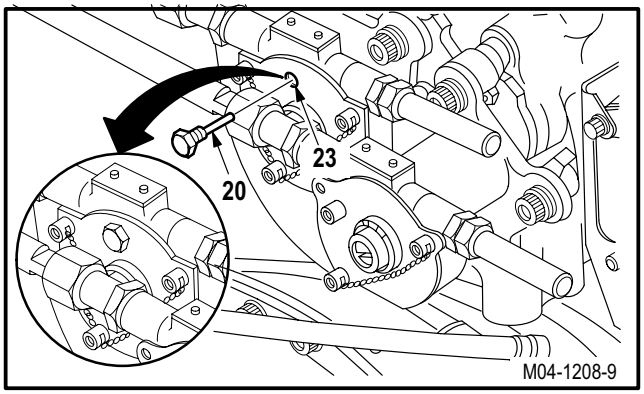
(2) Remove cap screw (22).




o. **Install rig pin (20) in PAS gearbox rig pin hole (23).**

**NOTE**

Rig pin must bottom and lock gearbox pinion in position. If rig pin bottoms and locks, go to step v. If rig pin does not bottom and lock, go to step p.



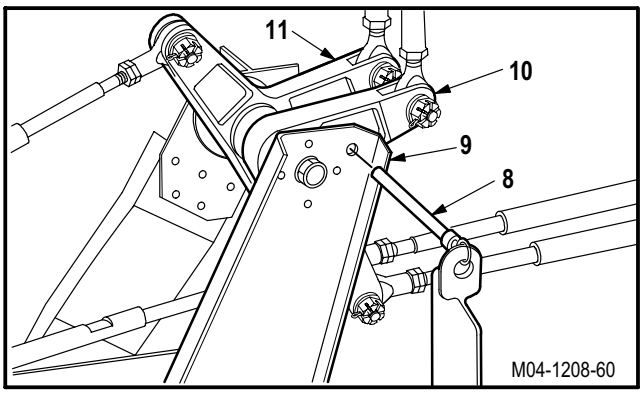

p. **In pilot station, remove rig pin (8) from bracket (9) and bellcranks (10) and (11).**

q. **Position bellcrank (10), to remove cable rod end (24).**

(1) Remove and discard cotter pin (25).

(2) Hold bolt (26). Remove nut (27).

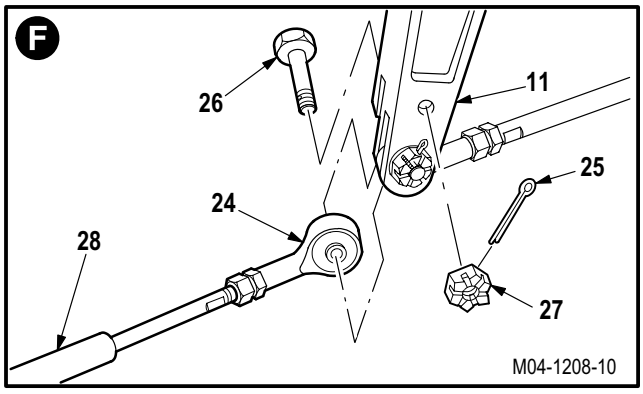
(3) Remove bolt (26) from bellcrank (10) and rod end (24).




r. **Move cable (28) as required until rig pin (20) can be installed in rig pin hole (23).**

**NOTE**

Pin must bottom and lock gearbox pinion in position.

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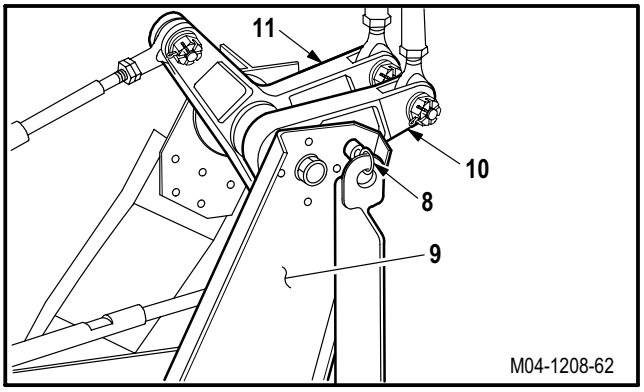
## 4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued

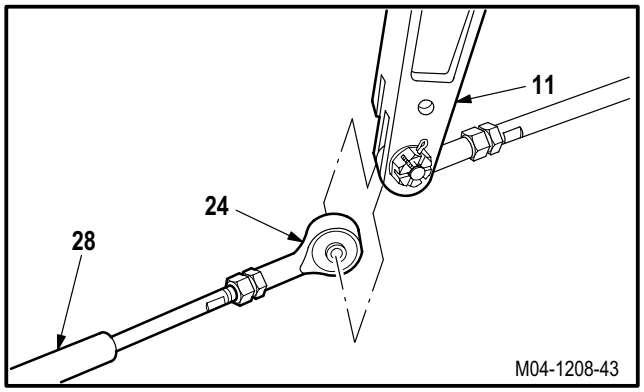
s. **Install -3 rig pin (8) fully in bracket (9) and bellcranks (10) and (11).**



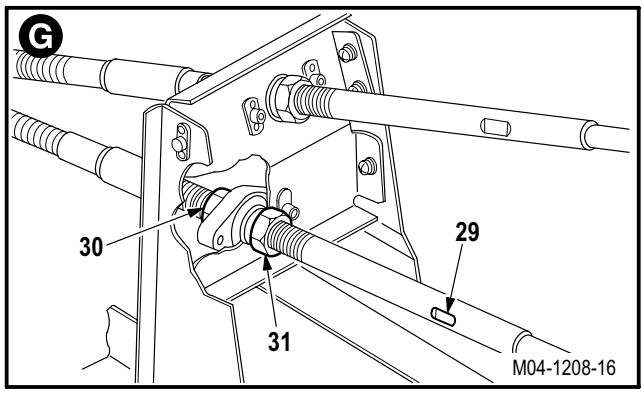

t. **Adjust cable (28).**

(1) If rod end (24) requires forward movement, hold cable flats (29). Loosen nut (30). Tighten nut (31) to aline rod end (24) with bellcrank (11).

(2) If rod end (24) requires aft movement, hold cable flats (29). Loosen nut (31). Tighten nut (30) to aline rod end (24) to bellcrank (11).




(3) Hold cable flats (29). Torque nuts (30) and (31) to **90 INCH-POUNDS**. Use torque wrench and crowfoot.

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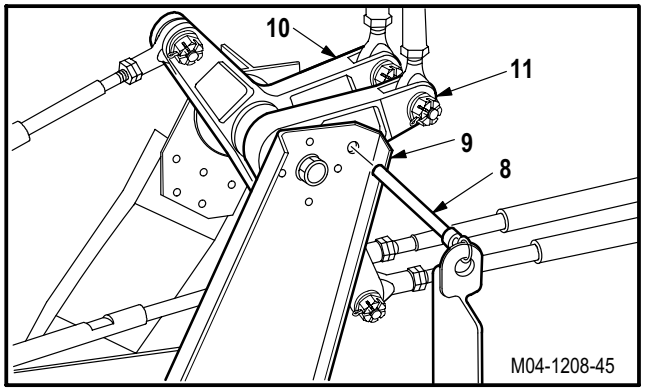
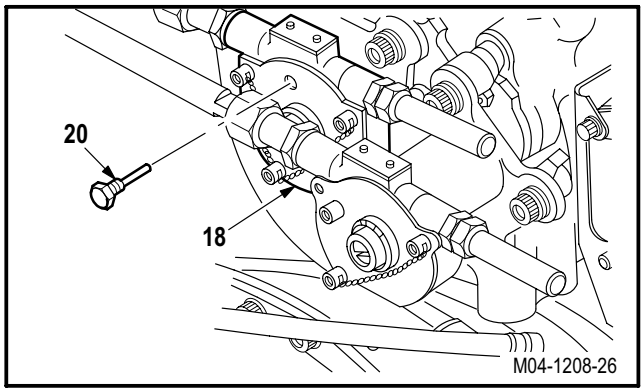
**4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

u. **In pilot station, remove rig pin (8) from bracket (9) and bellcranks (11) and (10).**




v. **Remove rig pin (20) from gearbox (18).**




w. **Install cable rod end (24) on bellcrank (11).** Torque nut (27) **14 to 18 INCH-POUNDS**.

(1) Position rod end (24) in bellcrank (11).

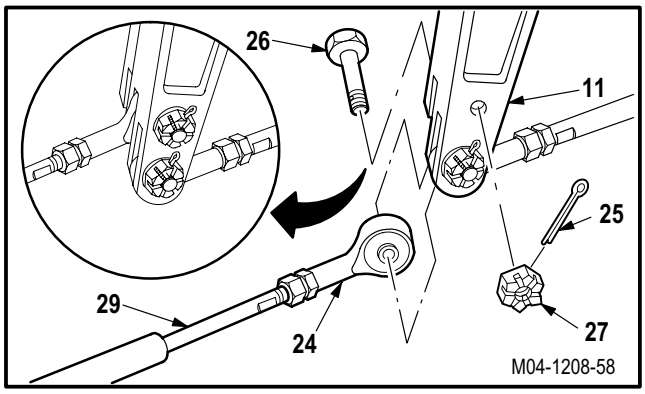
(2) Install bolt (26) through bellcrank (11) and rod end (24).

(3) Check fit of self-retaining bolt (26) (para 11.1).

(4) Hold bolt (26). Install nut (27). Torque nut (27) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (25).

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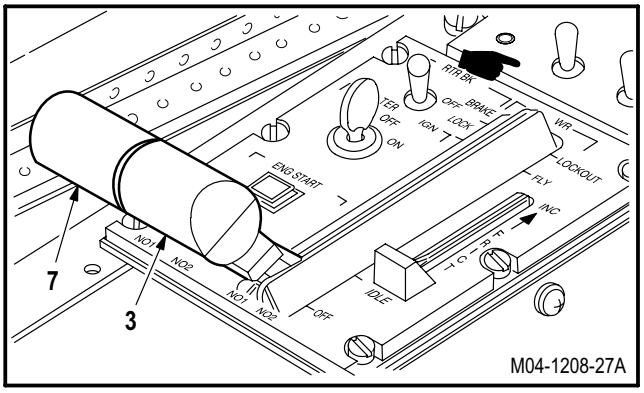
**4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

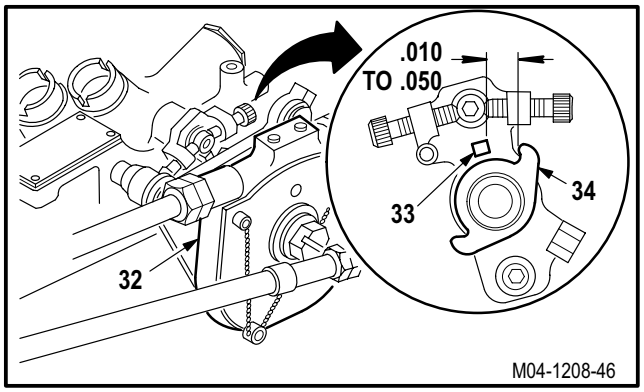
x. **Set pilot power levers (3) and (7) to OFF position.**




y. **At HMU spindle gearbox (32), obtain 0.010 to 0.050- INCH gap between spindle stop (33) and spindle cam (34).** Use gap setting gage.

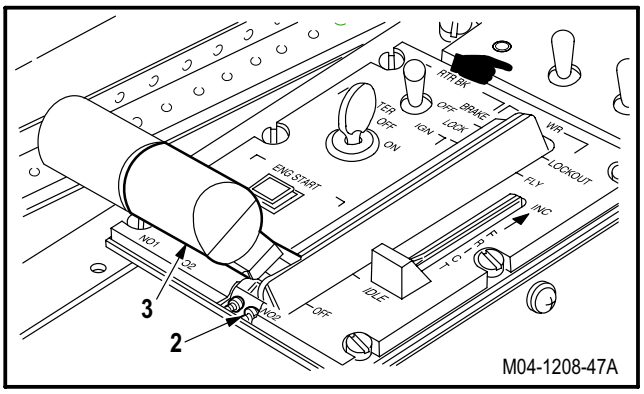
**NOTE**

If **0.010 to 0.050 INCH** clearance cannot be obtained, go to step b and repeat procedures.




z. **Adjust power lever (3) OFF stop screw (2).**

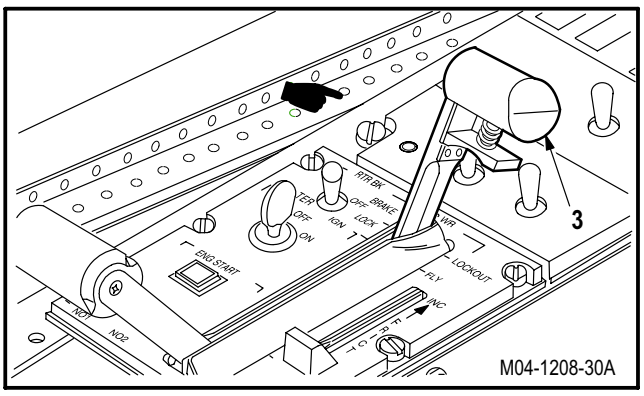
(1) With power lever (3) **OFF** position, adjust screw (2) until it touches power lever (3).




aa. **Set power lever (3) to LOCKOUT position.**

**NOTE**

If Hamilton Standard HMU is installed, perform step ab. If Woodward HMUs installed, perform step ac.

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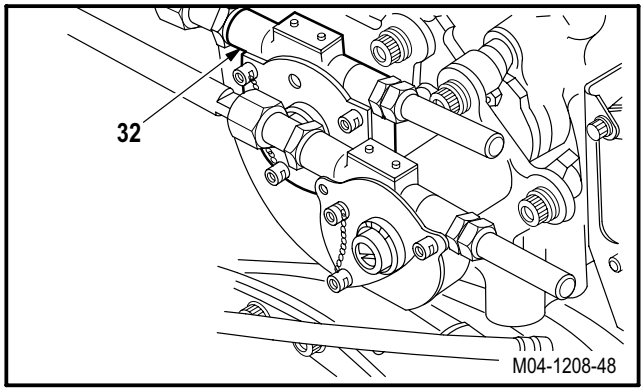
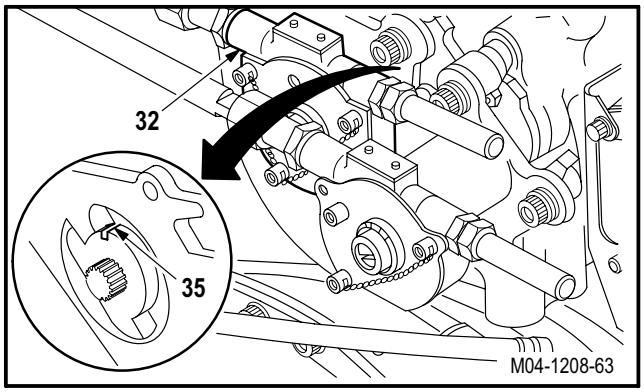
**4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

ab. **Verify lockout by audible click from Hamilton Standard HMU (32).**



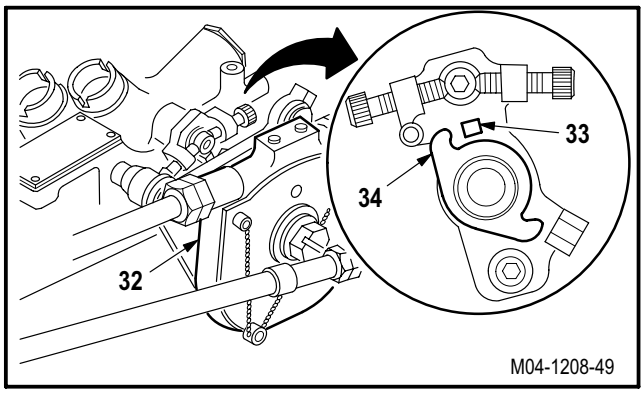

ac. **Verify lockout by ensuring scribed line (35) on Woodward HMU (32) is fully visible.**




ad. **At HMU (32), verify that spindle cam (34) does not contact spindle stop (33).**

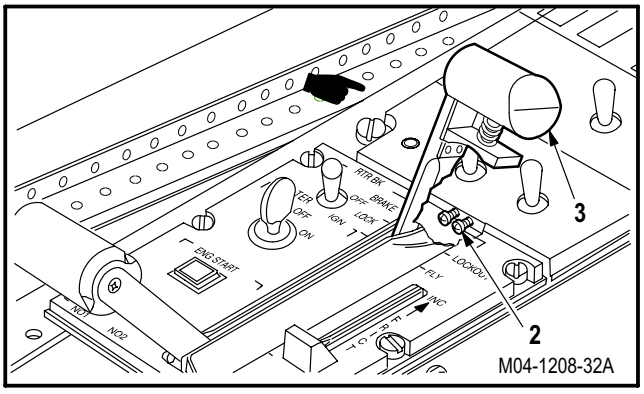
**NOTE**

If Woodward HMU is installed, spindle cam is allowed to contact spindle stop.




ae. **Adjust power lever (3) maximum stop screw (2).**

(1) With power lever (3) in **LOCKOUT** position, adjust screw (2) until it touches power lever (3).

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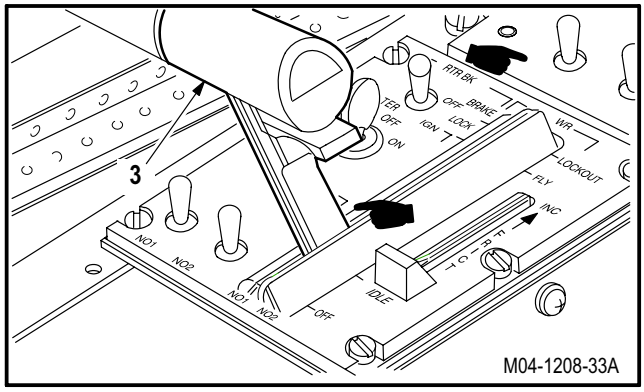
**4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

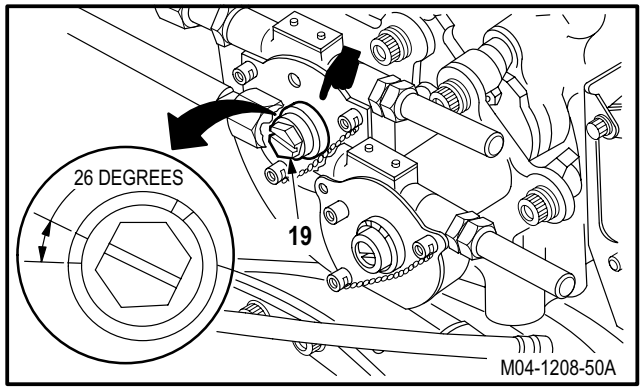
af. **Set power lever (3) to IDLE.**



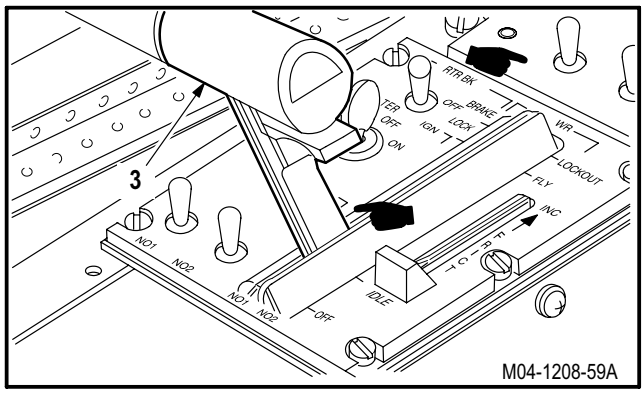

ag. **Verify pinion shaft (19) is in 26 degree (IDLE) position.**

**NOTE**

On Hamilton Standard HMU, an audible click is heard when power lever is moved to **IDLE** from **LOCKOUT**.




ah. **Move power lever (3) to OFF, IDLE, FLY, LOCK-OUT, and back to IDLE.**

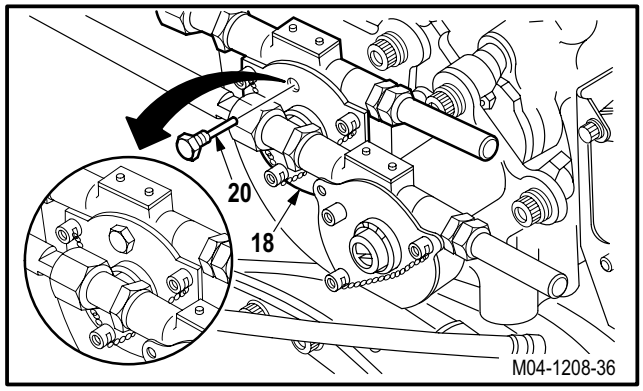



ai. **Install rig pin (20) in gearbox (18).**

**NOTE**

If rig pin cannot be installed, repeat steps f. thru ai.

aj. **Remove rig pin (20) from gearbox (18).**

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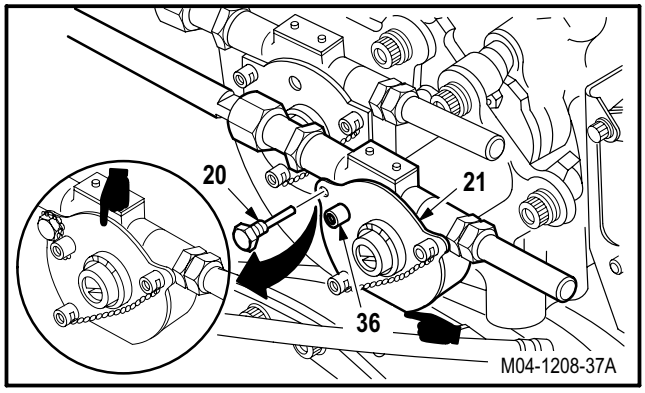
**4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

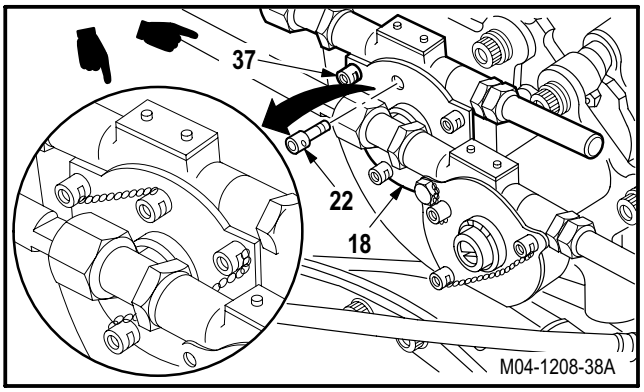
ak. **Stow rig pin (20) in gearbox (21).**

(1) Lockwire rig pin (20) to cap screw (36). Use wire (item 226, App F).

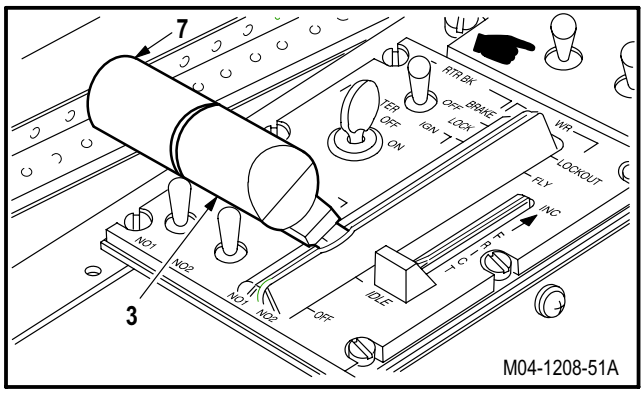



al. **Install cap screw (22) in gearbox (18).**

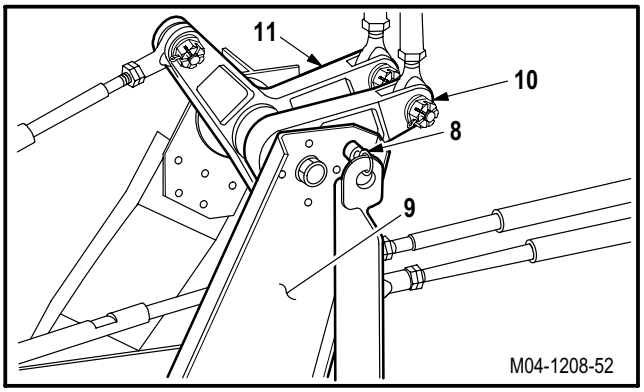
(1) Lockwire cap screws (22) and (37) together. Use wire (item 226, App F).




am. **Move power levers (3) and (7) to IDLE position.**




an. **At pilot station, install -3 rig pin (8) in bracket (9) and bellcranks (10) and (11).**

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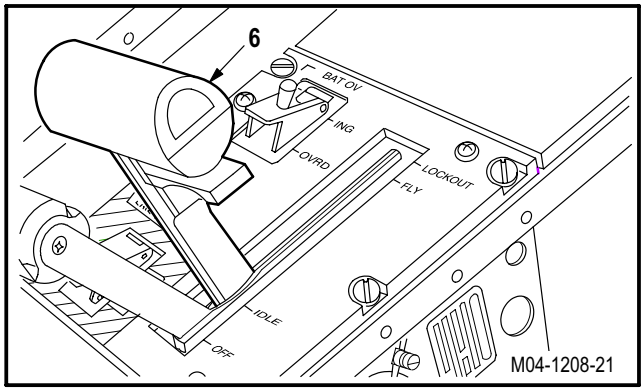
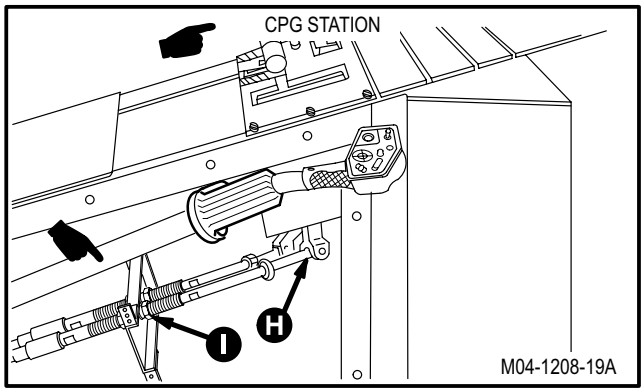
**4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

ao. **Verify power lever (6) is in IDLE position.**

**NOTE**

If CPG power lever alines with **IDLE** position, go to step aw.



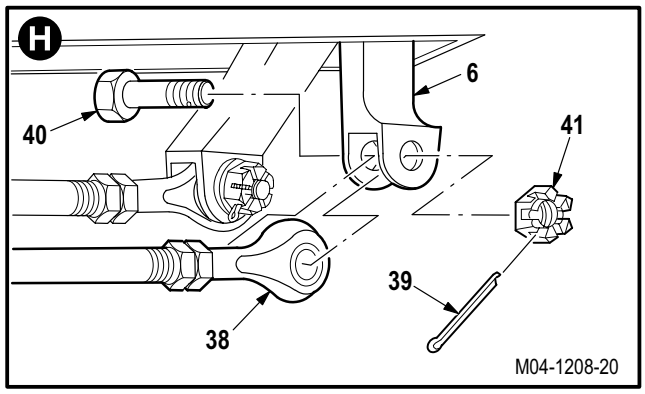




ap. **Remove cable rod end (38) from power lever (6).**

(1) Remove and discard cotter pin (39).

(2) Hold bolt (40). Remove nut (41).

(3) Remove bolt (40) from power lever (6) and rod end (38).

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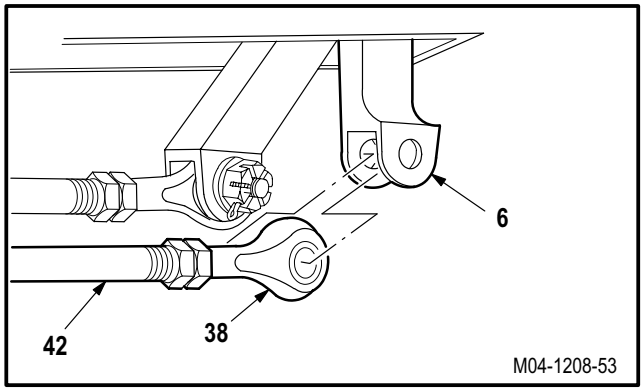
## 4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued

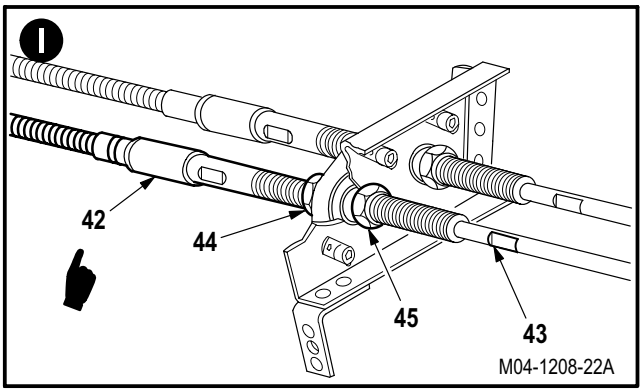
aq. **Adjust cable (42).**

(1) If rod end (38) requires forward movement, hold cable flats (43). Loosen nut (44). Tighten nut (45) to aline rod end (38) with power lever (6).

(2) If rod end (38) requires aft movement, hold cable flats (43). Loosen nut (45). Tighten nut (44) to aline rod end (38) with power lever (6).

(3) Hold cable flats (43). Torque nuts (44) and (45) to **90 INCH-POUNDS**. Use torque wrench and crowfoot.




ar. **Install rod end (38) on power lever (6).** Torque nut (41) **14 TO 18 INCH-POUNDS**.

(1) Position rod end (38) in power lever (6).

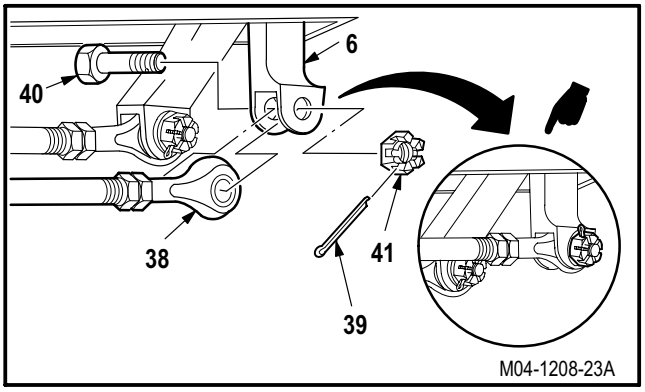
(2) Install bolt (40) through power lever (6) and rod end (38).

(3) Check fit of self-retaining bolt (para 11.1)

(4) Hold bolt (40). Install nut (41). Torque nut (41) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (39).

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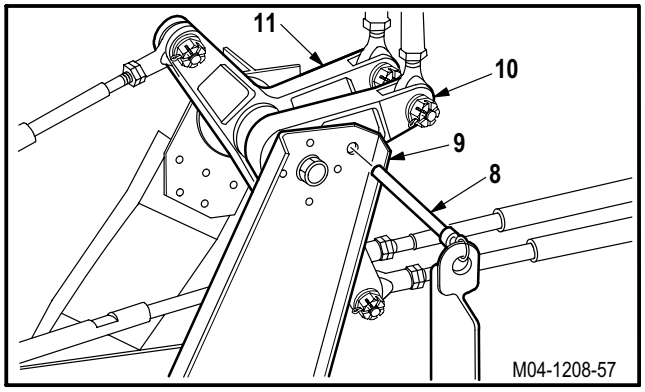
**4.183. NO. 2 ENGINE POWER AVAILABLE SPINDLE (PAS) RIGGING PROCEDURE - continued**

as. **In pilot station, remove rig pin (8) from bracket (9) and bellcranks (10) and (11).**

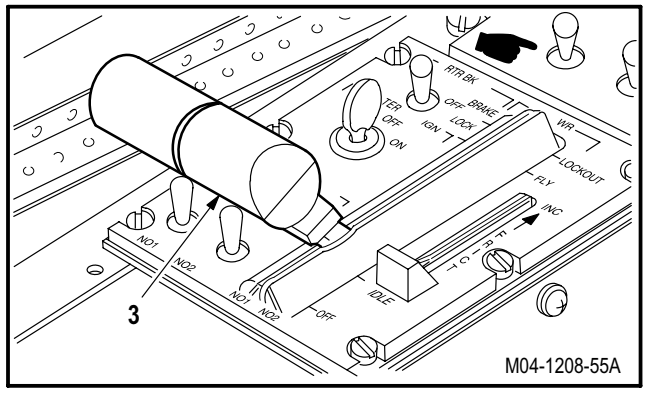



at. **Move power lever (3) to OFF, IDLE, FLY, LOCK-OUT, and back to IDLE position.**

au. **When power lever (3) is moved, verify power lever (6) moves to OFF, IDLE, FLY, LOCKOUT, and back to IDLE position.**

**NOTE**

If rig pin was removed in step as, proceed to step aw.




av. **In pilot station, remove rig pin (8) from bracket (9) and bellcranks (10) and (11).**

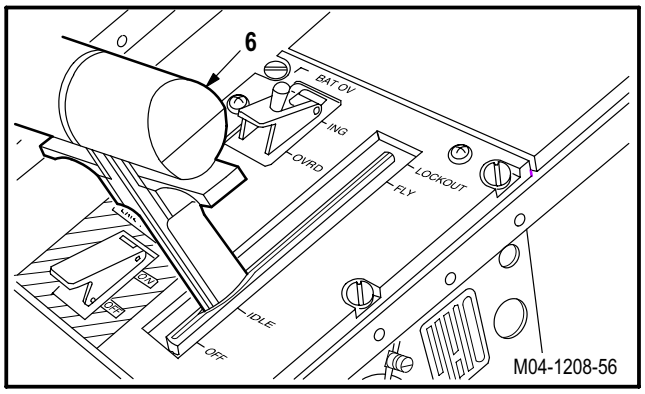
aw. **Inspect (QA).**

ax. **Install CPG FUEL panel** (para 10.62)**.**

ay. **Install CPG INTR LT panel** (para 9.81)**.**

az. **Install pilot FUEL panel** (para 10.54)**.**

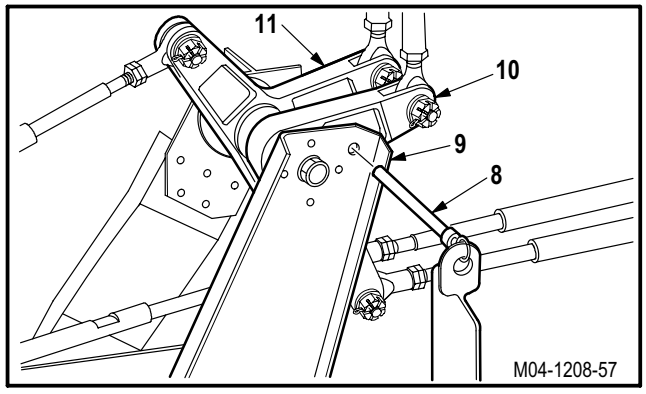
ba. **Install pilot EXT LT/INTR LT panel** (para 9.62)**.**




bb. **Perform power plants maintenance operational check (engine 2)** (TM 1-1520-238-T)**.**

bc. **Install No. 2 engine shroud assembly** (para 4.103)**.**

bd. **Install console panels PL1, PL3, CL1, and CL3** (para 2.2)**.**




END OF TASK

## 4.184. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING CHECK

4.184.1. Description

This task covers: Rigging check.

4.184.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Flight control rigging kit (item 267, App H)
Aircraft power unit (item 232, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

**Materials/Parts:**

Cotter pin
Wire (item 226, App F)

**Personnel Required:**

| | |
|---|---|
| 67R | Attack Helicopter Repairer<br>One person to assist |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

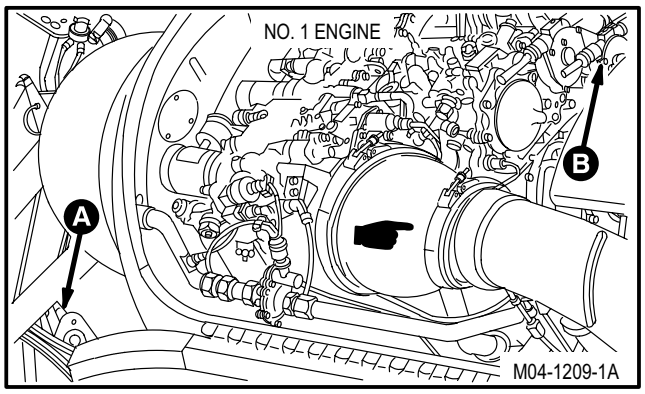
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 1.70 | External power application - electrical |
| 1.72 | External power application - hydraulic (primary) |
| 2.2 | Access doors LN1 and RN1 opened; panel L200 removed |
| 4.103 | No. 1 or No. 2 engine shroud assembly removed |

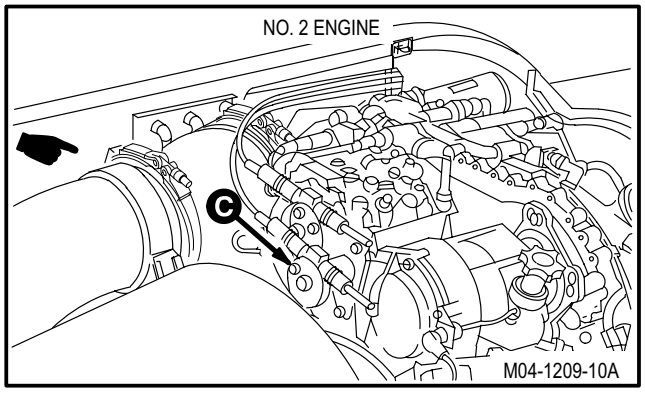
**NOTE**

- This task is typical for Hamilton Standard and Woodward hydromechanical units (HMUs).
- This task is typical for T700-GE-701 and T700-GE-701C engines.
- This task is typical for No. 1 or No. 2 load demand spindle rigging check.

4.184.3. Rigging Check

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

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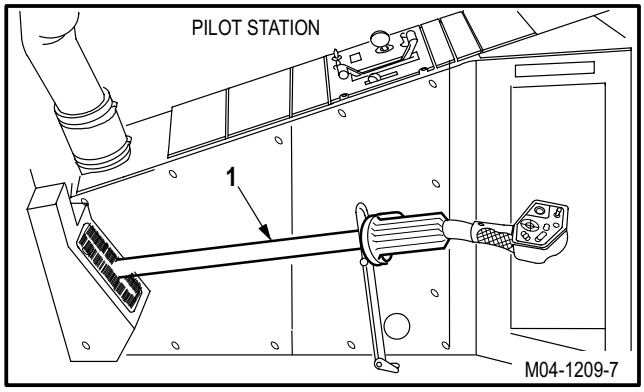
## 4.184. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING CHECK - continued

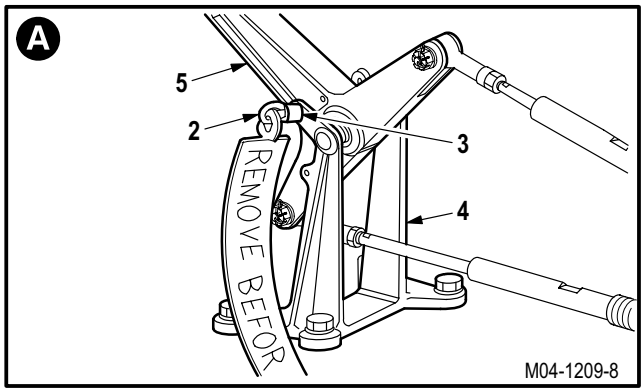
b. **Move pilot collective stick (1) through full up and full down positions.**

c. **Move pilot collective stick (1) to full down position.**




d. **Install -7 rig pin (2) in upper rig pin hole (3) of bracket (4) and bellcrank (5).**

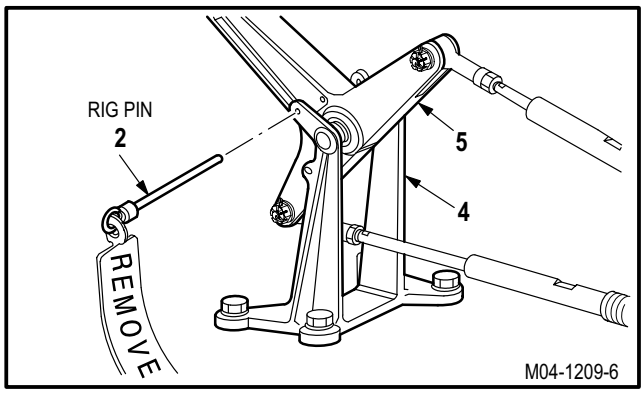
(1) If rig pin cannot be installed, system is out of rig (para 4.185).




e. **Remove -7 rig pin (2) from bracket (4) and bellcrank (5).**

f. **Remove external power - electrical** (para 1.70)**.**

g. **Remove external power - hydraulic (primary)** (para 1.72)**.**

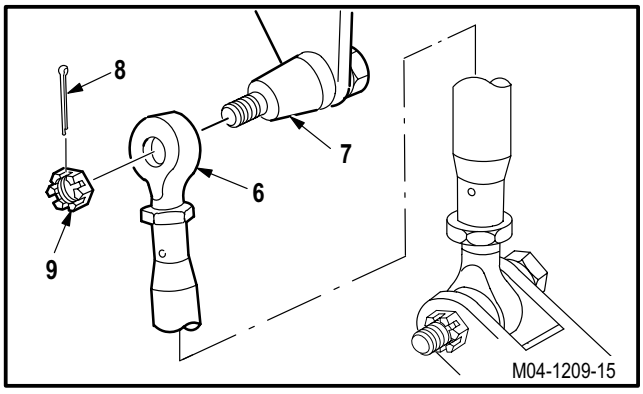



h. **Remove rod end (6) from collective servoactuator adapter (7).**

(1) Remove and discard cotter pin (8).

(2) Hold adapter (7) by flats, remove nut (10).

(3) Remove rod end (6) from adapter (7).

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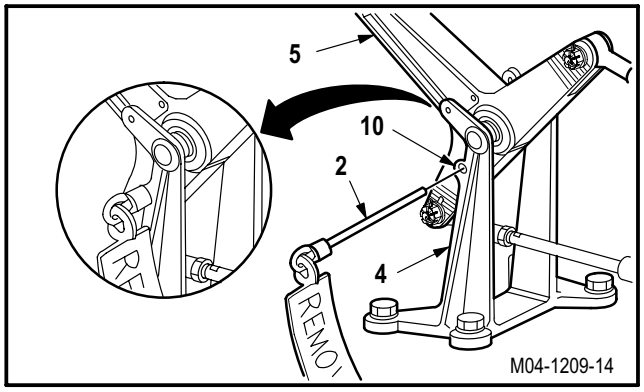
**4.184. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING CHECK - continued**

i. **Install -7 rig pin (2) in lower rig pin hole (10) on bracket (4) and bellcrank (5).**

(1) Lift loose end of bellcrank (5) until lower rig pin hole (10) on bracket (4) and bellcrank (5) are alined.

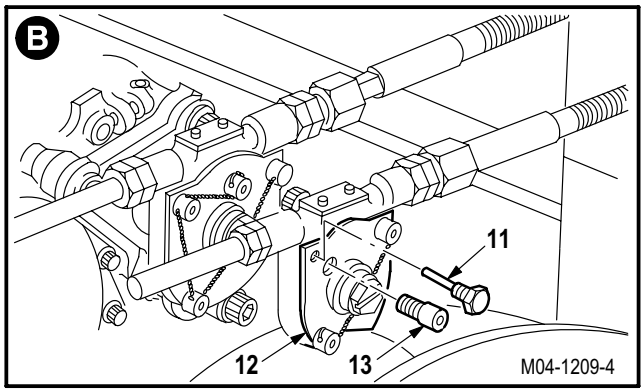
(2) If rig pin cannot be installed, system is out of rig (para 4.185).




j. **Remove rig pin (11) from No. 1 engine load demand spindle (LDS) gearbox (12).**

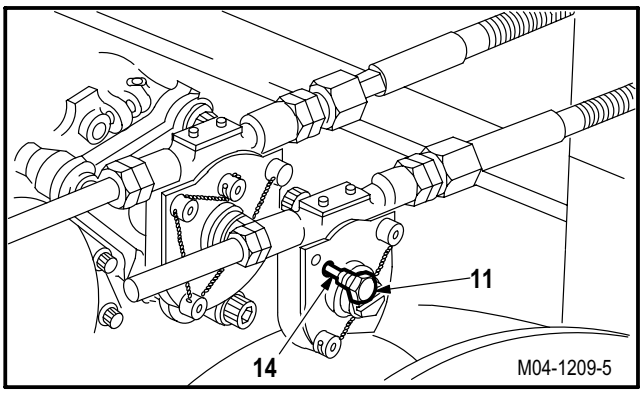
(1) Remove lockwire from rig pin (11) and cap screw (13).

(2) Remove rig pin (11) and cap screw (13) from gearbox (12).




k. **Install rig pin (11) in No. 1 engine LDS gearbox zero degree rig pin hole (14).**

(1) If rig pin cannot be installed, system is out of rig (para 4.185).

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**4.184. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING CHECK - continued**

l. **Remove rig pin (15) from No. 2 engine LDS gearbox (16).**

(1) Remove lockwire from rig pin (15) and cap screw (17).

(2) Remove rig pin (15) and cap screw (17) from gearbox (16).

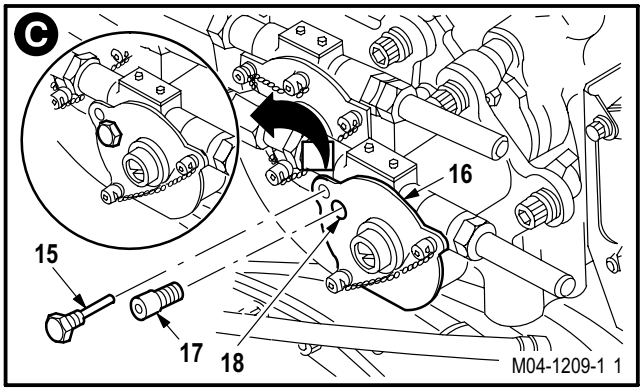
m. **Install rig pin (15) in No. 2 engine LDS gearbox zero degree rig pinhole (18).**

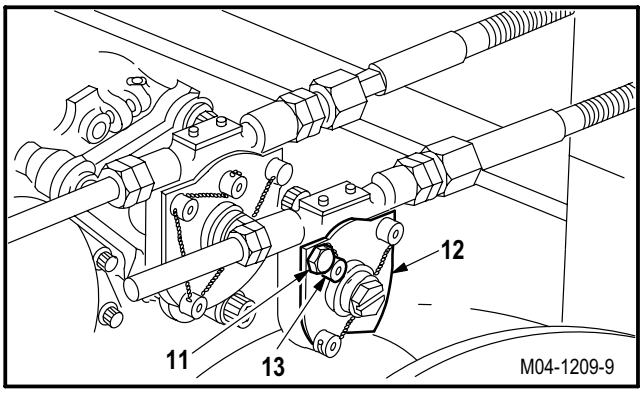
(1) If rig pin cannot be installed, system is out of rig (para 4.185).

n. **On No. 1 engine, stow rig pin (11) in gearbox (12).**

o. **Install cap screw (13) in gearbox (12).**

p. **Lockwire rig pin (11) to cap screw (13).** Use wire (item 226, App F).



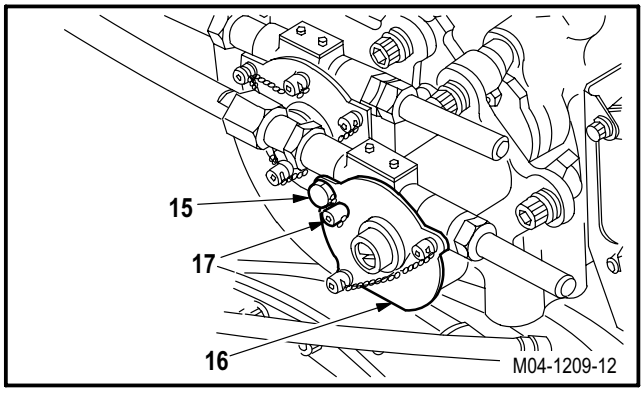




q. **On No. 2 engine, stow rig pin (15) in gearbox (16).**

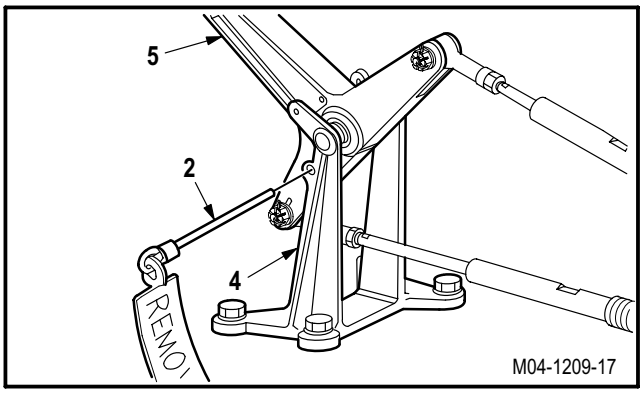
r. **Install cap screw (17) in gearbox (16).**

s. **Lockwire rig pin (15) to cap screw (17).** Use wire (item 226, App F).

t. **Inspect (QA).**




u. **Remove -7 rig pin (2) from bracket (4) and bellcrank (5).**

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**4.184. NO. 1 OR NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING CHECK - continued**

v. **Install rod end (6) on adapter (7).** Torque nut (9) to **30 to 40 INCH-POUNDS**.

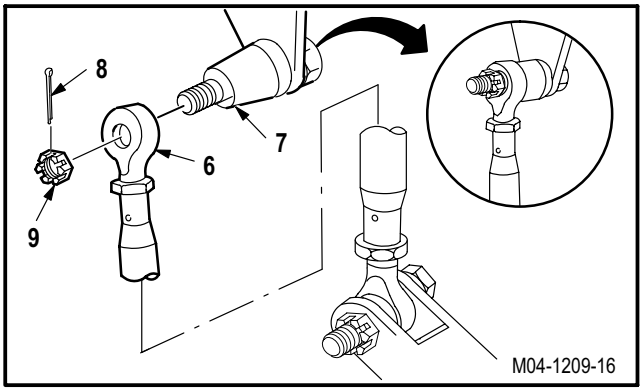
(1) Position rod end (6) on adapter (7).

(2) Install nut (9) on adapter (7).

(3) Hold adapter (7), torque nut (9) to **30 INCH-POUNDS**. Use torque wrench.

(4) Increase torque to aline cotter pin hole, but do not exceed **40 INCH-POUNDS**.

(5) Install new cotter pin (8).




w. **Inspect (QA).**

x. **Install No. 1 or No. 2 engine shroud assembly** (para 4.103)**.**

y. **Secure access doors LN1 and RN1; install panel L200** (para 2.2)**.**

z. **Perform power plants maintenance operational check (engine 1 and engine 2)** (TM 1-1520-238-T)**.**

END OF TASK

## 4.185. NO. 1 AND NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING

4.185.1. Description

This task covers: Rigging.

4.185.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Flight control rigging kit (item 267, App H)
Aircraft power unit (item 232, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)
30 - 150 inch-pound 3/8-inch drive click type torque wrench (item 441, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

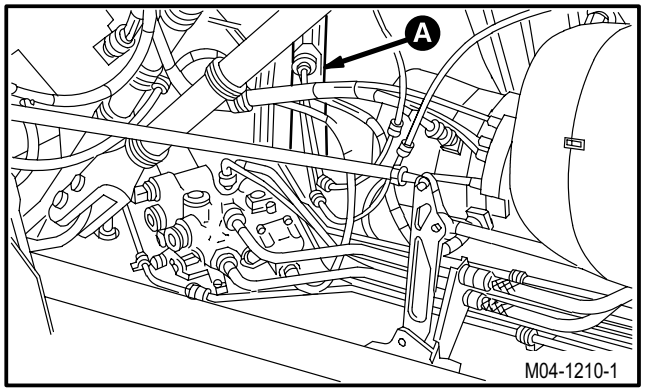
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors LN1 and RN1 opened; panels L200 and R200 removed |
| 4.103 | No. 1 or No. 2 engine shroud assembly removed |

**Materials/Parts:**

Cotter pin (3)
Wire (item 226, App F)

**NOTE**

- This task is typical for No. 1 and No. 2 engine load demand spindles.
- This task is typical for Hamilton Standard and Woodward hydromechanical units (HMUs).
- This task is typical for T700-GE-701 and T700-GE-701C engines.
- Hamilton Standard HMUs require a hardened steel rig pin **0.065 - 0.069 INCH** diameter. Use twist drill as a PAS gearbox rig pin. Woodward HMUs use the standard rig pin supplied with the load demand spindle (LDS) gearbox.

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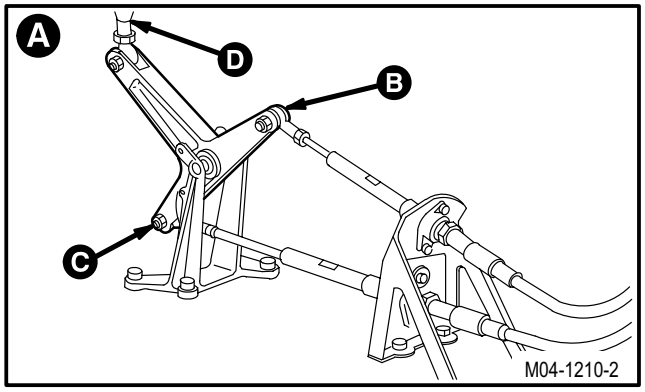
## 4.185. NO. 1 AND NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING - continued



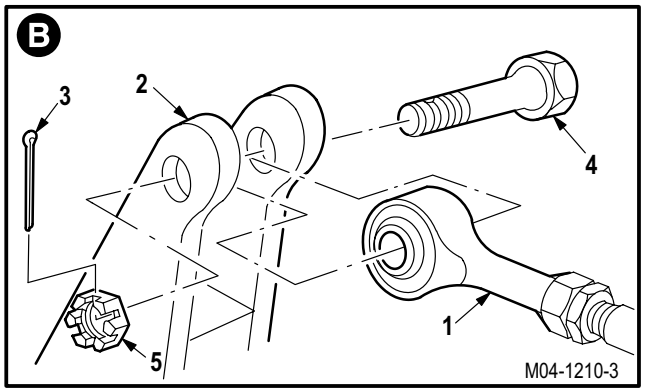

4.185.3. Rigging

a. **Remove cable rod end (1) from bellcrank (2).**

(1) Remove and discard cotter pin (3).

(2) Hold bolt (4). Remove nut (5).

(3) Remove bolt (4) from bellcrank (2) and rod end (1).

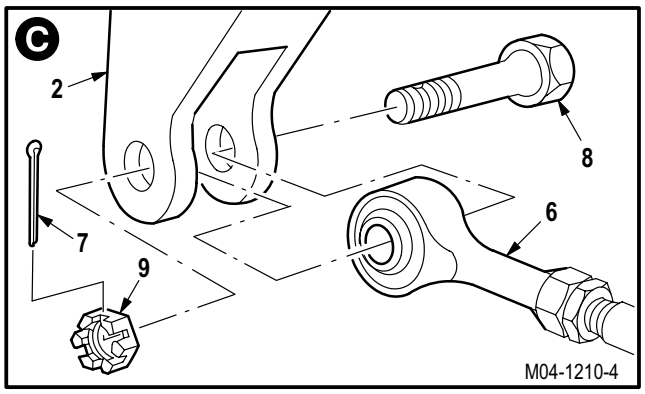



b. **Remove cable rod end (6) from bellcrank (2).**

(1) Remove and discard cotter pin (7).

(2) Hold bolt (8). Remove nut (9).

(3) Remove bolt (8) from bellcrank (2) and rod end (6).

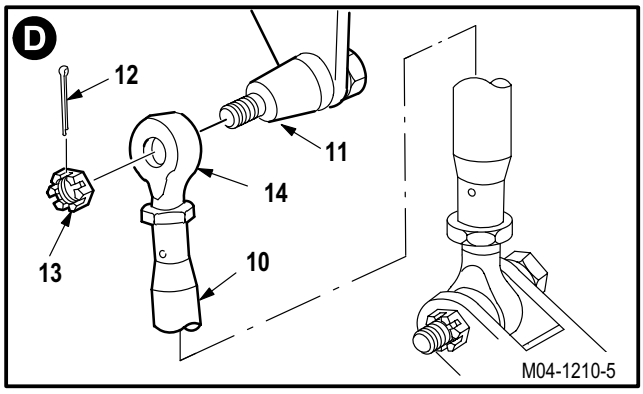



c. **Remove connecting link (10) from servoactuator adapter (11).**

(1) Remove and discard cotter pin (12).

(2) Remove nut (13) from adapter (11).

(3) Remove rod end (14) from adapter (11).

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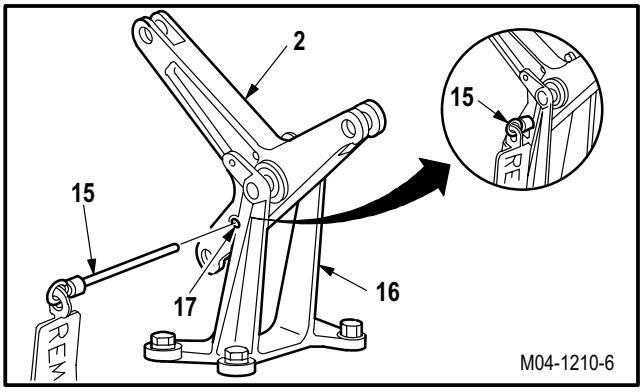
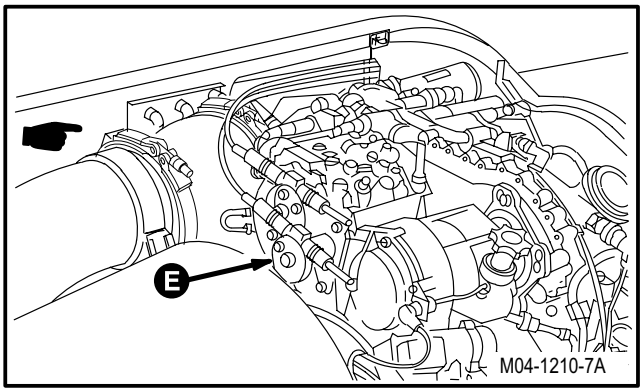
**4.185. NO. 1 AND NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING - continued**

d. **Install -7 rig pin (15) in bracket (16) and bellcrank (2) at bottom rig pin hole (17).**




e. **Remove rig pin (18) from No. 2 engine LDS gearbox (19).**

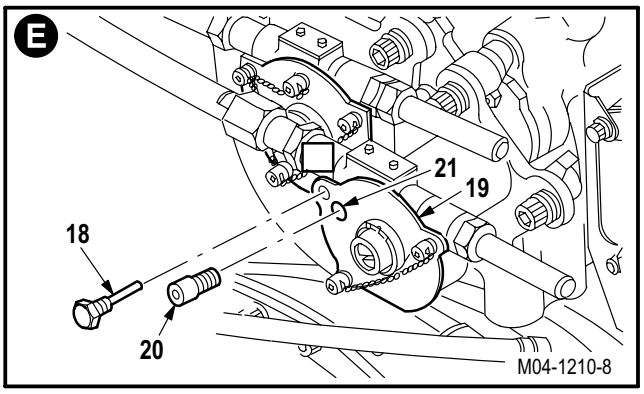
(1) Remove lockwire from pin (18).

(2) Remove rig pin (18).

f. **Remove cap screw (20) from gearbox (19).**

**NOTE**

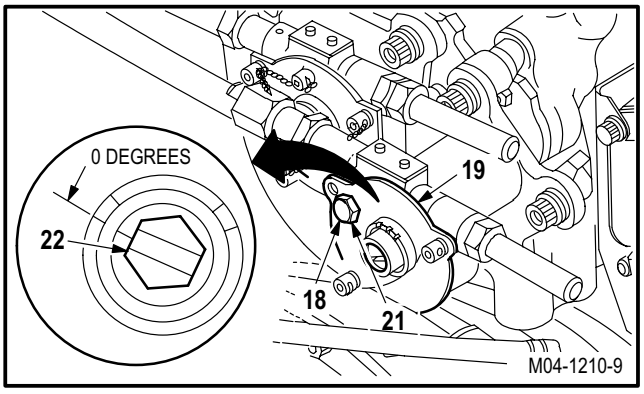
Rig pin must bottom and lock gearbox at zero degree position.




g. **Install rig pin (18) in gearbox (19) at zero degree rig pin hole (21).**

(1) Rotate gearbox shaft (22) as required to aline rig pin hole (21).

(2) Install rig pin (18) in rig pin hole (21).

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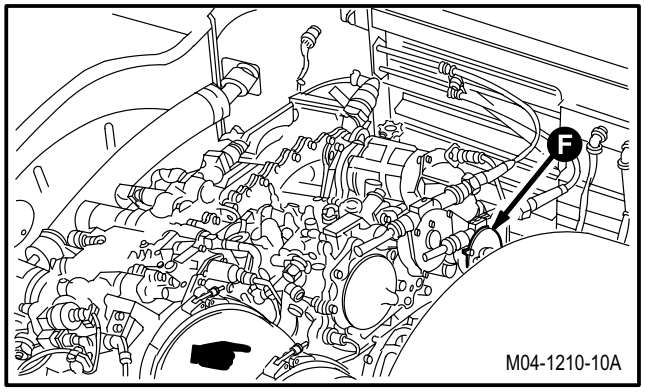
## 4.185. NO. 1 AND NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING - continued

h. **Remove rig pin (23) from No. 1 engine LDS gearbox (24).**

(1) Remove lockwire from pin (23).

(2) Remove pin (23).




i. **Remove cap screw (25) from gearbox (24).**

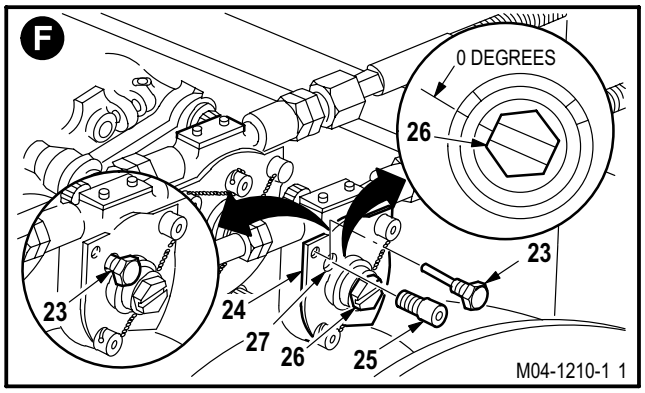
**NOTE**

Rig pin must bottom and lock gearbox at zero degree position.

j. **Install rig pin (23) in gearbox (24) at zero degree position.**

(1) Turn gearbox shaft (26) as required to aline rig pin hole (27).

(2) Install rig pin (23) in rig pin hole (27).




k. **Install cable rod end (1) to bellcrank (2).** Torque nut (5) **14 to 18 INCH-POUNDS**.

(1) Hold cable (28) on flats (29). Loosen nuts (30) and (31).

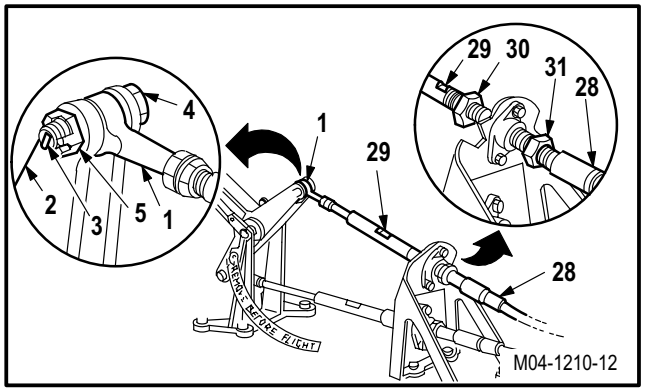
(2) Adjust cable (28) to aline rod end (1) with bellcrank (2).

(3) Install bolt (4) through bellcrank (2) and rod end (1).

(4) Install nut (5) on bolt (4). Torque nut (5) to **14 INCH-POUNDS**. Use torque wrench.

(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (3).

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**4.185. NO. 1 AND NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING - continued**

l. **Install cable rod end (6) to bellcrank (2).** Torque nut (9) **14 to 18 INCH-POUNDS**.

(1) Hold cable (32) on flats (33). Loosen nuts (34) and (35).

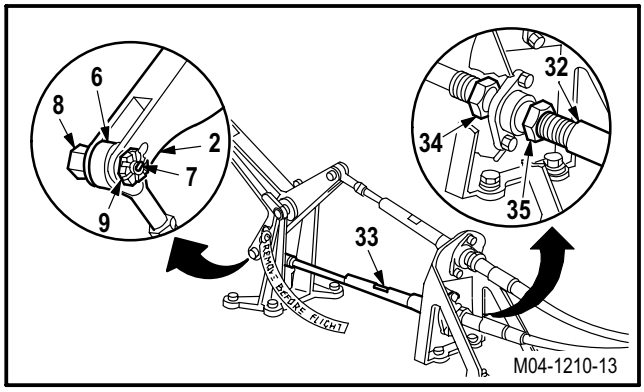
(2) Adjust cable (32) to aline rod end (6) with bellcrank (2).

(3) Install bolt (8) in bellcrank (2) and rod end (6).

(4) Install nut (9) on bolt (8). Torque nut (9) to **14 INCH-POUNDS**. Use torque wrench.

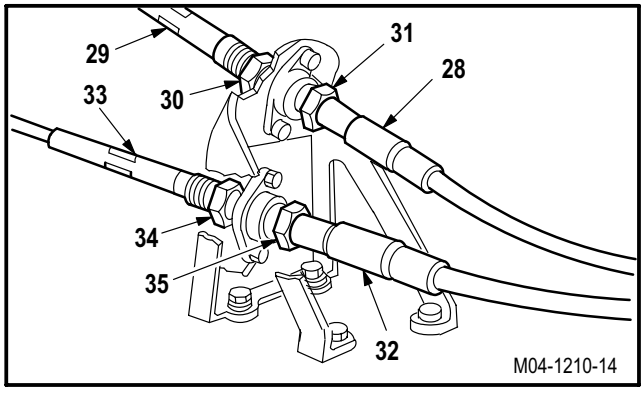
(5) Increase torque to aline cotter pin hole, but do not exceed **18 INCH-POUNDS**.

(6) Install new cotter pin (7).

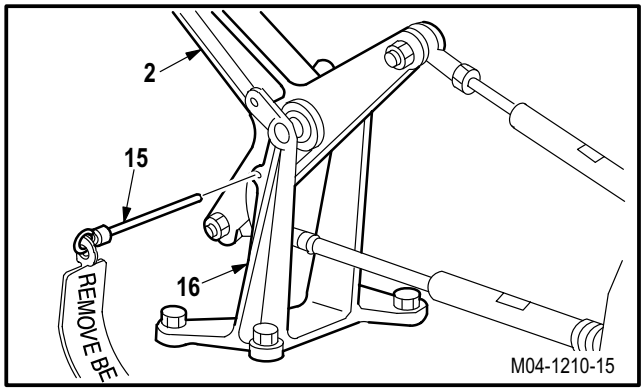



m. **Hold cable (32) on flats (33).** Torque nuts (34) and (35) to **90 INCH-POUNDS**. Use torque wrench.

n. **Hold cable (28) on flats (29).** Torque nuts (30) and (31) to **90 INCH-POUNDS**. Use torque wrench.




o. **Remove -7 rig pin (15) from bracket (16) and bellcrank (2).**

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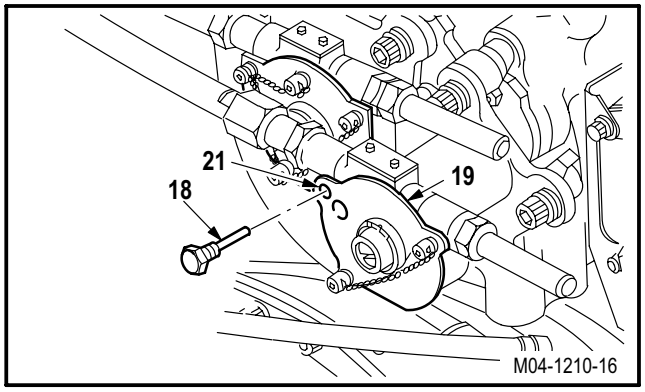
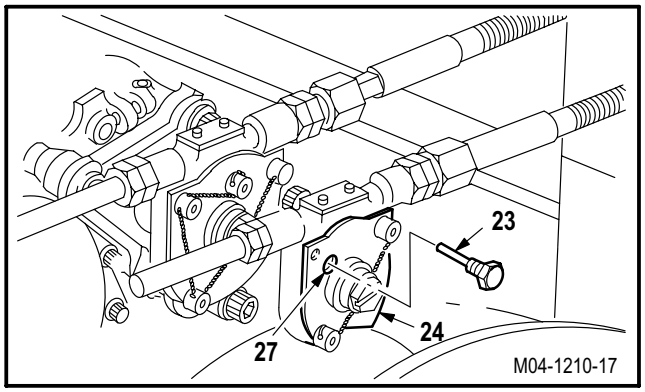
## 4.185. NO. 1 AND NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING - continued

p. **Remove rig pin (18) from gearbox (19) zero degree rig pin hole (21).**




q. **Remove rig pin (23) from gearbox (24) zero degree rig pin hole (27).**



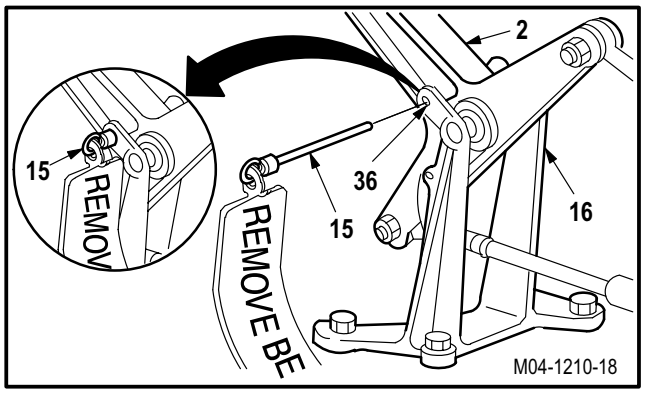

r. **Install -7 rig pin (15) in top hole (36) of bracket (16) and bellcrank (2).**

(1) Push bellcrank (2) down to aline holes.

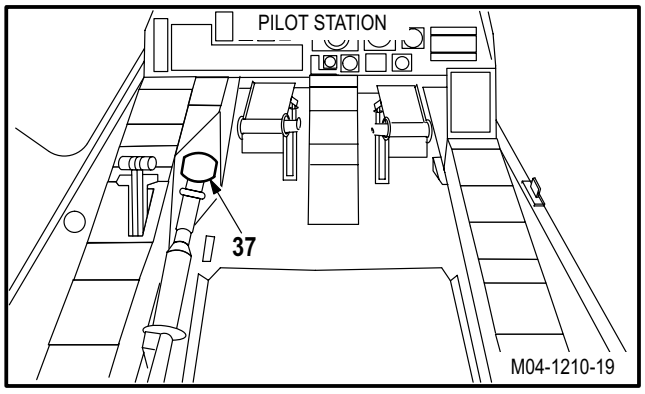
(2) Install -7 rig pin (15).

s. **Apply external power - electrical** (para 1.70)**.**

t. **Apply external power - hydraulic (primary)** (para 1.72)**.**




u. **Move collective stick (37) to full down position.**

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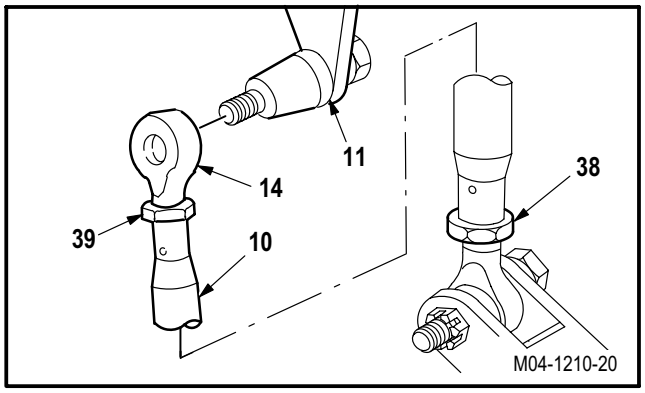
## 4.185. NO. 1 AND NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING - continued

v. **Aline link rod end (14) with adapter (11).**

(1) Remove lockwire from nuts (38) and (39).

(2) Loosen nuts (38) and (39).

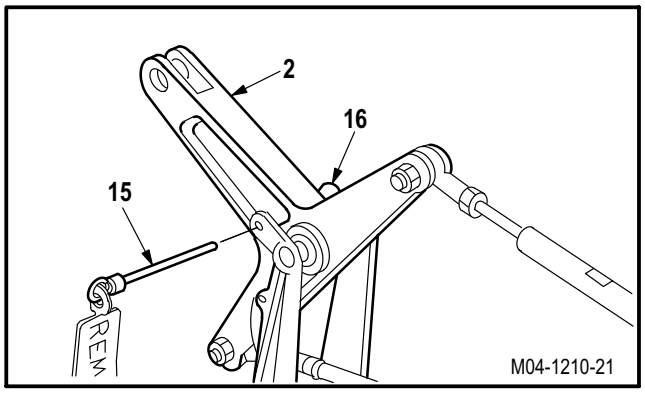
(3) Adjust rod (10) to aline rod end (14) with adapter (11), but do not install.




w. **Remove -7 rig pin (15) from bracket (16) and bellcrank (2).**

x. **Check system for smooth operation.**

(1) Move bellcrank (2) through full range of travel.




y. **Install link rod end (14) to adapter (11).** Torque nut (13) **30 to 40 INCH-POUNDS**.

(1) Aline rod end (14) with adapter (11).

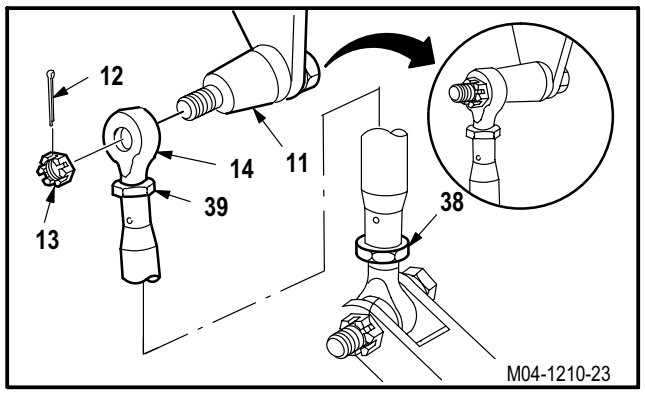
(2) Install nut (13) on adapter (11). Torque nut (13) to **30 INCH-POUNDS**. Use torque wrench.

(3) Increase torque to aline cotter pin hole, but do not exceed **40 INCH-POUNDS**.

(4) Install new cotter pin (12).

(5) Torque nuts (38) and (39) to **20 INCH-POUNDS**. Use torque wrench.

(6) Lockwire nuts (38) and (39) to link (40). Use wire (item 226, App F).

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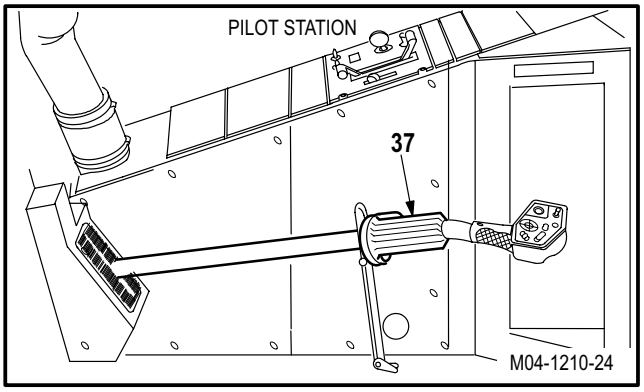
## 4.185. NO. 1 AND NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING - continued

z. **Move collective stick (37) to full down to full up to full down.**

**NOTE**

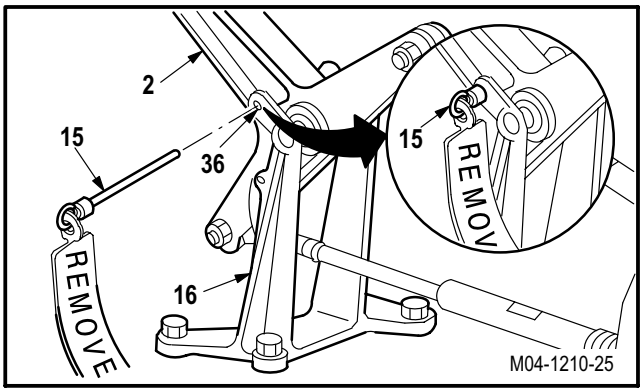
If rig pin cannot be installed through bracket and bellcrank, repeat steps a. thru ae.




aa. **Install -7 rig pin (15) in bracket (16) and bellcrank (2) upper rig pin holes (36).**

ab. **Remove -7 rig pin (15) from bracket (16) and bellcrank (2).**

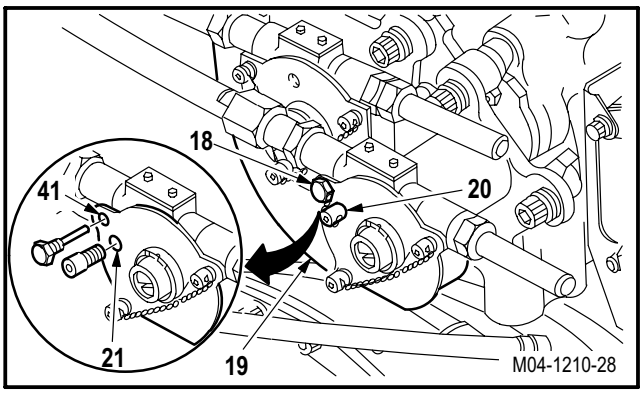
ac. **Remove external power - hydraulic (primary)** (para 1.72)**.**




ad. **Stow rig pin (18) in gearbox (19) rig pin hole (41).**

ae. **Install cap screw (20) in gearbox (19) rig pin hole (21).**

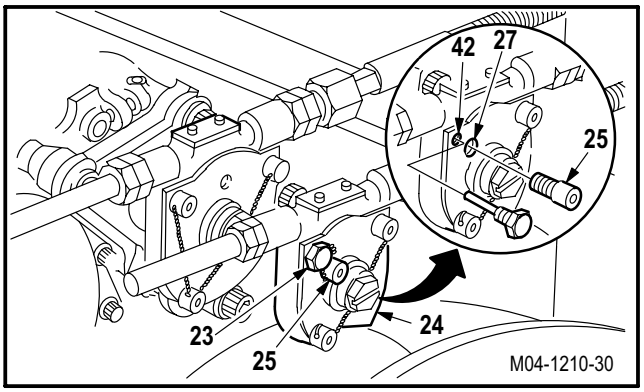
af. **Lockwire rig pin (18) to cap screw (20).** Use wire (item 226, App F).




ag. **Stow rig pin (23) in gearbox (24) rig pin hole (42).**

ah. **Install cap screw (25) in gearbox (24) rig pin hole (27).**

ai. **Lockwire cap screw (25) to rig pin (23).** Use wire (item 226, App F).

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**4.185. NO. 1 AND NO. 2 ENGINE LOAD DEMAND SPINDLE RIGGING - continued**

aj. **Inspect (QA).**

ak. **Remove external power - electrical** (para 1.70)**.**

al. **Install No. 1 or No. 2 engine shroud assembly** (para 4.103)**.**

am. **Secure access doors LN1 and RN1; install panel L200 and R200** (para 2.2)**.**

an. **Perform power plants maintenance operational check (engine No. 1 and engine No. 2)** (TM 1-1520-238-T)**.**

END OF TASK

## 4.186. NO. 1 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK

4.186.1. Description

This task covers: Rigging Check.

4.186.2. Initial setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Aircraft power unit (item 232, App H)
#51 twist drill (item 119, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

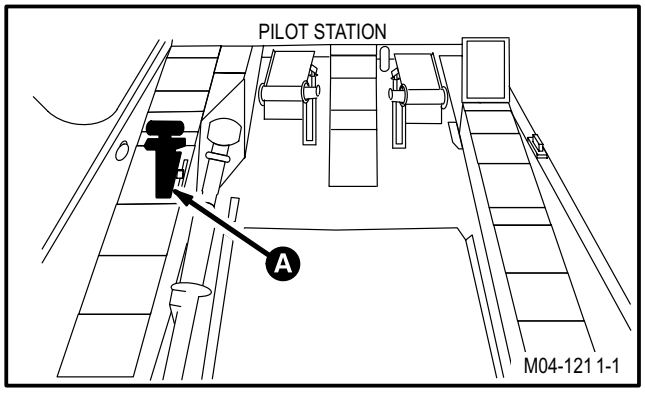
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 1.70 | External power application - electrical |
| 1.71 | External power application - air |
| 1.72 | External power application - hydraulic (utility) |
| 2.2 | Access door LN1 opened |
| 4.103 | No. 1 engine shroud assembly removed |

**Materials/Parts:**

Wire (item 226, App F)

**NOTE**

- This task is typical for both Hamilton Standard and Woodward hydromechanical units (HMUs).
- Hamilton Standard HMUs require a hardened steel pin **0.065 - 0.069 INCH** diameter. Use twist drill as a power available spindle (PAS) gearbox rig pin. Woodward HMUs use the standard rig pin supplied with the load demand spindle (LDS) gearbox.




4.186.3. Rigging Check

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

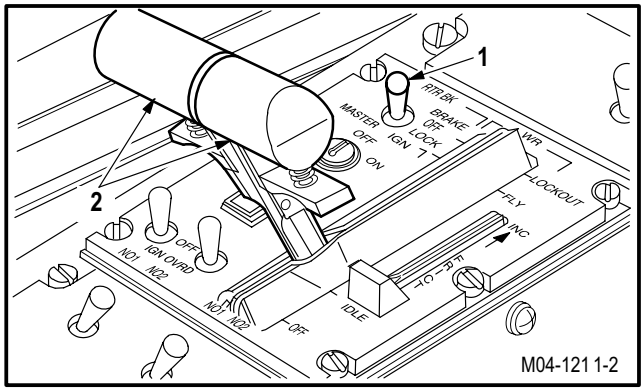
GO TO NEXT PAGE

**4.186. NO. 1 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued**

b. **Set pilot RTR BK switch (1) to OFF.**

c. **Remove external power - electrical** (para 1.70)**.**

d. **Set pilot No. 1 power lever (2) to IDLE.**



M04-1211-2

e. **Remove rig pin (3) from load demand spindle (LDS) gearbox (4).**

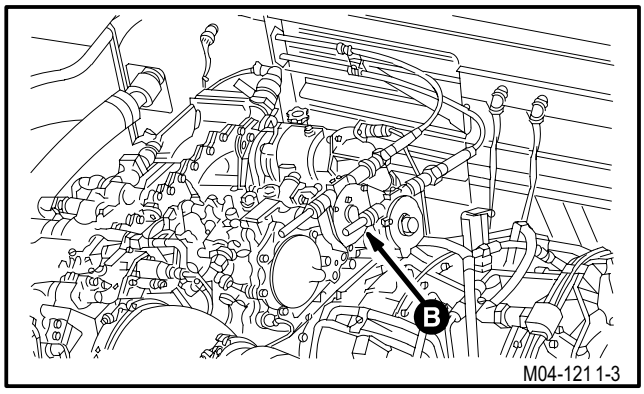
(1) Remove lockwire.

(2) Remove pin (3).

f. **Remove cap screw (5) from PAS gearbox (6).**

(1) Remove lockwire.

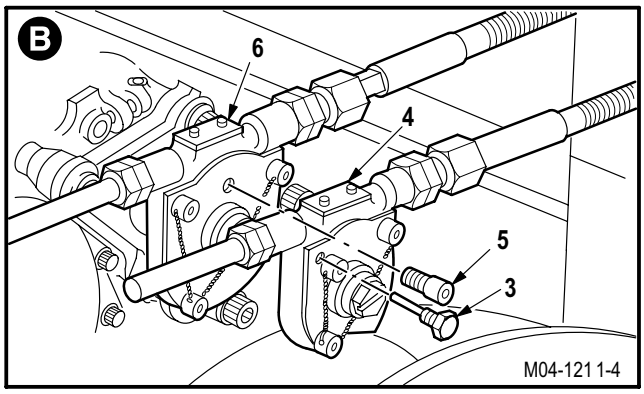
(2) Remove cap screw (5).



M04-1211-3

**NOTE**

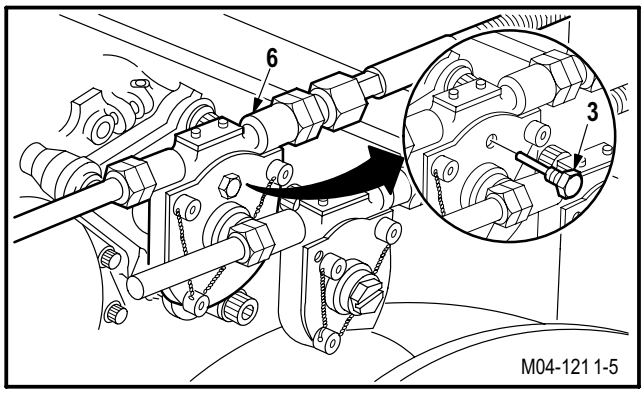
- The PAS system is out of rig when any of the following conditions exist (para 4.182):
- Rig pin cannot be installed when power lever is in **IDLE**.
- PAS gearbox is not at zero degrees when power lever is in **OFF**.
- PAS gearbox is not at 130 degrees when power lever is in **LOCKOUT**.



M04-1211-4

g. **Install rig pin (3) in gearbox (6).**

h. **Remove rig pin (3) from gearbox (6).**



M04-1211-5

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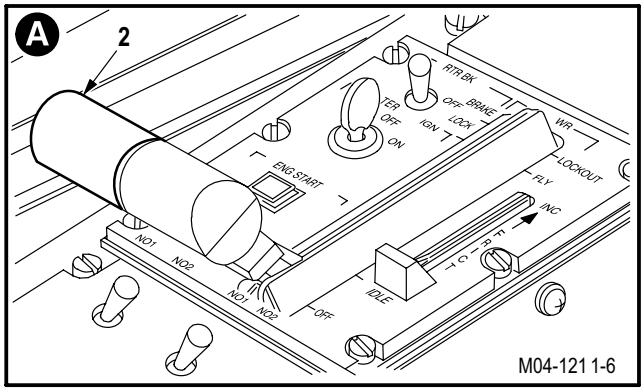
## 4.186. NO. 1 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued

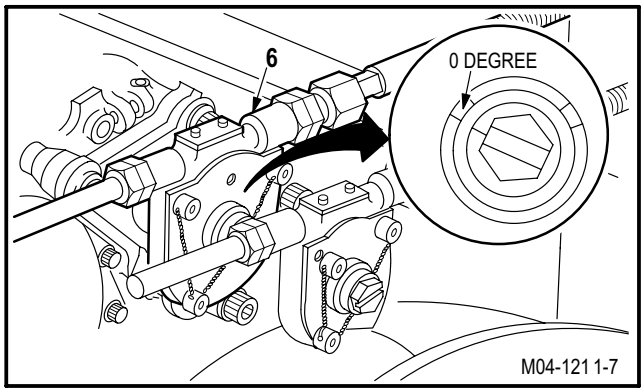
i. **Set power lever (2) to OFF.**



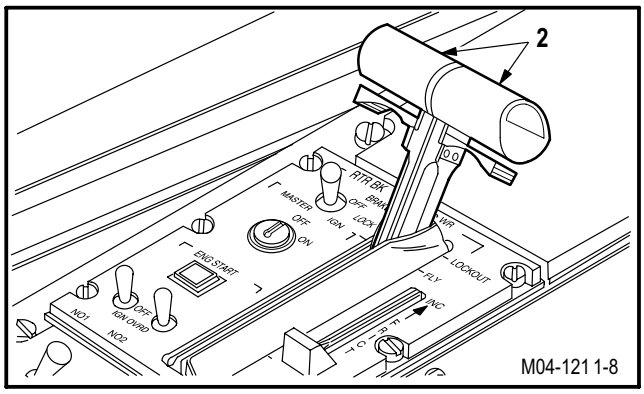

**NOTE**

Aline PAS gearbox with notch on pinion shaft. Screwdriver slot does not affect the rigging position.

j. **Verify that gearbox (6) is at zero degree position.**




k. **Set power lever No. (2) to LOCKOUT.**

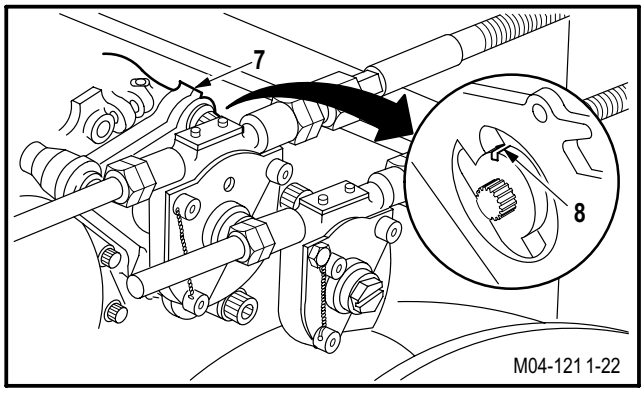



**NOTE**

If Hamilton Standard HMU is installed, perform step l. If Woodward HMU is installed, perform step m.

l. **Verify lockout by audible click from Hamilton Standard HMU (7).**

m. **Verify lockout by ensuring scribed line (8) on Woodward HMU is fully visible.**

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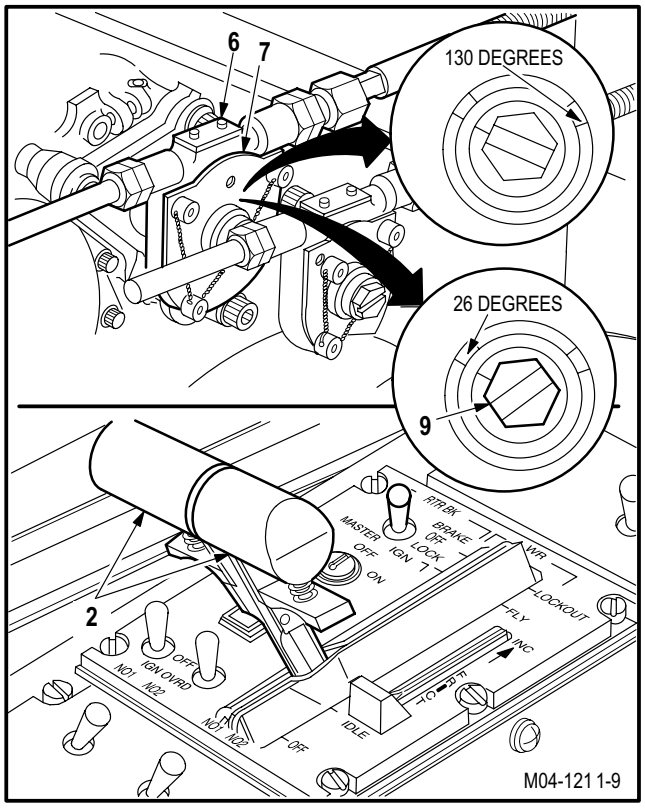
**4.186. NO. 1 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued**

n. **Verify that gearbox (6) is at 130 degree position.**

o. **Set power lever (2) to IDLE.**

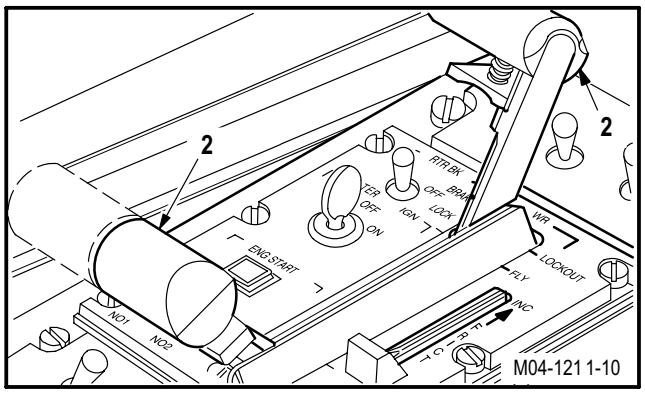
p. **Verify PAS gearbox pinion shaft (9) is in 26 degree (IDLE) position.**

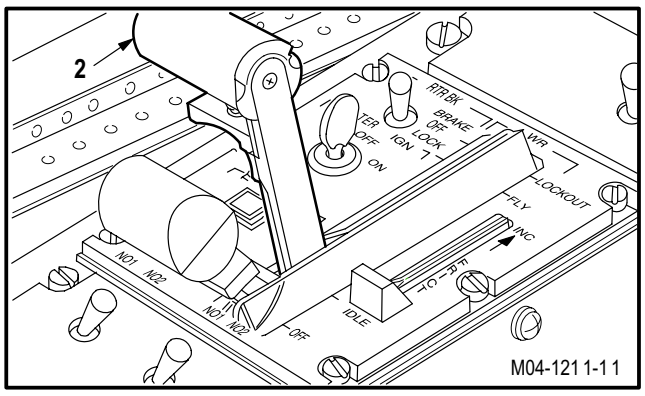



**NOTE**

On Hamilton Standard HMUs, an audible click is heard when power lever is moved to **IDLE** from **LOCKOUT**.

q. **Move power lever (2) to LOCKOUT, OFF, and back to IDLE.**

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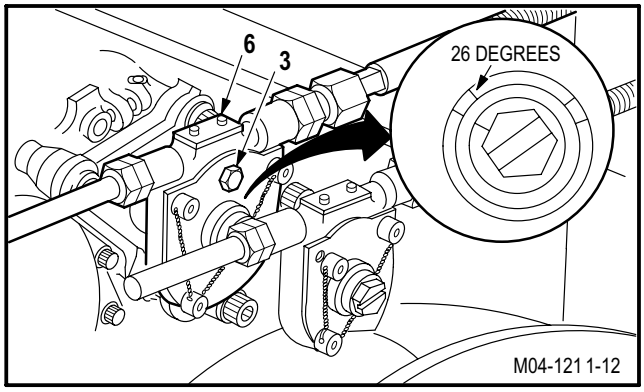
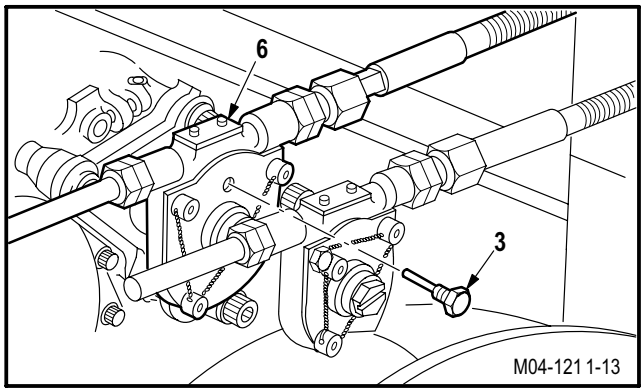
## 4.186. NO. 1 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued

r. **Install rig pin (3) in gearbox (6).**

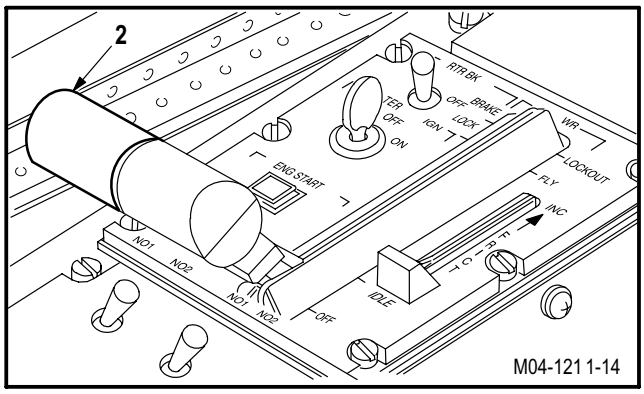
s. **Verify that gearbox (6) is at 26 degree position.**




t. **Remove rig pin (3) from gearbox (6).**

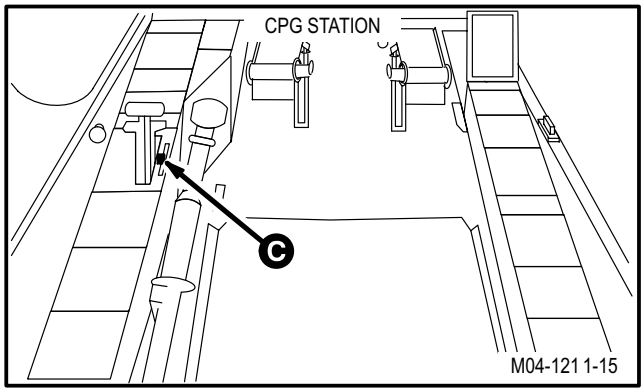



u. **Set power lever (2) to OFF.**




v. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

w. **Apply external power - electrical** (para 1.70)**.**

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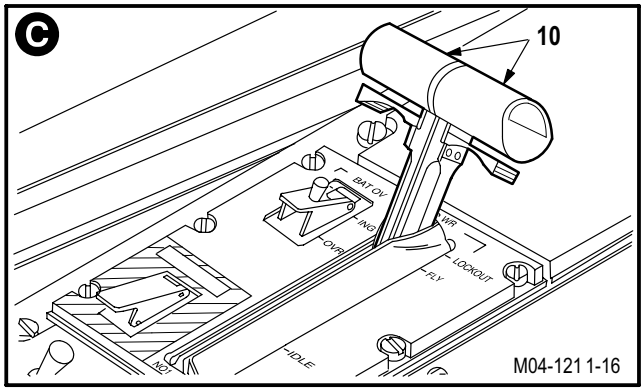
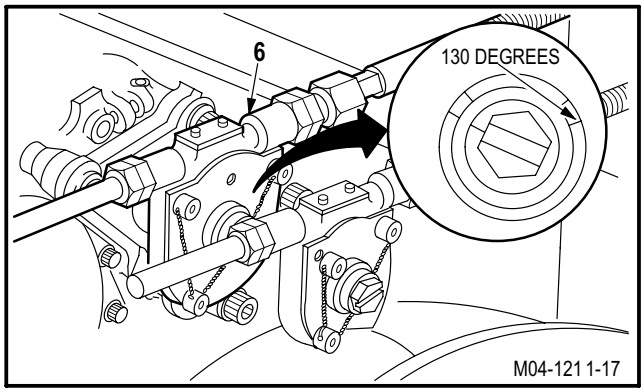
**4.186. NO. 1 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued**

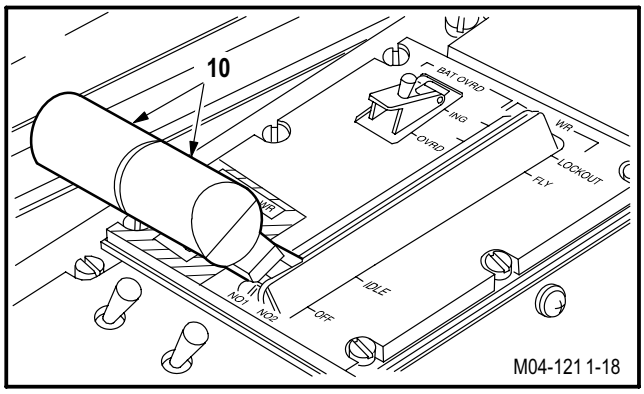
x. **Set CPG power levers (10) to LOCKOUT.**




y. **Verify that gearbox (6) is at 130 degree position.**

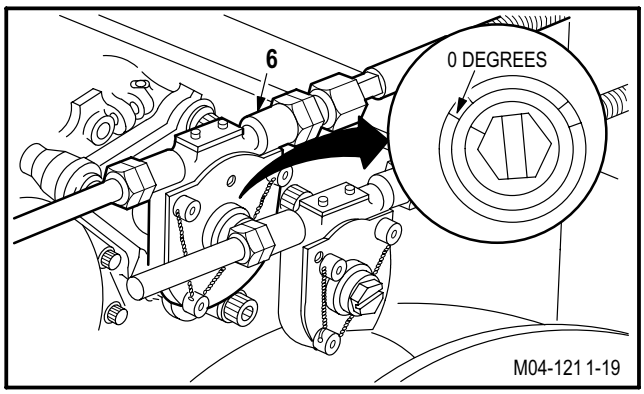



z. **Set power levers (10) to OFF.**




aa. **Verify that gearbox (6) is at zero degree position.**

ab. **Remove external power - electrical** (para 1.70)**.**

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**4.186. NO. 1 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued**

ac. **Stow rig pin (3) in gearbox (4).**

ad. **Install cap screw (5) on gearbox (6).**

ae. **Lockwire rig pin (3) to cap screw (11).** Use wire (item 226, App F).

af. **Lockwire cap screws (5) and (12) together.** Use wire (item 226, App F).

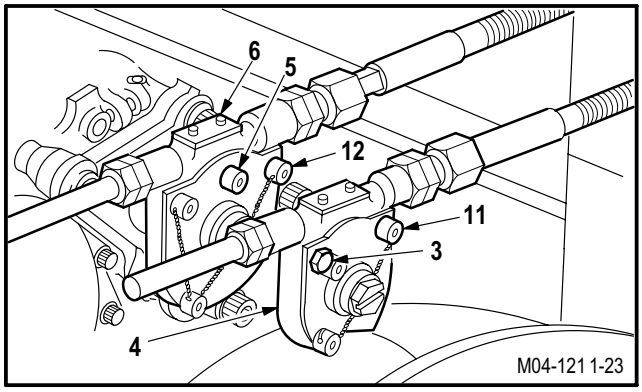
ag. **Inspect (QA).**

ah. **Install No. 1 engine shroud assembly** (para 4.103)**.**

ai. **Secure access door LN1** (para 2.2)**.**

aj. **Remove external power - electrical** (para 1.70)**.**

ak. **Remove external power - hydraulic (primary)** (para 1.72)**.**




END OF TASK

## 4.187. NO. 2 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK

4.187.1. Description

This task covers: Rigging Check.

4.187.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Aircraft power unit (item 232, App H)
#51 twist drill (item 119, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

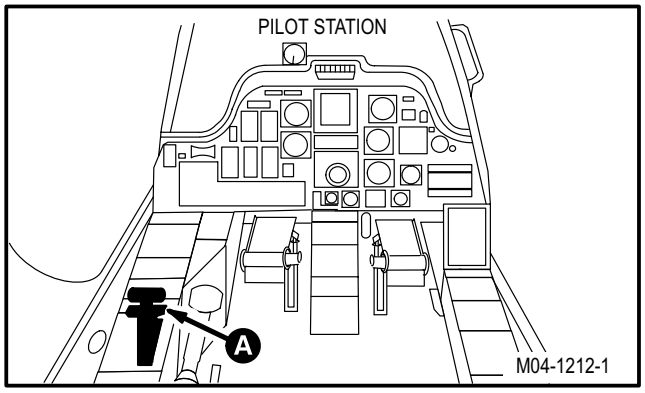
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 1.70 | External power application - electrical |
| 1.71 | External power application - air |
| 1.72 | External power application - hydraulic (primary) |
| 2.2 | Access door LN1 opened |
| 4.103 | No. 2 engine shroud assembly removed |

**Materials/Parts:**

Wire (item 226, App F)

**NOTE**

- This task is typical for both Hamilton Standard and Woodward hydromechanical units (HMUs).
- Hamilton Standard HMUs require a hardened steel pin **0.065 - 0.069 INCH** diameter. Use twist drill as a power available spindle (PAS) gearbox rig pin. Woodward HMUs use the standard rig pin supplied with the load demand spindle (LDS) gearbox.




4.187.3. Rigging Check

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

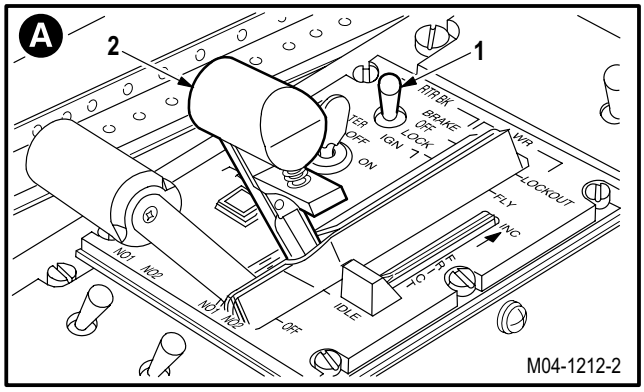
GO TO NEXT PAGE

## 4.187. NO. 2 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued

b. **Set pilot RTR BK switch (1) to OFF.**

c. **Remove external power - electrical** (para 1.70)**.**

d. **Set pilot No. 2 power lever (2) to IDLE.**



M04-1212-2

e. **Remove rig pin (3) from load demand spindle (LDS) gearbox (4).**

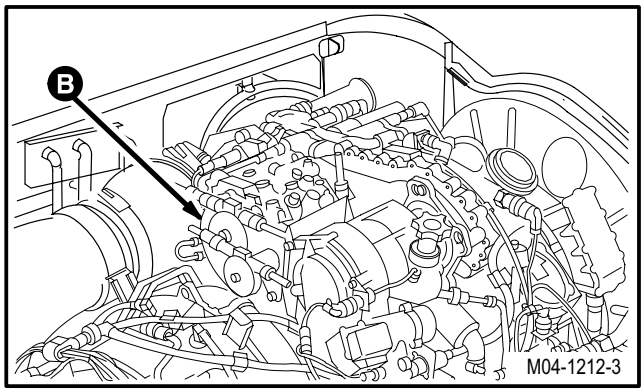
(1) Remove lockwire.

(2) Remove pin (3).

f. **Remove cap screw (5) from PAS gearbox (6).**

(1) Remove lockwire.

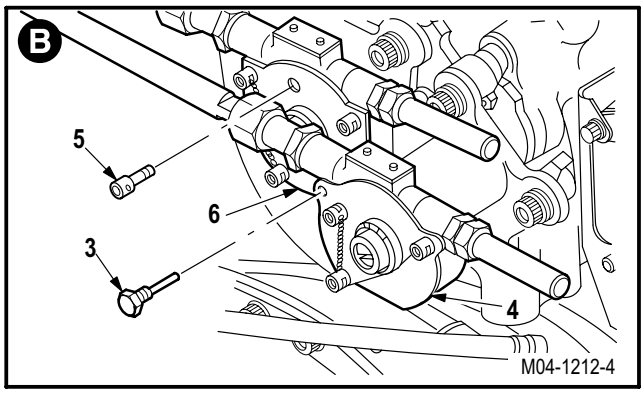
(2) Remove cap screw (5).



M04-1212-3

**NOTE**

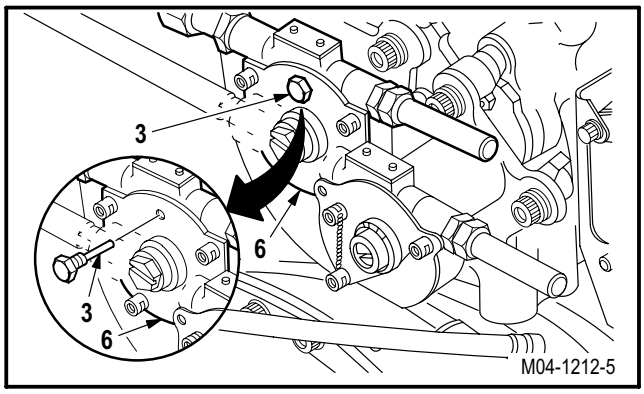
- The PAS system is out of rig when any of the following conditions exist (para 4.183):
- Rig pin cannot be installed when power lever is in **IDLE**.
- PAS gearbox is not at zero degrees when power lever is in **OFF**.
- PAS gearbox is not at 130 degrees when power lever is in **LOCKOUT**.



M04-1212-4

g. **Install rig pin (3) in gearbox (6).**

h. **Remove rig pin (3) from gearbox (6).**



M04-1212-5

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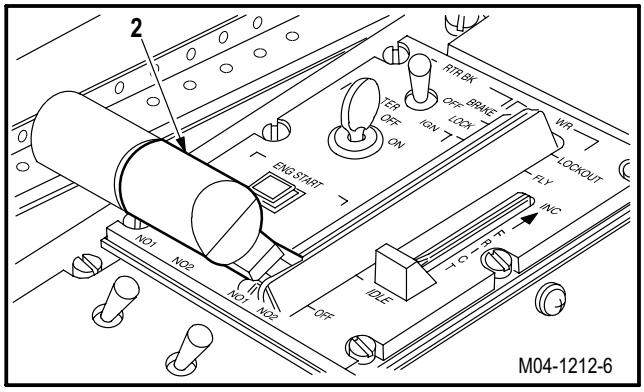
## 4.187. NO. 2 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued

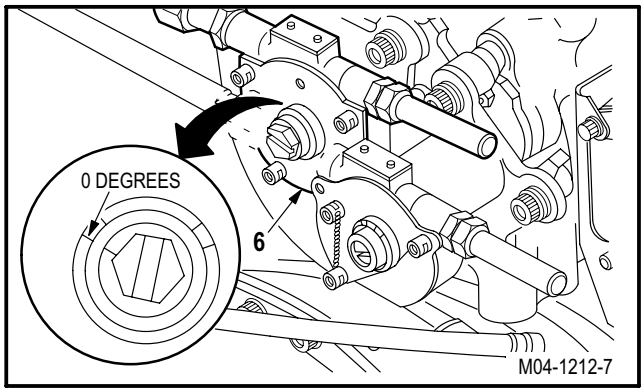
i. **Set power lever (2) to OFF.**



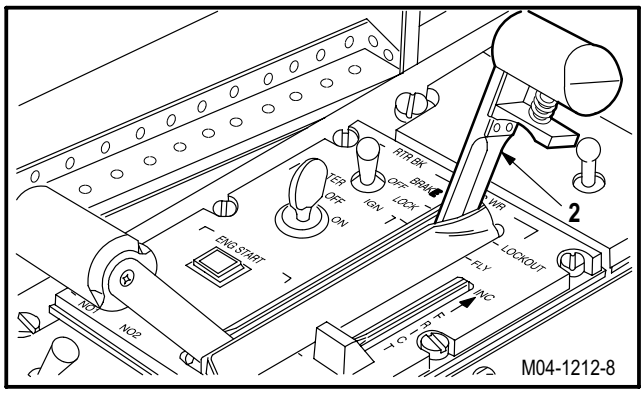

**NOTE**

Aline PAS gearbox with notch on pinion shaft. Screwdriver slot does not affect the rigging position.

j. **Verify that gearbox (6) is at zero degree position.**




k. **Set power lever (2) to LOCKOUT.**

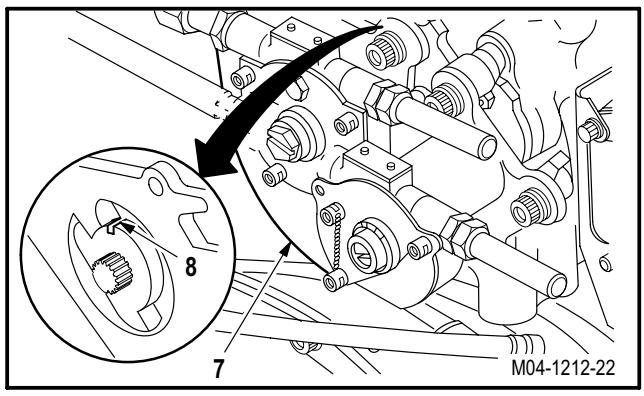



**NOTE**

If Hamilton Standard HMU is installed, perform step l. If Woodward HMU is installed, perform step m.

l. **Verify lockout by audible click from Hamilton Standard HMU (7).**

m. **Verify lockout by ensuring scribed line (8) on Woodward HMU is fully visible.**

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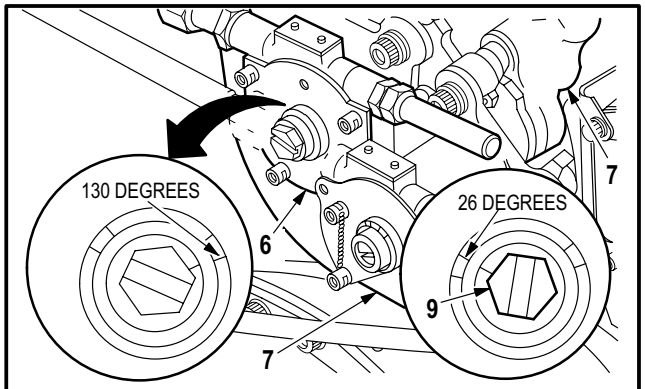
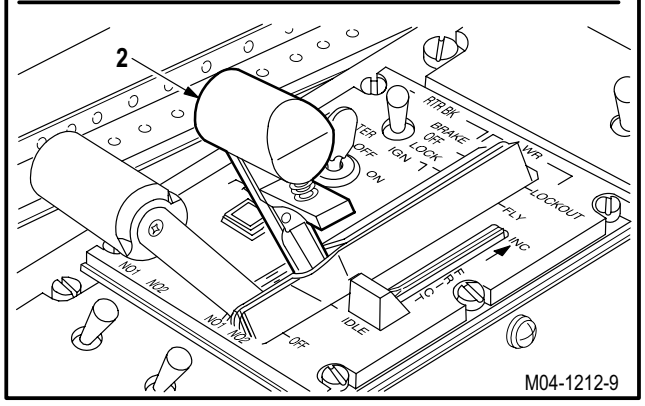
## 4.187. NO. 2 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued

n. **Verify that gearbox (6) is at 130 degree position.**

o. **Set power lever (2) to IDLE.**

p. **Verify PAS gearbox pinion shaft (9) is at 26 degree (IDLE) position.**

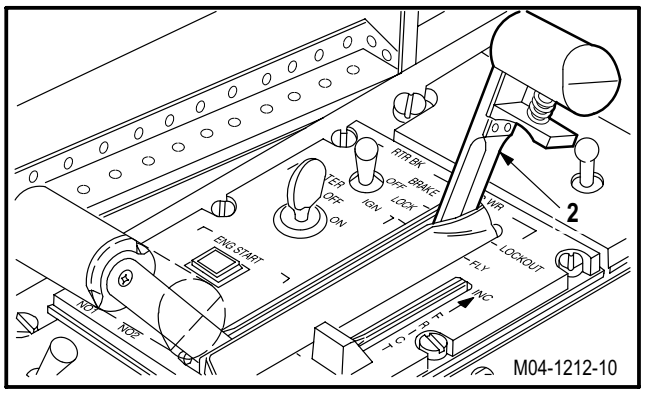


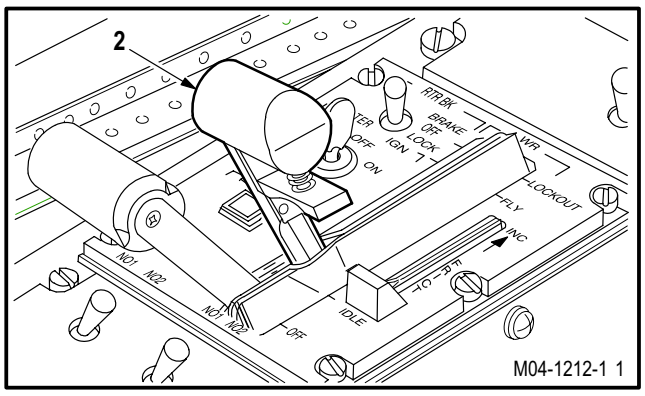




**NOTE**

On Hamilton Standard HMUs, an audible click is heard when power lever is moved to **IDLE** from **LOCKOUT**.

q. **Set power lever (2) to LOCKOUT, OFF, and back to IDLE.**

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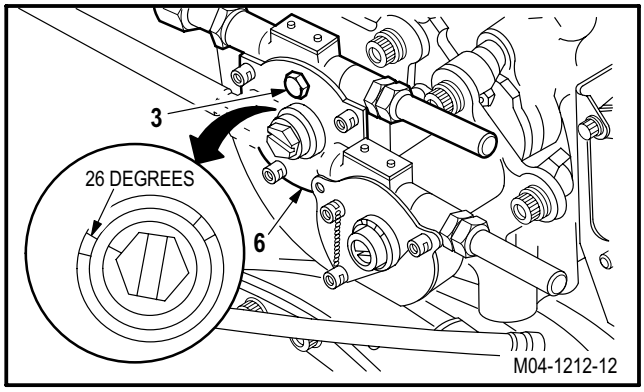
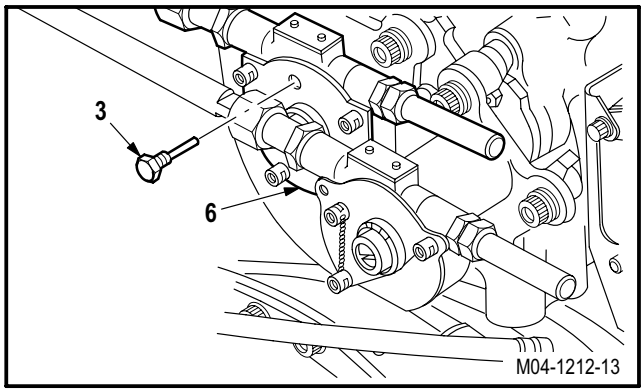
**4.187. NO. 2 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued**

r. **Install rig pin (3) in gearbox (6).**

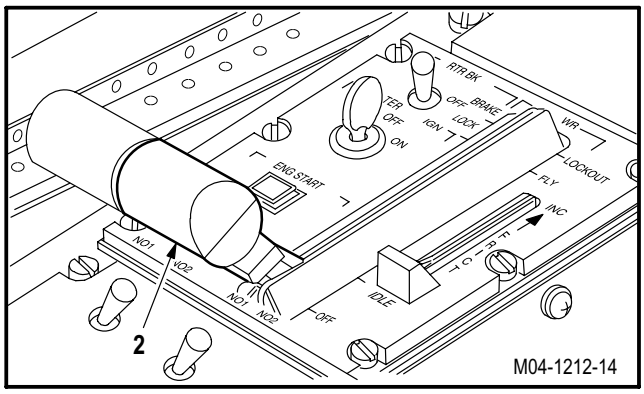
s. **Verify that gearbox (6) is at 26 degree position.**




t. **Remove rig pin (3) from gearbox (6).**

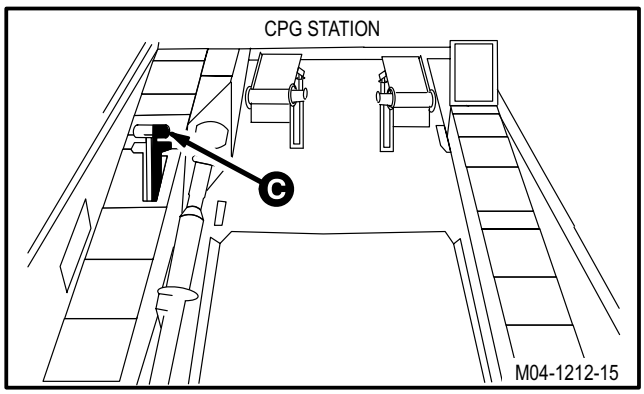



u. **Set power lever (2) to OFF.**




v. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

w. **Apply external power - electrical** (para 1.70)**.**

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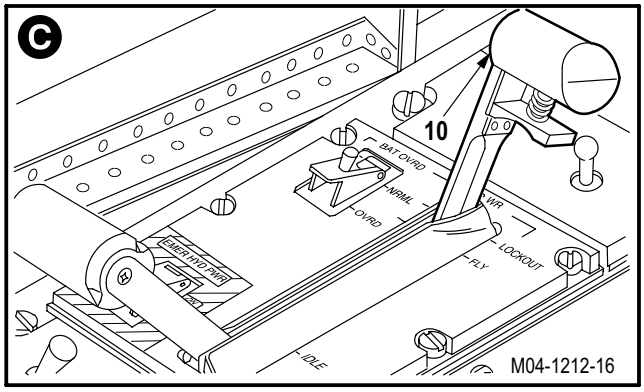
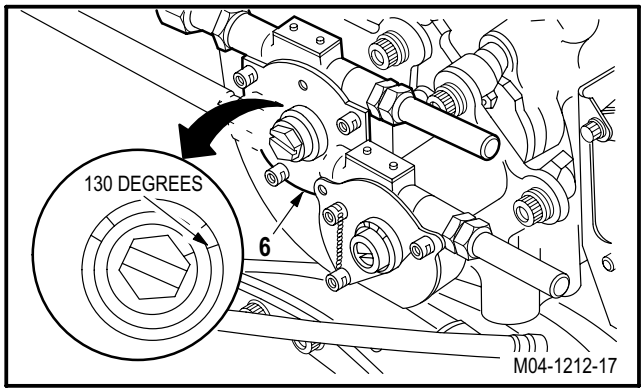
## 4.187. NO. 2 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued

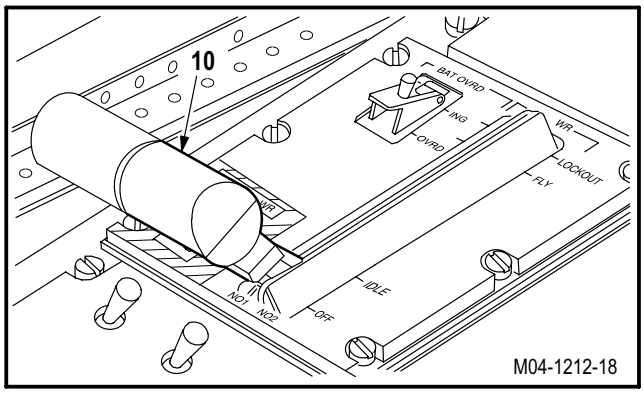
x. **Set CPG No. 2 power lever (10) to LOCKOUT.**




y. **Verify that gearbox (6) is at 130 degree position.**

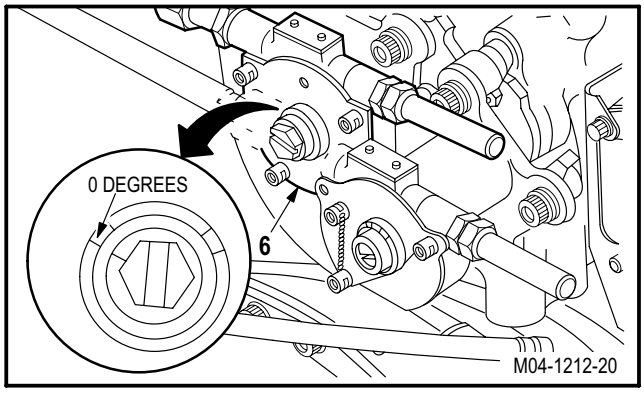



z. **Set power lever (10) to OFF.**




aa. **Verify that gearbox (6) is at zero degree position.**

ab. **Remove external power - electrical** (para 1.70)**.**

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**4.187. NO. 2 ENGINE POWER AVAILABLE SPINDLE SYSTEM RIGGING CHECK - continued**

ac. **Stow rig pin (3) in gearbox (4).**

ad. **Install cap screw (5) on gearbox (6).**

ae. **Lockwire rig pin (3) to cap screw (11).** Use wire (item 226, App F).

af. **Lockwire cap screws (5) and (12) together.** Use wire (item 226, App F).

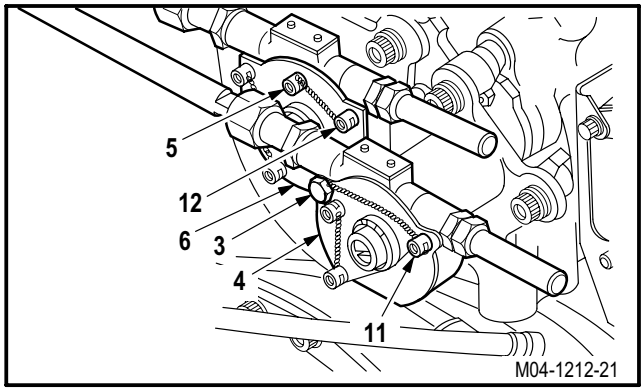
ag. **Inspect (QA).**

ah. **Install No. 2 engine shroud assembly** (para 4.103)**.**

ai. **Secure access door RN1** (para 2.2)**.**

aj. **Remove external power - air** (para 1.71)**.**

ak. **Remove external power - hydraulic (primary)** (para 1.72)**.**




END OF TASK

## 4.188. PILOT POWER QUADRANT LIGHT INDICATING PANEL REMOVAL/INSTALLATION

4.188.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.188.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)

**References:**

TM 1-1520-238-T

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

This task can be performed on or off helicopter.

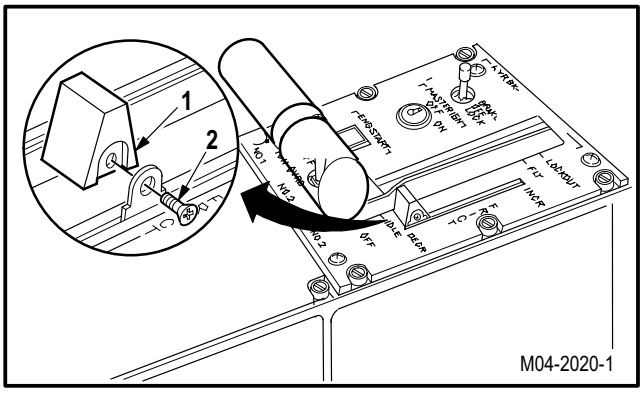
4.188.3. Removal

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **Remove friction lever control knob (1).**

(1) Remove screw (2) from control knob (1).

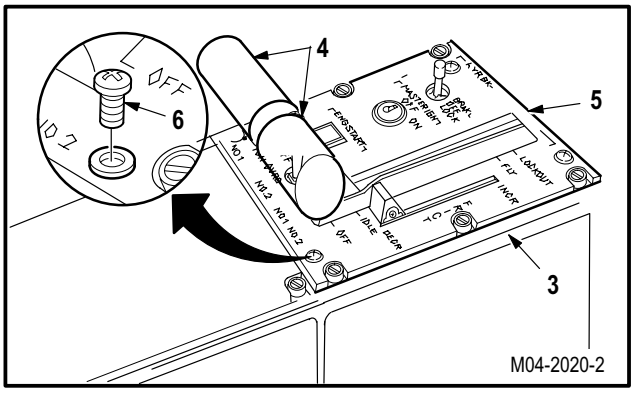
(2) Remove control knob (1).




c. **On pilot power quadrant (3) move No. 1 and No. 2 power lever handles (4) to mid travel.**

d. **Remove light indicating panel (5) from quadrant (3).**

(1) Remove four screws (6) from panel (5).

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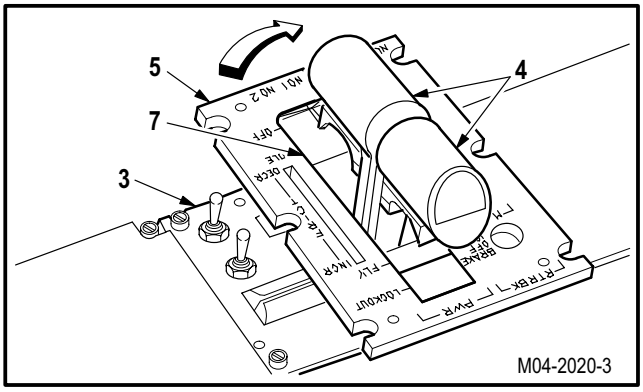
## 4.188. PILOT POWER QUADRANT LIGHT INDICATING PANEL REMOVAL/INSTALLATION - continued

(2) Lift panel (5) from quadrant (3) and turn 90 degrees.

(3) Aline slot (7) in panel (5) with handles (4).

(4) Remove panel (5).




4.188.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.188.5. Inspection

a. **Check panel for cracks.** None allowed.

b. **Check indicating panel connector and connector on power quadrant for damage.** None allowed.

c. **Check panel for corrosion** (para 1.49)**.**

4.188.6. Installation

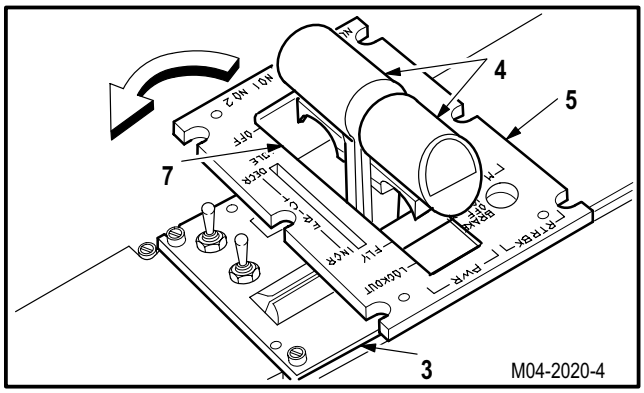
a. **Install panel (5) on power quadrant (3).**

(1) Aline slot (7) in panel (5) with handles (4).

(2) Lower panel (5) over handles (4).

(3) Aline panel (5) with quadrant (3).

(4) Press panel (5) on quadrant (3).

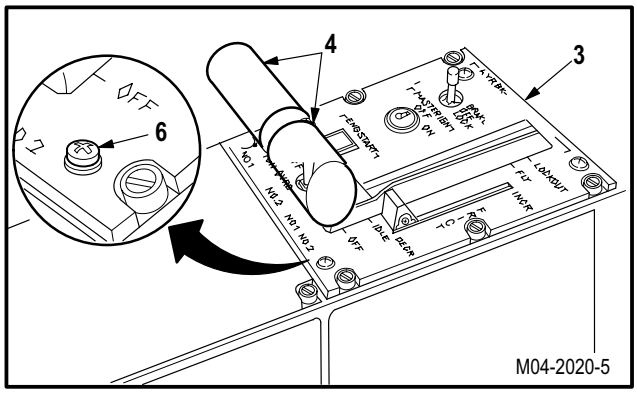



**NOTE**

Ensure electrical connector on light panel mates with electrical connector on power quadrant.

(5) Install four screws (6).

b. **On quadrant (3), move No. 1 and No. 2 handles (4) to OFF.**

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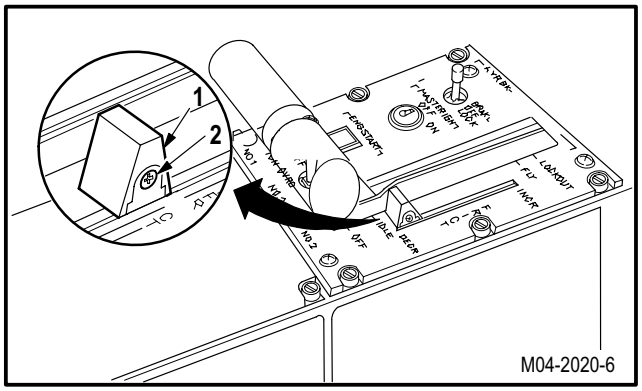
## 4.188. PILOT POWER QUADRANT LIGHT INDICATING PANEL REMOVAL/INSTALLATION - continued

c. **Install control knob (1).**

(1) Install screw (2).

d. **Inspect (QA).**

e. **Perform pilot edge-light maintenance operational check** (TM 1-1520-238-T)**.**




END OF TASK

## 4.189. PILOT POWER QUADRANT PANEL - RTR BRK SWITCH REMOVAL/INSTALLATION (AVIM)

4.189.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.189.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**References:**

TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.188 | Pilot power quadrant light indicating panel removed |

4.189.3. Removal

a. **Detach nine wires (1) from switch (2).**

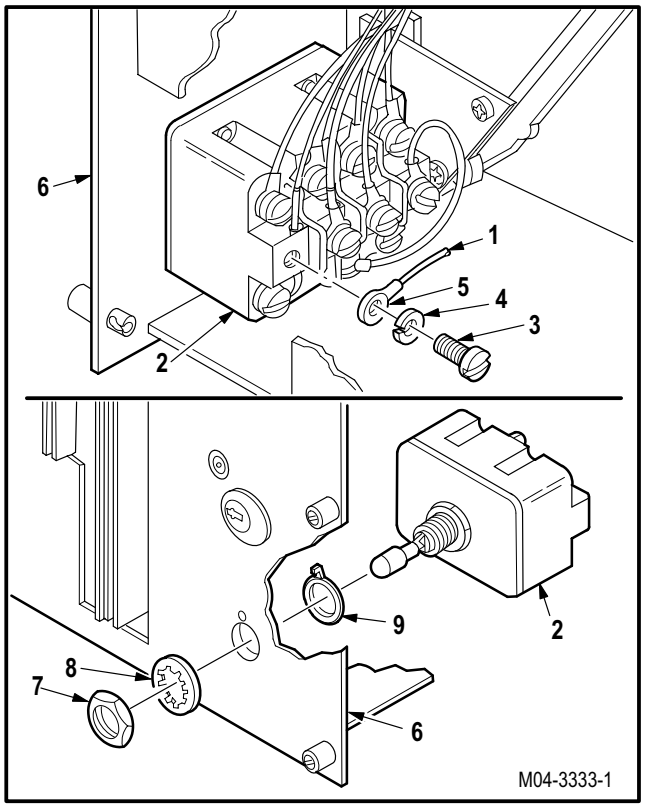
(1) Identify wires (1).

(2) Remove nine screws (3), lockwashers (4), and terminal lugs (5).

b. **Remove switch (2) from panel (6).**

(1) Remove nut (7), lockwasher (8), and lockring (9).

(2) Remove switch (2).




4.189.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.189.5. Inspection

a. **Check mounting surfaces and attaching parts for cracks.** None allowed.

b. **Check wires for cuts, cracks, and damaged connections** (TM 55-1500-323-24)**.**

c. **Check mounting surfaces and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

## 4.189. PILOT POWER QUADRANT PANEL - RTR BRK SWITCH REMOVAL/INSTALLATION (AVIM) - continued

4.189.6. Installation

a. **Install switch (2) on panel (6).**

(1) Install switch (2) through lockring (9) and panel (6). Make sure tab (10) on lockring (9) enters locator hole (11).

(2) Install lockwasher (8) and nut (7).

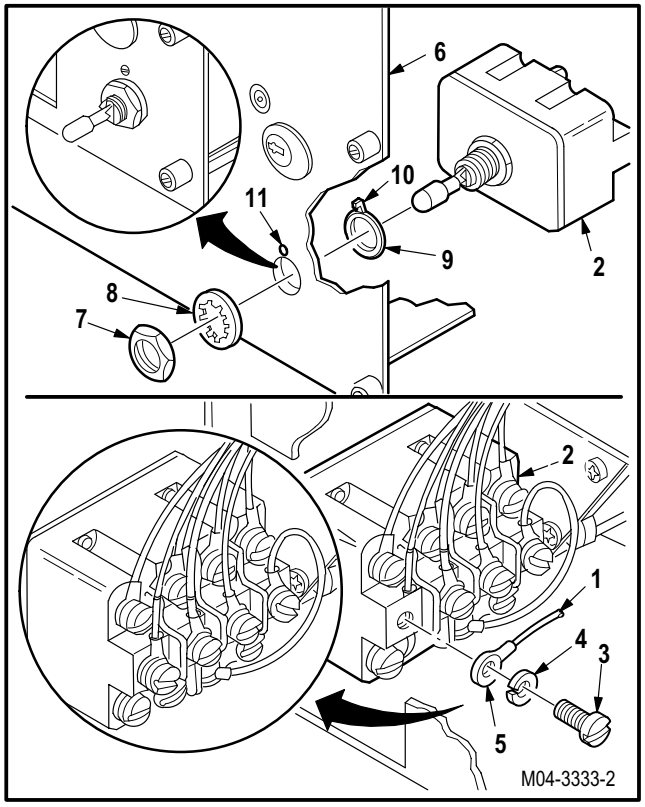
b. **Attach wires (1) to switch (2).**

(1) Position idetified wires (1) on switch (2).

(2) Install nine screws (3) through lockwashers (4), and terminal lugs (5) into switch (2).

c. **Inspect (QA).**

d. **Install pilot power quadrant light indicating panel** (para 4.188)**.**




END OF TASK

## 4.190. PILOT POWER QUADRANT PANEL - ENG START ADVISORY SWITCH REMOVAL/INSTALLATION (AVIM)

4.190.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.190.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
5-watt electric soldering iron (item 333, App H)
Electric gun type heater (item 163, App H)

**References:**

TM 55-1500-323-24

**Materials/Parts:**

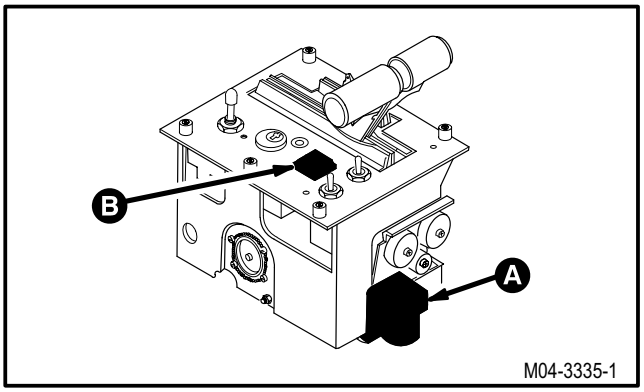
Insulation sleeving (item 105, App F)
Solder (item 189, App F)
Tape (item 202, App F)

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.188 | Pilot power quadrant light indicating panel removed |

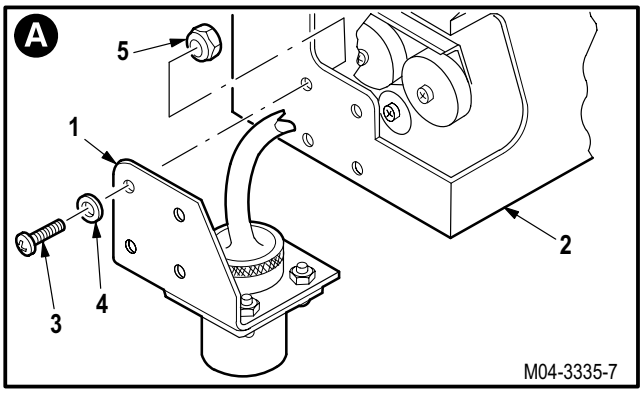



4.190.3. Removal

a. **Remove bracket (1) from panel (2).**

(1) Remove four screws (3), washers (4), and locknuts (5).

(2) Remove lacing tape as required.

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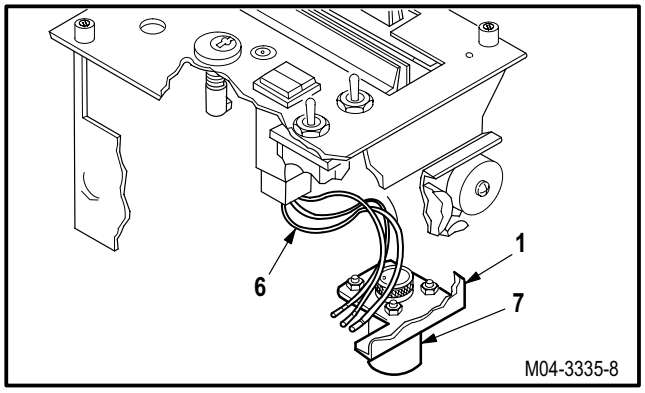
## 4.190. PILOT POWER QUADRANT PANEL - ENG START ADVISORY SWITCH REMOVAL/INSTALLATION (AVIM) - continued

b. **Depin three wires (6) from connector J1 (7).**

(1) Identify wires (6).

(2) Depin three wires (6) from connector J1 (7) (TM 55-1500-323-24).

(3) Remove connector J1 (7) with bracket (1).



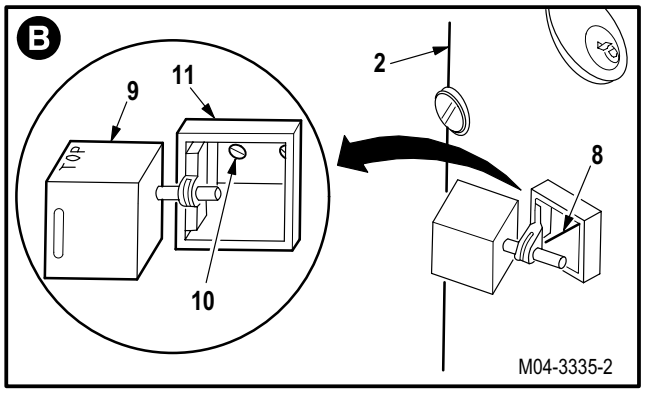

c. **Remove advisory light (8) from panel (2).**

(1) Pull out lens (9) and move to one side.

(2) Loosen two screws (10).

