

TECHNICAL MANUAL
Aviation Unit and Intermediate
Troubleshooting Manual
FOR
ARMY Model
AH-64A HELICOPTER
(NSN 1520-01-106-9519) (EIC: RHA)

CHAPTER 10 FUEL SYSTEM

CHAPTER 11 FLIGHT CONTROL SYSTEM

SUPERSEDURE NOTICE: This manual supersedes TM 55-1520-238-T-3, dated 15 DECEMBER 1985, including all changes.

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

HEADQUARTERS, DEPARTMENT OF THE ARMY
30 APRIL 1992

CHANGE
NO. 9



HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 15 February 2002

TECHNICAL MANUAL
AVIATION UNIT AND INTERMEDIATE
TROUBLESHOOTING MANUAL
FOR
ARMY MODEL AH-64A HELICOPTER
NSN: (1520-01-106-9519) EIC: (RHA)

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

OZONE DEPLETING CHEMICAL INFORMATION

This document has been reviewed for the presence of Class I Ozone depleting chemicals. As of Change 7 dated 19 December 1997, 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.

TM 1-1520-238-T-7, 30 April 1992, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
A through C/(D blank) i and ii 10-31 and 10-32 11-65 and 11-66	A through C/(D blank) i and ii 10-31 and 10-32 11-65 and 11-66

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

By Order of the Secretary of the Army:

Official:

JOEL B. HUDSON
*Administrative Assistant to the
Secretary of the Army*
0201612

ERIC K. SHINSEKI
*General, United States Army
Chief of Staff*

DISTRIBUTION: To be distributed in accordance with Initial Distribution Number (IDN) 313123 requirements for TM 1-1520-238-T-7.

CHANGE }
NO. 8 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 3 May 2000

AVIATION UNIT AND INTERMEDIATE
TROUBLESHOOTING MANUAL
FOR
ARMY MODEL
AH-64A HELICOPTER
NSN: (1520-01-106-9519) EIC: (RHA)

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

TM 1-1520-238-T-7, 30 April 1992, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages

—————
10-157 through 10-160
10-160.7 through 10-160.10

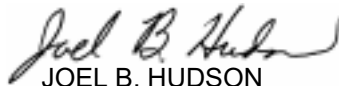
Insert pages

A through C/(D blank)
10-157 through 10-160
10-160.7 through 10-160.10

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

By Order of the Secretary of the Army:

Official:



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

0006207

ERIC K. SHINSEKI
*General, United States Army
Chief of Staff*

DISTRIBUTION:

To be distributed in accordance with the the Initial Distribution No. (IDN 313123) requirements for TM 1-1520-238-T-7.

CHANGE }
NO. 7 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 19 December 1997

AVIATION UNIT AND INTERMEDIATE
TROUBLESHOOTING MANUAL
FOR
ARMY MODEL
AH-64A HELICOPTER
NSN: (1520-01-106-9519) EIC: (RHA)

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

TM 1-1520-238-T-7, 30 April 1992, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
a and b	a and b
i and ii	i and ii
10-103 and 10-104	10-103 and 10-104
10-113 through 10-116	10-113 through 10-116
11-129 and 11-130	11-129 and 11-130
11-185 and 11-186	11-185 and 11-186
11-197 and 11-198	11-197 and 11-198
11-205 and 11-206	11-205 and 11-206
11-221 and 11-222	11-221 and 11-222
11-319 through 11-322	11-319 through 11-322
11-325 through 11-328	11-325 through 11-328
11-404.1 and 11-404.2	11-404.1 and 11-404.2
Electronic 2028	Electronic 2028
DA Form 2028	DA Form 2028

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

By Order of the Secretary of the Army:

Official:



JOEL B. HUDSON

Administrative Assistant to the
Secretary of the Army

04569

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

DISTRIBUTION:

To be distributed in accordance with the the Initial Distribution No. (IDN) 313123, requirements for TM 1-1520-238-T-7.

CHANGE }
NO. 6 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 September 1996

AVIATION UNIT AND INTERMEDIATE
TROUBLESHOOTING MANUAL
FOR
ARMY MODEL
AH-64A HELICOPTER
NSN: (1520-01-106-9519) EIC: (RHA)

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

TM 1-1520-238-T-7, 30 April 1992, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages

i and ii
v/(vi blank)
10-21 and 10-22
10-97 and 10-98
10-215 and 10-216
11-103 and 11-104
11-113 and 11-114
11-219 and 11-220

Insert pages

i and ii
v/(vi blank)
10-21 and 10-22
10-97 and 10-98
10-215 and 10-216
11-103 and 11-104
11-113 and 11-114
11-219 and 11-220

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

By Order of the Secretary of the Army:

Official:



JOEL B. HUDSON

*Administrative Assistant to the
Secretary of the Army*

02603

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

DISTRIBUTION: To be distributed in accordance with DA FORM 12-31-E, block no. 3123, requirements for TM 1-1520-238-T-7.

CHANGE }
NO. 5 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 February 1996

AVIATION UNIT AND INTERMEDIATE
TROUBLESHOOTING MANUAL
FOR
ARMY MODEL
AH-64A HELICOPTER
(NSN 1520-01-106-9519) (EIC: RHA)

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

TM 1-1520-238-T-7, 30 April 1992, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
10-1 and 10-2	10-1 and 10-2
10-7 and 10-8	10-7 and 10-8
10-23 and 10-24	10-23 and 10-24
10-29 and 10-30	10-29 and 10-30
_____	10-30.1/(10-30.2 blank)
10-41 and 10-42	10-41 and 10-42
10-53 through 10-56	10-53 through 10-56
10-63 through 10-64	10-63 through 10-64
10-79 and 10-80	10-79 and 10-80
10-91 through 10-102	10-91 through 10-102
_____	10-102.1/(10-102.2 blank)
10-103 through 10-108	10-103 through 10-108
10-111 through 10-116	10-111 through 10-116
_____	10-130.1 through 10-130.16
10-143 through 10-152	10-143 through 10-152
_____	10-152.1 and 10-152.2
10-153 through 10-160	10-153 through 10-160
_____	10-160.1 through 10-160.15/(10-160.16 blank)
10-161 through 10-166	10-161 through 10-166
10-169 and 10-170	10-169 and 10-170
10-171 and 10-172	10-171 and 10-172

Remove pages

10-173 through 10-176
10-177 through 10-182
10-185 and 10-186

10-251 and 10-252
11-137 through 11-140
11-147 through 11-152
11-159 and 11-160
11-231 and 11-232
11-339 though 11-352

11-357 through 11-360
11-365 and 11-366
11-373 through 11-376

11-377 and 11-378
11-379 through 11-384

11-385 through 11-388
11-388.1/(11-388.2 blank)
11-389 through 11-392

11-393 and 11-394
11-395 and 11-396
11-397 and 11-398
11-399 and 11-400

11-401 through 11-404

11-405 and 11-406
11-407 and 11-408
11-409 and 11-410

(11-411 blank)/11-412
11-413 and 11-414
11-415 and 11-416
11-417 and 11-418

11-419 and 11-420
11-421 and 11-422
11-423 and 11-424

Insert pages

10-176
10-177 through 10-182
10-185 and 10-186
10-188.1 through 0-188.9/(10-188.10
blank)

10-251 and 10-252
11-137 through 11-140
11-147 through 11-152
11-159 and 11-160
11-231 and 11-232
11-339 though 11-352
11-352.1 and 11-352.3/11-352.4 blank)

11-357 through 11-360
11-365 and 11-366
11-373.1 through 11-376.4
11-384.1/(11-384.2 blank)

(11-377blank)/ 11-378
11-379 through 11-384
11-384.1/(11-384.2 blank)

11-385 through 11-388
11-388.1/(11-388.2 blank)
11-389 through 11-392

11-395 and 11-396

11-399 and 11-400
11.400.1/(11-400.2 blank)

11-401 through 11-404
11-401.1 through 11-404.2
11-405 and 11-406

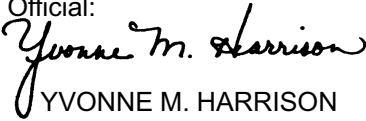
11-409 and 11-410
11-410.1 through 11-410.4
11-411 and 11-412
11-413/(11-414 blank)

11-417 and 11-418
11-418.1 and 11-418.2

11-421 and 11-422
(11-423 blank)/ 1-422
11-425 through 11-437/(11-438 blank)

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

By Order of the Secretary of the Army:

Official:

YVONNE M. HARRISON
*Administrative Assistant to the
Secretary of the Army*
01277

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

DISTRIBUTION:

To be distributed in accordance with DA Form 12-31-E, block no. 3123, requirements for TM 1-1520-238-T-7.

CHANGE }
NO. 4 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 December 1994

AVIATION UNIT AND INTERMEDIATE
TROUBLESHOOTING MANUAL
FOR
ARMY MODEL
AH-64A HELICOPTER
(NSN 1520-01-106-9519) (EIC: RHA)

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

TM 1-1520-238-T-7, 30 April 1992, is changed as follows:

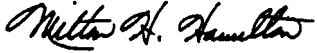
1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
10-139 and 10-140	10-139 and 10-140
11-27 and 11-28	11-27 and 11-28
11-65 and 11-66	11-65 and 11-66
11-131 and 11-132	11-131 and 11-132
11-155 and 11-156	11-155 and 11-156
11-161 through 164	11-161 through 11-164
11-191 and 11-192	11-191 and 11-192
11-247 through 11-250	11-247 through 11-250
11-253 and 11-254	11-253 and 11-254
11-387 and 11-388	11-387 through 11-388
-----	11-388.1/(11-388.2 blank)
11-409 and 11-410	11-409 and 11-410
11-411 and 11-412	(11-411 blank)/11-412

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

By Order of the Secretary of the Army:

Official:



MILTON H. HAMILTON
*Administrative Assistant to the
Secretary of the Army*
07849

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

DISTRIBUTION:

To be distributed in accordance with DA Form 12-31-E, block no. 3123, requirements for TM 1-1520-238-T-7.

CHANGE }
NO. 3 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 September 1993

Aviation Unit And Intermediate
Troubleshooting Manual

AH-64A HELICOPTER

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

TM 1-1520-238-T-7, 30 April 1992, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages

iii thru v/(vi blank)
10-113 and 10-114
10-117 and 10-118
10-171 thru 10-174
10-179 thru 10-182
10-213 and 10-214
10-217 and 10-218
10-243 and 10-244
11-11 and 11-12
11-129 thru 11-134
11-179 thru 11-182
11-187 and 11-188
11-195 and 11-196
11-201 and 11-202
11-205 and 11-206
11-223 and 11-224
11-231 and 11-234
11-241 thru 11-244
11-299 thru 11-306
11-309 thru 11-312
11-337 and 11-338

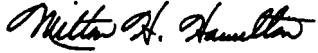
Insert pages

iii thru v/(vi blank)
10-113 and 10-114
10-117 and 10-118
10-171 thru 10-174
10-179 thru 10-182
10-213 and 10-214
10-217 and 10-218
10-243 and 10-244
11-11 and 11-12
11-129 thru 11-134
11-179 thru 11-182
11-187 and 11-188
11-195 and 11-196
11-201 and 11-202
11-205 and 11-206
11-223 and 11-224
11-231 and 11-234
11-241 thru 11-244
11-299 thru 11-306
11-309 thru 11-312
11-337 and 11-338

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

By Order of the Secretary of the Army:

Official:



MILTON H. HAMILTON
*Administrative Assistant to the
Secretary of the Army*
05374

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

DISTRIBUTION:

To be distributed in accordance with DA Form 12-31-E, block no. 3123, requirements for TM 1-1520-238-T-7.

CHANGE }
NO. 2 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 15 January 1993

AVIATION UNIT AND INTERMEDIATE
TROUBLESHOOTING MANUAL

AH-64A HELICOPTER

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

TM 1-1520-238-T-7, 30 April 1992, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages

iii through v/vi blank
10-103 and 10-104
10-107 and 10-108
10-165 and 10-166
10-213 and 10-214
10-219 and 10-220

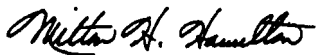
Insert pages

iii through v/vi blank
10-103 and 10-104
10-107 and 10-108
10-165 and 10-166
10-213 and 10-214
10-219 and 10-220

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

By Order of the Secretary of the Army:

Official:



MILTON H. HAMILTON
*Administrative Assistant to the
Secretary of the Army*

03403

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

DISTRIBUTION:

To be distributed in accordance with DA Form 12-31-E, block no. 3123, requirements for TM 1-1520-238-T-7.

CHANGE }
NO. 1 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 November 1992

Aviation Unit And Intermediate
Troubleshooting Manual
for
ARMY MODEL
AH-64A HELICOPTER
NSN: (1520-01-106-9519) EIC: (RHA)

TM 1-1520-238-T-7, 30 April 1992, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages

iii and iv
10-107 and 10-108
10-117 and 10-118
10-163 and 10-164
10-171 through 10-174
10-179 and 10-180
10-201 and 10-202
10-219 and 10-220
10-225 and 10-226
10-241 and 10-242
11-111 and 11-112
11-179 through 11-182
11-357 and 11-358

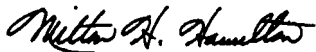
Insert pages

iii and iv
10-107 and 10-108
10-117 and 10-118
10-163 and 10-164
10-171 through 10-174
10-179 and 10-180
10-201 and 10-202
10-219 and 10-220
10-225 and 10-226
10-241 and 10-242
11-111 and 11-112
11-179 through 11-182
11-357 and 11-358

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

By Order of the Secretary of the Army:

Official:



MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
03122

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

DISTRIBUTION:

To be distributed in accordance with DA Form 12-31-E, block no. 3123, requirements for
TM 1-1520-238-T-7

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

The **WARNINGS** on these pages are to notify you of operating or maintenance procedures, practices or conditions, which, if not strictly observed, could result in long term health hazards, injury or death to personnel. If injury occurs, seek medical aid immediately. These **WARNINGS** must be obeyed by all personnel using this volume.

WARNING**NOISE**

Personnel in the area of jet engine operation will wear approved ear protection to protect their hearing.

WARNING**ELECTRICAL POWER**

- Voltages used may cause arcing. Remove rings, watches, and other jewelry which may cause a shock/burn hazard.
- Voltages used may cause severe shock or death on contact. Use caution to avoid contact with energized components.
- Turn off power before detaching or attaching wires and connectors. Failure to do so could result in death or serious injury.
- When opening a circuit breaker during system checks, tag circuit breaker to prevent unforeseen closing, which may cause injury or death to personnel.
- For artificial respiration, refer to FM 21-11.

WARNING**JET ENGINE FUEL**

Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well-ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.

WARNING

GRAVITY REFUELING/DEFUELING OPERATIONS

Set REFUEL VALVE switch to OPEN during gravity refueling/ defueling operations prior to opening fuel cell filler cap to prevent cap and fuel being forced out of filler neck by nitrogen inerting unit (NIU) pressurized air in fuel cell. Failure to do so may result in fuel spillage.

WARNING

CHECKING FUEL CROSSFEED/BOOST SYSTEM

Make sure all personnel are clear of engine 1 and 2 nacelles and aft deck before checking fuel crossfeed/boost system. Failure to do so may result in fire extinguishing agent being sprayed on personnel.

WARNING

CONTROL MOVEMENTS

Maintenance personnel must be warned verbally prior to moving the collective or cyclic stick. Any control activated can result in sudden blade movement that can sever or crush fingers or hands.

INSERT LATEST CHANGED PAGES: DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES

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 30 April 1992	Change 5 1 February 1996
Change 1 30 November 1992	Change 6 30 September 1996
Change 2 15 January 1993	Change 7 19 December 1997
Change 3 1 September 1993	Change 8 3 May 2000
Change 4 28 December 1994	Change 9 15 February 2002

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 808, CONSISTING OF THE FOLLOWING:

Page No.	*Change No.	Page No.	*Change No.
Cover	0	10-112 – 10-113	5
Blank	0	10-114 – 10-115	7
a	7	10-116	0
b	0	10-117	3
A – C	9	10-118	1
D Blank	9	10-119 – 10-130	0
i	9	10-130.1 – 10-130.16 Added	5
ii	0	10-131 – 10-139	0
iii – iv	3	10-140	4
v	6	10-141 – 10-143	0
vi Blank	0	10-144 – 10-152	5
10-1	5	10-152.1 – 10-152.2 Added	5
10-2 – 10-7	0	10-153 – 10-160	5
10-8	5	10-160.1 – 10-160.15 Added	5
10-9 – 10-21	0	10-160.16 Blank Added	5
10-22	6	10-161	0
10-23	5	10-162	5
10-24 – 10-28	0	10-163	0
10-29 – 10-30	5	10-164 – 10-165	5
10-30.1 Added	5	10-166 – 10-168	0
10-30.2 Blank Added	5	10-169 – 10-171	5
10-31 – 10-32	9	10-172 – 10-175 Deleted	5
10-33 – 10-40	0	10-176 – 10-182	5
10-41 – 10-42	5	10-183 – 10-184	0
10-43 – 10-53	0	10-185 – 10-186	5
10-54 – 10-55	5	10-187 – 10-188	0
10-56 – 10-62	0	10-188.1 – 10-188.9 Added	5
10-63	5	10-188.10 Blank Added	5
10-64 – 10-78	0	10-189 – 10-201	0
10-79	5	10-202	1
10-80 – 10-90	0	10-203 – 10-212	0
10-91 – 10-92	5	10-213	2
10-93	0	10-214	3
10-94 – 10-96	5	10-215	6
10-97	6	10-216	0
10-98 – 10-102	5	10-217	3
10-102.1 Added	5	10-218 – 10-219	0
10-102.2 Blank Added	5	10-220	2
10-103 – 10-104	7	10-221 – 10-224	0
10-105 – 10-107	5	10-225 – 10-226	1
10-108	2	10-227 – 10-240	0
10-109 – 10-111	0	10-241 – 10-242	1

*Zero in this column indicates an original page.

INSERT LATEST CHANGED PAGES: DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES

Page No.	*Change No.	Page No.	*Change No.
10-243 – 10-244	3	11-223	0
10-245 – 10-251	0	11-224	3
10-252	5	11-225 – 11-230	0
10-253 – 10-264	0	11-231	5
11-1 – 11-10	0	11-232	3
11-11	3	11-233	0
11-12 – 11-64	0	11-234	3
11-65	9	11-235 – 11-241	0
11-66 – 11-102	0	11-242 – 11-243	3
11-103	6	11-244 – 11-246	0
11-104 – 11-111	0	11-247 – 11-249	4
11-112	1	11-250 – 11-253	0
11-113 – 11-114	6	11-254	4
11-115 – 11-129	0	11-255 – 11-298	0
11-130	7	11-299 – 11-306	3
11-131	0	11-307 – 11-308	0
11-132	4	11-309	3
11-133	3	11-310 – 11-318	0
11-134 – 11-137	0	11-319	7
11-138 – 11-139	5	11-320 – 11-321	0
11-140 – 11-147	0	11-322	7
11-148	5	11-323 – 11-324	0
11-149	0	11-325	7
11-150	5	11-326 – 11-327	0
11-151	0	11-328	7
11-152	5	11-329 – 11-336	0
11-153 – 11-154	0	11-337 – 11-338	3
11-155	4	11-339	0
11-156 – 11-158	0	11-340 – 11-352	5
11-159	5	11-352.1 – 11-352.3 Added	5
11-160	0	11-352.4 Blank Added	5
11-161 – 11-163	4	11-353 – 11-356	7
11-164 – 11-179	0	11-357 – 11-360	5
11-180 – 11-181	3	11-361 – 11-365	0
11-182 – 11-184	0	11-366	5
11-185	7	11-367 – 11-373	0
11-186 – 11-187	0	11-374 – 11-376	5
11-188	3	11-376.1 – 11-376.4 Added	5
11-189 – 11-191	0	11-377 Blank	5
11-192	4	11-378 – 11-384	5
11-193 – 11-194	0	11-384.1 Added	5
11-195	3	11-384.2 Blank Added	5
11-196 – 11-197	0	11-385 – 11-388	5
11-198	7	11-388.1 – 11-388.2	5
11-199 – 11-201	0	11-389 – 11-392	5
11-202	3	11-393 – 11-394 Deleted	5
11-203 – 11-204	0	11-395	5
11-205	7	11-396 Blank	5
11-206 – 11-219	0	11-397 – 11-398 Deleted	5
11-220	6	11-399 – 11-400	5
11-221	0	11-400.1 Added	5
11-222	7	11-400.2 Blank Added	5

*Zero in this column indicates an original page.

INSERT LATEST CHANGED PAGES: DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES

Page No.	*Change No.	Page No.	*Change No.
11-401 – 11-404	5	11-417 – 11-418	5
11-404.1 – 11-404.2 Added	5	11-418.1 – 11-418.2 Added	5
11-405 – 11-406	5	11-419 – 11-420 Deleted	5
11-407 – 11-408 Deleted	5	11-421 – 11-422	5
11-409 – 11-410	5	11-423 Blank	5
11-410.1 – 11-410.4 Added	5	11-424 – 11-437	5
11-411 – 11-413	5	11-438 Blank	5
11-414 – 11-416 Deleted	5		

*Zero in this column indicates an original page.

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 30 April 1992

TECHNICAL MANUAL
AVIATION UNIT AND INTERMEDIATE
TROUBLESHOOTING MANUAL

FOR

ARMY MODEL
AH-64A HELICOPTER
(NSN 1520-01-106-9519) (EIC: RHA)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5230. A reply will be furnished to you.

You may also send in your comments electronically to our e-mail address: 2028@redstone.army.mil or by fax 205-842-6546/DSN 788-6546. Instructions for sending an electronic 2028 may be found at the end of this manual immediately preceding the hard copy 2028.

OZONE DEPLETING CHEMICAL INFORMATION:

This document has been reviewed for the presence of Class I Ozone depleting chemicals. As of Change 7 dated 19 December 1997, 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.

TABLE OF CONTENTS

	<u>Title</u>	<u>Page No.</u>
	HOW TO USE THIS VOLUME	ii
CHAPTER 10	FUEL SYSTEM	
Section I	Equipment Description and Data	10-2
Section II	Theory of Operation	10-31
Section III	Troubleshooting Procedures	10-52
CHAPTER 11	FLIGHT CONTROL SYSTEM	
Section I	Equipment Description and Data	11-2
Section II	Theory of Operation	11-42
Section III	Troubleshooting Procedures	11-71

* **SUPERSEDURE NOTICE:** This manual supersedes TM 55-1520-238-T-7, dated 15 DECEMBER 1985, including all changes.

HOW TO USE THIS VOLUME

OVERVIEW


If you can't find information, you can't do the job. Learn how to use the Integrated Troubleshooting Manual System and this volume. Refer to TM 1-1520-238-T-2 for instructions on how to use the troubleshooting manual system and TM 1-1520-238-T-4 for instructions on how to use this volume.

USING AH-64A HELICOPTER EFFECTIVITY CODES

Helicopter effectivity codes designate differences between helicopters by helicopter serial numbers. These codes consist of three letters representing various helicopter serial number blocks. They are used throughout this volume as necessary to aid the helicopter troubleshooting effort.

The codes are used to designate serial number block differences as follows:

- When used within narrative text and fault isolation procedures (FIPs), effectivity codes appear within parentheses.
For Example: Narrative text and FIPs (AAA)
- When used inside wiring interconnect diagrams, effectivity codes appear within triangular borders and are placed on the line which represents that particular helicopter's configuration.

For Example: Wiring interconnect diagram 

This volume uses these effectivity codes and corresponding helicopter serial numbers for reference.

To use the helicopter effectivity codes, note the helicopter serial number on the left side of the fuselage directly below the CPG window. Use this serial number to determine which procedure or path in a wiring interconnect diagram or FIP to use.

The effectivity codes and helicopter serial number blocks applicable to this volume are as follows:

<u>Effectivity Code</u>	<u>Helicopter Serial No.</u>
AAA	82-23355 thru 82-23365
AAB	82-23355 thru 83-23798
AAC	82-23355 thru 83-23814
AAD	85-25424 and subsequent
AAE	82-23355 thru 84-24231
AAF	84-24216 and subsequent
AAG	82-23355 thru 84-24289
AAH	82-23355 thru 85-25398
AAJ	85-25351 and subsequent
AAK	82-23355 thru 85-25488
AAL	88-0215 and subsequent

HOW TO USE THIS VOLUME (cont)

<u>Effectivity Code</u>	<u>Helicopter Serial No.</u>
AAM	85-25465 and subsequent
AAN	83-23787 thru 85-25415
AAP	82-23355 thru 88-0214
AAQ	82-23355 thru 84-24311
AAR	82-23355 thru 84-24239
AAS	84-24240 and subsequent
AAT	82-23355 thru 83-23804
AAU	83-23787 and subsequent
AAV	83-23805 and subsequent
AAW	83-23799 and subsequent
AAX	83-23799 thru 84-24245
AAZ	83-23799 thru 85-25470 (Before MWO 1-1520-238-50-37)
ABA	83-23815 and subsequent
ABB	84-24200 and subsequent
ABC	84-24246 and subsequent
ABD	84-24290 and subsequent
ABE	82-23355 thru 85-25415
ABF	82-23355 thru 84-24295
ABG	84-24296 and subsequent
ABH	85-25399 and subsequent
ABJ	82-23355 thru 84-24245
ABK	85-25447 and subsequent
ABL	82-23355 thru 85-24446
ABM	82-23355 thru 89-0215
ABN	84-24290 thru 88-0199
ABP	89-0192 and subsequent
ABQ	85-25471 and subsequent
ABR	86-8940 and subsequent
ABS	82-2355 thru 84-24232
ABT	84-24233 and subsequent
ABU	82-23355 thru 83-23816
ABV	83-23817 thru 85-25415
	84-24246 thru 85-25398

HOW TO USE THIS VOLUME (cont)

Effectivity Code

Helicopter Serial No.

ABW	82-23355 thru 83-23795
ABX	83-23796 and subsequent
ABY	With T700-GE 701 engines
ABZ	With T700-GE 701C engines
ACA	82-23355 thru 88-0199
ACB	88-0200 and subsequent
ACC	82-23355 thru 83-23834
ACD	85-25416 and subsequent
ACE	82-23355 thru 86-9011
ACF	82-23355 thru 88-0284
ACG	89-0192 and subsequent
ACH	82-23355 thru 85-25423
ACJ	82-23355 thru 90-0290, and 90-0292 thru 90-0301 (Before MWO 1-1520-238-50-07)
ACK	82-23355 thru 90-0290, 90-0292 thru 90-0301 (After MWO 1-1520-238-50-07) 90-0291, 90-0302 and subsequent
ACL	82-23355 thru 83-23814
ACM	83-23815 and subsequent
ACN	85-25471 thru 90-0448 (Before MWO 1-1520-238-50-37)
ACP	85-25471 thru 90-0448 (After MWO 1-1520-238-50-37) 90-0449 and subsequent
ACQ	82-23355 thru 90-0448 (Before MWO 1-1520-238-50-36)
ACR	82-23355 thru 90-0448 (After MWO 1-1520-238-50-36) 90-0449 and subsequent
ACS	82-23355 thru 90-0437
ACT	90-0438 and subsequent
ACU	82-23355 thru 90-0436
ACV	89-0192 thru 90-0434 with T700-GE-701C engines (Before MWO 1-1520-238-50-38)
ACW	89-0192 thru 90-0434 with T700-GE-701C engines (After MWO 1-1520-238-50-38) 90-0435 and subsequent with T700-GE-701C engines

HOW TO USE THIS VOLUME (cont)

ADA	Before MWO 1-1520-238-50-40
ADB	After MWO 1-1520-238-50-40
ADC	Before MWO 1-1520-238-50-49
ADD	After MWO 1-1520-238-50-49

USING THE ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX

The ECLC index will help you find electrical components and their connectors on the helicopter during troubleshooting. The ECLC is located at the beginning of the troubleshooting procedures of each chapter (when applicable). This index is a list of connectors and applicable wiring harnesses which are illustrated by component location. Component locations are shown from the helicopter's forward sections to its aft sections by horizontal and vertical grid numbers. Connectors are listed numerically in the **FROM COLUMN Connector Ref Des** column of the index. Every connector is referenced to a grid area within the illustrations.

EXAMPLE OF ECLC INDEX

FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
P1	A322	J1039	W119	7A	CPG STATION
P141	W157	J1	L5	78E	LW9
P142	W158	J1	L4	78C	RW9

Use the index to find connectors on the aircraft by first locating the connector reference designator number in the **FROM COLUMN Connector Ref Des** column of the index. Then, cross-reference the **FROM COLUMN Connector Ref Des** column with the following:

- **FROM COLUMN Component/Harness** column to locate the component or wire harness number.
- **TO COLUMN Connector Ref Des** column to locate the mating connector number.
- **TO COLUMN Component/Harness** column to locate the mating component or wire harness number.
- **Grid Area** column to find the grid zone (within the illustration) depicting the location of the connector on the aircraft.
- **Access** column to find where access can be obtained (TM 1-1520-238-23).

For example, to locate connector P1 on the aircraft find connector P1 in the **FROM COLUMN Connector Ref Des** column, then refer to the **FROM COLUMN Component/Harness** column. This column shows that P1 is part of component A322. The **TO COLUMN Connector/Ref Des** column shows that P1 connects to J1039 on wire harness W119 (**TO COLUMN Component/Harness**). The **Grid Area** column indicates that P1 is depicted at illustration grid zone 7A, and that **Access** to the connector is obtained through the CPG STATION.

CHAPTER 10 FUEL SYSTEM

CHAPTER INDEX

<u>Para Title</u>	<u>Para No.</u>
SECTION I. EQUIPMENT DESCRIPTION AND DATA	
Equipment Characteristics, Capabilities, and Features	10-1
Location and Description of Major Components	10-2
Equipment Data	10-3
Equipment Configuration	10-4
Safety, Care and Handling of Equipment	10-5
Controls and Indicators	10-6
SECTION II. THEORY OF OPERATION	
System Description	10-7
Multiplex Read Codes	10-8
SECTION III. TROUBLESHOOTING PROCEDURES	
Electrical Component Location and Configuration (ECLC) Index	10-9
Fuel System – Power Up	10-10
Fuel System – Power Down	10-11
Helicopter Fuel System – Visual Check	10-12
Fuel Crossfeed/Boost System – Maintenance Operational Check	10-17
Fuel Crossfeed/Boost System – Wiring Interconnect Diagram	10-18
Fuel Quantity Indication/Transfer – Maintenance Operational Check	10-47
Fuel Quantity System – Capacitance and Indicating Test (Using TF 579 Test Set)	10-48
Fuel Quantity System – Capacitance and Indicating Test (Using PSD 60-1AF Test Set)	10-48A
Fuel Quantity Indication/Transfer – Wiring Interconnect Diagram	10-49
Nitrogen Inerting System – Maintenance Operational Check	10-67
Nitrogen Inerting System – Wiring Interconnect Diagram	10-68
Gravity Refueling/Defueling – Maintenance Operational Check	10-72
Pressure Refueling/Defueling – Maintenance Operational Check	10-76
Pressure Refueling/Defueling – Wiring Interconnect Diagram	10-77
Auxiliary Fuel System – Maintenance Operational Check	10-100
Auxiliary Fuel System – Wiring Interconnect Diagram	10-101

SECTION I. EQUIPMENT DESCRIPTION AND DATA

10-1. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

10-1

a. Characteristics.

(1) **Fuel Storage System.** The purpose of the fuel storage system is to store fuel for distribution to the engines and the auxiliary power unit (APU).

(2) **Fuel Crossfeed/Boost System.** The fuel crossfeed/boost system provides fuel to the forward and aft fuel cells for starting and normal helicopter operation.

(3) **Fuel Quantity Indication/Transfer System.** The fuel quantity indication/transfer system allows crew members to monitor fuel quantity and to transfer fuel from cell to cell to maintain helicopter center of gravity, or to transfer fuel from a damaged cell.

(4) **Nitrogen Inerting System.** The nitrogen inerting system reduces fire hazards associated with fuel cell air space by filling air space with oxygen-depleted air to a level that does not support combustion.

(5) **Gravity Refueling/Defueling.** Gravity refueling/defueling provides a means for refueling or defueling the forward and aft fuel cells.

(6) **Pressure Refueling/Defueling.** The pressure refueling/defueling system allows pressure refueling or suction defueling of the forward and aft fuel cells.

(7) **Auxiliary Fuel System.** The auxiliary fuel system transfers fuel from the auxiliary fuel tanks to the internal fuel cells. Auxiliary fuel tanks store and supply fuel for ferry operations.

b. Capabilities and Features.

(1) **Fuel Storage System.** The fuel storage system provides fuel and fuel management provisions to operate both engines and the APU. Fuel is stored in two crash-resistant, self-sealing fuel cells, one forward and one aft. Fuel may be transferred from one fuel cell to another. The fuel system also enables either crewmember to select fuel supply to engines.

(2) **Fuel Crossfeed/Boost System.** The fuel crossfeed/boost system provides fuel pressure to the engine-driven fuel pumps during engine start-up. Positive fuel pressure is provided at altitudes over 10,000 feet. A crossfeed/shutoff valve allows or disables either cell to supply or shutoff fuel to both engines.

(3) **Fuel Quantity Indication/Transfer System.** The fuel quantity indication/transfer system uses the pressurized air system (PAS) to direct air for fuel transfer. **FUEL** panels provide crew members quick access for fuel management. Fuel quantity is continuously monitored and various panels indicate fuel level.

(4) **Nitrogen Inerting System.** The nitrogen inerting system provides a continuous oxygen-depleted airflow to both fuel cells, approximately 94% nitrogen. It is self-contained and automatically operates whenever pressurized air and 115 VAC power is available.

(5) **Gravity Refueling/Defueling.** The gravity refueling/defueling system fuels the forward, and aft fuel cells, and the auxiliary tanks separately. Refueling time required for gravity refueling is dependent upon the flow-rate capability of the servicing equipment.

(6) **Pressure Refueling/Defueling.** The pressure refueling/defueling system provides two adapters for alternative fuel nozzles. Forward and aft fuel cells may be filled separately or simultaneously dependent upon refueling panel switch settings. Fuel quantity is continuously monitored and fuel flow is automatically stopped by fuel cell sensors.

10-1. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (cont)

10-1

(7) **Auxiliary Fuel System.** The auxiliary fuel system provides fuel and air lines which are installed in each wing. Auxiliary fuel tanks can be jettisoned. Disconnect couplings are breakaway and self-sealing.

10-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

10-2

a. **Fuel Storage System.** The fuel storage system (fig. 10-1) consists of the forward and aft fuel cells, breakaway valves, a baffle/check valve, and the fuel sump drain assembly. Various fuel subsystems control fuel flow operation which are described in detail in the following paragraphs.

(1) **Forward Fuel Cell.** The forward fuel cell is located under the pilot's station and supplies fuel to engine 1 (left). The outer and inner layers are made of several layers of rubber-impregnated nylon. The intermediate layer consists of uncured rubber which forms a sealant material. The uncured rubber reacts to fuel whenever the fuel cell is punctured. This reaction causes the uncured rubber to swell and seal the hole. It is surrounded on the bottom and sides by the helicopter skin, rigid foam, Kevlar liner, and backing boards. The rigid foam is used to fill the voids between the bulkheads. The Kevlar liner is between the rigid foam and the backing boards and gives the fuel cell additional ballistic protection. The backing boards, made of fiberglass, reduce the possibility of fuel cell chafing. The forward fuel cell is secured in the helicopter fuselage by seven mounting pads which are molded to the fuel cell. The mounting pads consist of the forward fuel cell access panel pad, gravity filler port mount pad, pressure fuel inlet mount pad, fuel outlet mount pad, sump plate/drain valve mount pad, air vent/pressure relief valve mounting pad, and the pilot valve mounting pad.

(2) **Aft Fuel Cell.** The aft fuel cell, located aft of the ammunition bay, normally supplies fuel to engine 2 (right), the APU, and both engines during startup. If desired, either cell can supply both engines. The aft fuel cell is secured in the helicopter fuselage by six mounting pads which are molded to the fuel cell. The mounting pads consist of the boost pump mount pad, the air vent/pressure relief valve mount pad, the gravity filler port mount pad, the pilot valve mount pad, the pressure fuel inlet mount pad, and the sump plate/drain valve mount pad.

(3) **Breakaway Valves.** The breakaway valves, located in the upper left and right corners of the fuel cells, reduce fire hazards by sealing the fuel cells and lines in the event of a high impact landing. They are dual flapper-type breakaway valves that are normally open to permit fuel flow. In the event of valve displacement, the valve separates allowing spring tension to force the piston out which allows the flapper to seal the valve. If this happens, a yellow caution band becomes visible between the flange section and the connection assembly. If the caution band is visible, the valve is no longer serviceable and must be replaced.

(4) **Baffle/Check Valve.** The baffle/check valve, located inside the forward fuel cell, ensures that an uninterrupted supply of fuel is supplied to the engines. During level or nose-up attitude, the double-flapper check valve opens allowing fuel to flow between the forward and aft section of the forward fuel cell. When the fuel level is below the baffle and the helicopter is in a nose low attitude, the check valve closes and traps fuel.

(5) **Fuel Sump Drain Assembly.** The fuel sump drain assembly, located at the bottom of each fuel cell, permits fuel sampling checks for contamination, water content and draining of the fuel cells. The fuel sump drain assembly consists of a spring-loaded closed sump drain valve, a sump drain plunger, which when pushed, opens the sump drain valve allowing fuel to drain. Releasing the pushbutton on the sump drain plunger allows the spring-loaded drain valve to close, stopping fuel flow.

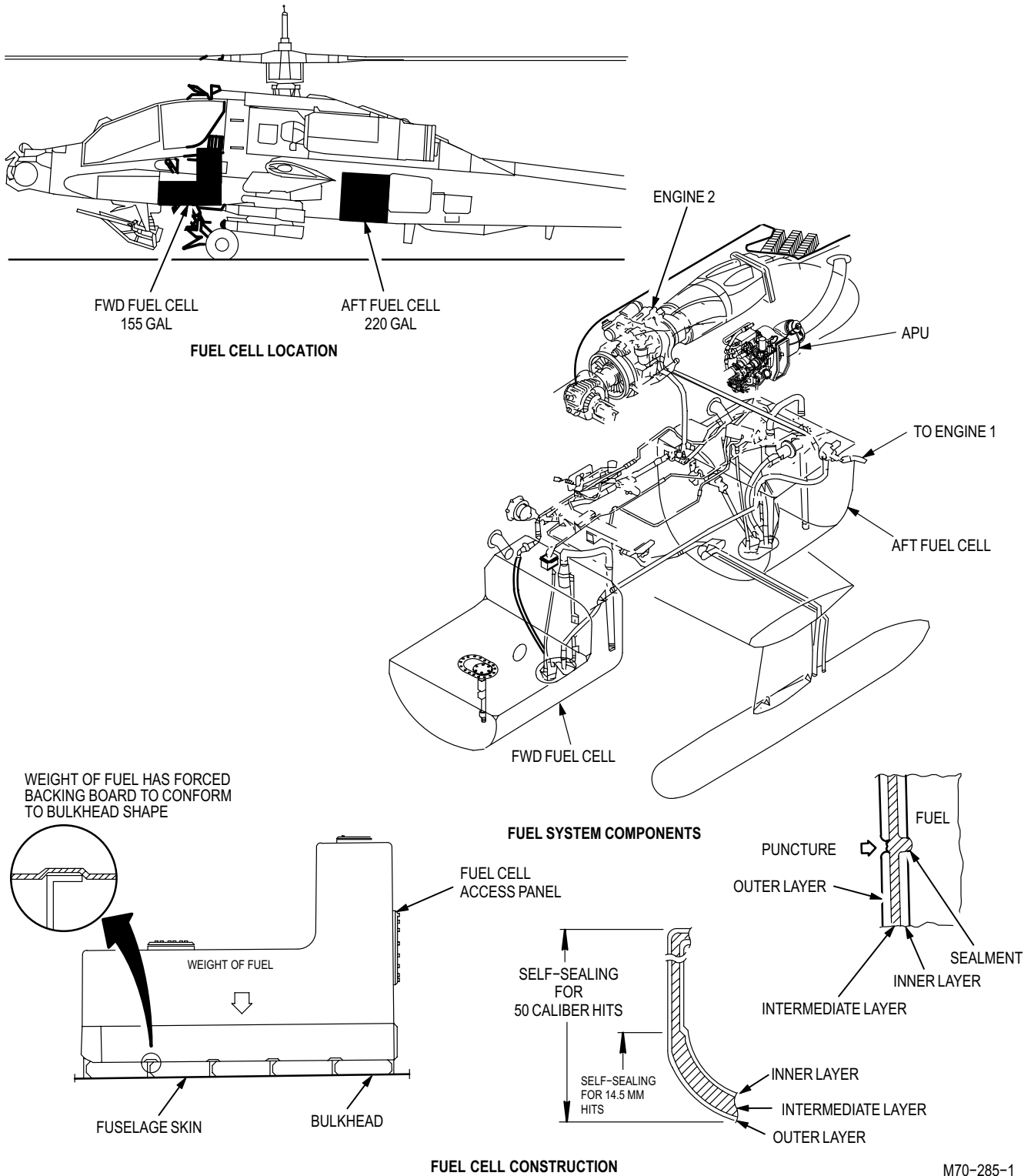
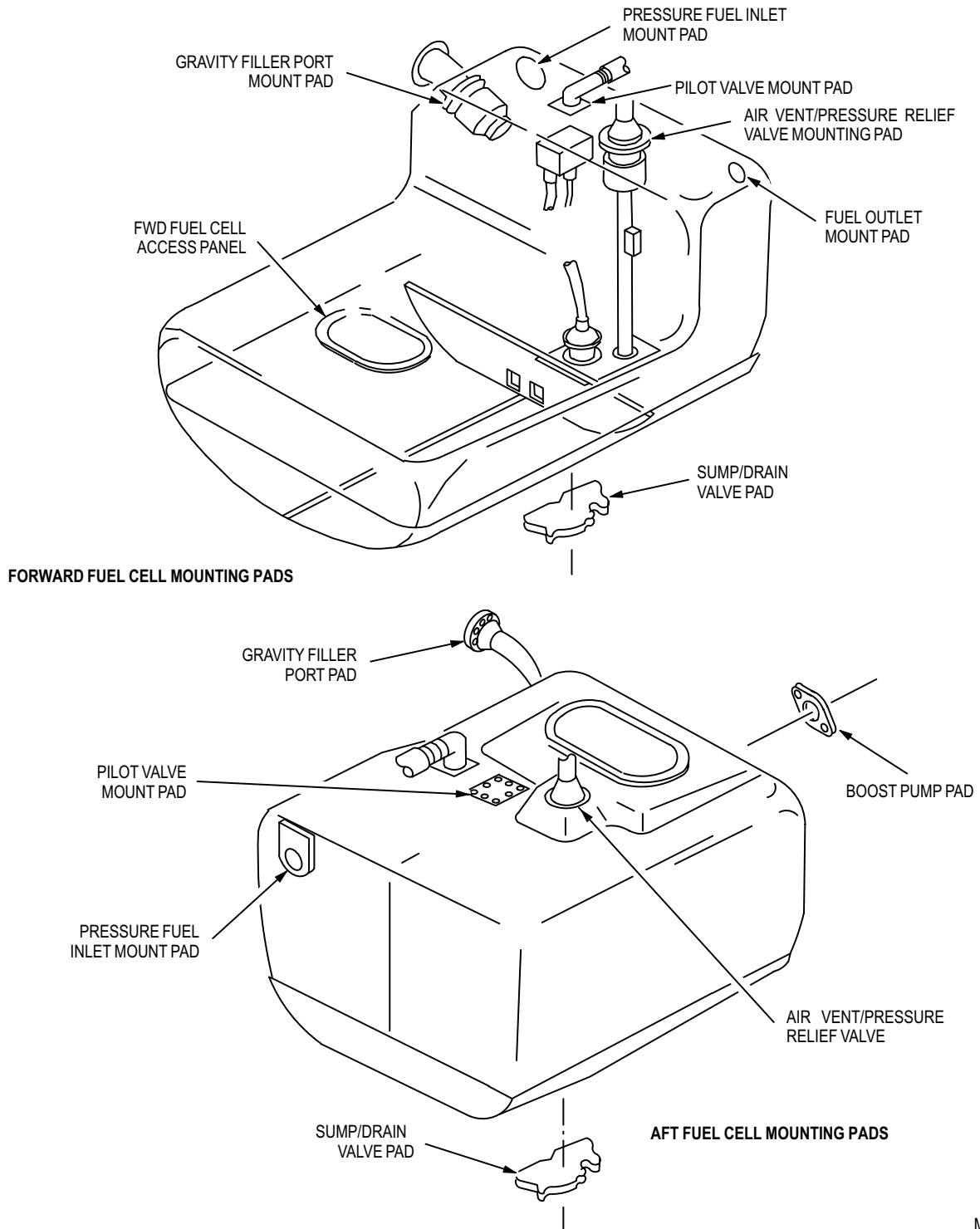


Figure 10-1. Fuel Storage System Major Component Location (Sheet 1 of 3)

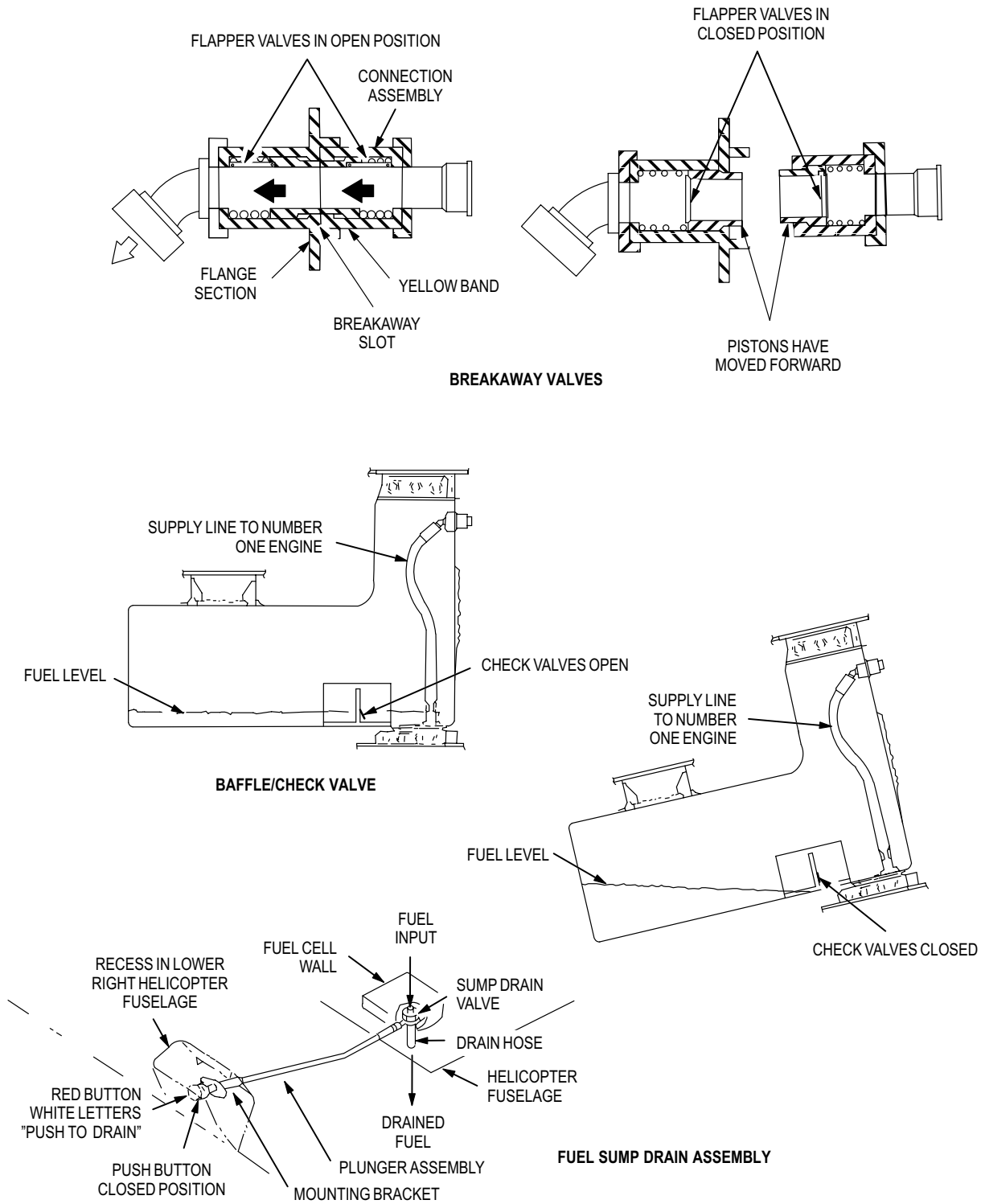
10-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

10-2



M70-285-2

Figure 10-1. Fuel Storage System Major Component Location (Sheet 2 of 3)



M70-285-3

Figure 10-1. Fuel Storage System Major Component Location (Sheet 3 of 3)

10-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

10-2

b. **Fuel Crossfeed/Boost System.** The fuel crossfeed/boost system (fig. 10-2) consists of the pilot and CPG **FUEL** panels, the boost pump pressure switch, fuel crossfeed/shutoff valves, the fuel boost pump shutoff (air) valve, the fuel boost pump, and the 4-way supply check valve.

(1) **Pilot FUEL Panel.** The pilot **FUEL** panel is located in the left side of the pilot console. The **ENG 1** and **ENG 2** switches control the activation of the fuel crossfeed/shutoff valves. In order for the fuel to flow to the engines (or crossfeed to the opposite engine if selected), the respective fuel **ENG** switch must be **ON**. When the **ENG** switch is in the **ON** position, the **CROSSFEED** switch is enabled. This controls the positioning of the fuel crossfeed/shutoff valve. The **CROSSFEED** switch simultaneously controls the position of both fuel crossfeed/shutoff valves. The **BOOST** switch electrically opens the boost pump shutoff (air) valve. The pilot **CROSSFEED** switch must be in the **AFT TK** position for the **BOOST** switch to latch on. If the **BOOST** switch is activated with the CPG **ORIDE** switch in the **CPG** position, the fuel crossfeed/ shutoff valves reposition to the aft tank. This condition may result in a dual engine flameout if the crossfeed does not properly position.

(2) **CPG FUEL Panel.** The CPG **FUEL** panel is located in the left side of the CPG console. With the **ORIDE** switch in the **PLT** position, only the pilot **FUEL** panel switches have control of fuel system operation. When the **ORIDE** switch is in the **CPG** position, the CPG **FUEL** panel switches are enabled. The **TK SEL** switch operates the same as the pilot **FUEL** panel **CROSSFEED** switch. The **BOOST** switch operates the same as the pilot **FUEL** panel **BOOST** switch.

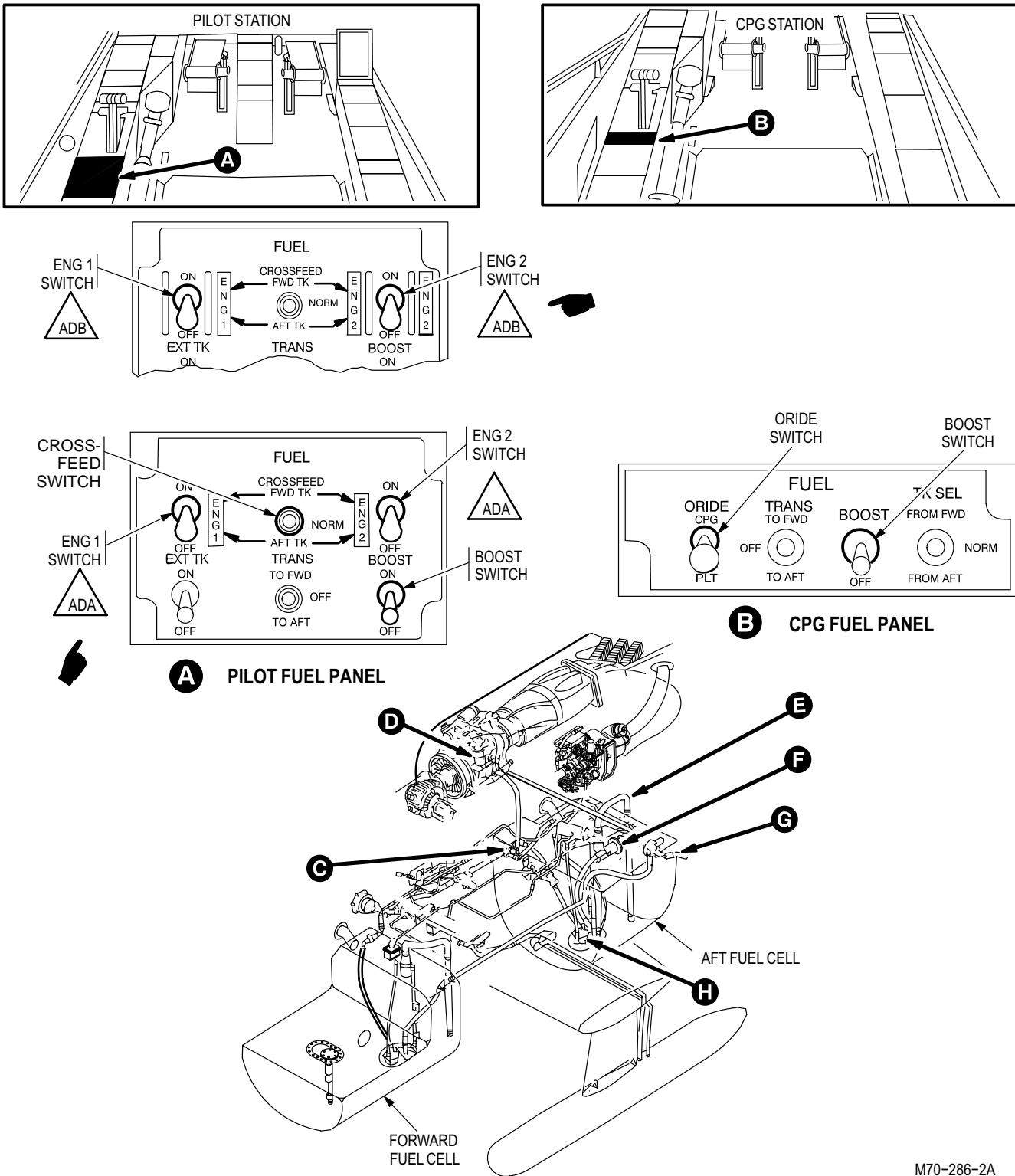
(3) **Boost Pump Pressure Switch.** The boost pump pressure switch is mounted on the right-upper aft side of the ammunition bay. The boost pump pressure switch gives an indication of boost pump operation to the pilot. It is normally open and closes when boost pump output pressure reaches 8.5 to 10 psi.

(4) **Fuel Crossfeed/Shutoff Valves.** The right fuel crossfeed/shutoff valve is mounted on the left forward section of the engine 2 firewall. The left crossfeed/shutoff valve is mounted on the upper forward section of the engine 1 firewall. The fuel crossfeed/shutoff valves provide a means of selecting a fuel source for the engines and a positive fuel shutoff during maintenance or emergencies. They are 3-way, 4-position ball valves, electrically controlled from either crew station.

(5) **Fuel Boost Pump Shutoff (Air) Valve.** The fuel boost pump shutoff (air) valve is located on the right-aft side of the main transmission deck. The pump controls airflow to the air-driven motor of the boost pump. The fuel boost pump (air) shutoff valve is a solenoid operated poppet valve that is electrically energized open and spring-loaded closed. The valve has one electrical connector and two ports for airflow (inlet and outlet).

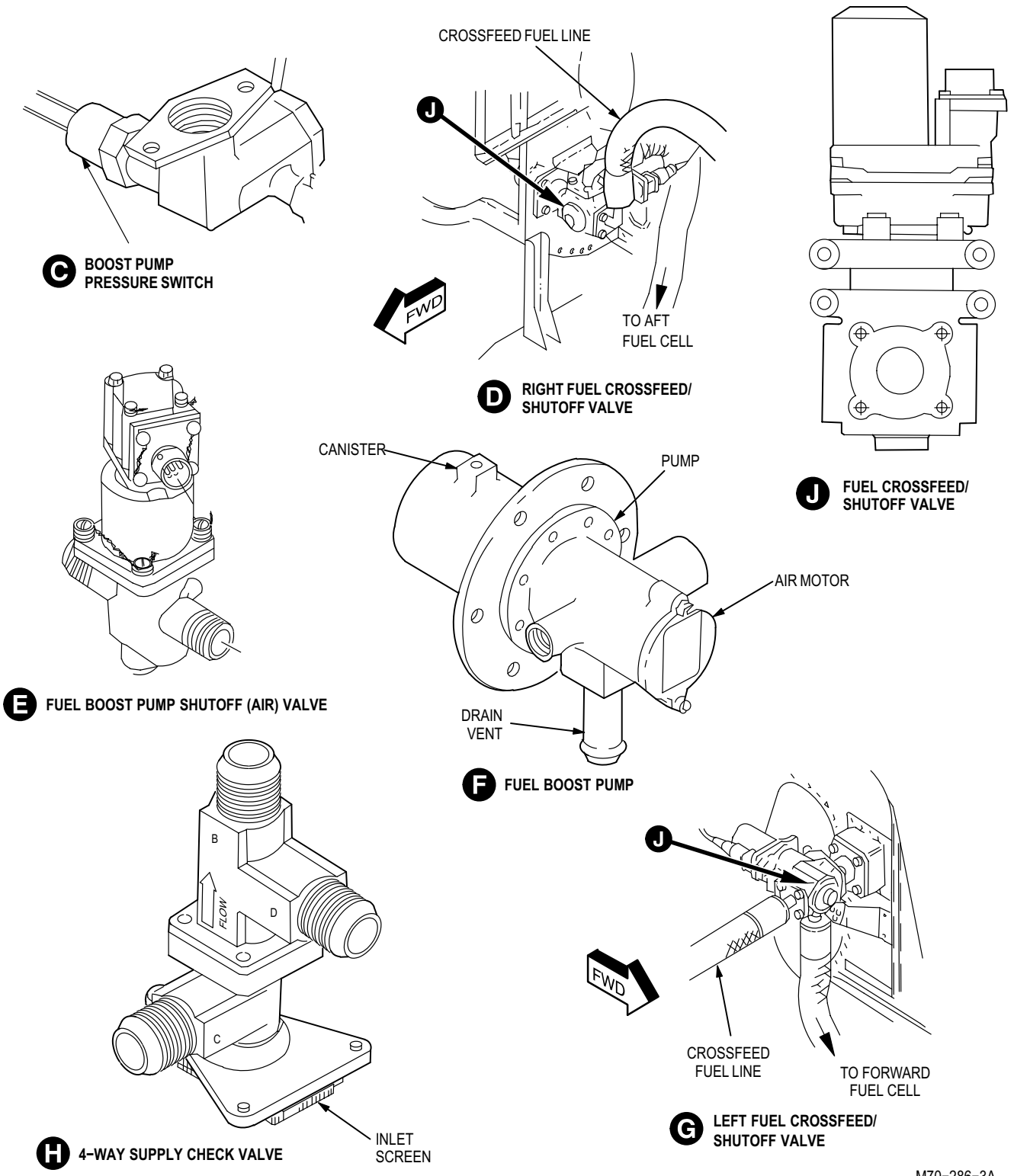
(6) **Fuel Boost Pump.** The fuel boost pump, mounted on the right aft area of the aft fuel cell, provides fuel under pressure to the engines during starting and high altitude operation. The fuel boost pump consists of an air motor, a fuel boost pump and a fuel boost pump canister. The fuel boost pump canister contains a 100 mesh inlet screen, a spring-loaded outlet flapper valve, a spring-loaded inlet flapper valve, a pressure relief valve, and a thermal relief valve. The fuel boost pump is automatically started and shutdown during the engine start sequence. Shutdown occurs at approximately 52% NG.

(7) **4-Way Supply Check Valve.** The 4-way supply check valve, mounted to the bottom of the aft fuel cell, permits fuel to bypass the fuel boost pump during normal operation. It allows fuel to flow to the fuel boost pump canister during operation. The 4-way supply check valve, in conjunction with the fuel boost pump canister flapper valves, prevents draining of the fuel lines after engine/APU shutdown.



M70-286-2A

Figure 10-2. Fuel Crossfeed/Boost System Major Component Location (Sheet 1 of 2)



M70-286-3A

Figure 10-2. Fuel Crossfeed/Boost System Major Component Location (Sheet 2 of 2)

c. **Fuel Quantity Indication/Transfer System.** The fuel quantity indication/transfer system (fig. 10-3) consists of the pilot and CPG **FUEL** panels, the pilot fuel quantity indicator, the CPG selectable digital display, the signal data converter (SDC), the fuel signal conditioner (FSC), the fuel transfer pump, the fuel transfer air valve, and fuel quantity transmitters.

(1) **Pilot and CPG FUEL Panels.** The pilot and CPG **FUEL** panels are located in the left console each crew station. The fuel **TRANS** switches gives the pilot and CPG a means of controlling fuel transfer. Selecting **TO FWD** will transfer fuel from the aft fuel cell to the forward fuel cell; selecting **TO AFT** will transfer fuel from the forward cell to the aft cell.

(2) **Pilot Fuel Quantity Indicator.** The pilot fuel quantity indicator, located in the left side of the pilot's instrument panel, has two side-by-side vertical scale displays and a **TOTAL** digital readout display under the scales. Fuel quantity in the aft fuel cell is displayed on the right scale, fuel quantity in the forward fuel cell is displayed on the left scale. Total fuel quantity of the two fuel cells are displayed on the **TOTAL** digital readout display.

(3) **CPG Selectable Digital Display.** The CPG selectable digital display, located in the right-hand center of the CPG instrument panel, provides the CPG with selection of engine instrument and fuel quantity data displays.

(4) **SDC.** The SDC, located on the left side of the aircraft nose behind access door L40, contains two power supplies and an internal fuse panel. The fuse panel protects all instruments from overload. The SDC receives 28 VDC from dc buses 1 and 2 and reduces this voltage for operation of the instrument system. The SDC routes operating power to the FSC except during refueling. The SDC also receives a signal from the low level sensors, processes the signal, and applies it to the pilot and CPG caution/warning panels.

(5) **FSC.** The FSC, located on the left side of the aircraft nose behind access door L40, converts aft and forward fuel quantity transmitter inputs to linear zero to 5 VDC to drive the fuel quantity indicators (pilot fuel quantity indicator and CPG selectable digital display). The FSC consists of a power supply, an oscillator, two signal conditioners (one for each fuel cell), and four screw adjustments used to adjust fuel and empty indications on the pilot fuel quantity indicator.

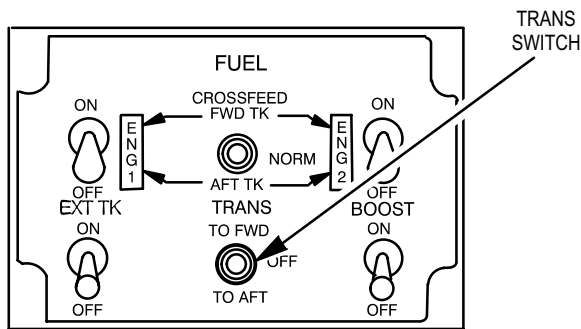
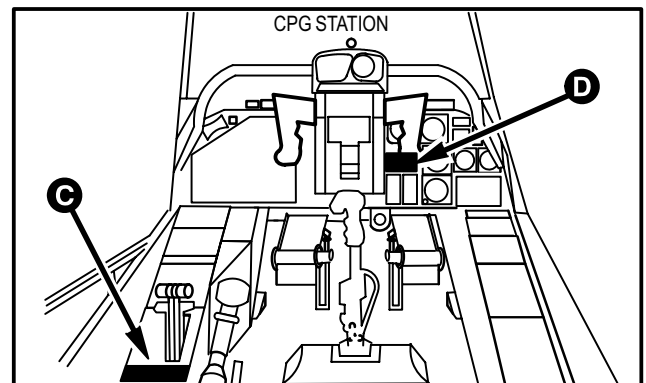
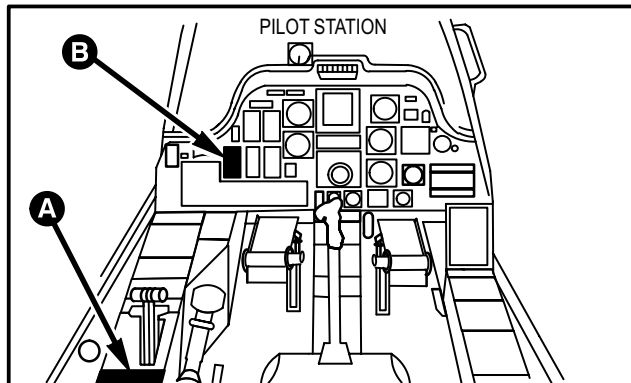
(6) **Fuel Transfer Air Valve.** The fuel transfer air valve, located in the upper right side of the ammunition bay, controls air to the air-driven fuel transfer pump.

(7) **Fuel Transfer Pump.** The fuel transfer pump, located in the upper right side of the ammunition bay, pumps fuel from one fuel cell to the other. It consists of an air-driven motor and a pump.

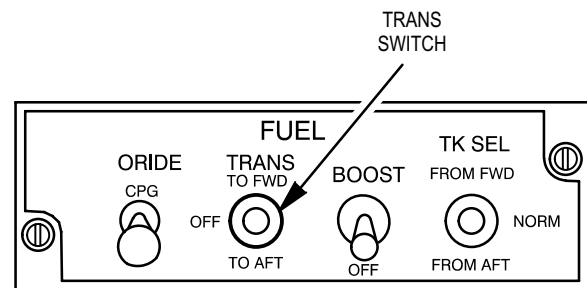
(8) **Fuel Quantity Transmitters.** The fuel quantity transmitters electronically measure the quantity of fuel in the forward and aft fuel cells. The forward fuel cell has two fuel quantity transmitters. The aft fuel cell has one fuel quantity transmitter. The aft transmitter in the forward fuel cell and the transmitter in the aft fuel cell each have a low fuel level sensor. An analog signal is sent from the transmitters to the SDC where it is converted to a digital signal and amplified before going to the indicators. All of the fuel quantity transmitters have fuel quantity compensators to compensate for different fuel densities.

10-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

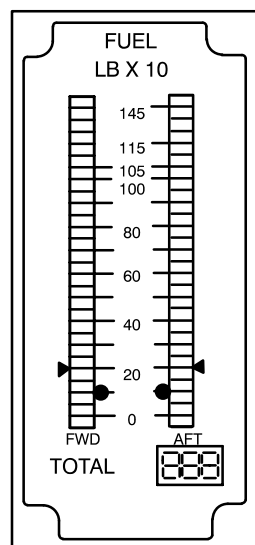
10-2



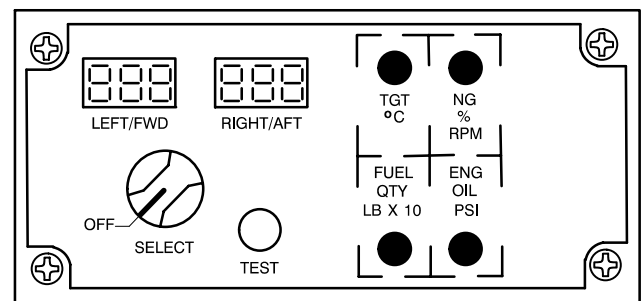
A PILOT FUEL PANEL



C CPG FUEL PANEL



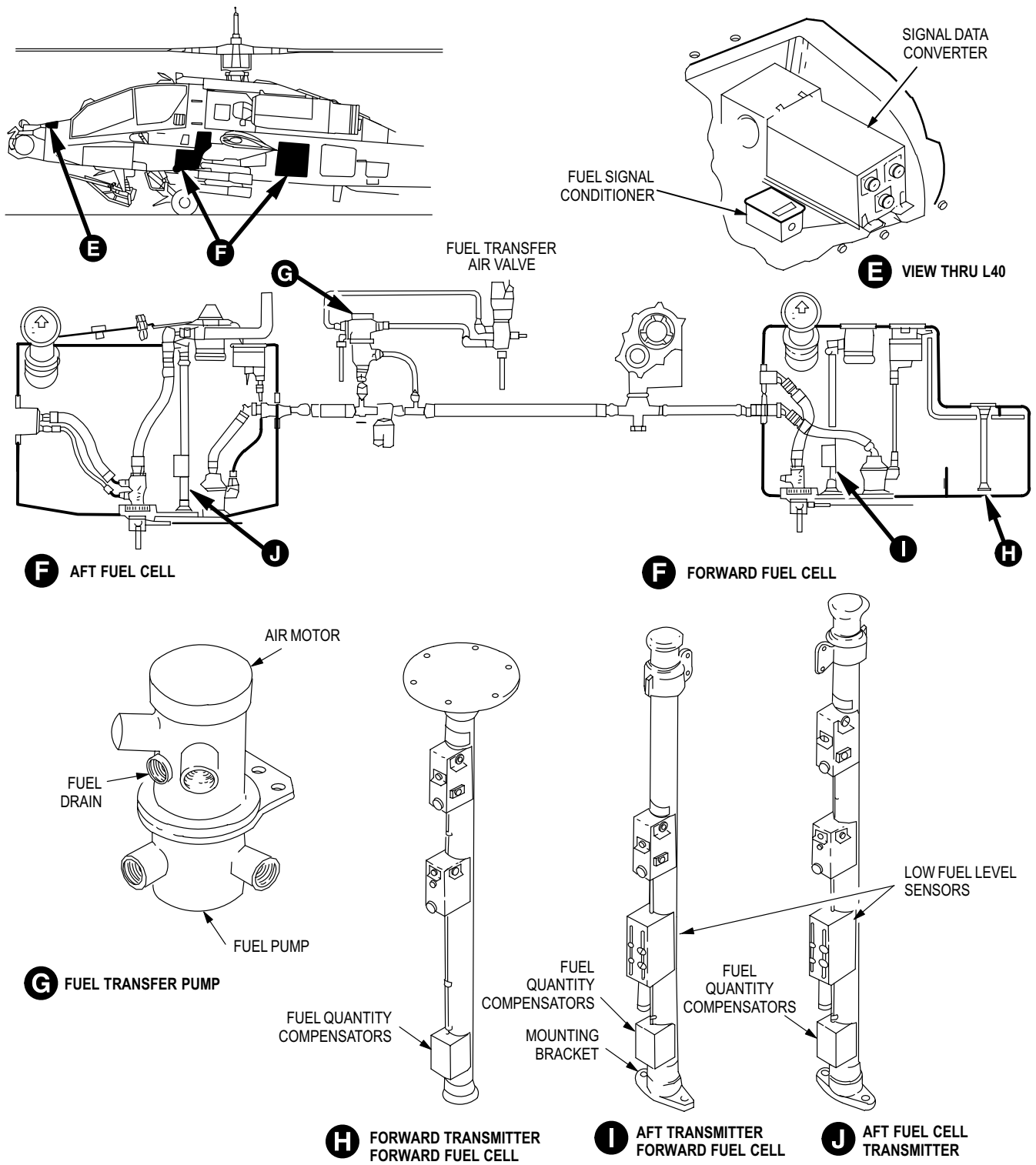
B PILOT FUEL QUANTITY INDICATOR



D CPG SELECTABLE DIGITAL DISPLAY

M70-287-1A

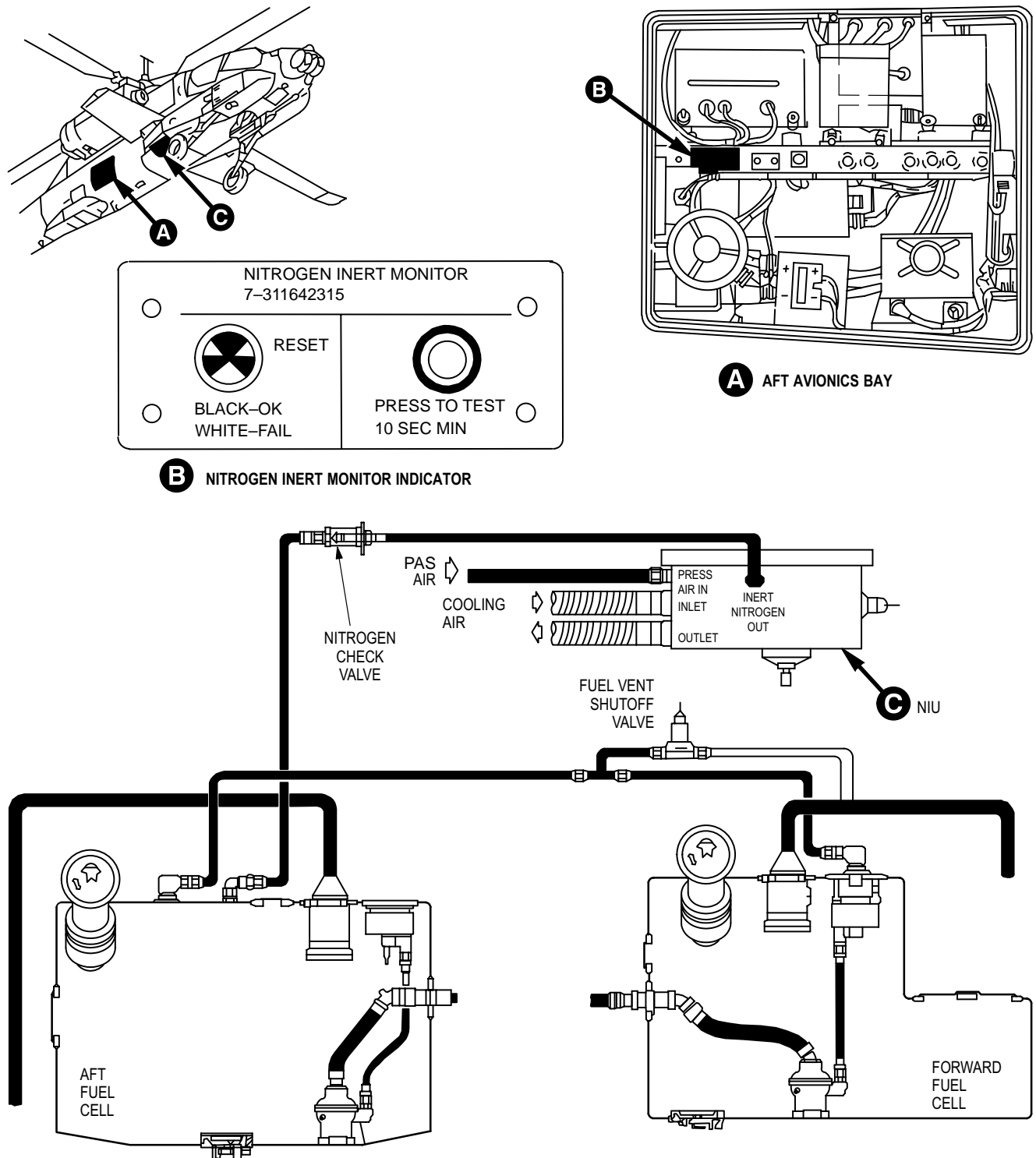
Figure 10-3. Fuel Quantity Indication/Transfer Major Component Location (Sheet 1 of 2)



M70-287-3A

Figure 10-3. Fuel Quantity Indication/Transfer Major Component Location (Sheet 2 of 2)

10-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)



M70-288

Figure 10-4. Nitrogen Inerting System Major Component Location

10-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

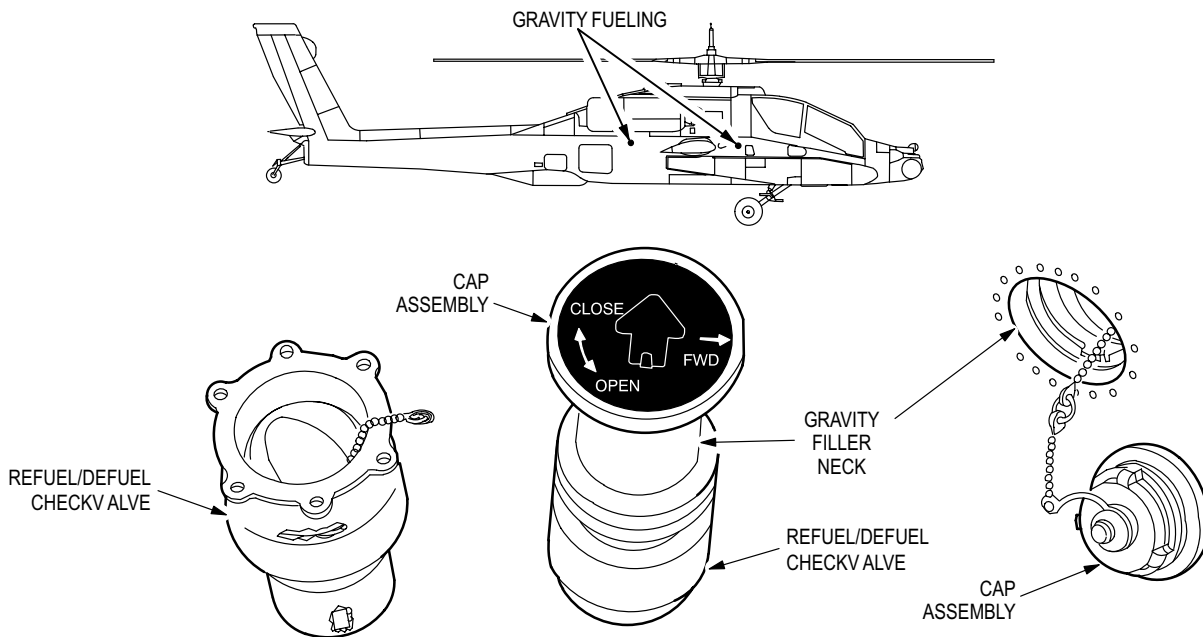
10-2

d. **Nitrogen Inerting System.** The nitrogen inerting system (fig. 10-4) consists of the nitrogen inerting unit (NIU), the **NITROGEN INERT MONITOR** indicator and associated lines and fittings.

(1) **NIU.** The NIU, located in the ammunition bay, utilizes pressurized air from the pressurized air manifold and purges about 70% of the oxygen present. This air is then regulated into the aft fuel cell and onward into the forward fuel cell.

(2) **NITROGEN INERT MONITOR Indicator.** The **NITROGEN INERT MONITOR** indicator, located on the aft avionics bay, displays normal system operation or system failure. It also provides a **PRESS TO TEST** pushbutton for simulated system testing.

e. **Gravity Refueling/Defueling System.** The gravity refueling/defueling system (fig. 10-5) consists of the gravity filler ports is located on the right side of the fuselage. The gravity filler port consists of a cap assembly that provides access to the gravity filler port, a gravity filler neck which provides an attachment point for the cap assembly, and a refuel/defuel check valve which has a flapper valve (installed within the valve housing) that is spring-loaded to the closed position. The flapper valve provides a means of sealing the gravity port to allow for pressurizing the fuel cell with nitrogen.



M70-289A

Figure 10-5. Gravity Refueling/Defueling Major Component Location

f. **Pressure Refueling/Defueling System.** The pressure refueling/defueling system (fig. 10-6) consists of the refueling panel, the pressure refueling/defueling manifold, the fuel transfer (refuel) valve, the fuel level control valve, the air/vent pressure relief valve, and the fuel vent shutoff valve.