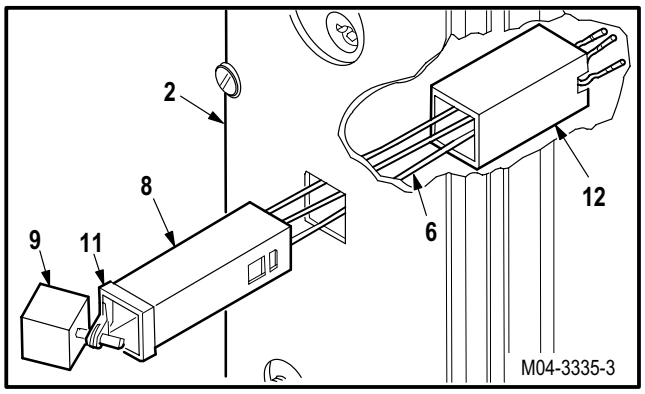
(3) Hold spacer (11). Pull sleeve (12) from advisory light (8).

(4) Pull advisory light (8) and attaching wires (6) from panel (2).



**WARNING**

**Soldering iron can cause severe burns to personnel and start fires. Observe all safety precautions when using soldering iron. If injury occurs, seek medical aid.**

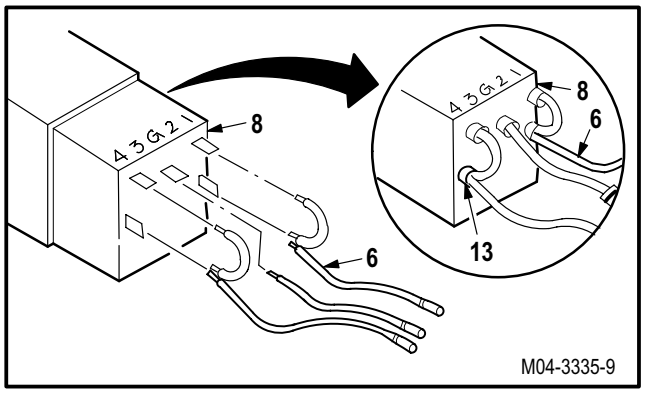



d. **Desolder wires (6) from advisory light (8).**

(1) Identify three wires (6).

(2) Remove insulation sleeving (13).

(3) Desolder wires (6). Use soldering iron (TM 55-1500-323-24).

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**4.190. PILOT POWER QUADRANT PANEL - ENG START ADVISORY SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

4.190.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.190.5. Inspection

a. **Check mounting surfaces and attaching parts for cracks.** None allowed.

b. **Check wires for cuts, cracks, and damaged connections** (TM 55-1500-323-24)**.**

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## 4.190. PILOT POWER QUADRANT PANEL - ENG START ADVISORY SWITCH REMOVAL/INSTALLATION (AVIM) - continued

4.190.6. Installation

**WARNING**

- **Soldering iron can cause severe burns to personnel and start fires. Observe all safety precautions when using soldering iron. If injury occurs, seek medical aid.**
- **Do not place heater near flammable material or allow heater to contact skin: severe burns can result. Wear protective equipment. If injury occurs, seek medical aid.**

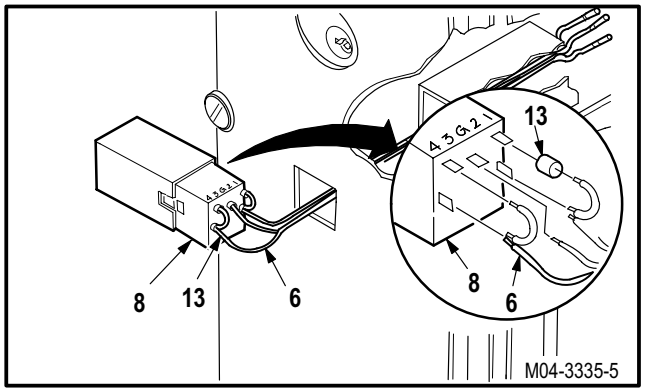
a. **Solder three wires (6) to advisory light (8).**

(1) Install insulation sleeving (13) over wires (6) (TM 55-1500-323-24). Use insulation sleeving (item 105, App F).

(2) Solder identified wires (6) to advisory light (8). Use soldering iron and solder (item 189, App F) (TM 55-1500-323-24).

(3) Install insulation sleeving (13) over soldered connections.

(4) Shrink sleeving (13). Use heater.

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**4.190. PILOT POWER QUADRANT PANEL - ENG START ADVISORY SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

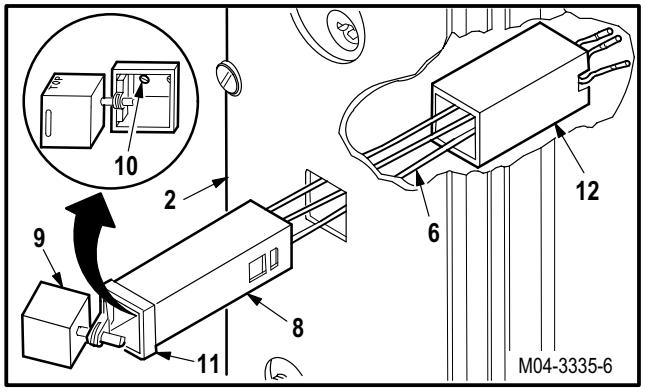
b. **Install advisory light (8) on panel (2).**

(1) Install advisory light (8) and wires (6) through opening in panel (2).

(2) Hold spacer (11). Position sleeve (12) on advisory light (8).

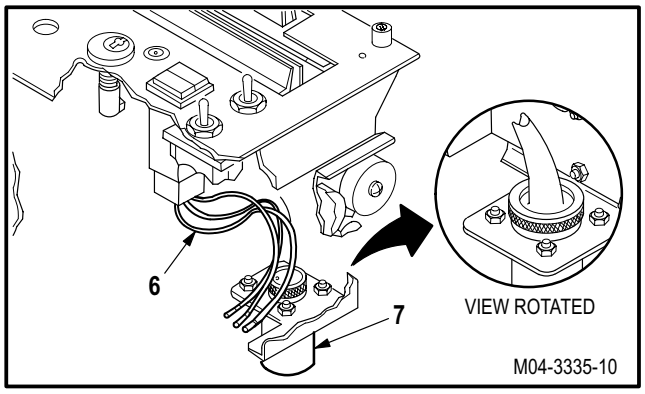
(3) Tighten two screws (10).

(4) Push in lens (9) to seat in place.




c. **Pin three identified wires (6) in connector (7)** (TM 55-1500-323-24)**.**

d. **Install lacing tape as required.** Use tape (item 202, App F).

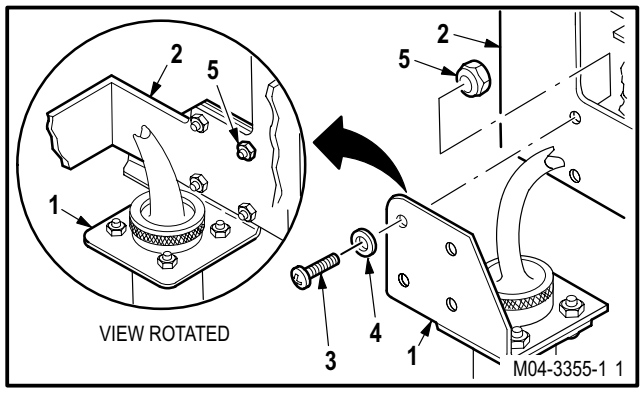



e. **Install bracket (1) on panel (2). Install four washers (4), screws (3), and locknuts (5).**

(1) Install four screws (3) through washers (4), bracket (1), panel (2), and locknuts (5).

f. **Inspect (QA).**

g. **Install pilot power quadrant light indicating panel** (para 4.188)**.**




END OF TASK

## 4.191. PILOT POWER QUADRANT PANEL - ENG IGN OVRD SWITCH REMOVAL/INSTALLATION (AVIM)

4.191.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.191.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)

**References:**

TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 4.188 | Pilot power quadrant light indicating panel removed |

**Personnel Required:**

| | |
|---|---|
| 68X | Armament/Electrical System Repairer |
| 68X3F | Armament/Electrical System Repairer/ Technical Inspector |

**NOTE**

This task is typical for No. 1 engine or No. 2 engine **ENG IGN OVRD** switches.

4.191.3. Removal

a. **Detach wires (1) from ENG IGN OVRD switch (2).**

(1) Identify wires (1).

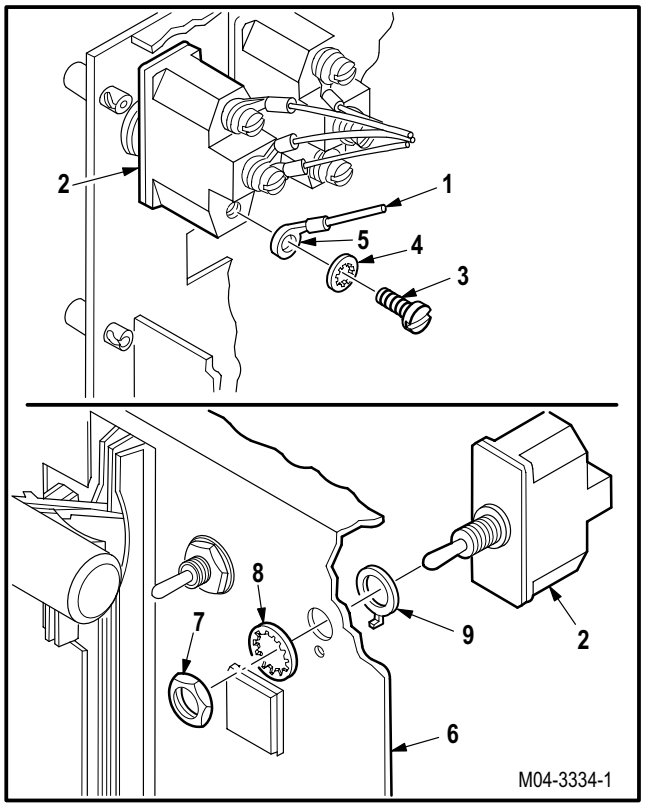
(2) For No. 1 engine switch (2), remove three screws (3), lockwashers (4), and four terminal lugs (5) from switch (2).

(3) For No. 2 engine switch (2), remove three screws (3), lockwashers (4), and three terminal lugs (5) from switch (2).

b. **Remove switch (2) from panel (6).**

(1) Remove nut (7), lockwasher (8), and lockring (9).

(2) Remove switch (2).

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## 4.191. PILOT POWER QUADRANT PANEL - ENG IGN OVRD SWITCH REMOVAL/INSTALLATION (AVIM) - continued

4.191.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.191.5. Inspection

a. **Check mounting surfaces and attaching parts for cracks.** None allowed.

b. **Check wires for cuts, cracks, and damaged connections** (TM 55-1500-323-24)**.**

c. **Check mounting surfaces and attaching parts for corrosion** (para 1.49)**.**

4.191.6. Installation

a. **Install switch (2) on panel (6).**

(1) Install switch (2) through lockring (9) on panel (6). Ensure tab (10) on lockring (9) enters locator hole (11).

(2) Install lockwasher (8) and nut (7).

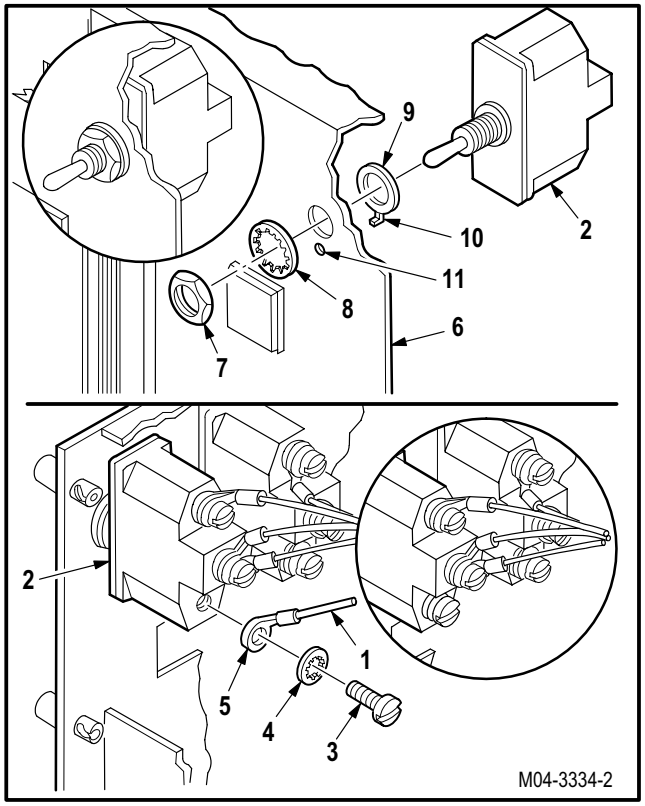
b. **Attach identified wires (1) to switch (2).**

(1) For No. 1 engine, install three screws (3) through lockwashers (4), four terminal lugs (5), into switch (2).

(2) For No. 2 engine, install three screws (3) through lockwashers (4), three terminal lugs (5), into switch (2).

c. **Inspect (QA).**

d. **Install pilot power quadrant light indicating panel** (para 4.188)**.**




END OF TASK

## 4.192. PILOT POWER QUADRANT PANEL - IGNITION LOCK SWITCH REMOVAL/INSTALLATION (AVIM)

4.192.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.192.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
7/8 x 3/8-inch drive open end box socket wrench crowfoot attachment (item 86, App H)

**Materials/Parts:**

Tape (item 202, App F)

**Personnel Required:**

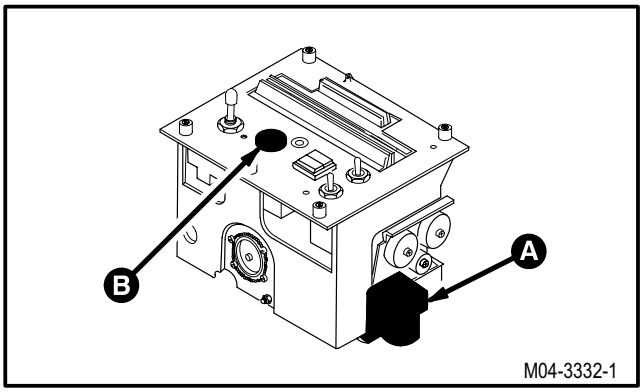
68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**References:**

TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.167 | Pilot power quadrant power levers removed |

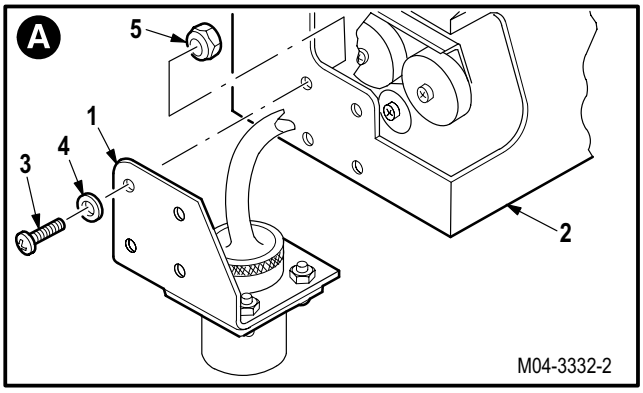



4.192.3. Removal

a. **Remove bracket (1) from panel (2).**

(1) Remove four screws (3), washers (4), and locknuts (5).

(2) Remove lacing tape as required.

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**4.192. PILOT POWER QUADRANT PANEL - IGNITION LOCK SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

b. **Depin wire (6) from connector J1 (7).**

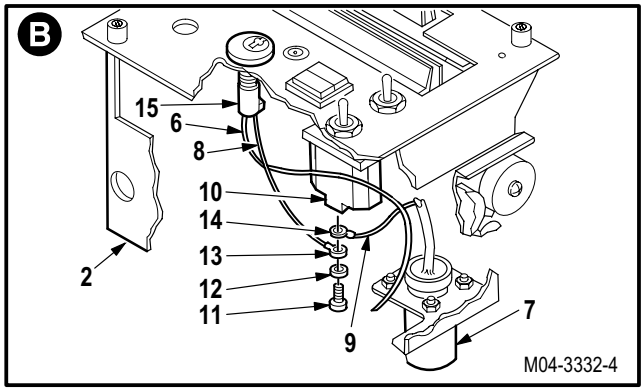
(1) Identify wire (6).

(2) Depin wire (6) from connector J1 (7) (TM 55-1500-323-24).

c. **Detach wires (8) and (9) from ENG NO. 1 IGN OVRD switch (10).**

(1) Identify wires (8) and (9).

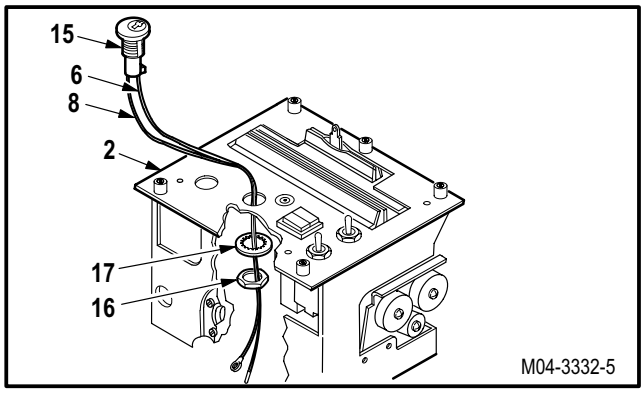
(2) Remove screw (11), lockwasher (12), and two terminal lugs (13) and (14).




d. **Remove MASTER IGN switch (15) from panel (2).**

(1) Remove nut (16) and lockwasher (17). Use crowfoot.

(2) Pull switch (15) with detached wires (6) and (8) from panel (2).




4.192.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.192.5. Inspection

a. **Check mounting surfaces and attaching parts for cracks.** None allowed.

b. **Check wires for cuts, cracks, and damaged connections** (TM 55-1500-323-24)**.**

c. **Check mounting surfaces and attaching parts for corrosion** (para 1.49)**.**

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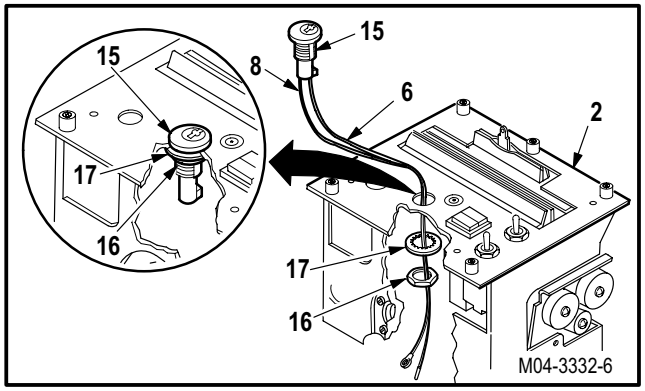
## 4.192. PILOT POWER QUADRANT PANEL - IGNITION LOCK SWITCH REMOVAL/INSTALLATION (AVIM) - continued

4.192.6. Installation

a. **Install MASTER IGN switch (15) on panel (2).**

(1) Guide wires (6) and (8) through panel (2) and seat switch (15) in panel (2).

(2) Install lockwasher (17) and nut (16). Use crowfoot.

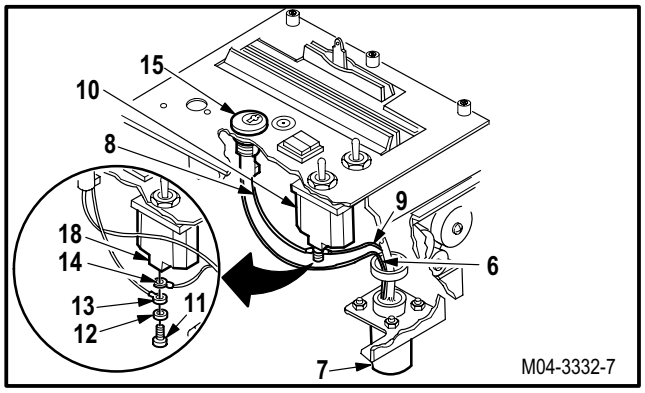



b. **Pin wire (6) in connector J1 (7)** (TM 55-1500-323-24)**.**

c. **Attach wires (8) and (9) on ENG NO. 1 IGN OVRD switch (10).**

(1) Install screw (11) through washer (12), terminal lugs (13) and (14), into terminal 2 (18) of switch (10).

d. **Install lacing tape as required.** Use tape (item 202, App F).

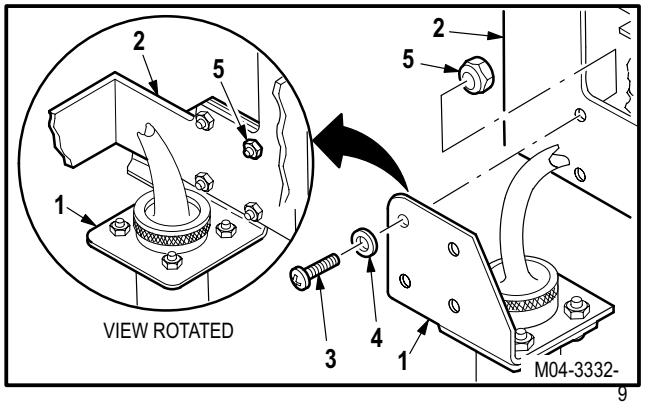



e. **Install bracket (1) on panel (2).**

(1) Install four screws (3), through washers (4), bracket (1), and panel (2) into locknuts (5).

f. **Inspect (QA).**

g. **Install pilot power quadrant power levers** (para 4.167)**.**




END OF TASK

## 4.193. PILOT POWER QUADRANT PANEL - NO. 1 ENGINE INTERLOCK SWITCH REMOVAL/INSTALLATION (AVIM)

4.193.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.193.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**References:**

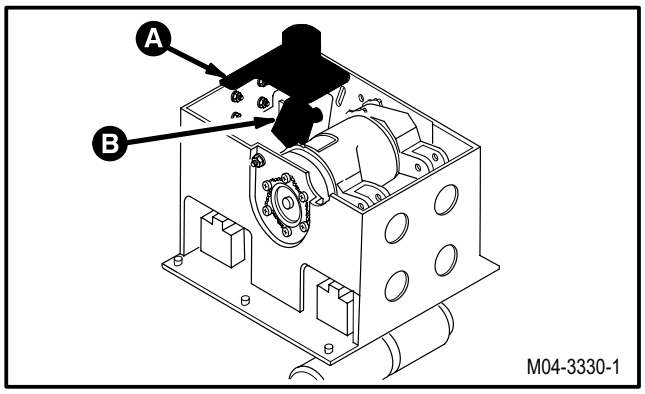
TM 55-1500-323-24

**Materials/Parts:**

Wire cap (2)
Sealing compound (item 172, App F)
Tape (item 202, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.188 | Pilot power quadrant light indicating panel removed |

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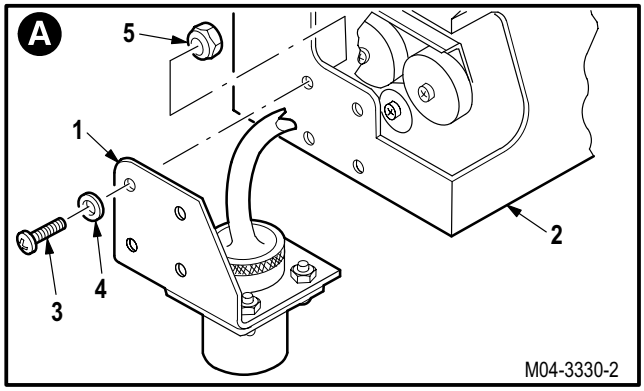
## 4.193. PILOT POWER QUADRANT PANEL - NO. 1 ENGINE INTERLOCK SWITCH REMOVAL/INSTALLATION (AVIM) - continued

4.193.3. Removal

a. **Remove bracket (1) from panel (2).**

(1) Remove four screws (3), washers (4), and locknuts (5).

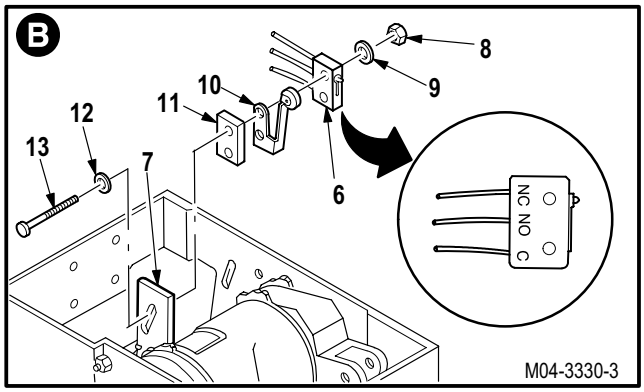
(2) Remove lacing tape as required.




b. **Remove interlock switch (6) from support plate (7).**

(1) Remove two nuts (8) and washers (9).

(2) Remove switch (6), switch actuator (10), spacer (11), two washers (12), and screws (13).

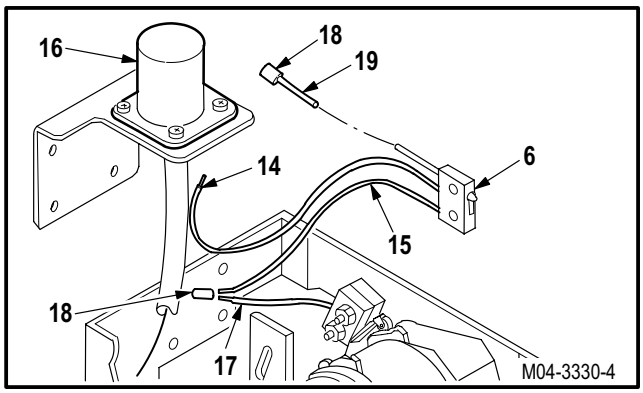



c. **Detach wires (14) and (15).**

(1) Identify and depin wire (14) from receptacle J1 (16) (TM 55-1500-323-24).

(2) Identify and detach wires (15) and (17) from wire cap (18) (TM 55-1500-323-24). Discard wire cap (18).

(3) Do not remove wire cap (18) from wire (19) if switch is being removed for other maintenance.

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## 4.193. PILOT POWER QUADRANT PANEL - NO. 1 ENGINE INTERLOCK SWITCH REMOVAL/INSTALLATION (AVIM) - continued

4.193.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.193.5. Inspection

a. **Check mounting surfaces and attaching parts for cracks.** None allowed.

b. **Check wires for cuts, cracks, and damaged connections** (TM 55-1500-323-24)**.**

c. **Check mounting surfaces and attaching parts for corrosion** (para 1.49)**.**

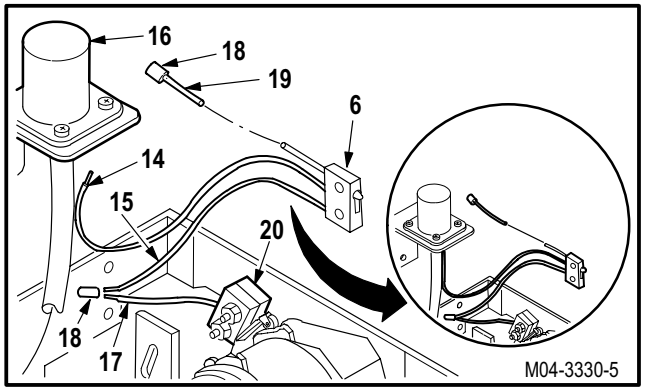
4.193.6. Installation

a. **Attach wires (14) and (15).**

(1) Pin identified wire (14) to receptacle J1 (16) (TM 55-1500-323-24).

(2) Install new wire cap (18) on wire (15) from switch (6) and wire (17) from switch (20) (TM 55-1500-323-24).

(3) If switch (6) was replaced, install new wire cap (18) on wire (20) (TM 55-1500-323-24).

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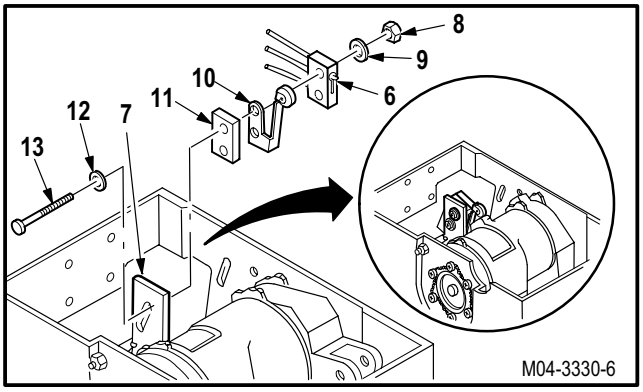
## 4.193. PILOT POWER QUADRANT PANEL - NO. 1 ENGINE INTERLOCK SWITCH REMOVAL/INSTALLATION (AVIM) - continued

b. **Install switch (6) on support plate (7).**

(1) Install two screws (13) through washers (12), plate (7), spacer (11), switch actuator (10), and switch (6).

(2) Apply sealing compound to threads of two screws (13). Use sealing compound (item 172, App F).

(3) Install two washers (9) and nuts (8). Do not tighten.




**CAUTION**

To prevent damage to switch, ensure switch actuator does not bend excessively during switch closure, and that switch opens past the **IDLE** position.

c. **Adjust switch (6).**

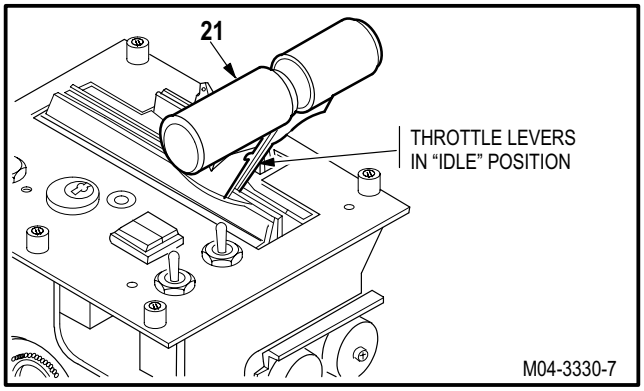
**NOTE**

Switch will actuate only when No. 1 engine power lever is between **OFF** and **IDLE**.

(1) Set No. 1 engine power lever (21) to **IDLE**.

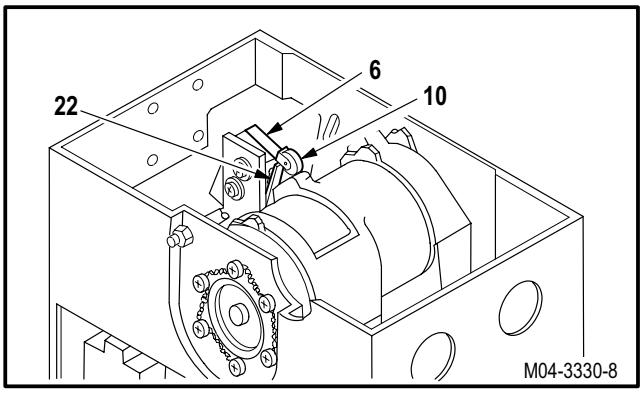
(2) Adjust switch (6) so switch actuator (10) presses plunger (22) to its maximum travel.

(3) Set lever (21) to idle, ensure switch (6) is in open position.




d. **Tighten two nuts (8).**

e. **Install lacing tape as required.** Use tape (item 202, App F).

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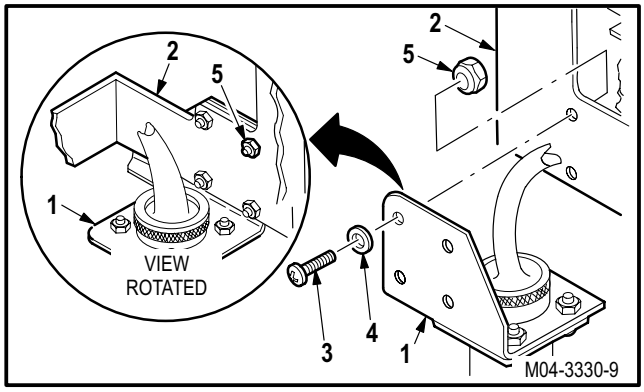
## 4.193. PILOT POWER QUADRANT PANEL - NO. 1 ENGINE INTERLOCK SWITCH REMOVAL/INSTALLATION (AVIM) - continued

f. **Install bracket (1) on panel (2).**

(1) Install four screws (3) through washers (4), bracket (1), panel (2), into locknuts (5).

g. **Inspect (QA).**

h. **Install pilot power quadrant light indicating panel** (para 4.188)**.**




END OF TASK

## 4.194. PILOT POWER QUADRANT PANEL - NO. 2 ENGINE INTERLOCK SWITCH REMOVAL/INSTALLATION (AVIM)

4.194.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.194.2. Initial setup

**Tools:**

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

**Materials/Parts:**

Wire cap (2)
Sealing compound (item 172, App F)
Tape (item 202, App F)

**Personnel Required:**

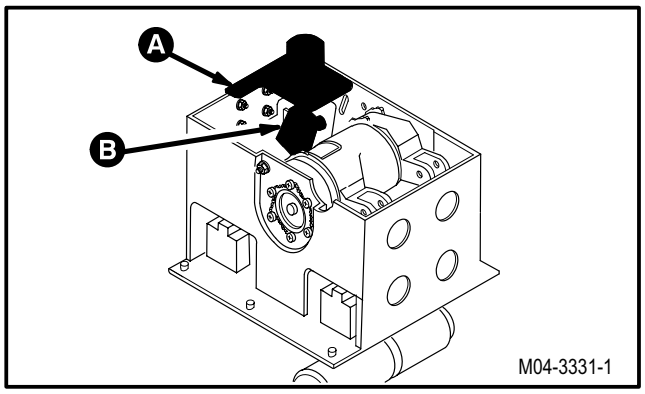
68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**References:**

TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.188 | Pilot power quadrant light indicating panel removed |

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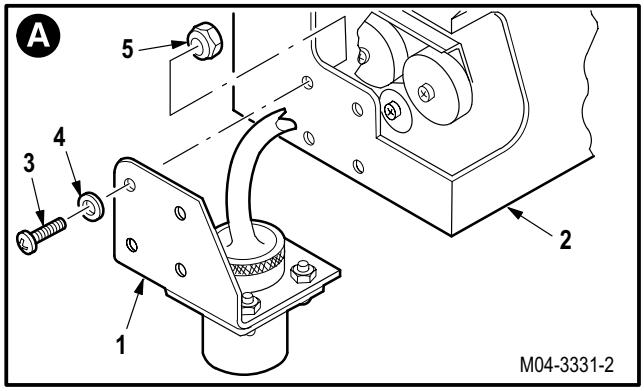
## 4.194. PILOT POWER QUADRANT PANEL - NO. 2 ENGINE INTERLOCK SWITCH REMOVAL/INSTALLATION (AVIM) - continued

4.194.3. Removal

a. **Remove bracket (1) from panel (2).**

(1) Remove four screws (3), washers (4), and locknuts (5).

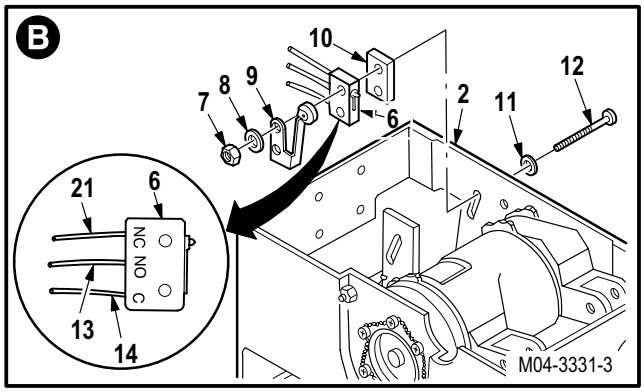
(2) Remove lacing tape as required.




b. **Remove interlock switch (6) from panel (2).**

(1) Remove two nuts (7) and washers (8).

(2) Remove switch actuator (9), switch (6), spacer (10), two washers (11), and screws (12).




c. **Detach wires (13) and (14).**

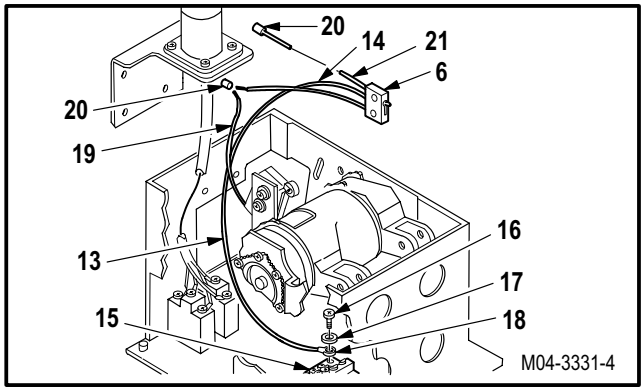
(1) Identify and remove wire (13) from **RTR BRK** switch (15).

(a) Remove screw (16), lockwasher (17), and terminal lug (18).

(b) Remove wire (13).

(2) Identify and detach wires (14) and (19) from wire cap (20) (TM 55-1500-323-24). Discard wire cap (20).

(3) Do not remove wire cap (20) from wire (21) if switch is being removed for other maintenance.

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## 4.194. PILOT POWER QUADRANT PANEL - NO. 2 ENGINE INTERLOCK SWITCH REMOVAL/INSTALLATION (AVIM) - continued

4.194.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.194.5. Inspection

a. **Check mounting surfaces and attaching parts for cracks.** None allowed.

b. **Check wires for cuts, cracks, and damaged connections** (TM 55-1500-323-24)**.**

c. **Check mounting surfaces and attaching parts for corrosion** (para 1.49)**.**

4.194.6. Installation

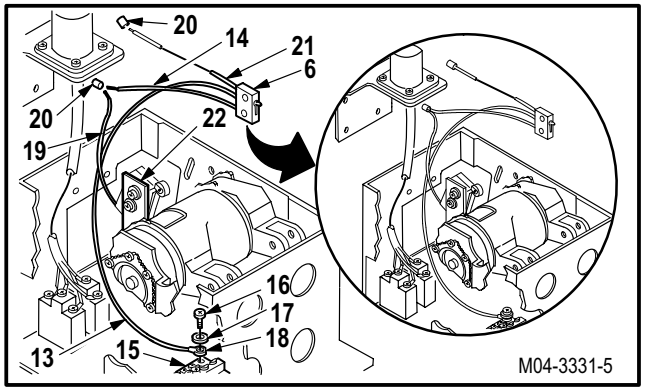
a. **Attach wires (13) and (14).**

(1) Install identified wire (13) on switch (15).

(a) Install screw (16) through lockwasher (17), terminal lug (18), into terminal 3 of switch (15).

(2) Install new wire cap (20) on wire (14) from switch (6) and wire (19) from switch (22) (TM 55-1500-323-24).

(3) If switch (6) was replaced, install new wire cap (20) on wire (21).

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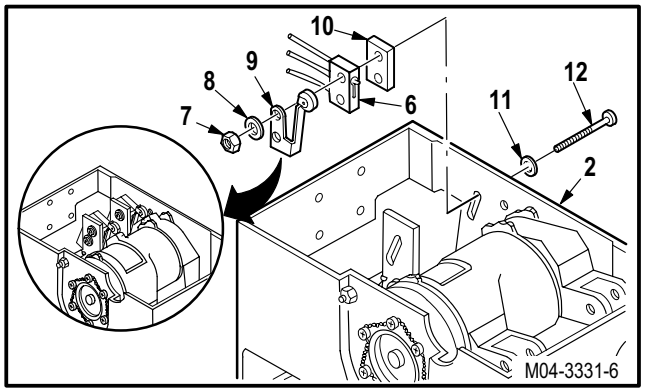
## 4.194. PILOT POWER QUADRANT PANEL - NO. 2 ENGINE INTERLOCK SWITCH REMOVAL/INSTALLATION (AVIM) - continued

b. **Install switch (6) on panel (2).**

(1) Install two screws (12) through washers (11), panel (2), spacer (10), switch (6), and switch actuator (9).

(2) Apply sealing compound to threads of two screws (12). Use sealing compound (item 172, App F).

(3) Install two washers (8) and nuts (7). Do not tighten.




**CAUTION**

To prevent damage to switch, ensure switch actuator does not bend excessively during switch closure, and that switch opens past the **IDLE** position.

c. **Adjust switch (6).**

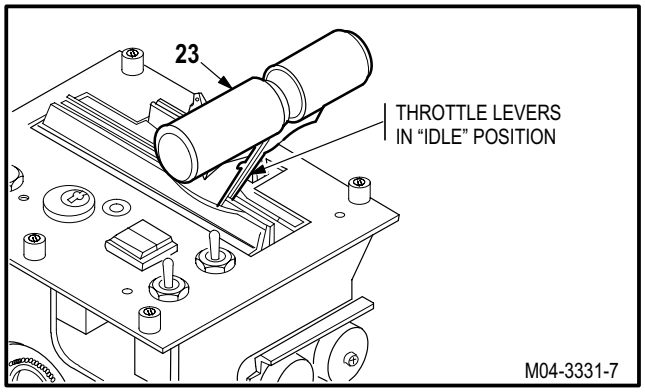
**NOTE**

Switch actuates only when No. 2 engine throttle lever is between **OFF** and **IDLE**.

(1) Set No. 2 engine power lever (23) to **IDLE**.

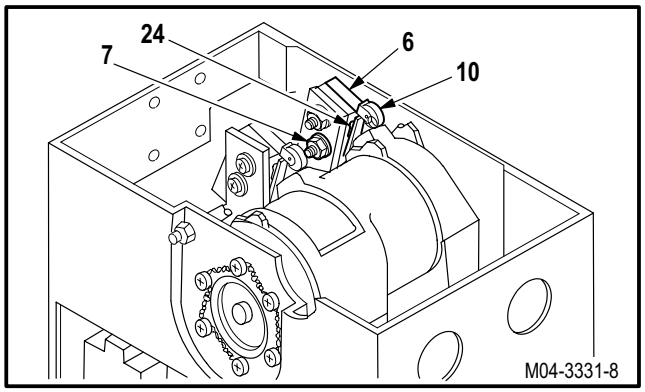
(2) Adjust switch (6) so switch actuator (10) presses plunger (24) to its maximum travel.

(3) Set lever (23) to idle, ensure switch is in open position.




d. **Tighten two nuts (7).**

e. **Install lacing tape as required.** Use tape (item 202, App F).

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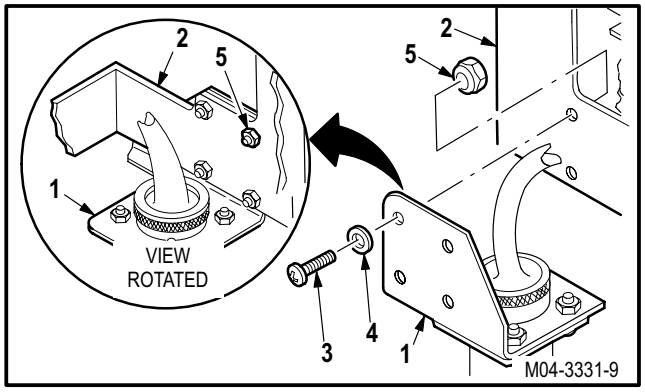
**4.194. PILOT POWER QUADRANT PANEL - NO. 2 ENGINE INTERLOCK SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

f. **Install bracket (1) on panel (2).**

(1) Install four screws (3) through washers (4), bracket (1), panel (2), into locknuts (5).

g. **Inspect (QA).**

h. **Install pilot power quadrant light indicating panel** (para 4.188)**.**




END OF TASK

## 4.195. CPG POWER QUADRANT LIGHT INDICATING PANEL REMOVAL/INSTALLATION

4.195.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.195.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**References:**

TM 1-1520-238-T

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

This task can be performed on or off helicopter.

4.195.3. Removal

a. **Enter CPG station** (para 1.56)**. Observe all safety precautions.**

b. **On CPG power quadrant (1), move No. 1 and No. 2 power lever handles (2) to mid travel.**

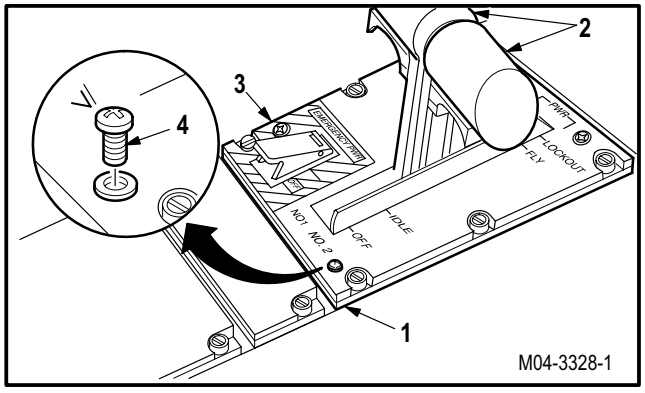
c. **Remove light indicating panel (3) from quadrant (1).**

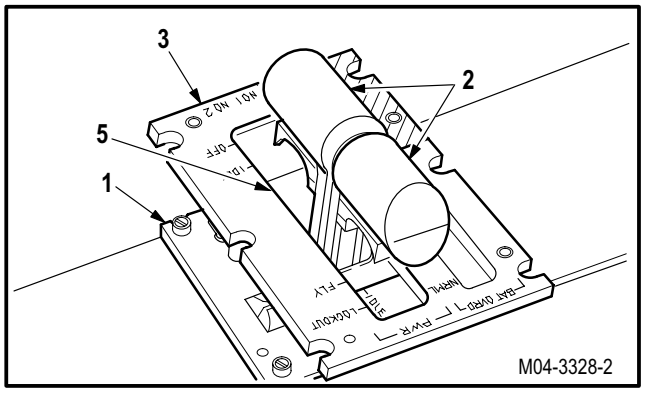
(1) Remove four screws (4) from panel (3).

(2) Lift panel (3) from quadrant (1) and turn 90 degrees.

(3) Aline slot (5) in panel (3) with handles (2).

(4) Remove panel (3).

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## 4.195. CPG POWER QUADRANT LIGHT INDICATING PANEL REMOVAL/INSTALLATION - continued

4.195.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.195.5. Inspection

a. **Check panel for cracks.** None allowed.

b. **Check indicating panel connector and connector on power quadrant for damage.** None allowed.

c. **Check panel for corrosion** (para 1.49)**.**

4.195.6. Installation

a. **Install panel (3) on quadrant (1).**

(1) Aline slot (5) in panel (3) with handles (2).

(2) Lower panel (3) over handles (2).

(3) Aline panel (3) with quadrant (1).

(4) Press panel (3) on quadrant (1).

**NOTE**

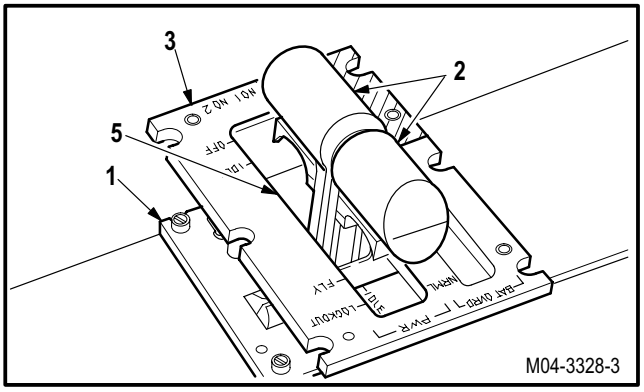
Ensure electrical connector on light panel mates with electrical connector on power quadrant.

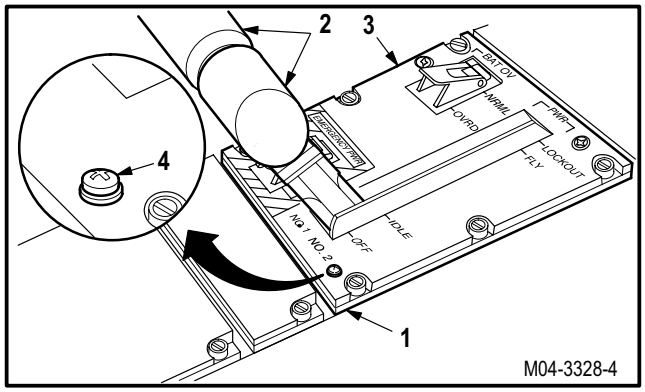
(5) Install four screws (4).

b. **On quadrant (1), move No. 1 and No. 2 handles (2) to OFF.**

c. **Inspect (QA).**

d. **Perform CPG edge-light maintenance operational check** (TM 1-1520-238-T)**.**




END OF TASK

## 4.196. CPG POWER QUADRANT NO. 1 ENGINE OUT DISABLE SWITCH REMOVAL/INSTALLATION (AVIM)

4.196.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.196.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**Materials/Parts:**

Wire cap (2)
Sealing compound (item 172, App F)
Tape (item 202, App F)

**References:**

TM 55-1500-323-24

4.196.3. Removal

a. **Depin wires (1) and (2) from receptacle J1 (3).**

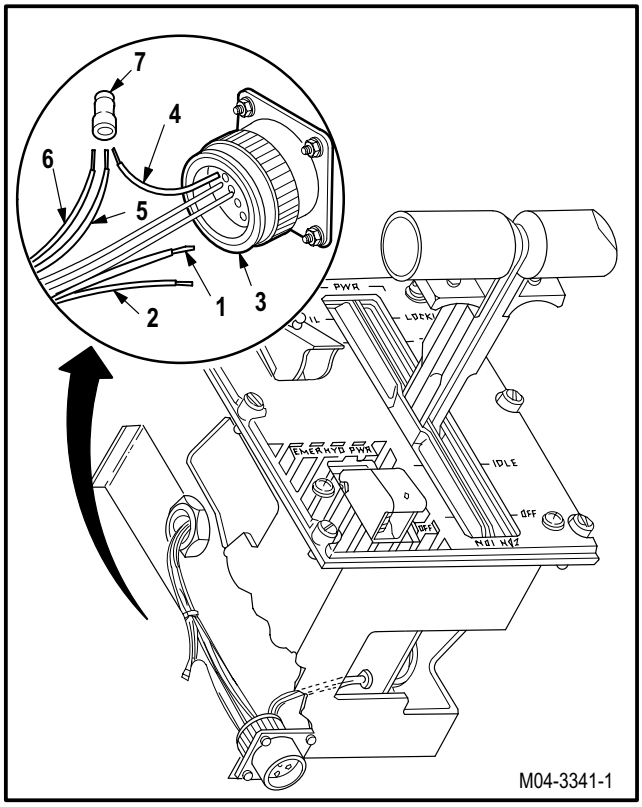
(1) Remove lacing tape as required

(2) Identify and depin wires (1) and (2) (TM 55-1500-323-24).

b. **Detach wires (4), (5), and (6).**

(1) Remove lacing tape as required

(2) Identify and detach wires (4), (5), and (6) from wire cap (7) (TM 55-1500-323-24). Discard wire cap (7).

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**4.196. CPG POWER QUADRANT NO. 1 ENGINE OUT DISABLE SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

c. **Remove No. 1 engine out disable switch (8) from CPG power quadrant (9).**

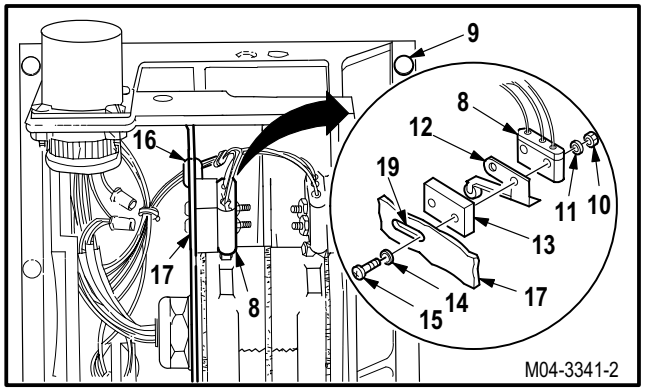
(1) Remove two locknuts (10) and lockwashers (11).

(2) Remove switch (8) switch actuator (12) spacer (13) washers (14), and screws (15).

(3) Remove lacing tape as required.

(4) Pull wires of switch (8) through grommet (16) in shaft support plate (17).

(5) Remove switch (8).




4.196.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.196.5. Inspection

a. **Check removed and attaching parts for cracks.** None allowed.

b. **Check wires for cuts, cracks, and damaged connectors** (TM 55-1500-323-24)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

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## 4.196. CPG POWER QUADRANT NO. 1 ENGINE OUT DISABLE SWITCH REMOVAL/INSTALLATION (AVIM) - continued

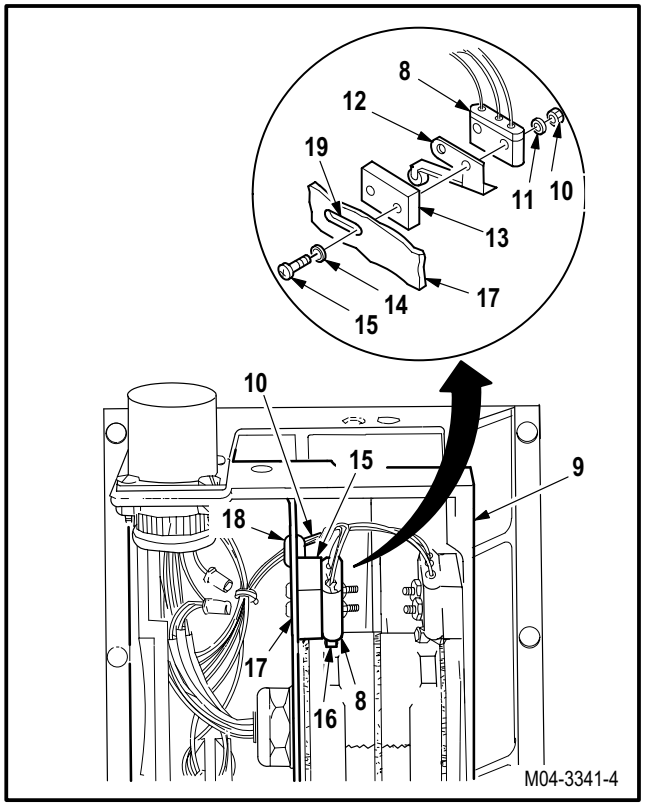
4.196.6. Installation

a. **Install switch (8) in power quadrant (9).**

(1) Install wires of switch (8) through grommet (16) in shaft support plate (17).

(2) Apply sealing compound to threads of two screws (15). Use sealing compound (item 172, App F)

(3) Install two screws (15) through washers (14), plate (17), spacer (13), switch actuator (12), switch (8), lockwashers (11), and locknuts (10). Do not tighten locknuts (10).



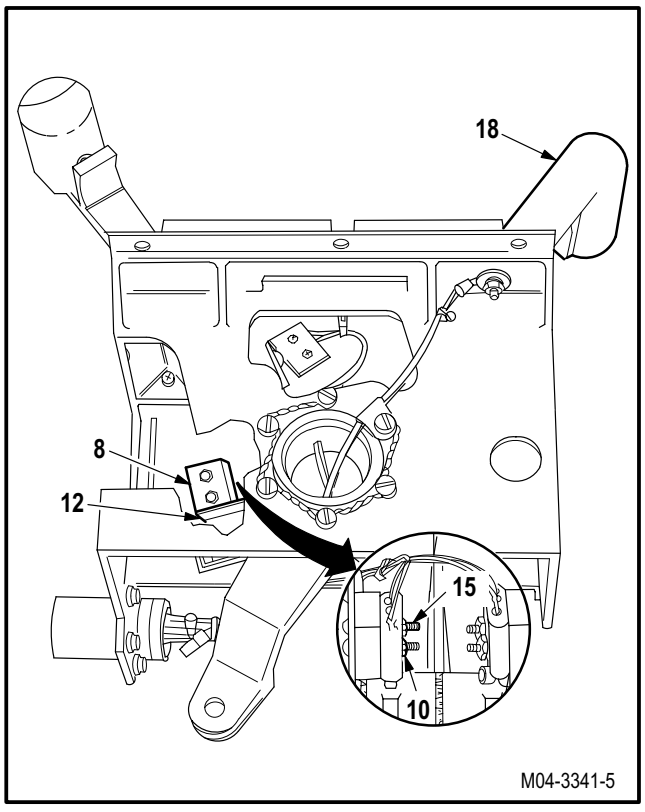

b. **Adjust switch (8).**

(1) Set power lever (18) to **FLY**.

(2) Adjust switch (8) so actuator (12) is fully depressed.

(3) Move power lever (18) back from **FLY**, ensure switch (8) is in open position.

c. **Tighten two locknuts (10).**

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**4.196. CPG POWER QUADRANT NO. 1 ENGINE OUT DISABLE SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

d. **Attach wires (4), (5), and (6).**

(1) Install new wire cap (7) on wires (4), (5), and (6) (TM 55-1500-323-24).

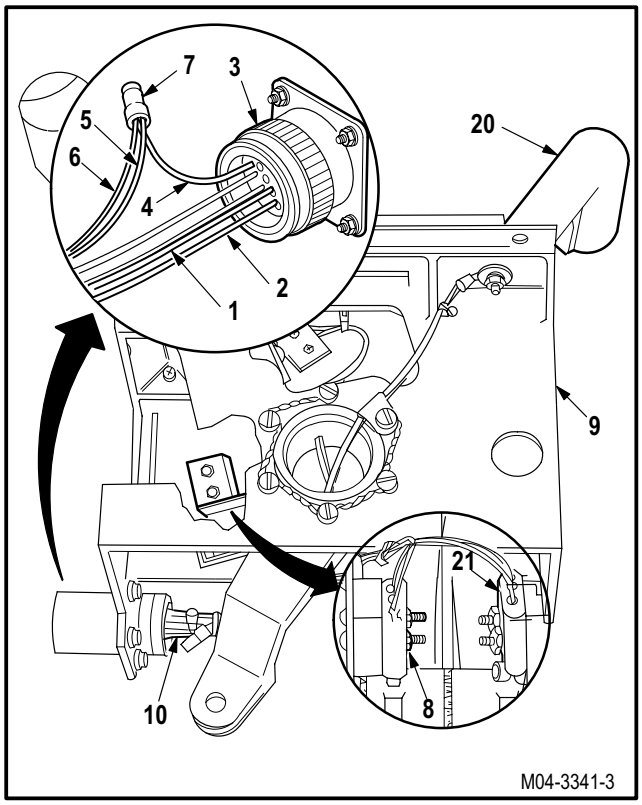
e. **Pin wires (1) and (2) to receptacle J1 (3).**

(1) Pin identified wire (1) to pin 2 of receptacle J1 (3).

(2) Pin identified wire (2) to pin 14 of receptacle J1 (3).

f. **Install lacing tape as required.** Use tape (item 202, App F).

g. **Inspect (QA).**




END OF TASK

## 4.197. CPG POWER QUADRANT NO. 2 ENGINE OUT DISABLE SWITCH REMOVAL/INSTALLATION (AVIM)

4.197.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.197.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**Materials/Parts:**

Wire cap (2)
Sealing compound (item 172, App F)
Tape (item 202, App F)

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

4.197.3. Removal

a. **Depin wire (1) from receptacle J1 (2).**

(1) Remove lacing tape as required

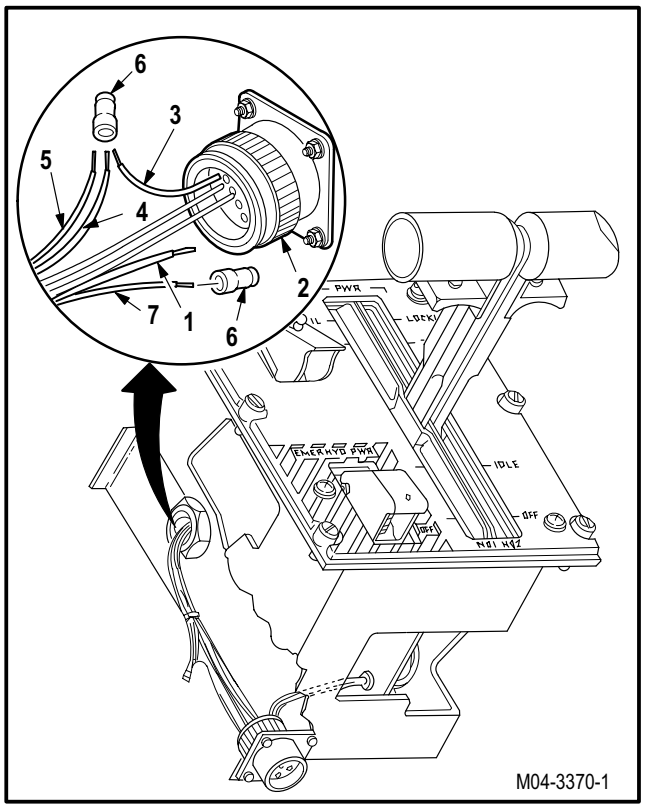
(2) Identify and depin wire (1) (TM 55-1500-323-24).

b. **Detach wires (3), (4), and (5).**

(1) Remove lacing tape as required

(2) Identify and detach wires (3), (4), and (5) from wire cap (6) (TM 55-1500-323-24). Discard wire cap (6).

(3) Do not remove wire cap (6) from wire (7) if switch is being removed for other maintenance.

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**4.197. CPG POWER QUADRANT NO. 2 ENGINE OUT DISABLE SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

c. **Remove No. 2 engine out disable switch (9) from CPG power quadrant (10).**

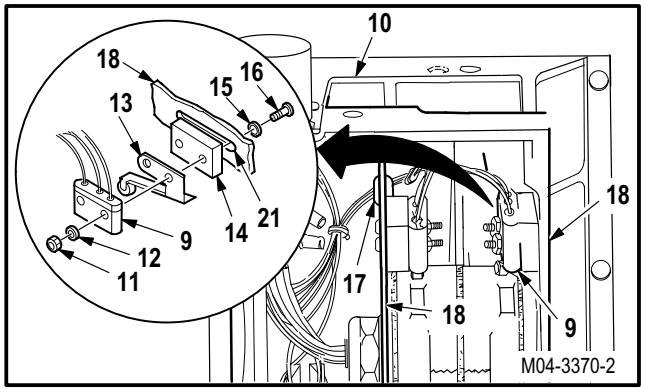
(1) Remove two locknuts (11) and lockwashers (12).

(2) Remove switch (9) switch actuator (13) spacer (14) washers (15), and screws (16).

(3) Remove lacing tape as required.

(4) Pull wires of switch (9) through grommet (17) in shaft support plate (18).

(5) Remove switch (9).




4.197.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.197.5. Inspection

a. **Check mounting surfaces and attaching parts for cracks.** None allowed.

b. **Check wires for cuts, cracks, and damaged connectors** (TM 55-1500-323-24)**.**

c. **Check mounting surfaces and attaching parts for corrosion** (para 1.49)**.**

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## 4.197. CPG POWER QUADRANT NO. 2 ENGINE OUT DISABLE SWITCH REMOVAL/INSTALLATION (AVIM) - continued

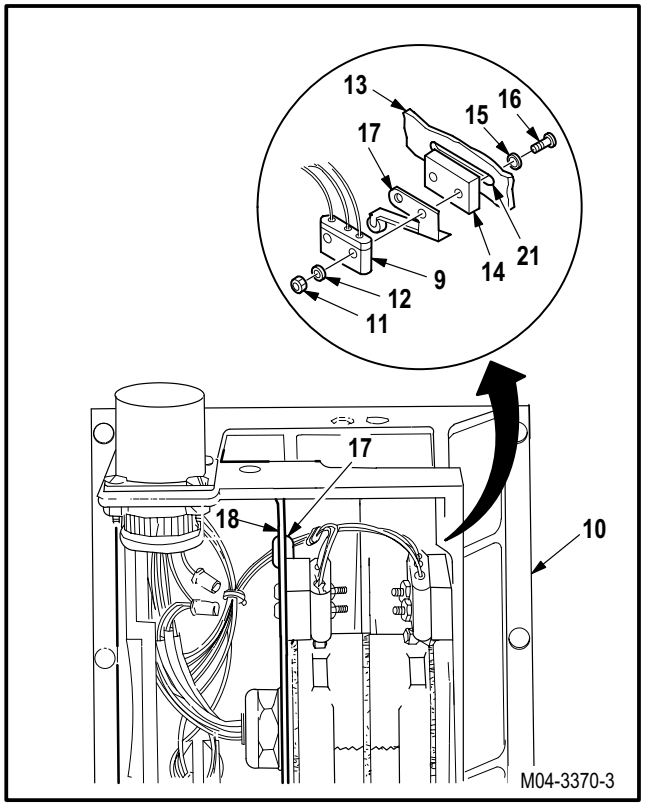
4.197.6. Installation

a. **Install switch (9) in power quadrant (10).**

(1) Install wires of switch (9) through grommet (17) in support plate (18).

(2) Install two screws (16) through washers (15), plate (18), spacer (14), switch actuator (13), switch (9), lockwashers (12), and locknuts (11). Do not tighten locknuts (11).

(3) Apply sealing compound to threads of two screws (16). Use sealing compound (item 172, App F)



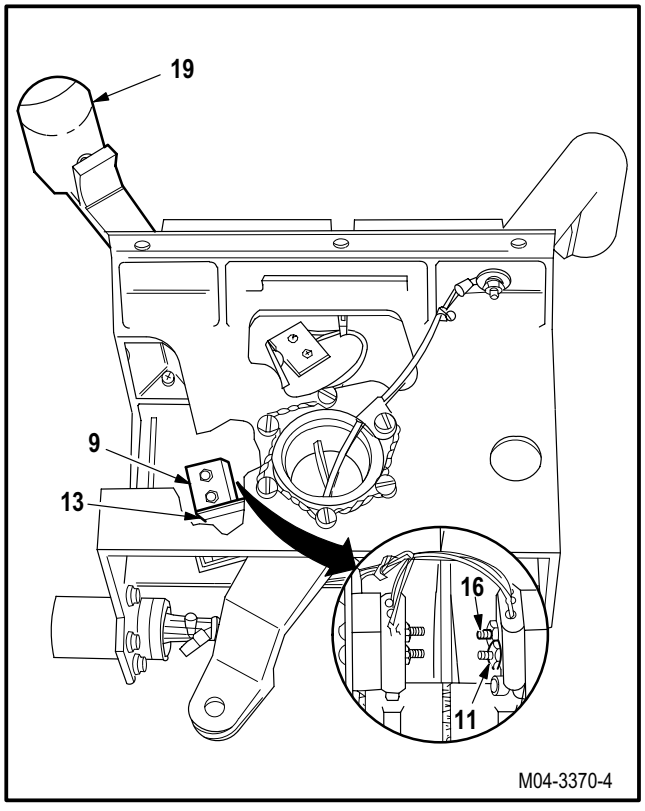

b. **Adjust switch (9).**

(1) Set power lever (19) to **FLY**.

(2) Adjust switch (9) so actuator (13) is fully depressed.

(3) Move power lever (19) back from **FLY**, ensure switch (9) is in open position.

c. **Tighten two locknuts (11).**

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**4.197. CPG POWER QUADRANT NO. 2 ENGINE OUT DISABLE SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

d. **Attach wires (3), (4), and (5).**

(1) Install new wire cap (6) on wires (3), (4), and (5) (TM 55-1500-323-24).

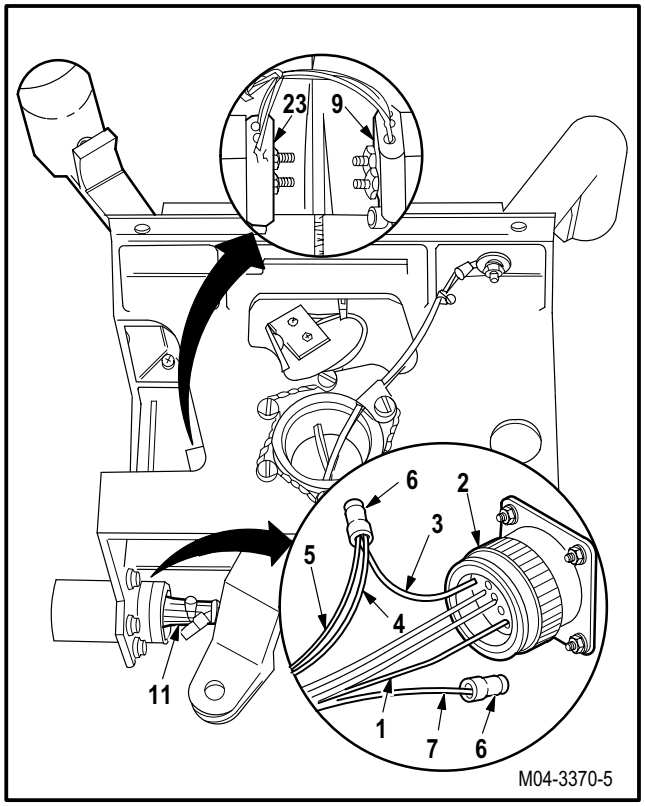
(2) If switch (9) was replaced, install new wire cap (6) on wire (7).

e. **Pin wire (1) to receptacle J1 (2).**

(1) Pin identified wire (1) (TM 55-1500-323-24).

f. **Install lacing tape as required.** Use tape (item 202, App F).

g. **Inspect (QA).**




END OF TASK

## 4.198. CPG POWER QUADRANT LEVER RELEASE SWITCH REMOVAL/INSTALLATION (AVIM)

4.198.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.198.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**Materials/Parts:**

Wire cap (2)
Sealing compound (item 172, App F)
Tape (item 202, App F)

**References:**

TM 55-1500-323-24

**NOTE**

This task is typical for CPG power quadrant engine No. 1 or No. 2 lever release switch.

4.198.3. Removal

a. **Depin wire (1) from receptacle J1 (2).**

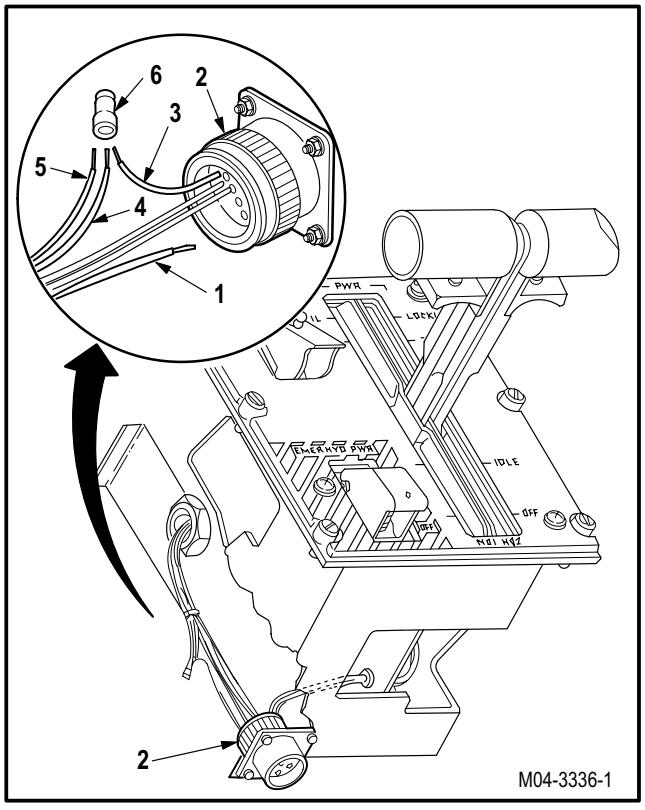
(1) Remove lacing tape as required.

(2) For engine No. 1, identify and depin wire (1) from pin 4 of receptacle J1 (2) (TM 55-1500-323-24).

(3) For engine No. 2, identify and depin wire (1) from pin 5 of receptacle J1 (2) (TM 55-1500-323-24).

b. **Detach wires (3), (4), and (5).**

(1) Identify and detach wires (3), (4), and (5) from wire cap (6) (TM 55-1500-323-24). Discard wire cap (6).

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**4.198. CPG POWER QUADRANT LEVER RELEASE SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

c. **Remove lever release switch (7) from CPG power quadrant (8).**

(1) Remove wires of switch (7) from power lever (16). Remove switch (7) and switch actuator (15) from power quadrant (8).

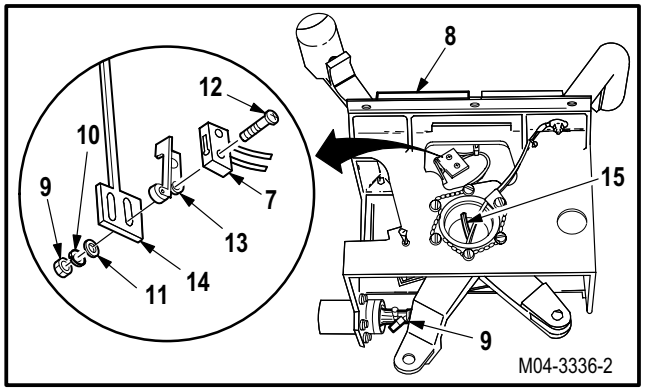
(2) Remove two locknuts (9) lockwashers (10) and washers (11).

(3) Remove two screws (12) from switch (7) switch actuator (13) and stop bar (14).

(4) Remove lacing tape as required.

(5) Pull wires of switch (7) through power lever (16).

(6) Remove switch (7).




4.198.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.198.5. Inspection

a. **Check mounting surfaces and attaching parts for cracks.** None allowed.

b. **Check wires for cuts, cracks, and damaged connectors** (TM 55-1500-323-24)**.**

c. **Check mounting surfaces and attaching parts for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

## 4.198. CPG POWER QUADRANT LEVER RELEASE SWITCH REMOVAL/INSTALLATION (AVIM) - continued

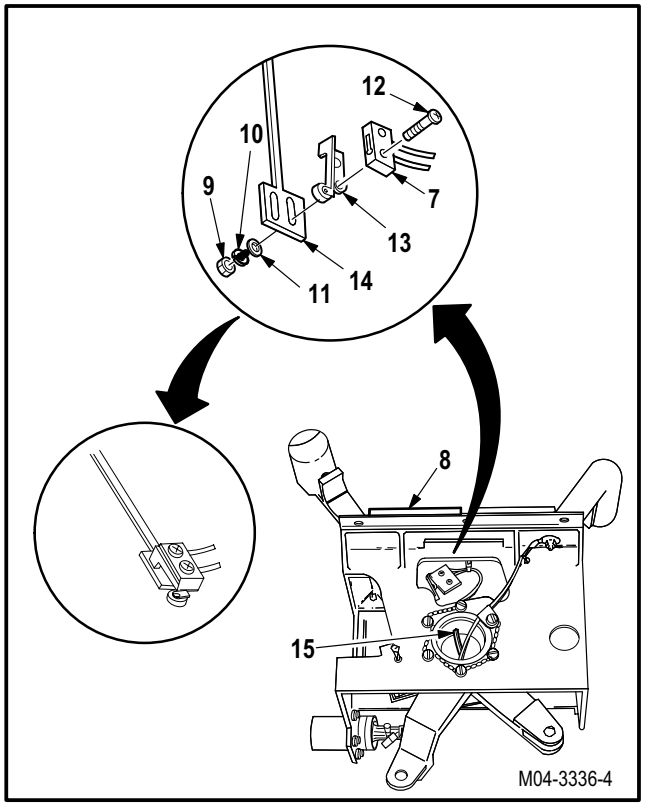
4.198.6. Installation

a. **Install switch (7) in power quadrant (8).**

(1) Install wires of switch (7) through power lever (16).

(2) Apply sealing compound to threads of two screws (12). Use sealing compound (item 172, App F)

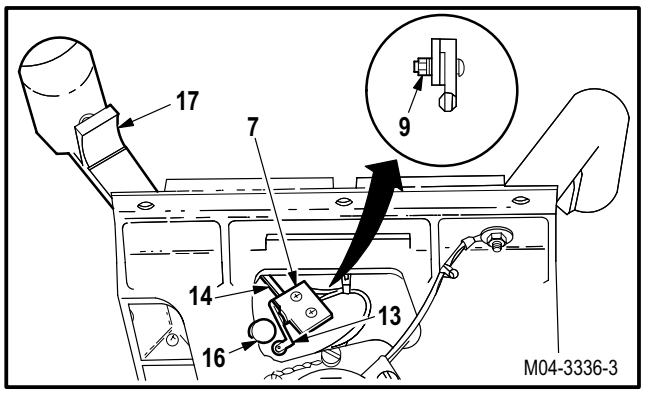
(3) Install two screws (13) through switch (7), switch actuator (15), stop bar (14) washers (11), lockwashers (10), and locknuts (9). Do not tighten locknuts (9).




b. **Adjust switch (7).**

(1) Adjust switch (7) so actuator (15) strikes power quadrant guide (17) with **0.125 to 0.250 INCH** of upward travel on release trigger (18).

c. **Tighten two locknuts (9).**

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**4.198. CPG POWER QUADRANT LEVER RELEASE SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

d. **Attach wires (3), (4), and (5).**

(1) Install new wire cap (6) on wires (3), (4), and (5) (TM 55-1500-323-24).

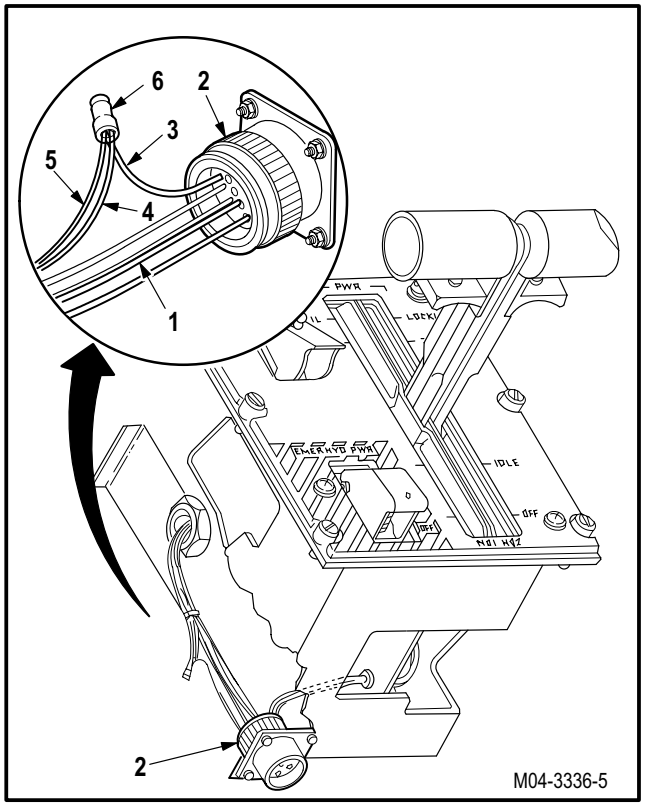
e. **Pin wire (1) to receptacle J1 (2).**

(1) For engine No. 1, pin identified wire (1) in pin 4 of receptacle J1 (2) (TM 55-1500-323-24).

(2) For engine No. 2, pin identified wire (1) in pin 5 of receptacle J1 (2) (TM 55-1500-323-24).

f. **Install lacing tape as required.** Use tape (item 202, App F).

g. **Inspect (QA).**




END OF TASK

## 4.199. CPG BAT OVRD SWITCH REMOVAL/INSTALLATION (AVIM)

4.199.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.199.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)

**References:**

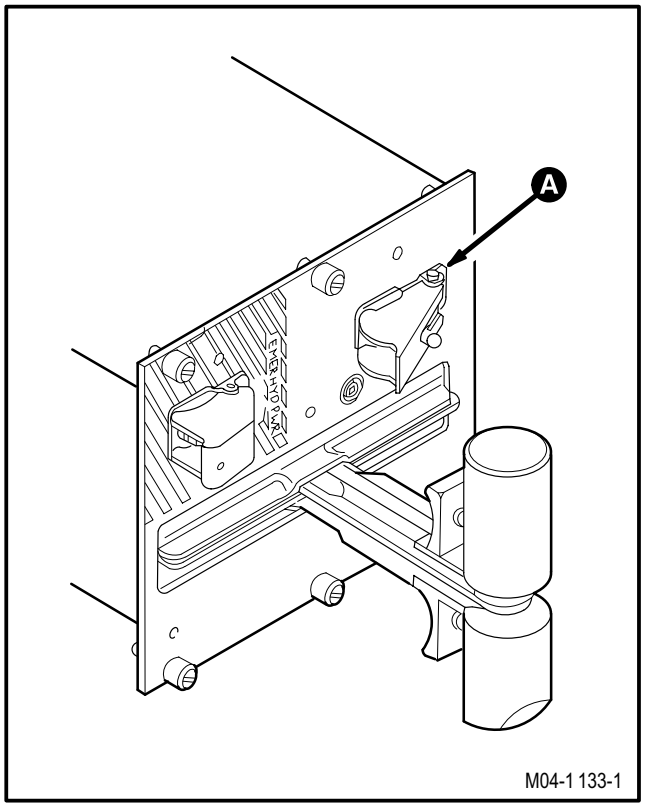
TM 55-1500-323-24

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.195 | CPG power quadrant light indicating panel removed |

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## 4.199. CPG BAT OVRD SWITCH REMOVAL/INSTALLATION (AVIM) - continued

4.199.3. Removal

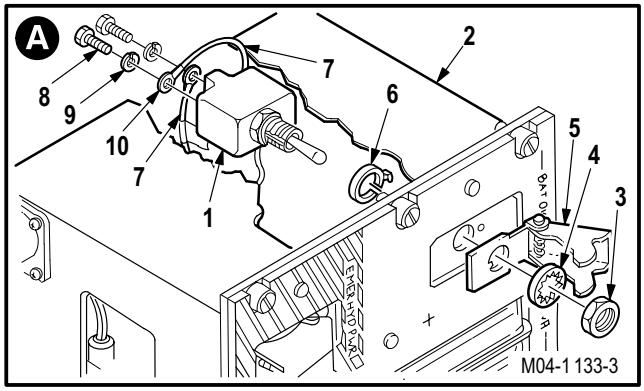
a. **Remove CPG BAT OVRD switch (1) from CPG power quadrant (2).**

(1) Remove nut (3), lockwasher (4), switch guard (5), and lockring (6).

b. **Identify and detach two wires (7) from switch (1).**

(1) Position switch (1) so wires (7) are accessible.

(2) Remove two screws (8), lockwashers (9), and terminal lugs (10).




4.199.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.199.5. Inspection

a. **Check removed and attaching parts for cracks.** None allowed.

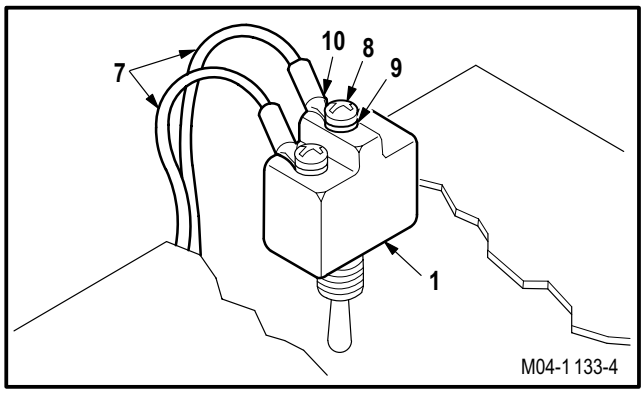
b. **Check wires for cuts, cracks, and damaged connections** (TM 55-1500-323-24)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

4.199.6. Installation

a. **Attach two wires (7) to switch (1).**

(1) Install two screws (8) through lockwashers (9), terminal lugs (10), into switch (1).

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## 4.199. CPG BAT OVRD SWITCH REMOVAL/INSTALLATION (AVIM) - continued

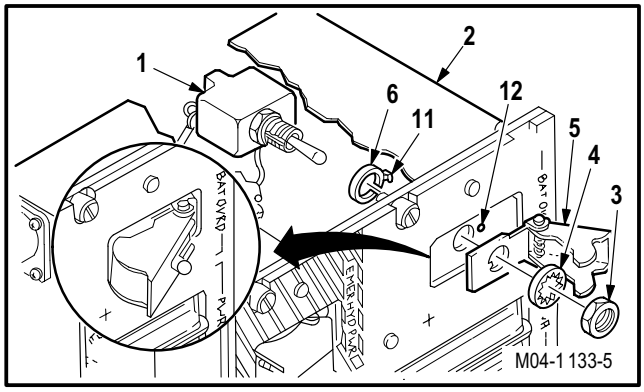
b. **Install switch (1) in CPG power quadrant (2).**

(1) Install switch (1) through lockring (6) so tab (11) enters locator hole (12).

(2) Install switch guard (5), lockwasher (4), and nut (3).

c. **Inspect (QA).**

d. **Install CPG power quadrant light indicating panel** (para 4.195)**.**




END OF TASK

## 4.200. CPG EMER HYD PWR SWITCH REMOVAL/INSTALLATION (AVIM)

4.200.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

4.200.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)

**References:**

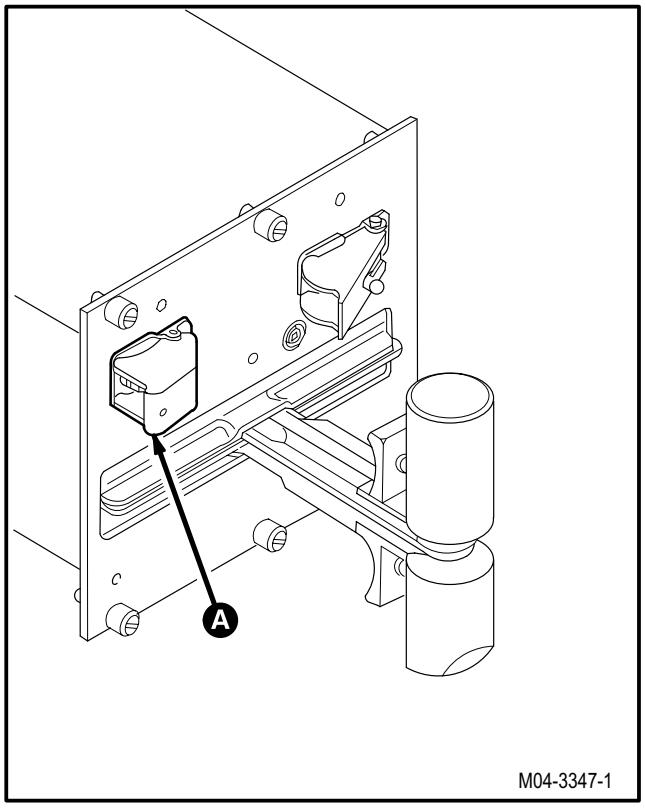
TM 55-1500-323-24

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 4.195 | CPG power quadrant light indicating panel removed |

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## 4.200. CPG EMER HYD PWR SWITCH REMOVAL/INSTALLATION (AVIM) - continued

4.200.3. Removal

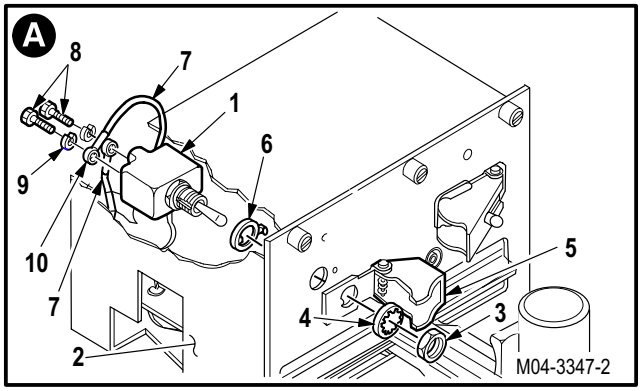
a. **Remove EMER HYD PWR switch (1) from CPG power quadrant (2).**

(1) Remove nut (3), lockwasher (4), switch guard (5), and lockring (6).

b. **Identify and detach two wires (7) from switch (1).**

(1) Position switch (1) so wires (7) are accessible.

(2) Remove two screws (8), lockwashers (9), and terminal lugs (10).




4.200.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

4.200.5. Inspection

a. **Check removed and attaching parts for cracks.** None allowed.

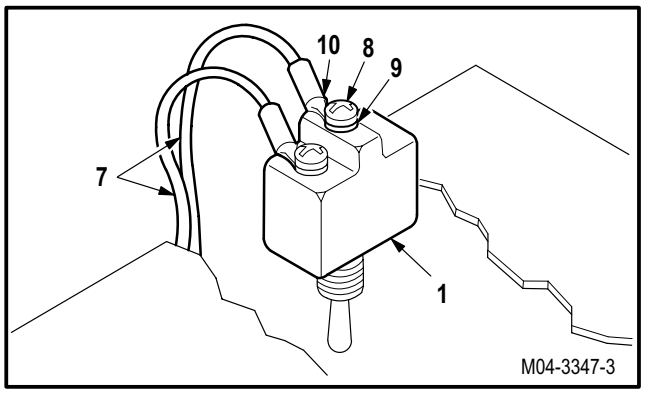
b. **Check wires for cuts, cracks, and damaged connections** (TM 55-1500-323-24)**.**

c. **Check removed and attaching parts for corrosion** (para 1.49)**.**

4.200.6. Installation

a. **Attach two wires (7) to switch (1).**

(1) Install two screws (8) through lockwashers (9), terminal lugs (10), into switch (1).

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**4.200. CPG EMER HYD PWR SWITCH REMOVAL/INSTALLATION (AVIM) - continued**

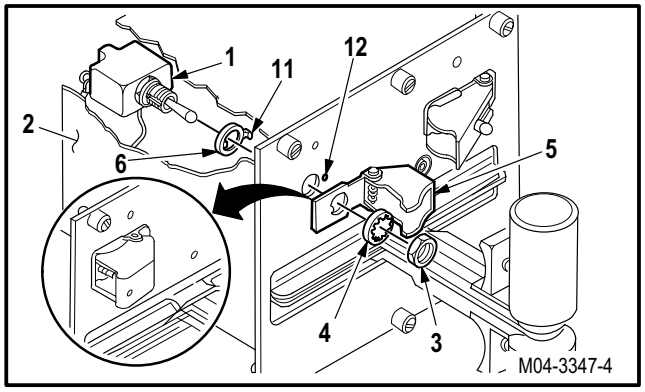
b. **Install switch (1) in CPG power quadrant (2).**

(1) Install switch (1) through lockring (6) so that tab (11) enters locator hole (12).

(2) Install switch guard (5), lockwasher (4), and nut (3).

c. **Inspect (QA).**

d. **Install CPG power quadrant light indicating panel** (para 4.195)**.**




END OF TASK

# CHAPTER 5
# ROTORS

## CHAPTER OVERVIEW

Chapter 5 contains the maintenance instructions for the main and tail rotors. Rotor systems description, operation, and troubleshooting information is contained in TM 1-1520-238-T.

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# SECTION I. MAIN ROTOR BLADE MAINTENANCE

## 5.1. MAIN ROTOR INSPECTION

5.1.1. Description

This task covers: Inspection.

5.1.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
10-inch hand metal cutting shears (item 285, App H)

**References:**

TM 1-1520-238-PMS
TM 55-1500-345-23

**Materials/Parts:**

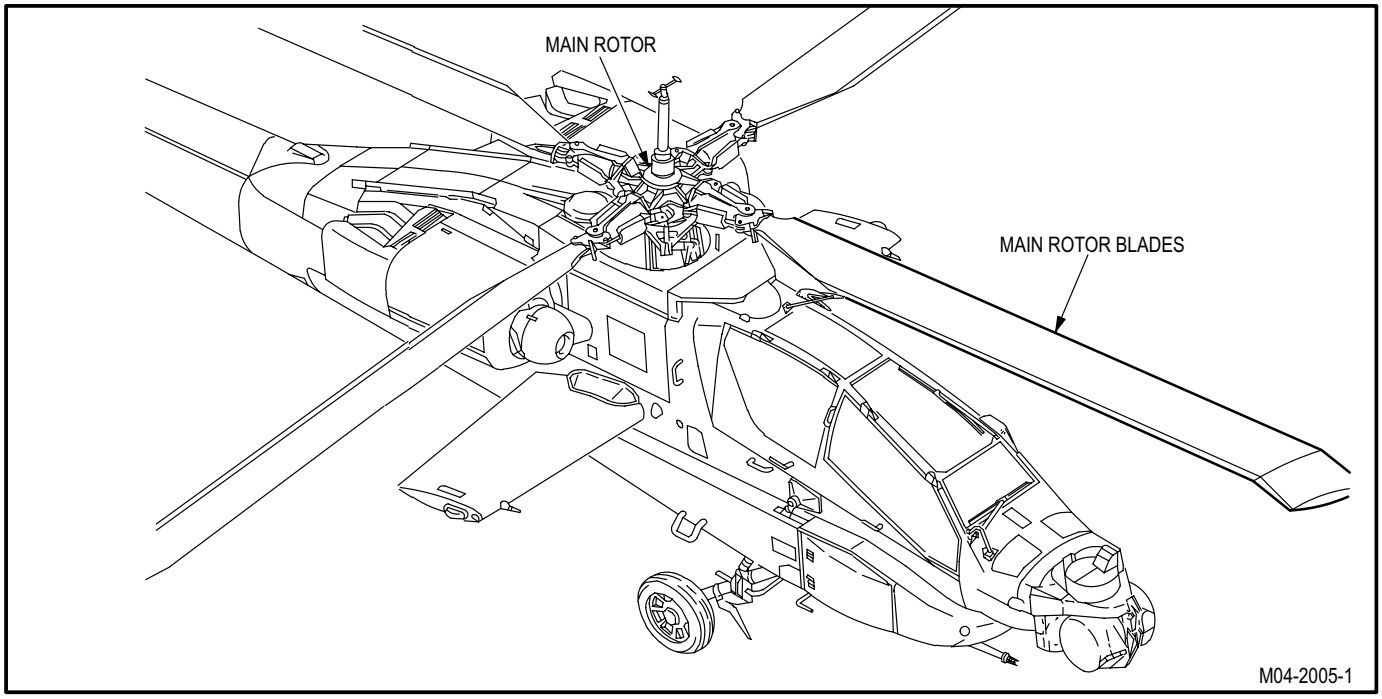
Cloth (item 51, App F)
Depressor (item 70, App F)
Polyurethane coating (item 141A, App F)

**Personnel Required:**

| | |
|---|---|
| 67R | Attack Helicopter Repairer<br>One person to assist |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors T250L, T250R, T290L, T290R, and L325 opened |

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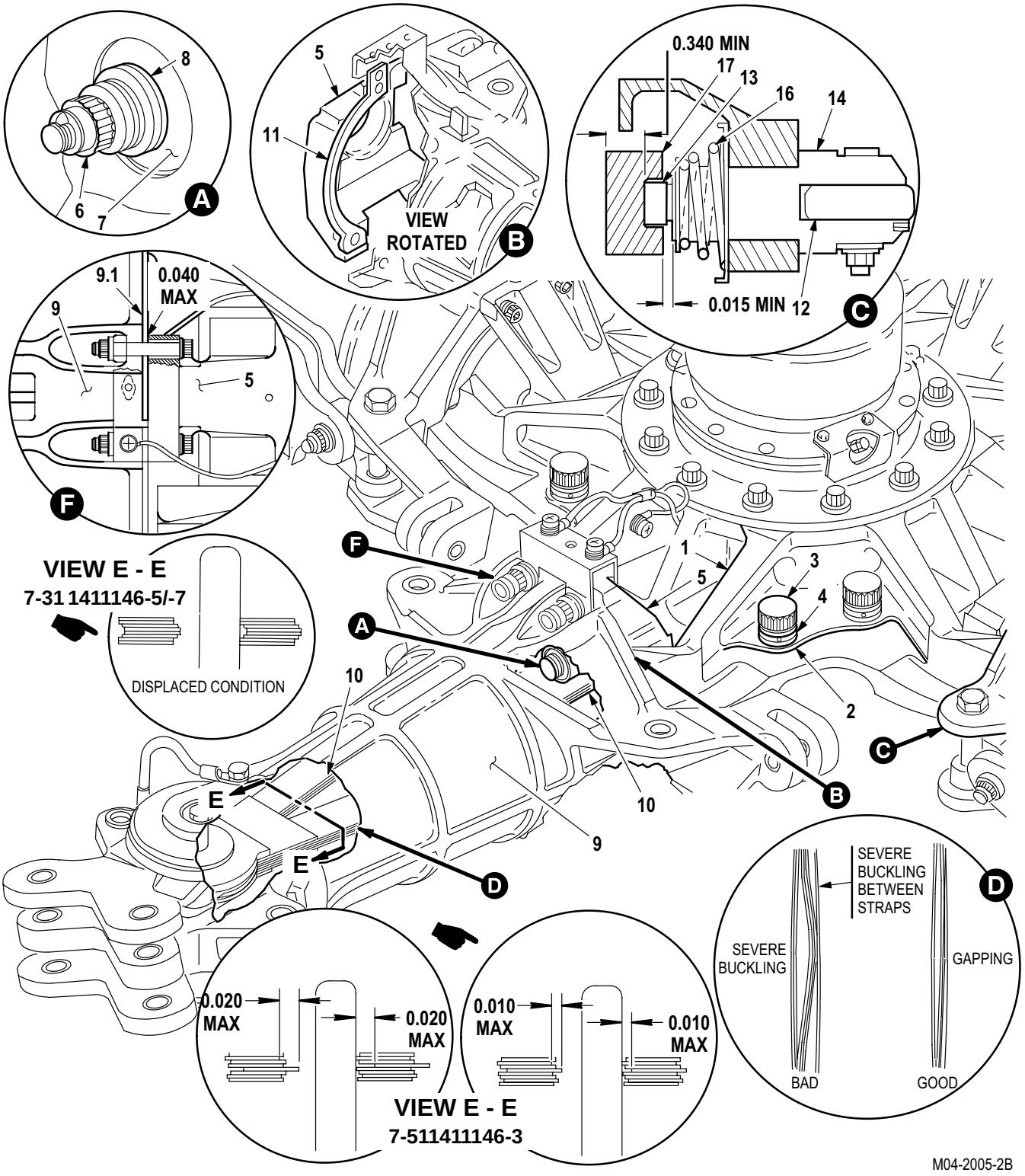
## 5.1. MAIN ROTOR INSPECTION - continued

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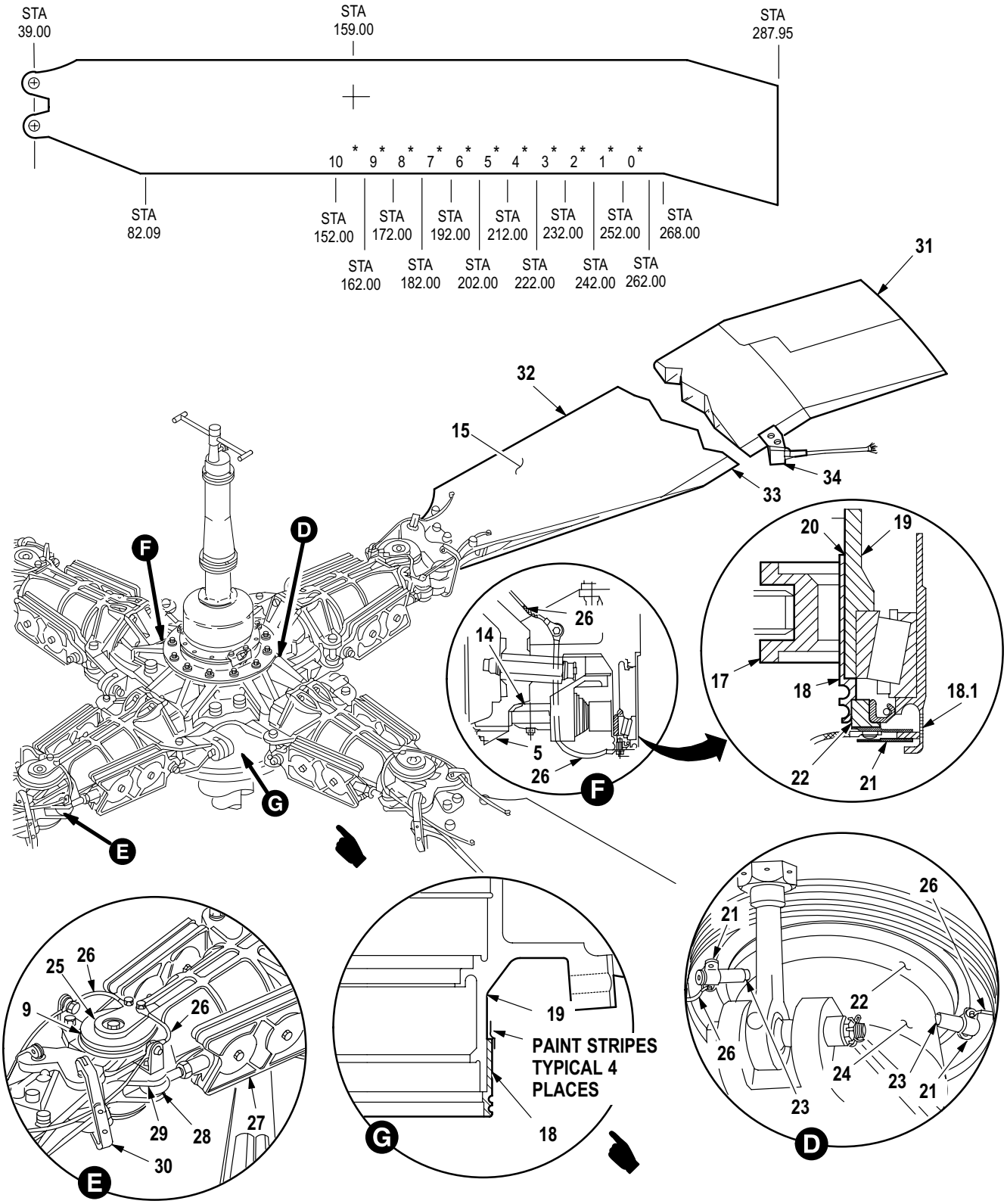
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M04-2005-3B

## 5.1. MAIN ROTOR INSPECTION - continued

5.1.3. Inspection

**NOTE**

- The main rotor includes the main rotor blades.
- Cracks in any main rotor component are cause for rejection.
- Corroded areas will be treated and restored in accordance with paragraph 1.49.

a. **Check main rotor for loose or missing lockwire and cotter pins.** Replace if loose or missing.

**NOTE**

If a preload indicating (PLI) washer is loose, the washer must be removed and replaced.

b. **Check main rotor hub (1), lower shoe (2), and attaching bolts (3) for loose preload indicating (PLI) washers (4).** None allowed.

**NOTE**

- Debonding near the surface of the elastomeric and metal shims without lateral inboard/outboard displacement or visible separation (gaps), has no functional impact on serviceability of the bearing and is not reason for rejection.
- Bearings should be examined visually and not probed with a feeler gauge or tools.

c. **Check feathering bearing housing (5) for serviceability.**

(1) Check housing (5) and retaining nut (6) for looseness. None allowed.

(2) Check feathering bearing (7) for the following:

(a) Check feathering bearing (7) for separation between elastomeric and metal shims. Maximum separation not to exceed 0.01 inch.

(b) Check feathering bearing (7) for separation between elastomeric and metal shims. Maximum separation not to exceed 0.01 inch.

(c) Black powdery discharge is evidence of normal deterioration of elastomeric compound which is acceptable.

(d) Elastomeric compound surface cracks are allowed over entire area.

(e) Debonding along circular metal shim is allowable provided the shim has not separated. Displacement of any shim (outboard or inboard) is cause for removal.

(f) Large pieces (**0.050 INCH or larger**) of extruding elastomer from bearing (7) is cause for removal.

(g) Metal shims for cracks. None allowed.

(3) If there is any doubt regarding the serviceability of the feathering bearing, remove (para 5.37) for closer inspection.

(a) Bearings with displaced shims, large amounts of elastomer extruded, or have separated into two or more pieces are unserviceable and shall be replaced (para 5.37).

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**5.1. MAIN ROTOR INSPECTION - continued**

d. **Check pitch housing (9) for serviceability.**

(1) Check pitch housing (9) for loose attachment to feathering bearing housing (5). None allowed.

(2) Check inside of pitch housing (9) for foreign matter.

**NOTE**

Gap is allowed only at the upper left-hand bolt of pitch housing and feathering bearing housing where bushing is installed.

e. **Inspect gap between striker strip (9.1) and feathering bearing housing (5).** Gap shall be **0.040 INCH** maximum.

**CAUTION**

- Do not damage adjacent laminate or abrasion strip.
- Any other trimming of the teflon cloth strips is not authorized.

**NOTE**

Ensure that the collective control stick and the cyclic control stick are in the neutral position. Ensure that the swashplate is level/centered with respect to the aircraft.

f. **Inspect strap pack (10) for serviceability.**

(1) Check accessible portions of strap pack (10) for cracked, buckled, broken, or horizontally displaced laminates. Use mirror, flashlight, and depressor (item 70, App F). Perform borescope inspection (para 5.34A).

(a) A failed top or bottom laminate of the strap pack assembly (10) may be repaired (para 5.36).

**NOTE**

- This repair is not allowed for laminate failures under the outboard or inboard shoes. The repair limits are defined in (para 5.36). Upon detection of any other discrepant laminate, the strap pack assembly is unserviceable.
- Laminate manufacturing processes differ between the 7-311411146-5/-7 strap packs and the new 7-511411146-3 strap packs. As a result, the laminate edges of the 7-511411146-3 packs may not all be aligned, and offsets between laminates of up to **0.010 INCH** may occur. These offsets are not cause for rejection.

(b) Any cracked, buckled, broken, or horizontally displaced laminate is considered discrepant. Maximum allowable displacement is **0.020 INCH** or, a change in displacement exceeding **0.010 INCH** between inspections.

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**5.1. MAIN ROTOR INSPECTION - continued**

(c) If one laminate, other than a previously trimmed top or bottom laminate, is discrepant the strap pack (10) is unserviceable, but a one time flight to an adequate AH-64 maintenance facility is authorized. This flight shall not exceed two hours.

(d) If two laminates, other than a previously trimmed top or bottom laminate, are discrepant, the strap pack (10) is unserviceable and no flights are authorized.

(2) Damage or missing teflon material under the inboard abrasion strips is acceptable.

g. **Inspect droop stop striker plates (11) and roller (12) for serviceability.**

(1) Check droop stop roller striker plates (11) for wear.

(a) Striker plates (11) may have wear or dents/gouges up to **0.030 INCH** maximum.

(2) Check droop stop roller (12) in droop stop follower (13) for freedom of movement (when blades (15) are not installed) and loose hardware.

(3) Check droop stop rollers (12) for chipping, wear, or play.

(a) Maximum depth of flat spots or dents on rollers (12) not to exceed **0.10 INCH** (para 5.41).

(4) Check droop stop rollers (12) for wear and dents (para 5.41).

h. **Inspect droop stop plunger (14) for serviceability.**

(1) Check droop stop plunger (14) for cracks. None allowed.

(2) Check droop stop plunger (14) for wear.

(a) Maximum wear through anodized surface not to exceed **0.50 INCH** by **0.50 INCH**, three places.

(3) Check droop stop plunger (14) for freedom of movement by moving rotor blade (15) up and down.

i. **Inspect droop stop follower (13) for serviceability.**

(1) Check droop stop follower (13) for wear, galling, scoring, and elongation. Maximum depth of damage is **0.025 INCH**.

(2) Check droop stop follower (13) for broken or damaged spring (16). None allowed.

(3) Check droop stop follower (13) for surface wear.

(a) Curved surface wear can be measured on assembly by measuring gap. Minimum allowable gap **0.015 INCH**.

(b) Top or bottom surface wear at corners (13) not to exceed maximum depth of **0.050 INCH**.

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**5.1. MAIN ROTOR INSPECTION - continued**

j. **Inspect droop stop ring (17) for serviceability.**

(1) Check droop stop ring (17) for cracks and distortion. None allowed.

(2) Check droop stop ring (17) for surface wear, galling, or scoring. Not to exceed **0.025 INCH**.

(3) Check droop stop ring (17) for ring wall thickness. Minimum ring wall thickness is **0.340 INCH**.

k. **After completion of steps g.(1) thru j.(3), check droop angle** (para 5.10)**.**

l. **Check droop stop liner (18) for rotational shifting.**

(1) Visually inspect for bending or misalignment of four equally spaced paint stripes around hub (19) and liner (18).

(a) If rotational shifting has occurred, inspect liner (18) for vertical slippage. Go to step n.

(b) If no vertical slippage has occurred or vertical slippage is within tolerance, then measure, record, and monitor rotational shifting prior to each flight for the next ten flight hours.

1 If rotational shifting does not increase within the next ten flight hours, then inspect every 10 hours/14 days (TM 1-1520-238-PMS).

(2) If paint stripes are not present or are faded, go to step m. to paint hub and liner, if necessary.

m. **Apply four equally spaced paint stripes around hub (19) and liner (18)** (TM 55-1500-345-23)**.**

(1) Paint stripes shall be **0.125 to 0.1875 INCH** wide and **1.0 to 1.5 INCHES** long.

(2) Paint stripes shall be painted vertically, equally spaced, and centered between pitch housings. Use polyurethane coating (item 141A, App F) (TM 55-1500-345-23).

n. **Check droop stop liner (18) for vertical slippage.**

(1) Visually inspect sealant bead at droop stop liner (18) to hub (19) interface (20). If sealant is cracked completely around circumference and there is a color change (primer or loctite visible), droop stop liner (18) has vertically slipped.

(a) If droop stop liner (18) has vertically slipped, inspect for gap between lower surface of electrical brush holder (21) and lower flange of bearing liner (18.1).

1 If gap is less than **0.030 INCH**, reseat lower oil seal retainer (22) in droop stop liner (18) (para 5.46A) and recheck gap. If unable to reseat lower oil seal retainer (22) to achieve gap of **0.030 INCH** or greater, hub (1) is unserviceable.

2 If gap is greater than **0.030 INCH**, hub (1) is serviceable.

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**5.1. MAIN ROTOR INSPECTION - continued**

o. **Inspect electrical brush holder (21) for serviceability.**

(1) Check electrical brush holder (21) for looseness. None allowed.

(2) Check electrical brush (23) for even contact with static mast (24).

(3) Check for electrical brush (23) contact with lower flange of bearing liner (18.1), refer to step n.

p. **Check lead lag link upper and lower hub bearings (25) for serviceability.**

(1) Check lead lag link hub bearings (25) in pitch housing (9) for looseness. None allowed.

(2) Check lead lag link hub bearings (25) for wear (para 5.32).

q. **Inspect main rotor electrical leads (26) for serviceability.**

(1) Check electrical leads (26) for broken wires. None allowed.

(2) Check electrical leads (26) for broken attaching lugs. None allowed.

r. **Check electrical leads (26) attached to electrical brush holders (21) for slack.**

(1) If leads (26) do not have any slack, then reseat lower oil seal retainer (22) in liner (18) (para 5.46A).

s. **Inspect damper (27), rod end (28), and rod end bearing (29) for serviceability.**

(1) Check damper (27) for tears or delamination of elastomeric material.

(a) If surface tears or delamination have spread out along inner or outer edges, or if upper or lower edges of elastomeric material have tears or delamination exceeding **FOUR INCHES**, replace damper (27) (para 5.23).

(2) Check rod end (28) for thread damage. None allowed.

(3) Check rod end (28) for corrosion (para 1.49).

(4) Check rod end bearing (29) ball for corrosion (para 1.49).

(5) Check rod end bearing (29) for wear.

(a) Radial play not to exceed **0.007 INCH**.

(b) Axial play not to exceed **0.010 INCH**.

t. **Inspect main rotor blade (15) for serviceability.**

(1) Check rotor blade (15) for loose attaching pins (30) (para 5.3).

(2) Check rotor blades (15) for corrosion (para 5.2).

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**5.1. MAIN ROTOR INSPECTION - continued**

**CAUTION**

Do not manually press suspect areas. This will cause blade to yield to pressure causing core shear. Crackling sound is evidence of core shear.

(3) Check main rotor blade (15) for bonding separation.

(a) Coin tap suspect area to detect debonding of skin from honeycomb. Tapping alternately between a suspect area and a bonded area will produce a different sound. A dull sound (thud) will indicate a skin to honeycomb debonding or core shear. Repair debonding defect (para 5.2),

(4) Check rotor blade (15) for scratches, nicks, and gouges (para 5.2).

(5) Check rotor blade (15) for dents and depressions (para 5.2).

(6) Visually check rotor blade (15) leading edge tip (31) for loose or missing screws. None allowed.

(7) Check rotor blade (15) leading edge (32) for paint erosion (para 5.2).

(8) Check entire upper/lower and trailing edge (33) surfaces of main rotor blade (15) for cracks and voids.

**NOTE**

Pay particular attention to main rotor blade trailing edge for cracking.

(a) Check main rotor blade (15) for cracks visually and by wiping upper and lower surfaces of blade and top and bottom of trailing edge (33) with cloth. Snagging of cloth indicates a crack. Use cloth (item 51, App F).

(b) If cracks are suspected, examine with magnifier. No cracks allowed.

(c) Do not manually press suspect areas. This will cause blade (15) to yield to pressure causing core shear. Crackling sound is evidence of core shear.

(9) Check rotor blade static discharger (34) for loose attachment and fraying (para 5.15).

u. **Inspect main rotor seal housing, bearing retainer, hub nut retainer, and bolt for grease leakage.**

(1) Following first few flights and until newly packed bearing has accumulated 25 flight hours, grease leakage must continue to decrease or stop.

(2) After 25 flight hours no grease leakage is permitted only an occasional light trace.

(3) When wiping grease from the rotor head, care must be exercised to avoid disturbing dried grease accumulated around the seal. Dried accumulated grease around the seal enhances the seal's effectiveness.

v. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

END OF TASK

## 5.2. MAIN ROTOR BLADE REPAIR CRITERIA

5.2.1. Description

This task covers: Repair Criteria.

5.2.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

5.2.3. Repair Criteria

a. **The main rotor blade repair criteria provide inspection and repair information for the rotor blades. The instructions for inspection are presented in tabular form.**

Table 5-1. Provides repair limits for scratches, nicks, and gouges in the metallic skin area. This table shall also apply as limits for corrosion of the root fitting.

Table 5-2. Provides repair limits for dents, depressions, and creases in the metallic skin area.

Table 5-3. Provides repair limits for miscellaneous damage in the metallic skin area.

Table 5-4. Provides repair limits for damage in the glass skinned honeycomb area.

Figure 5-1. Provides repair limits for paint erosion.

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## 5.2. MAIN ROTOR BLADE REPAIR CRITERIA - continued

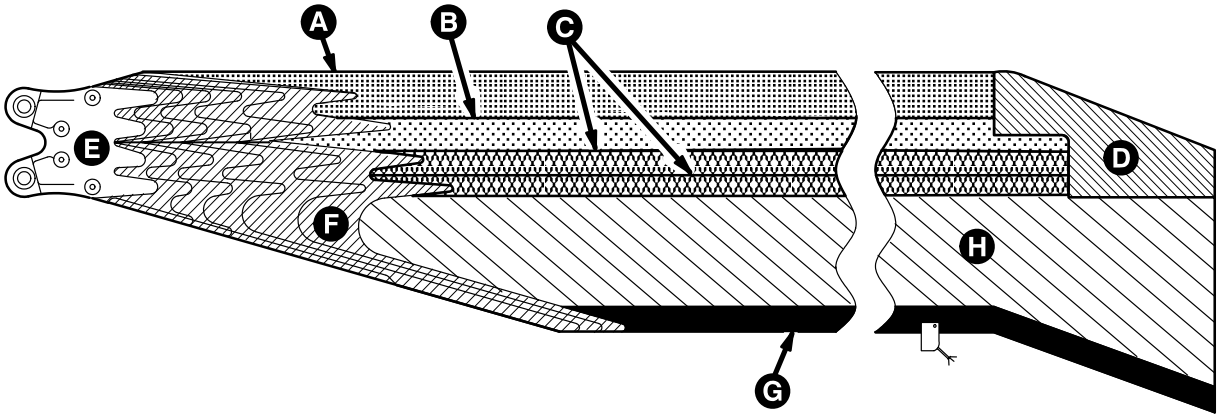


TABLE 5-1. SCRATCHES, NICKS, AND GOUGES.

| AREA | MAXIMUM DEPTH WITHOUT REPAIR | [1] MAXIMUM REPAIRABLE DEPTH | REPAIR PARAGRAPH |
|---|---|---|---|
| A NO. 1 SPAR | .002 | .010 | 5.6 |
| B NO. 2 SPAR | .002 | .008 | 5.6 |
| C NO. 3 & 4 SPARS | .002 | .005 | 5.6 |
| D TIP CAP | .002 | .005 | 5.6 |
| E ROOT FITTING | NONE | .025 | 5.6 |
| F DOUBLERS | NONE | .003 | 5.6 |
| G METALLIC TRAILING EDGE | NONE | .003 | 5.6 |
| H GLASS SKINS | SEE TABLE 4 | | |

**NOTES:**

[1] DAMAGE EXCEEDING THESE LIMITS IS REPAIRABLE AT DEPOT ONLY.
2 ALL DIMENSIONS ARE IN INCHES.
3 LIMITS APPLY TO BOTH UPPER AND LOWER SURFACES.
4 INSPECTION WITH MAGNIFIER REQUIRED.
5 REPAIRS APPLY TO BOTH UPPER AND LOWER SURFACES.
6 THIS TABLE SHALL ALSO APPLY AS LIMITS FOR CORROSION OF THE ROOT FITTING.

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## 5.2. MAIN ROTOR BLADE REPAIR CRITERIA - continued

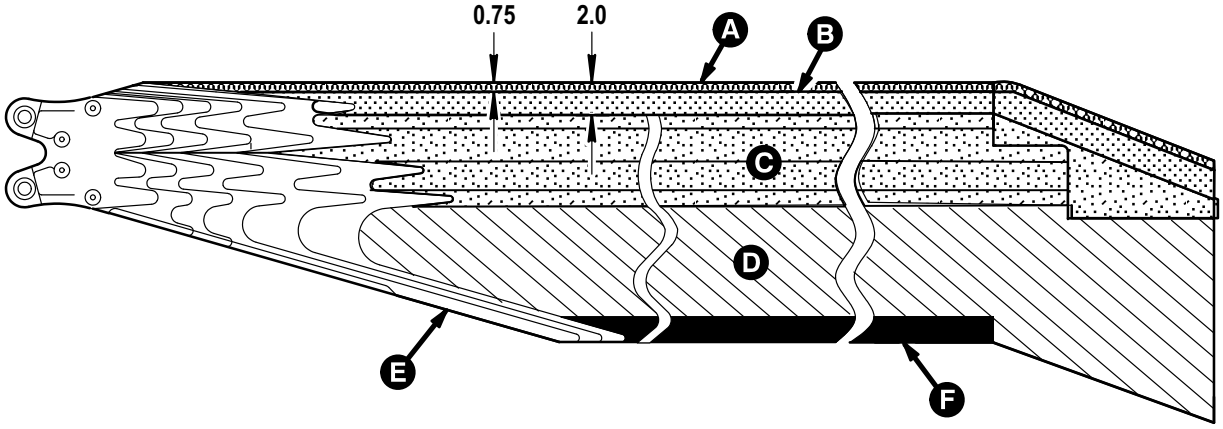


TABLE 5-2. DENTS, DEPRESSIONS, AND CREASES.

| AREA | MAXIMUM DEPTH WITHOUT REPAIR | MAXIMUM REPAIRABLE DEPTH | MAXIMUM ALLOWED AREA | MAXIMUM NUMBER OF DEFECTS | MINIMUM DISTANCE BETWEEN DEFECT CENTERS | REPAIR PARAGRAPHS |
|---|---|---|---|---|---|---|
| A | UPPER SURFACE 0.008 LOWER SURFACE 0.009 | 0.015 [4] | 0.50 x 0.50 | 3 | 10.0 | 5.5 |
| B | UPPER SURFACE 0.010 LOWER SURFACE 0.017 | 0.025 [4] | 1.25 x 1.25 | 3 | 10.0 | 5.5 |
| C | UPPER SURFACE 0.015 LOWER SURFACE 0.017 | 0.030 [4] | 1.5 x 1.5 | 0.025 | 10.0 | 5.5 |
| D | SEE TABLE 5-4 | | | | | |
| E | .020 | 0.030 | 1.5 x 1.5 | 3 | 6.0 | 5.5 |
| F | 0.010 [3] | [3] | ——— | 3 | 18.0 | 5.5 |

NOTES:

1. ALL DIMENSIONS ARE IN INCHES.
2. USE STRAIGHT EDGE AND DEPTH GAGE. NO VISIBLE DENT SHALL EXIST DURING STRAIGHT EDGE TEST. STRAIGHT EDGE SHALL ROCK SMOOTHLY WITHOUT JARRING OR CLICKING ON ALL CURVED SURFACES.

[3]. INSPECT FOR VOIDED (GAPPED) BOND LINES.

[4]. INSPECT FOR VOIDED (GAPPED) BOND LINES AND DE-ICING BLANKET ELECTRICAL CONTINUITY.

5. REPAIRS APPLY TO BOTH UPPER AND LOWER SURFACES.

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## 5.2. MAIN ROTOR BLADE REPAIR CRITERIA - continued

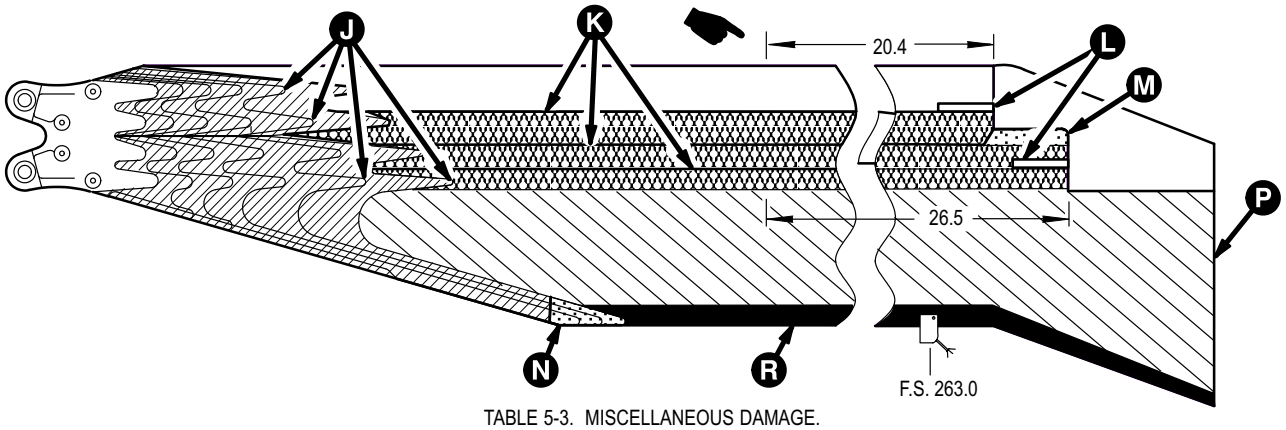


TABLE 5-3. MISCELLANEOUS DAMAGE.

| AREA | TYPE OF DAMAGE | MAXIMUM WITHOUT REPAIR | PARAGRAPH |
|---|---|---|---|
| J DOUBLERS | DOUBLER DAMAGE | NONE | 5.7 |
| K SPARS | SPAR TO SPAR DEBOND | NONE [1] [7] [10] [11] | 5.7<br>5.7A |
| L SPAR TIPS | NO. 1 & NO. 3 SPAR DEBOND | NONE [8] [9] | 5.7 |
| M NO. 2 SPAR TIP | DEBOND | NONE | [2] 5.7 |
| N AFT DOUBLER TIP | DEBOND | NONE | 5.7 |
| P GLASS SKIN AREA | SEE TABLE 5-4 | | |
| R METALLIC TRAILING EDGE | CRACKS | NONE | DEPOT ONLY |
| R METALLIC TRAILING EDGE | CREASES | 3 | 5.5 |

NOTES:

[1.] MAXIMUM 3 DEFECTS PER BLADE WITH A MINIMUM OF 18.0 INCHES BETWEEN DEFECTS.

[2.] IF NO. 2 SPAR IS CRACKED, REPAIR IS AT DEPOT ONLY.

4. ALL DIMENSIONS ARE IN INCHES.

5. STATION 263 IS STATIC WICK LOCATION.

6. REPAIRS APPLY TO BOTH UPPER AND LOWER SURFACES.

[7.] MAXIMUM REPAIR IS 10 INCHES FOR SPAR TO SPAR DEBONDS LOCATED INBOARD OF 20.4 INCHES AS MEASURED FROM OUTBOARD TIP END OF SPAR 1 TO 2 JOINT OR 26.5 INCHES AS MEASURED FROM OUTBOARD TIP END OF SPAR 2 TO 3 JOINT.

[8.] MINIMUM REPAIR IS 3 INCHES.

[9.] DEBONDING EXCEEDING THESE LIMITS IS REPAIRABLE AT DEPOT ONLY.

[10.] MAXIMUM REPAIR FOR SPAR 1 TO 2 DEBOND IS 20.4 INCHES AS MEASURED FROM THE OUTBOARD TIP END OF THE SPAR TO SPAR JOINT.

[11.] MAXIMUM REPAIR FOR SPAR 2 TO 3 AND 3 TO 4 DEBONDS IS 26.5 INCHES AS MEASURED FROM THE OUTBOARD TIP END OF THE SPAR TO SPAR JOINT.

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## 5.2. MAIN ROTOR BLADE REPAIR CRITERIA - continued

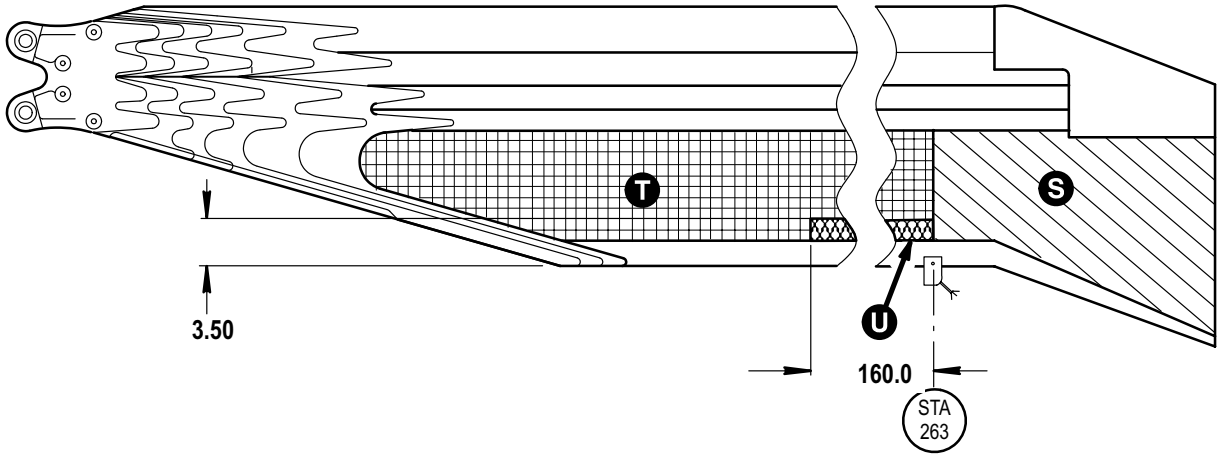


TABLE 5-4. GLASS SKIN AREA REPAIR.

| AREA | TYPE OF DAMAGE | ALLOWABLE LIMITS WITHOUT REPAIR | ALLOWABLE LIMITS WITH REPAIR [1] | REPAIR PARAGRAPH |
|---|---|---|---|---|
| S | DENTS, DEPRESSIONS AND CREASES | 3 SQ. IN. | 12 SQ. IN. | 5.5 |
| S | HOLES THROUGH SKIN | NONE | 0.25 DIA OR SMALLER | [3] [4] |
| T | DENTS, DEPRESSIONS AND CREASES | 7 SQ. IN. | 25 SQ. IN. | 5.5 |
| T | HOLES THROUGH SKIN | NONE | 0.25 DIA OR SMALLER | [3] [4] |
| U | DENTS, DEPRESSIONS AND CREASES | 160.0 INCHES SPANWISE [2] | 160.0 INCHES SPANWISE [2] | 5.5 |
| U | HOLES THROUGH SKIN | NONE | 0.25 DIA OR SMALLER | [3] [4] |

NOTES:

[1.] DAMAGE EXCEEDING THESE LIMITS IS REPAIRABLE AT DEPOT ONLY.
[2.] PROVIDED THAT CORE DAMAGE DOES NOT INTERFERE WITH TAB BENDING WHEN TRACKING BLADES.
[3.] IF THERE IS A REASON TO SUSPECT THAT WATER IS PRESENT IN THE PIERCED AREA, X-RAY MAY BE USED FOR DETERMINATION. IF WATER IS FOUND TO BE PRESENT, REPAIR AT DEPOT ONLY.
[4.] REFER TO TM 1-1500-204-23 FOR REPAIR INSTRUCTIONS.
5. ALL DIMENSIONS ARE IN INCHES.
6. REPAIRS APPLY TO BOTH UPPER AND LOWER SURFACES.

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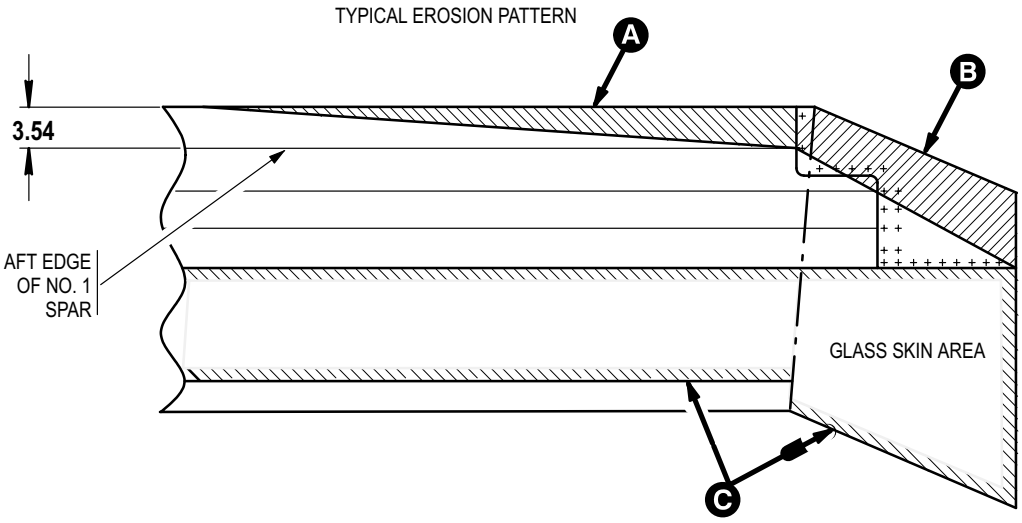
## 5.2. MAIN ROTOR BLADE REPAIR CRITERIA - continued




**A** AREA A IS SATISFACTORY WITHOUT REPAIR PROVIDED THAT BARE METAL IS NOT EXPOSED PAST THE AFT EDGE OF THE NO. 1 SPAR.
FOR REPAIR SEE PARAGRAPH 5.6.

**B** AREA B IS SATISFACTORY WITHOUT REPAIR WITHIN THE DEPICTED LIMITS UNLESS A PINK COLORED FILL-AND-FLAIR MATERIAL IS EXPOSED, IN WHICH CASE IT SHOULD BE TOUCHED UP.
FOR REPAIR SEE PARAGRAPH 5.6.

**C** AREA C (THE GLASS SKIN AREA) SHOULD NOT BE ALLOWED TO ERODE PAST THE POINT WHERE THE SKIN IS EXPOSED.
FOR REPAIR SEE PARAGRAPH 5.6.

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END OF TASK

## 5.3. MAIN ROTOR BLADE REMOVAL

5.3.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.3.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Sling set kit (item 194, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
Two persons to assist

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 1.97 | Maintenance crane installed |
| 1.100 | Crane adjustment-main rotor blade |
| 1.106 | Main rotor blade tiedown installed |
| 1.112 | Main rotor blade adapter installed |
| 1.83 | Droop stop wedges installed |

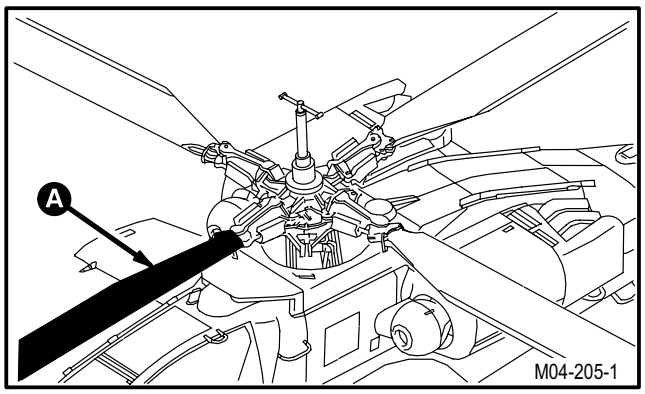
**Materials/Parts:**

Cloth (item 52, App F)
Corrosion preventive compound (item 63, App F)
Cotton gloves (item 82, App F)

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




**CAUTION**

Main rotor blades are individually calibrated to de-icing system controller. When removing main rotor blades, record blade serial number and power distributor connector number to ensure installation at same position. Incorrect de-ice system adjustment will cause damage to heater elements.

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## 5.3. MAIN ROTOR BLADE REMOVAL - continued

5.3.3. Removal

**NOTE**

- If blade is to be replaced, remove balance weights from blade root and install on replacement blade.
- If TB 1-1520-238-20-62 (Deactivation of Main Rotor and Tail Rotor Blade De-ice Capability) is complied with, then step a. should have been complied with. If not, perform step a.

a. **On the pilot aft circuit breaker panel, disable de-ice system by opening BLADE DE-ICE and BLADE DE-ICE CONTR circuit breakers.** Install wire tie to prevent reactivation.

b. **Position main rotor blade (1) to be removed over forward fuselage.**

c. **Lock rotor brake** (para 1.62)**.**

d. **Remove lockwire from power distributor connector P1, P2, P3, or P4 (2).**

e. **Detach connector P1, P2, P3, or P4 (2) from heater element receptacle J1 (3) on blade (1).**

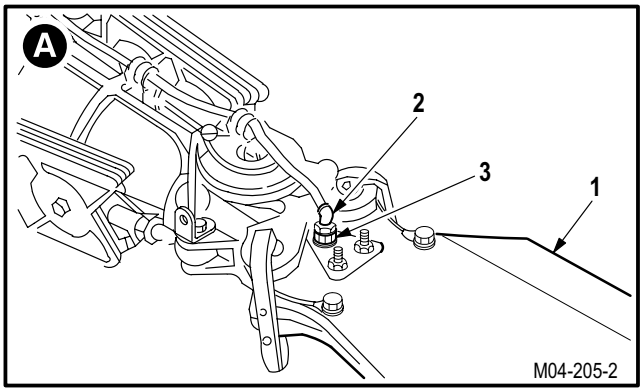
f. **Record blade serial number and connector number if removing blade for other maintenance.**

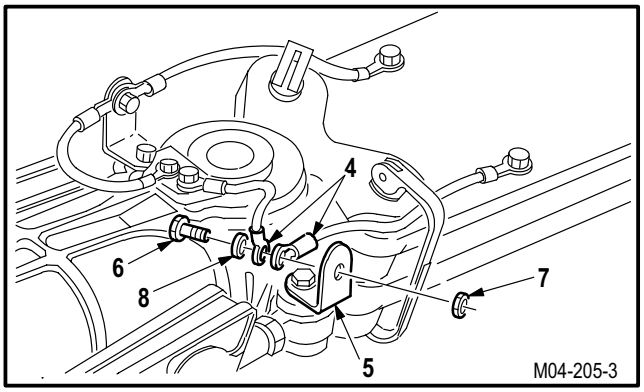
g. **Remove two electrical leads (4) from angle bracket (5).**

(1) Hold bolt (6) and remove nut (7).

(2) Remove bolt (6), washer (8), and leads (4).

(3) Temporarily install bolt (6), washer (8), and nut (7) for storage.

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## 5.3. MAIN ROTOR BLADE REMOVAL - continued

**CAUTION**

To prevent damage to main rotor blade, ensure rubber padding is secured to sling. Padding should be approximately 3/16 inch thick and undamaged.

h. **Position crane hook (9) in lifting ring (10).**

**CAUTION**

Prior to installation of main rotor blade sling assembly, ensure that the eye bolt (TM 1-1520-238-23P, Fig 731, Item 46) is secure in the sleeve nut (Item 35).

i. **Install main rotor blade sling (11).** Use sling set kit.

(1) Rotate two knurled knobs (12) clockwise to open jaws (13).

(2) Position sling (11) on leading edge of blade (1) with maintenance crane.

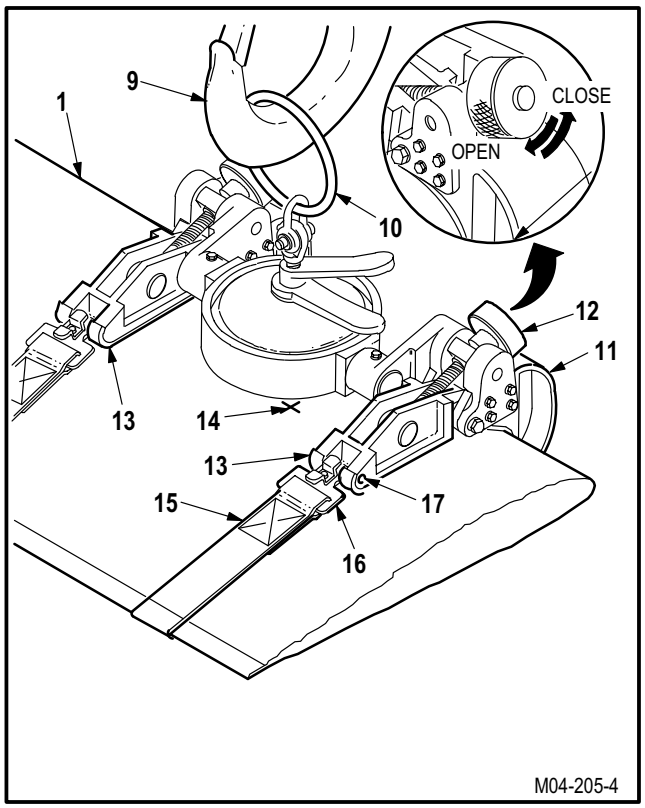
(3) Position center-of-gravity (CG) indicator (14) approximately midway between jaws (13).

(4) Aline sling (11) with CG indicator (14) on blade (1).

(5) Position two straps (15) around blade trailing edge.

(6) Rotate two knobs (12) counterclockwise to close jaws (13) around blade trailing edge.

(7) Attach two spring clips (16) to two bolts (17).

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## 5.3. MAIN ROTOR BLADE REMOVAL - continued

**WARNING**

**If hoisted components are allowed to fall, personnel can suffer injury or death. Keep away from component mounting surfaces and loaded crane boom. If injury occurs, seek medical aid.**

**CAUTION**

Do not lift main rotor blade. Damage to blade and main rotor head can occur.

**NOTE**

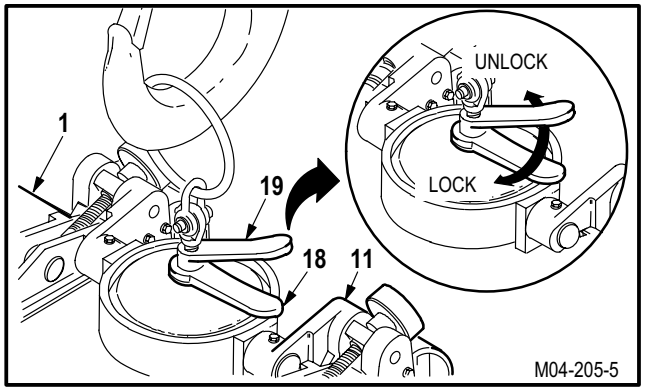
Locking spherical bearing on sling allows main rotor blade position adjustment ±15 degrees in any direction to ensure proper removal/installation angle.

j. **Adjust position of sling (11) for blade removal.**

(1) Hold torque handle (18). Move clamp handle (19) counterclockwise to release bearing.

(2) Take up slack in sling (11), but do not lift blade (1).

(3) Hold torque handle (18). Move clamp handle (19) clockwise to lock bearing.

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## 5.3. MAIN ROTOR BLADE REMOVAL - continued

**WARNING**

**Keep fingers and hands away from the lead lag link. The main rotor blade could move after the pins are removed. A sudden blade movement could sever or crush fingers or hands. If injury occurs, seek medical aid.**

**CAUTION**

To prevent damage to the attaching pin when not installed on the aircraft, ensure that the spring clip is disengaged.

**NOTE**

Wear clean gloves (item 82, App F) when handling lead lag link.

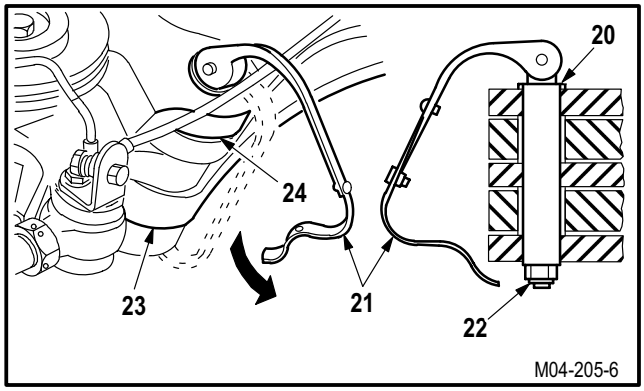
k. **Unlatch and remove attaching pin (20).**

(1) Push down on spring clip (21) to remove from nut (22).

(2) Lift spring clip (21) out and away.

(3) Move two pins (20) up until free of blade root (23) and lead lag link (24).

(4) Use crane to relieve grip pressure on blade root (23).




l. **Install blade on handling adapter** (para 1.83)**.**

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## 5.3. MAIN ROTOR BLADE REMOVAL - continued

**WARNING**

**Release tension on maintenance crane cable before removing the blade sling. If tension is not released, serious injury could occur. If injury occurs, seek medical aid.**

**CAUTION**

Do not damage main rotor blade trailing edge tabs during removal of main rotor blade sling.

m. **Remove sling (11).**

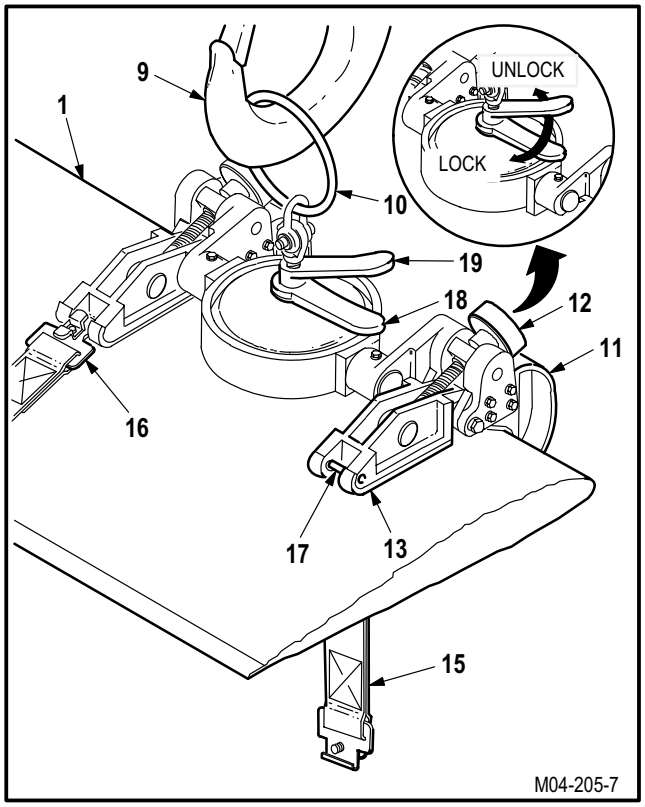
(1) Hold torque handle (18). Move clamp handle (19) counterclockwise to release bearing.

(2) Rotate two knobs (12) clockwise to open jaws (13).

(3) Pull two spring clips (16) and detach two straps (15) from bolts (17).

(4) Use crane to remove sling (11) from blade (1).

(5) Remove hook (9) from ring (10).

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**5.3. MAIN ROTOR BLADE REMOVAL - continued**

5.3.4. Cleaning

a. **Wipe lead lag link blade root and pin.** Use cloth (item 52, App F).

b. **Apply corrosion preventive compound on adjustment nut and threads of attaching pins.** Use corrosion preventive compound (item 63, App F)**.**

5.3.5. Inspection

a. **Check blade, especially trailing edge tab and where sling was installed, for damage** (para 5.2)**.**

b. **Check lead lag link** (para 5.33) **and blade root attaching holes for excessive wear, scratches, and hole elongation.** None allowed.

c. **Check pins for corrosion** (para 1.49)**.**

(1) Maximum **0.010 INCH** on handle, maximum **0.001 INCH** elsewhere.

d. **Check lead lag link** (para 5.33) **and blade root** (para 5.2) **for corrosion** (para 1.49)**.**

e. **Check main rotor damper elastomeric material for tears or delamination** (para 5.1)**.**

END OF TASK

## 5.4. MAIN ROTOR BLADE INSTALLATION

5.4.1. Description

This task covers: Installation.

5.4.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Sling set kit (item 194, App H)
Multimeter (item 215, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 100 pound spring resiliency tester (item 352, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**Materials/Parts:**

Tag lines
Cotton gloves (item 82, App F)
Lubricant (item 114, App F)
Wire (item 222, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
Two persons to assist
68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 1.97 | Maintenance crane installed |
| 1.100 | Crane adjustment - main rotor blade |
| 1.106 | Main rotor blade tiedown installed |
| 1.83 | Droop stop wedges installed |

**WARNING**

**FLIGHT SAFETY PART**

- **The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **If hoisted components are allowed to fall, personnel can suffer injury or death. Keep away from component mounting surfaces and loading crane boom. If injury occurs, seek medical aid.**

**CAUTION**

- Main rotor blades are individually calibrated to de-icing system controller. The de-icing system controller shall be adjusted any time blades are not installed in same position as removed. Incorrect de-ice system adjustment will cause damage to heater elements.
- AVIBANK main rotor attach pins with a vendor part number 53460 are **not authorized** for use. Any pin where the part number cannot be determined should be discarded.

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## 5.4. MAIN ROTOR BLADE INSTALLATION - continued

5.4.3. Installation

**NOTE**

- If blade being installed is a replacement blade, balance weights from removed blade must be installed on replacement blade.
- Blades determined to have inoperable de-ice shall be re-identified by vibro-etching an additional letter “A” or -A after the part number. Upon reidentification a stencil with 2 inch letters marking “**BLADE DE-ICE INOPERABLE**” is required on top and bottom of the blades.
- If TB 1-1520-238-20-62 (Deactivation of Main Rotor and Tail Rotor Blade De-ice Capability) is complied with, then step a. should have been complied with. If not, perform step a.
- A maintenance test flight is not required when flight characteristics are normal and blades have been removed for inspection or shipment, have not been abused or damaged, required no adjustments or replacement and are reinstalled in their original positions and location.

a. **On the pilot aft circuit breaker panel, disable de-ice system by opening BLADE DE-ICE and BLADE DE-ICE CONTR circuit breakers.** Install wire tie to prevent reactivation.

b. **Inspect blade (1) for loose blade root fitting bushings (2).** None allowed.

c. **Attach crane hook (3) to main rotor sling (4) lifting ring (5).** Use sling set kit.

**CAUTION**

To prevent damage to main rotor blade, ensure rubber padding is secured to sling. Padding should be approximately 3/16 inch thick and undamaged. Use care when installing sling on base.

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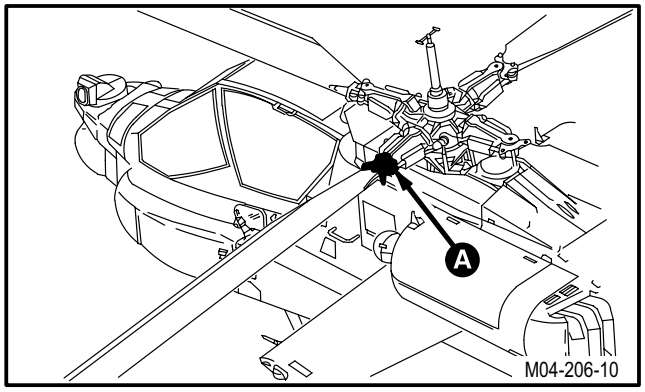
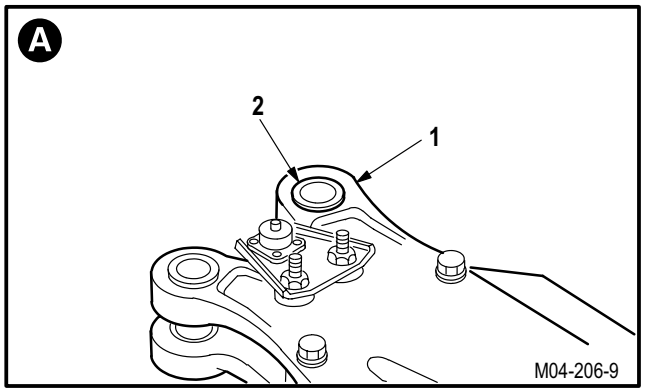
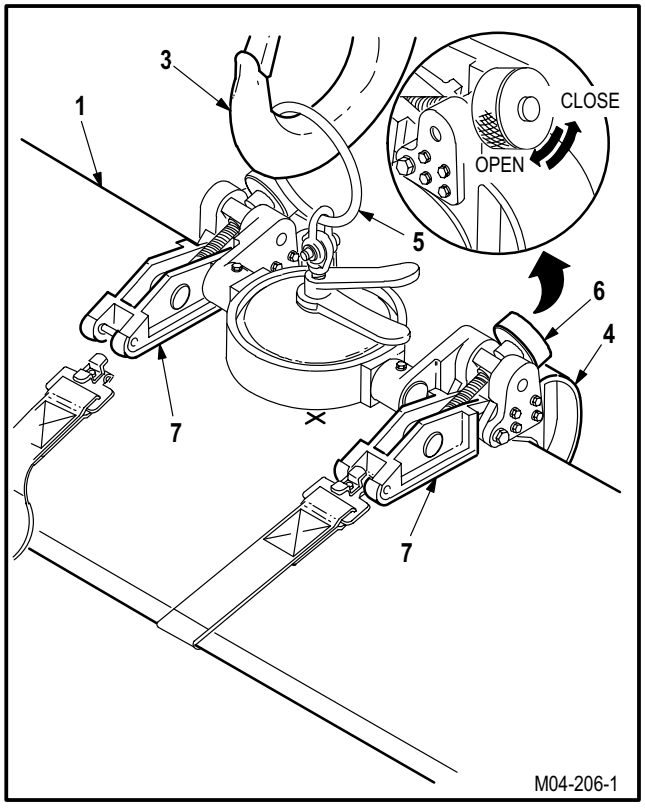


## 5.4. MAIN ROTOR BLADE INSTALLATION - continued

d. **Install sling (4) on blade (1).**

(1) Rotate two knurled knobs (6) clockwise to open jaws (7).

(2) Use crane to position sling (4) on leading edge of blade (1).

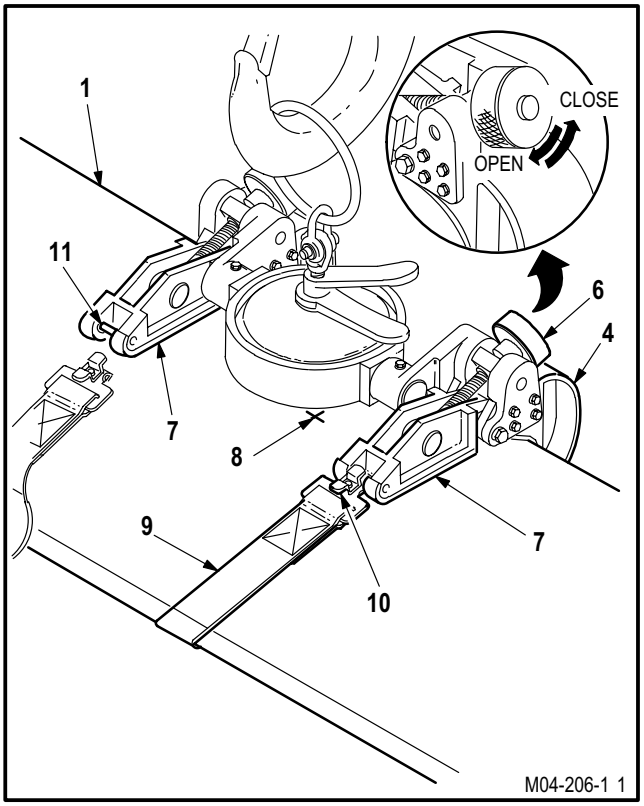
(3) Position center-of-gravity (CG) indicator (8) approximately midway between jaws (7).

(4) Aline sling (4) with CG indicator (8) on blade (1).

(5) Position two straps (9) around blade (1) trailing edge.

(6) Rotate two knobs (6) counterclockwise to close jaws (7) around blade (1).

(7) Attach two spring clips (10) to two bolts (11).




**WARNING**

**If hoisted components are allowed to fall, personnel can suffer injury or death. Keep away from component mounting surfaces and loading crane boom. If injury occurs, seek medical aid.**

**NOTE**

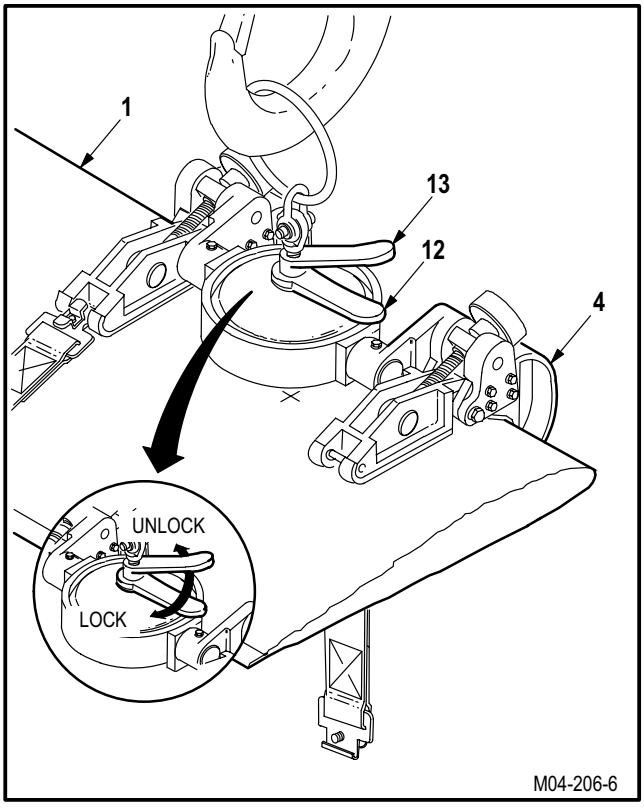
Locking spherical bearing on sling allows blade position adjustment ±15 degrees in any direction to ensure proper removal/ installation angle.

e. **Use sling (4) to position blade (1) at proper installation attitude.**

(1) Hold torque handle (12) and remove clamp handle (13) counterclockwise to release bearing.

(2) Position blade (1) as required.

(3) Hold torque handle (12) and move clamp handle (13) clockwise to lock bearing.




f. **Install tag line to hub end of blade (1).**

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## 5.4. MAIN ROTOR BLADE INSTALLATION - continued

**NOTE**

- If blade was removed for other maintenance, note connector number and blade serial number recorded during removal. Install in same position.
- Wear clean gloves (item 82, App F) when handling lead lag link.

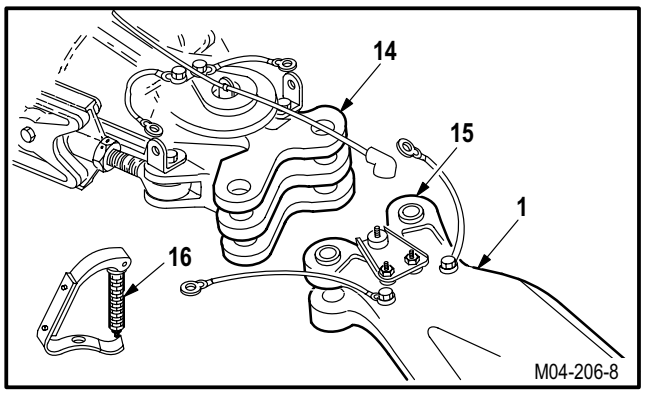
g. **Install blade (1).**

(1) Use tag lines to position and guide blade (1) in main rotor blade lead lag link (14).

(2) Aline holes in link (14) with holes in blade root (15).

(3) Insert main rotor blade pin (16) through link (14) and root (15).

(4) Move pin (16) up or down to maintain a gap of **0.002** to **0.060 INCH** between link (14) and bottom of pin washer (17).



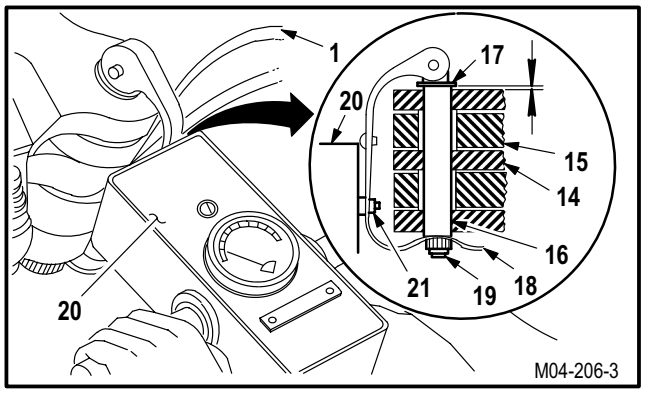

**NOTE**

When measuring or adjusting spring clip tension, blade must be supported so there will be a minimal load on the pin.

h. **Latch clip (18) over nut (19) at bottom of pin (16).**

(1) Aline spring tester (20) with clip (18) and lower rivet (21). Use spring tester.

(2) Push spring tester (20) against rivet (21) until clip (18) latches over nut (19).




**NOTE**

If **50 to 60 POUNDS** closing force is not indicated, adjust nut to required tension and repeat step h.

(3) Check for gap of **0.002 to 0.060 INCH** between link (14) and pin washer (17) after adjusting and closing clip (18). Repeat step h.

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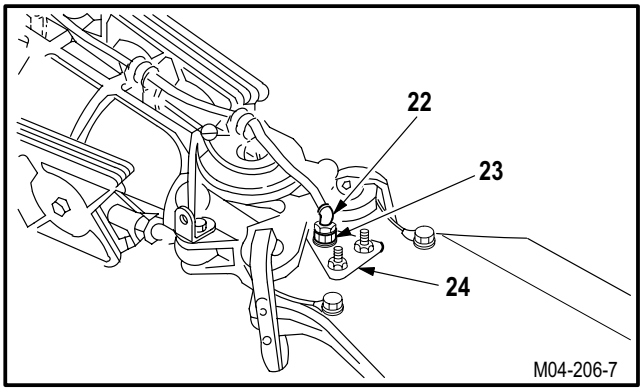
## 5.4. MAIN ROTOR BLADE INSTALLATION - continued

i. **Attach power distributor connector P1, P2, P3, and P4 (22) to receptacle J1 (23).**




j. **Lockwire connector (22) to electrical bracket (24).** Use wire (item 222, App F).

**NOTE**

Allow lubricated hardware to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (65.6 °C).

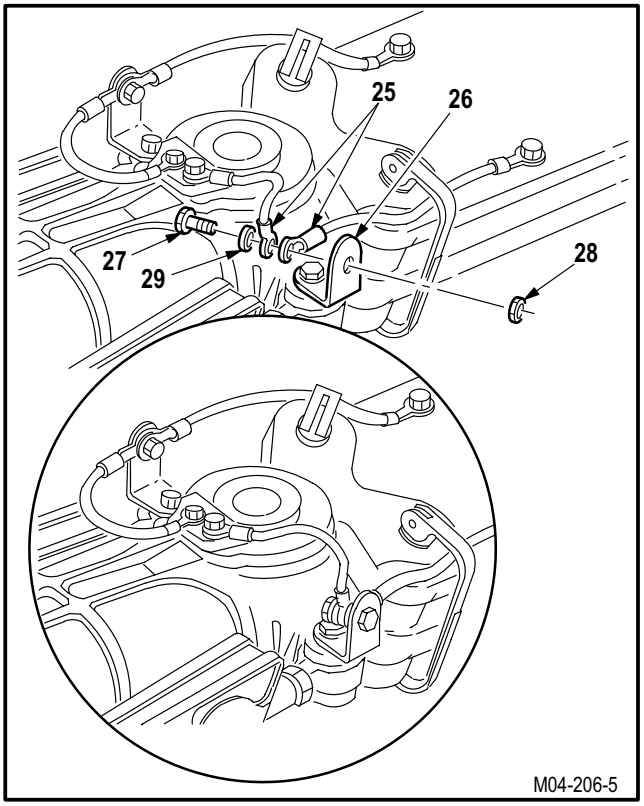
k. **Connect two electrical leads (25) to angle bracket (26).** Torque bolt (27) to **75 INCH-POUNDS**.

(1) Lubricate bolt (27) and nut (28). Use lubricant (item 114, App F).

(2) Install bolt (27) through washer (29), two leads (25), and bracket (26).

(3) Install nut (28) on bolt (27).

(4) Hold nut (28) and torque bolt (27) to **75 INCH-POUNDS**. Use torque wrench.




l. **Perform electrical bond check on electrical leads (25)** (TM 55-1500-323-24)**.**

(1) Bond shall be **0.1 OHM** or less. Use multimeter.

**NOTE**

If installing a new blade, connect electrical lead between blade and pitch housing (para 5.31).

m. **Inspect (QA).**

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## 5.4. MAIN ROTOR BLADE INSTALLATION - continued

**WARNING**

**Release tension on maintenance crane cable before removing sling. If tension is not released, serious injury may occur. If injury occurs, seek medical aid.**

**CAUTION**

Do not damage blade trailing edge tabs during while removing sling.

n. **Remove sling (4).**

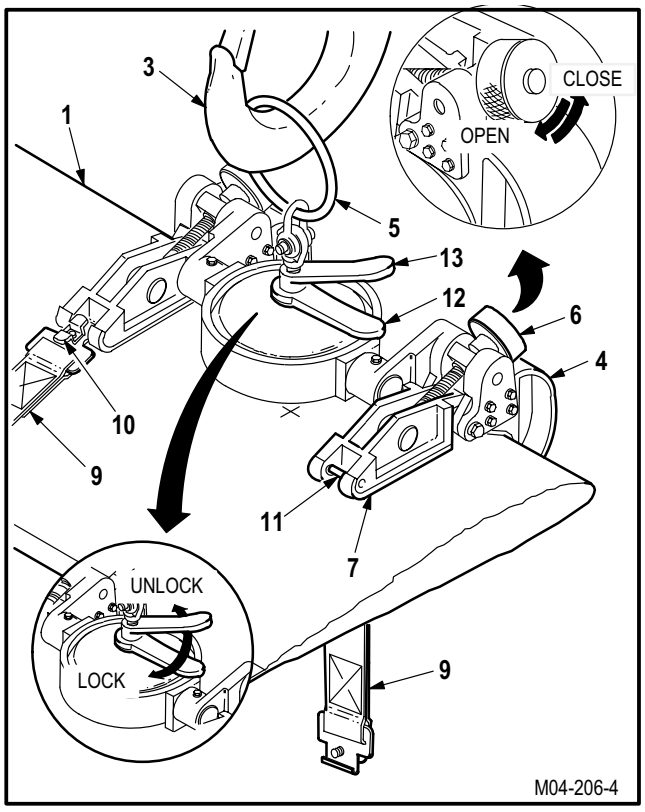
(1) Hold torque handle (12) and move clamp handle (13) counterclockwise to release bearing.

(2) Pull two clips (10) and detach two straps (9) from bolts (11).

(3) Rotate two knobs (6) clockwise to open jaws (7).

(4) Use crane to lower sling (4) from blade (1) to ground.

(5) Remove crane hook (3) from lifting ring (5).

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**5.4. MAIN ROTOR BLADE INSTALLATION - continued**

o. **Remove droop stop wedges** (para 1.83)**.**

p. **Inspect main rotor blade** (para 5.2)**.**

q. **Remove main rotor blade tiedown** (para 1.107)**.**

r. **Remove maintenance crane from aircraft** (para 1.105)**.**

s. **Inspect (QA).**

**CAUTION**

If TB 1-1520-238-20-62 (Deactivation of Main Rotor and Tail Rotor Blade De-ice Capability) is complied with, do not perform step t. and u. Go to step v.

t. **On the pilot aft circuit breaker panel, enable de-ice system by closing BLADE DE-ICE and BLADE DE-ICE CONTR circuit breakers.** Remove wire tie to reactivate.

u. **Adjust de-ice system controller** (para 12.56)**.**

v. **Perform main rotor track and balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.5. MAIN ROTOR BLADE DENT, DEPRESSION, AND CREASE REPAIR (AVIM)

5.5.1. Description

This task covers: Repair.

5.5.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 1, App F)
Brush (item 34, App F)
Cloth (item 51, App F)
Methyl ethyl ketone (item 124, App F)
Naphtha (item 127, App F)
Paper (item 133, App F)
Paper (item 135, App F)
Primer (item 143, App F)
Thinner (item 211, App F)

**References:**

TM 1-1520-238-T
TM 55-1500-345-23

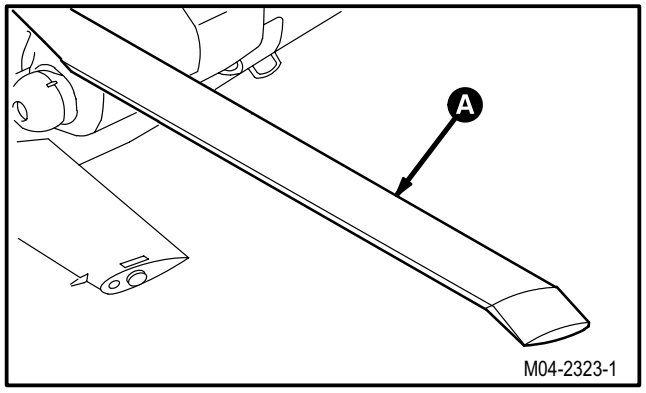
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.5. MAIN ROTOR BLADE DENT, DEPRESSION, AND CREASE REPAIR (AVIM) - continued

5.5.3. Repair

**CAUTION**

To prevent damage to main rotor blade, sand metallic surfaces in a spanwise direction and sand glass skin surfaces in a chordwise direction.

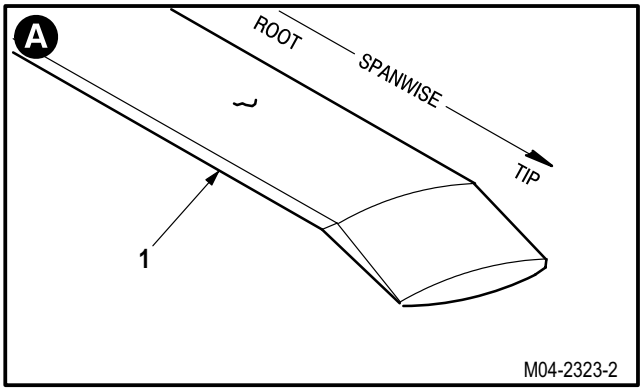
a. **Sand spanwise to remove paint from main rotor blade (1) dents, depressions, creases, and surrounding area.** Use paper (item 133, App F).

b. **Sand spanwise to finish sand blade (1) surface.** Use paper (item 135, App F).

c. **Wipe blade (1) surface clean.** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

d. **Brush an even coat of primer on blade (1) dents, depressions, creases, and surrounding area.** Use brush (item 34, App F) and primer (item 143, App F).

(1) Allow primer to dry at room temperature **1 HOUR**.

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## 5.5. MAIN ROTOR BLADE DENT, DEPRESSION, AND CREASE REPAIR (AVIM) - continued

e. **Spread adhesive over blade (1) repair.**

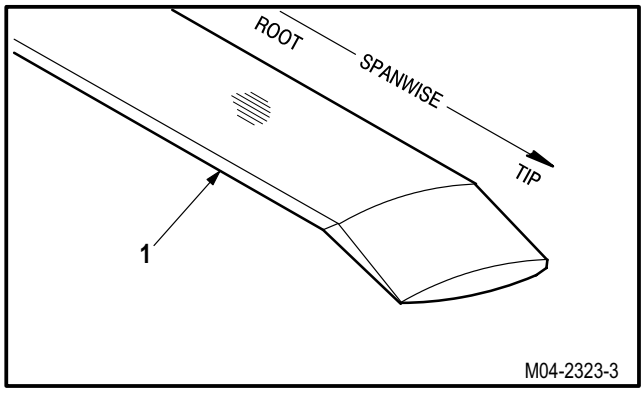
(1) Blend compound to surrounding skin surface. Use putty knife and adhesive (item 1, App F).

(2) Allow compound to dry at room temperature for **24 HOURS**.

f. **Sand dried adhesive on blade (1) in spanwise direction.** Use paper (item 133, App F).

g. **Finish sanding dried adhesive on blade (1) in appropriate direction.** Use paper (item 135, App F).

h. **Wipe blade (1) clean.** Use methyl ethyl ketone (item 124, App F), naphtha (item 127, App F), or thinner (item 211, App F), and cloth (item 52, App F).




**CAUTION**

Rotor blades are not to be repainted over the entire surface of blade. Only light touch up of the eroded or repaired area is allowed. Severe chordwise imbalance problems may result from repainting blade.

i. **Spot prime and paint blade (1) repair and surrounding area** (TM 55-1500-345-23)**.**

j. **Inspect (QA).**

k. **Perform main rotor track and balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.6. MAIN ROTOR BLADE SCRATCH, NICK, OR GOUGE REPAIR

5.6.1. Description

This task covers: Repair.

5.6.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Spray gun paint cup (item 102, App H)
0.000 - 0.125-inch dial indicator depth gage (item 145, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Paint spray gun (item 339, App H)

**Materials/Parts:**

Cloth (item 51, App F)
Epoxy primer coating kit (item 78, App F)
Methyl ethyl ketone (item 124, App F)
Naphtha (item 127, App F)
Paper (item 133, App F)
Paper (item 135, App F)
Polyurethane coating (item 140, App F)
Thinner (item 211, App F)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T
TM 55-1500-345-23

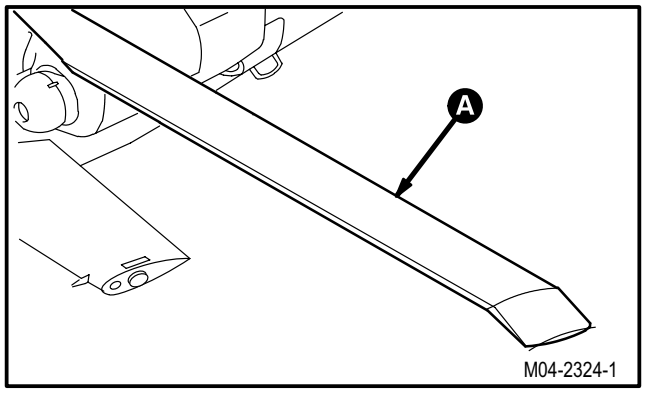
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.6. MAIN ROTOR BLADE SCRATCH, NICK, OR GOUGE REPAIR - continued

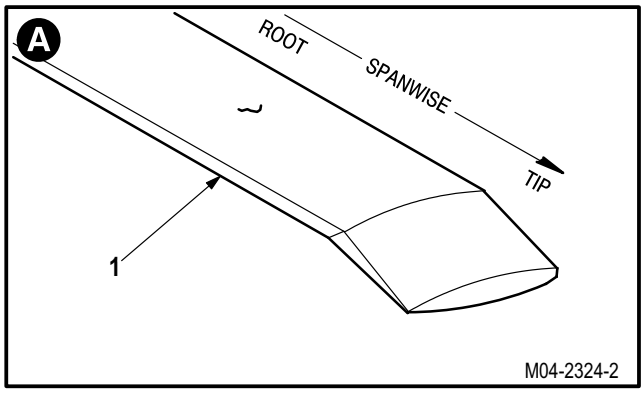
5.6.3. Repair

**CAUTION**

Spanwise sanding applies to the metallic area only. The glass skinned area should be sanded chordwise.

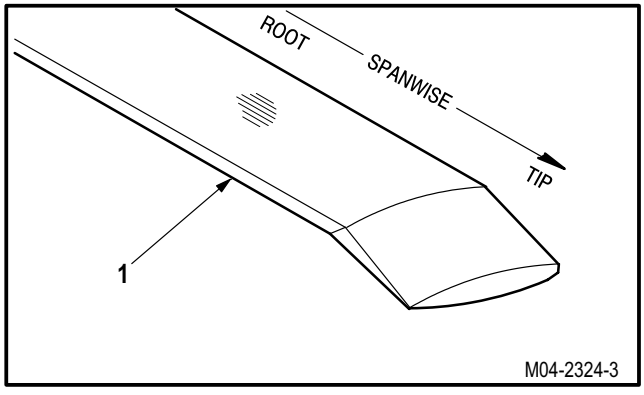
a. **Remove scratches, nicks, or gouges from main rotor blade (1) by locally sanding damaged area in a spanwise direction.**

(1) Blend and feather damage into surrounding area. Use paper (item 133, App F).




b. **Remove any remaining sanding marks and finish blending damaged area by sanding in a a spanwise direction.** Use paper (item 135, App F).

c. **Wipe reworked area clean.** Use methyl ethyl ketone (item 124, App F), naphtha (item 127, App F), or thinner (item 211, App F), and cloth (item 52, App F).




d. **Inspect repaired area.**

(1) Check that all damage is removed and no sanding marks remain (para 5.2).

(2) Check that depth of repair does not exceed limits of Table 1 (para 5.2). Use depth gage.

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**5.6. MAIN ROTOR BLADE SCRATCH, NICK, OR GOUGE REPAIR - continued**

**CAUTION**

Rotor blades are not to be repainted over entire surface of blade. Only light touchup of eroded or repaired area is allowed. Severe chordwise imbalance problems may result from repainting blade.

e. **Refinish reworked area.**

(1) Spray a full, even coat of primer on reworked area (TM 55-1500-345-23). Use epoxy primer coating kit (item 78, App F), spray gun, and paint cup.

(2) Feather primer into existing painted surfaces.

(3) Allow primer to air dry for at least **1 HOUR**.

(4) Spray a full, even coat of polyurethane coating on reworked area (TM 55-1500-345-23). Use polyurethane coating (item 140, App F), spray gun, and paint cup.

(5) Feather edges into the existing surfaces.

(6) Allow polyurethane coating to air dry at least **3 HOURS**.

f. **Inspect (QA).**

g. **Perform main rotor track and balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.7. MAIN ROTOR BLADE DEBONDED DOUBLER OR SPAR REPAIR (AVIM)

5.7.1. Description

This task covers: Doubler Repair. Spar Repair.

5.7.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Air blow gun (item 158, App H)
8-ounce hand sealant gun (item 160, App H)
Adjustable air filtering respirator (item 262, App H)
9-inch pinking shears (item 287, App H)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 1, App F)
Adhesive (item 2, App F)
Brush (item 34, App F) (2)
Cloth (item 51, App F)
Cloth (item 52, App F)
Cloth (item 56, App F)
Methyl ethyl ketone (item 124, App F)
Paper (item 133, App F)
Paper (item 135, App F)
Wax pencil (item 137, App F)
Primer (item 144, App F)
Syringe (item 195, App F)

**References:**

TM 55-1500-345-23

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**CAUTION**

Spanwise sanding applies to the metallic area only. The glass skinned area should be sanded chordwise.

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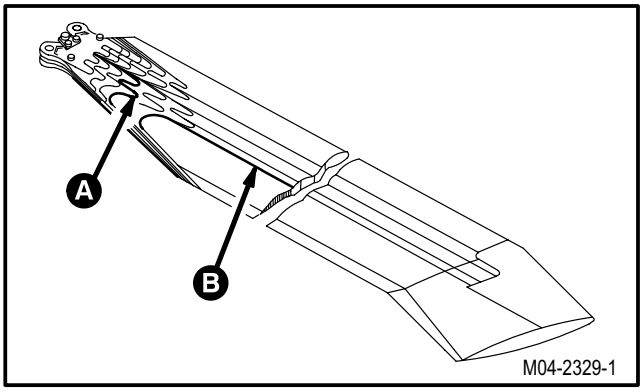
## 5.7. MAIN ROTOR BLADE DEBONDED DOUBLER OR SPAR REPAIR (AVIM) - continued

5.7.3. Doubler Repair

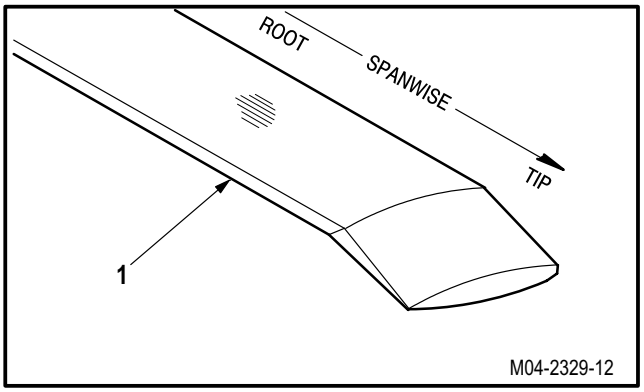
a. **Check main rotor blade (1) for cracks** (para 5.1)**.**

b. **Check doubler (2) for debonded area.**

(1) Tap edge of a coin held between thumb and forefinger on main blade (1) and doubler (2). A bonded spot will have a sharp ring. A debonded spot will have a dull sound.

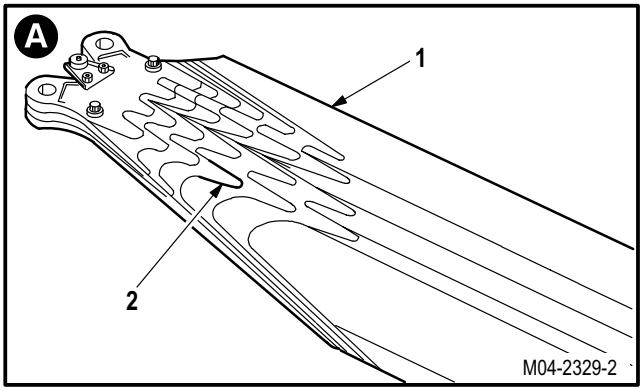



c. **Mark area of doubler (2) to be repaired.**




d. **Sand spanwise to remove paint from debonded doubler (2) and surrounding area.** Use paper (item 133, App F).

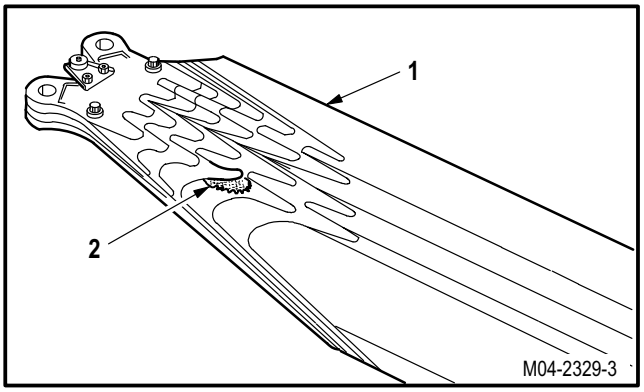
e. **Sand spanwise to finish sand doubler (2) surface.** Use paper (item 135, App F).




f. **Lift debonded doubler (2) just high enough to remove existing loose cured adhesive.**

(1) Scuff sand surface of remaining adhesive. Use paper (item 133, App F) and paper (item 135, App F).

g. **Remove loose scale, chips, and dust between mating surface of blade (1) and debonded doubler (2).**




h. **Brush and wipe between mating surface of blade (1) and debonded doubler (2).** Use brush (item 34, App F) and methyl ethyl ketone (item 124, App F).

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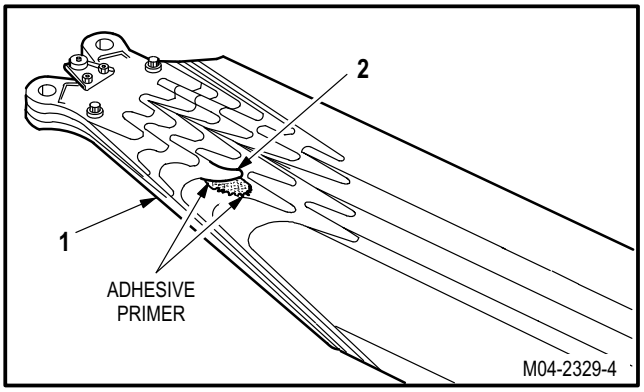
## 5.7. MAIN ROTOR BLADE DEBONDED DOUBLER OR SPAR REPAIR (AVIM) - continued

(1) Wipe dry. Use cloth (item 51, App F).

i. **Prime cleaned area** (TM 55-1500-345-23)**.** Use primer (item 144, App F) and air blow gun.

(1) Allow primer to dry at room temperature **1 HOUR**.

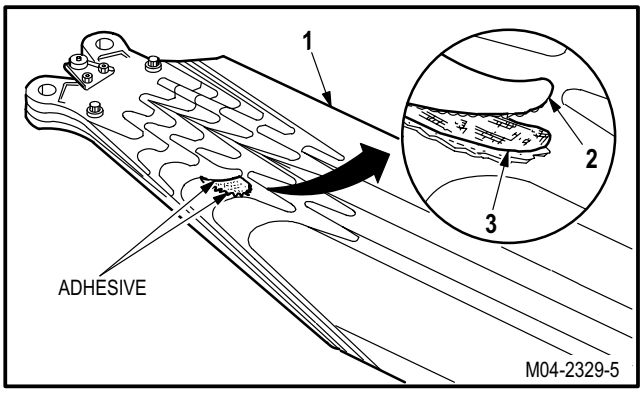
j. **Brush an even coat of adhesive between blade (1) and debonded doubler (2).** Use brush (item 34, App F) and adhesive (item 2, App F).




k. **Cut a piece of cloth (3) to size and shape of debonded doubler (2).** Use cloth (item 56, App F) and shears.

l. **Impregnate cloth (3) with adhesive.** Use adhesive (item 2, App F).

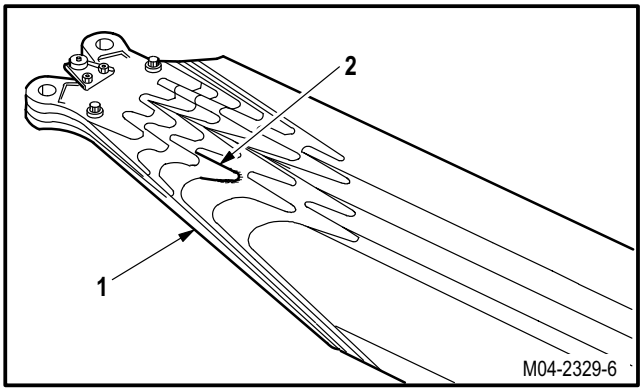
m. **Place impregnated cloth (3) between blade (1) and debonded doubler (2).**




n. **Press debonded doubler (2) against blade (1).**

(1) Apply only necessary pressure to hold doubler (2) against blade (1). Hold with tape if necessary.

o. **Wipe excess adhesive from blade (1).** Use cloth (item 52, App F).

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## 5.7. MAIN ROTOR BLADE DEBONDED DOUBLER OR SPAR REPAIR (AVIM) - continued

p. **Allow adhesive to cure at room temperature for 24 HOURS.**

q. **Sand adhesive on blade (1) in a spanwise direction.** Use paper (item 133, App F).

r. **Sand finish adhesive on blade (1) in a spanwise direction.** Use paper (item 135, App F).

s. **Wipe blade (1) clean.** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

t. **Check repaired debonded doubler (2).**

(1) Tap edge of a coin held between thumb and forefinger on doubler (2). A bonded spot will have a sharp ring. A debonded spot will have a dull sound.

u. **Fill and flair cavity between blade (1) and repaired doubler (2).** Use adhesive (item 1, App F) and sealant gun.

v. **Allow compound to dry at room temperature for 24 HOURS.**

5.7.4. Spar Repair

a. **Check spar (4) for debonded area.**

(1) Tap edge of a coin held between thumb and forefinger on main blade (1) and spar (4). A bonded spot will have a sharp ring. A debonded spot will have a dull sound.

b. **Mark area of spar (4) to be repaired.** Use wax pencil (item 137, App F).

c. **Sand spanwise to remove paint from debonded spar (4) and surrounding area.** Use paper (item 133, App F).

d. **Sand spanwise to finish sand spar (4) surface.** Use paper (item 135, App F).

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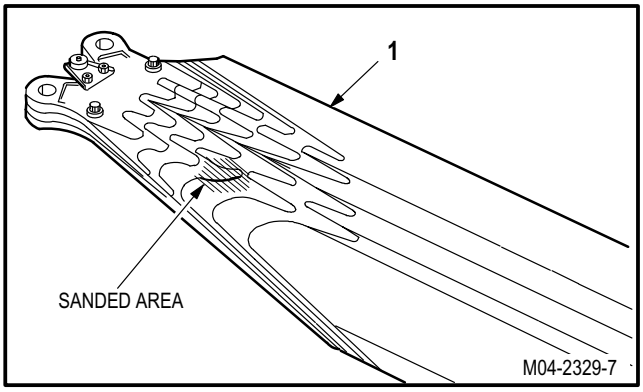
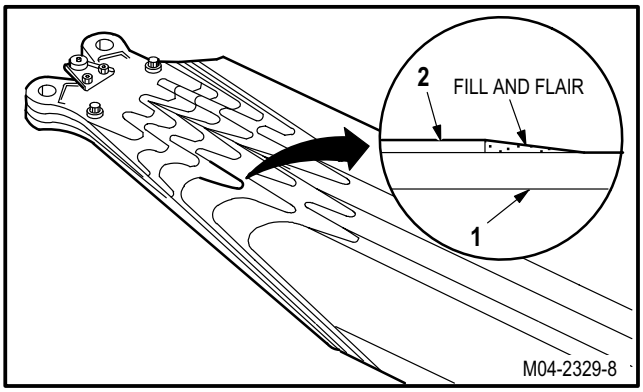
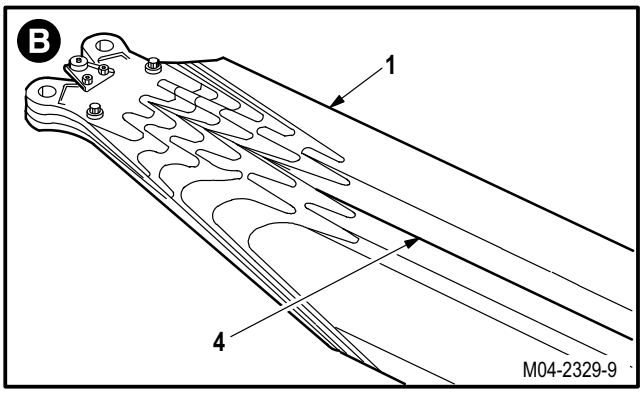
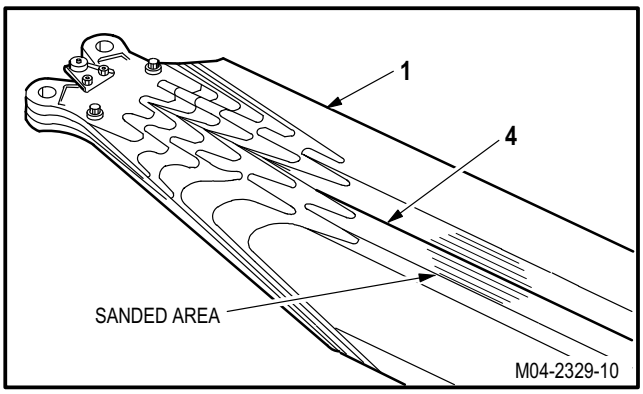


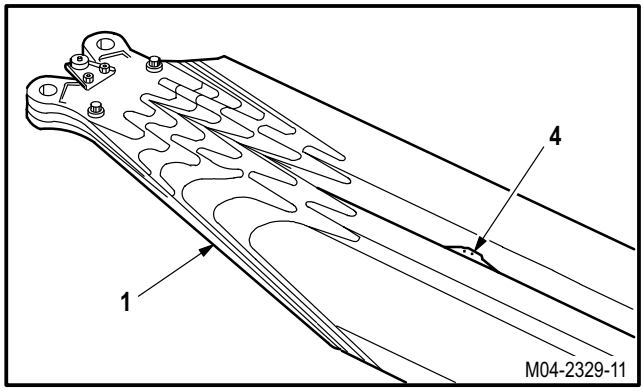



## 5.7. MAIN ROTOR BLADE DEBONDED DOUBLER OR SPAR REPAIR (AVIM) - continued

e. **Lift debonded spar (4) just high enough to remove existing loose adhesive.**

(1) Scuff sand both surfaces. Use paper (item 133, App F) and paper (item 135, App F).

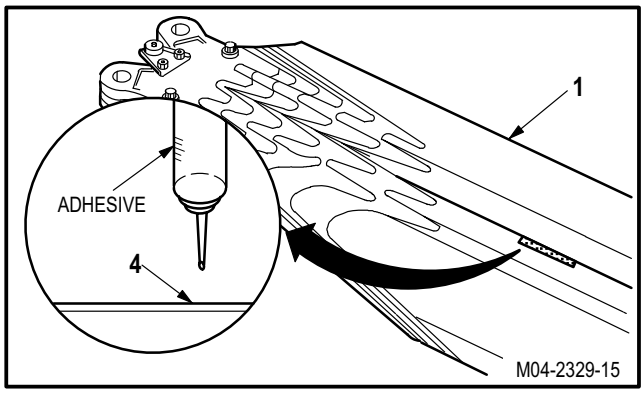



f. **Remove loose scale, chips, and dust between mating surfaces of blade (1) and debonded spar (4).**

g. **Clean mating surfaces between blade (1) and debonded spar (4).** Use brush (item 34, App F) and methyl ethyl ketone (item 124, App F).

h. **Prime cleaned area** (TM 55-1500-345-23)**.** Use primer (item 144, App F) and air blow gun.

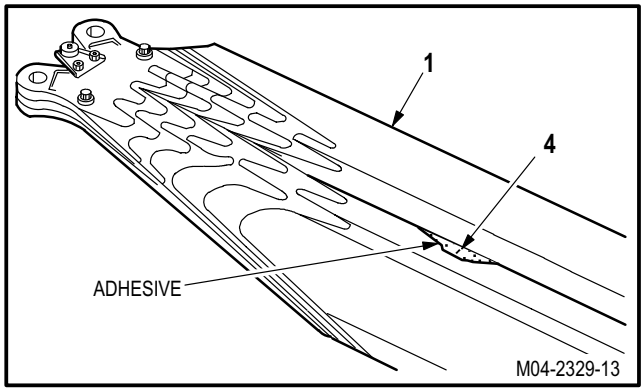
(1) Allow primer to dry at room temperature **1 HOUR**.




i. **Inject adhesive between mating surfaces of blade (1) and debonded spar (4).** Use adhesive (item 2, App F) and syringe (item 195, App F).

j. **Press debonded spar (4) against blade (1).**

(1) Apply only necessary pressure to hold spar (4) against blade (1).




k. **Wipe excess adhesive from blade (1).** Use cloth (item 52, App F).

l. **Allow adhesive to cure at room temperature for 24 HOURS.**

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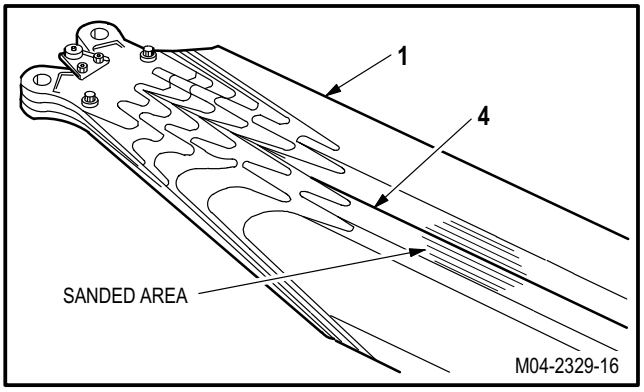
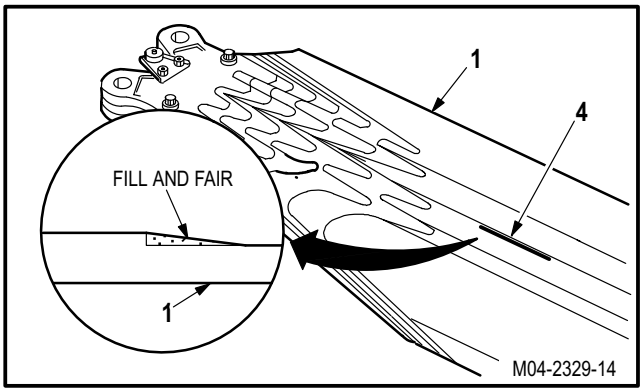
## 5.7. MAIN ROTOR BLADE DEBONDED DOUBLER OR SPAR REPAIR (AVIM) - continued

m. **Wipe blade (1) clean.** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).




n. **Check repaired debonded spar (4).**

(1) Tap a coin held between thumb and fore finger on blade (1). A bonded spot will have a sharp ring. A debonded spot will have a dull sound.



o. **Fill and flair cavity between blade (1) and repaired spar (4).** Use adhesive (item 1, App F).

(1) Allow adhesive to dry at room temperature **24 HOURS**.

**CAUTION**

Rotor blades are not to be repainted over the entire surface of blade. Only light touchup of the eroded or repaired area is allowed. Severe chordwise imbalance problems may result from repainting blade.

p. **Spot prime and paint blade (1) repair and surrounding area** (TM 55-1500-345-23)**.**

q. **Inspect (QA).**

END OF TASK

## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM)

5.7A.1. Description

This task covers: Inspection. Repair.

5.7A.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Blade, thickness gauge (item 38A, App H)
Applicator bottle (item 42, App H)
6-inch C clamp (item 61, App H)
Chip breaker (item 63A, App H)
Pneumatic vacuum cleaner (item 65, App H)
Chemical protective gloves (item 154, App H)
Air blow gun (item 158, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)
File set, hand (item 280A, App H)
1/4-inch hi-torque screwdriver socket wrench attachment (item 320, App H)
Tool, spar debond repair (item 370A, App H)
Pressure block, main rotor blade spar to spar debond repair tool (Figure D-478, App D)

**Materials/Parts:**

Adhesive (item 1, App F)
Adhesive (item 2A, App F)
Cloth (item 51, App F)
Cloth (item 52, App F)
Depressor (item 70, App F)
Disk, abrasive (item 72A, App F)
Methyl ethyl ketone (item 124, App F)
Needle Hypodermic (item 127A, App F)
Paper (item 133, App F)

**Materials/Parts: (continued)**

Paper (item 136A, App F)
Silver pencil (item 136B, App F)
Plastic sheet (item 138A, App F)
Primer (item 143, App F)
Sealing compound (item 167, App F)
Syringe (item 195A, App F)
Tape (item 203A, App F)
Tape (item 204A, App F)
Buff and blend wheel (item 219A, App F)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 55-1500-345-23

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**CAUTION**

Spanwise sanding applies to the metallic area only. The glass skinned area should be sanded chordwise.

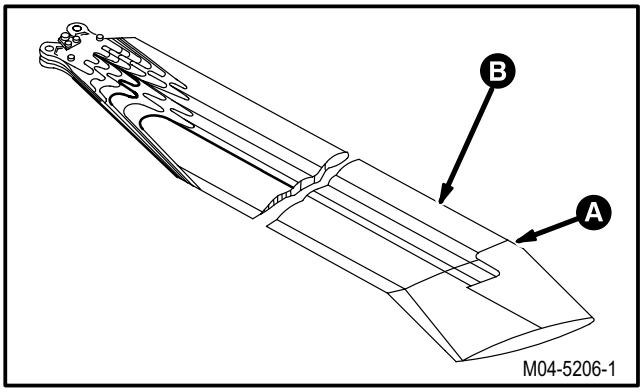
To prevent contamination of bonding process, use only filtered pressurized air. Filter must be capable of removing oil and debris from air.

5.7A.3. Inspection

a. **Clean main rotor blade surface** (para 1.47)**.**

**NOTE**

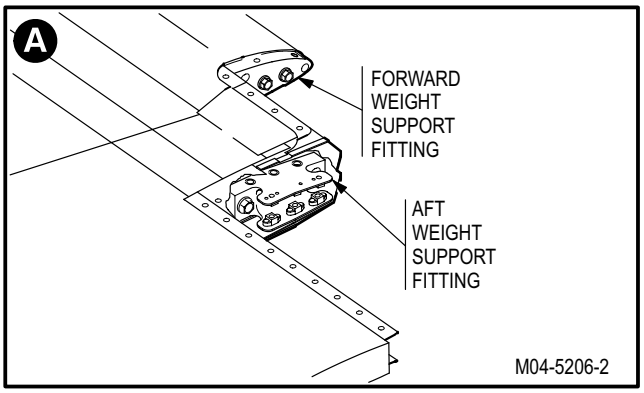
Ensure the locations for the main rotor blade outboard forward and aft weight support fittings are not misinterpreted as debonded area of blade.




b. **Check main rotor blade (1) for debonded areas.**

(1) Tap edge of a coin held between thumb and forefinger on main blade (1) spar to spar joint (2). A bonded spot will have a sharp ring. A debonded spot will have a dull sound.

(2) Visually inspect blade for cracks or raised seams in areas of spars.



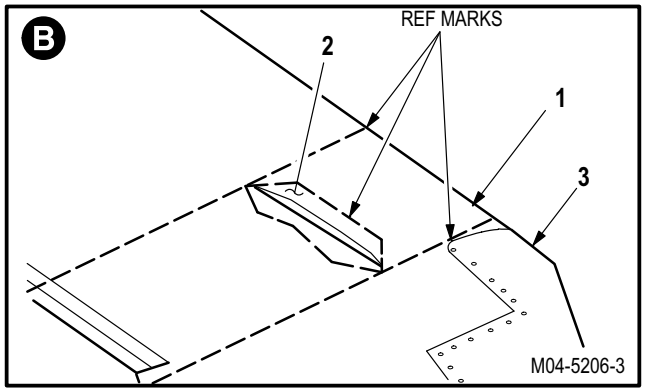

c. **Mark area of debonded spar (2) to be repaired.** Use pencil (item 136B, App F).

(1) Mark the outline of the debonded area of blade.

(2) Place reference marks at the leading and trailing edge of the blade depicting the ends of debonded area.

**NOTE**

For spar debonds located outboard of F.S. 250.0, remove the main rotor blade leading edge tip fairing prior to repair.




d. **If required remove leading edge tip fairing (3)** (para 5.13)**.**

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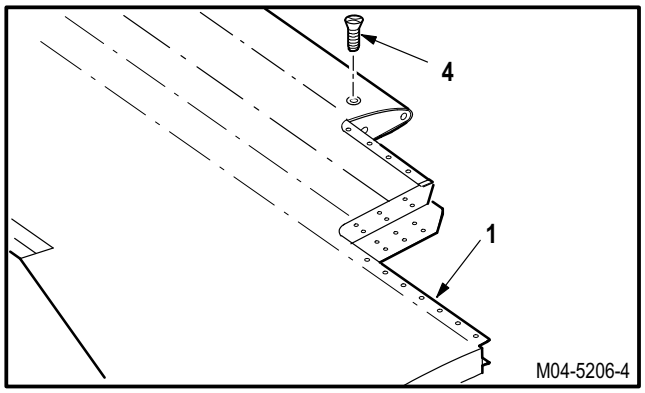
## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

5.7A.4. Repair

**NOTE**

If spar debond extends underneath spar No. 1 screw (if installed), remove screw prior to repair.

a. **If required, remove spar No. 1 tip screws (4) from blade (1).**



**NOTE**

If available, use vacuum while sanding.

b. **Sand spanwise to remove paint from debonded spar (2) to expose filler and adhesive.**

(1) Sand **0.75** to **1.0 INCHES** wide band centered over spar to spar joint and sand approximately **2.0 INCHES** past length of debond at both ends. Use wheel (item 219A, App F).

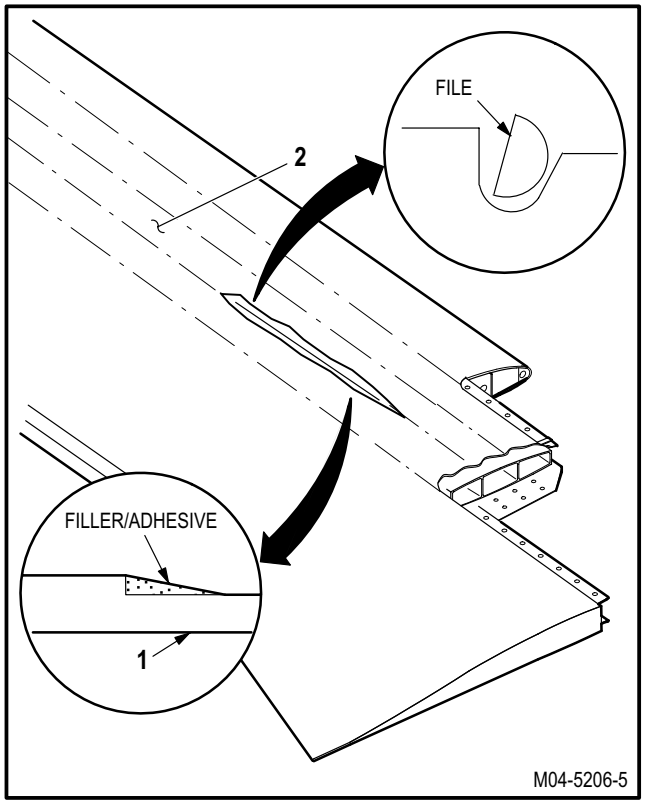
(2) Remove filler and adhesive from spar joint. Use wheel (item 219A, App F).

(3) Using the 1/2 round side of round file, remove any remaining filler and adhesive. Use 1/2 round file from file set.

**NOTE**

Pressurized air used shall not exceed **30 PSI**, ensure debris is not blown into repair area.

(4) Remove loose material or debris from repair area. Use pressurized air and/or vacuum cleaner.

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

c. **Clean surfaces of main rotor blade (1).**

(1) Apply flashbreaker tape over center of seam of repair. Use tape (item 203A, App F).

(2) Clean surface of repair area at least **6.0 INCHES** in all directions. Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

(3) Remove tape from spar (2) repair area.

**CAUTION**

- To prevent damage to main rotor blade, do not lift debonded spar more than **0.080 INCH**.
- To prevent damage to main rotor blade, do not wedge material/tooling more than **0.50 INCH** underneath spar or from end of repair.

**NOTE**

If spar debond ends within **6.0 INCHES** of the outboard tip end, debond remaining **6.0 INCHES** of spar.

d. **Remove adhesive from between mating surfaces of debonded spar (2).**

(1) Mark off tools for **0.50 INCH**. Use tape (item 203A, App F).

(2) Debond mating surfaces over length of repair. Use putty knife.

(3) If required debond remaining **6.0 INCHES** of debonded spar only if debond ends within **6.0 INCHES** of outboard tip.

(4) Lift and brace the debonded outer spar surface open at center of repair area. Use depressor (item 70, App F).

(5) Remove adhesive or debris from between spar mating surfaces. Use chip breaker or hacksaw blade with a V-notch cut-out on non-cutting edge side.

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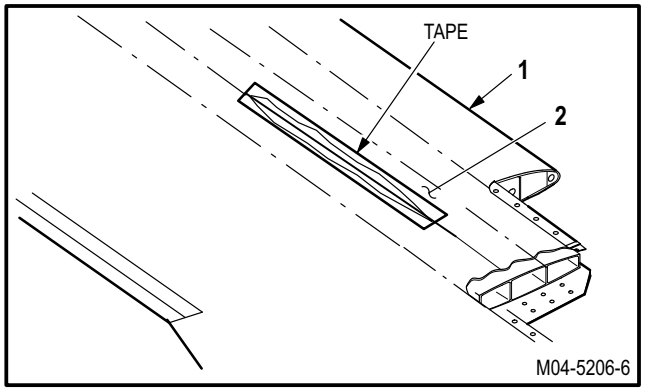
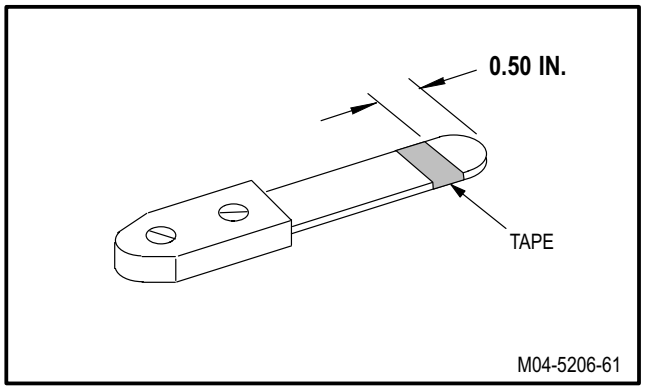
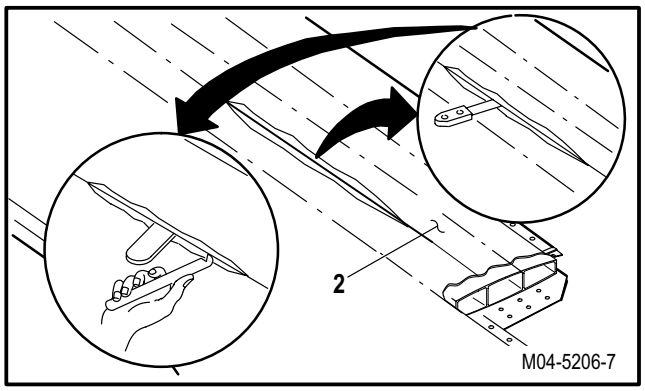
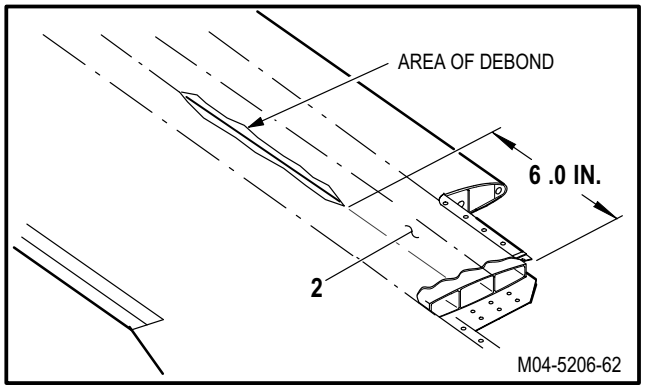


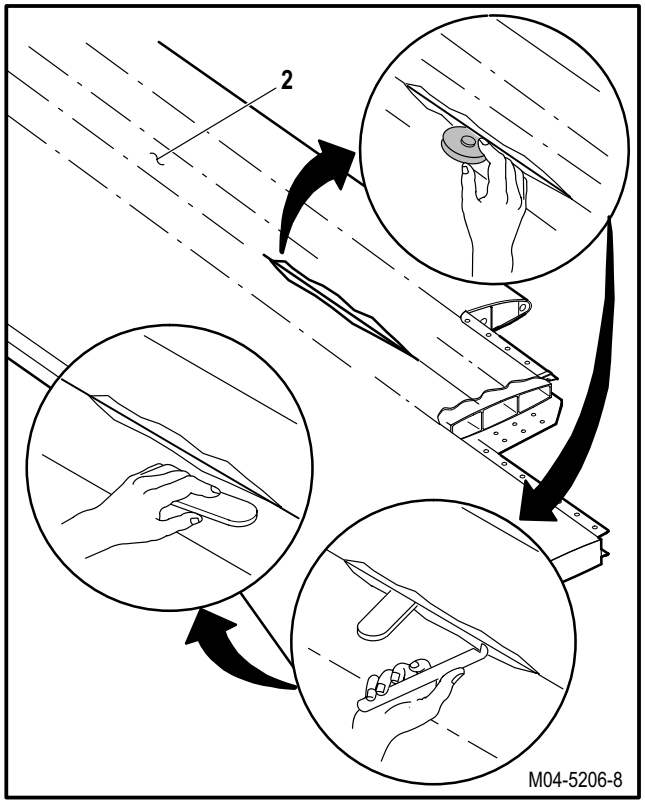
## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

(6) Remove loose debris from between spar mating surfaces by lifting surface and vacuuming. Use vacuum cleaner and putty knife.

(7) Scuff sand upper and lower spar mating surfaces. Use disk, abrasive (item 72A, App F).

(8) Remove loose debris from repair area. Use vacuum cleaner and putty knife.

(9) Remove and discard wedging material.

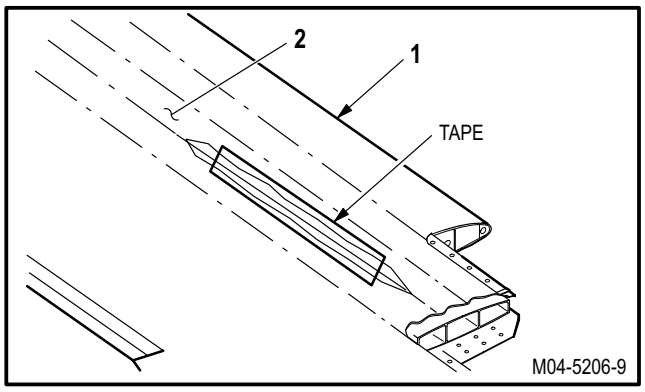


e. **Clean between mating surfaces of blade (1) debonded spar (2).**

(1) Apply flashbreaker tape over repair area. Use tape (item 203A, App F).

(2) Clean surface of blade at least **6.0 INCHES** in all directions. Use methyl ethyl ketone (item 124, App F), and cloth (item 51, App F).

(3) Remove flashbreaker tape from repair area.

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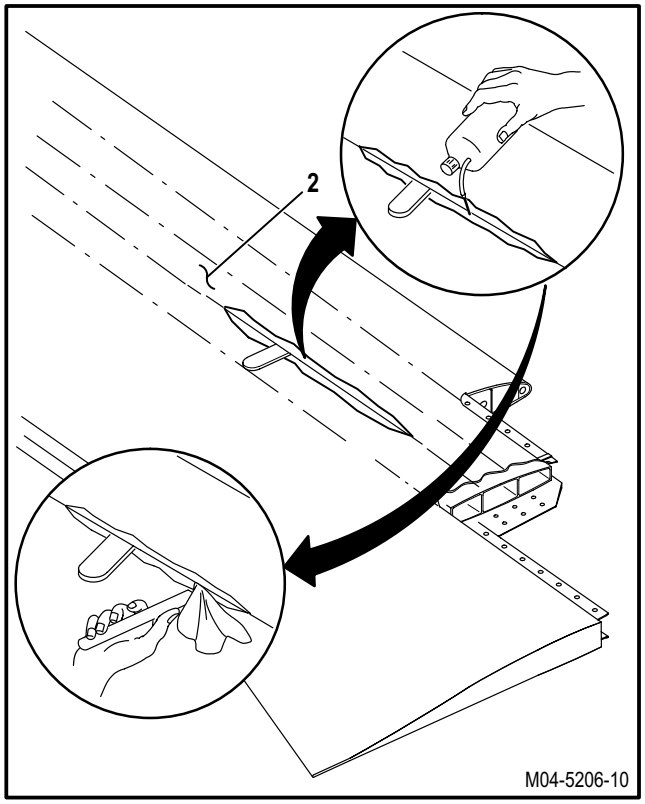
## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

(4) Lift and brace the debonded outer spar surface open. Use depressor (item 70, App F).




**NOTE**

Ensure solvent is applied in all areas where wedging material is located by moving wedging material as you go.

(5) Apply solvent liberally between mating surfaces of repair, moving from one end of repair to the other. Use applicator bottle and methyl ethyl ketone (item 124, App F).

(6) Wipe mating surfaces of repair area with lint free cloth. Use cloth (item 52, App F).

(a) Pull cloth between spar mating surfaces. Use chip breaker or equivalent.

(7) Visually inspect cloth for evidence that surfaces are clean of dirt and debris.

(8) Repeat steps (5) thru (7) (application of solvent starting from opposite end of repair) until surfaces are clean of dirt and debris.

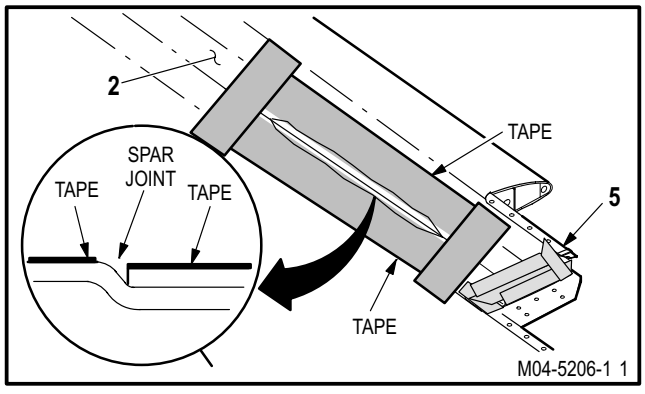
(9) Remove and discard wedging material.

(10) Allow to dry at room temperature for **1 HOUR** minimum.

**NOTE**

Step (3) only applies for repairs of spar debonds located at the outboard tip end of the blade.

f. **Mask around debonded spar (2) surface.**




(1) Mask repair area on both sides of spar to spar joint, less the joggle area of the aft side of the spar to spar joint seam.

(2) Mask approximately **6.0** to **12.0 INCHES** wide from center of repair area. Masking should extent past both ends of the spar debond by at least **2.0 INCHES.** Use tape (item 204A, App F).

(3) Cover balance weight studs (5) to protect them from adhesive squeeze-out. Use tape (item 204A, App F).

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**NOTE**

Primer shall be applied within **2 HOURS** of cleaning.

g. **Prime cleaned area** (TM 55-1500-345-23)**.** Use primer (item 143, App F).

(1) Tear, do not cut (rough edge to facilitate application of primer), a strip of clean bond paper, approximately **4.0** by **1.0 INCHES** wide. Use paper (item 136A, App F).

(2) Wet **1/4** to **1/2 INCH** of the bond paper (on the **4.0 INCH** side) along the edge with adhesive primer.

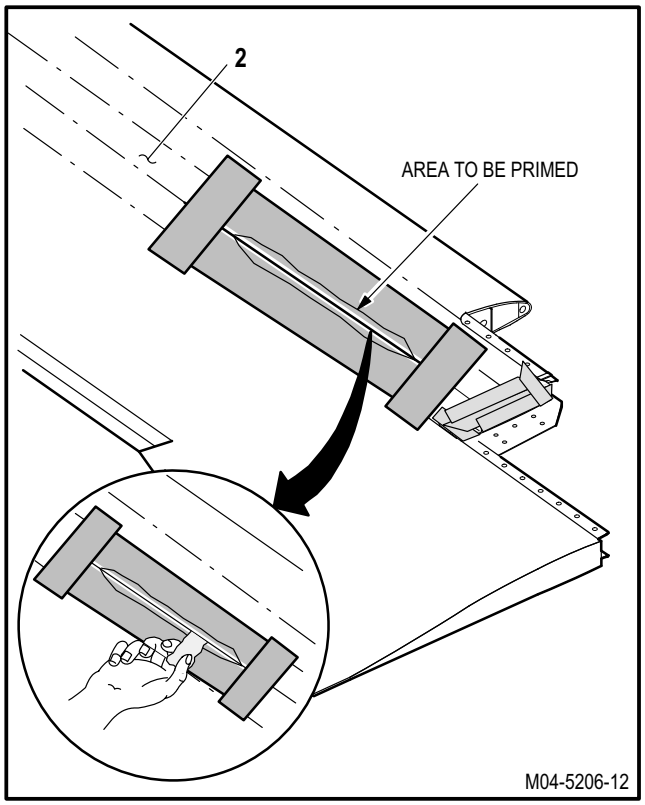
**NOTE**

Do not over wet spar mating surfaces during application of primer.

(3) Apply a thin coat of adhesive primer to mating surfaces of debonded spar (2).

(4) Allow primer to dry for **1 HOUR** minimum at room temperature or for **2 HOURS** minimum, if temperature is below 60 °F (15.6 °C).

(5) Note time drying of primer begins.

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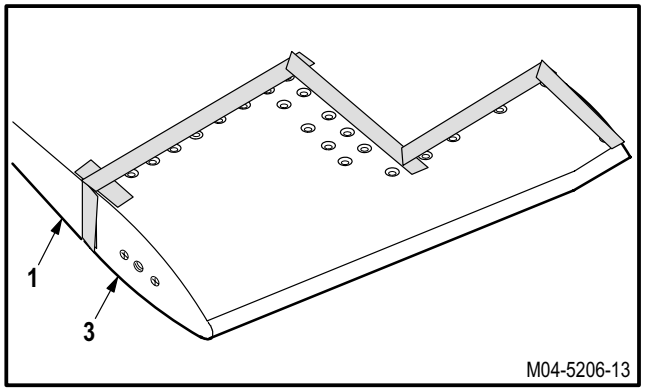
## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**NOTE**

- If repair is near tip end area, leading edge tip fairing must be installed to support cure tool during curing.
- Adhesive shall be applied within **4 HOURS** of applying primer.
- The following steps (h through m) should be performed while primer is drying.

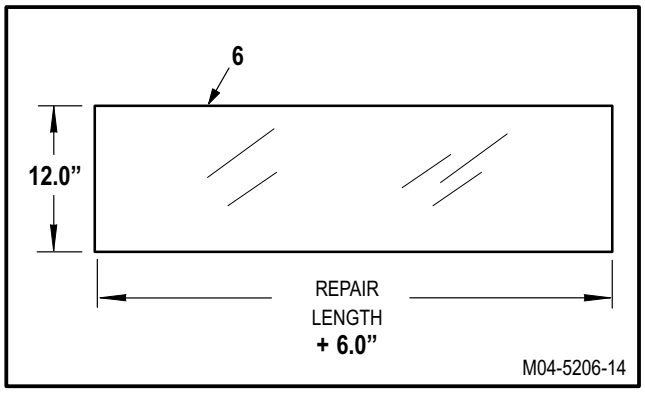
h. **If required, install tip end fairing (3) on blade (1).**

(1) Cover mating surfaces of main rotor blade tip end fairing (3) to protect it from adhesive squeeze out. Use tape (item 204A, App F).



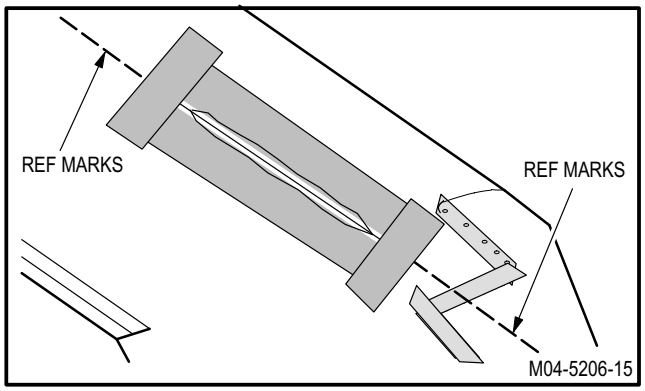

i. **Pre-cut release film (6) to cover repair area.**

(1) Cut a piece of release film (6), **12.0 INCHES** wide and length of repair plus **6.0 INCHES**. Use plastic sheet (item 138A, App F).




j. **Place reference marks on blade (1) to align bonding tool over repair.**

(1) Place reference marks for the centerline of repair at each end, approximately **1.5** to **2.0 FEET** out from repair center. Use pencil (item 136B, App F).

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**NOTE**

- If Spar Debond Tool is available, perform steps k thru m.
- If pressure plate and C-clamps are to be used, go to step n.

k. **Remove Spar Debond Repair Tool (7) from transport case.**

(1) Check tool (7) for damaged equipment.

(2) Check thermocouple (8) for wire condition and attachment to heater blanket.

(3) Check condition of heater blankets (9) and pressure bladders (10).

(4) Ensure the four footing pads (11) of fixture are fully opened.

(5) Loosening securing knobs (12) and position heater blankets (9) and pressure bladders (10) at center of tool (7).

(6) Tighten knobs (12).

**NOTE**

The Spar Debond Repair Tool is equipped with fittings to connect either a pressurized air or an air pump with tire valve connection.

l. **Prepare tool (7) for connection to pressurized air.**

(1) Close **PRESSURE REGULATOR** (13).

(a) Close **PRESSURE REGULATOR** (13) by pulling knob out and rotating to its full counter clockwise position until **PRESSURE GAUGE** (14) reads zero.

(b) Obtain available air source manual pump or compressed air and prepare for use.

(2) Switch **AIR INPUT SELECT** switch (15) to **MANUAL PUMP** (16) or **COMPRESSED AIR** (17).

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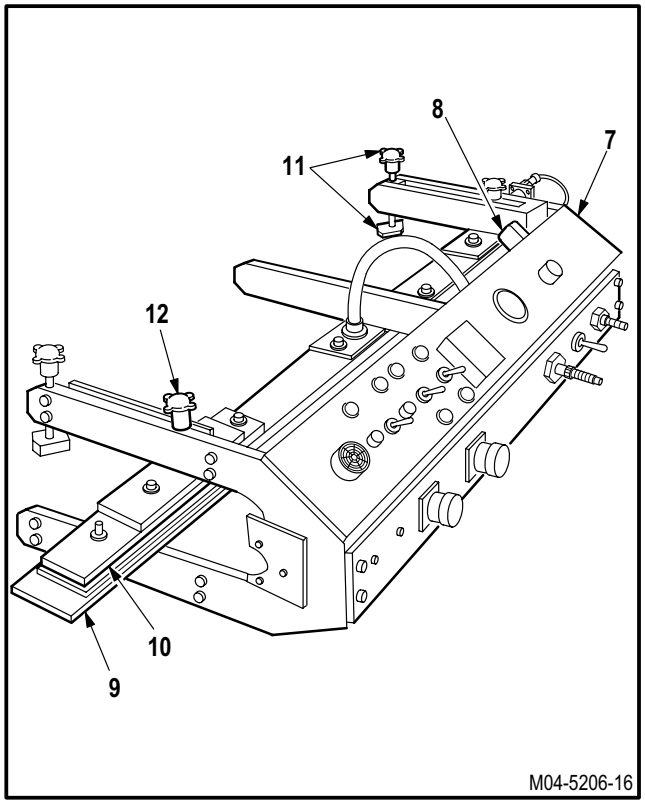
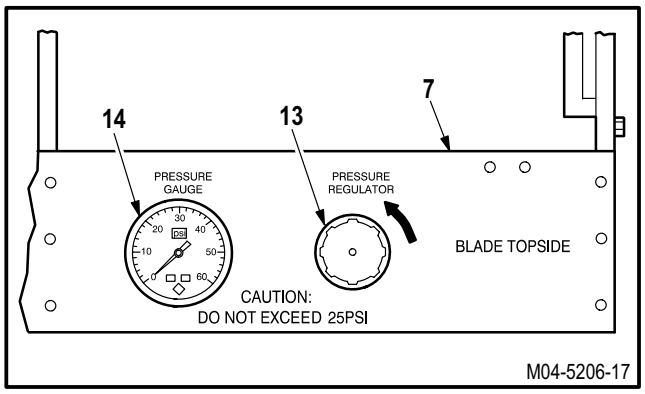
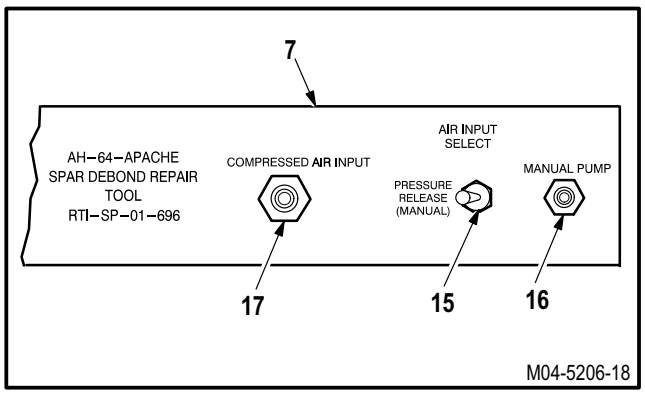


## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

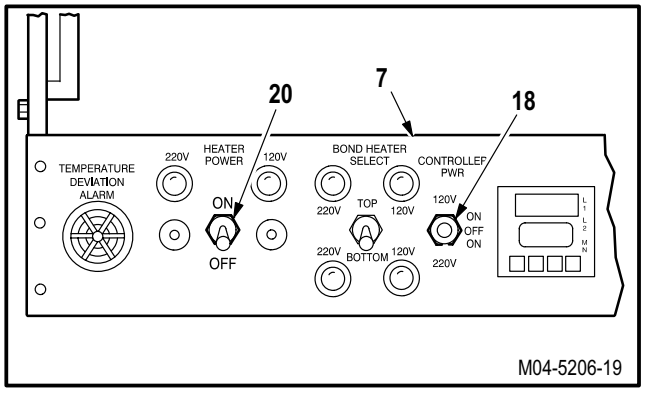
**NOTE**

The Spar Debond Repair Tool is equipped to accept power input from 120V or 220V electrical power source.

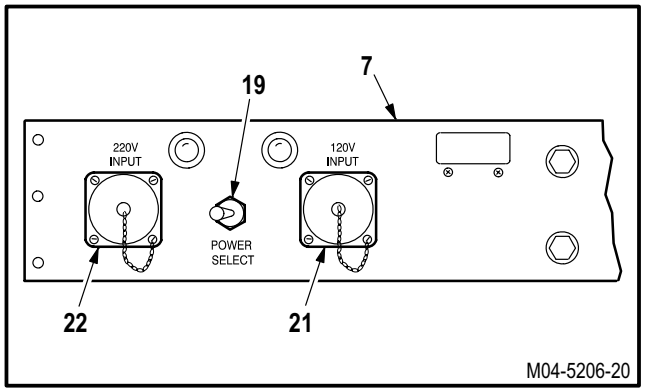
m. **Prepare tool (7) for electrical power.**

(1) Ensure all switches **CONTROLLER PWR** (18), **POWER SELECT** (19)**,** and **HEATER POWER** (20) are in the **OFF** or center position.

(b) Obtain electrical power source and prepare for use.




(2) Position the **POWER SELECT** switch (19) to **120V INPUT** (21) or **220V INPUT** (22) power source.

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**CAUTION**

Do not apply adhesive if pressure cannot be applied to repair before pot life of adhesive expires once mixed, failure to comply will result in an ineffective spar debond repair.

**NOTE**

If primer was applied in excess of **4 HOURS** repeat solvent wiping and priming application.

n. **Prepare adhesive for use.** Use adhesive (item 2A, App F).

(1) Note time of adhesive mix.

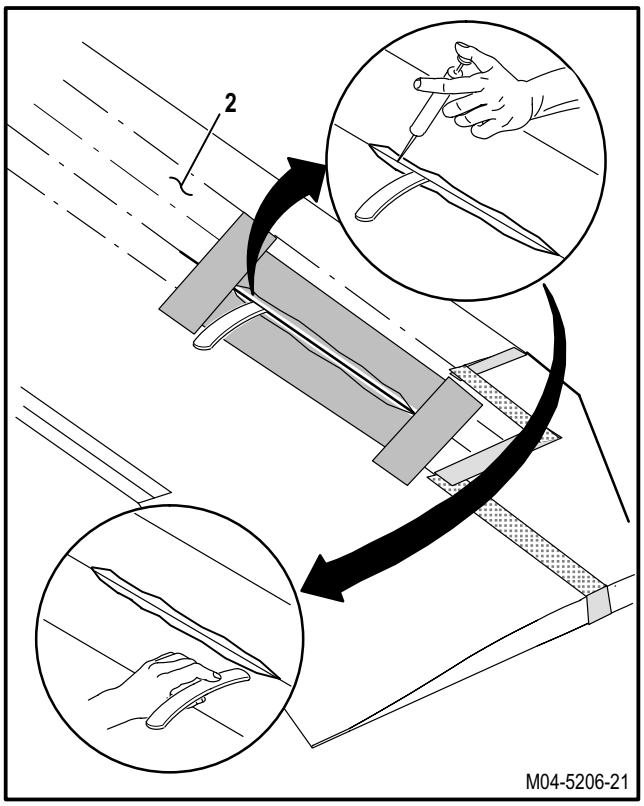
(2) Lift and brace the debonded outer spar surface open at center of repair area. Use depressor (item 70, App F).

(3) Apply adhesive between mating surfaces of spars until adhesive flows out, past the edge surfaces. Use syringe (item 195A, App F) and needle (item 127A, App F).

(4) Work adhesive under spar mating surfaces moving from inboard to outboard end of repair. Use gauge or metal applicator equivalent **0.003 - 0.005 INCHES** thick.

(5) Remove and discard wedging material.

(6) Wipe excess adhesive from blade (1) with dry cloth. Use cloth (item 51, App F).

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

o. **Cover debonded spar (2) repair area with flashbreaker tape.**

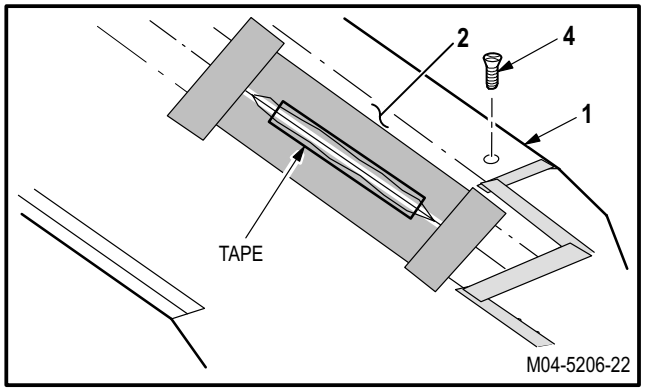
(1) Work air out of adhesive by applying and releasing thumb pressure on spar, working from one end of repair to the other.

(2) If required, cut away tape to allow for reinstallation of tip screw (4).

(3) Install spar No. 1 tip screw (4) on main rotor blade (1).

(4) Torque tip screw to **25 INCH POUNDS**. Use hi-torque screwdriver.

(5) Apply tape over center of seam of repair leaving **0.5 to 1.0 INCH** open at each end of repair. Use tape (item 203A, App F).

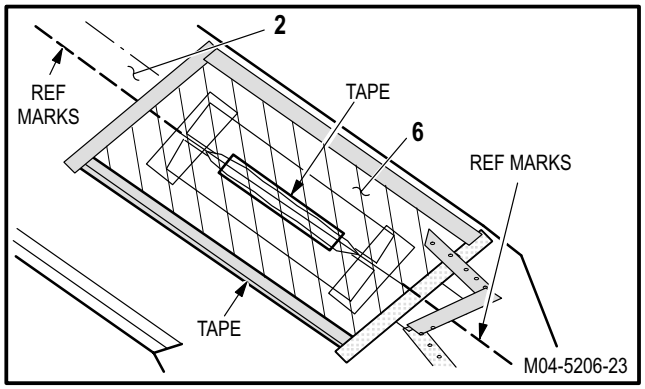



p. **Cover debonded spar (2) repair area with release film (6).**

(1) Cover repair area with release film, **12.0 INCHES** wide and length of repair plus **6.0 INCHES**. Use release film pre-cut earlier and tape (item 203A, App F).

**NOTE**

- If Spar Debond Tool is available, perform steps q thru w.
- If Spar Debond Tool is not available, perform steps x and y.

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**CAUTION**

Do not over tighten four footing pads or damage to the blade will occur.

q. **Install tool (7) on blade (1).**

(1) Center tool (7) with center of repair area of blade (1).

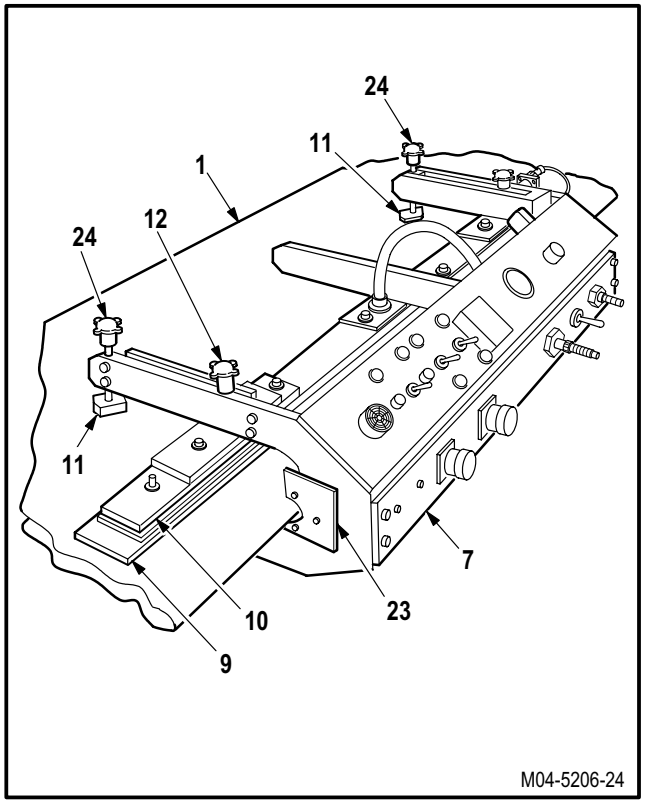
(2) Install tool (7) on blade (1) ensuring leading edge of blade is seated against tool leading edge stop (23).

(3) Adjust four footing pads (11) so that the top and bottom bond plates of the tool are equally spaced from the top and bottom surfaces of the blade (1).

(4) Secure four footing pads (11) by turning knob (24) one to three turns from initial point of contact with blade (1).

(5) Using the reference marks, center heater blankets (9) and pressure bladders (10) over center of repair area.

(6) Secure bladders in place by tightening four knobs (12) hand tight.

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**CAUTION**

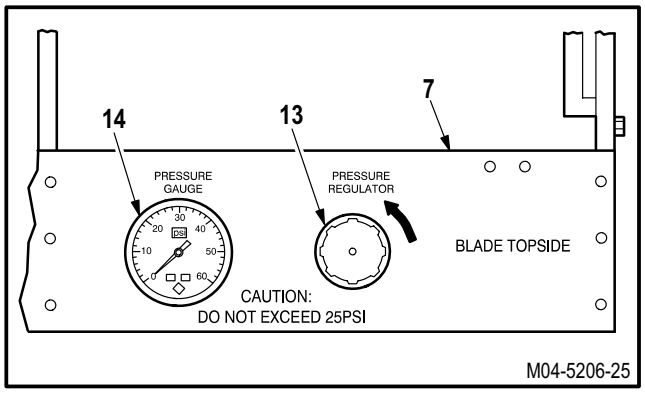
Over-pressurization of pressure bladders will cause excessive adhesive squeeze-out and a weaker bond.

**NOTE**

- Ensure air pressure does not exceed **20 PSI** or rupture of the pressure bladders could occur.
- Air pressure must be applied on repair area before adhesive pot life expires.

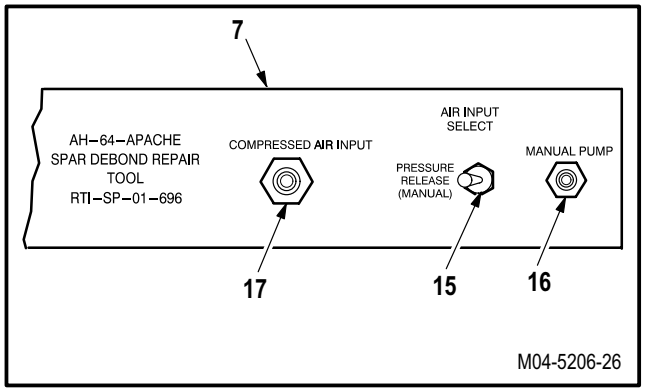
r. **Ensure PRESSURE REGULATOR (13) is closed.**

(1) Close **PRESSURE REGULATOR** (13) by pulling knob out and rotating to its full counter clockwise position until **PRESSURE GAUGE** (14) reads zero.

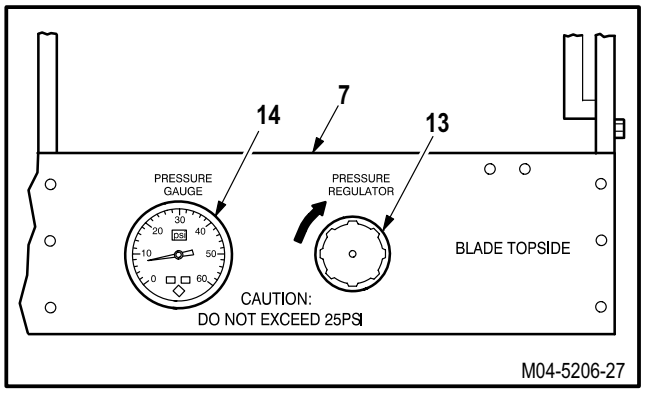



s. **Apply air pressure** (**MANUAL PUMP or COMPRESSED AIR**) **to tool (7).**

(1) Connect air pressure source to **MANUAL PUMP** (16) or **COMPRESSED AIR** (17) air inlet on tool (7).




(2) Open **PRESSURE REGULATOR** (13) by pulling knob out and rotating clockwise until **PRESSURE GAUGE** (14) reads **5 to 10 PSI**.

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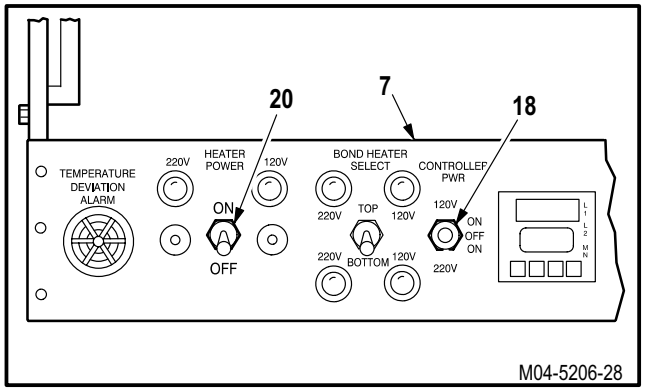
## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

t. **Apply power to tool (7).**

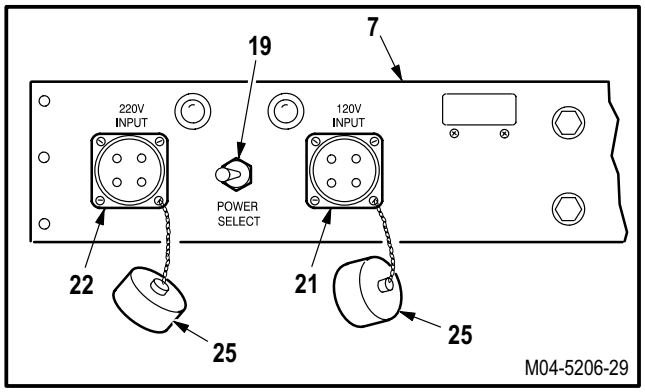
(1) Ensure all switches **CONTROLLER PWR** (18), **POWER SELECT** (19), and **HEATER POWER**, (20) are in the **OFF** or center position.



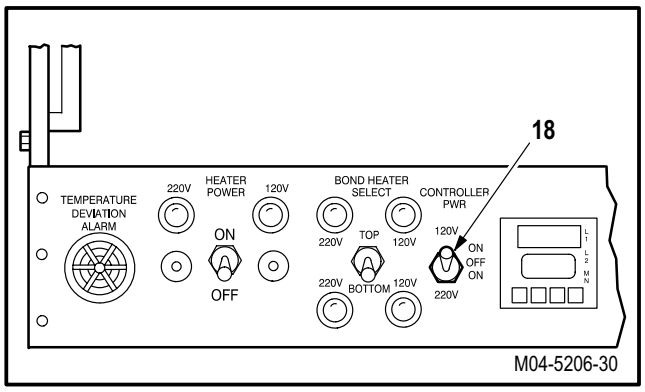

(2) Remove cap (25) from **120V INPUT** (21) or **220V INPUT** (22) on tool (7).

(3) Connect electrical power source to **120V INPUT** (21) or **220V INPUT** (22) on tool (7).

(4) Position the **POWER SELECT** switch (19) to **120V** or **220V** position as appropriate.




(5) Position **CONTROLLER PWR** switch (18) to the **ON** position.

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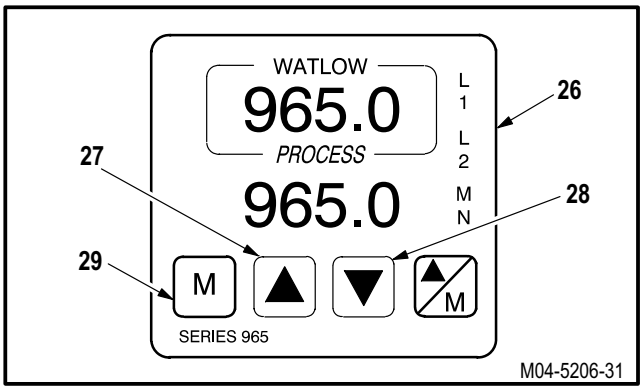
## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**NOTE**

Press controller **"M"** key once to scroll through each menu item. Use controller up and down keys to set operational values.

u. **Set-up controller (26) operation menu.**




(1) Use up key (27) and down key (28) to set set point (rP) to 180 °F (88.2 °C).

(2) Press "**M**" key (29), use up key (27) and down key (28) to set proportional band (Pb1) to 25 °F (-3.9 °C).

(3) Press "**M**" key (29), use up key (27) and down key (28) to set reset/integral (rE1) to 0.08.

(4) Press "**M**" key (29), use up key (27) and down key (28) to set rate/derivative (rA1) to 0.08.

(5) Press "**M**" key (29), use up key (27) and down key (28) to set cycle time (Ct1) to 6.5 seconds.

(6) Press "**M**" key (29), use up key (27) and down key (28) to set alarm low (ALO) to -10 °F (-23.3 °C).

(7) Press "**M**" key (29), use up key (27) and down key (28) to set alarm high (AH1) to 10 °F (-12.2 °C).

(8) Press "**M**" key (29), use up key (27) and down key (28) to set calibration offset (CAL) to -1 °F (-18.3 °C).

(9) Press ''**M**" key (29), use up key (27) and down key (28) to set auto-tune (AUt) to 0.

(10) Press ''**M**" key (29) to return to beginning menu.

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**CAUTION**

The surface temperature of the blade must not exceed 190 °F (87.8 °C) or blade debonding and/or paint blistering may result.

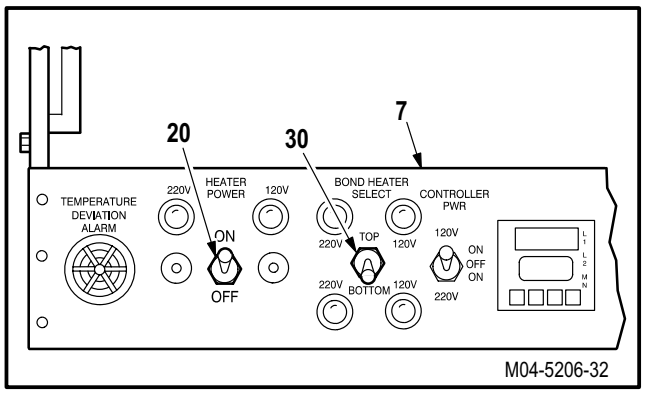
**NOTE**

Do not apply power to bonding tool heater until the pot life of the adhesive has expired.

v. **Apply heater power to tool (7).**

(1) Position the **BOND HEATER SELECT** switch (30) to **TOP** or **BOTTOM** heater.

(2) Position the **HEATER POWER** switch (20) to **ON** (controller L1 output light will illuminate).




w. **Perform bonding cure cycle.**

(1) After heater reaches 180 °F (88.2 °C) ±5°, note time and cure adhesive for **90 MINUTES**.

**CAUTION**

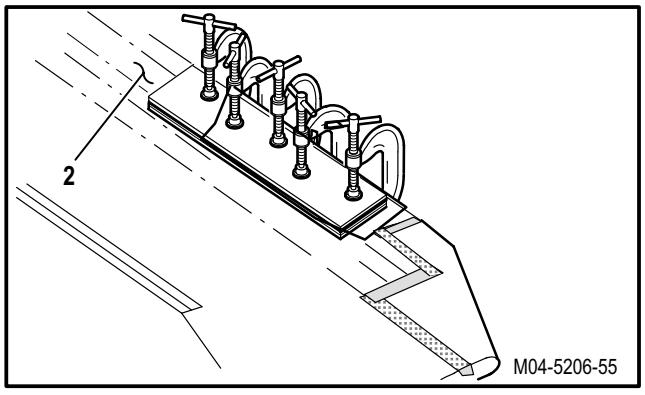
To ensure a good bond, do not apply excessive pressure.

x. **Apply pressure to debonded spar (2) repair area.**

(1) Install pressure block over debonded spar (2) repair area, ensuring rubber pad is on side facing repair. Use pressure blocks (Figure D-478, App D).

(2) Place C-clamps into position over pressure block every **2** to **3 INCHES**. Use C clamp(s).

(3) Apply pressure evenly, tightening C-clamps 1/2 turn after contact.

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**CAUTION**

The surface temperature of the blade must not exceed 190 °F (87.8 °C) or blade debonding and/or paint blistering may result.

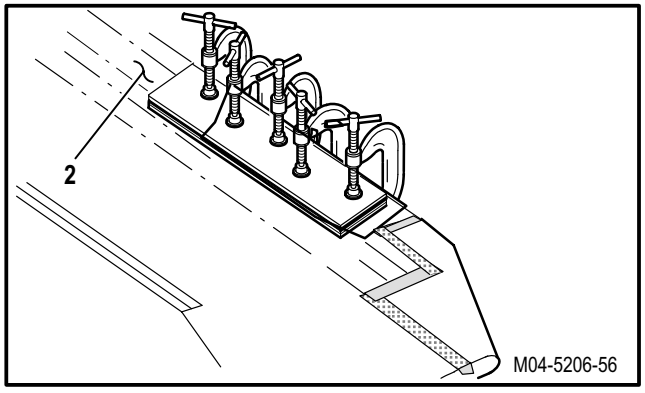
**NOTE**

- Adhesive requires a constant minimum curing temperature of 60 °F (15.6 °C) to obtain a full and satisfactory bond. Heat lamps may be used to maintain the required minimum adhesive curing temperature.

y. **Perform bonding cure cycle.**

(1) Re-check c-clamps after **15 MINUTES** for looseness. Re-tighten as required.

(2) Allow adhesive to cure at room temperature for **24 HOURS**. Minimum room temperature is 70 °F (21.1 °C).

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

**NOTE**

- If Spar Debond Repair Tool was used, perform steps z thru ac.
- If pressure plate and C-clamps where used, go to step ad.

z. **Remove heater power from tool (7).**

(1) Position the **HEATER POWER** switch (20) to **OFF**.

(2) Position the **CONTROLLER PWR** switch (18) to **OFF** or center position.

(3) Position the **POWER SELECT** switch (19) to off or center position.

aa. **Remove electrical power from tool (7).**

(1) Disconnect electrical power source from **120V INPUT** (21) or **220V INPUT** (22).

(2) Install cap (25) on **120V INPUT** (21) or **220V INPUT** (22) on tool (7).

ab. **Remove air pressure from tool (7).**

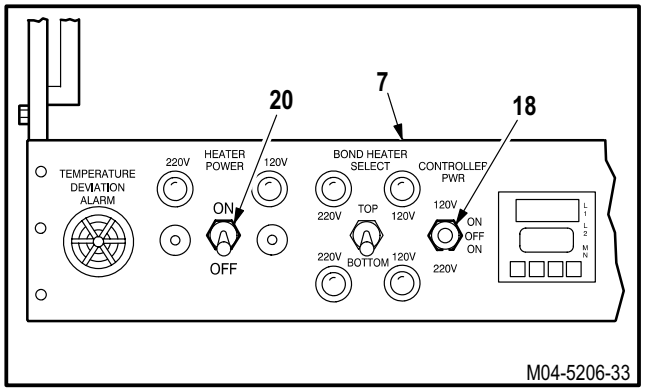
(1) Disconnect shop air pressure source from **MANUAL PUMP** (16) or **COMPRESSED AIR** (17) air inlet on tool (7).

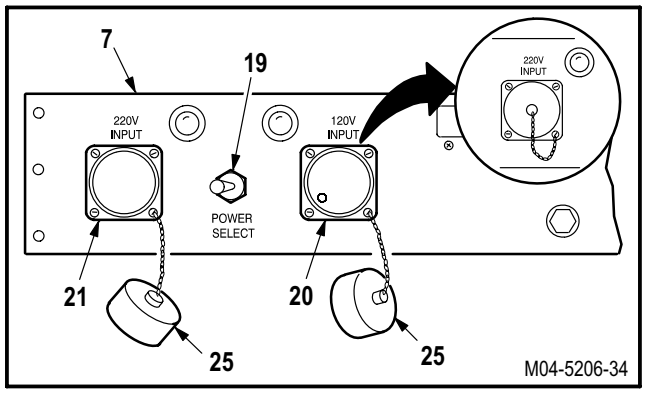
(2) Close **PRESSURE REGULATOR** (13).

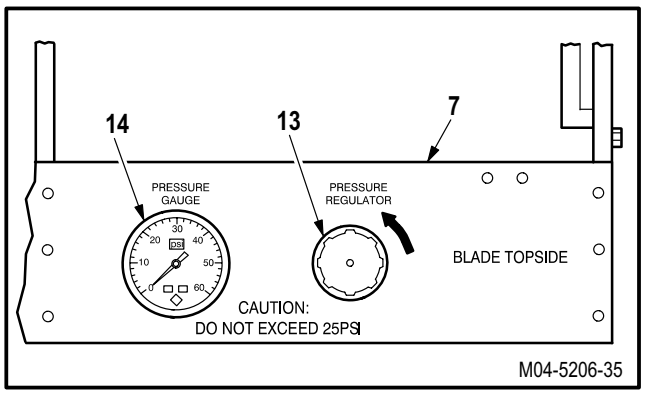
(a) Close **PRESSURE REGULATOR** (13) by pulling knob out and rotating to its full counter clockwise position until **PRESSURE GAUGE** (14) reads zero.

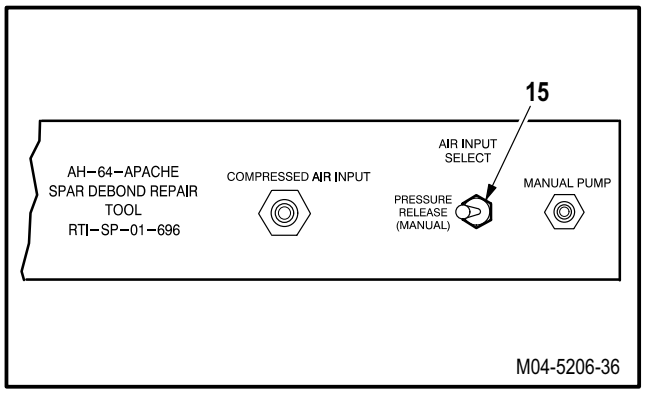
or

(b) If using manual air pump was used, position the **AIR INPUT SELECT** switch (15) to **PRESSURE RELEASE (MANUAL)**.

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## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

ac. **Remove tool (7) from blade (1).**

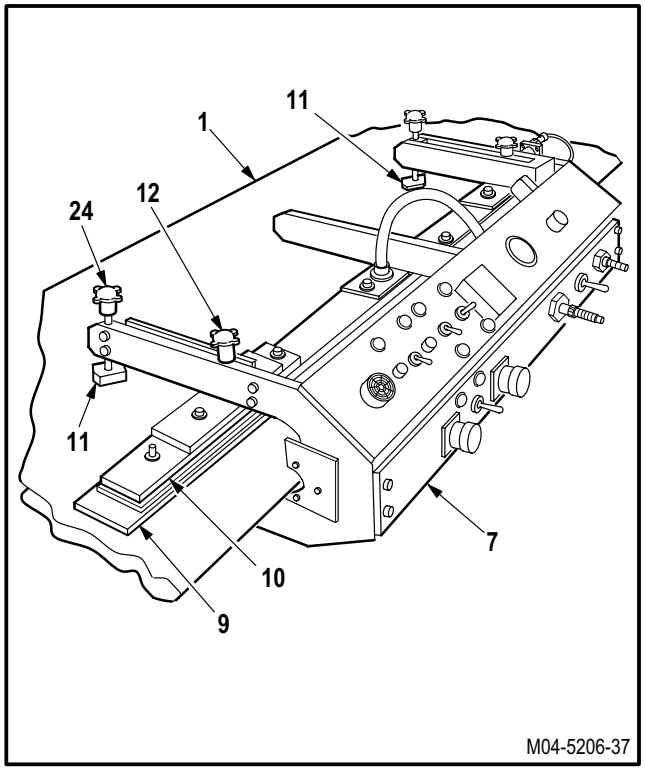
(1) Loosen four knobs (12) securing heater blankets (9) and pressure bladders (10) on tool (7).

(2) Move heater blankets (9) and pressure bladders (10) clear of repair areas.

(3) Fully loosen four footing pads using knobs (24) from tool (7) and blade (1).

(4) Remove tool (7) from blade (1).

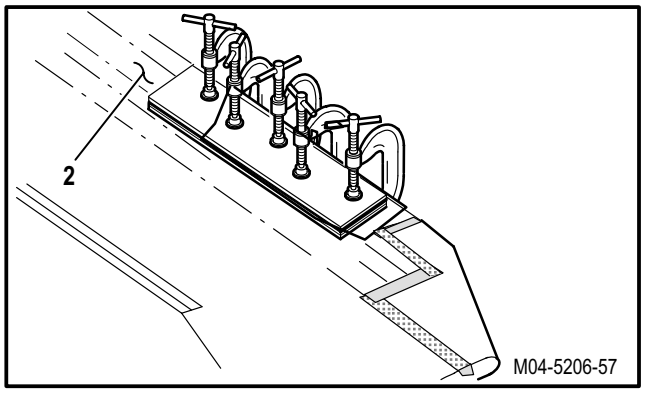
(5) Go to step ae.




ad. **Remove pressure from debonded spar (2) repair area.**

(1) Loosen and remove all C-clamps.

(2) Remove pressure blocks, peel ply and flashbreaker tape.

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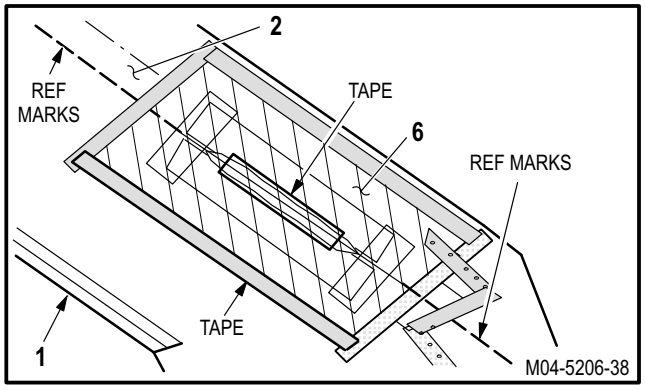
## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

ae. **Remove release film (6) from blade (1).**

(1) Remove tape and release film (6) from blade (1).

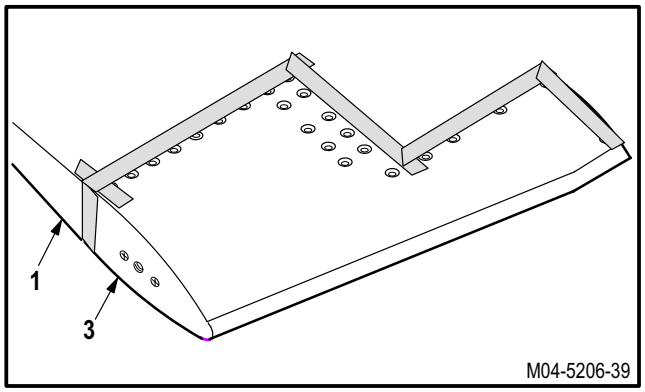



af. **Remove tip end fairing (3) from tip end of blade (1).**

(1) Remove tape holding tip end fairing (3) on blade (1).

(2) Remove tip end fairing (3) from blade (1).

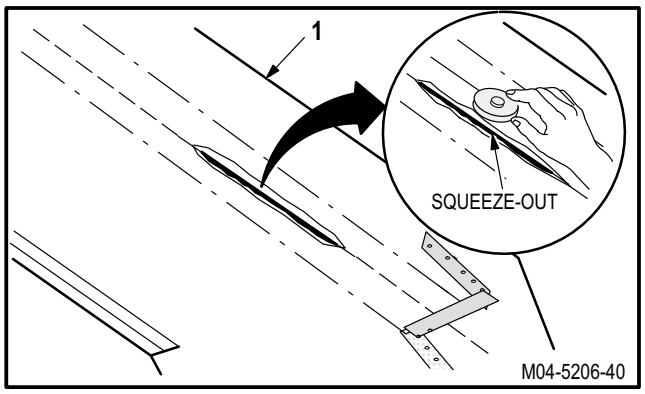
(3) Remove all tape used for protection from tip end fairing (3).




ag. **Sand adhesive squeeze-out on blade (1) in spanwise direction.** Use wheel (item 219A, App F) and file set.

**NOTE**

Ensure the locations for the main rotor blade outboard weight support fittings are not misinterpreted as debonded area of blade.




ah. **Check repaired debonded spar (2).**

(1) Tap a coin held between thumb and fore finger on blade (1). A bonded spot will have a sharp ring. A debonded spot will have a dull sound.

ai. **Wipe blade (1) clean.** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

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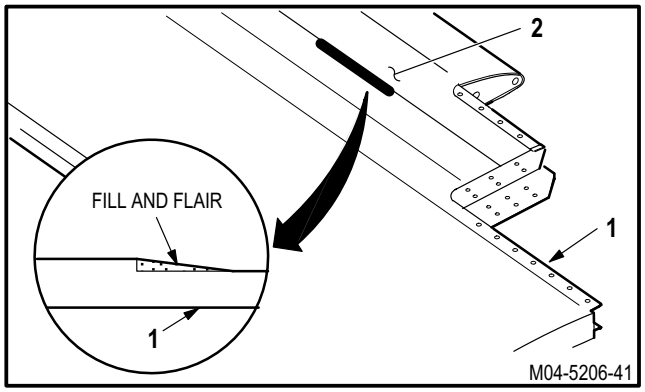
## 5.7A. MAIN ROTOR BLADE SPAR TO SPAR DEBOND REPAIR (AVIM) - continued

aj. **Fill and fair cavity between blade (1) and repaired spar (2).** Use adhesive (item 1, App F).




**NOTE**

- Adhesive requires a constant minimum curing temperature of 60 °F (15.6 °C) to obtain a full and satisfactory bond. Heat lamps may be used to maintain the required minimum adhesive curing temperature.
- Curing of adhesive may be accelerated by using a heat lamp for **1.5** to **2.0 HOURS**. Maintain blade surface temperature at 120 °F (48.9 °C).

(1) Allow adhesive to dry at room temperature **24 HOURS**.

ak. **Sand faired adhesive smooth on blade (1) in spanwise direction.** Use paper (item 133, App F).

al. **Wipe blade (1) clean.** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

am. **If removed, install leading edge tip fairing** (para 5.13)**.**

**CAUTION**

Rotor blades are not to be repainted over the entire surface of blade. Only light touchup of the eroded or repaired area is allowed. Severe chordwise imbalance problems may result from repainting blade.

an. **Spot prime and paint blade (1) repair and surrounding area** (TM 55-1500-345-23)**.**

ao. **Inspect (QA).**

ap. **Install main rotor blade** (para 5.4)**.**

END OF TASK

## 5.8. MAIN ROTOR BLADE PHASE ADJUSTMENT

5.8.1. Description

This task covers: Checking Phase Adjustment. Phase Adjustment.

5.8.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
1 3/8 x 1/2-inch drive open end box socket wrench crowfoot attachment (item 78, App H)
1/2-inch drive ratchet socket wrench handle (item 172, App H)
Aircraft maintenance platform (item 211, App H)
Rigging pin set (item 224, App H) (p/o item 390, App H)
Helicopter rotor head balance and blade tracking test equipment (item 354, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)
Rod end centering fork (Figure D-444, App D)

**Materials/Parts:**

Wire (item 225, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

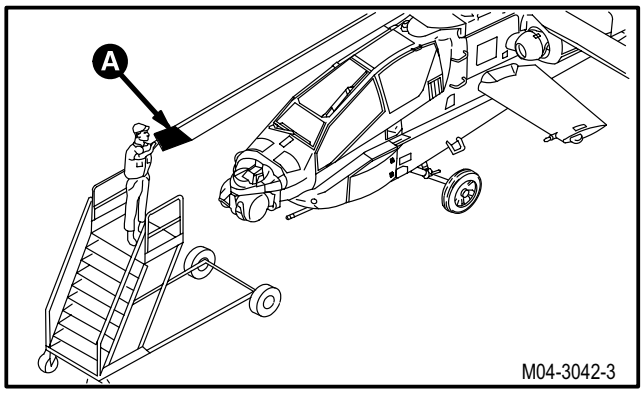
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| TM 1-1520-238-T | Collective flight controls rigging operational check performed |
| | Cyclic flight controls rigging operational check performed |
| 1.62 | Rotor brake off |
| 2.2 | Access panels L200 and R200 removed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.8. MAIN ROTOR BLADE PHASE ADJUSTMENT - continued

5.8.3. Checking Phase Adjustment

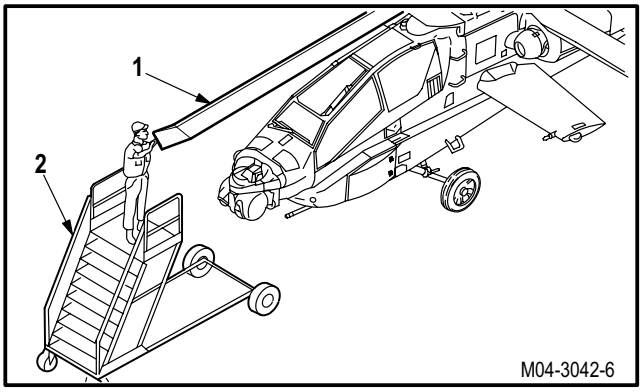
a. **Position main rotor blade (1) to be adjusted over nose of helicopter.**

b. **Place maintenance platform (2) under tip of blade (1).** Use maintenance platform.

c. **Install phasing target (3).**

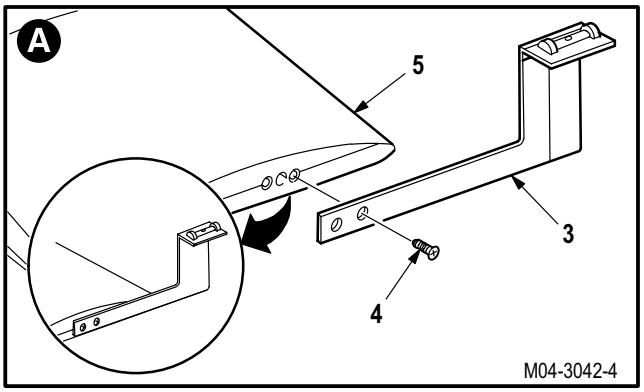
(1) Remove two screws (4) from main rotor blade tip cap (5).

(2) Install target (3) on tip cap (5) using two screws (4) from tip cap (5). Use helicopter rotor head balance and blade tracking test equipment




**CAUTION**

To prevent damage to flight control systems do not use force if binding or roughness occurs while moving controls with hydraulic power.




d. **Apply external primary hydraulic power** (para 1.72)**.**

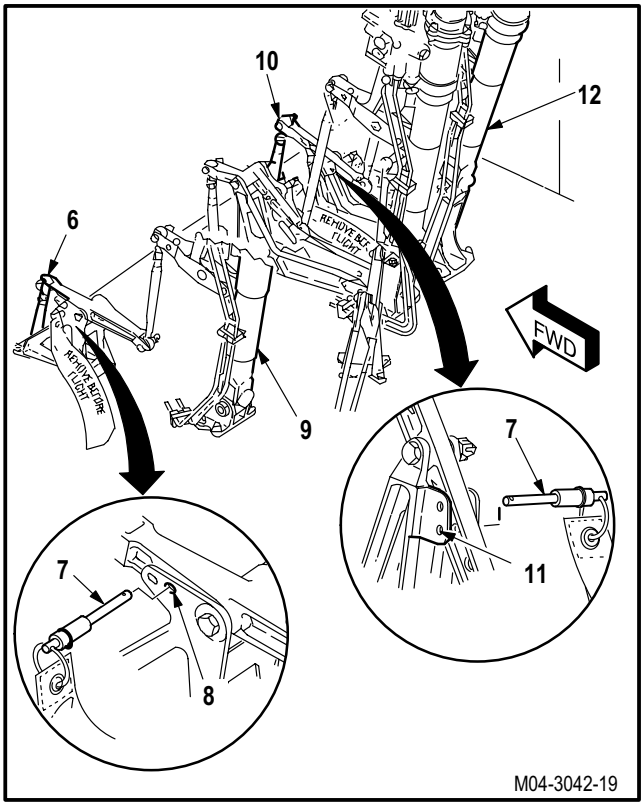
e. **Rig lateral bellcrank (6) for level swashplate.**

(1) Install -5 rig pin (7) in aft hole (8) of bellcrank (6) forward of lateral actuator (9). Use rigging pin set.

f. **Rig longitudinal bellcrank (10) for level swashplate.**

(1) Install -5 rig pin (7) in lower hole (11) of bellcrank (10) forward of longitudinal actuator (12). Use rigging pin set.

g. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

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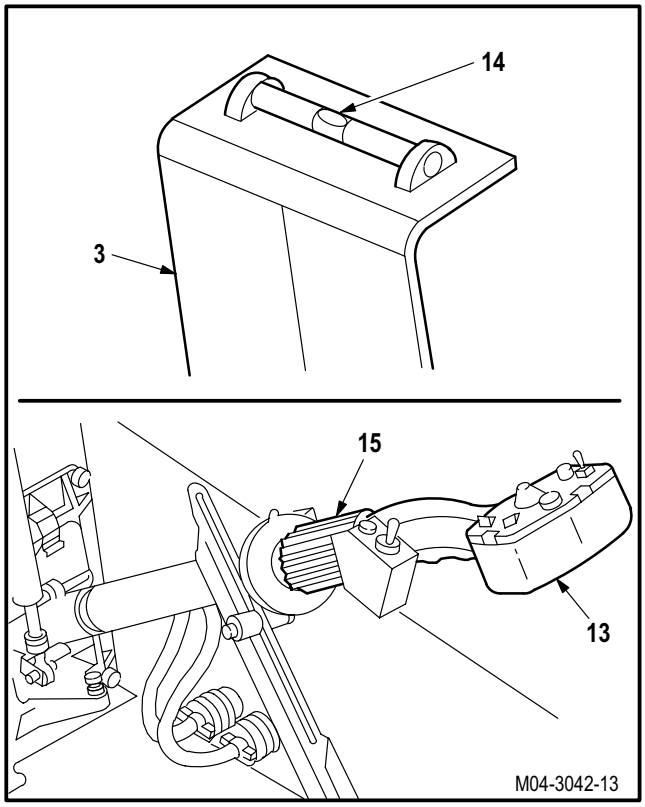
## 5.8. MAIN ROTOR BLADE PHASE ADJUSTMENT - continued

h. **Move collective stick (13) until bubble level (14) on target (3) is centered.**

(1) Apply collective friction by rotating collar (15).

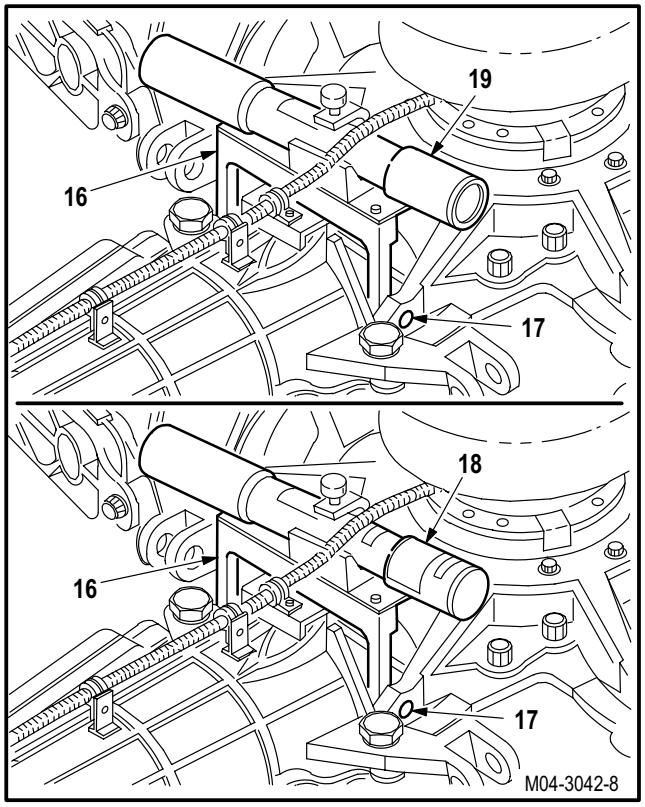
i. **Shut down external primary hydraulic power** (para 1.72)**.**




**NOTE**

The phasing tool may be used with either laser or telescopic sight.

j. **Install the phasing tool (16) in the hub sling holes (17) so that the laser (18) or telescope (19) points toward target (3).** Use helicopter rotor head balance and blade tracking test equipment.

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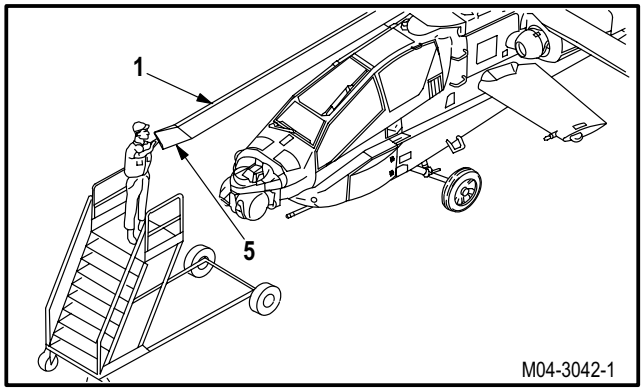
## 5.8. MAIN ROTOR BLADE PHASE ADJUSTMENT - continued

k. **Grasp tip cap (5) and oscillate blade (1) fore and aft 20 times, with total displacement of 6.0 to 10.0 INCHES.**

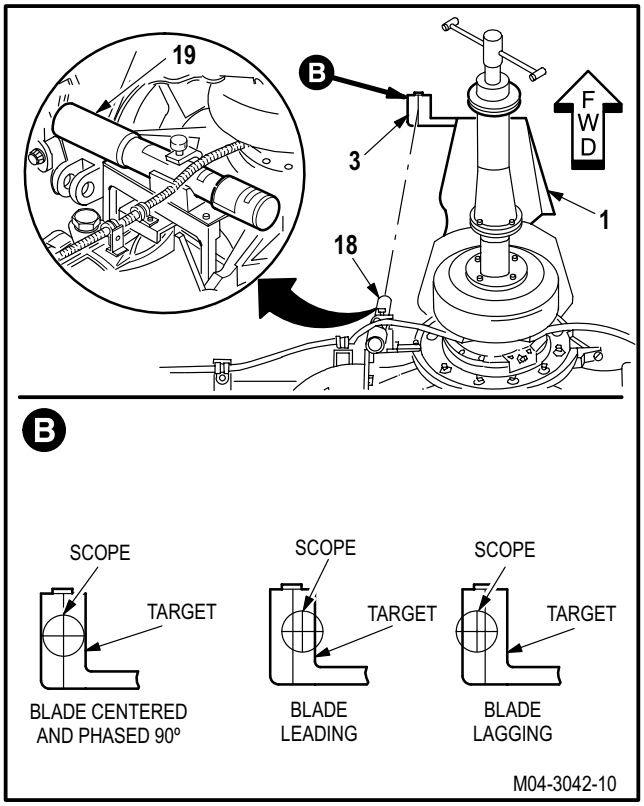
(1) Release tip cap (5) and allow blade (1) to settle.




**WARNING**

**Laser radiation**

- **Do not stare into beam. Class 2 laser devices, which emit visible light, are not hazardous when viewed for less than 0.25 seconds. Eye injury can occur to viewers who continuously stare at the direct beam.**
- **Do not fire a laser upon any surface that can cause specular reflection, such as mirrors, glass, chrome or other shiny surfaces. Reflected laser light can be as dangerous to the eye as direct exposure.**




l. **Turn on laser (18), or view target (3) through telescope (19).**

(1) If laser spot or crosshairs are centered on target (3) center line, or no more than **0.30 INCH** to left of target center line, blade (1) is in phase. Go to step m.

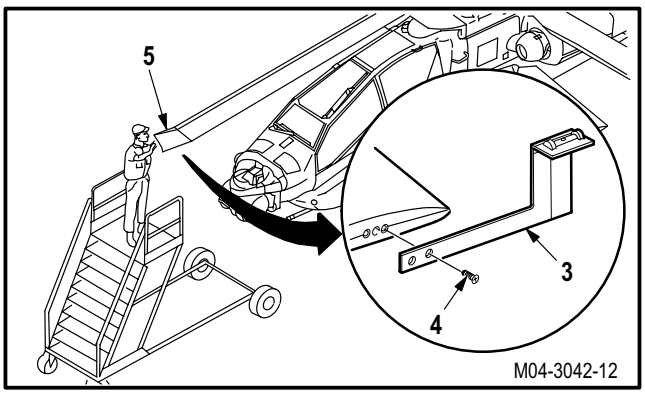
(2) If laser spot or crosshairs are more than **0.30 INCH** to left of the target line (lagging), adjust dampers. Go to paragraph 5.8.4.

(3) If laser spot or crosshairs are to the right of target line (leading), adjust dampers. Go to paragraph 5.8.4.

m. **Remove phasing target (3).**

(1) Remove two screws (4) and target (3) from tip cap (5).

(2) Reinstall two screws (4) in tip cap (5).

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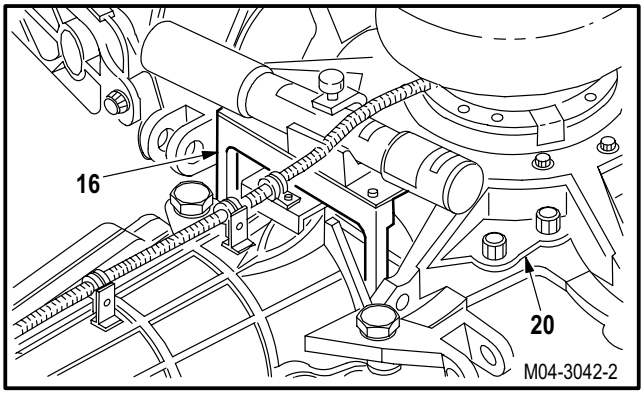
## 5.8. MAIN ROTOR BLADE PHASE ADJUSTMENT - continued

n. **Remove tool (16) from main rotor hub (20).**

o. **Repeat steps a. thru c. and j. thru n. for remaining blades.**

**CAUTION**

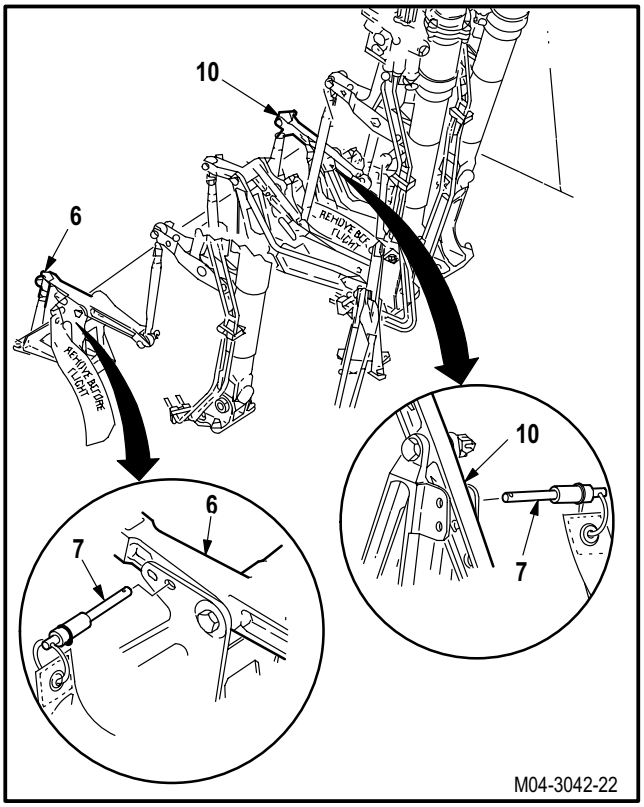
To prevent damage to flight control systems do not use force if binding or roughness occurs while moving controls with hydraulic power.




p. **Apply external primary hydraulic power** (para 1.72)**.**

q. **Remove two -5 rig pins (7) from the bellcrank (6) and bellcrank (10).**

r. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**




s. **Lower pilot collective stick (13).**

(1) Rotate collective stick friction collar (15) to zero.

(2) Move stick (13) full down.

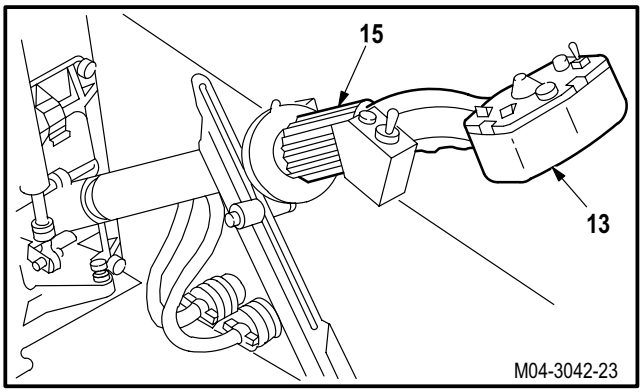
(3) Rotate collar (15) to apply friction.

t. **Shut down and disconnect external primary hydraulic power** (para 1.72)**.**

u. **Inspect (QA).**

v. **Install access panels L200 and R200** (para 2.2)**.**

w. **Perform main rotor track and balance maintenance operational check** (TM 1-1520-238-T)**.**

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## 5.8. MAIN ROTOR BLADE PHASE ADJUSTMENT - continued

5.8.4. Phase Adjustment

**NOTE**

- Temperature affects damper performance. Best results may be obtained when phasing is accomplished above 50 degrees F. If phasing cannot be accomplished above 50 degrees F, phasing should be checked after first flight.
- Fine blade adjustment is accomplished by adjusting the forward or aft damper rod end only one half turn at a time. Do not adjust either damper more than one half turn without adjusting the other damper one half turn.
- Manually oscillate the blade fore and aft, prior to and after each adjustment.

a. **Disconnect aft damper (21).**

(1) Remove lockwire (22).

(2) Insert rod end centering fork (23) to prevent damage to key washer (24). Use rod end centering fork (figure D-444, App D).

(3) Loosen jam nut (25).

(4) Remove fork (23).

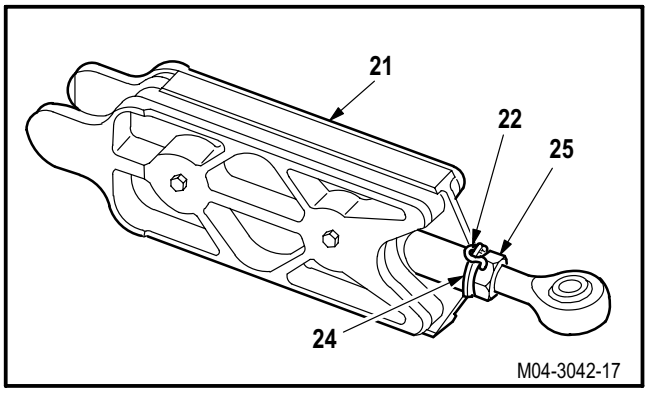
(5) Disconnect damper rod end (26) from lead lag link (27).

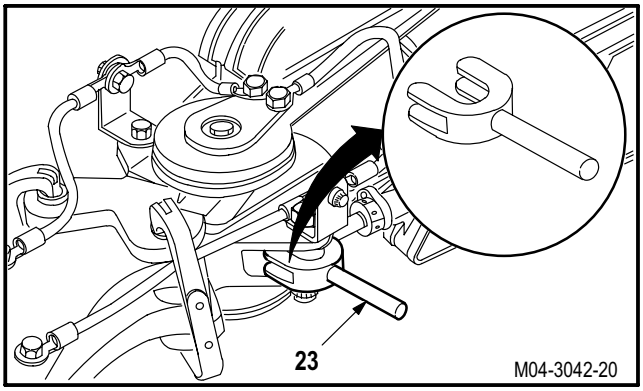
(a) Hold bolt (28). Use box wrench.

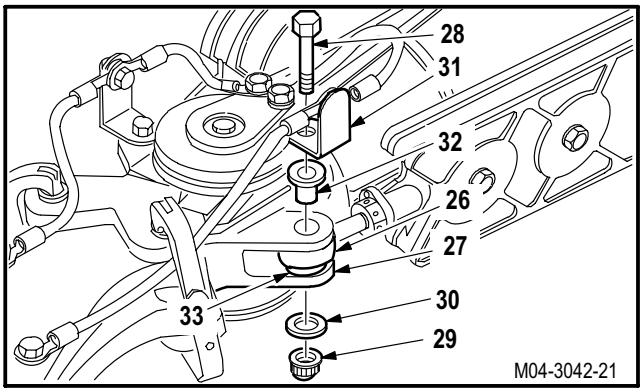
(b) Remove nut (29) and washer (30). Use ratchet.

(c) Remove bolt (28), angle bracket (31), sleeve bushing (32), and washer (33).

b. **Check phase. If blade moves into phase, adjust aft damper rod end so the bolt drops in unassisted (within 1/2 turn lagging) and go to subsequent step c.(4).**

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**5.8. MAIN ROTOR BLADE PHASE ADJUSTMENT - continued**

c. **If blade does not return to phase, disconnect forward damper (21) (subparagraph 5.8.4, step a.).**

(1) Move blade into phase.