(1) **Refueling Panel.** The refueling panel, located on the right side of the fuselage, provides a means of controlling refuel operations and monitoring fuel quantity during refueling, and allows the crew to pre-check automatic fuel shutoff. To allow refueling operations without having to gain access to the crew station, power is supplied by the battery to the **FUEL QTY** indicator switch and **REFUEL VALVE** switch.

10-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

10-2

(2) **Fuel Level Control Valve.** A fuel level control valve, located in each fuel cell, automatically shuts off fuel flow into the fuel cell when it reaches capacity during pressure refueling or fuel transfer. The fuel level control valve consists of a pilot valve, a fuel shutoff valve, a pilot valve tube, and an isolation switch (not shown). The pilot valve contains a gravity ball valve, a fuel float valve, and a solenoid-operated poppet valve.

(3) **Fuel Vent Shutoff Valve.** When open, the fuel vent shutoff valve allows air trapped in the top of the fuel cells to be vented overboard during refueling. When closed, the valve prevents loss of nitrogen during operation.

(4) **Pressure Fuel Manifold.** The pressure fuel manifold, mounted on the right side of the fuselage forward of the wing, houses the single point adapter (SPA) and the closed circuit adapter (CCA). Each adapter has a spring-loaded check valve that is forced open when the fuel nozzle is connected.

(a) The SPA is used in the continental United States (CONUS) and United States bases outside CONUS. It allows a refueling rate of 100 gpm.

(b) The CCA is for used at North Atlantic Treaty Organization (NATO) bases. It allows a refueling rate of 60 gpm.

(5) **Fuel Transfer (Refuel) Valve.** The fuel transfer (refuel) valve, located on the upper right side of the ammunition bay, is open only during refuel or defuel operations and allows pressure refueling and suction defueling of the aft tank. It is a motor-operated valve requiring 24 VDC for operation and is controlled by the **REFUEL VALVE** switch on the refueling panel.

(6) **Air Vent/Pressure Relief Valve.** The air vent/pressure relief valve equalizes pressure inside the fuel cell by venting excess pressure overboard to prevent overexpansion of the fuel cells. It also vents excess fuel overboard in the event of automatic fuel shutoff failure and prevents fuel leakage in the event of a rollover. The air vent/pressure relief valve port vents the fuel cell during NIU operation.

g. **Auxiliary Fuel System.** The auxiliary fuel system (fig. 10-7) consists of the auxiliary fuel tanks, the auxiliary fuel tank empty switches, the auxiliary fuel tank air shutoff valve, the auxiliary fuel tank fuel shutoff valves, and the auxiliary fuel system check valves.

(1) **Auxiliary Fuel Tanks (2 or 4).** The auxiliary fuel tanks are carried on the wing pylon attachment points. There are provisions for as many as four external fuel tanks. The auxiliary fuel tanks are made of aluminum alloy and are individually refueled via a gravity filler port.

(2) **Fuel Empty Switches.** One fuel empty switch is mounted inside each auxiliary fuel tank and provides a visual indication when the auxiliary fuel tanks are empty by illuminating the **EXT EMP** indicator on the pilot caution/warning panel. The fuel empty switch is a float switch that completes a circuit when the fuel level is below the float. The fuel empty switches are connected in a series so that all tanks must be empty before the electrical circuit for the pilot caution/warning panel is signaled.

(3) **Auxiliary Fuel Tank Shutoff Valves.** The auxiliary fuel tank shutoff valves are located in the trailing edge of each wing when the auxiliary tank kit is installed on the helicopter. They provide positive fuel shutoff when the pilot **FUEL** panel **EXT TK** transfer switch is placed in the **OFF** position and prevents air from being drawn from the auxiliary tanks during internal fuel system transfer.

(4) **Auxiliary Fuel Tank Air Shutoff Valve.** The auxiliary fuel tank air shutoff valve, mounted on the left side of the aft equipment bay, controls airflow that is used to transfer fuel from the auxiliary tanks to the internal cells. The auxiliary fuel tank air shutoff solenoid valve is spring-loaded closed and electrically opened. The valve has an electrical receptacle, an air inlet port and an air outlet port.

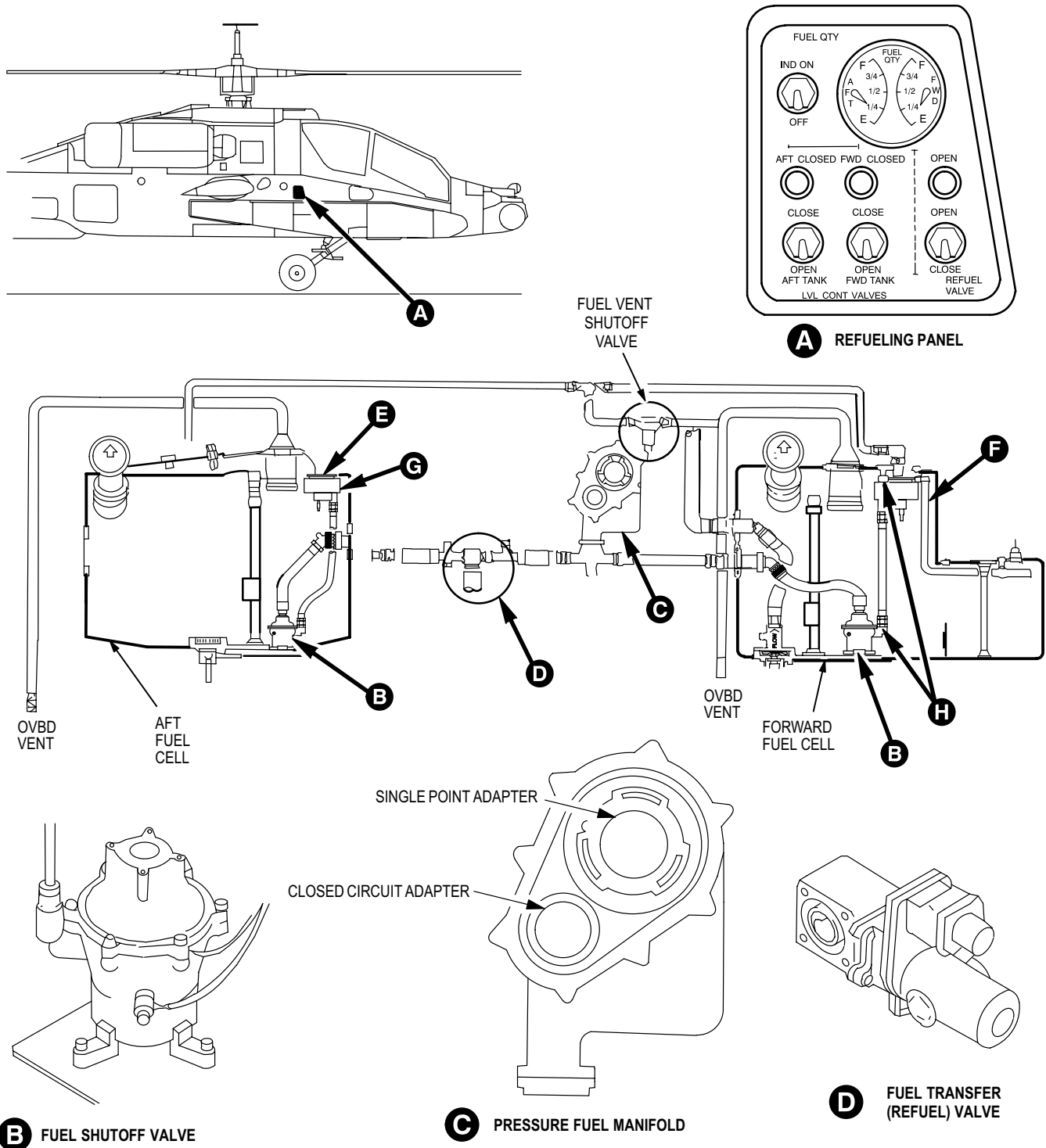
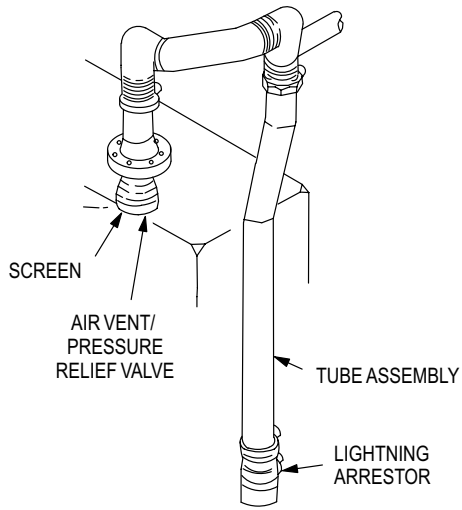


Figure 10-6. Pressure Refueling/Defueling System Major Component Location (Sheet 1 of 2)

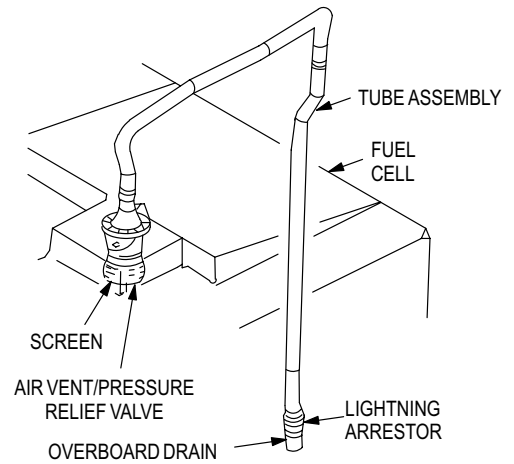
M70-290-1

10-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

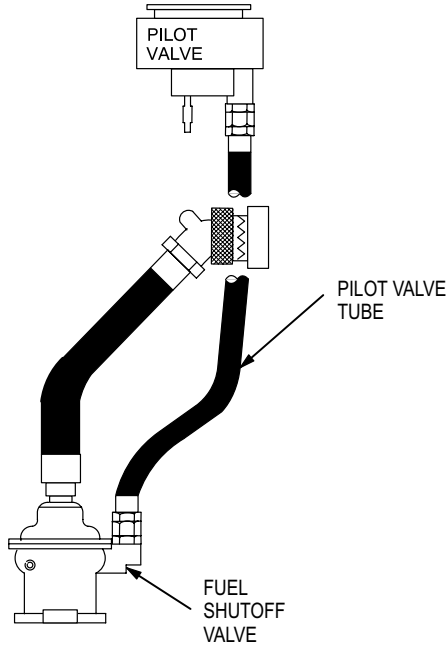
10-2



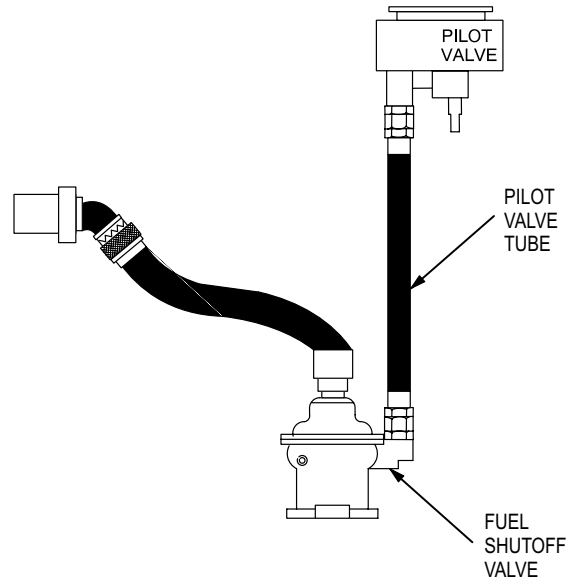
E FORWARD FUEL CELL AIR VENT/PRESSURE RELIEF VALVE



F AFT FUEL CELL AIR VENT/ PRESSURE RELIEF VALVE



G AFT FUEL LEVEL CONTROL VALVE

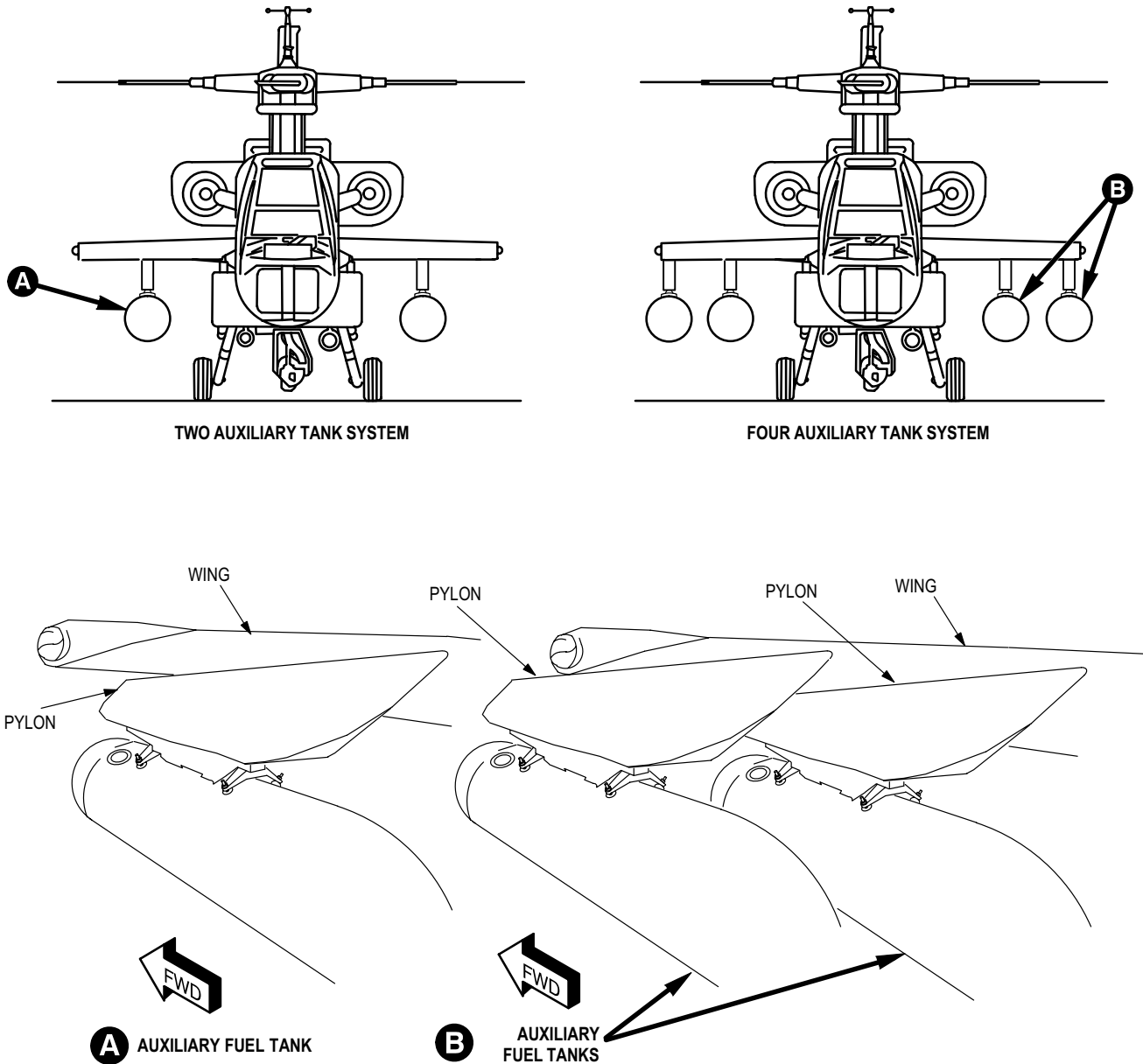


H FWD FUEL LEVEL CONTROL VALVE

M70-290-2

Figure 10-6. Pressure Refueling/Defueling System Major Component Location (Sheet 2 of 2)

(5) **Auxiliary Fuel System Check Valves.** The auxiliary fuel system check valves, mounted on the upper right side of the ammunition bay, prevent fuel from entering the auxiliary fuel tanks during refueling or internal transfer operations. A narrow red band on the end indicates that it is a fuel system low pressure check valve. An arrow stamped on the barrel indicates direction of flow. Inside the valve body is a 1-way, spring-loaded flapper valve.

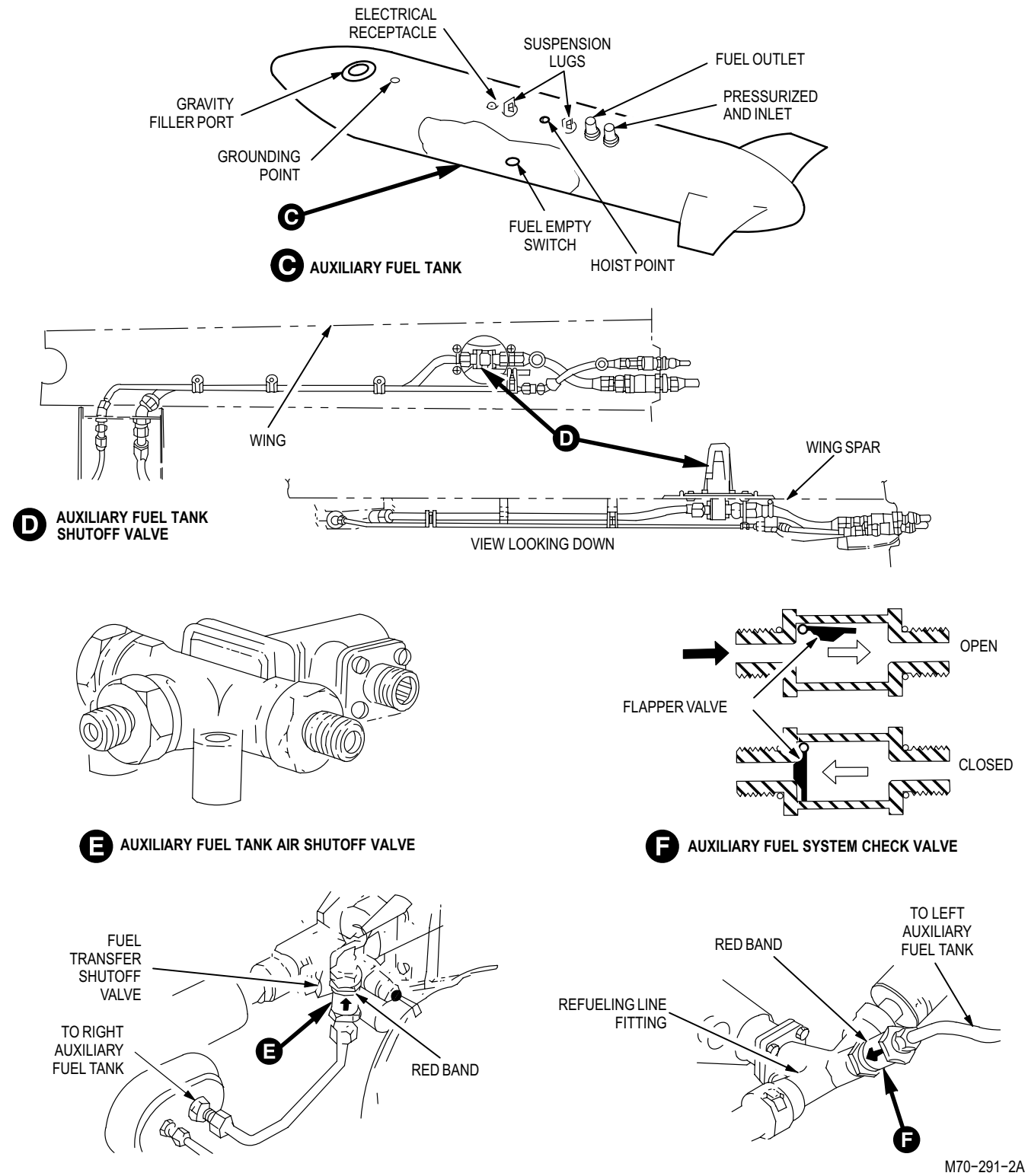


M70-291-1

Figure 10-7. Auxiliary Fuel System Major Component Location (Sheet 1 of 2)

10-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

10-2



M70-291-2A

Figure 10-7. Auxiliary Fuel System Major Component Location (Sheet 2 of 2)

10-3. EQUIPMENT DATA

10-3

Forward Fuel Cell

Internal fuel capacity 155 gallons/1007.5 lbs.

Aft Fuel Cell

Internal fuel capacity 220 gallons/1430 lbs.

Range

Internal fuel 2.0 hours with 30 minute reserve

NIU

Power requirement 115 VAC

Approximate weight 11 lbs.

Auxiliary Fuel Tanks

Range (4 external tanks) 7 hours, 20 minute reserve

Fuel tank capacity (2 external tanks) 460 gallons/2990 lbs.

Fuel tank capacity (4 external tanks) 920 gallons/5980 lbs.

Empty weight 140 lbs.

Length 15 feet

Circumference 6.25 feet

10-4. EQUIPMENT CONFIGURATION

10-4

Not applicable.

10-5. SAFETY, CARE AND HANDLING OF EQUIPMENT

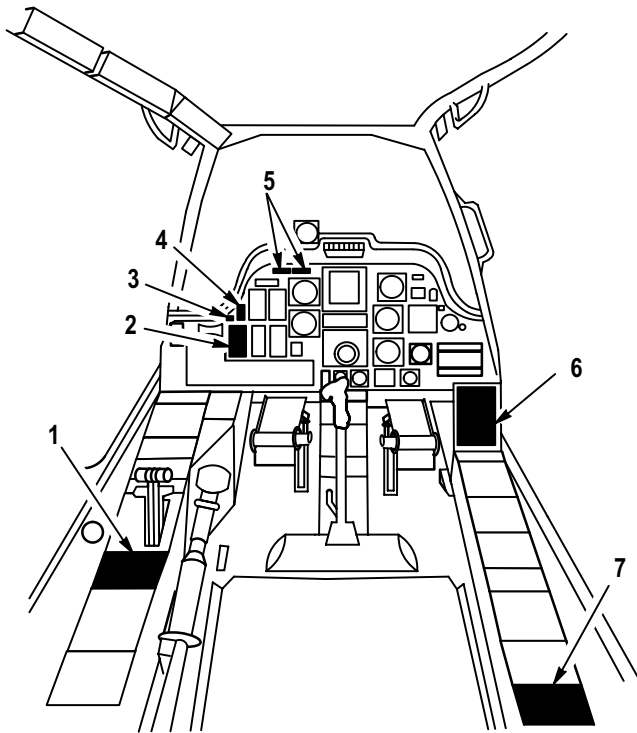
10-5

Not applicable.

10-6. CONTROLS AND INDICATORS

10-6

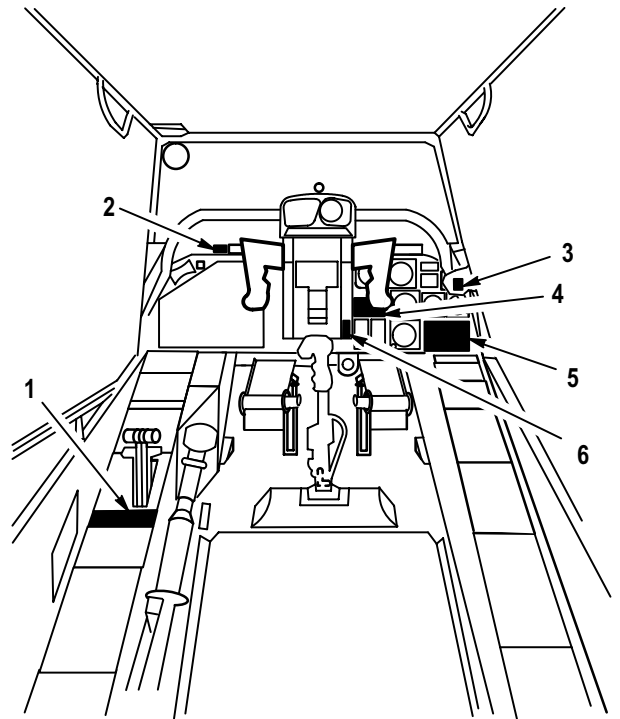
The fuel system receives mode selects and remote switch inputs from various controls located within the pilot station (fig. 10-8) and CPG station (fig. 10-9), and outside on the helicopters' right fuselage (fig. 10-10). Table 10-1 provides a listing of the controls, switches and associated indicators pertaining to the fuel system along with a description of their function.



- 1. PILOT FUEL PANEL
- 2. PILOT FUEL QUANTITY INDICATOR
- 3. PILOT FUEL XFR INDICATOR
- 4. PILOT DIM/TEST PANEL
- 5. PILOT FIRE PULL HANDLES
- 6. PILOT CAUTION/WARNING PANEL
- 7. PILOT BTL DISCHARGE/APU PANEL

M70-222A

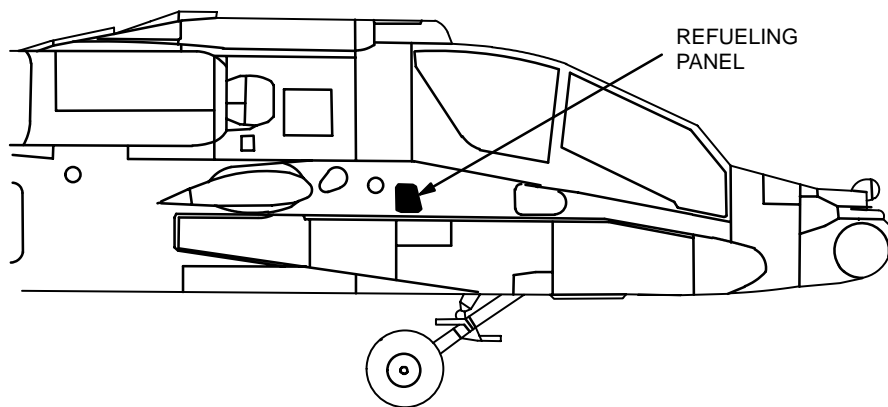
Figure 10-8. Pilot Station



- 1. CPG FUEL PANEL
- 2. CPG FIRE PULL HANDLES
- 3. CPG FUEL XFR INDICATOR
- 4. CPG SELECTABLE DIGITAL DISPLAY
- 5. CPG CAUTION/WARNING PANEL
- 6. CPG DIM/TEST PANEL

M70-223A

Figure 10-9. CPG Station



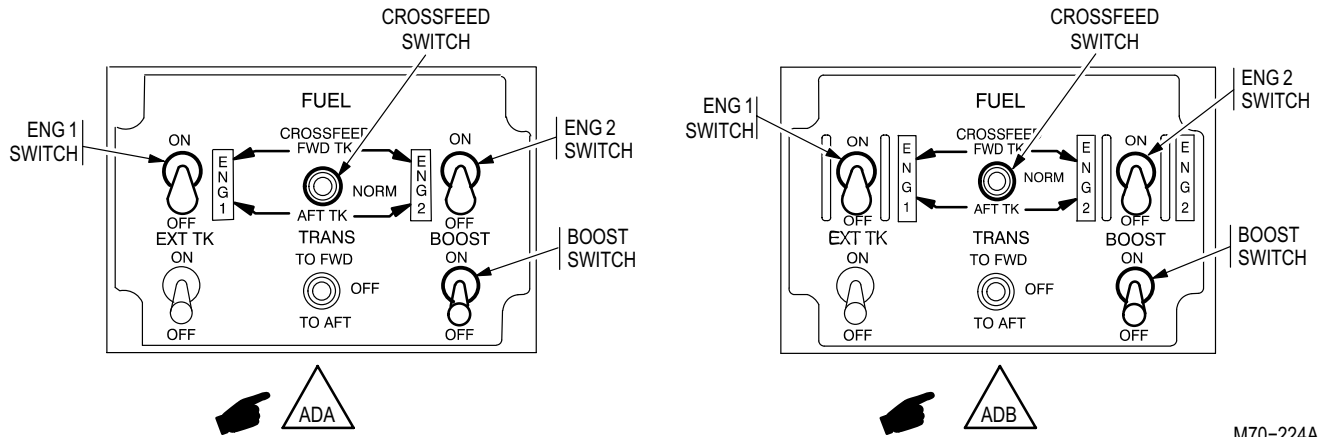
M70-244

Figure 10-10. Refueling Panel Location

Table 10-1. Fuel System Controls and Indicators

Pilot FUEL Panel		
SWITCH/INDICATOR	POSITION	FUNCTION
ENG 1 switch	ON	Energizes engine 1 fuel crossfeed/shutoff valve.
	OFF	De-energizes engine 1 fuel crossfeed/shutoff valve.
CROSSFEED switch	FWD TK	Enables both engines to receive fuel from forward fuel cell.
	NORM	Enables ENG 1 to feed from forward fuel cell. Enables ENG 2 to feed from aft fuel cell.
	AFT TK	Enables both engines to receive fuel from aft fuel cell.
ENG 2 switch	ON	Energizes engine 2 fuel crossfeed/shutoff valve.
	OFF	De-energizes engine 2 fuel crossfeed/shutoff valve.
BOOST switch	ON	Enables pneumatically driven boost pump (in aft fuel cell) to deliver fuel to both engine fuel crossfeed/shutoff valves.
	OFF	De-energizes boost pump.
TRANS switch	TO FWD	Transfers fuel from aft fuel cell to forward fuel cell via the fuel transfer pump.
	OFF	De-energizes fuel transfer pump.
	TO AFT	Transfers fuel from forward fuel cell to aft fuel cell via the fuel transfer pump.
EXT TK switch	ON	Energizes auxiliary fuel tank air and fuel shutoff valves and routes pressurized air to external tanks for transfer of fuel to internal fuel cells. When four external tanks are installed, PAS air only pressurizes outboard tanks. Fuel is forced from outboard tanks, through inboard tanks, and into aircraft internal fuel cells.
	OFF	De-energizes auxiliary fuel tank shutoff valves.

Table 10-1. Fuel System Controls and Indicators (cont)

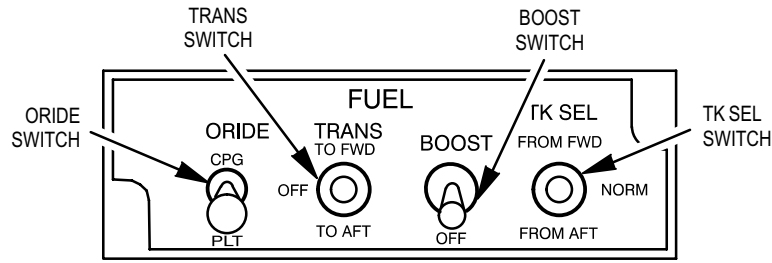


M70-224A

Pilot FUEL Panel

CPG FUEL Panel		
SWITCH/INDICATOR	POSITION	FUNCTION
ORIDE switch	CPG	Enables CPG FUEL panel.
	PLT	Enables pilot FUEL panel.
TRANS switch	TO FWD	Transfers fuel from aft fuel cell to forward fuel cell via the fuel transfer pump.
	TO AFT	Transfers fuel from forward cell to aft fuel cell via the fuel transfer pump.
	OFF	De-energizes fuel transfer pump.
BOOST switch	ON	Enables pneumatically driven boost pump (in aft fuel cell) to deliver fuel to both engine fuel crossfeed/shutoff valves.
	OFF	De-energizes fuel boost pump.
TK SEL switch	FROM FWD	Enables both engines to receive fuel from forward fuel cell.
	NORM	Enables engine 1 to feed from forward fuel cell. Enables engine 2 to feed from aft fuel cell.
	FROM AFT	Enables both engines to receive fuel from aft fuel cell.

Table 10-1. Fuel System Controls and Indicators (cont)



M70-225A

CPG FUEL Panel

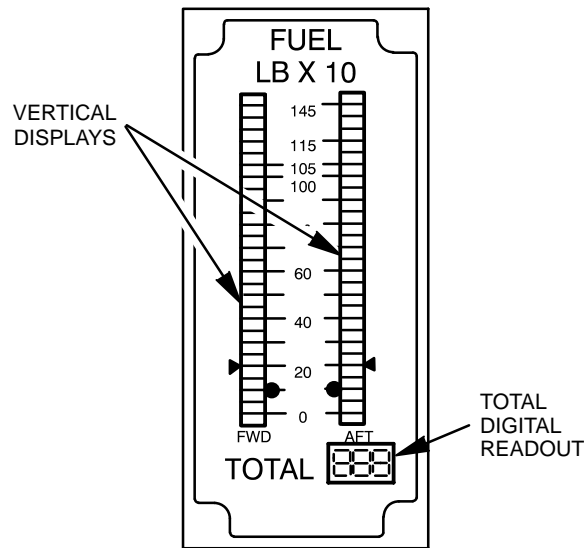
Pilot Fuel Quantity Indicator		
SWITCH/INDICATOR	POSITION	FUNCTION

Vertical displays

Indicates the quantity (in **LB X 10**) of fuel remaining in the forward and aft fuel cells.

TOTAL digital readout

Indicates combined total of remaining fuel (in **LB X 10**).



M70-232

Pilot Fuel Quantity Indicator

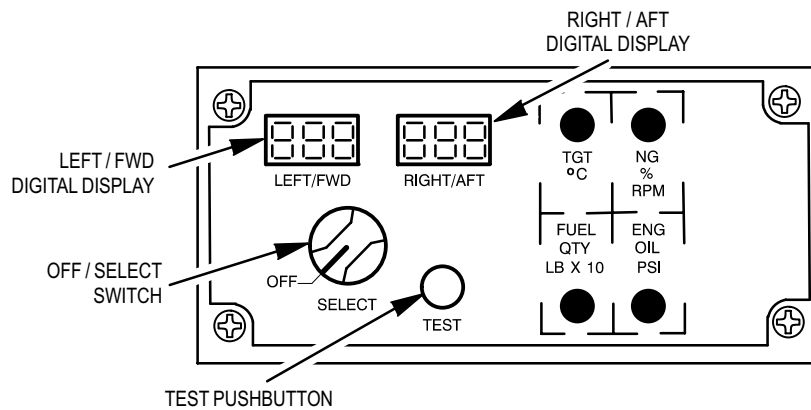
Table 10-1. Fuel System Controls and Indicators (cont)

NOTE

The CPG selectable digital display provides the CPG with fuel quantity data displays.

CPG Selectable Digital Display		
SWITCH/INDICATOR	POSITION	FUNCTION

RIGHT/AFT digital display		Indicates lbs. of fuel remaining in aft fuel cell.
TEST pushbutton		Initiates a press to test cycle of the selectable digital display lights.
OFF/SELECT 5-position switch	OFF	De-energizes selectable digital display.
	SELECT	Energizes selectable digital display. Enables CPG to monitor, via digital displays, engine function indicator selected. (Pilot TGT indicator, pilot NG% RPM indicator, pilot fuel quantity indicator (FUEL QTY LB X 10), and pilot ENG OIL PSI indicator.)
LEFT/FWD digital display		Indicates lbs. of fuel remaining in forward fuel cell.

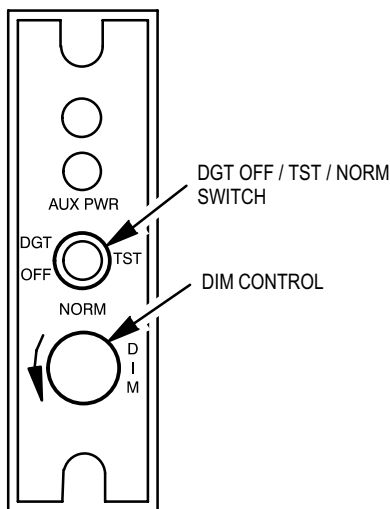


M70-233

CPG Selectable Digital Display

Table 10-1. Fuel System Controls and Indicators (cont)

Dim/Test Panel		
SWITCH/INDICATOR	POSITION	FUNCTION
DGT OFF/TST/NORM 3-position spring loaded switch	DGT OFF	Disables digital readouts. Vertical scales continue to operate normally.
	TST	Initiates testing of all vertical scales, illuminates from bottom to full scale for three seconds. All digital readouts display 888s .
	NORM	Enables normal operation of both vertical scales and digital displays.
DIM variable control		Allows instrument intensity to be adjusted.

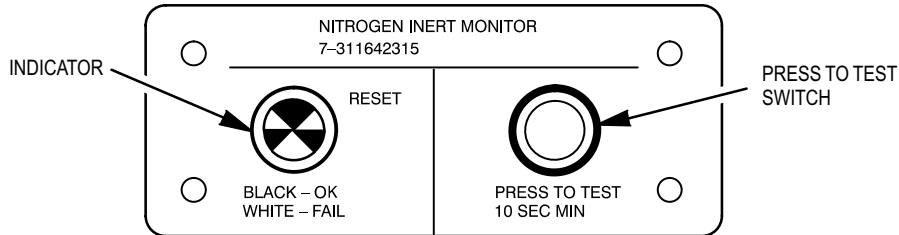


M70-234A

Dim/Test Panel

NITROGEN INERT MONITOR Indicator		
SWITCH/INDICATOR	POSITION	FUNCTION
Indicator	Black (OK)	Lights when nitrogen to oxygen mixture is at appropriate level.
	Black and white (FAIL)	Lights when more oxygen than nitrogen is present in fuel cells.
PRESS TO TEST switch		Simulates failure of NIU.

Table 10-1. Fuel System Controls and Indicators (cont)

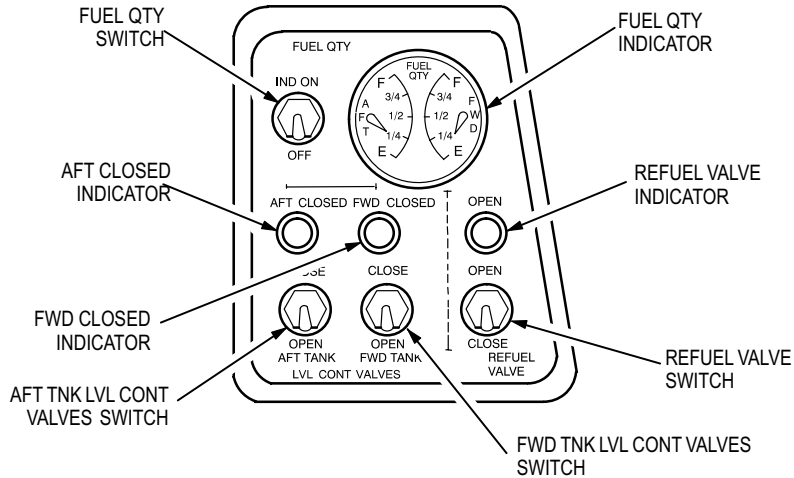


M70-238A

NITROGEN INERT MONITOR Indicator

Refueling Panel		
SWITCH/INDICATOR	POSITION	FUNCTION
FUEL QTY switch	IND ON	Enables FUEL QTY indicator to display fuel quantity in forward and aft fuel cells.
	OFF	De-energizes FUEL QTY indicator.
FUEL QTY indicator		Indicates fuel quantity in forward and aft fuel cells.
Refuel valve OPEN indicator		Indicates refuel valve switch is open when lighted.
Refuel valve switch	OPEN	Energizes fuel transfer valve and fuel vent shutoff valve.
	CLOSE REFUEL VALVE	De-energizes fuel transfer valve and fuel vent shutoff valve.
FWD TNK LVL CONT VALVES switch	CLOSE	Allows checking of forward fuel level control valve for automatic shutoff after refueling begins.
	OPEN	Opens fuel control valves in forward fuel cell. Turns off indicator and allows refueling to continue.
AFT TNK LVL CONT VALVES switch	CLOSE	Allows checking of aft fuel level control valve for automatic shutoff after refueling begins.
	OPEN	Opens fuel control valves in aft fuel cell. Turns off indicator and allows refueling to continue.
FWD CLOSED indicator		Lights when forward fuel level control valve is closed when lighted.
AFT CLOSED indicator		Lights when aft fuel level control valve is closed when lighted.

Table 10-1. Fuel System Controls and Indicators (cont)

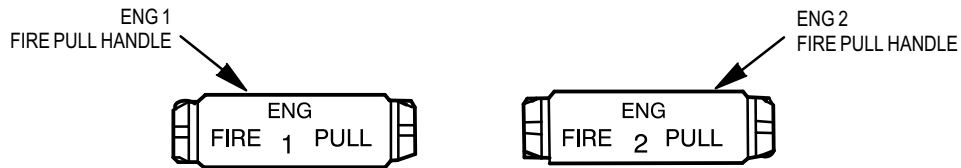


M70-245

Refueling Panel

ENG 1 and ENG 2 FIRE PULL Handles		
SWITCH/INDICATOR	POSITION	FUNCTION

- ENG 1 FIRE PULL** handle Pull to close engine 1 fuel crossfeed/shutoff valve.
- ENG 2 FIRE PULL** handle Pull to close engine 2 fuel crossfeed/shutoff valve.



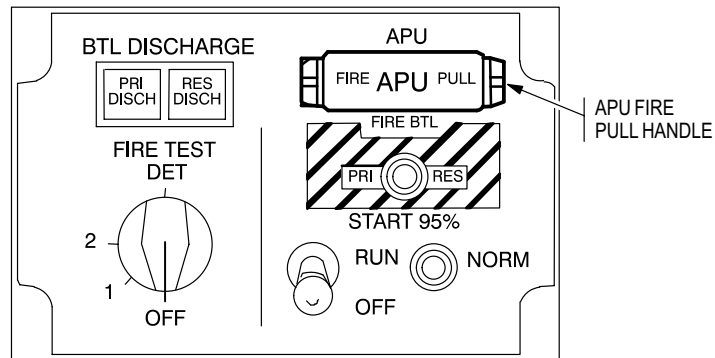
M70-227

ENG 1 and ENG 2 FIRE PULL Handles

Table 10-1. Fuel System Controls and Indicators (cont)

Pilot BTL DISCHARGE/APU Panel		
SWITCH/INDICATOR	POSITION	FUNCTION

APU FIRE PULL Handle Pull to close APU fuel shutoff valve.



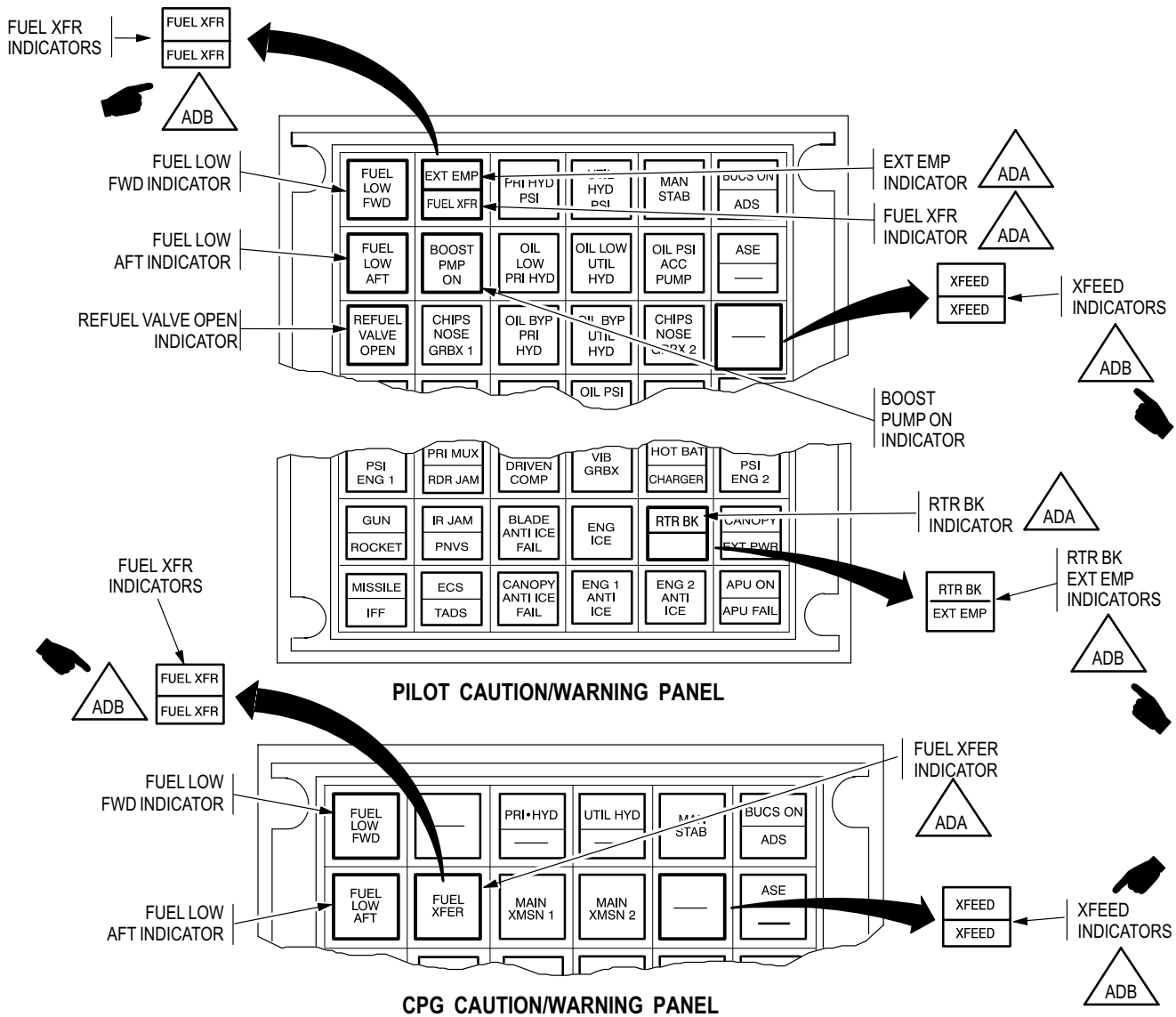
M70-283A

Pilot BTL DISCHARGE/APU Panel

Caution/Warning Panels		
SWITCH/INDICATOR	POSITION	FUNCTION

EXT EMP indicator (pilot)	AMBER	Lights when all external tanks are empty.
(ADA) FUEL XFR (pilot) (ADB) FUEL XFR (CPG) FUEL XFR (CPG) indicators	AMBER	Lights when failure of fuel transfer with TRANS switch set to TO FWD or TO AFT .
(ADB) FUEL XFR indicator	GREEN	Lights when FUEL TRANS switch is set to TO FWD or TO AFT and fuel transfer occurs.
BOOST PMP ON indicator (pilot)	AMBER	Lights when boost pump is operating and is providing 8 to 10 psi in fuel line to fuel filter.
REFUEL VALVE OPEN indicator (pilot)	AMBER	Lights when refuel valve is open.
FUEL LOW AFT indicator	AMBER	Lights when 210 to 270 lbs. of fuel remains in aft fuel cell at cruise attitude.
FUEL LOW FWD indicator	AMBER	Lights when 260 to 300 lbs. of fuel remains in forward fuel cell at cruise attitude.
(ADB) XFEED indicator	GREEN	Lights when crossfeed is selected and both engine fuel valves are correctly positioned.
(ADB) XFEED indicator	AMBER	Lights when one or both engine fuel valves are closed or crossfeed is selected and both valves are incorrectly positioned.

Table 10-1. Fuel System Controls and Indicators (cont)



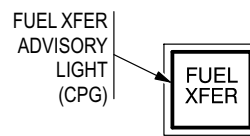
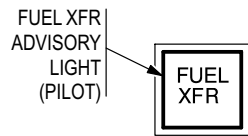
M70-235B

Caution/Warning Panels

Table 10-1. Fuel System Controls and Indicators (cont)

FUEL XFR/XFER Advisory Lights (ADA)		
SWITCH/INDICATOR	POSITION	FUNCTION

<p>FUEL XFR (pilot) FUEL XFER (CPG) indicators</p>	<p>AMBER</p>	<p>Lights when fuel transfer is selected by either crew member.</p>
--	--------------	---



M70-236

FUEL XFR/XFER Advisory Lights (ADA)

SECTION II. THEORY OF OPERATION

10-7. SYSTEM DESCRIPTION

10-7

a. **Fuel System.** The fuel system (fig. 10-11) stores and supplies fuel for engines 1 and 2, and the APU. Internal fuel cells store 375 gallons (2437 lbs.) and the auxiliary fuel tanks store 920 gallons (5978 lbs.). The fuel system provides a means of controlling refueling/defueling operations while monitoring fuel quantity. It also allows the crew to transfer fuel from the forward fuel cell to the aft, or the aft fuel cell to the forward to maintain center of gravity or to remove fuel from the auxiliary fuel tanks. Fuel cannot be transferred from internal fuel cells to the auxiliary fuel tanks.

(1) The fuel system provides the crew a means of selecting engine fuel source through the crossfeed system. A crew member may select the forward or aft fuel cell as a fuel source for engine 1, engine 2, or both. This allows a fuel source option in the event of fuel cell damage or engine failure.

(2) The fuel system incorporates the NIU which depletes oxygen content in internal fuel cells to a level that will not support combustion. During normal operation, the NIU diverts and regulates pressurized air to approximately 25 psi at 94% nitrogen into the aft fuel cell. The aft fuel cell pressurizes the forward fuel cell.

(3) The fuel system can be refueled/defueled through a pressure fuel manifold which houses a SPA (CONUS fitting) and a CCA (NATO fitting). The SPA has a 100 gallons per minute (gpm) flow capability, while the CCA has a 60 gpm flow capability.

(4) Gravity fuel ports, located on each internal fuel cell and each auxiliary fuel tank, provide an alternative way of refueling/defueling the helicopter in forward operating areas with portable fuel supplies.

(5) The fuel system consists of the fuel storage subsystem, fuel crossfeed/boost subsystem, fuel quantity indication subsystem, fuel transfer subsystem, fuel warning subsystem, nitrogen inerting subsystem, gravity refueling/defueling subsystem, pressure refueling/defueling subsystem, and an auxiliary fuel subsystem.

b. Fuel Storage System.

(1) **Purpose.** The purpose of the internal fuel cells are to provide fuel storage for engine and APU starting and operation.

(2) **System Operation** (fig. 10-12).

(a) The aft fuel cell is gravity fueled through a gravity filler port, or pressure fueled via the refuel/defuel/transfer breakaway valve. The air vent/pressure relief valve vents air pressure out of the fuel cell during pressure fueling. The fuel quantity transmitter outputs analog data for use with fuel indicators. The pilot valve, pilot valve tube and fuel shutoff valve provide automatic fuel shutoff when the fuel cell is full. In case of automatic fuel shutoff failure, the air vent/pressure relief valve vents fuel out of the fuel cell. The boost pump is driven by pressurized air from the PAS. The boost pump pressurizes the fuel in the aft fuel cell for use during engine starting and high altitude operations.

(b) During boost pump operation, boost pump suction draws fuel through an inlet screen on the bottom of the 4-way check valve. Fuel is pressurized and pumped through the 4-way check valve to supply pressurized fuel to engine 1, engine 2 and the APU.

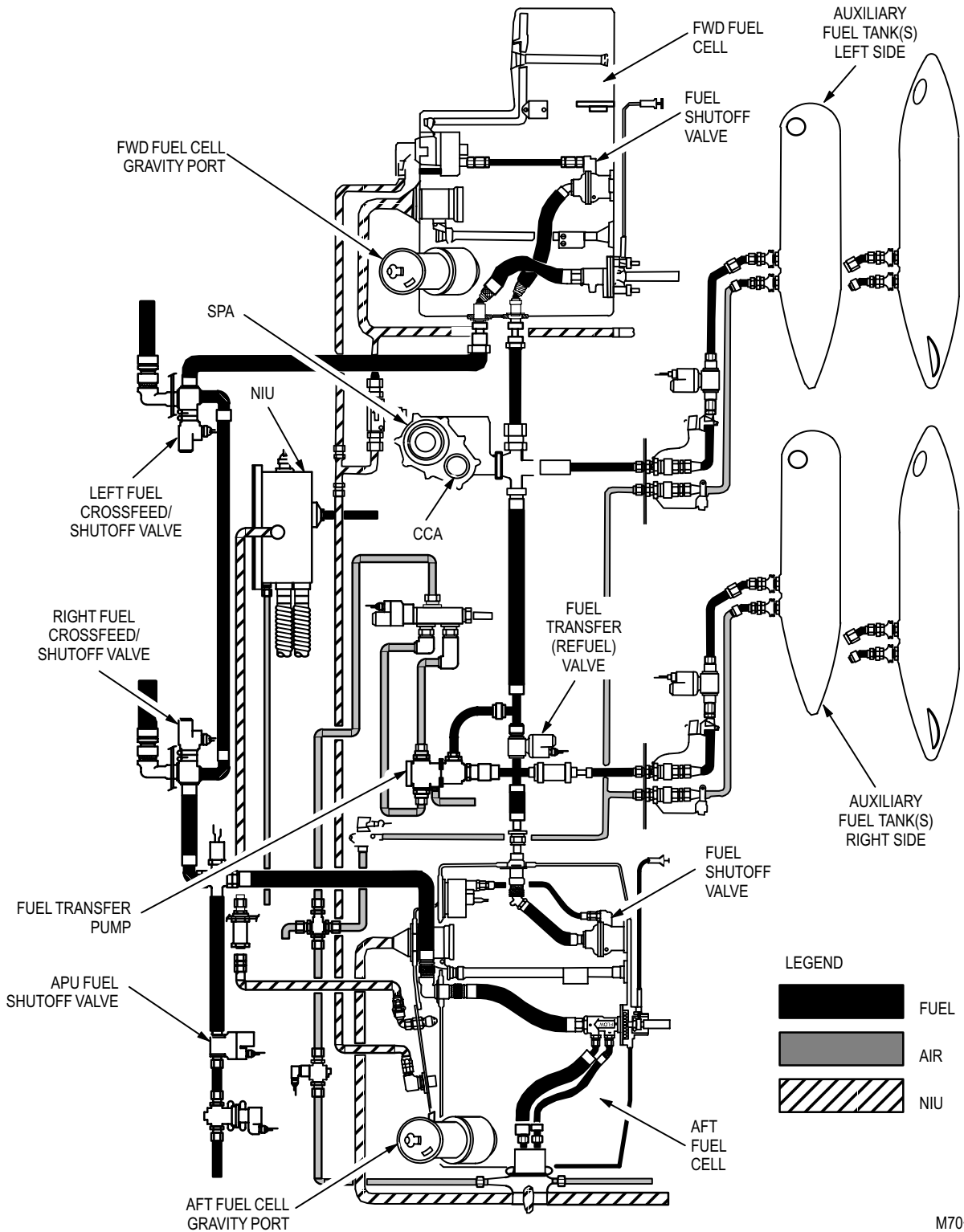
(c) During normal fuel system operation, the fuel cell is pressurized by the NIU. Pressure from the aft fuel cell pressurizes the forward fuel cell. The fuel/defuel check valve provides a seal to maintain fuel cell pressure forcing the fuel through the 4-way fuel supply check valve to the APU and engine 2.

(d) The sump drain valve is used to take fuel samples or to drain the fuel cell. When the push-to-drain control is pushed, the sump drain valve is opened. When the push-to-drain control is released, the sump drain valve is closed.

(e) The forward fuel cell is gravity fueled through a gravity filler port, or pressure fueled via the fuel inlet breakaway valve. The air vent/pressure relief valve vents air pressure out of the fuel cell during pressure fueling. The fuel quantity transmitter outputs analog data for use with fuel indicators. The pilot valve, pilot valve tube and fuel shutoff valve provide automatic fuel shutoff when the fuel cell is full. In case of automatic fuel shutoff failure, the air vent/pressure relief valve vents fuel out of the fuel cell. The fuel cell is pressurized from the aft fuel cell. The fuel/defuel check valve provides a seal to maintain fuel cell pressure. Pressure forces the fuel through the check/thermal relief valve to engine 1. The baffle allows fuel flow between the forward and aft sections of the forward fuel cell during level or nose-up attitude. During nose-down attitude, the baffle provides an uninterrupted fuel supply to engine 1.

(f) The fuel crossfeed warning system will indicate GREEN CROSSFEED when the crossfeed is selected and both engine 4 way valves are in the proper crossfeed position. The fuel crossfeed warning system will indicate YELLOW CROSSFEED when crossfeed or normal is selected and both engine 4 way valves are not in the proper crossfeed/normal position.

(g) The fuel transfer warning system will indicate GREEN CROSSFEED when transfer is selected and fuel is transferring. The fuel transfer warning system will indicate YELLOW CROSSFEED when transfer is selected and fuel is not transferring.



M70-355

Figure 10-11. Fuel System

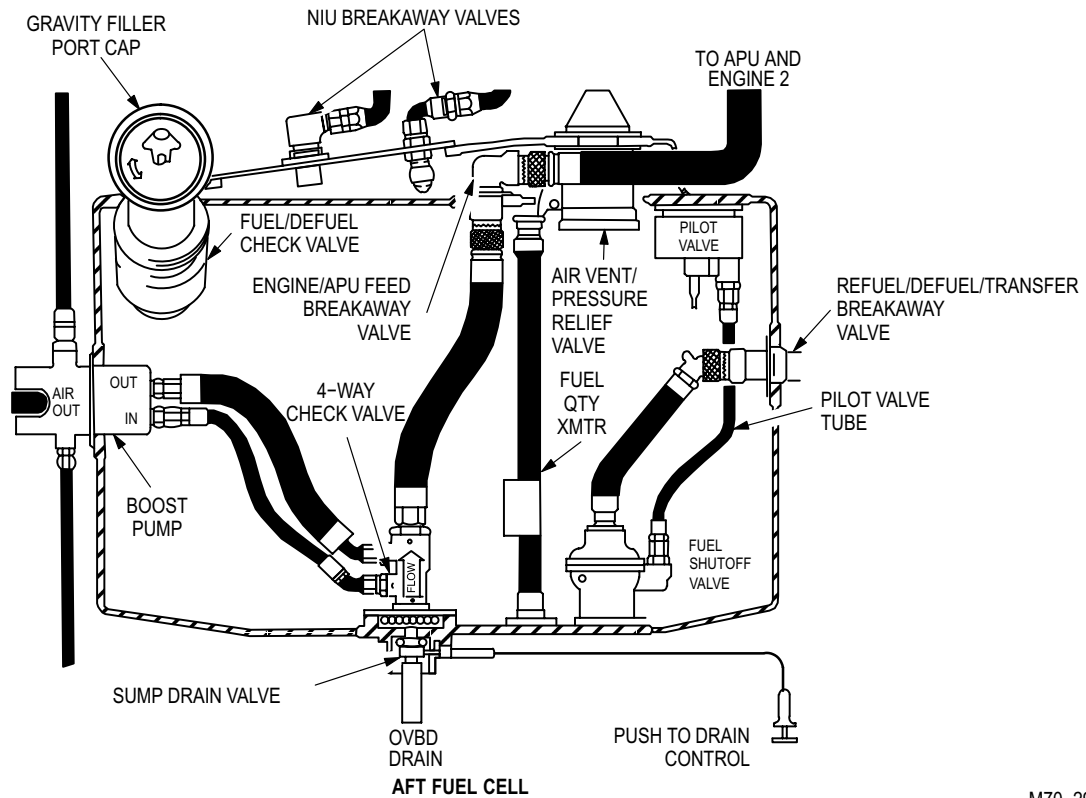
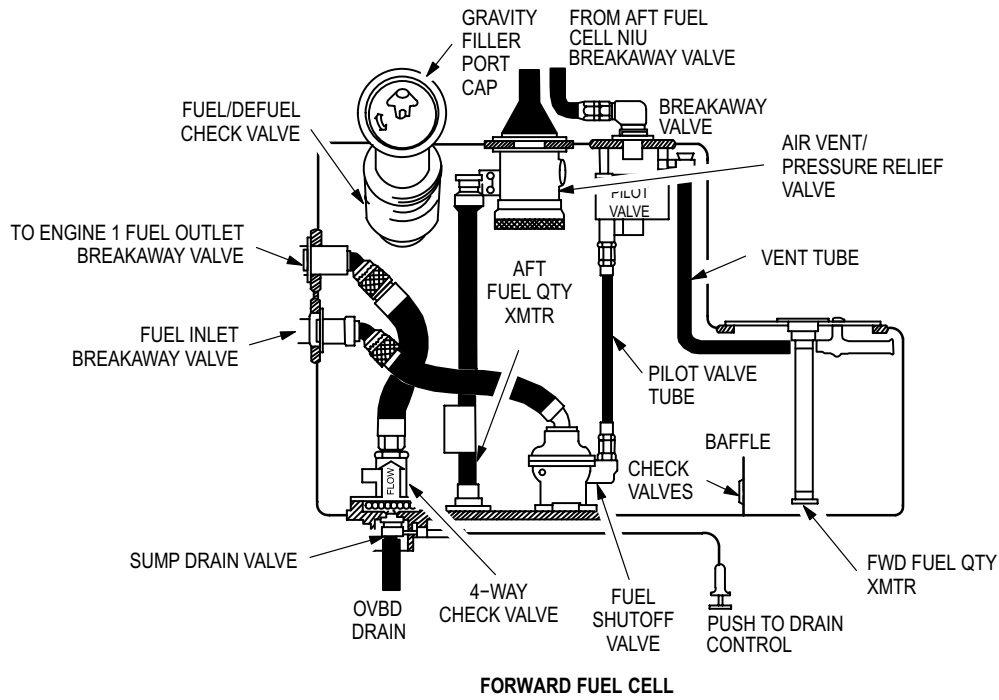


Figure 10-12. Fuel Storage System

M70-292

10-7. SYSTEM DESCRIPTION (cont)

10-7

c. Fuel Crossfeed/Boost System.

(1) **Purpose.** The purpose of the fuel crossfeed/boost system is to provide fuel for engine starting and operation.

(2) **System Operation** (fig. 10-13).

(a) During engine start, the **BOOST** switch on the pilot's **FUEL** panel is set to **ON**, or the **ORIDE** switch is set to **CPG** and **BOOST** switch is set to **ON** on the **CPG FUEL** panel. When boost operation is selected, 28 VDC is supplied to the fuel boost pump shutoff valve to supply pressurized air to drive the fuel boost pump. The fuel boost pump is driven by 19 psi of pressurized air from the PAS through the fuel boost pump shutoff valve. The fuel boost pump pressurizes the fuel in the aft fuel cell for use during engine starting and high altitude operations.

(b) During boost pump operation, boost pump suction draws fuel through an inlet screen on the bottom of the 4-way check valve. Fuel is drawn into the boost pump, then pressurized and pumped through the 4-way check valve. The output of the 4-way check valve supplies pressurized fuel to the fuel pressure switch, APU shutoff valve, right fuel crossfeed/shutoff valve, and left fuel crossfeed/shutoff valve.

(c) The fuel pressure switch provides the pilot with an indication of boost pump operation. When the fuel pressure reaches 8.5 to 10 psi, the switch closes, lighting the **BOOST PMP ON** indicator on the pilot's caution/warning panel.

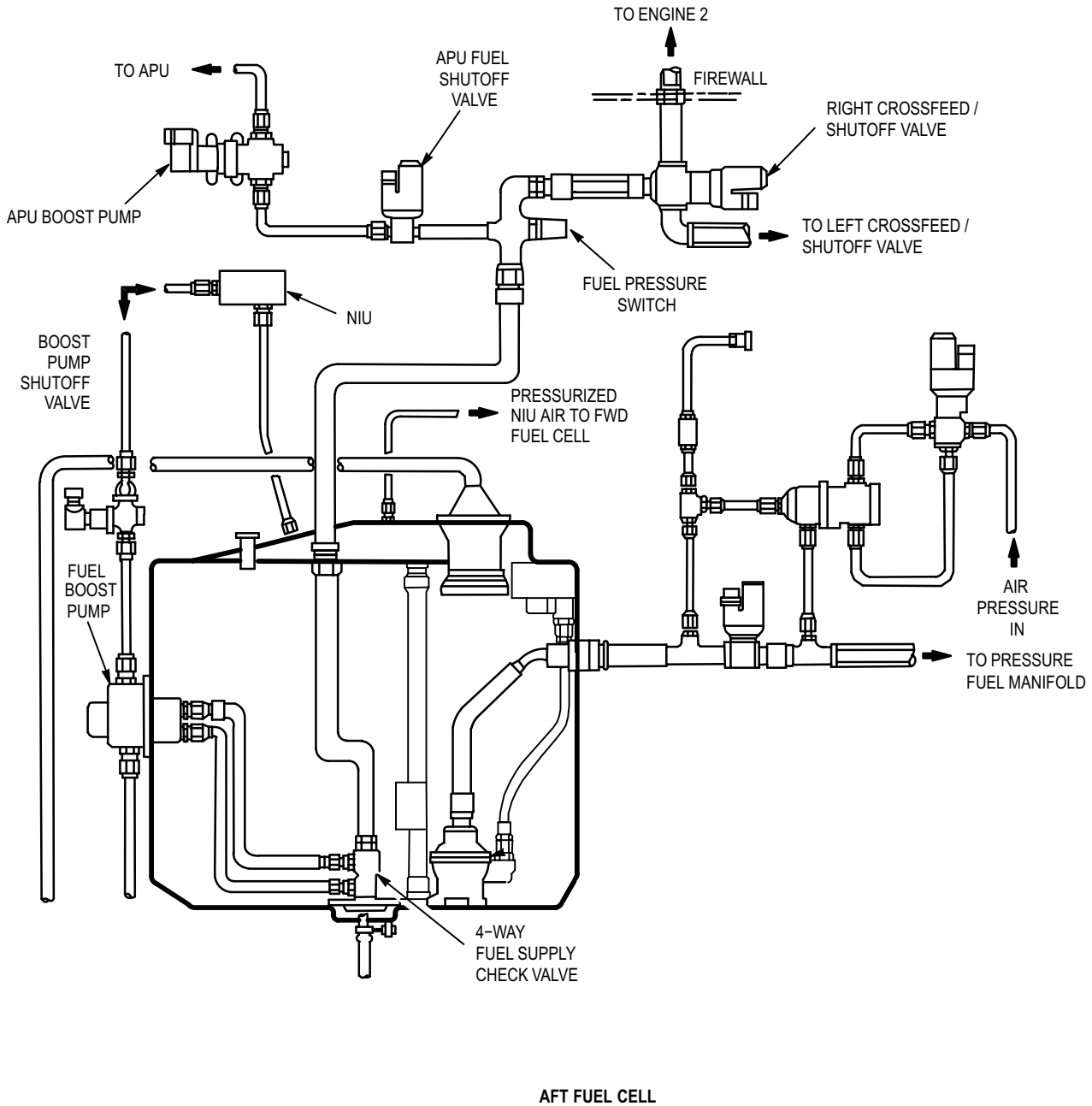
(d) The left and right fuel crossfeed/shutoff valves (fig. 10-14) are 3-way, 4-position, electronically controlled valves which select a fuel source for engine 1 and 2 and provide positive fuel shutoff during emergencies. During engine start, the crossfeed/shutoff valves are electronically positioned to supply fuel to engines 1 and 2 from the aft fuel cell.

(e) The APU fuel shutoff valve controls fuel flow to the APU fuel boost pump (fig. 10-13). When the **APU START/RUN/OFF** switch on the pilot's **BTL DISCHARGE/APU** panel is set to **START** or **RUN**, 28 VDC is applied to the APU fuel shutoff valve and the APU fuel boost pump. The APU fuel boost pump is a 28 VDC motor operated pump, which draws fuel through the APU shutoff valve from the aft fuel cell, pressurizes the fuel to 10 ±3 psi, and supplies pressurized fuel to the APU. When the **APU FIRE PULL** handle is pulled, 28 VDC is removed from the APU fuel shutoff valve and the APU fuel boost pump, discontinuing fuel flow.

(f) During normal operation, pressurized nitrogen rich air from the NIU pressurizes the aft and forward fuel cells to 25 ±3 psi. Nitrogen reduces the level of oxygen in the fuel cells so that combustion will not be supported. Fuel is forced through the 4-way fuel supply check valve to the left and right crossfeed/shutoff valves.

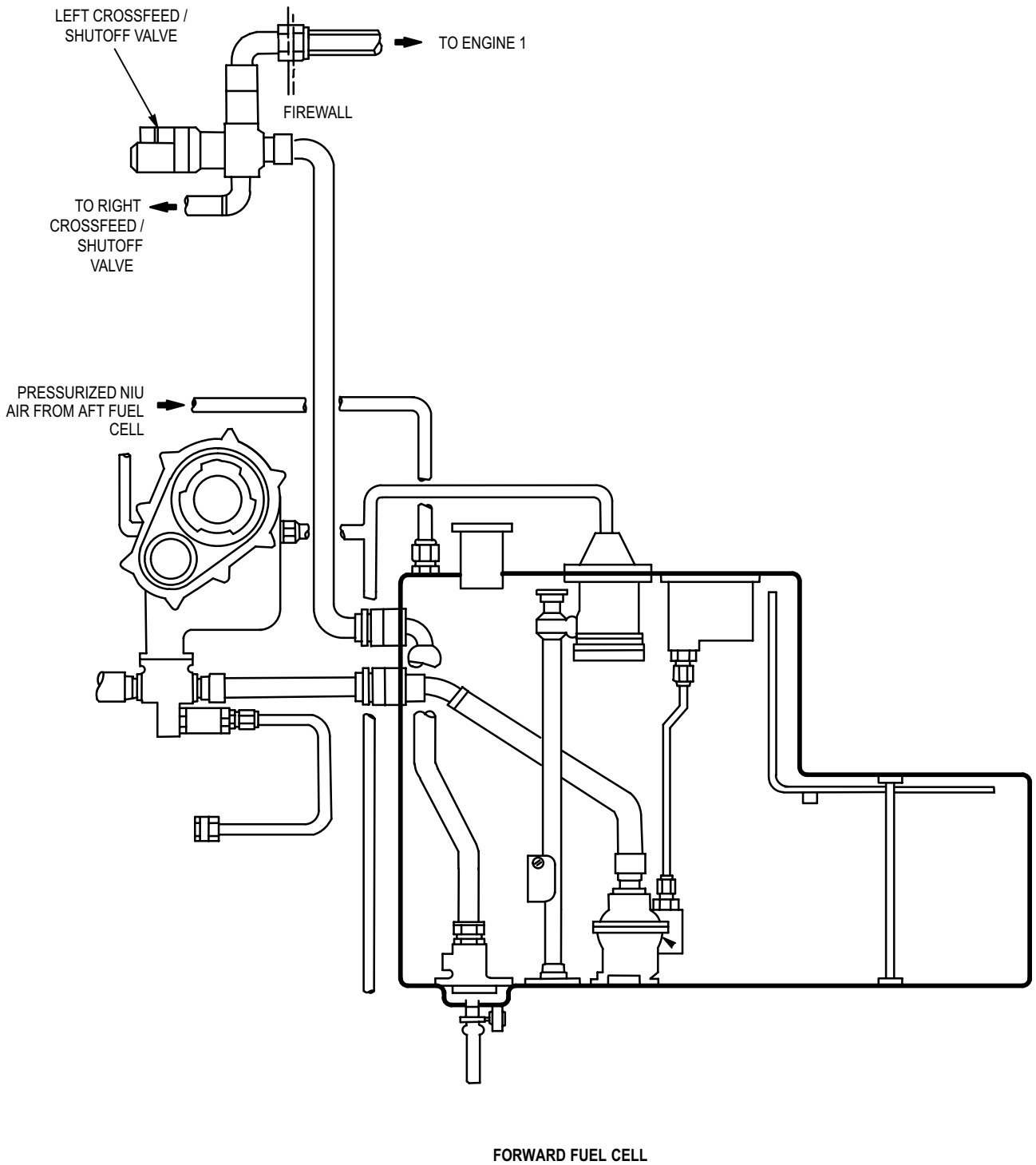
(g) The left fuel crossfeed/shutoff valve selects a fuel source for engine 1 (fig. 10-14). With **ENG 1** switch on the pilot's **FUEL** panel set to **OFF** and **CROSSFEED** switch set to **NORM**, fuel is not supplied to engine 1. When **ENG 1** switch is set to **ON**, fuel is supplied to engine 1 from the forward fuel cell. When **CROSSFEED** switch is set to **FWD TK**, fuel is supplied to engine 1 from the forward fuel cell. When **CROSSFEED** switch is set to **AFT TK**, fuel is supplied to engine 1 from the aft fuel cell. If the pilot or CPG **ENG 1 FIRE PULL** handle is pulled, the engine 1 fuel supply is shutoff.

(h) The right fuel crossfeed/shutoff valve selects a fuel source for engine 2. With **ENG 2** switch on the pilot's **FUEL** panel set to **OFF** and **CROSSFEED** switch set to **NORM**, fuel is not supplied to engine 2. When **ENG 1** switch is set to **ON**, fuel is supplied to engine 2 from the aft fuel cell. When **CROSSFEED** switch is set to **FWD TK**, fuel is supplied to engine 2 from the forward fuel cell. When **CROSSFEED** is set to **AFT TK**, fuel is supplied to engine 2 from the aft fuel cell. If the pilot or CPG **ENG 2 FIRE PULL** handle is pulled, the engine 2 fuel supply is shutoff.



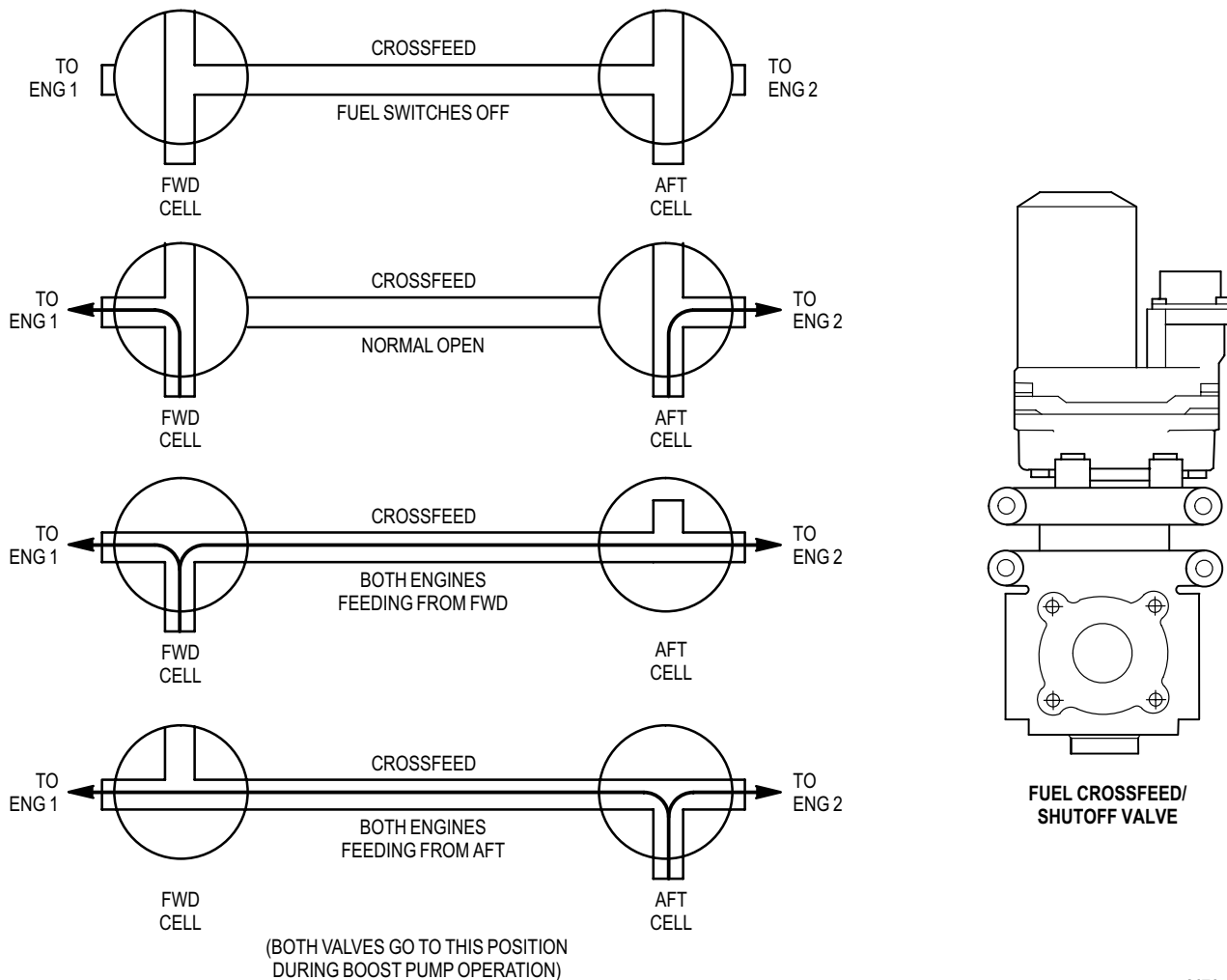
M70-204-1

Figure 10-13. Fuel Crossfeed/Boost System Interface Diagram (Sheet 1 of 2)



M70-204-2

Figure 10-13. Fuel Crossfeed/Boost System Interface Diagram (Sheet 2 of 2)



M70-205

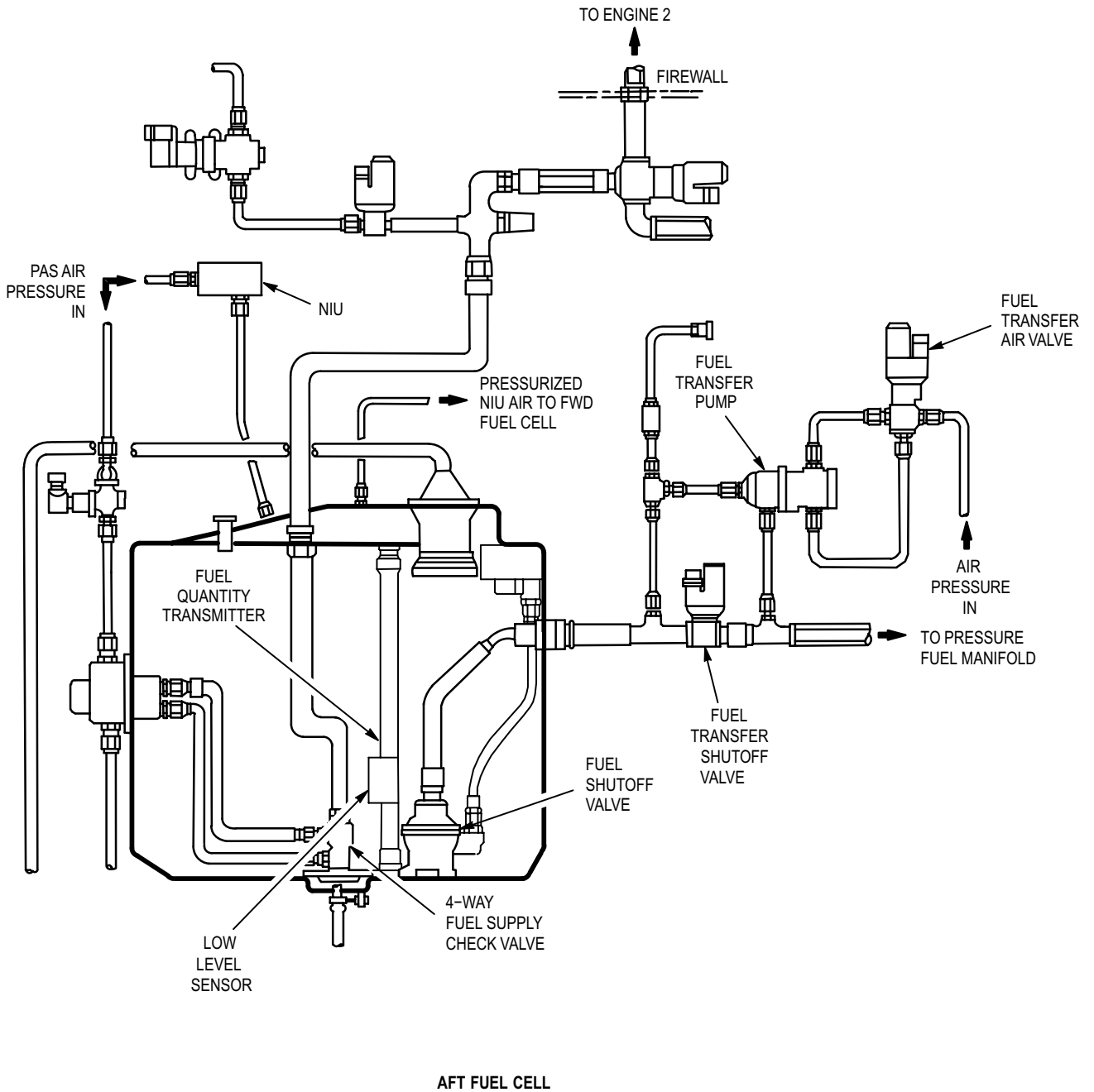
Figure 10-14. Fuel Crossfeed/Shutoff Valves Functional Block Diagram

d. Fuel Quantity Indication/Transfer System.