(2) Adjust leading damper (21) rod end (26) so bolt drops in unassisted.

(3) Adjust trailing damper so bolts drop in unassisted (within 1/2 turn).

(4) Connect damper rod end (26) to link (27) using bolt (28), angle bracket (31), sleeve bushing (32), washer (33), washer (30), and nut (29). Use box wrench and ratchet.

(5) Torque nut (29) to **675 INCH-POUNDS**. Use torque wrench and box wrench.

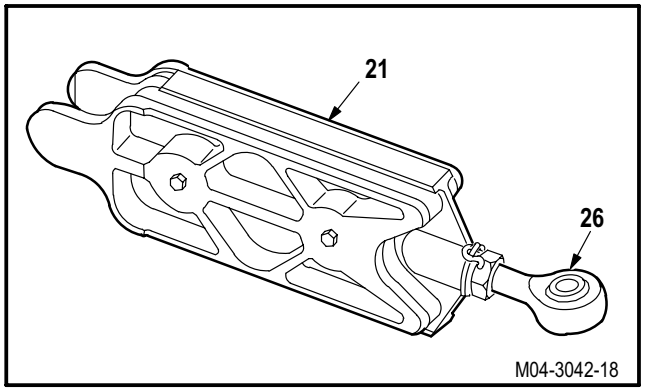
(6) Torque nut (25) to **1650 INCH-POUNDS**. Use crowfoot and torque wrench.

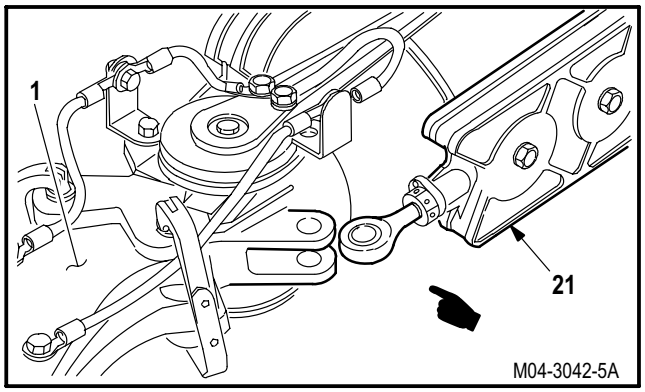
(7) Lockwire nut (25) to key washer (24). Use wire (item 225, App F).

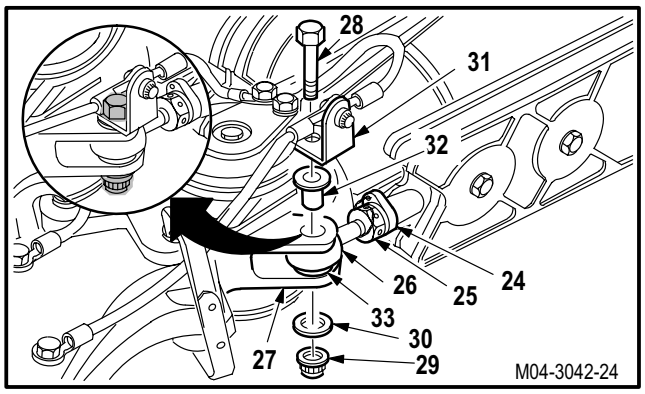
(7) Repeat phase check and adjustment starting at subparagraph 5.8.3, step k. until blade (1) is in phase.

d. **Go to subparagraph 5.8.3, step a. thru c. and j. thru l. for remaining blades.**

e. **Go to para 5.24, step 5.24.6.i and apply sealing compound to installation as required.**




END OF TASK

## 5.8A. MAIN ROTOR BLADE TRAILING EDGE TRIM TAB MARKING

5.8A.1. Description

This task covers: Marking of Trim Tab Adjustment Reference Points.

5.8A.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Marking stencil set (item 344A, App H)

**Materials/Parts:**

Cloth (item 52, App F)
Isopropyl alcohol (item 106, App F)
Lacquer (item 106A, App F)
Tape (item 206, App F)

**Personnel Required:**

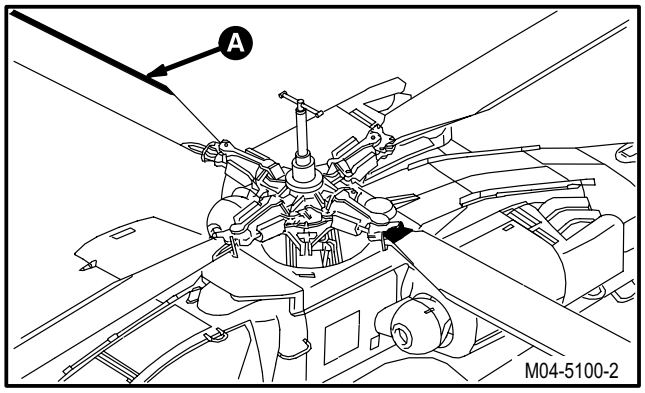
67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23

5.8A.3. Marking of Trim Tab Adjustment Reference Points

a. **Clean area to be marked.** Use isopropyl alcohol (item 106, App F) and cloth (item 52, App F).

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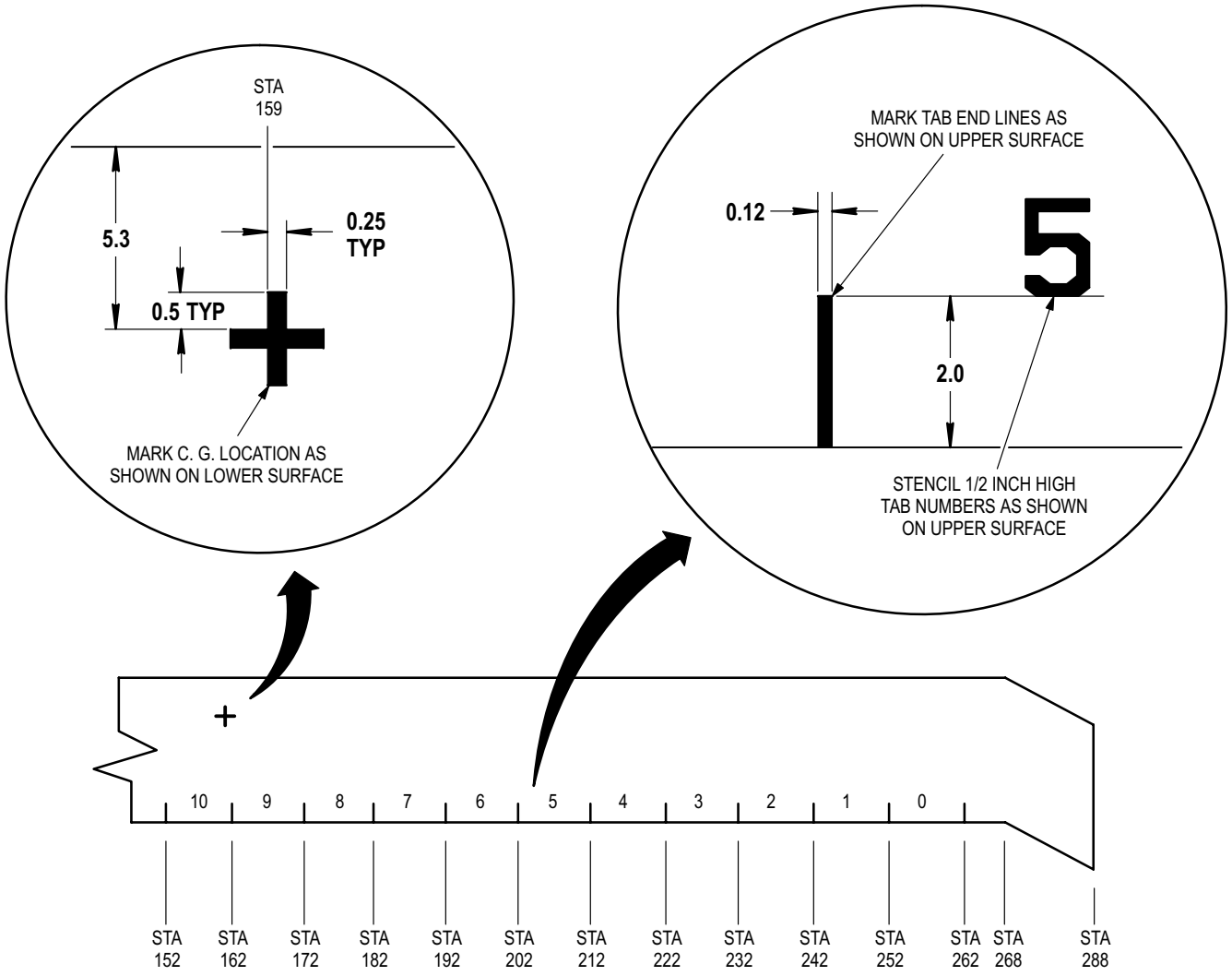
## 5.8A. MAIN ROTOR BLADE TRAILING EDGE TRIM TAB MARKING - continued




**NOTES:**

1. **PREPARE SURFACE BY WIPING CLEAN WITH ALCOHOL**
2. **USE LACQUER PER MIL-L-19537, COLOR NUMBER 31038 OR 11136 PER FED STD 595**

M04-5100-1

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**5.8A. MAIN ROTOR BLADE TRAILING EDGE TRIM TAB MARKING - continued**

b. **Mark tab end lines.**

(1) Locate blade station 152.

(2) Paint a 0.12 INCH wide by 2.0 INCHES long line extending from the trailing edge inward. Use tape (item 206, App F) and lacquer (item 106A, App F).

(3) Repeat this task at blade stations 162, 172, 182, 192, 202, 212, 222, 232, 242, 252, and 262 on both upper and lower surfaces.

c. **Mark tab numbers.**

(1) Paint 1/2 inch high blade numbers, starting with the number 10, at a point exactly midway between blade stations 152 and 162, 2.0 inches from the trailing edge of blade, on both upper and lower surfaces. Use tape (item 206, App F), lacquer (item 106A, App F), and stencil set.

(2) Repeat this task.

d. **Mark Center Of Gravity (CG) location on lower surface of blade.**

(1) Locate blade station 159.

(2) Mark and paint cross. Use tape (item 206, App F), lacquer (item 106A, App F), and stencil set.

END OF TASK

## 5.9. MAIN ROTOR BLADE BALANCE WEIGHT REMOVAL/INSTALLATION

5.9.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.9.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Materials/Parts:**

Cloth (item 52, App F)
Counterbalance weight (item 215, App F)
Counterbalance weight (item 216, App F)

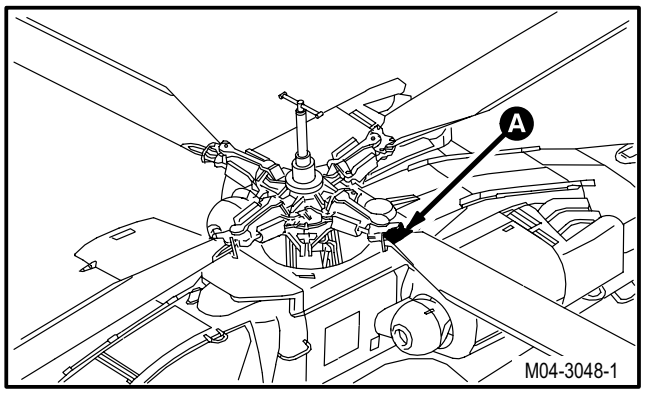
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




**NOTE**

This task is typical for all four main rotor blades.

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## 5.9. MAIN ROTOR BLADE BALANCE WEIGHT REMOVAL/INSTALLATION - continued

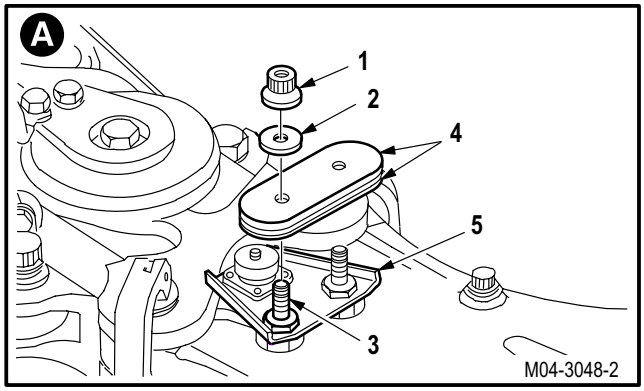
5.9.3. Removal

**NOTE**

- Weights are added or subtracted to balance main rotor. A maximum of nine may be installed.
- Additional washers may have been used to prevent nuts from shanking out on studs.

a. **Remove two nuts (1) and washers (2) from studs (3).**

b. **Remove weights (4) from bracket (5).**




5.9.4. Cleaning

a. **Wipe bracket.** Use cloth (item 52, App F).

5.9.5. Inspection

a. **Check bracket for cracks and studs for stripped threads.** None allowed.

b. **Check bracket and weights for corrosion** (para 1.49)**.**

5.9.6. Installation

**NOTE**

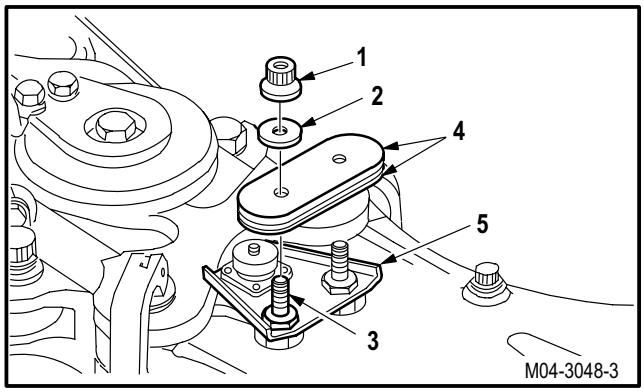
Additional washers may be added to prevent nuts from shanking out on studs.

a. **Install weights (4), two washers (2), and nuts (1).** Torque nuts (1) to **100 INCH-POUNDS**.

(1) Install weights (4) on studs (3). Use counterbalance weight (item 215, App F) and/or counterbalance weight (item 216, App F).

(2) Install two washers (2) and nuts (1) on studs (3).

(3) Torque nuts (1) to **100 INCH-POUNDS**. Use torque wrench.




b. **Inspect (QA).**

c. **Perform main rotor track and balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.10. MAIN ROTOR BLADE DROOP ANGLE MEASUREMENT

5.10.1. Description

This task covers: Measurement.

5.10.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Sling set kit (item 194, App H)
Rigging pin set (item 224, App H) (p/o item 390, App H)
Protractor assembly (item 238, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors T250L, T250R, T290L, T290R, and L325 opened |
| 1.62 | Rotor brakes unlocked |
| 1.72 | External hydraulic power applied |
| 1.97 | Maintenance crane installed |
| 1.100 | Crane adjustment - main rotor blade |

**WARNING**

**FLIGHT SAFETY PART**

- **The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Application of hydraulic power could cause injury to personnel. Make certain all switches and controls are in safe condition before applying hydraulic power. Inform all persons working on helicopter that hydraulic power is to be applied.**

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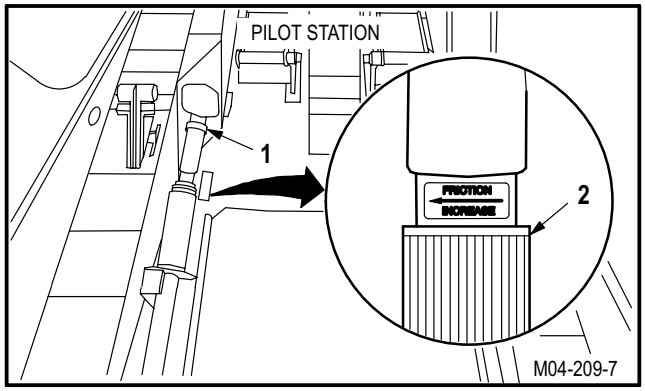
## 5.10. MAIN ROTOR BLADE DROOP ANGLE MEASUREMENT - continued

5.10.3. Measurement

a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **Position collective stick (1) full down.**

(1) Apply friction lock (2) fully counterclockwise.



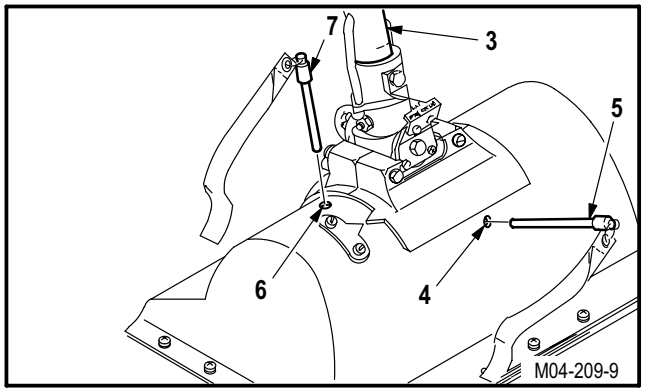

c. **Move pilot cyclic stick (3) to aline lateral rig pin holes (4).**

(1) Install -3 rig pin (5). Use rigging pin set.

d. **Move pilot cyclic stick (3) to aline longitudinal rig pin holes (6).**

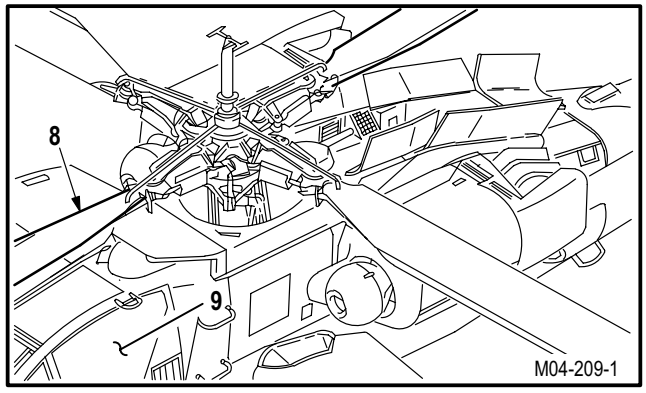
(1) Install -9 rig pin (7). Use rigging pin set.

e. **Disconnect external hydraulic power** (para 1.72)**.**




f. **Position main rotor blade (8) over forward fuselage (9).**

(1) Turn rotor by hand.

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## 5.10. MAIN ROTOR BLADE DROOP ANGLE MEASUREMENT - continued

**CAUTION**

To prevent damage to main rotor blade, ensure rubber padding is secured to sling. Padding should be approximately 3/16 inch thick and undamaged.

g. **Install main rotor blade sling (10).** Use sling set kit.

(1) Rotate two knurled knobs (11) clockwise to open jaws (12).

(2) Position sling (10) on leading edge (13) of blade (14) with maintenance crane.

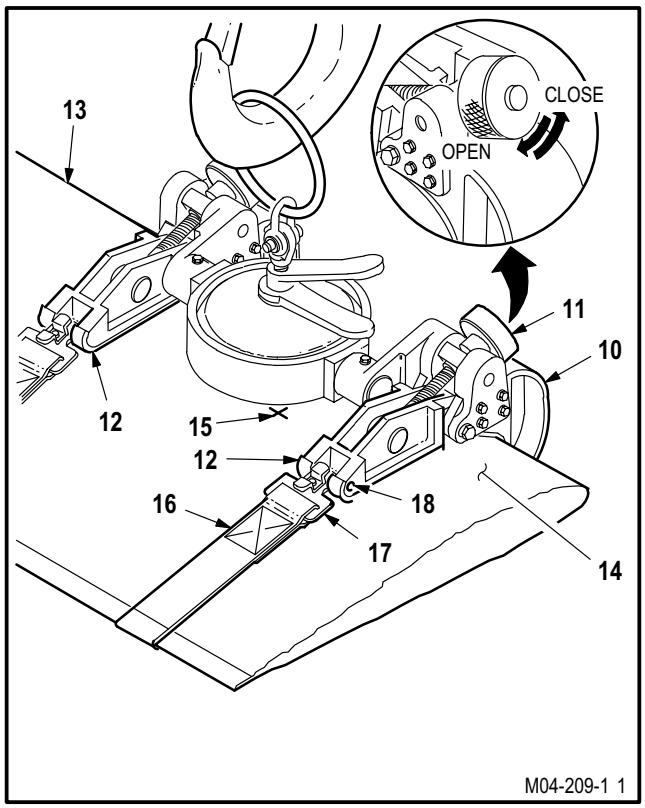
(3) Aline sling (10) with center-of-gravity (CG) indicator (15) on bade (14).

(4) Position CG indicator (15) approximately mid-way between jaws (12).

(5) Position two straps (16) around blade trailing edge.

(6) Rotate two knobs (11) counterclockwise to close jaws (12) around blade trailing edge.

(7) Attach two spring clips (17) to two bolts (18).

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## 5.10. MAIN ROTOR BLADE DROOP ANGLE MEASUREMENT - continued

**WARNING**

**If hoisted components are allowed to fall, personnel can suffer injury or death. Keep away from component mounting surfaces and loaded crane boom. If injury occurs, seek medical aid.**

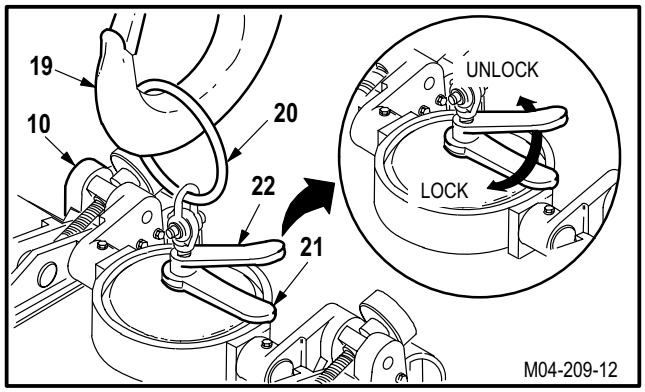
h. **Position crane hook (19) in lifting ring (20).**

**CAUTION**

Do not lift blade. Damage to main rotor head will result.

**NOTE**

Locking spherical bearing on sling allows main rotor blade position adjustment ±15 degrees in any direction to ensure proper removal/installation angle.




i. **Adjust position of sling (10) for lifting blade (14).**

(1) Hold torque handle (21) and move clamp handle (22) counterclockwise to release bearing.

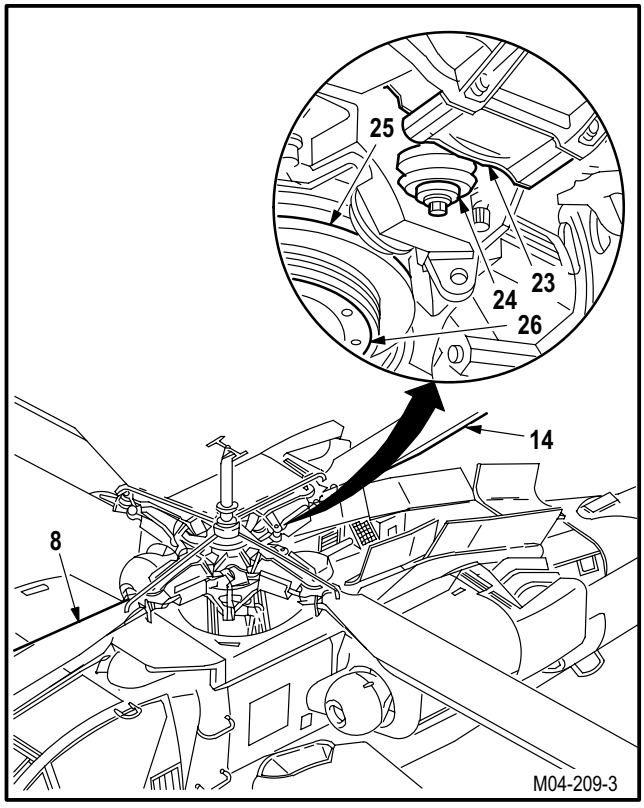
(2) Take up slack in sling (10).

(3) Hold torque handle (21) and move clamp handle (22) clockwise to lock bearing.

j. **With assistant, raise blade (14) (opposite blade (8) to be measured).**

(1) Raise blade (14) until main rotor droop stop (23) does not touch roller (24). Use crane and sling set kit.

(2) On blade (8) ensure main rotor droop ring (25) bottoms out on static ring (26).

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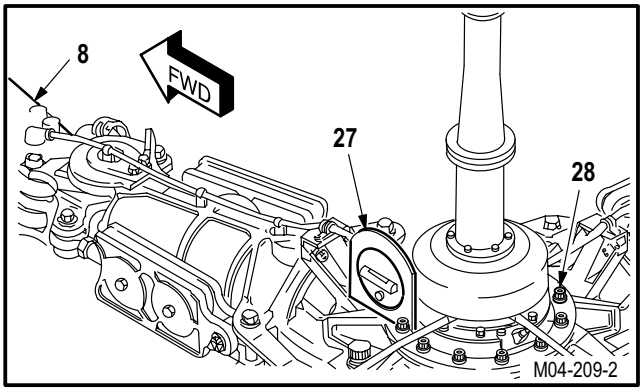
## 5.10. MAIN ROTOR BLADE DROOP ANGLE MEASUREMENT - continued

k. **Set protractor (27) reference zero point.**

(1) Place protractor (27) on main rotor driveplate (28). Use protractor assembly.

(2) Aline body of protractor (27) with blade (8).

(3) Adjust protractor (27) for zero. This setting is to be used as reference point.



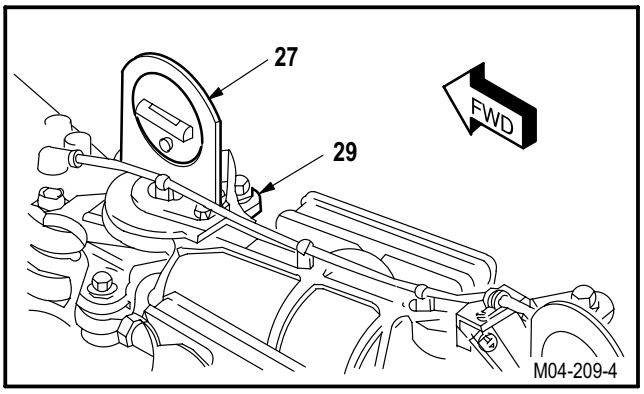

l. **Place protractor (27) on upper surface of outboard pitch housing (29).**

(1) Aline protractor (27) with blade (8). Use protractor assembly.

m. **Adjust protractor (27) inner dial to center level bubble.**

**NOTE**

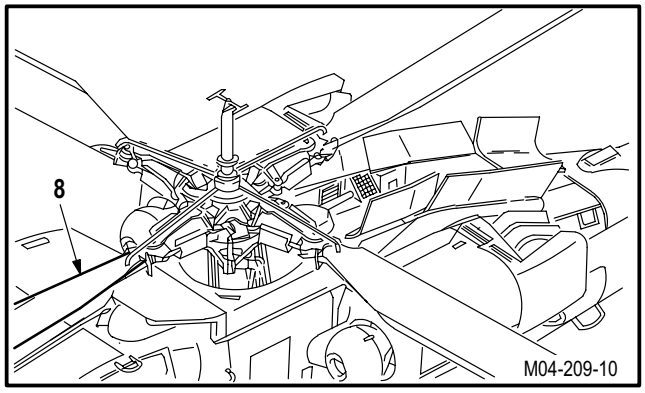
- This is droop angle reading and should be 7 to 7-1/2 degrees from reference zero point in step k.
- One **0.020 INCH** thick shim changes droop above 1/2 degree.
- Maximum number of shims is 9.




n. **If needed, adjust droop angle to 7 to 7-1/2 degrees.**

(1) If droop angle is too great, add shims (para 5.30).

(2) If droop angle is not enough, remove shims (para 5.30).

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## 5.10. MAIN ROTOR BLADE DROOP ANGLE MEASUREMENT - continued

**WARNING**

**Release tension on maintenance crane cable before removing blade sling. If tension is not released, serious injury can occur, seek medical aid.**

**CAUTION**

Do not damage main rotor blade trailing edge tabs during removal of main rotor blade sling.

o. **Remove sling (10).**

(1) Hold torque handle (21) and move clamp handle (22) counterclockwise to release bearing.

(2) Rotate two knobs (11) clockwise to open jaws (12).

(3) Pull two spring clips (17) and detach two straps (16) from bolts (18).

(4) Use crane to lower sling (10) from blade (14) to ground.

(5) Remove hook (19) from ring (20).

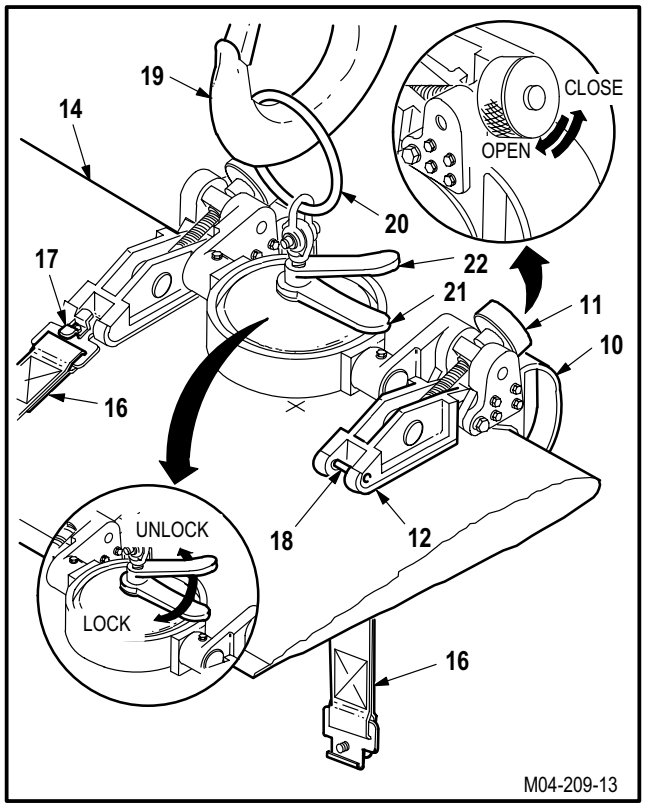
p. **Check blade** (para 5.2)**.**

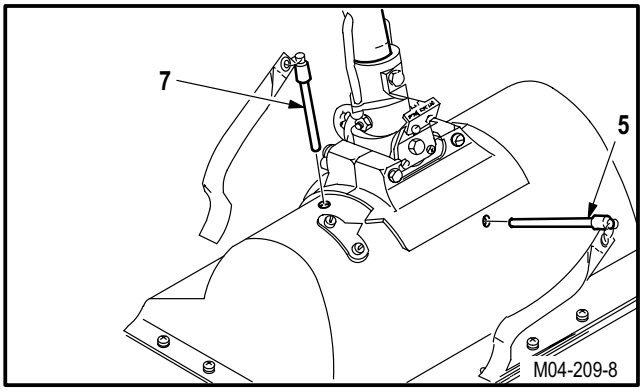
q. **Remove maintenance crane from aircraft** (para 1.105)**.**

r. **Remove rig pins (5) and (7).**

s. **Inspect (QA).**

t. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**




END OF TASK

## 5.11. MAIN ROTOR BLADE PAINT EROSION TOUCHUP

5.11.1. Description

This task covers: Paint Touchup.

5.11.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Spray gun paint cup (item 102, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Paint spray gun (item 339, App H)

**Materials/Parts:**

Cloth (item 48, App F)
Cloth (item 51, App F)
Epoxy primer coating kit (item 78, App F)
Methyl ethyl ketone (item 124, App F)
Polyurethane coating (item 140, App F)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 55-1500-345-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.11. MAIN ROTOR BLADE PAINT EROSION TOUCHUP - continued

5.11.3. Paint Touchup

**CAUTION**

To prevent damage to main rotor blade, sand metallic surfaces in a spanwise direction and sand glass skin surfaces in a chordwise direction.

a. **Remove all loose and non-adhering paint from area to be touched up on main rotor blade (1).**

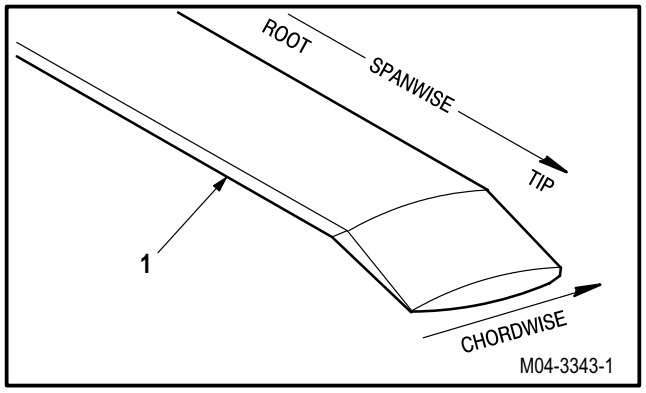
(1) Feather edges of repair area. Use cloth (item 48, App F).

b. **Clean sanded areas.** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

(1) Allow surface to dry not less than **15 MINUTES** or until no solvent odor is noticeable before applying primer.

c. **Apply primer by spraying full wet coats to produce a dry film to a thickness of 0.8 to 1.2 mils** (TM 55-1500-345-23)**.** Use epoxy primer coating kit (item 78, App F), paint cup, and spray gun.

(1) Allow primer dry film to dry not less than **1 HOUR** and no more than **48 HOURS** before application of topcoat.

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**5.11. MAIN ROTOR BLADE PAINT EROSION TOUCHUP - continued**

**CAUTION**

Rotor blades are not to be repainted over the entire surface of blade. Only light touchup of the eroded or repaired area is allowed. Severe chordwise imbalance problems may result from repainting blade.

d. **Apply topcoat of polyurethane by spraying full wet coats to produce a dry film thickness of 1.8 to 3.0 mils dry film** (TM 55-1500-345-23)**.** Use polyurethane coating (item 140, App F), paint cup, and spray gun.

(1) Topcoat of polyurethane will dry to touch in **30 MINUTES** and dry hard in **3 HOURS**.

**NOTE**

Main rotor blade rebalance is not necessary if steps a. thru d. are performed.

END OF TASK

## 5.12. MAIN ROTOR BLADE ANTI-PEEL DOUBLER REPAIR (AVIM)

5.12.1. Description

This task covers: Removal. Inspection. Repair.

5.12.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
9-inch pinking shears (item 287, App H)
Shot bag (item 288, App H)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 1, App F)
Adhesive (item 2, App F)
Antiseize compound (item 26, App F)
Brush (item 34, App F) (2)
Cellophane (item 41, App F)
Cloth (item 48, App F)
Cloth (item 51, App F)
Cloth (item 53, App F)
Distilled water (item 73, App F)
Dry cleaning solvent (item 74, App F)
Cotton gloves (item 82, App F)
Methyl ethyl ketone (item 124, App F)
Paper (item 135, App F)
Primer (item 143, App F)
Tape (item 207, App F)
Tape (item 208, App F)

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.3 | Main rotor blade removed |
| 5.13 | Main rotor blade leading edge tip removed |

**WARNING**

**FLIGHT SAFETY PART**

- **The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **The anti-peel doubler shall not be installed if any debonding outboard station 263 is detected. The No. 2 spar is a critical area. Failure to repair any debonded area may cause serious injury or death. If injury occurs, seek medical aid.**

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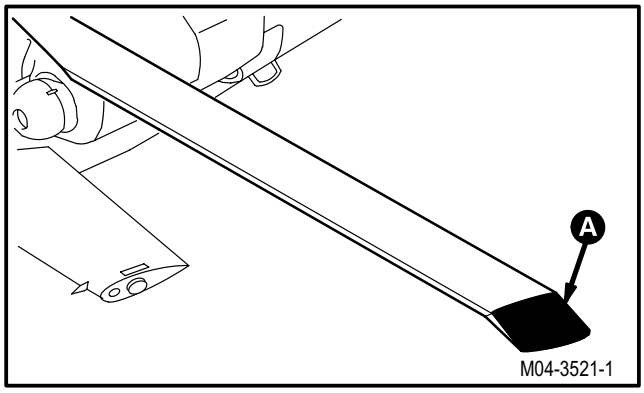
## 5.12. MAIN ROTOR BLADE ANTI-PEEL DOUBLER REPAIR (AVIM) - continued

**NOTE**

This task is typical for the upper and lower anti-peel doubler. The upper anti-peel doubler is shown.

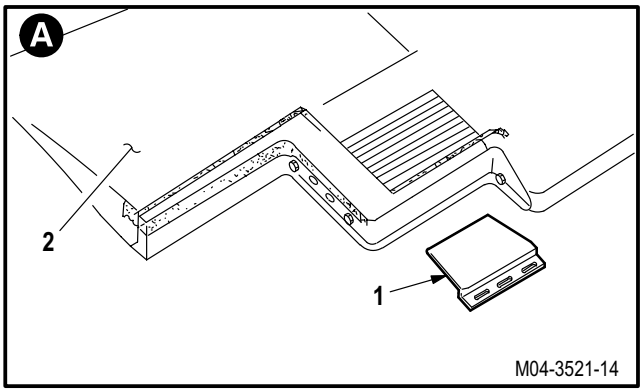



5.12.3. Removal

a. **Check main rotor blade outboard station 263 for debonding** (para 5.7)**.** None allowed.

b. **Remove anti-peel doubler (1) from main rotor blade (2).**

(1) Carefully pry doubler (1) from blade (2) and discard.




5.12.4. Cleaning

a. **Remove old adhesive from bonding surface of blade (2).** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

b. **Wipe the bonding surfaces of doubler (1) and blade (2).** Use cloth (item 51, App F).

(1) Allow bonding surface **30 MINUTES** minimum to air dry.

5.12.5. Inspection

**NOTE**

For inspection purposes, checking the blade tip area means checking all surface areas between station 262 and 287.95.

a. **Check blade tip area for cracks.** None allowed.

b. **Check blade tip area for corrosion** (para 1.49)**.**

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## 5.12. MAIN ROTOR BLADE ANTI-PEEL DOUBLER REPAIR (AVIM) - continued

c. **Check blade tip area for scratches, nicks, gouges, dents, depressions, and damage** (para 5.2)**.**

d. **Check blade tip area for paint erosion** (para 5.2)**.**

e. **Check blade tip area for debonding.** None allowed.

f. **Check blade tip area for loose or missing hardware** (para 5.1)**.**

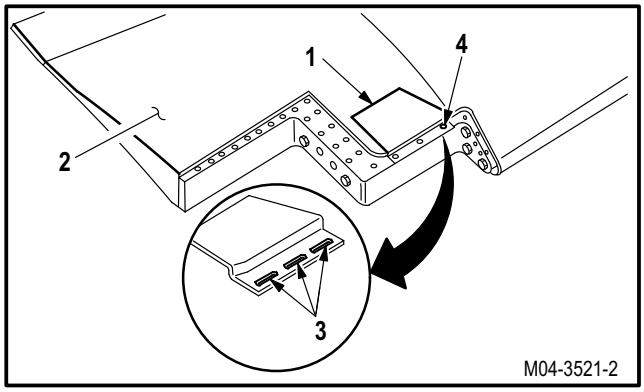
5.12.6. Repair

**WARNING**

**The anti-peel doubler shall not be installed if any debonding of outboard station 263 is detected. The number 2 spar is a critical area. Failure to repair any debonded area may cause death or serious injury. If injury occurs, seek medical aid.**

a. **Determine installation location of doubler (1).**

(1) Place doubler (1) on blade (2) alining the slots (3) with screw holes (4).




**NOTE**

- Masking should be at least **2 INCHES** wide.
- Do not mask the area where the new anti-peel doubler is to be bonded.

(2) Mask off bonding area approximately **1/4 INCH** beyond edges of doubler (1). Use tape (item 207, App F).

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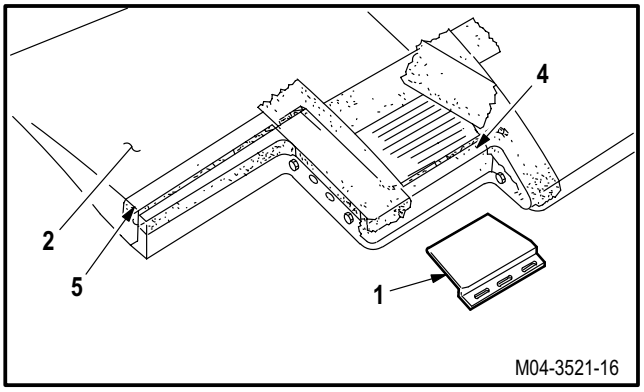
## 5.12. MAIN ROTOR BLADE ANTI-PEEL DOUBLER REPAIR (AVIM) - continued

b. **Mask off all screw holes (4).** Use tape (item 207, App F).




c. **Mask off faying surfaces (5) of blade (2).** Use tape (item 208, App F).

(1) Do not mask the area where doubler (1) is to be bonded.

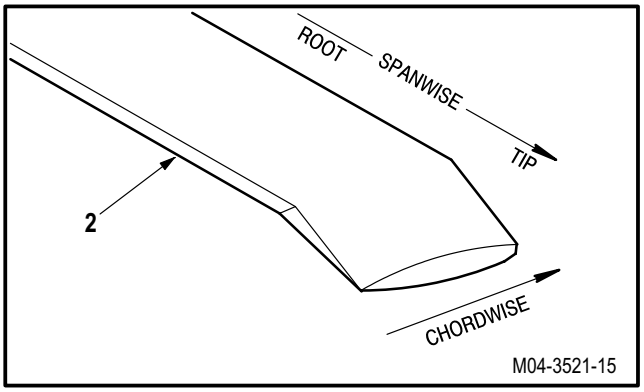
**CAUTION**

- To prevent damage to main rotor blade, fill and flair material between spars is not to be removed when preparing surface of main rotor blade.
- To prevent damage to main rotor blade, sand metallic surfaces in a spanwise direction. Sand glass skin areas in a chordwise direction.

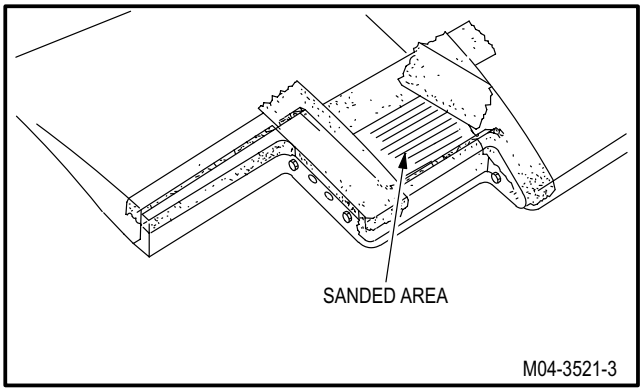
**NOTE**

When the paint is removed there will be an layer of baked-on primer which has a light drab green color. This primer is an excellent bonding surface when clean and should not be removed.

d. **Sand spanwise to remove paint primer and fill material from area to be bonded.** Use cloth (item 48, App F).



e. **Sand spanwise to finish sanding area to be bonded.** Use paper (item 135, App F).

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## 5.12. MAIN ROTOR BLADE ANTI-PEEL DOUBLER REPAIR (AVIM) - continued

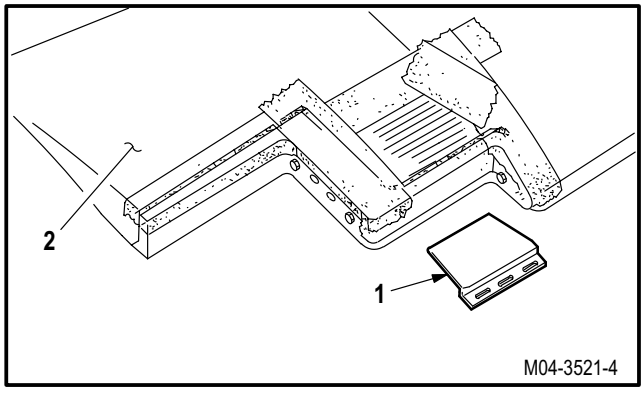
**CAUTION**

- To prevent contamination of the bonding process, clean gloves (item 82, App F) must be worn by anyone handling materials to be bonded until assembly is complete.
- The following procedure shall be performed in a dust free environment. Do not touch repair area after cleaning.

f. **Clean bonding surfaces of doubler (1) and blade (2).** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

**NOTE**

Repeat cleaning procedure if there is visible discoloration on cloth.




g. **Wipe bonding surfaces of doubler (1) and blade (2) to remove residue.** Use cloth (item 51, App F).

(1) Allow bonding surface **30 MINUTES** minimum to air dry.

**NOTE**

Apply primer to any exposed metal surfaces prior to applying fiberglass tape overlay.

h. **Apply primer to bare metal of bonding area on blade (2).** Use primer (item 143, App F) and brush (item 34, App F).

(1) Allow primer **1 HOUR** minimum to air dry.

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## 5.12. MAIN ROTOR BLADE ANTI-PEEL DOUBLER REPAIR (AVIM) - continued

i. **Cut one piece of ply cloth (6) the same size as doubler (1).** Use cloth (item 53, App F) and shears.

j. **Apply adhesive to binding surfaces of doubler (1) and blade (2).**

(1) Apply a smooth coat of adhesive to bonding surface of doubler (1) and blade (2). Use adhesive (item 2, App F) and brush (item 34, App F).

k. **Place cloth (6) on blade bonding surface and impregnate with adhesive.**

(1) Place cloth (6) on blade (2) bonding surface.

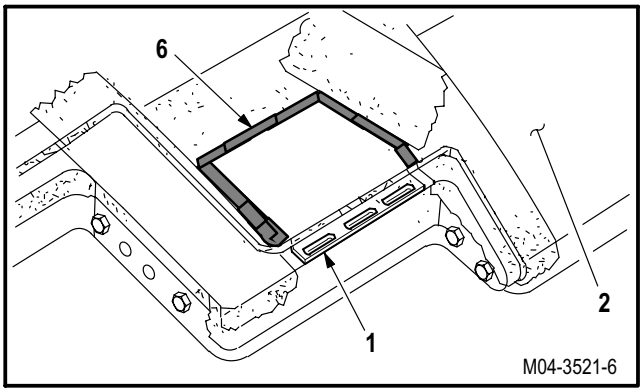
(2) Apply adhesive to cloth (6) so that cloth is fully wetted with adhesive. Ensure that no air bubbles or wrinkles exist. Use adhesive (item 2, App F) and cloth (item 53, App F).

l. **Install doubler (1) on blade (2).**

(1) Position doubler (1) on cloth (6) and work into adhesive using gentle hand pressure. Ensure that slots in doubler are alined with mounting holes on blade (2).

(2) Place tape over doubler (1) and work all air bubbles out from under doubler (1). Use tape (item 207, App F).

(3) Cover entire repair area with cellophane. Use cellophane (item 41, App F).

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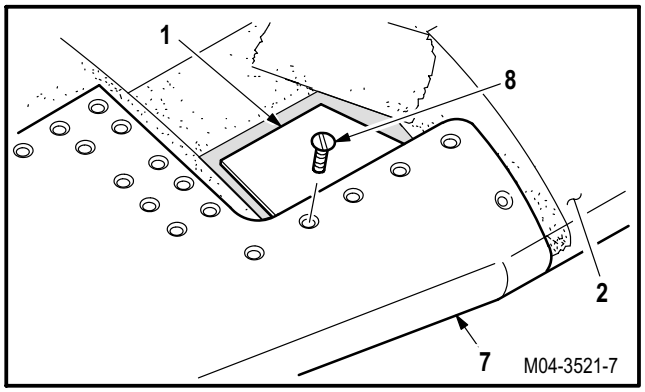
## 5.12. MAIN ROTOR BLADE ANTI-PEEL DOUBLER REPAIR (AVIM) - continued

m. **Install leading edge tip (7) on blade (2).**

(1) Position leading edge tip (7) on blade (2).

(2) Apply antiseize compound to threads of three screws (8) which will extend through doubler (1). Use antiseize compound (item 26, App F).

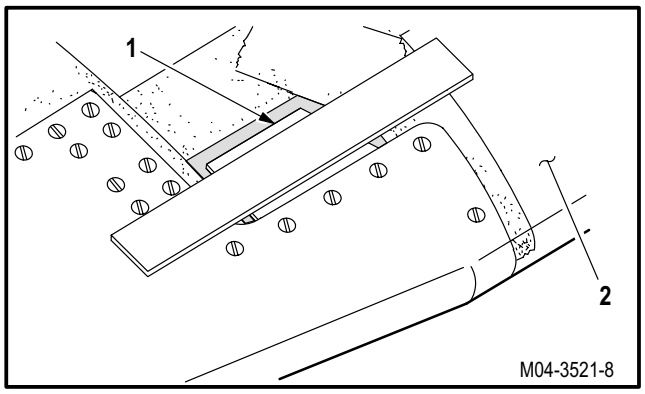
(3) Install and hand tighten screws (8). Do not torque.




n. **Place tape over doubler (1).** Use tape (item 207, App F).

(1) Work air bubbles out from under the doubler (1).

o. **Wipe excess adhesive from blade (2).** Use cloth (item 51, App F).

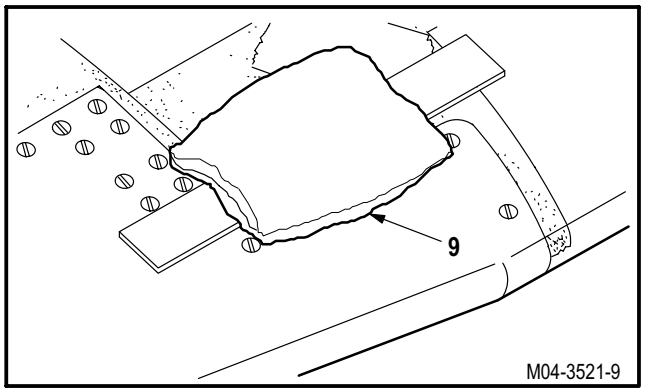



p. **Place shot bag (9) on doubler (1).** Use shot bag.

q. **Allow adhesive to cure at room temperature for 24 HOURS minimum.**

(1) Adhesive cure may be accelerated by heat cure for **1 HOUR** at 165 to 175 °F (74 to 79 °C).

r. **Remove shot bag (9).**




s. **Remove edge tip (7) from blade (2).**

(1) Remove three screws (8) and edge tip (7).

(2) Clean threads that extended through doubler (1). Use dry cleaning solvent (item 74, App F) and cloth (item 51, App F).

(3) Remove tape from blade (2).

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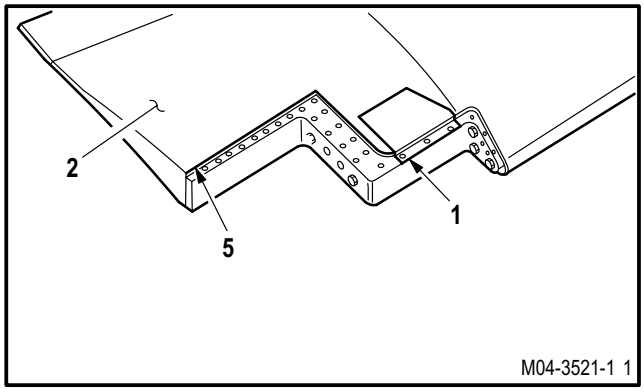
## 5.12. MAIN ROTOR BLADE ANTI-PEEL DOUBLER REPAIR (AVIM) - continued

t. **Remove cellophane and tape from doubler (1), blade (2), and blade faying surfaces (5).**




u. **Remove excess cured adhesive on blade (2) by sanding in a spanwise direction.** Use cloth (item 48, App F).

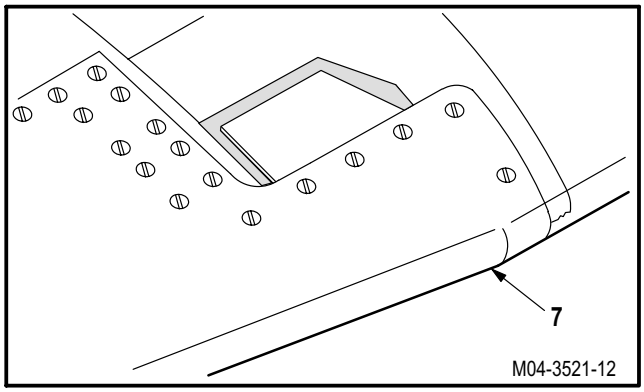
v. **Finish sanding excess cured adhesive on blade (2).** Use paper (item 135, App F).

w. **Clean the entire repair area on blade (2).** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

x. **Rinse and wipe the entire repair area on blade (2) to remove residue.** Use distilled water (item 73, App F) and cloth (item 51, App F).

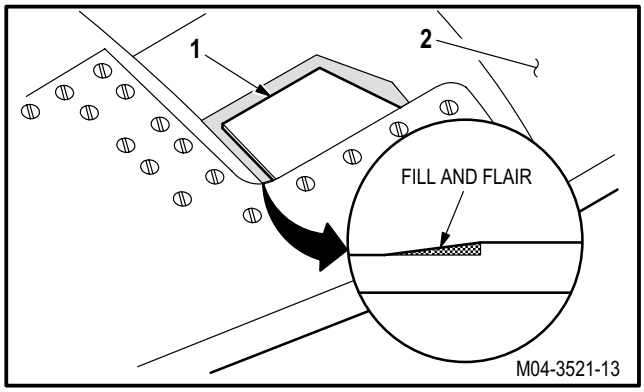
(1) Allow surfaces to air dry **30 MINUTES** minimum.

y. **Install edge tip (7)** (para 5.13)**.**



z. **Apply adhesive to fill and flair edges of doubler (1).** Use adhesive (item 1, App F).

aa. **Allow adhesive to dry at room temperature for 24 HOURS.**




ab. **Paint touchup repair areas on blade (2)** (para 5.11)**.**

ac. **Inspect (QA).**

ad. **Install main rotor blade** (para 5.4)**.**

ae. **Perform main rotor blade track and balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.13. MAIN ROTOR BLADE LEADING EDGE TIP REPLACEMENT

5.13.1. Description

This task covers: Removal. Cleaning. Inspection. Repair. Installation.

5.13.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
1/4-inch hi-torque screwdriver socket wrench attachment (item 320, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)

**Materials/Parts:**

Wood block
Adhesive (item 1, App F)
Adhesive (item 4, App F)
Antiseize compound (item 26, App F)
Brush (item 34, App F)
Cloth (item 51, App F)
Epoxy primer coating kit (item 78, App F)
Naphtha (item 127, App F)
Paper (item 133, App F)
Paper (item 135, App F)
Primer (item 143, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23
TM 1-1520-238-T
TM 55-1500-345-23

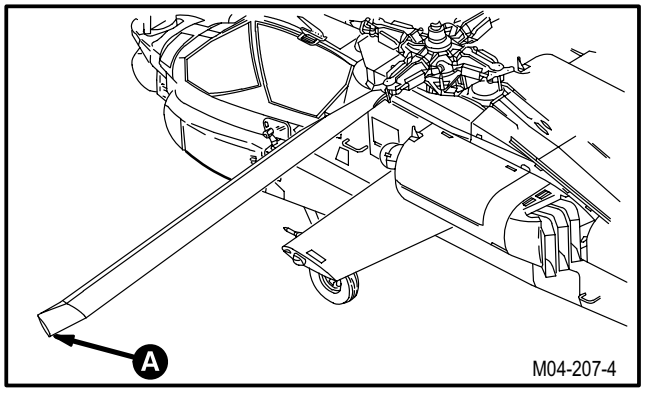
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.13. MAIN ROTOR BLADE LEADING EDGE TIP REPLACEMENT - continued

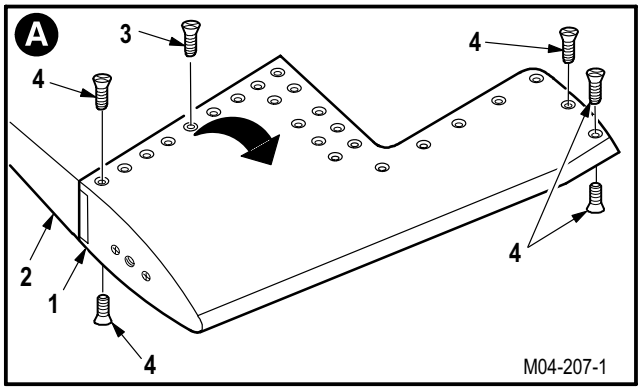
5.13.3. Removal

a. **Remove main rotor blade leading edge tip (1) from main rotor blade (2).**

(1) Remove 21 screws (3) and 3 screws (4) from edge tip (1) upper surface. Use hi-torque screwdriver.

(2) Remove 21 screws (3) and 2 screws (4) from edge tip (1) lower surface. Use hi-torque screwdriver.

(3) Pull edge tip (1) from blade (2).




5.13.4. Cleaning

a. **Clean leading edge tip faying surface** (para 1.47)**.**

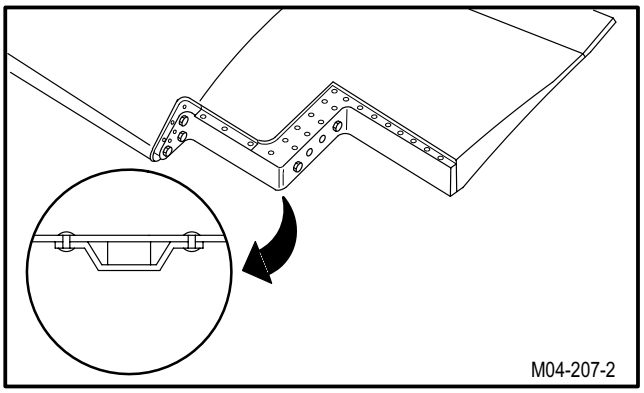
5.13.5. Inspection

a. **Check leading edge tip faying surface for cracks, wear, and chafing.** None allowed.

b. **Check 47 nutplates for loose and missing rivets or damaged threads** (TM 1-1500-204-23)**.**

c. **Check leading edge tip doublers for debonding.** None allowed.

d. **Check leading edge tip for curled or missing washer.** Repair if curled or missing: refer to paragraph 5.13.6.




e. **Check blade edge tip and main rotor blade weight support fitting insert for corrosion** (para 1.49)**.**

f. **Check main rotor blade weight support fitting insert.**

(1) Check for cracks. None allowed.

(2) Check for stripped, crossed, or flattened threads. None allowed.

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## 5.13. MAIN ROTOR BLADE LEADING EDGE TIP REPLACEMENT - continued

5.13.6. Repair

a. **Repair curled washer edge.**

(1) Remove raised washer edge by sanding in spanwise direction. Use wood block and paper (item 135, App F).

(2) Wipe surface of blade clean. Use cloth (item 51, App F) and naphtha (item 127, App F).

(3) Spot prime and paint. Take care to keep paint out of screw threads (TM 55-1500-345-23). Use epoxy primer coating kit (item 78, App F).

b. **Repair edge tip (1) by replacing missing washers (6).**

(1) Remove old adhesive. Use paper (item 133, App F) and paper (item 135, App F).

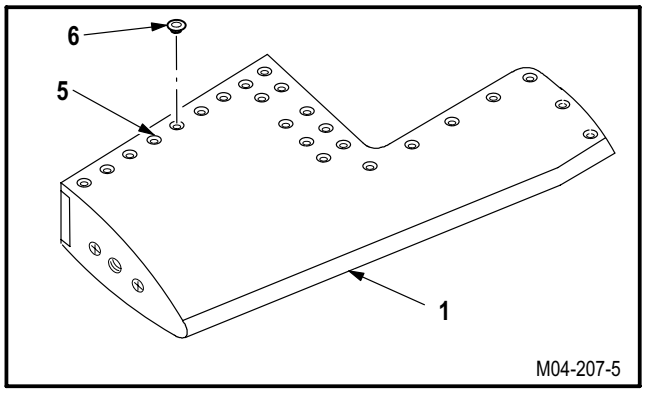
(2) Apply a coat of primer to edge tip washer mounting hole (5) and washer (6). Use primer (item 143, App F).

**NOTE**

- Washer must be installed within **24 HOURS** of application of primer.
- While performing the next step ensure that adhesive does not get into nut plate threads.

(3) Apply a thin uniform layer of adhesive to washer (6). Use adhesive (item 4, App F) and brush (item 34, App F).

(4) Seat washer (6) firmly in mounting hole (5).

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## 5.13. MAIN ROTOR BLADE LEADING EDGE TIP REPLACEMENT - continued

(5) Allow adhesive to cure at room temperature for **24 HOURS** minimum.

c. **Inspect (QA).**

5.13.7. Installation

**CAUTION**

There are two different size screws installed on the edge tip. If installed in the wrong location they may damage the nut-plate.

**NOTE**

Mismatch between edge tip and blade over the first **2 INCHES** of chordwise distance from leading edge shall not exceed **0.020 INCH**. Mismatch on upper surface should be minimized to make upper surface as flush as possible.

a. **Install edge tip (1) on blade (2).** Torque screws (3) and screws (4) to **45 INCH-POUNDS**.

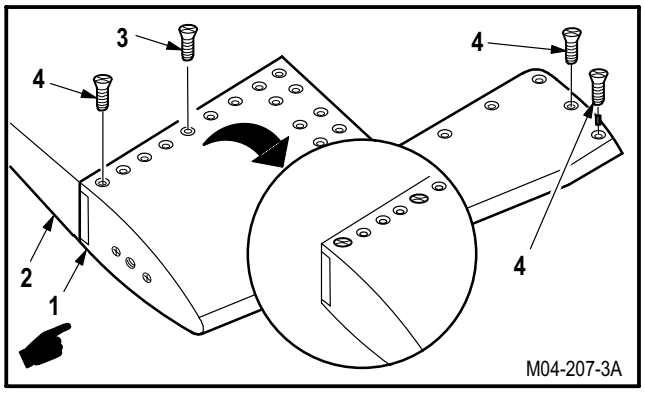
(1) Install edge tip on blade (2) and aline screw holes.

(2) Trim and file new tip cap, if required, to match main rotor blade.

(3) Spot prime and paint exposed surfaces. Take care to keep paint out of screw threads (TM 55-1500-345-23).

(4) Coat 21 screws (3) and 3 screws (4) with antiseize compound. Use antiseize compound (item 26, App F).

(5) Install 21 screws (3) and 3 screws (4), wet, on edge tip (1) upper surface. Use hi-torque screwdriver.

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**5.13. MAIN ROTOR BLADE LEADING EDGE TIP REPLACEMENT - continued**

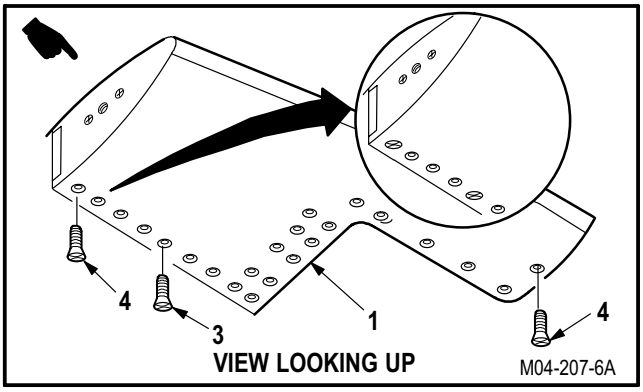
(6) Coat 21 screws (3) and 2 screws (4) with antiseize compound. Use antiseize compound (item 26, App F).

(7) Install 21 screws (3) and 2 screws (4), wet, on edge tip (1) lower surface. Use hi-torque screwdriver.

(8) Torque screws (3) and screws (4) to **45 INCH-POUNDS**. Use hi-torque screwdriver and torque wrench.

(9) Fill and flair any gaps **0.015 INCH** or larger. Use adhesive (item 1, App F).

(10) Allow adhesive to cure at room temperature for **24 HOURS** minimum.




b. **Inspect (QA).**

c. **Perform main rotor blade track and balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.14. MAIN ROTOR BLADE WEIGHT SUPPORT FITTING INSERT REPLACEMENT (AVIM)

5.14.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.14.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
3/8-inch portable pneumatic drill (item 116, App H)
11/32-inch twist drill (item 120, App H)
Screw extractor set (item 128, App H)
Chemical protective gloves (item 154, App H)
Rawhide mallet (item 212, App H)
1/16-inch drive pin punch (item 250, App H)
Adjustable air filtering respirator (item 262, App H)
Insert installation tool (item 367, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Insert (KNKDL1032S)
Adhesive (item 8, App F)
Brush (item 34, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.13 | Main rotor blade leading edge tip removed |

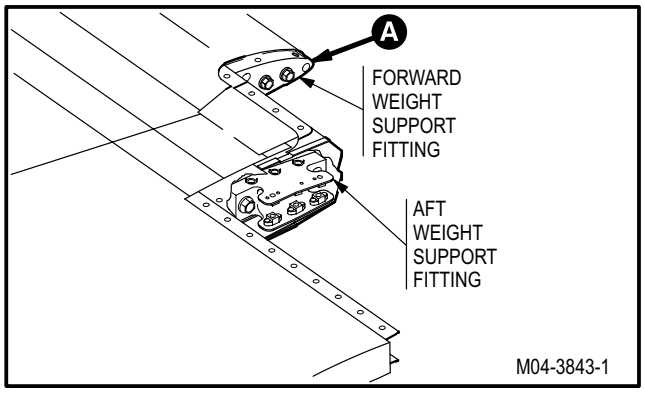
**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for both the forward or aft main rotor blade weight support fitting.

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## 5.14. MAIN ROTOR BLADE WEIGHT SUPPORT FITTING INSERT REPLACEMENT (AVIM) - continued

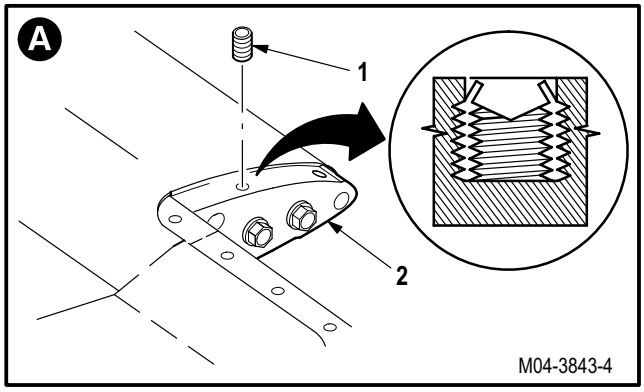
5.14.3. Removal

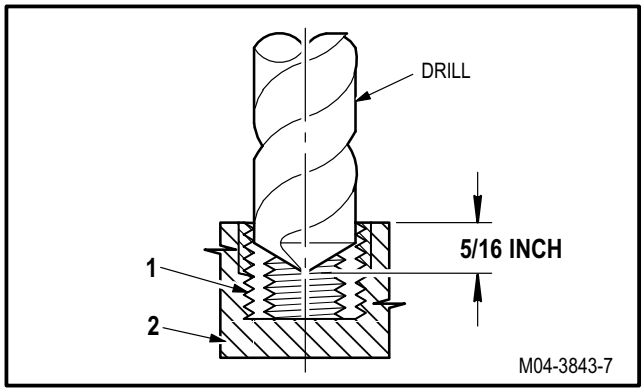
**CAUTION**

- Exercise care and undertake protective measures when handling or performing any type of maintenance or repair on main rotor blade. Accidental dents, gouges, or scratches caused by improper usage or slippage of tools such as drills may damage main rotor blade.
- To prevent damage to main rotor blade weight support fitting, do not drill defective insert deeper than **5/16 INCH**.

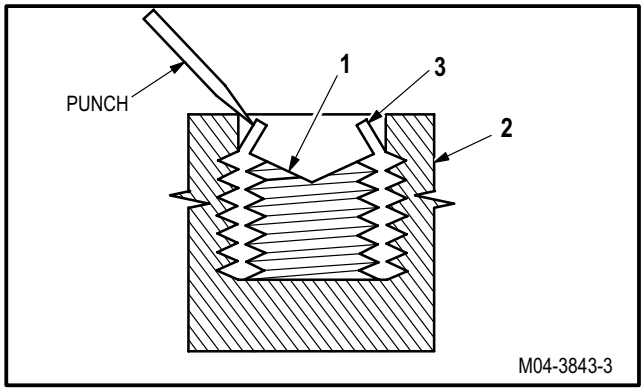
a. **Remove insert (1) from weight support fitting (2).**

(1) Position drill on center of defective insert (1) and drill to a depth of **5/16 INCH**. Use pneumatic drill and twist drill.

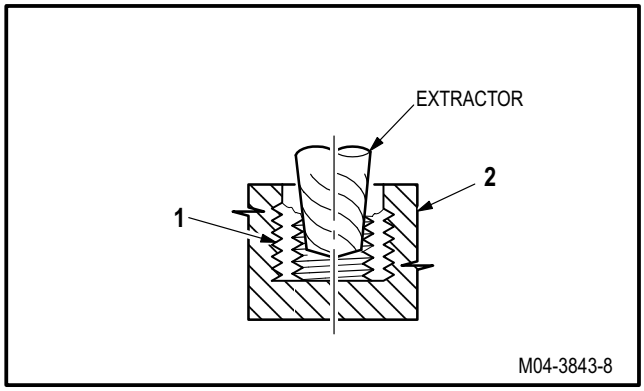



(2) Bend locking keys (3) on insert (1) inward and break off. Use punch and mallet.




(3) Remove insert (1) from fitting (2) and discard. Use screw extractor.

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## 5.14. MAIN ROTOR BLADE WEIGHT SUPPORT FITTING INSERT REPLACEMENT (AVIM) - continued

5.14.4. Cleaning

a. **Remove debris inside weight support fitting threaded hole.**

5.14.5. Inspection

**NOTE**

Unless otherwise specified, the following inspection procedures apply to the main rotor blade forward and/or aft weight support fitting.

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for debris inside threaded hole.** None allowed.

d. **Check threaded hole for stripped, crossed, or flattened threads.** None allowed.

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## 5.14. MAIN ROTOR BLADE WEIGHT SUPPORT FITTING INSERT REPLACEMENT (AVIM) - continued

5.14.6. Installation

**CAUTION**

To prevent corrosion, ensure that adhesive is wet when installing new insert. Do not allow adhesive to air dry.

a. **Install new insert (1) in fitting (2).**

(1) Coat threaded hole of fitting (2) with adhesive. Use brush (item 34, App F) and adhesive (item 8, App F).

**NOTE**

When installing insert, ensure that insert locking keys are located 45 degrees from original location.

(2) Install insert (1) until flush to or below surface of fitting (2). Use insert tool.

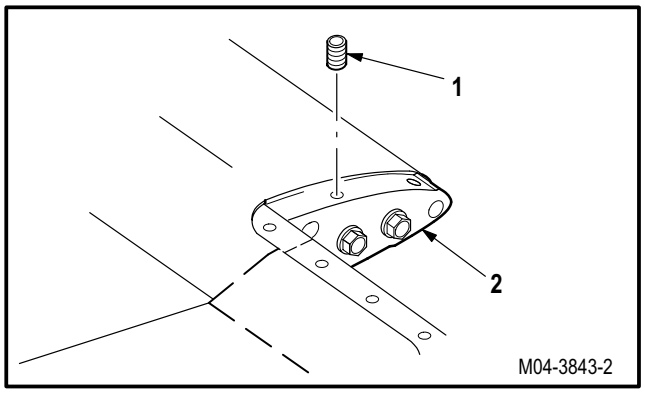
(3) Position shoulder on opposite end of insert installation tool (4) against surface of fitting (2). Use insert tool.

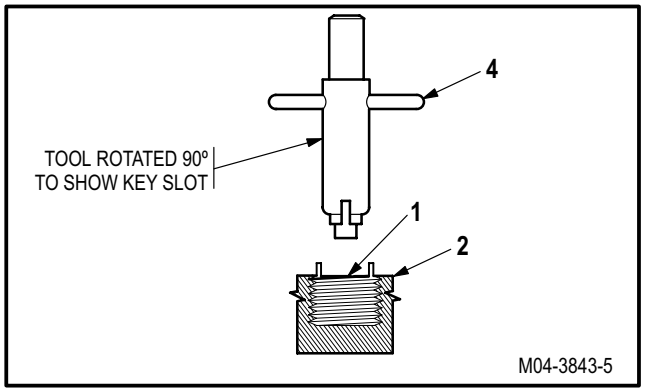
(4) Gently tap tool (4) until insert locking keys (3) are flush with insert (1). Use mallet.

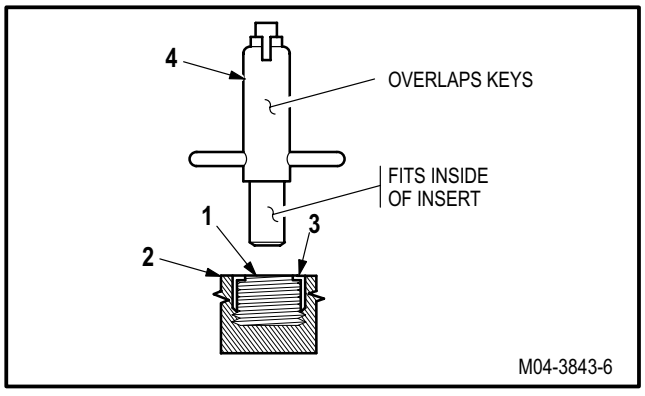
(5) Allow adhesive to cure for **24 HOURS** at room temperature.

b. **Inspect (QA).**

c. **Install main rotor blade leading edge tip** (para 5.13)**.**




END OF TASK

## 5.14A. MAIN ROTOR BLADE FORWARD AND AFT TIP WEIGHT REMOVAL/INSTALLATION (AVIM)

5.14A.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.14A.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

**Materials/Parts:**

Antiseize compound (item 26, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-264-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.13 | Main rotor blade leading edge tip removed |

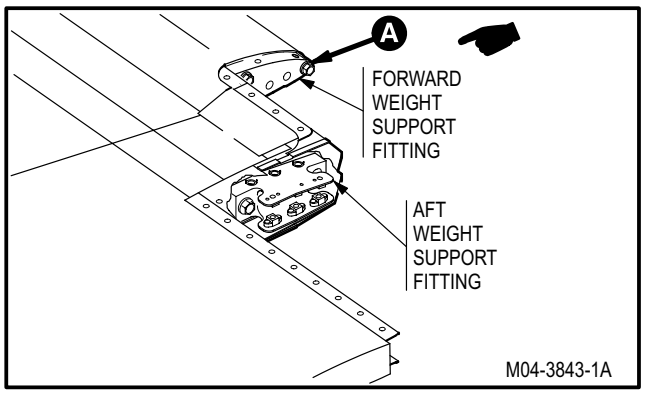
**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**CAUTION**

Exercise care and undertake protective measures when handling or performing any type of maintenance or repair on main rotor blade. Accidental dents, gouges, or scratches caused by improper usage or slippage of tools such as drills may damage main rotor blade.

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## 5.14A. MAIN ROTOR BLADE FORWARD AND AFT TIP WEIGHT REMOVAL/INSTALLATION (AVIM) - continued

**NOTE**

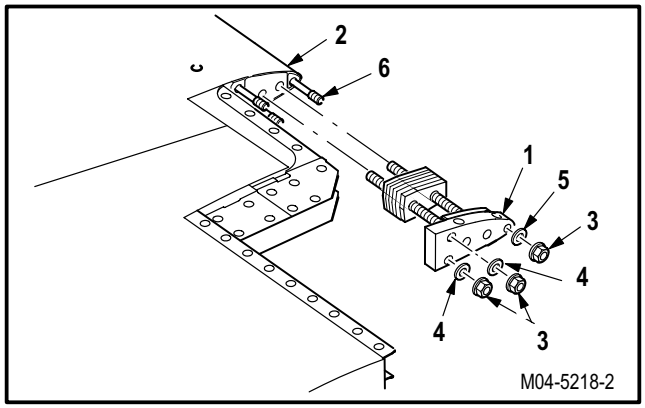
- This task is typical for both the forward or aft main rotor blade weight support fitting on all four main rotor blades.
- This task is for facilitation of other maintenance and not for weight adjustment.

5.14A.3. Removal

a. **Remove forward weight support fitting (1) from blade (2).**

(1) Remove three nuts (3), two washers (4) and one washer (5) from forward studs (6).

(2) Remove the forward weight support fitting (1) from blade (2).




**NOTE**

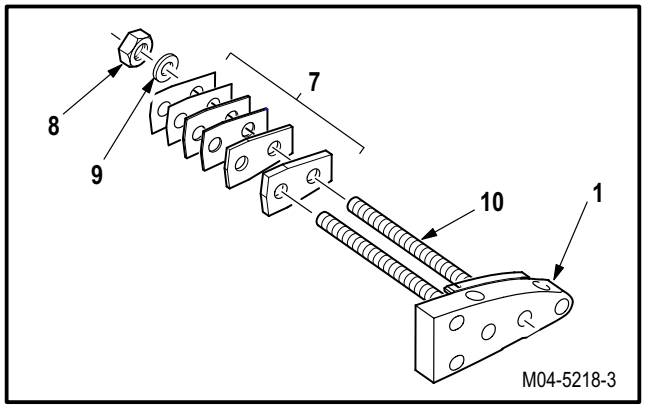
Weights must be reinstalled in the exact order and placement they are removed. do not mix weight, stack height, and arrangement of weights.

b. **Remove forward tip weights (7) from support fitting (1).**

(1) Inventory and record the forward counterbalance weights (7) by part number. Include total weight, stack height, and arrangement of weights.

(2) Remove two nuts (8) and washers (9) from studs (10).

(3) Remove forward counterbalance weights (7) from support fitting (1).

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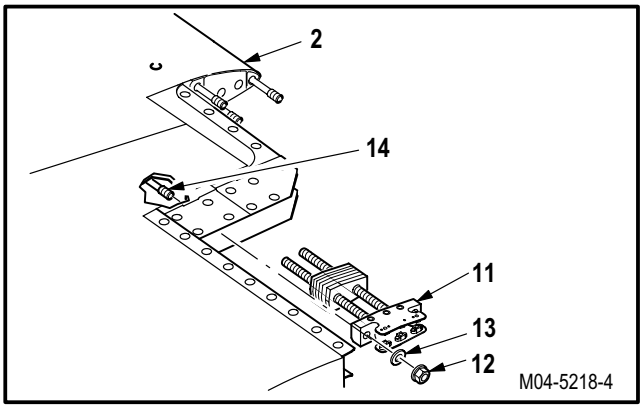
## 5.14A. MAIN ROTOR BLADE FORWARD AND AFT TIP WEIGHT REMOVAL/INSTALLATION (AVIM) - continued

c. **Remove aft weight support fitting (11) from blade (2).**

(1) Remove two nuts (12) and washers (13) from aft studs (14).

(2) Remove the aft weight support fitting (11) from blade (2).




**NOTE**

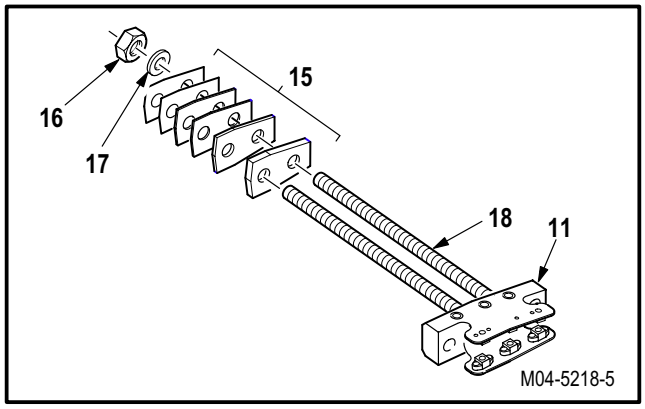
Weights must be reinstalled in the exact order and placement they are removed. do not mix weight, stack height, and arrangement of weights.

d. **Remove aft tip weights (15) from support fitting (11).**

(1) Inventory and record the aft counterbalance weights (15) by part number. Include total weight, stack height, and arrangement of weights.

(2) Remove two nuts (16) and washers (17) from studs (18).

(3) Remove aft counterbalance weights (15) from support fitting (11).




5.14A.4. Cleaning

a. **Clean removed and attaching parts** (para 1.47)**.**

5.14A.5. Inspection

a. **Check removed and attaching parts for cracks.**

(1) If cracks are suspected, perform nondestructive inspection (TM 1-1520-264-23).

b. **Check main rotor blade tip counterbalance weights for corrosion.** (para 1.49**).**

c. **Check main rotor blade weight support fitting insert.**

(1) Check for stripped, crossed, or flattened threads. None allowed.

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## 5.14A. MAIN ROTOR BLADE FORWARD AND AFT TIP WEIGHT REMOVAL/INSTALLATION (AVIM) - continued

5.14A.6. Installation

**CAUTION**

- The same total weight, stack height, and arrangement of weights that were removed must be reinstalled on the blade unless the weight stack is adjusted using an AMCOM approved blade static balance tool and procedures. Failure to do so could result in excess vibration causing damage to the aircraft.
- The Maximum permissible weight that may be mounted on each weight support fitting is **5.0 POUNDS**.

a. **Install aft tip weights (15) on support fitting (11). Torque nuts (16).**

(1) Install aft counterbalance weights (15) on support fitting (11) in the exact order, height and weight as removed.

(2) Apply antiseize compound (item 26, App F) to studs (18).

(3) Install two washers (17) and nuts (16) on studs (18).

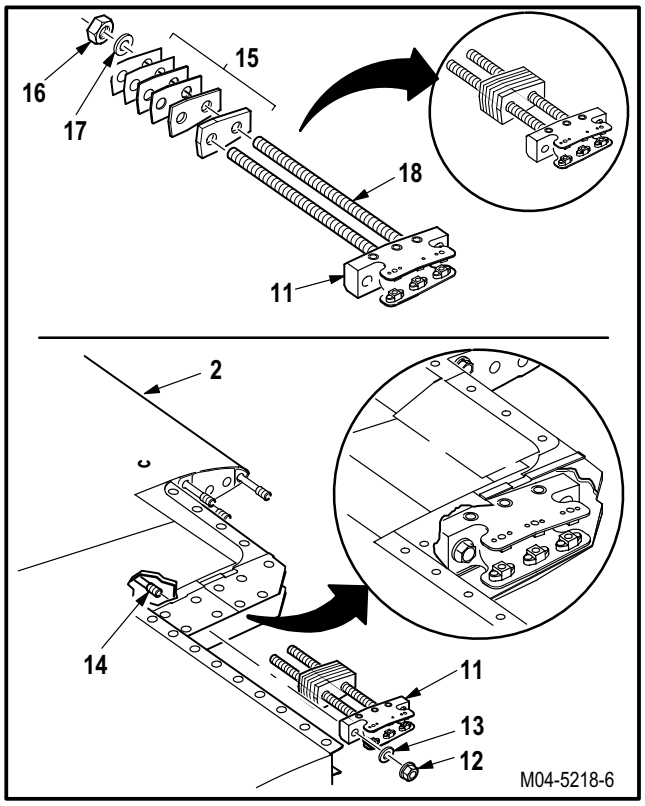
(4) Torque two nuts (16) to **260- 290 INCH-POUNDS**. Use torque wrench.

b. **Install aft weight support fitting (11) on blade (2). Torque nuts (12).**

(1) Install the aft weight support fitting (11) on blade (2).

(2) Install two washers (13) and nuts (12) on studs (14).

(3) Torque two nuts (12) to **205- 225 INCH-POUNDS**. Use torque wrench.

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## 5.14A. MAIN ROTOR BLADE FORWARD AND AFT TIP WEIGHT REMOVAL/INSTALLATION (AVIM) - continued

**CAUTION**

- The same total weight, stack height, and arrangement of weights that were removed must be reinstalled on the blade unless the weight stack is adjusted using an AMCOM approved blade static balance tool and procedures. Failure to do so could result in excess vibration causing damage to the aircraft.
- The Maximum permissible weight that may be mounted on each weight support fitting is **5.0 POUNDS**.

c. **Install forward tip weights (7) on support fitting (1). Torque nuts (8).**

(1) Install forward counterbalance weights (7) on support fitting (1) in the exact order, height and weight as removed.

(2) Apply antiseize compound (item 26, App F) to studs (10).

(3) Install two washers (9) and nuts (8) on support fitting (1).

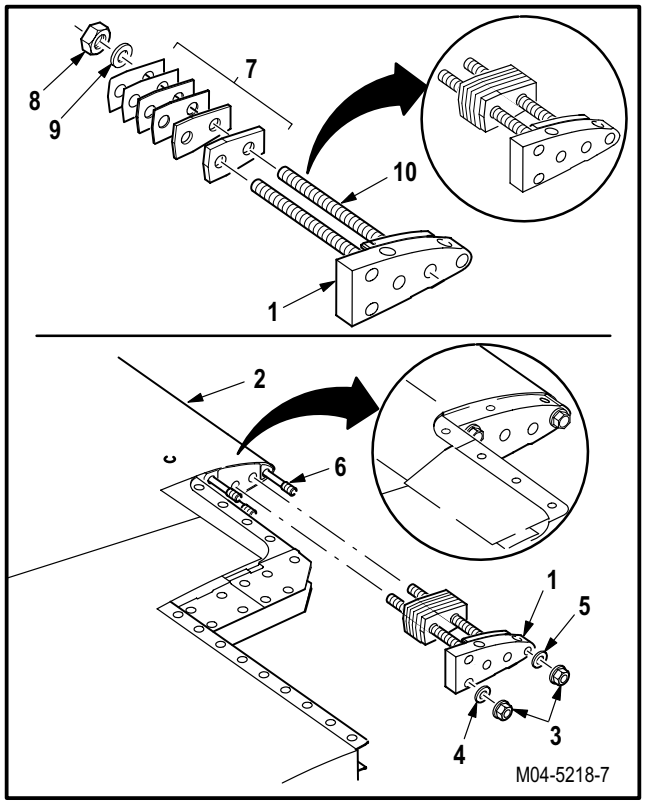
(4) Torque two nuts (8) to **275 INCHPOUNDS**. Use torque wrench.

d. **Install the forward weight support fitting (1) on blade (2). Torque nuts (3).**

(1) Install the forward weight support fitting (1) on blade (2).

(2) Install two washers (4), one washer (5) and three nuts (3) on forward studs (6).

(3) Torque three nuts (3) to **175 INCH-POUNDS**. Use torque wrench.

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**5.14A MAIN ROTOR BLADE FORWARD AND AFT TIP WEIGHT REMOVAL/INSTALLATION (AVIM) - continued**

e. **Inspect (QA).**

f. **Install leading edge tip assembly** (para 5.13)**.**

g. **Perform main rotor blade track and balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.15. MAIN ROTOR BLADE ELECTROSTATIC DISCHARGER DISASSEMBLY/ASSEMBLY

5.15.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly.

5.15.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
3-inch C clamp (item 60, App H)
3/8-inch portable pneumatic drill (item 116, App H)
#41 twist drill (item 118, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
12-inch strap pipe wrench (item 425, App H)

**Materials/Parts:**

Wood block (2)
Adhesive (item 2, App F)
Adhesive (item 19, App F)
Brush (item 34, App F)
Cloth (item 47, App F)
Cloth (item 48, App F)
Cloth (item 52, App F)
Methyl ethyl ketone (item 124, App F)
Paper (item 134, App F)
Primer (item 144, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23
TM 55-1500-345-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

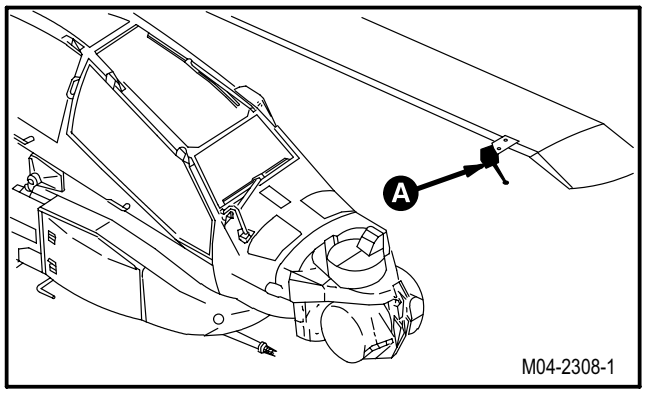
**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for the main rotor blade electrostatic discharger assemblies.

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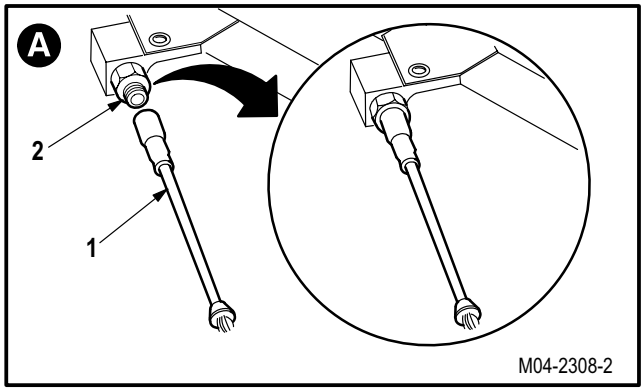
## 5.15. MAIN ROTOR BLADE ELECTROSTATIC DISCHARGER DISASSEMBLY/ASSEMBLY - continued

5.15.3. Disassembly

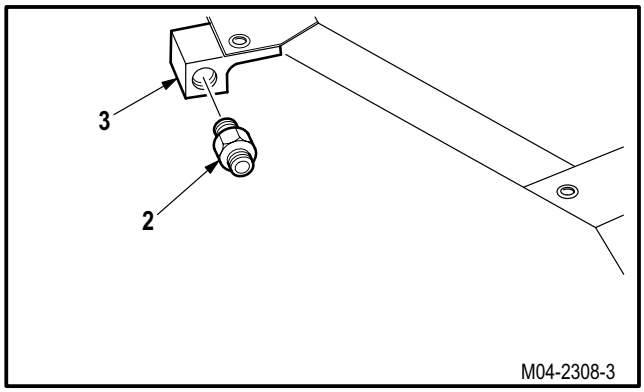
a. **Remove electrostatic discharger (1) from electrostatic discharger stud (2).**

(1) Hold stud (2).

(2) Remove discharger (1) from stud (2). Use strap wrench.




b. **Remove stud (2) from electrostatic discharger fitting (3).**



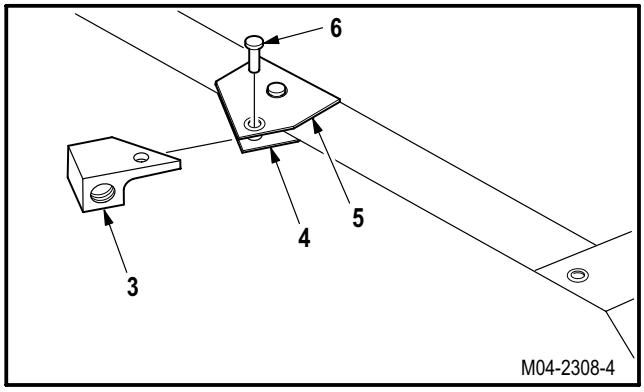

c. **Remove fitting (3) from lower electrostatic discharger mounting bracket (4) and upper electrostatic discharger mounting bracket (5).**

(1) Remove and discard rivet (6) and brackets (4) and (5) (TM 1-1500-204-23).

(2) Remove fitting (3) from brackets (4) and (5).

**NOTE**

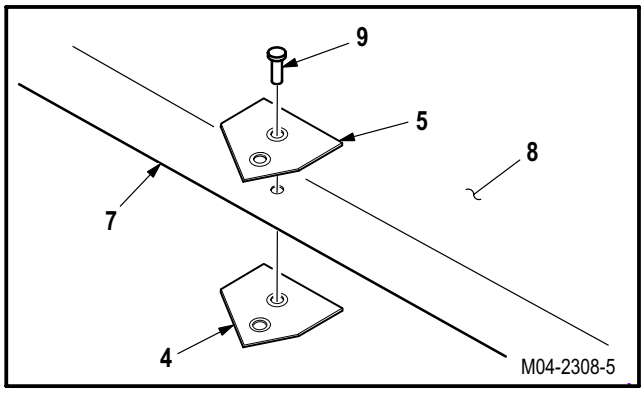
Perform step d only if replacing one or both of the brackets. Otherwise, proceed directly to paragraph 5.15.4.




d. **Remove brackets (4) and (5) from trailing edge (7) of main rotor blade (8).**

(1) Remove and discard rivet (9) and brackets (4) and (5) (TM 1-1500-204-23).

(2) Remove brackets (4) and (5) from trailing edge (7) of blade (8).

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## 5.15. MAIN ROTOR BLADE ELECTROSTATIC DISCHARGER DISASSEMBLY/ASSEMBLY - continued

5.15.4. Cleaning

a. **Clean electrostatic discharger, stud, fitting, and brackets.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

**CAUTION**

To prevent damage to main rotor blade, sand metallic surfaces in a spanwise direction and sand glass skin surfaces in a chordwise direction.

**NOTE**

- Perform steps b and c only if one or both brackets were removed. Otherwise, proceed directly to paragraph 5.15.5.
- The bracket bonding area on the blade trailing edge consists of the bracket mating surface and an area extending a minimum of 4 inches beyond the inboard and outboard sides of bracket mating surface.

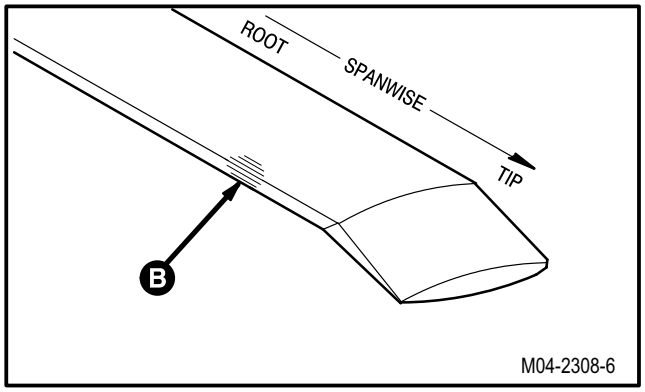
b. **Remove top coat of paint and primer from bracket bonding area.**

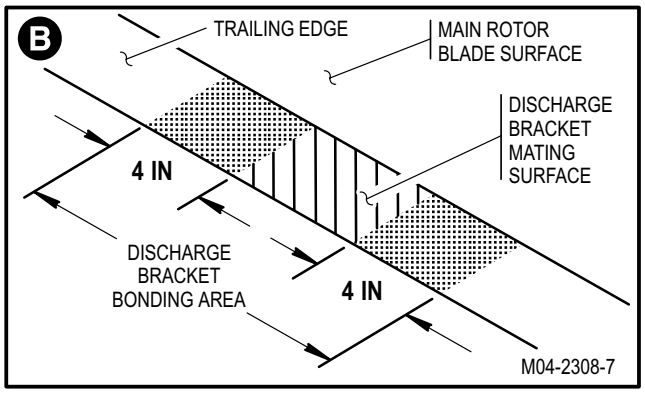
(1) Sand bracket bonding area in a spanwise direction.

(a) Start with cloth (item 47, App F).

(b) Finish with cloth (item 48, App F).

(2) Verify that no traces of paint remain on bracket bonding area.

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**5.15. MAIN ROTOR BLADE ELECTROSTATIC DISCHARGER DISASSEMBLY/ASSEMBLY - continued**

**NOTE**

- Repeat cleaning procedure until there is no visible discoloration on cloth.
- Do not touch bracket bonding area after cleaning.

c. **Clean upper and lower bracket bonding area.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

5.15.5. Inspection

**NOTE**

Unless otherwise specified, the following inspection procedures apply to the electrostatic discharger, stud, fitting, and brackets (removed or attached).

a. **Check for cracks.** None allowed.

b. **Check for corrosion** (para 1.49)**.**

c. **Check for scratches, nicks, and gouges** (para 5.1)**.**

d. **Check discharger, fitting, and stud for stripped, crossed, or flattened threads.** None allowed.

**NOTE**

- If the brackets were not removed, the following inspection procedures apply to the main rotor blade surface area adjacent to all sides of the attached brackets.
- If the upper or lower brackets were removed, the following inspection procedures apply to the entire bracket bonding area (where paint and primer was removed) on the main rotor blade.

e. **Check for cracks.** None allowed.

f. **Check for corrosion** (para 1.49)**.**

g. **Check for dents and depressions** (para 5.1)**.**

h. **Check for scratches, nicks, and gouges** (para 5.1)**.**

GO TO NEXT PAGE

## 5.15. MAIN ROTOR BLADE ELECTROSTATIC DISCHARGER DISASSEMBLY/ASSEMBLY - continued

5.15.6. Assembly

**NOTE**

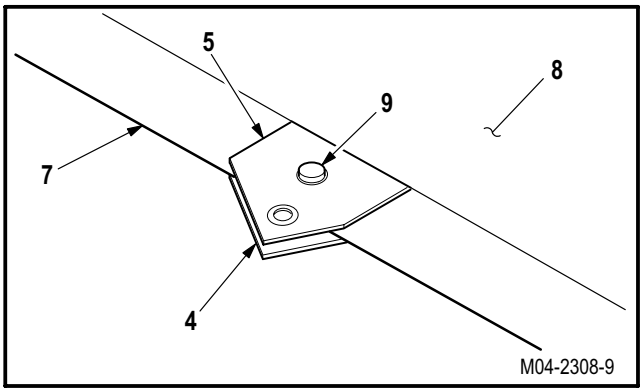
Perform steps a thru c only if the upper or lower brackets were removed from the main rotor blade. Otherwise, proceed directly to step d.

a. **Prime entire bracket bonding area on trailing edge (7) of blade (8).**

(1) Apply a thin, uniform coat of primer to bracket mating surface and adjacent surface areas where paint was removed on trailing edge (7) of blade (8). Use primer (item 144, App F) and brush (item 34, App F).

(2) If both brackets (4) and (5) are being installed, repeat step a(1) for the opposite bracket bonding area on blade (8).

(3) Allow primer to air dry for **1 HOUR**.



b. **Install new brackets (4) and (5) on trailing edge (7) of blade (8).**

(1) Apply a thin, uniform coat of adhesive to mating surface of brackets (4) and (5) on trailing edge (7) of blade (8). Use adhesive (item 2, App F) and brush (item 34, App F).

(2) Position brackets (4) and (5) on mating surface of blade (8).

(3) Slide new rivet (9) through bracket (4), blade (8), and bracket (5).

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## 5.15. MAIN ROTOR BLADE ELECTROSTATIC DISCHARGER DISASSEMBLY/ASSEMBLY - continued

(4) Apply light clamping pressure to hold brackets (4) and (5) in place. Use C clamp and wood blocks.

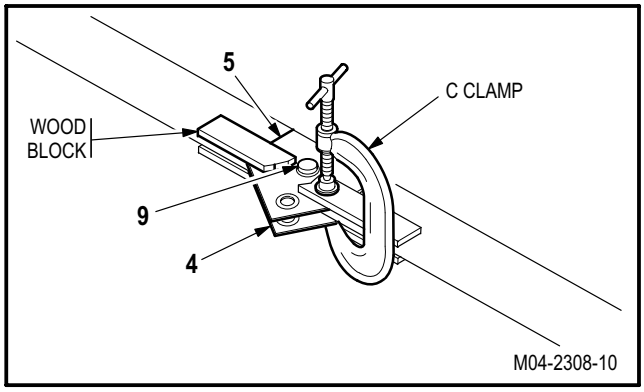
(5) Remove excess adhesive squeeze-out from around edges of brackets (4) and (5). Use cloth (item 52, App F).

(6) Allow adhesive to cure for a minimum of **24 HOURS** at room temperature.

(7) Remove C clamp.

(8) Featheredge any cured adhesive squeezeout from around edges of brackets (4) and (5) by sanding in a spanwise direction. Use paper (item 134, App F).

(9) Install rivet (9) (TM 1-1500-204-23).




c. **Touch-up paint all surface areas adjacent to brackets (4) and (5) where paint was originally removed** (TM 55-1500-345-23).

**NOTE**

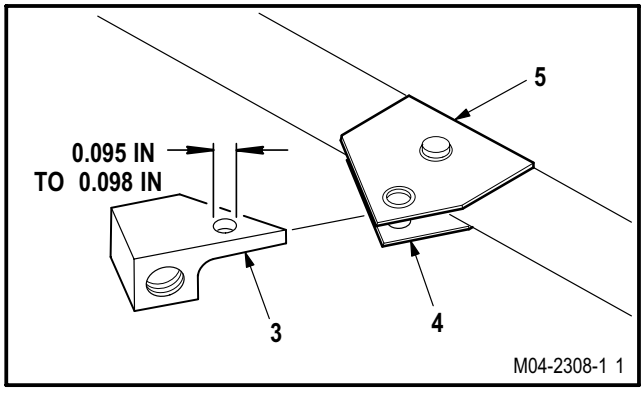
Perform step d only if replacing fitting. Otherwise proceed directly to step e.

d. **Drill a 0.095 to 0.098 INCH diameter hole in fitting (3).**

(1) Position fitting (3) between bracket (4) and bracket (5).

(2) Mark location of rivet hole on fitting (3) from rivet hole on brackets (4) and (5).

(3) Remove fitting (3) and drill a **0.095 to 0.098 INCH** diameter rivet hole through fitting (3). Use pneumatic drill and twist drill.

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## 5.15. MAIN ROTOR BLADE ELECTROSTATIC DISCHARGER DISASSEMBLY/ASSEMBLY - continued

e. **Install fitting (3) between brackets (4) and bracket (5).**

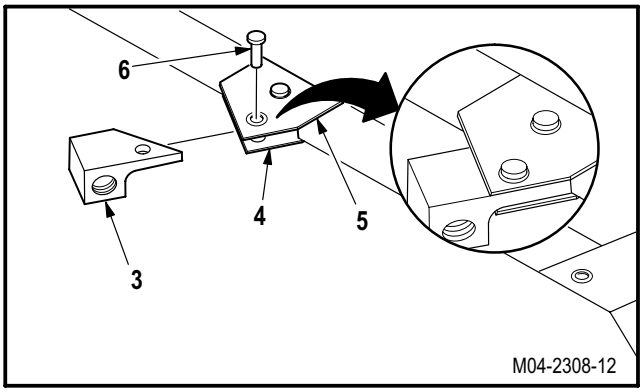
**NOTE**

Ensure adhesive does not get into the rivet hole in brackets or fitting.

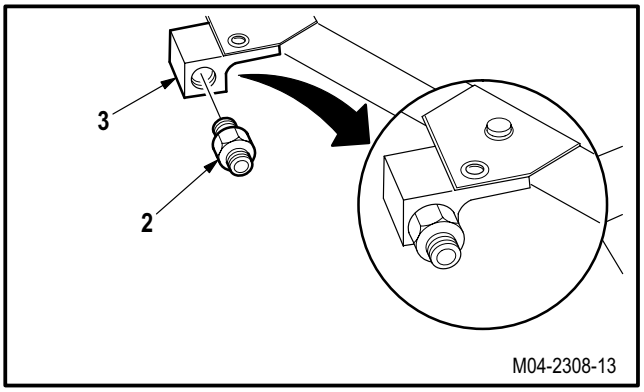
(1) Apply a thin, uniform coat of adhesive to mounting surfaces of fitting (3). Use adhesive (item 19, App F) and brush (item 34, App F).

(2) Position fitting (3) between brackets (5) and (4).

(3) Install new rivet (6) through bracket (5), fitting (3), and bracket (4) (TM 1-1500-204-23).



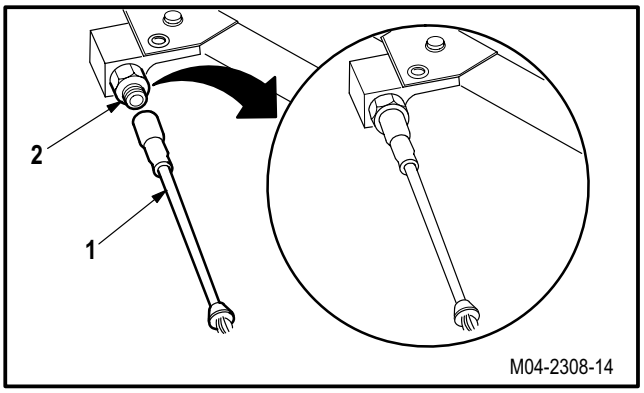

f. **Install stud (2) in fitting (3).**




g. **Install discharger (1) in stud (2).**

(1) Hold stud (2). Install discharger (1) in stud (2). Use strap wrench.

h. **Inspect (QA).**




END OF TASK

## 5.16. MAIN ROTOR BLADE ELECTRICAL BRACKET REPLACEMENT

5.16.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.16.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

Wire (item 226, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.3 | Main rotor blade removed |
| 5.9 | Main rotor blade balance weights removed |

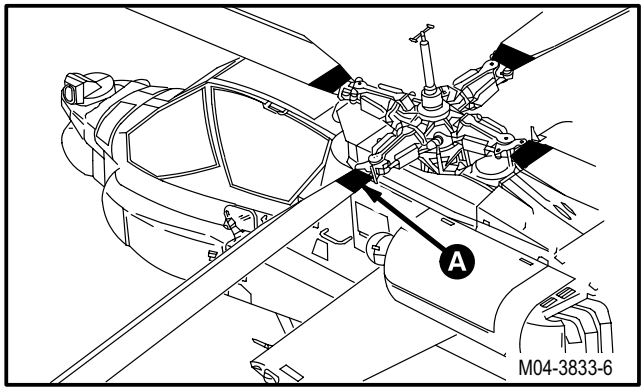
**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for all main rotor blade electrical brackets.

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## 5.16. MAIN ROTOR BLADE ELECTRICAL BRACKET REPLACEMENT - continued

5.16.3. Removal

a. **Remove receptacle connector (1) from main rotor blade (2) electrical bracket (3).**

(1) Remove lockwire from connector (1) and bracket (3).

(2) Remove four nuts (4), washers (5), and screws (6) attaching connector (1) to bracket (3).

(3) Remove connector (1) from bracket (3).

b. **Remove bracket (3) from blade (2).**

(1) Remove two nuts (7), washers (8), and shouldered studs (9) attaching bracket (3) to blade (2).

(2) Remove and discard bracket (3) from blade (2).

5.16.4. Cleaning

a. **Clean bracket mounting area on blade root** (para 1.47)**.**

5.16.5. Inspection

a. **Check blade for corrosion** (para 1.49)**.**

b. **Inspect blade for cracks, scratches, nicks, gouges, dents, and depressions** (para 5.1)**.**

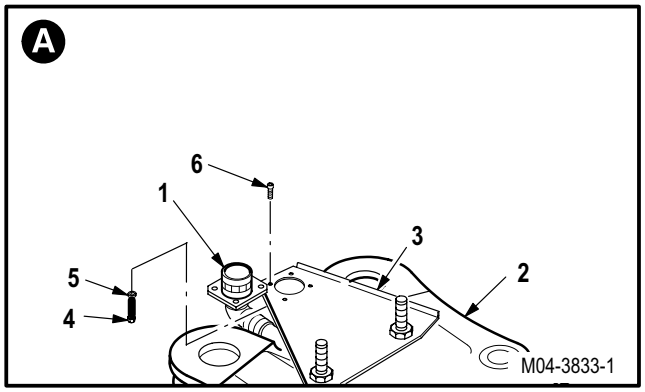
5.16.6. Installation

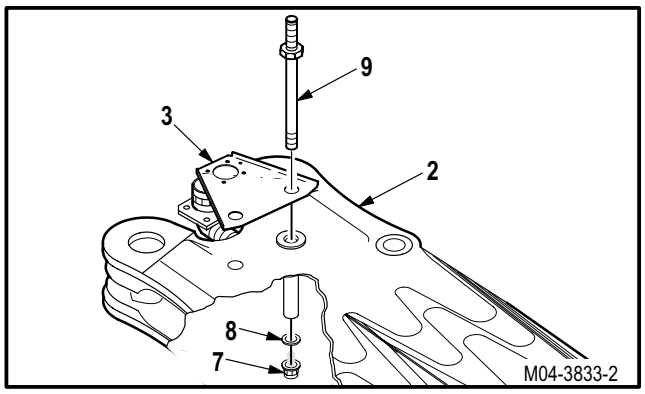
a. **Install new bracket (3) on blade (2).** Torque nuts (7) to **375 INCH-POUNDS**.

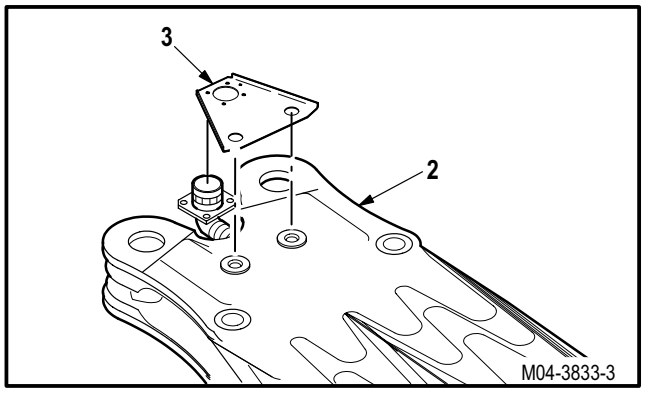
(1) Aline bracket (3) with mounting holes on blade (2).

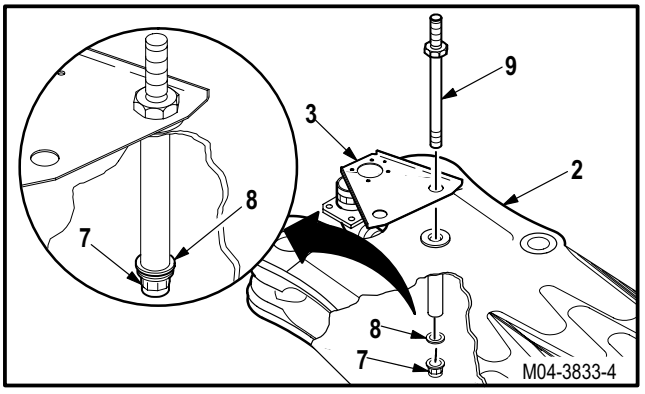
(2) Install two shouldered studs (9), washers (8), and nuts (7).

(3) Hold shouldered studs (9) and torque nuts (7) to **375 INCH-POUNDS**. Use torque wrench.

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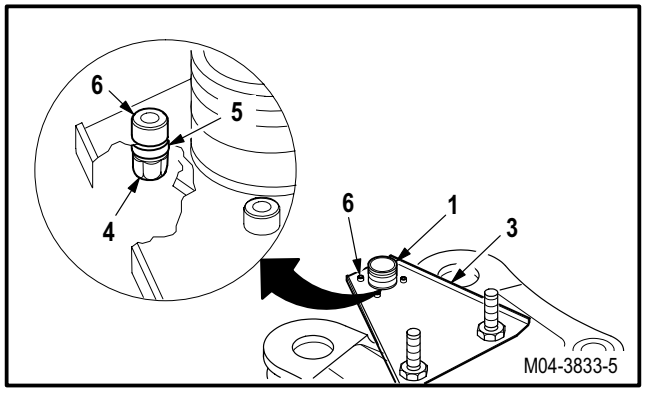
## 5.16. MAIN ROTOR BLADE ELECTRICAL BRACKET REPLACEMENT - continued

b. **Install connector (1) on bracket (3).** Torque four nuts (4) to **11 INCH-POUNDS**.

(1) Position connector (1) on bracket (3) with key slot outboard.

(2) Install four screws (6) through bracket (3), connector (1), washers (5), and nuts (4).

(3) Torque nuts (4) to **11 INCH-POUNDS**. Use torque wrench.




c. **Lockwire between connector (1) and bracket (3).** Use wire (item 226, App F).

d. **Install main rotor blade** (para 5.4)**.**

e. **Install main rotor blade weights** (para 5.9)**.**

f. **Inspect (QA).**

END OF TASK

## 5.17. MAIN ROTOR BLADE RECEPTACLE CONNECTOR REPLACEMENT

5.17.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.17.2. Initial Setup

**Tools:**

Electrical tool kit (item 378, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Personnel Required:**

68X Armament/Electrical System Repairer
68X3F Armament/Electrical System Repairer/ Technical Inspector

**References:**

TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.3 | Main rotor blade removed |

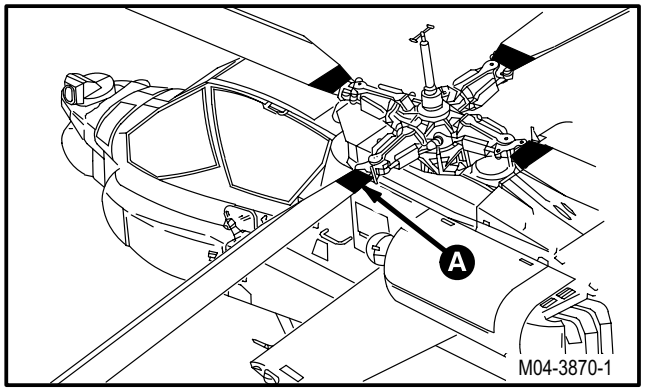
**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for all main rotor blade receptacle connectors.

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## 5.17. MAIN ROTOR BLADE RECEPTACLE CONNECTOR REPLACEMENT - continued

5.17.3. Removal

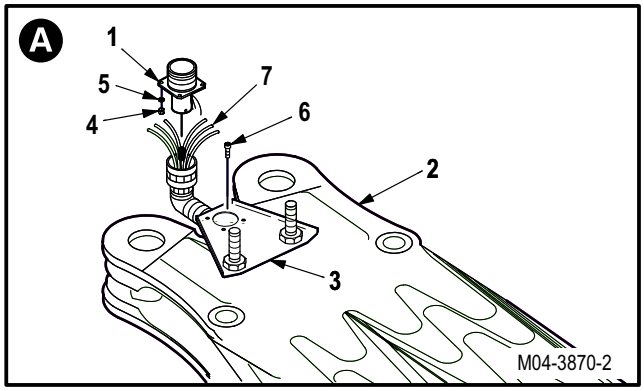
a. **Remove receptacle connector (1) from main rotor blade (2) electrical bracket (3).**

(1) Remove four nuts (4), washers (5), and screws (6) from connector (1).

(2) Remove connector (1).

b. **Identify and remove six electrical wires (7) from connector (1)** (TM 55-1500-323-24)**.**

c. **Discard connector (1).**




5.17.4. Cleaning

a. **Clean electrical wires and bracket** (para 1.47)**.**

5.17.5. Inspection

a. **Check bracket for cracks.** None allowed.

b. **Check bracket for corrosion** (para 1.49)**.**

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## 5.17. MAIN ROTOR BLADE RECEPTACLE CONNECTOR REPLACEMENT - continued

5.17.6. Installation

a. **Identify and install six wires (7) in new receptacle connector (1)** (TM 55-1500-323-24)**.**

b. **Install connector (1) on bracket (3).** Torque four nuts (4) to **11 INCH-POUNDS**.

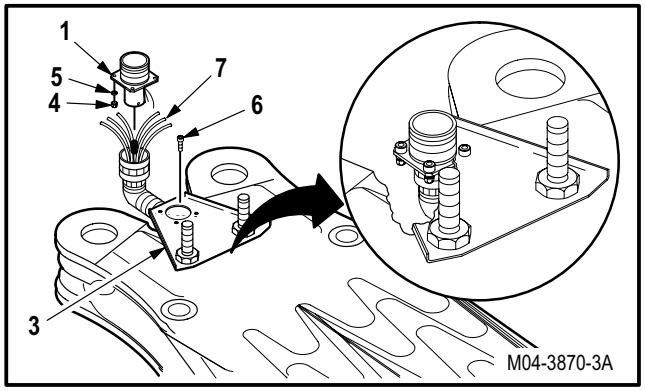
(1) Position connector (1) on bracket (3) with key slot outboard.

(2) Install four screws (6), washers (5), and nuts (4) on connector (1).

(3) Hold screws (6). Torque four nuts (4) to **11 INCH-POUNDS**. Use torque wrench.

c. **Inspect (QA).**

d. **Install main rotor blade** (para 5.4)**.**




END OF TASK

## 5.18. MAIN ROTOR BLADE IDENTIFICATION PLATE REPLACEMENT

5.18.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.18.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 3, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Methyl ethyl ketone (item 124, App F)

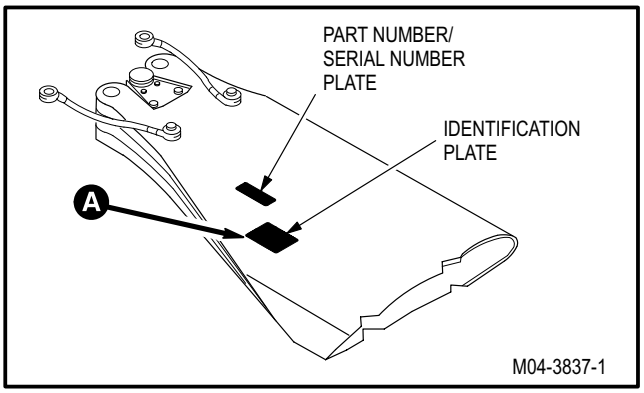
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.18. MAIN ROTOR BLADE IDENTIFICATION PLATE REPLACEMENT - continued

**NOTE**

- This task is typical for the identification plate and the part number/serial number plate.
- The part number/serial number plate and identification plate will be referred to as the identification plate in this task.

5.18.3. Removal

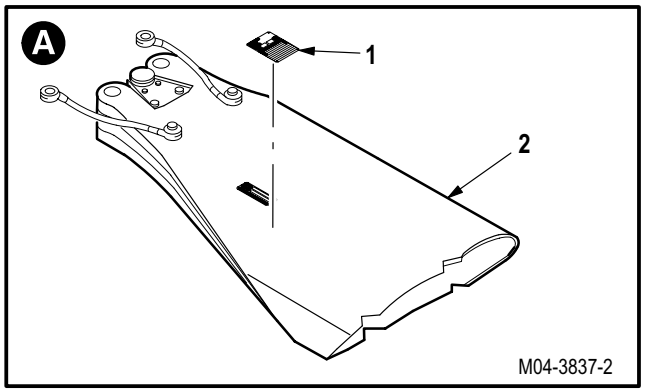
a. **Record all data found on identification plate (1).**

b. **Remove plate (1) from main rotor blade (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from blade (2).

(3) Discard plate (1).




5.18.4. Cleaning

a. **Clean plate mounting area.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

5.18.5. Inspection

a. **Inspect blade for cracks, scratches, nicks, gouges, dents, and depressions** (para 5.1)**.**

b. **Inspect blade for corrosion** (para 1.49)**.**

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## 5.18. MAIN ROTOR BLADE IDENTIFICATION PLATE REPLACEMENT - continued

5.18.6. Installation

a. **Transcribe recorded data on new identification plate (1).** Use die set.

b. **Install plate (1) on blade (2).**

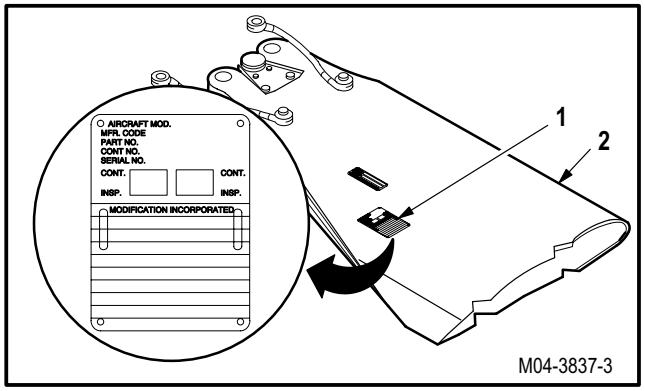
(1) Lightly abrade blade (2) in same location as old plate (1). Use cloth (item 48, App F).

(2) Apply adhesive to plate (1). Use brush (item 34, App F) and adhesive (item 3, App F).

(3) Install plate (1) on blade (2) in same location as old plate.

(4) Place bead of adhesive around edge of plate (1). Use adhesive (item 3, App F).

c. **Inspect (QA).**




END OF TASK

## 5.19. MAIN ROTOR HUB RETENTION NUT REMOVAL

5.19.1. Description

This task covers: Removal. Cleaning. Inspection. Repair.

5.19.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

**Materials/Parts:**

Corrosion preventive compound (item 63, App F)
Epoxy primer coating kit (item 78, App F)
Mat (item 122, App F)
Methyl ethyl ketone (item 124, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

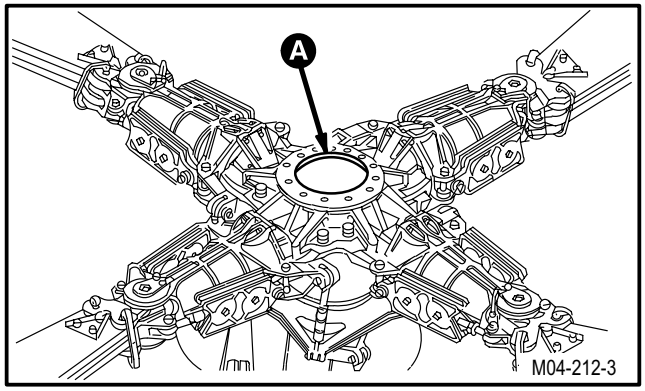
**Equipment Conditions:**

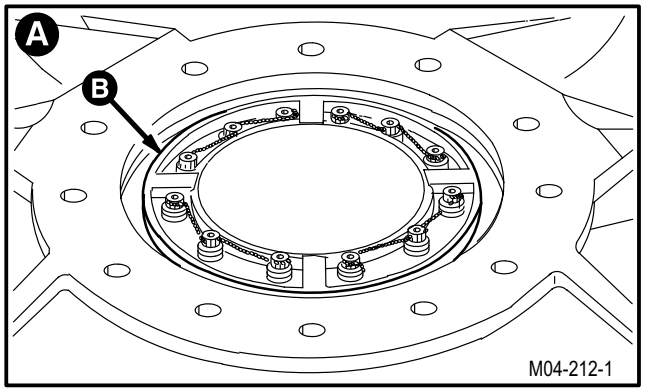
| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.3 | Main rotor blades removed |
| 6.96 | Main rotor drive plate removed |
| 11.14 | Main rotor blade pitch links removed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor hub retention nut is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.19. MAIN ROTOR HUB RETENTION NUT REMOVAL - continued

5.19.3. Removal

a. **Check torque and remove 12 retaining ring bolts (1).**

(1) Remove lockwire from bolts (1).

**NOTE**

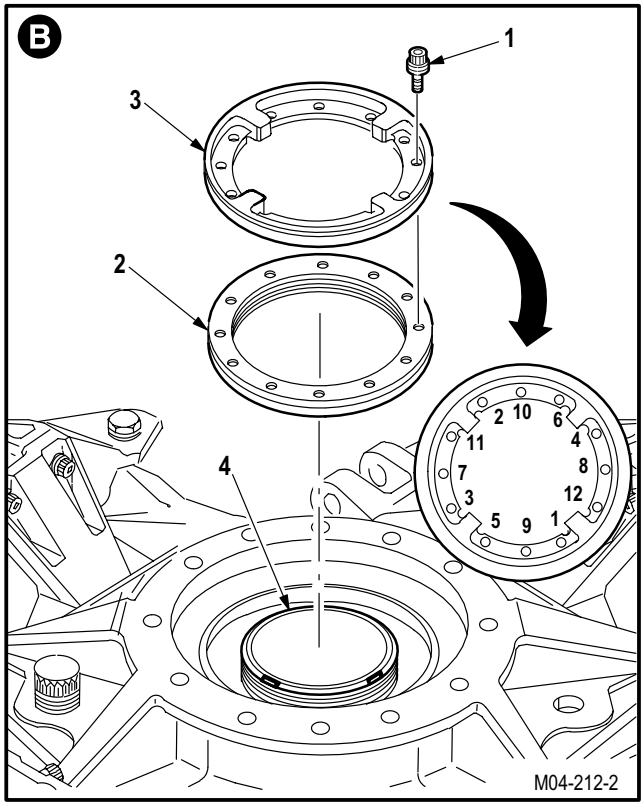
- Check torque on retaining ring bolt by tightening until it begins to turn.
- Bolt holes are identified on retaining ring.

(2) Check and record the torque value on each bolt (1) in the following order: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12. Use torque wrench.

(3) If the torque on any bolt (1) is below **125 INCH-POUNDS**, check torque on two adjacent bolts.

(4) If either torque is below **175 INCH-POUNDS**, replace main rotor hub retention nut (2).

(5) Remove bolts (1) from retaining ring (3) in the following order: 12, 11,10, 9, 8, 7, 6, 5, 4, 3, 2, 1.




b. **Remove retaining ring (3) from mast (4).**

c. **Remove retention nut (2).**

(1) Install two bolts (1) in retention nut (2) 180 degrees apart.

(2) Use two bolts (1) as handles to turn retention nut (2) clockwise.

(3) Remove retention nut (2) from mast (4).

(4) Remove bolts (1) from retention nut (2).

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**5.19. MAIN ROTOR HUB RETENTION NUT REMOVAL - continued**

5.19.4. Cleaning

a. **Clean retaining ring, retention nut, and twelve bolts** (para 1.47)**.**

5.19.5. Inspection

a. **Check mast, retaining ring, and attaching hardware for cracks.** None allowed.

b. **Check retaining ring for nicks, gouges, scratches, scoring, and galling.**

(1) Defects shall not exceed **0.010 INCH** width, **0.010 INCH** depth, and **1.00 INCH** length.

c. **Check bolts and mast for thread damage.** None allowed.

d. **Check threads in the 12 bolt holes of retention nut for red rust using a x10 power glass.**

(1) Rust spots on the plating or blistered plating indicates corrosion or pitting of the steel underneath. If rust is detected replace retention nut.

e. **Check retention nut surface for white powdery deposits which indicate corrosion of the cadmium plating.** Repair per paragraph 5.19.6.

f. **Check retaining ring and retention nut for scratches.**

(1) Scratches which penetrate less than **0.010 INCH** into base metal and which are less than **0.063 INCH** wide are permissible.

(2) Clean scratches (para 1.47).

(3) Touch-up finish scratches by applying two coats of epoxy primer. Use epoxy primer coating kit (item 78, App F).

(4) Coat part with corrosion preventive compound. Use corrosion preventive compound (item 63, App F).

(5) Scratches which are wider than **0.063 INCH** or which penetrate more than **0.010 INCH** into base metal shall be repaired per paragraph 5.19.6.

g. **Check retention nut for cracks.** None allowed.

(1) If cracks are suspected, perform nondestructive inspection (TM 1-1520-264-23).

h. **Check serial number of retention nut.**

(1) If serial number is 0212 through 0266 or 005222-53 through 005222-105, replace retention nut.

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**5.19. MAIN ROTOR HUB RETENTION NUT REMOVAL - continued**

5.19.6. Repair

a. **Light surface corrosion and scratches shall be removed by hand sanding using a very fine abrasive mat.** Use mat (item 122, App F).

**WARNING**

**Repair by blending is limited to one time repair.**

b. **Pitting corrosion and nicks, scratches, and gouges shall be removed by hand sanding.**

(1) Blending area should be ten times bigger than depth of pitting.

(2) Polish and blend rework areas with abrasive mat. Use mat (item 122, App F).

c. **After removal of corrosion pits and scratches, inspect area with a x10 power glass to ensure no evidence of imperfections remains.**

(1) Repeat step b until imperfection is removed.

d. **If the maximum material removed during repair exceeds 0.030 INCH, replace part.**

e. **Clean repaired area.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

f. **Touch-up finish by applying two coats of epoxy primer to repair area.** Use epoxy primer coating kit (item 78, App F).

g. **Coat part with corrosion preventive compound.** Use corrosion preventive compound (item 63, App F).

h. **Inspect (QA).**

END OF TASK

## 5.20. MAIN ROTOR HUB RETENTION NUT INSTALLATION

5.20.1. Description

This task covers: Installation.

5.20.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

**Materials/Parts:**

Cloth (item 52, App F)
Lubricant (item 114, App F)
Wire (item 225, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T
TM 55-1520-238-MTF

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

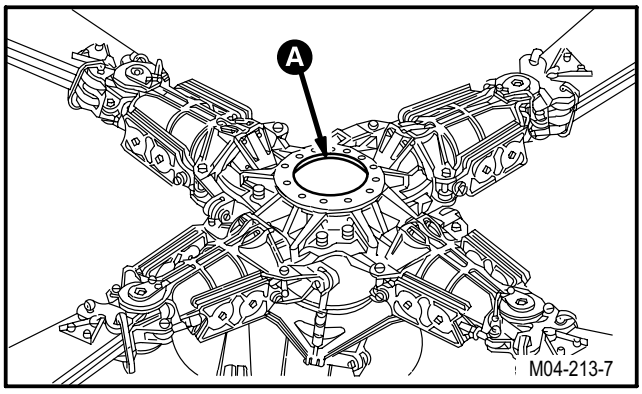
**WARNING**

**FLIGHT SAFETY PART**

**The main rotor hub retention nut is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**CAUTION**

To prevent damage to main rotor mast, do not move rotor blade during this task.

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## 5.20. MAIN ROTOR HUB RETENTION NUT INSTALLATION - continued

5.20.3. Installation

a. **Wipe grease from retainer (1) surface.** Use cloth (item 52, App F).

b. **Clean oil from internal threads of 12 bolt holes on main rotor hub retention nut (2)** (para 1.47)**.**

c. **Install retention nut (2) on mast (3).**

(1) Hand tighten retention nut (2) counterclockwise.

**NOTE**

Bolt holes are identified on retaining ring.

d. **Install retaining ring (4).**

(1) Aline tangs on retaining ring (4) with slot on mast (3).

(2) Place retaining ring (4) on top of retention nut (2).

(3) Aline holes. If holes in retaining ring (4) do not aline with holes in retention nut (2), loosen retention nut (2) until alinement is obtained.

e. **Install 12 retaining ring bolts (5) in retention nut (2).**

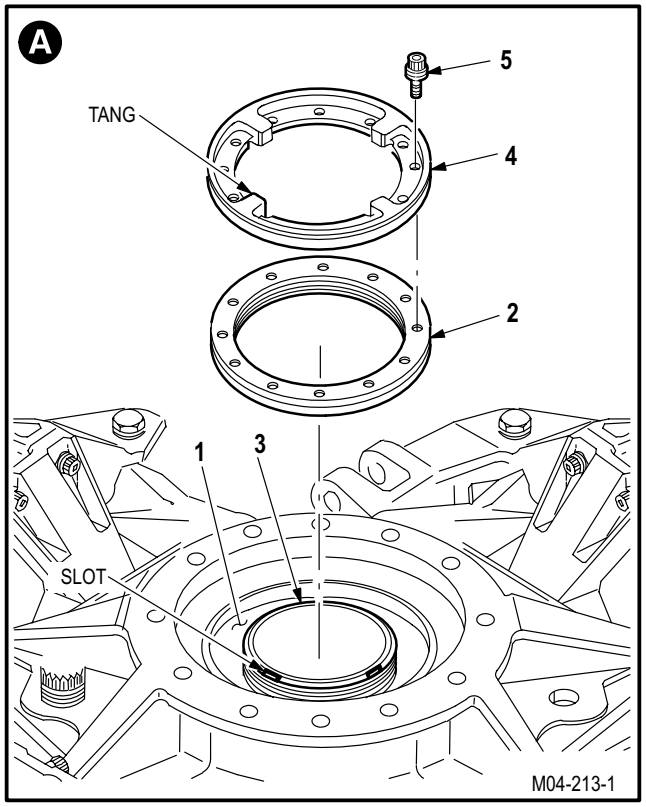
(1) Install 12 bolts (5) through retaining ring (4) and retention nut (2).

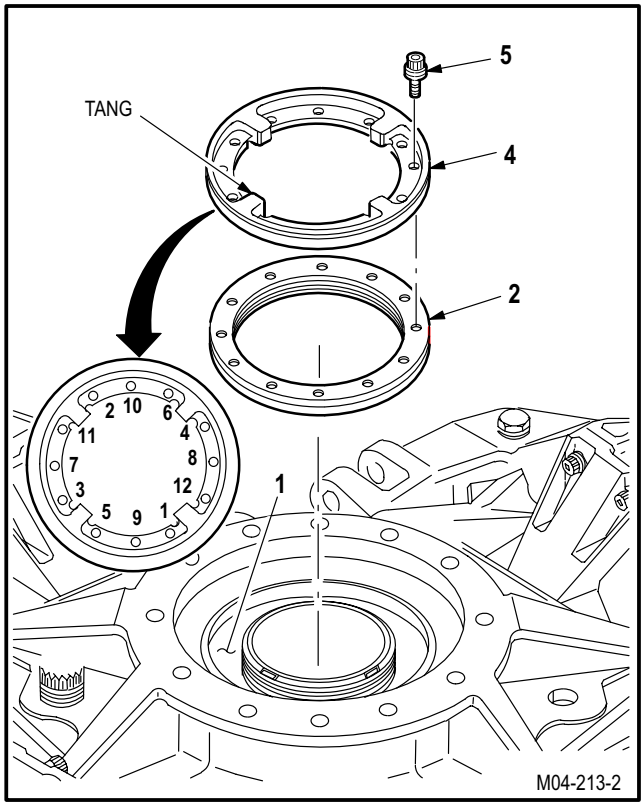
(2) Tighten 12 bolts (5) until they bear lightly against retainer (1).

f. **Torque 12 bolts (5) in the following order: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.**

(1) Torque 12 bolts (5) to **90 INCH-POUNDS**. Use torque wrench.

(2) Torque 12 bolts (5) to **225 INCH-POUNDS**. Use torque wrench.

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## 5.20. MAIN ROTOR HUB RETENTION NUT INSTALLATION - continued

(3) Torque 12 bolts (5) to **315 INCH-POUNDS**. Use torque wrench.

g. **Remove retaining ring (4).**

(1) Remove 12 bolts (5) in reverse order starting with No. 12.

(2) Remove retaining ring (4).

h. **Hand tighten retention nut (2).**

i. **Install retaining ring (4).**

(1) Aline tangs on retaining ring (4) with slots on mast (3).

(2) Place retaining ring (4) on top of retention nut (2).

(3) Aline holes. If holes in retaining ring (4) do not aline with holes in retention nut (2), loosen retention nut (2) until alignment is obtained.

j. **Lubricate threads of bolts (5).** Use lubricant (item 114, App F).

(1) Allow bolts (5) to dry for **6 HOURS** after coating with lubricant.

(2) Alternate accelerated cure time is **30 MINUTES** air dry plus **30 MINUTES** at 150 °F (66 °C).

k. **Install 12 bolts (5) in retaining ring (4).**

(1) Torque 12 bolts (5) to **45 INCH-POUNDS**. Use torque sequence from step f. Use torque wrench.

(2) Torque 12 bolts (5) to **90 INCH-POUNDS**. Use torque wrench.

(3) Torque 12 bolts (5) to **135 INCH-POUNDS**. Use torque wrench.

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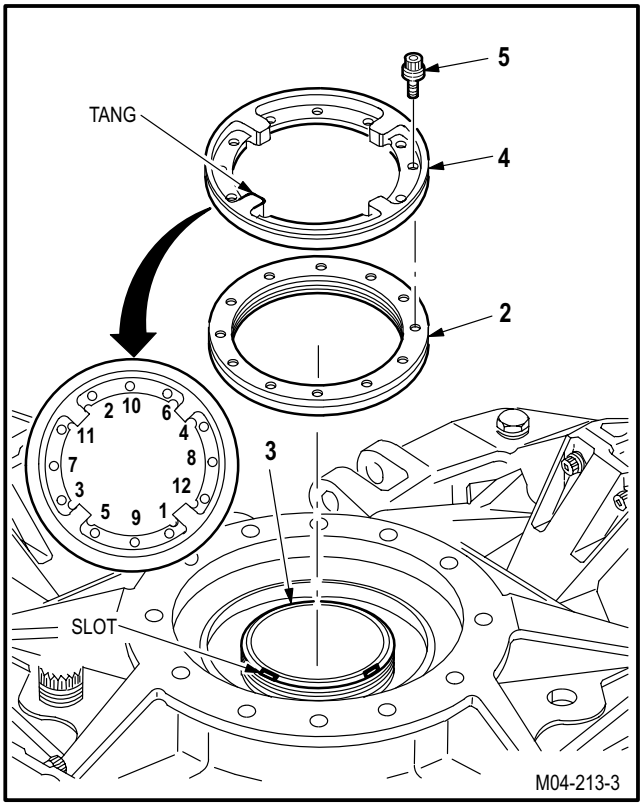
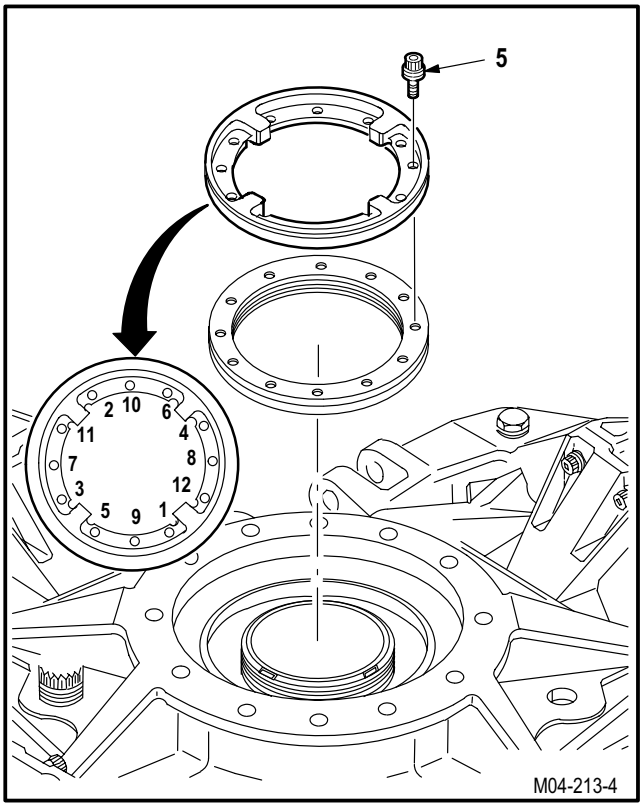


## 5.20. MAIN ROTOR HUB RETENTION NUT INSTALLATION - continued

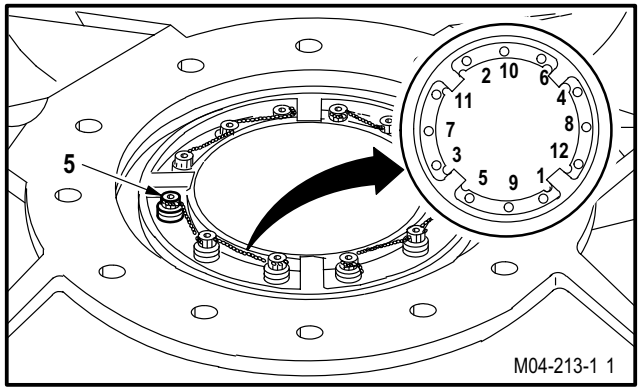
(4) Torque 12 bolts (5) to **180 INCH-POUNDS**. Use torque wrench.

l. **Accomplish final torque requirement.**

(1) Torque 12 bolts (5) to **225 INCH-POUNDS**. Use torque sequence from step f. Use torque wrench.

(2) Torque 12 bolts (5) to **225 INCH-POUNDS**.

(3) Torque 12 bolts (5) to **225 INCH-POUNDS**.