(1) **Purpose.** The purpose of the fuel quantity indication/transfer system is to provide the pilot and CPG with fuel system status and to transfer fuel from one fuel cell to another in order to maintain center of gravity or in case of fuel cell damage.

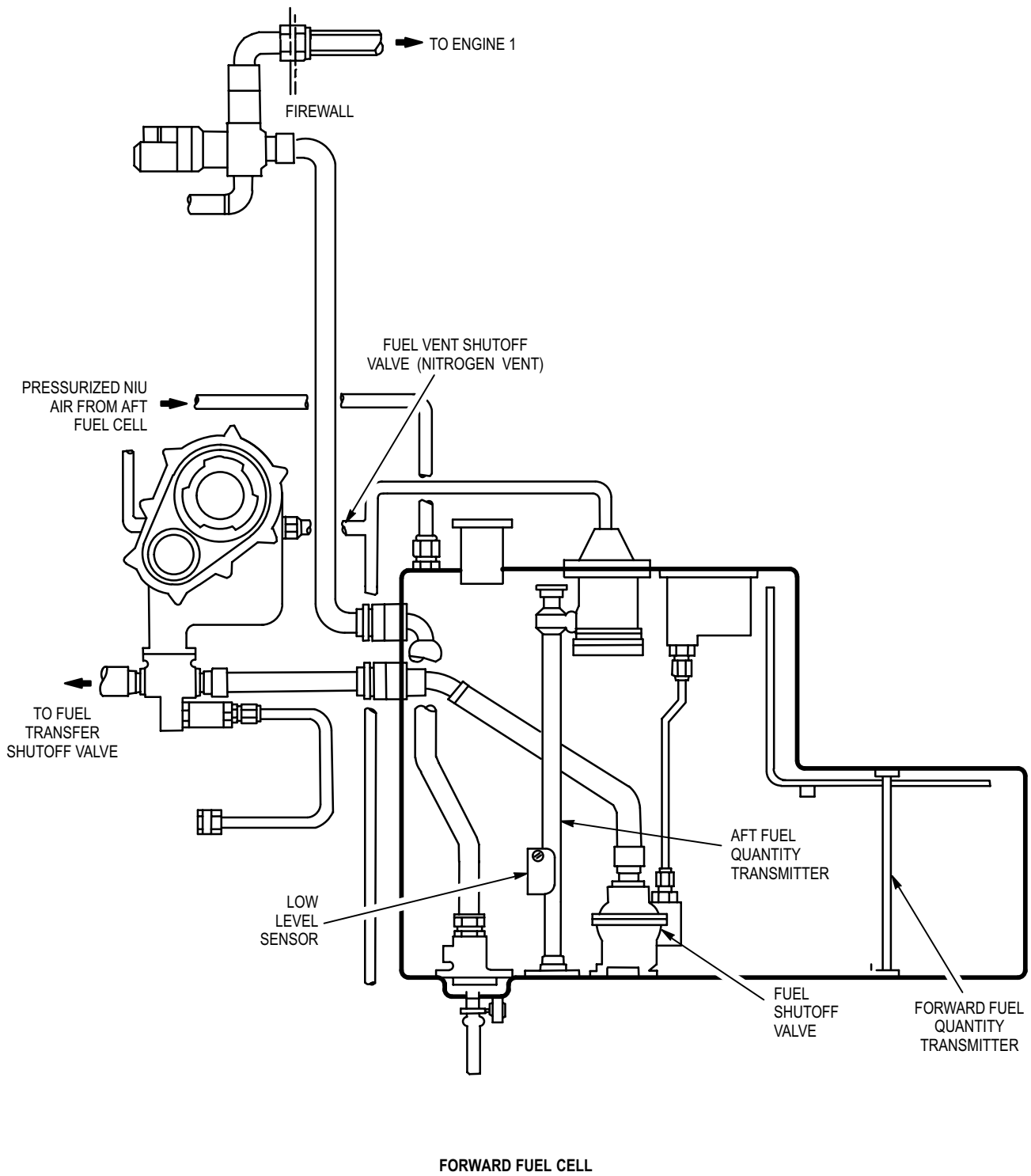
(2) **System Operation.**

(a) During fuel quantity transfer operation (fig. 10-15), 28 VDC is applied to the fuel transfer air valve. The fuel transfer air valve controls PAS air used to drive the fuel transfer pump. The fuel transfer pump transfers fuel from one fuel cell to another. When the **TO FWD** position on the **FUEL** panel is selected, PAS air drives the fuel transfer pump, transferring fuel from the aft fuel cell to the forward fuel cell. When the **TO AFT** position on the **FUEL** panel is selected, PAS air drives the fuel transfer pump, transferring fuel from the forward fuel cell to the aft fuel cell. The fuel shutoff valve shuts off fuel flow when the fuel cells are full.



M70-206-1

Figure 10-15. Fuel Quantity Indication/Transfer System Diagram (Sheet 1 of 2)



M70-206-2

Figure 10-15. Fuel Quantity Indication/Transfer System Diagram (Sheet 2 of 2)

10-7. SYSTEM DESCRIPTION (cont)

10-7

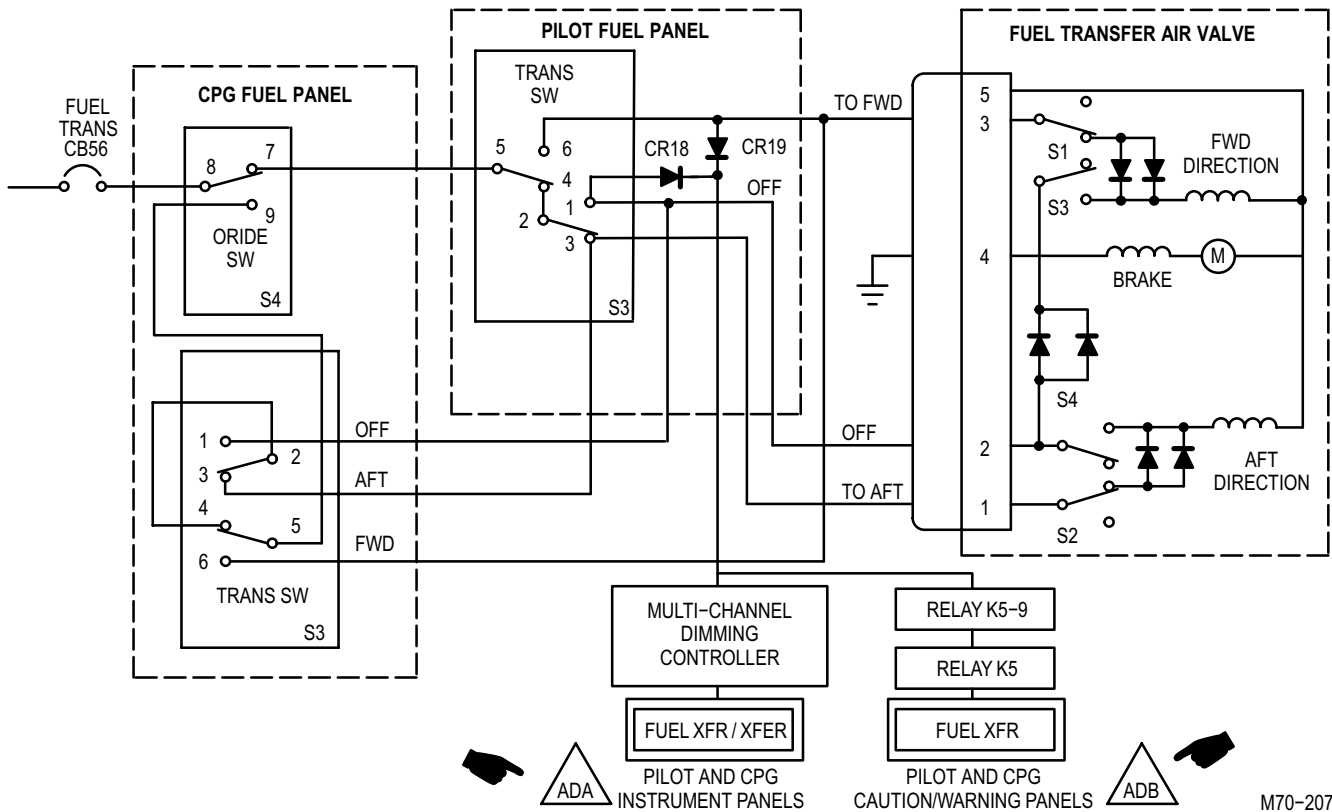
(b) During fuel transfer electrical operation (fig. 10-16), 28 VDC is supplied to the pilot's **TRANS** switch or the CPG's **ORIDE** switch on the respective **FUEL** panel by the **FUEL TRANS** circuit breaker (CB56). When the CPG selects the **CPG ORIDE** switch position on the CPG **FUEL** panel, the CPG **TRANS** switch is enabled and the pilot's **TRANS** switch is disabled. When the **CPG ORIDE** switch is in **PLT** position, the pilot's **TRANS** switch is enabled and the CPG's **TRANS** switch is disabled.

(c) When the pilot's **TRANS** switch is enabled and set to **TO FWD**, 28 VDC is applied through pins 5 and 6 of the pilot **TRANS** switch to pin 3 of the fuel transfer valve and CR19. When the CPG's **TRANS** switch is enabled and set to **TO FWD**, 28 VDC is applied through pins 5 and 6 of the CPG's **TRANS** switch to pin 3 of the fuel transfer valve and CR19. **(ADA)** Current through CR19 is drawn from the instrument panel transfer fuel indicators through the multi-channel dimming controller, causing the **FUEL XFR/XFER** indicators to light. **(ADA)** If fuel does not transfer with the **TRANS** switch set to **TO FWD**, the caution/warning panel indicators **FUEL XFR** (pilot) and **FUEL XFER** (CPG) light to indicate a failure. **(ADB)** Current through CR19 energizes relay K5-9 allowing the green **FUEL XFR** indicators to light if fuel transfers and the amber **FUEL XFR** indicators to light if fuel does not transfer. Voltage at pin 3 is applied to the forward direction winding to unlock the brake and drive the valve to port PAS air in the direction to transfer fuel from the aft fuel cell to the forward fuel cell. As the valve leaves center position, switch S4 closes. When the valve reaches the full forward position, switch S1 opens, removing power from the forward winding of the motor and locking the brake. After fuel has been transferred, the **TRANS** switch is placed in the **OFF** position. This applies 28 VDC from pins 2 and 3 of the **TRANS** switches to pin 2 of the fuel transfer air valve. Voltage applied through the aft motor winding drives the valve in the aft direction. Switch S1 closes as soon as the valve leaves the full position. When the valve reaches the center position, switch S4 opens, removing power from the motor and locking the brake.

(d) When the pilot's **TRANS** switch is enabled and set to **TO AFT**, 28 VDC is applied through pins 2 and 1 of the pilot's **TRANS** switch to pin 1 of the fuel transfer valve and CR18. When the CPG's **TRANS** switch is enabled and set to **TO AFT**, 28 VDC is applied through pins 2 and 1 of the CPG's **TRANS** switch to pin 3 of the fuel transfer valve and CR18. **(ADA)** Current through CR18 is drawn from the instrument panel transfer fuel indicators through the multi-channel dimming controller, causing the **FUEL XFR/XFER** indicators to light. **(ADA)** If fuel does not transfer with the **TRANS** switch set to **TO AFT**, the caution/warning panel indicators **FUEL XFR** (pilot) and **FUEL XFER** (CPG) light to indicate a failure. **(ADB)** Current through CR18 energizes relay K5-9 allowing the green **FUEL XFR** indicators to light if fuel transfers and the amber **FUEL XFR** indicators to light if fuel does not transfer. Voltage at pin 1 is applied to the aft direction winding to unlock the brake and drive the valve to port PAS air in the direction to transfer fuel from the forward fuel cell to the aft fuel cell. As the valve leaves center position, switch S3 closes. When the valve reaches the full forward position, switch S2 opens, removing power from the aft winding of the motor and locking the brake. After fuel has been transferred, the **TRANS** switch is placed in the **OFF** position. This applies 28 VDC from pins 2 and 3 of the **TRANS** switches to pin 2 of the fuel transfer air valve. Voltage applied through the forward motor winding drives the valve in the forward direction. Switch S2 closes as soon as the valve leaves the full position. When the valve reaches the center position, switch S3 opens, removing power from the motor and locking brake.

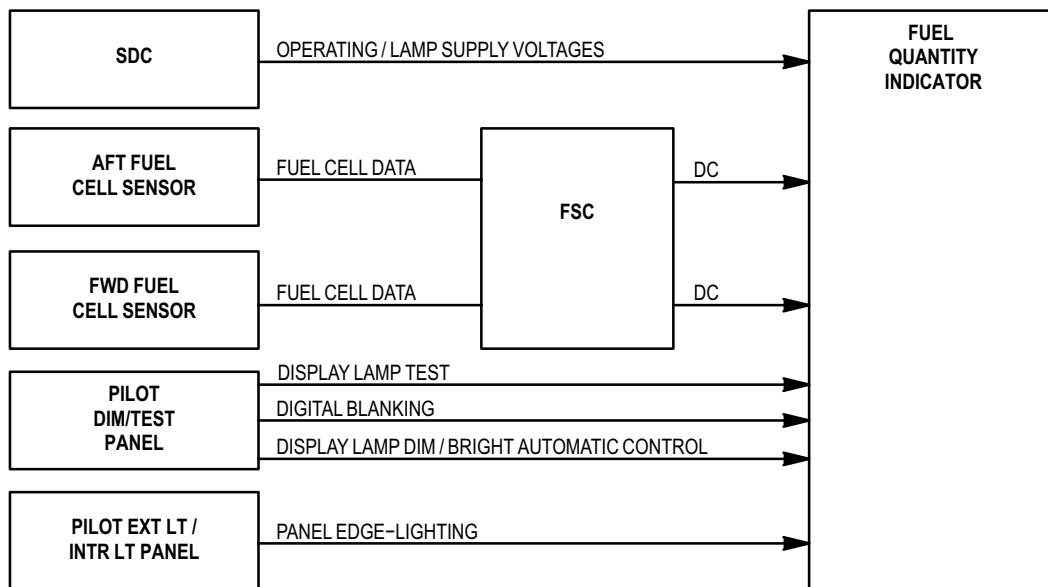
(e) The fuel quantity transmitters (fig 10-17) electronically measure the quantity of fuel in the forward and aft fuel cells. The forward fuel cell contains two fuel quantity transmitters and the aft fuel cell contains one fuel quantity transmitter. The aft fuel transmitter in each fuel cell contains a low level sensor. The low level outputs are sent to the SDC. The fuel system is a capacitive sensing system which sends fuel cell data to the FSC.

(f) The SDC (fig. 10-18) receives 28 VDC during normal operation and 24 VDC during refueling. The input voltage is reduced for operation of the instrument system. Power is routed through an internal fuse panel to two power supplies. The power supplies lower the 28 VDC to signal processing voltages. Operating power is also routed to the FSC and engine torque sensors. The fuse panel provides instrument overload protection. The forward and aft fuel cells send low fuel warning signals. The SDC outputs the signals to light the pilot and CPG caution/warning panels **FUEL LOW FWD** and **FUEL LOW AFT** indicators.



M70-207

Figure 10-16. Fuel Transfer Electrical Schematic

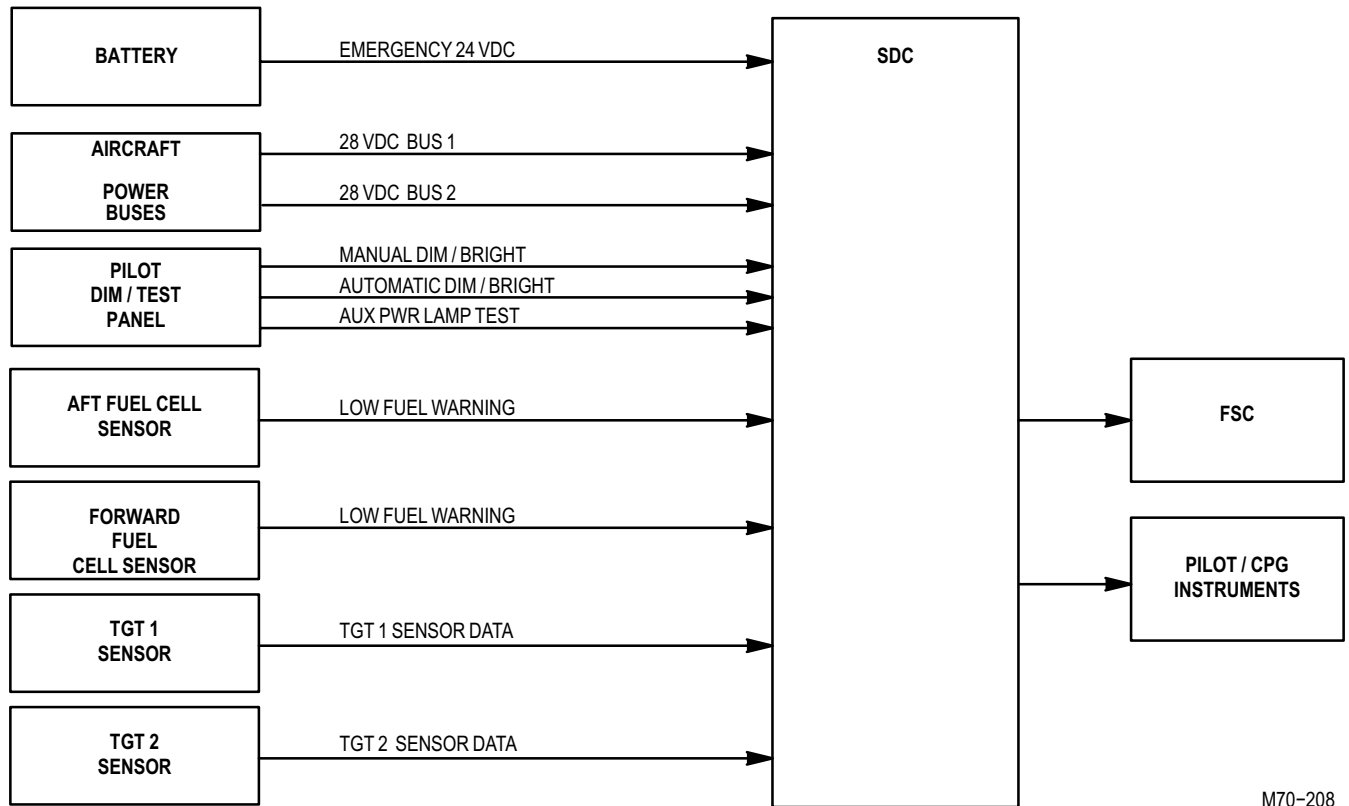


M70-210

Figure 10-17. Fuel Quantity Indicator Functional Block Diagram

10-7. SYSTEM DESCRIPTION (cont)

10-7



M70-208

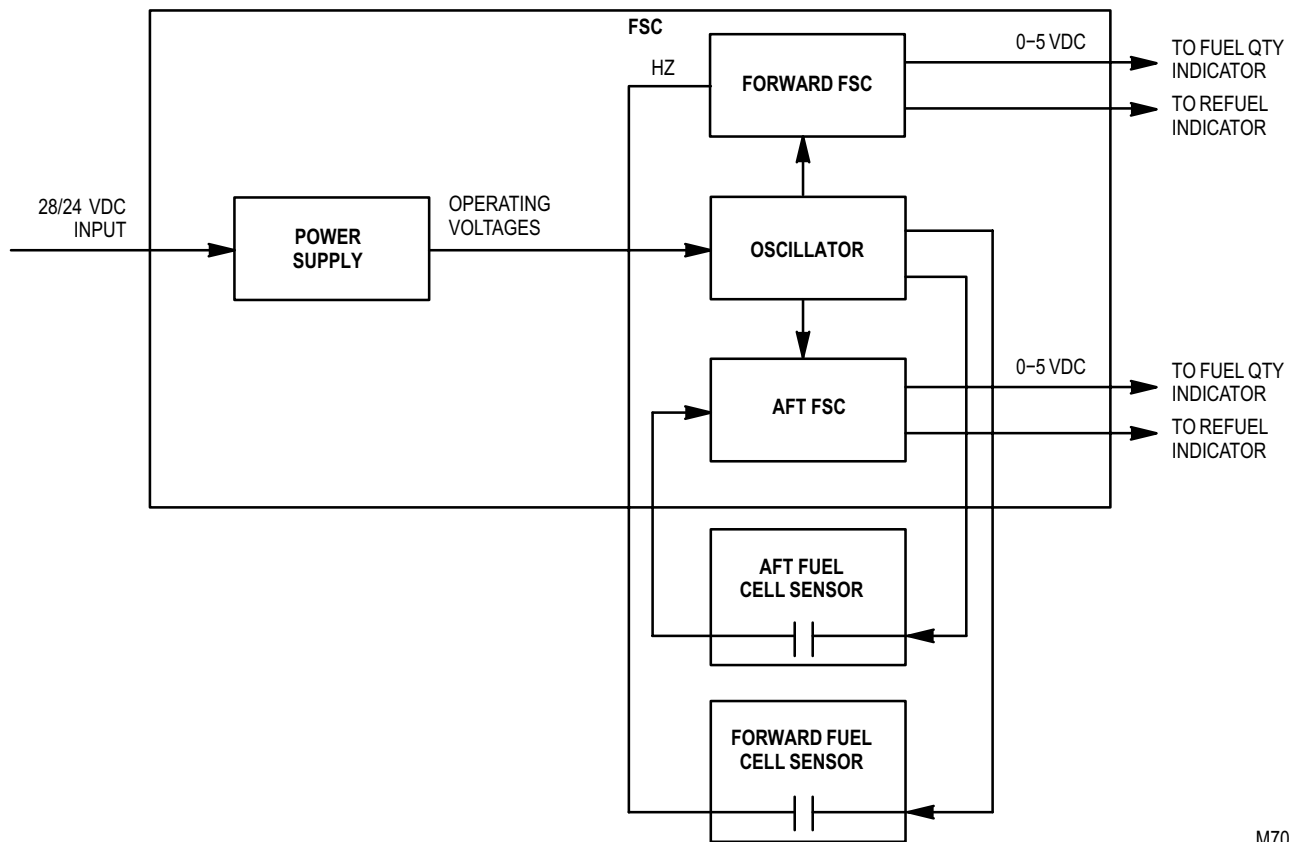
Figure 10-18. SDC Functional Block Diagram

(g) The FSC (fig. 10-19) operates on 28 VDC from the SDC except during refueling. During refueling the FSC operates on 24 VDC from the battery.

(h) The fuel cells act as the sensing capacitor for the system. The capacitive value is determined by the level of fuel between the inner and outer tubes of the sensor, density of fuel, and the shape of the inner tube.

(i) The FSC derives its operating voltages from an internal power supply. A 6 kHz oscillator provides a LO-Z voltage across the fuel tanks. The amount of current the tank passes from the LO-Z unshielded line to the HI-Z shielded line is directly proportional to the mass of fuel in the tank. The forward and aft signal conditioners amplify and rectify the HI-Z signals, producing zero to 5 VDC to the fuel indicators. Internal empty adjustment is made at transformer centertaps at the oscillator. Internal full adjustment is made in the dc amplifier. The FSC contains built-in-test (BIT) circuitry. BIT provides a known signal to functionally check the FSC by full fuel cell simulation. BIT is activated by an external test switch on the FSC.

(j) The pilot fuel quantity indicator receives operating and lamp supply voltages from the SDC. The FSC supplies aft and forward fuel cell data to the indicator. The pilot dim/test panel provides display lamp test, digital blanking and display lamp dim/bright automatic control. The pilot's indicator edge-lighting is controlled by the pilot **EXT LT/INTR LT** panel.



M70-209

Figure 10-19. FSC Functional Block Diagram

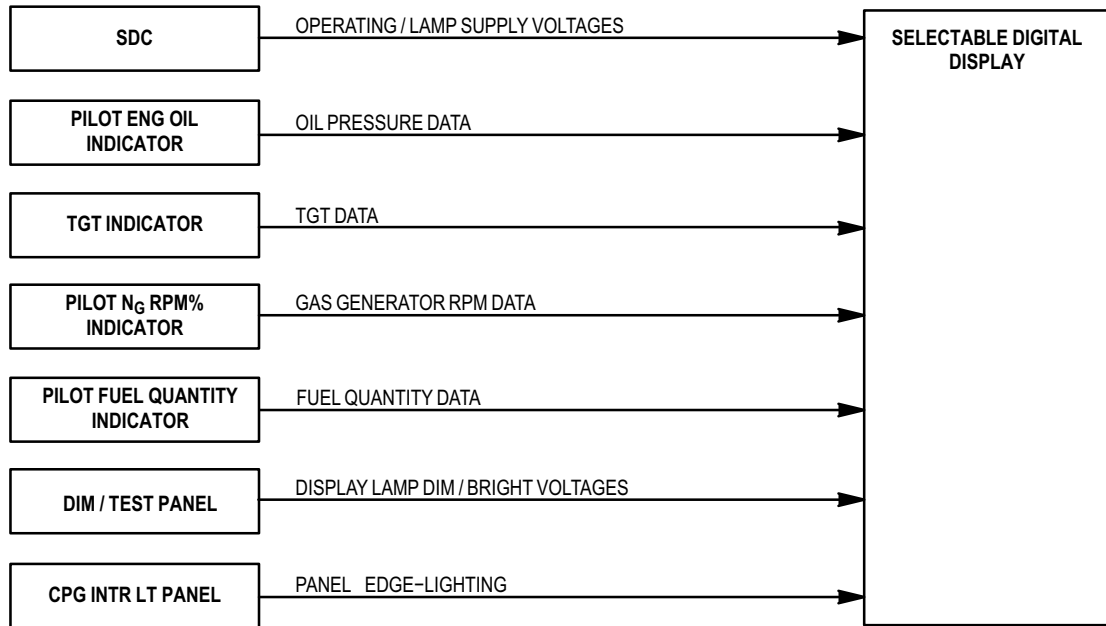
(k) The CPG selectable digital display (fig. 10-20) selects pilot instrument data for display on the digital readouts. The **SELECT** switch selects the indicator data to be displayed. At the same time the indicator light on the display indicates the selected indicator. The **TEST** switch position tests the CPG selectable digital display and CPG engine torque instrument displays and readouts.

e. Nitrogen Inerting System.

(1) **Purpose.** The purpose of the nitrogen inerting system is to provide pressurized air to the fuel cells and reduce the amount of oxygen to a level that will not support combustion.

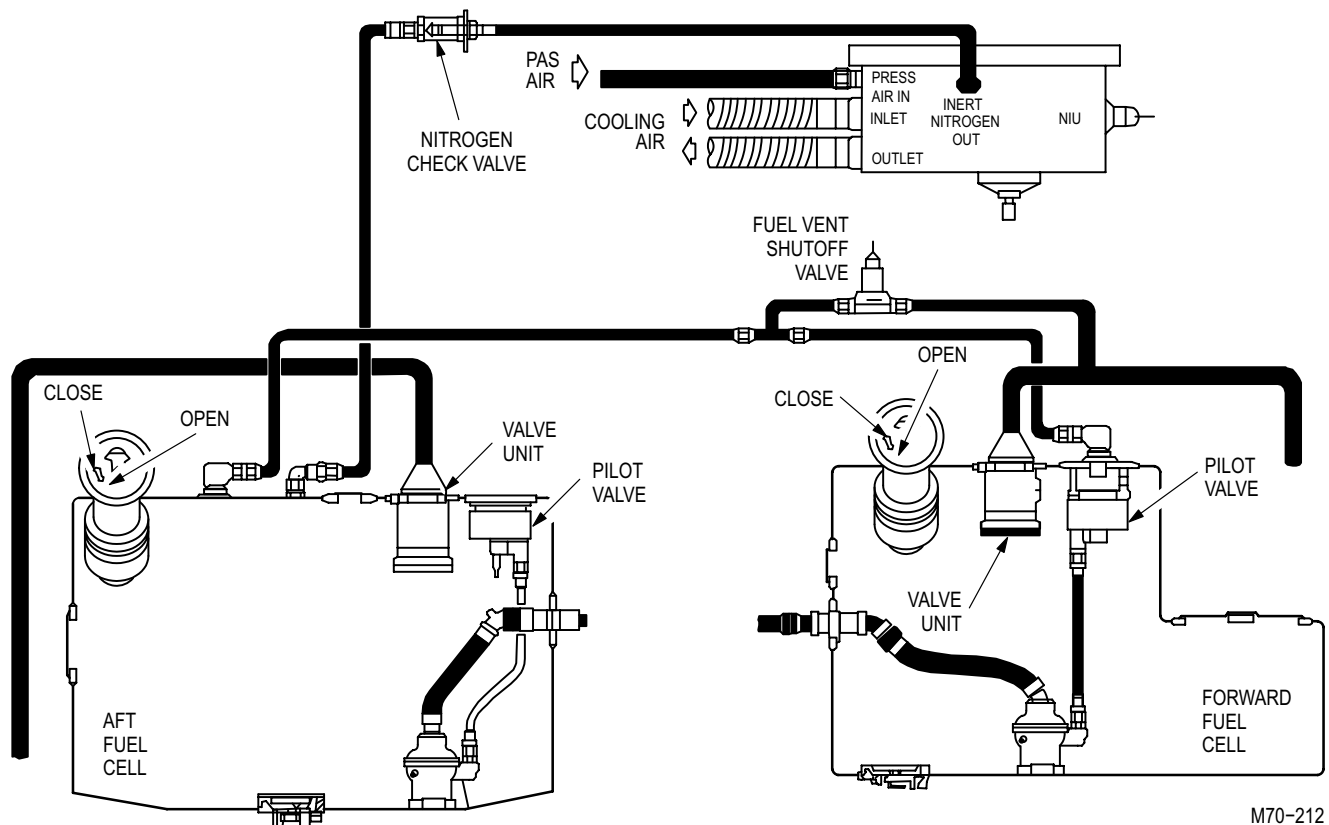
(2) **System Operation** (fig 10-21).

(a) Pressurized air from the PAS enters the NIU. The pressurized air is regulated by the NIU to 25 ±3 psi. The NIU delivers the regulated air, which is 94% nitrogen, through the nitrogen check valve to the fuel cells. Cooling air is drawn into and exhausted from the NIU. The nitrogen check valve is an in-line valve that provides 1-way flow of nitrogen enriched air to the fuel cells. The fuel vent shutoff valve is a spring-loaded valve that is closed during NIU operation to prevent nitrogen from being vented out of the fuel cells.



M70-211

Figure 10-20. CPG Selectable Digital Display Functional Block Diagram



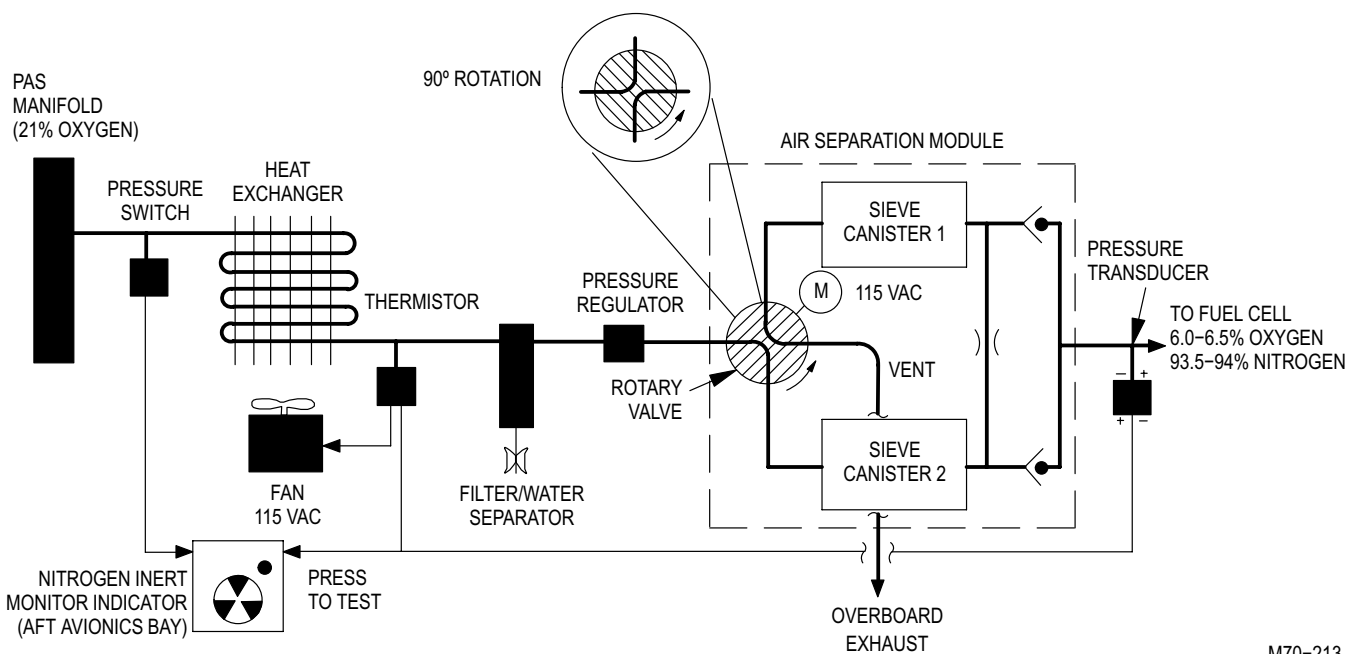
M70-212

Figure 10-21. Nitrogen Inerting System Interface Diagram

(b) The NIU (fig. 10-22) receives pressurized air from the PAS manifold. The pressure switch senses the pressure and closes, sending a signal to the NIU monitor which activates a timing circuit. The timing circuit provides a 10 second delay to allow the NIU to come on line before energizing the **NITROGEN INERT MONITOR** indicator.

(c) Air flows through the heat exchanger where it is cooled to approximately 25° F (-3.9° C) of the ambient air temperature. The air exiting the heat exchanger passes over a thermistor. If the temperature is below 40° F (4.4° C), the thermistor turns the fan off. If the temperature is above 140° F (60° C), the thermistor turns the fan on. Before entering the pressure regulator, the air enters the filter/water separator and condensation is drained overboard. The pressure regulator regulates the air pressure to 25 ± 3 psi.

(d) Regulated air enters the air separation module and is directed to one of two sieve canisters. The selected sieve canister traps approximately 71% of the oxygen molecules and outputs the nitrogen-rich air through a check valve to the pressure transducer. A portion of the nitrogen-rich air is fed back through a metering orifice of the other canister to flush the trapped oxygen molecules out the overboard exhaust. The pressure transducer monitors the pressurized output. If the pressure is insufficient, the pressure transducer fails the **NITROGEN INERT MONITOR** indicator. The fuel cells receive an output air mixture of 93.5% to 94.0% nitrogen and 6.0% to 6.5% oxygen.



M70-213

Figure 10-22. NIU Functional Block Diagram

f. Pressure Refueling/Defueling System.

(1) **Purpose.** The purpose of the pressure refueling/defueling system is to provide a means pressure refueling or suction defueling of the forward and aft fuel cells.

(2) System Operation.

(a) The refueling panel provides a means of controlling refuel operations and monitoring fuel quantity during refueling/defueling operations.

10-7. SYSTEM DESCRIPTION (cont)

10-7

(b) The pressure fuel manifold (fig. 10-23) contains a SPA and a CCA. Each adapter has a spring-loaded check valve that is forced open when the fuel nozzle is connected.

(c) The fuel vent shutoff valve and the fuel transfer shutoff valve are opened when the **REFUEL VALVE** switch on the refueling panel is placed to the **OPEN** position. The fuel vent shutoff valve allows air trapped in the top of the fuel cells to be vented overboard during refueling operations. When closed, the valve prevents the loss of nitrogen pressurization. The fuel transfer shutoff valve allows refueling/defueling of the aft fuel cell.

(d) The air vent/pressure relief valves equalize the pressure inside the fuel cells and vents excess pressure overboard during refueling and vent fuel overboard in case of automatic fuel shutoff failure. The forward air vent/pressure relief valve pressure is 1.5 ± 0.13 psi. The aft air vent/pressure relief valve pressure relief is 2.0 ± 0.13 psi.

(e) The pilot and fuel shutoff valves combine to form an automatic fuel shutoff system during pressure refueling and fuel transfer operations.

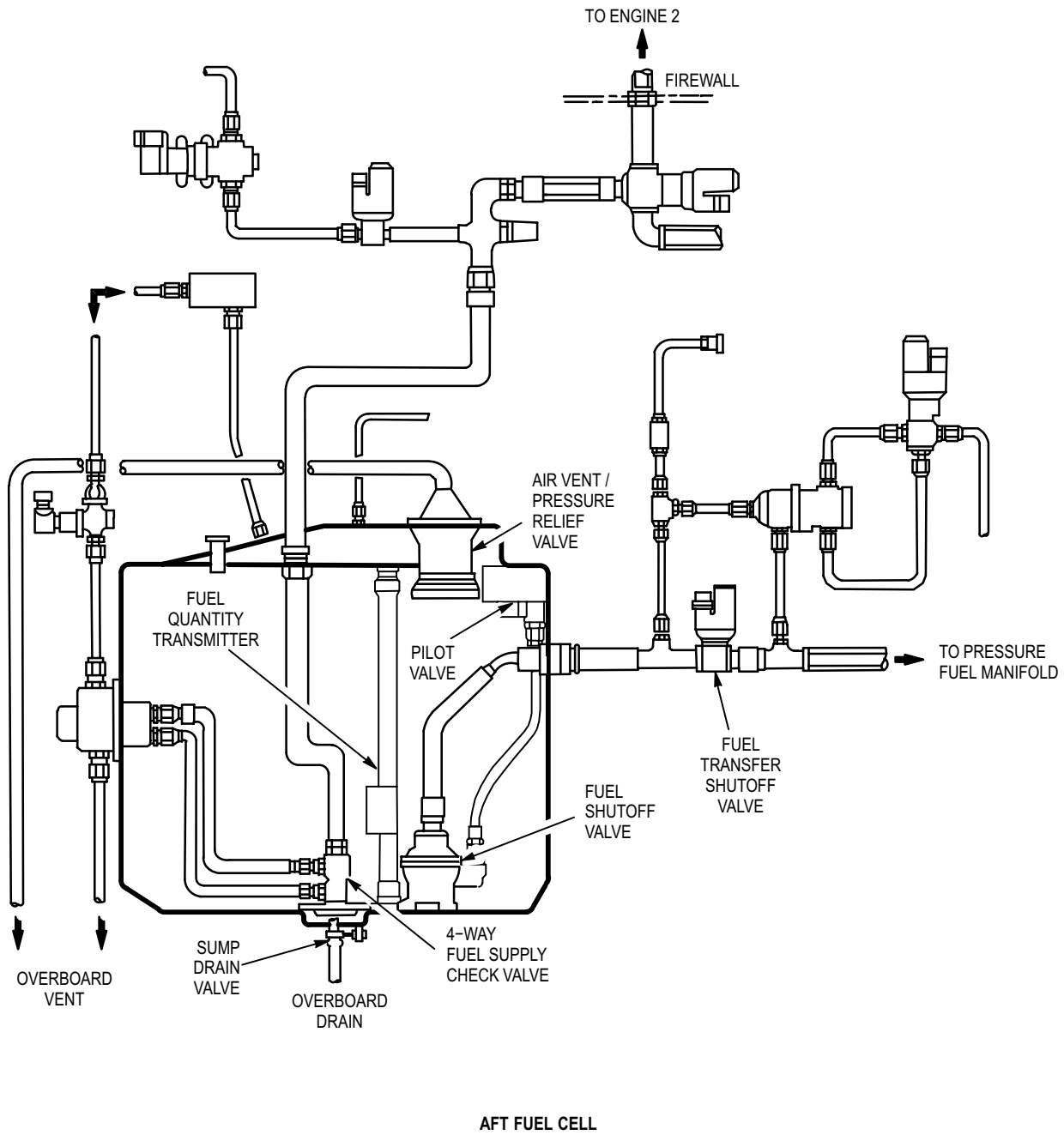
(f) The vent tubes and overboard vents relieve excess pressure overboard during refueling and drain fuel overboard in case of automatic fuel shutoff failure.

(g) The sump drain valves permit fuel sampling checks for contamination, water content and the draining of the fuel cells.

(h) During pressure refueling (fig. 10-24), the **REFUEL VALVE** switch on the refueling panel is placed to the **OPEN** position. The aircraft battery supplies 24 VDC through the **FUEL FILL** circuit breaker (CB32) to the refuel/transfer valve. The refuel/transfer valve motor drives to the open position, allowing a fuel path to the aft fuel cell and lighting the **OPEN** indicator on the refueling panel and the **REFUEL VALVE OPEN** indicator on the pilot's caution/warning panel. Pressurized fuel is connected to the pressure fuel manifold and flows through the flow check valves and pilot valves into the fuel cells.

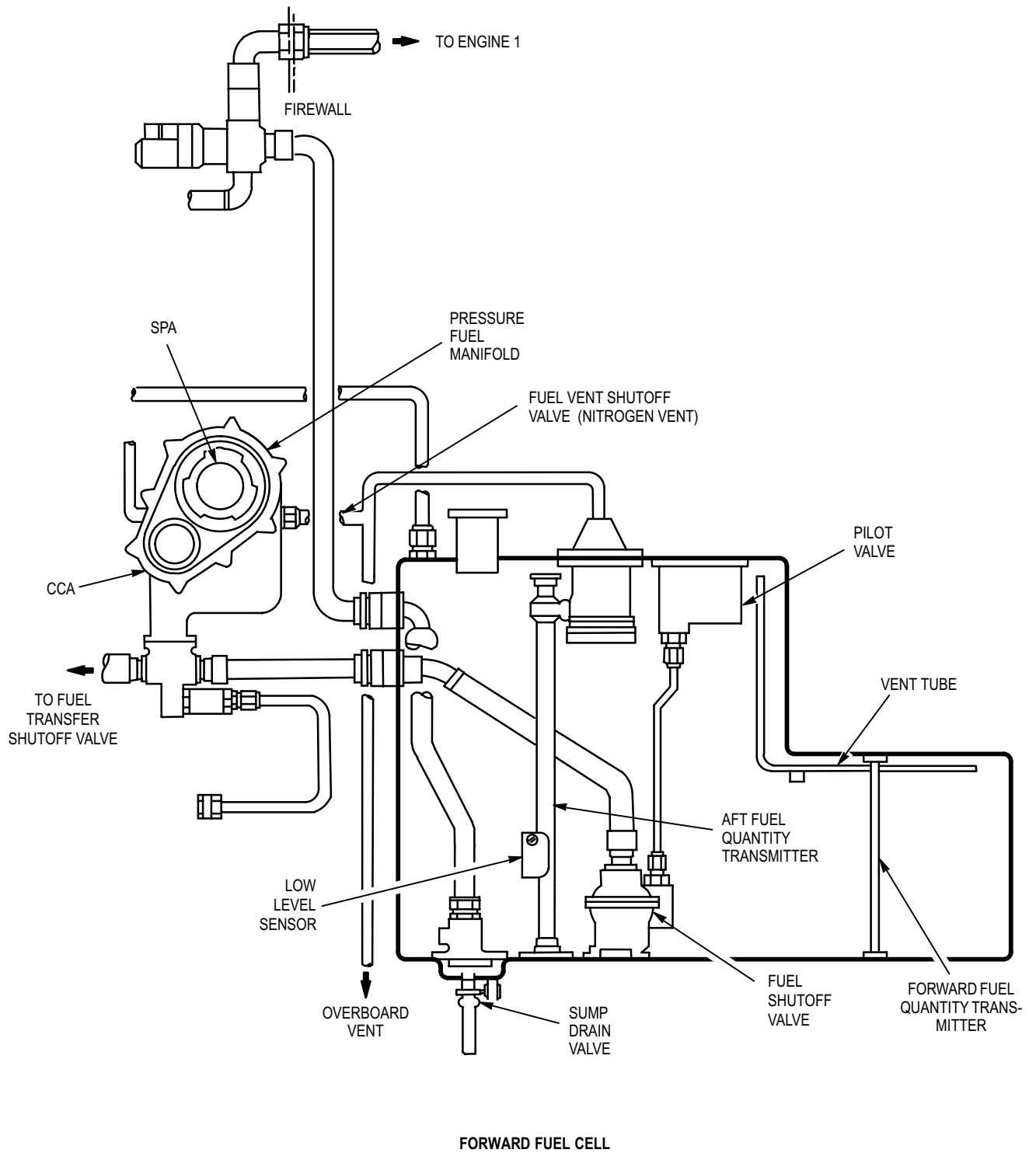
(i) The **AFT** and **FWD TNK LVL CONT VALVES** switches and indicator lights are used to check the operation of the fuel shutoff valves and pilot valves. When the switches are set to the **CLOSE** position after refueling begins, the fuel shutoff valves closes, ending refueling and causes the **CLOSED AFT** and **FWD** indicators to light. When the switches are set to the **OPEN** position the indicator lights go out and fuel flow continues. This procedure checks the automatic shutoff function of the refuel system.

(j) The refueling panel refuel indicator (fig. 10-25) receives 24 VDC battery power through the fuel quantity **IND ON/OFF** switch via the FSC. The FSC converts forward and aft fuel cell analog sensor data to linear zero to 5 VDC. The **FUEL QTY** indicator changes the electrical inputs into mechanical outputs. The mechanical outputs move the **FWD** and **AFT FUEL QTY** pointers along the scale.



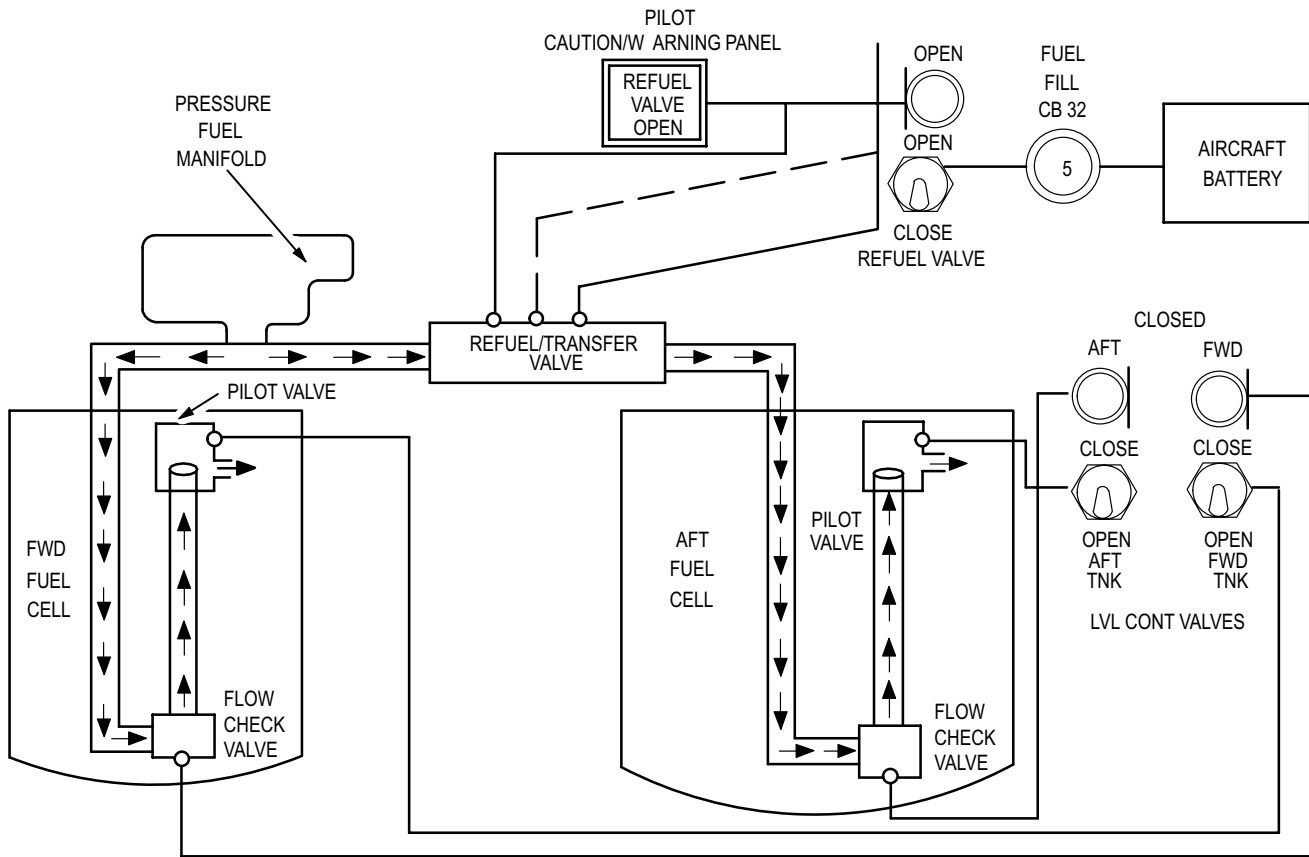
M70-214-1

Figure 10-23. Pressure Refuel/Defuel Interface Diagram (Sheet 1 of 2)



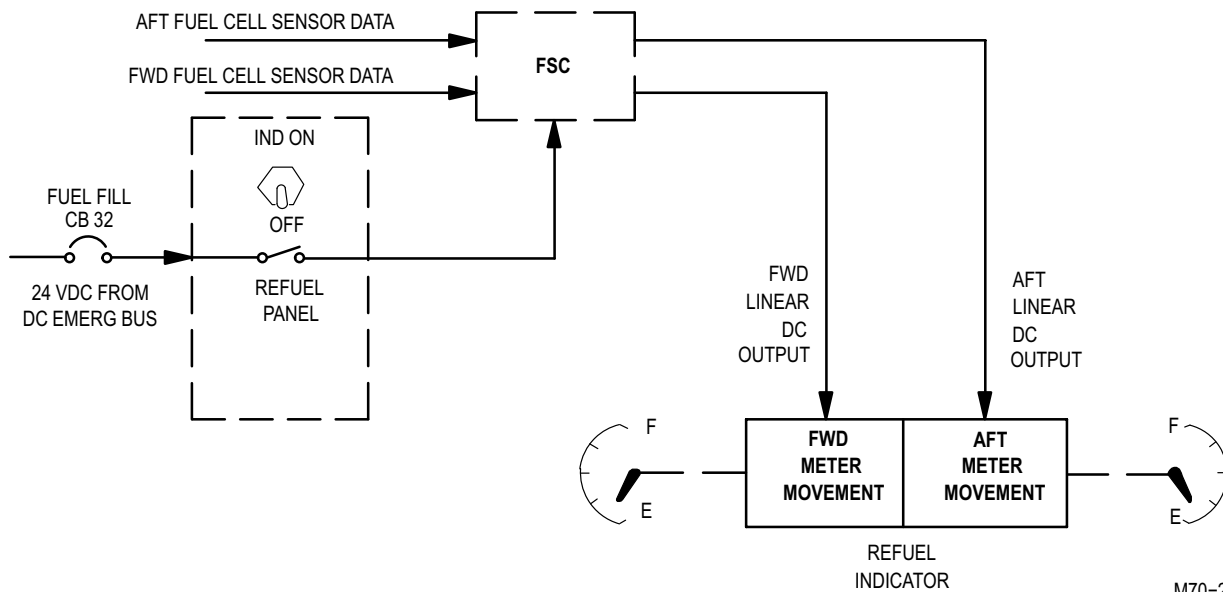
M70-214-2

Figure 10-23. Pressure Refuel/Defuel Interface Diagram (Sheet 2 of 2)



M70-215

Figure 10-24. Pressure Refueling Functional Block Diagram



M70-216

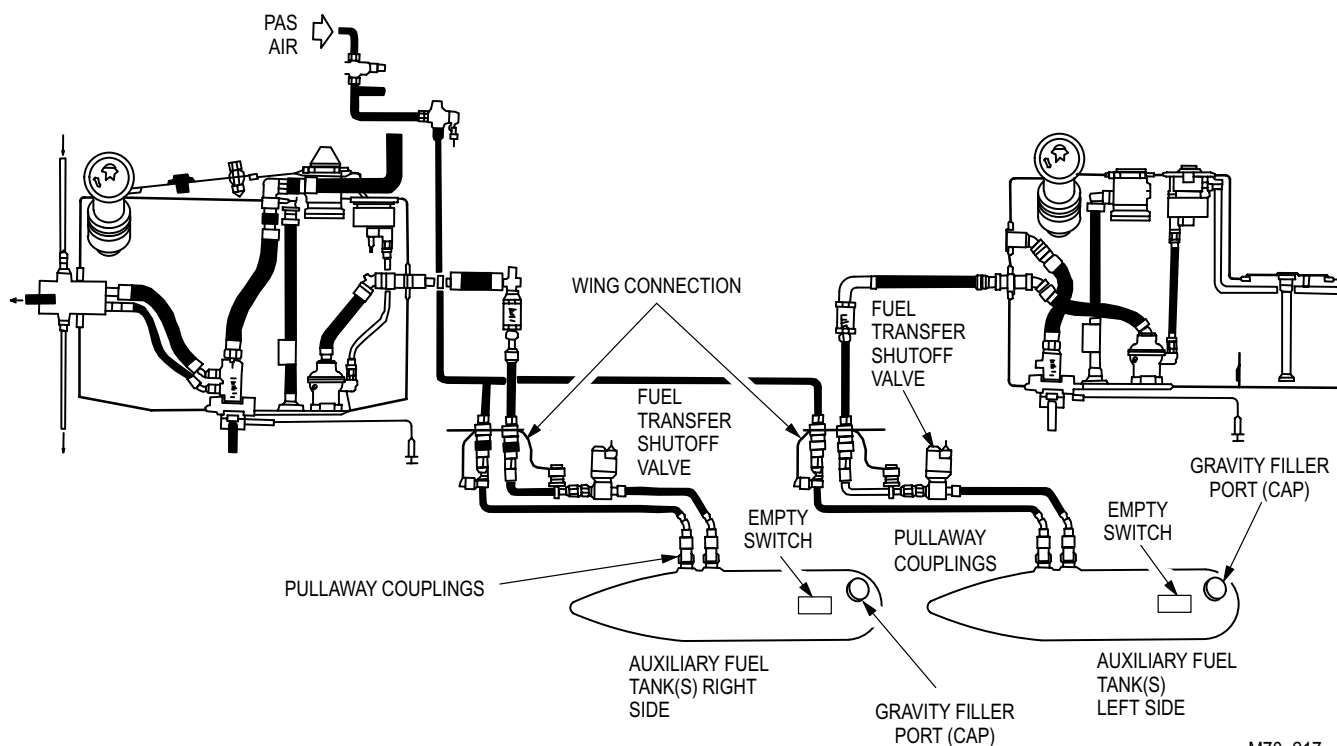
Figure 10-25. Refuel Indicator Functional Block Diagram

g. Auxiliary Fuel System.

(1) **Purpose.** The purpose of the auxiliary fuel system is to transfer additional fuel from auxiliary tanks to internal fuel cells.

(2) **System Operation** (fig. 10-26).

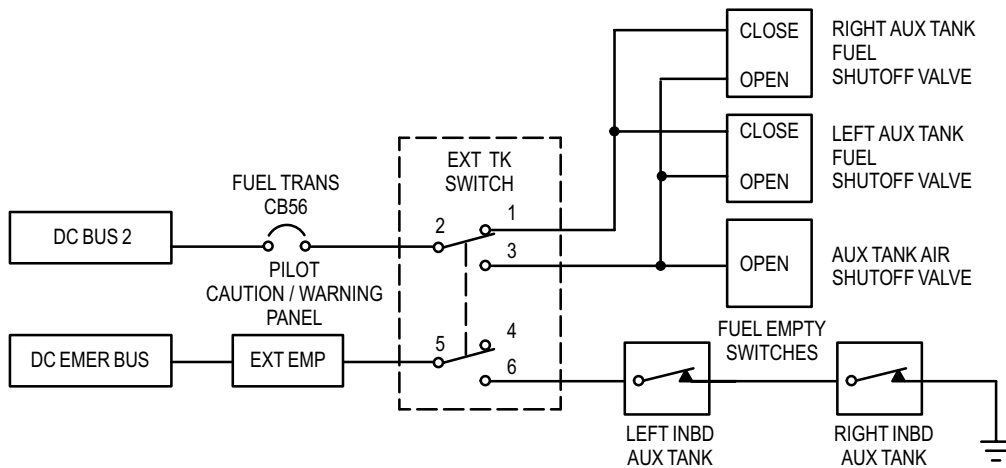
(a) The cap assembly provides fueling access to the gravity filler port. When the pilot's **FUEL** panel **EXT TK** switch is placed to **ON**, the auxiliary fuel tank air shutoff valve and auxiliary tank fuel shutoff valves are opened. PAS air pressurizes the fuel, forcing fuel flow through auxiliary tank fuel shutoff valves into the internal fuel cells. When four external fuel tanks are used, the PAS air is connected only to the outboard auxiliary fuel tanks. The fuel is forced from the outboard fuel tanks, through the inboard fuel tanks, into the internal fuel cells. When the internal fuel cells are full, automatic fuel shutoff occurs, terminating fuel flow. The fuel empty switches complete a circuit when the fuel level is below the float, lighting the **EXT EMP** indicator on the pilot caution/warning panel. Disconnect couplings are used for jettison capabilities of the external fuel tanks.



M70-217

Figure 10-26. Auxiliary Fuel Tank Transfer System Interface Diagram

(b) Electrical power (fig. 10-27) is supplied through **FUEL TRANS** circuit breaker (CB56) to the external **EXT TK** switch on the pilot **FUEL** panel. When the **EXT TK** switch is in the **OFF** position, 28 VDC is applied through contacts 2 and 1 to close the auxiliary tank shutoff valves. When the **EXT TK** switch is in the **ON** position, 28 VDC is applied through contacts 2 and 3 to open the auxiliary tank shutoff valves and the auxiliary tank air shutoff valve. Contacts 5 and 6 complete a ground path for the **EXT EMP** indicator on the pilot's caution/warning panel. The **EXT EMP** indicator will light only when both fuel empty switches are below the float level. When four external fuel tanks are used, the fuel empty switches are connected only to the inboard auxiliary fuel tanks.



M70-218

Figure 10-27. Auxiliary Tanks Electrical Diagram

Not applicable.

SECTION III. TROUBLESHOOTING PROCEDURES

Use the information in Table 10-2 to locate the electrical components and their connectors to perform the troubleshooting tasks in this chapter. Table 10-2 includes locator illustrations which supplement the ECLC listing. The listing entry in the grid area column tells where to locate the component in the illustrations.

Table 10-2. Electrical Component Location and Configuration (ECLC) Index Listing

FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
P1	A322	J1039	W119	7A	CPG STATION
P1	W605/A76	J1	A402	32B	R200 PANEL
P1066	W118	J1	S65	44C	PLT STATION
P1067	W268	J1	S64	70E	L325 DOOR
P1085	W118	J1	A146	62D	B200 DOOR

10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

10-9

Table 10-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

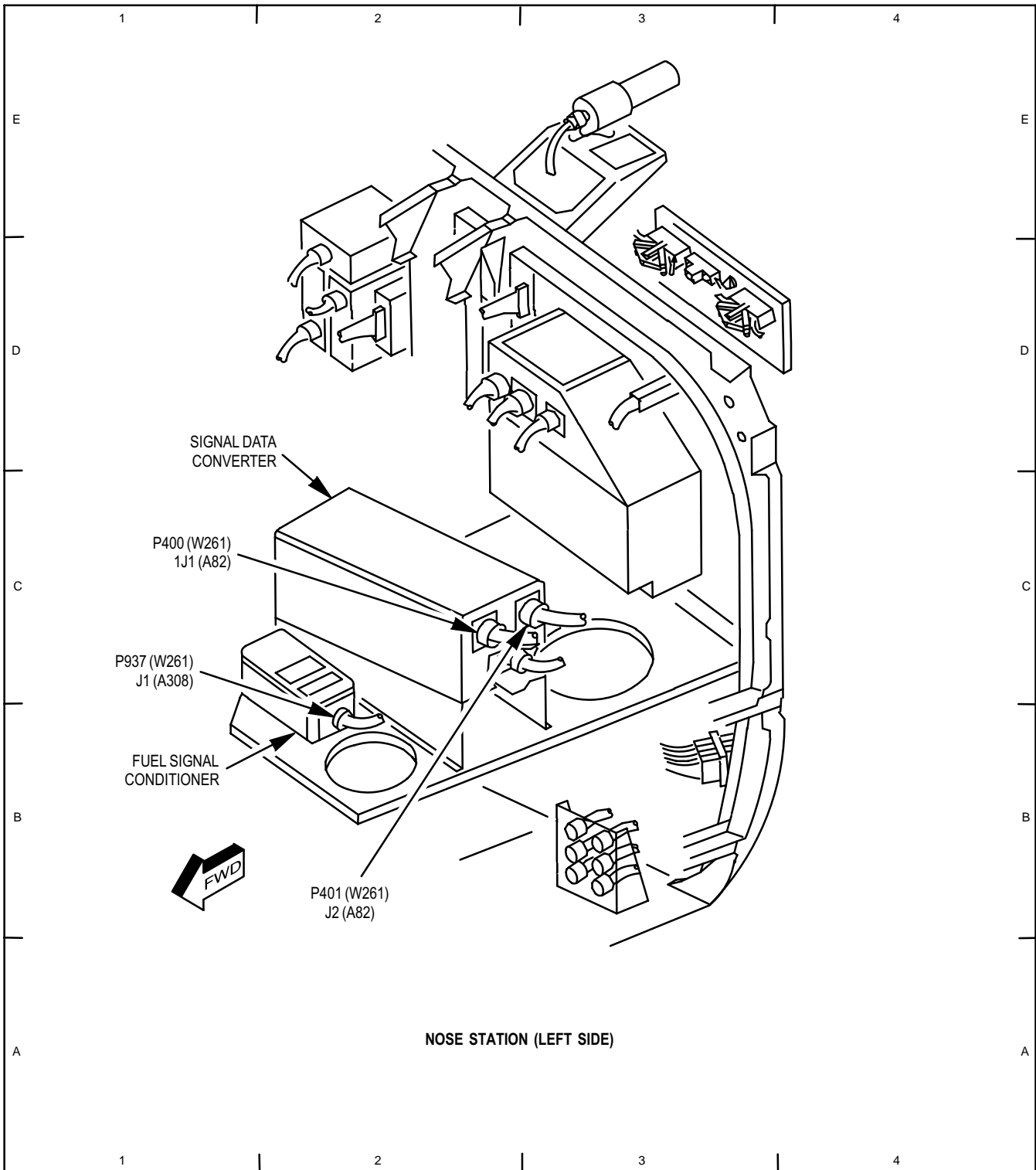
FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
P1086	W268	J1	L48	61E	B200 DOOR
P141	W157	J1	L5	78E	L325 DOOR
P142	W158	J1	L4	78C	R29
P174	W119	J1	A131	18B	PLT STATION
P179	W119	J2	A131	18C	PLT STATION
P18	W118	J1	A106	25D	PLT STATION
P191	W119	J1	A179	11C	CPG STATION
P2	W605/A76	J2	A402	32C	R200 PANEL
P242	W102		L15	52B	RN1
P243	W119	J1	L14	59B	L325 DOOR
P251	W268	J1	L17	63E	B200 DOOR
P253	W261	J1	M17	36E	PLT STATION
P260	W268	J1	A57	65D	PLT STATION
P263	W118	J1	A58	44C & 65C	PLT STATION
P264	W268	J1	A59	72E	L325 DOOR
P400	W261	1J1	A82	1C	L40 COVER
P401	W261	1J2	A82	2B	L40 COVER
P419	W117	J13	A402	31C	L200 PANEL
P425	W117	J12	A402	31D	L200 PANEL
P428	W116	J428	W117	21C	PLT STATION
P429	W119	J23	A402	31D	L200 PANEL
P433	W119	J20	A402	31E	L200 PANEL
P436	A335/L47	J436	W118	74C	R295 DOOR
P436	A335/S90	J436	W118	74C	R295 DOOR

Table 10-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
P437	W119	J25	A402	29E	L200 PANEL
P438	W118	J15	A402	30C	L200 PANEL
P439	W119	J21	A402	31E	L200 PANEL
P440	W118	J16	A402	30C	L200 PANEL
P441	W119	J24	A402	31D	L200 PANEL
P442	W102	J5	A402	29B	L200 PANEL
P444	W268	J31	A402	30B	L200 PANEL
P444	W268		S67	63C	B200 DOOR
P457 (ADB)	W119	J22	A402	31D	L200 PANEL
P463	W119	J1	A76	24D	PLT STATION
P465	W119	J12	A326	39C	CPG STATION
P467	W261	J5	A326	40C	CPG STATION
P475	W119	J475	A327	36C	PLT STATION
P478	W116	J17	A402	30C	R200 PANEL
P505	A333	2J505	W157	77E	LW7
P505	A333	3J505	W158	78C	RW7
P587	W157	J587	W117	80E	LW9
P589	W158	J589	W116	79A	RW9
P747	W119	J1	A403	8E	L90 DOOR
P748	W119	J2	A403	8E	L90 DOOR
P914	W118	J914	W119	13D	CPG STATION
P915	W118	J915	W261	13C	CPG STATION
P937	W261	J1	A308	1C	L40 COVER
P938	W119	J1	L1	60D	L325 DOOR

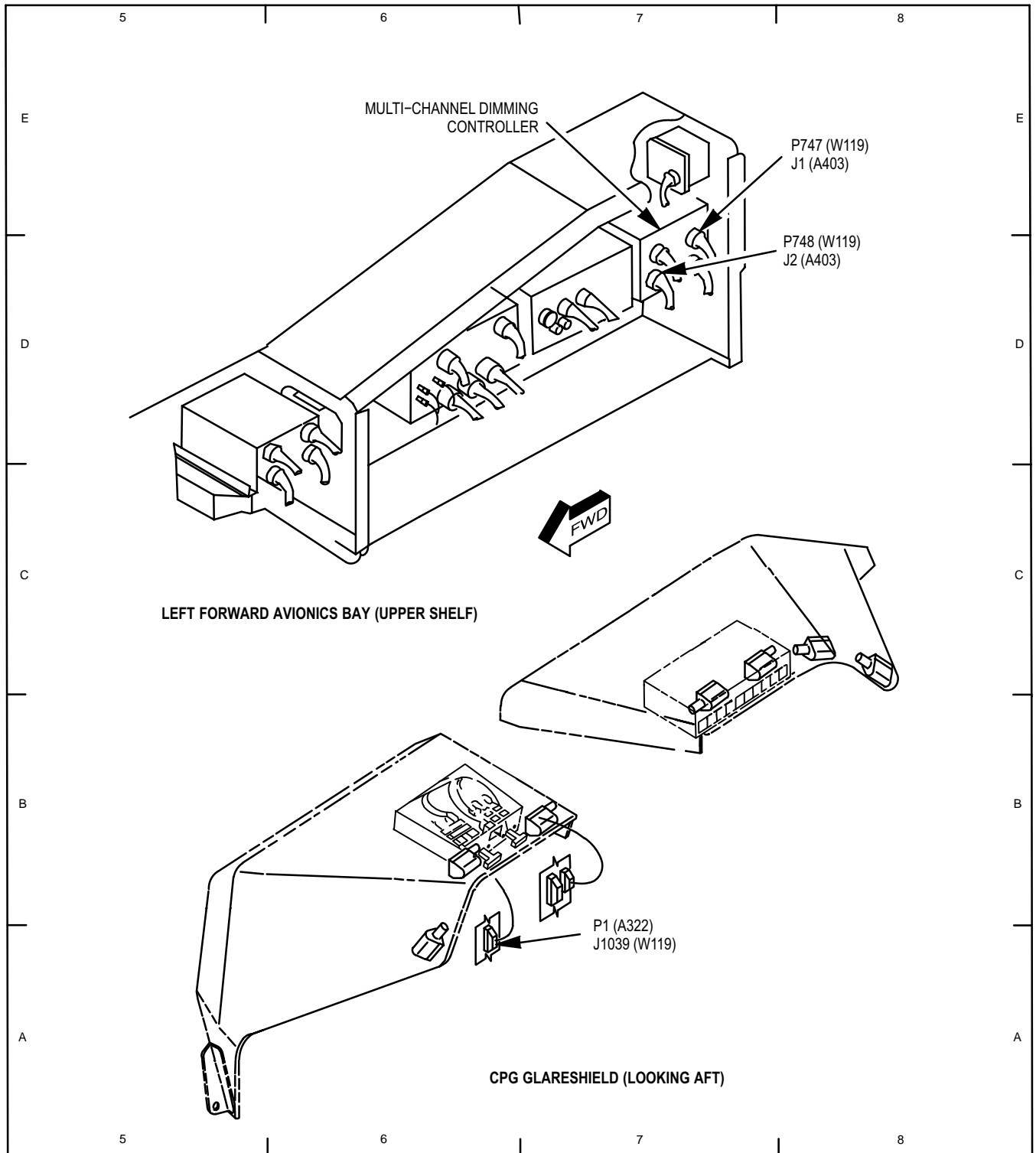
Table 10-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

FROM COLUMN		TO COLUMN		Grid Area	Access
<u>Connector Ref Des</u>	<u>Component/Harness</u>	<u>Connector Ref Des</u>	<u>Component/Harness</u>		
P939	W102	J1	L2	47B	R200 FAIRING
P940	W268	J1	L3	62E	B200 DOOR
P942	W118	J2	A58	43B	B120 FAIRING
P943	W268	J2	A59	71E	L325 DOOR
P977	W119	J1	A330	56E	L200 PANEL
P978	W119	J2	A330	56C	R200 PANEL

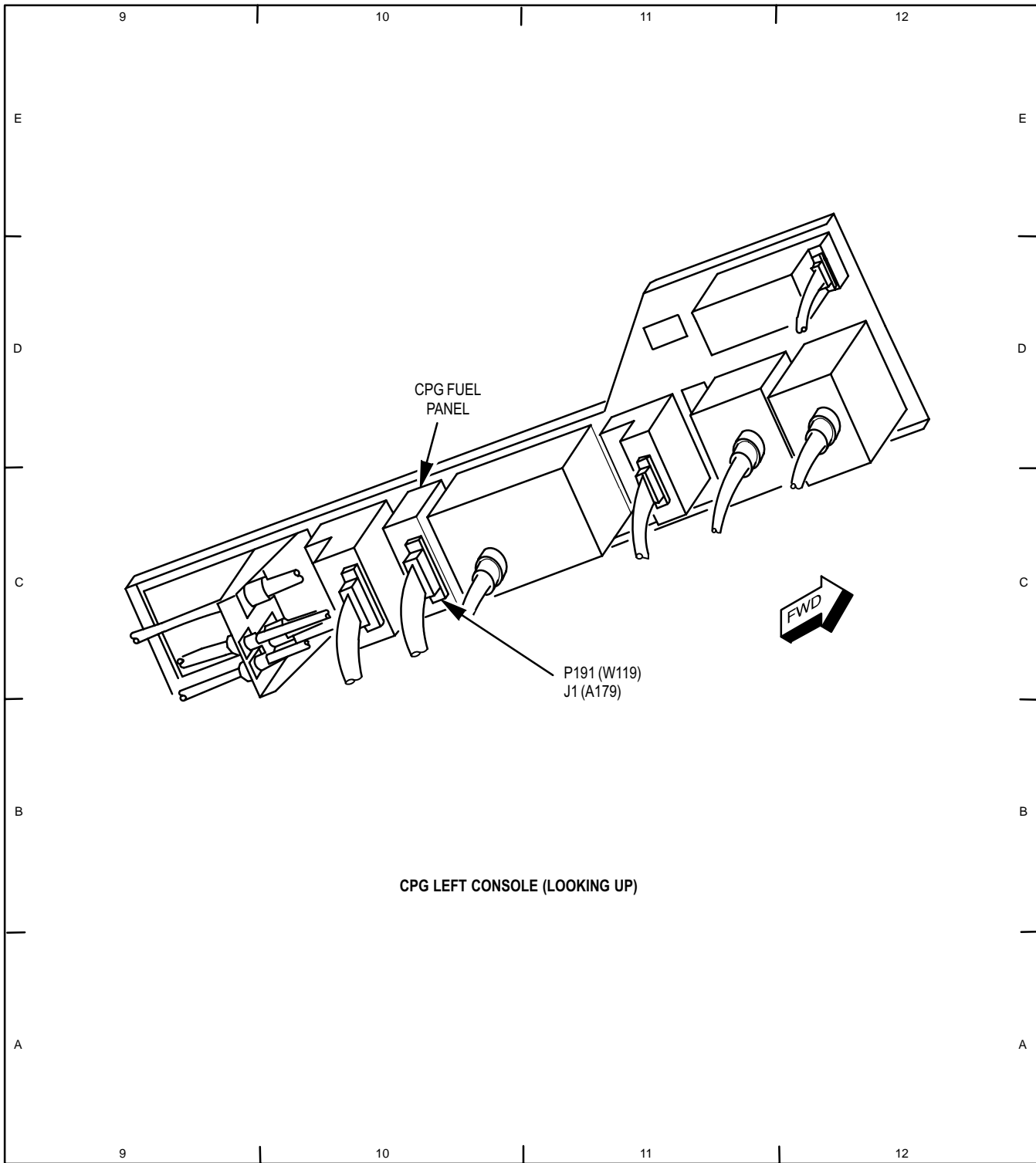


M70-341

10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)