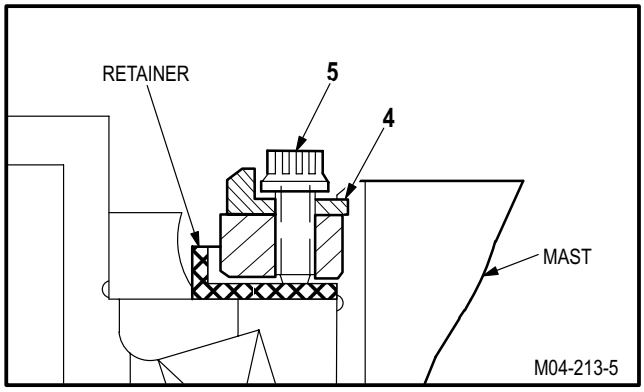



m. **Ensure that retaining ring (4) is free and floating under bolt (5) heads.**

**NOTE**

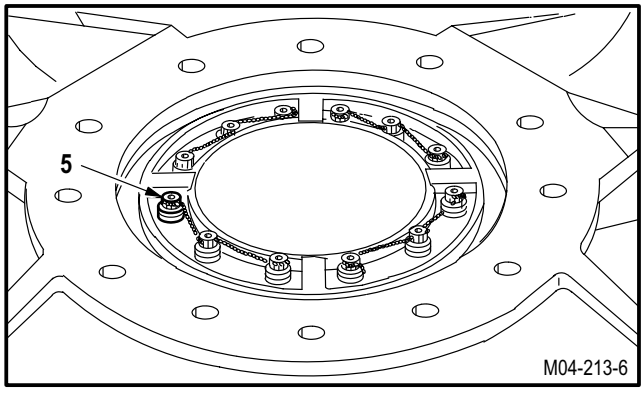
Repeat steps e thru l if retaining ring is not free and floating under bolt heads.

n. **Inspect (QA).**




o. **Lockwire 12 bolts (5) in sets of three.** Use wire (item 225, App F).

p. **Inspect (QA).**

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**5.20. MAIN ROTOR HUB RETENTION NUT INSTALLATION - continued**

**NOTE**

Do not seal drive plate until limited test flight has been accomplished (step w).

q. **Install main rotor drive plate** (para 6.96)**.**

**NOTE**

- Do not install main rotor de-ice distributor or air data system mast prior to limited test flight.
- P/N MS20073-03-05 bolts may be used in place of P/N MS20073-03-10 and P/N MS20073-03-11 bolts. Extra washers may not be required.
- Use P/N AN960KD10 washers as required under P/N MS20073-03-11 bolts. Extra washers may not be required.

r. **Install main rotor drive plate cover** (para 6.92)**.**

s. **Connect main rotor pitch links** (para 11.14)**.**

t. **Install main rotor blades** (para 5.4)**.**

u. **Perform main rotor blade phase adjustment** (para 5.8)**.**

v. **Perform main rotor track and balance maintenance operational check** (TM 1-1520-238-T)**.**

w. **Perform a limited flight test with ADS in OFF position** (TM 55-1520-238-MTF)**.**

x. **Remove drive plate cover** (para 6.92)**.**

(1) Discard extra washers (if installed in step r).

y. **Remove drive plate** (para 6.96)**.**

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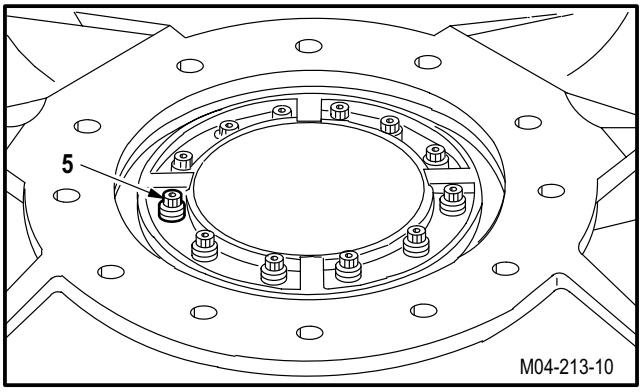
## 5.20. MAIN ROTOR HUB RETENTION NUT INSTALLATION - continued

z. **Remove lockwire and check torque on 12 retaining ring bolts (5) by applying 225 INCH-POUNDS of torque on each bolt.**

(1) Use torque sequence from step f. Use torque wrench.

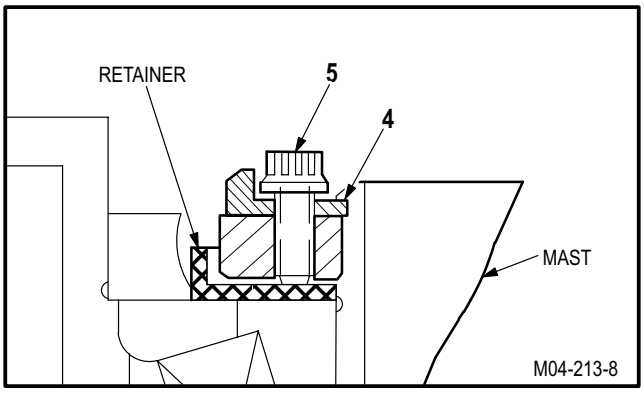
(2) Retorque any bolt having less than **225 INCH-POUNDS**. Use torque wrench.




aa. **Ensure retaining ring (4) is free and floating under bolt heads (5).**

**NOTE**

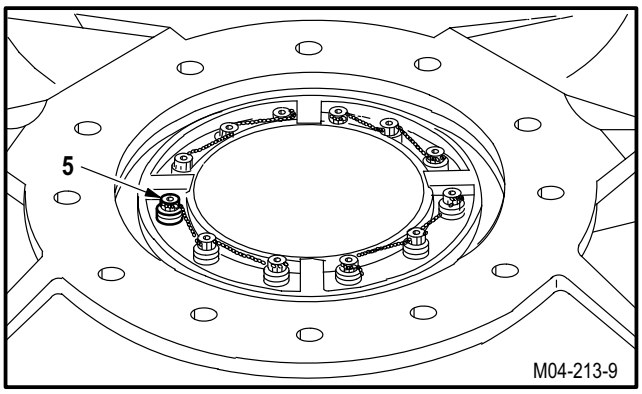
Repeat steps e thru l if retaining ring is not free and floating under bolt heads.




ab. **Lockwire 12 bolts (5) in sets of three.** Use wire (item 225, App F).

ac. **Inspect (QA).**

ad. **Install main rotor drive plate** (para 6.96)**.**




END OF TASK

# SECTION II. MAIN ROTOR HEAD MAINTENANCE

## 5.21. MAIN ROTOR HEAD REMOVAL/INSTALLATION

5.21.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.21.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Airframe adapter kit (item 25, App H)
Sling set kit (item 194, App H)

**Personnel Required:**

| | |
|---|---|
| 67R | Attack Helicopter Repairer<br>Two persons to assist |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

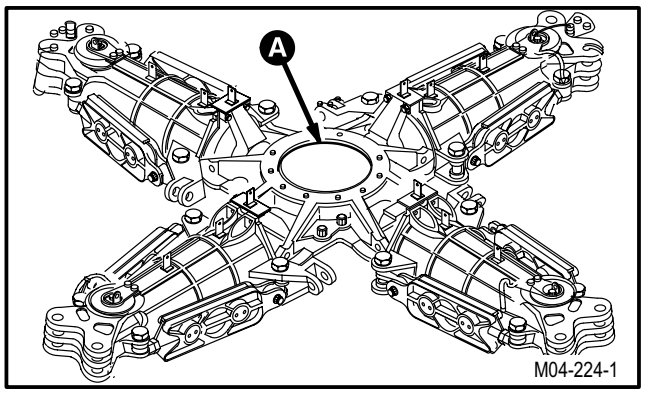
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors T250L, T250R, T290L, T290R, and L325 opened |
| 1.97 | Aircraft mounted maintenance crane installed |
| 11.16 | Load bearing main rotor scissor disconnected |
| 11.18 | Secondary main rotor scissor disconnected |
| 5.19 | Main rotor hub retention nut removed |
| 5.48 | Main rotor electrical brush, electrical holder, and pitch web electrical lead removed |

**WARNING**

**FLIGHT SAFETY PART**

- **The main rotor head is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Main rotor head weighs approximately 675 pounds. Use crane to lift rotor head. Failure to do so can result in serious injury. If injury occurs, seek medical aid.**




**NOTE**

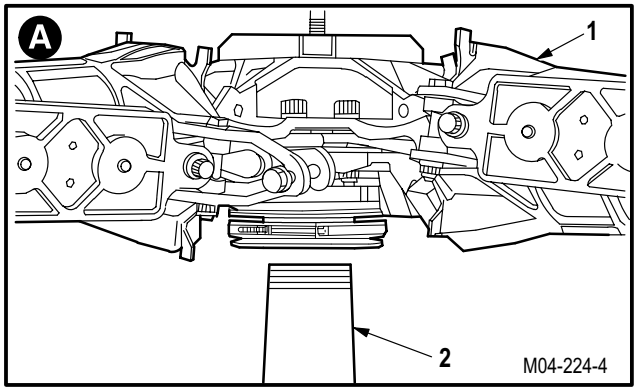
This task is typical for either the 7-311411003-621 or 7-311411003-625 main rotor head.

GO TO NEXT PAGE

## 5.21. MAIN ROTOR HEAD REMOVAL/INSTALLATION - continued

5.21.3. Removal

a. **With assistants, remove main rotor head (1) from mast (2)** (para 1.85)**.**




5.21.4. Cleaning

a. **Clean head** (para 1.47)**.**

5.21.5. Inspection

a. **Check head for cracks.** None allowed.

b. **Check head for corrosion** (para 1.49)**.**

c. **Check head for scratches and scoring.**

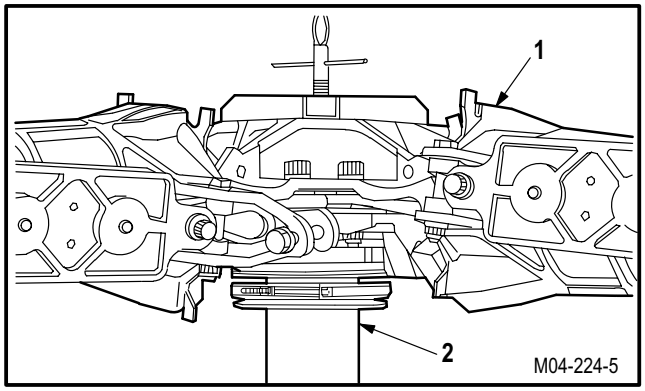
(1) Maximum depth not to exceed **0.010 INCH**.

d. **Check exposed area of mast** (para 6.97)**.**

GO TO NEXT PAGE

## 5.21. MAIN ROTOR HEAD REMOVAL/INSTALLATION - continued

5.21.6. Installation




a. **With assistants, install head (1) on mast (2)** (para 1.86)**.**

b. **Inspect (QA).**

c. **Install main rotor hub retention nut** (para 5.20)**.**

d. **Install main rotor brush, electrical holder, and pitch web electrical lead** (para 5.48)**.**

e. **Install secondary main rotor scissor** (para 11.18)**.**

f. **Install load bearing main rotor scissor** (para 11.16)**.**

g. **Remove maintenance crane** (para 1.105)**.**

h. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

**NOTE**

If the main rotor head was removed to facilitate other maintenance and the same main rotor head is re-installed (with no other maintenance accomplished on the head), the equipment conditions for paragraph 5.8 to perform the collective and cyclic flight controls rigging maintenance operational check is not required.

i. **Perform main rotor blade phase adjustment** (para 5.8)**.**

END OF TASK

## 5.22. MAIN ROTOR HEAD IDENTIFICATION PLATE REPLACEMENT

5.22.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.22.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 3, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Methyl ethyl ketone (item 124, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

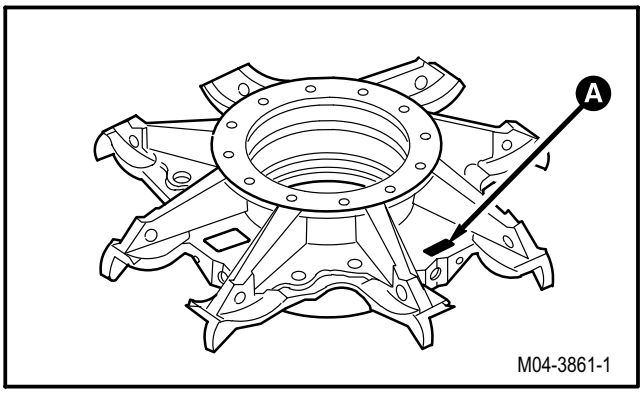
**WARNING**

**FLIGHT SAFETY PART**

**The main rotor head is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for either the 7-311411003-621 or 7-311411003-625 main rotor head.

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## 5.22. MAIN ROTOR HEAD IDENTIFICATION PLATE REPLACEMENT - continued

5.22.3. Removal

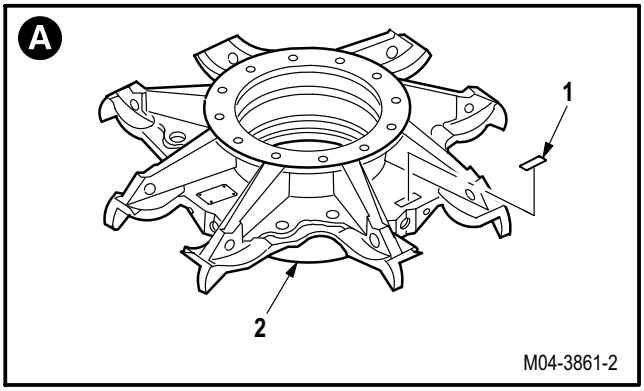
a. **Record all data on identification plate (1).**

b. **Remove plate (1) from main rotor head (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from head (2).

(3) Discard plate (1).




5.22.4. Cleaning

a. **Clean plate mounting area.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

5.22.5. Inspection

a. **Inspect main rotor head** (para 5.1)**.**

b. **Check main rotor head for corrosion** (para 1.49)**.**

5.22.6. Installation

a. **Transcribe recorded data on new plate (1).** Use die set.

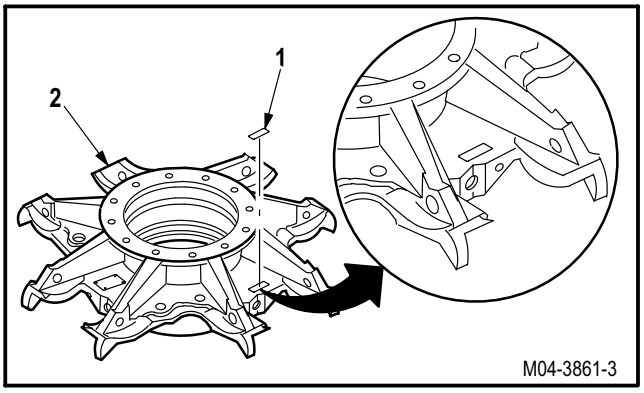
b. **Install plate (1) on head (2).**

(1) Lightly abrade head (2) in same location as old plate (1). Use cloth (item 48, App F).

(2) Apply adhesive to plate (1). Use brush (item 34, App F) and adhesive (item 3, App F).

(3) Install plate (1) on head (2) in same location as old plate.

(4) Place bead of adhesive around edge of plate (1). Use adhesive (item 3, App F).




c. **Inspect (QA).**

END OF TASK

## 5.23. MAIN ROTOR DAMPER REMOVAL/INSTALLATION

5.23.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.23.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
1/2-inch drive ratchet socket wrench handle (item 172, App H)
Adjustable air filtering respirator (item 262, App H)
3-piece spatula set (item 337, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

**Materials/Parts:**

Cloth (item 52, App F)
Dry cleaning solvent (item 74, App F)
Lubricant (item 114, App F)
Sealing compound (item 175, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

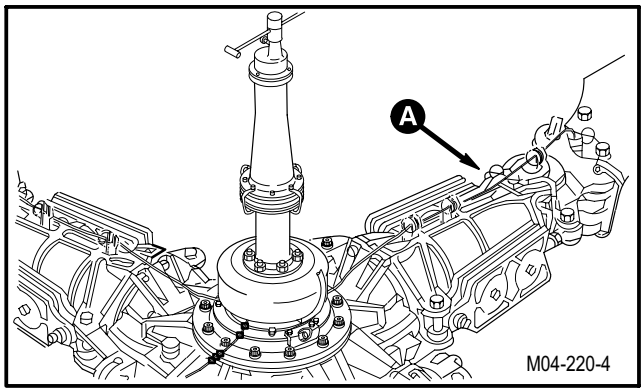
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 1.62 | Rotor brake locked |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor damper is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




**NOTE**

This task is typical for removal and installation of all main rotor dampers on either the 7-311411003-621 or 7-311411003-625 main rotor head.

GO TO NEXT PAGE

## 5.23. MAIN ROTOR DAMPER REMOVAL/INSTALLATION - continued

5.23.3. Removal

a. **Remove main rotor damper rod end (1) from lead lag link (2).**

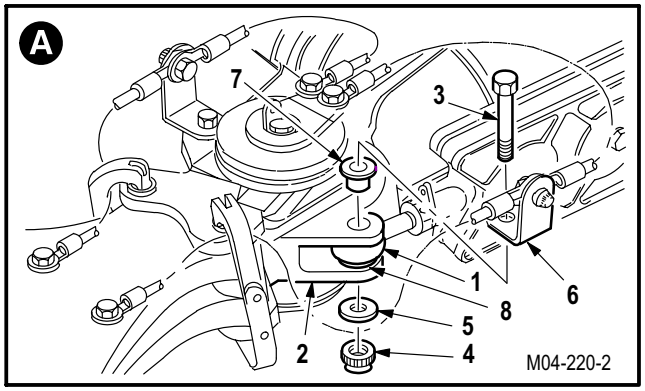
(1) Remove sealing compound from attaching hardware. Use spatula set.

(2) Hold bolt (3). Use box wrench.

(3) Remove nut (4) and washer (5). Use ratchet.

(4) Remove bolt (3), angle bracket (6), and sleeve bushing (7).

(5) Swing rod end (1) free from link (2) and remove washer (8).




b. **Remove damper trunnion (9) from pitch housing (10).**

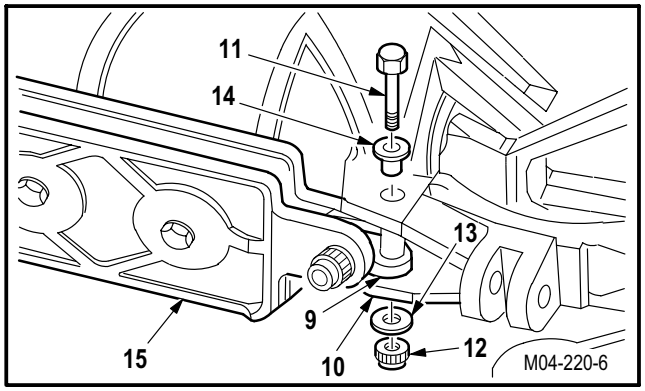
(1) Remove sealing compound from attaching hardware. Use spatula set.

(2) Hold bolt (11). Use box wrench.

(3) Remove nut (12) and washer (13). Use ratchet.

(4) Remove bolt (11) and sleeve bushing (14).

(5) Remove main rotor damper (15).



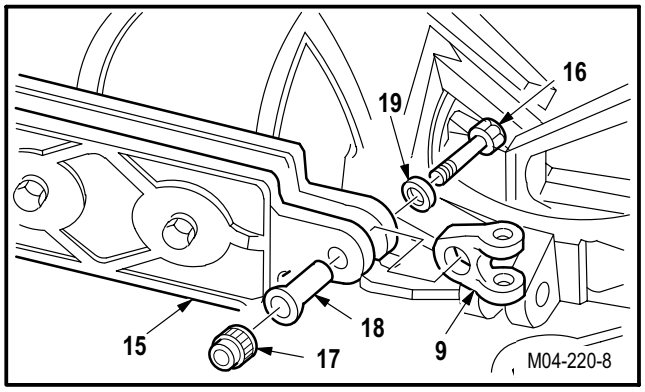

c. **Remove trunnion (9) from damper (15).**

(1) Remove sealing compound from attaching hardware. Use spatula set.

(2) Hold bolt (16). Use box wrench.

(3) Remove nut (17) and bushing (18). Use ratchet.

(4) Remove bolt (16) and washer (19) from damper (15) and trunnion (9).

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## 5.23. MAIN ROTOR DAMPER REMOVAL/INSTALLATION - continued

5.23.4. Cleaning

a. **Wipe damper and mating surfaces.** Use cloth (item 52, App F).

b. **Clean corrosion preventive compound from removed hardware.** Use dry cleaning solvent (item 74, App F).

5.23.5. Inspection

**NOTE**

The two bolts through the plate section of the damper assembly may show looseness, particularly at low temperatures. This is a normal condition, not a defective condition, and no corrective action is required. Rotational movement is allowed.

a. **Check link, damper, and trunnion for cracks.** None allowed.

b. **Check trunnion for nicks, gouges, scratches, scoring, and galling.**

(1) Less than **0.010 INCH** is acceptable.

(2) Superficial scratches are acceptable if no material is raised above surrounding surface.

c. **Check trunnion for the following:**

(1) Wear limit on damper to trunnion attachment. Maximum allowable radial play **0.010 INCH**.

(2) Wear limit on trunnion to pitch housing. Maximum allowable radial play **0.010 INCH**.

(3) There shall be no evidence of teflon debonding.

(4) Check damper, trunnion, bushing, and angle bracket for corrosion (para 1.49). Maximum depth **0.005 INCH**.

d. **Check elastomeric material on edge of damper for tears or delaminations.**

(1) Tears or delaminations along outer or inner ends of damper are acceptable if they have not spread apart along the upper or lower edges.

(2) Tears or delaminations along upper or lower edges of damper totaling more than four inches require replacement of damper.

e. **Inspect rod end** (para 5.24)**.**

f. **Inspect link** (para 5.33)**.**

g. **Inspect nuts for damage.**

GO TO NEXT PAGE

## 5.23. MAIN ROTOR DAMPER REMOVAL/INSTALLATION - continued

5.23.6. Installation

a. **Lubricate threads of all removed bolts and nuts.** Use lubricant (item 114, App F).

(1) Allow lubricated hardware to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

b. **Install trunnion (9) on damper (15).** Torque nut (17) to **1400 INCH-POUNDS**.

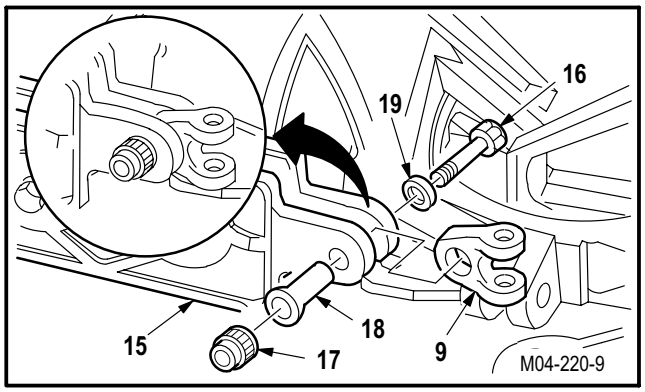
(1) Install trunnion (9) in damper (15).

(2) Install bushing (18) through damper (15) and trunnion (9).

(3) Install bolt (16) through washer (19) and bushing (18).

(4) Install nut (17) on bolt (16).

(5) Hold bolt (16) and torque nut (17) to **1400 INCH-POUNDS**. Use torque wrench and box wrench.



c. **Apply sealing compound to joints around bolt head (16), washer (19), bushing (18), nut (17), and exposed threads of bolt (16).** Use sealing compound (item 175, App F) and spatula set.

GO TO NEXT PAGE

**5.23. MAIN ROTOR DAMPER REMOVAL/INSTALLATION - continued**

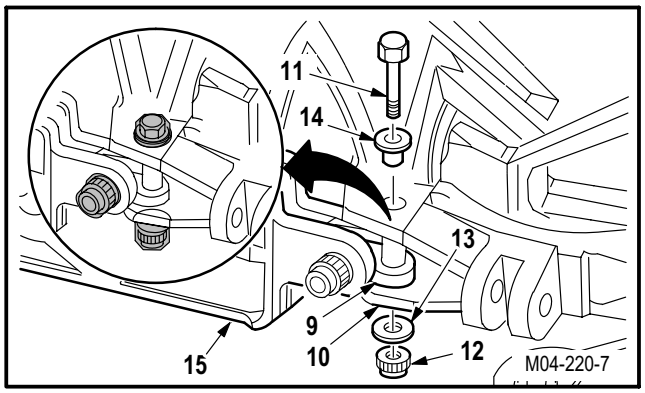
d. **Install damper (15) and trunnion (9) in pitch housing (10).** Torque nut (12) to **1000 INCH-POUNDS**.

(1) Install bushing (14) in pitch housing (10) and trunnion (9).

(2) Install bolt (11) through bushing (14).

(3) Install washer (13) and nut (12).

(4) Hold bolt (11). Torque nut (12) to **1000 INCH-POUNDS**. Use torque wrench and box wrench.




e. **Apply sealing compound to joints around head of bolt (11), bushing (14), washer (13), nut (12), and exposed threads of bolt (11).** Use sealing compound (item 175, App F) and spatula set.

GO TO NEXT PAGE

**5.23. MAIN ROTOR DAMPER REMOVAL/INSTALLATION - continued**

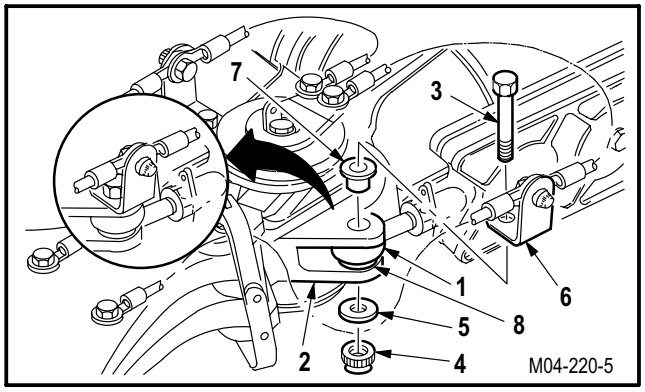
f. **Install rod end (1) in link (2).** Torque nut (4) to **675 INCH-POUNDS**.

(1) Install bushing (7) through link (2).

(2) Install bolt (3) through bracket (6), bushing (7), rod end (1), washer (8), and bottom flange of link (2).

(3) Install washer (5) and nut (4).

(4) Hold bolt (3). Torque nut (4) to **675 INCH-POUNDS**. Use torque wrench and box wrench.




g. **Apply sealing compound to joints around head of bolt (3), bushing (7), washer (5), nut (4), and exposed threads of bolt (3).** Use sealing compound (item 175, App F) and spatula set.

h. **Inspect (QA).**

i. **Release rotor brake lock** (para 1.62)**.**

j. **Perform main rotor blade phase adjustment** (para 5.8)**.**

k. **Perform main rotor track and balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.24. MAIN ROTOR DAMPER ROD END REMOVAL/INSTALLATION

5.24.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.24.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
1 3/8 x 1/2-inch drive open end box socket wrench crowfoot attachment (item 78, App H)
Chemical protective gloves (item 154, App H)
1/2-inch drive ratchet socket wrench handle (item 172, App H)
Adjustable air filtering respirator (item 262, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
3-piece spatula set (item 337, App H)
700 - 1600 inch-pound 1/2-inch drive click type torque wrench (item 433, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Materials/Parts:**

Self-locking nut
Cloth (item 52, App F)
Corrosion preventive compound (item 62A, App F)
Dry cleaning solvent (item 74, App F)
Lubricant (item 114, App F)
Sealing compound (item 177, App F)
Wire (item 225, App F)

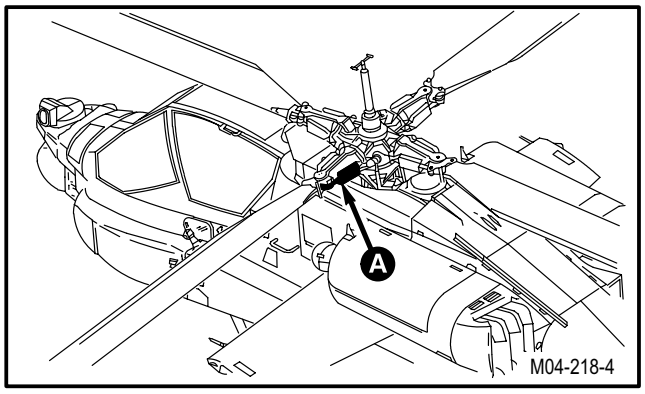
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 1.62 | Rotor brake locked |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor head assembly is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.24. MAIN ROTOR DAMPER ROD END REMOVAL/INSTALLATION - continued

5.24.3. Removal

**NOTE**

Count the visible threads showing on the threaded portion of the main rotor rod end. Use this information during installation procedures.

a. **Remove main rotor damper rod end (1) from lead lag link (2).**

(1) Remove sealing compound from attaching hardware. Use spatula set.

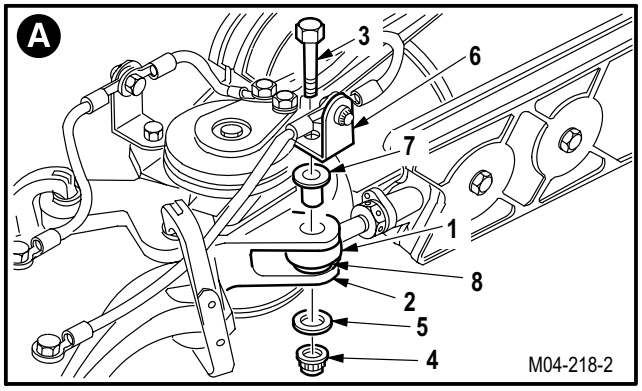
(2) Hold bolt (3). Use box wrench.

(3) Remove nut (4) and washer (5). Use ratchet.

(4) Discard nut (4).

(5) Remove bolt (3), angle bracket (6), and sleeve bushing (7).

(6) Swing rod end (1) free from link (2) and remove washer (8).



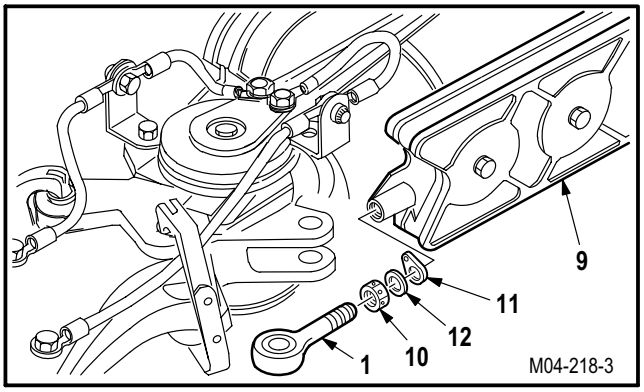

b. **Remove rod end (1) from damper (9).**

(1) Remove lockwire from nut (10) and key washer (11).

(2) Loosen nut (10).

(3) Remove rod end (1) from damper (9). Use crowfoot.

(4) Remove key washer (11), washer (12), and nut (10) from rod end (1).

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## 5.24. MAIN ROTOR DAMPER ROD END REMOVAL/INSTALLATION - continued

5.24.4. Cleaning

a. **Wipe removed and attaching parts.** Use cloth (item 52, App F).

b. **Clean corrosion preventative compound from removed hardware.** Use dry cleaning solvent (item 74, App F).

5.24.5. Inspection

**NOTE**

The two bolts through the plate section of the damper assembly may show looseness, particularly at low temperatures. This is a normal condition, not a defective condition, and no corrective action is required. Rotational movement is allowed.

a. **Check link, damper, rod end, and attaching hardware for cracks.** None allowed.

b. **Check damper and rod end for wear or damage** (para 5.1)**.**

c. **Check nut and key washer for wear or damage.** None allowed.

d. **Check rod end housing for corrosion** (para 1.49)**.**

(1) Maximum **0.005 INCH** deep allowed.

e. **Check lead lag link for damage** (para 5.33)**.**

f. **Check link rod end mating surface for wear.**

(1) Nicks and scratches less than **0.005 INCH** deep may be blended out.

g. **Check rod end bearing for corrosion** (para 1.49)**.**

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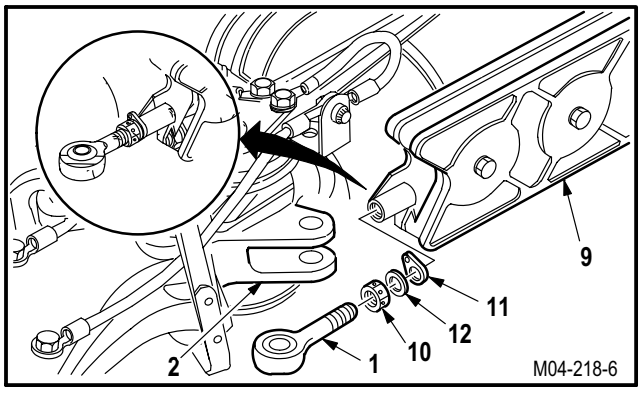
## 5.24. MAIN ROTOR DAMPER ROD END REMOVAL/INSTALLATION - continued

5.24.6. Installation

a. **Lubricate threads of rod end (1) and nut (10).** Use lubricant (item 114, App F).

(1) Allow lubricated hardware to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).




b. **Install rod end (1) in damper (9).**

**NOTE**

Install nut same number of threads as was removed in paragraph 5.24.3.

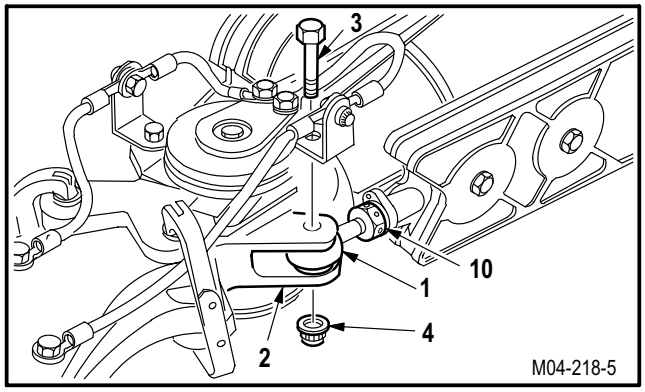
(1) Install nut (10), washer (12), and key washer (11) on rod end (1).

(2) Screw rod end (1) in damper (9).

c. **Aline rod end (1) with link (2) by adjusting nut (10) until bolt (3) can be installed and removed freely.**

d. **Lubricate threads of bolt (3) and new nut (4).** Use lubricant (item 114, App F).

(1) Allow lubricated hardware to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

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## 5.24. MAIN ROTOR DAMPER ROD END REMOVAL/INSTALLATION - continued

**CAUTION**

To prevent under torquing of bolt, do not allow corrosion preventive compound on threads of bolt.

e. **Coat shank and head of bolt (3) with corrosion preventive compound.** Use corrosion preventive compound (item 62A, App F)

f. **Install rod end (1) in link (2).** Torque nut (4) to **675 INCH-POUNDS**.

(1) Apply compound to outside diameter of bushings (7) and install in link (2) while compound is still wet. Use corrosion preventive compound (item 62A, App F)

(2) Install bolt (3) through bracket (6), bushing (7), rod end (1), washer (8), and bottom flange of link (2).

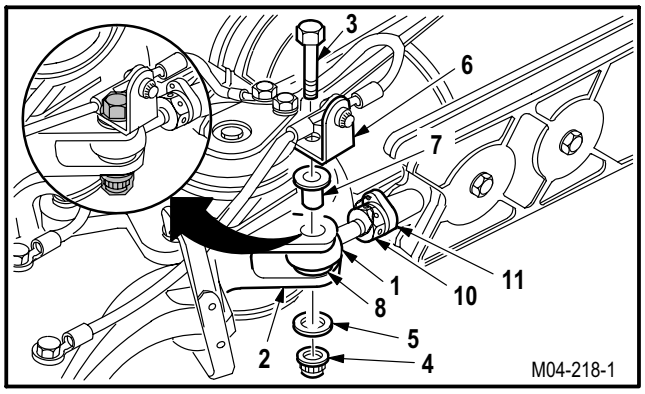
(3) Install washer (5) and nut (4) on bolt (3).

(4) Hold bolt (3). Torque nut (4) to **675 INCH-POUNDS**. Use torque wrench and box wrench.

g. **Torque nut (10) to 1650 INCH-POUNDS.** Use crowfoot and torque wrench.

h. **Lockwire nut (10) to key washer (11).** Use wire (item 225, App F).

i. **Apply sealing compound to joints around bolt head (3), bushing (7), washer (5), nut (4), and exposed threads of bolt (3).** Use sealing compound (item 177, App F) and spatula set.

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**5.24. MAIN ROTOR DAMPER ROD END REMOVAL/INSTALLATION - continued**

j. **Release rotor brake lock** (para 1.62)**.**

k. **Inspect (QA).**

l. **Perform main rotor blade phase adjustment** (para 5.8)**.**

m. **Perform main rotor track and balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.25. MAIN ROTOR PITCH HOUSING REMOVAL

5.25.1. Description

This task covers: Removal. Cleaning. Inspection.

5.25.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)

**Materials/Parts:**

Rope
Cloth (item 52, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist

**References:**

TM 1-1500-204-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.23 | Main rotor dampers removed |
| 5.33 | Main rotor lead lag link removed |
| 11.14 | Main rotor blade pitch link disconnected |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor pitch housing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**CAUTION**

This task is typical for either 7-311411215-15 or 7-311411215-19 pitch housing. 7-311411215-15 housings must not be mixed with 7-311411215-19 housings. Pitch housings are matched according to weight. The maximum permissible weight for 7-311411215-15 housing is 26.9 pounds. Opposite housing must be within 1.5 pounds of each other. Weigh the pitch housing and record the weight on DA Form 2408-16, in Block 6C below the serial number of the respective pitch housing. Prior to removal, match mark on pitch housings to facilitate proper matching during installation, i.e., 1 opposite 3 and 2 opposite 4 or A opposite C and B opposite D.

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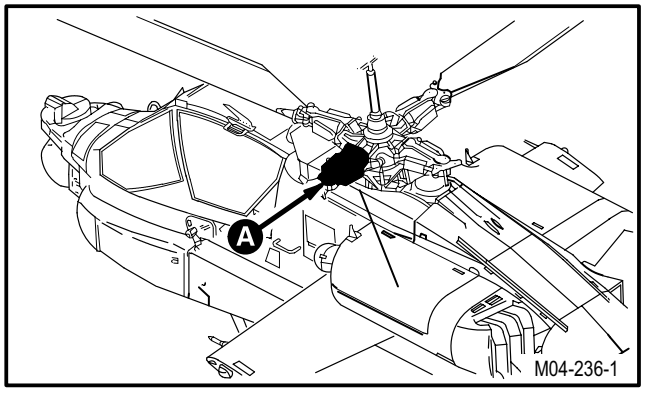
## 5.25. MAIN ROTOR PITCH HOUSING REMOVAL - continued

5.25.3. Removal




**CAUTION**

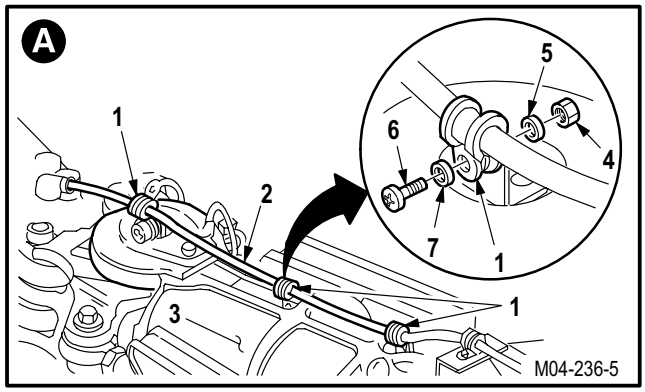
Convoluted covering on wire harness is fragile. Do not bend or crush while removing harness. Flexibility will be lost.

a. **Remove clamps (1) and harness (2) from main rotor pitch housing (3).**

(1) Remove three nuts (4) and washers (5).

(2) Remove three screws (6) and washers (7).

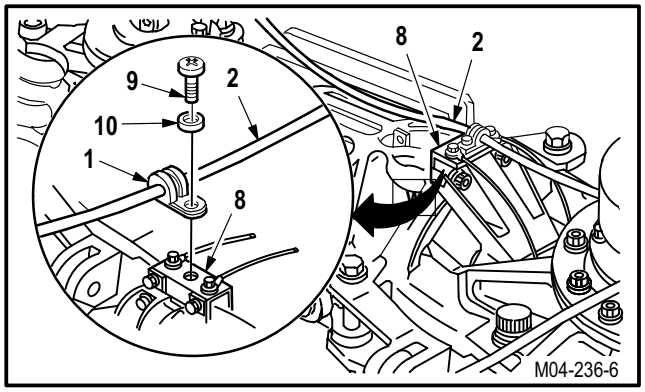
(3) Remove three clamps (1) from harness (2).




b. **Remove clamp (1) and harness (2) from angle bracket (8).**

(1) Remove screw (9), washer (10), and clamp (1).

(2) Remove clamp (1) from harness (2).

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## 5.25. MAIN ROTOR PITCH HOUSING REMOVAL - continued

c. **Remove two electrical leads (11) from support bracket (8).**

(1) Remove two screws (12), washers (13), and leads (11) from bracket (8).

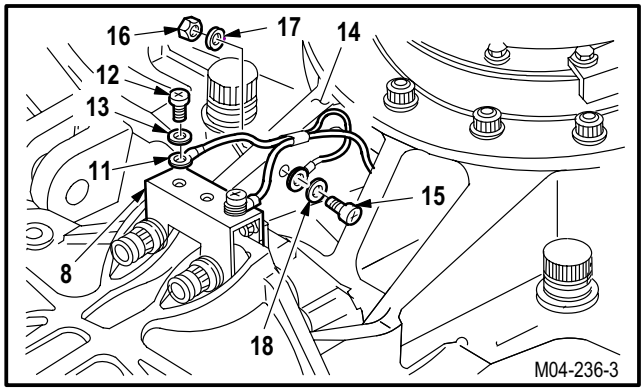
d. **Remove two electrical leads (11) from pitch web (14).**

(1) Cut tie strap that holds leads (11) together.

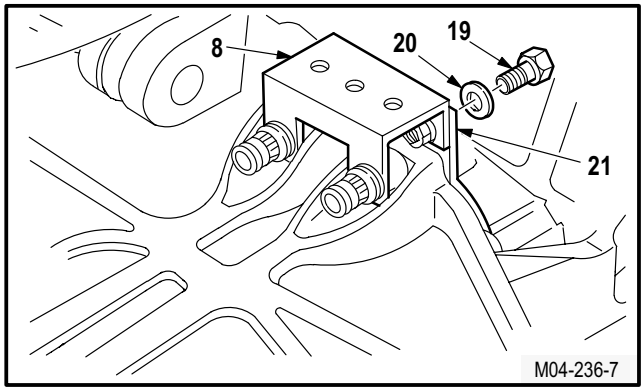
(2) Hold two screws (15). Remove nuts (16) and washers (17).

(3) Remove two screws (15), washers (18), and leads (11) from pitch web (14).

(4) Remove leads (11).




e. **Remove two bolts (19) and washers (20) from striker strips (21) and bracket (8).**



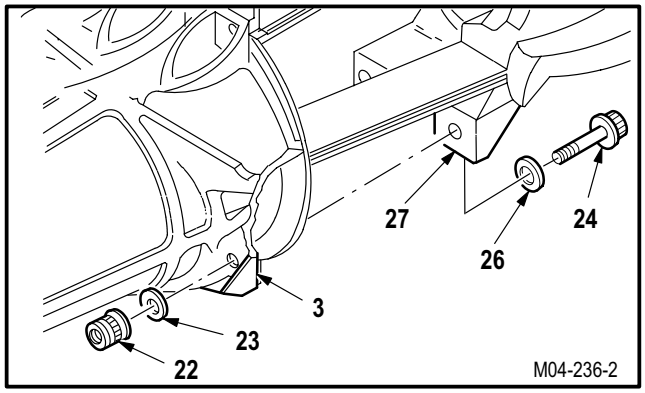

f. **Support pitch housing (3).**

g. **Remove two nuts (22) and washers (23) from lower bolts (24).**

(1) Hold two bolts (24).

(2) Remove two nuts (22) and washers (23).

(3) Remove two bolts (24) and washers (26) from feathering bearing housing (27).

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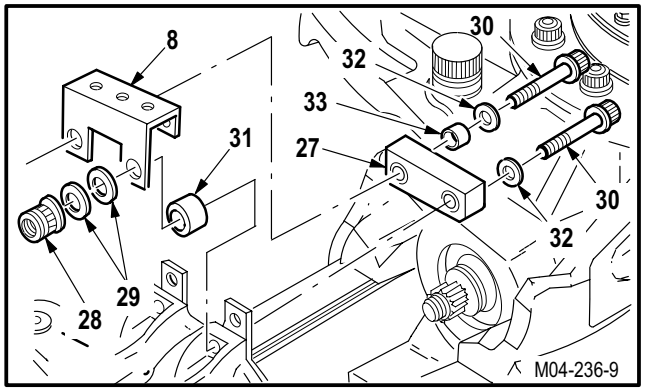
## 5.25. MAIN ROTOR PITCH HOUSING REMOVAL - continued

h. **Remove two nuts (28) and four washers (29) from upper bolts (30).**

(1) Hold two bolts (30).

(2) Remove two nuts (28), four washers (29), one bracket (8), and two sleeve bushings (31).

(3) Remove two bolts (30), washers (32), and one sleeve bushing (33) from housing (27).



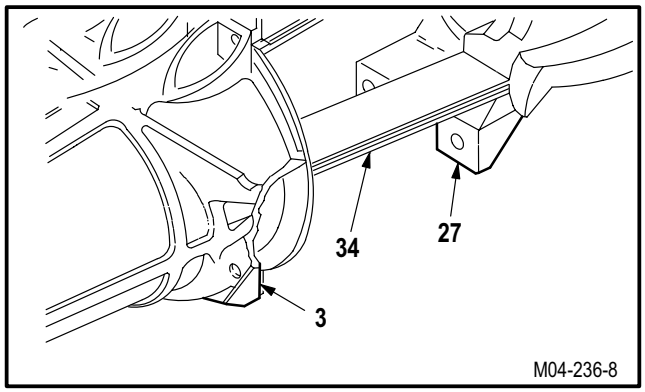

**CAUTION**

Do not allow strap pack to remain unsupported when pitch housing is removed. Support strap pack in horizontal position. Failure to do so may result in damage to strap pack.

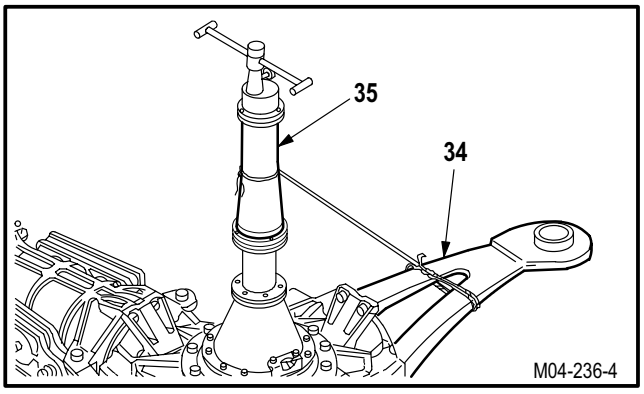
i. **Remove pitch housing (3) from housing (27).**

(1) Pull pitch housing (3) from housing (27) and strap pack (34).

(2) Support strap pack (34) in horizontal position as pitch housing (3) is removed.




(3) Keep strap pack (34) in horizontal position by supporting strap pack (34) with a rope tied to center of strap pack (34) and air data mast (35).




5.25.4. Cleaning

a. **Wipe harness support bracket, striker strips, pitch housing, feathering bearing, feathering bearing housing, and strap pack with a clean cloth.** Use cloth (item 52, App F).

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**5.25. MAIN ROTOR PITCH HOUSING REMOVAL - continued**

5.25.5. Inspection

a. **Check striker plates, feathering bearing housing, feathering bearing, and strap pack for damage** (para 5.1)**.**

b. **Check harness support bracket for loose or damaged nutplates** (TM 1-1500-204-23)**.**

c. **Check electrical leads for loose terminals, damaged insulation, or broken wires.** None allowed.

d. **Check pitch housing and feathering bearing housing for cracks.** None allowed.

e. **Check pitch housing for nicks, scratches, gouges, and corrosion.**

(1) Defects up to **0.010 INCH** deep, **0.010 INCH** wide, and **0.050 INCH** long are acceptable.

f. **Check pitch housing shim for debonding.**

(1) Debonding up to **50 PERCENT** of circumference is allowed provided shim is not cracked, torn, or buckled.

(2) Debonded shim shall be replaced not later than next phase inspection interval. Annotate aircraft records as applicable.

g. **Check inboard feathering bearing mounting holes for wear.**

(1) Maximum diameter of inboard holes is **0.407 INCH**.

h. **Inspect pitch link attachment area.**

(1) Flange bushing maximum inside diameter is **0.7505 INCH**.

(2) Aluminum bronze bushing maximum inside diameter is **0.8765 INCH**.

(3) Nylon washer for bonding and damage. Loose washer shall be rebonded and a washer that is worn through shall be replaced (para 5.29A).

i. **Check pitch link holes for wear.**

(1) Flange bushings maximum diameter is **0.7505 INCH**.

(2) Aluminum bronze bushing maximum diameter is **0.8765 INCH**.

j. **Check outboard lead lag link mounting holes for wear.**

(1) Teflon liner minimum thickness **0.008 INCH**.

(2) Maximum radial play between lead lag link bearing and teflon lined insert is **0.015 INCH**.

(3) Teflon liner material cannot be worn through.

k. **Check damper holes for wear.**

(1) Upper bushing **0.8771 INCH** maximum.

(2) Lower bushing **0.7508 INCH** maximum.

END OF TASK

## 5.26. MAIN ROTOR PITCH HOUSING INSTALLATION

5.26.1. Description

This task covers: Installation.

5.26.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Electric gun type heater (item 163, App H)
Multimeter (item 215, App H)
Adjustable air filtering respirator (item 262, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

Insulation sleeving (item 99, App F)
Lubricant (item 114, App F)
Sealing compound (item 175, App F)
Strap (item 191, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor pitch housing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**CAUTION**

This task is typical for either 7-311411215-15 or 7-311411215-19 pitch housing. 7-311411215-15 housings must not be mixed with 7-311411215-19 housings. Pitch housings are matched according to weight. The maximum permissible weight for 7-311411215-15 housing is 26.9 pounds. Opposite housing must be within 1.5 pounds of each other. Weigh the pitch housing and record the weight on DA Form 2408-16, in Block 6C below the serial number of the respective pitch housing. Prior to removal, match mark on pitch housings to facilitate proper matching during installation, i.e., 1 opposite 3 and 2 opposite 4 or A opposite C and B opposite D.

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## 5.26. MAIN ROTOR PITCH HOUSING INSTALLATION - continued

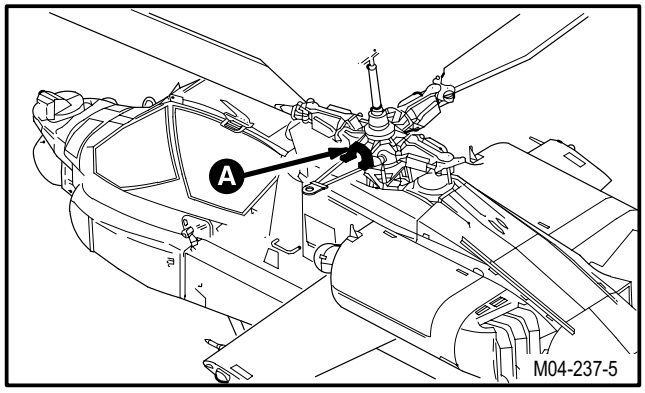
5.26.3. Installation

a. **Lubricate threads of bolts and nuts.** Use lubricant (item 114, App F).

(1) Allow lubricated hardware to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

**CAUTION**

Do not allow strap pack to remain unsupported when pitch housing is being installed. Support strap pack in horizontal position. Failure to do so may result in damage to strap pack.

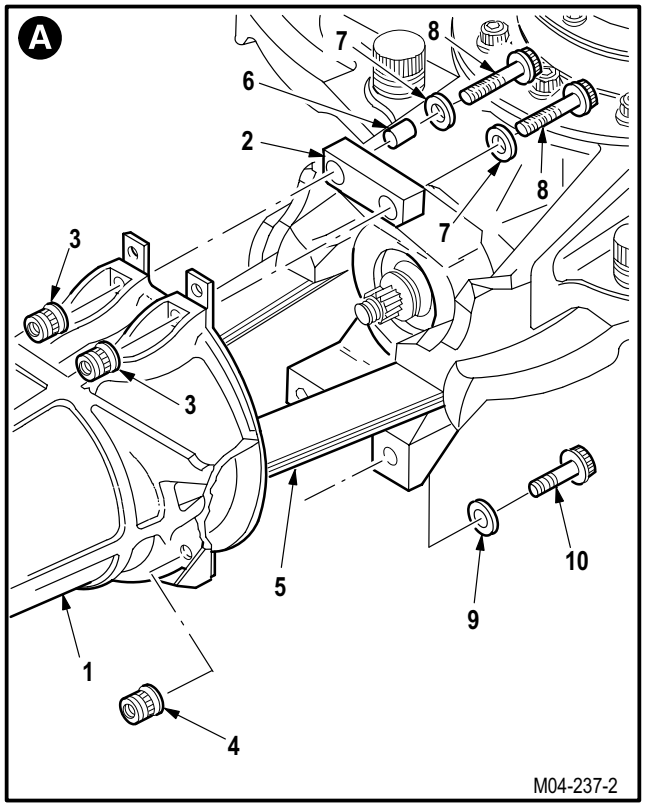



b. **Install main rotor pitch housing (1) on feathering bearing housing (2).** Torque two nuts (3) and (4) to **350 INCH-POUNDS**.

(1) Slide pitch housing (1) over strap pack (5).

(2) Install one bushing (6), two washers (7), and long bolts (8) in top of housing (2).

(3) Install two washers (9) and short bolts (10) in bottom of housing (2).

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## 5.26. MAIN ROTOR PITCH HOUSING INSTALLATION - continued

(4) Install two spacers (11), one angle bracket (12), four washers (13), and two nuts (3) on top bolts (8).

(5) Install two washers (14) and nuts (4) on bottom bolts (10).

(6) Hold two bolts (8) and (10). Torque two nuts (3) and (4) to **350 INCH-POUNDS**. Use torque wrench.

**NOTE**

A minimum clearance of **0.002 INCH** shall be maintained between the washer and the feathering bearing where the bushing is installed.

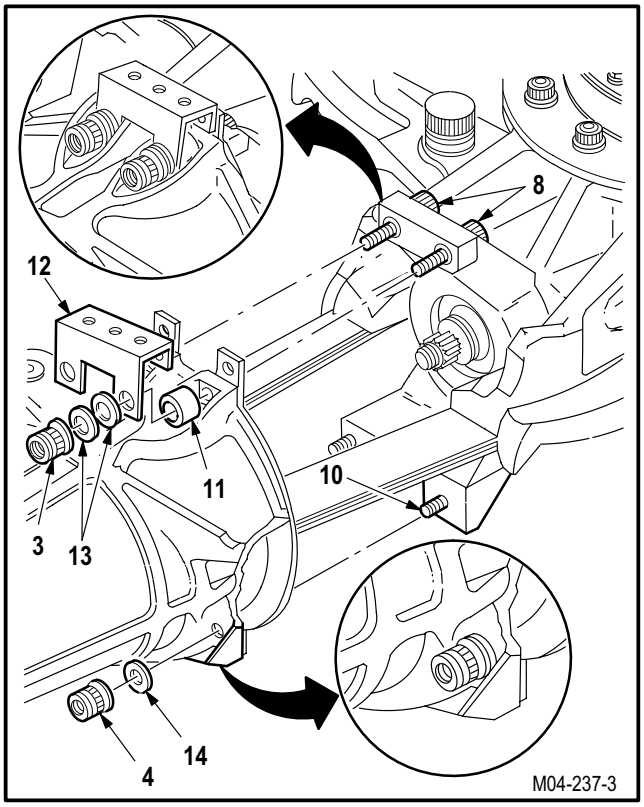
c. **Inspect thread end of two bolts (10) and bolts (8) for maximum of 5.5 or minimum of 1.5 threads extending through nuts (3) and (4).**

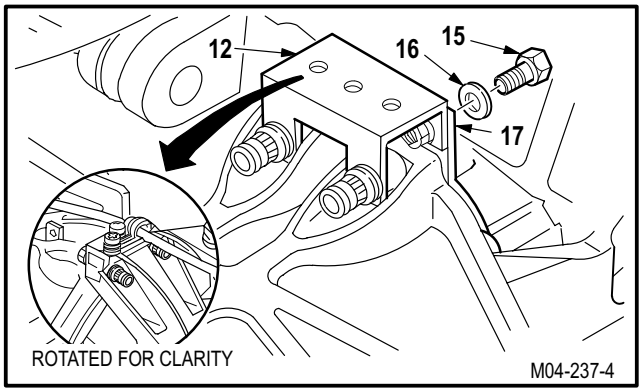
(1) Add one washer (13) under nut (3) or, one washer (14) under nut (4) as necessary, to maintain bolt thread range.

**NOTE**

A maximum gap of **0.040 INCH** is permissible between striker strip and feathering bearing housing.

d. **Install two bolts (15) through washers (16), striker strips (17), and bracket (12).**

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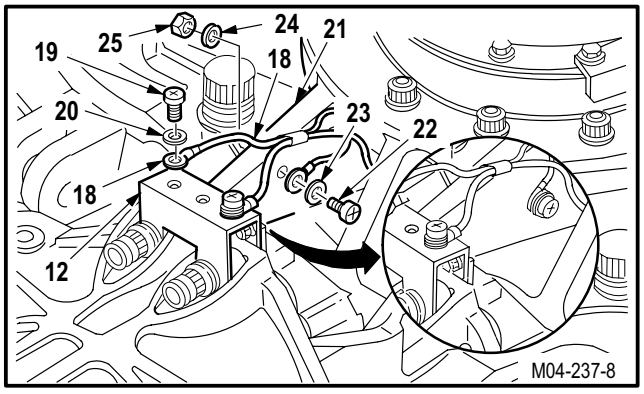
## 5.26. MAIN ROTOR PITCH HOUSING INSTALLATION - continued

e. **Install two electrical leads (18) on bracket (12).** Torque two screws (19) to **25 INCH-POUNDS**.

(1) Install two screws (19) through washers (20), leads (18), and bracket (12). Torque screws (19) to **25 INCH-POUNDS**. Use torque wrench.

(2) Apply sealant to screws (19) mounting area. Use sealing compound (item 175, App F).




**WARNING**

**Do not place heater near flammable material or allow heater to contact skin: severe burns can result. Wear protective equipment. If injury occurs, seek medical aid.**

**NOTE**

- Two pitch webs have two electrical leads installed.
- Install bolt with head in direction of rotation.

f. **Install end of lead (18) on pitch web (21).**

(1) Install a **0.5 INCH** length of insulation sleeving on each of the leads at the point where they will be tied. Use insulation sleeving (item 99, App F), heater, and protective gloves.

(2) Install bolt (22) through washer (23), lead (18) (two, if required), pitch web (21), washer (24), and nut (25).

(3) Apply sealant to nut (25) and bolt (22) mounting areas. Use sealing compound (item 175, App F).

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## 5.26. MAIN ROTOR PITCH HOUSING INSTALLATION - continued

(4) Wrap a tie strap around the two leads (18), over the insulation sleeving, and pull it finger tight. Use strap (item 191, App F).

g. **Perform electrical bond check on electrical leads (18)** (TM 55-1500-323-24)**.**

(1) Bond shall be **1.00 OHM** or less. Use multimeter.

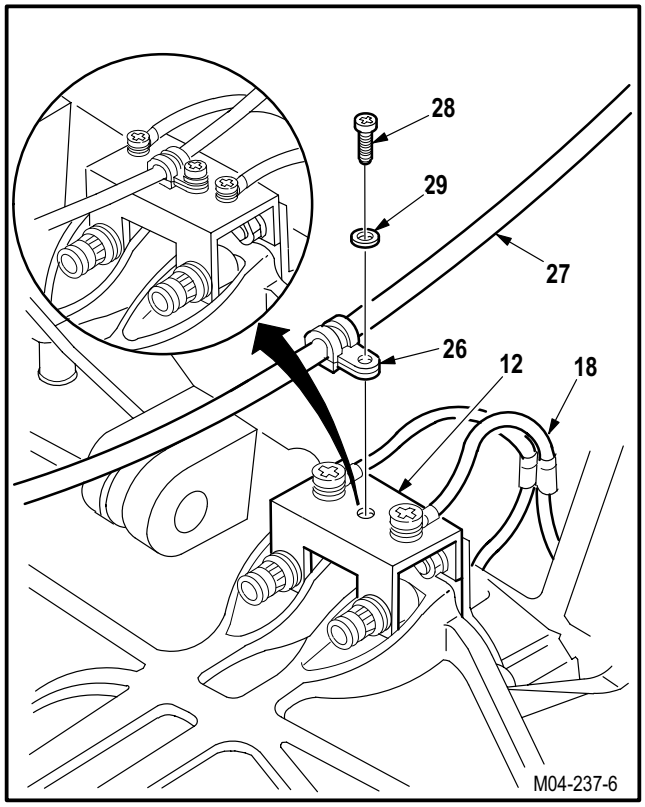
**CAUTION**

Convoluted covering on wire harness is fragile. Do not bend or crush while installing clamps.

h. **Install clamp (26) and harness (27) on bracket (12).**

(1) Position clamp (26) on harness (27).

(2) Install bolt (28) through washer (29), clamp (26), and bracket (12).

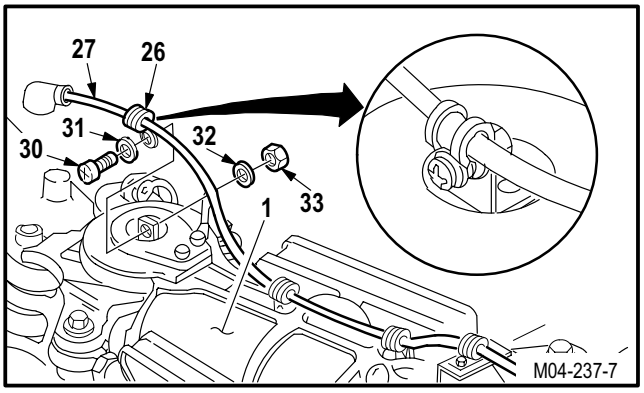



i. **Install three clamps (26) and harness (27) on pitch housing (1).**

(1) Position clamp (26) on harness (27).

(2) Install bolt (30) through washer (31), clamp (26), and pitch housing (1).

(3) Install washer (32) and nut (33) on bolt (30).




j. **Inspect (QA).**

k. **Install main rotor blade pitch link** (para 11.14)**.**

l. **Install main rotor lead lag link** (para 5.33)**.**

m. **Install main rotor dampers** (para 5.23)**.**

n. **Install main rotor blade** (para 5.4)**.**

END OF TASK

## 5.27. MAIN ROTOR PITCH HOUSING SHIM REPLACEMENT (AVIM)

5.27.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.27.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Electric gun type heater (item 163, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)
Clamping fixture (figure D-454, App D)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 2, App F)
Cloth (item 48, App F)
Cloth (item 51, App F)
Methyl ethyl ketone (item 124, App F)
Primer (item 143, App F)

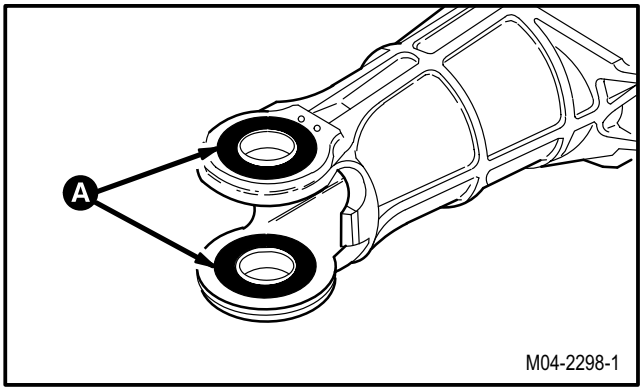
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.33 | Lead lag link removed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor pitch housing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




**NOTE**

This task is typical of all pitch housing shims for either 7-311411215-15 or 7-311411215-19 pitch housing.

GO TO NEXT PAGE

## 5.27. MAIN ROTOR PITCH HOUSING SHIM REPLACEMENT (AVIM) - continued

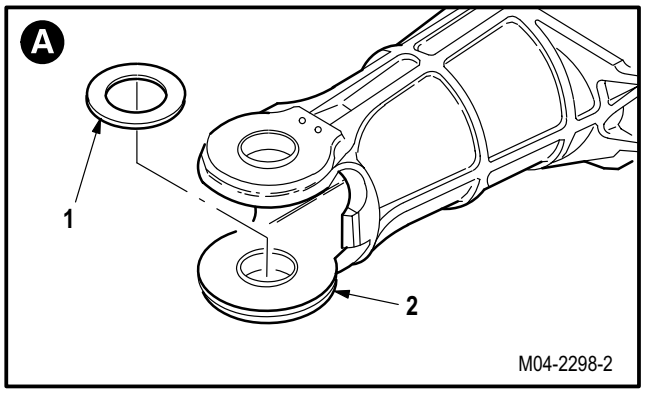
5.27.3. Removal

**WARNING**

**Do not place heater near flammable material or allow heater to contact skin: severe burns can result. Wear protective equipment. If injury occurs, seek medical aid.**

a. **Remove shim (1) from main rotor pitch housing (2).**

(1) Apply heat to shim (1) and pry loose. Use putty knife, heater, and protective gloves.




5.27.4. Cleaning

a. **Clean pitch housing** (para 1.47)**.**

5.27.5. Inspection

a. **Check pitch housing shim mounting area for damage.**

(1) Check for cracks. None allowed.

(2) Defects are acceptable up to **0.010 INCH** deep, **0.010 INCH** wide, and **0.050 INCH** long, before blending.

(3) Check for corrosion (para 1.49).

b. **Check pitch housing tang minimum thickness.** Use caliper set.

(1) Measure upper tang, minimum thickness **0.670 INCH**.

(2) Measure lower tang, minimum thickness **0.680 INCH**.

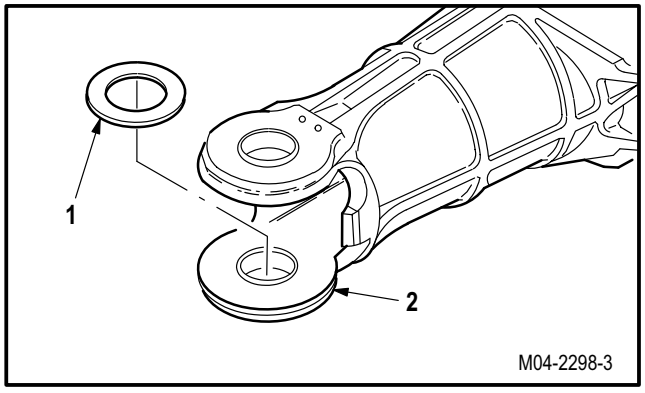
5.27.6. Installation

**NOTE**

It is not necessary to remove old adhesive completely. Old adhesive works well as a primer when rebonding.

a. **Prepare surface of shim (1) and pitch housing (2).**

(1) Lightly sand pitch housing (2) shim mating surface. Use cloth (item 48, App F).

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## 5.27. MAIN ROTOR PITCH HOUSING SHIM REPLACEMENT (AVIM) - continued

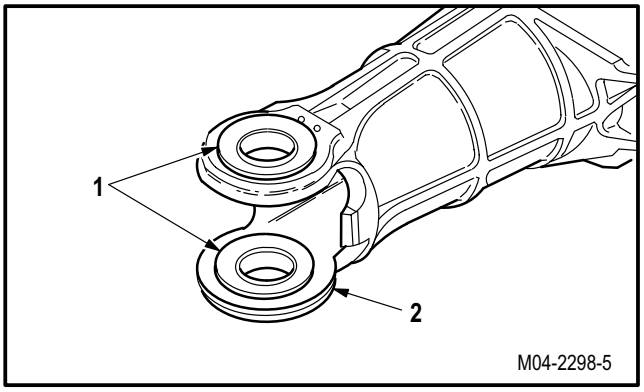
(2) Lightly sand surface of shim (1) to produce a dull matt surface. Use cloth (item 48, App F).

(3) Wipe pitch housing (2) shim mating surface clean. Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

(4) Apply a light, even coat of primer to mating surfaces of shim (1) and pitch housing (2). Use primer (item 143, App F).

(5) Allow to air dry at room temperature for **30 MINUTES**.

(6) Apply an even coat of adhesive to mating surfaces of shim (1) and pitch housing (2). Use adhesive (item 2, App F).




b. **Install shim (1) on pitch housing (2).**

(1) Install shim (1) on pitch housing (2) and hand tighten clamp. Use clamping fixture (figure D-454, App D).

(2) Wipe excess adhesive squeeze-out from perimeter of shim (1). Use cloth (item 51, App F).

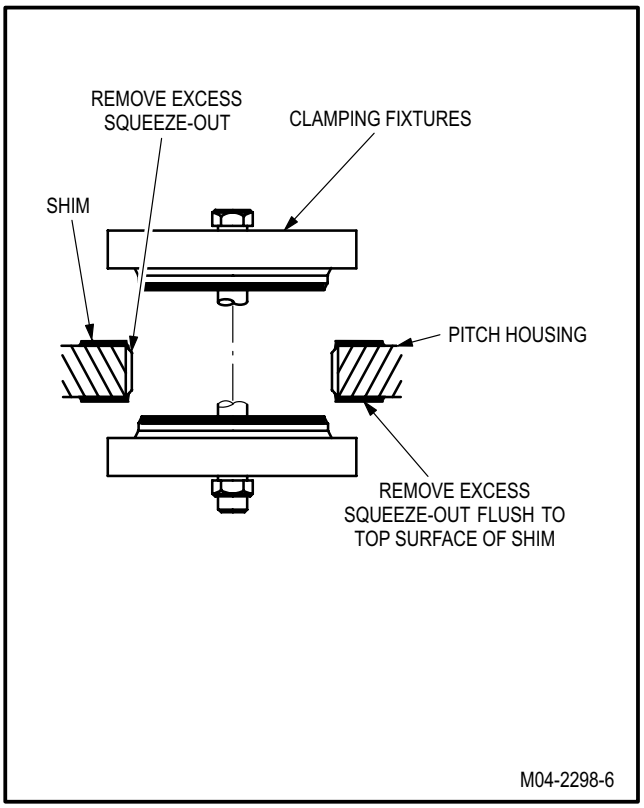
(3) Allow adhesive to cure for **24 HOURS** at room temperature.

c. **Remove clamping fixture from pitch housing (2).**

d. **Check shim (1) inner and outer ring area for air bubbles under shim (1).** None allowed.

e. **Inspect (QA).**

f. **Install main rotor lead lag link** (para 5.33)**.**




END OF TASK

## 5.28. MAIN ROTOR PITCH HOUSING WIRE SUPPORT BRACKET REPLACEMENT (AVIM)

5.28.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.28.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Electric gun type heater (item 163, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

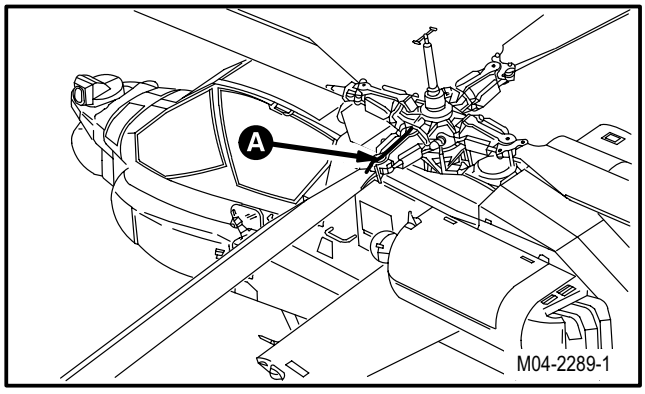
**Materials/Parts:**

Adhesive (item 3, App F)
Paper (item 133, App F)
Paper (item 135, App F)
Methyl ethyl ketone (item 124, App F)
Primer (item 143, App F)

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor pitch housing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




**NOTE**

This task is typical for all eight wire support brackets for either 7-311411215-15 or 7-311411215-19 pitch housing.

GO TO NEXT PAGE

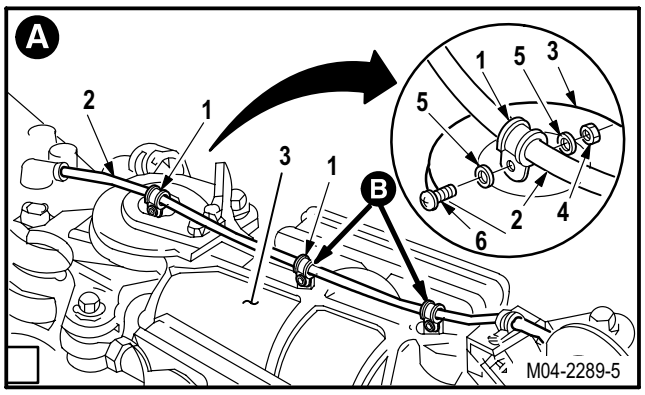
## 5.28. MAIN ROTOR PITCH HOUSING WIRE SUPPORT BRACKET REPLACEMENT (AVIM) - continued

5.28.3. Removal

a. **Remove three clamps (1) and harness (2) from main rotor pitch housing (3).**

(1) Remove nuts (4), washers (5), screws (6), and washers (5).

(2) Remove clamps (1) from pitch housing (3).

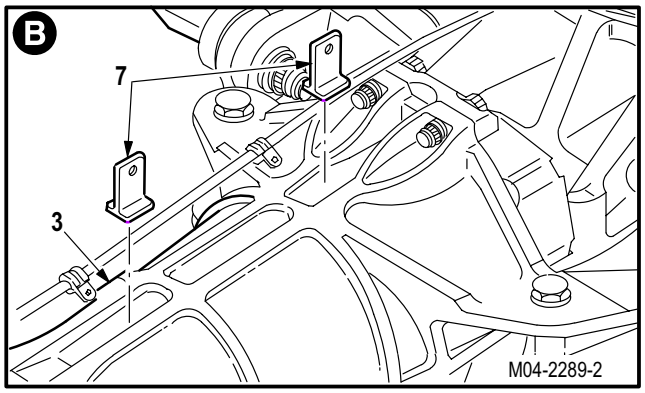



**WARNING**

**Do not place heater near flammable material or allow heater to contact skin: severe burns can result. Wear protective equipment. If injury occurs, seek medical aid.**

b. **Remove wire support bracket (7) from pitch housing (3).**

(1) Apply only enough heat to remove bracket (7) from pitch housing (3). Use heater and protective gloves.



c. **Remove old adhesive.** Use paper (item 133, App F) followed by paper (item 135, App F).

5.28.4. Cleaning

a. **Clean pitch housing.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

5.28.5. Inspection

a. **Check pitch housing bracket mounting area for damage.**

(1) No cracks permitted.

(a) Maximum depth not to exceed **0.010 INCH**.

b. **Check pitch housing bracket mounting area for corrosion** (para 1.49)**.**

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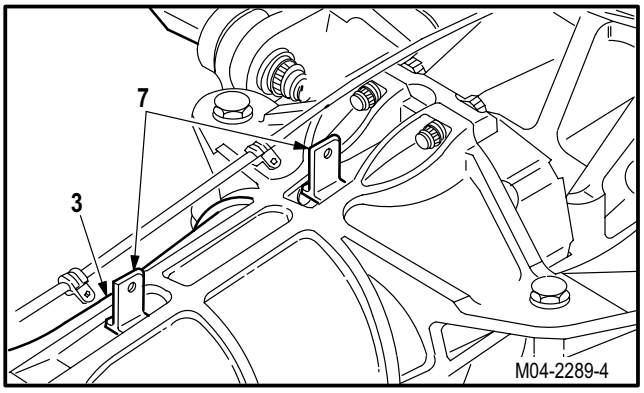
## 5.28. MAIN ROTOR PITCH HOUSING WIRE SUPPORT BRACKET REPLACEMENT (AVIM) - continued

5.28.6. Installation

a. **Apply coat of primer to pitch housing (3), bracket (7), and mounting area.** Use primer (item 143, App F).

(1) Install bracket (7) within **24 HOURS** of application of primer.



b. **Apply a thin, uniform layer of adhesive to pitch housing (3) and bracket (7) mating surfaces.** Use adhesive (item 3, App F).

c. **Attach bracket (7) to pitch housing (3) and press firmly together.**

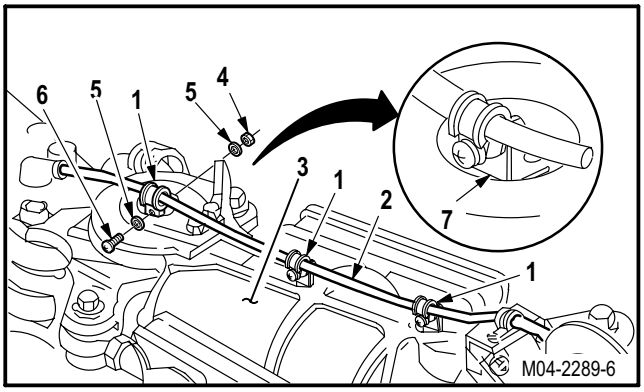
(1) Allow bracket (7) to cure for a minimum of **24 HOURS** at room temperature or **1 HOUR** at 190 to 200 °F (88 to 99 °C).

(2) Check bracket (7) after cure for loose mounting.

d. **Install three clamps (1) and harness (2) on pitch housing (3).**

(1) Install screws (6) through washers (5), clamps (1), and bracket (7).

(2) Install three washers (5) and nuts (4) on screws (6).




e. **Inspect (QA).**

END OF TASK

## 5.29. MAIN ROTOR PITCH HOUSING STRIKER STRIP REPLACEMENT (AVIM)

5.29.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.29.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Craftsman's knife (item 197, App H)
1 1/4-inch blade putty knife (item 199, App H)
Rawhide mallet (item 212, App H)
Adjustable air filtering respirator (item 262, App H)
9-inch pinking shears (item 287, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

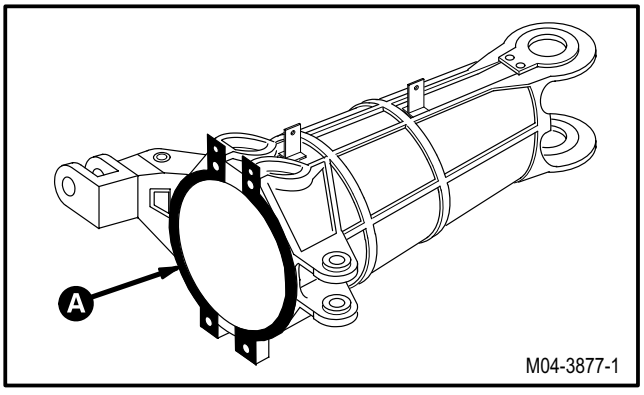
**Materials/Parts:**

Adhesive (item 3, App F)
Brush (item 34, App F)
Carbon dioxide (item 40, App F)
Cloth (item 47, App F)
Cloth (item 49, App F)
Cloth (item 51, App F)
Cloth (item 52, App F)
Cloth (item 57, App F)
Methyl ethyl ketone (item 124, App F)
Primer (item 142, App F)

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor pitch housing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.29. MAIN ROTOR PITCH HOUSING STRIKER STRIP REPLACEMENT (AVIM) - continued

**CAUTION**

To prevent damage to the main rotor pitch housing, protect part from external impact during inspection and other handling. Ensure that work area is clean and that pitch housing is placed only on a soft and adequately protected working surface.

**NOTE**

This task is typical for both striker strips on either 7-311411215-15 or 7-311411215-19 main rotor pitch housing.

5.29.3. Removal

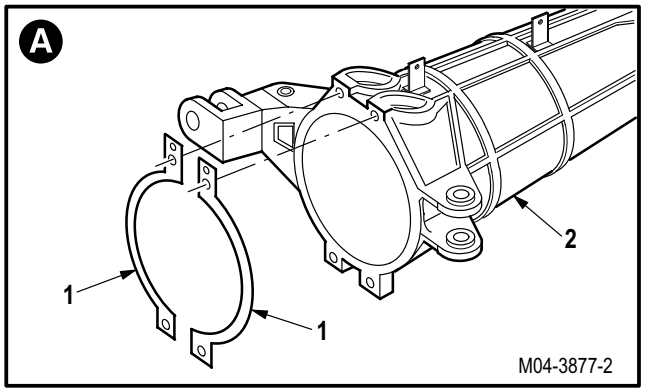
**WARNING**

**Frostbite or freezing of tissue can occur from improper handling of chilled parts. Use temperature resistant gloves and apron when handling chilled parts. If a burning sensation is felt, seek medical aid immediately.**

a. **Remove striker strip (1) from main rotor pitch housing (2).**

(1) Chill housing (2) in area around strip (1) to crystallize compound that bonds strip (1) to housing (2). Use carbon dioxide (item 40, App F) and protective gloves.

(2) Sharply tap strip (1) to separate from housing (2). Use mallet.

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## 5.29. MAIN ROTOR PITCH HOUSING STRIKER STRIP REPLACEMENT (AVIM) - continued

5.29.4. Cleaning

a. **Remove cured adhesive from striker strip mounting surface on pitch housing.** Use putty knife, cloth (item 47, App F), and cloth (item 49, App F).

b. **Clean striker plate mounting surface on pitch housing.** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

5.29.5. Inspection

**NOTE**

The following inspection procedures apply to the striker plate mounting surface on the main rotor pitch housing.

a. **Check pitch housing for cracks.** None allowed.

b. **Check pitch housing for corrosion** (para 1.49)**.**

c. **Check pitch housing for nicks, scratches, and gouges** (para 5.25)**.**

5.29.6. Installation

a. **Prime striker plate mounting surface on pitch housing.**

**NOTE**

- Do not allow parts to air dry for more than **4 HOURS**. Heat cure must be performed within **4 HOURS** of application of primer in order for primer to achieve its optimum bonding properties.
- Bonding surface of the striker plate is the opposite of the spot faced surface.

(1) Apply a thin uniform coat of adhesive primer to bonding surface of striker plate and striker plate mounting surface on pitch housing. Use primer (item 142, App F) and brush (item 34, App F).

(2) Allow parts to cure for a minimum of **30 MINUTES** at room temperature.

(3) Heat cure parts for **30 MINUTES** at 300 to 310 °F (148 to 154 °C).

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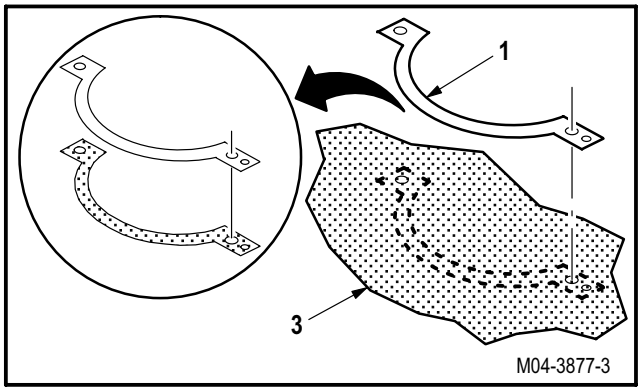
## 5.29. MAIN ROTOR PITCH HOUSING STRIKER STRIP REPLACEMENT (AVIM) - continued

b. **Cut a single ply patch of fiberglass cloth (3) to match bonding surface of plate (1).**

(1) Position plate (1) on cloth (3) and trace bonding surface outline of plate (1). Use cloth (item 57, App F).

(2) Cut and trim cloth (3) to match bonding surface outline of plate (1). Use shears and/or knife.




c. **Install strip (1) on housing (2).**

(1) Lightly wipe bonding surface of strip (1) and strip mounting surface of housing (2) with solvent. Use methyl ethyl ketone (item 124, App F) and cloth (item 52, App F).

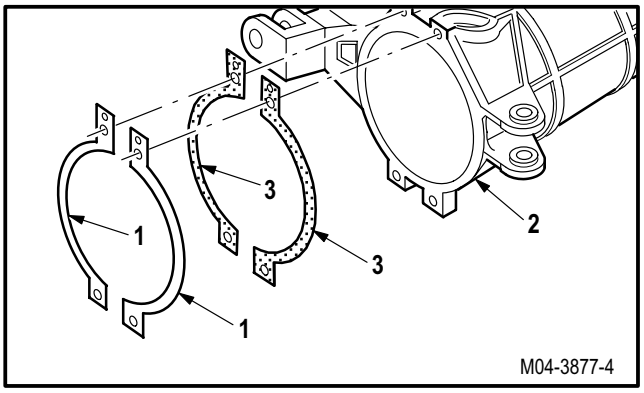
(2) Apply a thin, uniform coat of adhesive on bonding surface of strip (1) and strip mounting surface of housing (2). Use adhesive (item 3, App F) and brush (item 34, App F).

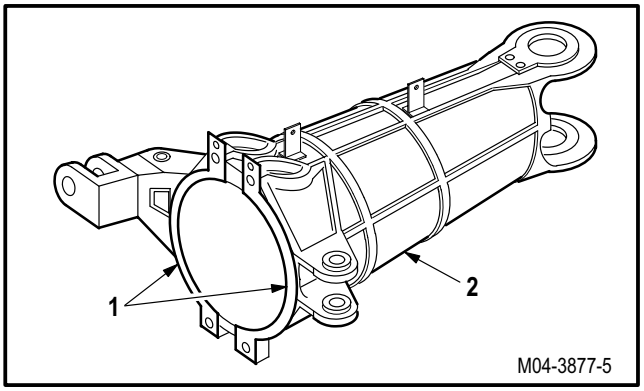
(3) Place cloth patch (3) on bonding surface of strip (1).

(4) Place strip (1) with cloth (3) on strip mounting surface of housing (2) and apply firm but light pressure to join parts.

(5) Wipe away all excess adhesive squeeze-out along inner and outer seam of plate (1). Use cloth (item 52, App F).

(6) Allow adhesive to cure for a minimum of **24 HOURS** at room temperature.




d. **Inspect (QA).**

END OF TASK

## 5.29A. MAIN ROTOR PITCH HORN WASHER REPLACEMENT (AVIM)

5.29A.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.29A.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
3-inch C clamp (item 60, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Electric gun type heater (item 163, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 2, App F)
Cloth (item 48, App F)
Cloth (item 51, App F)
Methyl ethyl ketone (item 124, App F)
Primer (item 143, App F)

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor pitch housing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical of all pitch horn washers on either 7-311411215-15 or 7-311411215-19 pitch housing.

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## 5.29A. MAIN ROTOR PITCH HORN WASHER REPLACEMENT (AVIM) - continued

5.29A.3. Removal

**WARNING**

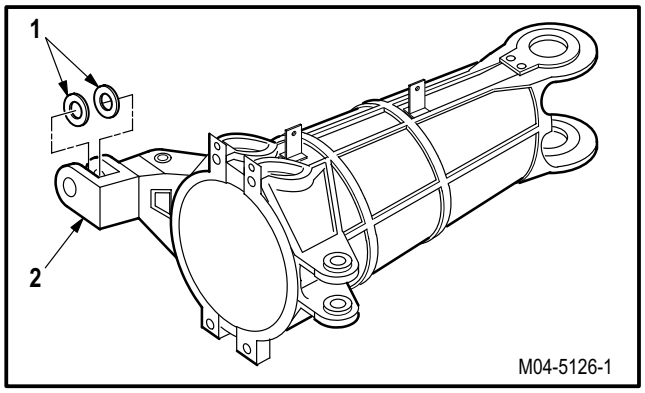
**Do not place heater near flammable material or allow heater to contact skin: severe burns can result. Wear protective equipment. If injury occurs, seek medical aid.**

**CAUTION**

Do not exceed 200 °F when using heater or damage to main rotor pitch horn may occur.

a. **Remove washer (1) from main rotor pitch horn (2).**

(1) Apply heat to washer (1) and remove. Use putty knife, heater, and protective gloves.




5.29A.4. Cleaning

a. **Clean pitch horn** (para 1.47)**.**

5.29A.5. Inspection

a. **Check pitch horn washer mounting area for damage.**

(1) No cracks permitted.

(2) Defects up to **0.010 INCH** deep, **0.010 INCH** wide, and **0.050 INCH** long may be blended out at 10:1 ratio.

b. **Check mounting area for corrosion** (para 1.49)**.**

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**5.29A. MAIN ROTOR PITCH HORN WASHER REPLACEMENT (AVIM) - continued**

5.29A.6. Installation

a. **Prepare surface of washer (1) and pitch horn (2).**

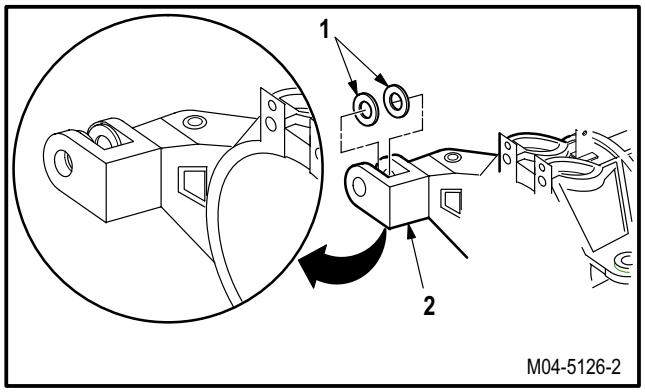
(1) Lightly sand pitch horn (2) washer mating surface. Use cloth (item 48, App F).

(2) Lightly sand surface of washer (1). Use cloth (item 48, App F).

(3) Wipe pitch horn (2) washer mating surface clean. Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

(4) Apply a light, even coat of primer to mating surface of pitch horn (2). Use primer (item 143, App F).

(5) Allow to air dry at room temperature for **30 MINUTES**.



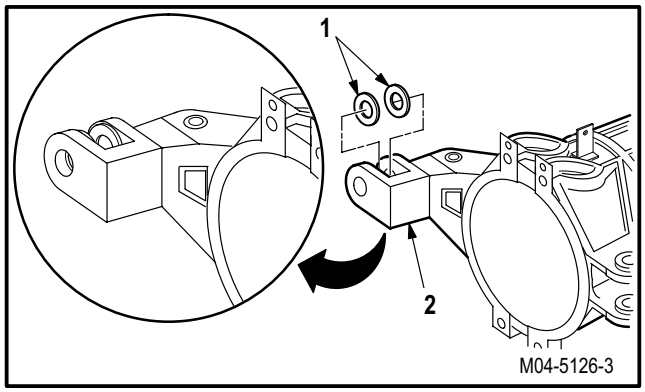
b. **Install washer (1) on pitch horn (2).**

(1) Apply an even coat of adhesive to mating surfaces of washer (1) and pitch horn (2). Use adhesive (item 2, App F).

(2) While adhesive is still wet, install washer (1) on pitch housing (2) and hand tighten clamp. Use C clamp.

(3) Wipe excess adhesive squeeze-out from perimeter of washer (1). Use cloth (item 51, App F).

(4) Allow adhesive to cure for **24 HOURS** at room temperature.




c. **Remove C clamp from pitch horn (2).**

d. **Check washer (1) inner and outer ring area for air bubbles around washer.** None allowed.

e. **Inspect (QA).**

END OF TASK

## 5.30. MAIN ROTOR STRIKER PLATE REMOVAL/INSTALLATION

5.30.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.30.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

**Materials/Parts:**

Cloth (item 52, App F)
Lubricant (item 114, App F)
Wire (item 225, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 1.97 | Maintenance crane installed |
| 1.83 | Main rotor blade raised and droop stop wedges installed |

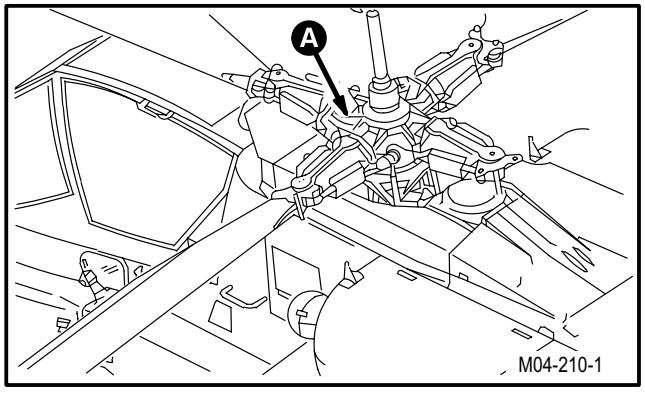
**WARNING**

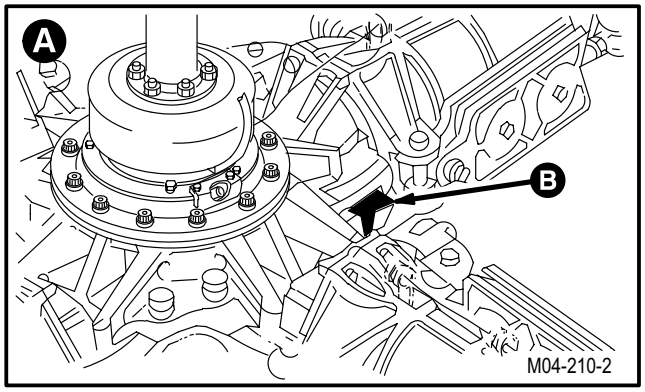
**FLIGHT SAFETY PART**

**The main rotor head is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for all four main rotor striker plates on either 7-311411003-621 or 7-311411003-625 main rotor head.

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## 5.30. MAIN ROTOR STRIKER PLATE REMOVAL/INSTALLATION - continued

5.30.3. Removal

a. **Remove main rotor striker plate (1) and shim(s) (2) from feathering bearing housing (3).**

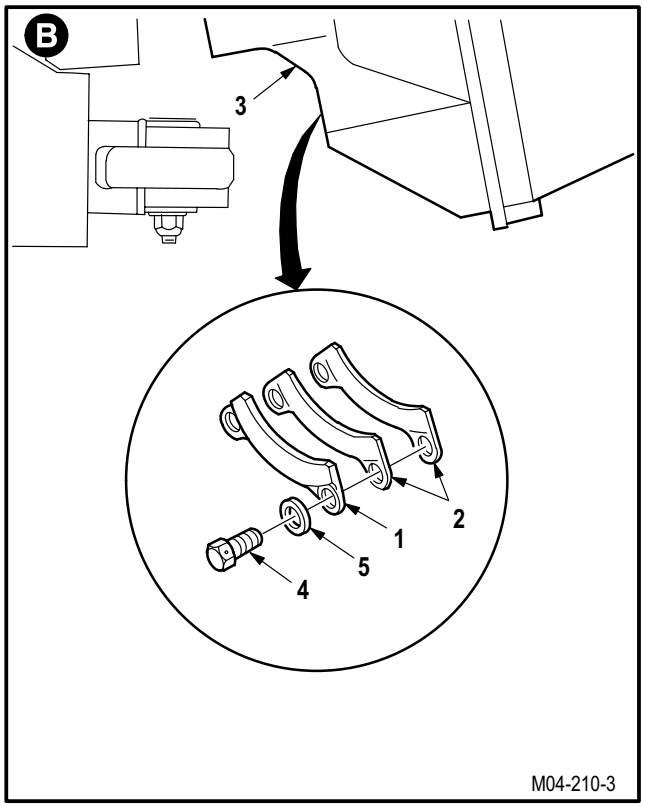
(1) Remove lockwire from two bolts (4).

(2) Remove two bolts (4) and washers (5).

**NOTE**

Place hand under striker plate to prevent shim(s) from falling when striker plate is removed.

(3) Remove plate (1) and shim(s) (2).




5.30.4. Cleaning

a. **Wipe striker plate and feathering bearing housing.** Use cloth (item 52, App F).

5.30.5. Inspection

a. **Check pitch housing, striker plate, shims, and feathering bearing housing for cracks.** None allowed.

b. **Check striker plate for dents or gouges.**

(1) Maximum depth not to exceed **0.030 INCH**.

c. **Check feathering bearing housing for scratches and nicks.**

(1) Less than **0.005 INCH** may be blended out.

d. **Check pitch housing and feathering bearing housing for corrosion** (para 1.49)**.**

e. **Check feathering bearing housing threaded inserts and shims for damage.** None allowed.

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## 5.30. MAIN ROTOR STRIKER PLATE REMOVAL/INSTALLATION - continued

5.30.6. Installation

a. **Lubricate two bolts (4).** Use lubricant (item 114, App F).

(1) Allow lubricated bolts to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

b. **Install plate (1) and shims(s) (2) on housing (3).** Torque two bolts (4) to **285 INCH-POUNDS**.

**NOTE**

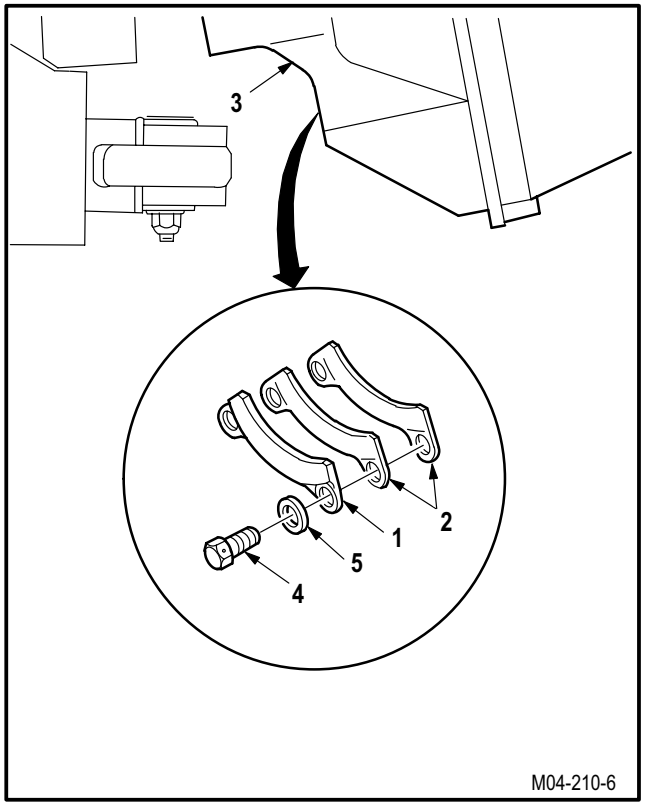
Maximum number of shims is 9.

(1) Position shim(s) (2) and plate (1) on housing (3) with holes alined.

(2) Install two washers (5) and bolts (4).

(3) Torque two bolts (4) to **285 INCH-POUNDS**. Use torque wrench.

(4) Lockwire two bolts (4) to housing (3). Use wire (item 225, App F).




c. **Remove droop stop wedges and release tension on lift cable lowering main rotor blade** (para 1.84)**.**

d. **Measure main rotor blade droop angle** (para 5.10)**.**

e. **Remove maintenance crane** (para 1.105)**.**

f. **Inspect (QA).**

END OF TASK

## 5.31. MAIN ROTOR PITCH HOUSING AND BLADE - ELECTRICAL LEAD REMOVAL/INSTALLATION

5.31.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.31.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Industrial goggles (item 156, App H)
Multimeter (item 215, App H)
Adjustable air filtering respirator (item 262, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

**Materials/Parts:**

Cloth (item 52, App F)
Lubricant (item 114, App F)
Sealing compound (item 163, App F)
Wire (item 225, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

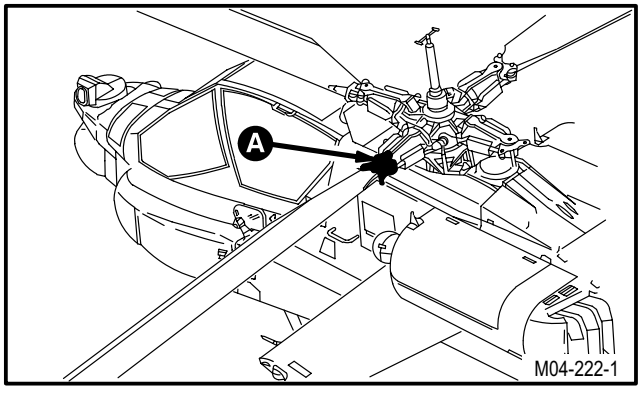
TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**NOTE**

This task is typical for all eight pitch housing to blade electrical leads and bearing retainer to angle bracket electrical leads for either 7-311411215-15 or 7-311411215-19 pitch housing.

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## 5.31. MAIN ROTOR PITCH HOUSING AND BLADE - ELECTRICAL LEAD REMOVAL/INSTALLATION - continued

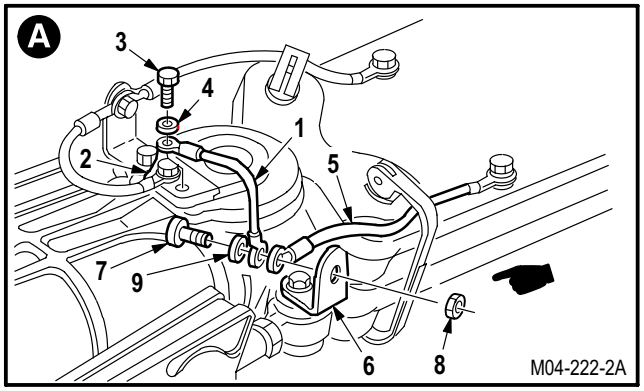
5.31.3. Removal

a. **Remove electrical lead (1) from bearing retainer (2).**

(1) Remove sealing compound from attaching hardware if installed. Use spatula set.

(2) Remove lockwire from bolt (3).

(3) Remove bolt (3), washer (4), and bearing retainer to angle bracket electrical lead (1) from bearing retainer (2).




b. **Disconnect pitch housing to rotor blade electrical lead (5) and lead (1) from angle bracket (6).**

(1) Hold bolt (7). Remove nut (8).

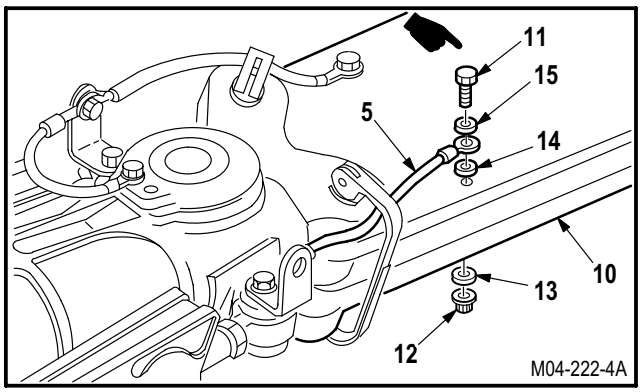
(2) Remove bolt (7), washer (9) and leads (1) and (5).

c. **Remove electrical lead (5) from main rotor blade (10).**

(1) Hold bolt (11). Remove nut (12) and washer (13).

(2) Remove bolt (11), washer (14), lead (5), and washer (15).

(3) Remove lead (5).




5.31.4. Cleaning

a. **Wipe retainer and bracket.** Use cloth (item 52, App F).

5.31.5. Inspection

a. **Check retainer and bracket for cracks.** None allowed.

b. **Check retainer and bracket for corrosion** (para 1.49)**.**

GO TO NEXT PAGE

## 5.31. MAIN ROTOR PITCH HOUSING AND BLADE - ELECTRICAL LEAD REMOVAL/INSTALLATION - continued

5.31.6. Installation

a. **Lubricate bolt (11).** Use lubricant (item 114, App F).

(1) Allow lubricated bolts to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

b. **Install electrical lead (5).** Torque nut (12) to **375 INCH-POUNDS**.

(1) Install bolt (11) through washer (15), lead (5), washer (14), and blade (10).

(2) Install washer (13) and nut (12) on bolt (11).

(3) Hold bolt (11). Torque nut (12) to **375 INCH-POUNDS**. Use torque wrench.

c. **Lubricate bolts (1), (7), and nut (8).** Use lubricant (item 114, App F).

(1) Allow lubricated bolts to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

d. **Install lead (3).** Torque bolt (7) to **75 INCH-POUNDS**.

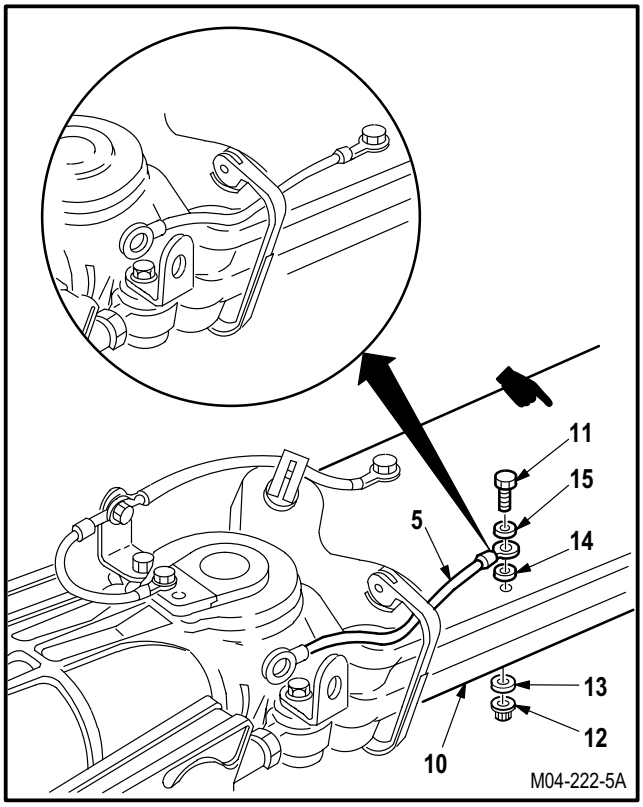
(1) Install lead (3), washer (2), and bolt (1) on retainer (4).

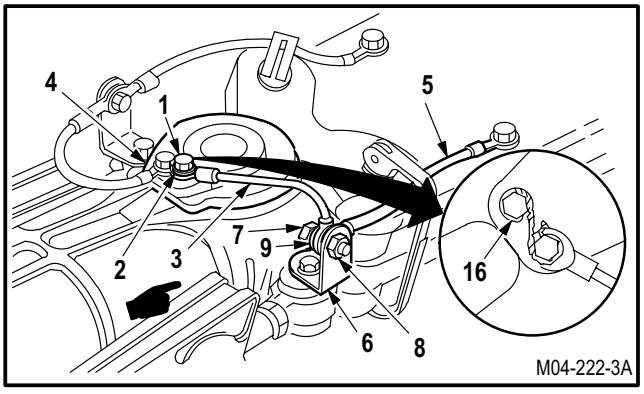
(2) Install bolt (7), washer (9), leads (3), and (5), on bracket (6).

(3) Install nut (8).

(4) Hold bolt (7). Torque nut (8) to **75 INCH-POUNDS**. Use torque wrench.

(5) Torque bolt (1) to **75 INCH-POUNDS**. Use torque wrench.

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**5.31. MAIN ROTOR PITCH HOUSING AND BLADE - ELECTRICAL LEAD REMOVAL/INSTALLATION - continued**

e. **Perform electrical bond check on electrical leads** (TM 55-1500-323-24)**.**

(1) Bond shall be **1.00 OHM** or less. Use multimeter.

f. **Lockwire bolt (1) to adjacent bolt (16).** Use wire (item 225, App F).

g. **Seal electrical lead attaching hardware.** Use sealing compound (item 163, App F)

h. **Inspect (QA).**

END OF TASK

## 5.32. MAIN ROTOR LEAD LAG LINK BEARING RETAINER AND ROTOR HUB BEARING REMOVAL/INSTALLATION

5.32.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.32.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
1/2-inch drive ratchet socket wrench handle (item 172, App H)
Multimeter (item 215, App H)
Adjustable air filtering respirator (item 262, App H)
3-piece spatula set (item 337, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)
Pitch Case Housing Lead Lag Link/Strap Pack Alignment Tool (Figure D-475, App D)
Pitch Case Housing Lead Lag Link/Strap Pack Alignment Tool (Figure D-476, App D)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 55-1500-323-24

**Materials/Parts:**

Self-locking nut (2)
Corrosion preventive compound (item 62A, App F)
Sealing compound (item 175, App F)
Wire (item 225, App F)

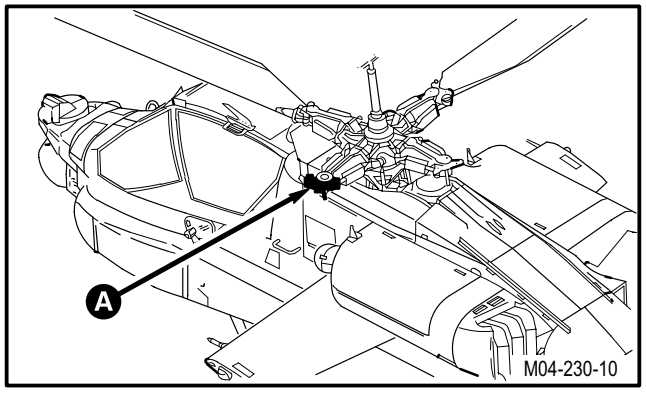
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.3 | Main rotor blade removed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor lead lag link is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.32. MAIN ROTOR LEAD LAG LINK BEARING RETAINER AND ROTOR HUB BEARING REMOVAL/INSTALLATION - continued

**NOTE**

This task is typical for all lead lag link bearing retainers and rotor hub bearings on either 7-311411003-621 or 7-311411003-625 main rotor head.

5.32.3. Removal

a. **Remove two damper rod ends (1) from lead lag link (2).**

(1) Remove sealing compound from attaching hardware. Use spatula set.

(2) Insert pitch case housing alignment tool. Use alignment tool (Figure D-475, App D).

(3) Secure alignment tool in place with two quick release pins (2.1).

(4) Hold bolts (3). Remove nuts (4) and washers (5). Use ratchet and box wrench.

(5) Discard nuts (4).

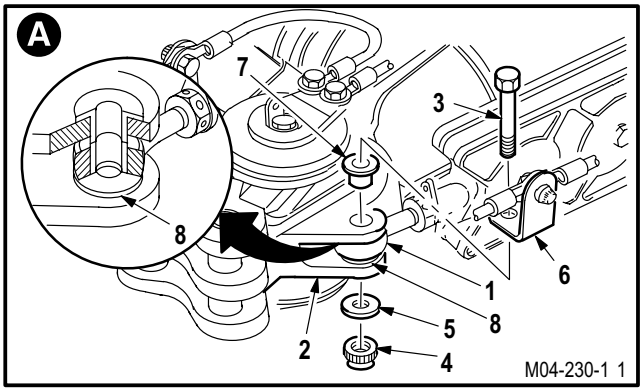
(6) Remove bolts (3), angle brackets (6), sleeve bushings (7), and washers (8).

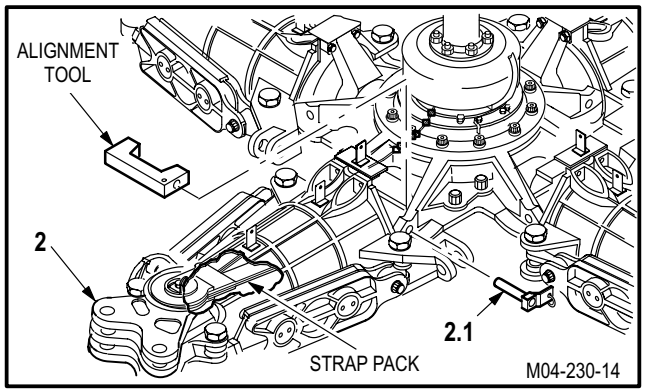
(7) Swing rod ends (1) free from link (2).

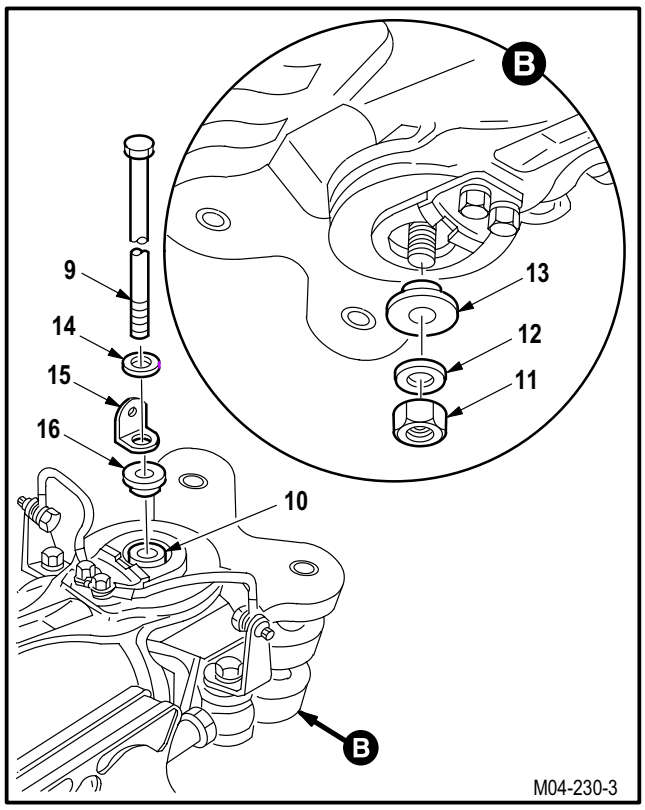
b. **Remove center bolt (9) from lead lag link pin (10).**

(1) Hold bolt (9). Remove nut (11), washer (12), and sleeve bearing (13).

(2) Remove bolt (9), washer (14), bracket (15), and sleeve bearing (16) from pin (10).

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## 5.32. MAIN ROTOR LEAD LAG LINK BEARING RETAINER AND ROTOR HUB BEARING REMOVAL/INSTALLATION - continued

**CAUTION**

To prevent damage to Teflon lining, do not pound or force hub bearings out of lead lag link.

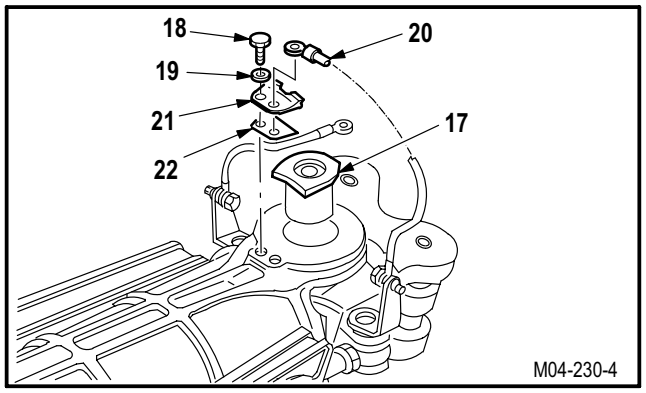
c. **Remove main rotor upper hub bearing (17).**

(1) Remove sealing compound from attaching hardware. Use spatula set.

(2) Remove lockwire from two bolts (18).

(3) Remove two bolts (18), washers (19), and electrical leads (20).

(4) Remove bearing retainer (21), shim (22) (if installed), and bearing (17).



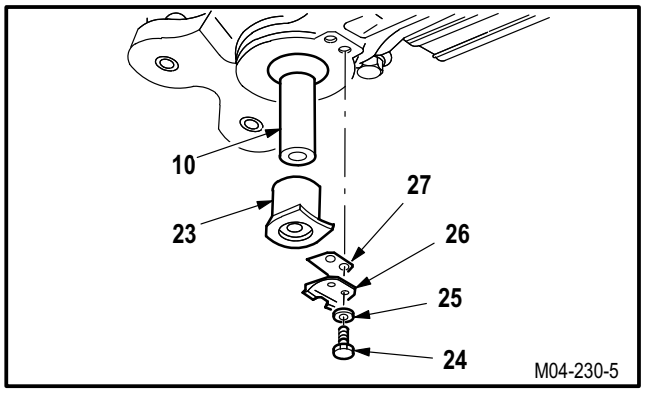

d. **Remove main rotor lower hub bearing (23).**

(1) Remove sealing compound from attaching hardware. Use spatula set.

(2) Remove lockwire from two bolts (24).

(3) Remove two bolts (24) and washers (25).

(4) Remove bearing retainer (26), shim (27) (if installed), bearing (23), and pin (10).




5.32.4. Cleaning

a. **Clean center bolt, link pin, bushings, clip, hub bearings, retainers, and lead lag link, and related hardware** (para 1.47)**.**

5.32.5. Inspection

a. **Check center bolt, link pin, clip, bearings, retainers, lead lag link, and all related hardware for damage and distortion.** None allowed.

(1) Pay particular attention to the condition of the Teflon lining in the lead lag link.

(2) Check Teflon for chips or tears. None allowed.

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## 5.32. MAIN ROTOR LEAD LAG LINK BEARING RETAINER AND ROTOR HUB BEARING REMOVAL/INSTALLATION - continued

b. **Check retainers for burrs, nicks, or scratches.**

(1) Damage not to exceed **0.010 INCH** maximum.

c. **Check link pin for scratches, nicks, gouges, and dents.**

(1) Damage not more than **0.002 INCH** deep may be blended out to a pin diameter not less than **1.496 INCH**.

(2) Replace pin if diameter is less than **1.496 INCH** or if damage is greater than **0.002 INCH** deep.

d. **Check local areas which come in contact with hub bearings.**

(1) Damage not to exceed **0.005 INCH** maximum.

(2) Blend sharp edges.

e. **Check inside diameter of hub bearings.**

(1) Hub bearing ID not to exceed **1.506 INCH**.

f. **Check hub bearings for wear and damage in the following zones.**

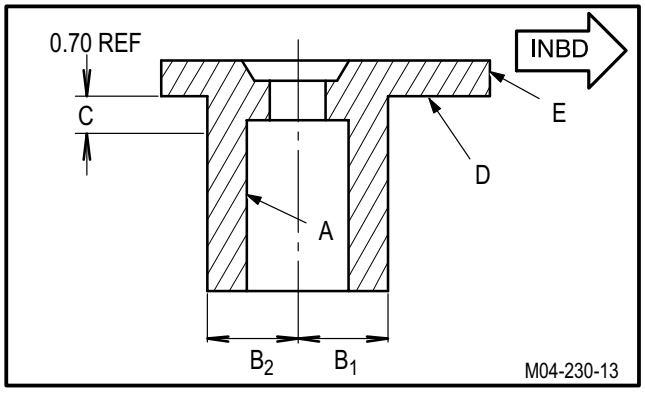
ZONE A. Any crack is cause for rejection.

ZONE B. Worn anodizing, permissible if in ZONE B2. Up to **0.050 x 0.50 INCH** ZONE B1. Any crack is cause for rejection.

ZONE C. Scoring and galling permissible to a depth of **0.005 INCH** maximum.

ZONE D. Corrosion, scoring, and galling permissible up to **0.010 INCH** maximum.

ZONE E. Fretting and galling permissible up to a depth of **0.010 INCH** maximum.

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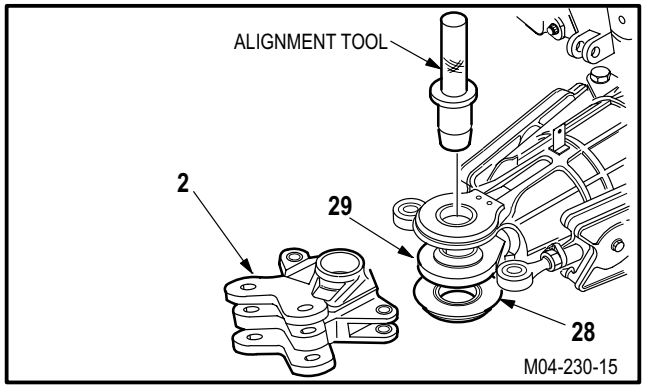
## 5.32. MAIN ROTOR LEAD LAG LINK BEARING RETAINER AND ROTOR HUB BEARING REMOVAL/INSTALLATION - continued

5.32.6. Installation

a. **Lubricate threads of all removed bolts, nut, and new nuts with lubricant (item 114, App F).**

**Lubricate pin, ID's of bearings, and mating surfaces of retainers and bearings.**

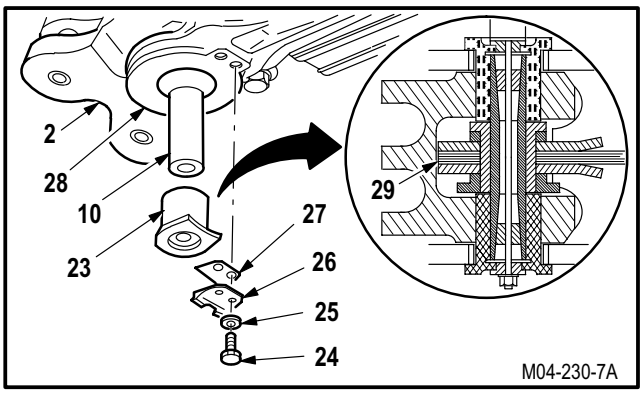
(1) Allow lubricated hardware to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).




b. **Align link (2) with housing (28).**

(1) Lift and move pitch housing (28) as needed to aline strap pack (29) and link (2) with pitch housing bearing bore.

(2) Install alignment tool. Use alignment tool (Figure D-476, App D).




**CAUTION**

- Failure to assure proper alinement prior to installation of link pin and hub bearing can result in damage to the Teflon liners of the lead lag link and/or pitch housing.
- To prevent damage to Teflon lining, do not pound or force hub bearings into lead lag link.

c Install pin (10) and bearing (23).

(1) Install pin (10) and bearing (23) in housing (28).

(2) Remove alignment tool.

d. **Install retainer (26) and shim (27) (if required) on housing (28).** Torque two bolts (24) to **75 INCH POUNDS**.

(1) Aline holes and install two bolts (24) through washers (25), retainers (26), shims (27) (if necessary), and housing (28).

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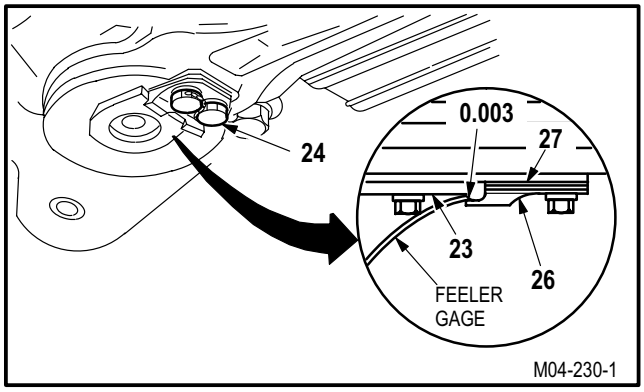
## 5.32. MAIN ROTOR LEAD LAG LINK BEARING RETAINER AND ROTOR HUB BEARING REMOVAL/INSTALLATION - continued

(2) Push retainer (26) against bearing (23) before torquing.

(3) Torque two bolts (24) to **75 INCH POUNDS**. Use torque wrench.

e. **Check gap between retainer (26) and bearing (23).**

(1) Gap required is **0.003 INCH** minimum. If gap is not **0.003 INCH** minimum, remove retainer (26) and add shim (27) [as required, step d.(1)].




f. **Lockwire two bolts (24) together.** Use wire (item 225, App F).

g. **Apply sealing compound to bolt (24) heads.** Use sealing compound (item 175, App F) and spatula set.

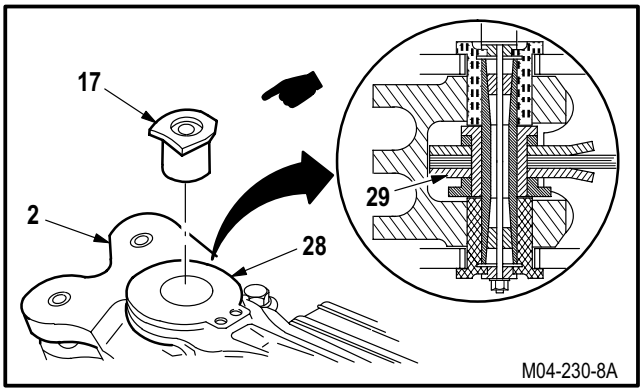
**CAUTION**

- Failure to assure proper alinement prior to installation of link pin and hub bearing can result in damage to the Teflon liners of the lead lag link and/or pitch housing.
- To prevent damage to Teflon lining, do not pound or force hub bearings into lead lag link.

h. **Install bearing (17).**

(1) Lift and move housing (28) as needed to aline strap pack (29) and link (2) with pitch housing bearing bore.

(2) Install bearing (17).

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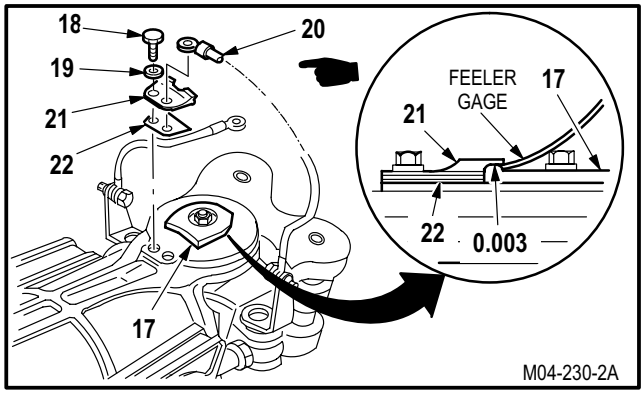
## 5.32. MAIN ROTOR LEAD LAG LINK BEARING RETAINER AND ROTOR HUB BEARING REMOVAL/INSTALLATION - continued

i. **Install retainer (21) and shim (22) (if required) on housing (28) with holes alined.** Torque two bolts (18) to **75 INCH-POUNDS**.

(1) Install two bolts (18) through washers (19), leads (20), retainer (21), shims (22) (if necessary), and housing (28).

(2) Push retainer (21) against bearing (17) before torquing.

(3) Torque two bolts (18) to **75 INCH-POUNDS**. Use torque wrench.




j. **Check for 0.003 INCH minimum gap between retainer (21) and bearing (17).**

(1) If gap is not **0.003 INCH** minimum, remove retainer (21) and add shim (22) [as required, step i.(1)].

k. **Perform electrical bond check on connection of bonding lead (20), bolt (18), and retainer (21)** (TM 55-1500-323-24)**.**

(1) Bond shall be **1.00 OHM** or less. Use multimeter.

l. **Lockwire two bolts (18) together.** Use wire (item 225, App F).

m. **Apply sealing compound to bolt (18) heads.** Use sealing compound (item 175, App F) and spatula set.

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## 5.32. MAIN ROTOR LEAD LAG LINK BEARING RETAINER AND ROTOR HUB BEARING REMOVAL/INSTALLATION - continued

n. **Install bolt (9) through bracket (15) and in pin (10).** Torque nut (11) to **35 INCH-POUNDS**.

(1) Install centering bolt (9) through washer (14), bracket (15), bearing (16), and pin (10).

(2) Hold bolt (9). Install bearing (13), washer (12), and nut (11).

(3) Hold bolt (9). Torque nut (11) to **35 INCH-POUNDS**. Use torque wrench.

**CAUTION**

To prevent under torquing of bolt, do not allow corrosion preventive compound on threads of bolt.

o. **Coat shank and head of bolt (3) with corrosion preventive compound.** Use corrosion preventive compound (item 62A, App F)

p. **Install rod ends (1) in link (2).** Torque two nuts (4) to **675 INCH-POUNDS**.

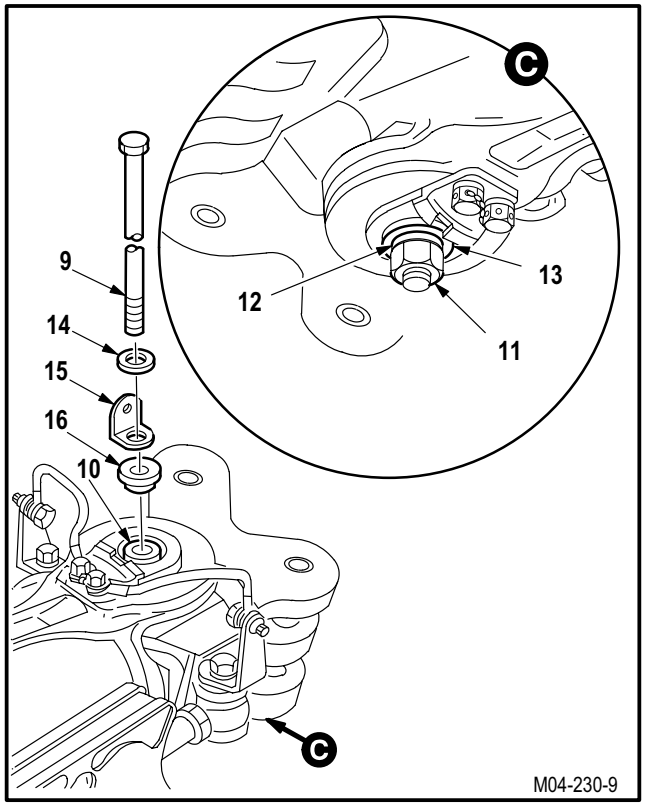
(1) Apply compound to outside diameter of bushings (7) and install in link (2) while compound is still wet. Use corrosion preventive compound (item 62A, App F).

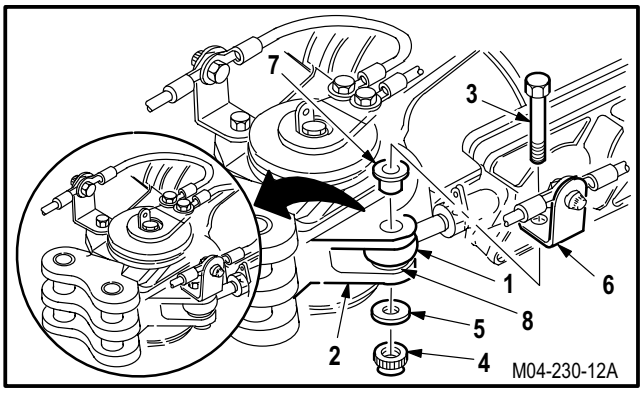
(2) Install bolts (3) through brackets (6), bushings (7), rod ends (1), washers (8), and bottom flange of link (2).

(3) Install washers (5) and nuts (4) on bolts (3).

(4) Hold bolts (3). Torque nuts (4) to **675 INCH-POUNDS**. Use torque wrench and box wrench.

q. **Inspect (QA).**

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## 5.32. MAIN ROTOR LEAD LAG LINK BEARING RETAINER AND ROTOR HUB BEARING REMOVAL/INSTALLATION - continued

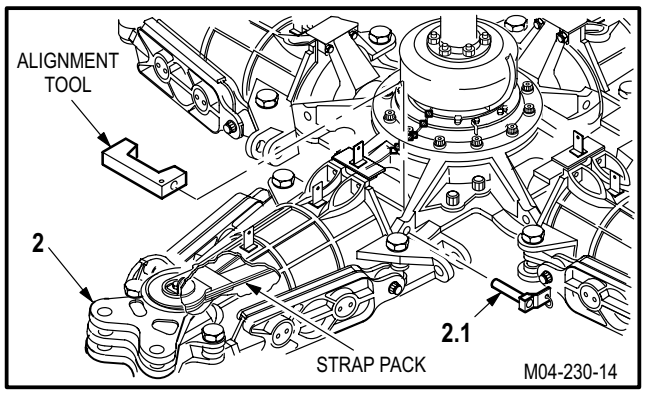
r. **Apply sealing compound to joints around head of bolt (3), bushing (7), washer (5), nut (4), and exposed threads of bolt (3).** Use sealing compound (item 175, App F) and spatula set.

s. **Remove alignment tool from pitch housing bearing bore.**

(1) Remove two quick release pins (2.1) from alignment tool.

(2) Remove alignment tool.

t. **Install main rotor blade** (para 5.4)**.**




END OF TASK

## 5.33. MAIN ROTOR BLADE LEAD LAG LINK REMOVAL/INSTALLATION

5.33.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.33.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
0.300 - 24/0 - 24-inch inside/outside vernier caliper (item 54, App H)
Pitch Case Housing Lead Lag Link/Strap Pack Alignment Tool (Figure D-475, App D)
Pitch Case Housing Lead Lag Link/Strap Pack Alignment Tool (Figure D-476, App D)

**Materials/Parts:**

Cloth (item 52, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

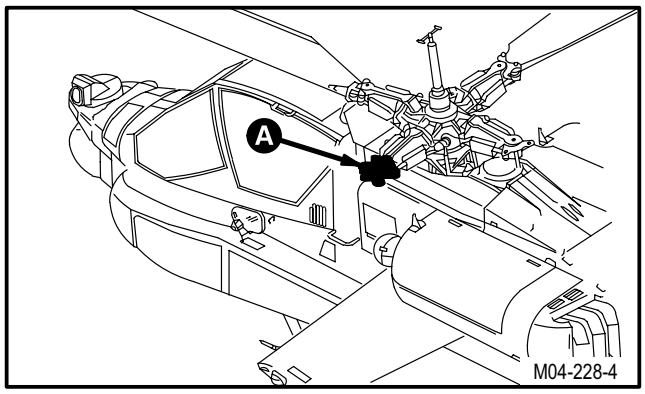
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.23 | Main rotor damper disconnected from lead lag link |
| 5.32 | Main rotor lead lag link bearing retainer and hub bearing removed |

**WARNING**

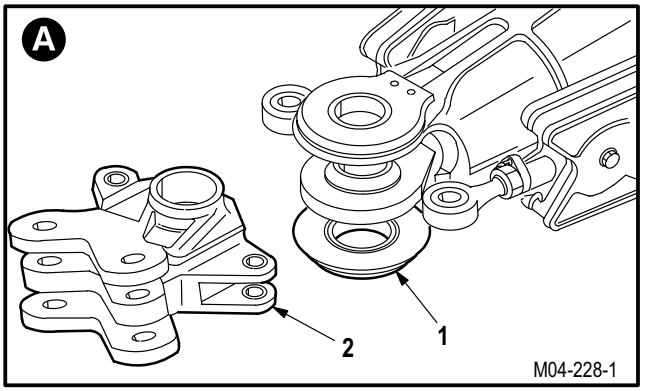
**FLIGHT SAFETY PART**

**The main rotor lead lag link is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




5.33.3. Removal

a. **Support pitch housing (1) and pull lead lag link (2) from housing (1).**




5.33.4. Cleaning

a. **Wipe pitch housing, exposed strap pack, and lead lag link.** Use cloth (item 52, App F).

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## 5.33. MAIN ROTOR BLADE LEAD LAG LINK REMOVAL/INSTALLATION - continued

5.33.5. Inspection

a. **Check pitch housing and exposed strap pack for wear and damage** (para 5.1)**.**

b. **Check lead lag link (2).**

(1) Check ID of blade attach lug bushings (3) (6 places). ID not to exceed **1.066 INCH**. Use caliper.

(2) Check ID of lower damper attach lug flanged bushings (4) (2 places). ID not to exceed **0.7557 INCH**. Use caliper.

(3) Check flange thickness of lower damper attach lug flanged bushings (4) (2 places). Thickness shall not be less than **0.050 INCH**. Use caliper set.

(4) Check ID of upper damper attach lug flanged bushings (5) (2 places). ID not to exceed **0.9572 INCH**. Use caliper.

(5) Check thickness of upper and lower blade attach flanges (6) (4 places). Thickness shall not be less than **0.790 INCH**. Use caliper set.

(6) Check thickness of center blade attach flanges (7) (2 places). Thickness shall not be less than **0.690 INCH**. Use caliper set.

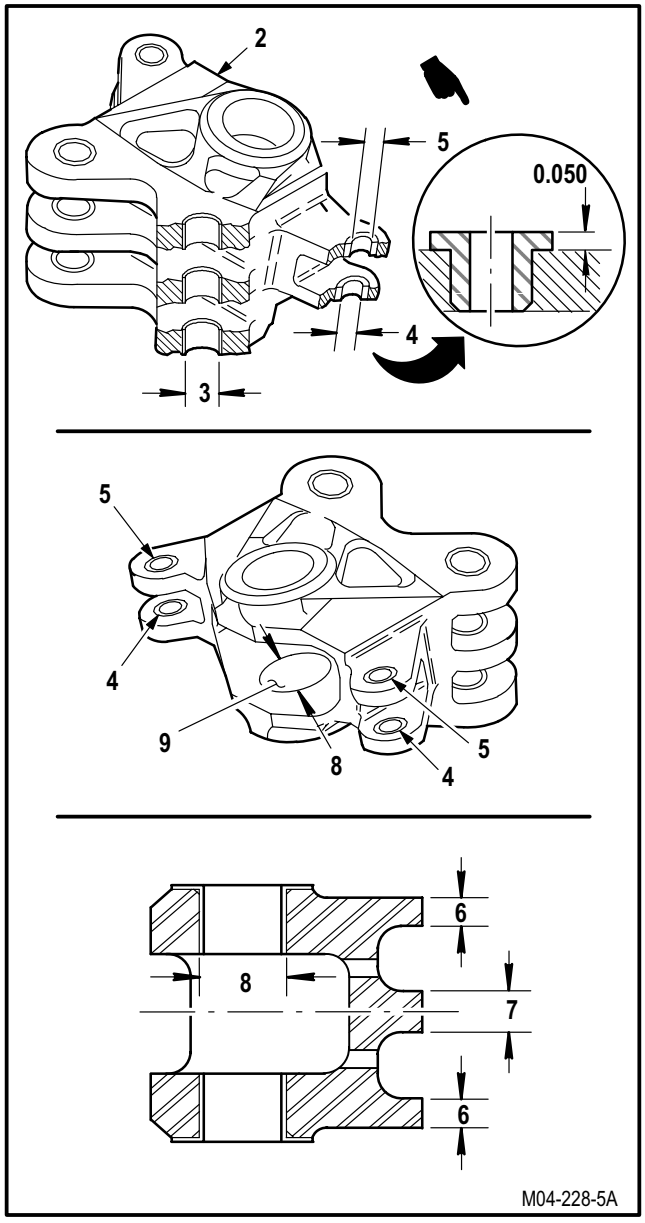
**NOTE**

If center pivot Teflon liners are installed, perform steps (7) thru (9). If center pivot sleeve bearings are installed, perform steps (10) thru (12).

(7) Check ID of upper and lower holes (8). ID not to exceed **2.536 INCH**. Use caliper.

(8) Check Teflon liners (9) for evidence of liner to-metal penetration at any point. None allowed.

(9) Check Teflon liners (9) for evidence of debonding. None allowed.

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**5.33. MAIN ROTOR BLADE LEAD LAG LINK REMOVAL/INSTALLATION - continued**

(10) Check ID (10) of upper and lower sleeve bearings (11) (2 places). ID not to exceed **2.503 INCH**. Use caliper. Replace bearings (para 5.33A).

(11) Check sleeve bearings (11) for evidence of bearing-to-metal penetration at any point. None allowed. Replace bearings (para 5.33A).

(12) Check distance (12) between upper and lower sleeve bearing (11). Dimension not to exceed **5.560 INCH**. Use caliper set. Replace bearings (para 5.33A).

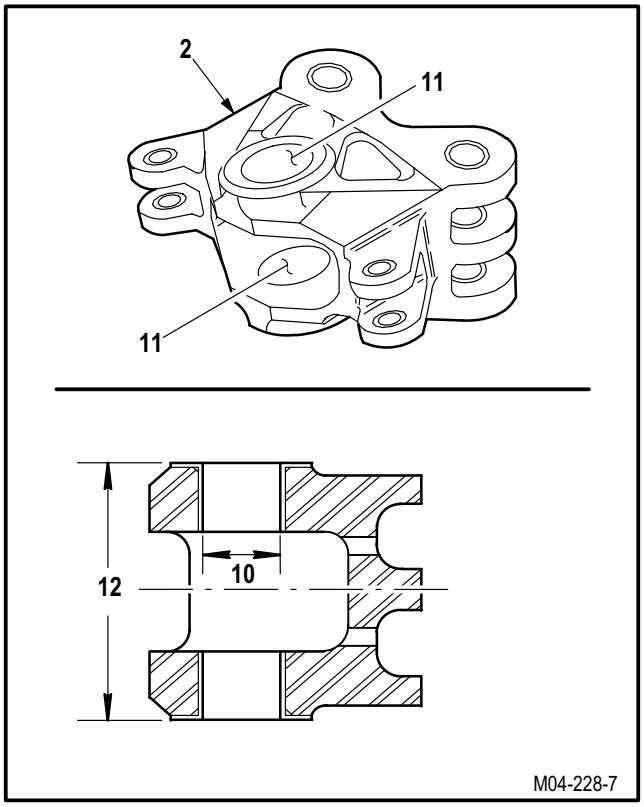
(13) Check sleeve bearings (11) for looseness. None allowed. Replace bearings (para 5.33A).

c. **Check link for cracks.** None allowed.

d. **Check link for corrosion** (para 1.49)**.**

e. **Check link (2) for nicks, gouges, and scratches.**

(1) Depth up to **0.005 INCH** must be blended (blend ratio 10:1).




5.33.6. Installation

a. **Install link (2) on housing (1).**

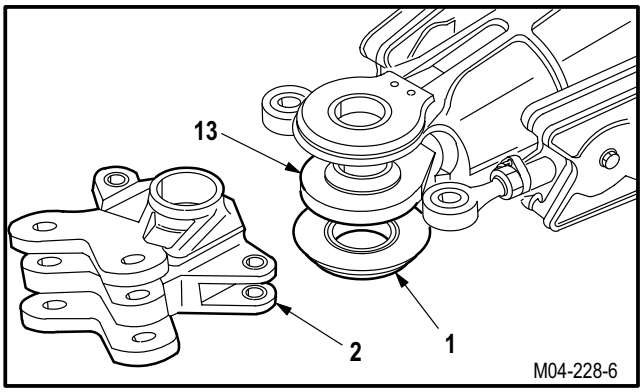
(1) Support housing (1).