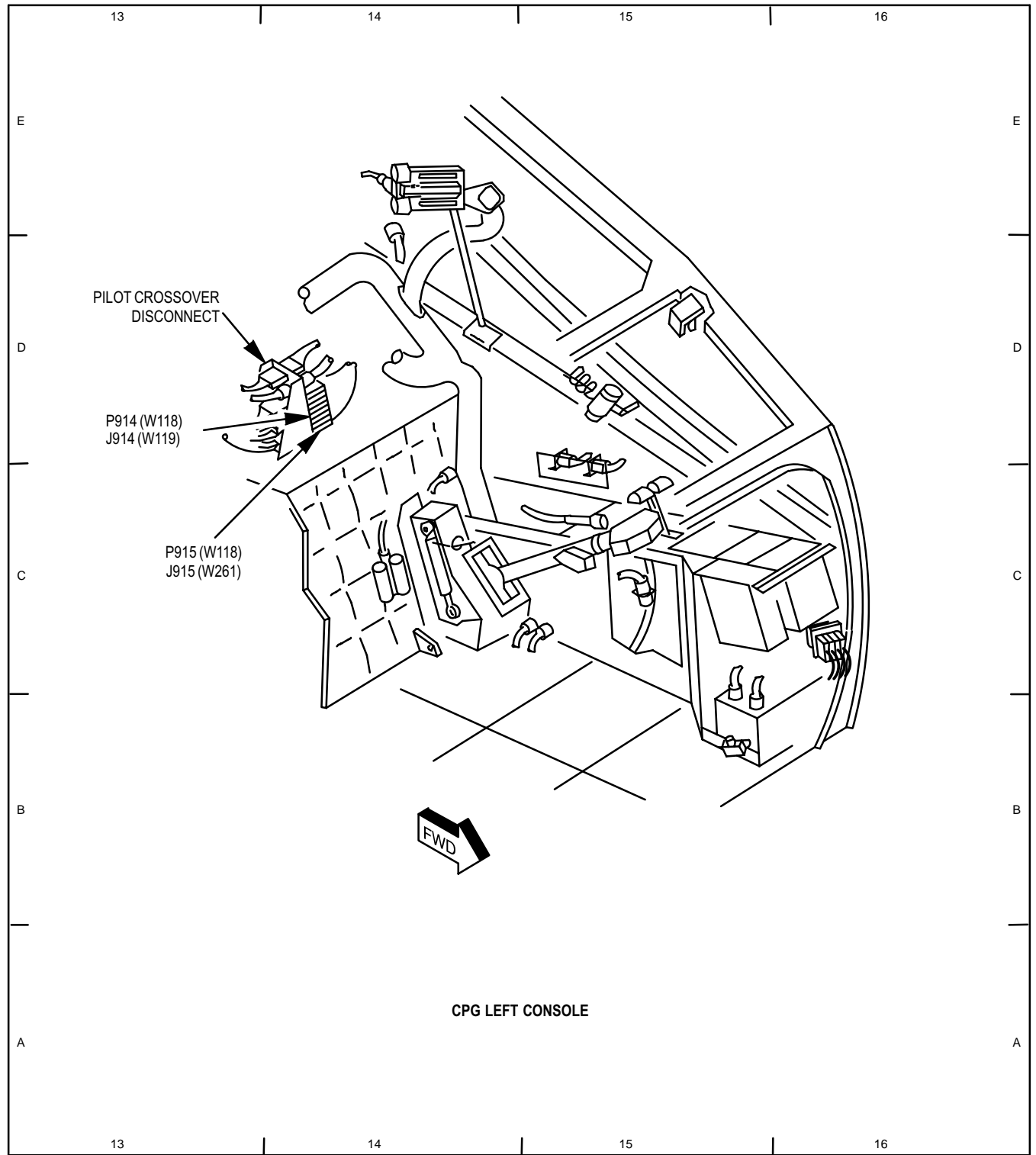
M70-013A



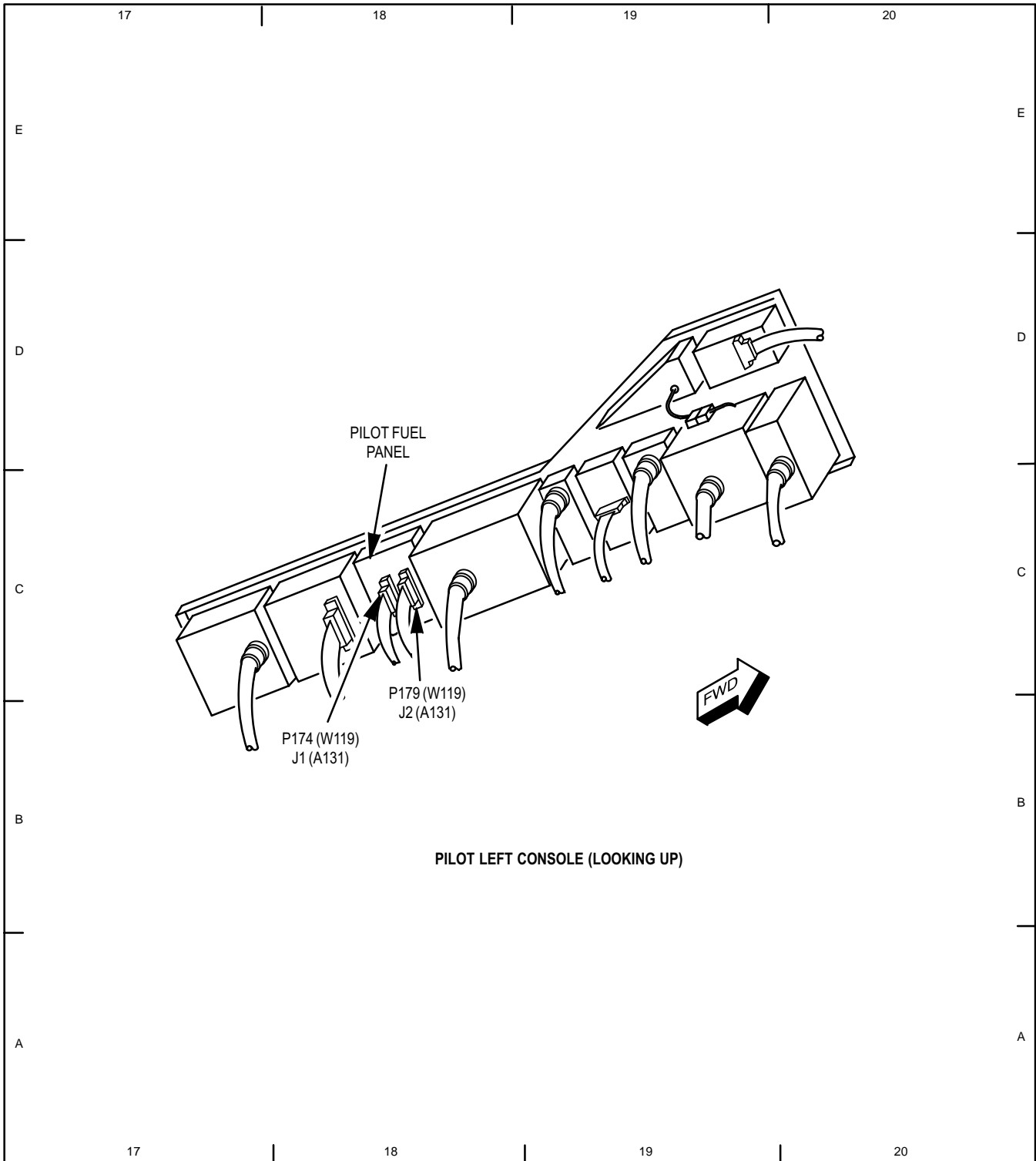
M70-015A

10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

10-9

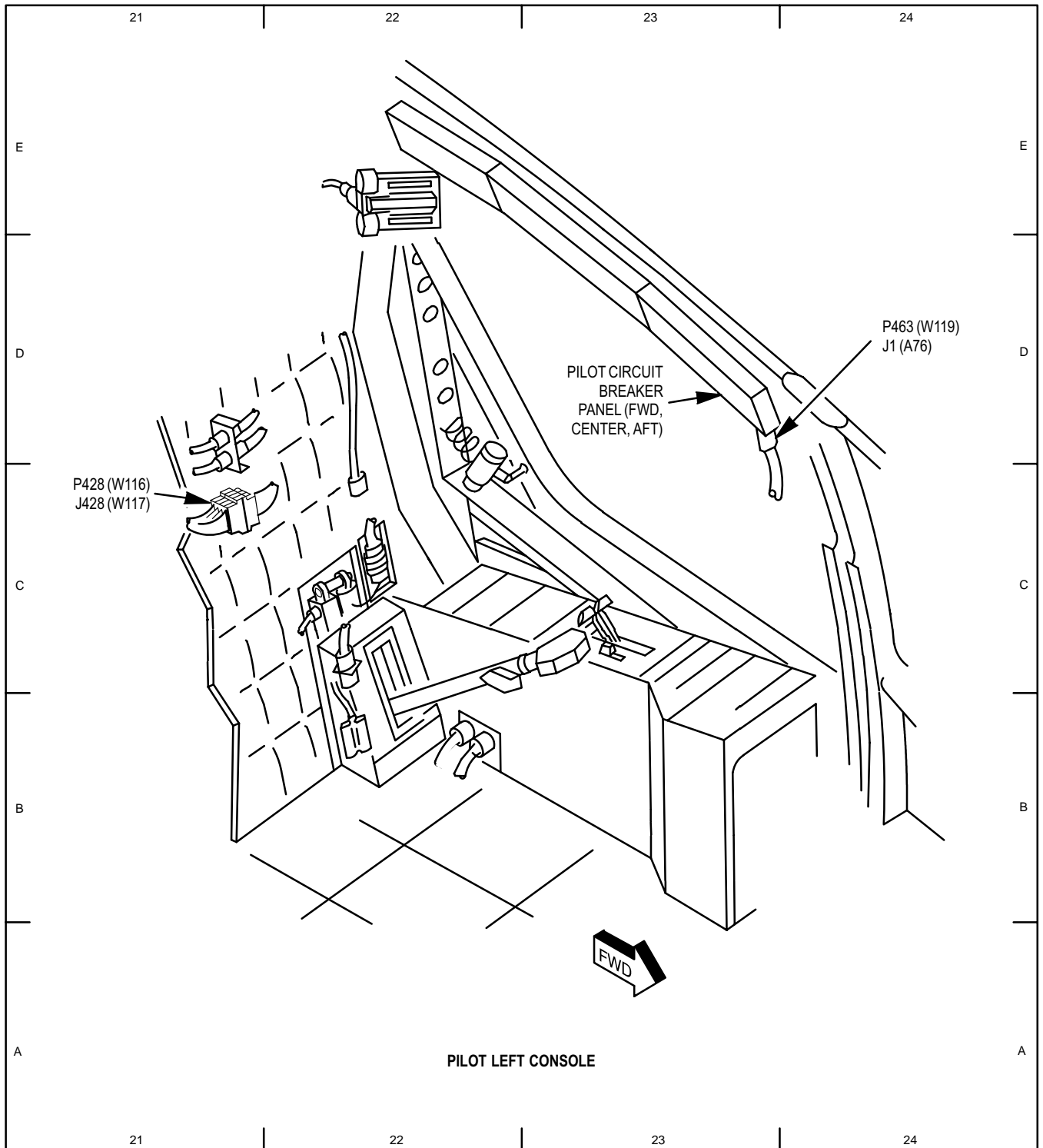


M70-342

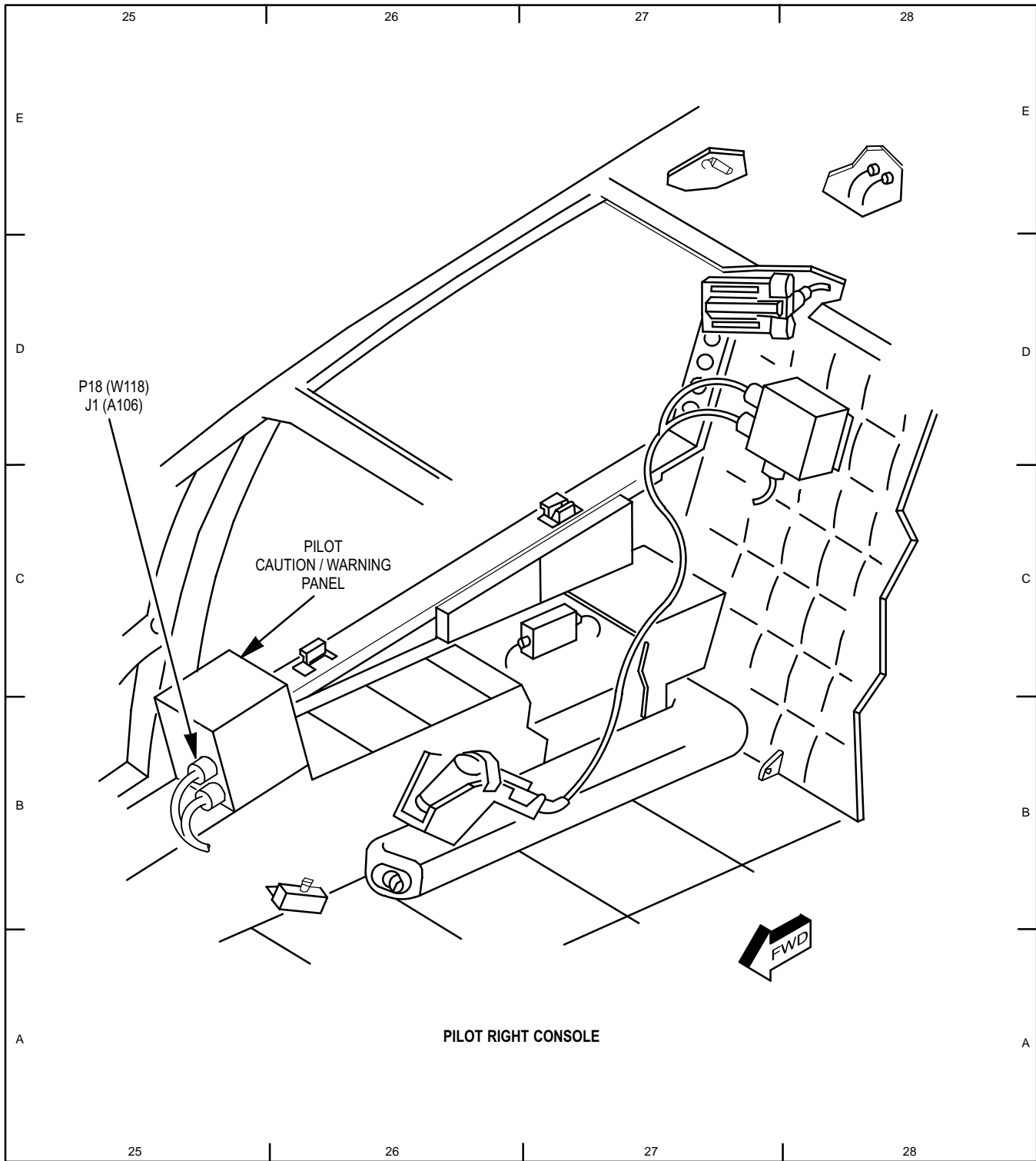


M70-343

10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

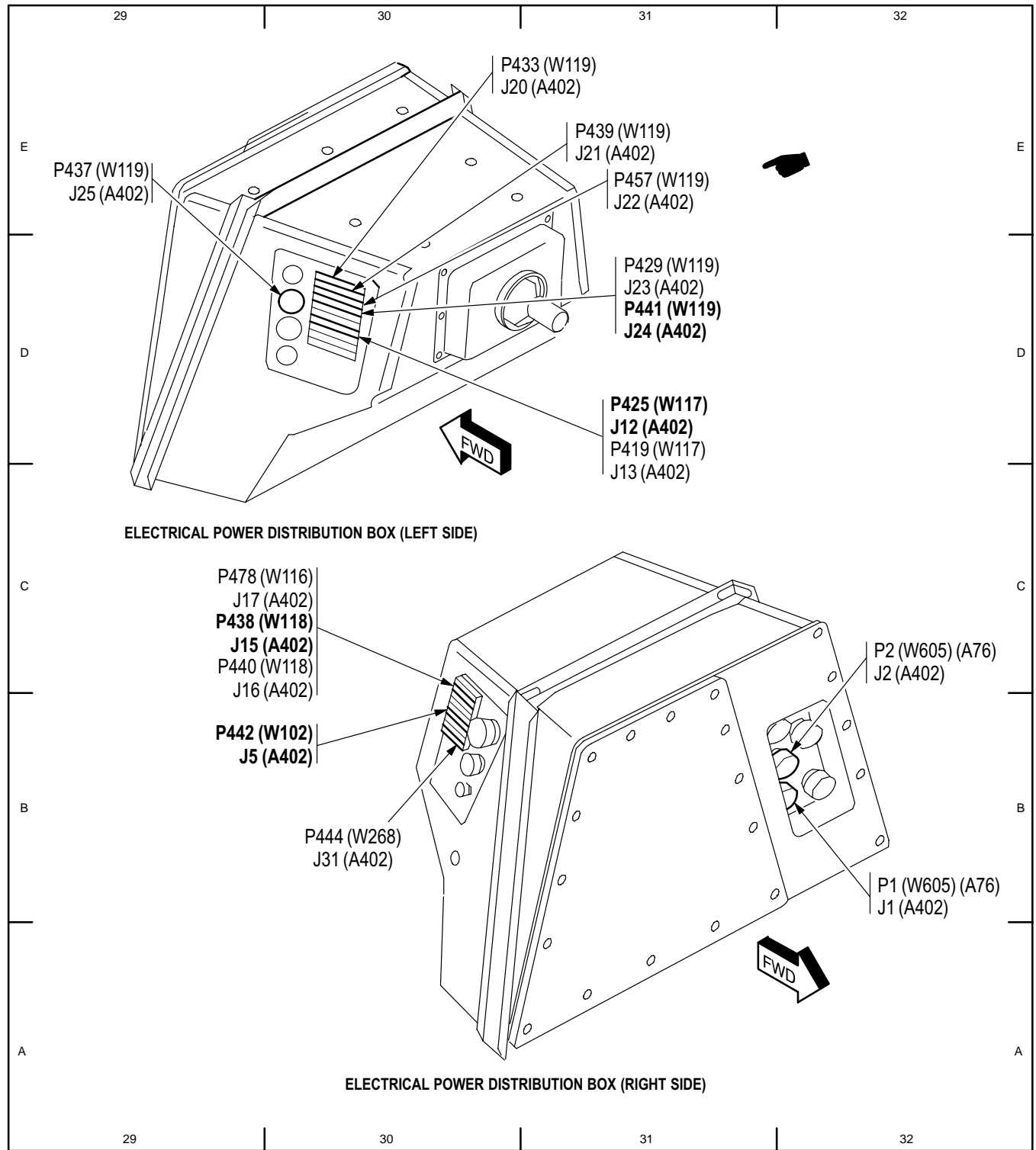


M70-344

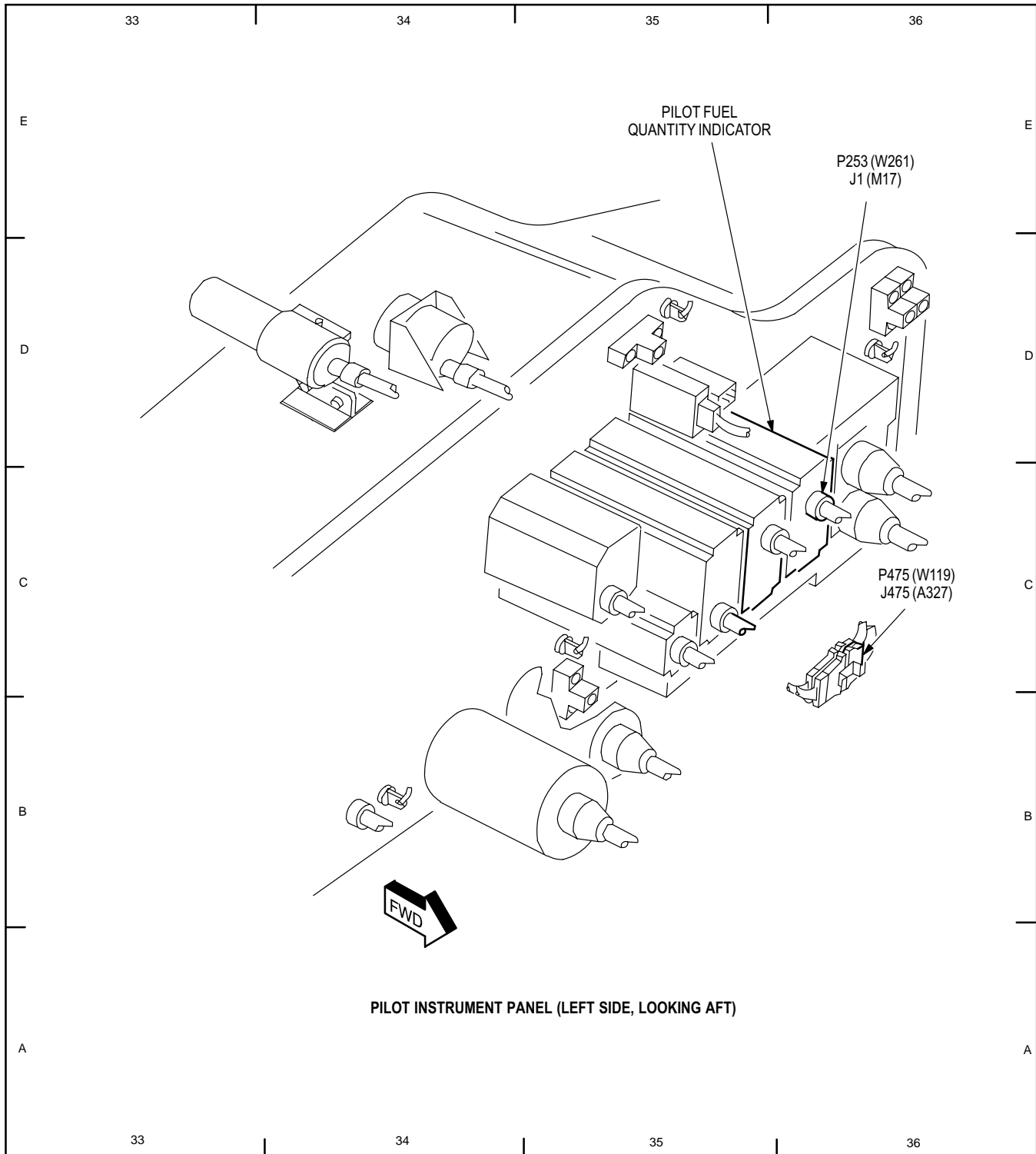


M70-345

10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)



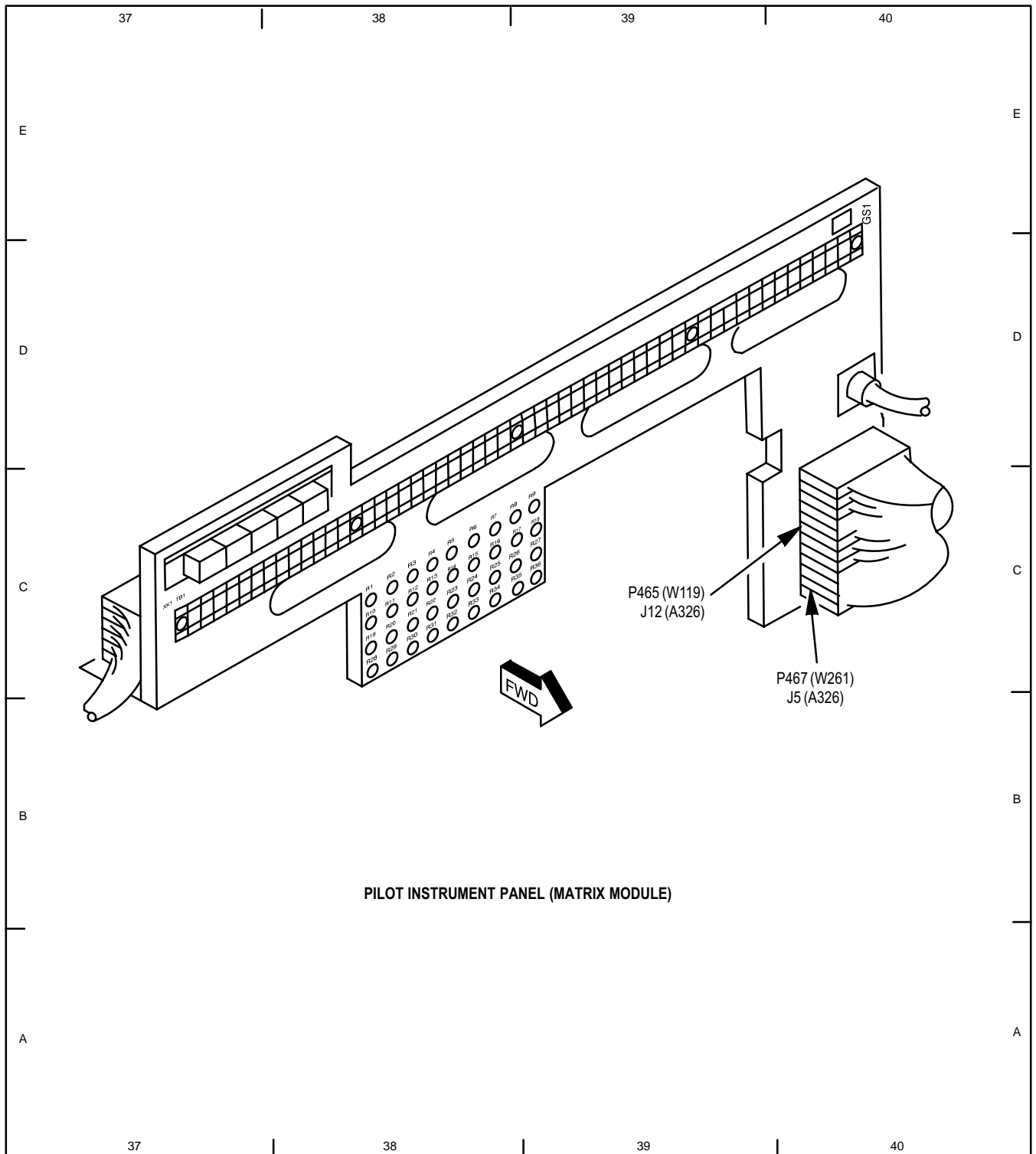
M70-346A



M70-022A

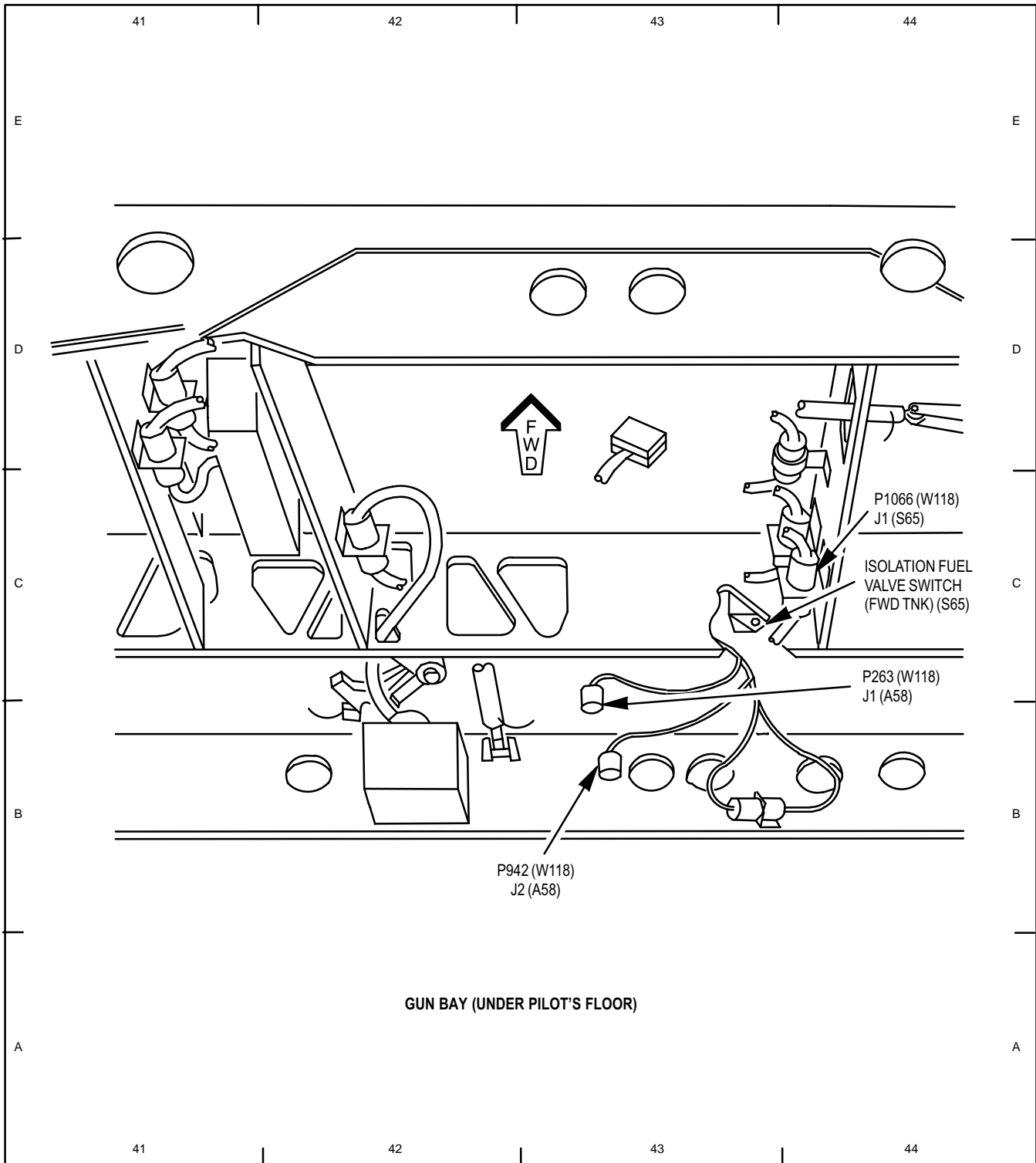
10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

10-9



PILOT INSTRUMENT PANEL (MATRIX MODULE)

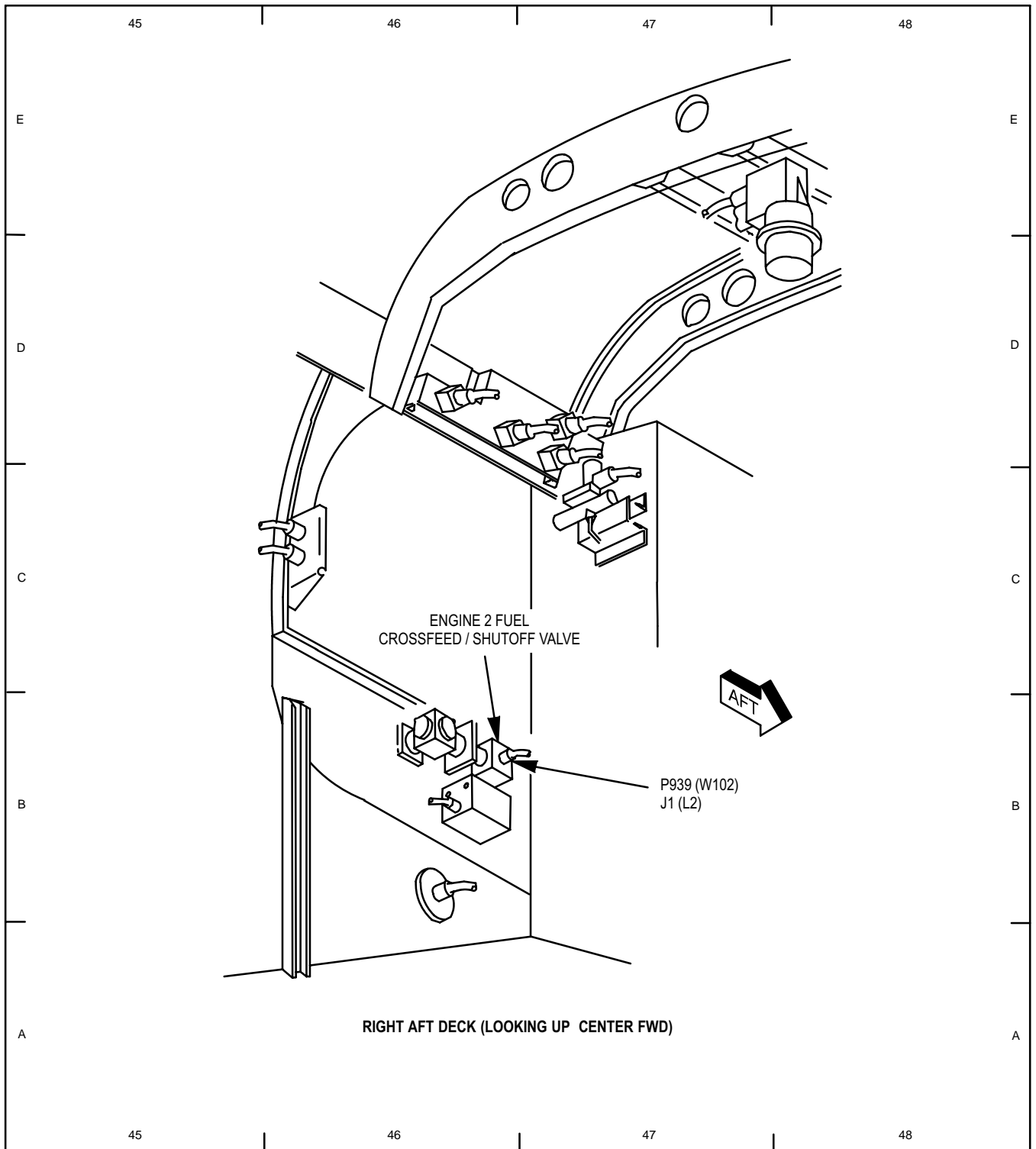
M70-347



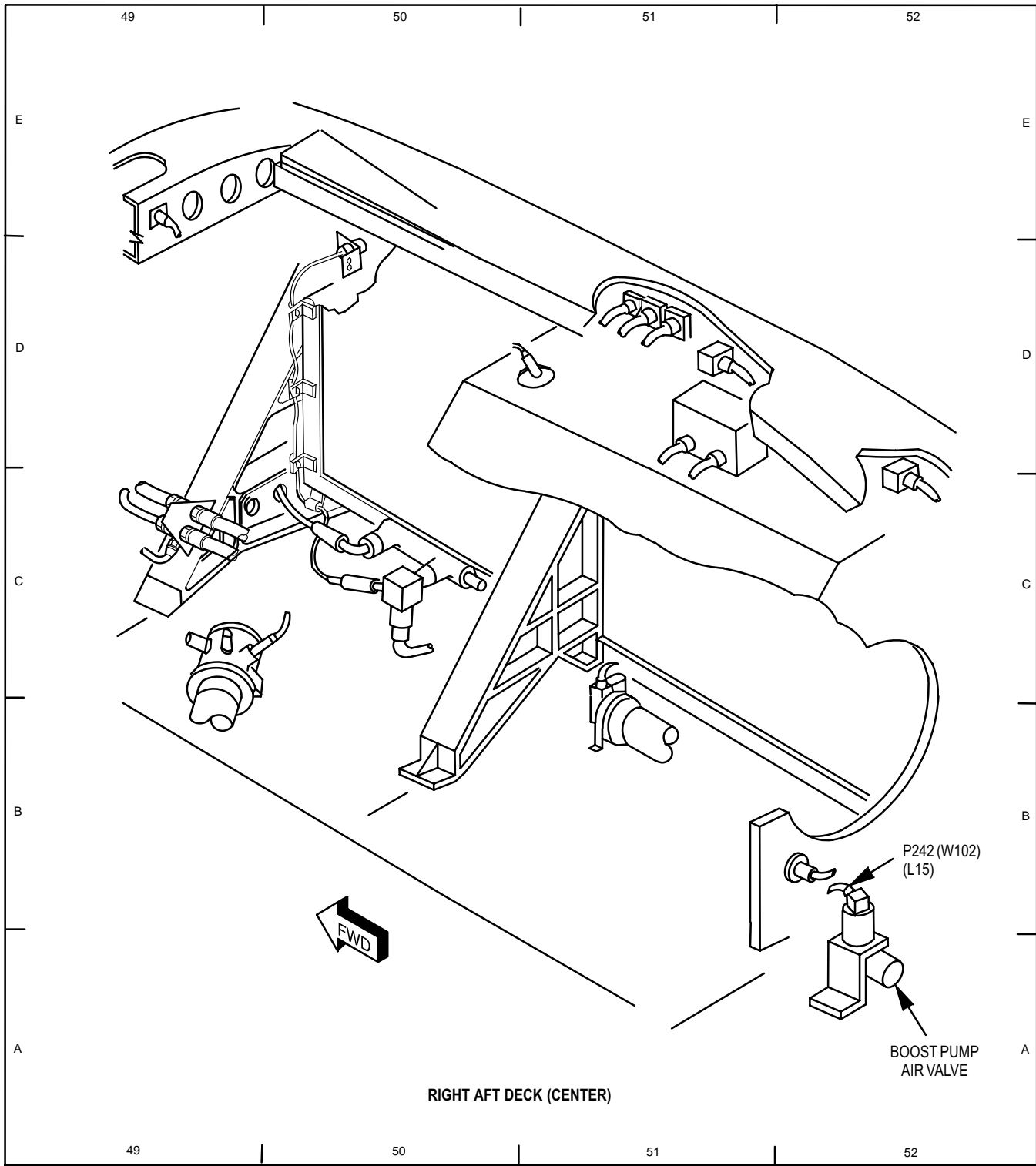
M70-348

10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

10-9

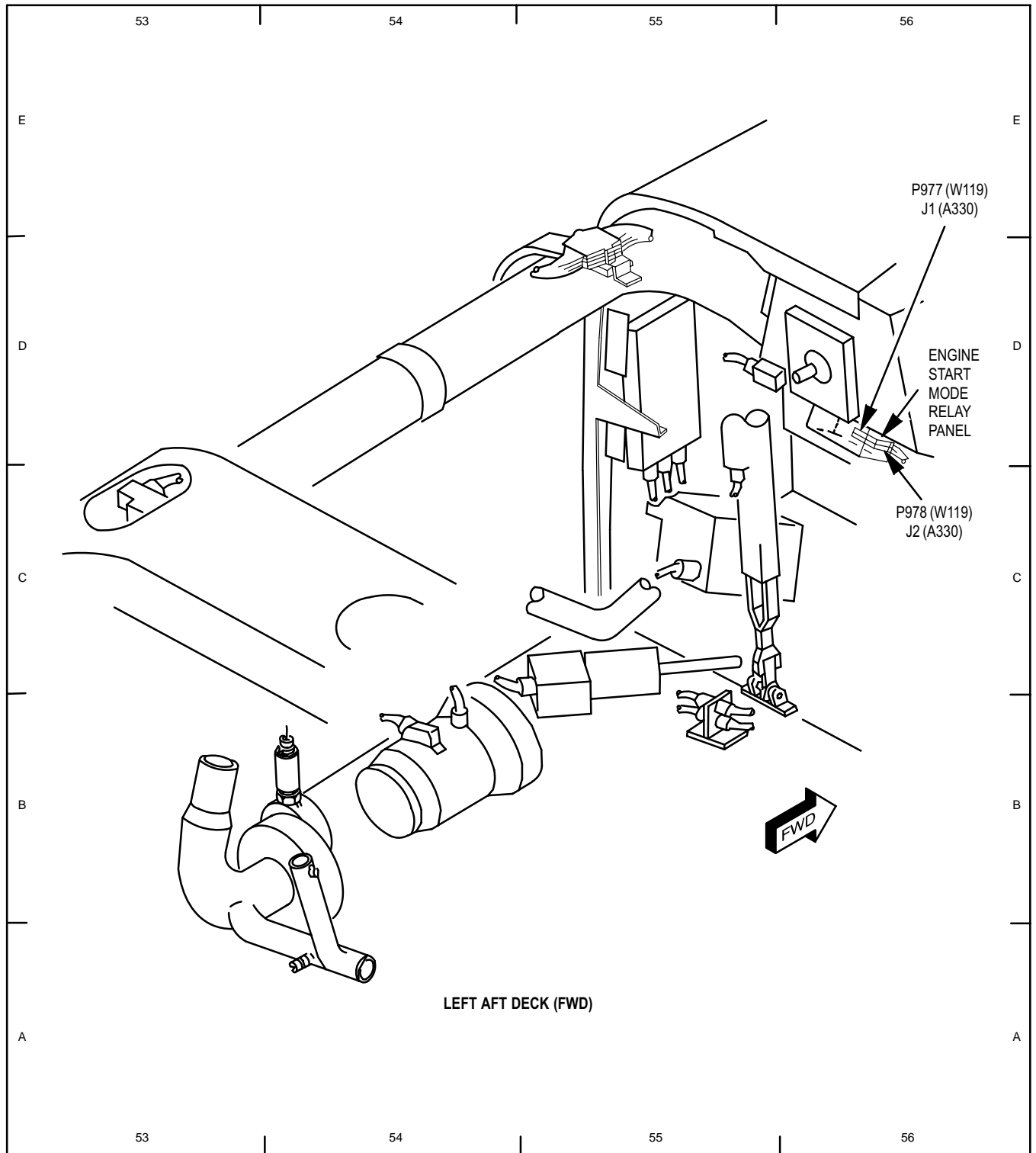


M70-349

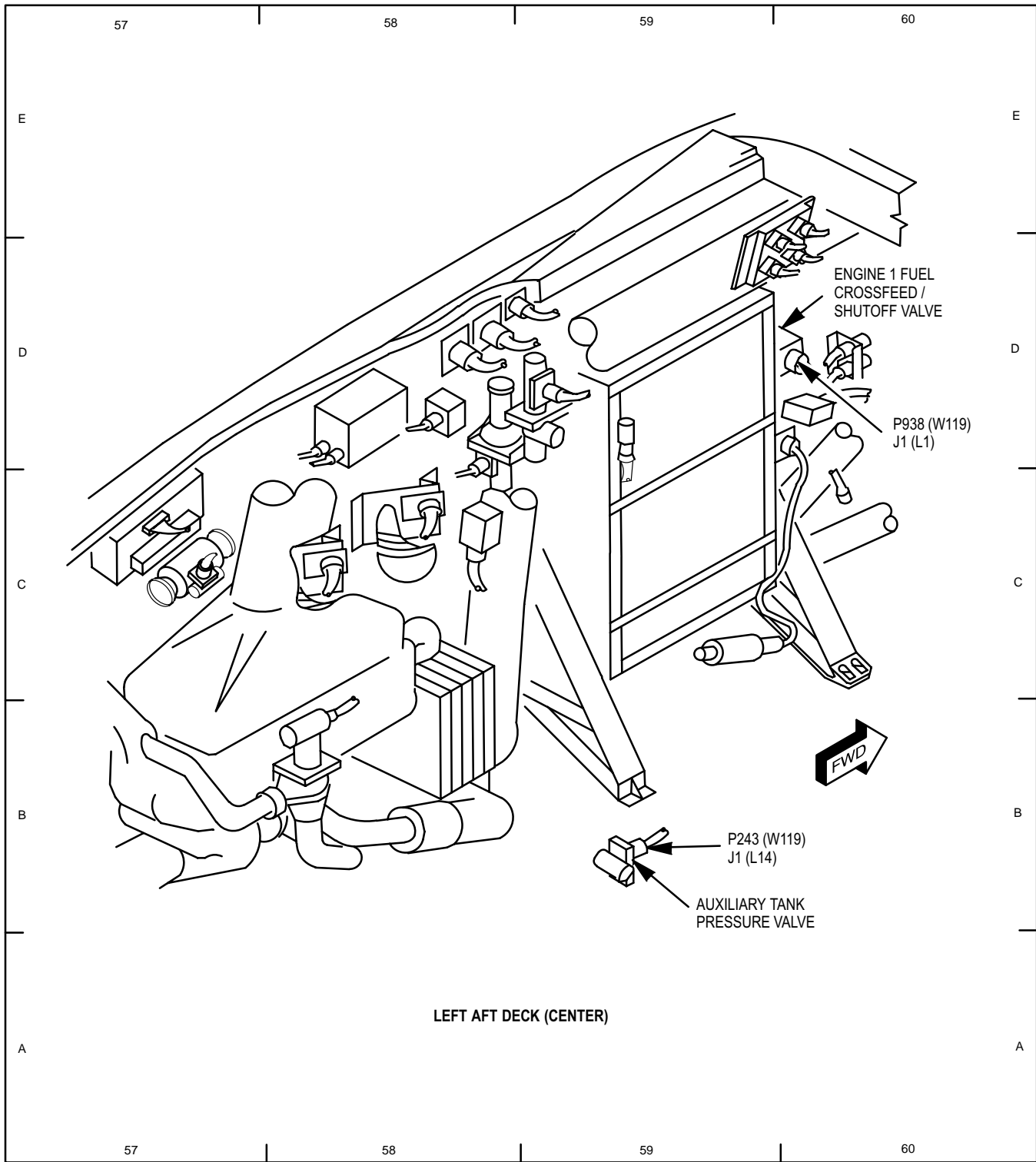


M70-031A

10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)



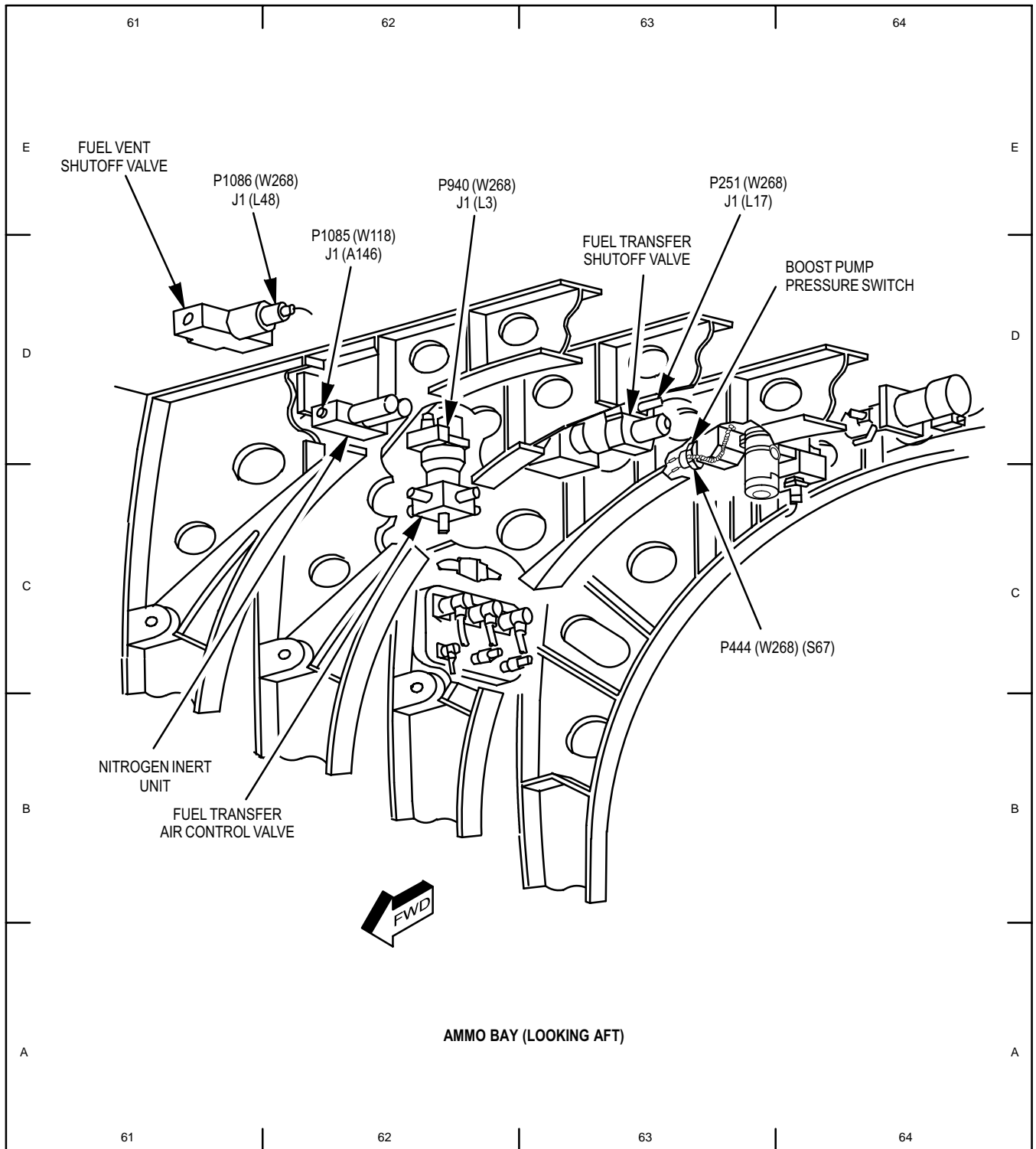
M70-350



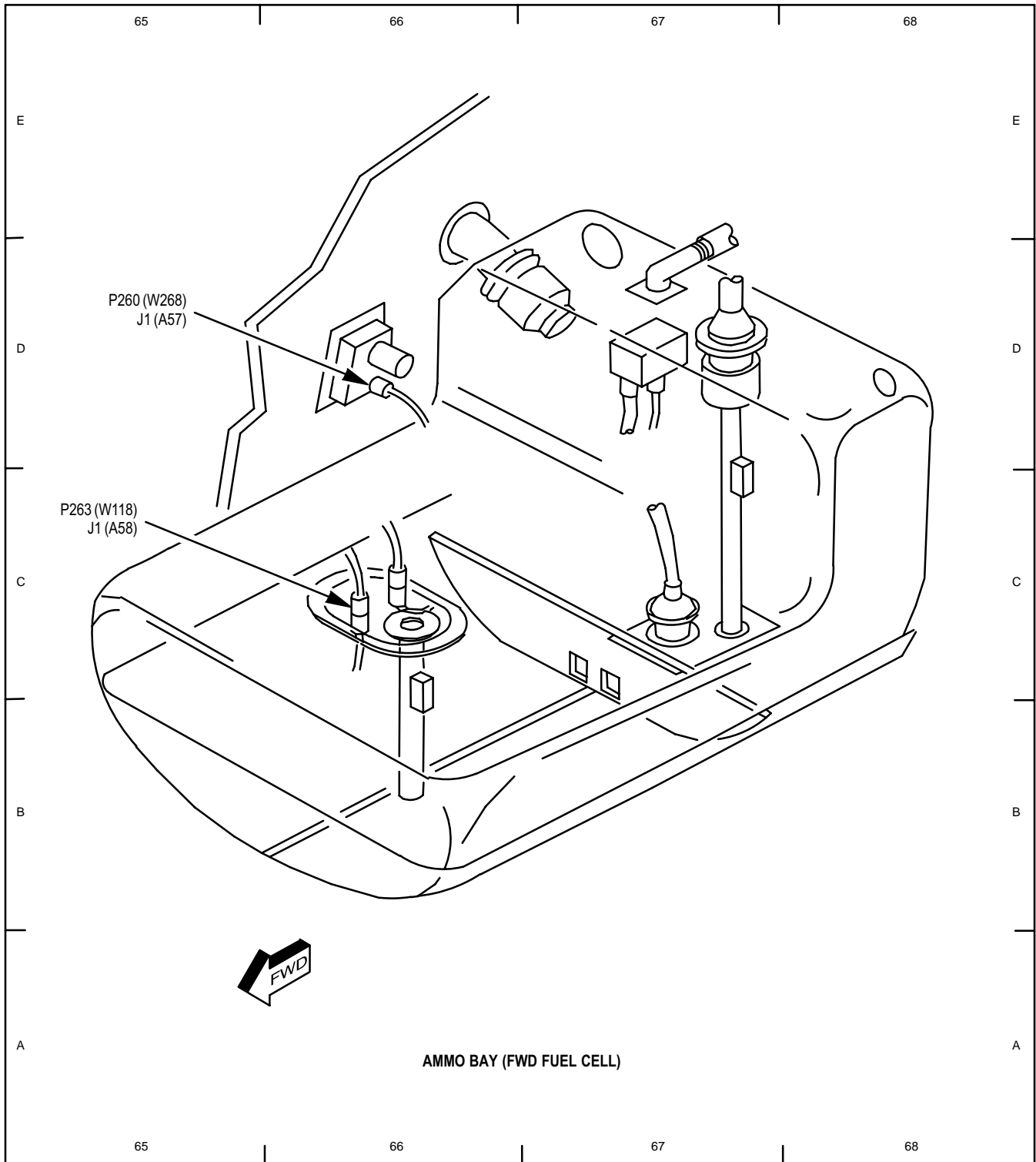
M70-351

10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

10-9

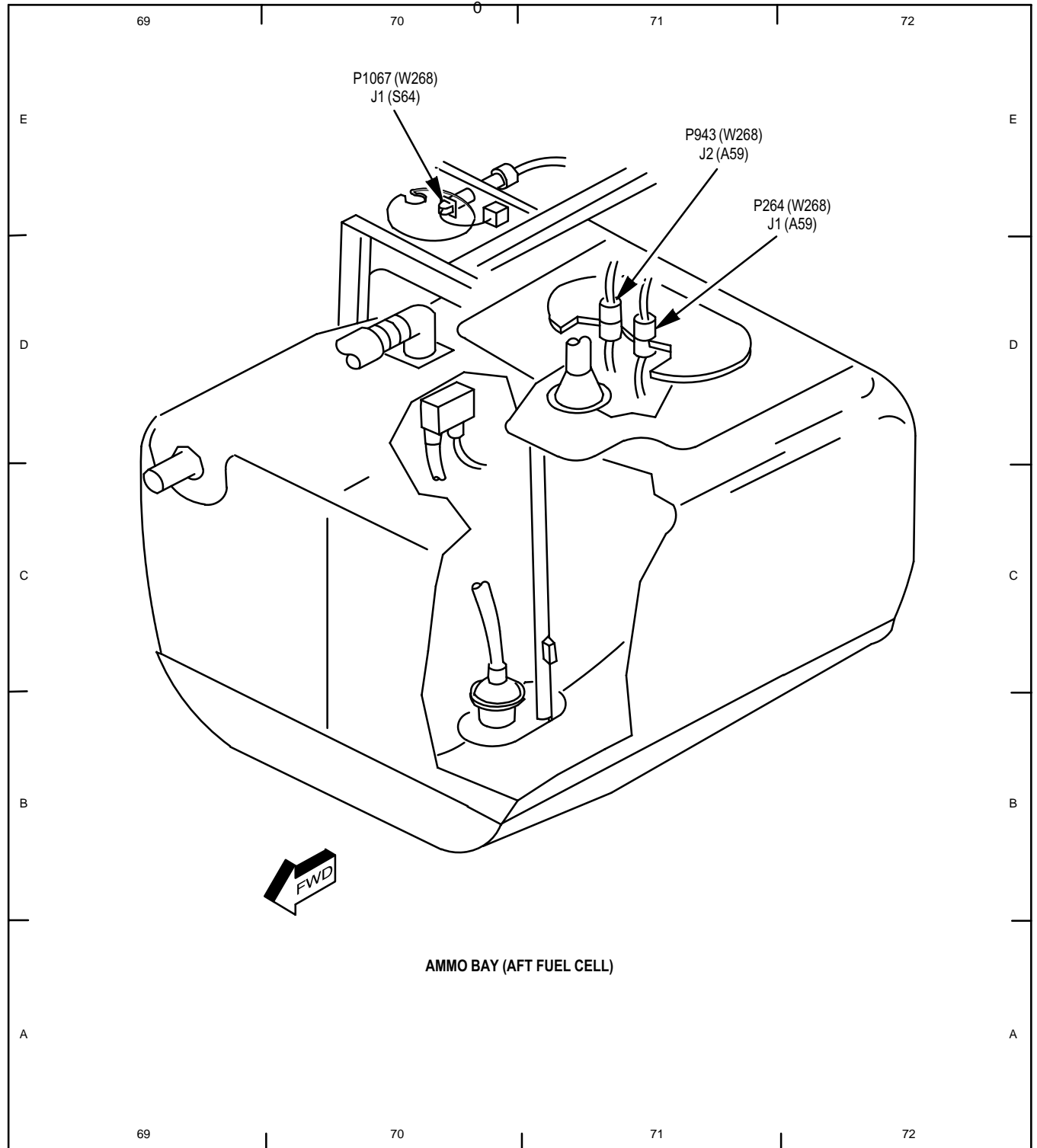


M70-036A

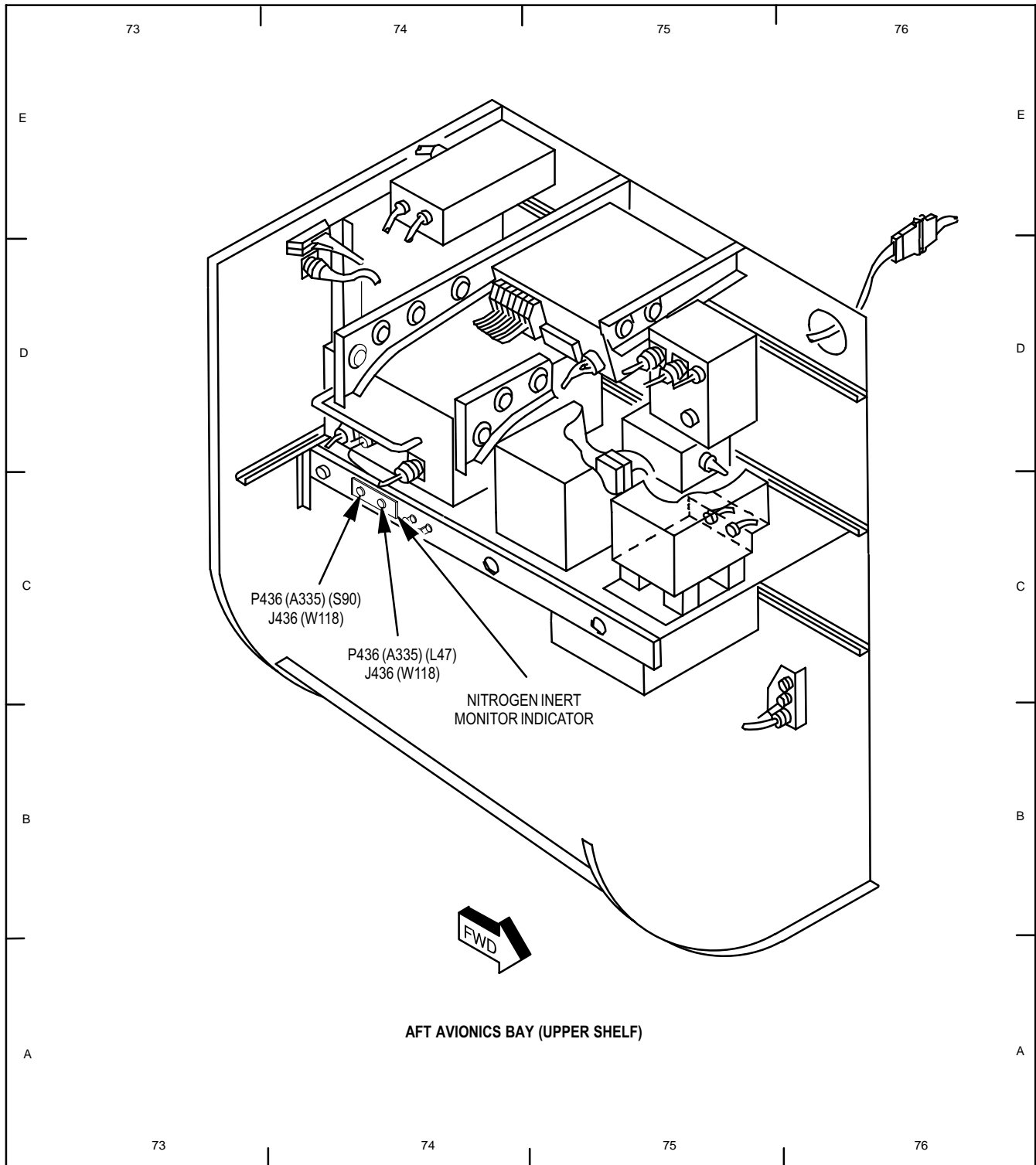


M70-037A

10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)



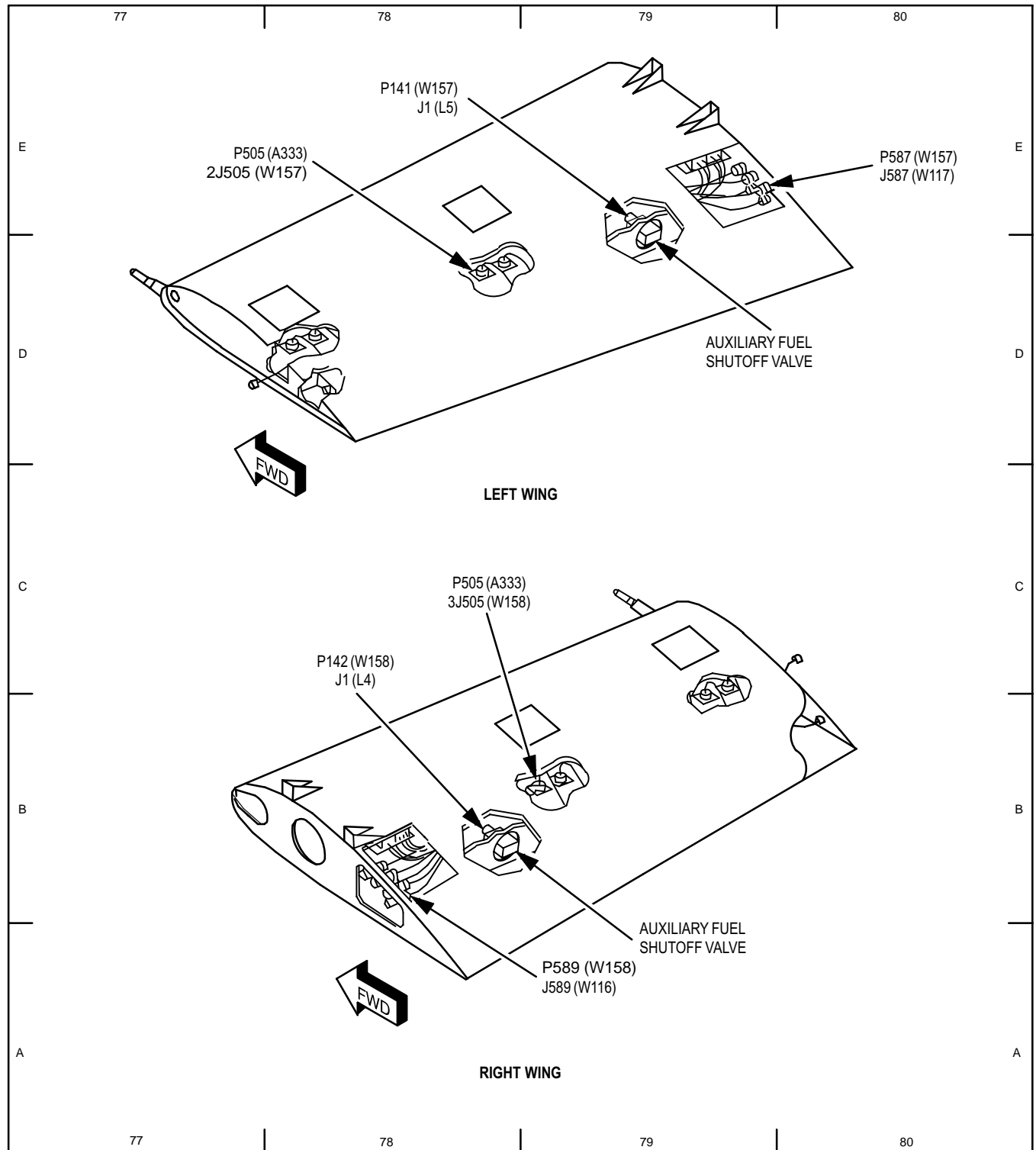
M70-038A



M70-352

10-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

10-9



M70-043A

10-10. FUEL SYSTEM – POWER UP

10-10

Tools:

Nomenclature	Part Number
Tool Kit, Aircraft Mechanic's	SC518099CLA01

References:

TM 1-1520-238-23

Equipment Conditions:

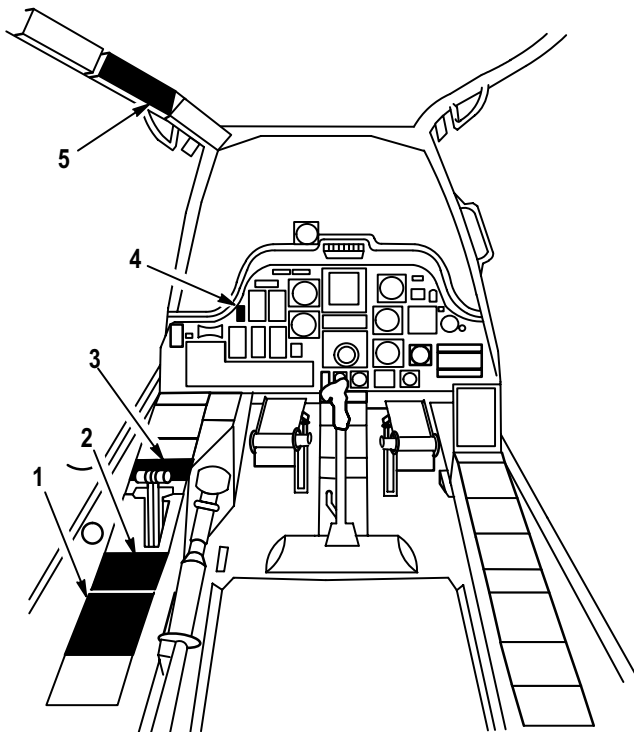
Ref	Condition
TM 1-1520-238-23	Helicopter safed External power application – Electrical Pressurized air

Personnel Required:

67R Attack Helicopter Repairer
One person to assist

NOTE

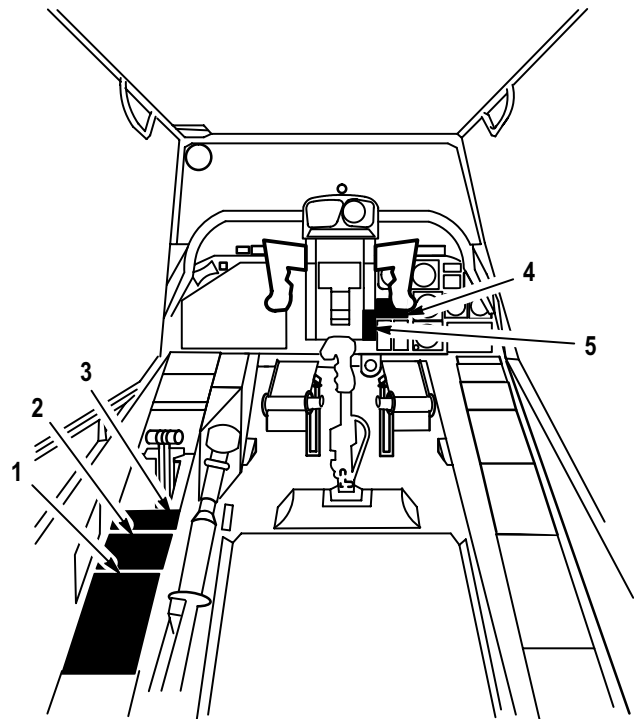
Refer to pilot station (fig. 10-28) and CPG station (fig. 10-29) for cockpit configuration and equipment.



1. PILOT EXT LT / INTR LT PANEL
2. PILOT FUEL PANEL
3. PILOT ELEC PWR PANEL
4. PILOT DIM / TEST PANEL
5. PILOT CIRCUIT BREAKER PANEL (CENTER)

M70-044

Figure 10-28. Pilot Station



1. CPG CIRCUIT BREAKER PANEL 1
2. CPG INTR LT PANEL
3. CPG FUEL PANEL
4. CPG SELECTABLE DIGITAL DISPLAY PANEL
5. CPG DIM / TEST PANEL

M70-045

Figure 10-29. CPG Station

WARNING

Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory. Work in a well ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.

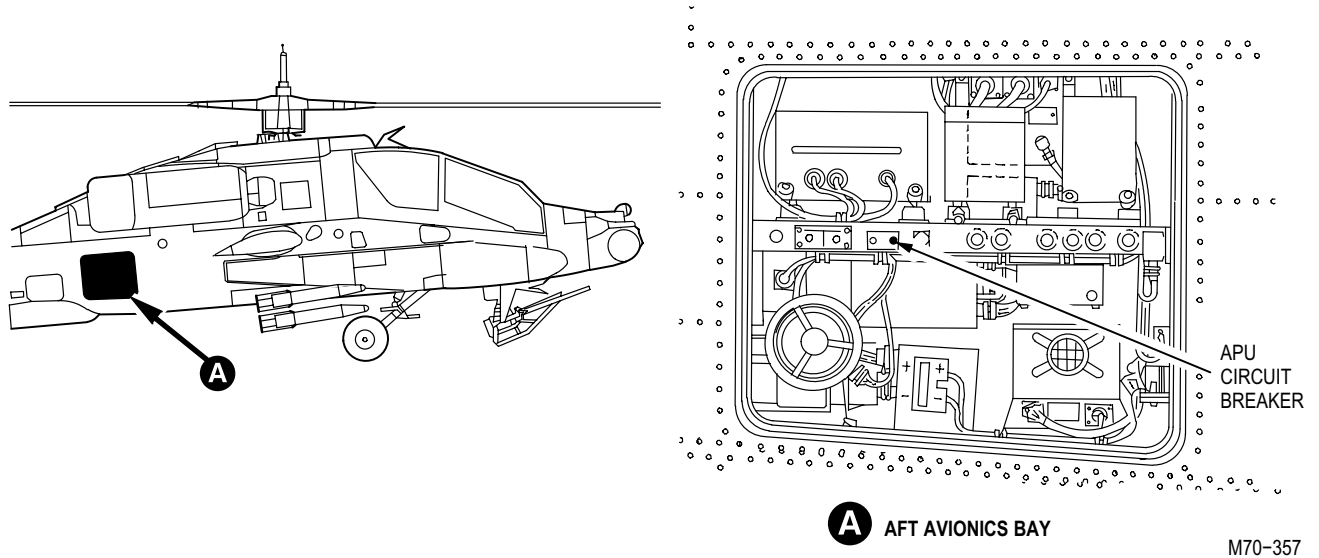
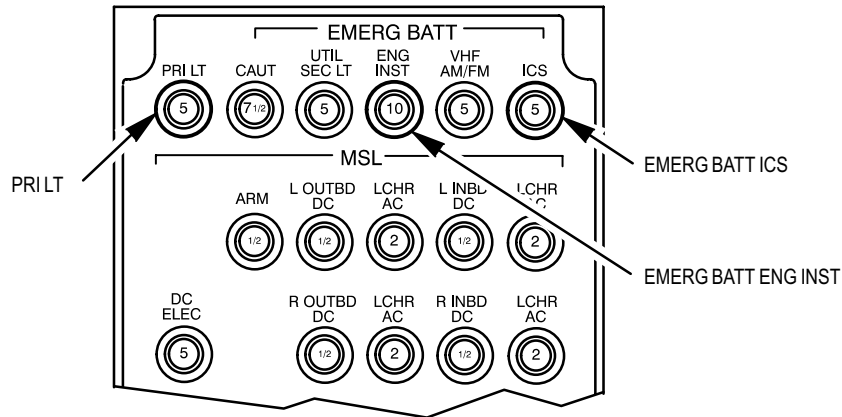


Figure 10-30. APU Circuit Breaker Location

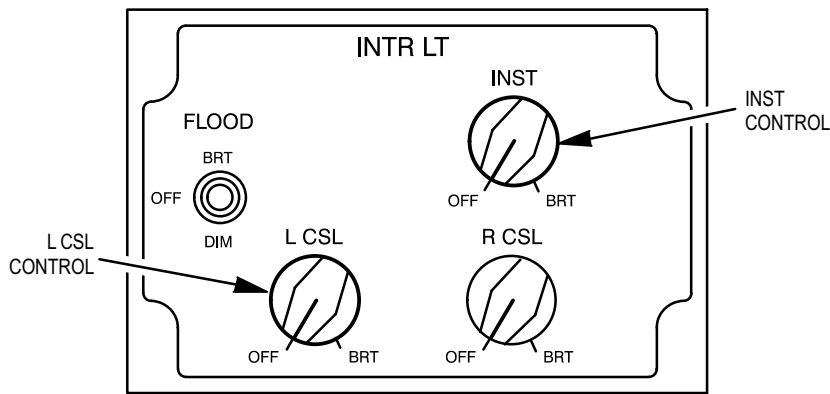
1. In aft avionics bay, close the **APU** circuit breaker CB148 (fig. 10-30).
2. At CPG station, set switches/circuit breakers as follows (figs. 10-31 thru 10-33):

Location	Name	Position (set to)
Circuit breaker panel 1	PRI LT	Closed
	EMERG BATT ICS	Closed
	EMERG BATT ENG INST	Closed
INTR LT panel	INST	BRT
	L CSL	BRT
FUEL panel	ORIDE	PLT
	TK SEL	NORM
	BOOST	OFF
	TRANS	OFF



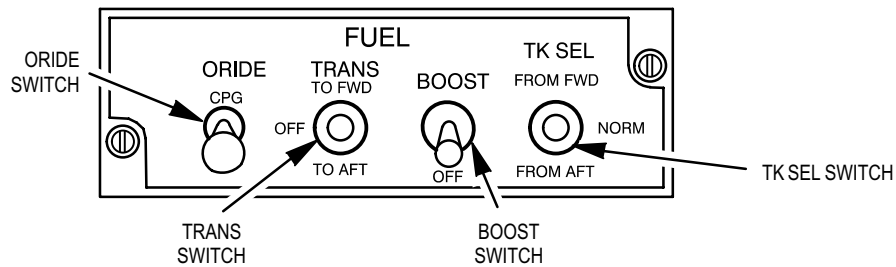
M70-046

Figure 10-31. CPG Circuit Breaker Panel 1



M70-047

Figure 10-32. CPG INTR LT Panel



M70-048

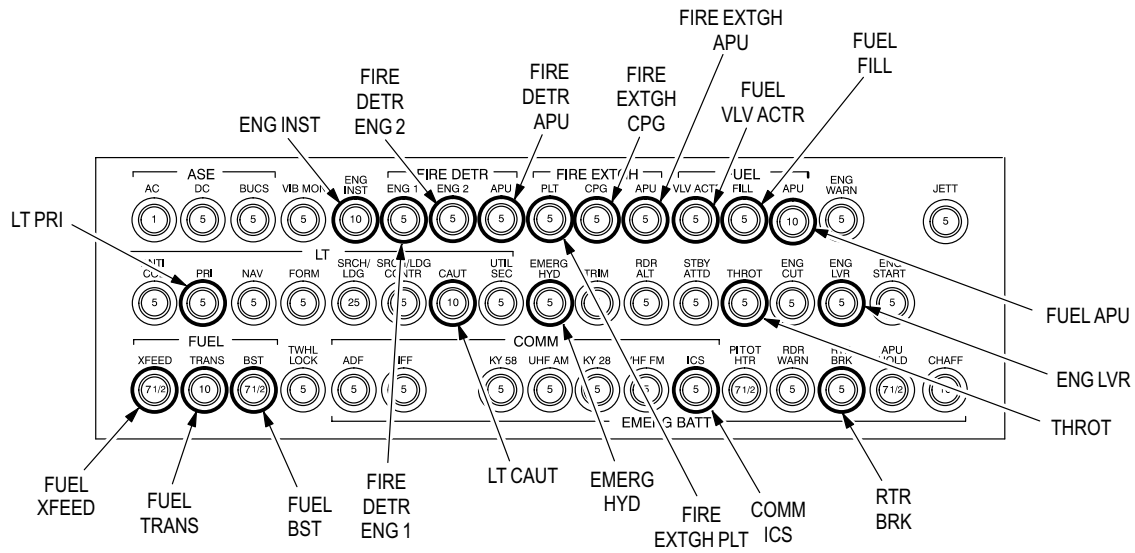
Figure 10-33. CPG FUEL Panel

3. On pilot center circuit breaker panel (fig. 10-34), check that the following circuit breakers are closed:

- | | | |
|-----------------|----------------|-----------------|
| ENG INST | FUEL APU | LT CAUT |
| FIRE DETR ENG 2 | ENG LVR | FIRE DETR ENG 1 |
| FIRE DETR APU | THROT | FUEL BST |
| FIRE EXTGH CPG | RTR BRK | FUEL TRANS |
| FIRE EXTGH APU | COMM ICS | FUEL XFEED |
| FUEL VLV ACTR | FIRE EXTGH PLT | LT PRI |
| FUEL FILL | EMERG HYD | |

10-10. FUEL SYSTEM – POWER UP (cont)

10-10

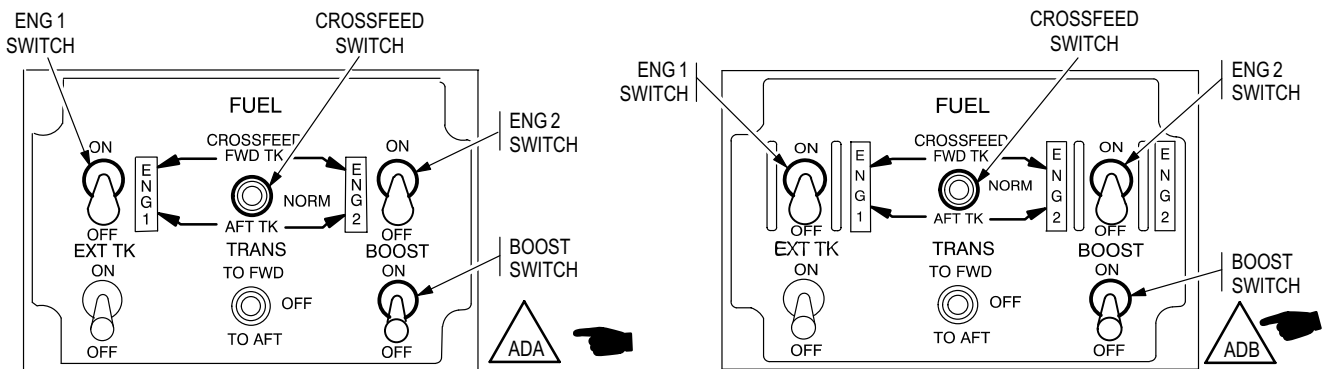


M70-049

Figure 10-34. Pilot Center Circuit Breaker Panel

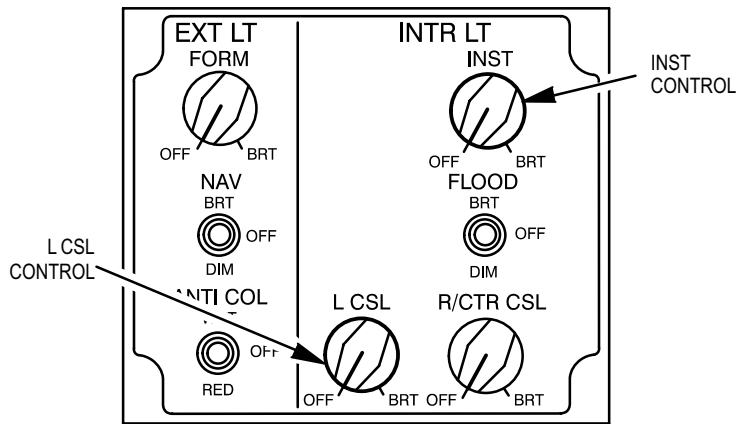
4. At pilot station, set switches as follows (figs. 10-35 thru 10-37):

Location	Name	Position (set to)
FUEL panel	TRANS	OFF
	CROSSFEED	NORM
	ENG 2	OFF
	BOOST	OFF
	EXT TK	OFF
	ENG 1	OFF
EXT LT/INTR LT panel	INST	BRT
	L CSL	BRT
Dim/test panel	DGT OFF/NORM/TST	OFF
	DIM	BRT



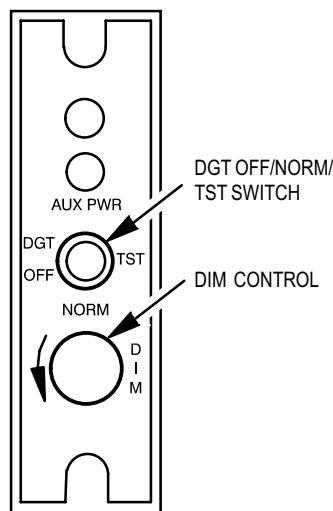
M70-050A

Figure 10-35. Pilot FUEL Panel



M70-051A

Figure 10-36. Pilot EXT LT/INTR LT Panel



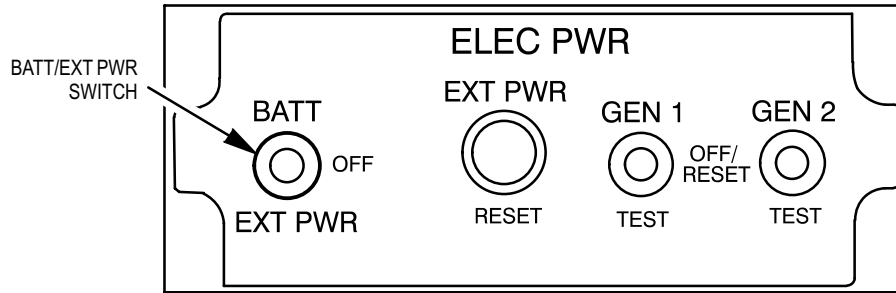
M70-052

Figure 10-37.

NOTE

If aviation ground power unit (AGPU) is not available, use helicopter APU to provide electrical/PAS power (TM 1-1520-238-23).

5. On pilot **ELEC PWR** panel (fig. 10-38), set **BATT/EXT PWR** switch to **EXT PWR**.

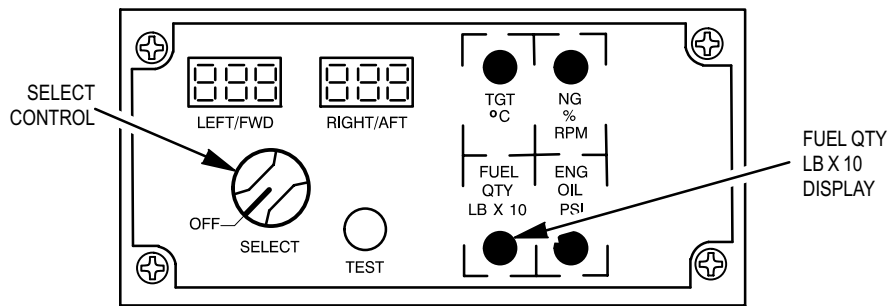


M70-053

Figure 10-38. Pilot ELEC PWR Panel

6. At CPG station, set switch as follows (fig. 10-39):

Location	Name	Position (set to)
Selectable digital display	SELECT	FUEL QTY LB X 10



M70-054

Figure 10-39. CPG Selectable Digital Display

END OF TASK

10-11. FUEL SYSTEM – POWER DOWN

10-11

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

References:

TM 1-1520-238-23

Equipment Conditions:

Personnel Required:

67R Attack Helicopter Repairer
One person to assist

<u>Ref</u>	<u>Condition</u>
Paragraph 10-10	FUEL SYSTEM – POWER UP completed

1. At CPG station, set switches/circuit breakers (fig. 10-31 thru 10-33 and 10-39) as follows:

<u>Location</u>	<u>Name</u>	<u>Position (set to)</u>
Circuit breaker panel 1	PRI LT	Open
	EMERG BATT ICS	Open
	EMERG BATT ENG INST	Open
INTR LT panel	INST	OFF
	L CSL	OFF
FUEL panel	ORIDE	PLT
	TK SEL	NORM
	BOOST	OFF
	TRANS	OFF
Selectable digital display	SELECT	OFF

2. On pilot center circuit breaker panel (fig. 10-34), open the following circuit breakers:

ENG INST	FUEL APU	LT CAUT
FIRE DETR ENG 2	ENG LVR	FIRE DETR ENG 1
FIRE DETR APU	THROT	FUEL BST
FIRE EXTGH CPG	RTR BRK	FUEL TRANS
FIRE EXTGH APU	COMM ICS	FUEL XFEED
FUEL VLV ACTR	FIRE EXTGH PLT	LT PRI
FUEL FILL	EMERG HYD	

3. At pilot station, set switches as follows (fig. 10-35 thru 10-37):

<u>Location</u>	<u>Name</u>	<u>Position (set to)</u>
FUEL panel	TRANS	OFF
	CROSSFEED	NORM
	ENG 2	OFF
	BOOST	OFF
	EXT TK	OFF
	ENG 1	OFF
EXT LT/INTR LT panel	INST	OFF
	L CSL	OFF
Dim/test panel	DGT OFF/NORM/TST	OFF
	DIM	OFF

10-11. FUEL SYSTEM – POWER DOWN (cont)

10-11

4. On pilot **ELEC PWR** panel (fig. 10-38), set **BATT/EXT PWR** switch to **OFF**.
5. Shut down APU (if operating) (TM 1-1520-238-23).
6. In aft avionics bay (fig. 10-30), open **APU** circuit breaker CB148.
7. Remove external power – electrical and pressurized air (TM 1-1520-238-23).

END OF TASK

10-12. HELICOPTER FUEL SYSTEM – VISUAL CHECK

10-12

Tools:

Nomenclature
Tool Kit, Aircraft
Mechanic's

Part Number
SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

WARNING

Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory. Work in a well ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.

1. Visually examine helicopter exterior for signs of fuel leakage (fig. 10-40). Look at the ground beneath the helicopter as well as the fuselage. Pay particular attention to the fuel cell areas, the ammunition bay and the aft avionics bay.

NOTE

Minor fuel leaks from overboard vent tubes are normal in warm climates because of fuel expansion.

2. Complete the visual check as follows:

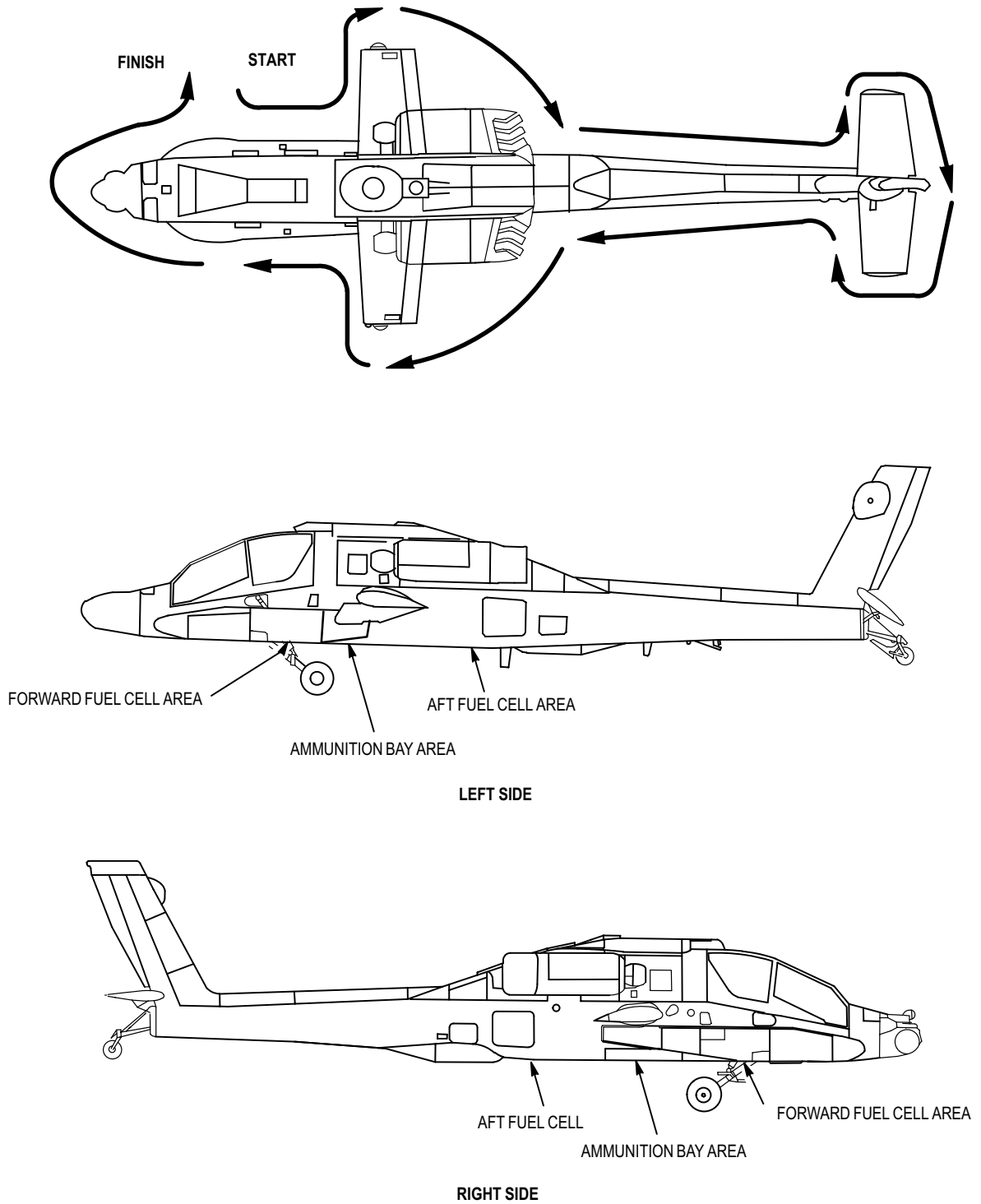
Task	Result
a. Are fuel leaks present?	If fuel leaks are present, go to paragraph 10-13.
b. Place fuel sample container under forward sump drain hose. Press and hold forward push-to-drain control (fig. 10-41).	If fuel does not flow from sump drain hose, go to paragraph 10-15.
c. Release the forward push-to-drain control.	If fuel continues to flow from sump drain hose, go to paragraph 10-14.
d. Check the fuel sample taken from the forward fuel cell.	If fuel is contaminated, go to paragraph 10-16.
e. Place fuel sample container under aft sump drain hose. Press and hold aft push-to-drain control.	If fuel does not flow from sump drain hose, go to paragraph 10-15.
f. Release the aft push-to-drain control.	If fuel continues to flow from sump drain hose, go to paragraph 10-14.
g. Check the fuel sample taken from the aft fuel cell.	If fuel is contaminated, go to paragraph 10-16.

3. Properly dispose of fuel samples.

END OF TASK

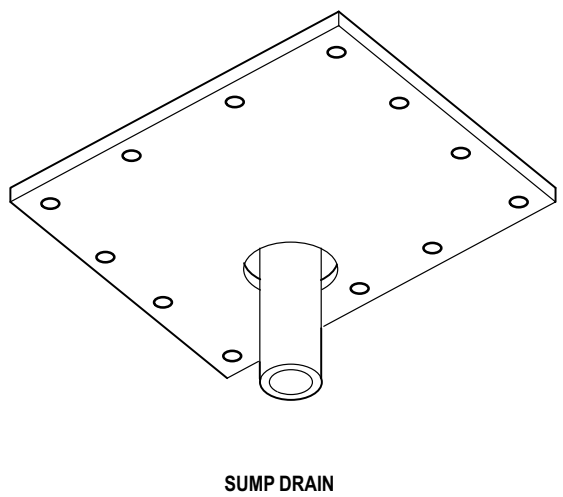
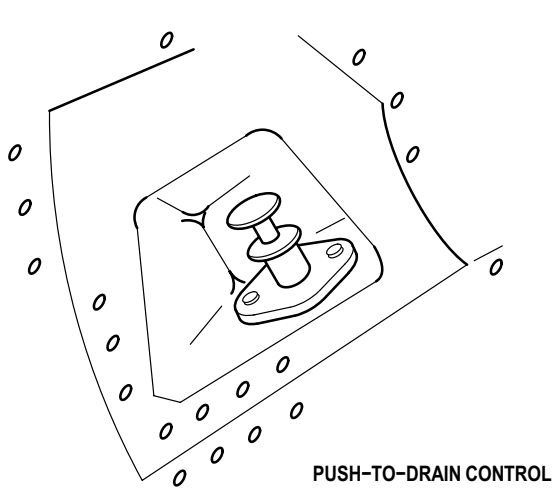
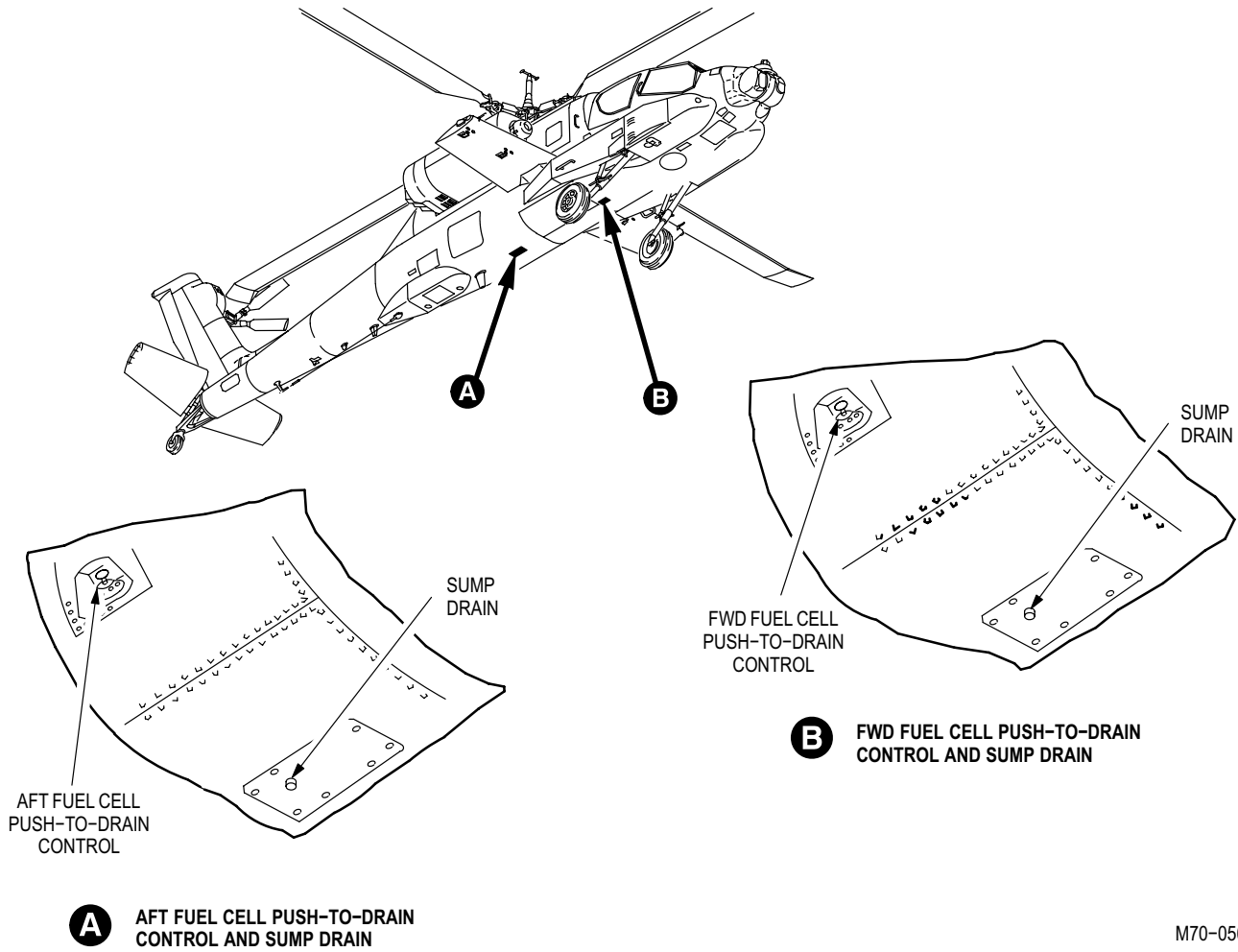
10-12. HELICOPTER FUEL SYSTEM – VISUAL CHECK

10-12



M70-055

Figure 10-40. Helicopter Visual Check



M70-056

M70-057

Figure 10-41. Fuel Cell Push-to-Drain Controls and Sump Drains

10-13. FUEL – LEAKAGE

10-13**Tools:**

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:TM 1-1520-238-23

1. Check helicopter.

Can fuel leakage area be identified?

YES	Replace faulty component (TM 1-1520-238-23).
NO	Trace fuel leaks to locate problem area. Check fuel cell for cracks or punctures. Check components and fuel lines for damage. Replace leaking component (TM 1-1520-238-23).

END OF TASK

10-14. FUEL – CONTINUES TO DRAIN FROM SUMP DRAIN AFTER PUSH-TO-DRAIN CONTROL IS RELEASED

10-14

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Pail, Utility (2)	A-A-1273

Personnel Required:

67R Attack Helicopter Repairer

References:TM 1-1520-238-23

1. Defuel helicopter. Remove push-to-drain control. Check control for damage (TM 1-1520-238-23).

Is control operational?

YES	Replace sump drain valve (TM 1-1520-238-23).
NO	Replace push-to-drain control (TM 1-1520-238-23).

END OF TASK

10-15. FUEL – DOES NOT FLOW FROM SUMP DRAIN AFTER PUSH-TO-DRAIN CONTROL IS PRESSED

10-15

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:TM 1-1520-238-23

1. Check amount of fuel in fuel cells.

Is fuel present in fuel cells?

YES	Go to step 2.
NO	Refuel helicopter. Go to paragraph 10-12.

2. Press push-to-drain control.

Does control have spring loaded action?

YES	Go to step 3.
NO	Replace push-to-drain control (TM 1-1520-238-23).

3. Defuel helicopter. Check sump drain valve opening for obstruction.

Are there any obstructions?

YES	Remove obstructions. Go to paragraph 10-12.
NO	Replace sump drain valve (TM 1-1520-238-23).

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:FM 10-68
TM 1-1520-238-23

1. Examine fuel sample.

Are metal or packing fragments visible in fuel sample?

YES	Go to step 2.
NO	Take corrective action to decontaminate fuel system (FM 10-68).

2. Defuel helicopter and visually inspect fuel system components for damage (TM 1-1520-238-23).

Can contamination source be identified?

YES	Replace contamination source, and decontaminate fuel system (TM 1-1520-238-23).
NO	Flush fuel cells. Replace fuel filters (TM 1-1520-238-23). To isolate fault, go to paragraphs 10-17 and 10-47.

END OF TASK

10-17. FUEL CROSSFEED/BOOST SYSTEM – MAINTENANCE OPERATIONAL CHECK

10-17

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Pail, Utility (2)	A-A-1273

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L200 and R200 access panels removed
Paragraph 10-12	HELICOPTER FUEL SYSTEM – VISUAL CHECK completed
Paragraph 10-10	FUEL SYSTEM – POWER UP completed
TM 1-1520-238-T-4	Maintenance headset connected
TM 1-1520-238-T-6	Pilot and CPG caution/warning maintenance operational check performed

Personnel Required:

67R Attack Helicopter Repairer (3)
Two people to assist

References:

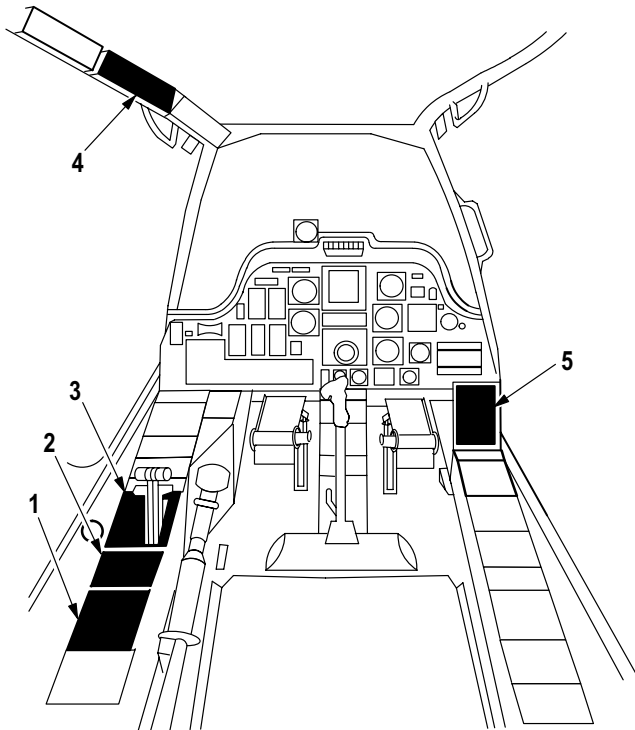
FM 10-68
TM 1-1520-238-T-4
TM 1-1520-238-T-6
TM 9-1090-208-23-1
TM 1-1520-238-23
TM 1-1520-238-CL

WARNING

- Make sure helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting or maintenance tasks. Failure to do so could result in death or serious injury. If injury occurs, seek medical aid.
- Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well-ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.
- Do not allow sparks or flame near helicopter when servicing or performing maintenance on fuel system.
- Make sure helicopter and drains are properly grounded (FM 10-68).

NOTE

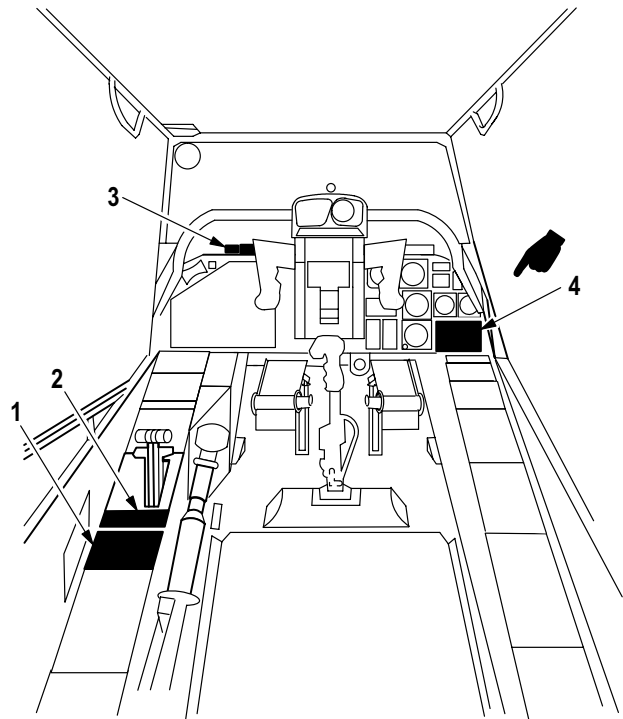
- Refer to pilot station (fig. 10-42) and CPG station (fig. 10-43) for cockpit configuration and equipment.
- If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.
- Amber XFEED indicators on pilot and CPG caution/warning panels (fig.10-51) will light with pilot FUEL panel (fig. 10-46) ENG 1 and ENG 2 switches set to OFF (engine 1 and engine 2 crossfeed/shutoff valves closed).



1. PILOT EXT LT / INTR LT PANEL
2. PILOT FUEL PANEL
3. PILOT POWER QUADRANT
4. PILOT CIRCUIT BREAKER PANEL (CENTER)
5. PILOT CAUTION / WARNING PANEL

M70-058A

Figure 10-42. Pilot Station



1. CPG INTR LT PANEL
2. CPG FUEL PANEL
3. CPG FIRE PULL HANDLES
4. CPG CAUTION / WARNING PANEL

M70-059A

Figure 10-43. CPG Station

1. Place utility pails or other suitable containers under engine 1 and 2 overboard drains (fig. 10-44).

10-17. FUEL CROSSFEED/BOOST SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

10-17

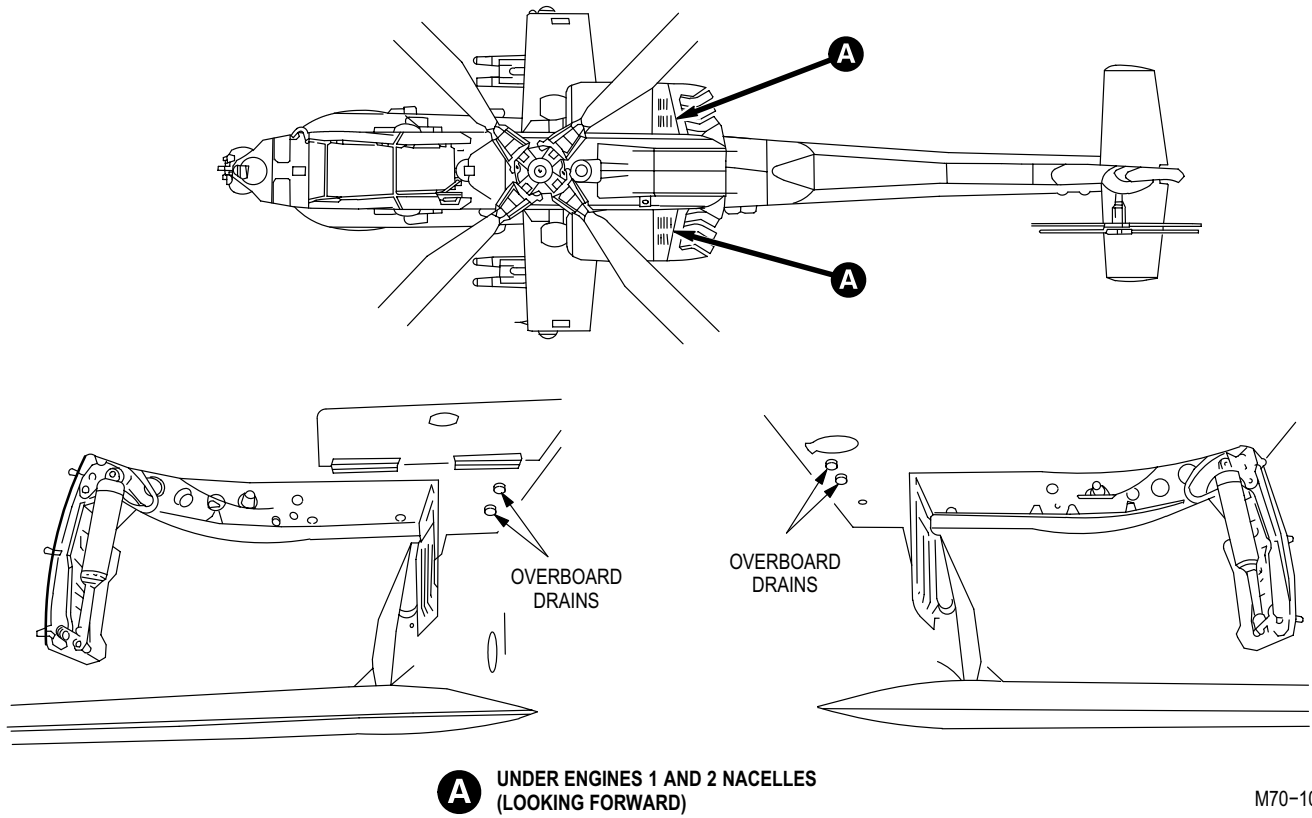
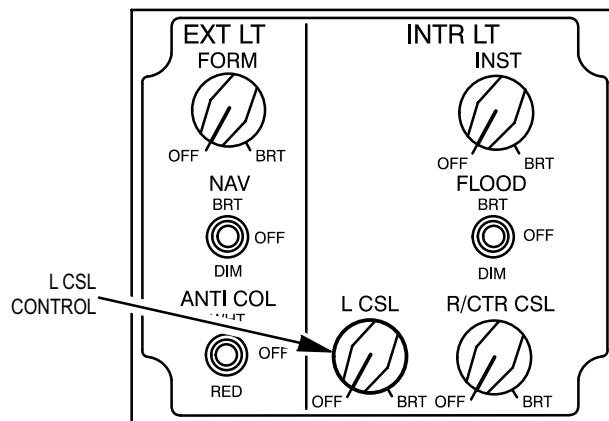


Figure 10-44. Engines 1 and 2 Overboard Drains

2. Complete the maintenance operational check as follows:

Task	Result
------	--------

- a. On pilot **EXT LT/INTR LT** panel (fig. 10-45), rotate **L CSL** control to **BRT**.



M70-060

Figure 10-45. Pilot EXT LT/INTR LT Panel

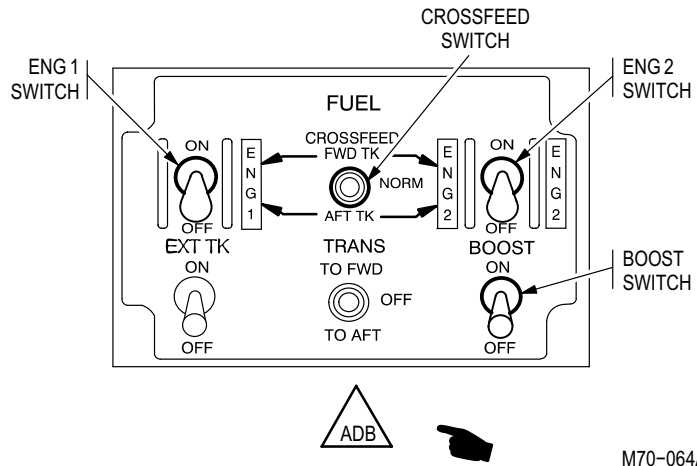
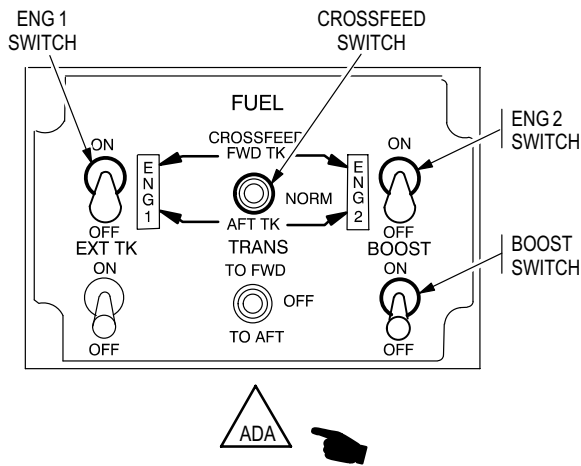
10-17. FUEL CROSSFEED/BOOST SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

Task

Result

- b. On pilot **FUEL** panel (fig. 10-46), check that edge-lights are lighted.

If edge-lights do not light, go to paragraph 10-19.



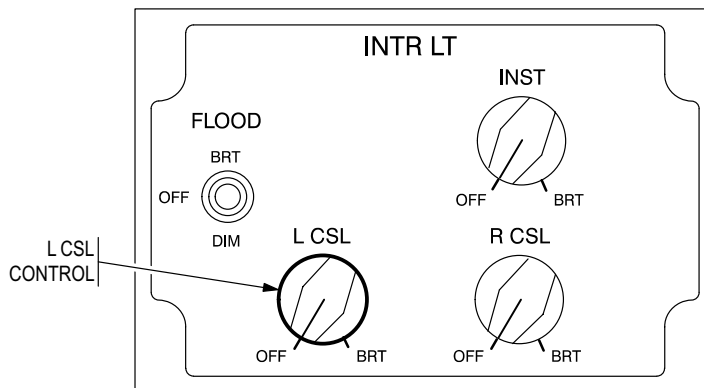
M70-064A

Figure 10-46. Pilot FUEL Panel

Task

Result

- c. On CPG **INTR LT** panel (fig. 10-47), rotate **L CSL** control to **BRT**.



M70-061

Figure 10-47. CPG INTR LT Panel

Task

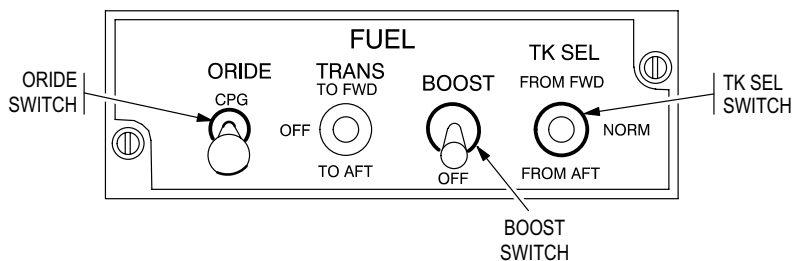
Result

- d. On CPG **FUEL** panel (fig. 10-48), check that edge-lights are lighted.

If edge-lights do not light, go to paragraph 10-20.

10-17. FUEL CROSSFEED/BOOST SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

10-17

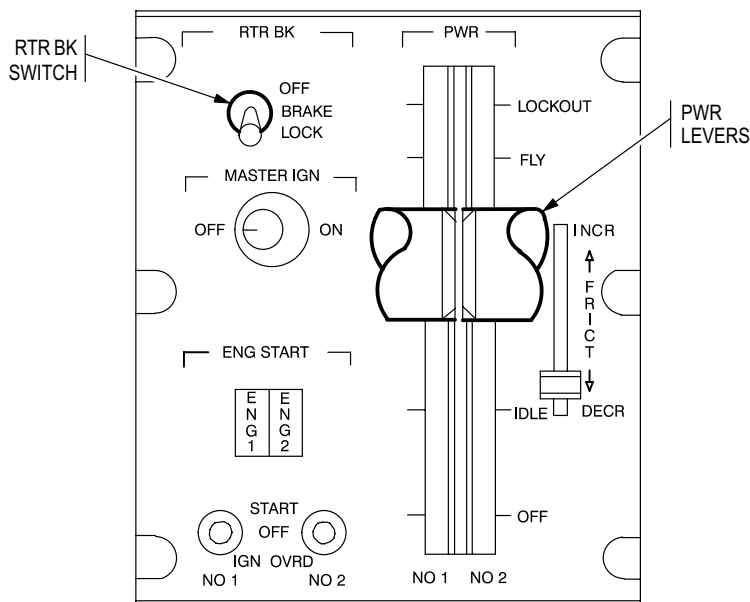


M70-066

Figure 10-48. CPG FUEL Panel

Task	Result
------	--------

- e. On pilot power quadrant (fig. 10-49), move engine **NO 1** and **NO 2 PWR** levers to **LOCKOUT**.



M70-062

Figure 10-49. Pilot Power Quadrant

Task	Result
------	--------

- f. On pilot center circuit breaker panel (fig. 10-50), check that **FUEL BST** and **FUEL XFEED** circuit breakers are closed.

If **FUEL BST** circuit breaker does not stay closed, go to paragraph 10-21.

(ADA) If **FUEL XFEED** circuit breaker does not stay closed, go to paragraph 10-22.

(ADB) If **FUEL XFEED** circuit breaker does not stay closed, go to paragraph 10-35B.

- g. (ADB) On pilot and CPG caution/warning panels (fig. 10-51), check that green **XFEED** indicators are not lighted.

If pilot and CPG green **XFEED** indicators are lighted, go to paragraph 10-35I.

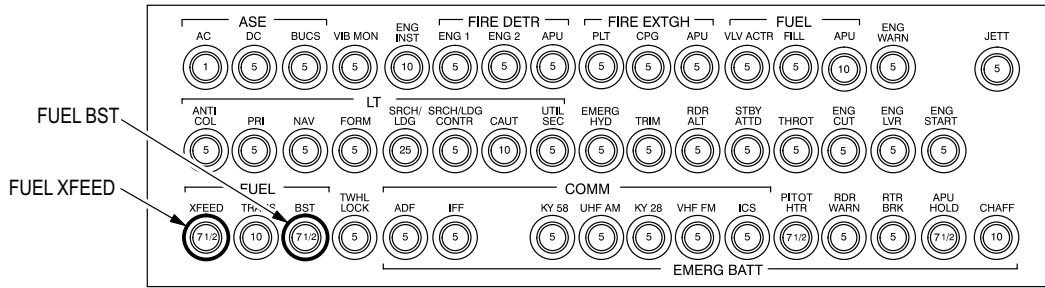
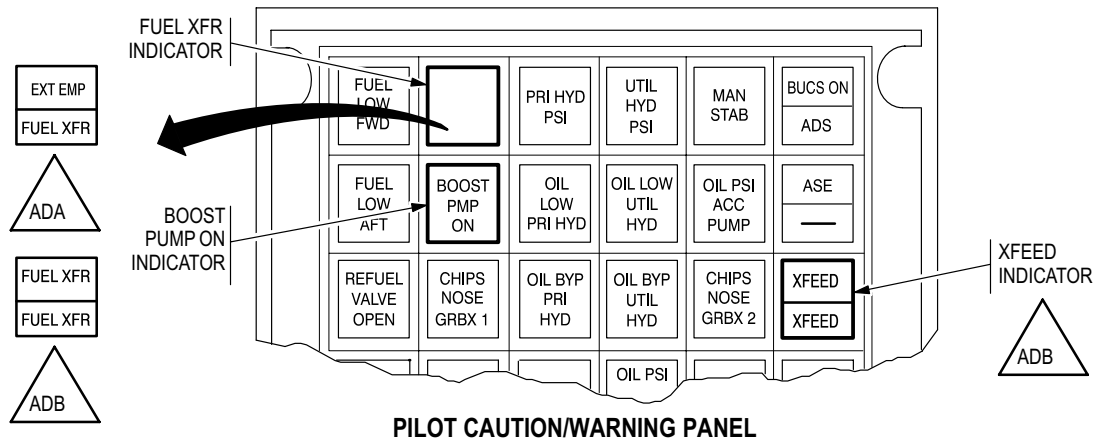
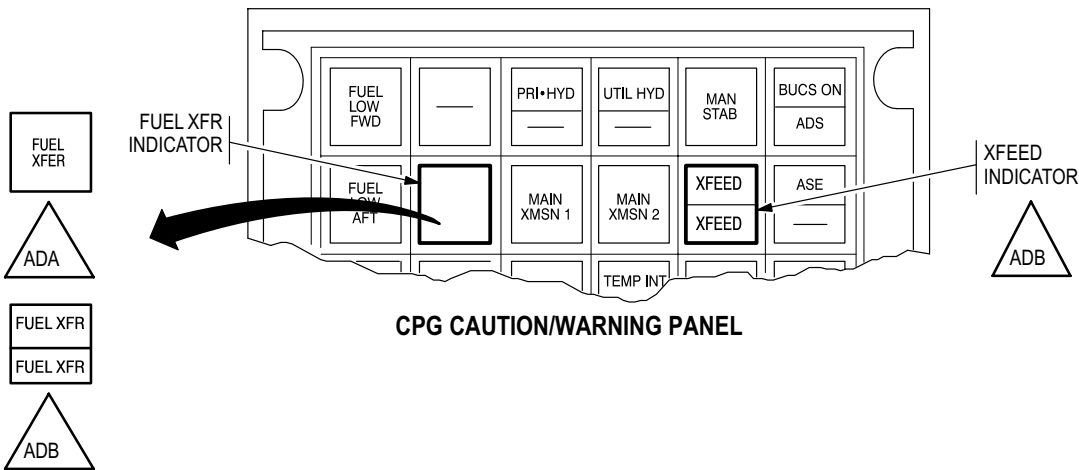


Figure 10-50. Pilot Center Circuit Breaker Panel

M70-063



PILOT CAUTION/WARNING PANEL



CPG CAUTION/WARNING PANEL

Figure 10-51. Pilot and CPG Caution/Warning Panels

M70-065-1

10-17. FUEL CROSSFEED/BOOST SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

10-17

Task

Result

NOTE

Fuel boost pump does not operate through pilot FUEL panel BOOST switch unless CROSSFEED switch is set to AFT TK.

h. On pilot **FUEL** panel (fig. 10-46), set **CROSSFEED** switch to **AFT TK**. Fuel crossfeed/shutoff valve indicator moves to aft position (fig. 10-53).

If engine 1 fuel crossfeed/shutoff valve indicator does not move aft, go to paragraph 10-32.

i. On pilot **FUEL** panel, set **ENG 2** switch to **ON**. Have assistant check engine 2 fuel crossfeed/shutoff valve indicator thru R200 (fig. 10-52). Fuel crossfeed/shutoff valve moves to aft position (fig. 10-53). Fuel may be discharged through engine 2 nacelle overboard drain.

If engine 2 fuel crossfeed/shutoff valve indicator does not move to aft position, go to paragraph 10-26.

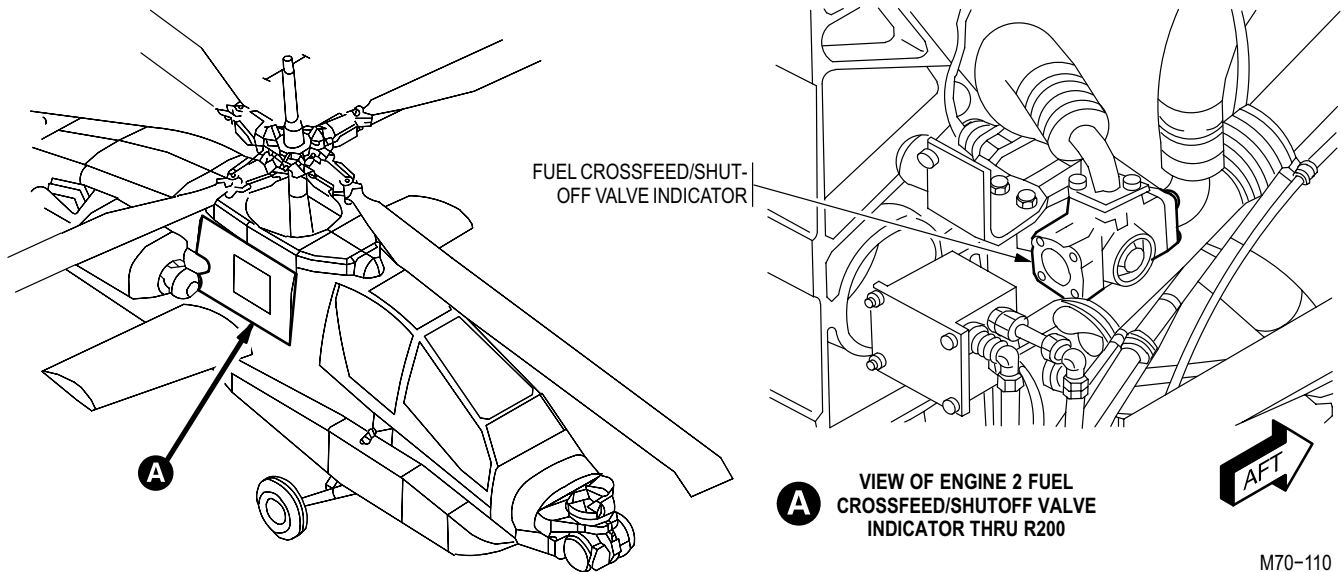
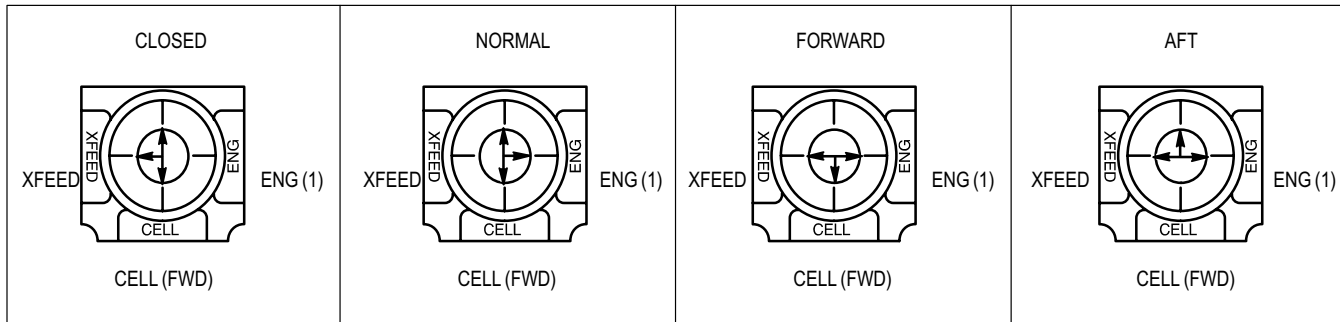
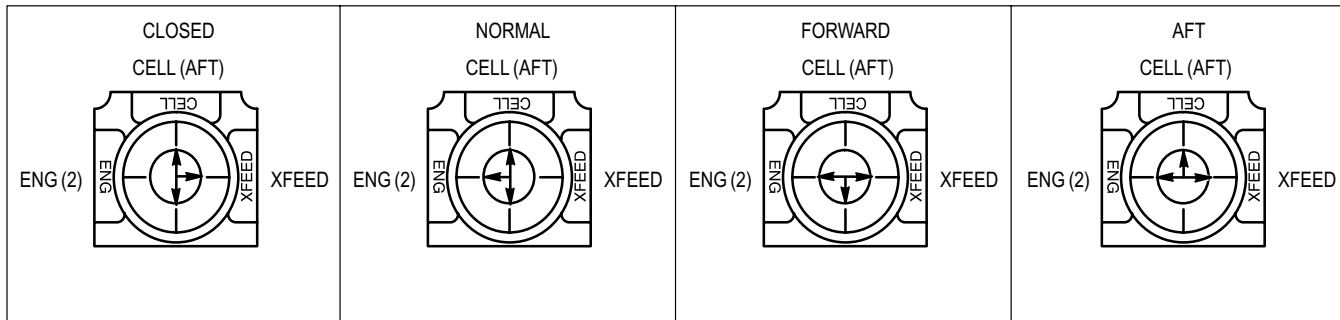


Figure 10-52. Engine 2 Fuel Crossfeed/Shutoff Valve Location

M70-110



ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR POSITIONS



ENGINE 2 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR POSITIONS

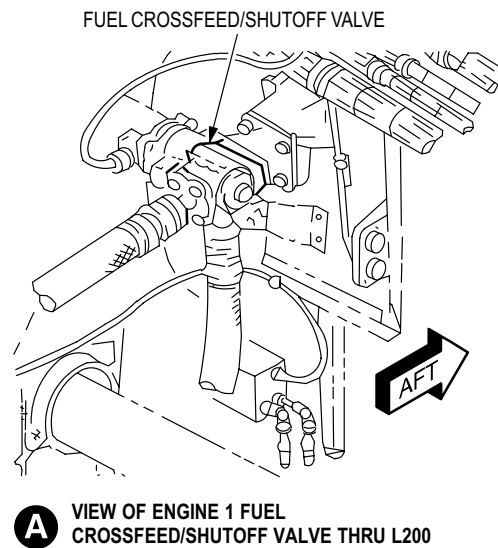
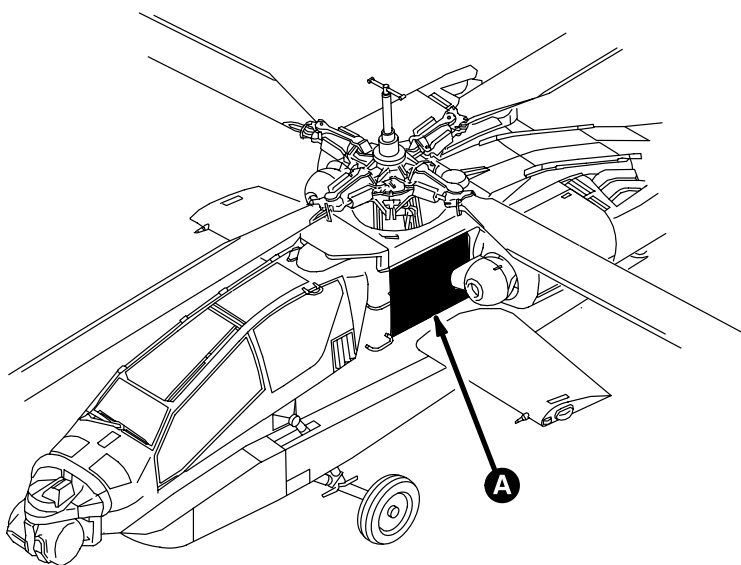
M70-111

Figure 10-53. Engine Fuel Crossfeed/Shutoff Valve Indicator Positions

Task	Result
------	--------

- j. Have assistant check engine 1 fuel crossfeed/shutoff valve indicator thru L200 (fig.10-54). Fuel crossfeed/shutoff valve indicator moves to closed position.

If engine 1 fuel crossfeed/shutoff valve indicator does not move to closed position, go to paragraph 10-29.



A VIEW OF ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE THRU L200

M70-109

Figure 10-54. Engine 1 Fuel Crossfeed/Shutoff Valve Location

10-17. FUEL CROSSFEED/BOOST SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

10-17

Task	Result
------	--------

k. (ADB) On pilot and CPG caution/warning panels (fig. 10-55), check that amber XFEED indicators are lighted.

If pilot and CPG amber XFEED indicators are not lighted, go to paragraph 10-35A.

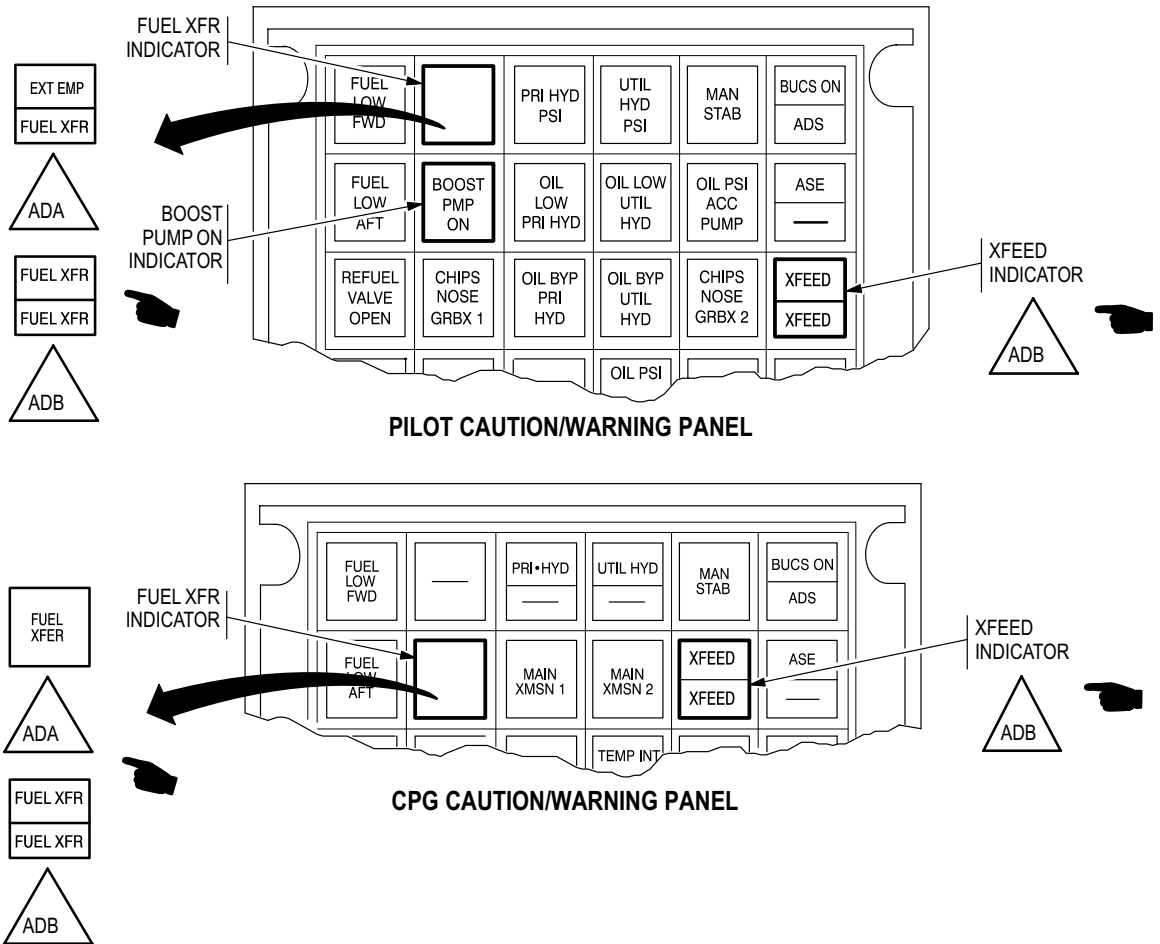


Figure 10-55. Pilot and CPG Caution/Warning Panels

M70-065-2A

10-17. FUEL CROSSFEED/BOOST SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont) 10-17

Task	Result
<p>l. On pilot FUEL panel (fig. 10-46), set ENG 1 switch to ON. Engine 1 fuel crossfeed/shutoff valve indicator moves to aft position.</p>	<p>(ADB) If FUEL XFEED circuit breaker (fig. 10-50) does not stay closed, go to paragraph 10-35E.</p> <p>If engine 1 fuel crossfeed/shutoff valve indicator does not move to aft position, go to paragraph 10-32.</p>
<p>m. (ADB) On pilot and CPG caution/warning panels (fig. 10-58), check that green XFEED indicators are lighted.</p>	<p>If pilot and CPG green XFEED indicators are not lighted, go to paragraph 10-35C.</p>
<p>n. (ADB) On pilot and CPG caution/warning panels, check that amber XFEED indicators are not lighted.</p>	<p>If amber XFEED indicators are lighted, go to paragraph 10-35D.</p>
<p>o. On pilot FUEL panel, set BOOST switch to ON. Fuel may be discharged through engines 1 and 2 and nacelle overboard drains.</p>	<p>If FUEL BST circuit breaker does not stay closed, go to paragraph 10-43.</p> <p>If FUEL BOOST switch does not stay ON with CROSSFEED switches set to AFT TK, go to paragraph 10-45.</p>
<p>p. On pilot caution/warning panel, check that BOOST PMP ON indicator is lighted.</p>	<p>If BOOST PMP ON indicator is not lighted, go to paragraph 10-23.</p>
<p>q. On pilot FUEL panel, set CROSSFEED switch to NORM. BOOST switch moves to OFF. BOOST PMP ON indicator is not lighted. Engine 2 fuel crossfeed/shutoff valve indicator moves to normal position (fig. 10-53).</p>	<p>If BOOST switch does not move to OFF, go to paragraph 10-46.</p> <p>If BOOST PMP ON indicator is lighted with BOOST switch OFF, go to paragraph 10-25.</p> <p>If engine 2 fuel crossfeed/shutoff valve indicator does not move to normal, go to paragraph 10-27.</p>
<p>r. On pilot FUEL panel (fig. 10-46), set CROSSFEED switch to FWD TK. Engine 1 and Engine 2 fuel crossfeed/shutoff valve indicators move to forward position (fig. 10-53).</p>	<p>If engine 1 fuel crossfeed/shutoff valve indicator does not move to forward position, go to paragraph 10-30.</p> <p>If engine 2 fuel crossfeed/shutoff valve indicator does not move to forward, go to paragraph 10-28.</p>
<p>s. (ADB) On pilot and CPG caution/warning panels (fig. 10-59), check that green XFEED indicators are lighted.</p>	<p>(ADB) If FUEL XFEED circuit breaker (fig. 10-50) does not stay closed, go to paragraph 10-35H.</p> <p>If pilot and CPG green XFEED indicators are not lighted, go to paragraph 10-35F.</p>

10-17. FUEL CROSSFEED/BOOST SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

10-17

Task	Result
t. On pilot FUEL panel, set CROSSFEED switch to AFT TK .	
u. Have assistant positioned to check fuel overboard drains beneath engines 1 and 2 nacelles (fig. 10-44).	
v. On pilot FUEL panel, set BOOST switch to ON . On pilot caution/warning panel, BOOST PMP ON indicator lights, and fuel flows from engines 1 and 2 nacelle fuel overboard drains.	<p>If BOOST PMP ON indicator is not lighted, replace lamp (TM 1-1520-238-23). If replaced lamp is not lighted, go to paragraph 10-23.</p> <p>If fuel does not flow from engines 1 and 2 nacelle overboard drains, refer to TM 1-1520-238-T-4 to troubleshoot engines.</p>
w. On pilot FUEL panel, set CROSSFEED switch to NORM , BOOST switch moves to OFF . On pilot caution/warning panel, BOOST PMP ON indicator is not lighted. Fuel stops flowing from engines 1 and 2 nacelle overboard drains.	<p>If BOOST PMP ON indicator is lighted, go to paragraph 10-25.</p> <p>If fuel flows from engines 1 and 2 nacelle overboard drains, refer to TM 1-1520-238-T-4 to troubleshoot engines.</p>
x. On pilot FUEL panel, verify ENG 2 switch is set to ON .	
y. On pilot FUEL panel, set CROSSFEED switch to AFT TK .	
z. On CPG FUEL panel (fig. 10-48), set ORIDE switch to CPG . Engines 1 and 2 fuel crossfeed/shutoff valve indicators move to normal position.	<p>If FUEL BST circuit breaker does not stay closed, go to paragraph 10-44.</p> <p>If engine 1 fuel crossfeed/shutoff valve indicator does not move to normal position with ORIDE switch set to CPG, go to paragraph 10-33.</p> <p>If engine 2 fuel crossfeed/shutoff valve indicator does not move to normal position with ORIDE switch set to CPG, go to paragraph 10-37.</p>
aa. (ADB) On pilot and CPG caution/warning panels (fig. 10-60) that amber XFEED indicators are not lighted.	<p>If pilot and CPG amber XFEED indicators are lighted, go to paragraph 10-35G.</p>
ab. On CPG FUEL panel, set TK SEL switch to FROM AFT . Engines 1 and 2 fuel crossfeed/shutoff valve indicators move to aft position.	<p>If engine 1 fuel crossfeed/shutoff valve indicator does not move to aft position, go to paragraph 10-34.</p> <p>If engine 2 fuel crossfeed/shutoff valve indicator does not move to aft position, go to paragraph 10-35.</p>

10-17. FUEL CROSSFEED/BOOST SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont) 10-17

Task	Result
<p>ac. On CPG FUEL panel, set BOOST switch to BOOST. Fuel flows from engines 1 and 2 nacelle overboard drains (fig. 10-44).</p>	<p>If FUEL BST circuit breaker does not stay closed, go to paragraph 10-44.</p> <p>If boost pump does not operate with ORIDE switch set to CPG, go to paragraph 10-36.</p> <p>If fuel does not flow from engine 1 nacelle overboard drain, refer to TM 1-1520-238-T-4 to troubleshoot engine.</p> <p>If fuel does not flow from engine 2 nacelle overboard drain, refer to TM 1-1520-238-T-4 to troubleshoot engine.</p>
<p>ad. On CPG FUEL panel, set TK SEL switch to NORM. BOOST switch moves to OFF, engine 1 and engine 2 fuel crossfeed/shutoff valve moves to normal position (fig. 10-53), and fuel stops flowing from engines 1 and 2 nacelle overboard drains.</p>	<p>If BOOST switch is ON with TK SEL switch not set to FROM AFT, replace CPG FUEL panel (TM 1-1520-238-23).</p> <p>If engine 1 fuel crossfeed/shutoff valve indicator does not move to normal position, go to paragraph 10-33.</p> <p>If engine 2 fuel crossfeed/shutoff valve indicator does not move to normal position, go to paragraph 10-37.</p> <p>If fuel flows from engine 1 nacelle overboard drain, refer to TM 1-1520-238-T-4 to troubleshoot engine.</p> <p>If fuel flows from engine 2 nacelle overboard drain, refer to TM 1-1520-238-T-4 to troubleshoot engine.</p>
<p>ae. On CPG FUEL panel (fig. 10-48), set TK SEL switch to FROM FWD. Engines 1 and 2 crossfeed/shutoff valve indicators move to forward position.</p>	<p>If engine 1 fuel crossfeed/shutoff valve indicator does not move to forward position, go to paragraph 10-38.</p> <p>If engine 2 fuel crossfeed/shutoff valve indicator does not move to forward position, go to paragraph 10-41.</p>
<p>af. On CPG FUEL panel, set ORIDE switch to PLT. Engines 1 and 2 fuel crossfeed/shutoff valve indicators move to aft position.</p>	<p>If engine 1 fuel crossfeed/shutoff valve indicator does not move to aft position, go to paragraph 10-32.</p> <p>If engine 2 fuel crossfeed/shutoff valve indicator does not move to aft position, go to paragraph 10-26.</p>

10-17. FUEL CROSSFEED/BOOST SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont) 10-17

Task	Result
ag. On pilot FUEL panel (fig. 10-46), set CROSSFEED switch to NORM . Engines 1 and 2 fuel crossfeed/shutoff valve indicators move to normal position (fig. 10-53).	If engine 1 fuel crossfeed/shutoff valve indicator does not move to normal position, go to paragraph 10-31. If engine 2 fuel crossfeed/shutoff valve indicator does not move to normal position, go to paragraph 10-27.
ah. On pilot FUEL panel, set ENG 1 and ENG 2 switches to OFF . Engines 1 and 2 fuel crossfeed/shutoff valve indicators move to closed position.	If engine 1 fuel crossfeed/shutoff valve indicator does not move to closed position, go to paragraph 10-29. If engine 2 fuel crossfeed/shutoff valve indicator does not move to closed position, go to paragraph 10-24.

NOTE

- **If engine fuel delivery components have been removed, reinstalled or replaced, perform the following steps.**
- **Engine will flame out until fuel displaces air in fuel lines.**

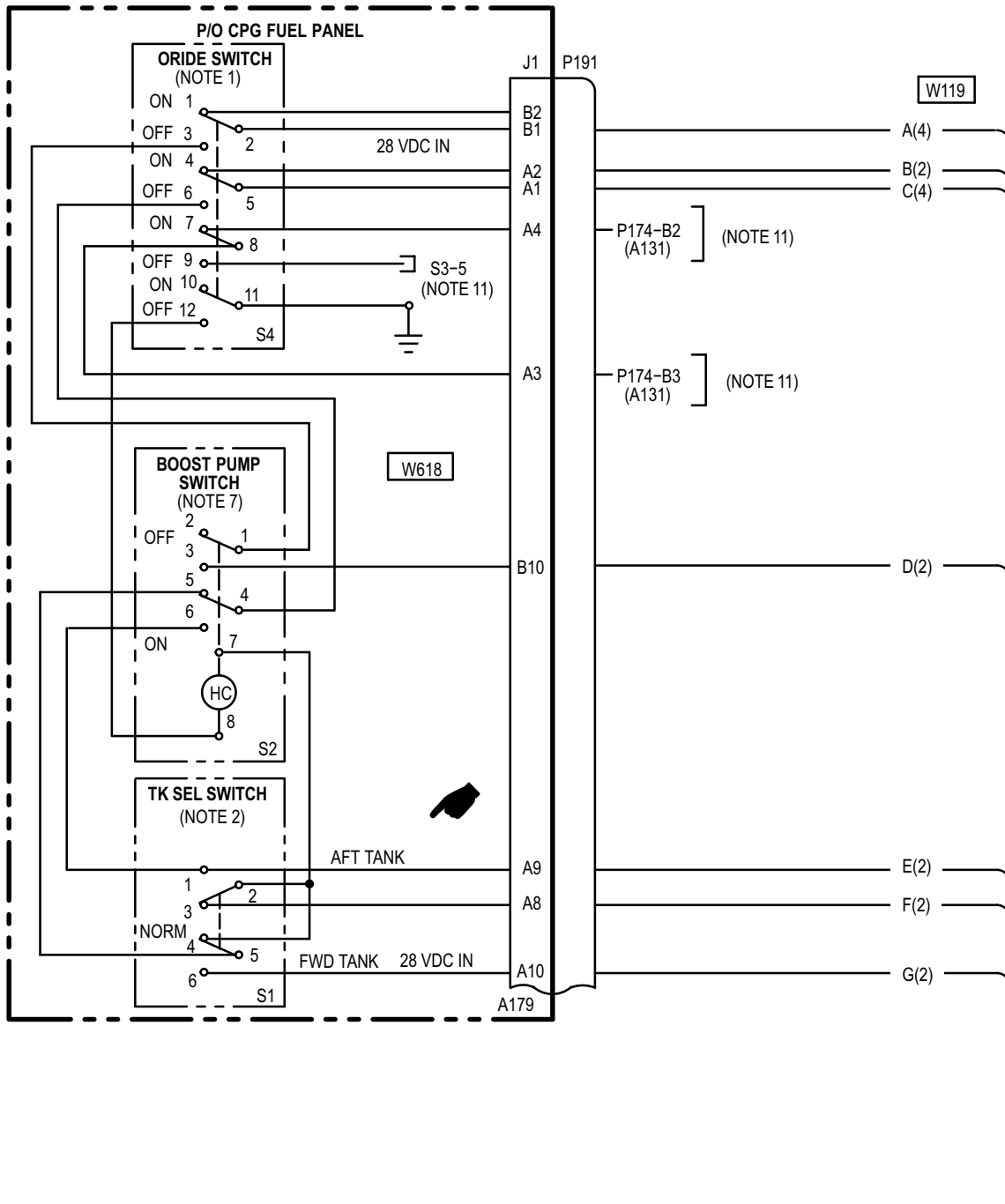
Task	Result
ai. Have pilot start and operate appropriate engine (TM 1-1520-238-CL). Repeat starting procedures as required (within limits) until engine no longer flames out.	
aj. After temperature and pressures have stabilized, shut down engine (TM 1-1520-238-CL).	

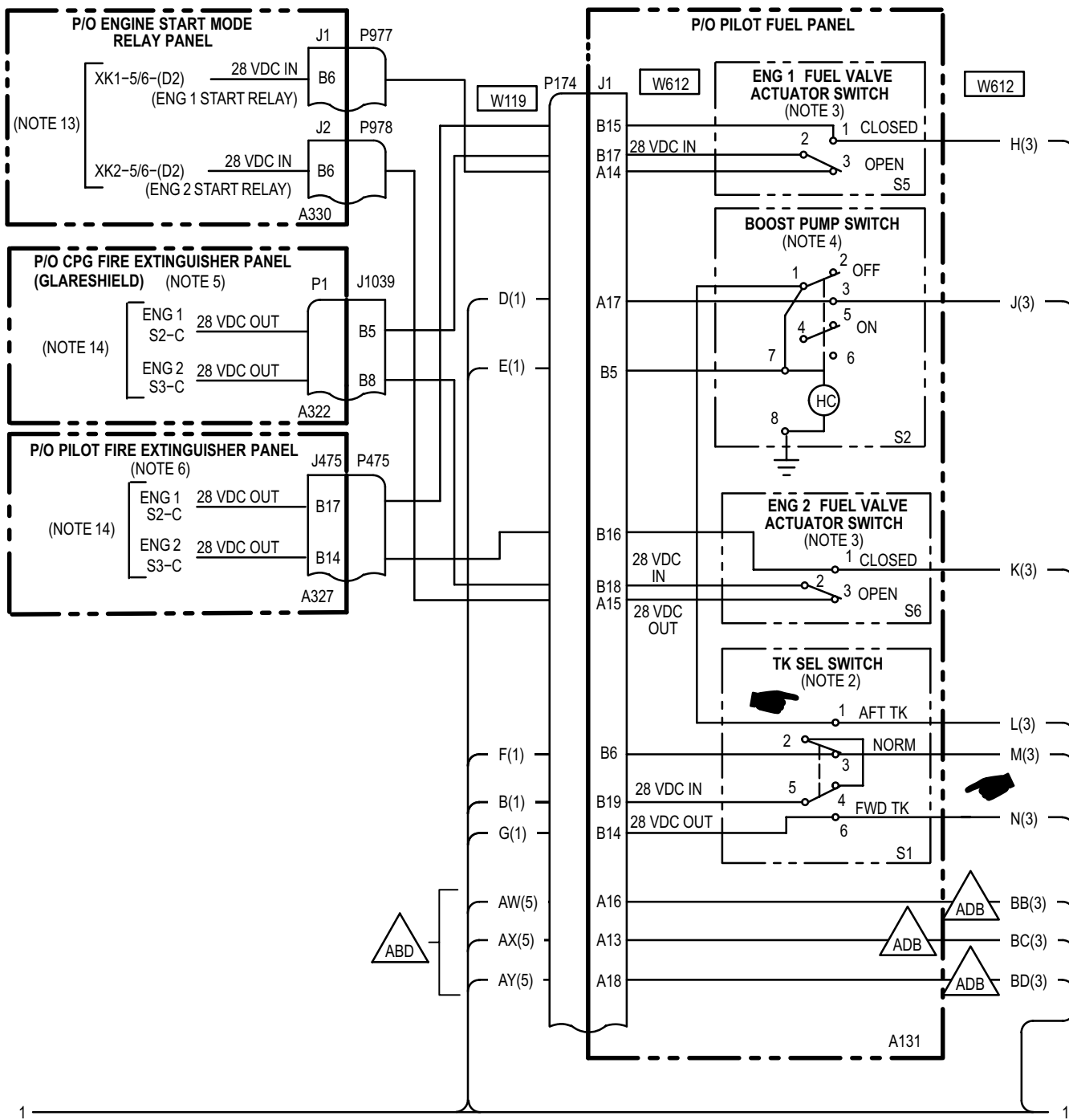
-
3. Perform FUEL SYSTEM – POWER DOWN (para 10-11).
 4. Disconnect maintenance headset (TM 1-1520-238-T-4).
 5. Secure access panels L200 and R200.

END OF TASK

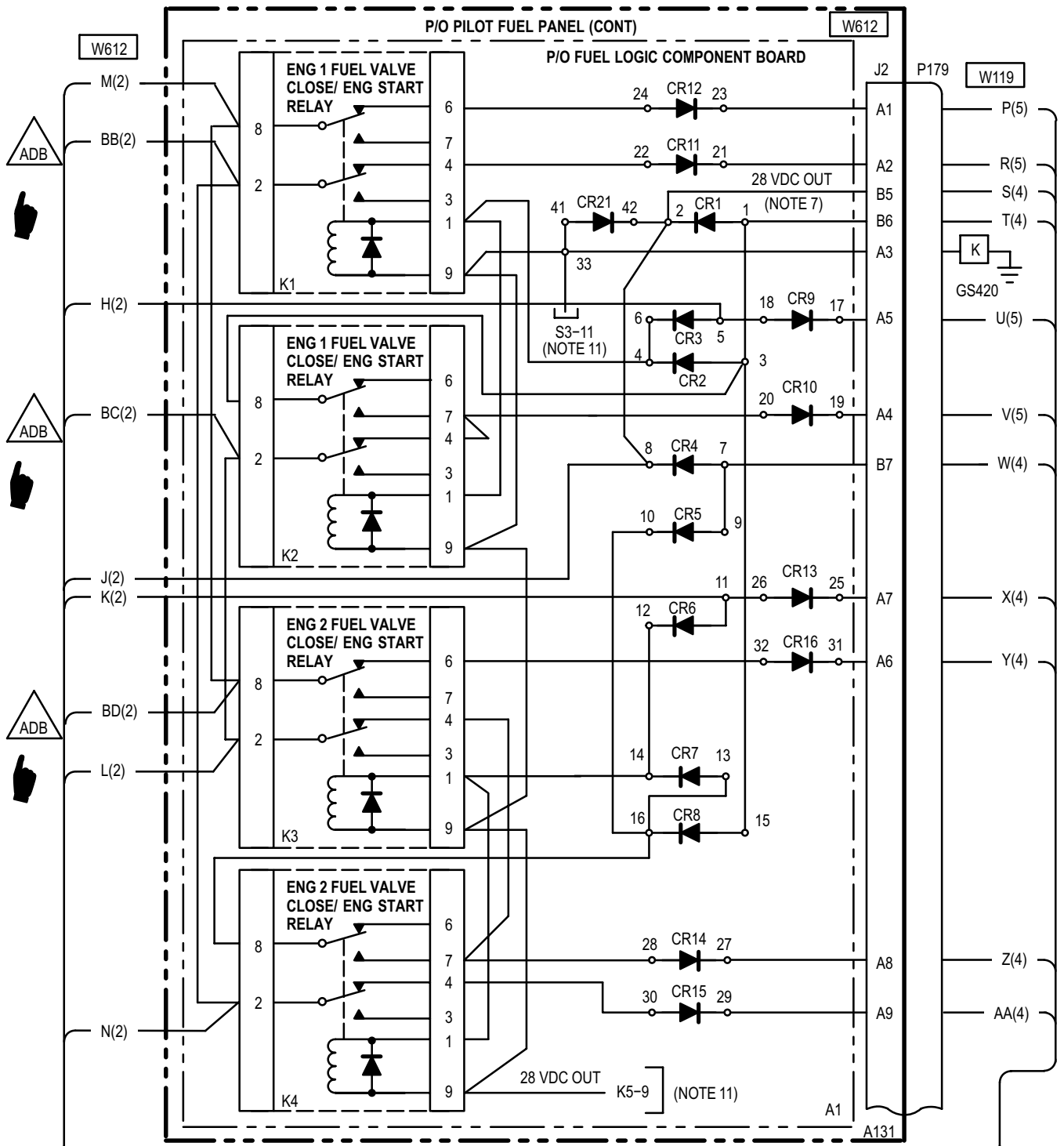
10-18. FUEL CROSSFEED/BOOST SYSTEM – WIRING INTERCONNECT DIAGRAM

10-18

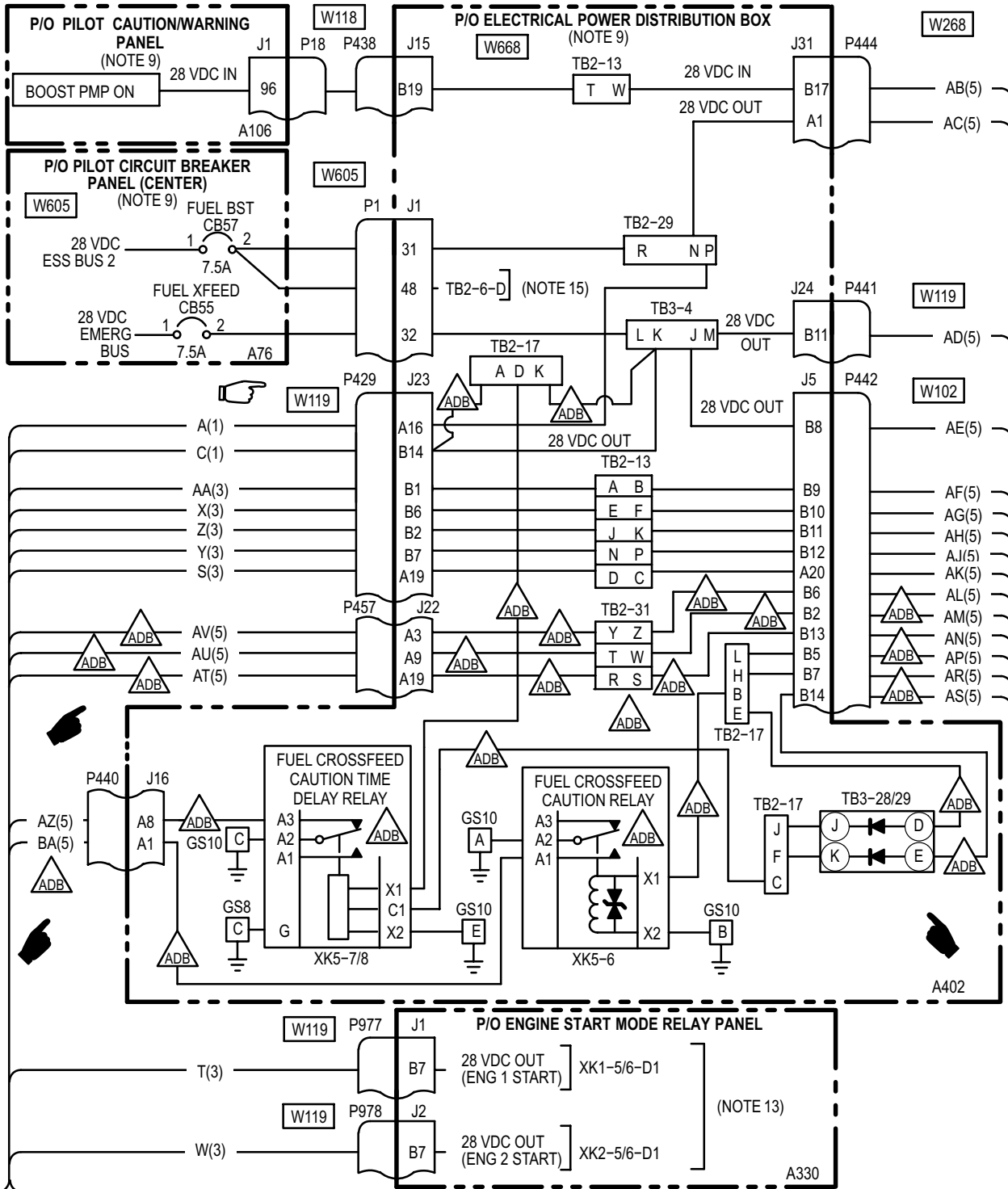




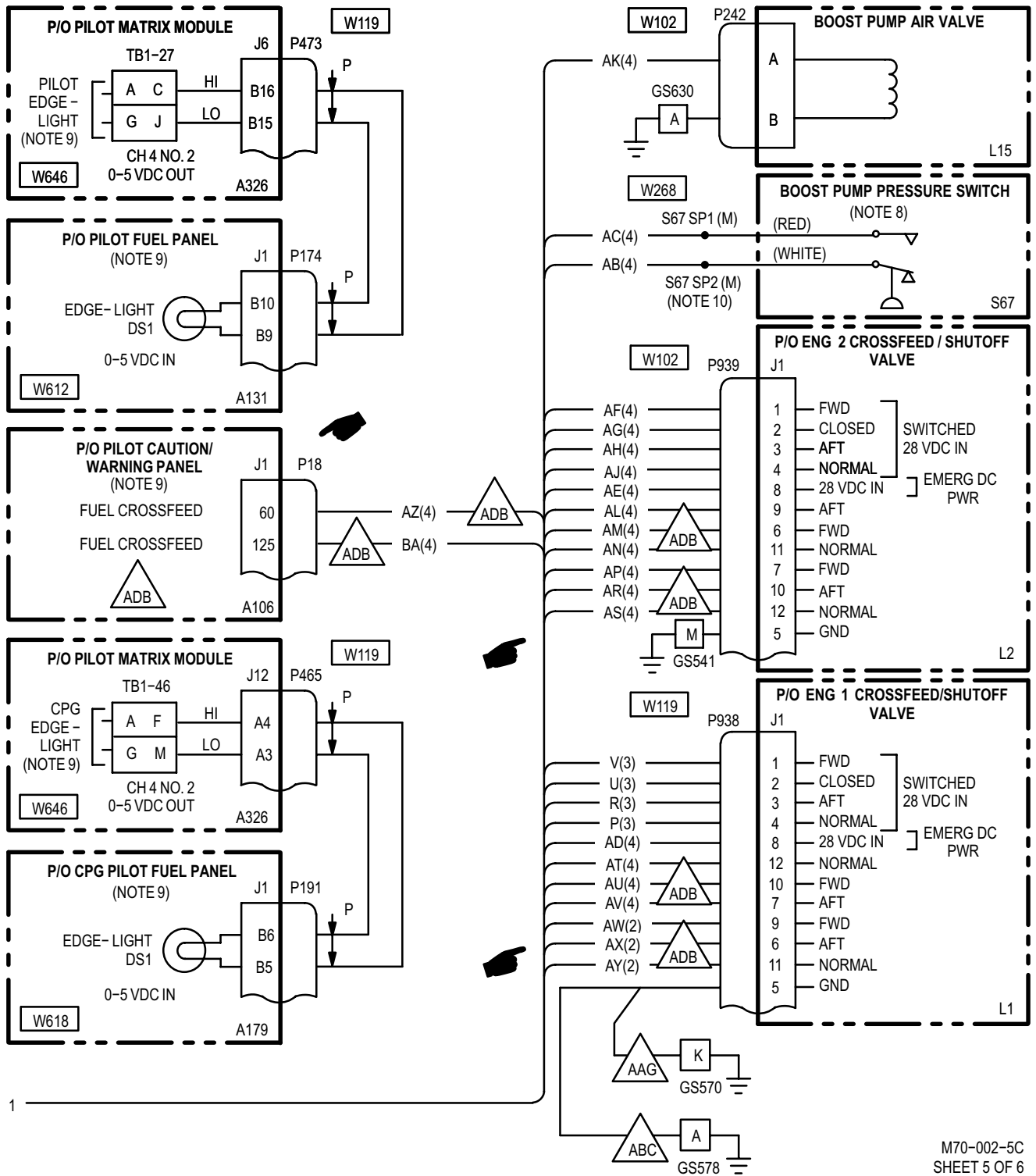
10-18. FUEL CROSSFEED/BOOST SYSTEM – WIRING INTERCONNECT DIAGRAM (cont)



10-18. FUEL CROSSFEED/BOOST SYSTEM – WIRING INTERCONNECT DIAGRAM (cont)



10-18. FUEL CROSSFEED/BOOST SYSTEM – WIRING INTERCONNECT DIAGRAM (cont)



M70-002-5C
SHEET 5 OF 6

NOTES:

HIGHWAY USE: THE ALPHA CHARACTER IDENTIFIES A SPECIFIC LINE, AND THE NUMBER IN PARENTHESIS IDENTIFIES THE SHEET NUMBER WHERE THE SIGNAL TERMINATES.

1. ENABLES AND DISABLES PILOT AND CPG FUEL PANELS.
2. SELECTS FUEL TANK (CELL) TO SUPPLY FUEL TO ENGINES.

<u>SWITCH POSITION</u>	<u>TERMINALS CONNECTED</u>
CPG – FROM FWD: PILOT FWD TK	2-3,5-6
NORM (CPG AND PILOT)	2-3,4-5
CPG – FROM AFT: PILOT AFT TK	1-2,4-5
3. PROVIDES 28 VDC TO NORMAL OR CLOSED CIRCUITS OF ASSOCIATED CROSSFEED/SHUTOFF VALVE, AS SELECTED.

<u>SWITCH POSITION</u>	<u>28 VDC TO</u>
ON	NORMAL
OFF	CLOSED
4. USED ONLY FOR STARTING ENGINES AND HIGH ALTITUDE FLIGHT. (HOLDING COIL HOLDS SWITCH AT BOOST POSITION IF AFT TANK IS SELECTED BY S1).
5. S2 AND S3 (NORMALLY CLOSED) PROVIDES 28 VDC TO S5 AND S6 ON PILOT FUEL PANEL FOR NORMAL OPERATION. (WHEN EITHER CPG FIRE HANDLE IS PULLED THE 28 VDC IS ROUTED THROUGH ASSOCIATED PILOT FIRE HANDLE (NOT SHOWN) AND S5 AND S6 OF PILOT FUEL PANEL TO CLOSE SELECTED ENGINE FUEL CROSSFEED/SHUTOFF VALVE).
6. PROVIDES 28 VDC THRU S5 AND S6 ON PILOT FUEL PANEL TO CLOSED TERMINAL OF SELECTED ENGINE FUEL CROSSFEED/SHUTOFF VALVE, WHEN EITHER OF PILOT OR CPG FIRE HANDLES ARE PULLED, S2 AND S3 (NORMALLY OPEN).
7. PROVIDES 28 VDC TO BOOST PUMP AIR VALVE (L15) DURING EITHER ENGINE START OR WHEN BOOST PUMP SWITCH IS ON.
8. CLOSURES WITH BOOST PUMP PRESSURE TO APPLY 28 VDC TO LIGHT BOOST PMP ON INDICATOR.
9. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
10. M DESIGNATES A SOFT SPLICE WHICH MAY BE DISCONNECTED FOR A WIRING CHECK.
11. REFER TO PARAGRAPH 10-49. FUEL QUANTITY INDICATION/TRANSFER-WIRING INTERCONNECT DIAGRAM.
12. DELETED
13. POWER PLANTS (TM 1-1520-238-T-4).
14. UTILITY SYSTEM (TM 1-1520-238-T-8).
15. AUXILIARY POWER UNIT (TM 1-1520-238-T-8).