(2) Case Housing/Lead Lag Link and strap pack alignment tool (Fig D-475, App D). Aline link (2) with strap pack (13) and housing (1).

b. **Install main rotor lead lag link bearing retainer and bearing** (para 5.32)**.**

c. **Install main rotor damper** (para 5.23)**.**

d. **Inspect (QA).**




END OF TASK

## 5.33A. MAIN ROTOR BLADE LEAD LAG LINK PIVOT LOW FRICTION SLEEVE BEARINGS REPLACEMENT (AVIM)

5.33A.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.33A.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.300 - 24/0 - 24-inch inside/outside vernier caliper (item 54, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Adjustable air filtering respirator (item 262, App H)

**Materials/Parts:**

Cloth (item 52, App F)
Sealing compound (item 157, App F)

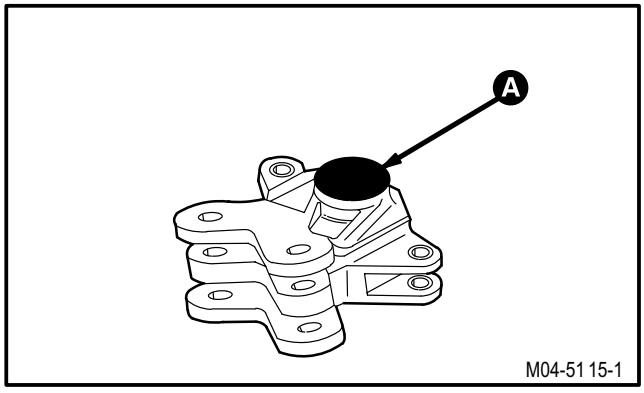
**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor lead lag link is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.33A. MAIN ROTOR BLADE LEAD LAG LINK PIVOT LOW FRICTION SLEEVE BEARINGS REPLACEMENT (AVIM) - continued

5.33A.3. Removal

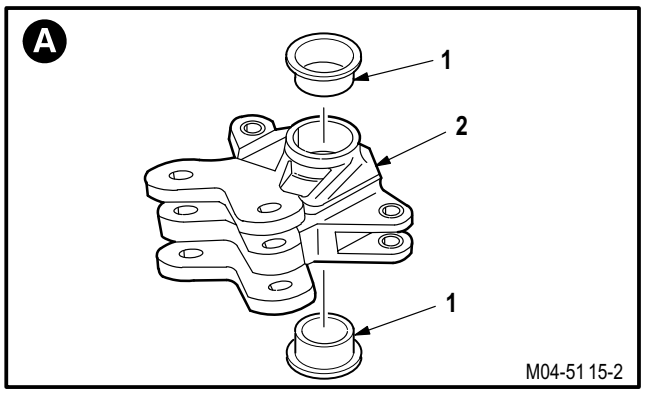
**WARNING**

**Do not use heat guns or ovens near flammables. Fatal explosions may result. Handling hot items presents a serious burn potential. Post warning signs in work area to alert people to high temperature items. If burns occur seek medical aid.**

a. **Remove two main rotor lead lag link pivot low friction sleeve bearings (1) from main rotor blade lead lag link (2).**

(1) Heat lead lag link (2) at **230 to 270 °F (110 to 132 °C)** for one hour minimum.

(2) Remove two bearings (1).




5.33A.4. Cleaning

a. **Clean sealing compound** (para 1.47)**.**

b. **Wipe lead lag link and bearing mounting surfaces.** Use cloth (item 52, App F).

5.33A.5. Inspection

a. **Check ID of upper and lower sleeve bearing mounting holes.** ID not to exceed **2.6893 INCH**. Use caliper.

GO TO NEXT PAGE

## 5.33A. MAIN ROTOR BLADE LEAD LAG LINK PIVOT LOW FRICTION SLEEVE BEARINGS REPLACEMENT (AVIM) - continued

5.33A.5. Installation

**WARNING**

**Do not use heat guns or ovens near flammables. Fatal explosions may result. Handling hot items presents a serious burn potential. Post warning signs in work area to alert people to high temperature items. If burns occur seek medical aid.**

a. **Install two new bearings (1) in lead lag link (2).**

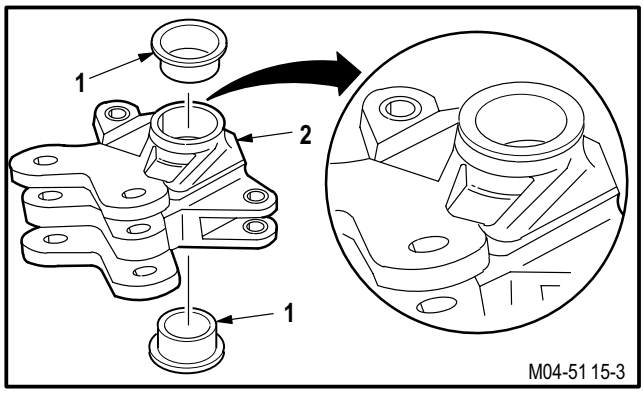
(1) Heat lead lag link (2) at **230 to 270 °F (110 to 132 °C)** for one hour minimum.

(2) After required soak time, apply sealant to two new bearings (1). Use sealing compound (item 157, App F).

(3) Insert two new bearings (1) in lead lag link (2) until bearing flange seats against lead lag link.

(4) Allow lead lag link (2) to return to ambient temperature.

(5) Apply finger pressure to verify bearings (1) do not move.




b. **Inspect (QA).**

END OF TASK

## 5.33B. MAIN ROTOR BLADE LEAD LAG LINK SLEEVE BUSHINGS REPLACEMENT (AVIM)

5.33B.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.33B.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.300 - 24/0 - 24-inch inside/outside vernier caliper (item 54, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 6, App F)
Cloth (item 52, App F)

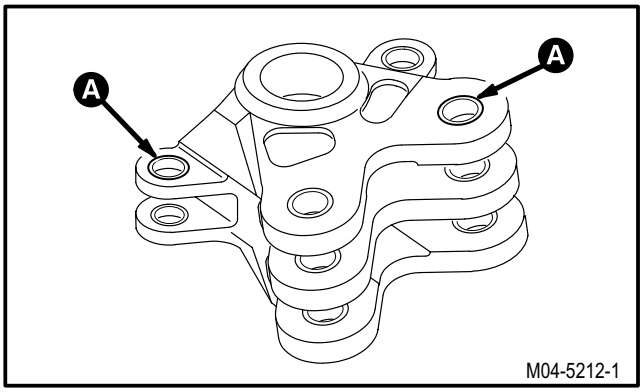
**References:**

TM 1-1520-264-23
TM 55-1500-322-24

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor lead lag link is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.33B. MAIN ROTOR BLADE LEAD LAG LINK SLEEVE BUSHINGS REPLACEMENT (AVIM) - continued

5.33B.3. Removal

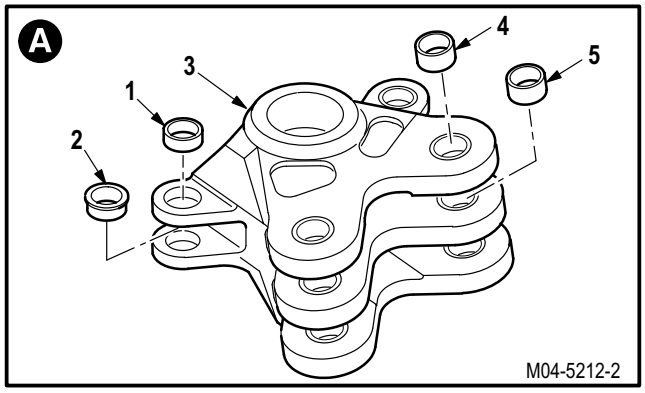
**WARNING**

**Do not use heat guns or ovens near flammables. Fatal explosions may result. Handling hot items presents a serious burn potential. Post warning signs in work area to alert people to high temperature items. If burns occur, seek medical aid.**

a. **Remove main rotor lead lag link sleeve bushings (1), (2), (3), and/or (4) (as required) from main rotor blade lead lag link (5)** (TM 55-1500-322-24)**.**

(1) Heat lead lag link (5) at **325 to 355 °F (163 to 179 °C)** for one hour minimum.

(2) Remove lead lag link sleeve bushings (1), (2), (3), and/or (4) from lead lag link (5).




5.33B.4. Cleaning

a. **Clean sealing compound** (para 1.47)**.**

b. **Wipe lead lag link and bushing mounting surfaces.** Use cloth (item 52, App F).

5.33B.5. Inspection

a. **Check lead lag link for corrosion damage** (para 1.49)**.**

b. **Check lead lag link for cracks.**

(1) If cracks are suspected, perform nondestructive inspection (TM 1-1520-264-23).

c. **Check lead lag link bushing bores for elongation.** None allowed.

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## 5.33B. MAIN ROTOR BLADE LEAD LAG LINK SLEEVE BUSHINGS REPLACEMENT (AVIM) - continued

5.33B.6. Installation

**WARNING**

**Do not use heat guns or ovens near flammables. Fatal explosions may result. Handling hot items presents a serious burn potential. Post warning signs in work area to alert people to high temperature items. If burns occur, seek medical aid.**

a. **Install new bushings (1), (2), (3), and/or (4) in lead lag link (5) (as required)** (TM 55-1500-322-24)**.**

(1) Heat lead lag link (5) at **325 to 355 °F (163 to 179 °C)** for one hour minimum.

(2) After required soak time, apply sealant to new bushings (1), (2), (3), and/or (4). Use adhesive (item 6, App F).

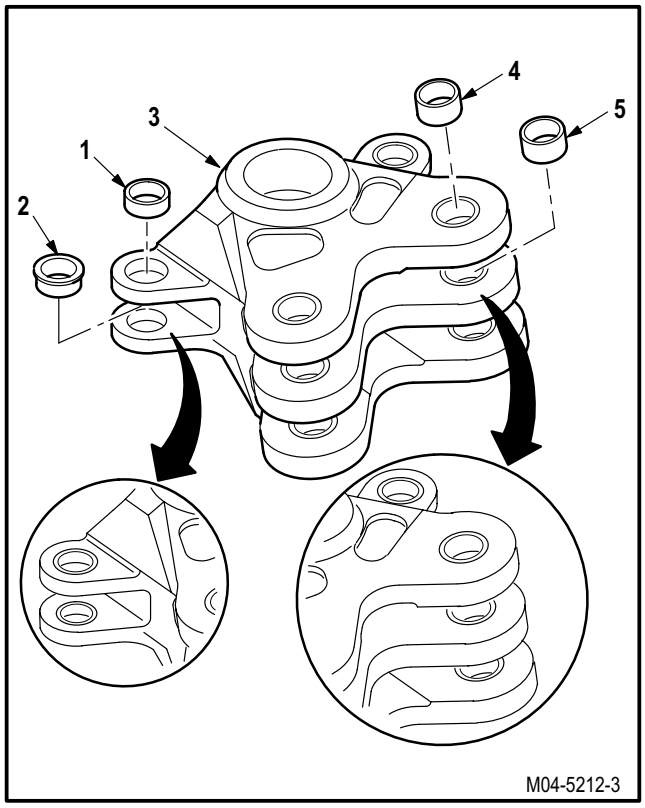
(3) Insert new bushings (1), (2), (3), and/or (4) in lead lag link (5).

(4) Ensure bushing (2) flange seats against lead lag link.

(5) Allow lead lag link (2) to return to ambient temperature.

(6) Apply finger pressure to verify bushings (1), (2), (3), and/or (4) do not move.

b. **Inspect (QA).**




END OF TASK

## 5.34. MAIN ROTOR PITCH HOUSING IDENTIFICATION PLATE REPLACEMENT

5.34.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.34.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 3, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Methyl ethyl ketone (item 124, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

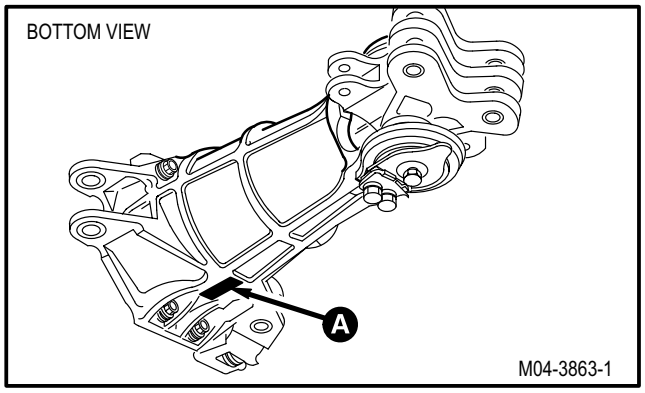
**WARNING**

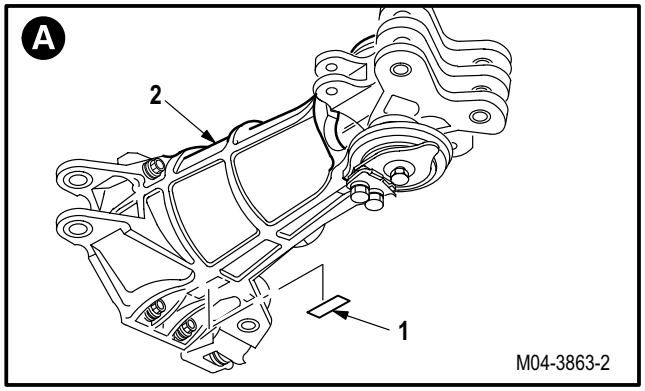
**FLIGHT SAFETY PART**

**The main rotor pitch housing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for either the 7-311411215-15 or 7-311411215-19 pitch housing.




5.34.3. Removal

a. **Record all data on identification plate (1).**

b. **Remove plate (1) from main rotor pitch housing (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from housing (2).

(3) Discard plate (1).

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## 5.34. MAIN ROTOR PITCH HOUSING IDENTIFICATION PLATE REPLACEMENT - continued

5.34.4. Cleaning

a. **Clean mounting area of plate.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

5.34.5. Inspection

a. **Inspect pitch housing** (para 5.1)**.**

b. **Check pitch housing for corrosion** (para 1.49)**.**

5.34.6. Installation

a. **Transcribe recorded data on new identification plate (1).** Use die set.

b. **Install plate (1) on housing (2).**

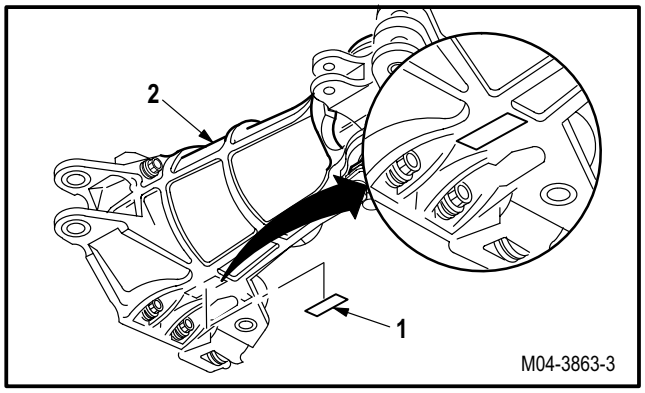
(1) Lightly abrade housing (2) in same location as old plate (1). Use cloth (item 48, App F).

(2) Apply adhesive to plate (1). Use brush (item 34, App F) and adhesive (item 3, App F).

(3) Install plate (1) on housing (2) in same location as old plate.

(4) Place a bead of adhesive around edge of plate (1). Use adhesive (item 3, App F).

c. **Inspect (QA).**




END OF TASK

## 5.34A. MAIN ROTOR STRAP PACK BORESCOPE INSPECTION

5.34A.1. Description

This task covers: Inspection Setup. Cleaning.

5.34A.2. Initial Setup

**Tools:**

Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Strap pack inspection kit (item 345A, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Alcohol (item 25, App F)
Dishwashing compound (item 72, App F)
Distilled water (item 73, App F)
Tape (item 208, App F)
Tubing (item 213A, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor strap pack is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

- This inspection is to aid in visual inspection of the strap pack laminates on the AH-64A helicopters. This inspection application is intended to be performed while the strap packs are retained in the pitch housings on the aircraft.
- This inspection is for both 7-311411146-7 and 7-511411146-3 strap packs. The full length of the outer edges of strap pack 7-311411146-7 may be inspected with the borescope, rather than only the outboard **8 INCHES** and inboard **6 INCHES** shown for strap pack 7-511411146-3.

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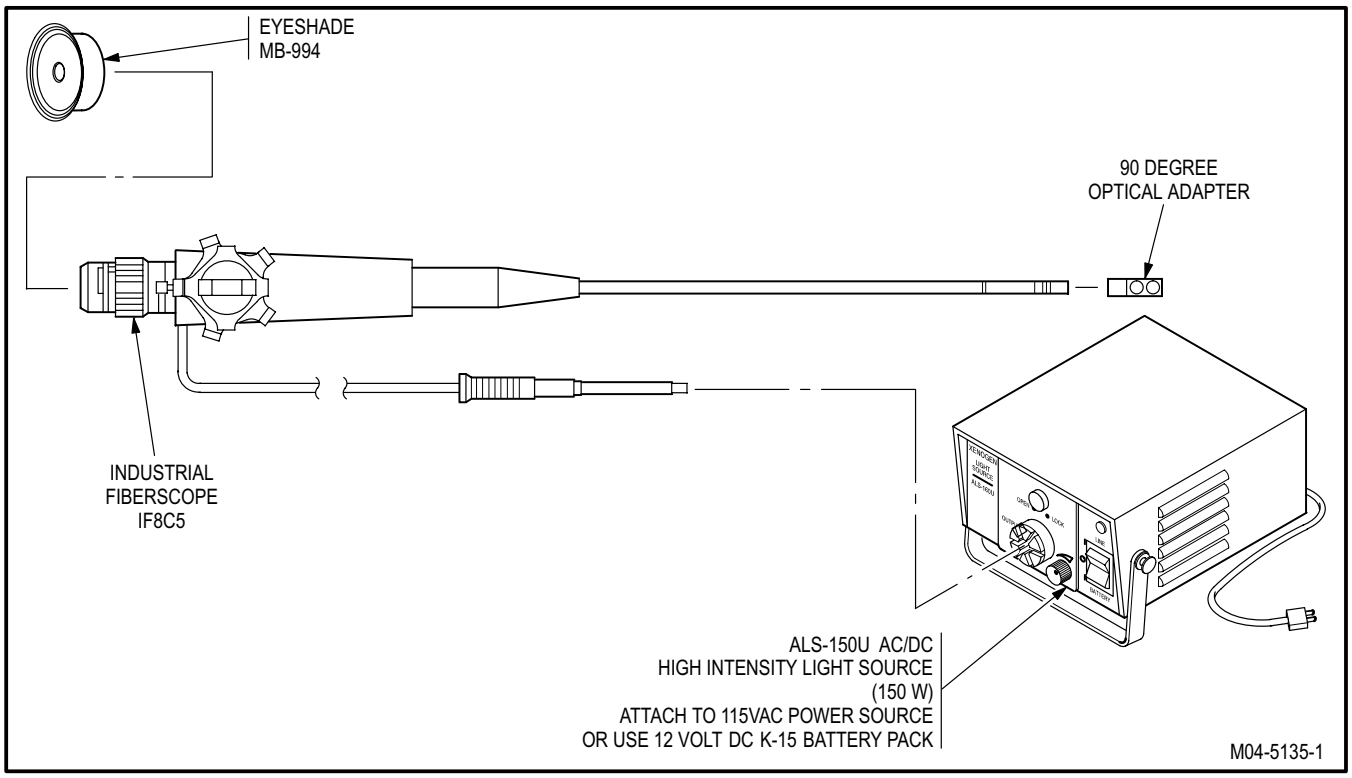
## 5.34A. MAIN ROTOR STRAP PACK BORESCOPE INSPECTION - continued




5.34A.3. Inspection Setup

a. **Procedure for use of borescope.** Use inspection kit.

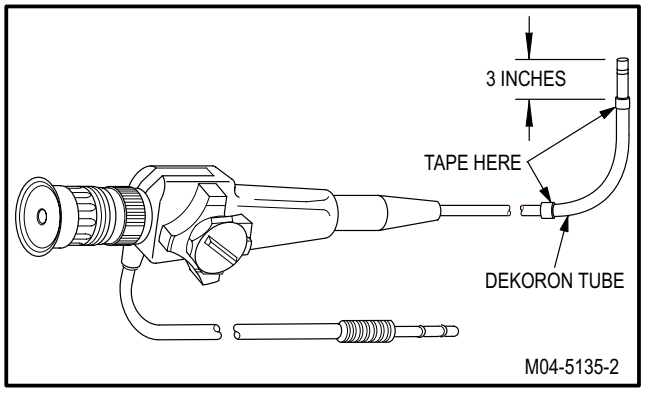
(1) Assemble borescope equipment per manufacturers instructions with 90 degree optical adapter.

(2) Cut a piece of Dekoron tube approximately **15 INCHES** long or as required. Use tubing (item 213A, App F).

**NOTE**

Ensure that articulation tip articulates fully without restriction.

(3) Insert flexible borescope tube through Dekoron flexible guide tube until articulation end protrudes approximately **3 INCHES** outside flex tube to ensure articulation.

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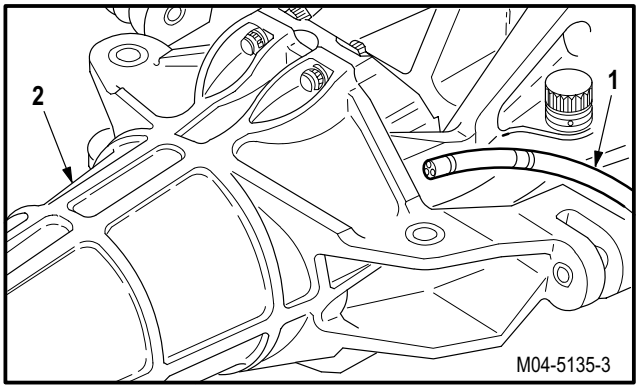
## 5.34A. MAIN ROTOR STRAP PACK BORESCOPE INSPECTION - continued

(4) Secure flexible borescope tube to Dekoron guide tube at transition band with tape. Use tape (item 208, App F).

(5) Position equipment on top of helicopter.

(6) Insert tube (1) into pitch housing (2) from inboard end straightening guide tube as it is inserted.

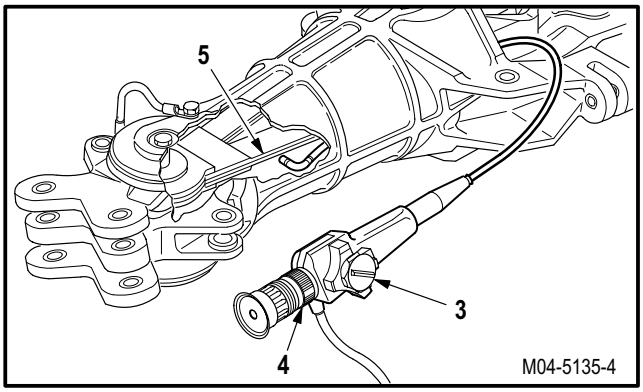



**NOTE**

The full length of the outer edges of strap pack 7-311411146-7 may be inspected with the borescope rather than only the outboard **8 INCHES** and inboard **6 INCHES** shown for strap pack 7-511411146-3.

(7) Using borescope articulation control (3), position tip so lens is viewing outer edge of leading leg a minimum of **1/2 INCH** outboard of centerline of outboard bolt hole and lock articulation in place.

(8) Adjust focus control (4) until a clear image of strap pack (5) edge is obtained.




(9) Carefully view along leading edge of strap pack (5) by moving guide tube inboard until a viewing point is reached approximately **3 INCHES** inboard of apex of strap pack. Some adjustment in articulation angle may be required.

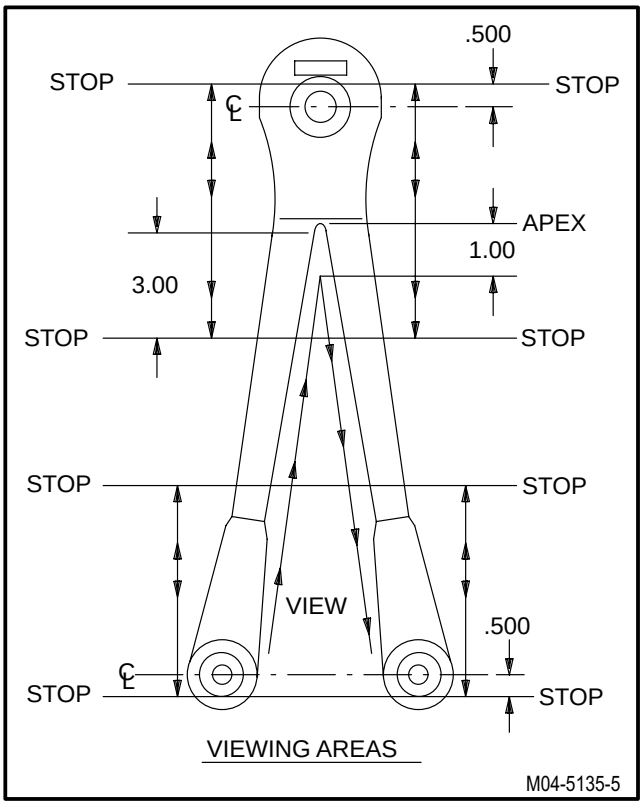
(10) Using a 10 power magnifying glass in conjunction with an adequate light source, inspect outer edge of strap pack from approximately **1/2 INCH** outboard of inboard bolt centerline to approximately **6 INCHES** from inboard bolt.

(11) Inspect strap pack (5) in accordance with special inspection No. 27, paragraph 1.137.

(12) Note any cracked/broken laminates.

(13) Move tube (1) to outer edge of lag leg of strap and repeat steps (7) through (12).

(14) Move borescope tube to inner edges of strap pack. View both inner edges of strap pack from **1 INCH** below apex of strap pack to approximately **1/2 INCH** outboard of inboard bolt centerline.

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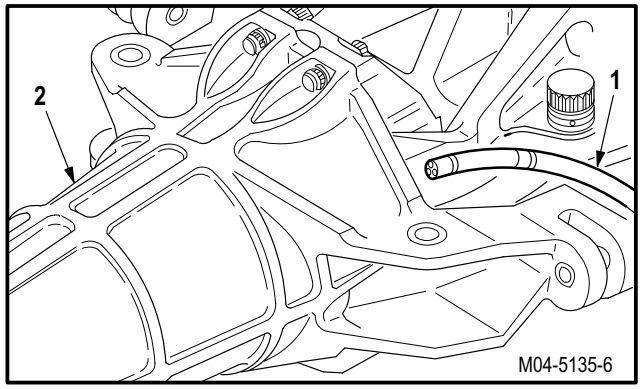
## 5.34A. MAIN ROTOR STRAP PACK BORESCOPE INSPECTION

(15) Remove tube (1) from pitch housing (2).

(16) Repeat steps (6) through (15) on other three main rotor head strap packs.

(17) Remove Dekoron guide tube from flexible borescope tube.




5.34A.4. Cleaning

a. **Clean borescope lens.** Use alcohol (item 25, App F) and cotton swabs.

b. **Clean flexible borescope tube.** Use dishwashing compound (item 72, App F) and distilled water (item 73, App F).

END OF TASK

## 5.35. MAIN ROTOR STRAP PACK REPLACEMENT

5.35.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.35.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
3/4 x 1/2-inch drive socket wrench adapter (item 5, App H)
Light duty laboratory apron (item 27, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
Chemical protective gloves (item 154, App H)
3/4-inch drive hinged socket wrench handle (item 173, App H) (2)
Rigging pin set (item 224, App H) (p/o item 390, App H)
Adjustable air filtering respirator (item 262, App H)
1 1/8 x 3/4-inch drive deep socket wrench socket (item 295, App H)
1 1/4 x 3/4-inch drive socket wrench socket (item 309, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)

**Materials/Parts:**

Nut (8)
PLI washer (8)
Cloth (item 52, App F)
Lubricant (item 114, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 2.2 | Access doors T250L, T250R, T290L, T290R, and L325 opened |
| 5.3 | Main rotor blades removed |
| 1.72 | External hydraulic power applied |
| 1.97 | Maintenance crane installed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor strap pack is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

- This task is typical for either the 7-311411146-7 or 7-511411146-3 strap pack.
- Strap packs must be installed in sets of four. Do not intermix 7-311411146-7 and 7-511411146-3 strap packs.

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## 5.35. MAIN ROTOR STRAP PACK REPLACEMENT - continued

5.35.3. Removal

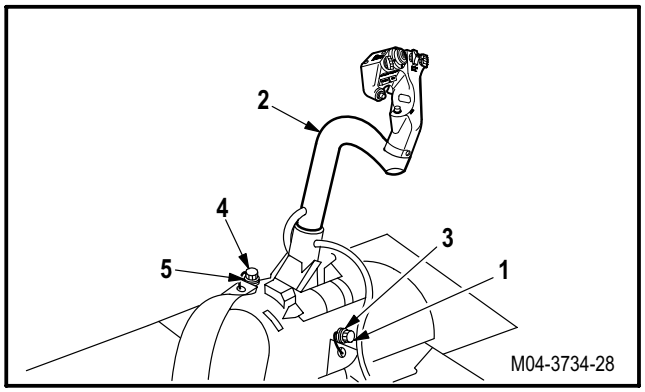
a. **Enter pilot station** (para 1.56)**. Observe all safety precautions.**

b. **Install -5 rig pin (1) in pilot cyclic stick (2) lateral rig pin hole (3).** Use rigging pin set.

c. **Install -9 rig pin (4) in pilot cyclic stick (2) longitudinal rig pin hole (5).** Use rigging pin set.

d. **Disconnect primary hydraulic external power** (para 1.72)**.**

e. **Disconnect main rotor blade pitch links** (para 11.14)**.**




**CAUTION**

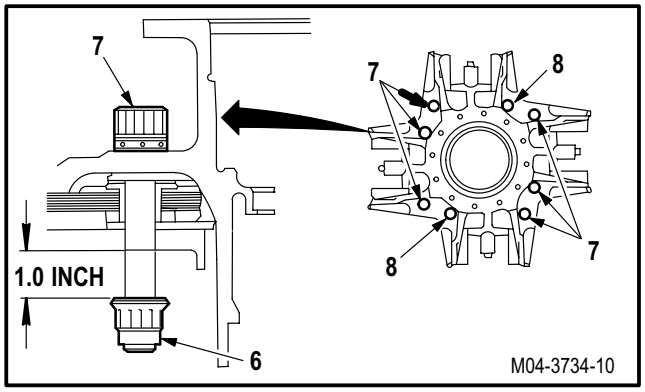
Loosen nuts only. Do not allow bolts to turn in main rotor hub. Damage to main rotor hub and lower shoe will result.

**NOTE**

Back off six nuts far enough that lower shoe can drop **1 INCH**.

f. **Loosen six nuts (6) on bolts (7).**

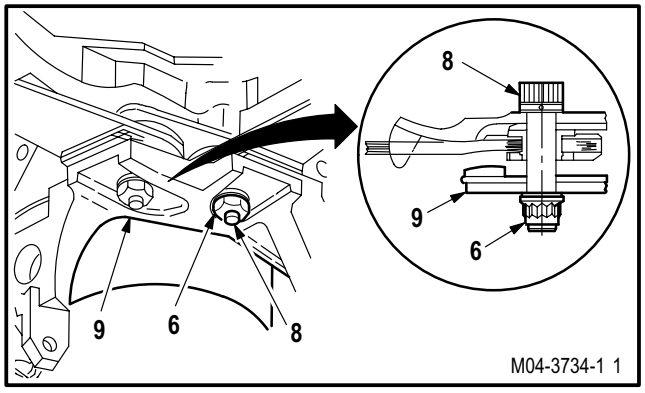
(1) Leave two nuts (6) tight on bolts (8).




g. **Loosen remaining two nuts (6) on bolts (8).**

(1) Back off nuts (6) one half turn at a time until lower shoe (9) has dropped **1 INCH**. Use hinged handle, two sockets, and box wrench.

h. **Remove main rotor pitch housing** (para 5.25)**.**

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## 5.35. MAIN ROTOR STRAP PACK REPLACEMENT - continued

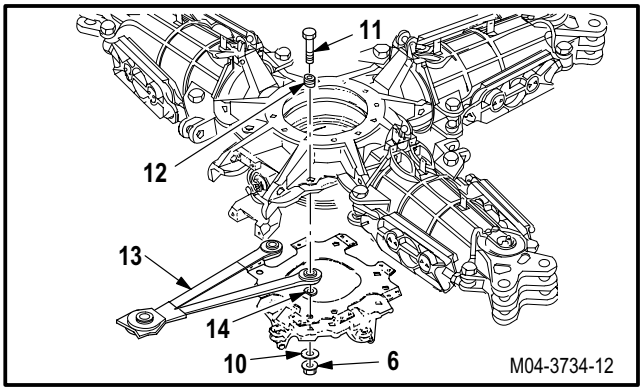
**CAUTION**

Do not remove more than two bolts from the main rotor hub at one time.

i. **Remove two nuts (6), washers (10), bolts (11), and pre-load indicating (PLI) washers (12) from strap pack (13) being replaced.**

(1) Discard nuts (6) and PLI washers (12).

j. **Remove strap pack (13) and four spacers (14) (two each from bolt hole if installed).**




5.35.4. Cleaning

a. **Clean lead lag centering bolt, link pin, bushings, clip, bearings, bushing retainers, and all related hardware** (para 1.47)**.**

b. **Wipe harness support bracket, striker strips, pitch housing, feathering bearing, and feathering bearing housing.** Use cloth (item 52, App F).

c. **Wipe exposed areas of main rotor hub, lower plate, lower shoe, and all related hardware with a clean cloth.** Use cloth (item 52, App F).

5.35.5. Inspection

a. **Check lead lag link bearing retainers and bearings** (para 5.32)**.**

b. **Check accessible areas of lead lag link** (para 5.33)**.**

c. **Check accessible areas of pitch housing** (para 5.25)**.**

d. **Check main rotor dampers** (para 5.23)**.**

e. **Check accessible areas of main rotor head** (para 5.42)**.**

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## 5.35. MAIN ROTOR STRAP PACK REPLACEMENT - continued

5.35.6. Installation

**CAUTION**

Strap pack must be supported in horizontal position during installation. Damage to the strap pack will result if it is not supported.

a. **Lubricate threads of two bolts (11) and new nuts (6).** Use lubricant (item 114, App F).

(1) Allow lubricated hardware to dry for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

b. **Install new strap pack (13) on main rotor hub (15).** Torque eight nuts (6) to **480 INCH-POUNDS**.

(1) Install two spacers (14) at each of the two bolt holes in lower shoe (9).

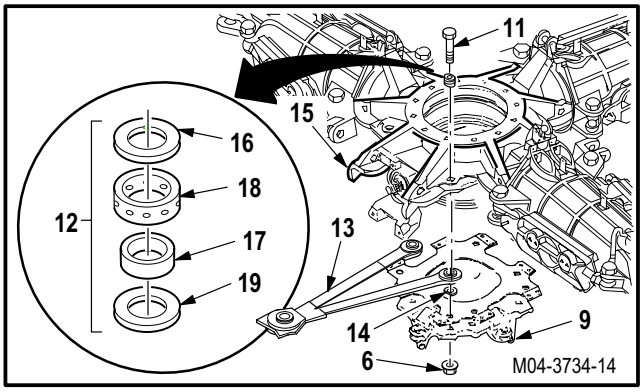
(2) Aline two inboard strap pack attaching bolt holes with hub (15), strap pack (13), spacers (14), and lower shoe (9).

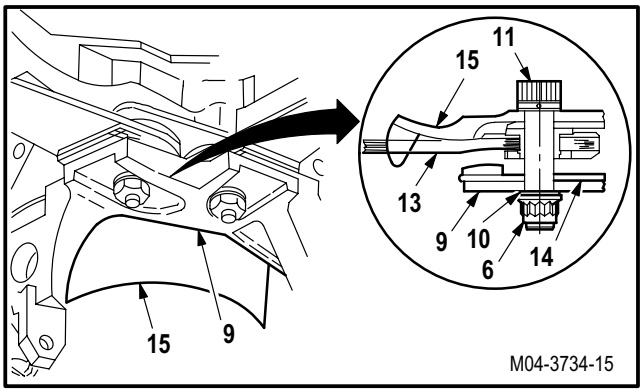
(3) Assemble two new PLI washers (12) in proper sequence on two bolts (11).

(a) Install washer (16), inner washer (17), outer washer (18), and washer (19).

(4) Install two bolts (11) with PLI washers (12) through hub (15), strap pack (13), spacers (14), and in lower shoe (9).

(5) Install two washers (10) and new nuts (6) on bolts (11).

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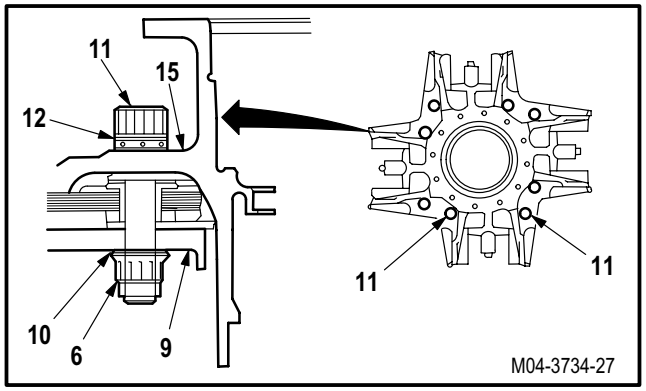
## 5.35. MAIN ROTOR STRAP PACK REPLACEMENT - continued

(6) Run nuts (6) up until washer (10) contacts lower shoe (9).




**NOTE**

Go to step b.(3) for PLI washer proper installation sequence.

(7) Install six new PLI washers (12) in proper sequence, and new nuts (6), two at a time, on remaining bolts (11).

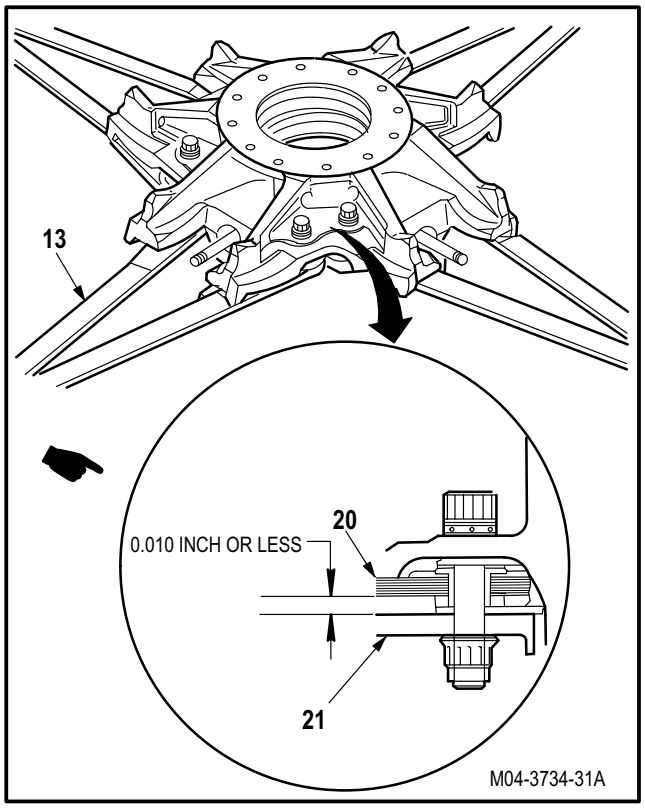
**CAUTION**

Tighten nuts only. Do not allow bolts to turn in main rotor hub. Damage to main rotor hub and lower shoe can result.

(8) Tighten nuts (6) on two bolts (11) one half turn at a time until lower shoe (9) contacts hub (15).

(9) Run on remaining six nuts (6) until washer (10) contacts lower shoe (9).

(10) Hold eight bolts (11) and torque nuts (6) to **480 INCH-POUNDS**. Use torque wrench, adapter, hinged handle, and sockets.




**NOTE**

Measurement only applies to strap pack that was replaced.

c. **Measure and record gap between each leg (20) of strap pack (13) and lower plate (21).** Use gap setting gage.

(1) If any gap measures **0.010 INCH** or less, go to step d.

(2) If all gap measurements are greater than **0.010 INCH**, go to step e.

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## 5.35. MAIN ROTOR STRAP PACK REPLACEMENT - continued

**NOTE**

- No more than three spacers may be installed at any single bolt hole.
- PLI washers will be reused if torque did not exceed the **480 INCH-POUNDS** in step b.(10).

d. **Install third spacer (14) at any gap identified in step c.**

(1) Remove nut (6), washer (10), PLI washer (12), and bolt (11) (one at a time) on any gap identified in step c.

(2) Separate lower shoe (9) and spacers (14) from strap pack (13).

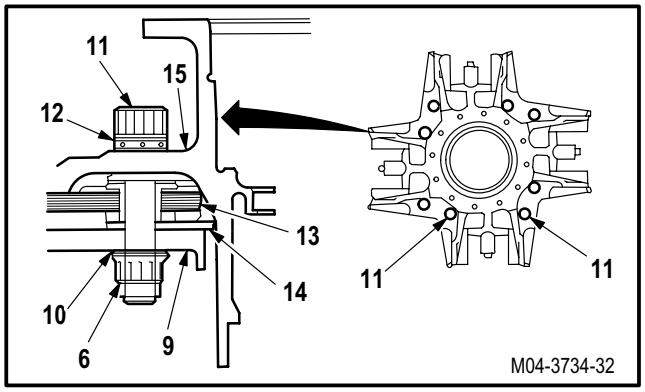
(3) Install third spacer (14) between strap pack (13) and original spacers (14).

(4) Aline bolt hole in hub (15), strap pack (13), spacers (14), and lower shoe (9).

(5) Install bolt (11) through PLI washer (12), hub (15), strap pack (13), spacers (14), and lower shoe (9).

(6) Install nut (6) and washer (10) on bolt (11).

(7) Tighten nut (6) until washer (10) contacts lower shoe (9).

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## 5.35. MAIN ROTOR STRAP PACK REPLACEMENT - continued

**CAUTION**

Do not continue to tighten nut after PLI washer no longer turns. Damage will occur to PLI washer, bolt, and nut. PLI washer, bolt, and nut must be replaced if over-torque occurs.

e. **Torque eight nuts (6) using PLI washer torquing method.**

(1) Torque nuts in crisscross pattern until correct torque is reached.

(2) Hold six bolts (7) and two bolts (8).

(3) Insert scribe in hole in outer washer (18).

(4) Tighten eight nuts (6) 1/8 turn at a time while turning outer washer (18). Use hinged handle, adapter, and socket.

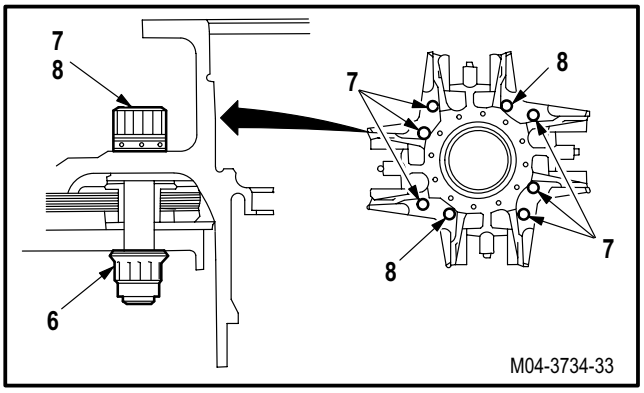
**NOTE**

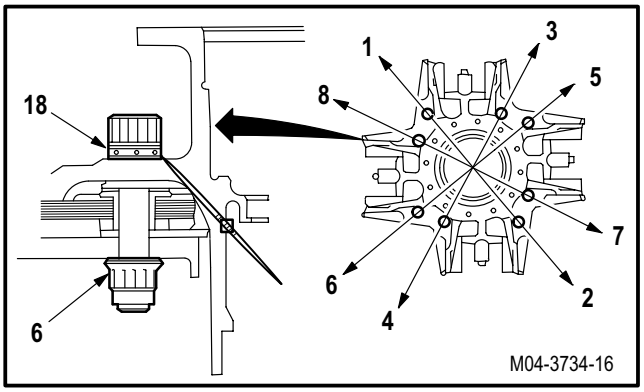
The correct torque is reached when outer washer no longer turns.

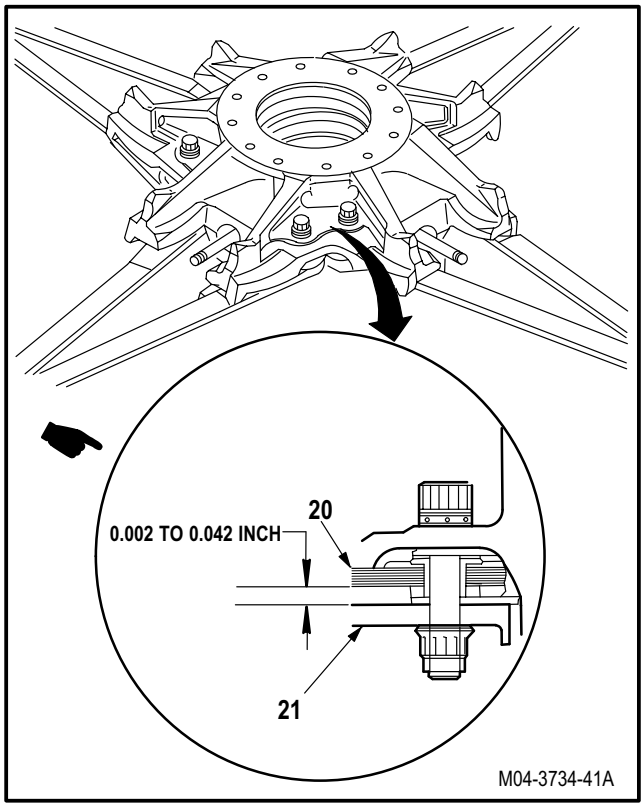
(5) Continue to tighten eight nuts (6) until all nuts are correctly torqued.

f. **Measure gap between each leg (20) and lower plate (21).**

(1) Gap must be **0.002 to 0.042 INCH**. If any gap measurement is not between **0.002 and 0.042 INCH** perform disassembly and inspection (para 5.42). Use gap setting gage.

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## 5.35. MAIN ROTOR STRAP PACK REPLACEMENT - continued

g. **Inspect (QA).**

h. **Install pitch housings** (para 5.26)**.**

i. **Remove -5 rig pin (1) and -9 rig pin (4) from pilot cyclic stick (2).**

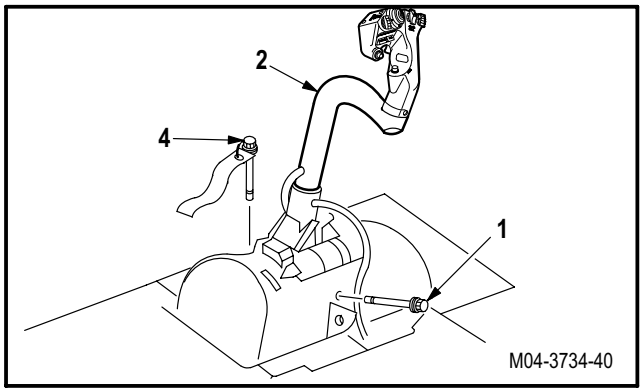
j. **Inspect (QA).**

k. **Install main rotor blades** (para 5.4)**.**

l. **Remove maintenance crane** (para 1.105)**.**

m. **Secure access doors T250L, T250R, T290L, T290R, and L325** (para 2.2)**.**

n. **Perform main rotor track and balance maintenance operational check** (TM 1-1520-238-T)**.**




END OF TASK

## 5.36. MAIN ROTOR BLADE STRAP PACK REPAIR CRITERIA

5.36.1. Description

This task covers: Repair Criteria.

5.36.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
10-inch hand metal cutting shears (item 285, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.25 | Main rotor pitch housing removed |

**Materials/Parts:**

Depressor (item 70, App F)

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor strap pack is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for all four strap packs (7-311411146-7 and 7-511411146-3). Repair is limited to the trim out of one laminate (top or bottom only) per strap pack.

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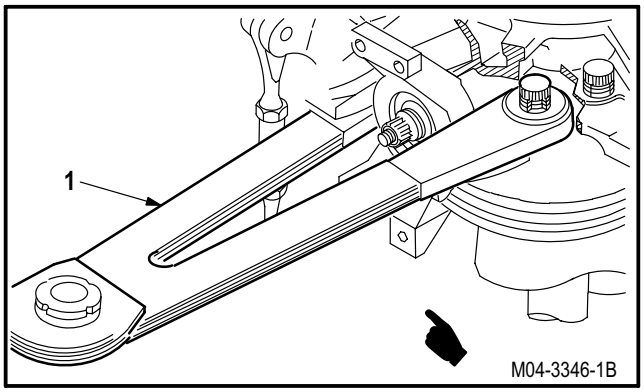
## 5.36. MAIN ROTOR BLADE STRAP PACK REPAIR CRITERIA - continued

5.36.3. Repair Criteria

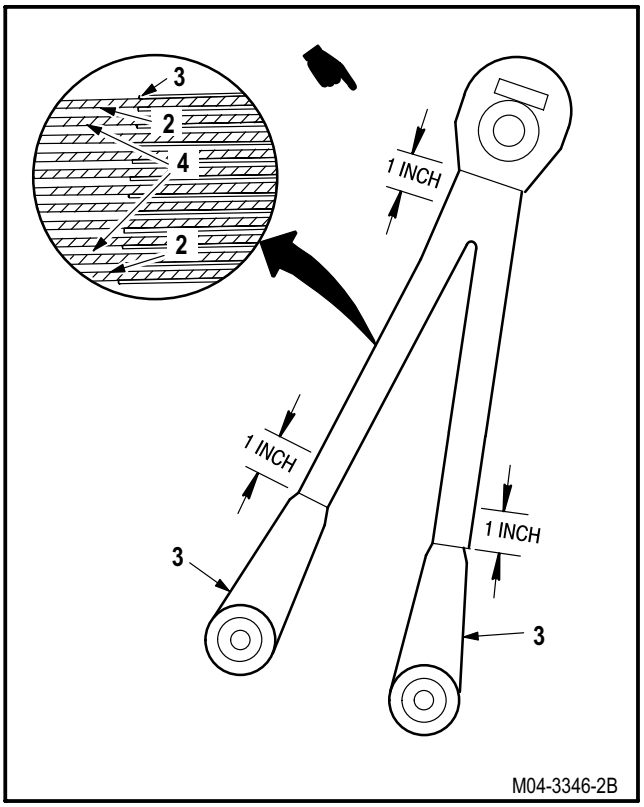
a. **Check top and bottom of strap pack (1) for failed laminates (2)** (para 5.1)**.**




**NOTE**

The break must be located within the repair limits defined as **1 INCH** inboard of the edge of the outboard shoe to **1 INCH** outboard from the strap abrasion strip. Breaks outside these limits are not repairable.

(1) If top or bottom laminate (2) is cracked or broken, remove laminate (2).




**NOTE**

- The removal of one laminate on one strap is one failure. Go to special inspection No. 27 in paragraph 1.137 or paragraph 5.1 for the number of allowable failures.
- Lower strap pack abrasion strips are shorter than upper abrasion strips. Repair of lower laminates requires measurement to be obtained from lower abrasion strip.

(2) Measure from strap pack steel abrasion strip (3) **1 INCH** outboard on both legs of laminate (2).

(3) Insert tongue depressor between cracked or broken laminate (2) and good laminate (4) at the **1 INCH** location. Use depressor (item 70, App F).

(4) Trim both legs of cracked or broken laminate (2) at the **1 INCH** location. Use shears.

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## 5.36. MAIN ROTOR BLADE STRAP PACK REPAIR CRITERIA - continued

(5) Bend trimmed edges 45 degrees away from good laminate (4). Bend should begin approximately **0.5 INCH** from strap pack abrasion strip (3).

(6) Measure from strap pack outboard shoe (5) **0.5 INCH** inboard on cracked or broken laminate. Trim top teflon sheet at this location.

(7) Trim top teflon sheet around thread connecting teflon sheets at apex.

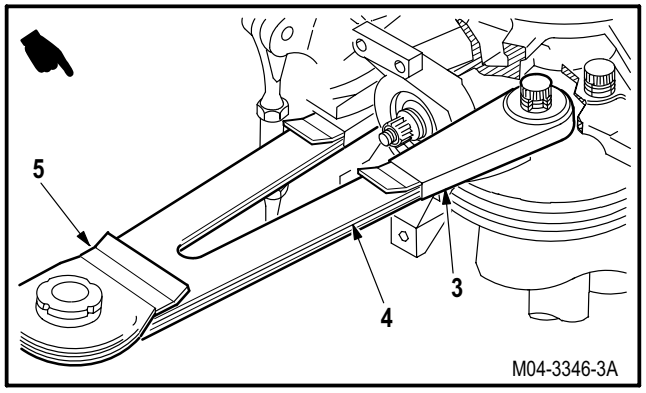
(8) Maintain **0.5 INCH** from thread ensuring that thread is undamaged.

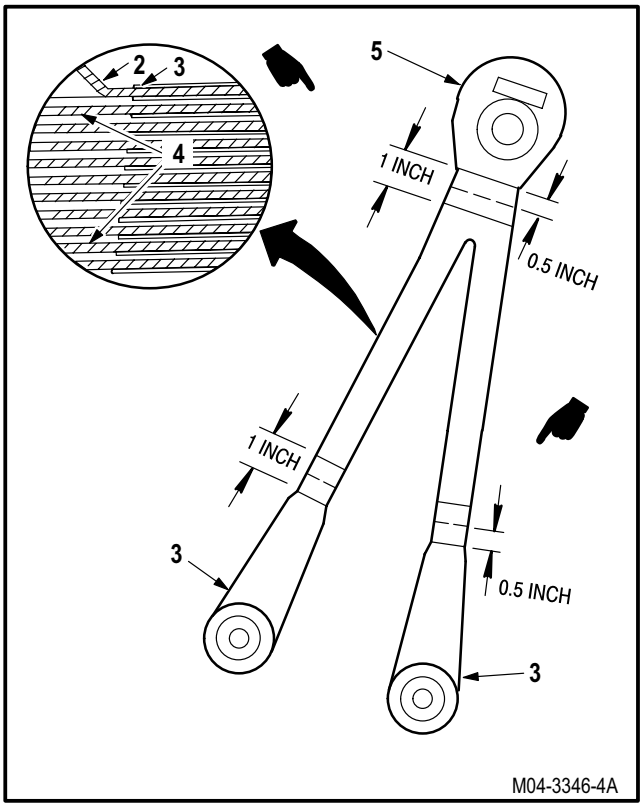
(9) Measure from strap pack shoe (5) **1 INCH** inboard on cracked or broken laminate.

(10) Insert tongue depressor between cracked or broken laminate (2) and good laminate (4) at the **1 INCH** location. Use depressor (item 70, App F).

(11) Trim cracked or broken laminate (2) at the **1 INCH** location. Use shears.

(12) Bend trimmed edge 45 degrees away from good laminate (4). Bend should begin approximately **0.5 INCH** from strap pack shoe (5).




b. **Inspect (QA).**

c. **Install main rotor pitch housing** (para 5.26)**.**

END OF TASK

## 5.37. MAIN ROTOR FEATHERING BEARING HOUSING REMOVAL/INSTALLATION

5.37.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.37.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
3/4 x 1/2-inch drive socket wrench adapter (item 5, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
18 - 30-inch telescoping x 3/4-inch drive socket wrench handle (item 161, App H)
Adjustable air filtering respirator (item 262, App H)
15/16 x 1/2-inch drive deep socket wrench socket (item 297, App H)
3-piece spatula set (item 337, App H)
100 - 500 foot-pound 3/4-inch drive click type torque wrench (item 438, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Cloth (item 52, App F)
Corrosion preventive compound (item 62, App F)
Lubricant (item 114, App F)
Methyl ethyl ketone (item 124, App F)
Sealing compound (item 177, App F)

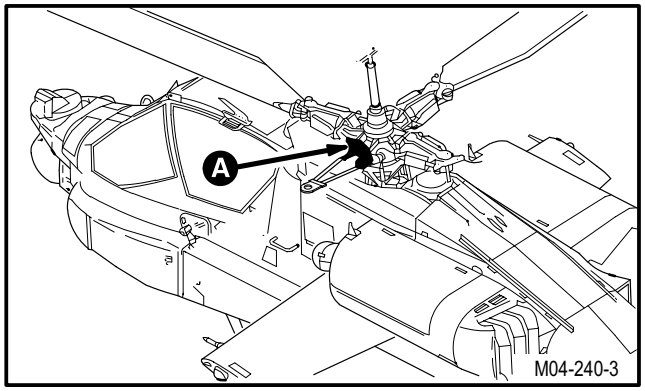
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.32 | Main rotor lead lag link bearing retainer and rotor hub bearing removed |
| 5.25 | Main rotor pitch housing removed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor feathering bearing housing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




**CAUTION**

To prevent damage and failure of strap pack lamination, do not scratch or stretch strap packs when removing feathering bearing housing.

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## 5.37. MAIN ROTOR FEATHERING BEARING HOUSING REMOVAL/INSTALLATION - continued

5.37.3. Removal

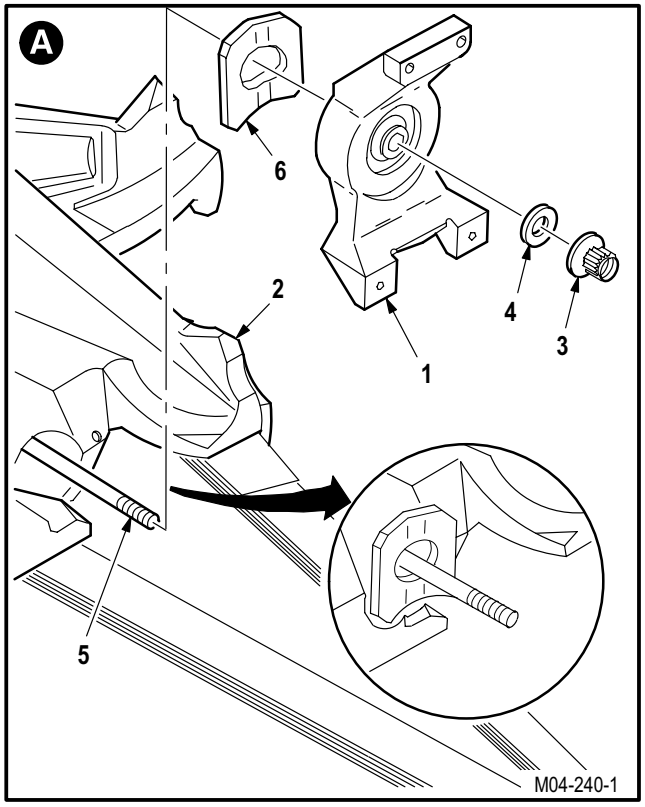
a. **Remove feathering bearing housing (1) from main rotor hub (2).**

(1) Remove sealing compound from the attaching hardware. Use spatula set.

(2) Remove nut (3) and washer (4). Use telescoping handle, adapter, and socket.

(3) Pull housing (1) clear of stud (5).

b. **Remove flooring plate (6).**




5.37.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

b. **Clean sealing compound and corrosion preventative compound from removed and attaching parts.** Use methyl ethyl ketone (item 124, App F).

5.37.5. Inspection

a. **Check feathering bearing housing, hub, and stud for cracks and thread damage.** None allowed.

(1) Dent and scoring on housing up to **0.063 INCH** must be blended.

b. **Check feathering bearing housing, hub, and stud for corrosion** (para 1.49)**.**

(1) If light corrosion is present on more than 25 percent of housing surface area, replace housing.

c. **Check feather bearing elastomeric for damage** (para 5.1)**.**

d. **Check hub and flooring plate for scratches, nicks, gouges, dents, and grooving not to exceed 0.010 INCH.**

(1) Scratches are acceptable if no material is raised above the surrounding surface.

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## 5.37. MAIN ROTOR FEATHERING BEARING HOUSING REMOVAL/INSTALLATION - continued

5.37.6. Installation

a. **Lubricate threads of stud (5) and nut (3).** Use lubricant (item 114, App F).

(1) Allow lubricated hardware to dry for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

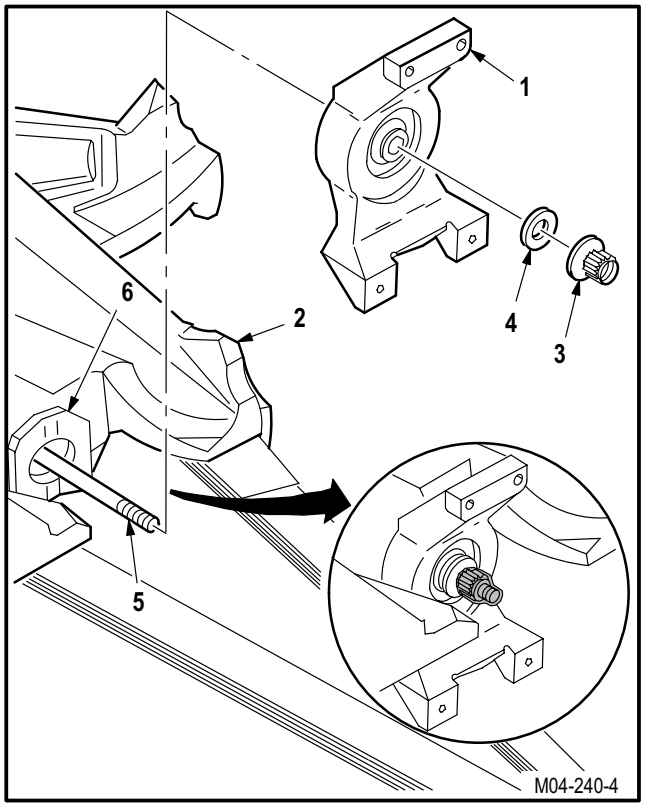
b. **Coat shank of stud (5) with corrosion preventive compound.** Use corrosion preventive compound (item 62, App F).

c. **Apply a continuous bead of sealing compound to both faces of flooring plate (6) where it mates with housing (1) and hub (2).** Use sealing compound (item 177, App F).

d. **Install flooring plate (6) on stud (5).**

e. **Install housing (1) on stud (5).** Torque nut (3) to **320 FOOT-POUNDS**.

(1) Install housing (1) on stud (5) and aline with hub (2) mating surface.




**CAUTION**

Allow sealant to hold washer inplace against the feathering bearing, otherwise the washer will drop down and become dished during installation and not allow proper engagement of nut.

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**5.37. MAIN ROTOR FEATHERING BEARING HOUSING REMOVAL/INSTALLATION - continued**

(2) Apply a fine bead of sealant to the outer edges and to both faces of washer (4) while the sealant is still tacky, install the washer (4) i9n place, centered with the feathering bearing (1) and nut (3). Use sealing compound (item 177, App F).

(3) Install washer (4) and nut (3).

(4) Torque nut (3) to **320 FOOT-POUNDS**. Use torque wrench, adapter, and socket.

f. **Apply sealing compound to joints around bolt head, washer, nuts, and exposed threads.** Use sealing compound (item 177, App F) and spatula set.

g. **Inspect (QA).**

h. **Install main rotor pitch housing** (para 5.26)**.**

i. **Install main rotor lead lag link bearing retainer and rotor hub bearing** (para 5.32)**.**

END OF TASK

## 5.38. MAIN ROTOR DROOP STOP FOLLOWER REMOVAL (AVIM)

5.38.1. Description

This task covers: Removal. Cleaning. Inspection.

5.38.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Sling set kit (item 194, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.37 | Main rotor feathering bearing housing removed |

**Materials/Parts:**

Wood block (4)
Cloth (item 52, App F)

**WARNING**

**FLIGHT SAFETY PART**

- **The main rotor droop stop follower is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Main rotor head weighs approximately 675 pounds. Use crane to invert rotor head. Failure to do so could result in serious injury. If injury occurs, seek medical aid.**

**NOTE**

This task is typical for either the 7-311411003-621 or 7-311411003-625 main rotor head.

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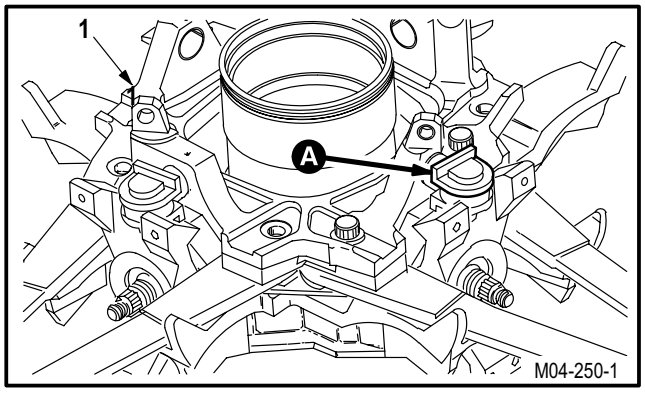
## 5.38. MAIN ROTOR DROOP STOP FOLLOWER REMOVAL (AVIM) - continued

5.38.3. Removal

**CAUTION**

Do not allow strap pack to remain unsupported when inverting main rotor. Failure to do so will result in damage to strap pack.

a. **With assistants, invert main rotor head (1) on wood blocks.** Use sling set kit and wood blocks.




**NOTE**

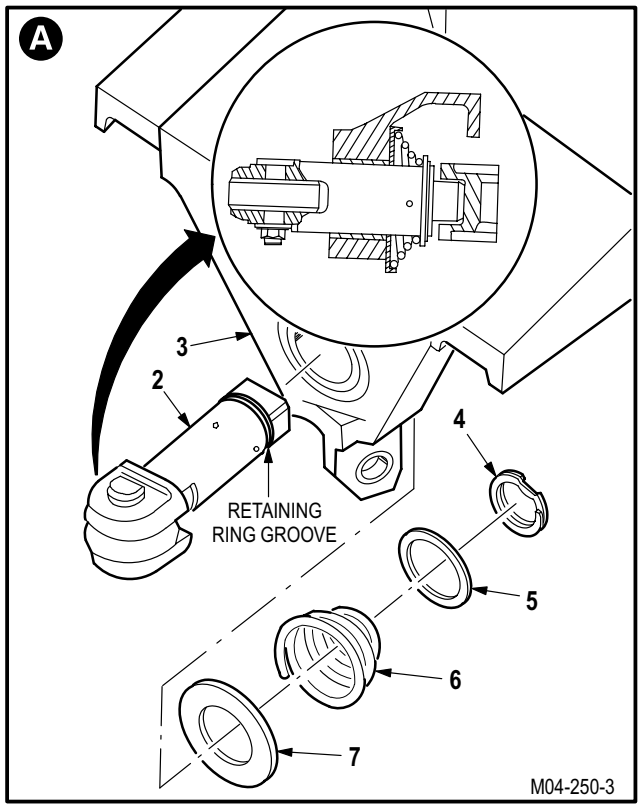
If all four droop stop followers are to be replaced, remove and install one at a time to prevent the droop stop ring from falling free of the lower shoe.

b. **Remove droop stop follower (2) from lower shoe (3).**

(1) Have assistant push in on follower (2) to relieve spring tension on retaining ring (4).

**WARNING**

**Droop stop follower is under approximately 50 pounds of spring tension. Use caution when removing retaining ring to avoid injury to personnel. If injury occurs, seek medical aid.**




(2) Remove retaining ring (4) from follower (2).

(3) Remove washer (5), spring (6), and cup (7) from follower (2).

(4) Remove follower (2) from shoe (3).

GO TO NEXT PAGE

## 5.38. MAIN ROTOR DROOP STOP FOLLOWER REMOVAL (AVIM) - continued

5.38.4. Cleaning

a. **Wipe droop stop follower, lower shoe, retaining ring, washer, spring, and cup.** Use cloth (item 52, App F).

5.38.5. Inspection

a. **Check droop stop follower, droop stop plunger, droop stop roller, striker plate, lower shoe, retaining ring, washer, spring, cup, and droop stop ring for cracks.** None allowed.

b. **Check droop stop follower, droop stop plunger, droop stop roller, striker plate, lower shoe, retaining ring, washer, spring, cup, and droop stop ring for wear, galling, scoring, and elongation** (para 5.1)**.**

c. **Check droop stop follower, droop stop plunger, droop stop roller, striker plate, lower shoe, retaining ring, washer, spring, cup, and droop stop ring for corrosion** (para 1.49)**.**

(1) Maximum depth **0.005 INCH**.

d. **Check droop stop roller teflon for debonding and damage.** None allowed.

e. **Check lower shoe for corrosion** (para 1.49)**.**

END OF TASK

## 5.39. MAIN ROTOR DROOP STOP FOLLOWER INSTALLATION (AVIM)

5.39.1. Description

This task covers: Installation.

5.39.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Sling set kit (item 194, App H)

**Materials/Parts:**

Wire (item 229, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
Two persons to assist
67R Attack Helicopter Repairer

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor droop stop follower is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

a. **Wrap lockwire around spring (1) three places.**

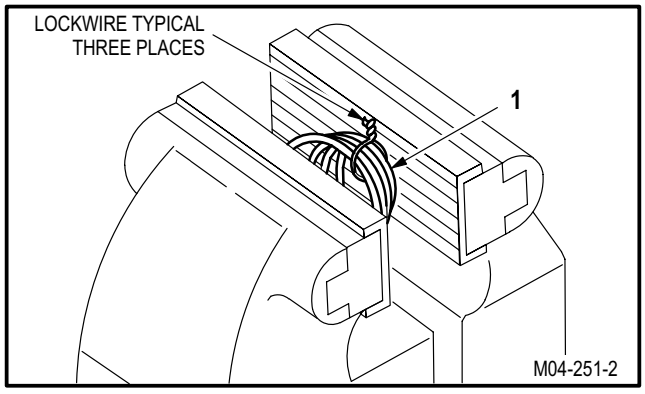
(1) Evenly space lockwire to hold spring (1) fully compressed. Use wire (item 229, App F).

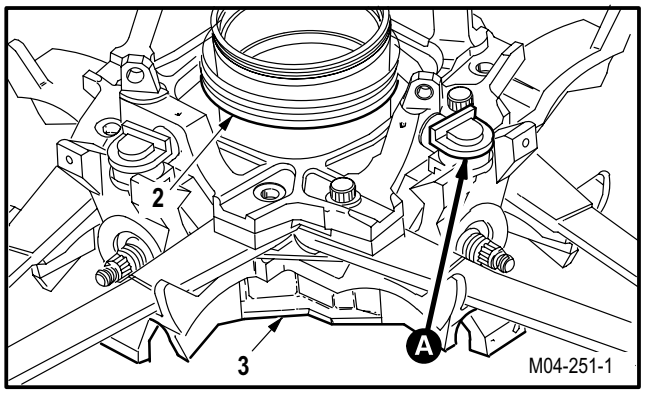
b. **Position spring (1) in vise and fully compress.**

(1) Tighten lockwire.

c. **Remove spring (1) from vise.**

d. **Place droop stop ring (2), if removed, in position on main rotor head (3).**

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## 5.39. MAIN ROTOR DROOP STOP FOLLOWER INSTALLATION (AVIM) - continued

**CAUTION**

- To prevent contamination of Teflon-type journal bearings do not apply lubricant on droop stop followers or journal bearings
- To prevent damage to feathering bearing install follower with roller nut to bottom of main roller head.

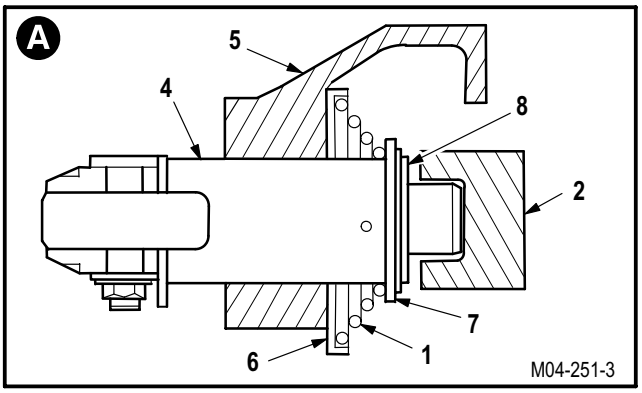
e. **Install droop stop follower (4) in lower shoe (5).**

(1) Install follower (4) partially in shoe (5).

(2) Place cup (6) between shoe (5) and ring (2), with flange facing ring (2), spring (1), and washer (7).

(3) Insert follower (4) through cup (6), spring (1), and washer (7).

(4) Install retaining ring (8) on follower (4).




f. **Remove lockwire from spring (1).**

g. **Allow a minimum gap of 0.015 INCH between retaining ring (8) and ring (2).**

h. **Inspect (QA).**

**WARNING**

**Main rotor head weighs approximately 675 pounds. Use crane to turn rotor over. Failure to do so could result in serious injury. If injury occurs, seek medical aid.**

i. **With assistants, invert main rotor head.** Use sling set kit.

j. **Install main rotor feathering bearing housing** (para 5.37)**.**

END OF TASK

## 5.40. MAIN ROTOR DROOP STOP FOLLOWER REPAIR (AVIM)

5.40.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.40.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Cloth (item 52, App F)
Epoxy primer coating kit (item 78, App F)

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor droop stop follower is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

5.40.3. Removal

**CAUTION**

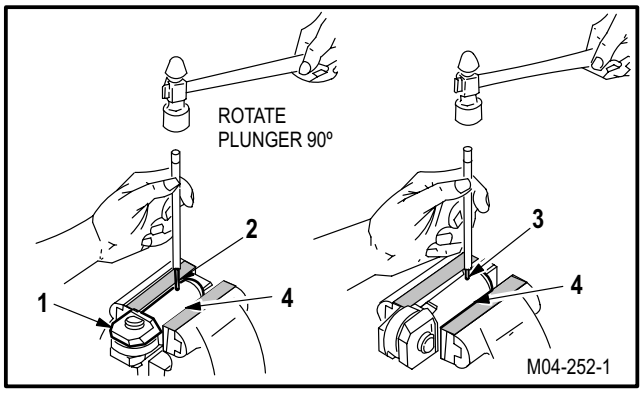
Place metal jaw protectors on vise to protect droop stop followers from scratches and dents.

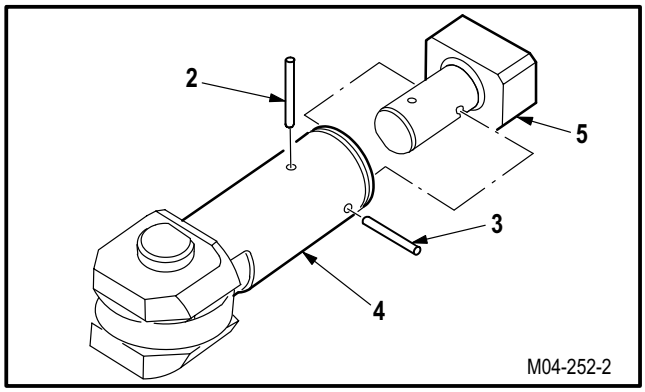
a. **Put droop stop follower (1) in vise.**

b. **Remove pins (2) from plunger (4).**

c. **Rotate plunger (4) 90 degrees and remove pin (3).**

d. **Remove linear roller (5) from plunger (4).**

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## 5.40. MAIN ROTOR DROOP STOP FOLLOWER REPAIR (AVIM) - continued

5.40.4. Cleaning

a. **Wipe follower and plunger.** Use cloth (item 52, App F).

5.40.5. Inspection

a. **Check follower and plunger for wear and damage** (para 5.38)**.**

b. **Check follower and plunger corrosion** (para 1.49)**.**

5.40.6. Installation

a. **Apply primer to mating surface of replacement roller (5).** Use epoxy primer coating kit (item 78, App F).

(1) Insert roller (5) in plunger (4) while primer is wet.

b. **Install pins (2) and (3) in plunger (4).**

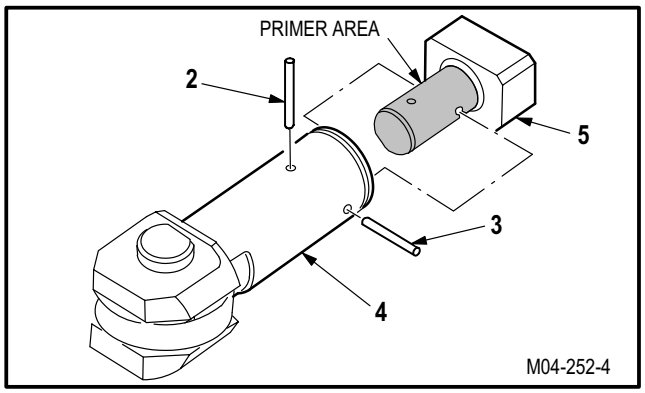
(1) Aline holes in roller (5) with holes in plunger (4).

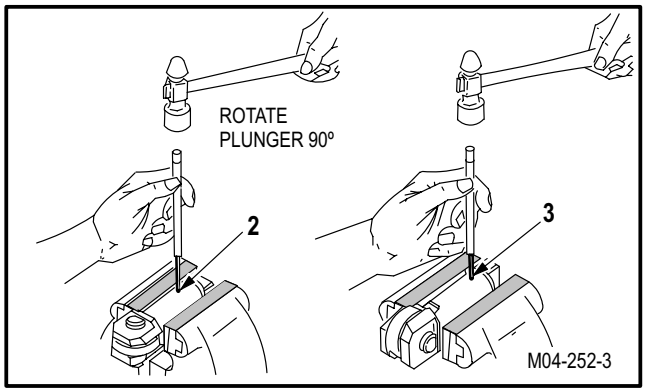
(2) Drive pin (2) in until approximately **1/16 INCH** below surface of plunger (4).

(3) Rotate plunger (4) 90 degrees.

(4) Drive pin (3) in until approximately **1/16 INCH** below surface of plunger (4).

c. **Inspect (QA).**




END OF TASK

## 5.41. MAIN ROTOR DROOP STOP FOLLOWER ROLLER AND INNER RACE REPLACEMENT

5.41.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.41.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 300 inch-pound 3/8-inch drive click type torque wrench (item 439, App H)

**Materials/Parts:**

Cloth (item 52, App F)
Lubricant (item 114, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

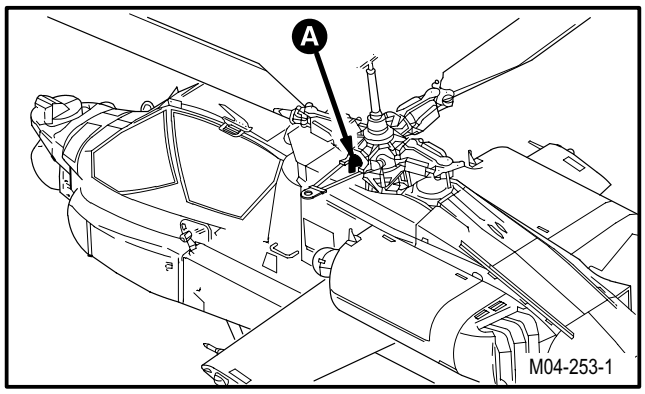
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.37 | Feathering bearing housing removed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor droop stop follower is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




5.41.3. Removal

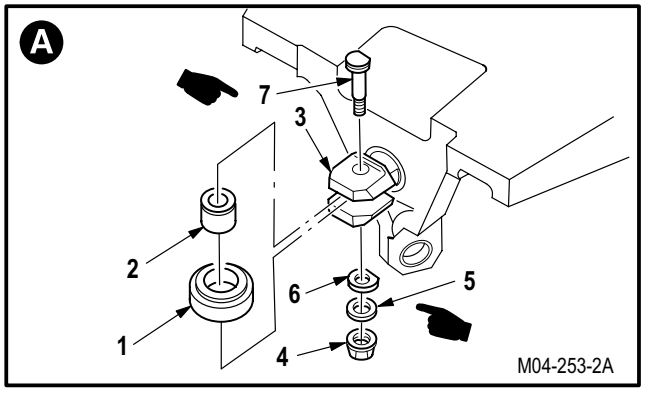
a. **Remove droop stop roller (1) and follower inner race (2) from droop stop follower (3).**

(1) Remove nut (4), washer (5), and flat-sided washer (6) from shoulder bolt (7).

(2) Remove bolt (7) from follower (3).

(3) Remove roller (1) from follower (3).

b. **Remove inner race (2) from roller (1).**

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## 5.41. MAIN ROTOR DROOP STOP FOLLOWER ROLLER AND INNER RACE REPLACEMENT - continued

5.41.4. Cleaning

a. **Wipe nut, washers, bolt, roller, inner race, and follower.** Use cloth (item 52, App F).

5.41.5. Inspection

a. **Inspect droop stop follower, roller, and inner race** (para 5.1)**.**

b. **Check roller for chipping.**

(1) Chipping of hard anodized surface allowed at edges and surfaces.

c. **Check inner race for chipping.**

(1) Chipping of hard anodized surface allowed around edges of ID and on flat surfaces (function of follower will not be affected).

d. **Check roller, inner race, and follower for cracks.** None allowed.

e. **Check roller for dents.**

(1) Dents/flat spots shall not exceed **0.010 INCH**.

f. **Check for wear through anodizing on inner race.** None allowed.

g. **Check for debonding of teflon.** None allowed.

h. **Check roller, inner race, and follower for corrosion** (para 1.49)**.**

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## 5.41. MAIN ROTOR DROOP STOP FOLLOWER ROLLER AND INNER RACE REPLACEMENT - continued

5.41.6. Installation

a. **Install follower inner race (2) in droop stop roller (1).**

b. **Lubricate threads of shoulder bolt (7).** Use lubricant (item 114, App F).

(1) Allow lubricated bolt to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

c. **Install roller (1) and inner race (2) in droop stop follower (3).** Torque nut (4) to **200 INCH-POUNDS**.

**NOTE**

- Install bolt so that flat side of bolt head is facing inboard against follower lip. Ensure bolt is installed from top.
- Install flat-sided washer so that flat side of washer is facing inboard against follower lip.

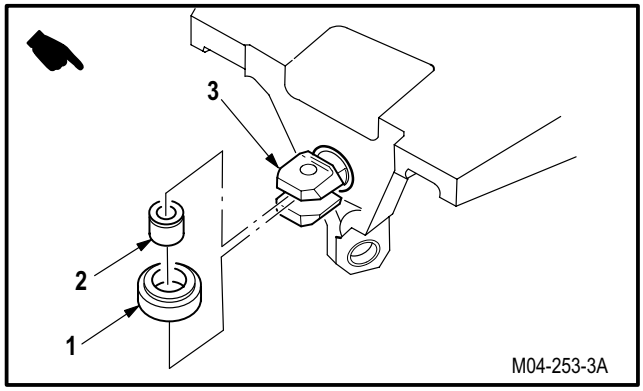
(1) Position roller (1) and inner race (2) in follower (3).

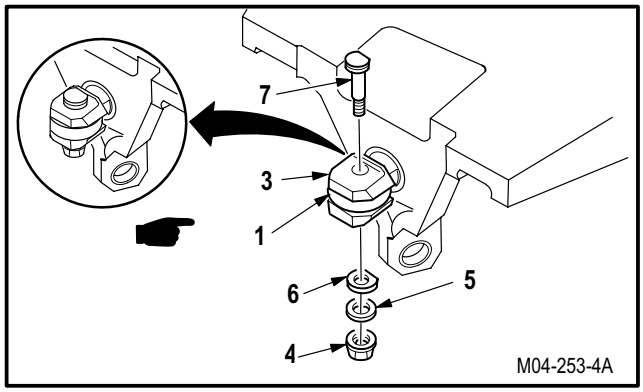
(2) Install bolt (7) through follower (3), roller (1), flat-sided washer (6), washer (5), and nut (4).

(3) Hold bolt (7) down against follower (3) so flat edge of bolt (7) is snug against follower (3) lip. Torque nut (4) to **200 INCH-POUNDS**. Use torque wrench.

d. **Inspect (QA).**

e. **Install feathering bearing housing** (para 5.37)**.**




END OF TASK

## 5.42. MAIN ROTOR HEAD DISASSEMBLY (AVIM)

5.42.1. Description

This task covers: Disassembly. Cleaning. Inspection.

5.42.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
3/4-inch drive hinged socket wrench handle (item 173, App H) (2)
Sling set kit (item 194, App H)
1 1/8 x 3/4-inch drive deep socket wrench socket (item 295, App H)
1 1/4 x 3/4-inch drive socket wrench socket (item 309, App H)
1 1/16 & 1 1/8-inch box wrench (item 410, App H)
12-inch strap pipe wrench (item 425, App H)

**Materials/Parts:**

Wood block (2)
Cloth (item 52, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
Two persons to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.37 | Main rotor feathering bearing housings removed (four places) |

**WARNING**

**FLIGHT SAFETY PART**

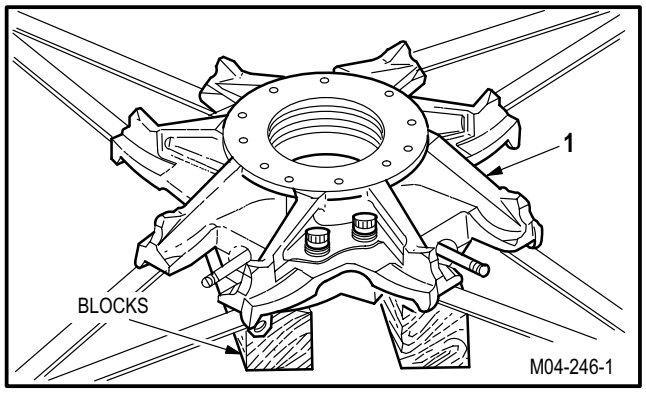
- **The main rotor head is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Main rotor head weighs approximately 675 pounds. Use crane to lift rotor head. Failure to do so could result in serious injury. If injury occurs, seek medical aid.**

**NOTE**

This task is typical for either the 7-311411003-621 or 7-311411003-625 main rotor head.

5.42.3. Disassembly

a. **With assistants, place main rotor head (1) on wood blocks.** Use sling set kit.

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## 5.42. MAIN ROTOR HEAD DISASSEMBLY (AVIM) - continued

**WARNING**

**Main rotor hub weighs approximately 200 pounds. Use crane to lift rotor hub. Failure to do so could result in serious injury. If injury occurs, seek medical aid.**

**NOTE**

If the main rotor hub is to be replaced, perform steps b, c, d, e, and f. If hub is to be removed, go to step f.

b. **Remove main rotor droop stop ring** (para 5.44)**.**

c. **Remove main rotor upper seal retainer and plain encased seal** (para 5.45)**.**

d. **Remove main rotor lower seal and oil seal retainer** (para 5.46)**.**

e. **Remove main rotor electrical brush, brush holder, and pitch web electrical lead** (para 5.48)**.**

f. **Remove hub (2) from lower shoe (3).**

(1) Hold eight bolts (4).

(2) Remove eight nuts (5) and washers (6).Use hinged handle, two sockets, and box wrench.

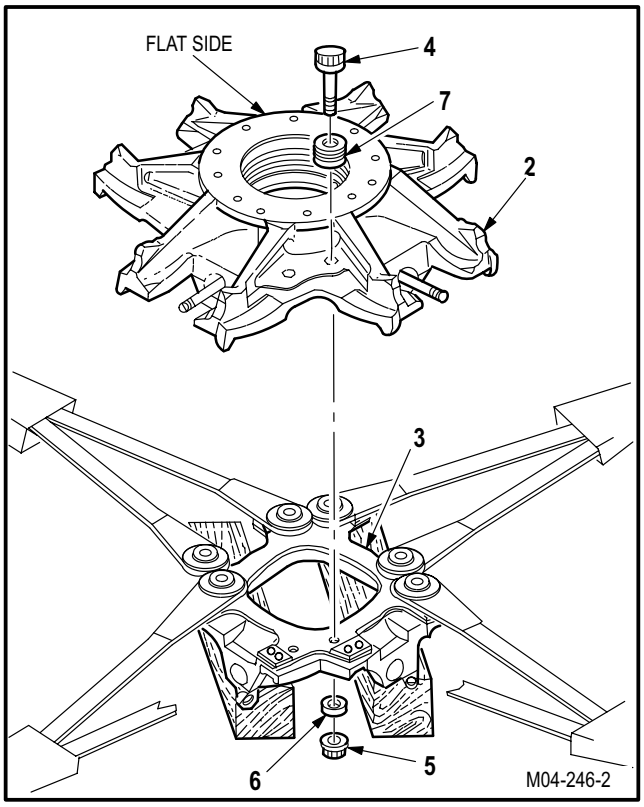
(3) Remove eight bolts (4) and preload indicating (PLI) washers (7).

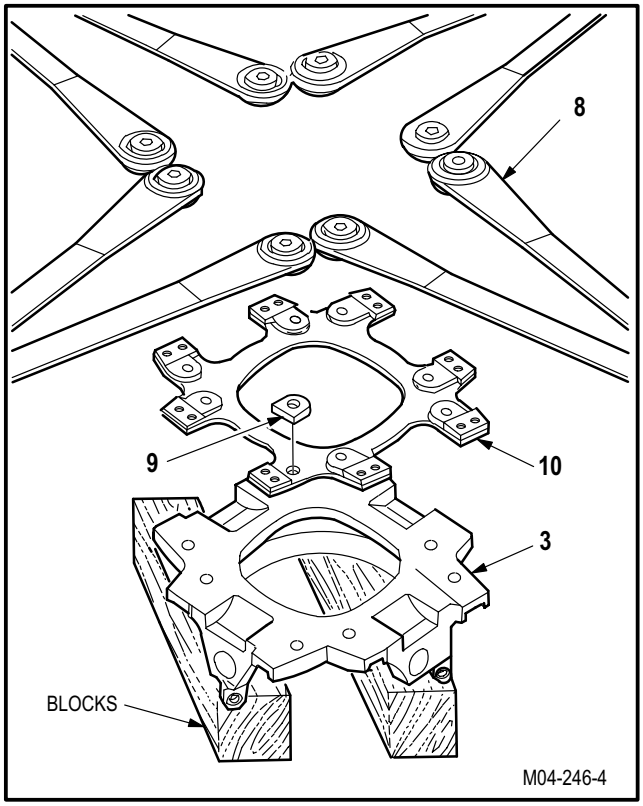
(4) Discard PLI washers (7).

(5) Lift hub (2) from shoe (3).

(6) Place hub (2) flat side down on work bench.

g. **Remove four main rotor strap packs (8), spacers (9), and hub plate (10) from shoe (3).**

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## 5.42. MAIN ROTOR HEAD DISASSEMBLY (AVIM) - continued

h. **Remove four feathering bearing studs (11) from hub (2).**

(1) Hold eight screws (12).

(2) Remove eight nuts (13) and washers (14).

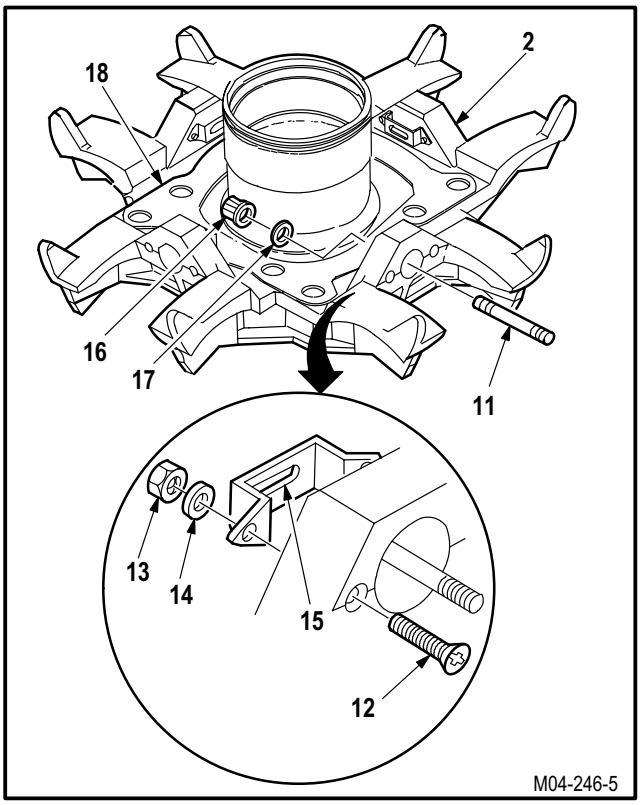
(3) Remove eight screws (12) and four brackets (15).

(4) Hold four studs (11). Use strap wrench.

(5) Remove four nuts (16) and washers (17).

(6) Remove studs (11) from hub (2).

i. **Remove hub load plate (18) from hub (2).**




5.42.4. Cleaning

a. **Wipe hub load plate, hub, strap packs, hub plate, brackets, studs, and related hardware.** Use cloth (item 52, App F).

5.42.5. Inspection

a. **Check hub load plate, hub, shoe, four brackets, four studs, and related hardware for cracks, wear, thread damage, scoring, hole elongation, and missing identification plate.** None allowed.

b. **Check hub load plate, hub, strap packs, hub plate, and shoe for corrosion** (para 1.49)**.**

c. **Check stud shank for corrosion** (para 1.49)**.**

(1) Maximum allowed is **0.005 INCH**.

d. **Check eight holes of hub, shoe, hub load plate, and hub plate for elongation or surface damage.** None allowed.

e. **Check strap packs for damage and repair** (para 5.36)**.**

f. **Inspect (QA).**

END OF TASK

## 5.43. MAIN ROTOR HEAD ASSEMBLY (AVIM)

5.43.1. Description

This task covers: Assembly.

5.43.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
3/4 x 1/2-inch drive socket wrench adapter (item 5, App H)
Light duty laboratory apron (item 27, App H)
0.002 - 0.040-inch gap setting gage (item 147, App H)
Chemical protective gloves (item 154, App H)
3/4-inch drive hinged socket wrench handle (item 173, App H)
Sling set kit (item 194, App H)
Adjustable air filtering respirator (item 262, App H)
Machinist's scriber (item 278, App H)
1 1/8 x 3/4-inch drive deep socket wrench socket (item 295, App H)
1 1/4 x 3/4-inch drive socket wrench socket (item 309, App H)
12-inch strap pipe wrench (item 425, App H)
150 - 750 inch-pound 3/8-inch drive click type torque wrench (item 442, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Materials/Parts:**

PLI washers (8)
Self-locking nuts (8)
Corrosion preventive compound (item 62, App F)
Lubricant (item 114, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

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**5.43. MAIN ROTOR HEAD ASSEMBLY (AVIM) - continued**

**WARNING**

**FLIGHT SAFETY PART**

- **The main rotor head is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Main rotor head weighs approximately 675 pounds. Use crane to lift rotor head. Failure to do so could result in serious injury. If injury occurs, seek medical aid.**

**NOTE**

This task is typical for either the 7-311411003-621 or 7-311411003-625 main rotor head.

5.43.3. Assembly

**NOTE**

If the main rotor hub was replaced, perform steps a, b, c, and d. If hub was removed, go to step e.

a. **Install main rotor droop stop ring** (para 5.44)**.**

b. **Install main rotor upper seal retainer and plain encased seal** (para 5.45)**.**

c. **Install main rotor lower seal and oil seal retainer** (para 5.46)**.**

d. **Install main rotor electrical brush, brush holder, and pitch web electrical lead** (para 5.48)**.**

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## 5.43. MAIN ROTOR HEAD ASSEMBLY (AVIM) - continued

**NOTE**

Hub, hub load plate, hub plate, and lower shoe each have a small index bump on outer edge contour. Ensure bumps are alined for proper installation of these parts.

e. **Install hub load plate (1) on main rotor hub (2).**

f. **Lubricate threads of four feathering bearing studs (3) and nuts (4).** Use lubricant (item 114, App F).

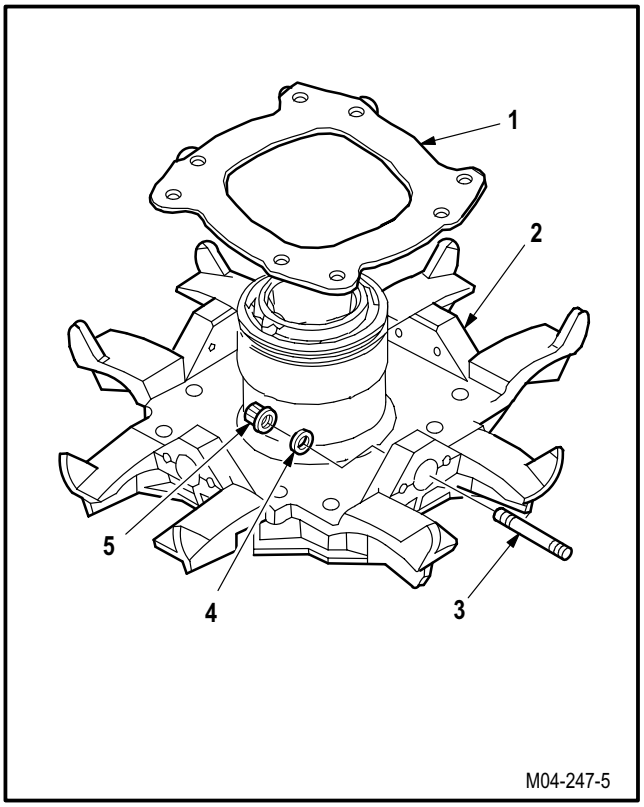
(1) Allow lubricated studs (3) to dry for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

g. **Coat four studs (3) with corrosion preventive compound.** Use corrosion preventive compound (item 62, App F).

h. **Install four studs (3) on hub (2).**

(1) Install keyed end of four studs (3) in hub (2).

(2) Hold four studs (3). Install four washers (4) and nuts (5). Use strap wrench.

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## 5.43. MAIN ROTOR HEAD ASSEMBLY (AVIM) - continued

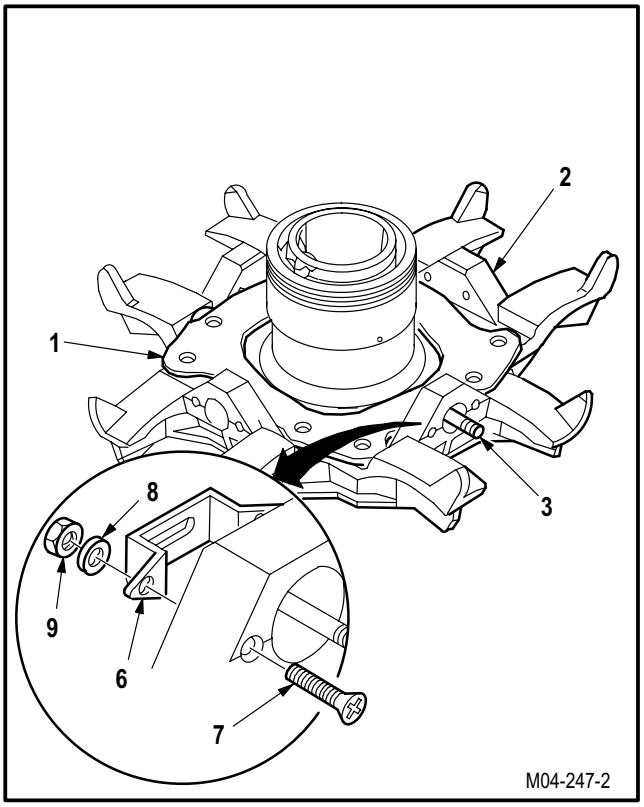
i. **Install four brackets (6) on hub (2).** Torque eight nuts (9) to **20 INCH-POUNDS**.

(1) Aline four brackets (6) with hub (2) mounting holes and key of four studs (3).

(2) Install eight screws (7) through hub (2) and brackets (6).

(3) Install eight washers (8) and nuts (9) on screws (7).

(4) Hold eight screws (7). Torque eight nuts (9) to **20 INCH-POUNDS**. Use torque wrench.




**NOTE**

Hub, hub load plate, hub plate, and lower shoe each have a small index bump on outer edge contour. Index bumps are provided for alignment of bolt holes in hub. Alignment with index bumps are recommended but not mandatory.

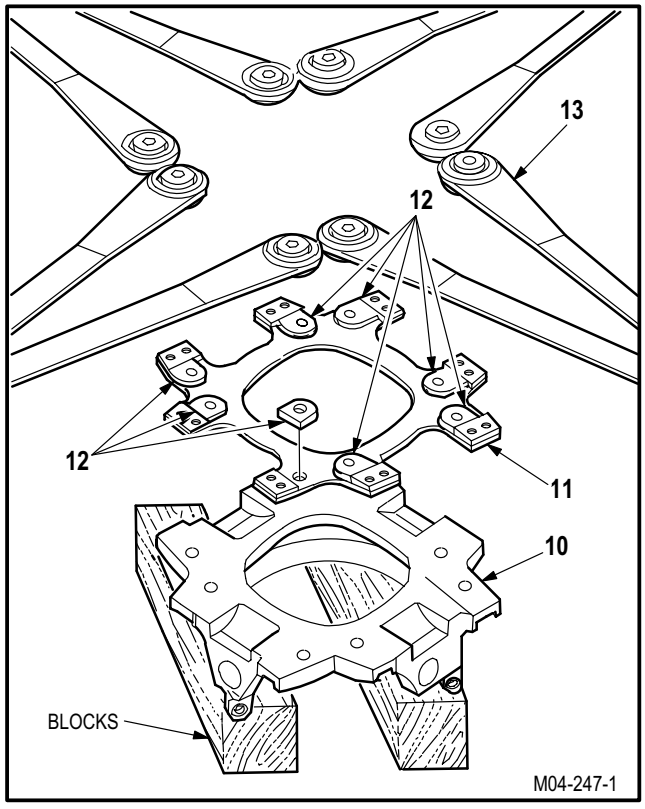
j. **Assemble lower shoe (10), hub plate (11), spacers (12), and four strap packs (13).**

(1) Place shoe (10) on wood blocks.

(2) Place hub plate (11) on shoe (10) and aline bolt holes.

(3) Place two spacers (12) on hub plate (11) at each bolt hole.

(4) Place strap packs (13) on spacers (12) and aline bolt holes.

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## 5.43. MAIN ROTOR HEAD ASSEMBLY (AVIM) - continued

k. **Lubricate eight bolts (14) and threads of nuts (15).** Use lubricant (item 114, App F).

(1) Allow lubricated bolts (14) and nuts (15) to dry for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

**WARNING**

**Main rotor hub weighs approximately 200 pounds. Use crane to lift rotor hub. Failure to do so could result in serious injury. If injury occurs, seek medical aid.**

**CAUTION**

Tighten nuts only. Do not allow bolts to turn in main rotor hub. Damage to main rotor hub and lower shoe will result.

l. **With assistant, install hub (2) on shoe (10).** Torque eight nuts (15) to **480 INCH-POUNDS**.

(1) Place hub (2) on strap packs (13) and aline bolt holes. Use sling set kit.

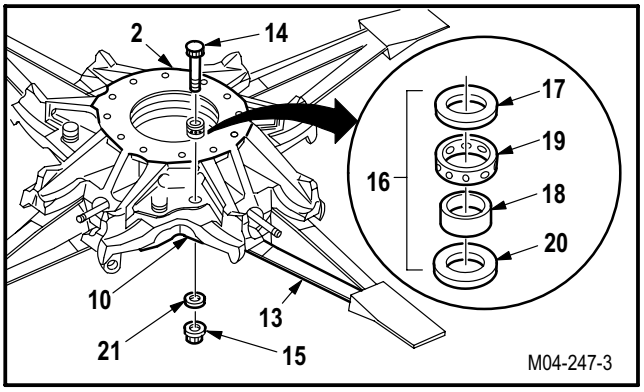
(2) Install eight new preload indicating (PLI) washers (16) in proper sequence on eight bolts (14).

(a) Install washer (17), inner washer (18), outer washer (19), and washer (20).

(3) Install eight bolts (14) with PLI washers (16) through hub (2), and shoe (10).

(4) Install eight washers (21) and new nuts (15) on bolts (14).

(5) Hold eight bolts (14). Torque nuts (15) to **480 INCH-POUNDS**. Use torque wrench, adapter, hinged handle, and sockets.

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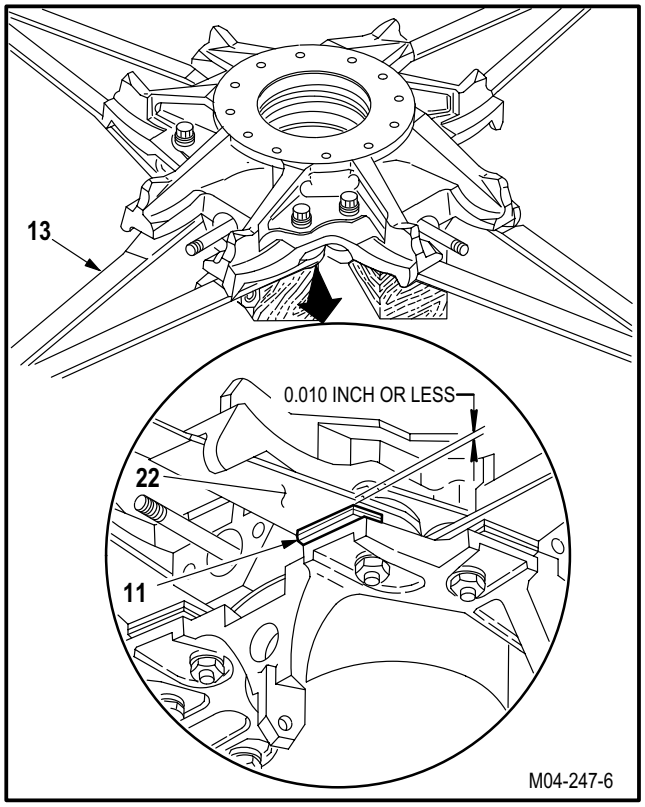
## 5.43. MAIN ROTOR HEAD ASSEMBLY (AVIM) - continued

m. **While holding strap pack (13) in horizontal position, measure and record gap between each leg (22) of strap pack (13) and hub plate (11).** Use gap setting gage.

(1) If any gap measures **0.010 INCH** or less, go to step n.

(2) If all gap measurements are greater than **0.010 INCH**, go to step o.




**NOTE**

- No more than three spacers may be installed at any single bolt hole.
- PLI washers will be reused if torque did not exceed the **480 INCH-POUNDS** in step l.

n. **Install third spacer (12) at any gap identified in step m.**

(1) Remove nut (15), washer (21), PLI washer (16), and bolt (14) (one at a time) on any gap identified in step m.

(2) Separate shoe (10) and spacers (12) from strap pack (13).

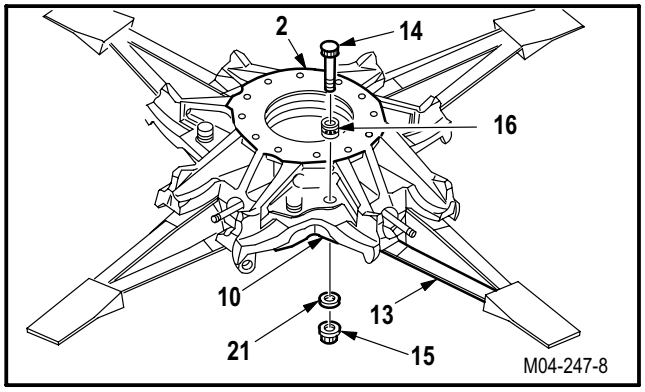
(3) Install third spacer (12) between strap pack (13) and original spacers (12).

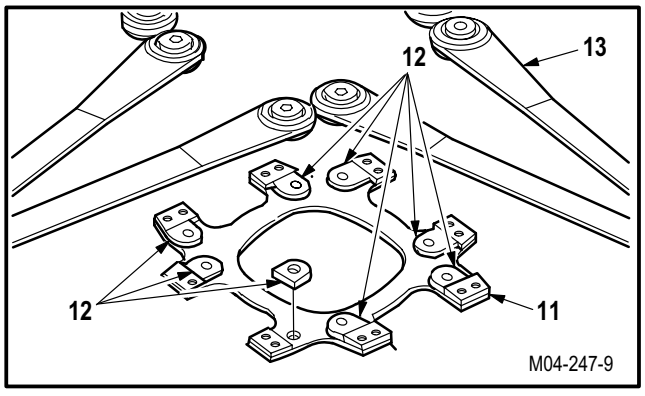
(4) Aline bolt hole in hub (2), strap pack (13), spacers (12), and shoe (10).

(5) Install bolt (14) through PLI washer (16), hub (2), strap pack (13), spacers (12), and shoe (10).

(6) Install nut (15) and washer (21) on bolt (14).

(7) Tighten nut (15) until washer (21) contacts shoe (10).

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## 5.43. MAIN ROTOR HEAD ASSEMBLY (AVIM) - continued

**CAUTION**

Do not continue to tighten nut after PLI washer no longer turns. Damage will occur to PLI washer, bolt, and nut. PLI washer, bolt, and nut must be replaced if over-torque occurs.

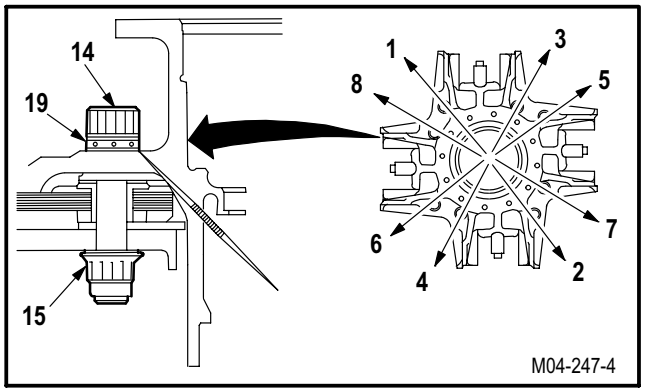
o. **Torque eight nuts (15) using PLI washer torquing method.**

(1) Torque nuts in a criss-cross manner until correct torque is reached.

(2) Hold eight bolts (14).

(3) Insert scriber in hole in outer washer (19). Use scriber.

(4) Tighten eight nuts (15) 1/8 turn at a time while turning outer washer (19). Use hinged handle, adapter, and socket.



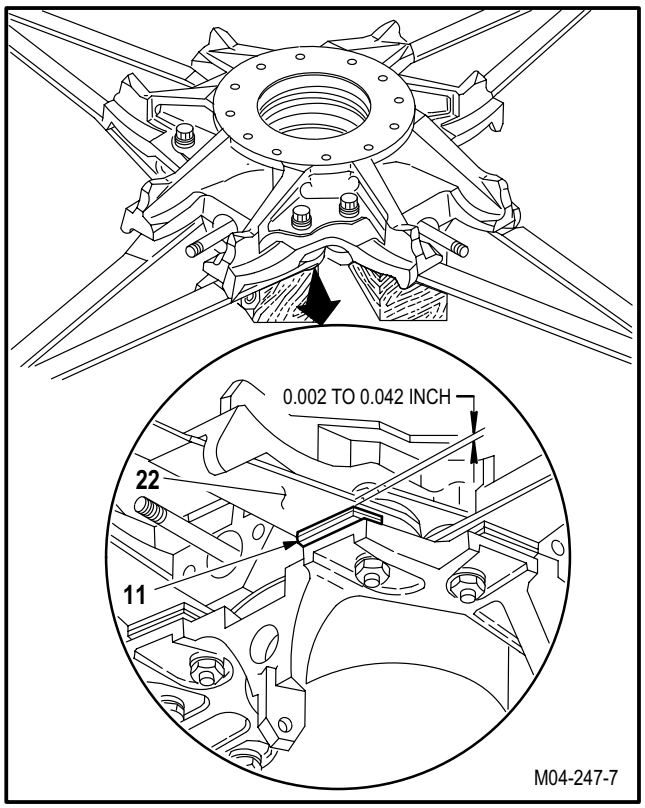

**NOTE**

The correct torque is reached when outer washer no longer turns.

(5) Continue to tighten eight nuts (15) until all nuts are correctly torqued.

p. **Measure gap between each strap pack leg (22) and hub plate (11).**

(1) Gap must be **0.002 to 0.042 INCH**. If any gap measurement is not between **0.002 and 0.042 INCH**, perform disassembly and inspection (para 5.42). Use gap setting gage.




q. **Inspect (QA).**

r. **Install main rotor feathering bearing housings (four places)** (para 5.37)**.**

END OF TASK

## 5.44. MAIN ROTOR DROOP STOP RING REMOVAL/INSTALLATION (AVIM)

5.44.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.44.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
0.000 - 6.000-inch outside micrometer caliper set (item 52, App H)
2 - 12-inch inside micrometer caliper (item 56, App H)

**Materials/Parts:**

Cloth (item 52, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.38 | Main rotor droop stop followers removed (four places) |

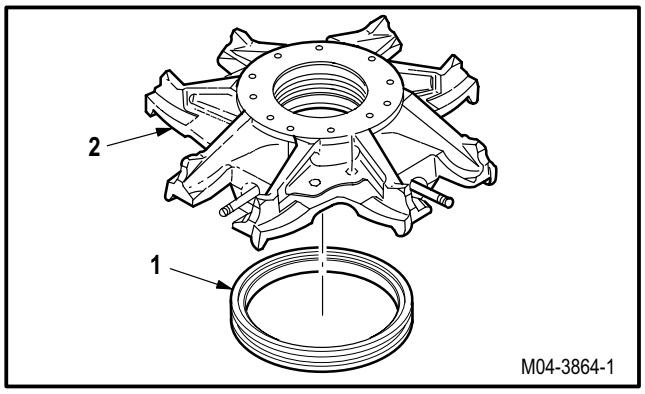
**WARNING**

**FLIGHT SAFETY PART**

**The main rotor droop stop ring is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

5.44.3. Removal

a. **Remove droop stop ring (1) from main rotor head (2).**




5.44.4. Cleaning

a. **Wipe droop stop follower, lower shoe, retaining ring, washer, spring, cup.** Use cloth (item 52, App F).

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## 5.44. MAIN ROTOR DROOP STOP RING REMOVAL/INSTALLATION (AVIM) - continued

5.44.5. Inspection

**NOTE**

All of the following inspection procedures apply to the main rotor droop stop ring.

a. **Check for cracks and distortion** (para 5.1)**.**

b. **Check for corrosion and pitting** (para 1.49)**.**

c. **Check for evidence of scoring and galling** (para 5.1)**.**

d. **Check droop stop ring for ring wall thickness** (para 5.1)**.**

e. **Check inside diameter (dimension A).**

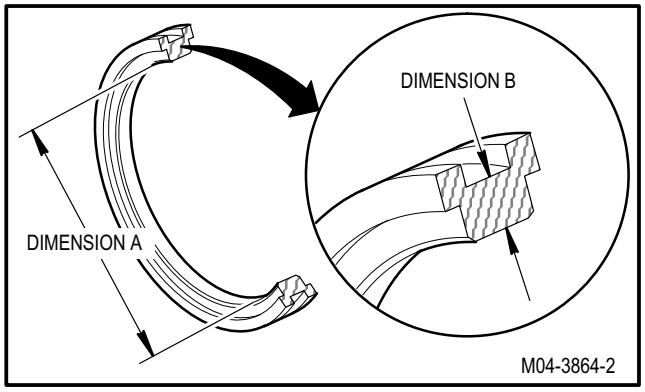
(1) Maximum diameter - **10.655 INCHES**. Use caliper.

f. **Check channel thickness (dimension B).**

(1) Minimum thickness - **0.340 INCHES**. Use caliper set.

g. **Check for scratches.**

(1) Superficial scratches measuring **0.010 INCH** in depth or less without any raised parent metal are allowed and may be repaired by blending at a 10:1 transition ratio.

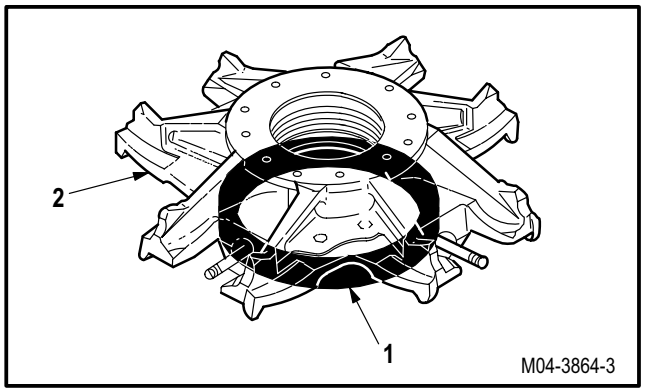



5.44.6. Installation

a. **Install ring (1) in head (2).**

b. **Inspect (QA).**

c. **Install main rotor droop stop followers (four places)** (para 5.38)**.**




END OF TASK

## 5.45. MAIN ROTOR UPPER SEAL RETAINER AND PLAIN ENCASED SEAL REMOVAL/INSTALLATION

5.45.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.45.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Aircraft maintenance platform (item 211, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
Adjustable air filtering respirator (item 262, App H)
Upper seal removal/installation tool kit (item 375, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Brush (item 34, App F)
Cloth (item 52, App F)
Depressor (item 70, App F)
Epoxy primer coating kit (item 78, App F)
Methyl ethyl ketone (item 124, App F)
Sealing compound (item 177, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.19 | Main rotor hub retention nut removed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor upper seal retainer and plain encased seal are a flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crew members and/or serious damage to the helicopter.**

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## 5.45. MAIN ROTOR UPPER SEAL RETAINER AND PLAIN ENCASED SEAL REMOVAL/INSTALLATION - continued

5.45.3. Removal

a. **Remove upper seal removal tool (1) from container (2).** Use seal removal/installation kit.

(1) Remove packing (3) and upper support shelf (4).

(2) Remove nut (5) from center bolt (6).

(3) Remove four support dowels (7).

(4) Remove phenolic installation ring (8) and removal plate (9).

(5) Remove puller support (10).

b. **Install upper seal removal tool (1) on main rotor head (11).** Use maintenance platform.

(1) Remove four detent pins (12) from puller support (10) allowing puller shoes (13) to move freely.

(2) Move four detent pins (12) over puller support (10).

(3) Fold puller shoes (13) toward center of head (11) and position puller support (10) on head (11).

(4) Fold puller shoes (13) out to engage retainer/seal (14).

(5) Install four detent pins (12) into puller support (10) and puller shoe (13).

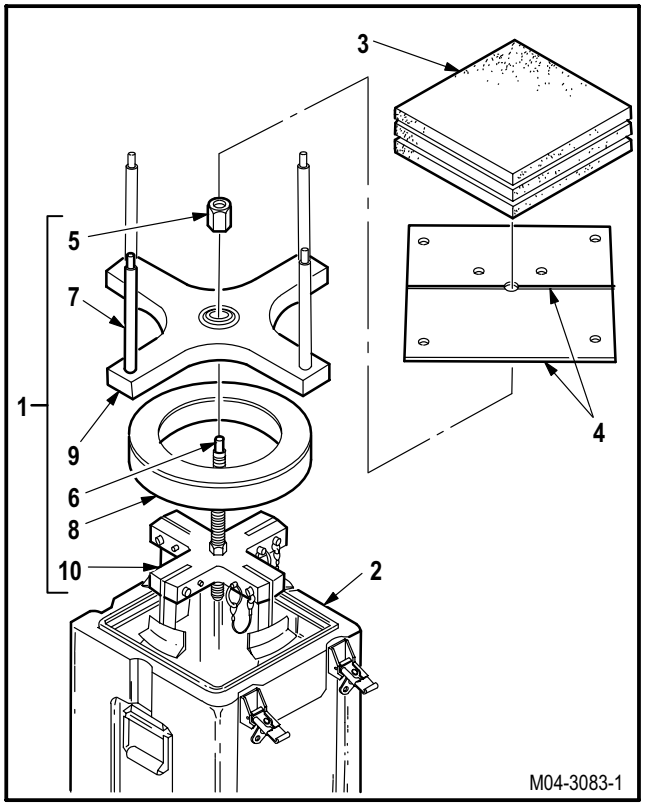
(6) Install four dowels (7) evenly around head (11).

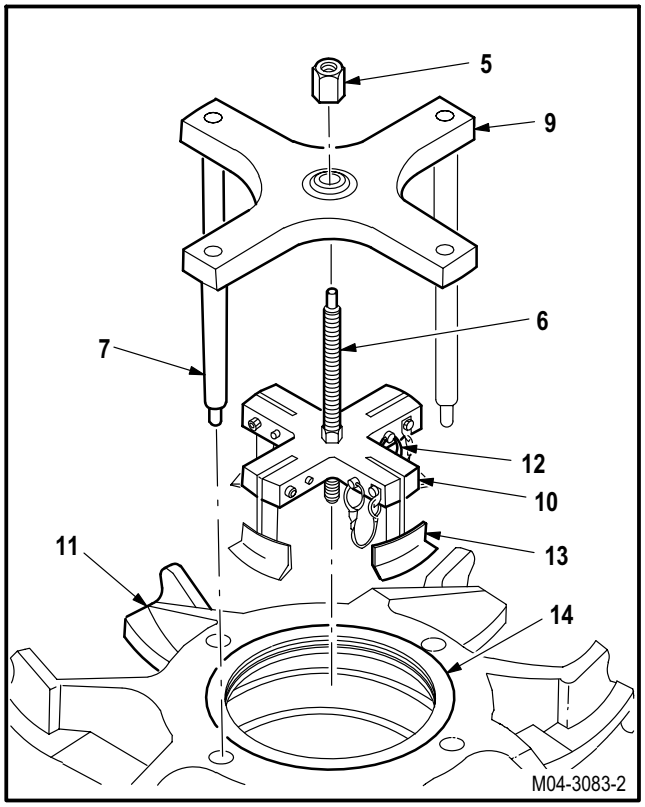
(7) Install plate (9) on center bolt (6) and four dowels (7).

(8) Adjust dowels (7) as necessary.

(9) Install nut (5) on center bolt (6).

c. **Tighten nut (5) until retainer/seal (14) is removed from the head (11).**

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## 5.45. MAIN ROTOR UPPER SEAL RETAINER AND PLAIN ENCASED SEAL REMOVAL/INSTALLATION - continued

5.45.4. Cleaning

a. **Remove grease from head above bearing rollers and retainer.** Use depressor (item 70, App F) and cloth (item 52, App F).

**CAUTION**

Damage to the main rotor head may occur if main rotor head grease is contaminated. Avoid contaminating grease with old sealant.

b. **Clean old adhesive from steel shell of main rotor head.** Use depressor (item 70, App F) and methyl ethyl ketone (item 124, App F).

5.45.5. Inspection

a. **Check main rotor head for nicks, scratches, and gouges.** None allowed.

b. **Check outside diameter of retainer for grooves and nicks.**

(1) Blend out, maximum **0.010 INCH**.

c. **Check head and retainer for corrosion** (para 1.49)**.**

d. **Check components for cracks.** None allowed.

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## 5.45. MAIN ROTOR UPPER SEAL RETAINER AND PLAIN ENCASED SEAL REMOVAL/INSTALLATION - continued

5.45.6. Installation

**CAUTION**

To prevent damage to bonded elastomer inner seal, do not allow primer to come in contact with elastomer material.

a. **Apply a thin coat of primer to steel shell (15).** Use epoxy primer coating kit (item 78, App F).

(1) Allow primer to cure at room temperature for **2 HOURS** prior to installation of retainer/seal (14). Use brush (item 34, App F).

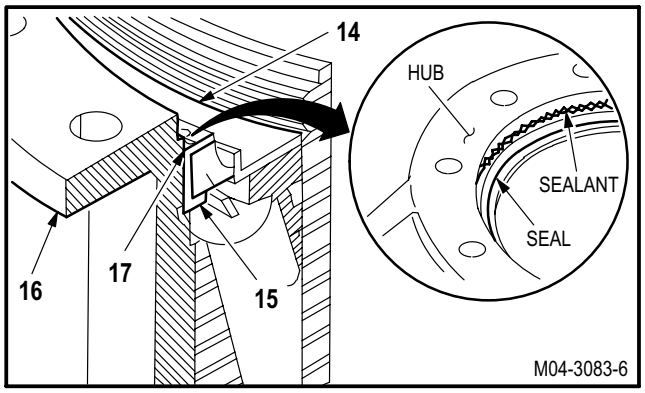
b. **Install retainer/seal (14).**

(1) Position retainer/seal (14) against head inner wall (16).

(2) Install retainer/seal (14). Use upper seal installation kit phenolic ring and mallet.

(3) Apply continuous bead of sealant (17) between head inner wall (16) and steel shell (15). Use sealing compound (item 177, App F) and brush (item 34, App F).

c. **Inspect (QA).**

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## 5.45. MAIN ROTOR UPPER SEAL RETAINER AND PLAIN ENCASED SEAL REMOVAL/INSTALLATION - continued

**NOTE**

Ensure that seal removal tool is clean and free of grease before storage.

d. **Place upper seal removal tool (1) in container (3).**

(1) Place puller support (10) in bottom of container (2).

(2) Place plate (9) and phenolic installation ring (8) in container (2).

(3) Install four dowels (7) in plate (9).

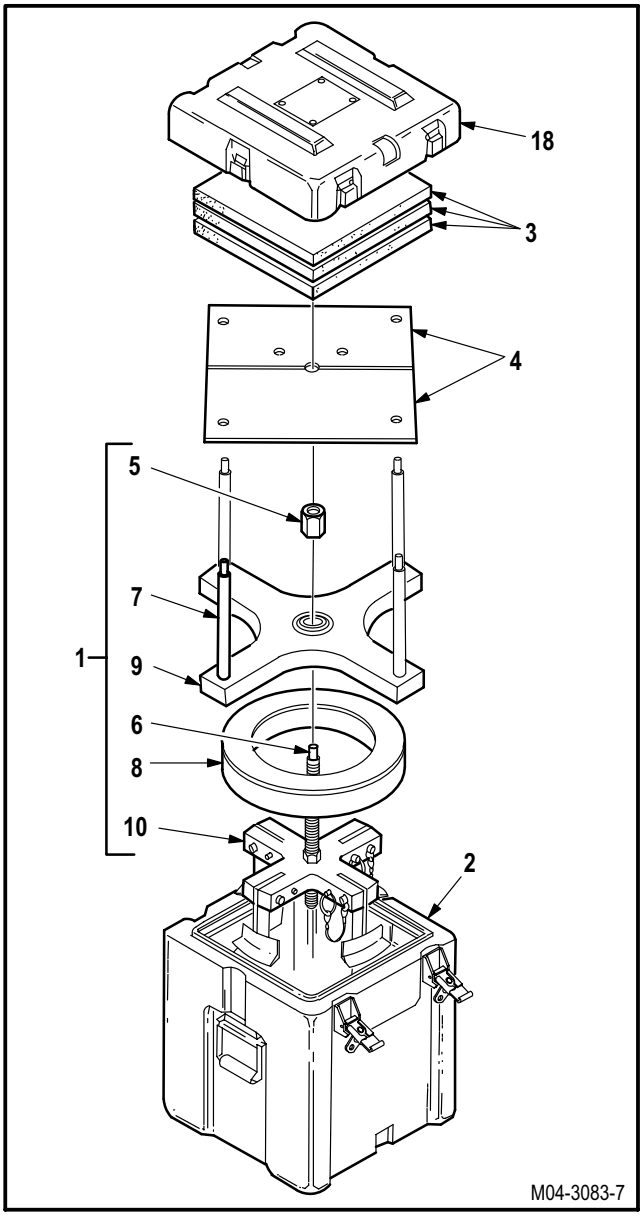
(4) Install nut (5) on center bolt (6).

(5) Install upper support shelf (4) and packing (3) in container (2).

(6) Install and secure container lid (18).

e. **Install main rotor hub retention nut** (para 5.20)**.**

f. **Install air data system (ADS) mast** (para 6.90)**.**




END OF TASK

## 5.46. MAIN ROTOR LOWER OIL SEAL AND OIL SEAL RETAINER REPLACEMENT (AVIM)

5.46.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.46.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Sling set kit (item 194, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
Adjustable air filtering respirator (item 262, App H)
1/4-inch - 20 socket head cap screw (item 274, App H) (4)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
Two persons to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Cloth (item 52, App F)
Depressor (item 70, App F)
Grease (item 87, App F)
Methyl ethyl ketone (item 124, App F)
Pad (item 130, App F)
Sealing compound primer (item 146, App F)
Sealing compound (item 167, App F)

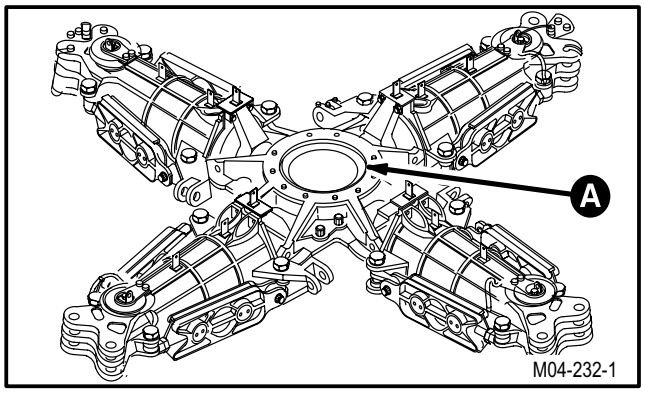
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.48 | Main rotor electrical brush and electrical brush holder removed |

**WARNING**

**FLIGHT SAFETY PART**

- **The main rotor lower oil seal and oil seal retainer are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Main rotor head weighs approximately 675 pounds. Use crane to invert main rotor head. Failure to do so could result in serious injury. If injury occurs, seek medical aid.**

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## 5.46. MAIN ROTOR LOWER OIL SEAL AND OIL SEAL RETAINER REPLACEMENT (AVIM) - continued

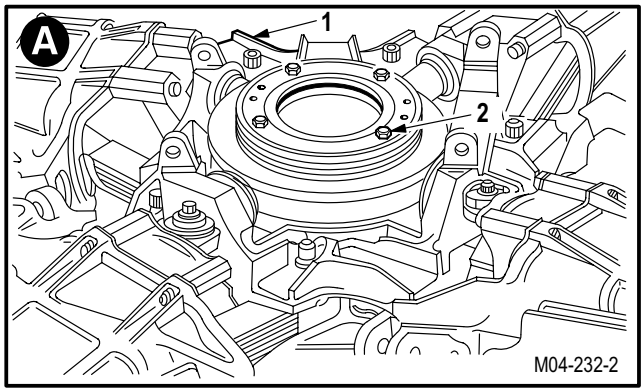
**CAUTION**

Do not allow pitch housings to be unsupported while inverting Failure to do so will result in damage to strap packs and feathering bearings.

5.46.3. Removal

a. **With assistants, position rotor head (1) flat side down on suitable support.** Use sling set kit.

b. **Remove four screw plugs (2).**

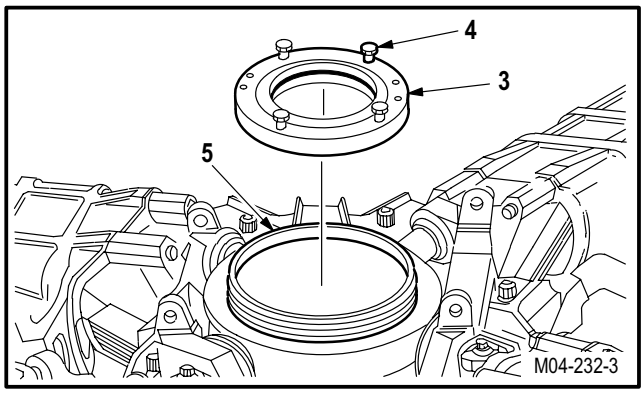



c. **Remove main rotor lower oil seal retainer (3).**

(1) Install four setscrews (4) and tighten until they bottom against lower bearing. Use screws.

(2) Continue tightening each setscrew 1/2 turn until retainer (3) is free of hub (5).

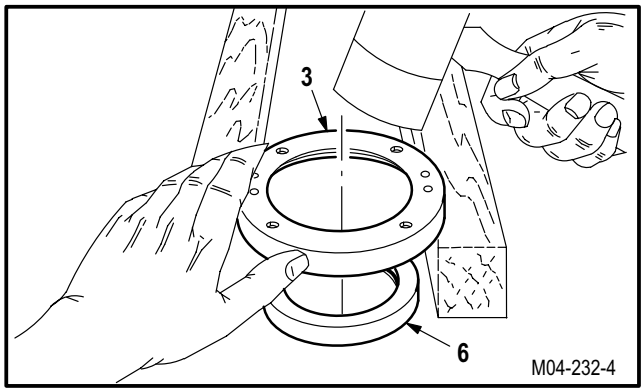
(3) Remove four setscrews (4) from retainer (3).




d. **Remove and discard main rotor lower oil seal (6) from retainer (3).**

(1) Support retainer (3), curved side down, on blocks.

(2) Tap around end of seal (6) until it drops from retainer (3). Use mallet.




5.46.4. Cleaning

a. **Remove grease from lower oil seal retainer and hub liner.** Use depressor (item 70, App F), methyl ethyl ketone (item 124, App F), and cloth (item 52, App F) (para 1.47).

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## 5.46. MAIN ROTOR LOWER OIL SEAL AND OIL SEAL RETAINER REPLACEMENT (AVIM) - continued

5.46.5. Inspection

a. **Check lower oil seal retainer for nicks, scratches, and gouges.**

(1) Damage not to exceed depth of **0.032 INCH** maximum.

b. **Check lower oil seal retainer for corrosion** (para 1.49)**.**

c. **Check retainer for distortion.**

(1) Lower surface to be flat within **0.030 INCH**.

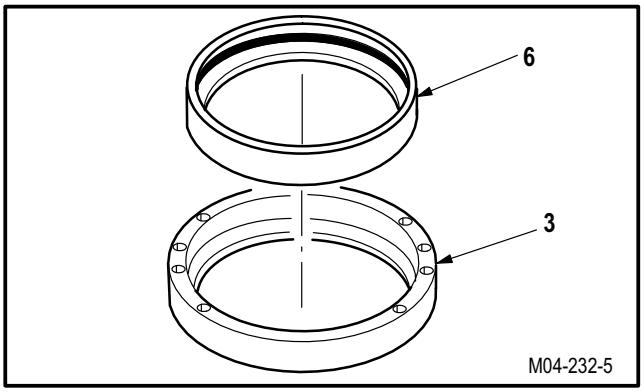
5.46.6. Installation

a. **Apply primer to exterior mating surface of retainer (3).** Use sealing compound primer (item 146, App F).

(1) Prevent primer from getting on aircraft components, interior surfaces of retainer (3), or lower oil seal (6).

(2) Allow to dry for **30 MINUTES**.

(3) Lightly scuff retainer (3) contact surface to prep surface for bonding. Use pad (item 130, App F).



b. **Apply a thin uniform layer of sealing compound to outer surface of retainer (3) immediately prior to installation.** Use sealing compound (item 167, App F).

(1) Allow sealing compound to cure undisturbed for **2 HOURS** at ambient temperatures of 70 to 77 °F (21 to 25 °C).

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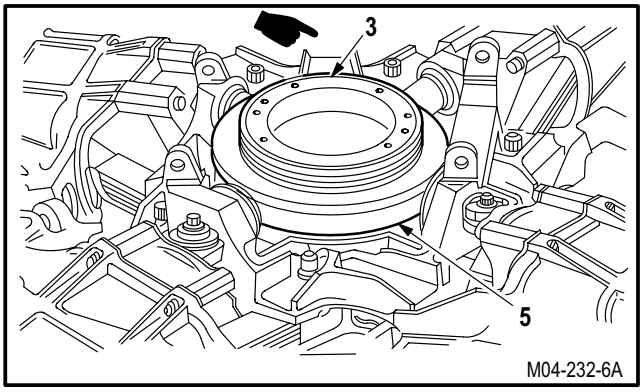
## 5.46. MAIN ROTOR LOWER OIL SEAL AND OIL SEAL RETAINER REPLACEMENT (AVIM) - continued

c. **Install main rotor lower oil seal retainer (3) in hub (5).**

(1) Position retainer (3), with curved side down, in hub (5).

(2) Tap retainer (3) in circular direction until retainer is seated in hub (5). Use mallet.



**NOTE**

Over-packing of the grease cavity between the lower main rotor head bearing and the lower oil seal will cause excessive main rotor head grease leakage. If grease replenishment is required, leave sufficient space in the grease cavity for thermal expansion and/or churning of the grease.

d. **Replenish cavity above bearing to top edge of bearing inner race.** Use grease (item 87, App F).

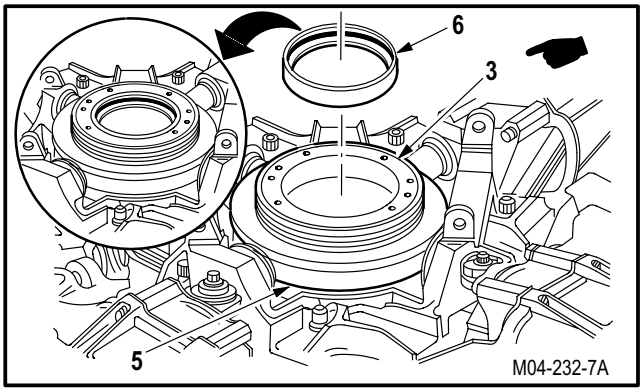
**NOTE**

Ensure that seal lip is properly positioned.

e. **Install new main rotor lower oil seal (6) in seal retainer (3).**

(1) Position seal (6) on top of retainer (3) with curved side up.

(2) Tap seal (6) in circular direction until seal is seated in retainer (3). Use mallet.

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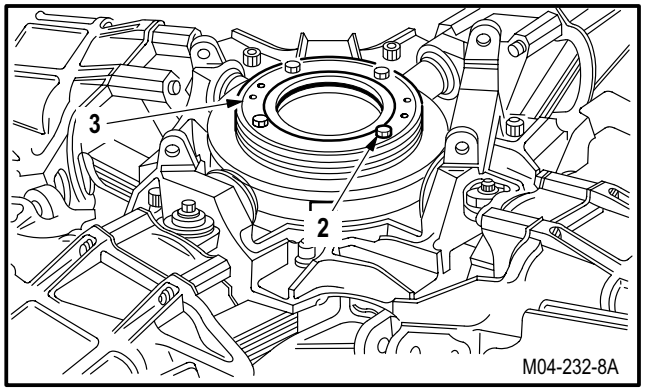
## 5.46. MAIN ROTOR LOWER OIL SEAL AND OIL SEAL RETAINER REPLACEMENT (AVIM) - continued

f. **Install four screw plugs (2) in retainer (3).**

g. **Inspect (QA).**

h. **Install main rotor electrical brush and electrical holder** (para 5.48)**.**




END OF TASK

## 5.46A. MAIN ROTOR LOWER OIL SEAL RETAINER RESEATING

5.46A.1. Description

This task covers: Unseating. Cleaning. Inspection. Reseating.

5.46A.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
Adjustable air filtering respirator (item 262, App H)
1/4-inch - 20 socket head cap screw (item 274, App H) (4)
Main rotor head lower oil seal retainer installation tool (figure D-468, App D)

**Materials/Parts:**

Cloth (item 52, App F)
Depressor (item 70, App F)
Grease (item 87, App F)
Methyl ethyl ketone (item 124, App F)
Pad (item 130, App F)
Sealing compound primer (item 146, App F)
Sealing compound (item 167, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

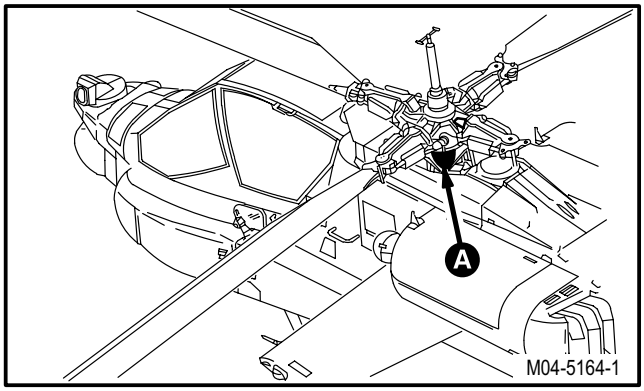
| Ref | Condition |
|---|---|
| 5.48 | Main rotor electrical brush and electrical brush holder removed |

5.46A.3. Unseating

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor lower oil seal and oil seal retainer are flight safety parts. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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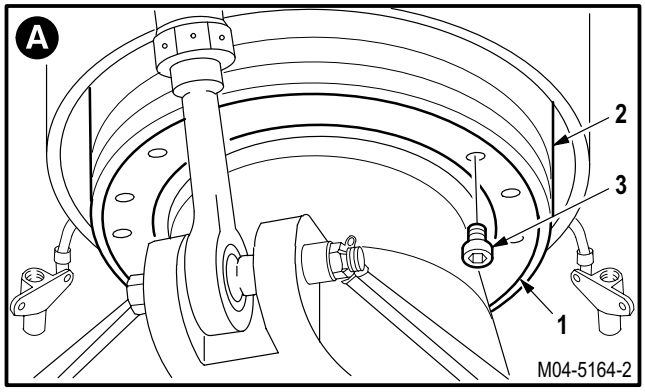
## 5.46A. MAIN ROTOR LOWER OIL SEAL RETAINER RESEATING - continued

a. **Unseat main rotor lower oil seal retainer (1) from hub (2).**

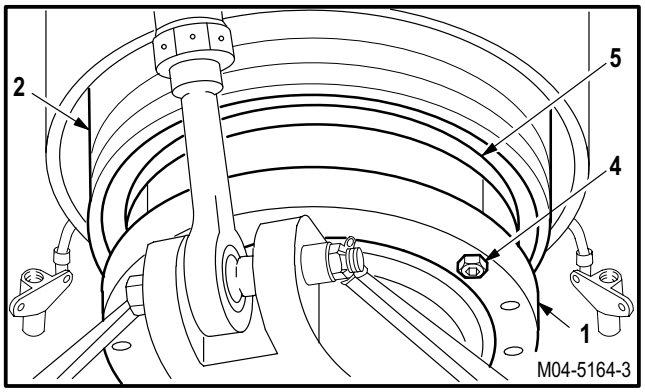
(1) Remove four screw plugs (3).