10-19. PILOT FUEL PANEL EDGE-LIGHTS – DO NOT LIGHT

10-19

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

4. Check for open between (A326):
TB1-27-C and J6-B16.

Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot pilot edge-lights.



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 5 VDC between P174-B9 and P174-B10.

Does voltage exist?

YES	Go to step 3.
NO	Go to step 2.

2. Check for open between P174-B9 and P473-B16.

Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Go to step 4.

3. Check for 5 VDC at (A131)DS1.

Does voltage exist?

YES	Replace pilot FUEL edge-light panel (TM 1-1520-238-23).
NO	Replace pilot FUEL panel (TM 1-1520-238-23).

END OF TASK

10-20. CPG FUEL PANEL EDGE-LIGHTS – DO NOT LIGHT

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

4. Check for open between (A326):
TB1-46-F and J12-A4.

Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot CPG edge-lights.



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 5 VDC between P191-B5 and P191-B6.

Does voltage exist?

YES	Go to step 3.
NO	Go to step 2.

2. Check for open between P191-B5 and P465-A4.

Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Go to step 4.

3. Check for 5 VDC at (A179)DS1.

Does voltage exist?

YES	Replace CPG FUEL edge-light panel (TM 1-1520-238-23).
NO	Replace CPG FUEL panel (TM 1-1520-238-23).

END OF TASK

10-21. FUEL BST CIRCUIT BREAKER – DOES NOT STAY CLOSED

10-21

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Electrical power distribution box cover removed

3. Attach P191. Check for short between detached wire end at (A402)TB2-29-P and ground.

Does short exist?

YES Replace CPG **FUEL** panel (TM 1-1520-238-23).
NO Go to paragraph 10-17.



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Detach P1 from (A402)J1. Check that **FUEL BST** circuit breaker is closed.
Does circuit breaker stay closed?

YES	Go to step 2.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 2 – pilot station).
- Detach wire end at (A402)TB2-29-P. Check for short between P191-B1 and ground.
Does short exist?

YES	Repair shorted wire. Go to paragraph 10-17.
NO	Go to step 3.

END OF TASK

10-22. FUEL XFEED CIRCUIT BREAKER – DOES NOT STAY CLOSED (ADA)

10-22

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Electrical power distribution box cover removed



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **FUEL XFEED** circuit breaker. Check for short between ground and P1-32.

Does short exist?

YES	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).
NO	Go to step 2.

2. Tag and detach wire from (A402): TB3-4-J, TB3-4-K, TB3-4-L, and TB3-4-M. Check for short between (A402):
J5-B8 and ground,
J23-B14 and ground,
J1-32 and ground,
J24-B11 and ground.

Does short exist?

YES	Repair shorted wire between (A402): J5-B8 and TB3-4-J, J23-B14 and TB3-4-K, J1-32 and TB3-4-L, J24-B11 and TB3-4-M. Go to paragraph 10-17.
NO	Go to step 3.

3. Check for short between P441-B11 and ground.

Does short exist?

YES	Go to step 6.
NO	Go to step 4.

4. Check for short between P442-B8 and ground.

Does short exist?

YES	Go to step 5.
NO	Go to step 7.

5. Detach P939. Check for short between P442-B8 and ground.

Does short exist?

YES	Repair shorted wire between P442-B8 and P939-8. Go to paragraph 10-17.
NO	Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

10-22. FUEL XFEED CIRCUIT BREAKER – DOES NOT STAY CLOSED (ADA) (cont)

10-22

6. Detach P938. Check for short between P441-B11 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between P441-B11 and P938-8.
Go to paragraph 10-17. |
| NO | Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23). |

7. Detach P191 and P174. Check for short between:
P429-B14 and ground,
P191-A2 and ground,
P191-A8 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between:
P429-B14 and P191-A1,
P191-A2 and P174-B19,
P191-A8 and P174-B6.
Go to paragraph 10-17. |
| NO | Go to step 8. |

8. Check for short between:
P174-B6 and ground,
P174-B19 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Replace CPG FUEL panel (TM 1-1520-238-23). |
| NO | Replace pilot FUEL panel (TM 1-1520-238-23). |

END OF TASK

10-23. BOOST PMP ON INDICATOR – IS NOT LIGHTED WITH BOOST SWITCH SET TO ON

10-23

Tools:

Nomenclature	Part Number
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Have assistant check boost pump air exhaust port for operating noise.

Is boost pump operating?

YES Go to step 6.
NO Go to step 2.

2. On pilot center circuit breaker panel, check **FUEL XFEED** circuit breaker.

Does circuit breaker stay closed?

YES Go to step 3.
NO Go to paragraph 10-22 (ADA), 10-35E (ADB) to troubleshoot **FUEL XFEED** circuit breaker.

3. Check for 28 VDC at P242-A.

Is voltage present?

YES Go to step 4.
NO Go to step 10.

4. Check for open wire between P242-B and GS630-A.

Does open exist?

YES Repair open wire.
Go to paragraph 10-17.
NO Go to step 5.

5. Have assistant remove the fuel boost pump air line from the fuel boost pump air valve outlet. Set **BOOST** switch to **ON**. Have assistant check air flow.

Does air flow from valve.

YES Replace fuel boost pump (TM 1-1520-238-23).
NO Replace fuel boost pump air valve (TM 1-1520-238-23).

6. Check for open between P444-B17 and P444-A1.

Does open exist?

YES Replace boost pump pressure switch (TM 1-1520-238-23).
NO Go to step 7.

7. Check for 28 VDC at (A402)J31-A1.

Is voltage present?

YES Go to step 8.
NO Go to step 9.

8. Check for 28 VDC at P18-96.

Is voltage present?

YES Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.
NO Repair open wire between: (A402)J31-B17 and (A402)TB2-13-W, (A402)TB2-13-T and (A402)J15-B19, P438-B19 and P18-96. Go to paragraph 10-17.

10-23. BOOST PMP ON INDICATOR – IS NOT LIGHTED WITH BOOST SWITCH SET TO ON (cont) 10-23

9. Check for 28 VDC at (A76)P1-31.

Is voltage present?

- | | |
|-----|---|
| YES | Repair open wire between:
(A402)J1-31 and TB2-29-R,
(A402)J31-A1 and TB2-29-N,
Go to paragraph 10-17. |
| NO | Refer to TM 1-1520-238-T-6 to
troubleshoot circuit protection
system (dc essential bus 2 –
pilot station). |

10. Check for 28 VDC at (A131)J2-B5.

Is voltage present?

- | | |
|-----|----------------|
| YES | Go to step 11. |
| NO | Go to step 12. |

11. Check for 28 VDC at (A402)J5-A20.

Is voltage present?

- | | |
|-----|---|
| YES | Repair open wire between:
P442-A20 and P242-A.
Go to paragraph 10-17. |
| NO | Repair open wire between:
P179-B5 and P429-A19,
(A402)J23-A19 and
(A402)TB2-13-D,
(A402)TB2-13-C and
(A402)J5-A20.
Go to paragraph 10-17. |

12. Check for 28 VDC at (A131)J1-B5.

Is voltage present?

- | | |
|-----|--|
| YES | Replace pilot FUEL panel
(TM 1-1520-238-23). |
| NO | Go to step 13. |

13. Check for 28 VDC at P191-A1.

Is voltage present?

- | | |
|-----|----------------|
| YES | Go to step 14. |
| NO | Go to step 15. |

14. Check for open between (A179):
P191-A9 and P174-B5.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire. |
| NO | Replace CPG FUEL panel
(TM 1-1520-238-23). |

15. Check for 28 VDC at (A402)J23-B14.

Is voltage present?

- | | |
|-----|---|
| YES | Repair open wire between
P429-B14 and P191-A1. |
| NO | Go to step 16. |

16. Check for 28 VDC at P1-32.

Is voltage present?

- | | |
|-----|---|
| YES | Repair open wire between
(A402):
J1-32 and TB3-4-L,
J23-B14 and TB3-4-K (ADA),
TB3-4-K and TB2-17-K (ADB),
J23-B14 and TB2-17-K (ADB).
Go to paragraph 10-17. |
| NO | Refer to TM 1-1520-238-T-6 to
troubleshoot circuit protection
system (dc emergency bus –
pilot station). |

END OF TASK

10-24. ENGINE 2 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT INDICATE CLOSED POSITION WITH ENG 2 SWITCH SET TO OFF **10-24**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-T-8
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P429-B6.

Is voltage present?

- YES Go to step 4.
- NO Go to step 2.

2. Check for 28 VDC at P174-B18.

Is voltage present?

- YES Go to step 7.
- NO Go to step 3.

3. Check for 28 VDC at (A322)P1-B8.

Is voltage present?

- YES Repair open wire between J1039-B8 and P174-B18. Go to paragraph 10-17.
- NO Refer to TM 1-1520-238-T-8 to troubleshoot utility system.

4. Check for 28 VDC at P939-2.

Is voltage present?

- YES Go to step 5.
- NO Go to step 8.

5. Check for 28 VDC at P939-8.

Is voltage present?

- YES Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).
- NO Go to step 6.

6. Check for 28 VDC at P1-32.

Is voltage present?

- YES Repair open wire between: (A402)J1-32 and (A402)TB3-4-L, (A402)TB3-4-J and (A402)J5-B8, P442-B8 and P939-8. Go to paragraph 10-17.
- NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).

7. Check for 28 VDC at (A131)J2-A7.

Is voltage present?

- YES Repair open wire between P179-A7 and P429-B6. Go to paragraph 10-17.
- NO Replace pilot **FUEL** panel (TM 1-1520-238-23).

8. Check for 28 VDC at (A402)J5-B10.

Is voltage present?

- YES Repair open wire between P442-B10 and P939-2. Go to paragraph 10-17.
- NO Repair open wire between (A402): J23-B6 and TB2-13-E, TB2-13-F and J5-B10. Go to paragraph 10-17.

END OF TASK

10-25. BOOST PMP ON INDICATOR – IS LIGHTED WITH BOOST SWITCH SET TO OFF

10-25

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Have assistant check boost pump for operating noise.

Is boost pump operating?

YES Go to step 4.
NO Go to step 2.

2. Check for open between P444-B17 and P444-A1.

Does open exist?

YES Go to step 3.
NO Replace boost pump pressure switch (TM 1-1520-238-23).

3. Check for 28 VDC at P18-96.

Is voltage present?

YES Go to step 5.
NO Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.

4. Check for 28 VDC at P242-A.
Is voltage present?

YES Go to step 6.
NO Replace boost pump air valve (TM 1-1520-238-23).

5. Check for short between: P18-96 and P438-B19, (A402)J15-B19 and (A402)TB2-13-T, (A402)TB2-13-W and (A402)J31-B17.

Does short exist?

YES Repair shorted wire. Go to paragraph 10-17.
NO Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.

6. Check for 28 VDC at P174-A17.
Is voltage present?

YES Replace CPG **FUEL** panel (TM 1-1520-238-23).
NO Replace pilot **FUEL** panel (TM 1-1520-238-23).

END OF TASK

10-26. ENGINE 2 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO AFT POSITION

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

4. Check for open between P939-5 and GS541-M. **Does open exist?**

YES	Repair open wire. Go to paragraph 10-17.
NO	Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

5. Check for 28 VDC at P191-A1. **Is voltage present?**

YES	Replace CPG FUEL panel (TM 1-1520-238-23).
NO	Repair open wire between P191-A2 and P174-B19. Go to paragraph 10-17.

1. Check for 28 VDC at (A131)J2-A8. **Is voltage present?**

YES	Go to step 3.
NO	Go to step 2.

2. Check for 28 VDC at P174-B19. **Is voltage present?**

YES	Replace pilot FUEL panel (TM 1-1520-238-23).
NO	Go to step 5.

3. Check for 28 VDC at P939-3. **Is voltage present?**

YES	Go to step 4.
NO	Repair open wire between: P939-3 and (A402)TB2-13-K, (A402)TB2-13-J and P179-A8. Go to paragraph 10-17.

END OF TASK

10-27. ENGINE 2 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO NORMAL POSITION **10-27**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for open between P179-A6 and P939-4.
Does open exist?
 - YES Repair open wire between: P939-4 and (A402)TB2-13-P, (A402)TB2-13-N and P179-A6. Go to paragraph 10-17.
 - NO Go to step 2.

2. On pilot **FUEL** panel, check for open with positive meter lead on terminal (A131)A1-32 and negative meter lead on terminal (A131)A1-31.
Does open exist?
 - YES Replace fuel logic component board (A131)A1 on pilot **FUEL** panel (TM 1-1520-238-23).
 - NO Go to step 3.

3. Check for open between (A131): A1-K3-8 and A1-K3-6.
Does open exist?
 - YES Replace fuel logic board on pilot **FUEL** panel (TM 1-1520-238-23).
 - NO Go to step 4.

4. Check for open between (A131): S1-5 and S1-3.
Does open exist?
 - YES Replace pilot **FUEL** panel (TM 1-1520-238-23).
 - NO Repair open wire between (A131): J2-A6 and A1-31, A1-K3-6 and A1-32, K3-8 and S1-3. Go to paragraph 10-17.

END OF TASK

10-28. ENGINE 2 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO FORWARD POSITION **10-28**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at (A131)J2-A9.
Is voltage present?

- YES Go to step 2.
- NO Go to step 3.

2. With P179 attached, check for 28 VDC at P939-1.

Is voltage present?

- YES Go to step 6.
- NO Repair open wire between: P939-1 and (A402)TB2-13-B, (A402)TB2-13-A and P179-A9. Go to paragraph 10-17.

3. Check for 28 VDC at P174-B19.

Is voltage present?

- YES Replace pilot **FUEL** panel (TM 1-1520-238-23).
- NO Go to step 4.

4. Check for 28 VDC at P191-A1.

Is voltage present?

- YES Go to step 5.
- NO Go to step 7.

5. Check for open between (A179): J1-A2 and J1-A1.

Does open exist?

- YES Replace CPG **FUEL** panel (TM 1-1520-238-23).
- NO Repair open wire between P191-A2 and P174-B19. Go to paragraph 10-17.

6. Check for open between P939-5 and GS541-M.

Does open exist?

- YES Repair open wire. Go to paragraph 10-17.
- NO Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

7. Check for 28 VDC at P1-32.

Is voltage present?

- YES Repair open wire between: P191-A1 and P429-B14, (A402)J23-B14 and (A402)TB3-4-K, (A402)TB3-4-L and (A402)J1-32. Go to paragraph 10-17.
- NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).

END OF TASK

10-29. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO CLOSED POSITION **10-29**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-T-8
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at (A131)J2-A5.
Is voltage present?

YES	Go to step 2.
NO	Go to step 3.

2. With P179 attached, check for 28 VDC at P938-2.
Is voltage present?

YES	(AAG) Go to step 5. (ABC) Go to step 6.
NO	Repair open wire between P179-A5 and P938-2. Go to paragraph 10-17.

3. Check for 28 VDC at P174-B17.
Is voltage present?

YES	Replace pilot FUEL panel (TM 1-1520-238-23).
NO	Go to step 4.

4. Check for 28 VDC at (A322)P1-B5.
Is voltage present?

YES	Repair open wire between J1039-B5 and P174-B17. Go to paragraph 10-17.
NO	Refer to TM 1-1520-238-T-8 to troubleshoot utility system.

5. (AAG) Check for open between P938-5 and GS570-K.
Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Go to step 7.

6. (ABC) Check for open between P938-5 and GS578-A.
Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Go to step 7.

7. Check for 28 VDC at P938-8.
Is voltage present?

YES	Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).
NO	Go to step 8.

8. Check for 28 VDC at P1-32.
Is voltage present?

YES	Repair open wire between (A402): J1-32 and TB3-4-L, TB3-4-M and J24-B11. Go to paragraph 10-17.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).

END OF TASK

10-30. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO FORWARD POSITION

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- On pilot **FUEL** panel, set **ENG 1** switch to **ON** and **CROSSFEED** switch to **FWD TK**. Check for 28 VDC at P938-3.

Is voltage present?

- | | |
|-----|--|
| YES | (AAG) Go to step 2.
(ABC) Go to step 3. |
| NO | Go to step 6. |

- (**AAG**) Check for open between P938-5 and GS570-K.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 10-17. |
| NO | Go to step 4. |

- (**ABC**) Check for open between P938-5 and GS578-A.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 10-17. |
| NO | Go to step 4. |

- Check for 28 VDC at P938-8.

Is voltage present?

- | | |
|-----|---|
| YES | Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23). |
| NO | Go to step 5. |

- Check for 28 VDC at P1-32.

Is voltage present?

- | | |
|-----|--|
| YES | Repair open wire between (A402)J1-32 and P938-8.
Go to paragraph 10-17. |
| NO | Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station). |

- Check for open between P179-A2 and P938-3.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 10-17. |
| NO | Replace pilot FUEL panel (TM 1-1520-238-23). |

END OF TASK

10-31. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO NORMAL POSITION **10-31**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L200 removed

3. **(AAG)** Check for open between P938-5 and GS570-K.

Does open exist?

YES Repair open wire.
Go to paragraph 10-17.

NO Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

4. **(ABC)** Check for open between P938-5 and GS578-A.

Does open exist?

YES Repair open wire.
Go to paragraph 10-17.

NO Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P938-4.

Is voltage present?

YES **(AAG)** Go to step 3.
(ABC) Go to step 4.

NO Go to step 2.

2. Check for open between P179-A1 and P938-4.

Does open exist?

YES Repair open wire.
Go to paragraph 10-17.

NO Replace pilot **FUEL** panel (TM 1-1520-238-23).

END OF TASK

10-32. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO AFT POSITION

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at (A131)J2-A4.

Is voltage present?

YES Go to step 7.
NO Go to step 2.

2. Check for 28 VDC at P174-B19.

Is voltage present?

YES Replace pilot **FUEL** panel (TM 1-1520-238-23).
NO Go to step 3.

3. Check for 28 VDC at P191-A1.

Is voltage present?

YES Go to step 5.
NO Go to step 4.

4. Check for 28 VDC at P1-32.

Is voltage present?

YES Go to step 6.
NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).

5. Check for open between (A179): J1-A1 and J1-A2.

Does open exist?

YES Replace CPG **FUEL** panel (TM 1-1520-238-23).
NO Repair open wire between P191-A2 and P174-B19. Go to paragraph 10-17.

6. Check for 28 VDC at (A402)J23-B14.

Is voltage present?

YES Repair open wire between P429-B14 and P191-A1. Go to paragraph 10-17.
NO Repair open wire between: P191-A1 and P429-B14, (A402)J23-B14 and (A402)TB3-4-K, (A402)TB3-4-L and (A402)J1-32. Go to paragraph 10-17.

7. With P179 attached, check for 28 VDC at P938-1.

Is voltage present?

YES **(AAG)** Go to step 8.
(ABC) Go to step 9.
NO Repair open wire between P179-A4 and P938-1. Go to paragraph 10-17.

10-32. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO AFT POSITION (cont)

10-32

8. **(AAG)** Check for open between P938-5 and GS570-K.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 10-17. |
| NO | Replace engine 1 fuel
crossfeed/shutoff valve
(TM 1-1520-238-23). |

9. **(ABC)** Check for open between P938-5 and GS578-A.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 10-17. |
| NO | Replace engine 1 fuel
crossfeed/shutoff valve
(TM 1-1520-238-23). |

END OF TASK

10-33. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO NORMAL POSITION WITH ORIDE SWITCH SET TO CPG

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P174-B6.
Is voltage present?
 - YES Go to step 2.
 - NO Go to step 4.

2. Check for 28 VDC at (A131)J2-A1.
Is voltage present?
 - YES Go to step 3.
 - NO Replace pilot **FUEL** panel (TM 1-1520-238-23).

3. Check for 28 VDC at P938-4.
Is voltage present?
 - YES **(AAG)** Go to step 6.
(ABC) Go to step 7.
 - NO Repair open wire between P179-A1 and P938-4. Go to paragraph 10-17.

4. Check for 28 VDC at P191-A1.
Is voltage present?
 - YES Go to step 5.
 - NO Go to step 9.

5. Check for open between P191-A8 and P174-B6.
Does open wire exist?
 - YES Repair open wire. Go to paragraph 10-17.
 - NO Replace CPG **FUEL** panel (TM 1-1520-238-23).

6. **(AAG)** Check for open between P938-5 and GS570-K.
Does open exist?
 - YES Repair open wire. Go to paragraph 10-17.
 - NO Go to step 8.

7. **(ABC)** Check for open between P938-5 and GS578-A.
Does open exist?
 - YES Repair open wire. Go to paragraph 10-17.
 - NO Go to step 8.

8. Check for 28 VDC at P938-8.
Is voltage present?
 - YES Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).
 - NO Repair open wire between: (A402)TB3-4-M and (A402)J24-B11, P441-B11 and P938-8. Go to paragraph 10-17.

**10-33. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT
MOVE TO NORMAL POSITION WITH ORIDE SWITCH SET TO CPG (cont)**

10-33

9. Check for 28 VDC at P1-32.

Is voltage present?

- | | |
|-----|--|
| YES | Repair open wire between:
P191-A1 and P429-B14,
(A402)J23-B14 and
(A402)TB3-4-K,
(A402)TB3-4-L and
(A402)J1-32.
Go to paragraph 10-17. |
| NO | Refer to TM 1-1520-238-T-6 to
troubleshoot circuit protection
system (dc emergency bus –
pilot station). |

END OF TASK

10-34. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO AFT POSITION WITH ORIDE SWITCH SET TO CPG

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P174-B5.

Is voltage present?

YES Go to step 2.
NO Go to step 4.

2. With P174 attached, check for 28 VDC at (A131)J2-A4.

Is voltage present?

YES Go to step 3.
NO Replace pilot **FUEL** panel (TM 1-1520-238-23).

3. With P179 attached, check for 28 VDC at P938-1.

Is voltage present?

YES **(AAG)** Go to step 6.
(ABC) Go to step 7.
NO Repair open wire between P179-A4 and P938-1. Go to paragraph 10-17.

4. Check for 28 VDC at P191-A1.

Is voltage present?

YES Go to step 5.
NO Go to step 8.

5. On CPG **FUEL** panel, set **ORIDE** switch to **CPG** and **TK SEL** switch to **FROM AFT**. Check for open between (A179): J1-A1 and J1-A9.

Does open exist?

YES Replace CPG **FUEL** panel (TM 1-1520-238-23).
NO Repair open wire between P191-A9 and P174-B5. Go to paragraph 10-17.

6. **(AAG)** Check for open between P938-5 and GS570-K.

Does open exist?

YES Repair open wire. Go to paragraph 10-17.
NO Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

7. **(ABC)** Check for open between P938-5 and GS578-A.

Does open exist?

YES Repair open wire. Go to paragraph 10-17.
NO Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

8. Check for 28 VDC at P1-32.

Is voltage present?

YES Go to step 9.
NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).

10-34. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO AFT POSITION WITH ORIDE SWITCH SET TO CPG (cont)

10-34

9. Check for 28 VDC at (A402)J23-B14.

Is voltage present?

- | | |
|-----|--|
| YES | Repair open wire between P429-B14 and P191-A1.
Go to paragraph 10-17. |
| NO | Repair open wire between (A402):
J23-B14 and TB3-4-K,
TB3-4-L and J1-32.
Go to paragraph 10-17. |

END OF TASK

10-35. ENGINE 2 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO AFT POSITION WITH ORIDE SWITCH SET TO CPG

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P174-B5.
Is voltage present?

YES	Go to step 2.
NO	Go to step 4.

2. With P174 attached, check for 28 VDC at (A131)J2-A8.
Is voltage present?

YES	Go to step 3.
NO	Replace pilot FUEL panel (TM 1-1520-238-23).

3. With P179 attached, check for 28 VDC at P939-3.
Is voltage present?

YES	Go to step 6.
NO	Repair open wire between: P939-3 and (A402)TB2-13-K, (A402)TB2-13-J and P179-A8. Go to paragraph 10-17.

4. Check for 28 VDC at P191-A1.
Is voltage present?

YES	Go to step 5.
NO	Go to step 8.

5. Check for open between (A179): J1-A1 and J1-A9.
Does open exist?

YES	Replace CPG FUEL panel (TM 1-1520-238-23).
NO	Repair open wire between P191-A9 and P174-B5. Go to paragraph 10-17.

6. Check for open between P939-5 and GS541-M.
Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Go to step 7.

7. Check for 28 VDC at P939-8.
Is voltage present?

YES	Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).
NO	Repair open wire between: (A402)TB3-4-J and (A402)J5-B8, P442-B8 and P939-8. Go to paragraph 10-17.

8. Check for 28 VDC at P1-32.
Is voltage present?

YES	Repair open wire between: P191-A1 and P429-B14, (A402)J23-B14 and (A402)TB3-4-K, (A402)TB3-4-L and (A402)J1-32. Go to paragraph 10-17.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).

END OF TASK

10-35A. PILOT AMBER XFEED INDICATOR IS NOT LIGHTED WITH ENGINE1 CROSSFEED VALVE CLOSED AND ENGINE 2 CROSSFEED VALVE AT AFT (ADB)

10-35A

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Check for open between (A402):
XK5-7/8-A3 and J16-A8,
XK5-7/8-A2 and GS10-C.
Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Go to step 2.
- Check for open between P18-60 and P440-A8.
Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Replace relay (A402)K5-7/8 (TM 1-1520-238-23).

END OF TASK

10-35B. FUEL XFEED CIRCUIT BREAKER DOES NOT STAY CLOSED WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT NORMAL (ADB) 10-35B

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Electrical power distribution box cover removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **FUEL XFEED** circuit breaker. Check for short between ground and P1-32.

Does short exist?

YES	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).
NO	Go to step 2.

2. Tag and detach wire from (A402): TB3-4-J, TB3-4-K, TB3-4-L, and TB3-4-M. Check for short between (A402):
J5-B8 and ground,
Wire end at TB2-17-K and ground,
J1-32 and ground,
J24-B11 and ground.

Does short exist?

YES	Repair shorted wire between (A402): J5-B8 and TB3-4-J, J23-B14 and TB3-4-K, J1-32 and TB3-4-L, J24-B11 and TB3-4-M. Go to paragraph 10-17.
NO	Go to step 3.

3. Detach wire from (A402)TB2-17-A. Check for short between (A402)J23-B14 and ground.

Does short exist?

YES	Repair shorted wire. Go to paragraph 10-17.
NO	Go to step 4.

4. Check for short between (A402)TB2-17-D and ground.

Does short exist?

YES	Go to step 5.
NO	Go to step 6.

5. Detach wire at (A402)XK5-7/8-X1. Check for short between (A402)TB2-17-D and ground.

Does short exist?

YES	Repair shorted wire. Go to paragraph 10-17.
NO	Replace relay (A402)K5-7/8 (TM 1-1520-238-23).

10-35B. FUEL XFEED CIRCUIT BREAKER DOES NOT STAY CLOSED WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT NORMAL (ADB) (cont) 10-35B

- | | |
|--|---|
| <p>6. Check for short between P441-B11 and ground.
Does short exist?</p> <p>YES Go to step 9.</p> <p>NO Go to step 7.</p> | <p>11. Check for short between P174-A18 and ground.
Does short exist?</p> <p>YES Go to step 12.</p> <p>NO Go to step 23.</p> |
| <p>7. Check for short between P442-B8 and ground.
Does short exist?</p> <p>YES Go to step 8.</p> <p>NO Go to step 10.</p> | <p>12. Detach P938. Check for short between P174-A18 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P174-A18 and P938-11. Go to paragraph 10-17.</p> <p>NO Go to step 13.</p> |
| <p>8. Detach P939. Check for short between P442-B8 and ground.
Does short exist?</p> <p>YES Repair shorted wire between P442-B8 and P939-8. Go to paragraph 10-17.</p> <p>NO Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).</p> | <p>13. Check for short between (L1)J1-11 and ground.
Does short exist?</p> <p>YES Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).</p> <p>NO Go to step 14.</p> |
| <p>9. Detach P938. Check for short between P441-B11 and ground.
Does short exist?</p> <p>YES Repair shorted wire between P441-B11 and P938-8. Go to paragraph 10-17.</p> <p>NO Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).</p> | <p>14. Detach P457. Check for short between P938-12 and ground.
Does short exist?</p> <p>YES Repair shorted wire between P938-12 and P457-A19. Go to paragraph 10-17.</p> <p>NO Go to step 15.</p> |
| <p>10. Detach P191 and P174. Check for short between: P429-B14 and ground, P191-A2 and ground, P191-A8 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P429-B14 and P191-A1, P191-A2 and P174-B19, P191-A8 and P174-B6. Go to paragraph 10-17.</p> <p>NO Go to step 11.</p> | <p>15. Detach wire at (A402) TB2-31-R. Check for short between (A402)J22-A19 and ground.
Does short exist?</p> <p>YES Repair shorted wire between (A402) J22-A19 and TB2-31-R. Go to paragraph 10-17.</p> <p>NO Go to step 16.</p> |

10-35B. FUEL XFEED CIRCUIT BREAKER DOES NOT STAY CLOSED WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT NORMAL (ADB) (cont) 10-35B

- | | |
|--|--|
| <p>16. Detach P442. Check for short between (A402)TB2-31-S and ground.
Does short exist?</p> <p>YES Repair shorted wire between(A402):
TB2-31-S and J5-B13.
Go to paragraph 10-17.</p> <p>NO Go to step 17.</p> | <p>21. Detach wire at (A402)TB2-17-F. Check for short between TB3-28/29-K and ground.
Does short exist?</p> <p>YES Repair shorted wire between (A402):
TB3-28/29-K and TB2-17-F.
Go to paragraph 10-17.</p> <p>NO Go to step 22.</p> |
| <p>17. Detach 939. Check for short between: P442-B13 and ground, P442-B14 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P442-B13 and P939-11, P442-B14 and P939-12.
Go to paragraph 10-17.</p> <p>NO Go to step 18.</p> | <p>22. Remove relay (A402)K5-7/8 (TM 1-1520-238-23). Check for short between (A402)TB2-17-C and ground.
Does short exist?</p> <p>YES Repair shorted wire between (A402):
TB2-17-C and XK5-7/8-C1.
Go to paragraph 10-17.</p> <p>NO Replace relay (A402)K5-7/8 (TM 1-1520-238-23).</p> |
| <p>18. Check for short between (L2)J1-11 and ground.
Does short exist?</p> <p>YES Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).</p> <p>NO Go to step 19.</p> | <p>23. Check for short between: P174-B6 and ground, P174-B19 and ground.
Does short exist?</p> <p>YES Replace CPG FUEL Panel (TM 1-1520-238-23).</p> <p>NO Replace pilot FUEL Panel (TM 1-1520-238-23).</p> |
| <p>19. Detach wire at (A402)TB3-28/29-E. Check for short between (A402)J5-B14 and ground.
Does short exist?</p> <p>YES Repair shorted wire between (A402):
J5-B14 and TB3-28/29-E.
Go to paragraph 10-17.</p> <p>NO Go to step 21.</p> | |
| <p>20. Check for short between (A402) TB3-28/29-K and ground.
Does short exist?</p> <p>YES Replace terminal board (A402) TB3-28/29 (TM 1-1520-238-23).</p> <p>NO Go to step 21.</p> | |

END OF TASK

**10-35C. PILOT AND CPG GREEN XFEED INDICATORS ARE NOT LIGHTED
WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT AFT (ADB)**

10-35C

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P939-9.
Is voltage present?

YES Go to step 2.
NO Go to step 5.

2. Check for open between (L2) J1-9 and J1-10.
Does open exist?

YES Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).
NO Go to step 3.

3. Check for open between P939-10 and P442-B7.

Does open exist?

YES Repair open wire.
Go to paragraph 10-17.
NO Go to step 4.

4. Check for open between (A402):
J5-B7 and TB2-17-H,
TB2-17-H and TB2-17-B,
XK5-6-X1 and TB2-17-B,
XK5-6-X2 and GS10-B,
XK5-6-A1 and J16-A1,
XK5-6-A2 and GS10-A.

Does open exist?

YES Repair open wire (A402) TB2-17.
Go to paragraph 10-17, or replace terminal board (TM 1-1520-238-23).
NO Replace relay (A402)K5-6 (TM 1-1520-238-23).

5. Check for open between P939-9 and P442-B6.

Does open exist?

YES Repair open wire.
Go to paragraph 10-17.
NO Go to step 6.

6. Check for open between (A402):
J5-B6 and J22-A3.

Does open exist?

YES Repair open wire between: TB2-31-Z and J5-B6, TB2-31-Y and J22-A3, Go to paragraph 10-17, or replace terminal board (A402) TB2-31 (TM 1-1520-238-23).
NO Go to step 7.

7. Check for open between P457-A3 and P938-7.

Does open exist?

YES Repair open wire.
Go to paragraph 10-17.
NO Go to step 8.

**10-35C. PILOT AND CPG GREEN XFEED INDICATORS ARE NOT LIGHTED
WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT AFT (ADB) (cont)**

10-35C

8. Check for open between (L1):
J1-6 and J1-7.

Does open exist?

YES Replace engine 1 fuel
 crossfeed/shutoff valve
 (TM 1-1520-238-23).

NO Go to step 9.

9. Check for open between P938-6 and
P174-A13.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-17.

NO Replace pilot **FUEL** panel
 (TM 1-1520-238-23).

END OF TASK

10-35D. PILOT AND CPG AMBER XFEED INDICATORS ARE LIGHTED WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AFT (ADB) 10-35D

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at (A402)XK5-7/8-X1.
Is voltage present?

YES	Go to step 2.
NO	Repair open wire between (A402): TB2-17-D and XK5-7/8-X1. Go to paragraph 10-17.

2. With meter at diode setting and positive meter lead on wire end at TB2-17-E, check for open between (A402):
TB2-17-E and TB2-17-J.

Does open exist?

YES	Go to step 3.
NO	Go to step 4.

3. Check for open between (A402):
TB2-17-E and TB3-28/29-D,
TB2-17-J and TB3-28/29-J.

Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Replace terminal board (A402)TB3-28/29 (TM 1-1520-238-23).

4. Check for open between (A402):
XK5-7/8-C1 and TB2-17-C,
TB2-17-C and TB2-17-J,
XK5-7/8-X2 and GS10-E.

Does open exist?

YES	Repair open wire or replace terminal board (A402) TB2-17. Go to paragraph 10-17.
NO	Go to step 5.

5. Detach wire at XK5-7/8-A3. Check for short between (A402)P440-A8 and ground.

Does short exist?

YES	Repair shorted wire. Go to paragraph 10-17.
NO	Replace relay (A402)K5-7/8 (TM 1-1520-238-23).

END OF TASK

10-35E. FUEL XFEED CIRCUIT BREAKER DOES NOT STAY CLOSED WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT AFT (ADB) 10-35E

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Electrical power distribution box cover removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for short between P174-A13 and ground.

Does short exist?

- YES Go to step 2.
- NO Replace pilot **FUEL** Panel (TM 1-1520-238-23).

2. Detach P938. Check for short between P174-A13 and ground.

Does short exist?

- YES Repair shorted wire between: P174-A13 and P938-6. Go to paragraph 10-17.
- NO Go to step 3.

3. Check for short between (L1)J1-6 and ground.

Does short exist?

- YES Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).
- NO Go to step 4.

4. Detach P457. Check for short between P938-7 and ground.

Does short exist?

- YES Repair shorted wire between P938-7 and P457-A3. Go to paragraph 10-17.
- NO Go to step 5.

5. Detach wire at (A402)TB2-31-Y. Check for short between (A402)J22-A3 and ground.

Does short exist?

- YES Repair shorted wire between (A402): J22-A3 and TB2-31-Y. Go to paragraph 10-17.
- NO Go to step 6.

6. Detach P442. Check for short between (A402)TB2-31-Z and ground.

Does short exist?

- YES Repair shorted wire between (A402): TB2-31-Z and J5-B6. Go to paragraph 10-17.
- NO Go to step 7.

7. Detach 939. Check for short between: P442-B6 and ground, P442-B7 and ground.

Does short exist?

- YES Repair shorted wire between: P442-B6 and P939-9, P442-B7 and P939-10. Go to paragraph 10-17.
- NO Go to step 8.

10-35E. FUEL XFEED CIRCUIT BREAKER DOES NOT STAY CLOSED WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT AFT (ADB) (cont) 10-35E

- | | |
|---|--|
| <p>8. Check for short between (L2)J1-9 and ground.
Does short exist?</p> <p>YES Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).</p> <p>NO Go to step 9.</p> | <p>13. Remove relay (A402)K5-6 (TM 1-1520-238-23). Check for short between (A402)TB2-17-B and ground.
Does short exist?</p> <p>YES Repair shorted wire between (A402):
TB2-17-B and KX5-6-X1.
Go to paragraph 10-17.</p> <p>NO Replace relay (A402)K5-6 (TM 1-1520-238-23).</p> |
| <p>9. Detach wire at (A402)TB2-17-H. Check for short between (A402)J5-B7 and ground.
Does short exist?</p> <p>YES Repair shorted wire between (A402):
J5-B7 and TB2-17-H.
Go to paragraph 10-17.</p> <p>NO Go to step 10.</p> | |
| <p>10. Detach wire at (A402)TB3-28/29-D. Check for short between TB2-17-E and ground.
Does short exist?</p> <p>YES Repair shorted wire between (A402):
TB2-17-E and TB3-28/29-D.
Go to paragraph 10-17.</p> <p>NO Go to step 11.</p> | |
| <p>11. Detach wire at (A402)TB2-17-J. Check for short between (A402)TB3-28/29-J and ground.
Does short exist?</p> <p>YES Repair shorted wire between (A402):
TB3-28/29-J and TB2-17-J.
Go to paragraph 10-17.</p> <p>NO Go to step 13.</p> | |
| <p>12. Check for short between (A402)TB3-28/29-D and ground.
Does short exist?</p> <p>YES Replace terminal board TB3-28/29 (TM 1-1520-238-23).</p> <p>NO Go to step 13.</p> | |

END OF TASK

10-35F. PILOT AND CPG GREEN XFEED INDICATORS ARE NOT LIGHTED WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT FORWARD (ADB)

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P939-6.
Is voltage present?

YES Go to step 2.
NO Go to step 5.

2. Check for open between (L2): J1-6 and J1-7.

Does open exist?

YES Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).
NO Go to step 3.

3. Check for open between P939-7 and P442-B5.
Does open exist?

YES Repair open wire. Go to paragraph 10-17.
NO Go to step 4.

4. Check for open between (A402): J5-B5 and TB2-17-L, TB2-17-L and TB2-17-B.

Does open exist?

YES Repair open wire (A402) TB2-17. Go to paragraph 10-17, or replace terminal board (TM 1-1520-238-23).
NO Replace relay (A402)K5-6 (TM 1-1520-238-23).

5. Check for open between: P939-6 and P442-B2.

Does open exist?

YES Repair open wire. Go to paragraph 10-17.
NO Go to step 6.

6. Check for open between (A402): J5-B2 and J22-A9.

Does open exist?

YES Repair open wire between (A402): J5-B2 and TB2-31-W, TB2-31-T and J22-A9, or replace terminal board (A402) TB2-31. Go to paragraph 10-17.
NO Go to step 7.

7. Check for open between P457-A9 and P938-10.

Does open exist?

YES Repair open wire. Go to paragraph 10-17.
NO Go to step 8.

**10-35F. PILOT AND CPG GREEN XFEED INDICATORS ARE NOT LIGHTED
WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT FORWARD (ADB) (cont)**

10-35F

8. Check for open between (L1):
J1-9 and J1-10.

Does open exist?

YES Replace engine 1 fuel
 crossfeed/shutoff valve
 (TM 1-1520-238-23).

NO Go to step 9.

9. Check for open between P938-9 and
P174-A16.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-17.

NO Replace pilot **FUEL** panel
 (TM 1-1520-238-23).

END OF TASK

10-35G. PILOT AND CPG AMBER XFEED INDICATORS ARE LIGHTED WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT NORMAL (ADB) 10-35G

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P939-11.
Is voltage present?

- YES Go to step 2.
- NO Go to step 5.

2. Check for open between (L2): J1-11 and J12.

Does open exist?

- YES Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).
- NO Go to step 3.

3. Check for open between P939-12 and P442-B14.

Does open exist?

- YES Repair open wire. Go to paragraph 10-17.
- NO Go to step 4.

4. Check for open between (A402): J5-B14 and TB3-28/29-E, TB2-17-F and TB3-28/29-K.

Does open exist?

- YES Repair open wire. Go to paragraph 10-17.
- NO Replace terminal board TB3-28/29 (TM 1-1520-238-23).

5. Check for open between P939-11 and P442-B13.

Does open exist?

- YES Repair open wire. Go to paragraph 10-17.
- NO Go to step 6.

6. Check for open between (A402): J5-B13 and J22-A19.

Does open exist?

- YES Repair open wire between (A402): TB2-31-S and J5-B13, TB2-31-R and J22-A19, Go to paragraph 10-17, or replace terminal board (A402) TB2-31 (TM 1-1520-238-23).
- NO Go to step 7.

7. Check for open between P457-A19 and P938-12.

Does open exist?

- YES Repair open wire. Go to paragraph 10-17.
- NO Go to step 8.

10-35G. PILOT AND CPG AMBER XFEED INDICATORS ARE LIGHTED WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT NORMAL (ADB) (cont)

8. Check for open between (L1):
J1-11 and J1-12.

Does open exist?

YES Replace engine 1 fuel
 crossfeed/shutoff valve
 (TM 1-1520-238-23).

NO Go to step 9.

9. Check for open between P938-11 and
P174-A18.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-17.

NO Replace pilot **FUEL** panel
 (TM 1-1520-238-23).

END OF TASK

10-35H. FUEL XFEED CIRCUIT BREAKER DOES NOT STAY CLOSED WITH ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT FORWARD (ADB)

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Electrical power distribution box cover removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for short between P174-A16 and ground.

Does short exist?

- YES Go to step 2.
- NO Replace pilot **FUEL** Panel (TM 1-1520-238-23).

2. Detach P938. Check for short between P174-A16 and ground.

Does short exist?

- YES Repair shorted wire between P174-A16 and P938-9. Go to paragraph 10-17.
- NO Go to step 3.

3. Check for short between (L1)J1-9 and ground.

Does short exist?

- YES Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).
- NO Go to step 4.

4. Detach P457. Check for short between P938-10 and ground.

Does short exist?

- YES Repair shorted wire between P938-10 and P457-A9. Go to paragraph 10-17.
- NO Go to step 5.

5. Detach wire at (A402)TB2-31-T. Check for short between (A402)J22-A9 and ground.

Does short exist?

- YES Repair shorted wire between (A402): J22-A9 and TB2-31-T. Go to paragraph 10-17.
- NO Go to step 6.

6. Detach P442. Check for short between (A402)TB2-31-W and ground.

Does short exist?

- YES Repair shorted wire between (A402): TB2-31-W and J5-B2. Go to paragraph 10-17.
- NO Go to step 7.

7. Detach 939. Check for short between: P442-B2 and ground, P442-B5 and ground.

Does short exist?

- YES Repair shorted wire between: P442-B2 and P939-6, P442-B5 and P939-7. Go to paragraph 10-17.
- NO Go to step 8.

**10-35H. FUEL XFEED CIRCUIT BREAKER DOES NOT STAY CLOSED WITH
ENGINE 1 AND ENGINE 2 CROSSFEED VALVES AT FORWARD (ADB) (cont)**

10-35H

8. Check for short between (L2)J1-6 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23). |
| NO | Repair shorted wire between (A402):
J5-B5 and TB2-17-L.
Go to paragraph 10-17. |

END OF TASK

**10-35I. PILOT AND CPG GREEN XFEED INDICATORS ARE LIGHTED WITH ENGINE 1
AND ENGINE 2 CROSSFEED VALVES AT NORMAL (ADB)**

10-35I

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Electrical power distribution box cover removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for short between (A402)J16-A1 and ground.

Does short exist?

YES	Go to step 2.
NO	Repair shorted wire between P440-A1 and P18-125. Go to paragraph 10-17.

2. Detach wire at (A402)XK5-6-A1. Check for short between (A402)J16-A1 and ground.

Does short exist?

YES	Repair shorted wire. Go to paragraph 10-17.
NO	Replace relay (A402)K5-6 (TM 1-1520-238-23).

END OF TASK

10-36. BOOST PMP ON INDICATOR – DOES NOT LIGHT WITH ORIDE SWITCH SET TO CPG

10-36

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Check for 28 VDC at P174-A17.
Is voltage present?

YES	Replace pilot FUEL panel (TM 1-1520-238-23).
NO	Go to step 2.
- Check for 28 VDC at P191-B1.
Is voltage present?

YES	Go to step 3.
NO	Repair open wire between: P191-B1 and P429-A16, (A402)J23-A16 and (A402)TB2-29-P. Go to paragraph 10-17.
- On CPG **FUEL** panel, hold **BOOST** switch at **ON** position, check for open between (A179): J1-B1 and J1-B10.
Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Replace CPG FUEL panel (TM 1-1520-238-23).

END OF TASK

10-37. ENGINE 2 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO NORMAL POSITION WITH ORIDE SWITCH SET TO CPG **10-37**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P174-B6.
Is voltage present?

YES	Go to step 2.
NO	Go to step 4.

2. With P174 attached, check for 28 VDC at (A131)J2-A6.
Is voltage present?

YES	Go to step 3.
NO	Replace pilot FUEL panel (TM 1-1520-238-23).

3. With P179 attached, check for 28 VDC at P939-4.
Is voltage present?

YES	Go to step 6.
NO	Repair open wire between: P939-4 and (A402)TB2-13-P, (A402)TB2-13-N and P179-A6. Go to paragraph 10-17.

4. Check for 28 VDC at P191-A1.
Is voltage present?

YES	Go to step 5.
NO	Go to step 8.

5. Check for open between P191-A8 and P174-B6.
Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Replace CPG FUEL panel (TM 1-1520-238-23).

6. Check for open between P939-5 and GS541-M.
Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Go to step 7.

7. Check for 28 VDC at P939-8.
Is voltage present?

YES	Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).
NO	Repair open wire between: (A402)J1-32 and (A402)TB3-4-L, (A402)TB3-4-J and (A402)J5-B8, P442-B8 and P939-8. Go to paragraph 10-17.

8. Check for 28 VDC at P1-32.
Is voltage present?

YES	Repair open wire between: P191-A1 and P429-B14, (A402)J23-B14 and (A402)TB3-4-K, (A402)TB3-4-L and (A402)J1-32. Go to paragraph 10-17.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).

END OF TASK

10-38. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO FORWARD POSITION WITH ORIDE SWITCH SET TO CPG **10-38**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P174-B14.
Is voltage present?
 - YES Go to step 2.
 - NO Go to step 3.

2. With P174 attached, check for 28 VDC at (A131)J2-A2.
Is voltage present?
 - YES Go to step 5.
 - NO Replace pilot **FUEL** panel (TM 1-1520-238-23).

3. Check for 28 VDC at P191-A1.
Is voltage present?
 - YES Go to step 4.
 - NO Go to step 8.

4. On CPG **FUEL** panel, set **ORIDE** switch to **CPG** and **TK SEL** switch to **FROM FWD**. Check for open between (A179): J1-A1 and J1-A10.
Does open exist?
 - YES Replace CPG **FUEL** panel (TM 1-1520-238-23).
 - NO Repair open wire between P191-A10 and P174-B14. Go to paragraph 10-17.

5. With P179 attached, check for 28 VDC at P938-3.
Is voltage present?
 - YES **(AAG)** Go to step 6. **(ABC)** Go to step 7.
 - NO Repair open wire between P179-A2 and P938-3. Go to paragraph 10-17.

6. **(AAG)** Check for open between P938-5 and GS570-K.
Does open exist?
 - YES Repair open wire. Go to paragraph 10-17.
 - NO Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

7. **(ABC)** Check for open between P938-5 and GS578-A.
Does open exist?
 - YES Repair open wire. Go to paragraph 10-17.
 - NO Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

8. Check for 28 VDC at P1-32.
Is voltage present?
 - YES Go to step 9.
 - NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).

**10-38. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE
TO FORWARD POSITION WITH ORIDE SWITCH SET TO CPG (cont)**

10-38

9. Check for 28 VDC at (A402)J23-B14.

Is voltage present?

- | | |
|-----|---|
| YES | Repair open wire between
P429-B14 and P191-A1.
Go to paragraph 10-17. |
| NO | Repair open wire between
(A402):
J23-B14 and TB3-4-K,
TB3-4-L and J1-32.
Go to paragraph 10-17. |

END OF TASK

10-39. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO CLOSED POSITION WITH CPG ENG 1 FIRE PULL HANDLE PULLED **10-39**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-8
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at (A131)J2-A5.

Is voltage present?

YES Go to step 2.
NO Go to step 3.

2. With P179 attached, check for 28 VDC at P938-2.

Is voltage present?

YES **(AAG)** Go to step 4.
 (ABC) Go to step 5.
NO Repair open wire between P179-A5 and P938-2.
 Go to paragraph 10-17.

3. Check for 28 VDC at P174-B15.

Is voltage present?

YES Replace pilot **FUEL** panel (TM 1-1520-238-23).
NO Refer to TM 1-1520-238-T-8 to troubleshoot utility system.

4. **(AAG)** Check for open between P938-5 and GS570-K.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-17.
NO Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

5. **(ABC)** Check for open between P938-5 and GS578-A.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-17.
NO Replace engine 1 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

END OF TASK

**10-40. ENGINE 1 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE
TO FORWARD POSITION WITH CPG ENG 1 FIRE PULL HANDLE PUSHED**

10-40

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-8

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P174-B15.

Is voltage present?

YES	Refer to TM 1-1520-238-T-8 to troubleshoot utility system.
NO	Go to step 2.

2. Check for 28 VDC at P174-B17.

Is voltage present?

YES	Repair open wire between P1039-B5 and P174-B17. Go to paragraph 10-17.
NO	Refer to TM 1-1520-238-T-8 to troubleshoot utility system.

END OF TASK

10-41. ENGINE 2 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO FORWARD POSITION WITH CPG ENG 2 FIRE PULL HANDLE PUSHED

10-41

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-8

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P174-B16.

Is voltage present?

YES	Refer to TM 1-1520-238-T-8 to troubleshoot utility system.
NO	Go to step 2.

2. Check for 28 VDC at P174-B18.

Is voltage present?

YES	Repair open wire between J1039-B8 and P174-B18. Go to paragraph 10-17.
NO	Refer to TM 1-1520-238-T-8 to troubleshoot utility system.

END OF TASK

10-42. ENGINE 2 FUEL CROSSFEED/SHUTOFF VALVE INDICATOR – DOES NOT MOVE TO CLOSED POSITION WITH CPG ENG 2 FIRE PULL HANDLE PULLED

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-8
TM 1-1520-238-23

3. Check for 28 VDC at P174-B16.

Is voltage present?

YES	Replace pilot FUEL panel (TM 1-1520-238-23).
NO	Refer to TM 1-1520-238-T-8 to troubleshoot utility system.

4. Check for open between P939-5 and GS541-M.

Does open exist?

YES	Repair open wire. Go to paragraph 10-17.
NO	Replace engine 2 fuel crossfeed/shutoff valve (TM 1-1520-238-23).

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at (A131)J2-A7.

Is voltage present?

YES	Go to step 2.
NO	Go to step 3.

2. With P179 attached, check for 28 VDC at P939-2.

Is voltage present?

YES	Go to step 4.
NO	Repair open wire between: P179-A7 and P429-B6, (A402)J23-B6 and (A402)TB2-13-E, (A402)TB2-13-F and (A402)J5-B10, P442-B10 and P939-2. Go to paragraph 10-17.

END OF TASK

10-43. FUEL BST CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH BOOST PUMP ON

10-43

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P444. Check for short between P18-96 and ground.

Does short exist?

YES	Repair shorted wire between P18-96 and (A402)J31-B17. Go to paragraph 10-17.
NO	Go to step 2.

2. Detach S67 SP2. Check for short between P444-B17 and ground.

Does short exist?

YES	Repair shorted wire between P444-B17 and S67 SP2. Go to paragraph 10-17.
NO	Replace boost pump pressure switch (S67) (TM 1-1520-238-23).

END OF TASK

10-44. FUEL BST CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH CPG FUEL PANEL ORIDE SWITCH SET TO CPG

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

4. Detach P242 from (L15). Check for short between:

P242-A and ground,
P242-B and ground.

Does short exist?

YES Repair shorted wire between P242-A and ground. Go to paragraph 10-17.

NO Replace boost pump air valve (TM 1-1520-238-23).

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P191 from (A179)J1. Check for short between P191-B10 and ground.

Does short exist?

YES Go to step 2.

NO Replace CPG **FUEL** panel (TM 1-1520-238-23).

2. Detach P174 from (A131)J1. Check for short between (A131)J1-A17 and ground.

Does short exist?

YES Go to step 3.

NO Repair shorted wire between (A131)J1-A17 and ground. Go to paragraph 10-17.

3. Detach P179 from (A131)J2. Check for short between P179-B5 and ground.

Does short exist?

YES Go to step 4.

NO Replace Pilot **Fuel** panel (TM 1-1520-238-23).

END OF TASK

10-45. FUEL BOOST SWITCH – DOES NOT STAY ON WITH CROSSFEED SWITCH SET TO AFT TK

10-45

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P174-B19.
Does open exist?
 - YES Go to step 4.
 - NO Go to step 2.

2. Check for 28 VDC at P191-A1.
Does open exist?
 - YES Go to step 5.
 - NO Go to step 3.

3. Check for 28 VDC at (A76)P1-32.
Does open exist?
 - YES Repair open wire between: (A402)J1-32 and (A402)TB3-4-L, (A402)J23-B14 and (A402)TB3-4-K, P429-B14 and P191-A1. Go to paragraph 10-17.
 - NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).

4. On pilot **FUEL** panel, set **CROSSFEED** switch to **AFT TK**. Check for open between (A131): J1-B19 and J1-B5.
Does open exist?
 - YES Go to step 6.
 - NO Repair open wire between (A131)S2-8 and chassis ground. Go to paragraph 10-17.

5. On CPG **FUEL** panel, set **ORIDE** switch to **PLT**. Check for open between (A179): J1-A1 and J1-A2.
Does open exist?
 - YES Go to step 7.
 - NO Repair open wire between P191-A2 and P174-B19. Go to paragraph 10-17.

6. Check for open between (A131): S1-5 and J1-B19, S2-7 and J1-B5, S2-1 and S2-7, S2-1 and S1-1, S1-3 and S1-4.
Does open exist?
 - YES Repair open wire. Go to paragraph 10-17.
 - NO Replace pilot **FUEL** panel (TM 1-1520-238-23).

10-45. FUEL BOOST SWITCH – DOES NOT STAY ON WITH CROSSFEED SWITCH SET TO AFT TK (cont)

10-45

7. On CPG **FUEL** panel, check for open between (A179):
S4-5 and S4-4.

Does open exist?

YES Repair open wire between (A179):
S4-5 and J1-A1,
S4-4 and J1-A2.
Go to paragraph 10-17.

NO Replace CPG **FUEL** panel (TM 1-1520-238-23).

END OF TASK

**10-46. FUEL BOOST SWITCH – DOES NOT GO TO OFF WITH CROSSFEED SWITCH
SET TO NORM**

10-46

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

4. Check for short between:
P174-B5 and P174-B17,
P174-B18 and P174-B19.

Does short exist?

YES	Repair shorted wire. Go to paragraph 10-17.
NO	Go to paragraph 10-47.

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for open between (A131):
S1-1 and S1-2.

Does open exist?

YES	Go to step 2.
NO	Replace pilot FUEL panel (TM 1-1520-238-23).

2. Check for 28 VDC at P174-B5.

Is voltage present?

YES	Go to step 3.
NO	Replace pilot FUEL panel (TM 1-1520-238-23).

3. Check for open between (A179):
S2-4 and S2-6.

Does open exist?

YES	Go to step 4.
NO	Replace CPG FUEL panel (TM 1-1520-238-23).

END OF TASK

10-47. FUEL QUANTITY INDICATION/TRANSFER – MAINTENANCE OPERATIONAL CHECK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 9-1090-208-23-1	Ammo storage magazine removed
Paragraph 10-12	HELICOPTER FUEL SYSTEM – VISUAL CHECK completed
Paragraph 10-10	FUEL SYSTEM – POWER UP completed
TM 1-1520-238-T-4	Maintenance headset connected
TM 1-1520-238-T-6	Pilot and CPG caution/warning maintenance operational checks performed

Personnel Required:

67R Attack Helicopter Repairer
Two people to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-T-5
TM 1-1520-238-T-6
TM 9-1090-208-23-1
TM 1-1520-238-10
TM 1-1520-238-23

WARNING

- Make sure helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting or maintenance procedures. Failure to do so could result in death or serious injury.
- Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well-ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.
- Do not allow sparks or flame near helicopter when servicing or performing maintenance on fuel system.
- Make sure helicopter is grounded.

NOTE

- Fuel quantity system capacitance and indicating test must be performed first if any of the following fuel system components have been replaced: FSC, fuel cell quantity transmitter or fuel system wire harness.
- If fuel quantity system capacitance and indicating test is to be performed, go to paragraph 10-48 or 10-48A.
- Amber XFEED indicators on pilot and CPG caution/warning panels (figs.10-56 and 10-57) will light with pilot FUEL panel (fig.10-58) ENG 1 and ENG 2 switches set to OFF (engine 1 and engine 2 crossfeed/shutoff valves closed).

10-47. FUEL QUANTITY INDICATION/TRANSFER – MAINTENANCE OPERATIONAL CHECK (cont)

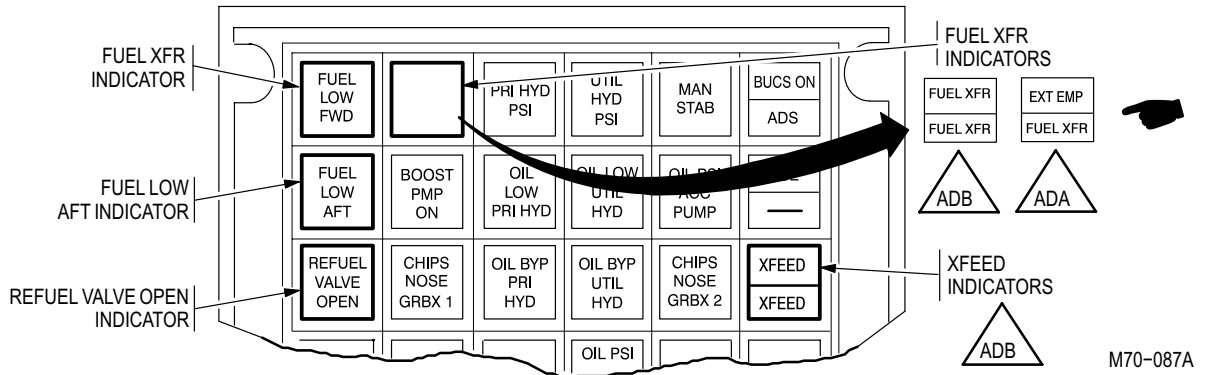


Figure 10-56. Pilot Caution/Warning Panel

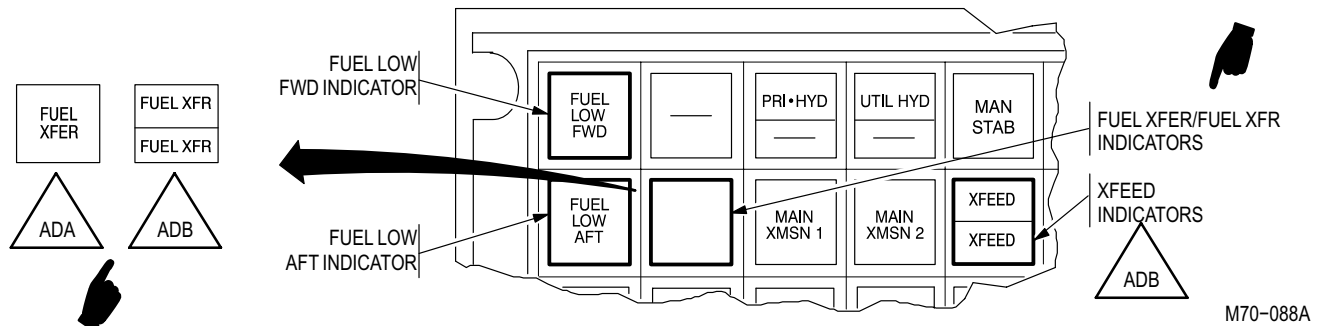


Figure 10-57. CPG Caution/Warning Panel

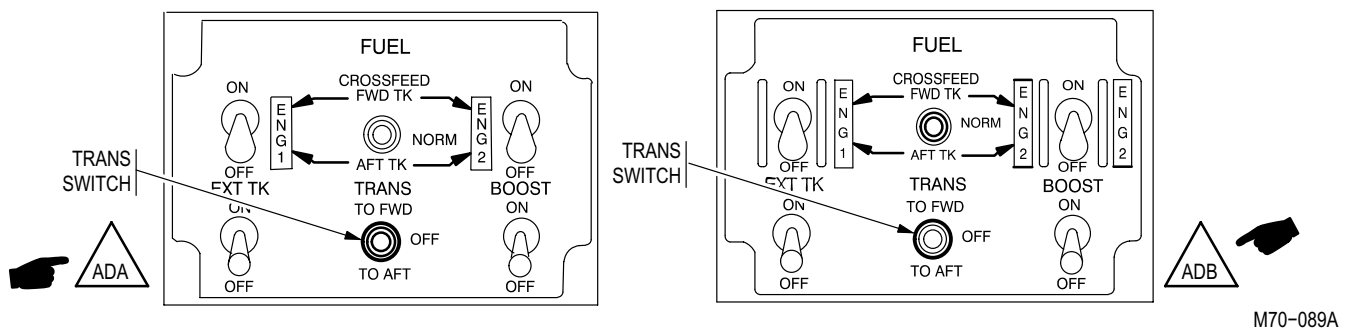
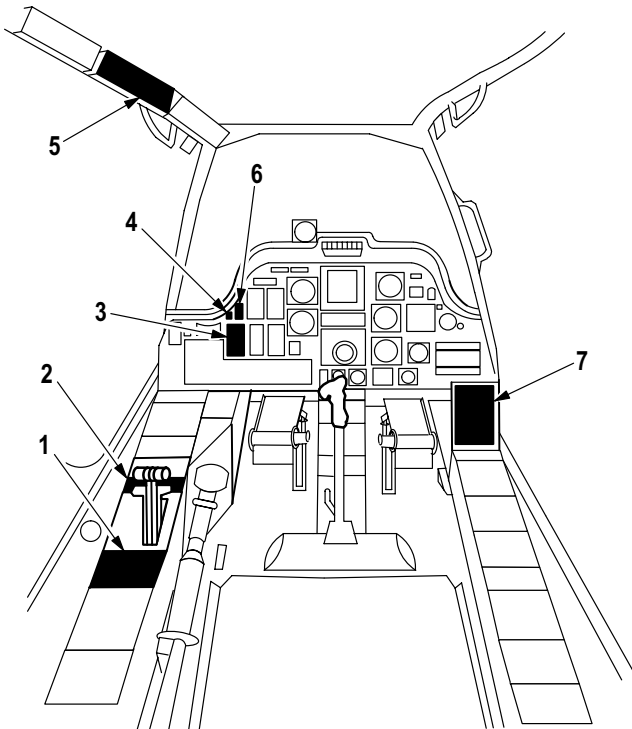


Figure 10-58. Pilot FUEL Panel

NOTE

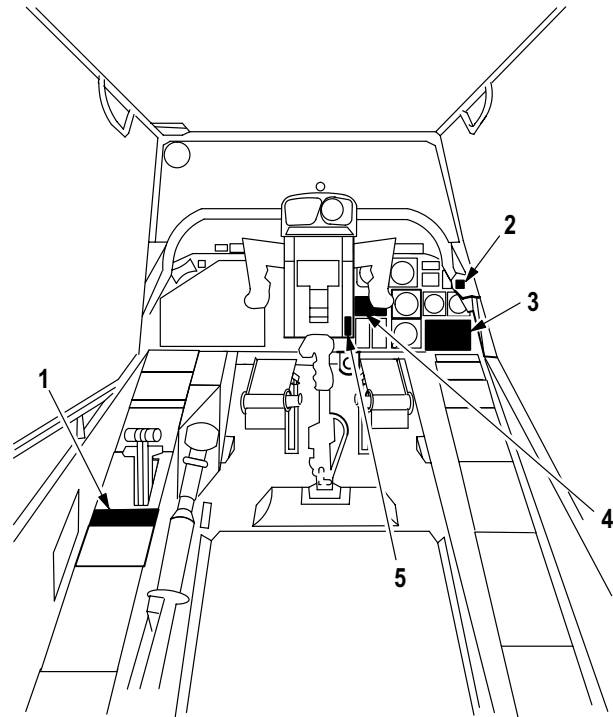
- Refer to pilot station (fig. 10-59) and CPG station (fig. 10-60) for cockpit configuration and equipment.
- If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.



1. PILOT FUEL PANEL
2. PILOT ELEC PWR PANEL
3. PILOT FUEL QUANTITY INDICATOR
4. PILOT FUEL XFR ADVISORY LIGHT
5. PILOT CIRCUIT BREAKER PANEL (CENTER)
6. PILOT DIM / TEST PANEL
7. PILOT CAUTION / WARNING PANEL

M70-082A

Figure 10-59. Pilot Station



1. CPG FUEL PANEL
2. CPG FUEL XFER ADVISORY LIGHT
3. CPG CAUTION / WARNING PANEL
4. CPG SELECTABLE DIGITAL DISPLAY
5. CPG DIM / TEST PANEL

M70-083A

Figure 10-60. CPG Station

1. Service aft fuel cell to 200 lbs. (30.8 gallons) (TM 1-1520-238-23).
2. Service forward fuel cell to 300 lbs. (46.2 gallons) (TM 1-1520-238-23).
- 3. Ensure helicopter is on level surface (4.3° to 4.6° tail down attitude).

10-47. FUEL QUANTITY INDICATION/TRANSFER – MAINTENANCE OPERATIONAL CHECK (cont)

10-47

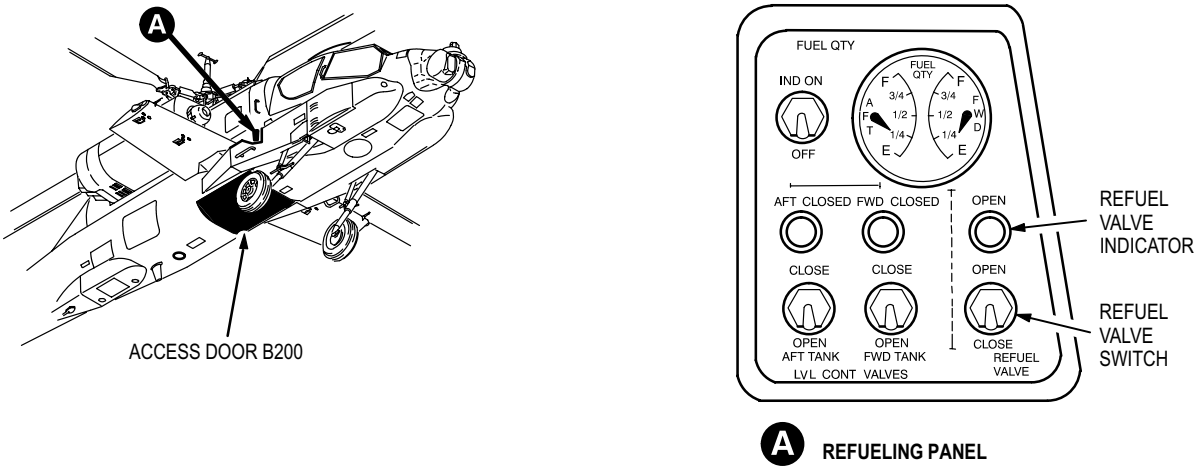


Figure 10-61. Access Door B200 And Refueling Panel Location

4. With one person in pilot station, one person in CPG station, and one person watching for leaks thru B200 (fig. 10-61), complete the maintenance operational check as follows:

Task	Result
------	--------

- a. On pilot **EXT LT/INTR LT** panel, (fig.10-62) rotate **L CSL** control to **BRT**.

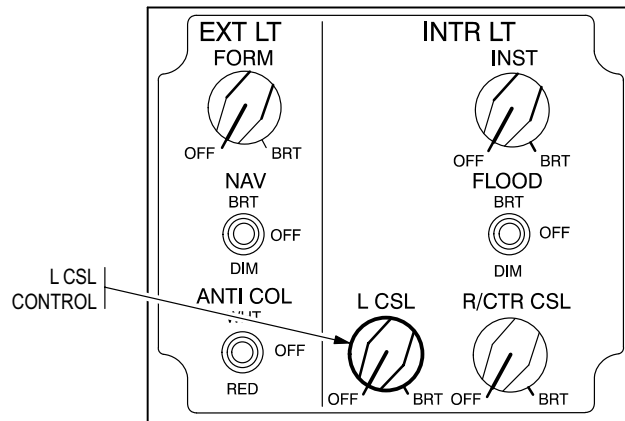
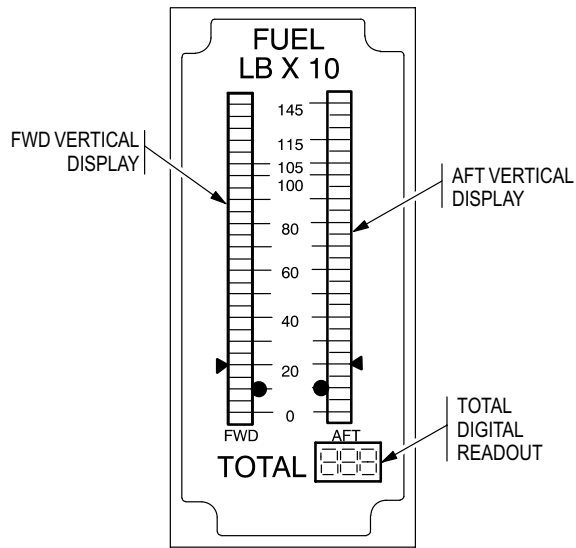


Figure 10-62. Pilot EXT LT/INTR LT Light Panel

- b. On pilot instrument panel, check that **FUEL** quantity indicator (fig. 10-63) edge-lights are lighted.

If pilot **FUEL** quantity indicator edge-lights are not lighted, refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.



M70-084

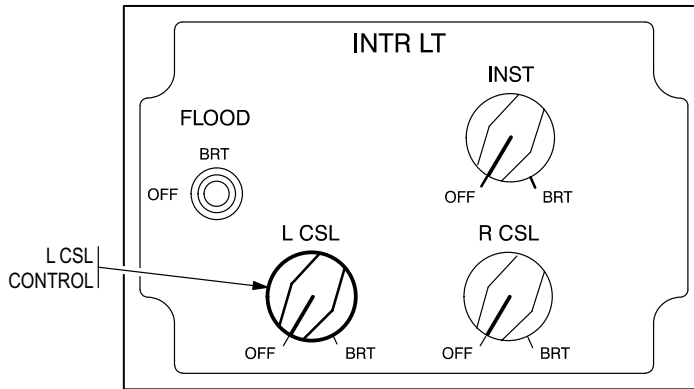
Figure 10-63. Pilot FUEL Quantity Indicator

Task

Result

- c. On CPG **INTR LT** panel (fig. 10-64), rotate **L CSL** control to **BRT**.

If CPG **FUEL** panel edge-lights are not lighted, refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.



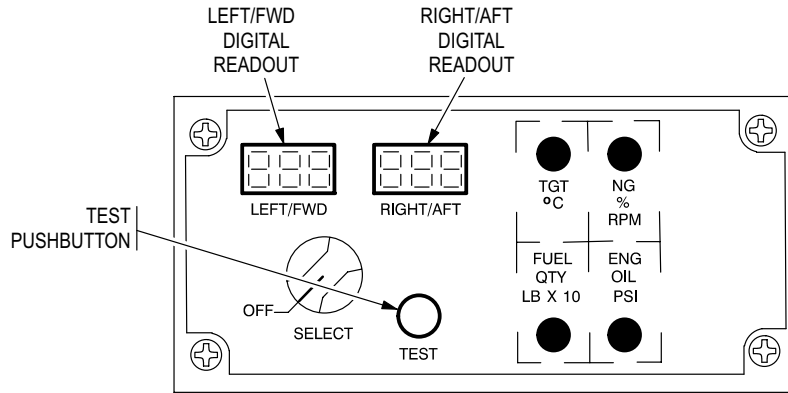
M70-367

Figure 10-64. CPG INTR Light Panel

- d. On CPG **INTR LT** panel, rotate **INST** control to **BRT**. On CPG instrument panel, check that selectable digital display (fig. 10-65) edge-lights are lighted. On CPG **INTR LT** panel, rotate **INST** control to **OFF**.

If CPG selectable digital display edge-lights are not lighted, refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.

10-47. FUEL QUANTITY INDICATION/TRANSFER – MAINTENANCE OPERATIONAL CHECK (cont)



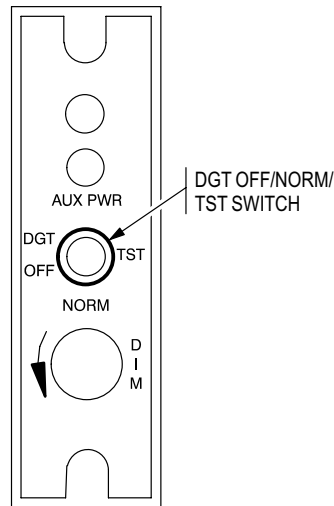
M70-085

Figure 10-65. CPG Selectable Digital Display

NOTE

The test circuit automatically opens (lamps out) two seconds after being switched on to prevent heat damage to digital instrument light segments. To recycle test mode, release switch, wait one second, and reset TST switch to TST.

Task	Result
<p>e. On pilot dim/test panel (fig. 10-66), set DGT OFF/NORM/TST switch to TST. Check pilot FUEL quantity indicator (fig. 10-63). All lamp segments are lighted (2 seconds), and digital readout is 888.</p>	<p>If all lamp segments are not lighted, replace lamps (TM 1-1520-238-23). If lamps are still not lighted, and/or digital readout is not 888, refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.</p>



M70-086

Figure 10-66. Dim/Test Panel

10-47. FUEL QUANTITY INDICATION/TRANSFER – MAINTENANCE OPERATIONAL CHECK (cont)

Task	Result
f. On CPG selectable digital display (fig. 10-65), push and hold TEST pushbutton. Check that digital readouts indicate 888 , then release.	If digital readouts do not indicate 888 , refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.
<p>NOTE</p>	
<p>A difference of up to 10 % between pilot and CPG readouts is acceptable.</p>	
g. Select FUEL QTY on CPG selectable digital display and compare CPG selectable digital display digital readouts with pilot FUEL quantity indicator (fig. 10-63) TOTAL digital readout.	If selectable digital display digital readouts do not agree with pilot FUEL quantity indicator TOTAL digital readout, refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.
h. On pilot FUEL quantity indicator, check that FWD vertical display indicates 29 to 31 .	If pilot FUEL quantity indicator FWD vertical display does not indicate 29 to 31 , go to paragraph 10-48 or 10-48A.
i. On pilot FUEL quantity indicator, check that AFT vertical display indicates 19 to 21 .	If pilot FUEL quantity indicator AFT vertical display does not indicate 19 to 21 , go to paragraph 10-48 or 10-48A.
j. On pilot and CPG caution/warning panels (fig. 10-56 and fig. 10-57), check that FUEL LOW AFT indicators are lighted and FUEL LOW FWD indicator and REFUEL VALVE OPEN indicator are not lighted.	If FUEL LOW AFT indicators are not lighted, go to paragraph 10-52.
	If pilot FUEL LOW FWD indicator is lighted, go to paragraph 10-62.
	If REFUEL VALVE OPEN indicator is lighted, have assistant open R160 door and verify on refueling panel (fig. 10-61) that REFUEL VALVE switch is set to CLOSE . If switch is set to CLOSE and refuel valve indicator remains lighted, go to paragraph 10-76, then complete this maintenance operational check.
k. On pilot and CPG caution/warning panels, check that amber FUEL XFR indicators are not lighted.	If pilot and CPG amber FUEL XFER indicators are lighted, go to paragraph 10-66C.
l. (ADA) On pilot and CPG instrument panels, check that green FUEL XFR/XFER advisory lights (fig. 10-67) are not lighted.	If pilot and CPG green FUEL XFR/XFER advisory lights are lighted, go to paragraph 10-66G.

10-47. FUEL QUANTITY INDICATION/TRANSFER – MAINTENANCE OPERATIONAL CHECK (cont)

10-47



M70-091

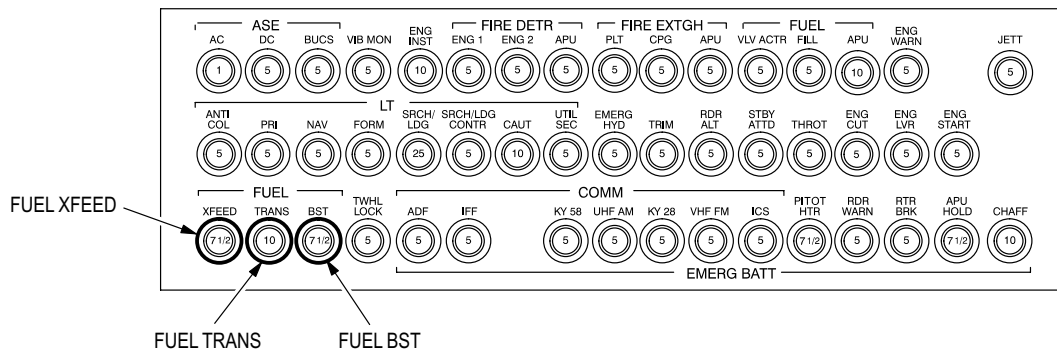
Figure 10-67. FUEL XFR/XFER Advisory Lights (ADA)

Task	Result
m. (ADB) On pilot and CPG caution/warning panels, (fig 10-56 and fig. 10-57) check that green FUEL XFR indicators are not lighted.	If pilot and CPG indicators are still lighted, go to paragraph 10-66D.

NOTE

The following steps transfer fuel between the forward fuel cell and the aft fuel cell. The repairer in the pilot seat is to monitor the pilot FUEL quantity indicator vertical displays and digital readouts, and the pilot caution/warning panel FUEL LOW FWD and FUEL LOW AFT indicators. The assistant in the CPG seat is to monitor the CPG selectable digital display digital readout, and the CPG caution/warning panel FUEL LOW FWD and FUEL LOW AFT indicators. FUEL LOW FWD indicator/quantity must be observed only when forward fuel level is decreasing. FUEL LOW AFT indicator/quantity must be observed only when aft fuel level is decreasing. Increasing fuel levels may provide incorrect indications. The second assistant watches for fuel leaks during the transfer procedure. If leaks are observed, stop transferring fuel and go to paragraph 10-12.

- n. On pilot **FUEL** panel (fig. 10-58), set **TRANS** switch to **TO AFT**.
 - o. On pilot center circuit breaker panel (fig. 10-67.1), check that **FUEL TRANS** circuit breaker stays closed.
- If **FUEL TRANS** circuit breaker does not stay closed, go to paragraph 10-53.



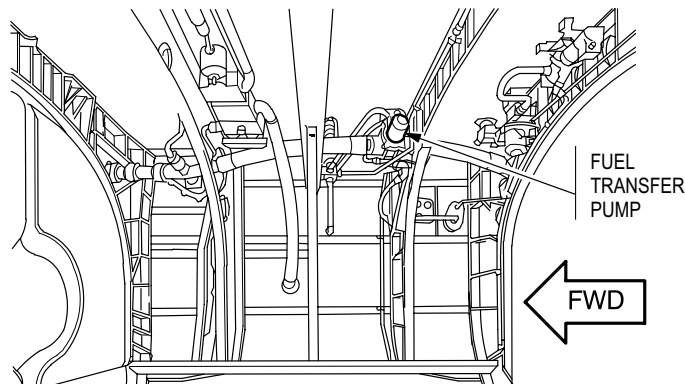
M70-090

Figure 10-67.1. Pilot Center Circuit Breaker Panel

10-47. FUEL QUANTITY INDICATION/TRANSFER – MAINTENANCE OPERATIONAL CHECK (cont)

10-47

Task	Result
p. In ammo storage bay (fig. 10-67.2), have assistant check fuel transfer pump for operating noise.	If fuel transfer pump is not operating, go to paragraph 10-59.



M70-371

Figure 10-67.2. Ammo Storage Bay and Fuel Transfer Valve

q. On pilot instrument panel, check FUEL quantity indicator (fig. 10-63). FWD vertical display shows decrease, AFT vertical display shows increase.	If AFT vertical display shows decrease and FWD vertical display shows increase, go to paragraph 10-59.
--	--

NOTE

Amber FUEL XFR indicators on pilot and CPG caution/warning panels (fig. 10-62 and fig. 10-63) may light momentarily prior to green indicators lighting.

r. (ADA) On pilot and CPG instrument panels, check that green FUEL XFR/XFER advisory lights (fig. 10-67) are lighted.	If pilot green FUEL XFR advisory light is not lighted, go to paragraph 10-63.
	If CPG green FUEL XFR advisory light is not lighted, go to paragraph 10-64.

10-47. FUEL QUANTITY INDICATION/TRANSFER – MAINTENANCE OPERATIONAL CHECK (cont)

10-47

Task	Result
s. (ADB) On pilot and CPG caution/warning panels (fig. 10-56 and fig.10-57), check that green FUEL XFR indicators are lighted.	If pilot and CPG green FUEL XFR indicators are not lighted, go to paragraph 10-66A.
t. On pilot and CPG caution/warning panels, check that amber FUEL XFR indicators are not lighted.	If pilot and CPG amber FUEL XFER indicators are lighted, go to to paragraph 10-76 to troubleshoot pressure refueling/defueling system. If pilot and CPG amber FUEL XFER indicators are still lighted, replace fuel transfer pump (TM 1-1520-238-23).

NOTE

When caution/warning panel FUEL LOW FWD indicator is set to illuminate between 160 and 200 lbs. at ground attitude (4.3° to 4.6° tail down), it will illuminate between 260 and 300 lbs. (per TM 1-1520-238-10) at cruise attitude (3.0° to 3.3° nose down).

u. On pilot and CPG instrument panels, as FUEL quantity indicator FWD vertical display indicates 20 to 16 , check that pilot and CPG caution/warning panel FUEL LOW FWD indicators are lighted.	If pilot and CPG caution/warning panel FUEL LOW FWD indicators are not lighted with pilot FUEL quantity indicator FWD vertical display indicating 20 to 16 , go to paragraph 10-57.
v. On pilot FUEL panel (fig. 10-58), set TRANS switch to TO FWD .	
w. On pilot center circuit breaker panel (fig. 10-67.1), check that FUEL TRANS circuit breaker stays closed.	If FUEL TRANS circuit breaker does not stay closed go to paragraph 10-58.
x. In ammo storage bay (fig. 10-67.2), have assistant check fuel transfer pump for operating noise.	If fuel transfer pump is not operating, go to paragraph 10-60.
y. On pilot instrument panel, check FUEL quantity indicator (fig. 10-63). FWD vertical display shows increase, AFT vertical display shows decrease.	If AFT vertical display shows increase and FWD vertical display shows decrease, go to paragraph 10-60.
z. (ADA) On pilot and CPG instrument panels, check that green FUEL XFR/XFER advisory lights (fig. 10-67) are lighted.	If pilot green FUEL XFR and CPG FUEL XFER advisory lights are not lighted, replace pilot FUEL panel (TM 1-1520-238-23).
aa. (ADB) On pilot and CPG caution/warning panels (fig. 10-56 and fig.10-57) , check that green FUEL XFR indicators are lighted.	If green pilot and CPG FUEL XFR indicators are not lighted, replace pilot FUEL panel (TM 1-1520-238-23).

Task	Result
------	--------

NOTE

A difference of up to 10 % between pilot and CPG readouts is acceptable.

NOTE

When caution/warning panel FUEL LOW AFT indicator is set to illuminate between 220 and 260 lbs. at ground attitude (4.3° to 4.6° tail down), it will illuminate between 210 and 270 lbs. (per TM 1-1520-238-10) at cruise attitude (3.0° to 3.3° nose down).

ab. When pilot **FUEL** quantity indicator (fig. 10-63) **AFT** vertical display reaches **22** to **26**, check that pilot and CPG caution/warning panel (fig. 10-56 and fig.10-57) **FUEL LOW AFT** indicators are lighted.

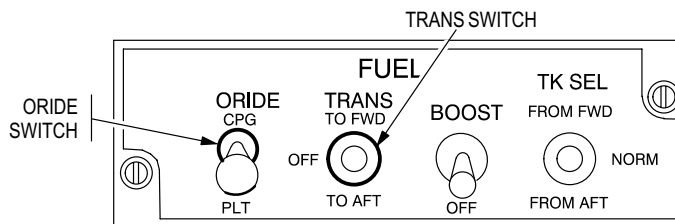
If pilot caution/warning panel **FUEL LOW AFT** indicators are not lighted with pilot **FUEL** quantity indicator **AFT** vertical display indicating **22** to **26**, go to paragraph 10-56.

ac. On pilot **FUEL** panel (fig. 10-58), set **TRANS** switch to **OFF**.

ad. On CPG **FUEL** panel (fig. 10-67.3), set **ORIDE** switch to **CPG**. Check that pilot center circuit breaker panel (fig. 10-67.1) **FUEL XFEED** and **FUEL BST** circuit breakers stay closed.

If **FUEL XFEED** circuit breaker does not stay closed with **ORIDE** switch set to **CPG**, go to paragraph 10-61.

If **FUEL BST** circuit breaker does not stay closed with **ORIDE** switch set to **CPG**, go to paragraph 10-44.



M70-092

Figure 10-67.3. CPG FUEL Panel

ae. On CPG **FUEL** panel, set **TRANS** switch to **TO AFT**.

af. On pilot center circuit breaker panel, check that **FUEL TRANS** circuit breaker stays closed.

If **FUEL TRANS** circuit breaker does not stay closed go to paragraph 10-66H.

ag. In ammo storage bay (fig. 10-67.2), have assistant check fuel transfer pump for operating noise.

If fuel transfer pump is not operating, go to paragraph 10-66E.

10-47 FUEL QUANTITY INDICATION/TRANSFER – MAINTENANCE OPERATIONAL CHECK (cont)

10-47

Task	Result
ah. On pilot instrument panel, check FUEL quantity indicator (fig. 10-63). FWD vertical display shows decrease, AFT vertical display shows increase.	If AFT vertical display shows decrease and FWD vertical display shows increase, go to paragraph 10-66E.
ai. On CPG FUEL panel (fig. 10-67.3), set TRANS switch to TO FWD .	
aj. On pilot center circuit breaker panel, check that FUEL TRANS circuit breaker stays closed.	If FUEL TRANS circuit breaker does not stay closed go to paragraph 10-66I.
ak. In ammo storage bay (fig. 10-67.2), have assistant check fuel transfer pump for operating noise.	If fuel transfer pump is not operating, go to paragraph 10-66F.
al. On pilot instrument panel, check FUEL quantity indicator (fig. 10-63). FWD vertical display shows increase, AFT vertical display shows decrease.	If AFT vertical display shows increase and FWD vertical display shows decrease, go to paragraph 10-66F.

NOTE

A difference of up to 10 % between pilot and CPG readouts is acceptable.

am. On CPG FUEL panel, set TRANS switch to OFF and ORIDE switch to PLT . Check that CPG selectable digital display (fig. 10-65) digital readouts agree with pilot FUEL quantity indicator displays/readouts.	If selectable digital display readouts do not agree with pilot FUEL quantity indicator displays/readouts, refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.
an. Service aft tank to 1300 pounds (TM 1-1520-238-23).	
ao. On pilot FUEL panel (fig. 10-58), set TRANS switch to TO AFT . When aft tank is full (1430 lbs) check that amber FUEL XFR indicators on pilot and CPG caution/warning panels are lighted.	If pilot and CPG amber FUEL XFR indicators are not lighted, go to paragraph 10-66B.
ap. On pilot FUEL panel, set TRANS switch to OFF .	

-
5. Perform FUEL SYSTEM – POWER DOWN (para 10-11).
 6. Install ammo storage magazine (TM 9-1090-208-23-1).
 7. Disconnect maintenance headset (TM 1-1520-238-T-4).

END OF TASK

**10-48. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING TF-579 TEST SET)**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Headset, Microphone (3)	H157AIC
Adapter Harness, Intercommunication System	7-311B22060-81601

References:

TM 1-1520-238-T-4
 TM 1-1520-238-T-5
 TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
Paragraph 10-12	HELICOPTER FUEL SYSTEM – VISUAL CHECK completed
Paragraph 10-10	FUEL SYSTEM – POWER UP completed
TM 1-1520-238-T-4	Maintenance headset connected

Personnel Required:

67R Attack Helicopter Repairer
 Two people to assist
 68X Armament/Electrical Systems Repairer

WARNING

- **Make certain helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting or maintenance procedures. Failure to do so could result in death or serious injury.**
- **Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well-ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.**
- **Do not allow sparks or flame near helicopter when servicing or performing maintenance on fuel system.**
- **Make certain helicopter is grounded.**
- **Turn off power before detaching or reattaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.**

NOTE

- **Refer to pilot station (fig. 10-59) and CPG station (fig. 10-60) for cockpit configuration and equipment.**
- **If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.**

10-48. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST (cont)
(USING TF-579 TEST SET)

10-48

1. Perform fuel quantity system capacitance and indicating test as follows:

Task	Result
a. On pilot instrument panel, check that fuel quantity indicator (fig. 10-63) edge-lights are lighted.	If pilot fuel quantity indicator edge-lights are not lighted, refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.
b. On CPG instrument panel, check that selectable digital display (fig. 10-65) edge-lights are lighted.	If selectable digital display edge-lights are not lighted, refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.

NOTE

To prevent heat damage to digital instrument light segments, the test circuit automatically opens (lamp out) two seconds after being switched on. To recycle test mode release switch, wait one second, and reset TST switch to TST.

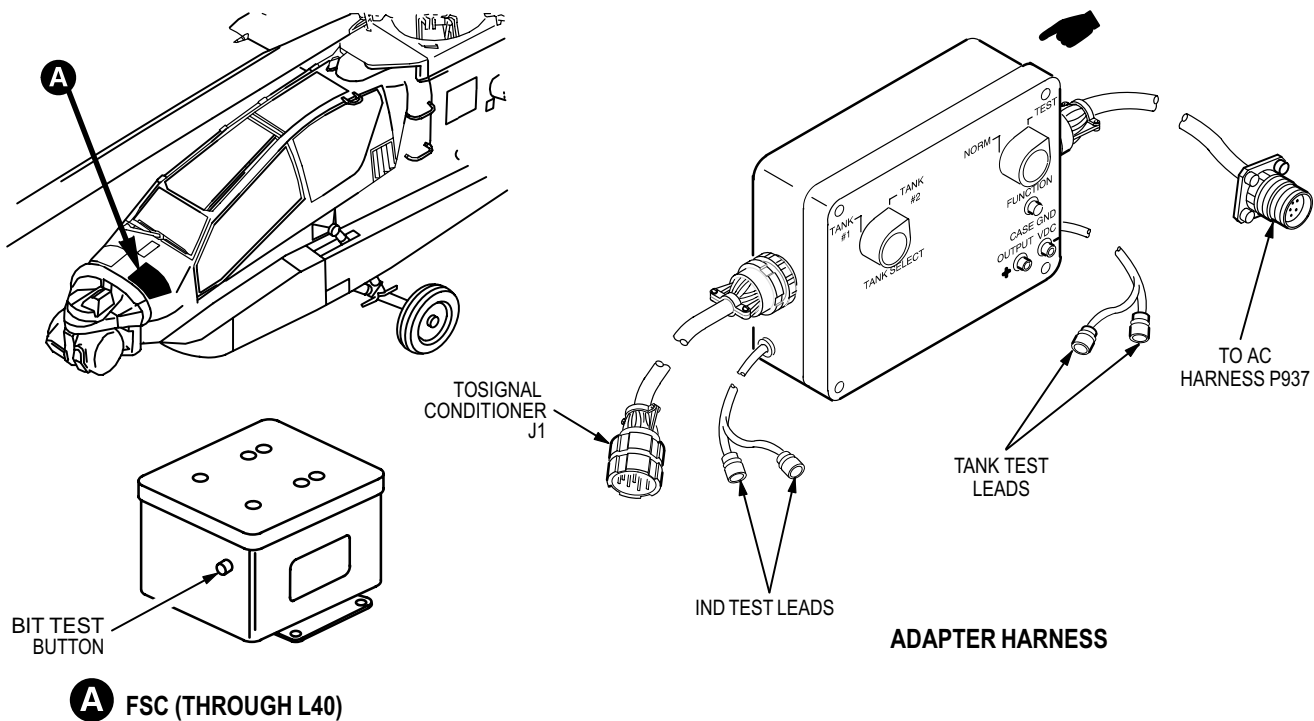
- | | |
|---|--|
| c. On dim/test panel (fig. 10-66), set DGT OFF/NORM/TST switch to TST . Check pilot fuel quantity indicator. All lamp segments are lighted (2 seconds), and digital readout is 888 . | If all lamp segments are not lighted, replace lamps (TM 1-1520-238-23). If lamps is still not lighted, and/or digital readout is not 888 , refer to TM 1-1520-238-T-5 to troubleshoot engine instruments. |
| d. On CPG selectable digital display, push and hold TEST pushbutton. Check that digital readouts indicate 888 , then release TEST pushbutton. | If digital readouts do not indicate 888 , refer to TM 1-1520-238-T-5 to troubleshoot engine instruments. |

NOTE

Prior to connecting the adapter harness (fig. 10-68) to the aircraft fuel quantity wiring harness, the open capacitance of the adapter harness tank and indicator leads must be measured and recorded using the fuel quantity test set.

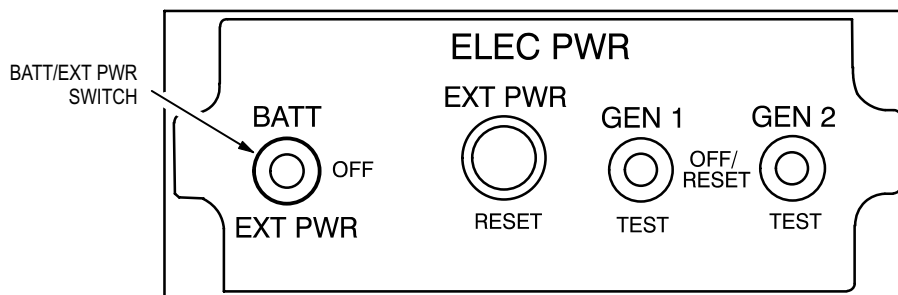
- e. Calibrate fuel quantity gage test set and perform adapter harness capacitance check(TM 1-1520-238-23).
- f. On pilot **ELEC PWR** panel (fig. 10-69), set **BATT/EXT PWR** switch to **OFF**.

10-48. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST (cont)
(USING TF-579 TEST SET)



M70-113A

Figure 10-68. Adapter Harness and FSC



M70-098

Figure 10-69. Pilot ELEC PWR Panel

Task

Result

NOTE

Fuel cells must be defueled before proceeding with test.

- g. Install fuel quantity test set (fig. 10-70) and adapter harness onto helicopter (TM 1-1520-238-23).

**10-48. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST (cont)
(USING TF-579 TEST SET)**

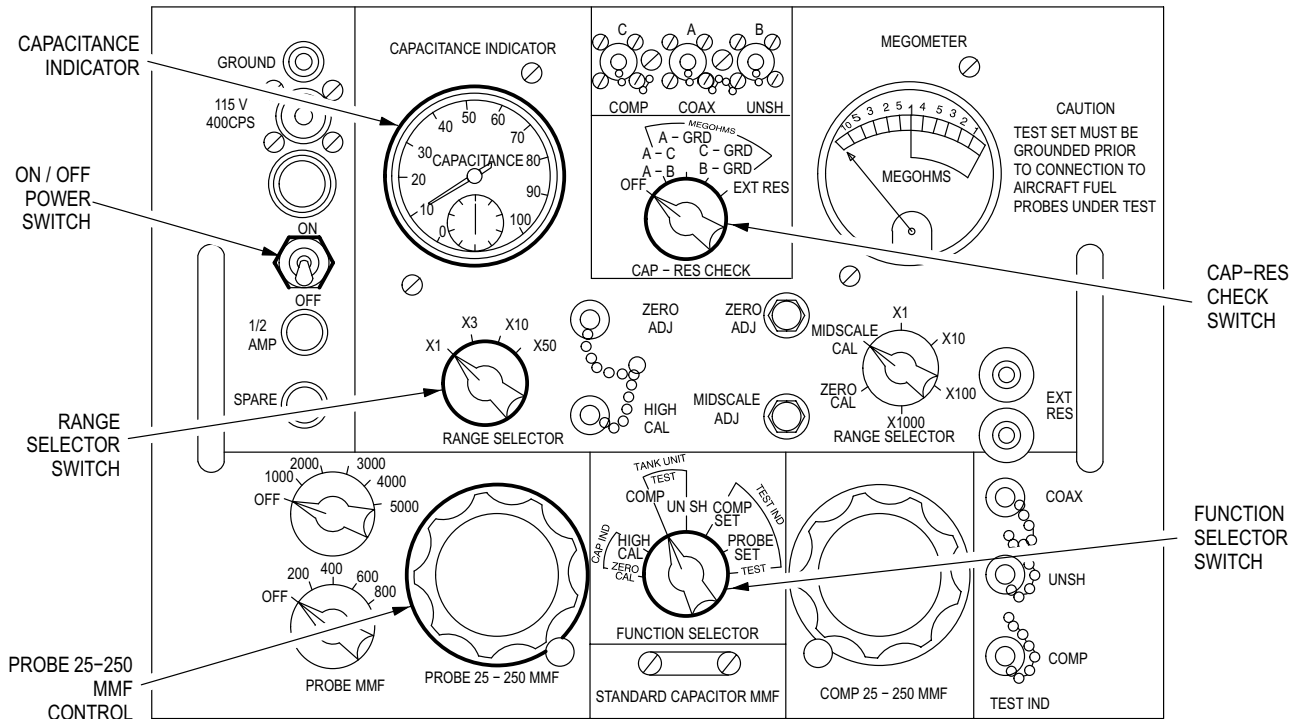


Figure 10-70. Fuel Quantity Test Set

Task	Result
h. On pilot ELEC PWR panel (fig. 10-69), set BATT/EXT PWR switch to EXT PWR .	
i. On adapter harness (fig. 10-68), set TANK SELECT switch to TANK 1 . Set FUNCTION switch to TEST .	
j. On fuel quantity test set (fig. 10-70), set switches as follows:	
Switch	Position
RANGE SELECTOR	X1
FUNCTION SELECTOR	TANK UNIT TEST/UN SH
ON/OFF power	ON
CAP-RES CHECK	CAP

10-48. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST (cont)
(USING TF-579 TEST SET)

Task	Result
------	--------

NOTE

- If adjusted capacitance value is excessive, the helicopter fuel system wire harness or connector pins may require replacement.
- For older model aircraft the forward tank (tank 1) capacitance tolerance may be increased to ± 1.0 pf.

- | | |
|--|---|
| <p>k. Fuel quantity test set (fig. 10-70)
CAPACITANCE INDICATOR should indicate 66.30 ± 0.8 pf when TANK 1 adapter tank loop capacitance value recorded during fuel quantity test set calibration is subtracted from actual indication.</p> | <p>If adjusted capacitance value is not within required tolerance, go to paragraph 10-65.</p> |
|--|---|

Example:

70.2 pf
~~**- 4.1 pf**~~
66.1 pf

Actual indication on **CAPACITANCE INDICATOR**
TANK 1 adapter tank loop capacitance
 Adjusted value

- l. On harness adapter (fig. 10-68), set **TANK SELECT** switch to **TANK 2**.

NOTE

For older model aircraft the aft tank (tank 2) capacitance tolerance may be increased to ± 1.5 pf.

- | | |
|--|---|
| <p>m. Fuel quantity test set CAPACITANCE INDICATOR should indicate 91.0 ± 1.0 pf when capacitance value recorded during fuel quantity test set calibration is subtracted from actual indication.</p> | <p>If adjusted capacitance value is not within required tolerance, go to paragraph 10-66.</p> |
|--|---|
- n. On fuel quantity test set, set **ON/OFF** power switch to **OFF**.
- o. On pilot **ELEC PWR** panel (fig. 10-69), set **BATT/EXT PWR** switch to **OFF**.
- p. Detach harness adapter from FSC and reconnect P937.
- q. On pilot **ELEC PWR** panel, set **BATT/EXT PWR** switch to **EXT PWR**.

**10-48. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST (cont)
(USING TF-579 TEST SET)**

10-48

Task	Result								
<p>r. Verify digital readouts of CPG selectable digital display (fig. 10-65) and pilot fuel quantity indicator (fig. 10-63) TOTAL digital readout and both vertical scales indicate 0 to 10.</p>	<p>If CPG selectable digital display TOTAL digital readout and pilot fuel quantity indicator TOTAL digital readout and vertical scales do not indicate 0 to 10, adjust FSC for 0 to 10 fuel indication (TM 1-1520-238-23).</p> <p>If both pilot and CPG fuel indicators cannot be adjusted to indicate between 0 to 10 using procedure in FSC adjustment, go to paragraph 10-50 for FWD fuel indication, or paragraph 10-51 for AFT fuel indication.</p>								
<p>s. On pilot ELEC PWR panel (fig. 10-69), set BATT/EXT PWR switch to OFF.</p>									
<p>t. Detach P937 from FSC and reinstall harness adapter (fig. 10-68).</p>									
<p>u. On pilot ELEC PWR panel, set BATT/EXT PWR switch to EXT PWR.</p>									
<p>v. On fuel quantity test set (fig. 10-70), set switches as follows:</p> <table border="0" style="margin-left: 40px;"> <thead> <tr> <th style="text-align: left;"><u>Switch</u></th> <th style="text-align: left;"><u>Position</u></th> </tr> </thead> <tbody> <tr> <td>RANGE SELECTOR</td> <td>X1</td> </tr> <tr> <td>FUNCTION SELECTOR</td> <td>TEST IND-PROBE SET</td> </tr> <tr> <td>ON/OFF power</td> <td>ON</td> </tr> </tbody> </table>	<u>Switch</u>	<u>Position</u>	RANGE SELECTOR	X1	FUNCTION SELECTOR	TEST IND-PROBE SET	ON/OFF power	ON	
<u>Switch</u>	<u>Position</u>								
RANGE SELECTOR	X1								
FUNCTION SELECTOR	TEST IND-PROBE SET								
ON/OFF power	ON								
<p>w. Loosen fuel quantity test set probe control lock and adjust PROBE 25-250 MMF control until the value indicated on CAPACITANCE INDICATOR is 47.2 pf minus the TANK 2 adapter tank loop capacitance value recorded during fuel quantity test set calibration. Tighten probe control lock.</p>									
<p>x. On fuel quantity test set, set FUNCTION SELECTOR control to TEST IND-TEST. On harness adapter, set TANK SELECT switch to TANK 2.</p>									

10-48. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST (cont)
(USING TF-579 TEST SET)

10-48

Task	Result
y. Verify CPG selectable digital display (fig. 10-65) RIGHT/AFT digital readout and pilot fuel quantity indicator (fig. 10-63) TOTAL digital readout and AFT vertical scale indicate 1450 ±50 .	If CPG selectable digital display RIGHT/AFT digital readout and pilot fuel quantity indicator TOTAL digital readout and AFT vertical scale do not indicate 1450 ±50 , adjust FSC for 1450 ±50 fuel indication (TM 1-1520-238-23).
z. On fuel quantity test set, set ON/OFF power switch to OFF .	If pilot and CPG AFT fuel indicators cannot be adjusted to indicate between 1450 ±50 using procedure in FSC adjustment, go to paragraph 10-51.
aa. On pilot ELEC PWR panel, set BATT/EXT PWR switch to OFF .	
ab. Remove fuel quantity test set (fig. 10-70) and harness adapter (fig. 10-68) from helicopter (TM 1-1520-238-23).	
ac. Go to paragraph 10-47.	

END OF TASK

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET)**

10-48A

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Adapter Harness, Intercommunication System	7-311B22060-81601
Cord Assembly, Electrical (make item)	7-262100009-601
Headset, Microphone (2)	TM 1-1520-238-23
Capacitance Resistance, Bridge	H157AIC
T Cable	PSDAF-113
Multimeter, Digital	AN/PSM-45

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Helicopter defueled
	Fuel system safety precautions observed
	Access panel L40 removed
TM 1-1520-238-T-4	Maintenance headset connected
TM 1-1520-238-T-5	Engine instruments maintenance operational check performed
TM 1-1520-238-T-6	Pilot and CPG edge-lights maintenance operational checks performed
Paragraph 10-12	HELICOPTER FUEL SYSTEM – VISUAL CHECK completed
Paragraph 10-10	FUEL SYSTEM – POWER UP completed

Personnel Required:

68X Armament/Electrical Systems Repairer
 One person to assist
 Attack Helicopter Repairer/
 Technical Inspector

References:

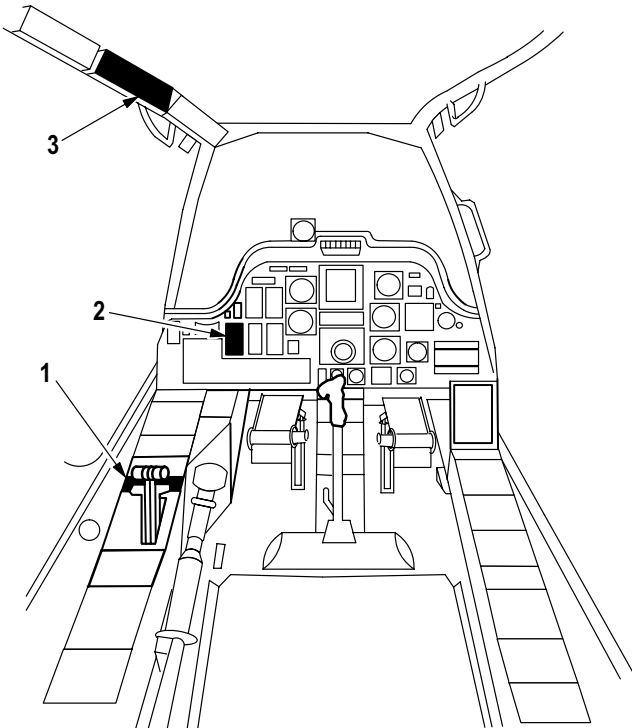
TM 1-1520-238-T-4
 TM 1-1520-238-T-5
 TM 1-1520-238-T-6
 TM 1-1520-238-23

WARNING

- **Make certain helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting or maintenance procedures. Failure to do so could result in death or serious injury.**
- **Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well-ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.**
- **Do not allow sparks or flame near helicopter when servicing or performing maintenance on fuel system.**
- **Make certain helicopter is grounded.**
- **Turn off power before detaching or reattaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.**

NOTE

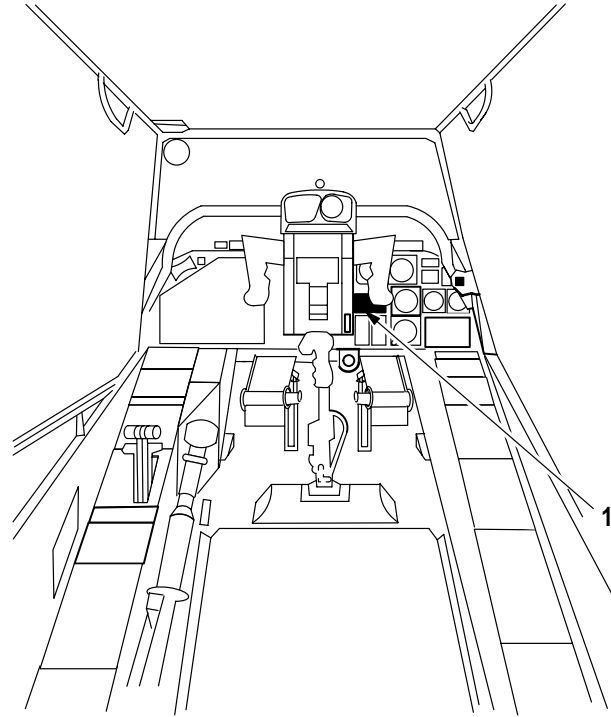
If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of task, return to maintenance operational check for original paragraph or volume.



- 1. PILOT ELEC PWR PANEL
- 2. PILOT FUEL QUANTITY INDICATOR
- 3. PILOT CIRCUIT BREAKER PANEL (CENTER)

M70-373

Figure 10-70.1. Pilot Station



- 1. CPG SELECTABLE DIGITAL DISPLAY

M70-372

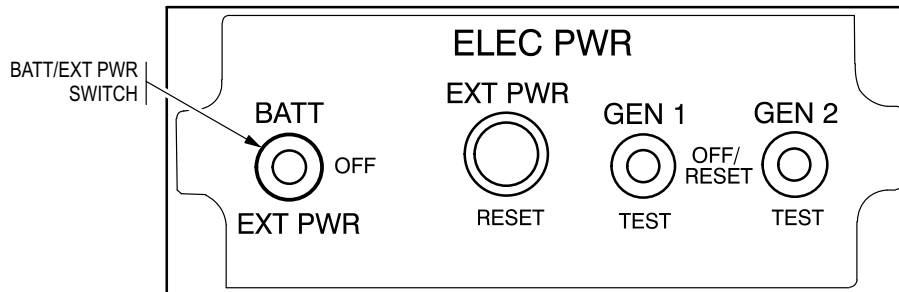
Figure 10-70.2. CPG Station

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

10-48A

Task	Result
------	--------

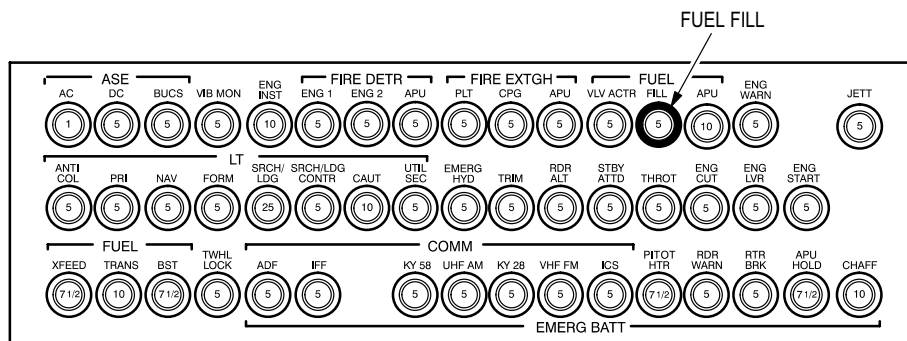
1. Perform the following:
 - a. On pilot **ELEC PWR** panel (fig. 10-70.3), set **BATT/EXT PWR** switch to **OFF**.



M70-360

Figure 10-70.3. Pilot ELEC PWR Panel

- b. On pilot center circuit breaker panel (fig. 10-70.4), open **FUEL FILL** circuit breaker.



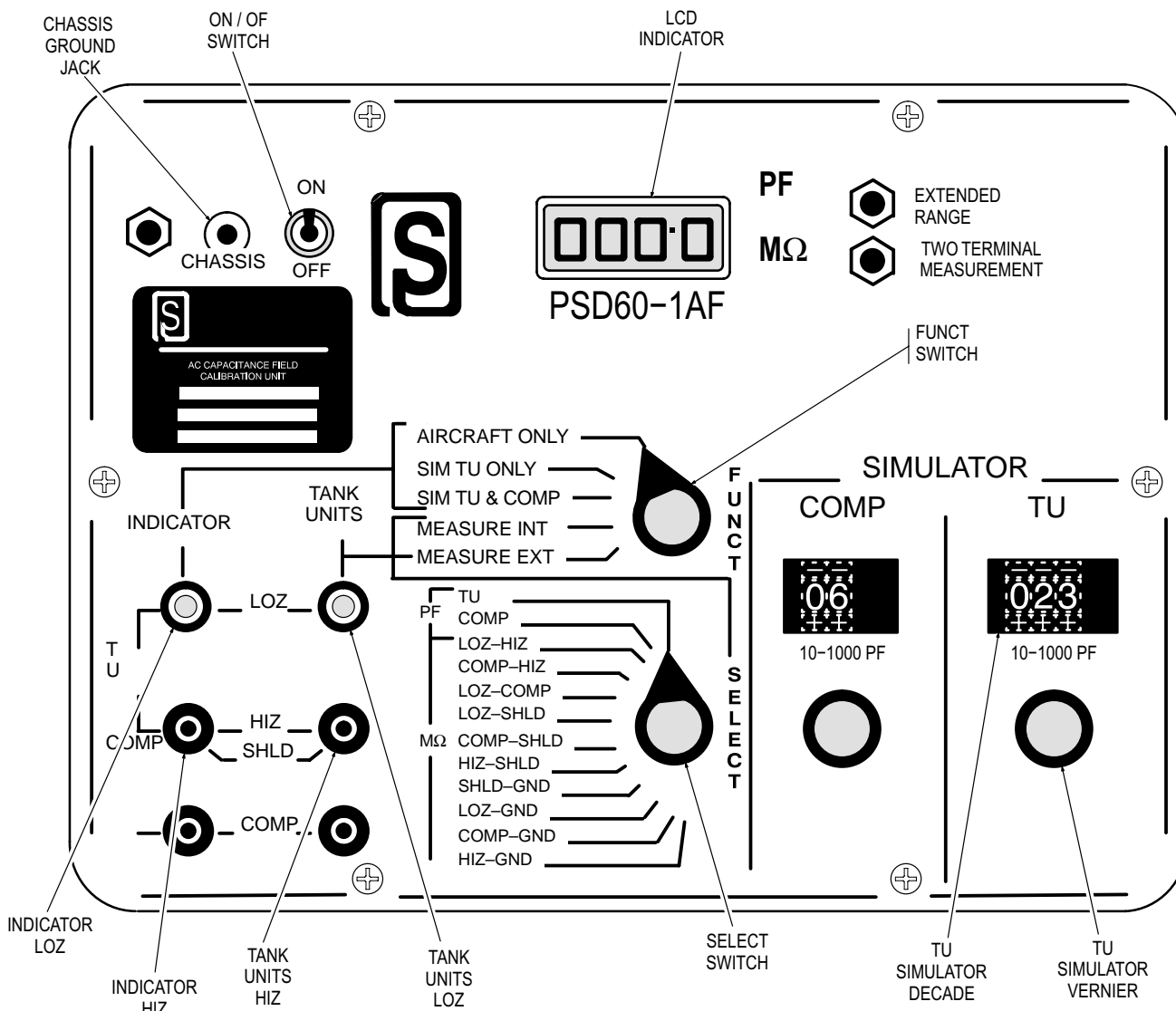
M70-361

Figure 10-70.4. Pilot Center Circuit Breaker Panel

2. Perform fuel quantity test set and T cable test as follows:
 - a. Ensure that test set (fig. 10-70.5) **ON/OFF** switch is set to **OFF**.

10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)

Task	Result
b. Attach test set ground cable to test set chassis jack.	
c. Attach test set ground cable to helicopter ground.	
d. Ensure that test set (fig. 10-70.5) ON/OFF switch is set to ON .	



M70-363

Figure 10-70.5. Capacitance Resistance Bridge Test Set

10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)

10-48A

Task	Result
e. Allow test set to warm up for three minutes. If LO BAT appears in upper left corner of LCD indicator (fig. 10-70.6), replace test set batteries.	



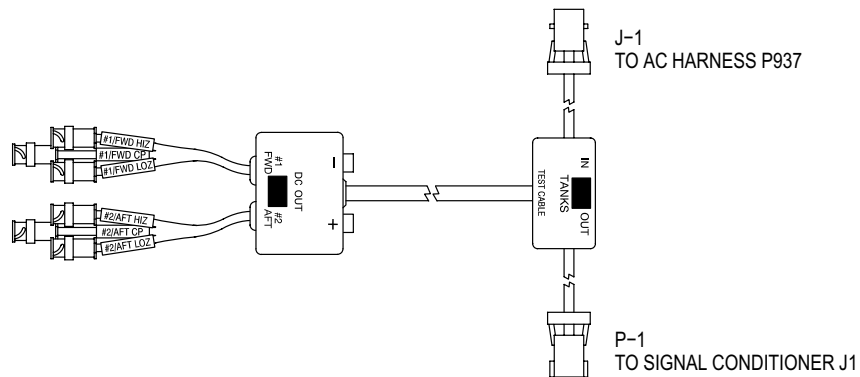
M70-362

Figure 10-70.6. LCD Indicator

NOTE

Prior to connecting the T cable (fig. 10-70.7) to the aircraft fuel quantity wiring harness, the open capacitance of the T cable leads must be measured and recorded using the Capacitance-Resistance Bridge test set.

- f. Attach T cable (fig. 10-70.7) #1 FWD LOZ lead connector to **TANK UNIT LOZ** receptacle.



M70-364

Figure 10-70.7. T Cable

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

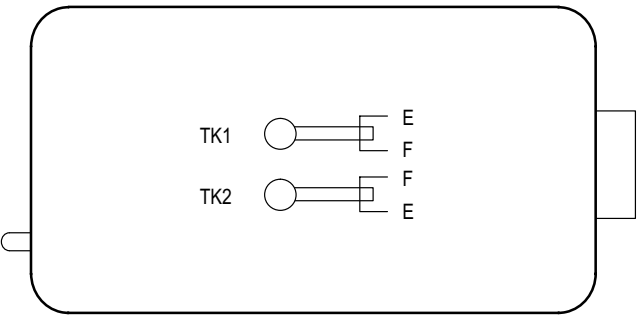
10-48A

Task	Result
g. Attach T cable (fig. 10-70.7) #1 FWD HIZ lead connector to TANK UNITS HIZ receptacle.	
<p>NOTE</p> <p>Do not attach T cable #1/FWD CP lead.</p>	
h. Set test set FUNCT switch to MEASURE EXT.	
i. Set test set SELECT switch to TU.	
j. On T cable, set TANKS IN/OUT switch to IN. Check capacitance of #1 FWD LOZ and #1 FWD HIZ leads on test set LCD indicator.	
k. Record #1 FWD LOZ and #1 FWD HIZ T cable capacitance value.	If capacitance indication is greater than 0.5 pf repair or replace T cable (TM 1-1500-204-23).
l. Detach T cable #1 FWD LOZ and #1 FWD HIZ leads from TANK UNITS LOZ and HIZ receptacles.	
<p>NOTE</p> <p>Do not attach T cable #2/AFT CP lead.</p>	
m. Attach T cable #2 AFT LOZ lead connector to TANK UNIT LOZ receptacle.	
n. Attach T cable #2 AFT HIZ lead connector to TANK UNIT HIZ receptacle.	
o. Verify test set FUNCT switch set to MEASURE EXT.	
p. Verify test set SELECT switch set to TU.	
q. Verify T cable, set TANKS IN/OUT switch to IN. Check capacitance of #2 AFT LOZ and #2 AFTHIZ leads on test set LCD indicator.	
r. Record #2 AFT LOZ and #2 AFT HIZ T cable capacitance value.	If capacitance indication is greater than 0.5 pf repair or replace T cable (TM 1-1500-204-23).

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

10-48A

3. Perform fuel quantity system aft tank capacitance test as follows:

Task	Result
<p>a. Detach connector P937 from fuel signal conditioner (A308)J1 (fig. 10-70.8).</p> <p>b. Attach T cable J1 (fig. 10-70.7) to P937.</p>	 <p style="text-align: center;">FUEL SIGNAL CONDITIONER POT POSITIONS (SIMPLIFIED)</p>

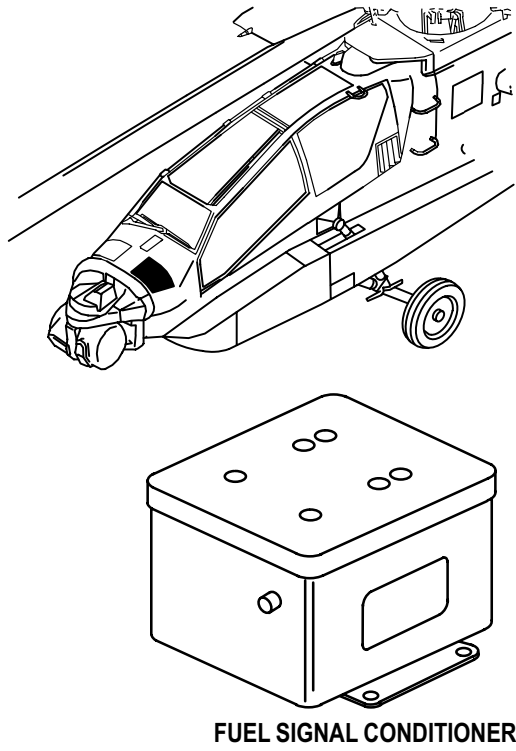


Figure 10-70.8. Fuel Signal Conditioner

M70-365

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

Task	Result
------	--------

- c. Check capacitance of **#2 AFT** tank on test set (fig. 10-70.5) **LCD** indicator.
- d. Record capacitance of **#2 AFT** tank.

NOTE

- **If adjusted capacitance value is excessive, the helicopter fuel system wire harness or connector pins may require replacement.**
- **For older model aircraft the aft tank capacitance tolerance may be increased to ± 1.5 pf.**

- e. Subtract **#2 AFT** T cable (fig. 10-70.7) capacitance (step 2.r.) from **#2 AFT** tank capacitance. Calculated capacitance value should be **91.0 \pm 1.0** pf. If calculated capacitance value is not within required tolerance, go to paragraph 10-66.

Example:

91.4 pf	Actual indication on test set LCD indicator
<u>- 0.3 pf</u>	#2/AFT T cable capacitance
91.1 pf	Calculated value

- f. Record **#2 AFT** empty tank calculated capacitance value.
 - g. Detach T cable **#2 AFT LOZ** and **#2 AFT HIZ** lead connectors from **TANK UNITS LOZ** and **TANK UNITS HIZ** receptacle.
4. Perform fuel quantity system forward tank capacitance test as follows:
- a. Attach T cable **#1 FWD LOZ** lead connector to **TANK UNITS LOZ** receptacle.
 - b. Attach T cable **#1 FWD HIZ** lead connector to **TANK UNITS HIZ** receptacle.
 - c. Check capacitance of **#1 FWD** tank on test set **LCD** indicator.
 - d. Record **#1 FWD** tank capacitance value.

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

10-48A

Task	Result
------	--------

NOTE

For older model aircraft the forward tank capacitance tolerance may be increased to ± 1.0 pf.

- e. Subtract **#1 FWD T** cable (fig. 10-70.7) capacitance (step 2.k.) from **#1 FWD** tank capacitance. Calculated capacitance value should be **66.3 \pm 0.8** pf.

If adjusted capacitance value is not within required tolerance, go to paragraph 10-65.

Example:

66.1 pf
- 0.3 pf
65.8 pf

Actual indication on test set **LCD** indicator
#1/FWD T cable capacitance
Calculated value

- 5. Perform fuel quantity system forward tank indicator test as follows:

- a. On test set (fig. 10-70.5), rotate **SELECT** switch to **LOZ-HIZ**.

NOTE

The PSD 60-1AF test set indicates “over range” above 10,000 megohms by flashing three colons and displaying four zeros (fig. 10-70.6).

- b. Allow test set to stabilize for 30 seconds. Verify test set **LCD** indicator displays greater than **20 megohms**.
- c. Rotate **SELECT** switch to the following positions and verify test set **LCD** indicator displays greater than **one megohm** in each position. **LOZ-SHLD, HIZ-SHLD, SHLD-GND, LOZ-GND** and **HIZ-GND**.
- d. Detach T cable **#1/FWD LOZ** and **HIZ** leads from **TANK UNITS LOZ** and **HIZ** receptacles.
- e. Attach T cable **#1/FWD LOZ** lead to **INDICATOR LOZ** receptacle.
- f. Attach T cable **#1/FWD HIZ** lead to **INDICATOR HIZ** receptacle.

If LOZ and HIZ values are not within required tolerance, go to paragraph 10-47.

NOTE

Do not attach T cable #1/FWD CP lead.

- g. Set test set **FUNCT** switch to **MEASURE INT**.
- h. Set test set **SELECT** switch to **TU**.

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

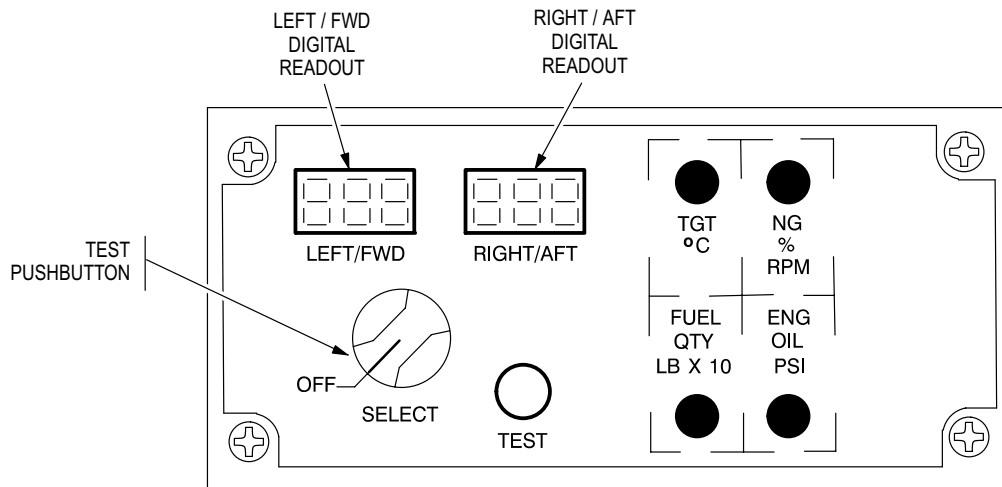
10-48A

Task	Result
i. Set test set (fig. 10-70.5) TU SIMULATOR decade to 002 .	
j. Adjust test set TU SIMULATOR vernier knob until LCD indicator displays 38.5 pf.	If adjusted capacitance value is not within required tolerance, replace test set.
k. Set test set FUNCT switch to AIRCRAFT ONLY .	
l. Attach T cable (fig. 10-70.7) connector P1 to fuel signal conditioner (A308)J1.	
m. Select 0-10 VDC scale on multimeter. Select multimeter to ON .	
n. Attach multimeter leads to receptacles on T cable. Attach multimeter positive lead to T cable + receptacle. Attach multimeter negative lead to T cable – receptacle.	
o. On T cable, set DC OUT switch to #1/FWD .	
p. On pilot ELEC PWR panel (fig. 10-70.3), set BATT/EXT PWR switch to EXT PWR .	
q. On pilot center circuit breaker panel (fig. 10-70.4), close FUEL FILL circuit breaker.	
NOTE	
Some fuel signal conditioner covers have slots to allow potentiometer adjustment without removing the cover.	
r. If a fuel signal conditioner potentiometer requires adjustment, loosen potentiometer adjustment slot cover and slide cover back to expose slots or remove cover. Rotate potentiometer counterclockwise to decrease or clockwise to increase indication.	
s. Verify DC voltage reading on multimeter is 0 ±0.5 VDC .	If DC voltage reading on multimeter is not 0 ±0.5 VDC adjust fuel signal conditioner TK1 E to obtain 0 ±0.5 VDC .

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

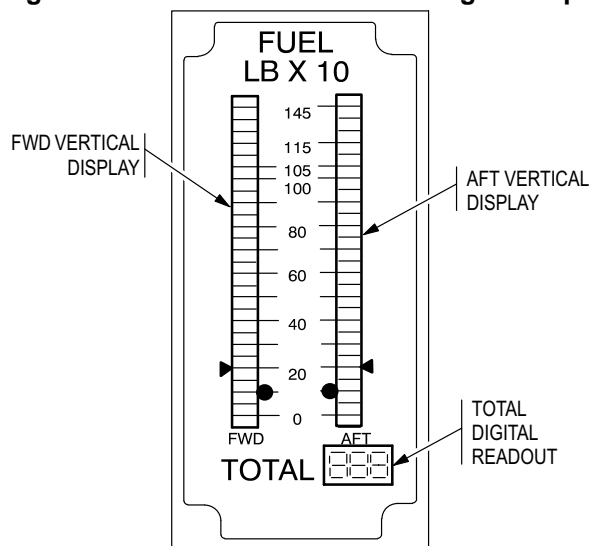
10-48A

Task	Result
<p>t. Verify digital readouts of CPG selectable digital display (fig. 10-70.9) and pilot fuel quantity indicator (fig. 10-70.10) vertical scale indicates 0 to 10.</p>	<p>If CPG selectable digital display LEFT/FWD digital readout and pilot fuel quantity indicator FWD vertical scale do not indicate 0 to 10, adjust fuel signal conditioner TK1 E to obtain 0 to 10 fuel indication.</p>
<p>u. On test set (fig. 10-70.5) select FUNCT switch to SIM TU ONLY. Verify DC voltage reading on multimeter is 5.0 ±0.5 VDC.</p>	<p>If DC voltage reading on multimeter is not 5.0 ±0.5 VDC adjust fuel signal conditioner TK1 F to obtain 5.0 ±0.5 VDC.</p>



M70-370

Figure 10-70.9. CPG Selectable Digital Display



M70-369

Figure 10-70.10. Pilot FUEL Quantity Indicator

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

10-48A

Task	Result
v. Verify CPG selectable digital display (fig. 10-70.9) LEFT/FWD digital readout and pilot fuel quantity indicator TOTAL digital readout and FWD vertical scale indicate 1050 ±30 .	If CPG selectable digital display LEFT/FWD digital readout and pilot fuel quantity indicator TOTAL digital readout and FWD vertical scale do not indicate 1050 ±30 , adjust fuel signal conditioner TK1 F to obtain 1050 ±30 fuel indication.
w. Set test set (fig. 10-70.5) FUNCT switch to AIRCRAFT ONLY .	
x. Verify DC voltage reading on multimeter is 0 ±0.5 VDC .	If DC voltage reading on multimeter is not 0 ±0.5 VDC adjust fuel signal conditioner TK1 E to obtain 0 ±0.5 VDC .
y. Remove multimeter leads from receptacles on T cable (fig. 10-70.7).	
z. On pilot center circuit breaker panel (fig. 10-70.4), open FUEL FILL circuit breaker.	
aa. On pilot ELEC PWR panel (fig. 10-70.3), set BATT/EXT PWR switch to OFF .	
ab. Detach T cable #1/FWD LOZ and #1/FWD HIZ lead from test set INDICATOR LOZ and INDICATOR HIZ receptacle.	
ac. Detach T cable P1 from (A308) fuel signal conditioner J1.	
6. Perform fuel quantity system aft tank indicating test as follows:	
a. Attach #2/FWD LOZ lead to test set TU LOZ receptacle.	
b. Attach #2/FWD HIZ lead to test set TU HIZ receptacle.	
c. Set test set FUNCT switch to MEASURE EXT .	
d. On test set, rotate SELECT switch to LOZ-HIZ .	

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

10-48A

Task	Result
------	--------

NOTE

The PSD 60-1AF test set indicates “over range” above 10,000 megohms by flashing three colons and displaying four zeros.

- | | |
|---|--|
| <p>e. Allow test set (fig. 10-70.5) to stabilize for 30 seconds. Verify test set LCD INDICATOR displays greater than 20 megohms.</p> <p>f. Rotate SELECT switch to the following positions and verify test set LCD indicator displays greater than one megohm in each position. LOZ-SHLD, HIZ-SHLD, SHLD-GND, LOZ-GND and HIZ-GND.</p> <p>g. Detach T cable (fig. 10-70.7) #2/AFT LOZ and HIZ leads from TANK UNITS LOZ and HIZ receptacles.</p> <p>h. Attach T cable #2 AFT LOZ lead to INDICATOR LOZ receptacle.</p> <p>i. Attach T cable #2 AFT HIZ lead to INDICATOR HIZ receptacle.</p> | <p>If LOZ and HIZ values are not within required tolerance, go to paragraph 10-47.</p> |
|---|--|

NOTE

Do not attach T cable #2/AFT CP lead.

- | | |
|--|--|
| <p>j. Set test set FUNCT switch to MEASURE INT.</p> <p>k. Set test set SELECT switch to TU.</p> <p>l. Set test set TU SIMULATOR decade to 003.</p> <p>m. Adjust test set TU SIMULATOR vernier knob until LCD indicator displays 49.4 pf.</p> <p>n. Set test set FUNCT switch to AIRCRAFT ONLY.</p> <p>o. Attach T cable connector P1 to fuel signal conditioner (A308)J1.</p> <p>p. Select 0-10 VDC scale on multimeter. Select multimeter to ON.</p> <p>q. Attach multimeter leads to receptacles on T cable. Attach multimeter positive lead to T cable + receptacle. Attach multimeter negative lead to T cable – receptacle.</p> | <p>If adjusted capacitance value is not within required tolerance, replace test set.</p> |
|--|--|

**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

10-48A

Task	Result
r. On T cable (fig. 10-70.7), set DC OUT switch to #2/AFT . s. On pilot ELEC PWR panel (fig. 10-70.3), set BATT/EXT PWR switch to EXT PWR . t. On pilot center circuit breaker panel (fig. 10-70.4), close FUEL FILL circuit breaker.	
NOTE	
Some fuel signal conditioner covers have slots to allow potentiometer adjustment without removing the cover.	
u. If a fuel signal conditioner potentiometer requires adjustment, loosen potentiometer adjustment slot cover and slide cover back to expose slots or remove cover. Rotate potentiometer counterclockwise to decrease or clockwise to increase indication.	
v. Identify (A308) fuel signal conditioner TK E trimmer for aft tank calibration.	
w. Verify DC voltage reading on multimeter is 0 ±0.5 VDC .	If DC voltage reading on multimeter is not 0 ±0.5 VDC adjust fuel signal conditioner TK2 E to obtain 0 ±0.5 VDC .
x. Verify digital readouts of CPG selectable digital display (fig. 10-70.9) and pilot fuel quantity indicator TOTAL digital readout and both vertical scales indicate 0 to 10 .	If CPG selectable digital display RIGHT/AFT digital readout and pilot fuel quantity indicator TOTAL digital readout and AFT vertical scale do not indicate 0 to 10 , adjust fuel signal conditioner TK2 E to obtain 0 to 10 fuel indication.
y. On test set (fig. 10-70.5) select FUNCT switch to SIM TU ONLY . Verify DC voltage reading on multimeter is 5.0 ±0.5 VDC .	If DC voltage reading on multimeter is not 5.0 ±0.5 VDC adjust fuel signal conditioner TK2 F to obtain 5.0 ±0.5 VDC .
z. Verify CPG selectable digital display RIGHT/AFT digital readout and pilot fuel quantity indicator TOTAL digital readout and AFT vertical scale indicate 1450 ±30 .	If CPG selectable digital display RIGHT/AFT digital readout and pilot fuel quantity indicator TOTAL digital readout and AFT vertical scale do not indicate 1450 ±30 , adjust fuel signal conditioner TK2 F to obtain 1450 ±30 fuel indication.
aa. Set test set FUNCT switch to AIRCRAFT ONLY .	

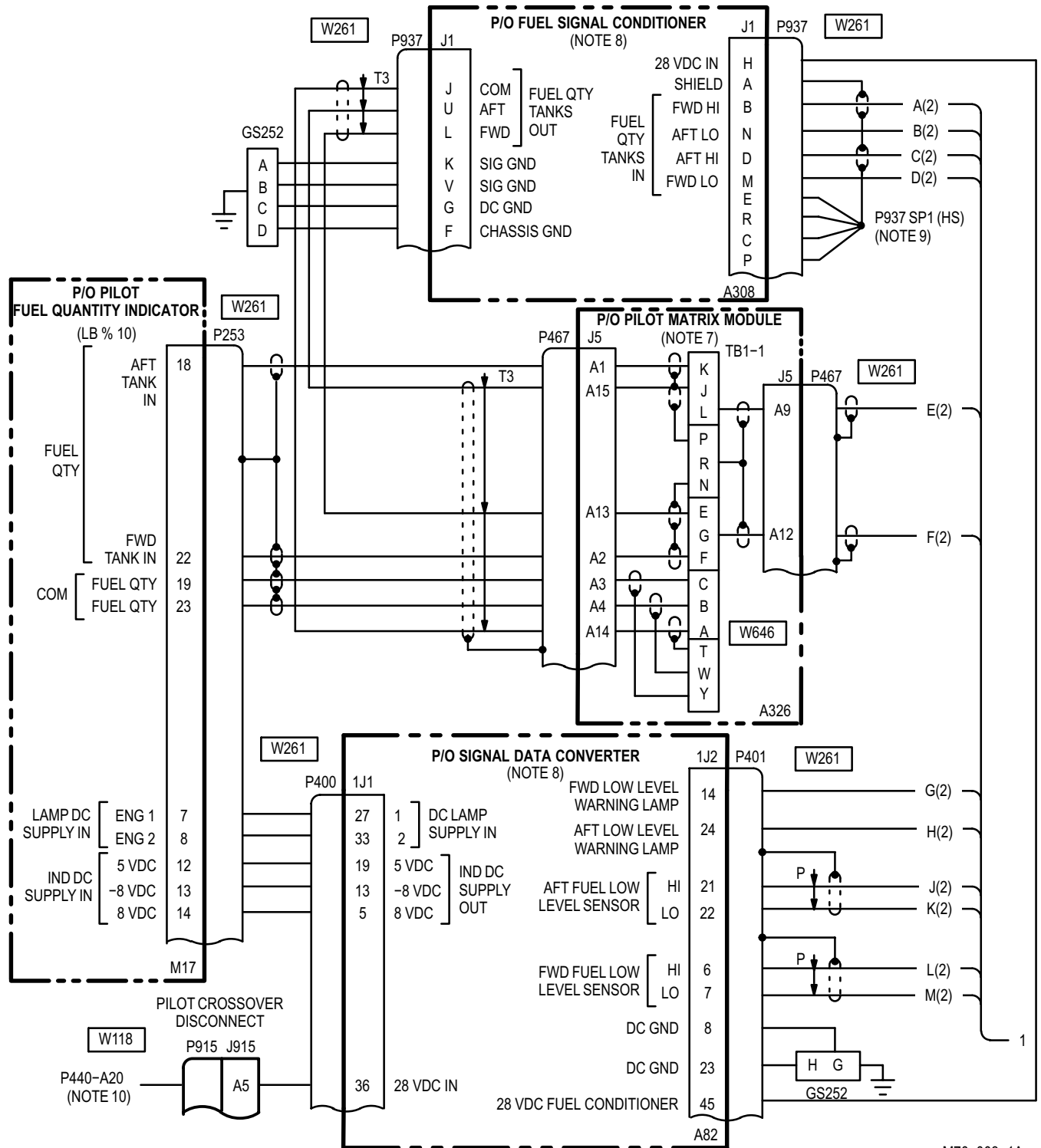
**10-48A. FUEL QUANTITY SYSTEM – CAPACITANCE AND INDICATING TEST
(USING PSD 60-1AF TEST SET) (cont)**

10-48A

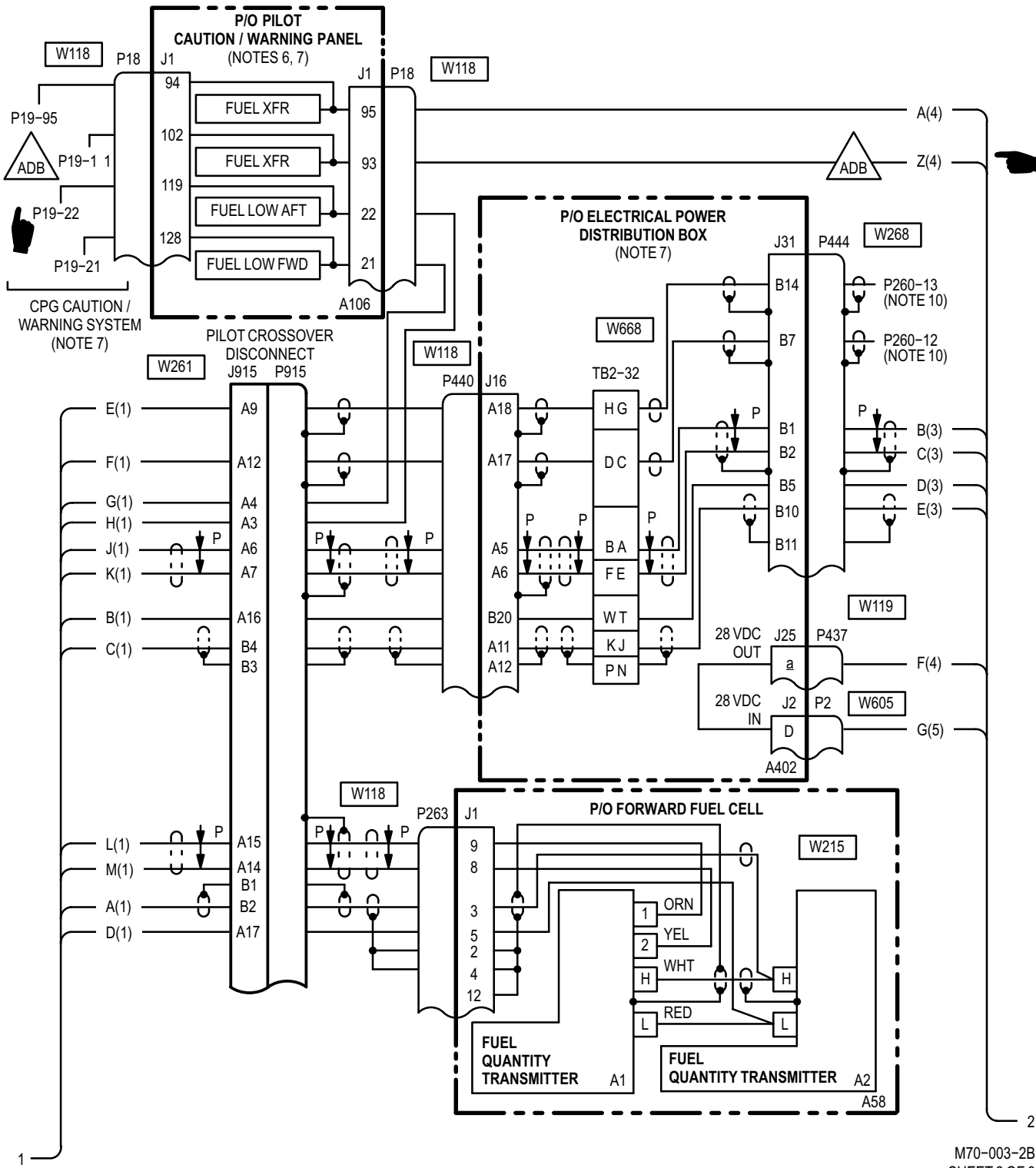
Task	Result
ab. Verify DC voltage reading on multimeter is 0 ±0.5 VDC .	If DC voltage reading on multimeter is not 0 ±0.5 VDC adjust fuel signal conditioner TK2 E to obtain 0 ±0.5 VDC .
ac. Detach multimeter leads from receptacles on T cable (fig. 10-70.7).	
7. Inspect (QA).	
8. Torque-stripe all potentiometers that have been adjusted during this procedure.	
9. Install cover on fuel signal conditioner, if removed.	
10. On pilot ELEC PWR panel, set BATT/EXT PWR switch to OFF .	
11. Set test set (fig. 10-70.5) ON/OFF switch to OFF .	
12. Detach test set ground cable from helicopter ground terminal.	
13. Detach test set ground cable from test set chassis jack.	
14. Detach T cable leads and from test set receptacles. Replace protective caps.	
15. Detach T cable connector P1 from fuel signal conditioner (A308)J1.	
16. Detach T cable connector J1 from connector P937.	
17. Attach P937 to fuel signal conditioner (A308)J1.	
18. Install access panel L40 (TM 1-1520-238-23).	
19. Go to paragraph 10-47.	

END OF TASK

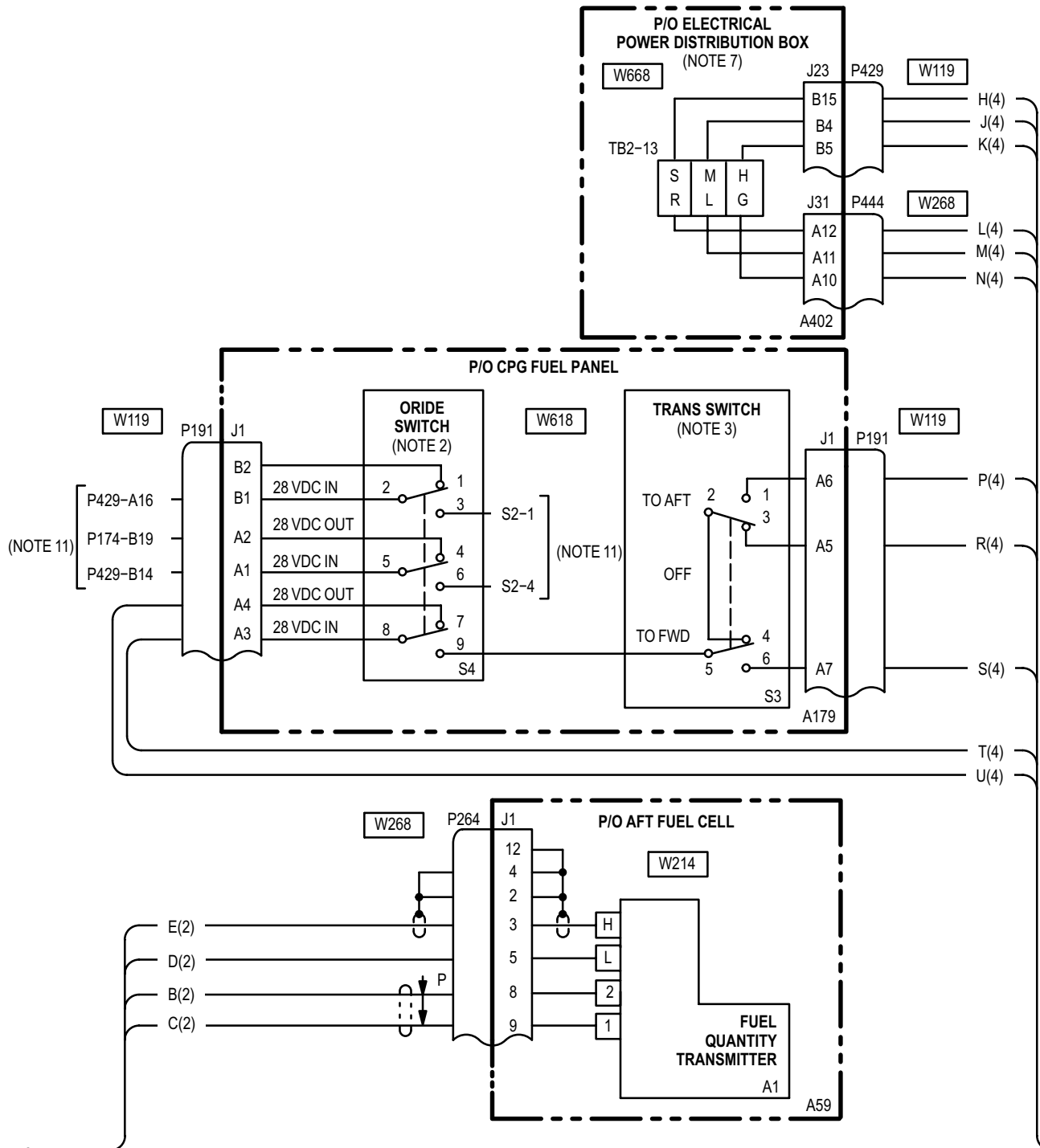
10-49. FUEL QUANTITY INDICATION/TRANSFER - WIRING INTERCONNECT DIAGRAM



M70-003-1A
SHEET 1 OF 6

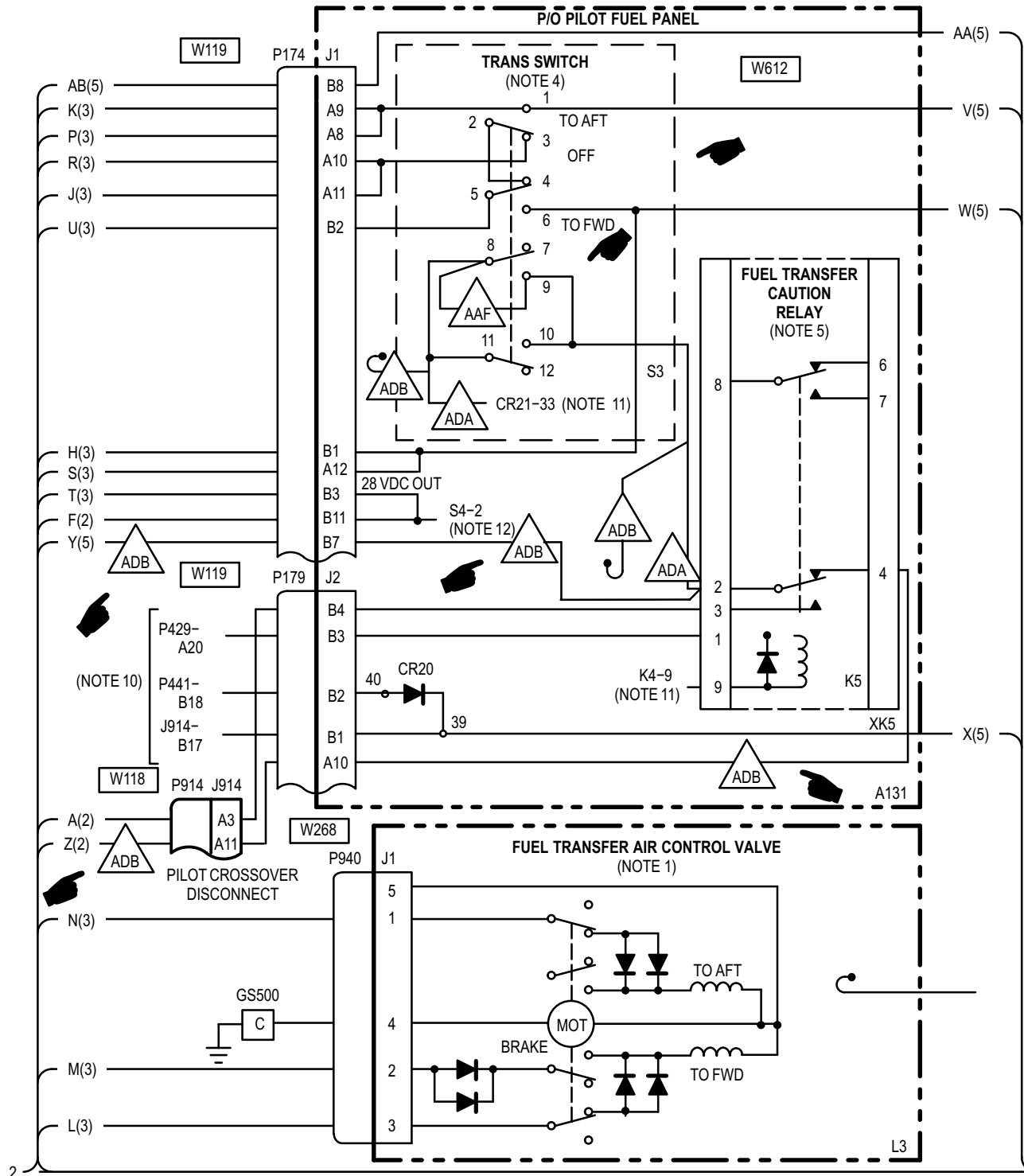


10-49. FUEL QUANTITY INDICATION/TRANSFER – WIRING INTERCONNECT DIAGRAM (cont)

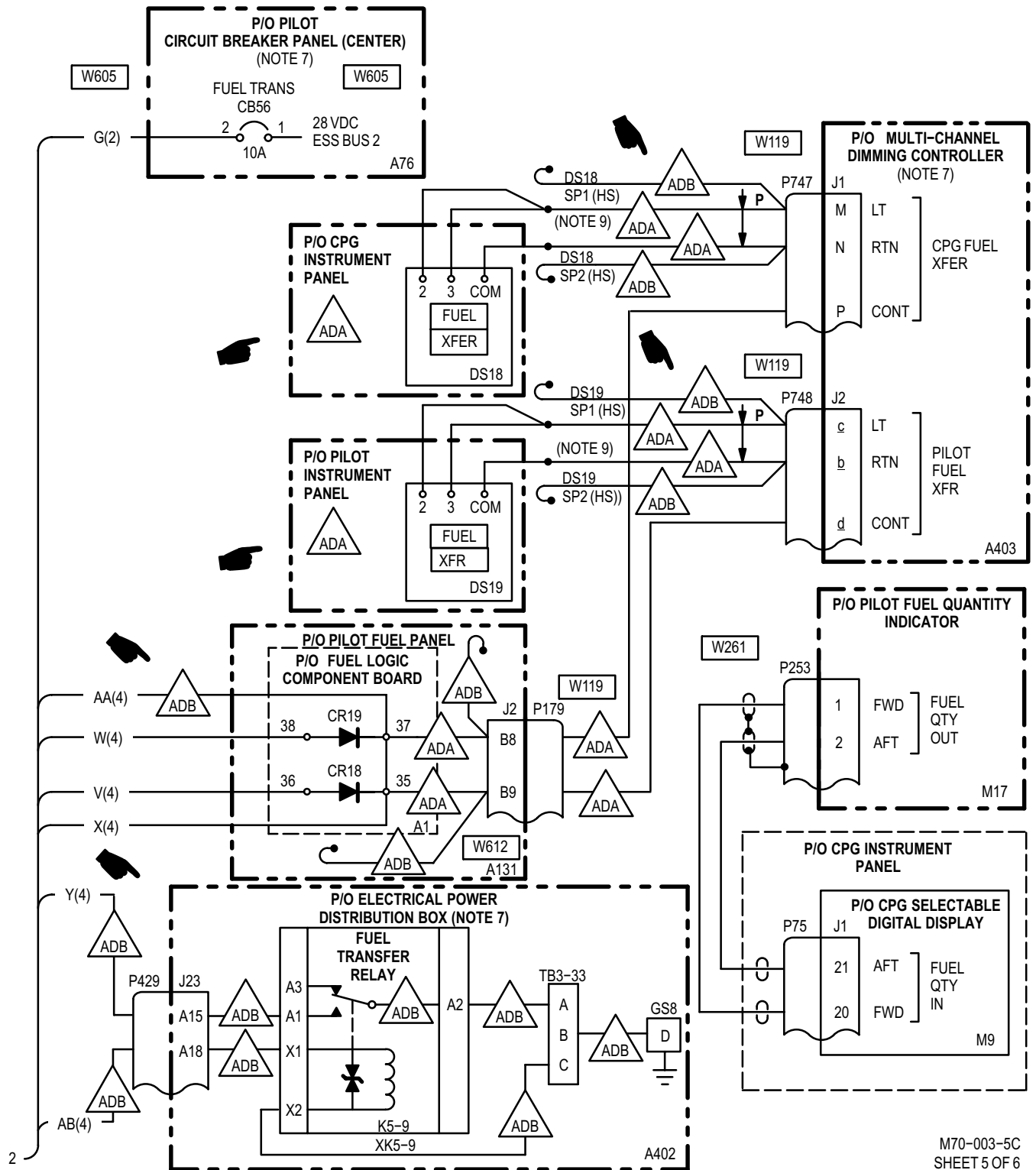


2

2



10-49. FUEL QUANTITY INDICATION/TRANSFER - WIRING INTERCONNECT DIAGRAM (cont)



M70-003-5C
SHEET 5 OF 6

NOTES:

HIGHWAY USE: THE ALPHA CHARACTER IDENTIFIES A SPECIFIC LINE, AND THE NUMBER IN PARENTHESIS IDENTIFIES THE SHEET NUMBER WHERE THE SIGNAL TERMINATES.

- | | |
|---|--|
| <p>1. DIRECTS PAS AIR TO CONTROL FUEL TRANSFER PUMP. TO TRANSFER FUEL TO FORWARD OR AFT FUEL CELL, (INTERNAL SWITCH CONTACTS ALLOW CONTROL OF VALVE REVERSAL POSITIONS).</p> <p>2. SELECTS AND ENABLES PILOT OR CPG FUEL PANEL FOR USE AS MARKED.</p> <p>3. <u>POSITION</u> <u>CONTINUITY BETWEEN</u>
 TO FWD 2-3, 5-6
 OFF 2-3, 4-5
 TO AFT 1-2, 4-5</p> <p>4. <u>POSITION</u> <u>CONTINUITY BETWEEN</u>
 TO FWD 2-3, 5-6, 8-9, 11-12
 OFF 2-3, 4-5, 7-8, 11-12
 TO AFT 1-2, 4-5, 7-8, 10-11</p> | <p>5. CLOSSES ONLY WHEN TRANSFERRED FUEL FILLS SELECTED TANK, WHICH CLOSSES ASSOCIATED FUEL VALVE SWITCH.</p> <p>6. GROUND INPUT LIGHT INDICATOR.</p> <p>7. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).</p> <p>8. INSTRUMENTS (TM 1-1520-238-T-5).</p> <p>9. HS DESIGNATES A HARD SPLICE WHICH CANNOT BE DISCONNECTED. M DESIGNATES A SOFT SPLICE WHICH MAY BE DISCONNECTED FOR A WIRING CHECK.</p> <p>10. REFER TO PARAGRAPH 10-77. PRESSURE REFUELING/DEFUELING-WIRING INTERCONNECT DIAGRAM.</p> <p>11. REFER TO PARAGRAPH 10-18. FUEL CROSSFEED/BOOST SYSTEM-WIRING INTERCONNECT DIAGRAM.</p> <p>12. REFER TO PARAGRAPH 10-101. AUXILIARY FUEL SYSTEM-WIRING INTERCONNECT DIAGRAM.</p> |
|---|--|

10-50. PILOT FUEL QUANTITY INDICATOR FWD VERTICAL DISPLAY – DOES NOT INDICATE CORRECT FUEL QUANTITY

10-50

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L40 door removed

3. Check for 28 VDC at P937–H.

Is voltage present?

YES	Replace FSC (TM 1-1520-238-23).
NO	Repair open wire between P401–45 and P937–H. Go to paragraph 10–48.

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With P937 attached to FSC, press bit **TEST** button on FSC. Check for 4.9 to 5.1 VDC between P253–22 and P253–23.