(2) Install four setscrews (4) and tighten until they bottom against lower bearing (5). Use screws.

(3) Continue tightening each setscrew 1/2 turn until retainer (1) is free of hub (2).

(4) Remove four setscrews (4) from retainer (1).

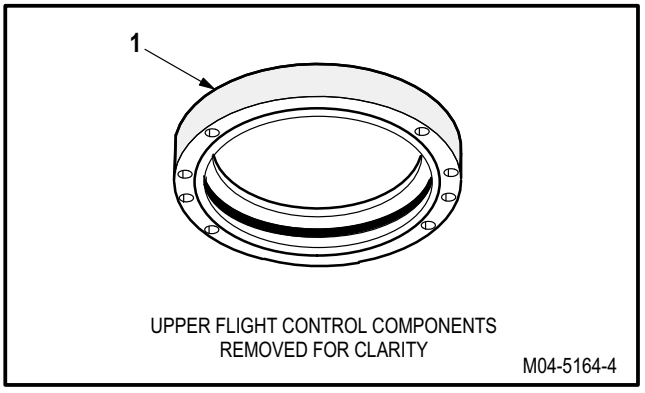



5.46A.4. Cleaning

a. **Remove sealing compound from lower oil seal retainer and hub.** Use depressor (item 70, App F), methyl ethyl ketone (item 124, App F), and cloth (item 52, App F) (para 1.47).

b. **Remove grease from lower oil seal retainer and hub liner.** Use depressor (item 70, App F), methyl ethyl ketone (item 124, App F), and cloth (item 52, App F) (para 1.47).

c. **Lightly scuff retainer (1) contact surface to prep surface for bonding.** Use pad (item 130, App F).

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## 5.46A. MAIN ROTOR LOWER OIL SEAL RETAINER RESEATING - continued

5.46A.5. Inspection

**NOTE**

If the seal or seal retainer requires replacement, the main rotor head must be removed (para 5.46).

a. **Check lower oil seal retainer for nicks, scratches, and gouges.**

(1) Damage not to exceed depth of **0.032 INCH** maximum.

b. **Check lower oil seal retainer for corrosion** (para 1.49)**.**

c. **Check retainer for distortion.**

(1) Lower surface to be flat within **0.030 INCH**.

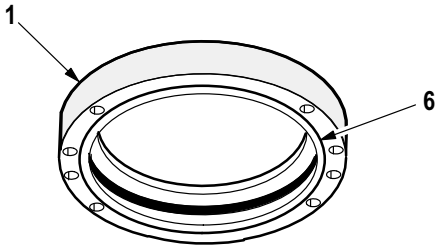
5.46A.6. Reseating

a. **Apply primer to exterior mating surface of retainer (1).** Use sealing compound primer (item 146, App F).

(1) Prevent primer from getting on aircraft components, interior surfaces of retainer (1), or lower oil seal (6).

(2) Allow to dry for **30 MINUTES**.

(3) Lightly scuff retainer (1) contact surface to prep surface for bonding. Use pad (item 130, App F).




UPPER FLIGHT CONTROL COMPONENTS REMOVED FOR CLARITY

M04-5164-5

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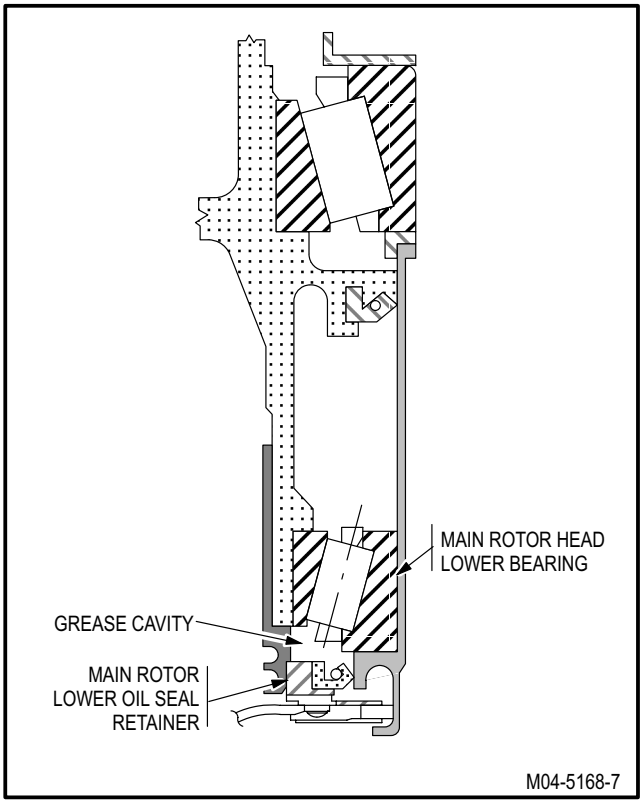
## 5.46A. MAIN ROTOR LOWER OIL SEAL RETAINER RESEATING - continued

b. **Replenish grease cavity directly beneath main rotor head lower bearing as required.** Use grease (item 87, App F).

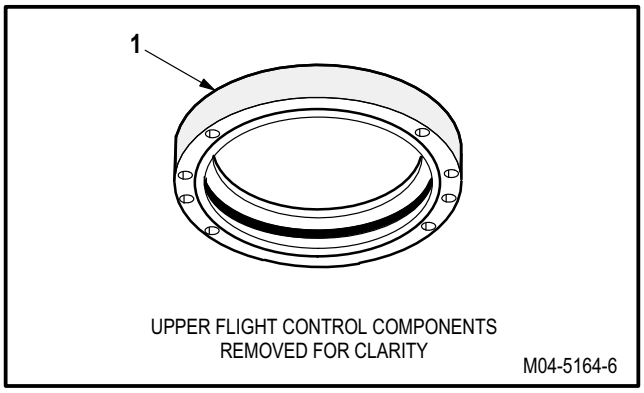
**NOTE**

Over-packing of the grease cavity between the main rotor head lower bearing and the lower oil seal will cause excessive main rotor head grease leakage. If grease replenishment is required, leave sufficient space in the grease cavity for thermal expansion and/or churning of the grease.



c. **Apply a thin uniform layer of sealing compound to outer surface of retainer (1) immediately prior to installation.** Use sealing compound (item 167, App F).

(1) Allow sealing compound to cure undisturbed for **2 HOURS** at ambient temperatures of 70 to 77 °F (21 to 25 °C).

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**5.46A. MAIN ROTOR LOWER OIL SEAL RETAINER RESEATING - continued**

**NOTE**

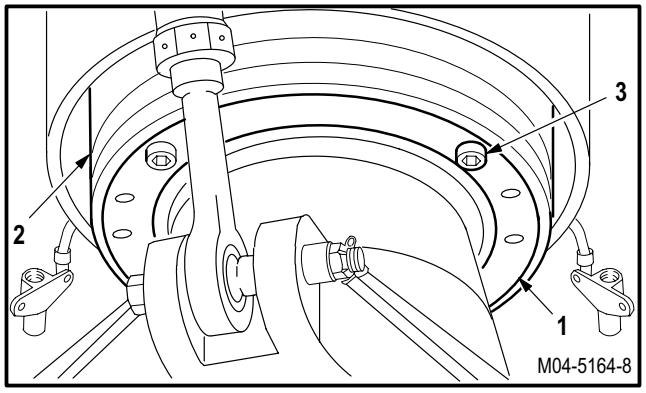
Ensure that seal lip is properly positioned and electrical brush holder mounting holes are alined with bonding jumpers.

d. **Reseat main rotor lower oil seal retainer (1) in hub (2).**

(1) Position retainer (1) in hub (2).

(2) Tap retainer (1) in circular direction until retainer is seated in hub (2). Use mallet and main rotor head lower oil seal retainer installation tool (figure D-468, App D).

(3) Install four screw plugs (3) in retainer (1).




e. **Inspect (QA).**

f. **Install main rotor electrical brush and electrical holder** (para 5.48)**.**

END OF TASK

## 5.46B. MAIN ROTOR UPPER BEARING INNER RACE/ROLLERS GREASE REPACKING (AVIM)

5.46B.1. Description

This task covers: Removal. Cleaning. Inspection. Servicing. Installation.

5.46B.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Bearing lubricant packer (item 204, App H)
Adjustable air filtering respirator (item 262, App H)

**Materials/Parts:**

Cloth (item 52, App F)
Depressor (item 70, App F)
Cotton gloves (item 82, App F)
Grease (item 87, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 55-1500-322-24

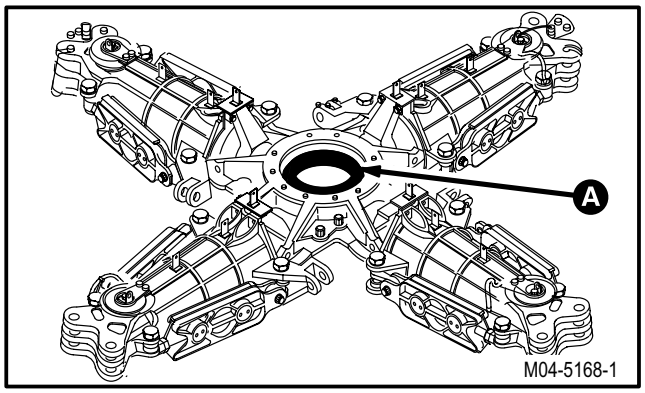
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.21 | Main rotor head removed |
| 5.45 | Main rotor seal retainer removed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor upper bearing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




**CAUTION**

- Wear cotton gloves when handling main rotor upper bearing inner race/ rollers. Failure to do so will result in damage to bearing.
- Upper bearing inner race/rollers must be protected from local environmental contamination and external impact during inspection and other handling. Failure to do so will result in damage to bearing.

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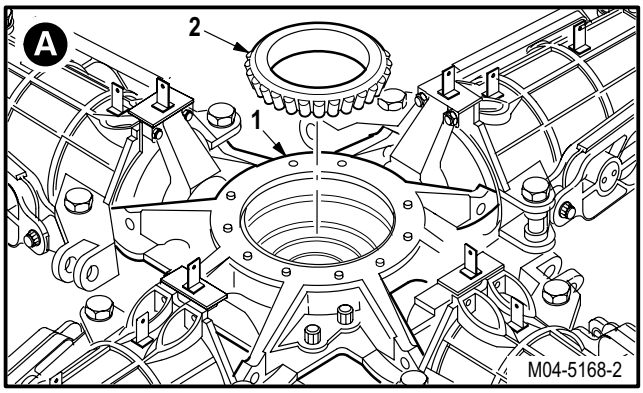
## 5.46B. MAIN ROTOR UPPER BEARING INNER RACE/ROLLERS GREASE REPACKING (AVIM) - continued

5.46B.3. Removal

a. **Wipe main rotor head (1) upper surface using outward motion away from main rotor upper bearing inner race/rollers (2).** Use cloth (item 52, App F).




**CAUTION**

After removal, upper bearing inner race/rollers must be placed on a clean, dry, dust-free surface. Failure to do so will result in damage to bearing.

b. **Remove main rotor upper bearing inner race/rollers (2) from main rotor head (1).** Use gloves (item 82, App F).

**NOTE**

If upper bearing inner race rollers and head upper cavity grease has been damaged by heat (discoloration) or contaminated by metal, main rotor head is unserviceable.

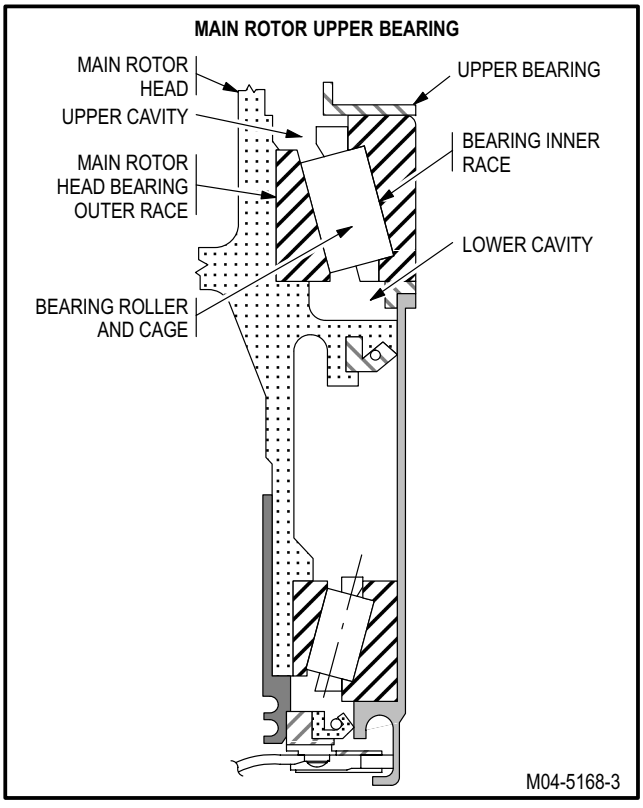
5.46B.4. Cleaning

a. **Clean grease from upper cavity.** Use cloth (item 52, App F) and depressor (item 70, App F).

b. **Clean grease from lower cavity.** Use cloth (item 52, App F) and depressor (item 70, App F)

c. **Clean grease from head outer race surfaces.** Use cloth (item 52, App F).

d. **Clean grease from bearing rollers and roller cage, inner race, and bearing surfaces.** Use cloth (item 52, App F).

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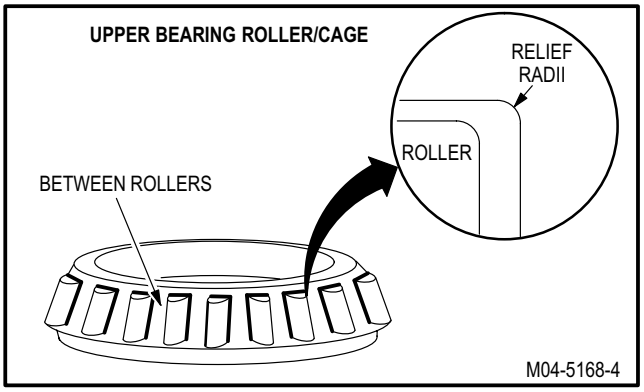
## 5.46B. MAIN ROTOR UPPER BEARING INNER RACE/ROLLERS GREASE REPACKING (AVIM) - continued

5.46B.5. Inspection

**NOTE**

- If bearing rollers or head outside race is unserviceable, then main rotor head is unserviceable.
- Manufacture radius scribes in accordance with TM 55-1500-322-24.




a. **Check cage between rollers and all relief radii for cracks** (TM 55-1500-322-24)**.** None allowed.

b. **Check outer race, inner race, rollers, and bearing surfaces for cracks, inclusions, and spalling** (TM 55-1500-322-24)**.** None allowed.

c. **Check non-functional surfaces for pitting/corrosion** (TM 55-1500-322-24)**.**

(1) Damage not to exceed three **0.060 INCH** diameter pits maximum in any **0.25 SQUARE INCH** diameter area, not to exceed depth of **0.015 INCH** maximum. Use 0.060 radius scribe.

d. **Check rollers and bearing race surfaces for pitting/corrosion** (TM 55-1500-322-24)**.**

(1) Damage not to exceed one **0.025 INCH** diameter pit maximum in any **1.0 INCH** diameter area. Use 0.060 radius scribe.

e. **Check rollers and bearing race surfaces for circumference and axial scratches** (TM 55-1500-322-24)**.**

(1) Circumference scratches not to exceed width of **0.020 INCH** maximum and length of **0.5 INCH** maximum in any **1.0 INCH** diameter area. Use 0.050 radius scribe.

(2) Axial scratches are not allowed.

f. **Check rollers and bearing race surfaces for indentations** (TM 55-1500-322-24)**.**

(1) Damage not to exceed one indent, width of **0.030 INCH** maximum and length of **0.080 INCH** maximum in any **1.0 INCH** diameter area. Use 0.080 radius scribe.

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## 5.46B. MAIN ROTOR UPPER BEARING INNER RACE/ROLLERS GREASE REPACKING (AVIM) - continued

5.46B.6. Servicing

a. **Repack main rotor head lower cavity** (TM 55-1500-322-24)**.** Use grease (item 87, App F).

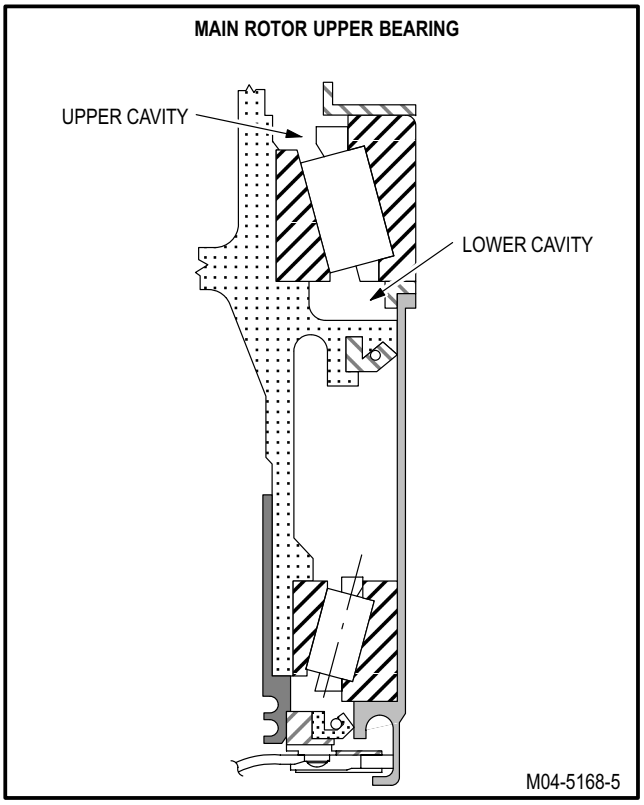
b. **Inspect (QA).**

**NOTE**

A small amount of grease overfill on top area of bearing roller and cage is acceptable.

c. **Repack upper bearing inner race/rollers and cage** (TM 55-1500-322-24)**.** Use grease (item 87, App F) and lubricant packer.

d. **Inspect (QA).**




5.46B.7. Installation

**CAUTION**

Do not pack grease in upper cavity, as this will result in damage to bearing.

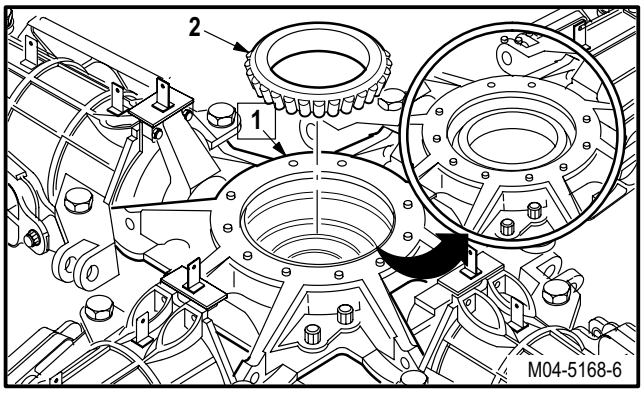
a. **Install upper bearing inner race/rollers (2) on main rotor head (1).**

**NOTE**

Rotate bearing back and forth to aline during installation.

(1) Aline and install upper bearing (2) in head (1).

(2) Remove excess grease from top of upper bearing (2). Use cloth (item 52, App F) and depressor (item 70, App F).

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**5.46B. MAIN ROTOR UPPER BEARING INNER RACE/ROLLERS GREASE REPACKING (AVIM) - continued**

b. **Inspect (QA).**

c. **Install main rotor seal retainer** (para 5.45)**.**

d. **Install main rotor head** (para 5.21)**.**

END OF TASK

## 5.46C. MAIN ROTOR LOWER BEARING GREASE REPACKING (AVIM)

5.46C.1. Description

This task covers: Removal. Cleaning. Inspection. Servicing. Installation

5.46C.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
Adjustable air filtering respirator (item 262, App H)
1/4-inch - 20 socket head cap screw (item 274, App H)

**Materials/Parts:**

Cloth (item 50, App F)
Cloth (item 52, App F)
Depressor (item 70, App F)
Grease (item 87, App F)
Methyl ethyl ketone (item 124, App F)
Pad (item 130, App F)
Sealing compound primer (item 146, App F)
Sealing compound (item 167, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.46B | Main rotor upper bearing inner race/rollers removed |

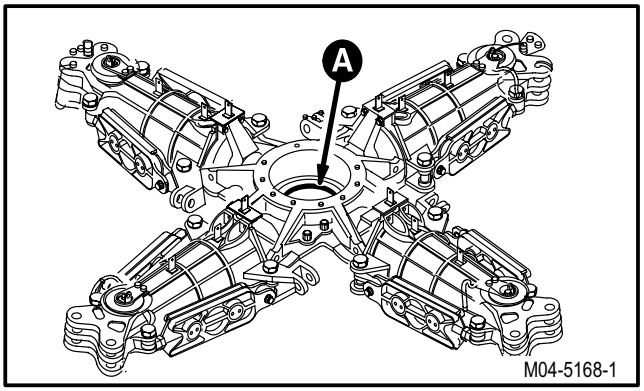
**WARNING**

**FLIGHT SAFETY PART**

**The main rotor lower bearing is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**CAUTION**

- Wear cotton gloves when handling main rotor lower bearing inner race/ rollers. Failure to do so will result in damage to bearing.
- Lower bearing inner race/rollers must be protected from local environmental contamination and external impact during inspection and other handling. Failure to do so will result in damage to bearing.

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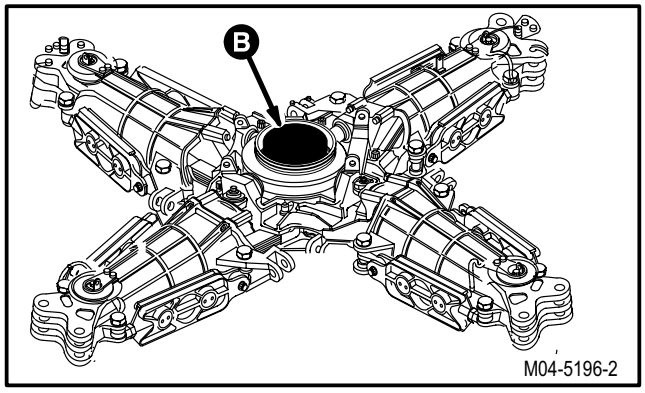
## 5.46C. MAIN ROTOR LOWER BEARING GREASE REPACKING (AVIM) - continued

5.46C.3. Removal

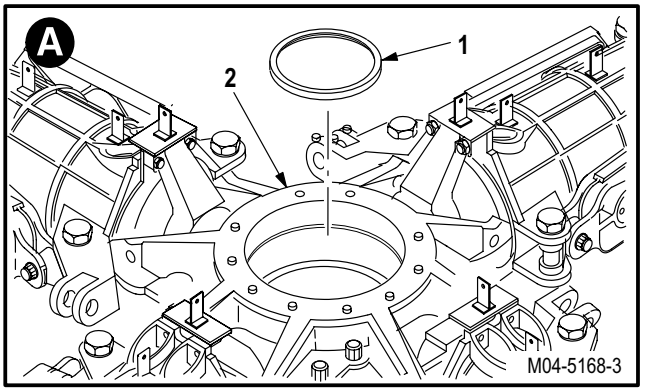
**CAUTION**

Be sure to keep spacer with same S/N main rotor head. If spacer is lost or damaged, main rotor head must be returned to depot.




a. **Remove spacer (1) from upper bearing cavity of main rotor head (2).**

b. **Remove main rotor lower seal and oil seal retainer from main rotor head** (para 5.46)**.**



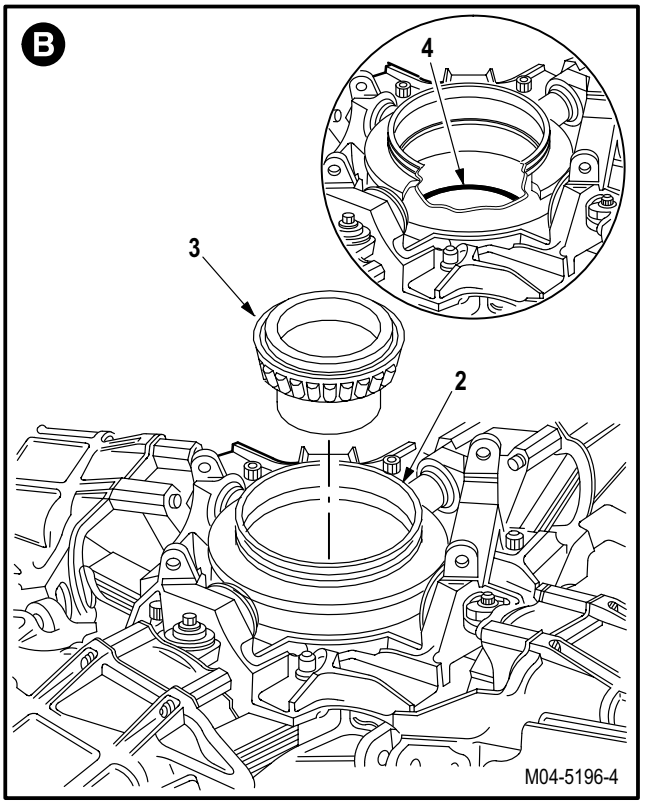

**CAUTION**

Use care not to damage or unseat center seal when removing mast liner/lower bearing from hub. If center seal is damaged or unseated, the main rotor head must be serviced at depot.

**NOTE**

The lower bearing is pressed on the mast liner.

c. **Remove mast liner/lower bearing (3) from head (2).** Gently pull liner/bearing (3) out of head (2) using care not to unseat or damage center seal (4).

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## 5.46C. MAIN ROTOR LOWER BEARING GREASE REPACKING (AVIM) - continued

5.46C.4. Cleaning

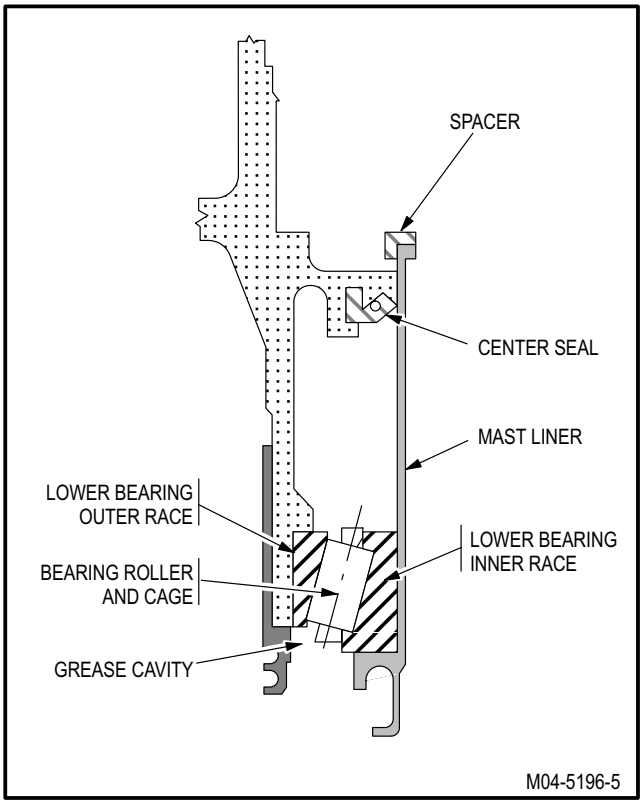
a. **Clean grease from spacer.** Use cloth (item 52, App F).

b. **Clean grease from hub cavity.** Use cloth (item 52, App F) and depressor (item 70, App F).

c. **Clean grease from center seal.** Use cloth (item 52, App F).

d. **Clean grease from lower bearing outer race.** Use cloth (item 52, App F).

e. **Clean grease from bearing rollers and roller cage, inner race, bearing surfaces, and mast liner.** Use cloth (item 52, App F).




5.46C.5. Inspection

**NOTE**

If the mast liner needs replacement, the main rotor head will need to be serviced at depot.

a. **Check center seal for damage to sealing lip of seal.** None allowed.

b. **Check mast liner where center seal and lower seal ride for excessive wear.**

(1) Blend out, maximum **0.010 INCH**.

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**5.46C. MAIN ROTOR LOWER BEARING GREASE REPACKING (AVIM) - continued**

**NOTE**

- If bearing rollers or head outside race is unserviceable, then main rotor head is unserviceable.
- Manufacture radius scribes in accordance with TM 55-1500-322-24.

c. **Check cage between rollers and all relief radii for cracks** (TM 55-1500-322-24)**.** None allowed.

d. **Check outer race, inner race, rollers, and bearing surfaces for cracks, inclusions, and spalling** (TM 55-1500-322-24)**.** None allowed.

e. **Check non-functional surfaces for pitting/corrosion** (TM 55-1500-322-24)**.**

(1) Damage not to exceed three **0.060 INCH** diameter pits maximum in any **0.25 SQUARE INCH** diameter area, not to exceed depth of **0.015 INCH** maximum. Use 0.060 radius scribe.

f. **Check rollers and bearing race surfaces for pitting/corrosion** (TM 55-1500-322-24)**.**

(1) Damage not to exceed one **0.025 INCH** diameter pit maximum in any **1.0 INCH** diameter area. Use 0.060 radius scribe.

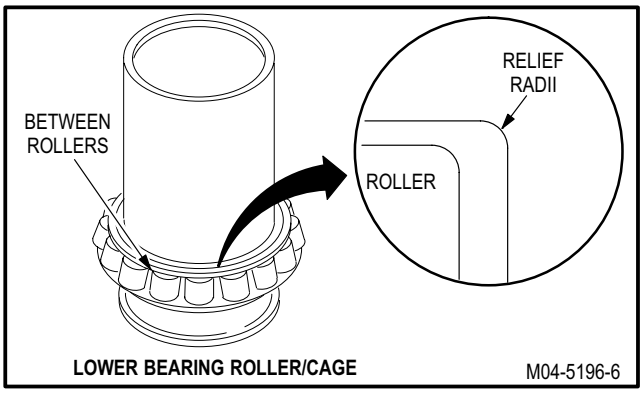
g. **Check rollers and bearing race surfaces for circumference and axial scratches** (TM 55-1500-322-24)**.**

(1) Circumference scratches not to exceed width of **0.020 INCH** maximum and length of **0.5 INCH** maximum in any **1.0 INCH** diameter area. Use 0.050 radius scribe.

(2) Axial scratches are not allowed.

h. **Check rollers and bearing race surfaces for indentations** (TM 55-1500-322-24)**.**

(1) Damage not to exceed one indent, width of **0.030 INCH** maximum and length of **0.080 INCH** maximum in any **1.0 INCH** diameter area. Use 0.080 radius scribe.

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## 5.46C. MAIN ROTOR LOWER BEARING GREASE REPACKING (AVIM) - continued

5.46C.6. Servicing

**NOTE**

A small amount of grease overfill on top area of bearing roller and cage is acceptable.

a. **Repack lower bearing inner race/rollers and cage** (TM 55-1500-322-24)**.** Use grease (item 87, App F).

b. **Apply a bead of grease between top of lower bearing and mast liner.** Use grease (item 87, App F).

c. **Apply a thin layer of grease on mast liner where center seal rides.** Use grease (item 87, App F).

d. **Apply a thin layer of grease to sealing surface of center seal.** Use grease (item 87, App F).

e. **Inspect (QA).**

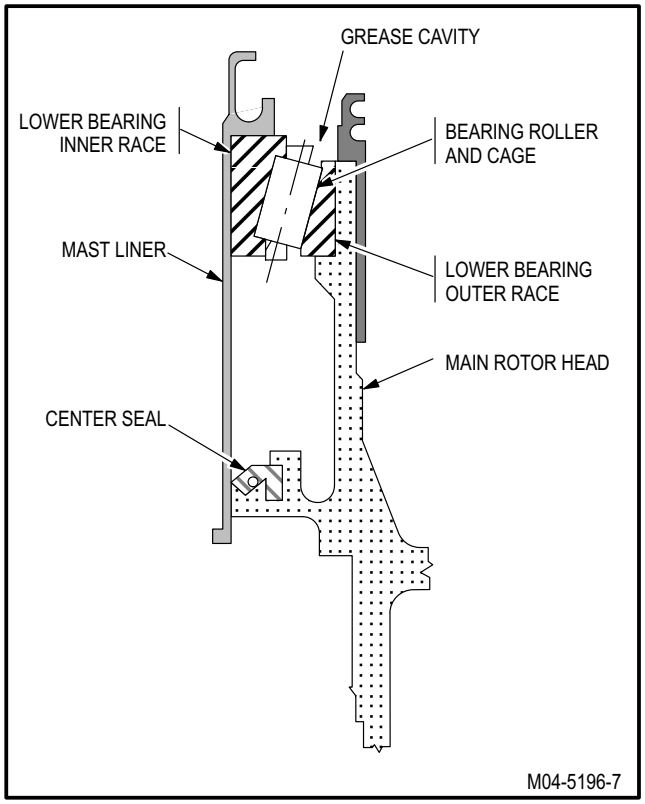
5.46C.7. Installation

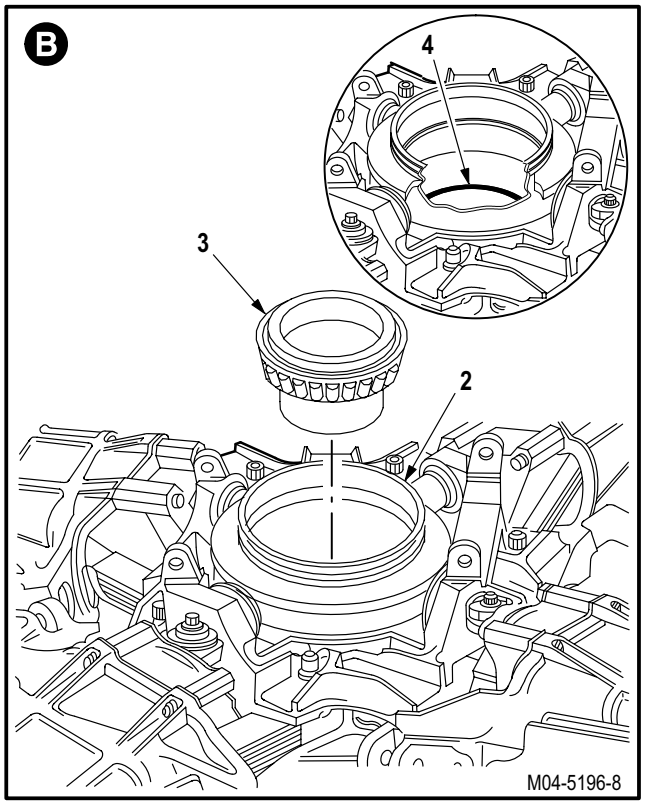
**CAUTION**

Use care not to damage or unseat center seal when installing top of mast liner through center seal. If center seal is damaged or unseated, the main rotor head must be serviced at depot.

a. **Gently install mast liner/lower bearing (3) into hub (2).** Use care not to damage or unseat center seal (4).

b. **Inspect (QA).**

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## 5.46C. MAIN ROTOR LOWER BEARING GREASE REPACKING (AVIM) - continued

c. **Pack grease on bearing rollers to top edge of inner race.** Use grease (item 87, App F).

d. **Inspect (QA).**

e. **Install main rotor lower seal and oil seal retainer in main rotor hub** (para 5.46)**.**

**WARNING**

**The main rotor head weighs approximately 675 pounds. Use crane to lift rotor head. Failure to do so can result in serious injury. If injury occurs, seek medical aid.**

f. **Turn main rotor head over on work bench.**

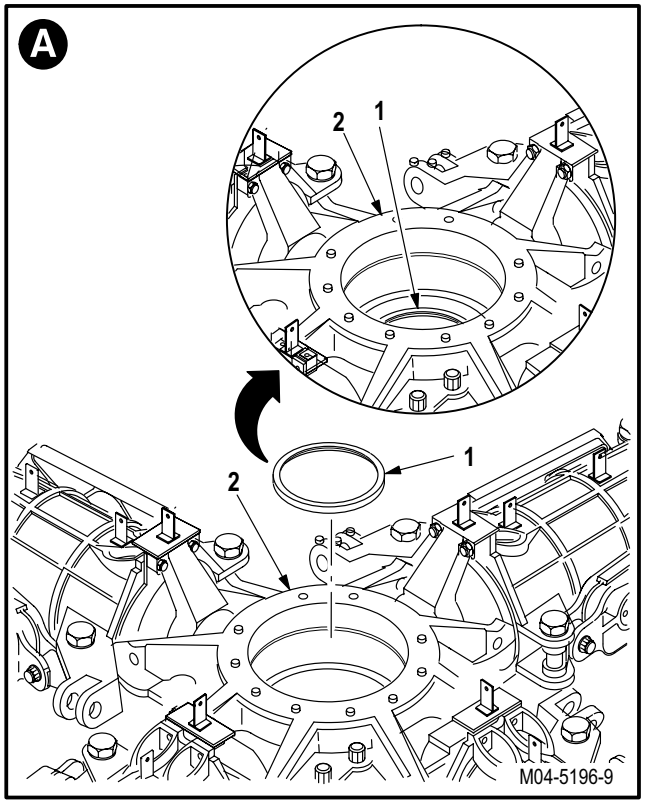
**CAUTION**

Make sure that the spacer being installed is the same one that was removed. If the spacer is lost or damaged, the main rotor head must be serviced at depot.

g. **Install spacer (1) in upper bearing cavity of main rotor hub (2).**

h. **Install main rotor upper bearing inner race/ rollers** (para 5.46B)**.**

i. **Inspect (QA).**




END OF TASK

## 5.47. MAIN ROTOR HUB LOWER PLATE PAD REPLACEMENT (AVIM)

5.47.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.47.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
3-inch C clamp (item 60, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Electric gun type heater (item 163, App H)
Craftsman's knife (item 197, App H)
1 1/4-inch blade putty knife (item 199, App H)
Rawhide mallet (item 212, App H)
Adjustable air filtering respirator (item 262, App H)
9-inch pinking shears (item 287, App H)

**Materials/Parts:**

Adhesive (item 3, App F)
Brush (item 34, App F)
Cloth (item 47, App F)
Cloth (item 49, App F)
Cloth (item 51, App F)
Cloth (item 52, App F)
Cloth (item 57, App F)
Distilled water (item 73, App F)
Cotton gloves (item 82, App F)
Methyl ethyl ketone (item 124, App F)
Primer (item 142, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1500-204-23
TM 55-1500-344-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.42 | Main rotor hub lower plate removed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor hub lower plate is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.47. MAIN ROTOR HUB LOWER PLATE PAD REPLACEMENT (AVIM) - continued

**CAUTION**

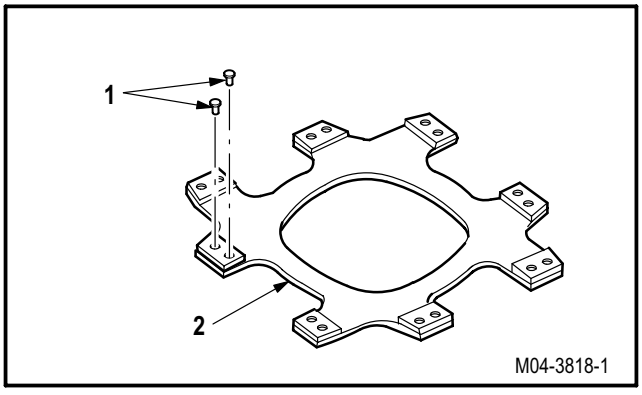
- Exercise extreme care and undertake protective measures when handling or performing any type of maintenance on the hub plate. All surface areas are critical. Scratches measuring **0.005 INCH** in depth or greater will render this part unserviceable.
- To prevent damage to the hub plate, ensure that work area is clean and that parts are placed only on a soft and adequately protected working surface.
- Heat treated condition of hub plate is critical. Part must be protected from unscheduled heating and external impact during inspection and other handling.

**NOTE**

- This task is typical for all eight pads on hub plate.
- Replacement of hub plate pad is not necessary if rivets have loosened but bond is still intact and pads show no evidence of damage. In this instance, replace only rivet(s).

5.47.3. Removal

a. **Remove and discard rivets (1) from hub lower plate (2)** (TM 1-1500-204-23)**.**

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## 5.47. MAIN ROTOR HUB LOWER PLATE PAD REPLACEMENT (AVIM) - continued

**WARNING**

**Do not place heater near flammable material or allow heater to contact skin: severe burns can result. Wear protective equipment. If injury occurs, seek medical aid.**

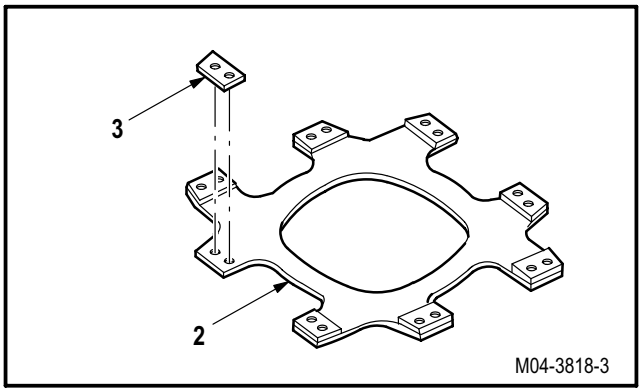
b. **Remove pad (3) from plate (2).**

**NOTE**

If bond is still intact, skip step b(1) and proceed directly to step b(2) and use heater to obtain adhesive release. Do not exceed 310 °F (154 °C) or damage will result.

(1) Pry off pad (3) from hub plate (2) and discard. Use putty knife.

(2) Apply heat evenly to area around pad (3) and gently tap pad (3) in an even circular pattern until loose. Use heater, mallet, and protective gloves.




5.47.4. Cleaning

a. **Remove cured epoxy adhesive from pad mounting area on hub plate.** Use cloth (item 47, App F) and cloth (item 49, App F).

b. **Clean pad mounting area on hub plate.** Use methyl ethyl ketone (item 124, App F) and cloth (item 51, App F).

c. **Rinse pad mounting area on hub plate and wipe dry.** Use cloth (item 52, App F) and distilled water (item 73, App F).

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## 5.47. MAIN ROTOR HUB LOWER PLATE PAD REPLACEMENT (AVIM) - continued

5.47.5. Inspection

**NOTE**

- Use clean gloves (item 82, App F) when handling new pad and hub plate during inspection and installation. Fingerprints on bonding surface of new pad and/or hub plate may impair the bonding strength of primer and/or adhesive.
- The following inspection procedures apply to the pad mounting area on hub plate.

a. **Check for cracks.** None allowed.

b. **Check for evidence of scoring and excessive wear.** None allowed.

c. **Check for elongation of rivet holes.** None allowed.

d. **Check for pitting, corrosion, and erosion of surface finish** (para 1.49)**.**

e. **Check for scratches, nicks or gouges.**

(1) Remove minor surface imperfections measuring **0.005 INCH** in depth or less by blending at a 10:1 transition ratio. Use pad (item 131, App F) and touch-up finish blended area (TM 55-1500-344-23).

5.47.6. Installation

**CAUTION**

Heat treated condition of hub plate is critical. Do not heat over 310 °F (154 °C) or damage will result.

**NOTE**

Do not allow parts to air dry for more than **4 HOURS**. Heat cure must be performed within **4 HOURS** of application of primer in order for primer to achieve it's optimum bonding properties.

a. **Prime bonding surface of new pad and mating surface of plate.**

(1) Apply a thin uniform coat of adhesive primer to bonding surface of new pad and mating surface of hub plate. Use primer (item 142, App F) and brush (item 34, App F).

(2) Air dry parts for a minimum of **30 MINUTES** at room temperature.

(3) Heat cure parts for **30 MINUTES** minimum at 290 to 310 °F (144 to 154 °C).

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## 5.47. MAIN ROTOR HUB LOWER PLATE PAD REPLACEMENT (AVIM) - continued

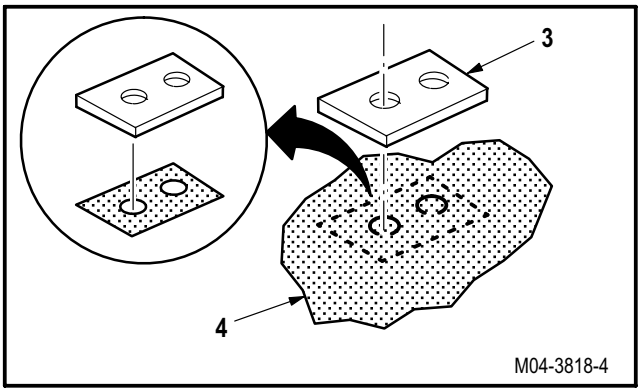
b. **Cut a single ply patch of fiberglass cloth (4) to match bonding surface of pad (3).** Use cloth (item 57, App F).

(1) Position pad (3) on cloth (4) and trace rivet hole locations and bonding surface outline of pad (3).

(2) Cut and trim cloth (4) to match bonding surface outline of pad (3). Use shears and/or knife.

(3) Drill or punch holes through rivet hole markings on cloth (4).

(4) Ensure that holes on cloth (4) aline with rivet holes of pad (3).

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## 5.47. MAIN ROTOR HUB LOWER PLATE PAD REPLACEMENT (AVIM) - continued

**CAUTION**

- Ensure that shop-formed (upset) rivet heads are flush with bottom surface of plate. Any rivet protrusions on bottom surface of plate will render lower shoe unserviceable.
- Excess adhesive squeeze-out along inner seam of pad and plate is prohibited. Failure to remove all excess adhesive squeeze-out along inner seam will render entire part unserviceable.

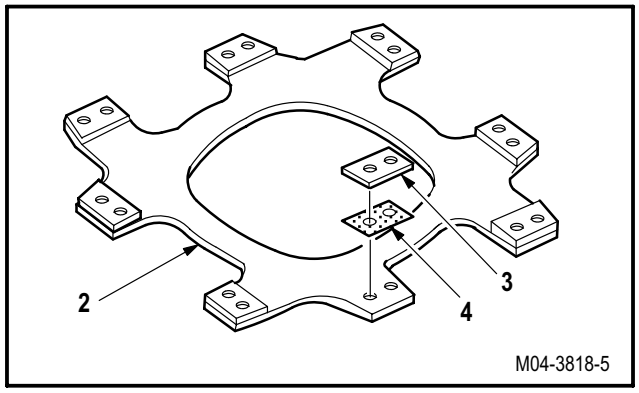
c. **Install new pad (3) on hub plate (2).**

(1) Lightly wipe bonding surface of pad (3) and mating surface of hub plate (2) with solvent. Use methyl ethyl ketone (item 124, App F) and cloth (item 52, App F).

(2) Apply a thin uniform coat of adhesive on bonding surface of pad (3) and mating surface of hub plate (2). Use adhesive (item 3, App F) and brush (item 34, App F).

(3) Aline and place cloth patch (4) on bonding surface of pad (3).

(4) Aline and place pad (3) with cloth (4) on mating surface of hub plate (2) and press firmly together.

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## 5.47. MAIN ROTOR HUB LOWER PLATE PAD REPLACEMENT (AVIM) - continued

(5) Rivet pad (3) to hub plate (2) (TM 1-1500-204-23).

(6) Apply clamping pressure to pad (3) and hub plate (2).

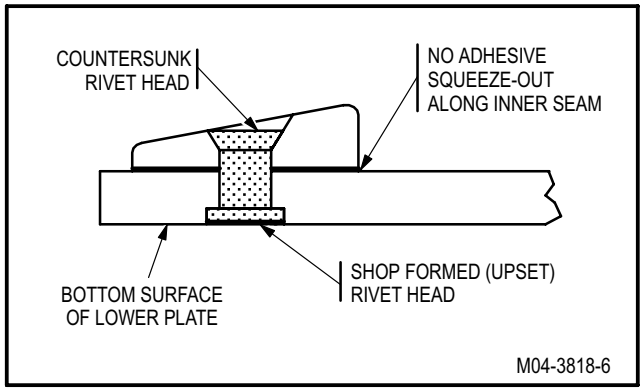
(7) Wipe away all excess adhesive squeeze-out along inner seam of pad (3). Use C clamp and cloth (item 52, App F).

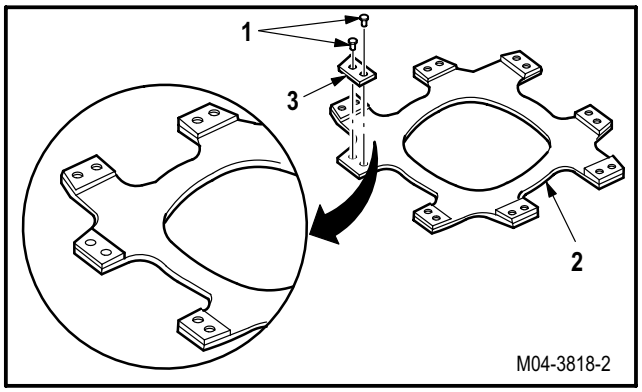
(8) Leave clamping pressure in place and allow adhesive to cure for a minimum of **24 HOURS** at room temperature or heat cure in oven for **1 HOUR** minimum at 170 to 190 °F (76 to 87°C) or for **2 HOURS** minimum at 150 to 170 °F (65 to 76°C).

(9) Remove clamping pressure and check that entire bondline around base of pad (3) is clean and complete.

(10) Trim away any excess cloth and remove any excess adhesive squeeze-out along inner seam of pad (3).

(11) Check that shop-formed (upset) rivet heads are flush with bottom of hub plate (2) and that rivets (1) have not loosened.




d. **Inspect (QA).**

e. **Install main rotor hub lower plate** (para 5.42)**.**

END OF TASK

## 5.48. MAIN ROTOR ELECTRICAL BRUSH, ELECTRICAL HOLDER, AND PITCH WEB ELECTRICAL LEAD REMOVAL/INSTALLATION

5.48.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.48.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Electric gun type heater (item 163, App H)
Multimeter (item 215, App H)
Adjustable air filtering respirator (item 262, App H)

**Materials/Parts:**

Adhesive (item 3, App F)
Lubricant (item 114, App F)
Paper (item 133, App F)
Paper (item 135, App F)
Sealing compound (item 175, App F)
Wire (item 225, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
68X Armament/Electrical System Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor head is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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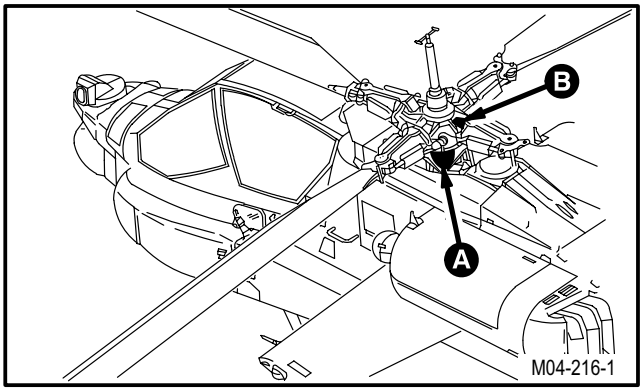
## 5.48. MAIN ROTOR ELECTRICAL BRUSH, ELECTRICAL HOLDER, AND PITCH WEB ELECTRICAL LEAD REMOVAL/INSTALLATION - continued

**NOTE**

- The brushes, brush holders, and electrical leads can be replaced separately or together.
- Check that brush makes full contact with mast. If brush does not contact mast, replace brush.

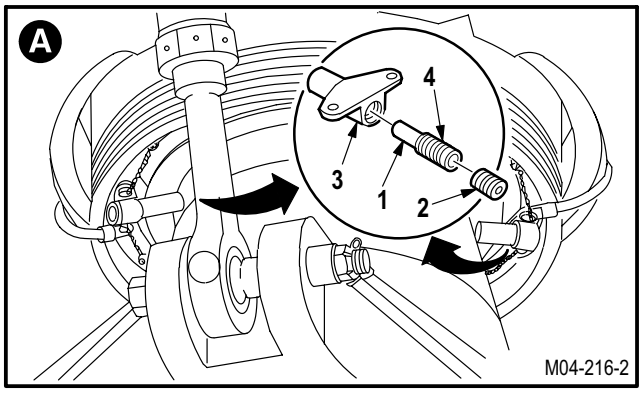



5.48.3. Removal

a. **Remove main rotor electrical brush (1).**

(1) Remove setscrew (2) from electrical brush holder (3).

(2) Remove brush (1) and spring (4) from holder (3).

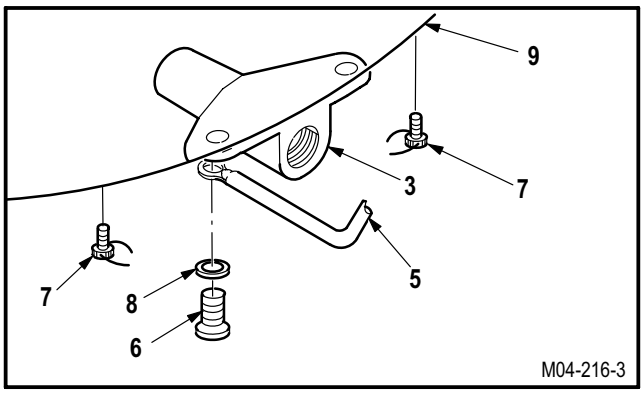



b. **Remove pitch web electrical lead (5) and holder (3).**

(1) Remove lockwire from two bolts (6) and capscrews (7).

(2) Remove one bolt (6).

(3) Remove opposite side bolt (6), washer (8), lead (5), and holder (3) from seal retainer (9).

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## 5.48. MAIN ROTOR ELECTRICAL BRUSH, ELECTRICAL HOLDER, AND PITCH WEB ELECTRICAL LEAD REMOVAL/INSTALLATION - continued

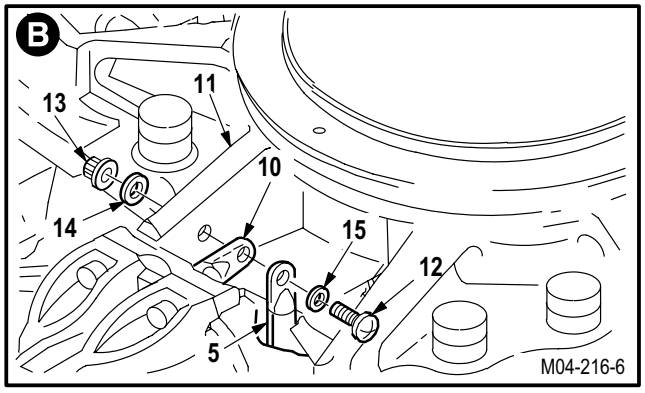
**WARNING**

**Do not place heater near flammable material or allow heater to contact skin: severe burns can result. Wear protective equipment. If injury occurs, seek medical aid.**

c. **Remove electrical leads (10) and (5) from pitch web (11).**

(1) Hold bolt (12). Remove nut (13) and washer (14).

(2) Remove bolt (12), two leads (10) and (5), and washer (15) from pitch web (11).




**NOTE**

Apply only enough heat to remove electrical lead from pitch web.

(3) Remove lead (5) from pitch web (11). Use heater and protective gloves.

(4) Remove old adhesive. Use paper (item 133, App F) and paper (item 135, App F).

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## 5.48. MAIN ROTOR ELECTRICAL BRUSH, ELECTRICAL HOLDER, AND PITCH WEB ELECTRICAL LEAD REMOVAL/INSTALLATION - continued

5.48.4. Cleaning

a. **Wipe removed and attaching parts with a clean rag.**

5.48.5. Inspection

a. **Check retainer and electrical holder for cracks.** None allowed.

b. **Check retainer and electrical holder for corrosion** (para 1.49)**.**

c. **If spring is broken or if brush is less than 1/8 INCH long, replace brush and spring.**

d. **Check leads for loose terminals, damaged insulation, or broken wires.** None allowed.

e. **Check gap between brush block holder and liner for greater than 0.030 INCH gap.**

(1) If gap is less than **0.030 INCH**, remove material from brush holder for clearance. Minimum brush holder wall thickness is **0.020 INCH**.

f. **Check brush wear pattern.**

(1) Wear pattern should be between **0.175 INCH** (both brushes alined) and **0.278 INCH** (maximum spread of brushes and full brush contact).

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## 5.48. MAIN ROTOR ELECTRICAL BRUSH, ELECTRICAL HOLDER, AND PITCH WEB ELECTRICAL LEAD REMOVAL/INSTALLATION - continued

5.48.6. Installation

a. **Lubricate threads of bolts and nuts.** Use lubricant (item 114, App F).

(1) Allow lubricated hardware to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

b. **Install two leads (10) and (5) on pitch web (11).**

(1) Route one end of lead (5) down through main rotor head (16) and to left of feathering bearing (17).

(2) Install bolt (12) through washer (15), leads (5) and (10), and pitch web (11).

(3) Install washer (14) and nut (13) on bolt (12).

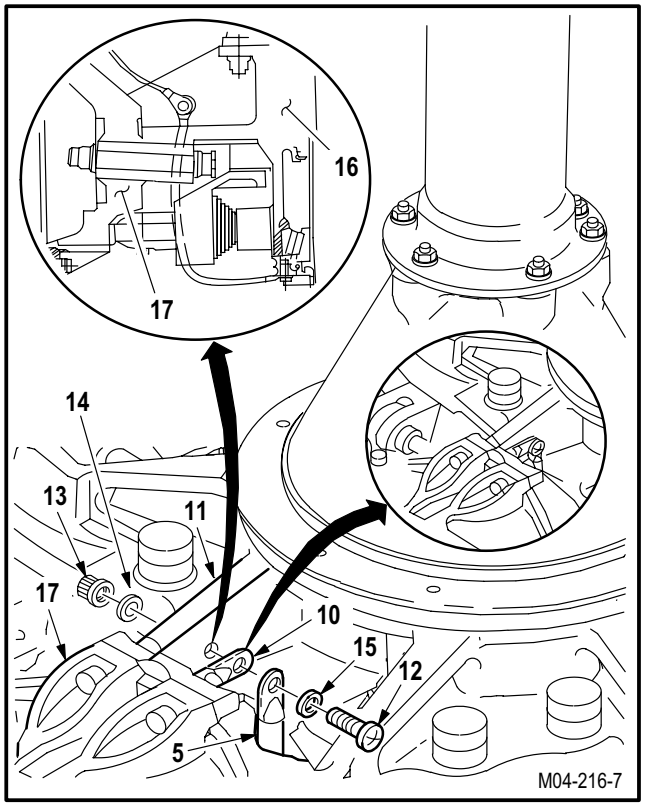
(4) Apply sealant to bolt (12) and nut (13) mounting area. Use sealing compound (item 175, App F).

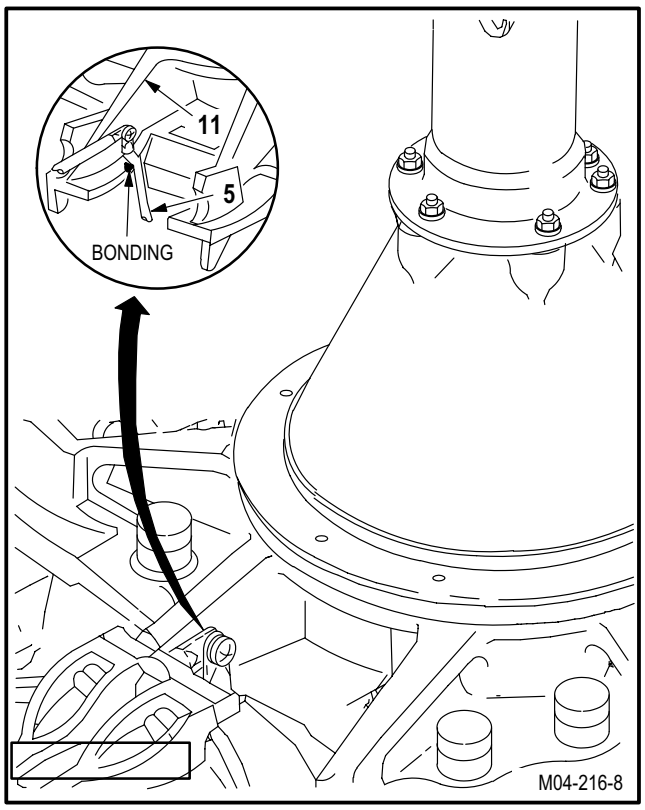
c. **Bond lead (5) to pitch web (11).** Use adhesive (item 3, App F).

(1) Press lead (5) firmly into adhesive.

(2) Allow adhesive to cure for **24 HOURS** at room temperature.

d. **Check lead (5) after cure for loose mounting.**

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## 5.48. MAIN ROTOR ELECTRICAL BRUSH, ELECTRICAL HOLDER, AND PITCH WEB ELECTRICAL LEAD REMOVAL/INSTALLATION - continued

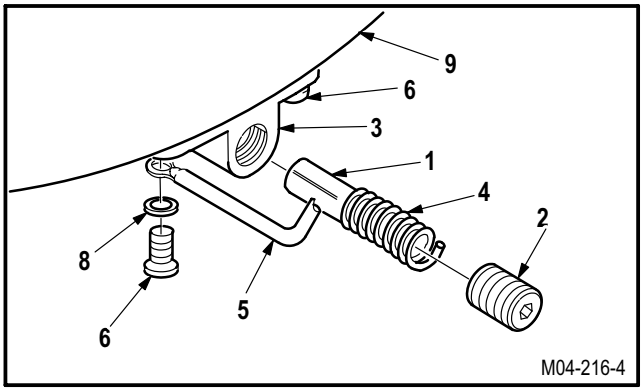
e. **Install holder (3) and lead (5).**

(1) Position holder (3) on retainer (9).

(2) Install second bolt (6) through washer (8), lead (5), holder (3), and in retainer (9).

(3) Lockwire two bolts (6) to capscrews (7). Use wire (item 225, App F).

(4) Apply sealant to bolt (6) and lead (5) mounting area. Use sealing compound (item 175, App F).




**NOTE**

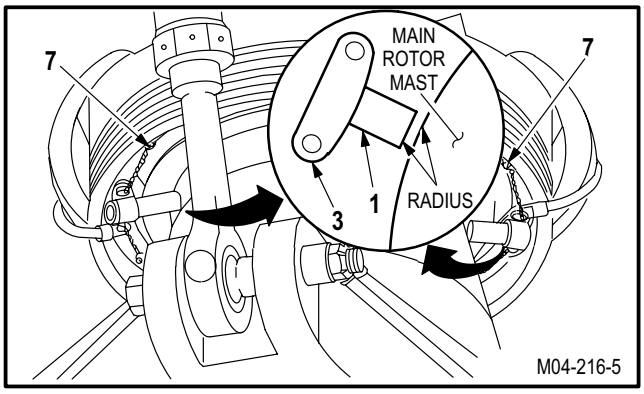
If installing a used static brush, ensure radius of brush tip alines with radius of mast edge. Misalinement will cause excessive static in the communication system.

f. **Install brush (1).**

(1) Install brush (1) and spring (4) in holder (3).

(2) Install setscrew (2) in holder (3).

(3) Tighten setscrew (2) until outer edge of setscrew (2) is flush with holder (3).




g. **Perform electrical bond check on electrical leads** (TM 55-1500-323-24)**.**

(1) Bond shall be **1.00 OHM** or less. Use multimeter.

h. **Inspect (QA).**

END OF TASK

## 5.49. MAIN ROTOR HUB IDENTIFICATION PLATE REPLACEMENT

5.49.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.49.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 10, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Methyl ethyl ketone (item 124, App F)

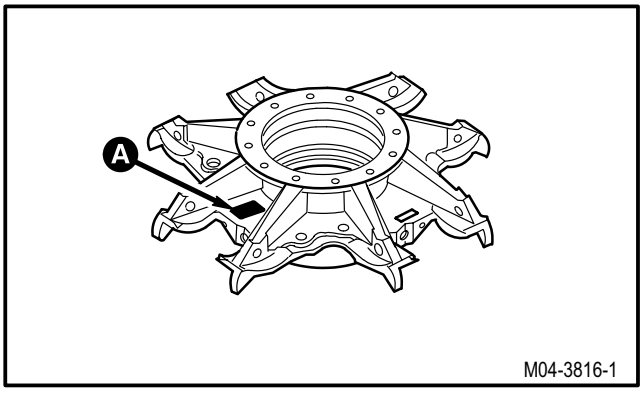
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor hub is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




5.49.3. Removal

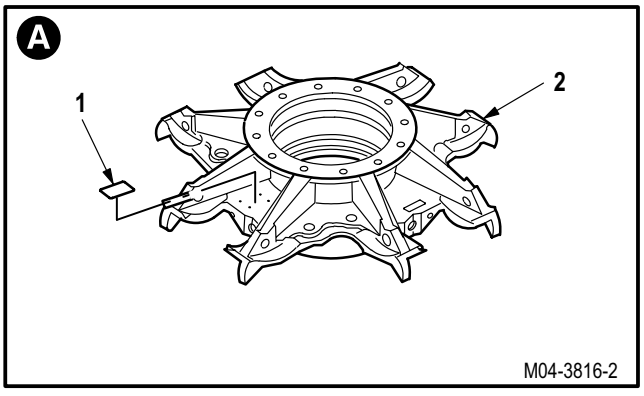
a. **Record all data on identification plate (1).**

b. **Remove plate (1) from main rotor hub (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from hub (2).

(3) Discard plate (1).

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## 5.49. MAIN ROTOR HUB IDENTIFICATION PLATE REPLACEMENT - continued

5.49.4. Cleaning

a. **Clean mounting area of plate.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

5.49.5. Inspection

a. **Check main rotor hub for cracks.** None allowed.

b. **Check main rotor hub for corrosion** (para 1.49)**.**

5.49.6. Installation

a. **Transcribe recorded data on new plate (1).** Use die set.

b. **Install plate (1) on hub (2).**

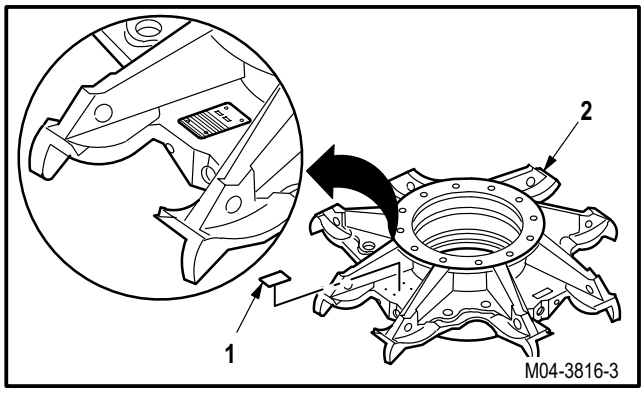
(1) Lightly abrade hub (2) in same location as old plate (1). Use cloth (item 48, App F).

(2) Apply adhesive to plate (1). Use brush (item 34, App F) and adhesive (item 10, App F).

(3) Install plate (1) on hub (2) in same location as old plate.

(4) Place a bead of adhesive around edge of plate (1). Use adhesive (item 10, App F).

c. **Inspect (QA).**




END OF TASK

## 5.49A. MAIN ROTOR LOWER SHOE SCISSOR ATTACH SLEEVE BEARINGS REPLACEMENT

5.49A.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.49A.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
0.000 - 0.100-inch outside micrometer caliper (item 51, App H)
0.3700 - 0.6300-inch cylinder gage (item 141, App H)
Heat protective gloves (item 155, App H)
Bearing removal/installation tool (item 257A, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Brush (item 34, App F)
Carbon dioxide (item 40, App F)
Cloth (item 49, App F)
Cloth (item 52, App F)
Dry cleaning solvent (item 74, App F)
Sealing compound (item 176, App F)
Corrosion preventive compound (item 62A, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 11.16 | Load bearing main rotor scissor removed or |
| 11.18 | Secondary main rotor scissor removed |

**WARNING**

**FLIGHT SAFETY PART**

- **The main rotor lower shoe is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Heat treat is a flight safety part critical characteristic of the main rotor lower shoe. Do not apply heat to the main rotor lower shoe to aid removal and/or installation of the main rotor lower shoe scissor attach sleeve bearing.**

**CAUTION**

To prevent damage to the lower shoe and/or sleeve bearing, the ram load in pounds shall not exceed 500 times the OD of the bearing measured in inches.

**NOTE**

This task is typical for all main rotor lower shoe scissor attach sleeve bearings.

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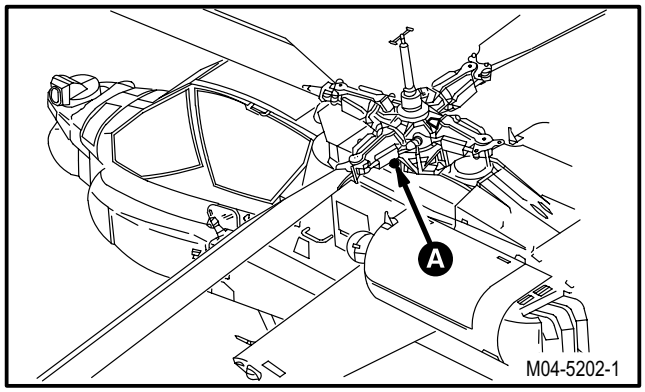
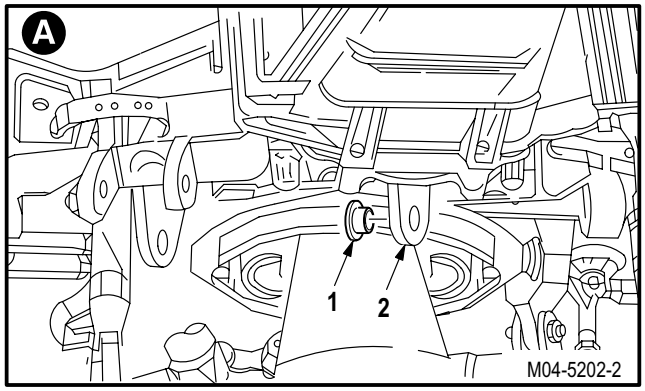
## 5.49A. MAIN ROTOR LOWER SHOE SCISSOR ATTACH SLEEVE BEARINGS REPLACEMENT - continued

**Sleeve Bearing and Mating Bore Tolerances**

| Bushing Part Number | Mating Bore Size (inches) | Bushing OD (inches) | Maximum Hydraulic Ram Pressure (pounds) |
|---|---|---|---|
| HS4617-11-20<br>(Basic Assembly) | 0.8755<br>0.8760 | 0.8762<br>0.8772 | 439 |
| HS5444-0005<br>(First Oversize) | 0.8906<br>0.8911 | 0.8913<br>0.8923 | 446 |
| HS5444-0006<br>(Second Oversize) | 0.9062<br>0.9067 | 0.9069<br>0.9079 | 454 |



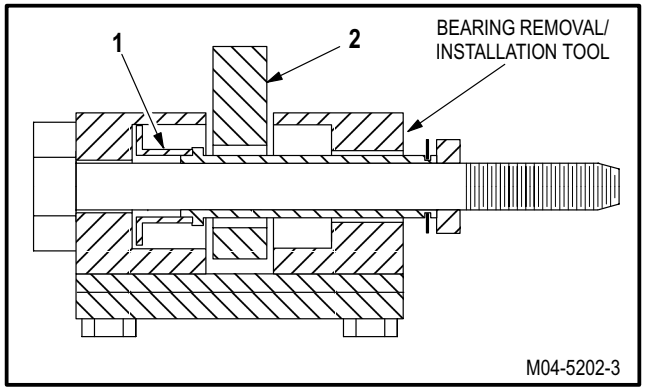




5.49A.3. Removal

**CAUTION**

Do not exceed maximum ram pressure stated in Sleeve Bearing and Mating Bore Tolerance table at beginning of task. Housing may be damaged.

a. **Remove scissor attach sleeve bearing (1) from main rotor head lower shoe (2).** Use bearing removal/installation tool.

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**5.49A. MAIN ROTOR LOWER SHOE SCISSOR ATTACH SLEEVE BEARINGS REPLACEMENT - continued**

5.49A.4. Cleaning

a. **Clean mating bore and surrounding surfaces on lower shoe.** Use dry cleaning solvent (item 74, App F) and cloth (item 52, App F).

5.49A.5. Inspection

a. **Check lower shoe for cracks.** None allowed.

b. **Check mating bore inside diameter in lower shoe for corrosion, scratches, nicks, and scoring.** Damage less than **0.005 INCH** deep may be blended out.

**CAUTION**

Repair is limited to replacement of same size bearing only. If bore in main rotor head lower shoe is out of tolerance for installation of same size bearing that was removed, the main rotor head must be returned to depot for repair.

c. **Measure and record diameter of mating bore in lower shoe for serviceable dimension.** Use cylinder gage and caliper. Record dimension.

(2) Mating bore diameter shall not exceed maximum listed in table at beginning of task.

(3) Out-of-roundness tolerance shall not exceed one-half the diametrical (size) tolerance listed in table at beginning of task. The tolerance shall be maintained for the total depth of the housing mating bore. Use cylinder gage and caliper.

d. **Measure and record outside diameter of replacement sleeve bearing.** Use caliper. Record dimension.

e. **Verify interference fit of 0.001 - 0.0025 INCH between sleeve bearing and mating bore in lower shoe.**

GO TO NEXT PAGE

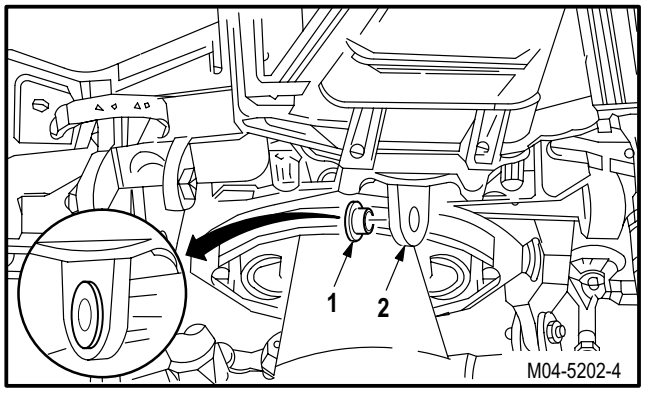
**5.49A. MAIN ROTOR LOWER SHOE SCISSOR ATTACH SLEEVE BEARINGS REPLACEMENT - continued**

5.49A.6. Installation

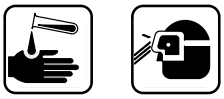
a. **Deleted**

b. **Clean mating bore on lower shoe.** Use dry cleaning solvent (item 74, App F) and cloth (item 52, App F).

c. **Apply corrosion preventive compound to mating bore on lower shoe (2).** Use corrosion preventive compound (item 62A, App F) and brush (item 34, App F).




d. **Freeze new bearing (1) in freezer at 0 °F (-18 °C) or below for 3 hours or use carbon dioxide (item 40, App F).** Use carbon dioxide (dry ice). Wear apron and protective gloves.



**CAUTION**

Do not allow compounds to enter bearing. Bearing may be damaged.

e. **Apply sealing compound to fillet between bearing (1) and mating bore in lower shoe (2).** Use sealing compound (item 176, App F) and brush (item 34, App F).

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## 5.49A. MAIN ROTOR LOWER SHOE SCISSOR ATTACH SLEEVE BEARINGS REPLACEMENT - continued

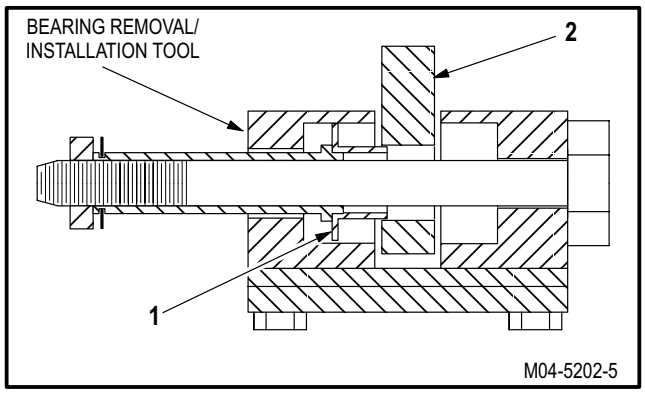
**CAUTION**

Do not exceed maximum ram pressure stated in Sleeve Bearing and Mating Bore Tolerance table at beginning of task. Housing may be damaged.

f. **Install frozen bearing (1) in lower shoe (2) mating bore while sealing compound is still wet** (TM 55-1500-322-24)**.** Use bearing removal/installation tool. Wear apron and protective gloves.

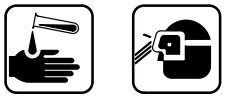
(1) Ensure no sealing compound is present under flange of bearing (1).

(2) Ensure flange of bearing (1) is fully seated against surface of lower shoe (2).




g. **Allow bearing (1) to return to room temperature.**

h. **Apply finger pressure to bearing (1) to ensure that it will not move (QA).**



i. **Apply sealing compound to form a fillet at seam ends of bore and flange surface.** Use sealing compound (item 176, App F).

j. **Inspect (QA).**

END OF TASK

## 5.50. MAIN ROTOR LOWER SHOE IDENTIFICATION PLATE REPLACEMENT (AVIM)

5.50.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.50.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 3, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Methyl ethyl ketone (item 124, App F)

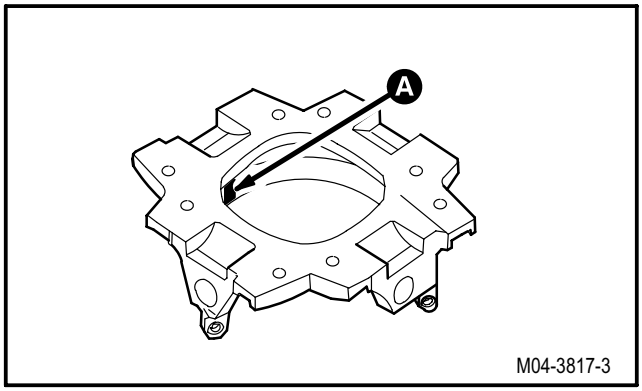
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.42 | Main rotor hub removed |

**WARNING**

**FLIGHT SAFETY PART**

**The main rotor shoe is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**




5.50.3. Removal

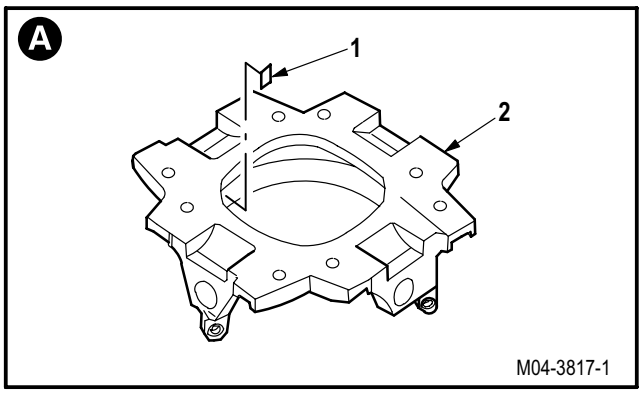
a. **Record all data on identification plate (1).**

b. **Remove plate (1) from main rotor lower shoe (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from shoe (2).

(3) Discard plate (1).

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## 5.50. MAIN ROTOR LOWER SHOE IDENTIFICATION PLATE REPLACEMENT (AVIM) - continued

5.50.4. Cleaning

a. **Clean plate mounting area.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

5.50.5. Inspection

a. **Check main rotor shoe for cracks.** None allowed.

b. **Check main rotor shoe for corrosion** (para 1.49)**.**

5.50.6. Installation

a. **Transcribe recorded data on new plate (1).** Use die set.

b. **Install plate (1) on shoe (2).**

(1) Lightly abrade shoe (2) in same location as old plate (1). Use cloth (item 48, App F).

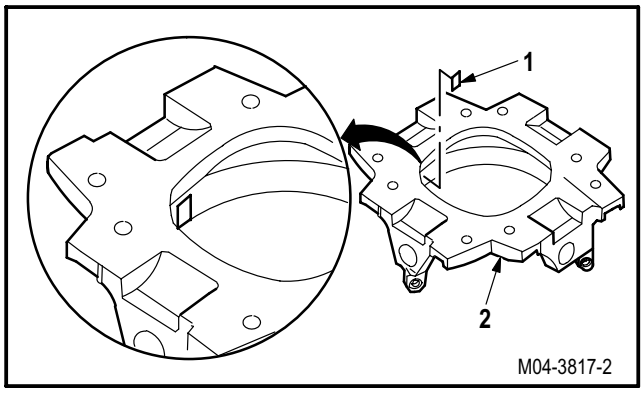
(2) Apply adhesive to plate (1). Use brush (item 34, App F) and adhesive (item 3, App F).

(3) Install plate (1) on shoe (2) in same location as old plate.

(4) Place bead of adhesive around the edge of plate (1). Use adhesive (item 3, App F).

c. **Inspect (QA).**

d. **Install main rotor hub** (para 5.43)**.**




END OF TASK

# SECTION III. TAIL ROTOR MAINTENANCE

## 5.51. TAIL ROTOR ASSEMBLY INSPECTION

5.51.1. Description

This task covers: Inspection. Swashplate Inspection.

5.51.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
0.0 - 50.0-pound weighing scale (item 273, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

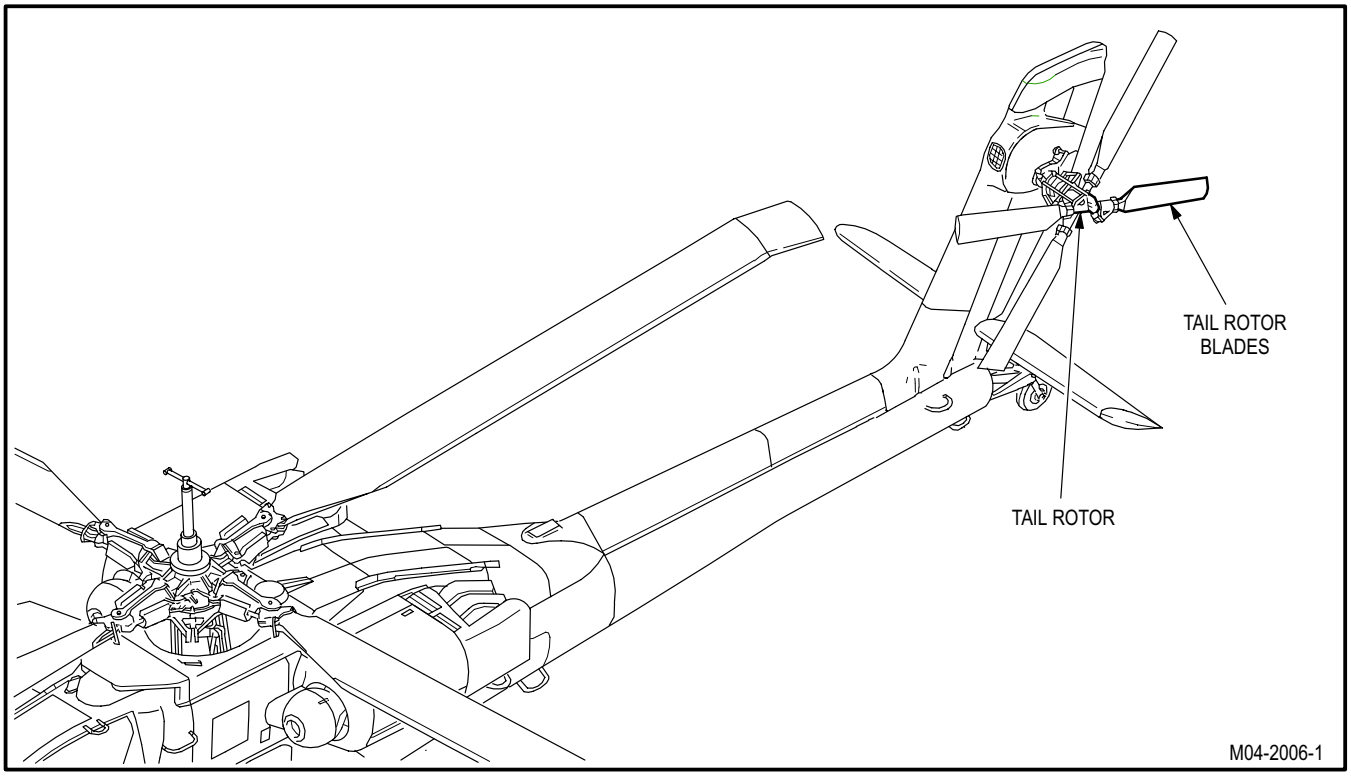
TM 55-1500-343-23

**Materials/Parts:**

Cloth (item 52, App F)
Pad (item 130, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

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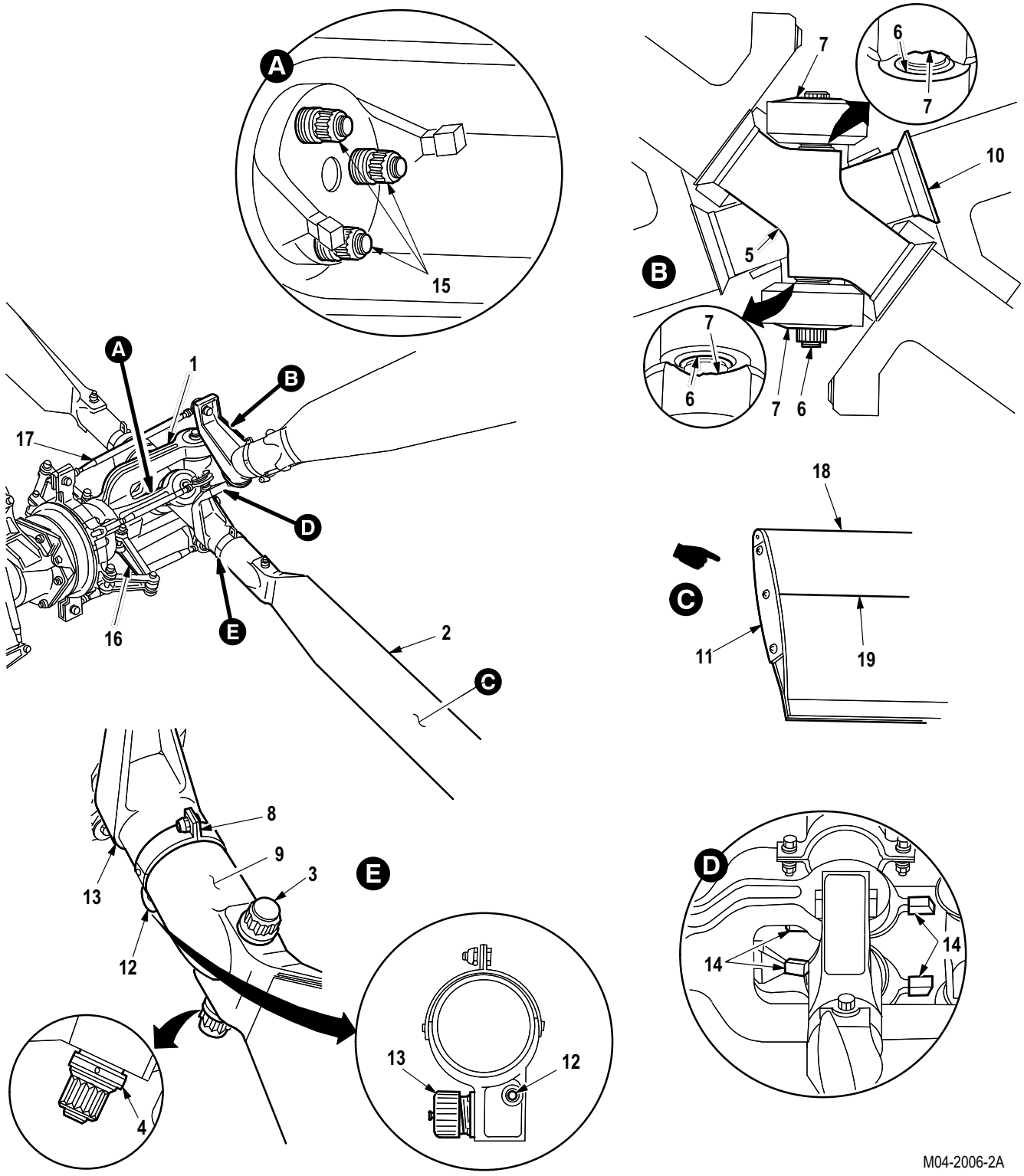
## 5.51. TAIL ROTOR ASSEMBLY INSPECTION - continued

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## 5.51. TAIL ROTOR ASSEMBLY INSPECTION - continued

5.51.3. Inspection

**NOTE**

- The tail rotor includes the tail rotor blades.
- Cracks in any tail rotor component is cause for rejection.
- Corroded areas will be treated and restored in accordance with (para 1.49)**.**

a. **Check tail rotor for corrosion** (para 1.49)**.**

b. **Check tail rotor for loose or missing lockwire and cotter pins.**

c. **Check tail rotor fork (1) for cracks, nicks, gouges, and scratches.**

(1) No cracks allowed.

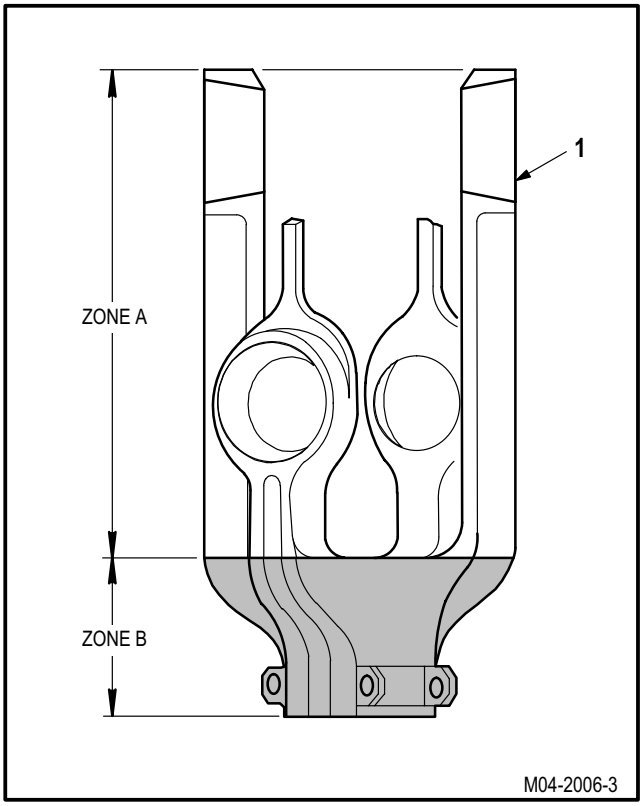
(2) Do not blend if damage exceeds:

(a) **Zone A** - Surface damage more than **0.001 INCH** deep.

(b) **Zone B** - Surface damage more than **0.005 INCH** deep.

d. **Check fork (1) for distortion or twists.** None allowed.

e. **Check hub (5) for play between hub bushings (6) and resilient mounts (7).** None allowed.

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**5.51. TAIL ROTOR ASSEMBLY INSPECTION - continued**

f. **Check resilient mounts (7) for deterioration and cracking.**

(1) Elastomeric compound surface cracks are allowed over entire area.

(2) Debonding along a circular shim is allowable to a maximum arc of **180 DEGREES, ONE PLACE ONLY**.

(3) Radial cracking through shim not allowed.

(4) Check resilient mount (7) outer race for damage. Curled edge or bulge surface not allowed.

g. **Check brackets (8) on tail rotor blade root fitting (9) for security of attachment.**

h. **Check tail rotor blade (2) for serviceability.**

**CAUTION**

If a preload indicating washer is loose, the washer must be removed and replaced with a new preload indicating washer.

(1) Check tail rotor blade (2) attaching bolt (3) for loose preload indicating (PLI) washer (4).

(2) Check tail rotor blade (2) for scratches, nicks, gouges, and corrosion (para 5.52)**.**

(3) Check tail rotor blade (2) for dents and depressions (para 5.52).

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## 5.51. TAIL ROTOR ASSEMBLY INSPECTION - continued

(4) Check tail rotor blade (2) erosion strip (18) for bonding separation. No debond allowed.

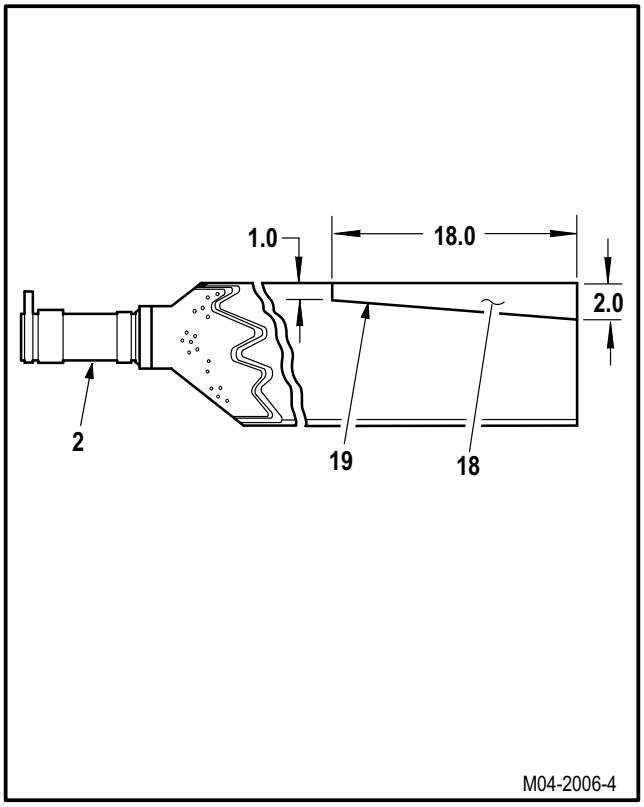
(a) Visually check for cracked paint or raised seam at edges (19) of erosion strip. Use 10X magnifier as necessary to assist inspection of erosion strip bond line.

(b) Coin tap any suspect area of erosion strip (18). Tapping alternately between a suspect area and a bonded area will produce a different sound. A dull sound (thud) will indicate a debond. A properly bonded area will produce a sharp ring or solid sound.

(c) If debond is suspected but cannot be confirmed by visual or coin tap inspection, perform NDI dye penetrant inspection (TM 1-1520-264-23).

(5) Visually check tail rotor blade (2), and tip cap (11) for loose or missing screws. None allowed.

(6) Check tail rotor blade dust shield (10) for splits, tears, or deterioration. None allowed.




i. **Check electrical conduit (12) and receptacle (13) for loose attachment** (TM 55-1500-343-23)**.**

j. **Check bumpers (14) for loose attachment, wear, splits, or deterioration.** None allowed.

k. **Check torque of tail rotor attaching nuts (15).**

(1) If torque is less than **750 INCH-POUNDS** (before MWO 1-1520-238-50-46), **710 INCH-POUNDS** (after MWO 1-1520-238-50-46), remove tail rotor fork assembly (para 5.60).

l. **Check drive links (scissors) for axial play.**

(1) Load-bearing maximum allowable axial play **0.030 INCH** measured at the elbow joint.

m. **Check drive links (16) for loose attachment.** None allowed.

n. **Check pitch control links (17) for loose attachment.** None allowed.

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**5.51. TAIL ROTOR ASSEMBLY INSPECTION - continued**

o. **Check pitch horn bushing for galling and elongation.**

(1) Elongation of inner diameter of bushings not to exceed **0.004 INCH**.

p. **Check pitch bearings for excessive wear.**

(1) Allowable play not to exceed **0.25 INCH** from tip to tip of opposing tail rotor blades.

5.51.4. Tail Rotor blade bearings Inspection

**NOTE**

This inspection will be also performed prior to removal of tail rotor swashplate for noisy or ratcheting condition. This will be performed on all four tail rotor blade assemblies.

a. **Inspect tail rotor blade bearings for pitch change force.**

(1) Remove pitch control link from blade pitch horn (para 5.53).

(2) Attach spring scale to blade pitch horn. Pulling perpendicular to pitch arm, measure force required to rotate blade on hub. Use scale.

(3) If force required is less than 25 pounds, install pitch control link on blade pitch horn (para 5.54) and accomplish steps a.(1) and a.(2) for remaining blades.

(4) If force required is 25 pounds or more, repair or replace using the following procedures:

(a) Remove tail rotor blade (para 5.53).

(b) Clean contaminants from inside diameter of tail rotor inner and outer bearing sleeves, and tail rotor hub bearing by lightly rubbing bearing surfaces. Use pad (item 130, App F).

(c) Wipe these bearing surfaces with clean, moistened cloth to remove any pad residue. Use cloth (item 52, App F).

(d) Reinstall tail rotor blade (para 5.54) and perform pitch change force test (step a).

(e) If force required is less than 25 pounds, complete installation of pitch control link on blade pitch horn (para 5.54).

(f) If force required is still 25 pounds or more, replace tail rotor blade (para 5.53).

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**5.51. TAIL ROTOR ASSEMBLY INSPECTION - continued**

5.51.5. Tail Rotor blade bearings Inspection

a. **Perform the following inspection for the tail rotor blade transition area.**

**NOTE**

This is a chordwise inspection of the doubler and spar edges located in the transition area of the tail rotor blade. THe transition area of the blade root fitting begins 1.5 inches from the centerline of the blade retention bolt and ends 2.5 inches from the centerline of blade retention bolt.

(1) Remove any reflective tape used in tail rotor balancing from the transition area prior to performing inspection.

(2) Solvent wipe both front and back sides of the transition area with isopropyl alcohol (item 25A, App F) or acetone (item 1A, App F) and allow to dry for 15 minutes.

**NOTE**

Re-appearance of alcohol/acetone after the surface appears dry during the 15 mnute drying period is a strong indication that a debond may be present.

(3) Visually inspect the doublers and spars in the transition area, both front and back sides, for “crazing” (appearance of paint cracks) utilizing a 10X magnifier and flashlight or other light source.

(4) If no crazing or cracks are found, inspection is complete.

(5) If a crack is found at any time during the inspection procedures, proceed to paragraph b.1.

(6) If crazing is found, perform the following additional inspection procedures -

**NOTE**

Blade may be removed from aircraft to facilitate inspection and repair procedures.

**CAUTION**

Do not use power sanders, chemical strippers or paint scrapers to remove topcoat, primer or filler material. The only approved method is by hand sanding using the following procedures.

**WARNING**

**No sanding of the root fitting is authorized. Sanding of the root fitting may cause damage, which would lead to blade rejection.**

(a) Install masking tape (item 205, App F)(or equivalent) in a chordwise direction along inboard edge of filler to ensure sufficient coverage to prevent sanding of the root fitting.

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**5.51. TAIL ROTOR ASSEMBLY INSPECTION - continued**

**NOTE**

When sanding topcoat and primer, use 180 cloth (item 47A, App F) to 240 cloth (item 47A, App F) grit sandpaper. When sanding the filler material, use 240 cloth (item 47A, App F) to 320 grit cloth (item 48, App F).

**NOTE**

While sanding the filler material, focus on sanding the filler material only. Incidental sanding of spar and doubler edges should be kept to a minimum.

**NOTE**

Do not sand scrim cloth. Scrim cloth is located underneath the filler material. The surface of the scrim cloth may give visual indications of crazing.

(b) Carefully hand sand the crazing/crack indication with the applicable sandpaper until crazing/crack disappears or the scrim cloth beneath the filler material becomes visible. Sanding should stop immediately if bare metal of root fitting becomes visible.

(c) Solvent wipe the indicated area with isopropyl alcohol (item 25A, App F) or acetone (item 1A, App F) and allow to dry for 15 minutes.

(d) Conduct visual inspection of sanded area for crazing or cracking indication using 10X magnifier and flashlight or other light source.

1 If crazing or crack indication is no longer visible, proceed to paragraph b.2.

2 If crazing or crack indication is still visible, repeat procedures in paragraph a.6.(b) and a.6.(c) before proceeding to next paragraph.

(e) If any crack indication remains visible after scrim cloth or bare metal on the root fitting becomes visible, a debond is presumed.

1 Replace tail rotor blade per paragraph 5.53.

(f) Use a 10X magnifier to inspect the inboard and outboard tail rotor blade surfaces for chordwise cracking and/or any indication of surface damage between blade stations 25.0 (measured 30 inches inboard of the blade tip) and 35.0 (measured 20 inches inboard of the blade tip).

1 Use approved limits in table 5.55 for scratches, nicks, gouges and corrosion.

2 Use table 5.56 for dents and depressions.

a If crack is found replace tail rotor blade per paragraph 5.53.

(g) If no cracks are found, proceed to paragraph b.2.

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**5.51. TAIL ROTOR ASSEMBLY INSPECTION - continued**

5.51.6. Correction of Tail Rotor Transition Area

a. **Correction procedure** -

(1) If tail rotor blade is cracked, replace per paragraph 5.53

(2) Upon completion of inspection procedures, which require hand sanding of the tail rotor blade surfaces, restore as follows -

(a) Smooth the sanded repair area using 320 grit cloth (item 48, App F) then use 400 grit cloth (item 49, App F) to finish blending the area.

(b) Solvent wipe the area with ispropyl alcohol (item 25A, App F) or acetone (item 1A, App F) and allow to dry for 15 minutes.

(c) Apply corrosion resistant coating (item 66, App F), MIL-C-5541 Class 1A, by brush or swab to any bare metal. Allow coating to remain on surface until color develops. Color need not be uniform in appearance. If the metal is stainless, the conversion coating will not change color and will not adversely affect the metal.

(d) Rinse with water and blot to remove excess (do not rub new coating).

(e) Allow to air dry for 1 to 2 hours.

**NOTE**

Primer must be applied within 1 to 2 hours after applying chemical conversion coating in step b.2.(c).

(f) Apply epoxy primer coating kit (item 76A, App F) (MIL-P-85582 TYPE I Class C2) or (MIL-P-23377 TYPE I Class C) to sanded area. Allow primer to dry for 1 to 2 hours prior to top coating or handling of part.

(g) Apply polyurethane coating (item 140, App F), (MIL-C-46168, TYPE IV) or(MIL-C-53039). Allow to dry for 1 to 2 hours before handling.

**NOTE**

Newly painted surface will dry to touch in one hour and will dry hard in approximately three hours.

END OF TASK

## 5.52. TAIL ROTOR BLADE REPAIR CRITERIA

5.52.1. Description

This task covers: Repair Criteria.

5.52.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

5.52.3. Repair Criteria

a. **The tail rotor blade repair criteria provide inspection and repair information for the rotor blades.**

b. **The instructions for inspection are presented in tabular form.**

(1) Table 5-5 provides repair limits for scratches, nicks, gouges, corrosion, debonding, delaminations, and voids.

(2) Table 5-6 provides limits for dents and depressions.

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## 5.52. TAIL ROTOR BLADE REPAIR CRITERIA - continued

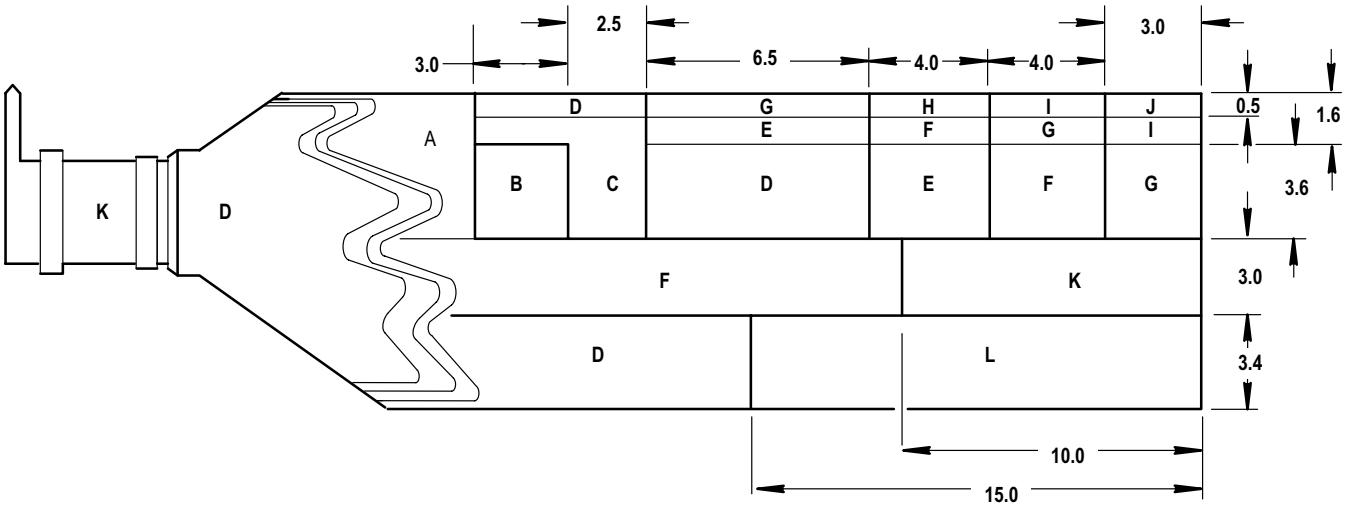


TABLE 5-5. REPAIR LIMITS FOR SCRATCHES, NICKS, GOUGES, AND CORROSION (SHEET 1 OF 2)

| AREA | MAXIMUM DEPTH WITHOUT REPAIR | MAXIMUM DEPTH WITH REPAIR (Note 6) | REPAIR PARAGRAPH |
|---|---|---|---|
| A | NONE | NONE | N/A |
| B | NONE | 0.002 | 5.55 |
| C | NONE | 0.004 | 5.55 |
| D | NONE | 0.005 | 5.55 |
| E | NONE | 0.008 | 5.55 |
| F | NONE | 0.010 | 5.55 |
| G | NONE | 0.015 | 5.55 |
| H | NONE | 0.018 | 5.55 |
| I | 0.005 | 0.020 | 5.55 |
| J | 0.005 | 0.025 | 5.55 |
| K | 0.002 | 0.015 | 5.55 |
| L | 0.002 | 0.005 | 5.55 |

NOTES:

1 ALL DIMENSIONS ARE IN INCHES (TOLERANCE = +/-0.25 INCH).
2 LIMITS APPLY TO BOTH INBOARD AND OUTBOARD SURFACES.
3 INSPECTION WITH MAGNIFIER REQUIRED.
4 CORROSION MUST BE TREATED PER TM PARA 1.49.
5 DAMAGE UP TO MAXIMUM DEPTH MUST BE REPAIRED PER PARA 5.55.

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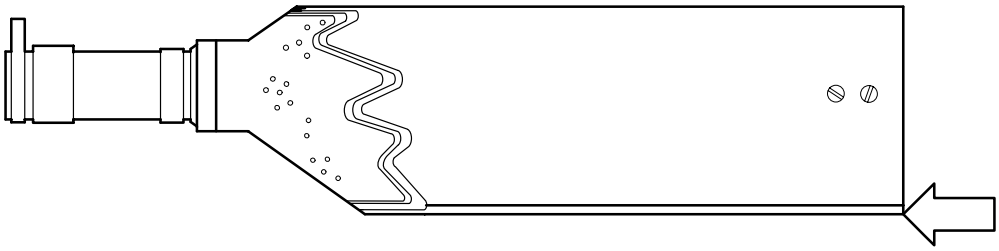
## 5.52. TAIL ROTOR BLADE REPAIR CRITERIA - continued



REPAIR LIMITS FOR DEBONDING
SHEET 2 OF 2

DEBONDING, DELAMINATIONS, OR VOIDS ARE NOT ACCEPTABLE EXCEPT VOIDS AT TRAILING EDGE TIP. TRIM TIP UP TO 3/8 INCH TO REMOVE VOIDS.

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## 5.52. TAIL ROTOR BLADE REPAIR CRITERIA - continued

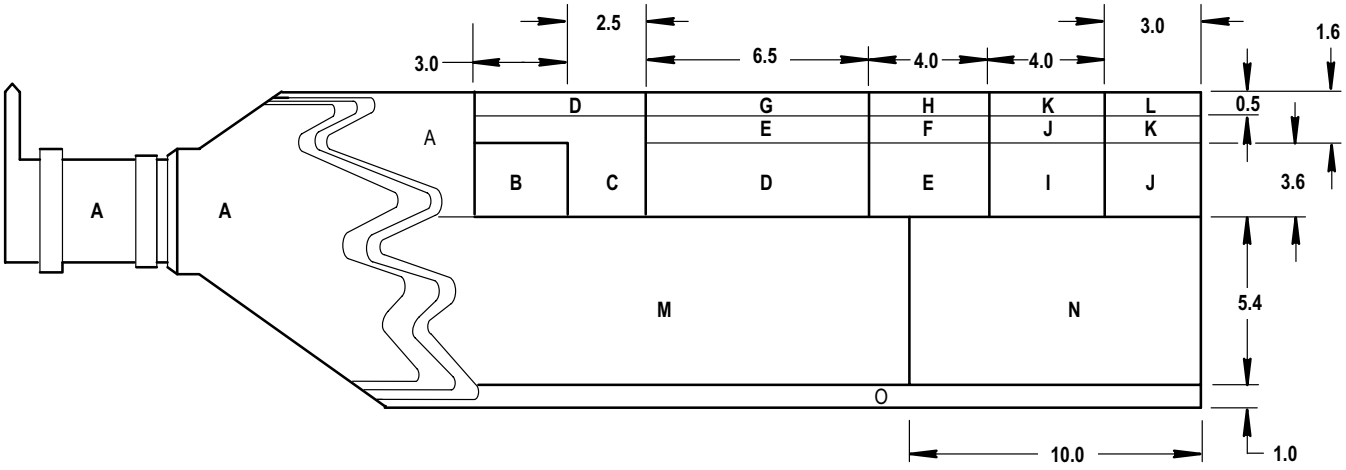


TABLE 5-6. REPAIR LIMITS FOR DENTS AND DEPRESSIONS

| AREA | MAXIMUM DEPTH WITHOUT REPAIR | MAXIMUM DEPTH WITH REPAIR (Note 6) | MAXIMUM ALLOWED AREA | MAXIMUM NUMBER OF DEFECTS | MINIMUM DISTANCE BETWEEN DEFECT CENTERS | TM REPAIR PARAGRAPH |
|---|---|---|---|---|---|---|
| A | NONE | NONE | N/A | N/A | N/A | N/A |
| B | [2] | 0.002 | 1.0 x 1.5 | 3 | 1.5 | 5.56 |
| C | [2] | 0.004 | 1.0 x 1.5 | 3 | 1.5 | 5.56 |
| D | [2] | 0.005 | 1.0 x 1.5 | 3 | 1.5 | 5.56 |
| E | [2] | 0.008 | 1.0 x 1.5 | 3 | 1.5 | 5.56 |
| F | [2] | 0.010 | 1.0 x 1.5 | 3 | 1.5 | 5.56 |
| G | [2] | 0.015 | 1.0 x 1.5 | 3 | 1.5 | 5.56 |
| H | [2] | 0.018 | 1.0 x 1.5 | 3 | 1.5 | 5.56 |
| I | 0.010 [5] | 0.020 | 1.0 x 1.5 | 3 | 1.0 | 5.56 |
| J | 0.010 [5] | 0.030 | 1.0 x 1.5 | 3 | 1.0 | 5.56 |
| K | 0.010 [5] | 0.040 | 1.0 x 1.5 | 3 | 1.0 | 5.56 |
| L | 0.010 [5] | 0.050 | 1.0 x 1.5 | 3 | 1.0 | 5.56 |
| M | 0.010 [5] | 0.010 | 1.0 x 1.5 | 3 | 2.5 | 5.56 |
| N | 0.025 [5] | 0.025 | 1.0 x 1.5 | 3 | 2.5 | 5.56 |
| O | 0.020 | N/A | 1.0 x 1.5 | 3 | 4.0 | N/A |

NOTES:

1 ALL DIMENSIONS ARE IN INCHES (TOLERANCE = +/-0.25 INCH).
[2] USE STRAIGHT EDGE AND DEPTH GAGE. NO VISIBLE DENT SHALL EXIST DURING STRAIGHT EDGE TEST. STRAIGHT EDGE SHALL ROCK SMOOTHLY WITHOUT JARRING OR CLICKING ON ALL CURVED SURFACES.
3 INSPECT FOR BOND DELAMINATION IN AREA OF DENT.
4 NO SHARP CREASES ALLOWED.
[5] SMOOTHLY ROUNDED DENTS ARE ACCEPTABLE TO THE MAXIMUM DIMENSION SHOWN.
6 DAMAGE UP TO THE MAXIMUM DEPTH MUST BE REPAIRED PER PARA 5.60.

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END OF TASK

## 5.53. TAIL ROTOR BLADE REMOVAL

5.53.1. Description

This task covers: Removal. Cleaning. Inspection.

5.53.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Maintenance platform (item 209, App H)
Adjustable air filtering respirator (item 262, App H)

**Materials/Parts:**

Cloth (item 52, App F)
Dry cleaning solvent (item 74, App F)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for all four rotor blades. Identify each blade for reinstallation at same location.

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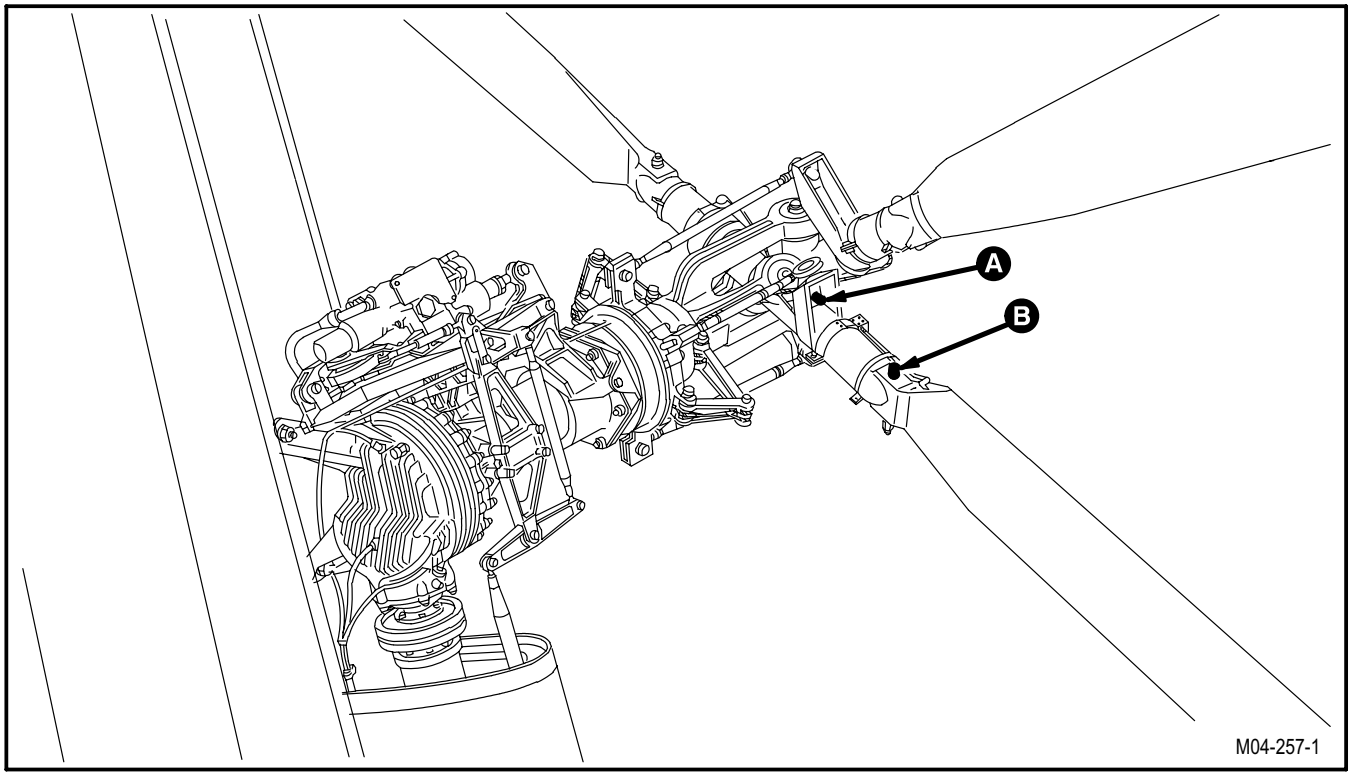
## 5.53. TAIL ROTOR BLADE REMOVAL - continued

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## 5.53. TAIL ROTOR BLADE REMOVAL - continued

5.53.3. Removal

**CAUTION**

Do not turn pitch horn more than 30 degrees in any direction while pitch control links are disconnected; damage to straps may result.

**NOTE**

If TB 1-1520-238-20-62 (Deactivation of Main Rotor and Tail Rotor Blade De-ice Capability) is complied with, then step a. should have been complied with. If not, perform step a.

a. **On the pilot aft circuit breaker panel, disable de-ice system by opening BLADE DE-ICE and BLADE DE-ICE CONTR circuit breakers.** Install wire tie to prevent reactivation.

b. **Inspect tail rotor blades** (para 5.51)**.** Use maintenance platform.

c. **Remove electrical lead (1) from rotor blade pitch horn (2).**

(1) Remove old sealant from lead (1) connection.

(2) Hold screw (3). Remove nut (4) and washer (5).

(3) Remove screw (3) and lead (1).

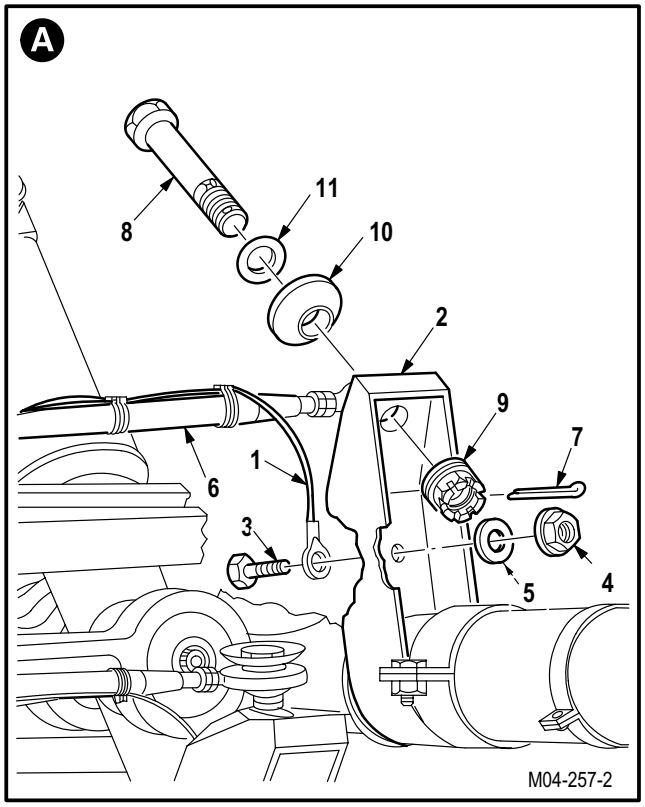
d. **Remove pitch control link (6) from pitch horn (2).**

(1) Remove and discard cotter pin (7).

(2) Hold bolt (8) and remove nut (9).

(3) Remove bolt (8), safety washer (10), and washer (11).

(4) Secure link (6) to prevent damage to parts.

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## 5.53. TAIL ROTOR BLADE REMOVAL - continued

e. **Detach de-ice connector P999, P1034, P1035, or P1036 (12) from blade receptacle J999, J1034, J1035, or J1036 (13).**

(1) Cut and remove lockwire.

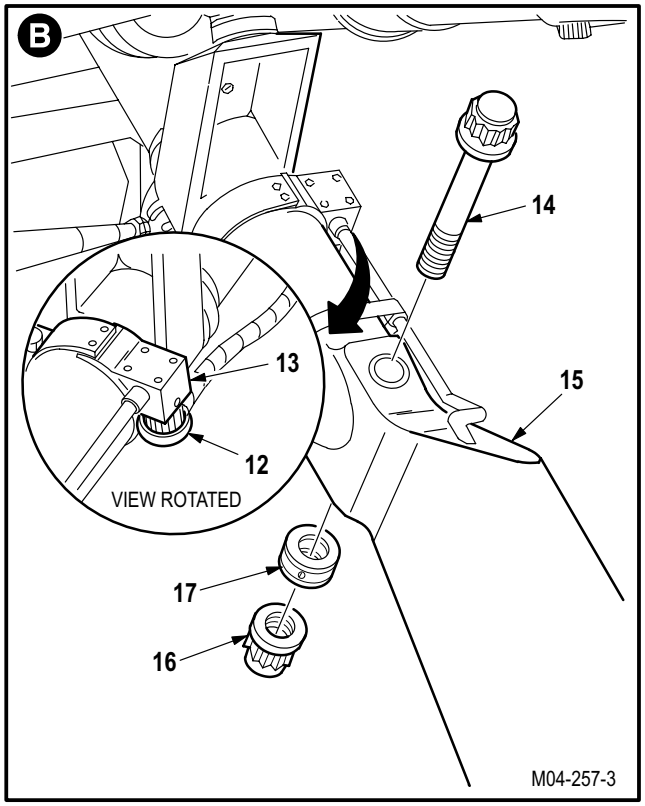
(2) Detach de-ice connector (12) from receptacle (13).

f. **Remove bolt (14) from blade (15).**

(1) Hold bolt (14).

(2) Remove and discard nut (16) and preload indicating (PLI) washer (17).

(3) Remove bolt (14) from blade (15).




g. **Remove two bushings (18) from blade (15).**

h. **Remove blade (15) from tail rotor hub (19).**

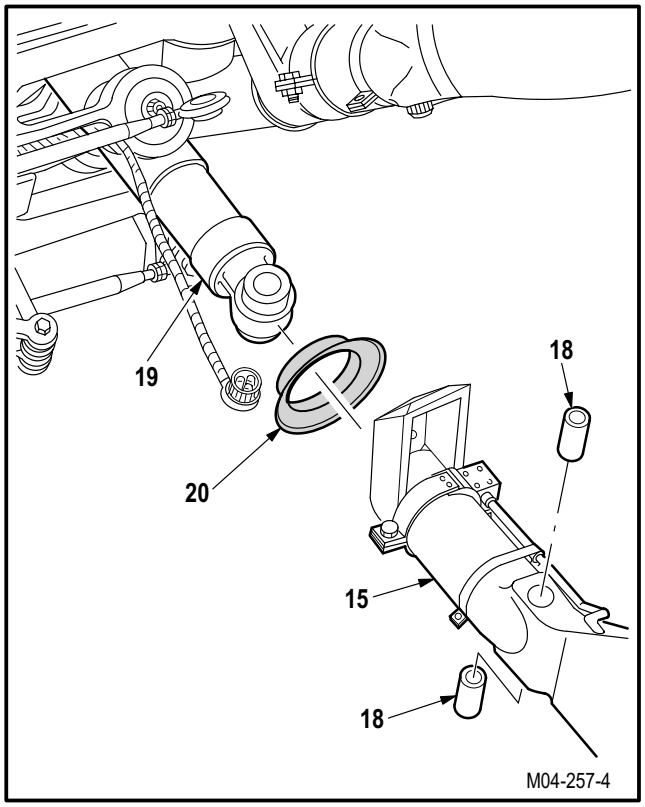
i. **Remove dust cap (20) from hub (19).**

5.53.4. Cleaning

a. **Wipe all removed and attaching parts.** Use cloth (item 52, App F).

b. **Clean electrical lead, attaching hardware, and metal contact surface of pitch horn** (para 1.47)**.** Use dry cleaning solvent (item 74, App F).

c. **Clean blade attachment holes** (para 1.47)**.**

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**5.53. TAIL ROTOR BLADE REMOVAL - continued**

5.53.5. Inspection

a. **Check hub for nicks, scratches, and gouges** (para 5.51)**.**

b. **Check removed and attaching parts for cracks.** None allowed.

c. **Check hub, pitch control link, pitch horn, electrical lead, and blade for corrosion** (para 1.49)**.**

d. **Check blade** (para 5.51 and 5.52)**.**

e. **Check entire blade for bonding separation.**

(1) A white line along the aft edge of spar 1 (3.6 inches aft of leading edge) or spar 2 (6.5 inches aft of leading edge) may be a symptom of debond.

(2) Tap on blade with edge of a coin held between thumb and forefinger. A bonded spot will have a sharp ring. An unbonded spot will have a dull or rattling sound.

f. **Check strap pack for corrosion** (para 1.49)**.**

g. **Check pitch link** (para 11.232)**.**

h. **Check blade attach bolts and bushings for wear.**

(1) Blade attach bolt **0.5600 INCH** minimum diameter.

(2) Bushing inside diameter **0.5635 INCH** maximum diameter.

(3) Bushing outside diameter **0.9340 INCH** minimum diameter. Bushing liner not to wear through.

(4) Blade root fitting **0.9385 INCH** maximum diameter.

i. **Check electrical lead for broken wires and missing terminal end.** None allowed.

END OF TASK

## 5.54. TAIL ROTOR BLADE INSTALLATION

5.54.1. Description

This task covers: Installation.

5.54.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Electrical tool kit (item 378, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
14-inch x 1/2-inch drive hinged socket wrench handle (item 170, App H)
Maintenance platform (item 209, App H)
Multimeter (item 215, App H)
Adjustable air filtering respirator (item 262, App H)
Machinist's scriber (item 278, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
0 - 600 inch-pound 3/8-inch drive dial indicator torque wrench (item 447, App H)

**Materials/Parts:**

Cotter pin
PLI washer
Self-locking nut
Corrosion preventive compound (item 62, App F)
Corrosion preventive compound (item 62A, App F)
Epoxy primer coating kit (item 78, App F)
Wire (item 222, App F)

**Personnel Required:**

| | |
|---|---|
| 67R | Attack Helicopter Repairer |
| | One person to assist |
| 68X | Armament/Electrical System Repairer |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

**References:**

TM 1-1520-238-T
TM 55-1500-323-24

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for all four rotor blades. If reinstalling old blades, ensure that previously identified tail rotor blades are installed in the same location.

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## 5.54. TAIL ROTOR BLADE INSTALLATION

5.54.3. Installation

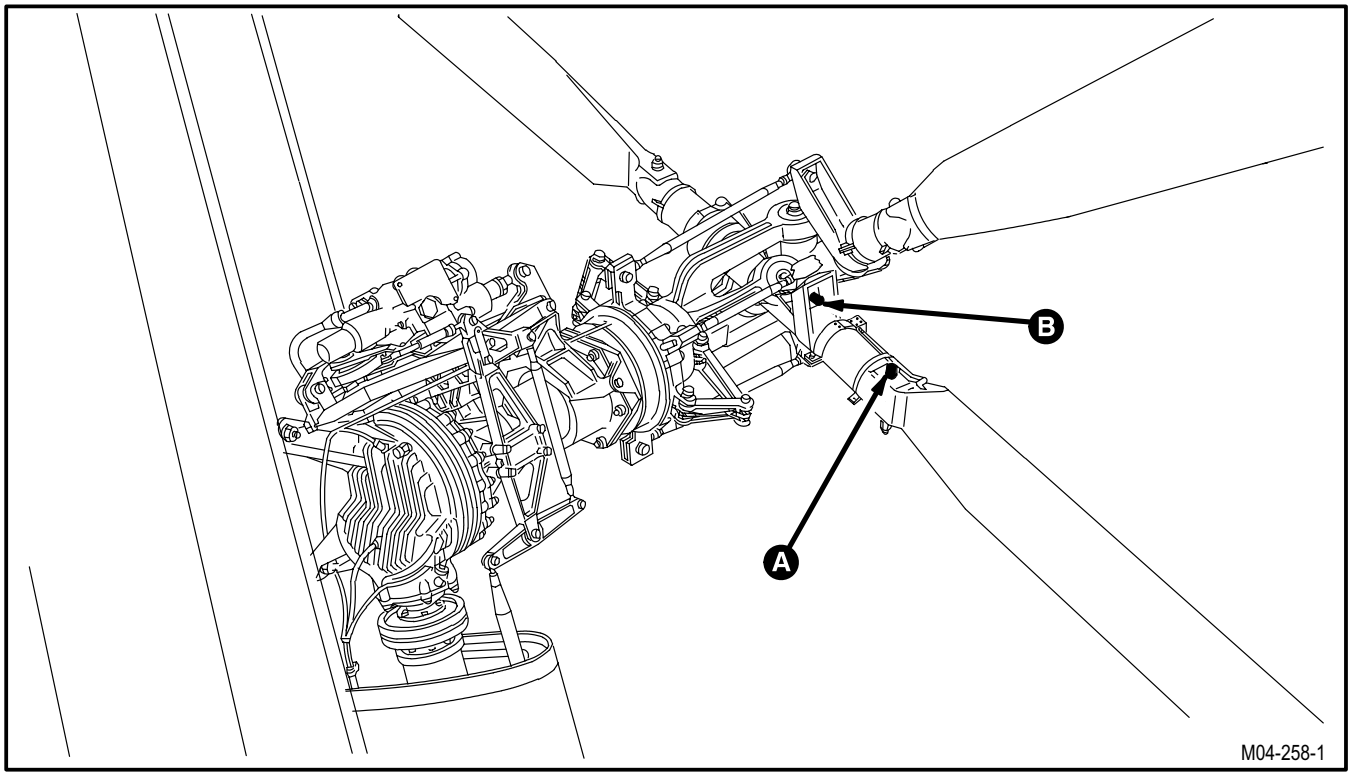
**CAUTION**

If blade balance weights are missing and/or balance status is unknown, replace with serviceable blade. Any blade with all leading and trailing edge balance weights removed shall be returned to depot. (Refer to para 5.57 for tail rotor blade tip cap removal and installation procedures.)

**NOTE**

If TB 1-1520-238-20-62 (Deactivation of Main Rotor and Tail Rotor Blade De-ice Capability) is complied with, then step a. should have been complied with. If not, perform step a.

a. **On the pilot aft circuit breaker panel, disable de-ice system by opening BLADE DE-ICE and BLADE DE-ICE CONTR circuit breakers.** Install wire tie to prevent reactivation.

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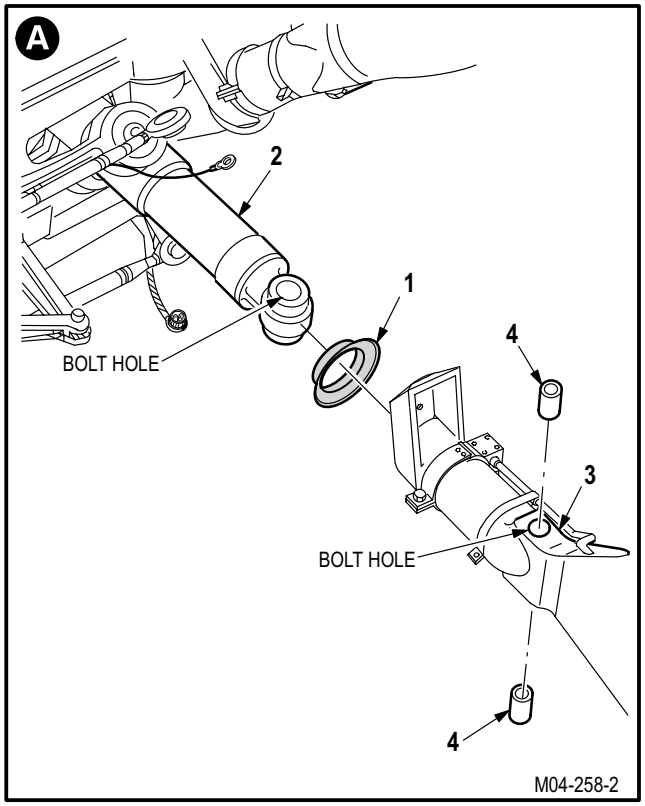
## 5.54. TAIL ROTOR BLADE INSTALLATION - continued

b. **Install dust cap (1) on tail rotor hub (2) with flared end of cap (1) facing tail rotor blade (3).** Use maintenance platform.

c. **Install blade (3) on hub (2).**

(1) Install blade (3) on hub (2) with bolt holes in blade and hub alined.

(2) Install two bushings (4) in bolt holes of blade (3).




d. **Thoroughly clean bolt (5), new preload indicating PLI washer (6), and new nut (11) before installation** (para 1.47)**.**

e. **Install bolt (5) through two bushings (4) and blade (3).**

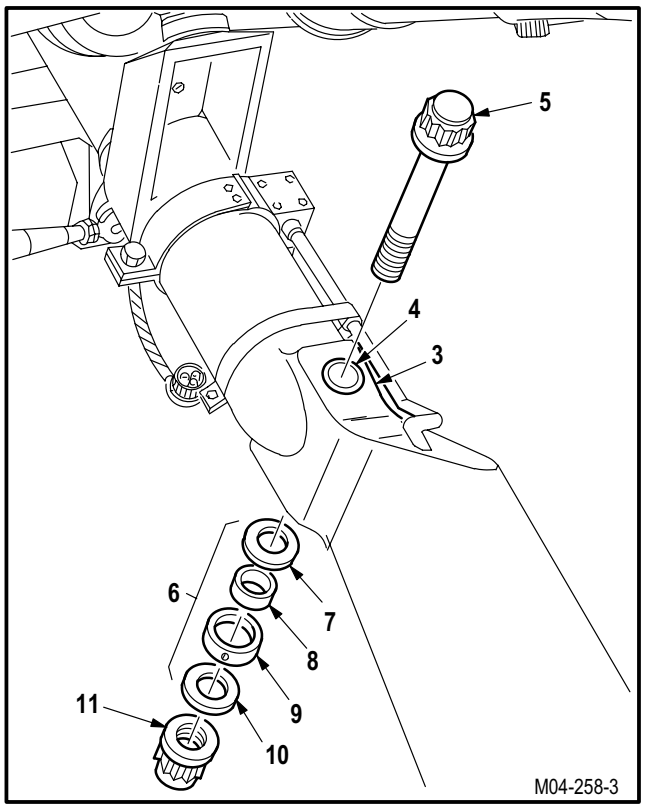
f. **Install PLI washer (6), in proper sequence, on bolt (5).**

(1) Install washer (7), inner washer (8), outer washer (9), and washer (10).

**NOTE**

Before installing nut check threads on bolt for the possibility of nut shanking. Use **0.279 INCH** as thickness of loaded PLI washer. One washer may be installed under bolt head.

(2) Install nut (11) and run nut (11) on bolt (5) until contact is made with PLI washer (6).

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## 5.54. TAIL ROTOR BLADE INSTALLATION - continued

**CAUTION**

Do not overtorque the nut. If the nut is tightened more than 1/8 turn (45 degrees) beyond the point where the outer PLI washer becomes immovable, the installation is not acceptable and the bolt, nut, and PLI washer shall be replaced.

g. **Torque nut (11) using PLI washer torquing method.**

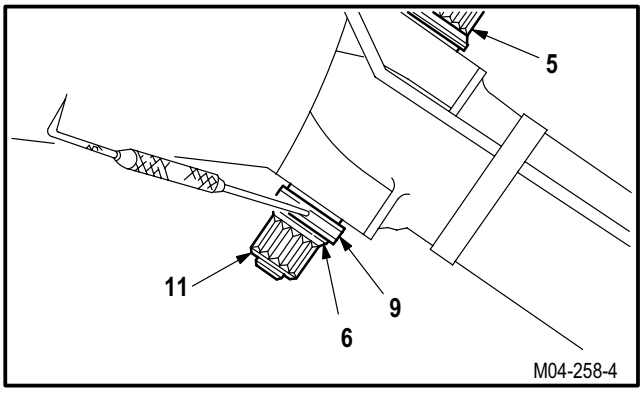
(1) Hold bolt (5).

(2) Insert scriber in hole of PLI outer washer (9). Use scriber.

**NOTE**

Torque is correct when outer washer no longer turns.

(3) Tighten nut (11) 1/8 turn (45 degrees) at a time while turning outer washer (9). Use hinged handle.




h. **Inspect (QA).**

i. **Check tail rotor blade bearings for pitch change force** (para 5.51)**.**

j. **Apply a coat of corrosion preventive compound to bolt (5) head, PLI washer (6), and nut (11).** Use corrosion preventive compound (item 62, App F).

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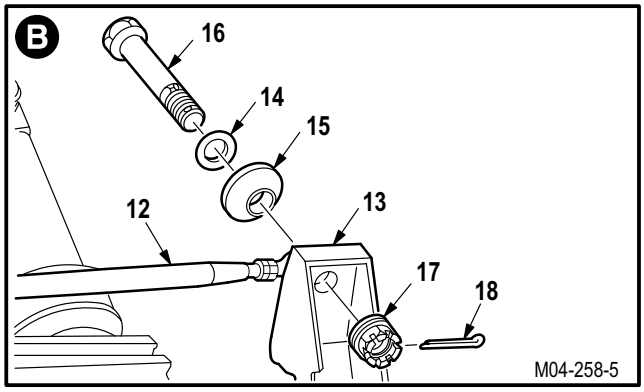
**5.54. TAIL ROTOR BLADE INSTALLATION - continued**

k. **Install pitch control link (12) on pitch horn (13).**

(1) Install washer (14) and safety washer (15) on bolt (16).

(2) Install bolt (16) through pitch control link (12) and pitch horn (13).

(3) Install nut (17).




l. **Perform self-retaining bolt fit check** (para 11.1)**.**

m. **Torque nut (17) 225 to 285 INCH-POUNDS.**

(1) Hold bolt (16). Torque nut (17) to **225 INCH-POUNDS**. Use torque wrench.

(2) Increase torque to aline cotter pin hole, but do not exceed **285 INCH-POUNDS**.

(3) Install new cotter pin (18).

n. **Apply primer to bolt (16) head and nut (17).** Use epoxy primer coating kit (item 78, App F).

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## 5.54. TAIL ROTOR BLADE INSTALLATION - continued

**NOTE**

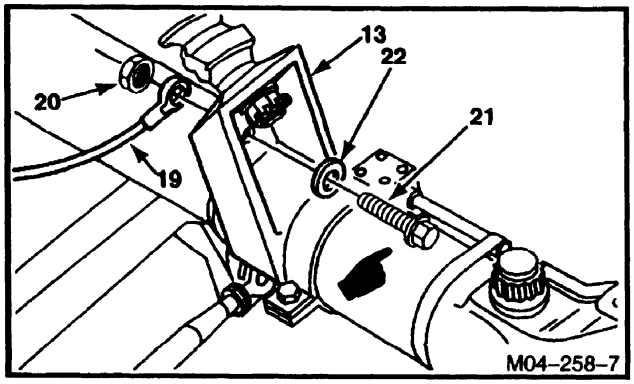
For proper preparation of bonding surface on pitch horn for electrical lead, refer to TM 55-1500-323-24.

o. **Install electrical lead (19) on pitch horn (13).** Torque nut (20) to **25 INCH-POUNDS**.

(1) Install screw (21) through lead (19) and horn (13).

(2) Install washer (22) and nut (20).

(3) Torque nut (20) to **25 INCH-POUNDS**. Use torque wrench.



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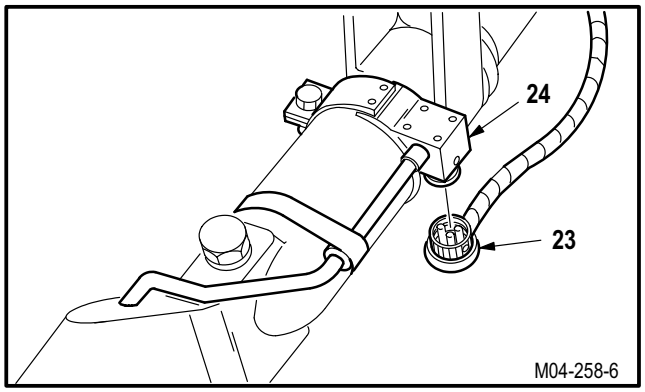
p. **Perform electrical bond check on lead (19)** (TM 55-1500-323-24)**.**

(1) Bond shall be **1.00 OHM** or less. Use multimeter.

q. **Apply a coat of corrosion preventive compound to screw (21) and nut (20).** Use corrosion preventive compound (item 62A, App F).

r. **Attach de-ice connector P999, P1034, P1035, or P1036 (23) to blade receptacle J999, J1034, J1035, or J1036 (24).**

(1) Lockwire connector (23) and receptacle (24) together. Use wire (item 222, App F).




s. **Inspect (QA).**

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**5.54. TAIL ROTOR BLADE INSTALLATION - continued**

**NOTE**

If TB 1-1520-238-20-62 (Deactivation of Main Rotor and Tail Rotor Blade De-ice Capability) is complied with, do not perform step t. and u. Go to step v.

t. **On the pilot aft circuit breaker panel, enable de-ice system by closing BLADE DE-ICE and BLADE DE-ICE CONTR circuit breakers.** Remove wire tie to reactivate.

u. **Perform tail rotor de-ice system controller adjustment** (para 12.56)**.**

v. **Perform tail rotor balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.55. TAIL ROTOR BLADE SCRATCH, NICK, OR GOUGE REPAIR

5.55.1. Description

This task covers: Abrasion Strip Repair. Blade Repair.

5.55.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Spray gun paint cup (item 102, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Paint spray gun (item 339, App H)

**Materials/Parts:**

Cloth (item 47, App F)
Cloth (item 48, App F)
Cloth (item 49, App F)
Cloth (item 52, App F)
Epoxy primer coating kit (item 78, App F)
Paper (item 133, App F)
Paper (item 135, App F)
Paper (item 136, App F)
Polyurethane coating (item 140, App F)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 1-1520-238-T
TM 55-1500-345-23

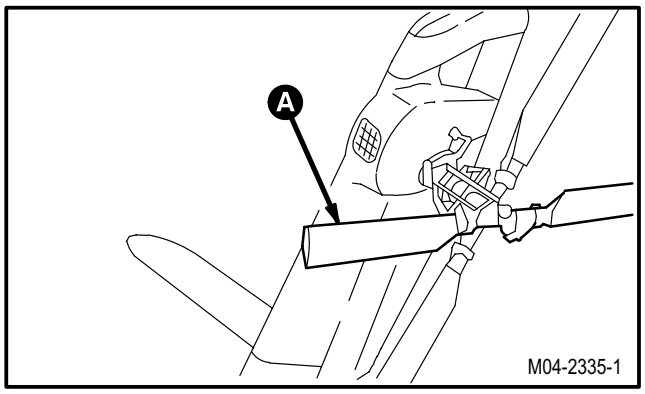
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.55. TAIL ROTOR BLADE SCRATCH, NICK, OR GOUGE REPAIR - continued

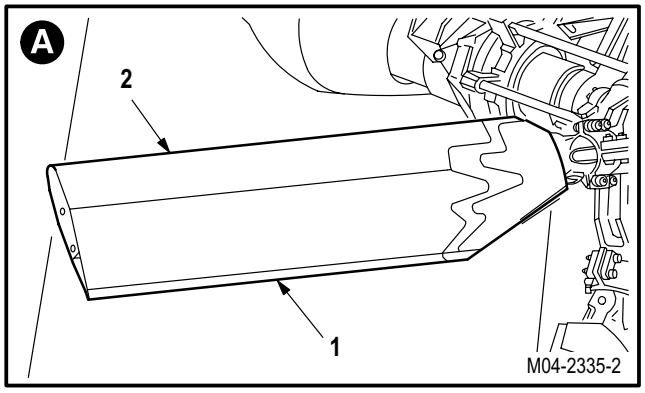
5.55.3. Abrasion Strip Repair

a. **Remove scratches, nicks, and gouges from tail rotor blade (1) leading edge (2) abrasion strip.**

(1) Remove defect from blade (1) leading edge (2) abrasion strip by sanding spanwise. Use paper (item 133, App F).

(2) Smooth sanded repair area on blade (1) leading edge (2) abrasion strip by sanding spanwise. Use paper (item 135, App F).

(3) Finish blade (1) leading edge (2) abrasion strip surface by sanding spanwise. Use paper (item 136, App F).




5.55.4. Blade Repair

a. **Remove scratches, nicks, and gouges from blade (1) surfaces.**

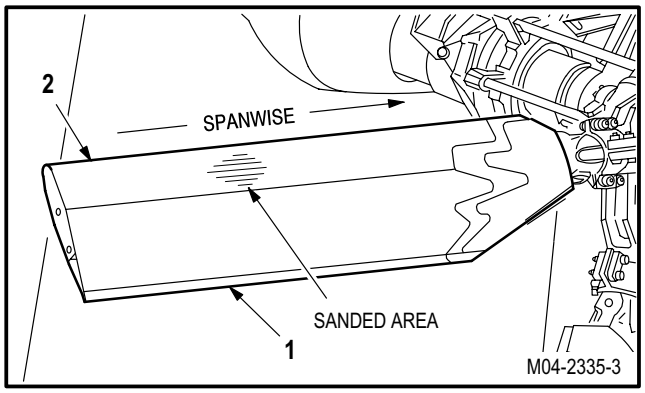
(1) Remove defects from blade (1) surfaces by sanding spanwise. Use cloth (item 47, App F).

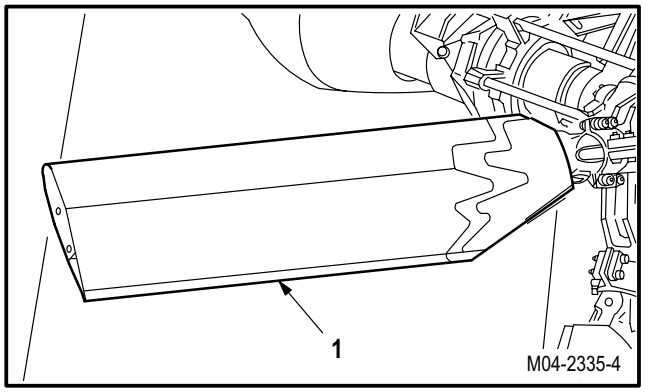
(2) Smooth sanded repair area on blade (1) by sanding spanwise. Use cloth (item 48, App F).

(3) Finish blade (1) by sanding spanwise. Use cloth (item 49, App F).

b. **Wipe blade (1) clean.** Use cloth (item 52, App F).

c. **Inspect (QA).**

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**5.55. TAIL ROTOR BLADE SCRATCH, NICK, OR GOUGE REPAIR - continued**

**CAUTION**

Rotor blades are not to be repainted over the entire surface of blade. Only light touchup of the eroded or repaired area is allowed. Severe chordwise imbalance problems may result from repainting blade.

d. **Refinish reworked area.**

(1) Spray a full, even coat of primer on reworked area (TM 55-1500-345-23). Use epoxy primer coating kit (item 78, App F), spray gun, and paint cup.

(2) Feather primer into existing painted surfaces.

(3) Allow primer to air dry for at least **1 HOUR**.

(4) Spray a full, even coat of polyurethane coating on reworked area (TM 55-1500-345-23). Use polyurethane coating (item 140, App F), spray gun, and paint cup.

(5) Feather edges into the existing surfaces.

(6) Allow polyurethane coating to air dry at least **3 HOURS**.

e. **Inspect (QA).**

f. **Perform tail rotor balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.56. TAIL ROTOR BLADE DENT AND DEPRESSION REPAIR

5.56.1. Description

This task covers: Repair.

5.56.2. Initial Setup

**Tools:**

Airframe repairman's tool kit (item 377, App H)
Light duty laboratory apron (item 27, App H)
Spray gun paint cup (item 102, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)
Paint spray gun (item 339, App H)

**Personnel Required:**

68G Aircraft Structural Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 8, App F)
Brush (item 34, App F)
Cloth (item 52, App F)
Epoxy primer coating kit (item 78, App F)
Methyl ethyl ketone (item 124, App F)
Naphtha (item 127, App F)
Paper (item 133, App F)
Paper (item 135, App F)
Polyurethane coating (item 140, App F)
1 1/4-inch blade putty knife (item 199, App H)
Thinner (item 211, App F)

**References:**

TM 1-1520-238-T
TM 55-1500-345-23

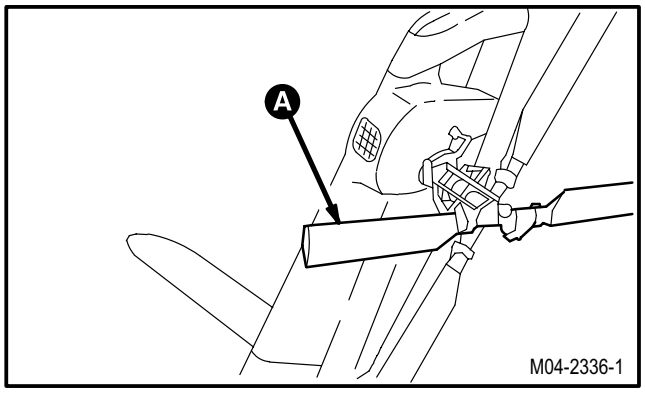
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.56. TAIL ROTOR BLADE DENT AND DEPRESSION REPAIR - continued

5.56.3. Repair

a. **Remove paint from rotor blade (1) dents, depressions, creases, and surrounding area by sanding in a spanwise direction.** Use paper (item 133, App F).

b. **Finish blade (1) surface by sanding in a spanwise direction.** Use paper (item 135, App F).

c. **Wipe blade (1) surface clean.** Use methyl ethyl ketone (item 124, App F).

d. **Brush an even coat of adhesive on blade (1) dents, depressions, creases, and surrounding area.** Use adhesive (item 8, App F) and brush (item 34, App F).

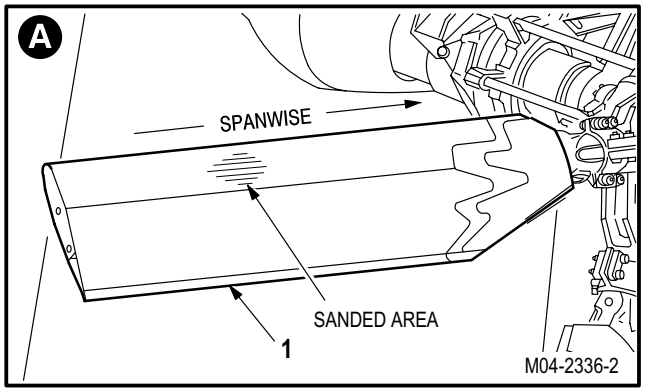
(1) Allow adhesive to dry at ambient temperature for **30 MINUTES**.

e. **Spread over blade (1) repair.**

(1) Blend adehesive to surrounding skin surface. Use putty knife.

(2) Allow adhesive to dry at ambient temperature for **24 HOURS**.

f. **Sand dried compound on blade (1) in a spanwise direction.** Use paper (item 133, App F).

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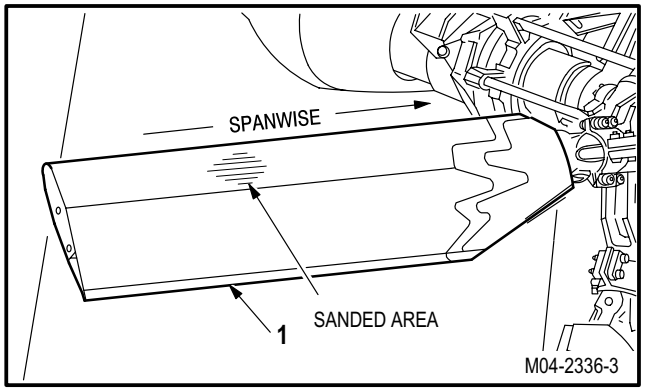
## 5.56. TAIL ROTOR BLADE DENT AND DEPRESSION REPAIR - continued

g Finish sanding dried compound on blade (1) in a spanwise direction. Use paper (item 135, App F).




h. **Wipe blade (1) clean.** Use methyl ethyl ketone (item 124, App F), naphtha (item 127, App F), or thinner (item 211, App F), and cloth (item 52, App F).

**CAUTION**

Rotor blades are not to be repainted over the entire surface of blade. Only light touchup of the eroded or repaired area is allowed. Severe chordwise imbalance problems may result from repainting blade.

i. **Refinish reworked area.**

(1) Spray a full, even coat of primer on reworked area (TM 55-1500-345-23). Use epoxy primer coating kit (item 78, App F), spray gun, and paint cup.

(2) Feather primer into existing painted surfaces.

(3) Allow primer to air dry for at least **1 HOUR**.

(4) Spray a full, even coat of polyurethane coating on reworked area (TM 55-1500-345-23). Use polyurethane coating (item 140, App F), spray gun, and paint cup.

(5) Feather edges into the existing surfaces.

(6) Allow polyurethane coating to air dry at least **3 HOURS**.

j. **Inspect (QA).**

k. **Perform tail rotor balance maintenance operational check** (TM 1-1520-238-T)**.**

END OF TASK

## 5.57. TAIL ROTOR BLADE BALANCE WEIGHT REMOVAL/INSTALLATION

5.57.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.57.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
30 - 150 inch-pound 1/4-inch drive click type torque wrench (item 435, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 16, App F)
Epoxy primer coating kit (item 78, App F)
Methyl ethyl ketone (item 124, App F)
Counterbalance weight (item 217, App F)
Counterbalance weight (item 218, App F)
Counterbalance weight (item 219, App F)

**References:**

TM 1-1520-238-T

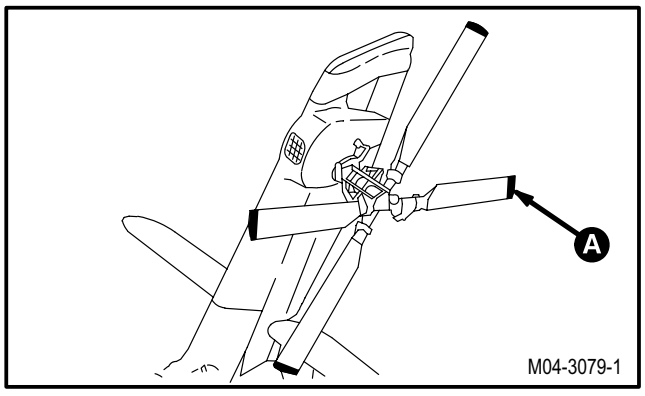
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.57. TAIL ROTOR BLADE BALANCE WEIGHT REMOVAL/INSTALLATION - continued

5.57.3. Removal

a. **Remove tail rotor blade tip cap (1) from tail rotor blade (2).**

(1) Remove three screws (3).

b. **Remove leading edge weights (4).**

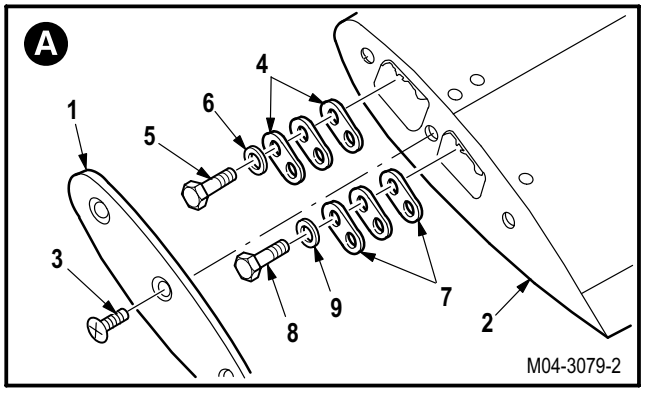
(1) Clean primer from two bolt (5) heads. Use methyl ethyl ketone (item 124, App F) (para 1.47).

(2) Remove two bolts (5), washers (6), and all weights (4).

c. **Remove trailing edge weights (7).**

(1) Clean primer from two bolt (8) heads. Use methyl ethyl ketone (item 124, App F) (para 1.47).

(2) Remove two bolts (8), washers (9), and all weights (7).




5.57.4. Cleaning

a. **Clean removed and attaching parts.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

5.57.5. Inspection

a. **Check bolts for cracks.** None allowed.

b. **Check bolts and weights for corrosion** (para 1.49)**.**

5.57.6. Installation

**NOTE**

Weights are added or subtracted to balance tail rotor blade according to balancing procedures. One half of required weight correction should be made at each mount point. Use counterbalance weight (item 217, App F), counterbalance weight (item 218, App F), and/or counterbalance weight (item 219, App F) for balancing.

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## 5.57. TAIL ROTOR BLADE BALANCE WEIGHT REMOVAL/INSTALLATION - continued

a. **Install leading edge weights (4).** Torque bolts (5) to **90 INCH-POUNDS**.

(1) Position and hold weights (4) in leading edge mount point (10).

(2) Coat two bolt (5) threads, shank, bottom of head, and two washers (6) with primer. Use epoxy primer coating kit (item 78, App F).

(3) While primer is wet, install two washers (6) and two bolts (5). Torque bolts (5) to **90 INCH-POUNDS**. Use torque wrench.

(4) Apply primer over weights (4) and bolt heads (5). Use epoxy primer coating kit (item 78, App F).

b. **Install trailing edge weights (7).** Torque bolts (8) to **90 INCH-POUNDS**.

(1) Position and hold weights (7) in trailing edge mount point (11).

(2) Coat two bolt (8) threads, shank, bottom of head, and two washers (9) with primer. Use epoxy primer coating kit (item 78, App F).

(3) While primer is wet, install two washers (9) and two bolts (8). Torque bolts (8) to **90 INCH-POUNDS**. Use torque wrench.

(4) Apply primer over weights (7) and bolt heads (8). Use epoxy primer coating kit (item 78, App F).

c. **Inspect (QA).**

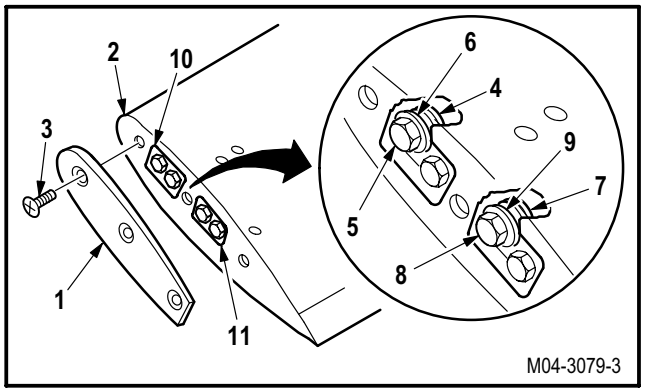
d. **Record amount of weights (4) and (7) installed and blade identification on tail rotor balance chart** (TM 1-1520-238-T)**.**

e. **Inspect (QA).**

f. **Install tip cap (1) on blade (2).**

(1) Position tip cap (1) on blade (2).

(2) Install three screws (3).

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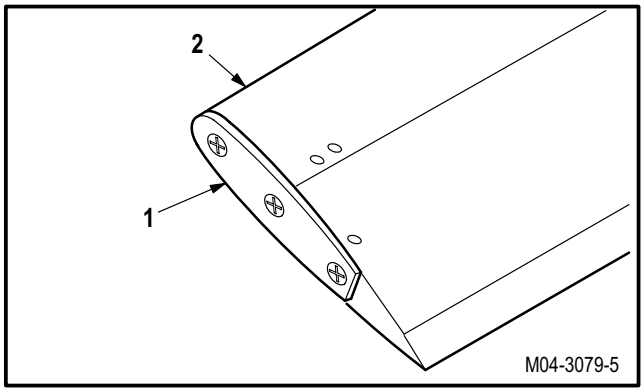
## 5.57. TAIL ROTOR BLADE BALANCE WEIGHT REMOVAL/INSTALLATION - continued

g. **Inspect (QA).**

h. **Perform tail rotor balance maintenance operational check** (TM 1-1520-238-T)**.**

i. **Apply a bead of adhesive to faying surface between tip cap (1) and blade (2).** Use adhesive (item 16, App F).

(1) Allow adhesive to cure for **24 HOURS** at room temperature.




j. **Inspect (QA).**

END OF TASK

## 5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM)

5.57A.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.57A.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
2 - 12-inch inside micrometer caliper (item 56, App H)
16-inch x 3/4-inch drive socket wrench extension (item 122, App H)
Tail rotor fixture (item 136, App H)
0 - 18-inch height gage (item 149, App H)
Chemical protective gloves (item 154, App H)
9-inch x 1/2-inch drive hinged socket wrench handle (item 171, App H)
0.0015 - 0.0250-inch thickness gage (item 152, App H)
15-inch master precision level (item 202, App H)
Adjustable air filtering respirator (item 262, App H)
11/16 x 1/2-inch drive socket wrench socket (item 304, App H)
13/16 x 1/2-inch drive socket wrench socket (item 311, App H)
Tail rotor strap pack centering tool kit (item 374, App H)
V-block (item 401, App H)
100 - 500 foot-pound 3/4-inch drive click type torque wrench (item 438, App H)
0 - 75 inch-pound 1/4-inch drive dial indicator torque wrench (item 446, App H)

**Materials/Parts:**

Spare bolt (2)
Nut (2)
Spacer (as required)
Brush (item 34, App F)
Corrosion preventive compound (item 62, App F)
Lubricant (item 114, App F)
Wax pencil (item 137, App F)
Sealing compound primer (item 146, App F)
Sealing compound (item 156A, App F)
Sealing compound (item 168, App F)
Tape (item 203, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**References:**

TM 55-1500-344-23

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.60 | Tail rotor head removed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor hub is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task applies to upper and lower tail rotor hubs.

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## 5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued

5.57A.3. Removal

**NOTE**

Removal of hub assembly and/or hub components is typical for both upper and lower hubs.

a. **Position tail rotor head (1) on tail rotor fixture (2).** Use tail rotor fixture.

(1) Remove nut (3) from pedestal (4).

(2) Guide fork (5) over pedestal (4).

(3) Rotate fork (5) around pedestal (4) to aline arms of hubs (6) with correct set of uprights (7).

(4) Aline any one of three holes (8) on fork (5) with guide pin (9) on pedestal (4).

(5) Lower fork (5) on pedestal (4).

(6) Hand tighten nut (3) on pedestal (4).

**CAUTION**

To prevent damage to bearings, ensure that bearings are not twisted in fork mounts while removing bolt.

b. **Remove hub (6) and strap pack (10) from fork (5).**

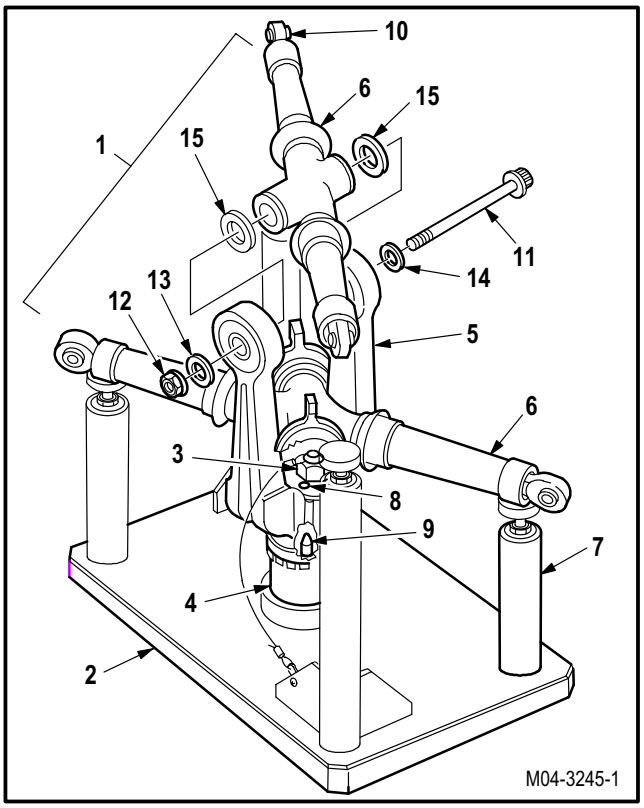
(1) Hold bolt (11) and remove nut (12) and washer (13).

(2) Remove bolt (11) and countersunk washer (14).

(3) Remove two spacers (15).

(4) Remove hub (6) and strap pack (10) from fork (5).

(5) Discard bolt (11), two washers (13), (14), and nut (12).

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**5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued**

c. **Place hub (6) in V-blocks (16).**

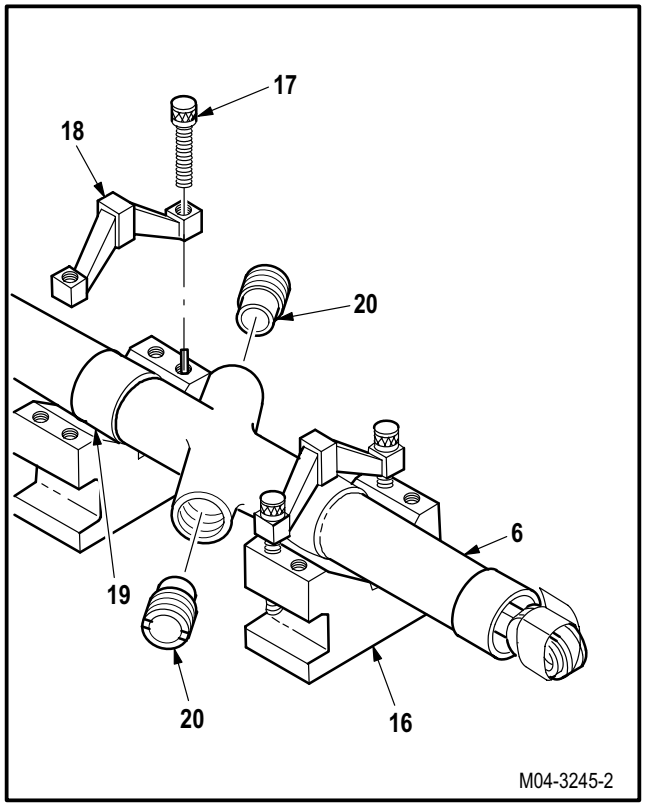
(1) Place two V-blocks (16) on a flat, smooth, level surface. Use V-blocks.

(2) Remove four thumb screws (17) and two clamps (18) from V-blocks (16).

(3) Place hub (6) in V-blocks (16) alining two inboard bearing collars (19) with V-blocks (16).

(4) Install four thumb screws (17) through two clamps (18) and in two V-blocks (16).

(5) Hand tighten four thumb screws (17) until clamps (18) secure hub (6).




d. **Remove threaded bushings (20) from hub (6).** Use torque adapters supplied in centering kit.

**CAUTION**

To prevent internal hub and strap pack edge damage, remove strap pack carefully.

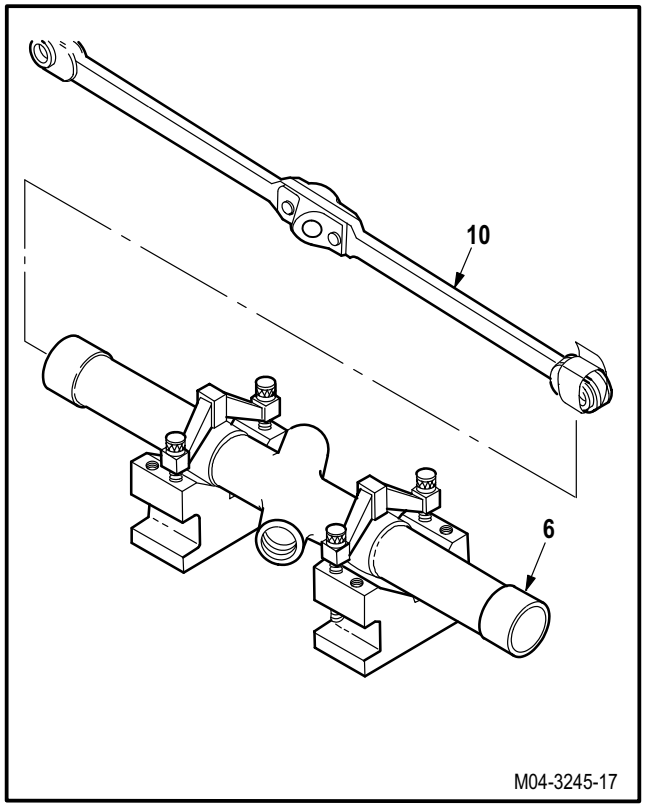
e. **Remove strap pack (10) from hub (6).**

(1) Apply one wrap of tape to cover either exposed end of strap pack (10). Use tape (item 203, App F).

(2) Remove strap pack (10) from hub (6) pulling taped end of strap pack (10) through hub (6).

(3) Remove four thumb screws (17) and two clamps (18) from V-blocks (16).

(4) Remove hub (6) from V-blocks (16).




5.57A.4. Cleaning

a. **Clean fork, strap pack, hub, and threaded bushings** (para 1.47)**.**

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**5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued**

5.57A.5. Inspection

a. **Check tail rotor fork for cracks and deformations.** None allowed.

b. **Check tail rotor fork for nicks, scratches, gouges, and dents** (para 5.51)**.**

c. **Check tail rotor fork teeter stops, shoes, and securing holes for wear damage:**

(1) Nicks, scratches, gouges, galling, scoring, and dents are acceptable if less than **0.010 INCH** deep.

(2) Superficial scratches are acceptable if no material is raised above surrounding surface.

d. **Check four rubber bumpers for looseness, splits, or deterioration.** None allowed.

e. **Check four elastomeric bearings for condition and looseness** (para 5.51)**.**

f. **Check strap pack for broken, loose, deformed, or cracked strap laminates.** None allowed.

(1) Acceptable for the outboard shoes on the strap pack to pivot in relation to the laminates.

g. **Check strap pack for corrosion** (para 1.49)**.**

(1) Check strap laminates for pits. None allowed.

(2) Check strap for discoloration. Clean (para 1.47).

(3) Corrosion not to exceed **0.005 INCH** on inboard or outboard shoes including diameter of teetering hole.

h. **Check threaded bushings and teetering bolts for corrosion, cracks, or damaged threads.** None allowed.

i. **Check hub for cracks and damaged threads.** None allowed.

j. **Check hub for scratches, gouges, dents, and corrosion.**

(1) Surface damage located within **3 INCHES** of hub center may be blended out.

(2) Damage not to exceed **0.020 INCH**.

k. **Check hub for corrosion** (TM 55-1500-344-23)**.**

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## 5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued

5.57A.6. Installation

**CAUTION**

To prevent internal hub and strap pack edge damage, install strap pack carefully.

a. **Install strap pack (10) in hub (6).**

(1) Place hub (6) in V-blocks (16) alining two inboard collars (19) with V-blocks (16).

(2) Install four thumb screws (17) through two clamps (18) and in two V-blocks (16).

(3) Hand tighten four thumb screws (17) until clamps (18) secure hub (6).

(4) Apply one wrap of tape to cover either end of strap pack (10). Use tape (item 203, App F).

(5) Install strap pack (10) in hub (6) inserting taped end first.

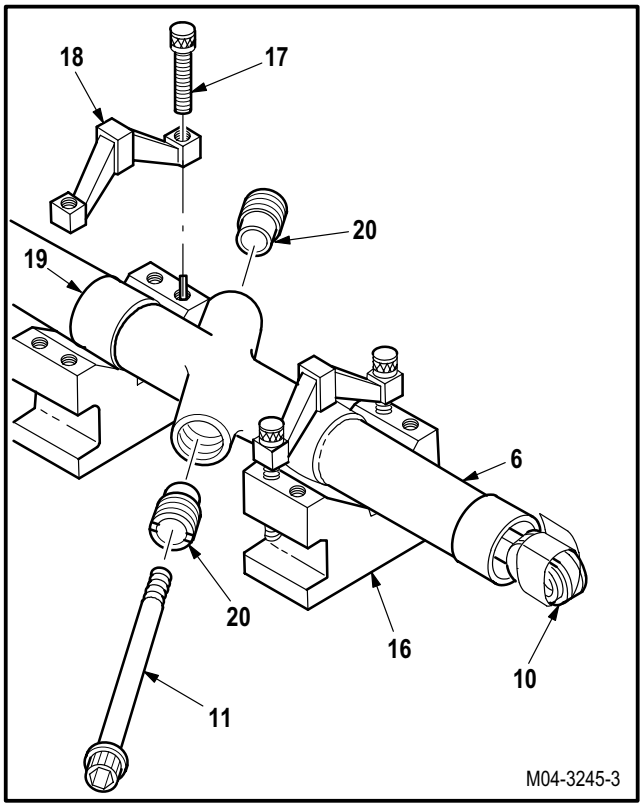
(6) Remove tape from strap pack (10).

**NOTE**

Threaded bushings should be evenly started in hub.

(7) Install threaded bushings (20) finger tight in hub (6).

(8) Insert new bolt (11) through bushings (20), hub (6), and strap pack (10) for alinement.

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## 5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued

b. **Center strap pack (10) in hub (6).**

(1) Place gage blocks (21) under each end of strap pack (10) so long ends of gage blocks (21) contact each end of hub (6).

(2) Install two spare bolts (22) through each end of strap pack (10).

(a) Position spare bolts (22) so that untreated portion is next to upper legs of gage block (21).

(3) Shim four places using thickness gage to obtain equal clearance between gage blocks (21) and spare bolts (22). Use enough gage thickness to stretch strap pack (10) taut in hub (6).

(4) Alternately tighten each threaded bushing (20) until final torque of **40 to 60 INCH-POUNDS** is reached on each bushing (20). Use torque wrench and torque adapters supplied in centering kit.

(5) Check for equal clearance between gage block (21) and spare bolt (22) at each end of hub (6). Use thickness gage.

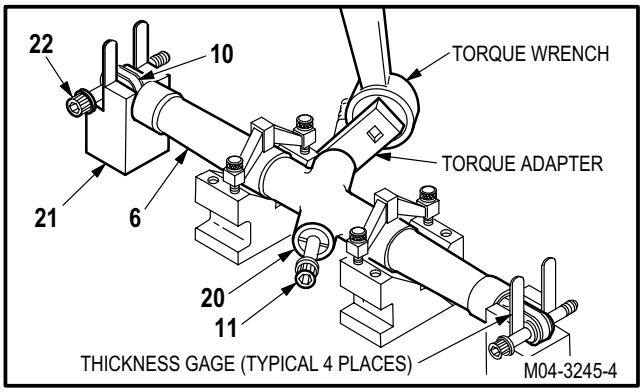
(a) Strap pack must be within **0.005 INCH** of each end of hub (6).

(6) Remove bolt (11) from hub (6).

(a) Bolt (11) must move freely in hub (6), bushings (20), and strap pack (10).

(7) Remove threaded bushings (20) from hub (6). Use torque adapters supplied in centering kit.

(8) Apply primer to threads of bushing (20) and threads of hub (6). Use brush (item 34, App F) and sealing compound primer (item 146, App F).

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## 5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued

(a) Allow primer to cure for **30 MINUTES** at room temperature.

(9) Apply sealing compound to threads of bushings (20). Use brush (item 34, App F) and sealing compound (item 168, App F).

(a) Allow sealing compound cure for **40 MINUTES** at room temperature.

**NOTE**

Threaded bushings should be evenly started in hub until finger tight.

(10) Install threaded bushings (20) finger tight in hub (6).

(11) Insert bolt (11) through bushings (20), hub (6), and strap pack (10) for alinement.

(12) Alternately tighten each threaded bushing (20) until final torque of **40 to 60 INCH-POUNDS** is reached on each bushing (20). Use torque wrench and torque adapters supplied in centering kit.

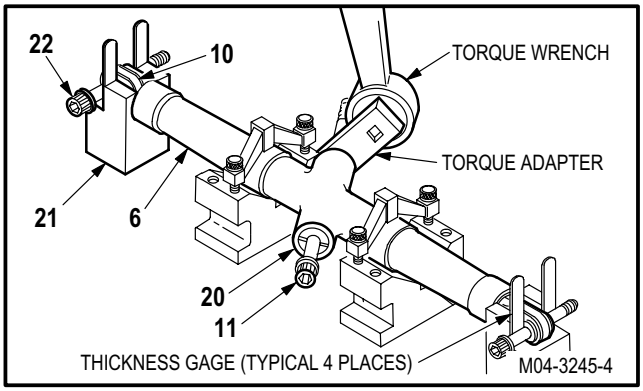
(13) Check for equal clearance between gage block (21) and spare bolt (22) at each end of hub (6). Use thickness gage.

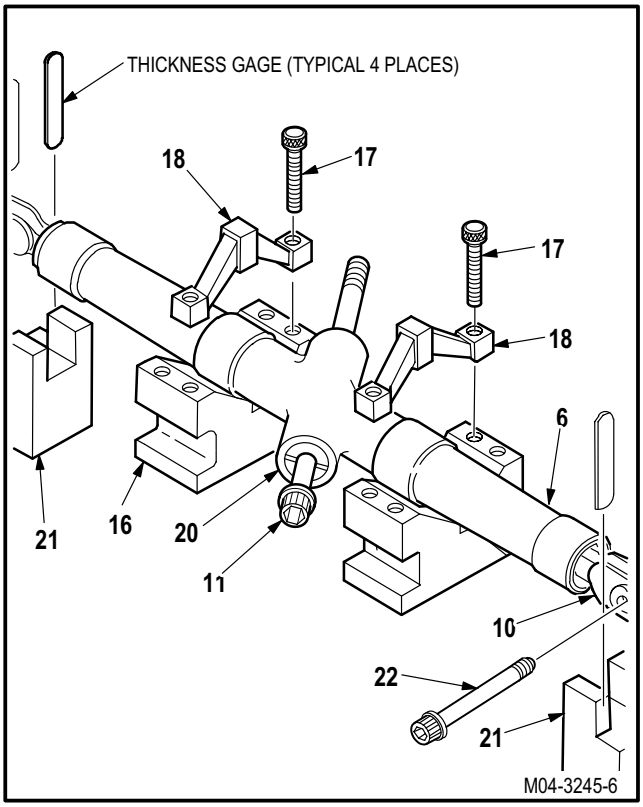
(a) Strap pack must be within **0.005 INCH** of each end of hub (6).

(14) Remove bolt (11) from hub (6).

(a) Bolt (11) must move freely in hub (6), bushings (20), and strap pack (10) during removal.

(15) Seal notches in threaded bushing using sealing compound. Use sealing compound (item 156A, App F).




c. **Inspect (QA).**

d. **Remove four thickness gages, two spare bolts (22), and two gage blocks (21).**

e. **Remove hub (6) from V-blocks (16).**

(1) Remove four thumb screws (17), two clamps (18), and hub (6) from V-blocks (16).

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## 5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued

f. **Identify one side of hub (6) as #1 and the other side as #2.** Use wax pencil (item 137, App F).

**NOTE**

Refer to Table 5-7 to record data.

g. **Determine bushing (20) thickness for hub (6).**

(1) Measure across hub (6) to obtain dimension A and record dimension A on line 1. Use caliper.

(2) On each side, measure from each hub (6) surface to bushing (20) surface to obtain dimension 1B and dimension 2B. Record dimension 1B and dimension 2B on line 2. Use caliper.

h. **Find center of hub (6):**

(1) Divide dimension A by 2 and record on line 3.

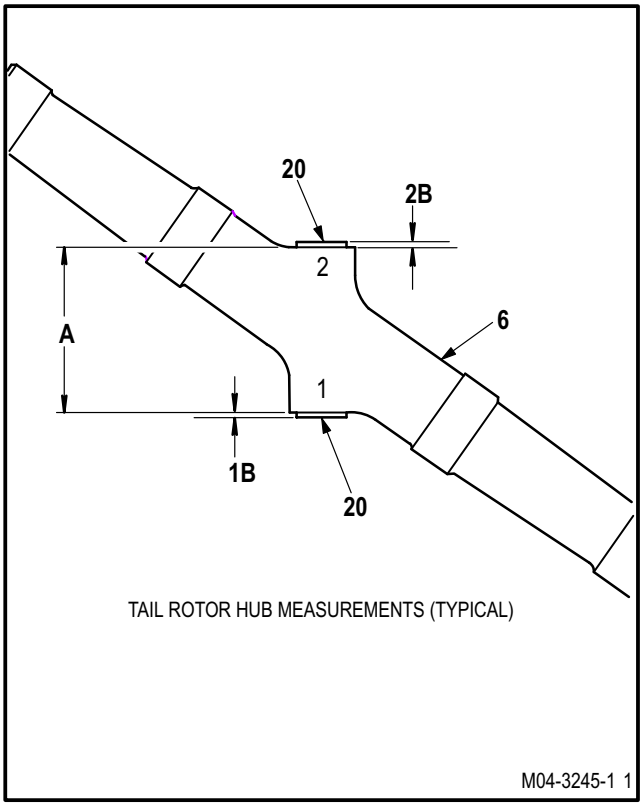
(2) Add quotient recorded on line 3 to dimension 1B and record on line 4.

(3) Add quotient recorded on line 3 to dimension 2B and record on line 5.

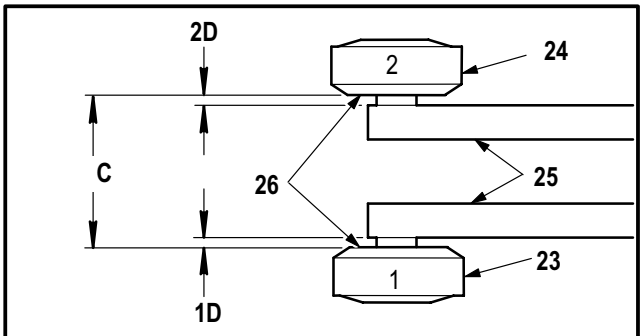
(4) Identify fork mount (23) as #1 and fork mount (24) as #2 to match hub markings applied in step f. Use wax pencil (item 137, App F).

(5) Measure distance between inboard surfaces of mounts (23) and (24) to obtain dimension C. Record dimension C on line 6.

(6) Lay a straight edge (25) across inboard surface of elastomeric bearing (26) and measure distance between straight edge and inboard surfaces of fork mounts (23) and (24) to obtain dimension 1D and dimension 2D. Record dimension 1D and dimension 2D on line 7.



TAIL ROTOR HUB MEASUREMENTS (TYPICAL)



TAIL ROTOR FORK MEASUREMENTS (TYPICAL)

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**5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued**

i. **Find center of fork:**

(1) Divide dimension C by 2 and record on line 8.

(2) Subtract dimension 1D from quotient recorded on line 8 and record difference on line 9.

(3) Subtract dimension 2D from quotient recorded on line 8 and record difference on line 10.

(4) Subtract figure recorded on line 4 from figure recorded on line 9 and record difference on line 11.

(5) Subtract figure recorded on line 5 from figure recorded on line10 and record difference on line 12.

**NOTE**

- Allow **0.010** to **0.012 INCH** clearance on each side of hub and upper fork assemblies.
- Allow **0.002** to **0.003 INCH** clearance on each side of hub and lower fork assemblies.

(6) Subtract proper precompression clearance (line 13 A or B) from figure recorded on line 11 to determine hub side #1 spacer stack thickness and record difference on line 14.

(7) Subtract proper precompression clearance (line 13 A or B) from figure recorded on line 12 to determine hub side #2 spacer stack thickness and record difference on line 15.

j. **Inspect (QA).**

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**5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued**

**TABLE 5-7**

| | | |
|---|---|---|
| 1. | _____ | DIMENSION A |
| 2. | 1B_____ 2B_____ | DIMENSION 1B AND DIMENSION 2B |
| 3. | _____ | 1/2 of #1 |
| 4. | _____ | Add #3 to DIMENSION 1B |
| 5. | _____ | Add #3 to DIMENSION 2B |
| 6. | _____ | DIMENSION C |
| 7. | 1D_____ 2D_____ | DIMENSION 1D and DIMENSION 2D |
| 8. | _____ | 1/2 of #6 |
| 9. | _____ | Subtract DIMENSION 1D from #8 |
| 10. | _____ | Subtract DIMENSION 2D from #8 |
| 11. | _____ | Subtract #4 from #9 |
| 12. | _____ | Subtract #5 from #10 |
| 13. | Bearing Precompression Allowance<br>A. Upper forks -**0.010** to **0.012 INCH** (each side of hub)<br>B. Lower forks -**0.002** to **0.003 INCH** (each side of hub) | |
| 14. | _____ | #1 side shim. Subtract proper precompression allowance #13 (A or B) from #11. |
| 15. | _____ | #2 side shim. Subtract proper precompression allowance #13 (A or B) from #12. |
| 16. | _____ | Bolt length before torque. |

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## 5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued

**CAUTION**

To prevent damage to bearings, ensure that bearings are not twisted in fork mounts while installing bolt.

**NOTE**

- All bolt measurements must be taken at the same points at each end of bolt. Points should be marked with a wax pencil.
- HS4243-V10-103 bolt may be used as alternate for HS4243-V10-105 bolt.

k. **Measure and record length of new bolt (11).** Use height gage.

(1) Record bolt (11) length on line 16.

l. **Apply an even coat of lubricant on bolt (11), new washers (14), (13), and new nut (12).** Use lubricant (item 114, App F).

(1) Allow lubricated hardware to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

**NOTE**

- Check that fixture assembly is level and secure before installing hub. Fixture must remain level during assembly.
- To install hub in upper fork, go to step u.

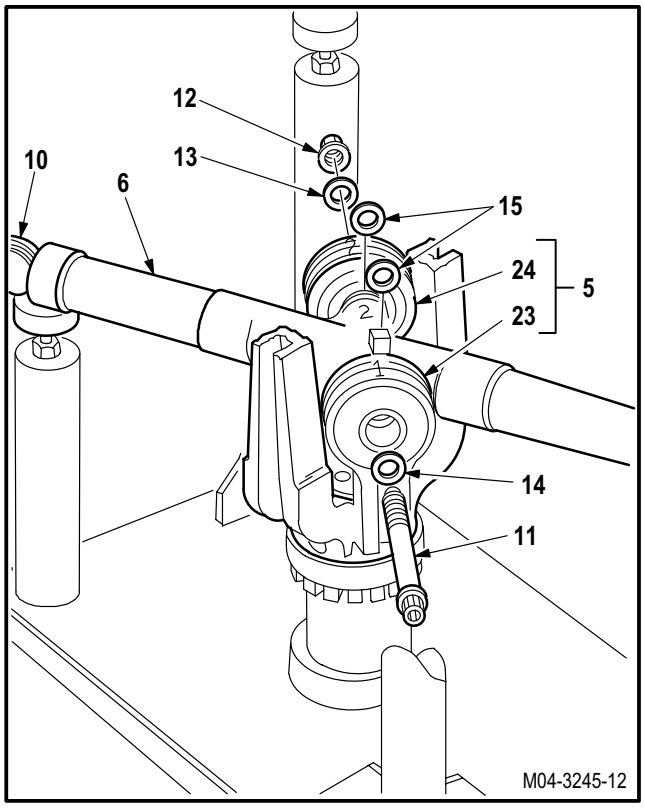
m. **Install hub (6) in lower fork (5).**

(1) Position hub (6) in fork (5) to match #1's and #2's.

(2) Install bolt (11) and washer (14) through #1 fork mount (23), #1 side spacer stack (15), hub (6), strap pack (10), #2 side spacer stack (15), and #2 fork mount (24).

(3) Install plain washer (13) and nut (12) on bolt (11).

(a) Tighten nut (12) finger tight.

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## 5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued

n. **Inspect (QA).**

o. **Level hub (6) by adjusting jack pads (27) on uprights (7) of fixture (2).**

(1) Hub must be level within ±**1/4 DEGREE** of horizontal measured at centerline of hub. Use level.

**CAUTION**

Ensure that bearings are not twisted in fork mounts while stretching bolt.

**NOTE**

When using longer bolt, ensure shank of bolt does not protrude beyond single washer. If shank does protrude, use additional washer under head of bolt.

p. **Tighten nut (12) to stretch bolt (11) until bolt is between 0.017 INCH and 0.028 INCH longer than original length recorded on line 16.**

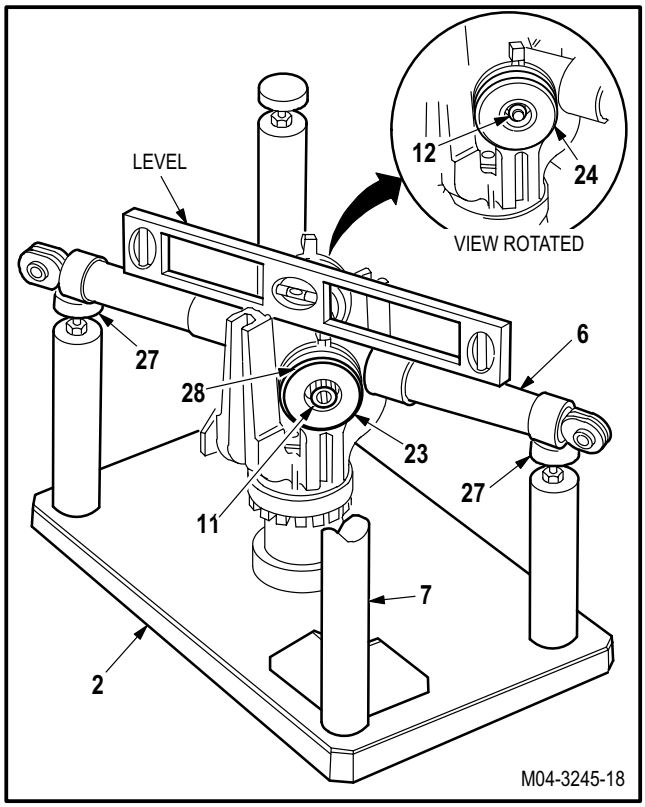
(1) Hold bolt (11). Use socket and hinged handle.

(2) Tighten nut (12) until bolt (11) is between **0.017 INCH** and **0.028 INCH** longer than original length. Use socket, adapter supplied in centering kit, 16-inch extension, torque wrench, and caliper.

(a) Bolt (11) must protrude **0.083 INCH** minimum, including chamfer, through nut (12). Use caliper.

(b) If bolt (11) does not protrude a minimum of **0.083 INCH**, including chamfer, replace bolt (11) with longer bolt.

(3) If bolt was elongated to **0.033 INCH** or greater, remove and discard bolt (11) and nut (12). Repeat steps k. through p.

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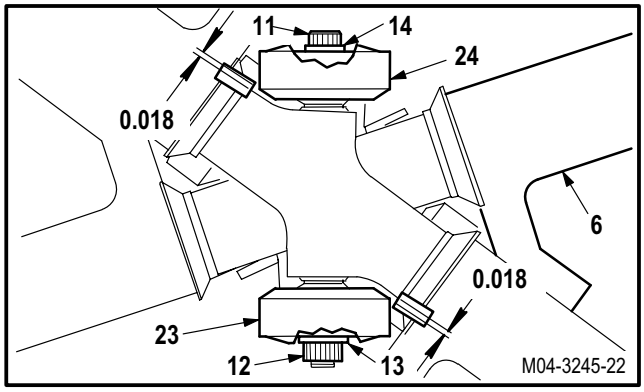
## 5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued

(4) If bolt (11) has been elongated between **0.028 to 0.032 INCH**, or bearing (28) has been twisted in fork mounts (23) or (24), remove nut (12) from bolt (11).

(a) After **15 MINUTES**, remeasure bolt (11) to assure bolt has returned to original length recorded on line 16.

(b) If bolt (11) has not returned to original length, remove and discard bolt (11) and nut (12). Repeat steps k. through p.

(5) Apply corrosion preventive compound to head of bolt (11), exposed areas of bolt (11) where it passes through hub (6), nut (12), and exposed threads of bolt (11). Use corrosion preventive compound (item 62, App F).




q. **Measure gap between hub (6) and mounts (23) and (24).** Use thickness gage.

(1) Measurement should be no less than **0.018 INCH**.

r. **Inspect (QA).**

**NOTE**

All bolt measurements must be taken at the same points at each end of bolts. Points should be marked with a wax pencil.

s. **Measure and record length of new bolt (11).** Use height gage.

(1) Record bolt (11) length on line 16.

t. **Apply an even coat of lubricant on bolt (11), new washers (13), (14), and new nut (12).** Use lubricant (item 114, App F).

(1) Allow lubricated hardware to cure for **6 HOURS** at room temperature, or air dry for **30 MINUTES** and then cure for **30 MINUTES** at 150 °F (66 °C).

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## 5.57A. TAIL ROTOR HUB ASSEMBLY REMOVAL/INSTALLATION (AVIM) - continued

**CAUTION**

Check that fixture assembly is level and secure. Fixture must remain level during assembly.

u. **Install hub (6) and strap pack (10) in upper fork (5).**

(1) Position hub (6) in fork (5) to match #1's and #2's.

(2) Install bolt (11) through countersunk washer (14), #1 fork mount (29), #1 side spacer (15) stack, hub (6), strap pack (10), #2 side spacer (15) stack, and #2 fork mount (30).

(3) Install plain washer (13) and nut (12) on bolt (11).

(a) Tighten nut (12) finger tight.

v. **Level hub (6).** Use level.

(1) Repeat steps o and p.

(2) Check that hub is still level. If not, repeat steps p thru u.

w. **Remove tail rotor head (1) from fixture (2).**

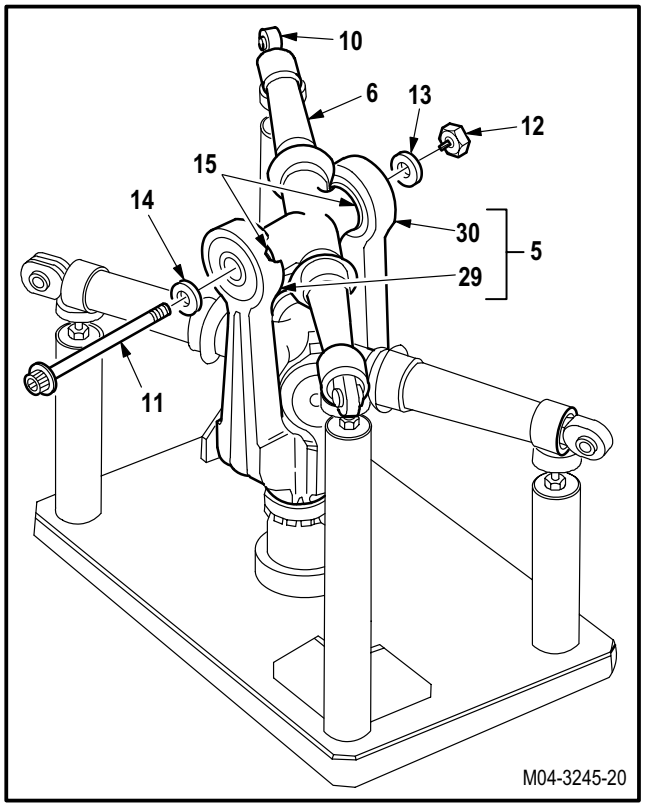
(1) Loosen four jack pads (27) on uprights (7) of fixture (2).

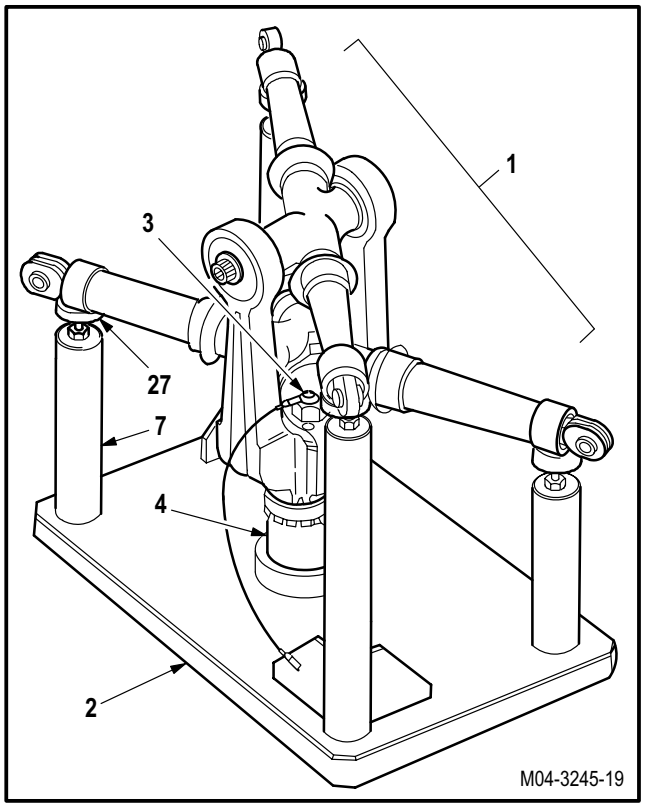
(2) Loosen and remove nut (3) from pedestal (4).

(3) Remove tail rotor head (1) from fixture (2).

x. **Install tail rotor head** (para 5.61)**.**

END OF TASK



## 5.58. TAIL ROTOR BLADE IDENTIFICATION PLATE REPLACEMENT

5.58.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.58.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 3, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Methyl ethyl ketone (item 124, App F)

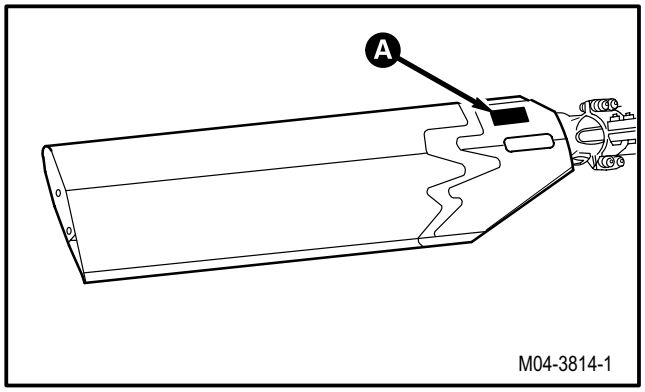
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.58. TAIL ROTOR BLADE IDENTIFICATION PLATE REPLACEMENT - continued

5.58.3. Removal

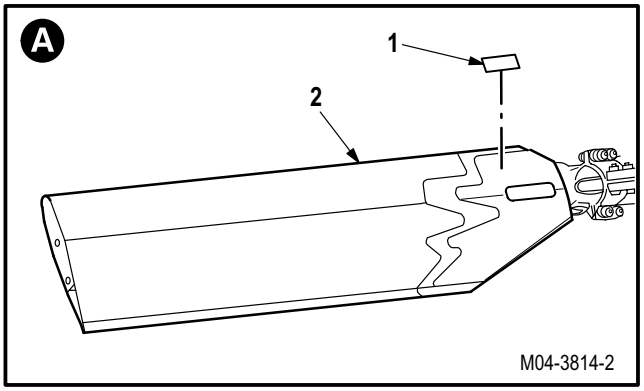
a. **Record all data on identification plate (1).**

b. **Remove plate (1) from tail rotor blade (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from blade (2).

(3) Discard plate (1).




5.58.4. Cleaning

a. **Clean plate mounting area on blade.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

5.58.5. Inspection

a. **Inspect blade for corrosion, cracks, scratches, nicks, gouges, dents and depressions** (para 5.52)**.**

5.58.6. Installation

a. **Transcribe recorded data on new plate (1).** Use die set.

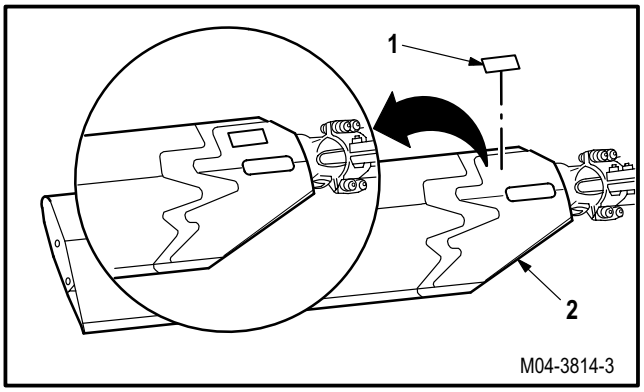
b. **Install plate (1) on blade (2).**

(1) Lightly abrade mounting surface area of blade (2). Use cloth (item 48, App F).

(2) Apply adhesive to plate (1). Use brush (item 34, App F) and adhesive (item 3, App F).

(3) Install plate (1) on blade (2) in same location as old plate.

(4) Place bead of adhesive around edge of plate (1). Use adhesive (item 3, App F).




c. **Inspect (QA).**

END OF TASK

## 5.59. TAIL ROTOR BLADE PART NUMBER/SERIAL NUMBER PLATE REPLACEMENT (AVIM)

5.59.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.59.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

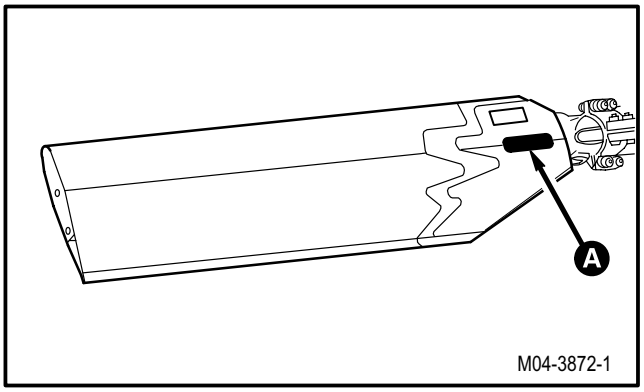
**Materials/Parts:**

Adhesive (item 3, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Methyl ethyl ketone (item 124, App F)

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.59. TAIL ROTOR BLADE PART NUMBER/SERIAL NUMBER PLATE REPLACEMENT (AVIM) - continued

5.59.3. Removal

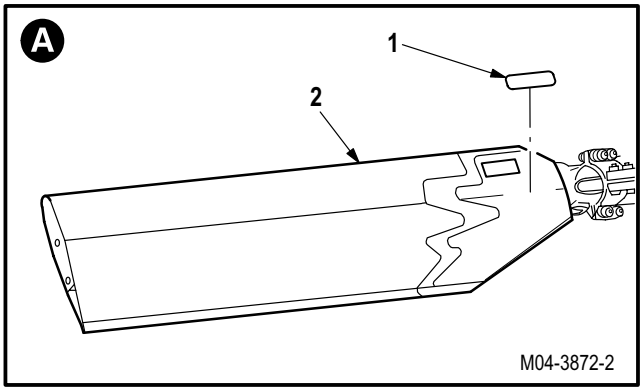
a. **Record all data on part number/serial number plate (1).**

b. **Remove plate (1) from tail rotor blade (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from blade (2).

(3) Discard plate (1).




5.59.4. Cleaning

a. **Clean plate mounting area on blade.** Use methyl ethyl ketone (item 124, App F) (para 1.47).

5.59.5. Inspection

a. **Inspect blade for corrosion, cracks, scratches, nicks, gouges, dents and depressions** (para 5.52)**.**

5.59.6. Installation

a. **Transcribe recorded data on new plate (1).** Use die set.

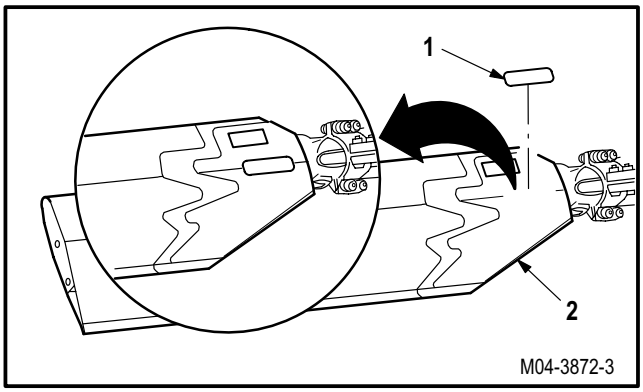
b. **Install plate (1) on blade (2).**

(1) Lightly abrade mounting surface area of blade (2). Use cloth (item 48, App F).

(2) Apply adhesive to plate (1). Use brush (item 34, App F) and adhesive (item 3, App F).

(3) Install plate (1) on blade (2) in same location as old plate.

(4) Place bead of adhesive around the edge of plate (1). Use adhesive (item 3, App F).




c. **Inspect (QA).**

END OF TASK

## 5.60. TAIL ROTOR HEAD REMOVAL

5.60.1. Description

This task covers: Removal. Cleaning. Inspection.

5.60.2. Initial Setup

**Tools:**

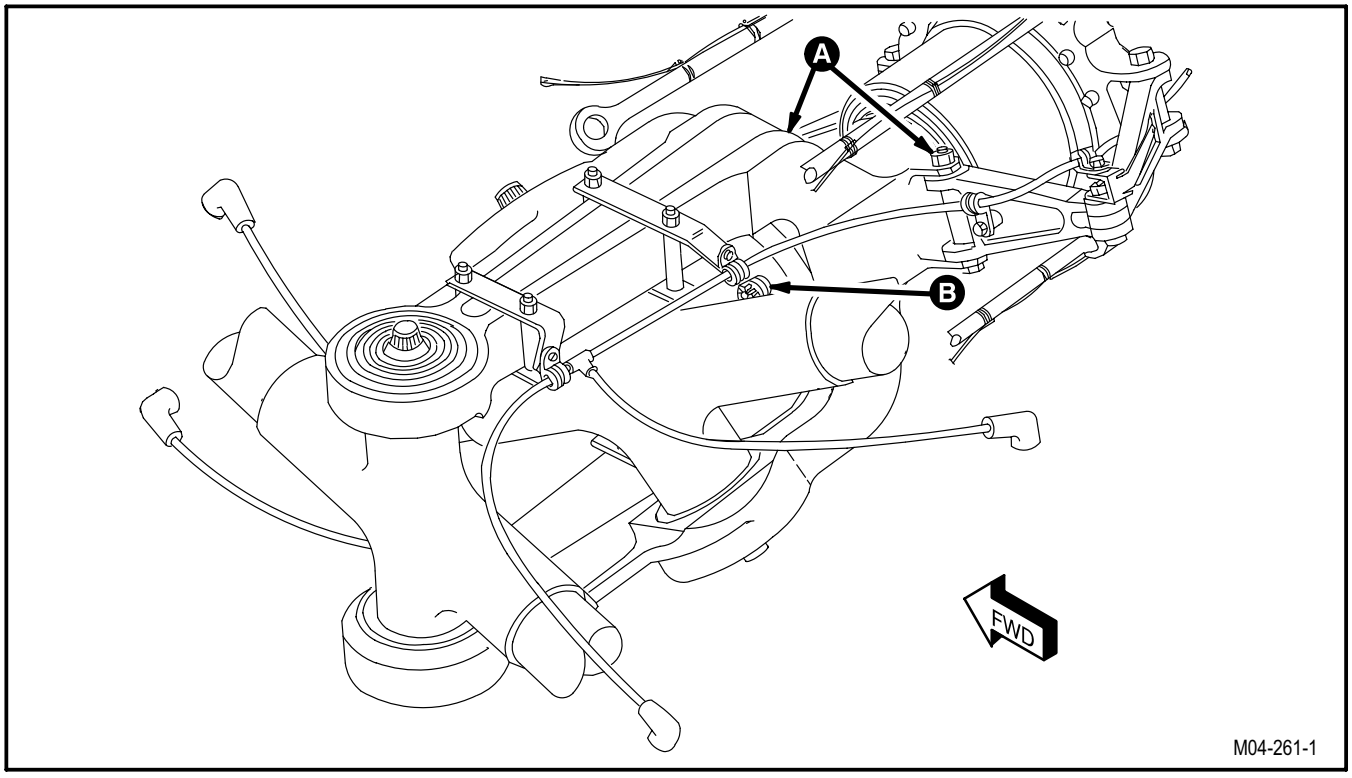
Aircraft mechanic's tool kit (item 376, App H)
Tail rotor torque wrench adapter (item 16, App H) (p/o item 391, App H)
Airframe adapter kit (item 25, App H)
Maintenance platform (item 209, App H)
Rail type trailer (item 396, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.53 | Tail rotor blades removed |

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## 5.60. TAIL ROTOR HEAD REMOVAL - continued

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

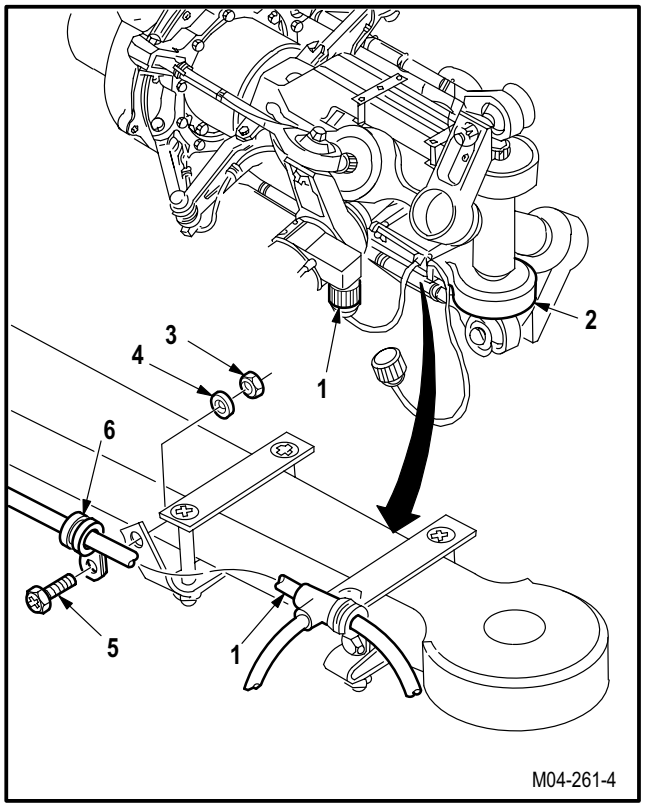
5.60.3. Removal

a. **Remove de-ice harness (1) from tail rotor head (2) two places.** Use maintenance platform.

b.

(1) Remove four nuts (3), washers (4), and screws (5).

(2) Remove two clamps (6).




b. **Remove two drive links (7) from head (2).**

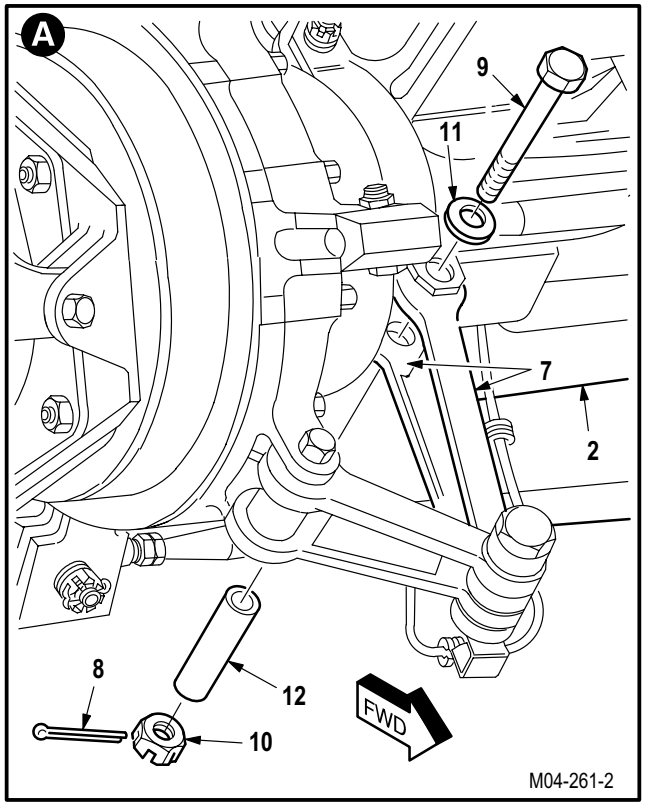
(1) Remove and discard two cotter pins (8).

(2) Hold two bolts (9) and remove nuts (10).

(3) Remove two bolts (9) and washers (11).

(4) Remove two bushings (12).

(5) Remove two links (7) from head (2).

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**5.60. TAIL ROTOR HEAD REMOVAL - continued**

**WARNING**

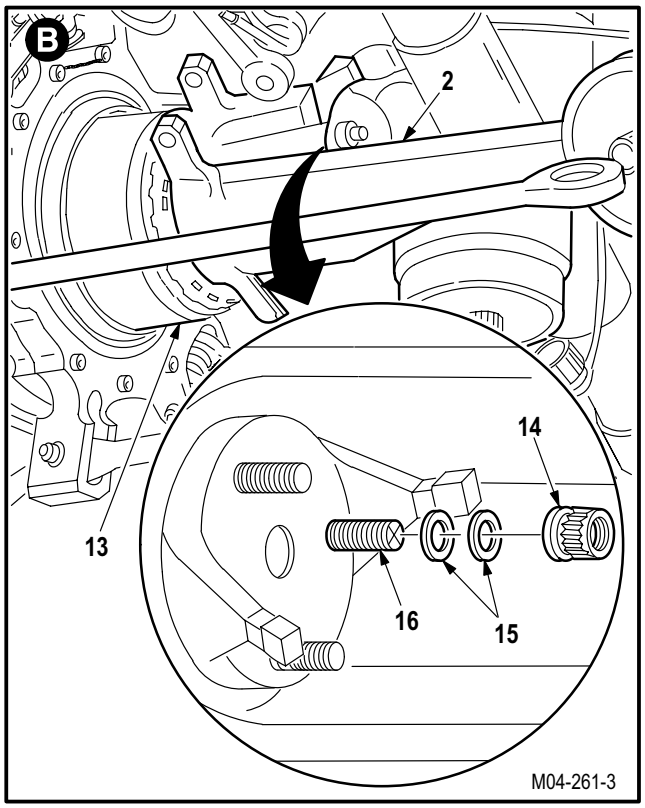
**Tail rotor head weighs approximately 40 pounds. Two persons are needed for handling. If injury occurs, seek medical aid.**

c. **Remove head (2) from tail rotor gearbox output shaft (13).**

(1) Remove three nuts (14) and six washers (15) from studs (16). Use torque wrench adapter.

(2) Discard nuts (14).

(3) Remove head (2) from output shaft (13).




5.60.4. Cleaning

a. **Clean drive links, head, output shaft, and surrounding area** (para 1.47)**.**

5.60.5. Inspection

a. **Check head for damage** (para 5.51)**.**

b. **Check for corrosion** (para 1.49)**.**

c. **Check for cracks.** None allowed.

d. **Check output shaft for wear, nicks, gouges, scratches, and hole elongations.** None allowed.

e. **Check studs for damage.**

(1) Thread damage. None allowed.

(2) Check for axial scoring/gouging through cadmium plating. None allowed.

(3) Check for radial wear marks between **1.5 and 2.0 INCHES** outboard of lockring. None allowed.

(4) Check for corrosion between **1.5 and 2.0 INCHES** outboard of lockring. None allowed.

f. **Check studs for looseness** (para 6.132)**.**

g. **Check drive links for wear** (para 11.232)**.**

END OF TASK

## 5.61. TAIL ROTOR HEAD INSTALLATION

5.61.1. Description

This task covers: Installation.

5.61.2. Initial Setup

**Tools:**

Aircraft mechanic's tool kit (item 376, App H)
Tail rotor torque wrench adapter (item 16, App H) (p/o item 391, App H)
Chemical protective gloves (item 154, App H)
Maintenance platform (item 209, App H)
Adjustable air filtering respirator (item 262, App H)
10 - 50 inch-pound 1/4-inch drive click type torque wrench (item 434, App H)
15 - 75 foot-pound 3/8-inch drive click type torque wrench (item 440, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
One person to assist
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Cotter pin (2)
Nut (3)
Corrosion preventive compound (item 62, App F)
Epoxy primer coating kit (item 78, App F)
Sealing compound (item 163, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

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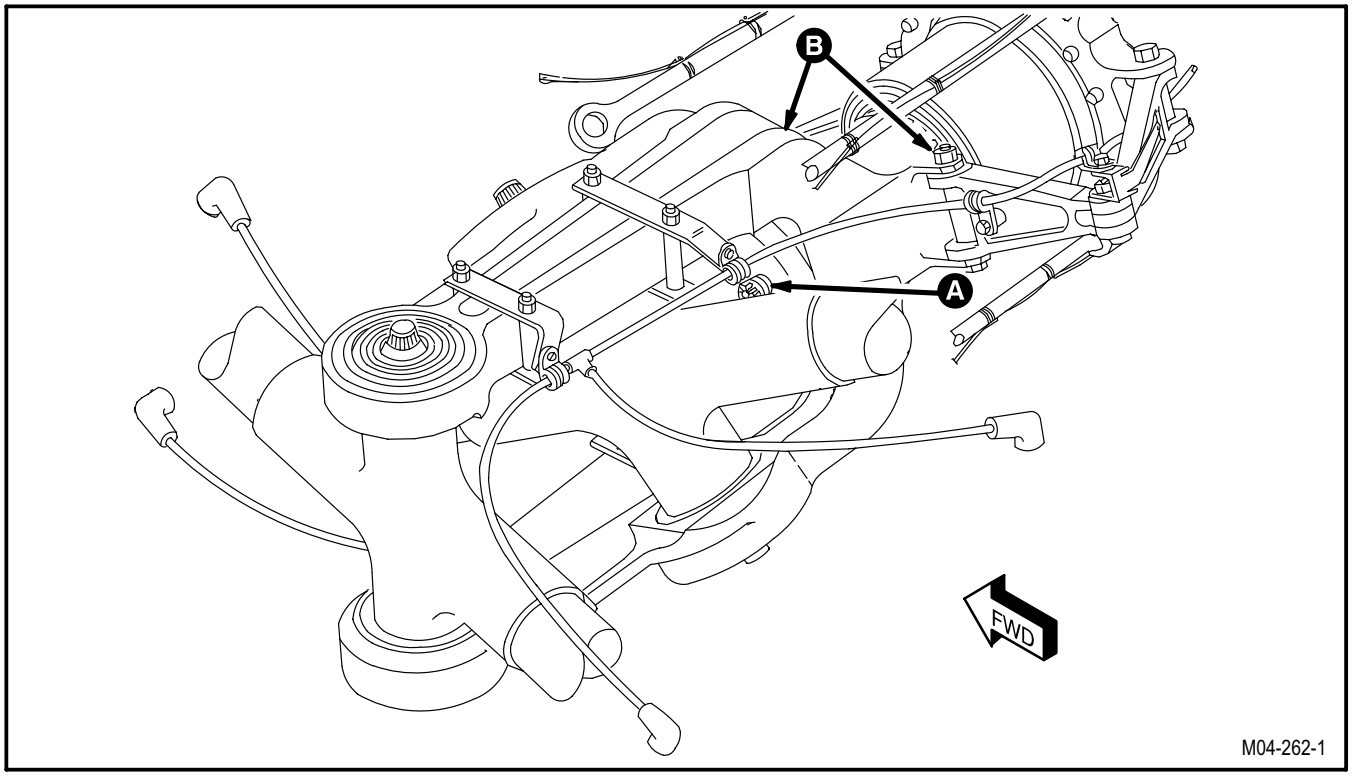
## 5.61. TAIL ROTOR HEAD INSTALLATION




**WARNING**

**FLIGHT SAFETY PART**

- **The tail rotor blade is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**
- **Tail rotor head weighs approximately 40 pounds. Two persons are needed for handling. If injury occurs, seek medical aid.**

5.61.3. Installation

**CAUTION**

- The tail rotor gearbox output shaft mounting studs are offset. Do not force tail rotor head on mounting studs. If binding occurs, remove and realign tail rotor head.
- Ignore studs previously marked with an “X”. This has been found to be an unreliable method to determine which stud is the #1 stud. Failure to heed this caution could result in damage to equipment.

**NOTE**

Torque on nuts before application of MWO 1-1520-238-50-46 is **750 INCH-POUNDS**. Torque on nuts after application of MWO 1-1520-238-50-46 is **710 INCH-POUNDS**.

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**5.61. TAIL ROTOR HEAD INSTALLATION - continued**

a. **Locate and mark the #1 mounting stud (3) on shaft (2) with an "X". The #1 mounting stud (3) is located counter- clockwise from the #2 mounting stud which is the only stud that is aligned with a gear tooth.** Use torque stripe paint.

b. **Install tail rotor head (1) on tail rotor gearbox output shaft (2) with mounting stud (3) marked with torque stripe painted "X" adjacent to arm of teeter stop (4).** Torque three nuts **750 INCH-POUNDS** (5) to (after MWO 1-1520-238-50-46). Use maintenance platform.

(1) Apply corrosion preventive compound (item 62, App F) to studs (3).

(2) Install head (1) on shaft (2) with mounting holes alined.

(3) Install six washers (6), two on each stud (3).

(4) Install three new nuts (5).

**NOTE**

Torque is equal to run-on torque plus torque value given.

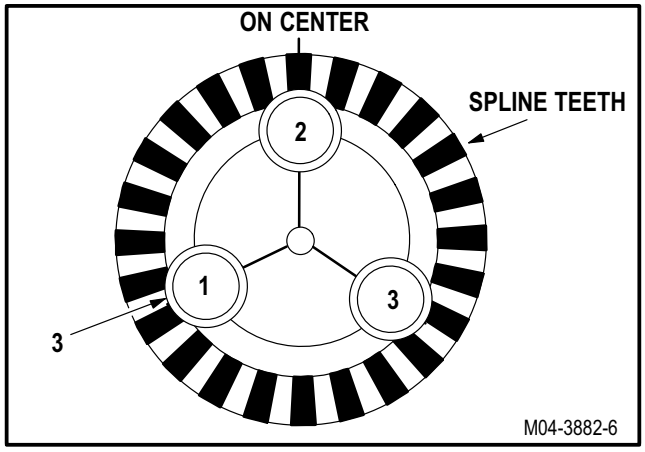
(5) Torque three nuts (5) to **750 INCH-POUNDS** (before MWO 1-1520-238-50-46) or **710 INCH-POUNDS**.

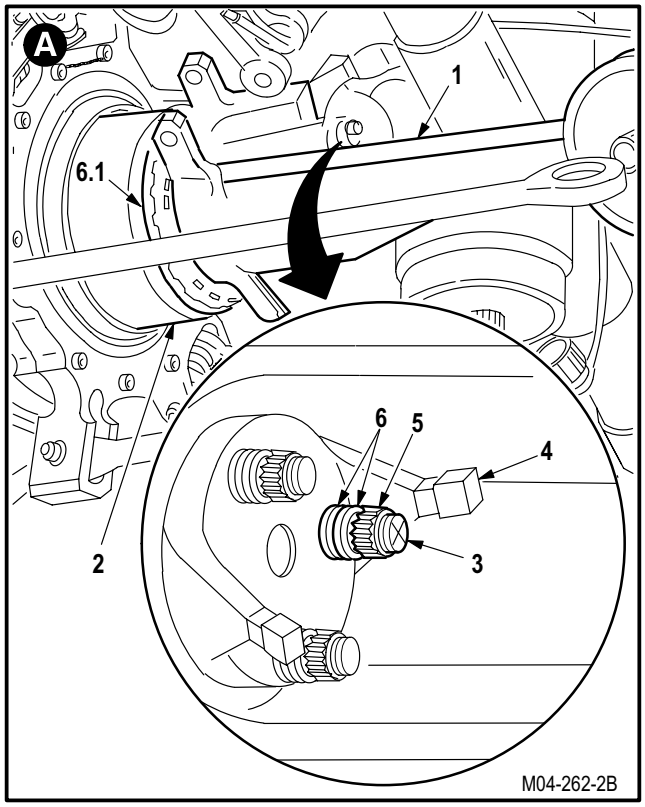
c. **Check that each nut (5) has 2-1/2 stud threads showing.**

(1) If not, remove one washer and repeat steps b.(4) and b.(5).

d. **Apply primer to nuts (5), washers (6), and exposed threads of studs (3).** Use epoxy primer coating kit (item 78, App F).

(1) Allow primer to become dry to touch.

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**5.61. TAIL ROTOR HEAD INSTALLATION - continued**

e. **Apply corrosion preventive compound to the curvic coupling interface (6.1) with the head (1) to seal the curvic teeth.** Use corrosion preventive compound (item 62A, App F).

f. **Apply a slippage mark across each stackup to include the stud (3), nut (5), washer (6), and the head (1).**

g. **Install two drive links (7) on head (1).** Torque two nuts (8) **30 to 40 INCH-POUNDS**.

(1) Position two links (7) between lugs of each clevis (9).

(2) Install two bushings (10) through clevis (9) and two links (7).

**NOTE**

Washer must always be installed on the side of the clevis with the small hole.

(3) Install two bolts (11) and washers (12) with heads of both bolts (11) facing direction of rotation.

(4) Install two new nuts (8).

(5) Hold two bolts (11). Torque nuts (8) to **30 INCH-POUNDS**. Use torque wrench.

(6) Increase torque to aline cotter pin hole, but do not exceed **40 INCH-POUNDS**.

(7) Install new cotter pin (13).

h. **Apply primer to heads of bolts (11), washers (12), nuts (8), exposed threads of bolts (11), and cotter pins (13).** Use epoxy primer coating kit (item 78, App F).

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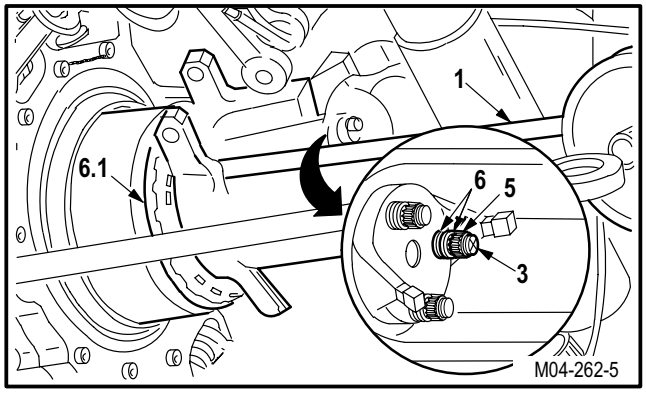
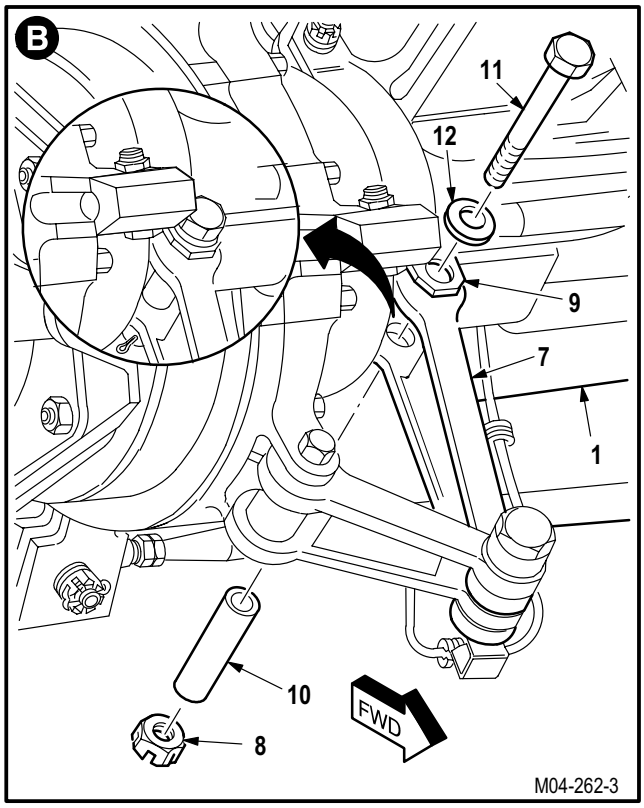
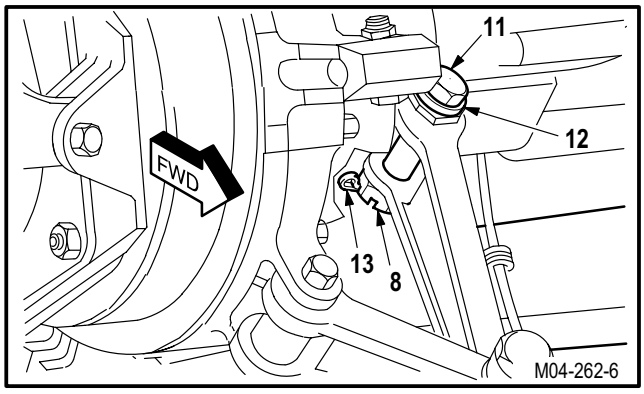


**5.61. TAIL ROTOR HEAD INSTALLATION - continued**

i. **Attach de-ice harness (14) (two places).**

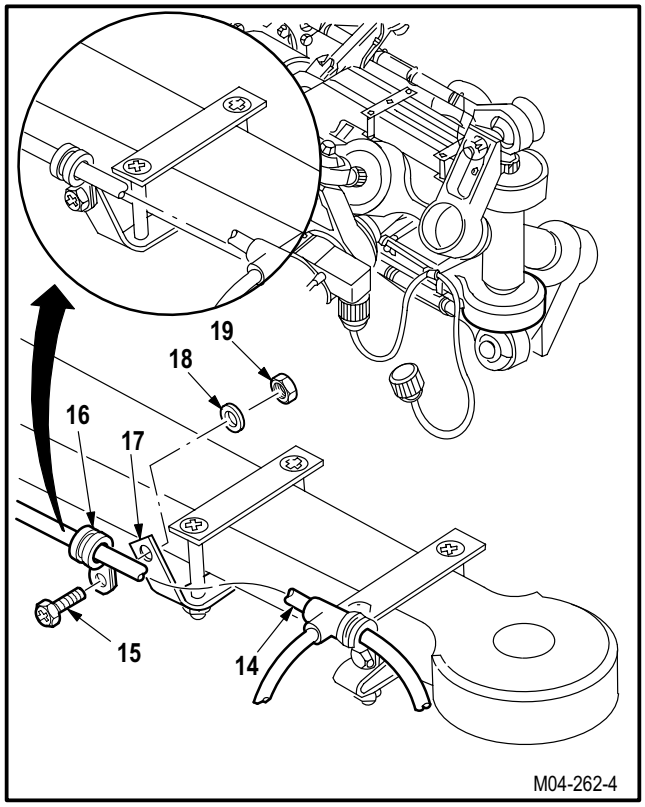
(1) Install eight screws (15) through two clamps (16) and brackets (17).

(2) Install eight washers (18) and nuts (19).

(3) Install tiedown strap (two places).

j. **Inspect (QA).**

k. **Install tail rotor blades** (para 5.54)**.**




END OF TASK

## 5.62. TAIL ROTOR HUB IDENTIFICATION PLATE REPLACEMENT

5.62.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.62.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 3A, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Cloth (item 51, App F)
Cloth (item 52, App F)
Distilled water (item 73, App F)
Cotton gloves (item 82, App F)
Isopropyl alcohol (item 106, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

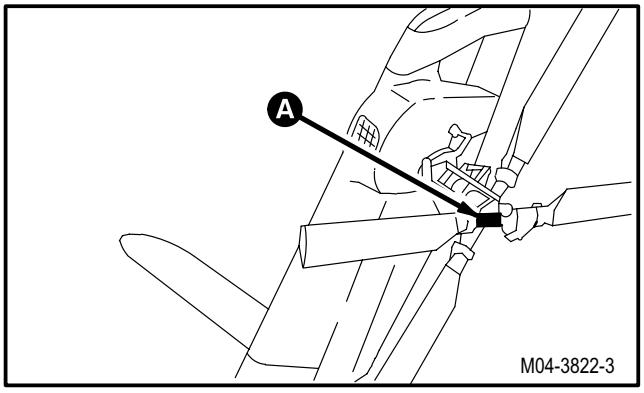
**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor hub is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for identification plate on both tail rotor hubs.

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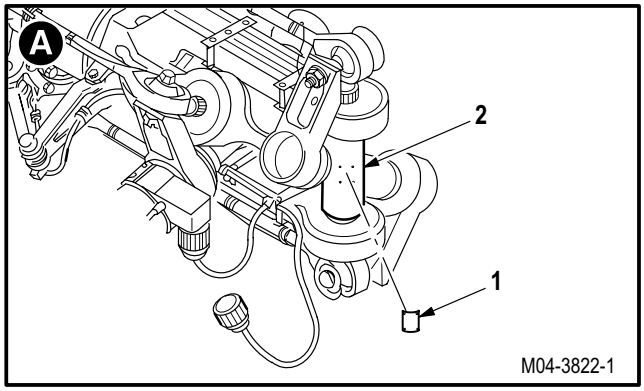
## 5.62. TAIL ROTOR HUB IDENTIFICATION PLATE REPLACEMENT - continued

5.62.3. Removal




a. **Record all data on identification plate (1).**

b. **Remove plate (1) from tail rotor hub (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from hub (2).

(3) Discard plate (1).

5.62.4. Cleaning

**CAUTION**

Do not use trichloroethane, chlorofluoroethane, or any other product with “chlor” in the name, for cleaning titanium, magnesium, aluminium, or galvanized metals. Products with “chlor” in the name are corrosive to these metals.

**NOTE**

- Wear clean gloves (item 82, App F) when handling fork.
- Do not allow alcohol to evaporate from surface. Discoloration will occur.

a. **Clean plate mounting area on hub** (para 1.47)**.**

(1) Ensure cured compound is completely removed from hub. Use isopropyl alcohol (item 106, App F) and cloth (item 51, App F).

b. **Rinse hub and wipe dry.** Use distilled water (item 73, App F) and cloth (item 52, App F).

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## 5.62. TAIL ROTOR HUB IDENTIFICATION PLATE REPLACEMENT - continued

5.62.5. Inspection

a. **Inspect tail rotor hub for cracks.** None allowed.

b. **Check tail rotor hub for corrosion** (para 1.49)**.**

5.62.6. Installation

a. **Transcribe all data on new plate (1).** Use die set.

b. **Install plate (1) on hub (2).**

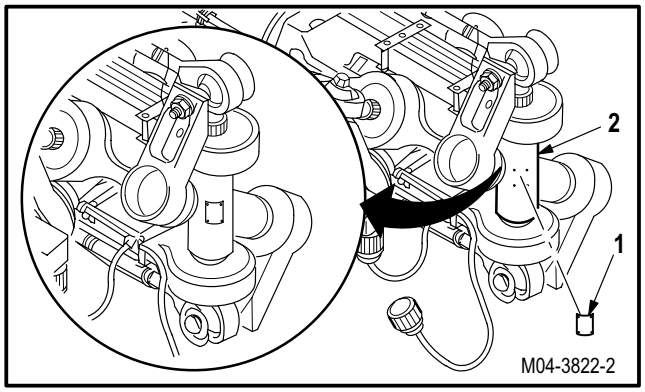
(1) Lightly abrade mounting area of plate (1). Use cloth (item 48, App F).

(2) Apply adhesive to plate (1). Use brush (item 34, App F) and adhesive (item 3A, App F).

(3) Install plate (1) on hub (2) in same location as old plate.

(4) Apply adhesive to edges of plate (1). Use adhesive (item 3A, App F).

c. **Inspect (QA).**




END OF TASK

## 5.63. TAIL ROTOR FORK CLAMP AND LOCKING PLATE REMOVAL/INSTALLATION (AVIM)

5.63.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.63.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
#2 phillips screwdriver bit (item 33, App H)
Chemical protective gloves (item 154, App H)
1/4-inch drive screwdriver bit holder (item 175, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
Adjustable air filtering respirator (item 262, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 19, App F)
Cloth (item 51, App F)
Cloth (item 52, App F)
Distilled water (item 73, App F)
Cotton gloves (item 82, App F)
Isopropyl alcohol (item 106, App F)
Wax pencil (item 137, App F)
Tape (item 205, App F)

**References:**

TM 1-1500-204-23

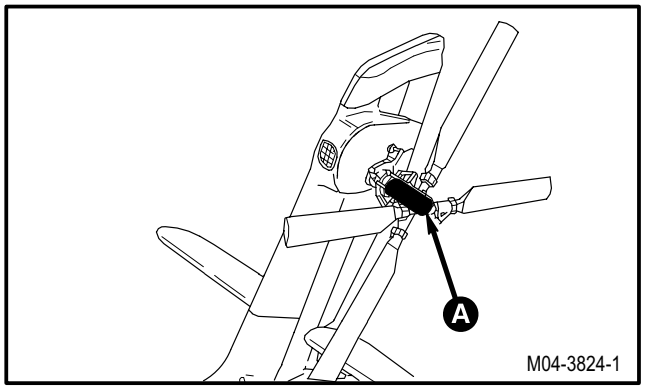
**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor fork is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for both clamp plate assemblies mounted on tail rotor fork.

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## 5.63. TAIL ROTOR FORK CLAMP AND LOCKING PLATE REMOVAL/INSTALLATION (AVIM) - continued

5.63.3. Removal

**CAUTION**

- Exercise extreme care and undertake protective measures when handling or performing any type of maintenance on the tail rotor fork. All surface areas are critical. Scratches measuring **0.001 INCH** in depth or greater in the base area or **0.005 INCH** in depth or greater in the fork area will render this part unserviceable.
- To prevent damage to tail rotor fork, ensure that work area is clean and that part is placed on a soft and adequately protected working surface.

**NOTE**

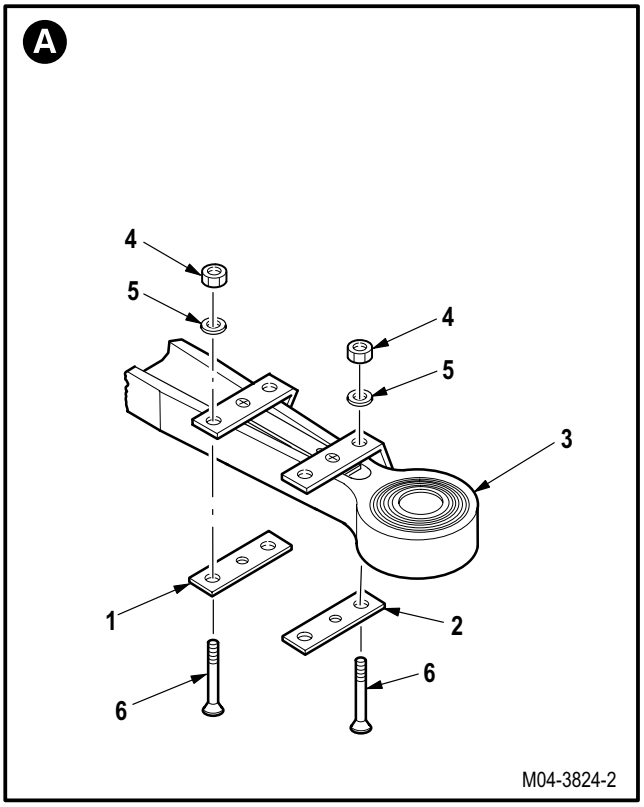
Wear clean gloves (item 82, App F) when handling fork.

a. **Remove clamp plates (1) and (2) from tail rotor fork (3).**

(1) Remove four nuts (4), washers (5), and screws (6).

(2) Lightly tap plates (1) and (2) until adhesive bond is broken. Use mallet.

(3) Remove plates (1) and (2) from fork (3).

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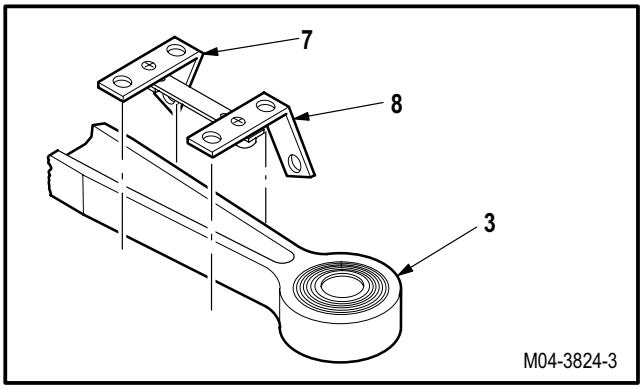
## 5.63. TAIL ROTOR FORK CLAMP AND LOCKING PLATE REMOVAL/INSTALLATION (AVIM) - continued

b. **Remove clamp plates (7) and (8) from fork (3).**

(1) Lightly tap plates (7) and (8) until adhesive bond is broken. Use mallet.

(2) Remove plates (7) and (8) from fork (3).




5.63.4. Cleaning

**CAUTION**

Do not use trichloroethane, chlorofluoroethane, or any other product with “chlor” in the name, for cleaning titanium, magnesium, aluminium, or galvanized metals. Products with “chlor” in the name are corrosive to these metals.

**NOTE**

Do not allow alcohol to evaporate from surface. Discoloration will occur.

a. **Clean plate mounting areas on fork.**

(1) Ensure all cured compound is completely removed. Use isopropyl alcohol (item 106, App F) and cloth (item 51, App F).

b. **Rinse plate mounting areas on fork and wipe dry.** Use distilled water (item 73, App F) and cloth (item 52, App F).

c. **Clean clamp plates and locking plate** (para 1.47)**.**

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## 5.63. TAIL ROTOR FORK CLAMP AND LOCKING PLATE REMOVAL/INSTALLATION (AVIM) - continued

5.63.5. Inspection

a. **Check fork, plates, and locking plate for corrosion** (para 1.49)**.**

b. **Check plate mounting areas on fork for damage** (para 5.51)**.**

c. **Check plates and locking plate for cracks, bends, distortion, or twists.** None allowed.

d. **Check nutplates on locking plate for loose or missing rivets or damaged threads.**

(1) Replace nutplate (TM 1-1500-204-23).

e. **Check plates and locking plate for scratches and nicks.**

(1) Minor scratches and nicks are acceptable provided that base metal is not exposed through surface finish.

5.63.6. Installation

a. **Install plates (7) and (8) on fork (3).**

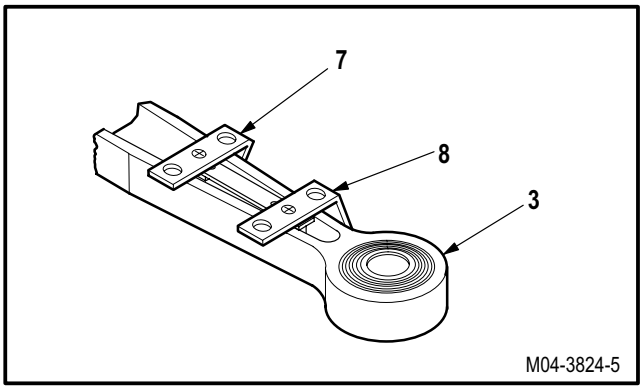
(1) Measure **4.9 INCHES** from **POINT A** on fork (3) and mark. Use wax pencil (item 137, App F).

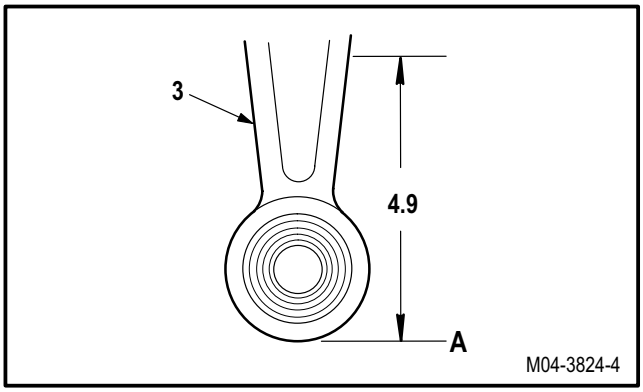
(2) Apply adhesive to mounting surface of plates (7) and (8). Use adhesive (item 19, App F).

(3) Position plate (8) outboard edge on fork (3) mark.

(4) Install plates (7) and (8) on fork (3).

(5) Temporarily secure with tape to prevent movement. Use tape (item 205, App F).

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## 5.63. TAIL ROTOR FORK CLAMP AND LOCKING PLATE REMOVAL/INSTALLATION (AVIM) - continued

b. **Install plates (1) and (2) on fork (3).** Torque screws (6) to **25 INCH-POUNDS**.

(1) Position plates (1) and (2) on fork (3) so that screw holes are alined with plates (7) and (8).

(2) Mark position of plates (1) and (2) on fork (3). Use wax pencil (item 137, App F).

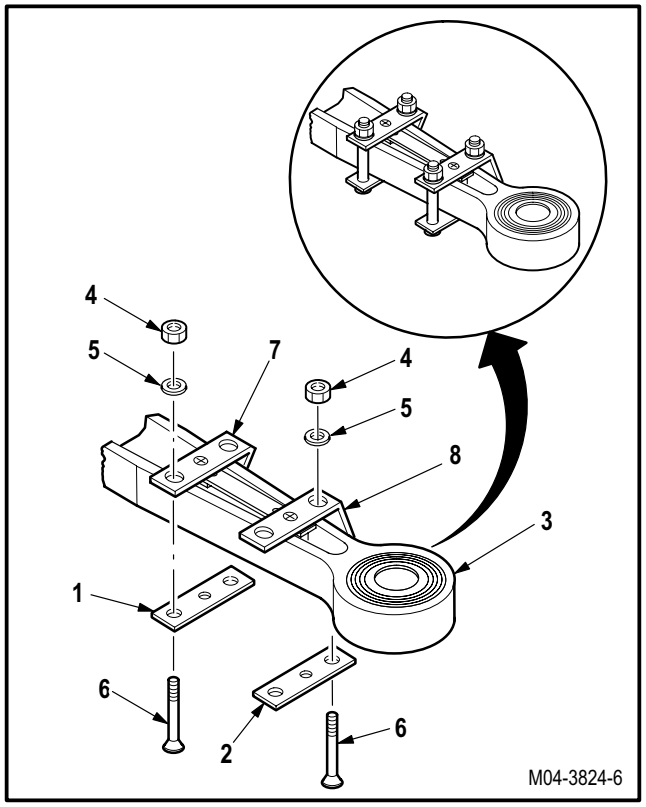
(3) Apply adhesive to mounting surface of plates (1) and (2). Use adhesive (item 19, App F).

(4) Position and install plates (1) and (2) on fork (3).

(5) Temporarily secure plates (1) and (2) with tape until mounting hardware is installed. Use tape (item 205, App F).

(6) Install four screws (6), washers (5), and nuts (4).

(7) Torque screws (6) to **25 INCH-POUNDS**. Use torque wrench, screwdriver bit holder, and screwdriver bit.




c. **Remove tape and excess adhesive from fork (3)** (para 1.47)**.**

d. **Inspect (QA).**

END OF TASK

## 5.64. TAIL ROTOR FORK LOCKING PLATE DISASSEMBLY/ASSEMBLY (AVIM)

5.64.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.64.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
#2 phillips screwdriver bit (item 33, App H)
1/4-inch drive screwdriver bit holder (item 175, App H)
0 - 30 inch-pound 1/4-inch drive dial indicator torque wrench (item 445, App H)

**References:**

TM 1-1500-204-23

**Personnel Required:**

| | |
|---|---|
| 68D | Aircraft Powertrain Repairer/NDI |
| 67R3F | Attack Helicopter Repairer/Technical Inspector |

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 5.63 | Tail rotor fork clamp and locking plate removed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor fork is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for both clamp plate assemblies mounted on tail rotor fork.

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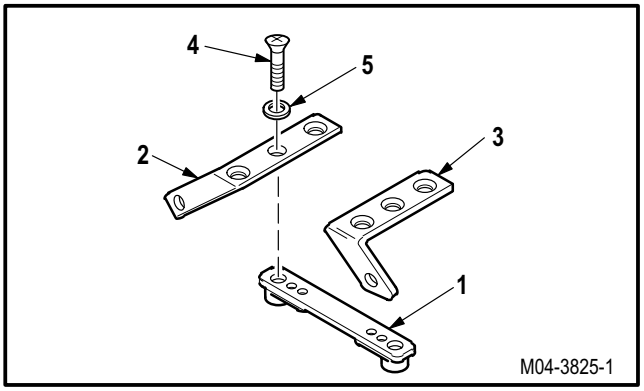
## 5.64. TAIL ROTOR FORK LOCKING PLATE DISASSEMBLY/ASSEMBLY (AVIM) - continued

5.64.3. Removal

a. **Remove locking plate (1) from clamp plates (2) and (3).**

(1) Remove two screws (4) with washers (5) from plates (2) and (3).




5.64.4. Cleaning

a. **Clean clamp plates and locking plate** (para 1.47)**.**

5.64.5. Inspection

a. **Check plates and locking plate for corrosion** (para 1.49)**.**

b. **Check plates and locking plate for cracks, bends, distortion, or twists.** None allowed.

c. **Check nutplates on locking plate for loose or missing rivets or damaged threads.** Replace nutplate (TM 1-1500-204-23).

d. **Check plates and locking plate for scratches and nicks.**

(1) Minor scratches and nicks are acceptable provided that base metal is not exposed through surface finish.

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## 5.64. TAIL ROTOR FORK LOCKING PLATE DISASSEMBLY/ASSEMBLY (AVIM) - continued

5.64.6. Installation

**NOTE**

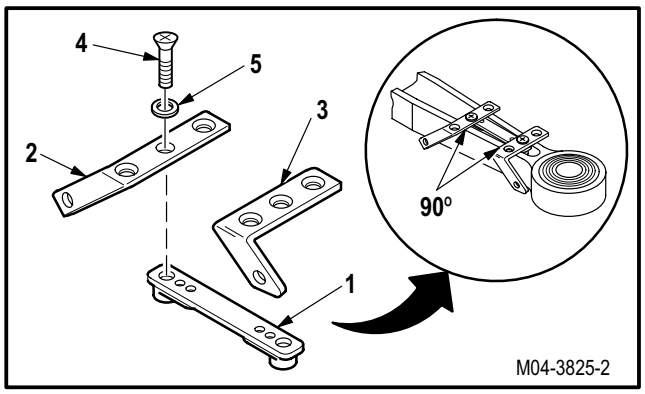
Clamp plates must be alined perpendicular (90 degrees) to locking plate when assembled. Do not allow clamp plates or locking plate to shift when installing or torquing screws.

a. **Install plates (2) and (3) on locking plate (1).** Torque screws (4) to **25 INCH-POUNDS**.

(1) Position plates (2) and (3) on locking plate (1) and aline 90 degrees perpendicular to locking plate (1).

(2) Install two screws (4) and washers (5).

(3) Torque screws (4) to **25 INCH-POUNDS**. Use torque wrench, screwdriver bit holder, and screwdriver bit.




b. **Inspect (QA).**

c. **Install tail rotor fork clamp and locking plate** (para 5.63)**.**

END OF TASK

## 5.65. TAIL ROTOR TEETER STOP BUMPER REPLACEMENT

5.65.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.65.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Chemical protective gloves (item 154, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

67R Attack Helicopter Repairer
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 3, App F)
Brush (item 34, App F)
Cloth (item 51, App F)
Cloth (item 52, App F)
Distilled water (item 73, App F)
Cotton gloves (item 82, App F)
Isopropyl alcohol (item 106, App F)
Paper (item 133, App F)
Paper (item 135, App F)

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

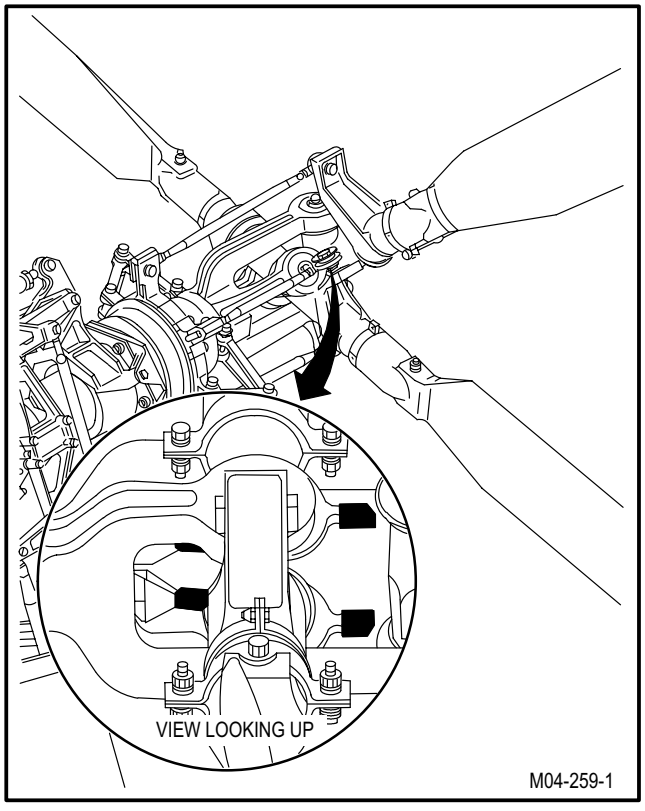
**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor head is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

**NOTE**

This task is typical for all four teeter stop bumpers.

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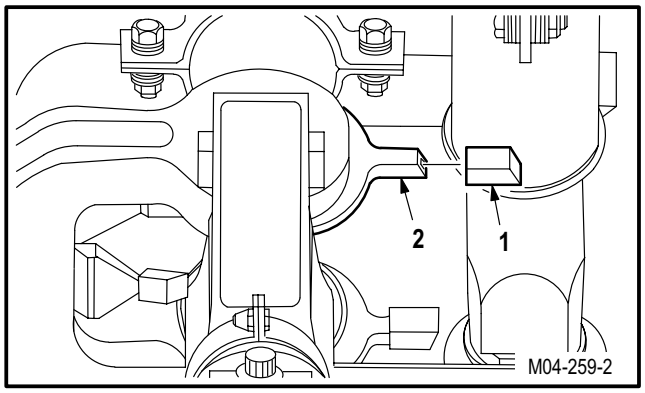
## 5.65. TAIL ROTOR TEETER STOP BUMPER REPLACEMENT - continued

5.65.3. Removal

a. **Remove bumper (1) from teeter stop (2).**




5.65.4. Cleaning

**CAUTION**

Do not use trichloroethane, chlorofluoroethane, or any other product with “chlor” in the name, for cleaning titanium, magnesium, aluminium, or galvanized metals. Products with “chlor” in the name are corrosive to these metals.

**NOTE**

- Do not allow alcohol to evaporate from surface. Discoloration will occur.
- Wear clean gloves (item 82, App F) when handling fork.

a. **Remove old adhesive from teeter stop.**

(1) Use paper (item 133, App F) followed by paper (item 135, App F).

(2) Ensure all cured compound is completely removed. Use isopropyl alcohol (item 106, App F) and cloth (item 51, App F).

b. **Rinse teeter stop bumper mounting area and wipe dry.** Use distilled water (item 73, App F) and cloth (item 52, App F).

5.65.5. Inspection

a. **Check teeter stop for nicks and scratches.**

(1) Maximum depth not to exceed **0.020 INCH**.

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## 5.65. TAIL ROTOR TEETER STOP BUMPER REPLACEMENT - continued

b. **Check teeter stop for corrosion** (para 1.49)**.**

(1) Maximum depth not to exceed **0.010 INCH**.

c. **Check teeter stop and tail rotor fork for cracks.** None allowed.

5.65.6. Installation

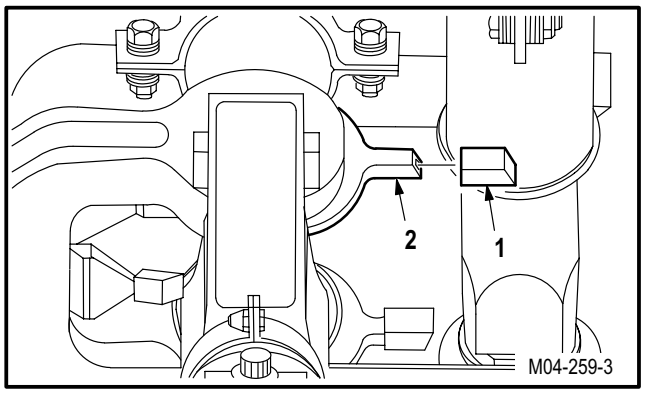
**CAUTION**

To ensure bonding of bumper to teeter stop. Temperature must be 69 °F (20 °C) or higher in area where adhesive is mixed and applied. Adhesive must be used within **40 MINUTES** from time of mixing.

a. **Apply adhesive to bumper (1) and teeter stop (2).**

(1) Wipe teeter stop (2) clean. Use cloth (item 52, App F)

(2) Apply a thin coat of adhesive to teeter stop (2) and inner surface of bumper (1). Use adhesive (item 3, App F) and brush (item 34, App F).




b. **Install bumper (1) on teeter stop (2).**

(1) No additional pressure is required other than that needed to hold bumper (1) in position.

c. **Allow adhesive to cure for 24 HOURS at ambient temperature.**

d. **Inspect (QA).**

END OF TASK

## 5.66. TAIL ROTOR FORK IDENTIFICATION PLATE REPLACEMENT

5.66.1. Description

This task covers: Removal. Cleaning. Inspection. Installation.

5.66.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Metal stamping die set (item 107, App H)
Chemical protective gloves (item 154, App H)
1 1/4-inch blade putty knife (item 199, App H)
Adjustable air filtering respirator (item 262, App H)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Materials/Parts:**

Adhesive (item 3, App F)
Brush (item 34, App F)
Cloth (item 48, App F)
Cloth (item 51, App F)
Cloth (item 52, App F)
Distilled water (item 73, App F)
Cotton gloves (item 82, App F)
Isopropyl alcohol (item 106, App F)

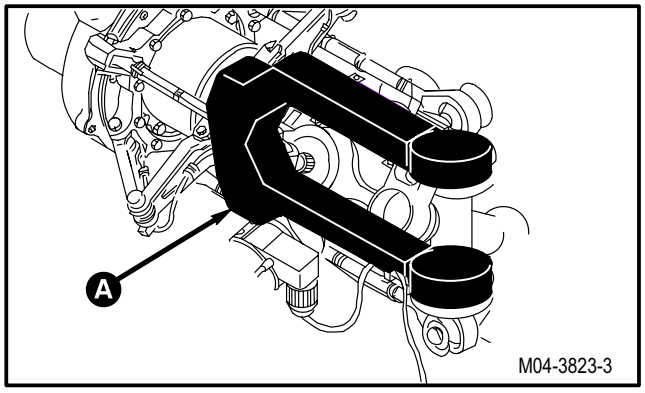
**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor fork is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

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## 5.66. TAIL ROTOR FORK IDENTIFICATION PLATE REPLACEMENT - continued

5.66.3. Removal

**CAUTION**

Exercise extreme care and undertake protective measures when handling or performing any type of maintenance on the tail rotor fork. All surface areas are critical. Scratches measuring **0.001 INCH** in depth or greater in the base area or **0.005 INCH** in depth or greater in the fork area will render this part unserviceable.

**NOTE**

Use clean gloves (item 82, App F) when handling the tail rotor fork.

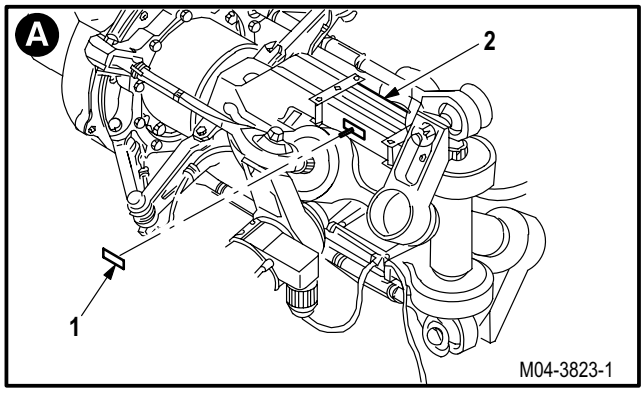
a. **Record all data on identification plate (1).**

b. **Remove plate (1) from tail rotor fork (2).**

(1) Peel up corner of plate (1). Use putty knife.

(2) Remove plate (1) from fork (2).

(3) Discard plate (1).

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## 5.66. TAIL ROTOR FORK IDENTIFICATION PLATE REPLACEMENT - continued

5.66.4. Cleaning

**CAUTION**

Do not use trichloroethane, chlorofluoroethane, or any other product with “chlor” in the name, for cleaning titanium, magnesium, aluminium, or galvanized metals. Products with “chlor” in the name are corrosive to these metals.

**NOTE**

- Do not allow alcohol to evaporate from surface. Discoloration will occur.
- Repeat cleaning procedure if there is visible discoloration on cheesecloth.

a. **Clean plate mounting area on fork.**

(1) Ensure cured compound is completely removed from fork. Use isopropyl alcohol (item 106, App F) and cloth (item 51, App F).

b. **Rinse fork and wipe dry.** Use distilled water (item 73, App F) and a cloth (item 52, App F).

5.66.5. Inspection

a. **Check teeter stop and fork for cracks.** None allowed.

b. **Check teeter stop and fork for evidence of corrosion** (para 1.49)**.**

c. **Check fork for nicks, gouges, and scratches** (para 5.51)**.**

d. **Check fork resilient mounts for deterioration and cracking** (para 5.51)**.**

e. **Check fork for distortion or twists.** None allowed.

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## 5.66. TAIL ROTOR FORK IDENTIFICATION PLATE REPLACEMENT - continued

5.66.6. Installation

a. **Transcribe recorded data on new plate (1).** Use die set.

b. **Install plate (1) on fork (2).**

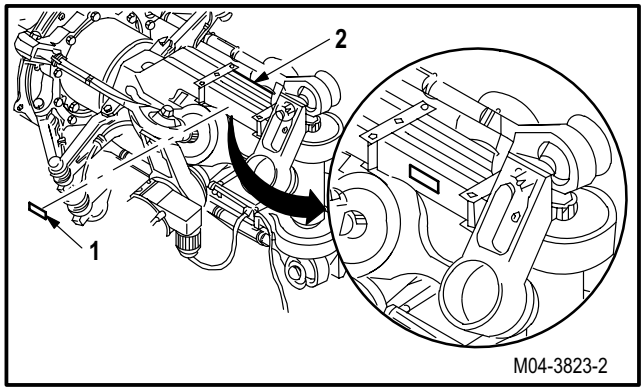
(1) Lightly abrade mounting area of plate (1). Use cloth (item 48, App F).

(2) Apply adhesive to plate (1). Use brush (item 34, App F) and adhesive (item 3, App F).

(3) Install plate (1) on fork (2) in same location as old plate.

(4) Seal edges of plate (1). Use adhesive (item 3, App F).

c. **Inspect (QA).**




END OF TASK

## 5.67. TAIL ROTOR FORK AND TEETER STOP DISASSEMBLY/ASSEMBLY (AVIM)

5.67.1. Description

This task covers: Disassembly. Cleaning. Inspection. Assembly

5.67.2. Initial Setup

**Tools:**

Aircraft maintenance tool kit (item 372, App H)
Light duty laboratory apron (item 27, App H)
Aircraft maintenance fixture (item 132, App H)
Chemical protective gloves (item 154, App H)
Heat protective gloves (item 155, App H)
Electric gun type heater (item 163, App H)
1 3/4 & 2 3/4-inch rubber mallet (item 213, App H)
Adjustable air filtering respirator (item 262, App H)

**Materials/Parts:**

Adhesive (item 8, App F)
Brush (item 34, App F)
Cloth (item 50, App F)
Cloth (item 51, App F)
Cloth (item 52, App F)
Distilled water (item 73, App F)
Cotton gloves (item 82, App F)
Isopropyl alcohol (item 106, App F)
Fishing line (item 110, App F)
Petrolatum (item 138, App F)

**Personnel Required:**

68D Aircraft Powertrain Repairer/NDI
67R3F Attack Helicopter Repairer/Technical Inspector

**Equipment Conditions:**

| Ref | Condition |
|---|---|
| 1.57 | Helicopter safed |
| 5.57A | Tail rotor hubs removed |

**WARNING**

**FLIGHT SAFETY PART**

**The tail rotor fork is a flight safety part. Failure to follow maintenance instructions may result in serious injury or death of crewmembers and/or serious damage to the helicopter.**

GO TO NEXT PAGE

## 5.67. TAIL ROTOR FORK AND TEETER STOP DISASSEMBLY/ASSEMBLY (AVIM) - continued

5.67.3. Disassembly

**WARNING**

**Do not place heater near flammable material or allow heater to contact skin; severe burns can result. Wear protective equipment. If injury occurs, seek medical aid.**

**CAUTION**

- Exercise extreme care and undertake protective measures when handling or performing any type of maintenance on the tail rotor fork. All surface areas are critical.
- To prevent damage to tail rotor fork, ensure that work area is clean and that parts are placed only on a soft and adequately protected working surface.
- Do not heat tail rotor fork over 250 °F (121 °C) or damage will result.

**NOTE**

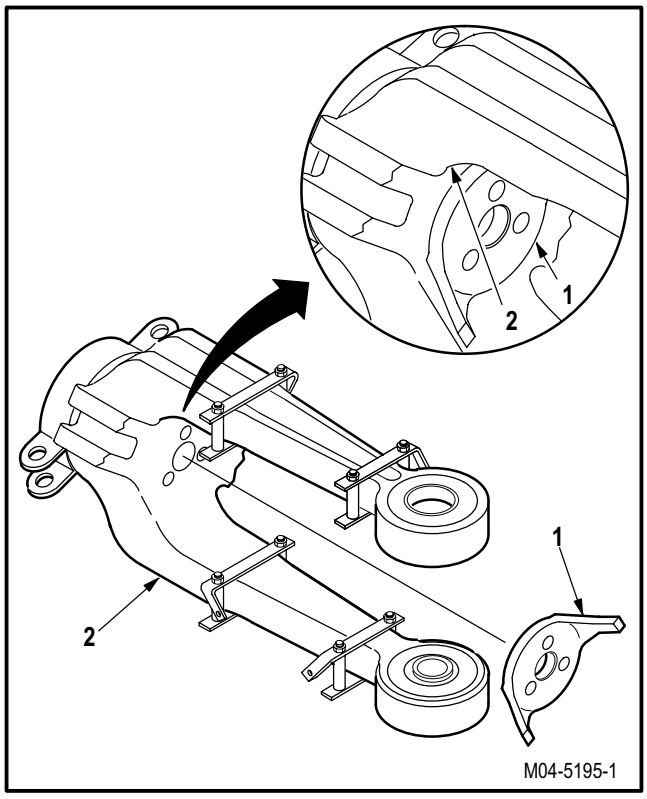
Wear clean cotton gloves when handling fork.

a. **Remove tail rotor teeter stop (1) from tail rotor fork (2).**

(1) Apply heat evenly to area around teeter stop (1). Use protective gloves and heater.

(2) Gently tap teeter stop (1) in an even circular pattern until loose. Use mallet.

(3) Remove teeter stop (1) from fork (2).




GO TO NEXT PAGE

## 5.67. TAIL ROTOR FORK AND TEETER STOP DISASSEMBLY/ASSEMBLY (AVIM) - continued

5.67.4. Cleaning

**CAUTION**

Do not use trichloroethane, chlorofluoroethane, or any other product with “chlor” in the name, for cleaning titanium, magnesium, aluminum, or galvanized metals. Products with “chlor” in the name are corrosive to these metals.

**NOTE**

- Do not allow alcohol to evaporate from surface. Discoloration will occur.
- Repeat cleaning procedure if there is visible discoloration on cheesecloth.

a. **Clean teeter stop and teeter stop mating surface of fork.**

(1) Ensure all cured compound is completely removed. Use isopropyl alcohol (item 106, App F) and cloth (item 51, App F)

b. **Rinse teeter stop and teeter stop mating surface of fork and wipe dry.** Use distilled water (item 73, App F) and cloth (item 52, App F).

5.67.5. Inspection

a. **Check teeter stop and fork for cracks.** None allowed.

b. **Check teeter stop and fork for evidence of corrosion** (para 1.49)**.**

c. **Check teeter stop securing holes for wear damage:**

(1) Nicks, scratches, gouges, galling, scoring, and dents are acceptable if less than **0.010 INCH** deep.

(2) Superficial scratches are acceptable if no material is raised above surrounding surface.

d. **Check fork for scratches, nicks, and gouges** (para 5.51)**.**

e. **Check fork resilient mounts for deterioration and cracking** (para 5.51)**.**

f. **Check fork for distortion or twists.** None allowed.

GO TO NEXT PAGE

## 5.67. TAIL ROTOR FORK AND TEETER STOP DISASSEMBLY/ASSEMBLY (AVIM) - continued

5.67.6. Assembly

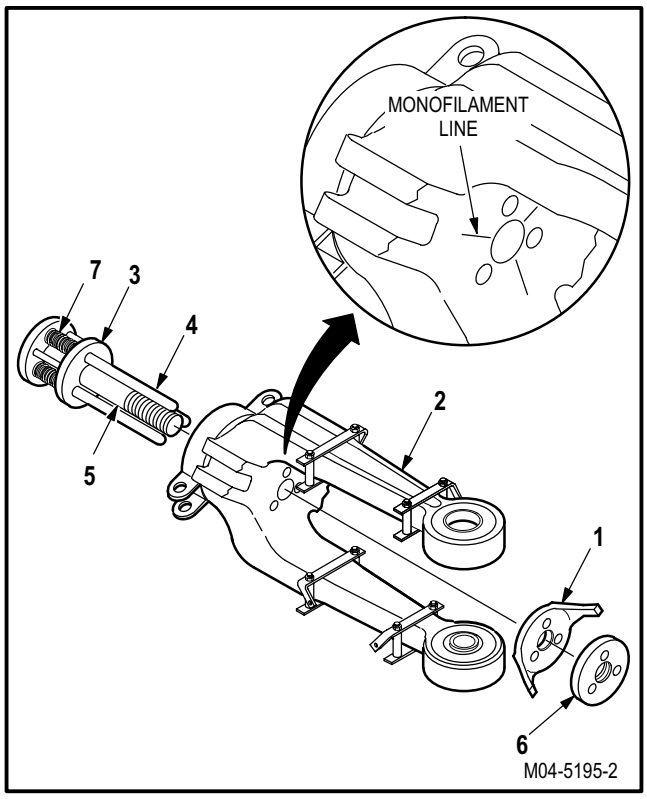
a. **Prepare bonding surface of teeter stop (1) and teeter stop mating surface of fork (2) for bonding.**

(1) Lightly abrade bonding surface of teeter stop (1) and teeter stop mating surface of fork (2). Use cloth (item 50, App F).

(2) Rinse teeter stop (1) and teeter stop mating surface of fork (2) and wipe dry. Use distilled water (item 73, App F) and cloth (item 52, App F).

(3) Apply a thin coat of petrolatum (item 138, App F) to inside diameter of bolt holes on teeter stop (1) and fork (2).

(4) On bonding fixture (3), apply a thin coat of petrolatum (item 138, App F) to fixture alignment rods (4), and draw bolt (5).




**CAUTION**

The alignment rods on the bonding fixture are offset. Do not force tail rotor fork, teeter stop, or compression disk on alignment rods of bonding fixture. If binding occurs, remove and realign holes with alignment rods.

b. **Install new teeter stop (1) on fork (2).**

(1) Apply a smooth and continuous coat of adhesive to bonding surface of teeter stop (1) and teeter stop mating surface on fork (2). Use brush (item 34, App F) and adhesive (item 8, App F).

(2) Embed a **1 INCH** long piece of monofilament line between each of the three mounting holes on teeter stop mating surface of fork (2). Use fishing line (item 110, App F).

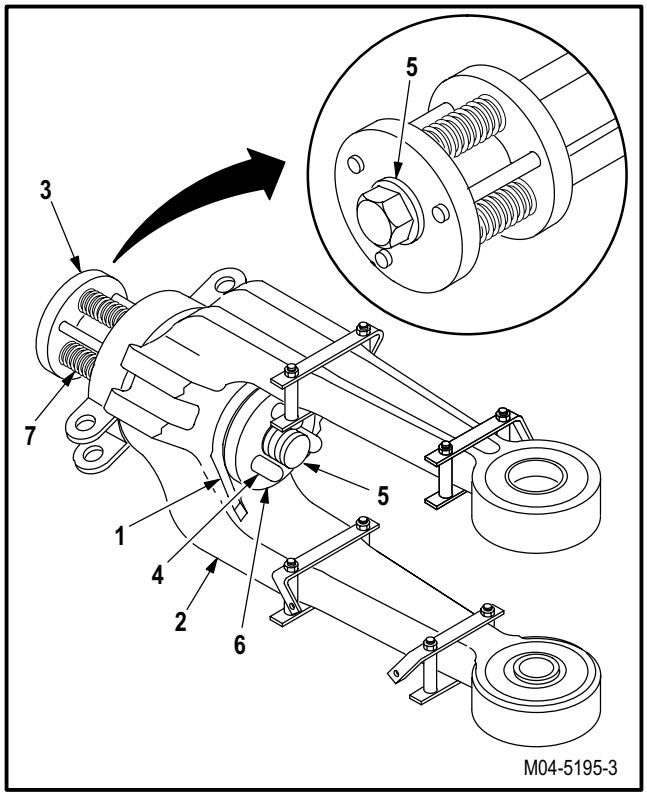
(3) Install fork (2) on bonding fixture (3). Use maintenance fixture.

GO TO NEXT PAGE

## 5.67. TAIL ROTOR FORK AND TEETER STOP DISASSEMBLY/ASSEMBLY (AVIM) - continued

(4) Aline bolt holes of teeter stop (1) with alinement rods (4) of fixture (3) and slide teeter stop (1) onto fixture (3). Press and hold teeter stop (1) firmly against mating surface of fork (2).

(5) Install compression disk (6) on fixture (3) and tighten bolt (5) until springs (7) are compressed to approximately 50% of original height.




c. **Remove excessive adhesive squeeze- out along teeter stop/fork bondline.** Use isopropyl alcohol (item 106, App F) and cloth (item 50, App F).

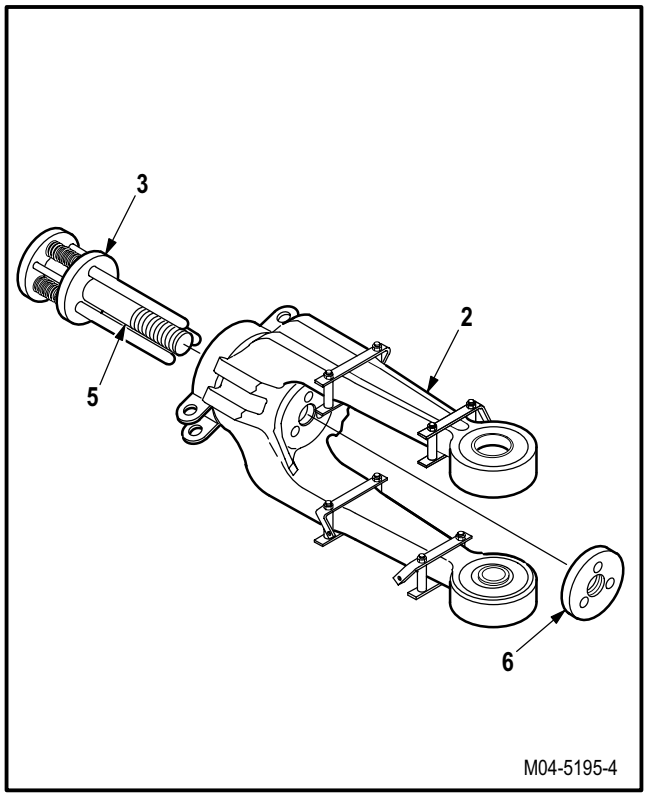
d. **Allow adhesive to cure for a minimum of 24 HOURS at room temperature, or heat cure for 2 HOURS at 150 ±5 °F (63 ±3 °C).**

e. **Rinse teeter stop bondline and wipe dry.** Use distilled water (item 73, App F) and cloth (item 52, App F).

f. **Remove fixture (3) from fork (2).**

(1) Loosen bolt (5).

(2) Remove compression disk (6) and fixture (3) from fork (2).




h. **Cut off excess monofilament line flush to glue line.**

i. **Inspect (QA).**

**NOTE**

If teeter stop was replaced, perform step j. Otherwise, proceed directly to step k.

j. **Install new teeter stop bumpers** (para 5.65)**.**

k. **Install tail rotor hub** (para 5.57A)**.**

END OF TASK

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
*General, United States Army*
*Chief of Staff*

Official:

MILTON H. HAMILTON
*Administrative Assistant to the*
*Secretary of the Army*
06933

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● U.S. GOVERNMENT PRINTING OFFICE: 1994-555-121/80110

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The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" <whomever@wherever.army.mil>

To: 2028@redstone.army.mil

Subject: DA Form 2028

1. ***From:*** Joe Smith
2. *Unit:* Home
3. ***Address:*** 4300 Park
4. ***City:*** Hometown
5. ***St:*** MO
6. ***Zip:*** 77777
7. ***Date Sent:*** 19-Oct-93
8. ***Pub no:*** 55-2840-229-23
9. ***Pub Title:*** TM
10. ***Publication Date:*** 04-Jul-85
11. *Change Number:* 7
12. *Submitter Rank:* MSG
13. ***Submitter Fname:*** Joe
14. *Submitter Mname:* T
15. ***Submitter Lname:*** Smith
16. ***Submitter Phone:*** 123-123-1234
17. ***Problem:*** 1
18. *Page:* 2
19. *Paragraph:* 3
20. *Line:* 4
21. *NSN:* 5
22. *Reference:* 6
23. *Figure:* 7
24. *Table:* 8
25. *Item:* 9
26. *Total:* 123
27. ***Text:***

This is the text for the problem below line 27.

**RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS**

For use of the for, see AR 25-35; the proponent agency is ODISC4

Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).

**DATE** 8/30/02

**TO:** *(Forward to proponent of the publication or form) (Include ZIP Code)*

Commander, U.S. Army Aviation and Missile Command
Attn: AMSAM-MMC-MA-NP
Redstone Arsenal, AL 35898

**FROM:** *(Activity and location) (Include ZIP Code)*

MSG, Jane Q. Doe
1234 Any Street
Nowhere Town, AL 34565

**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

| PUBLICATION/FORM NUMBER | DATE | TITLE |
|---|---|---|
| TM 1-1520-238-23-3 | 16 May 1994 | Aviation Unit and Intermediate Maintenance Manual, for Helicopter, Attack, AH-64A Apache (Volume 3 of 9) |

| ITEM | PAGE | PARA-GRAPH | LINE | FIGURE NO. | TABLE | RECOMMENDED CHANGES AND REASON |
|---|---|---|---|---|---|---|
| 1 | WP0005 PG 3 | | 2 | | | Test or Corrective Action column should identify a different WP number. |

EXAMPLE

**Reference to line numbers within the paragraph or subparagraph.*

| TYPED NAME, GRADE OR TITLE | TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENTION | SIGNATURE |
|---|---|---|
| MSG, Jane Q. Doe, SFC | 788-1234 | |

| **TO:** (*Forward direct to addressee listed in publication*) | **FROM:** *(Activity and location) (Include ZIP Code)* | **DATE** |
|---|---|---|
| Commander, U.S. Army Aviation and Missile Command<br>ATTN: AMSAM-MMC-MA-NP<br>RedstoneArsenal, 35898 | MSG, Jane Q. Doe<br>1234 Any Street<br>Nowhere Town, AL 34565 | 8/30/02 |

**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

| PUBLICATION NUMBER | DATE | TITLE |
|---|---|---|
| | | |

| PAGE NO. | COLM NO. | LINE NO. | NATIONAL STOCK NUMBER | REFERENCE NO. | FIGURE NO. | ITEM NO. | TOTAL NO. OF MAJOR ITEMS SUPPORTED | RECOMMENDED ACTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

**PART III - REMARKS** *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

EXAMPLE

| TYPED NAME, GRADE OR TITLE | TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENTION | SIGNATURE |
|---|---|---|
| MSG, Jane Q. Doe, SFC | 788-1234 | |

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|---|---|---|
| **TO:** *(Forward to proponent of the publication or form) (Include ZIP Code)*<br>Commander, U.S. Army Aviation and Missile Command<br>ATTN: AMSAM-MMC-MA-NP<br>Redstone Arsenal, AL 35898 | **FROM:** *(Activity and location) (Include ZIP Code)* | |

**PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS**

| PUBLICATION/FORM NUMBER | DATE | TITLE |
|---|---|---|
| TM 1-1520-238-23-3 | 16 May 1994 | Aviation Unit and Intermediate Maintenance Manual for Helicopter, Attack, AH-64A Apache; Volume 3 of 9 |

| ITEM | PAGE | PARA-GRAPH | LINE | FIGURE NO. | TABLE | RECOMMENDED CHANGES AND REASON |
|---|---|---|---|---|---|---|
| | | | | | | |

**Reference to line numbers within the paragraph or subparagraph.*

| TYPED NAME, GRADE OR TITLE | TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENTION | SIGNATURE |
|---|---|---|
| | | |

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|---|---|---|

**PART II - REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS**

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| PAGE NO. | COLM NO. | LINE NO. | NATIONAL STOCK NUMBER | REFERENCE NO. | FIGURE NO. | ITEM NO. | TOTAL NO. OF MAJOR ITEMS SUPPORTED | RECOMMENDED ACTION |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

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| TYPED NAME, GRADE OR TITLE | TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENTION | SIGNATURE |
|---|---|---|
| | | |

# The Metric System and Equivalents

### *Linear Measure*

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

### *Liquid Measure*

1 centiliter = 10 milliliters = .34 fl. ounces
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

### *Weights*

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigrams = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

### *Square Measure*

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

### *Cubic Measure*

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

# Approximate Conversion Factors

| *To change* | *To* | *Multiply by* | *To change* | *To* | *Multiply by* |
|---|---|---|---|---|---|
| inches | centimeters | 2.540 | ounce-inches | newton-meters | .007062 |
| feet | meters | .305 | centimeters | inches | .394 |
| yards | meters | .914 | meters | feet | 3.280 |
| miles | kilometers | 1.609 | meters | yards | 1.094 |
| square inches | square centimeters | 6.452 | kilometers | miles | .621 |
| square feet | square meters | .093 | square centimeters | square inches | .155 |
| square yards | square meters | .836 | square meters | square feet | 10.764 |
| square miles | square kilometers | 2.590 | square meters | square yards | 1.196 |
| acres | square hectometers | .405 | square kilometers | square miles | .386 |
| cubic feet | cubic meters | .028 | square hectometers | acres | 2.471 |
| cubic yards | cubic meters | .765 | cubic meters | cubic feet | 35.315 |
| fluid ounces | milliliters | 29.573 | cubic meters | cubic yards | 1.308 |
| pints | liters | .473 | milliliters | fluid ounces | .034 |
| quarts | liters | .946 | liters | pints | 2.113 |
| gallons | liters | 3.785 | liters | quarts | 1.057 |
| ounces | grams | 28.349 | liters | gallons | .264 |
| pounds | kilograms | .454 | grams | ounces | .035 |
| short tons | metric tons | .907 | kilograms | pounds | 2.205 |
| pound-feet | newton-meters | 1.356 | metric tons | short tons | 1.102 |
| pound-inches | newton-meters | .11296 | | | |

# Temperature (Exact)

| | | | | |
|---|---|---|---|---|
| ° F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | ° C |