Is voltage present?

YES	Replace pilot FUEL quantity indicator (TM 1-1520-238-23).
NO	Go to step 2.

2. Check for open between:
P937–J and P253–19,
P937–J and P253–23,
P937–L and P253–22.

Does open exist?

YES	Repair open wire. Go to paragraph 10–48.
NO	Go to step 3.

END OF TASK

10-51. PILOT FUEL QUANTITY INDICATOR AFT VERTICAL DISPLAY – DOES NOT INDICATE CORRECT FUEL QUANTITY

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L40 door removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With P937 attached to FSC, depress FSC bit **TEST** button. Check for 4.9 to 5.1 VDC between P253-18 and P253-19.

Is voltage present?

- | | |
|-----|--|
| YES | Replace pilot FUEL quantity indicator (TM 1-1520-238-23). |
| NO | Go to step 2. |

2. Check for open between: P937-J and P253-19, P937-J and P253-23, P937-U and P253-18.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 10-48. |
| NO | Go to step 3. |

3. Check for 28 VDC at P937-H.

Is voltage present?

- | | |
|-----|---|
| YES | Replace FSC (TM 1-1520-238-23). |
| NO | Repair open wire between P401-45 and P937-H. Go to paragraph 10-48. |

END OF TASK

10-52. FUEL LOW AFT INDICATORS – ARE NOT LIGHTED

10-52

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L40 door removed



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With power off, check resistance between P401-21 and P401-22.

Are 360 to 480 ohms present?

YES Go to step 2.
NO Go to step 3.

2. Check for open between P18-22 and P401-24.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-47.
NO Go to step 5.

3. Check resistance between P444-B1 and P444-B2.

Are 360 to 480 ohms present?

YES Repair open wire between:
 P401-21 and J915-A6,
 P401-22 and J915-A7,
 P915-A6 and P440-A5,
 P915-A7 and P440-A6.
 (A402):
 J16-A5 and TB2-32-B,
 J16-A6 and TB2-32-F,
 J31-B1 and TB2-32-A,
 J31-B2 and TB2-32-E.
 Go to paragraph 10-47.

NO Go to step 4.

4. Check for open between:
P444-B1 and P264-8,
P444-B2 and P264-9.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-47.
NO Replace fuel quantity transmitter
 in aft fuel cell
 (TM 1-1520-238-23).

5. Check for open between P18-22 and ground.

Does open exist?

YES Replace SDC
 (TM 1-1520-238-23).
NO Replace pilot caution/warning
 panel (TM 1-1520-238-23).

END OF TASK

10-53. FUEL TRANS CIRCUIT BREAKER – DOES NOT STAY CLOSED

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L40 door removed



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Attach positive meter lead to P174–A11 and check for short to ground.

Does short exist?

YES Go to step 2.
NO Go to step 4.

2. Detach P940, check for short between P174–A11 and ground.

Does short exist?

YES Go to step 3.
NO Replace fuel transfer air control valve (TM 1-1520-238-23).

3. Detach P429, check for short between: P174–A11 and ground, P444–A11 and ground.

Does short exist?

YES Repair shorted wire between: P174–A11 and P429–B4, P444–A11 and P940–2. Go to paragraph 10–47.
NO Repair shorted wire between (A402): J23–B4 and TB2–13–M, J31–A11 and TB2–13–L. Go to paragraph 10–47.

4. Attach positive meter lead to P174–A9 and check for short to ground.

Does short exist?

YES Go to step 11.
NO Go to step 5.

5. Check for short between (A402)J2–D and ground.

Does short exist?

YES Go to step 6.
NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 2 – pilot station).

6. Check for short between (A131): J1–B11 and chassis ground, J1–B2 and chassis ground, J1–A11 and chassis ground.

Does short exist?

YES Replace pilot **FUEL** panel (TM 1-1520-238-23).
NO Go to step 7.

7. Check for short between (A179): J1–A3 and chassis ground, J1–A5 and chassis ground, J1–A6 and chassis ground.

Does short exist?

YES Replace CPG **FUEL** panel (TM 1-1520-238-23).
NO Go to step 8.

10-53. FUEL TRANS CIRCUIT BREAKER – DOES NOT STAY CLOSED (cont)

10-53

8. Detach P191 and P174, check for short between:
P174-B3 and ground,
P174-A10 and ground,
P191-A4 and ground.

Does short exist?

YES Repair shorted wire between:
P174-B3 and P191-A3,
P191-A4 and P174-B2.
Go to paragraph 10-47.

NO **(ADA)** Repair shorted wire between:
P437-a and P174-B11,
(A402)J2-D and (A402)J25-a.
Go to paragraph 10-47.
(ADB) Go to step 9.

9. **(ADB)** Detach (A402)J25 and check for short between:
(A402)J2-D and ground,
P437-a and ground.

Does short exist?

YES Repair shorted wire between:
(A402)JD-2 and (A402)J25-a,
P437-a and P174-B11.
Go to paragraph 10-47.

NO Go to step 10.

10. **(ADB)** Check for short between P429-A18 ground.

Does short exist?

YES Repair shorted wire.
Go to paragraph 10-47.

NO Replace relay (A402)K5-9
(TM 1-1520-238-23).

11. Detach P940, check for short between P174-A9 and ground.

Does short exist?

YES Go to step 12.

NO Go to step 13.

12. Detach P429, check for short between P174-A9 and ground.

Does short exist?

YES Repair shorted wire between
P174-A9 and P429-B5.
Go to paragraph 10-47.

NO Go to step 14.

13. With P940 detached, check for short between P174-B1 and ground.

Does short exist?

YES Repair shorted wire between:
P940-3 and P444-A12,
P429-B15 and P174-B1.
(A402):
J31-A12 and TB2-13-R,
TB2-13-S and J23-B15,
Go to paragraph 10-47.

NO Replace fuel transfer air control valve
(TM 1-1520-238-23).

14. Detach P444, check for short between P444-A10 and ground.

Does short exist?

YES Repair shorted wire between
P444-A10 and P940-1.
Go to paragraph 10-47.

NO Go to step 15.

15. Detach wire end from (A402)TB2-13-H and check for short to ground.

Does short exist?

YES Repair shorted wire between
(A402):
J23-B5 and TB2-13-H.
Go to paragraph 10-47.

NO Repair shorted wire between
(A402):
J31-A10 and TB2-13-G.
Go to paragraph 10-47.

END OF TASK

Paragraphs 10-54, 10-55, and all data on pages 10-172 thru 10-175 deleted

10-56. FUEL LOW AFT INDICATORS – ARE NOT LIGHTED WITH PILOT FUEL QUANTITY INDICATOR AFT VERTICAL DISPLAY INDICATING BETWEEN 22 AND 26

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L40 door removed



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Check for open between: (A402)J31-B1 and P401-21, (A402)J31-B2 and P401-22.
Does open exist?

YES	Repair open wire. Go to paragraph 10-47.
NO	Go to step 2.
- Check for open between (A82) 1J2-24 and ground.
Does open exist?

YES	Go to step 3.
NO	Replace SDC (TM 1-1520-238-23).

- With P18 detached, check **FUEL LOW AFT** indicator.
Is indicator lighted?

YES	Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.
NO	Go to step 4.
- Check for short between: P401-24 and ground, P18-22 and ground.
Does short exist?

YES	Repair shorted wire. Go to paragraph 10-47.
NO	Go to step 5.
- Check for open between: P264-8 and P444-B1, P264-9 and P444-B2.
Does open exist?

YES	Repair open wire. Go to paragraph 10-47.
NO	Adjust aft fuel quantity low level sensor (TM 1-1520-238-23).

END OF TASK

10-57. FUEL LOW FWD INDICATORS – ARE NOT LIGHTED WITH PILOT FUEL QUANTITY INDICATOR FWD VERTICAL DISPLAY INDICATING BETWEEN 20 AND 16

10-57

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L40 door removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With power off, check resistance between P401-6 and P401-7.

Is resistance 360 to 480 ohms?

YES Go to step 2.
NO Go to step 3.

2. Check for open between P401-14 and P18-21.

Does open exist?

YES Repair open wire. Go to paragraph 10-47.
NO Go to step 5.

3. Check resistance between P915-A15 and P915-A14.

Is resistance 360 to 480 ohms?

YES Repair open wire between: P401-6 and J915-A15, P401-7 and J915-A14. Go to paragraph 10-47.
NO Go to step 4.

4. Check resistance between (A58): J1-8 and J1-9.

Is resistance 360 to 480 ohms?

YES Repair open wire between: P263-8 and P915-A14, P263-9 and P915-A15. Go to paragraph 10-47.
NO Adjust fuel low forward sensor on aft fuel quantity transmitter in forward fuel cell (TM 1-1520-238-23).

5. Check for open between P18-21 and ground.

Does open exist?

YES Replace SDC (TM 1-1520-238-23).
NO Refer to TM 1-1520-238-T-6 to troubleshoot the pilot caution/warning system.

END OF TASK

10-58. FUEL TRANS CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH PILOT TRANS SWITCH SET AT TO FWD

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Attach positive meter lead to P174-B1 and check for short to ground.
Does short exist?
 - YES Go to step 5.
 - NO Go to step 2.

2. Check for short between (A402)J2-D and ground.
Does short exist?
 - YES Go to step 3.
 - NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 2 – pilot station).

3. Check for short between (A131):
J1-B11 and chassis ground,
J1-A9 and chassis ground,
J1-A12 and chassis ground.
Does short exist?
 - YES Replace pilot **FUEL** panel (TM 1-1520-238-23).
 - NO Go to step 4.

4. Check for short between (A179):
J1-A3 and chassis ground,
J1-A4 and chassis ground.
Does short exist?
 - YES Replace CPG **FUEL** panel (TM 1-1520-238-23).
 - NO Go to step 7.

5. Detach P940. Check for short between P174-B1 and ground.
Does short exist?
 - YES Go to step 6.
 - NO Replace fuel transfer air control valve (TM 1-1520-238-23).

6. Detach P429. Check for short between: P174-B1 and ground, P444-A12 and ground.
Does short exist?
 - YES Repair shorted wire between: P174-B1 and P429-B15, P444-A12 and P940-1. Go to paragraph 10-47.
 - NO Repair shorted wire between (A402): J23-B15 and TB2-13-S, J31-A12 and TB2-13-R. Go to paragraph 10-47.

**10-58. FUEL TRANS CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH PILOT
TRANS SWITCH SET AT TO FWD**

10-58

7. Detach P191 and P174. Check for short
between:

P174-B3 and ground,

P174-B2 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between:
P174-B3 and P191-A3,
P174-B2 and P191-A4.
Go to paragraph 10-47. |
| NO | Repair shorted wire between:
P437-a and P174-B11,
(A402)J2-D and (A402)J25-a.
Go to paragraph 10-47. |

END OF TASK

10-59. FUEL TRANSFER PUMP IS NOT OPERATING WITH PILOT FUEL TRANS SWITCH SET AT TO AFT **10-59**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

- TM 1-1520-238-T-5
- TM 1-1520-238-T-6
- TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P940-1.

Is voltage present?

- | | |
|-----|---------------|
| YES | Go to step 3. |
| NO | Go to step 2. |

2. Check for open between P940-1 and P174-A9.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 10-47. |
| NO | Go to step 6. |

3. Check for open between P940-4 and ground.
Does open exist?

- | | |
|-----|--|
| YES | Repair open wire between P940-4 and GS500-C.
Go to paragraph 10-47. |
| NO | Go to step 7. |

4. Check for 28 VDC at P174-B11.

Is voltage present?

- | | |
|-----|---------------|
| YES | Go to step 5. |
| NO | Go to step 9. |

5. Check for open between:
P174-B3 and P191-A3,
P174-B2 and 191-A4.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 10-47. |
| NO | Go to step 6. |

6. Check for open between (A179):
J1-A3 and J1-A4.

Does open exist?

- | | |
|-----|---|
| YES | Replace CPG FUEL panel (TM 1-1520-238-23). |
| NO | Replace pilot FUEL panel (TM 1-1520-238-23). |

7. Have assistant detach fuel transfer air control valve air inlet lines. On pilot **FUEL** panel, verify that **TRANS** switch is set at **TO AFT**. Have assistant check air flow.

Is air flow present?

- | | |
|-----|--|
| YES | Go to step 8. |
| NO | Refer to TM 1-1520-238-T-5 to troubleshoot pressurized air system. |

10-59. FUEL TRANSFER PUMP IS NOT OPERATING WITH PILOT FUEL TRANS SWITCH SET AT TO AFT (cont)

10-59

8. Have assistant attach air inlet lines to fuel transfer air control valve and detach fuel transfer pump air inlet lines.

Is air flow present?

- | | |
|-----|---|
| YES | Replace fuel transfer pump (TM 1-1520-238-23). |
| NO | Replace fuel transfer air control valve (TM 1-1520-238-23). |

9. Check for 28 VDC at P2-D.

Is voltage present?

- | | |
|-----|--|
| YES | Repair open wire between P174-B11 and (A402)J2-D. Go to paragraph 10-47. |
| NO | Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 2 – pilot station). |

END OF TASK

10-60. FUEL TRANSFER PUMP IS NOT OPERATING WITH PILOT FUEL TRANS SWITCH SET AT TO FWD

10-60

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

- Check for 28 VDC at P940-3.
Is voltage present?
 - YES Go to step 4.
 - NO Go to step 2.
- Check for 28 VDC at P429-B15.
Is voltage present?
 - YES Repair open wire between (A402)J23-B15 and P940-3. Go to paragraph 10-47.
 - NO Go to step 4.
- Check for open between P174-B1 and P429-B15.
Is voltage present?
 - YES Repair open wire. Go to paragraph 10-47.
 - NO Replace pilot **FUEL** panel (TM 1-1520-238-23).
- Have assistant detach fuel transfer pump air inlet lines. On pilot **FUEL** panel, verify that **TRANS** switch is set at **TO FWD**. Have assistant check air flow.
Is air flow present?
 - YES Replace fuel transfer pump (TM 1-1520-238-23).
 - NO Replace fuel transfer air control valve (TM 1-1520-238-23).

END OF TASK

10-61. FUEL XFEED CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH ORIDE SWITCH SET TO CPG

10-61

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P1 from (A402)J1. On pilot center circuit breaker panel, open **FUEL XFEED** circuit breaker. Check for short between P1-32 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between P1-32 and FUEL XFEED circuit breaker.
Go to paragraph 10-47. |
| NO | Go to step 2. |

2. Check for short between (A402)J1-32 and P191-A1.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire. Go to paragraph 10-47. |
| NO | Check FUEL XFEED circuit breaker (para 10-22).
Go to paragraph 10-47. |

END OF TASK

10-62. FUEL LOW FWD INDICATOR – IS LIGHTED WITH PILOT FUEL QUANTITY INDICATOR FWD VERTICAL DISPLAY INDICATING MORE THAN 20

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L40 door removed



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for open between: J915–A14 and P401–7, J915–A15 and P401–6.

Does open exist?

YES Repair open wire.
Go to paragraph 10–47.

NO Go to step 2.

2. Check for open between (A82)1J2–14 and ground.

Does open exist?

YES Go to step 3.

NO Replace SDC (TM 1-1520-238-23).

3. With P18 detached, check **FUEL LOW FWD** indicator.

Is indicator lighted?

YES Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.

NO Go to step 4.

4. Check for short between: P401–14 and ground, P18–21 and ground.

Does short exist?

YES Repair shorted wire between: P401–14 and J915–A4, P915–A4 and P18–21. Go to paragraph 10–47.

NO Go to step 5.

5. Check for open between: P915–A14 and P263–8, P915–A15 and P263–9.

Does open exist?

YES Repair open wire. Go to paragraph 10–47.

NO Adjust fuel low forward sensor on forward fuel cell quantity transmitter (aft probe) (TM 1-1520-238-23).

END OF TASK

10-63. PILOT FUEL XFER ADVISORY LIGHT – IS NOT LIGHTED (ADA)

10-63

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L40 door removed

4. Check for open between: P748-b and DS19 SP2, P748-c and DS19 SP1.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 10-47. |
| NO | Replace pilot FUEL XFER advisory light (DS19) (TM 1-1520-238-23). |



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for open between P748-b and P748-c.
Does open exist?

- | | |
|-----|---------------|
| YES | Go to step 4. |
| NO | Go to step 2. |

2. Check for 28 VDC at P748-d.
Is voltage present?

- | | |
|-----|--|
| YES | Replace multi-channel dimming controller (TM 1-1520-238-23). |
| NO | Go to step 3. |

3. Check for open between P748-d and P197-B9.
Does open exist?

- | | |
|-----|---|
| YES | Repair open wire. Go to paragraph 10-47. |
| NO | Replace pilot FUEL panel (TM 1-1520-238-23). |

END OF TASK

10-64. CPG FUEL XFER ADVISORY LIGHT – IS NOT LIGHTED (ADA)

10-64

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L40 door removed

4. Check for open between:
P747-M and DS18 SP1,
P747-N and DS18 SP2.
Does open exist?

YES	Repair open wire. Go to paragraph 10-47.
NO	Replace CPG FUEL XFER advisory light (DS18) (TM 1-1520-238-23).



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for open between P747-M and P747-N.
Does open exist?

YES	Go to step 4.
NO	Go to step 2.

2. Check for 28 VDC at P747-P.
Is voltage present?

YES	Replace multi-channel dimming controller (TM 1-1520-238-23).
NO	Go to step 3.

3. Check for open between P747-P and P179-B8.
Does open exist?

YES	Repair open wire. Go to paragraph 10-47.
NO	Replace pilot FUEL panel (TM 1-1520-238-23).

END OF TASK

10-65. TANK 1 (FWD) FUEL QUANTITY TRANSMITTER ADJUSTED CAPACITANCE VALUE – 10-65
IS NOT WITHIN REQUIRED TOLERANCE

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for open between:
P937-B and P263-3,
P937-M and P263-5.

Does open exist?

YES	Repair open wire. Go to paragraph 10-48.
NO	Go to step 2.

2. Check for short between:
P937-B and ground,
P937-M and ground,
P937-A and ground.

Does short exist?

YES	Repair shorted wire. Go to paragraph 10-48.
NO	Replace both fuel quantity transmitters in forward fuel cell (TM 1-1520-238-23).

END OF TASK

**10-66. TANK 2 (AFT) FUEL QUANTITY TRANSMITTER ADJUSTED CAPACITANCE
VALUE – IS NOT WITHIN REQUIRED TOLERANCE**

10-66

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for open between:

P937-D and P264-3,
P937-N and P264-5.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-48.

NO Go to step 2.

2. Check for short between:

P937-D and ground,
P937-N and ground,
P937-D and ground,
P937-A and ground.

Does short exist?

YES Repair shorted wire.
 Go to paragraph 10-48.

NO Replace both fuel quantity
transmitters in aft fuel cell
(TM 1-1520-238-23).

END OF TASK

10-66A. PILOT GREEN FUEL XFR INDICATOR IS NOT LIGHTED WITH PILOT TRANS SWITCH SET AT TO AFT (ADB)

10-66A

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28VDC at P429-A18.
Is voltage present?

YES Go to step 2.
NO Go to step 6.

2. Check for open between (A402):
XK5-9-X1 and J23-A18,
XK5-9-X2 and TB3-33-C,
XK5-9-A1 and J23-A15,
XK5-9-A2 and TB3-33-A,
TB3-33-B and GS8-D.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-47.
NO Go to step 3.

3. Check for open between P429-A15 and P174-B7.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-47.
NO Go to step 4.

4. Check open for between (A131):
J1-B7 and J2-A10.

Does open exist?

YES Replace pilot **FUEL** panel
 (TM 1-1520-238-23).
NO Go to step 5.

5. Check open for between:
P179-A10 and P18-93.

Does open exist?

YES Repair open wire between:
 P179-A10 and J914-A11,
 P914-A11 and P18-93.
 Go to paragraph 10-47.
NO Replace relay (A402)K5-9
 (TM 1-1520-238-23).

6. Check open for between P429-A18 and P174-B8.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-47.
NO Replace pilot **FUEL** panel
 (TM 1-1520-238-23).

END OF TASK

**10-66B. PILOT AMBER FUEL XFR INDICATOR IS NOT LIGHTED WITH
TRANS SWITCH SET TO AFT AND AFT TANK FULL**

10-66B

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check that fuel is not being vented overboard.
Is fuel being vented overboard?

YES Go to paragraph 10-76 to troubleshoot pressure refueling/defueling system.

NO Go to step 2.

2. Check open for between:
P179-B4 and P18-95.

YES Repair open wire between:
P179-B4 and J914-A3,
P914-A3 and P18-95.
Go to paragraph 10-47.

NO Replace pilot **FUEL** panel
(TM 1-1520-238-23).

END OF TASK

10-66C. PILOT AND CPG AMBER FUEL XFR INDICATORS ARE LIGHTED WITH PILOT TRANS SWITCH SET TO OFF 10-66C

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

4. Check for short between (A106) J1-94 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Replace pilot caution/warning panel (TM 1-1520-238-23). |
| NO | Replace pilot FUEL panel (TM 1-1520-238-23). |

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P179. Check for short between P18-95 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between: P18-95 and P914-A3, J914-A3 and P179-B4. Go to paragraph 10-47. |
| NO | Go to step 2. |

2. Check for short between P18-94 and ground.

Does short exist?

- | | |
|-----|---------------|
| YES | Go to step 3. |
| NO | Go to step 4. |

3. Detach P19. Check for short between P18-94 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire. Go to paragraph 10-47. |
| NO | Replace CPG caution/warning panel (TM 1-1520-238-23). |

END OF TASK

10-66D. PILOT AND CPG GREEN FUEL XFR INDICATORS ARE LIGHTED WITH PILOT FUEL TRANS SWITCH SET TO OFF (ADB)

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P179. Check for short between P18-93 and ground.
Does short exist?

YES	Repair shorted wire between: P18-93 and P914-A11, J914-A11 and P179-A10. Go to paragraph 10-47.
NO	Go to step 2.

2. Check for short between P18-102 and ground.
Does short exist?

YES	Go to step 3.
NO	Go to step 4.

3. Detach P19. Check for short between P18-102 and ground.
Does short exist?

YES	Repair shorted wire. Go to paragraph 10-47.
NO	Replace CPG caution/warning panel (TM 1-1520-238-23).

4. Check for short between (A106) J1-102 and ground.
Does short exist?

YES	Replace pilot caution/warning panel (TM 1-1520-238-23).
NO	Go to step 5.

5. Check for short between XK5-9-A1 and ground.
Does short exist?

YES	Go to step 6.
NO	Replace relay K5-9 (TM 1-1520-238-23).

6. Detach P429. Check for short between XK5-9-A1 and ground.
Does short exist?

YES	Repair shorted wire. Go to paragraph 10-47.
NO	Go to step 7.

7. Detach P174. Check for short between P429-A15 and ground.
Does short exist?

YES	Repair shorted wire. Go to paragraph 10-47.
NO	Replace pilot FUEL panel (TM 1-1520-238-23).

END OF TASK

10-66E. FUEL TRANSFER PUMP IS NOT OPERATING WITH CPG FUEL TRANS SWITCH SET AT TO AFT

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check open for between:
P191-A6 and P174-A8.

Does open exist?

YES	Repair open wire between P191-A6 and P174-A8. Go to paragraph 10-47.
NO	Go to Step 2.

2. Check open for between (A131):
J1-A8 and J1-A9

Does open exist?

YES	Replace pilot FUEL panel (TM 1-1520-238-23).
NO	Replace CPG FUEL panel (TM 1-1520-238-23).

END OF TASK

10-66F. FUEL TRANSFER PUMP IS NOT OPERATING WITH CPG FUEL TRANS SWITCH SET AT TO FWD

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check open for between P191-A7 and P174-A12.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 10-47. |
| NO | Go to Step 2. |

2. Check open for between (A131): J1-B1 and J1-A12.

Does open exist?

- | | |
|-----|---|
| YES | Replace pilot FUEL panel (TM 1-1520-238-23). |
| NO | Replace CPG FUEL panel (TM 1-1520-238-23). |

END OF TASK

10-66G. FUEL XFR/XFER ADVISORY LIGHTS ARE LIGHTED WITH PILOT AND CPG TRANS SWITCHES SET TO OFF**10-66G****Tools:**

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for open between (A179):
J1-A3 and J1-A6,
J1-A3 and J1-A7.

Does open exist?

YES	Replace pilot FUEL panel TM 1-1520-238-23.
NO	Replace CPG FUEL panel TM 1-1520-238-23.

END OF TASK

10-66H. FUEL TRANS CIRCUIT BREAKER DOES NOT STAY CLOSED WITH CPG TRANS SWITCH SET AT TO AFT

10-66H

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Check for short between P174-A8 and ground.
Does short exist?

YES	Go to step 2.
NO	Replace pilot FUEL panel (TM 1-1520-238-23).
- Detach P191. Check for short between P174-A8 and ground.
Does short exist?

YES	Repair shorted wire between P174-A8 and P191-A6. Go to paragraph 10-47.
NO	Replace CPG FUEL panel (TM 1-1520-238-23).

END OF TASK

10-66I. FUEL TRANS CIRCUIT BREAKER DOES NOT STAY CLOSED WITH CPG TRANS SWITCH SET AT TO FWD

10-66I

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for short between P174-A12 and ground.
Does short exist?

YES	Go to step 2.
NO	Replace pilot FUEL panel (TM 1-1520-238-23).

2. Detach P191. Check for short between P174-A12 and ground.

Does short exist?

YES	Repair shorted wire between P174-A12 and P191-A7. Go to paragraph 10-47.
NO	Replace CPG FUEL panel (TM 1-1520-238-23).

END OF TASK

10-67. NITROGEN INERTING SYSTEM – MAINTENANCE OPERATIONAL CHECK**10-67**

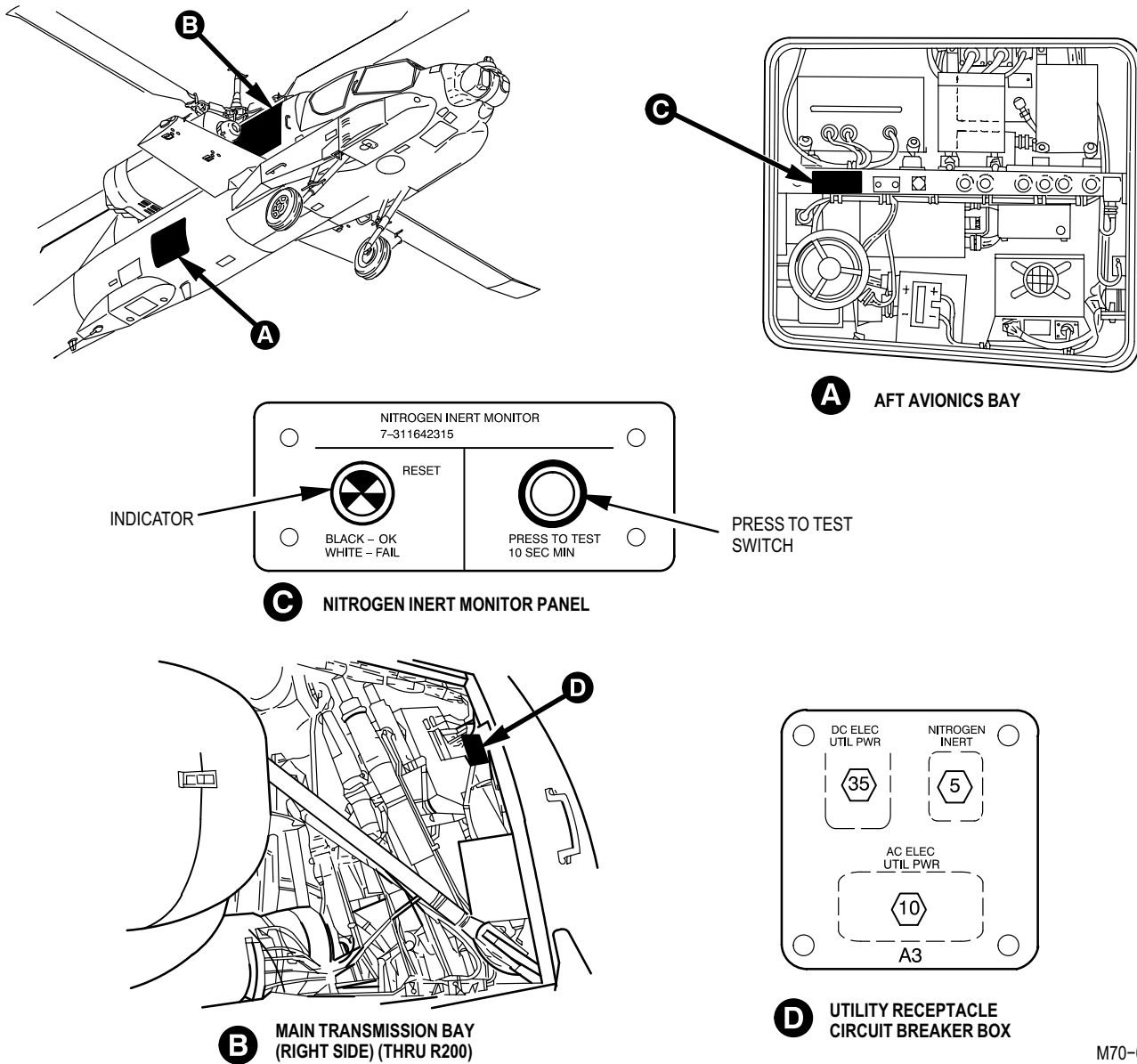
Tools:		Equipment Conditions:	
<u>Nomenclature</u>	<u>Part Number</u>	<u>Ref</u>	<u>Condition</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01	TM 1-1520-238-23	Access provisions – R200 access panel and R295 access door open
Personnel Required:		Paragraph 10-10	FUEL SYSTEM – POWER UP completed
67R Attack Helicopter Repairer One person to assist		Paragraph 10-12	FUEL SYSTEM – VISUAL CHECK completed
References:		TM 1-1520-238-T-4	Maintenance headset connected
TM 1-1520-238-T-4			
TM 1-1520-238-23			

WARNING

- **Make certain that helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting or maintenance procedures. Failure to do so could result in death or serious injury.**
- **Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well-ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.**
- **Do not allow sparks or flame near helicopter when servicing or performing maintenance on fuel system.**
- **Make certain helicopter is grounded.**

NOTE

- **Refer to NIU location (fig. 10-71) for helicopter configuration and equipment.**
- **If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.**



M70-068A

Figure 10-71. NIU Location

1. In aft avionics bay, manually reset **NITROGEN INERT MONITOR** indicator (fig. 10-71) to all black (**OK**).
2. With pressurized air and electrical power applied to the helicopter, complete the maintenance operational check as follows:

10-67. NITROGEN INERTING SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)**10-67****WARNING**

To prevent bodily injury, nitrogen inerting system pressure must be relieved prior to opening fuel service port covers.

Task	Result
a. On utility receptacle circuit breaker box (fig. 10-71), check that NITROGEN INERT circuit breaker is closed.	If NITROGEN INERT circuit breaker does not stay closed, go to paragraph 10-69.
b. Verify that unit is operating by listening for chugging sound.	If NIU is not operating (absence of chugging sound), remove ammo storage magazine (TM 9-1090-208-23-1). Perform visual inspection of all visible components. If components exhibit physical damage that affects NIU operation, replace damaged components (TM 1-1520-238-23). If no components exhibit physical damage, go to paragraph 10-69.
c. In aft avionics bay, check that NITROGEN INERT MONITOR indicator is all black (OK).	If NITROGEN INERT MONITOR indicator is not black (OK), go to paragraph 10-70.
d. Depress NITROGEN INERT MONITOR PRESS TO TEST switch for 10 seconds. Check that indicator trips to black and white (FAIL).	If NITROGEN INERT MONITOR indicator is not black and white (FAIL) with PRESS TO TEST switch depressed for 10 seconds, go to paragraph 10-71.
NOTE	
<ul style="list-style-type: none"> • PRESS TO TEST simulates a fault in the NIU. Resetting the NITROGEN INERT MONITOR indicator does not reset the NIU indicator. • A FAIL condition on the indicator of the NIU has no effect on the operation of the NIU system. Resetting the indicator is not necessary. 	
e. Reset NITROGEN INERT MONITOR indicator by manually rotating knurled ring clockwise 90° and release.	
f. Remove external pressurized air, if applied (TM 1-1520-238-23).	

10-67. NITROGEN INERTING SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

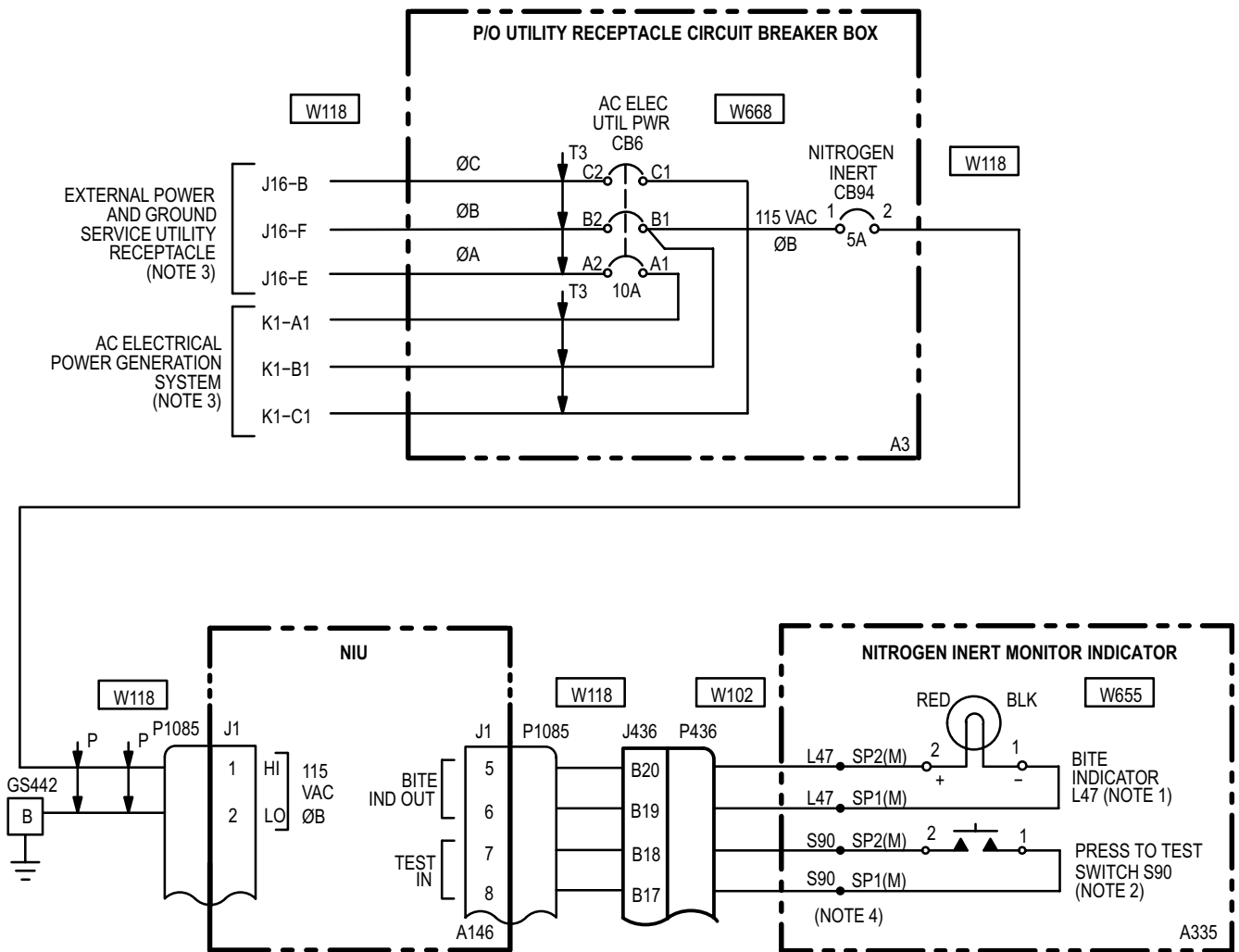
10-67

3. Perform FUEL SYSTEM – POWER DOWN (para 10-11).
4. Secure R200 panel and R295 door (TM 1-1520-238-23).
5. Disconnect maintenance headset (TM 1-1520-238-T-4).

END OF TASK

10-68. NITROGEN INERTING SYSTEM – WIRING INTERCONNECT DIAGRAM

10-68



NOTES:

1. GIVES AUTOMATIC VISUAL INDICATION AT FAILURE OF NIU.
2. USED TO CHECK OPERATION OF AUTOMATIC FAULT DETECTION CIRCUITS IN NITROGEN INERTING.
3. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
4. M DESIGNATES A SOFT SPLICE WHICH MAY BE DISCONNECTED FOR WIRING CHECK.

10-69. NITROGEN INERTING SYSTEM – IS NOT OPERATING

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R200 panel removed



- To prevent bodily injury, nitrogen inerting system pressure must be relieved prior to opening fuel service port covers.
- Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

NOTE

To relieve nitrogen inerting system pressure, refer to TM 1-1520-238-23.

1. On utility receptacle circuit breaker box, close **NITROGEN INERT** circuit breaker CB94.
Does circuit breaker stay closed?

YES	Go to step 3.
NO	Go to step 2.

2. Detach P1085. Open **NITROGEN INERT** circuit breaker. Check for short between CB94-2 and ground.

Does short exist?

YES	Repair shorted wire. Go to paragraph 10-67.
NO	Replace NIU (TM 1-1520-238-23).

3. Check for 115 VAC at P1085-1.

Is voltage present?

YES	Go to step 4.
NO	Go to step 5.

4. Check for open between P1085-2 and GS442-B.

Does open exist?

YES	Repair open wire. Go to paragraph 10-67.
NO	Replace NIU (TM 1-1520-238-23).

5. Check for open between CB94-1 and CB94-2.

Does open exist?

YES	Replace NITROGEN INERT circuit breaker (CB94) (TM 1-1520-238-23).
NO	Go to step 6.

6. Check for open between:
CB94-1 and CB6-B1,
CB94-2 and P1085-1.

Does open exist?

YES	Repair open wire. Go to paragraph 10-67.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot ac electrical power generation.

END OF TASK

10-70. NITROGEN INERT MONITOR INDICATOR – IS NOT ALL BLACK (OK) WITH UNIT OPERATING **10-70**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. In aft avionics bay, reset **NITROGEN INERT MONITOR** indicator.
Does indicator trip to black (OK) and white (FAIL)?

YES	Go to step 2.
NO	Go to paragraph 10-67.

2. Check for 28 VDC at J436-B20.
Is voltage present?

YES	Go to step 4.
NO	Go to step 3.

3. Check for 720 ±70 ohms resistance between (A335): L47-1 and L47-2.
Is resistance present?

YES	Repair shorted wire between: P436-B20 and (A335)L47-2, J436-B20 and P1085-5, P436-B19 and (A335)L47-1, J436-B19 and P1085-6. Go to paragraph 10-67.
NO	Replace NITROGEN INERT MONITOR indicator (TM 1-1520-238-23).

4. Remove pressurized air and electrical power. Replace filter element in NIU (TM 1-1520-238-23). Apply electrical power and pressurized air. Reset indicator.
Does indicator trip to black (OK) and white (FAIL)?

YES	Go to step 5.
NO	Go to paragraph 10-67.

5. Check for open between P1085-7 and P1085-8.
Does open exist?

YES	Replace NIU (TM 1-1520-238-23).
NO	Go to step 6.

6. Check for open between (A335): S90-1 and S90-2.
Does open exist?

YES	Repair open wire between: P436-B18 and (A335)S90-2, J436-B18 and P1085-7, P436-B17 and (A335)S90-1, J436-B17 and P1085-6. Go to paragraph 10-67.
NO	Replace NITROGEN INERT MONITOR indicator (TM 1-1520-238-23).

END OF TASK

10-71. NITROGEN INERT MONITOR INDICATOR – IS NOT BLACK (OK) AND WHITE (FAIL) WHEN PRESS TO TEST SWITCH IS DEPRESSED FOR 10 SECONDS

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door opened, R200 panel removed

- Check for continuity between (A335): L47-1 and L47-2.
Does continuity exist?
YES Go to step 4.
NO Replace **NITROGEN INERT MONITOR** indicator (TM 1-1520-238-23).
- Check for open between: P1085-5 and (A335)L47-2, P1085-6 and (A335)L47-1, P1085-7 and J436-B18, P1085-8 and J436-B17.
Does open exist?
YES Repair open wire. Go to paragraph 10-67.
NO Replace NIU (TM 1-1520-238-23).



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- With **PRESS TO TEST** button on **NITROGEN INERT MONITOR** indicator depressed, check for open between P436-B17 and P436-B18.
Does open exist?
YES Go to step 2.
NO Go to step 3.
- With **PRESS TO TEST** button on **NITROGEN INERT MONITOR** indicator depressed, check for open between (A335): S90-1 and S90-2.
Does open exist?
YES Replace NIU (TM 1-1520-238-23).
NO Repair open wire between: P436-B17 and (A335)S90 SP1, P436-B18 and (A335)S90 SP2. Go to paragraph 10-67.

END OF TASK

10-72. GRAVITY REFUELING/DEFUELING – MAINTENANCE OPERATIONAL CHECK

10-72

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Truck, Tank Fuel Servicing 2500 gal	M978
Pail, Utility	A-A-1273
Faceshield (2)	L-F-36

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R160 door open Aircraft grounded
Paragraph 10-10	FUEL SYSTEM – POWER UP completed
Paragraph 10-12	FUEL SYSTEM – VISUAL CHECK completed

Personnel Required:

- 67R Attack Helicopter Repairer
- 77F Petroleum Supply Specialist

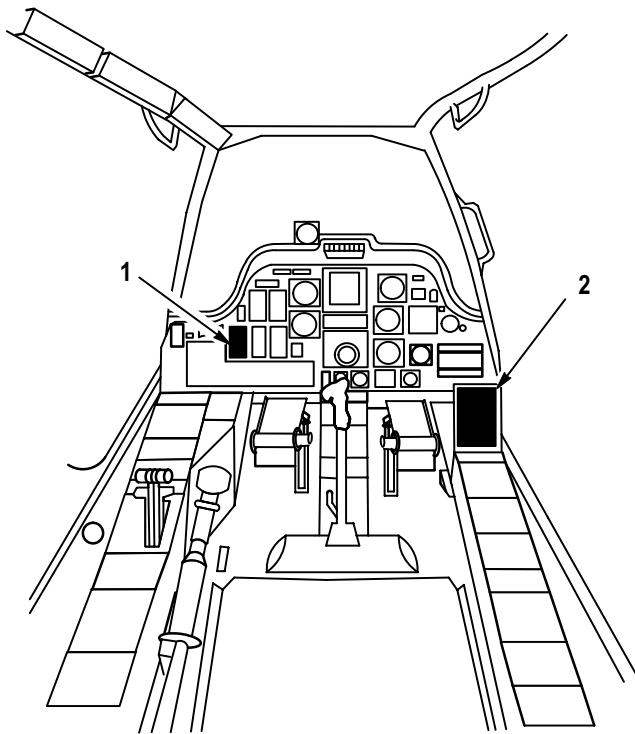
WARNING

- **Make certain that helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting and maintenance procedures. Failure to do so could result in death or serious injury.**
- **Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well-ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.**
- **Do not allow sparks or flame near helicopter when servicing or performing maintenance on fuel system.**
- **Make sure helicopter is grounded.**

NOTE

- **Refer pilot station (fig. 10-72) for cockpit configuration and equipment.**
- **If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.**

1. Ensure that fuel truck is grounded (TM 1-1520-238-23).
2. Install static ground between helicopter and fuel truck (TM 1-1520-238-23).



- 1. PILOT FUEL QUANTITY INDICATOR
- 2. PILOT CAUTION / WARNING PANEL

M70-069A

Figure 10-72. Pilot Station

10-72. GRAVITY REFUELING/DEFUELING – MAINTENANCE OPERATIONAL CHECK (cont)

10-72

WARNING

During gravity refueling/defueling operations set REFUEL VALVE switch to OPEN on refueling panel (fig. 10-73) prior to opening fuel cell filler cap. This prevents cap and/or fuel being forced out of filler neck by NIU pressurized air in fuel cell, and prevents fuel from splashing on personnel. Failure to do so could cause injury or death.

CAUTION

- To prevent discharging aircraft battery, ensure that all non-essential electrical equipment is OFF. Failure to comply could result in damage to equipment.
- Do not use battery if status of charge is low.
- Do not exceed 20 minute limit to complete this maintenance operational check.

3. Complete the maintenance operational check as follows:

Task	Result
a. On refueling panel (fig. 10-73), set FUEL QTY switch to IND ON . AFT and FWD FUEL QTY indicator needles indicate fuel loads in aft and forward fuel cells.	If AFT FUEL QTY indicator does not indicate aft fuel load with FUEL QTY switch at IND ON , go to paragraph 10-80. If FWD FUEL QTY indicator does not indicate forward fuel load with FUEL QTY switch at IND ON , go to paragraph 10-81.
b. On refueling panel, set REFUEL VALVE switch to OPEN . Refuel valve is heard to open, REFUEL VALVE OPEN indicator is lighted.	If REFUEL VALVE OPEN indicator is not lighted with REFUEL VALVE switch set to OPEN , replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 10-78.
c. On pilot caution/warning panel (fig. 10-74), check that REFUEL VALVE OPEN indicator is lighted.	If REFUEL VALVE OPEN indicator is not lighted with REFUEL VALVE switch set to OPEN , replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 10-79.
d. Unlock fuel cell filler cap locking tab (fig. 10-73) and rotate counterclockwise to open cap. Locking tab unlocks, and cap rotates smoothly.	If locking tab is broken or cap does not rotate smoothly, replace fuel cell filler cap. (Detach check valve control cable from cap lanyard, and install new cap from lanyard on check valve control cable).

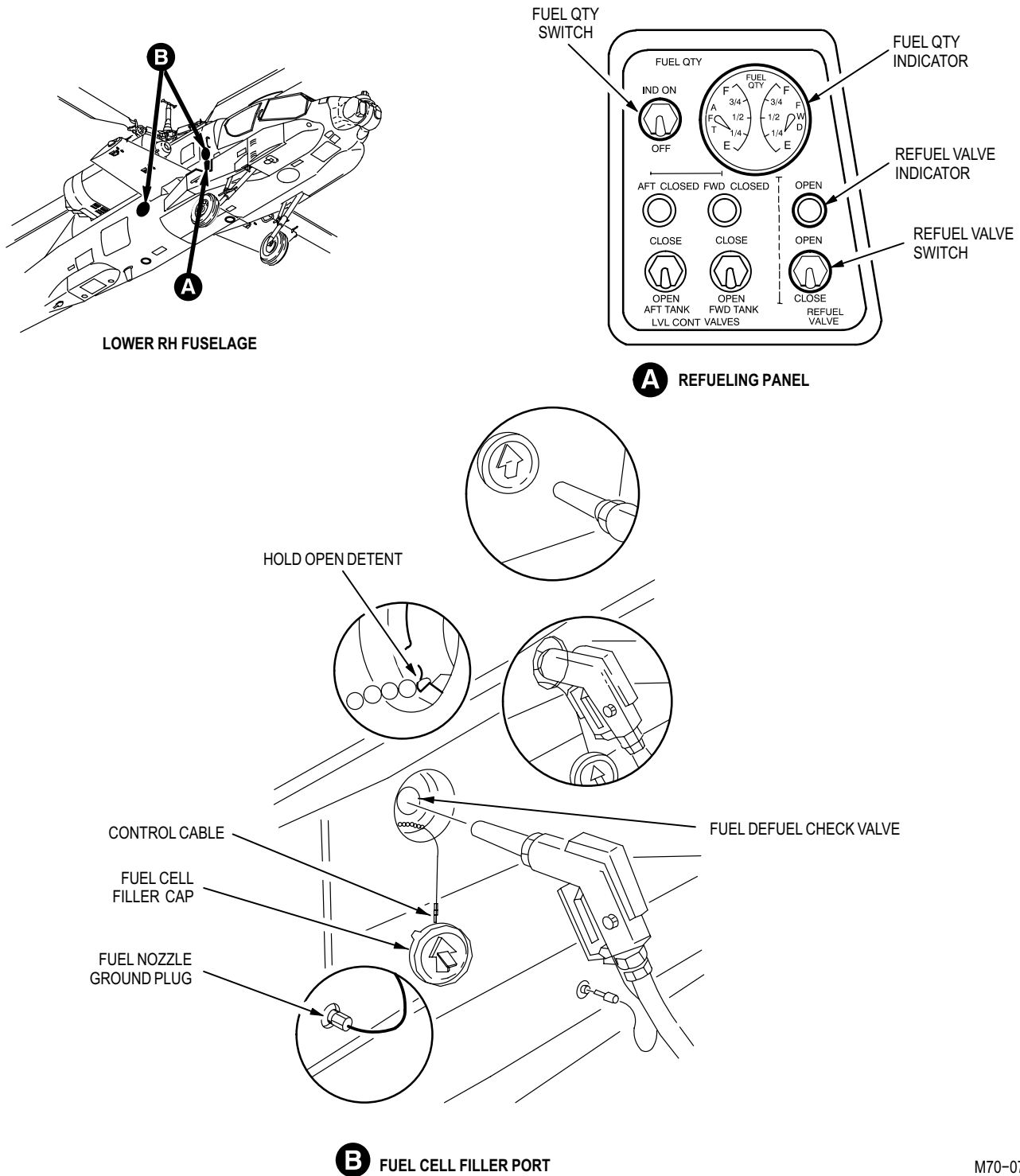
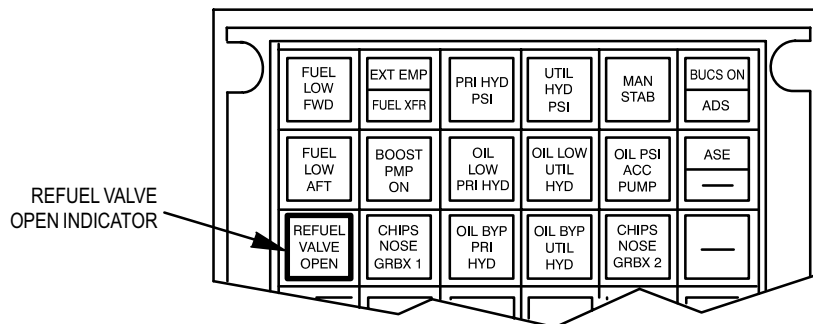


Figure 10-73. Refueling Panel and Filler Port

M70-071

10-72. GRAVITY REFUELING/DEFUELING – MAINTENANCE OPERATIONAL CHECK (cont)

10-72



M70-072

Figure 10-74. Pilot Caution/Warning Panel

Task	Result
e. Pull fuel cell filler cap out of fuel cell filler neck (fig. 10-73) to open fuel/defuel controllable check valve.	If fuel/defuel controllable check valve does not open, go to paragraph 10-73.
f. Place check valve control cable in hold-open detent. Check that valve stays open.	If hold-open detent does not hold check valve control cable, replace fuel filler neck (TM 1-1520-238-23).
g. Attach fuel nozzle static ground plug to refueling ground jack on helicopter. Plug stays in jack.	If ground jack does not retain fuel nozzle ground plug due to damage to jack, replace ground jack (TM 1-1520-238-23).
h. Place fuel nozzle in cell filler port and start loading fuel. Check fuel cell for leaks.	If fuel leaks from fuel cell, go to paragraph 10-13.

NOTE

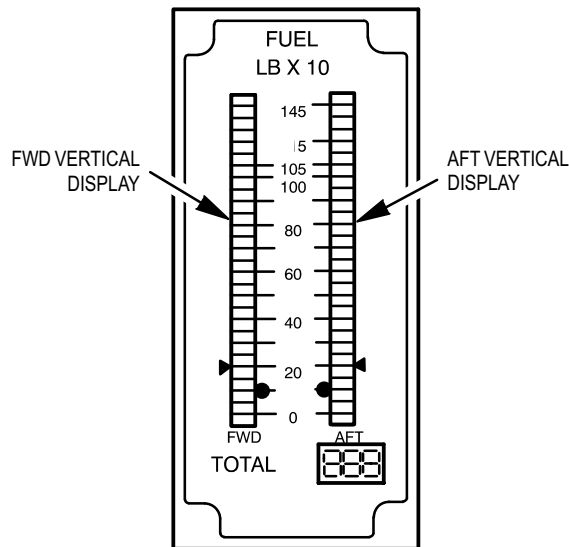
If fuel load is to be less than full, monitor FUEL QTY indicator on refueling panel (fig. 10-73). Stop loading fuel in cell when desired fuel is aboard, then go to step j. below.

- | | |
|---|---|
| i. Check for fuel to appear in filler neck. Stop loading fuel when cell is topped off. | |
| j. On refueling panel, check FUEL QTY indicator when fuel appears in filler neck. FUEL QTY indication is F . | If FUEL QTY indication is not F with fuel level in filler neck, go to paragraph 10-80 when checking aft fuel cell or paragraph 10-81 when checking fwd fuel cell. |

10-72. GRAVITY REFUELING/DEFUELING – MAINTENANCE OPERATIONAL CHECK (cont)

10-72

Task	Result
k. Check that FUEL QTY indicator and pilot FUEL quantity indicator (fig. 10-75) indications are the same.	If AFT FUEL QTY indicator does not indicate same fuel load as pilot FUEL quantity indicator AFT vertical display, go to paragraph 10-82. If FWD FUEL QTY indicator does not indicate same fuel load as pilot FUEL quantity indicator FWD vertical display, go to paragraph 10-83.

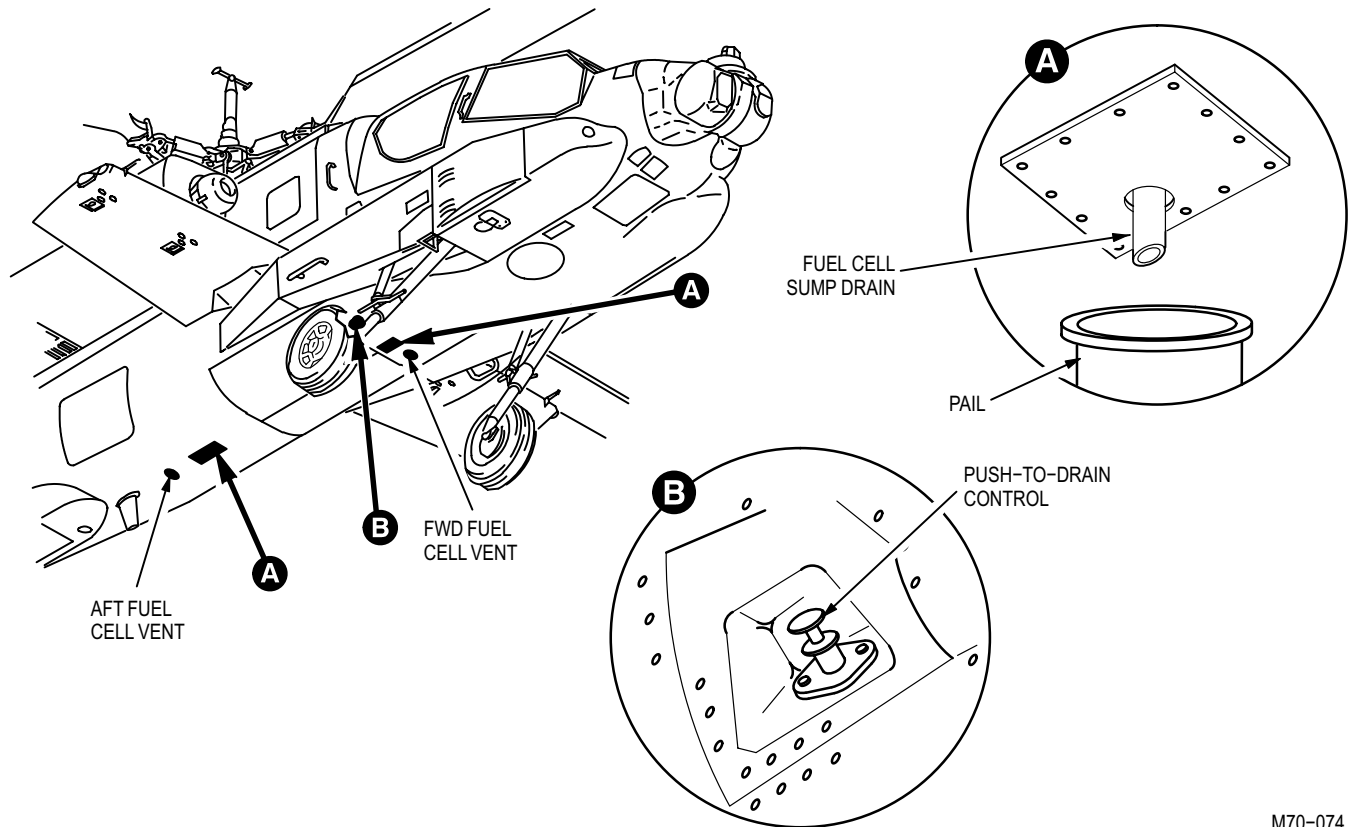


M70-073

Figure 10-75. Pilot FUEL Quantity Indicator

- l. Remove fuel nozzle from cell filler port (fig. 10-73), then remove fuel nozzle ground plug from helicopter refueling ground jack.
- m. Release fuel/defuel controllable (fig. 10-73) check valve control cable from hold-open detent, and allow check valve to close.
If check valve does not close with control cable released from hold-open detent, replace refuel/defuel controllable check valve (TM 1-1520-238-23).
- n. Install fuel filler cap in fuel cell filler port (TM 1-1520-238-23).
If fuel filler cap does not fit into fuel cell filler port, go to paragraph 10-74.

If filler cap locking tab does not lock filler cap, go to paragraph 10-75.
- o. Place suitable container under fuel cell sump drain and operate push-to-drain control (fig. 10-76). Fuel flows from sump drain.
If fuel does not flow from sump drain, go to paragraph 10-15.



M70-074

Figure 10-76. Mid-Lower RH Fuselage

Task	Result
p. Release push-to-drain control (fig. 10-76). Fuel stops flowing from sump drain.	If fuel flows from sump drain with push-to-drain control released, go to paragraph 10-14.
q. Repeat steps a. thru p. above to check remaining fuel cell, then go to step r.	
r. On refueling panel (fig. 10-73), set REFUEL VALVE switch to CLOSE . Refuel valve is heard to close and REFUEL VALVE OPEN indicator is not lighted.	If REFUEL VALVE OPEN indicator is lighted with REFUEL VALVE switch set to CLOSE , go to paragraph 10-86.
s. Set FUEL QTY switch to OFF . AFT and FWD indicators indicate E .	If AFT FUEL QTY indicator does not indicate E with FUEL QTY switch set to OFF , go to paragraph 10-84. If FWD FUEL QTY indicator does not indicate E with FUEL QTY switch set to OFF , go to paragraph 10-85.

10-72. GRAVITY REFUELING/DEFUELING – MAINTENANCE OPERATIONAL CHECK (cont)

10-72

Task	Result
t. On pilot caution/warning panel (fig. 10-74), check REFUEL VALVE OPEN indicator. Indicator is not lighted.	If REFUEL VALVE OPEN indicator is lighted with REFUEL VALVE switch set to CLOSE , replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 10-86.

4. Perform FUEL SYSTEM – POWER DOWN (para 10-11).
5. Secure R160 door (TM 1-1520-238-23).
6. Remove static ground between helicopter and fuel truck (TM 1-1520-238-23).
7. Remove static ground from fuel truck (TM 1-1520-238-23).
8. Remove fuel truck from vicinity of helicopter.

END OF TASK

10-73. FUEL/DEFUEL CONTROLLABLE CHECK VALVE – DOES NOT OPEN

10-73

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:

TM 1-1520-238-23

3. Check fuel check valve control cable.

Is cable free from filler neck hold-down detent?

YES	Replace fuel/defuel controllable check valve (TM 1-1520-238-23).
NO	Replace fuel cell filler neck (TM 1-1520-238-23)

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check fuel/defuel controllable check valve control cable.

Is control cable intact?

YES	Go to step 2.
NO	Replace fuel/defuel controllable check valve (TM 1-1520-238-23).

2. Check fuel cell filler neck for obstructions.

Are obstructions present?

YES	Clear filler neck of obstructions. Go to paragraph 10-72.
NO	Go to step 3.

END OF TASK

10-74. FUEL FILLER CAP – DOES NOT FIT IN FUEL FILLER PORT

10-74**Tools:**

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check fuel filler neck for damage or obstructions.

Is filler neck damaged or obstructed?

YES	Replace filler neck or clear obstruction (TM 1-1520-238-23).
NO	Go to step 2.

2. Check fuel filler cap for damage or obstructions.

Is filler cap damaged or obstructed?

YES	Replace filler cap or clear obstruction (TM 1-1520-238-23).
NO	Clear filler cap lanyard/check valve control cable from filler cap tracks. Orient filler cap in filler neck properly, and install filler cap (TM 1-1520-238-23). Go to paragraph 10-72.

END OF TASK

10-75. FUEL FILLER CAP LOCKING TAB – DOES NOT LOCK FILLER CAP

10-75

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

Check filler neck for damage or distortion.

Is filler neck damaged or distorted?

YES	Replace fuel filler neck (TM 1-1520-238-23).
NO	Replace fuel filler cap (TM 1-1520-238-23).

END OF TASK

10-76. PRESSURE REFUELING/DEFUELING – MAINTENANCE OPERATIONAL CHECK

Tools:		Equipment Conditions:	
<u>Nomenclature</u>	<u>Part Number</u>	<u>Ref</u>	<u>Condition</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01	TM 1-1520-238-23	Helicopter safed
Truck, Tank Fuel Servicing, 2500 gal	M978		Helicopter static ground installed
Pail, Utility	A-A-1273		Access provisions –
Faceshield (2)	L-F-36		R160 door open, R180 cover removed
Personnel Required:		TM 9-1090-208-23-1	Ammo storage magazine removed
67R Attack Helicopter Repairer		Paragraph 10-13	FUEL SYSTEM – VISUAL CHECK completed
77F Petroleum Supply Specialist			
References:			
TM 1-1520-238-23			
TM 9-1090-208-23-1			

WARNING

- **Make certain that helicopter safing procedures are accomplished. Observe all safety precautions during troubleshooting and maintenance. Failure to do so could result in death or serious injury.**
- **Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well-ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.**
- **Do not allow sparks or flame near helicopter when servicing or performing maintenance on fuel system.**
- **Make certain helicopter is grounded.**

NOTE

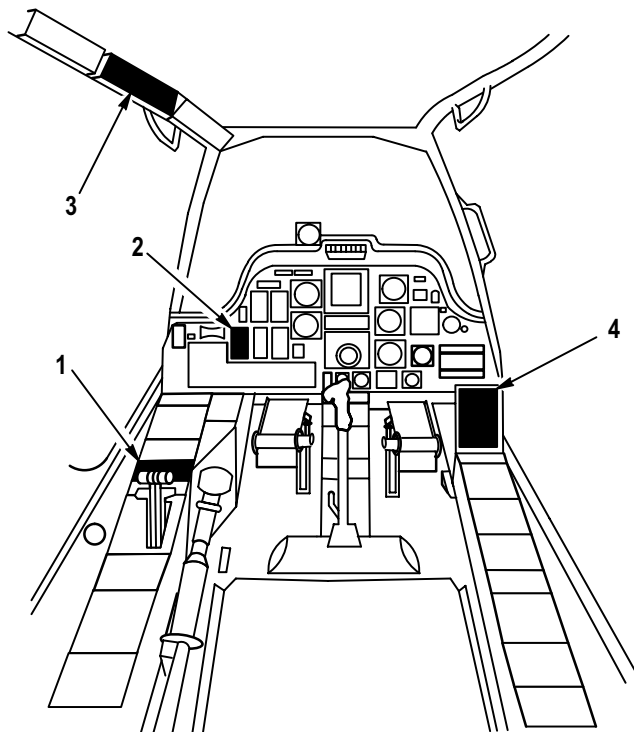
- **Refer to pilot station (fig. 10-77) cockpit configuration and equipment.**
- **If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.**

1. Ensure that fuel truck is grounded (TM 1-1520-238-23).
2. Install static ground between helicopter and fuel truck (TM 1-1520-238-23).



- To prevent discharging aircraft battery, ensure that all non-essential electrical equipment is OFF.
- Do not use battery if status of charge is low.
- Do not exceed 20 minute limit to complete this maintenance operational check.

3. Connect helicopter battery (TM 1-1520-238-23).

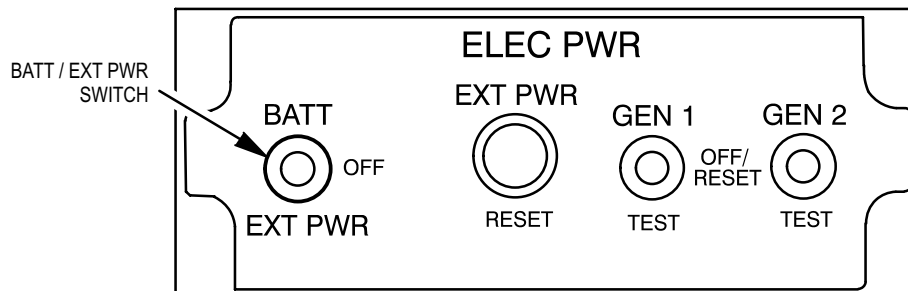


- 1. PILOT ELEC PWR PANEL
- 2. PILOT FUEL QUANTITY INDICATOR
- 3. PILOT CIRCUIT BREAKER PANEL (CENTER)
- 4. PILOT CAUTION / WARNING PANEL

M70-075

Figure 10-77. Pilot Station

4. On pilot **ELEC PWR** panel (fig. 10-78), set **BATT/EXT PWR** switch to **BATT**.



M70-081

Figure 10-78. Pilot ELEC PWR Panel

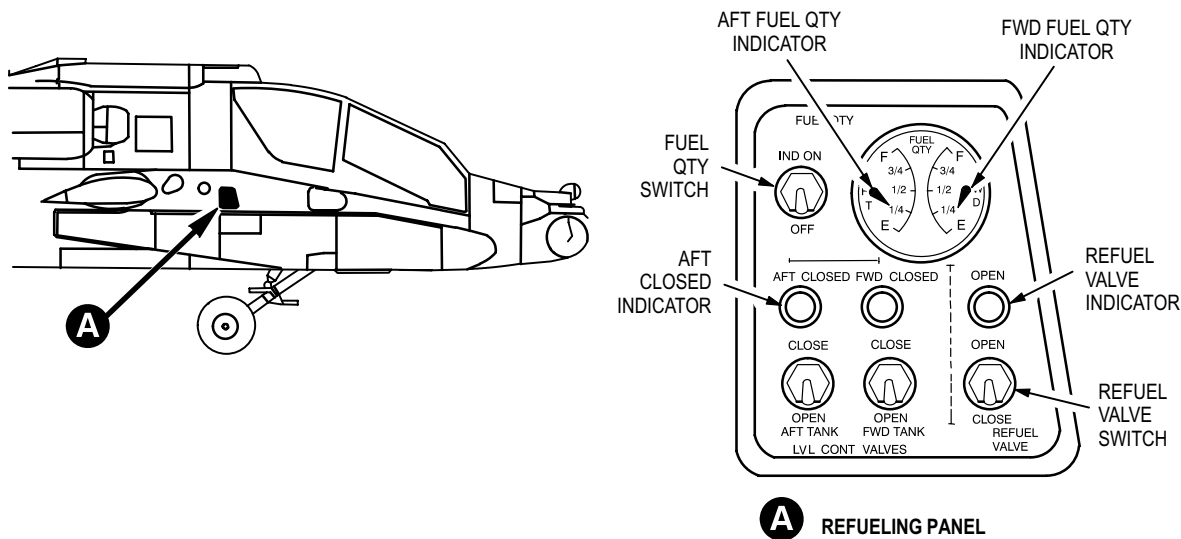


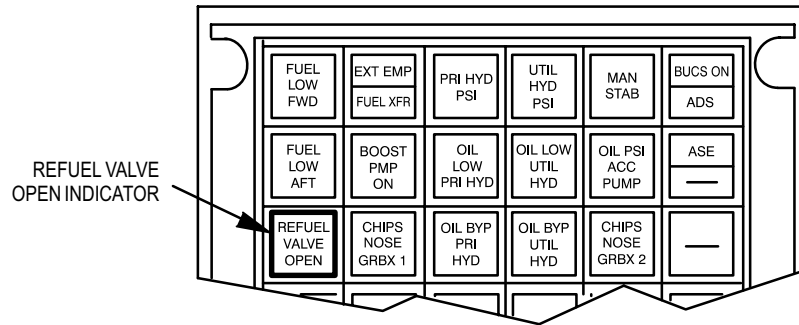
Figure 10-79. Refueling Panel

5. Complete the maintenance operational check as follows:

Task	Result
<p>a. On refueling panel (fig. 10-79), set FUEL QTY switch to IND ON. AFT and FWD FUEL QTY indicator needles indicate fuel loads in aft and forward fuel cells.</p>	<p>If AFT FUEL QTY indicator does not indicate aft fuel load, with FUEL QTY switched at IND ON, go to paragraph 10-80.</p>
<p>b. On refueling panel, set REFUEL VALVE switch to OPEN. Refuel valve is heard to open, REFUEL VALVE OPEN indicator is lighted on pilot caution/warning panel (fig. 10-80), and air is heard venting overboard. Assure both LVL CONT VALVES switches are set to CLOSE.</p>	<p>If FWD FUEL QTY indicator does not indicate forward fuel load with FUEL QTY switch at IND ON, go to paragraph 10-81.</p>
<p>c. On pilot caution/warning panel, check that REFUEL VALVE OPEN indicator is lighted.</p>	<p>If FUEL FILL circuit breaker does not stay closed with LVL CONT VALVES switches set to CLOSE, go to paragraph 10-94.</p>
	<p>If REFUEL VALVE OPEN indicator is not lighted with REFUEL VALVE switch set to OPEN, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 10-78.</p>
	<p>If fuel system air pressure is not heard venting overboard, go to paragraph 10-99.</p>
	<p>If REFUEL VALVE OPEN indicator on pilot caution/warning panel is not lighted with REFUEL VALVE switch set to OPEN, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 10-79.</p>

10-76. PRESSURE REFUELING/DEFUELING – MAINTENANCE OPERATIONAL CHECK (cont)

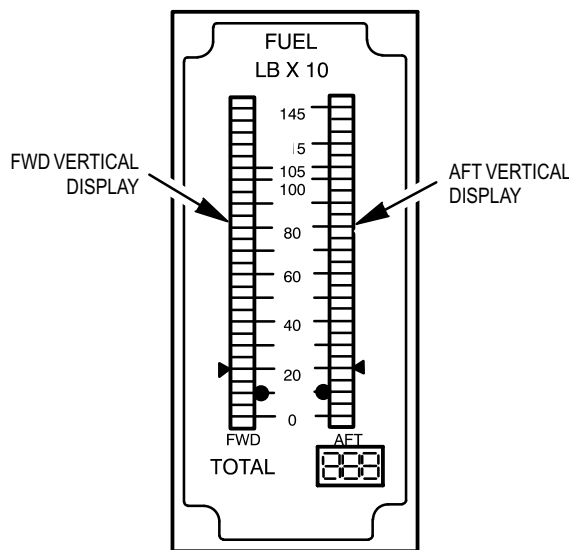
10-76



M70-077

Figure 10-80. Pilot Caution/Warning Panel

Task	Result
<p>d. On pilot FUEL quantity indicator (fig. 10-81), check that FWD and AFT vertical displays indicate approximately the same as FUEL QTY FWD and AFT indicators on refueling panel (fig. 10-79).</p>	<p>If AFT FUEL QTY indicator does not indicate approximately the same fuel load as pilot FUEL quantity indicator AFT vertical display, go to paragraph 10-82.</p> <p>If FWD FUEL QTY indicator does not indicate approximately the same fuel load as pilot FUEL quantity indicator FWD vertical display, go to paragraph 10-83.</p>

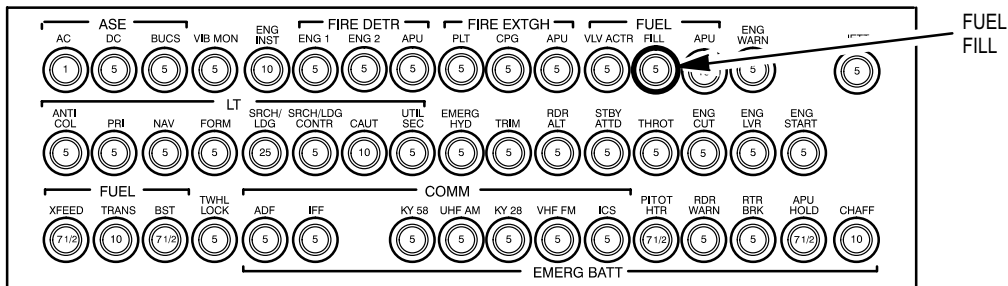


M70-078

Figure 10-81. Pilot Fuel Quantity Indicator

10-76. PRESSURE REFUELING/DEFUELING – MAINTENANCE OPERATIONAL CHECK (cont) 10-76

Task	Result
<p>e. On refueling panel (fig. 10-79), set LVL CONT VALVES AFT TNK and FWD TNK switches to OPEN. AFT CLOSED and FWD CLOSED indicators are not lighted.</p>	<p>If AFT CLOSED indicator is lighted with LVL CONT VALVES AFT TNK switch set to OPEN, replace refueling panel (TM 1-1520-238-23).</p> <p>If FWD CLOSED indicator is lighted with LVL CONT VALVES FWD TNK switch set to OPEN, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, replace refueling panel (TM 1-1520-238-23).</p>
<p>f. On pilot center circuit breaker panel (fig. 10-82), check that FUEL FILL circuit breaker is closed.</p>	<p>If FUEL FILL circuit breaker does not stay closed with LVL CONT VALVES switches set to OPEN, go to paragraph 10-87.</p>



M70-079

Figure 10-82. Pilot Center Circuit Breaker Panel

<p>g. On refueling panel, set LVL CONT VALVES AFT TNK and FWD TNK switches to CLOSE. AFT CLOSED and FWD CLOSED indicators are lighted.</p>	<p>If AFT CLOSED indicator is not lighted with LVL CONT VALVES AFT TNK switch set to CLOSE, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 10-89.</p> <p>If FWD CLOSED indicator is not lighted with VALVES FWD TNK switch set to CLOSE, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 10-88.</p>
<p>h. Install fuel nozzle static ground plug into jack on helicopter (fig. 10-83).</p>	<p>If ground jack is damaged and will not accept ground plug, replace ground jack (TM 1-1520-238-23).</p>

NOTE

The dual pressure fuel manifold provides adapters for SPA and CCA refueling system (fig. 10-83). The following steps apply to either method. Equipment availability determines the method used.

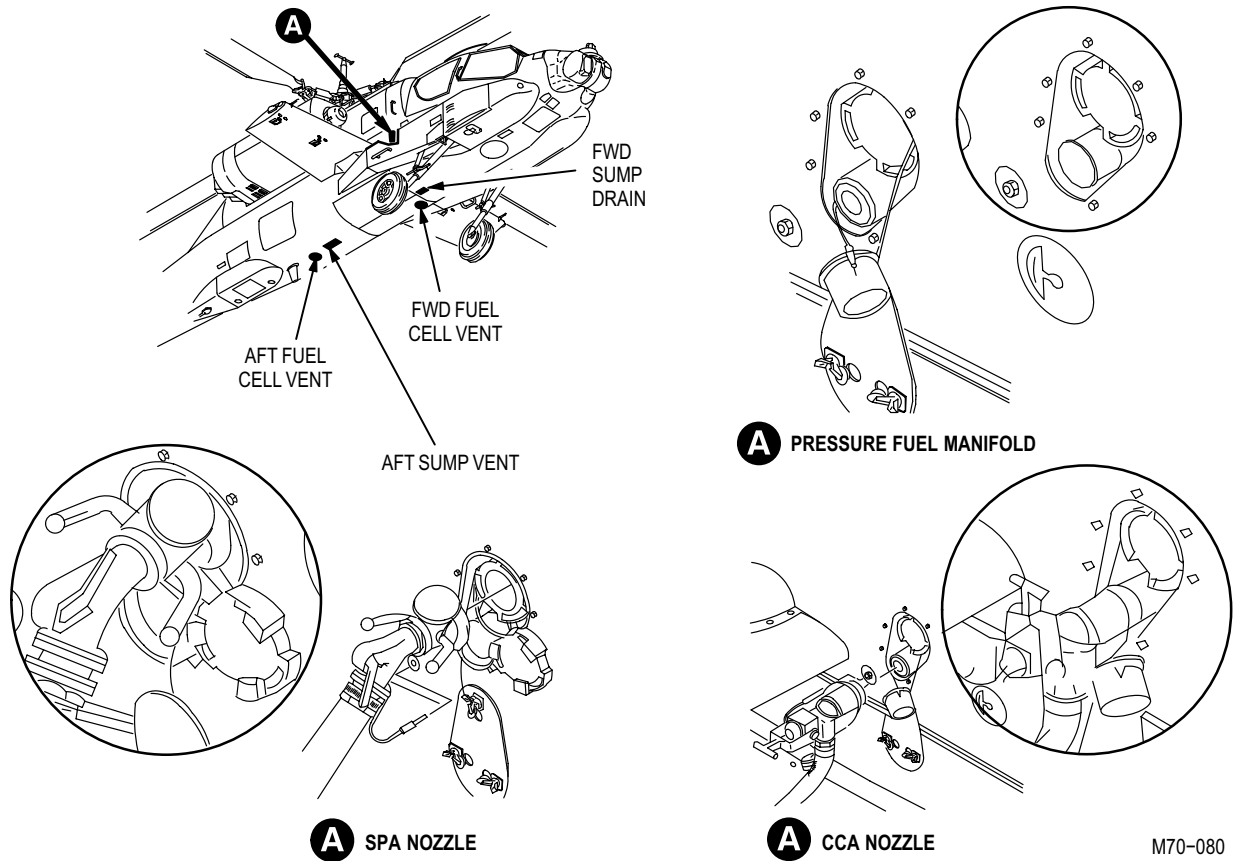


Figure 10-83. Pressure Fuel Manifold, Adapter Nozzles and Sump Drains

Task	Result
i. Remove cap from appropriate adapter (fig. 10-83).	
j. Connect and lock fuel nozzle onto adapter.	If fuel nozzle does not lock onto adapter, go to paragraph 10-90.
k. Begin pressure defueling (TM 1-1520-238-23). Check fuel truck flow meter. Fuel flow meter indicates fuel being drawn from helicopter. On refueling panel (fig. 10-79), FUEL QTY indicator indicates cells being defueled.	If FUEL QTY indicator does not indicate fuel cell being defueled, go to paragraph 10-91.
l. When fuel truck flow meter indicates fuel is not flowing, stop defueling. On refueling panel, check FUEL QTY indicator. FWD and AFT FUEL QTY indicators indicate E .	If FWD FUEL QTY indicator does not indicate E with fuel truck unable to defuel forward fuel cell, go to paragraph 10-92. If AFT FUEL QTY indicator does not indicate E with fuel truck unable to defuel forward fuel cell, go to paragraph 10-93.

10-76. PRESSURE REFUELING/DEFUELING – MAINTENANCE OPERATIONAL CHECK (cont) 10-76

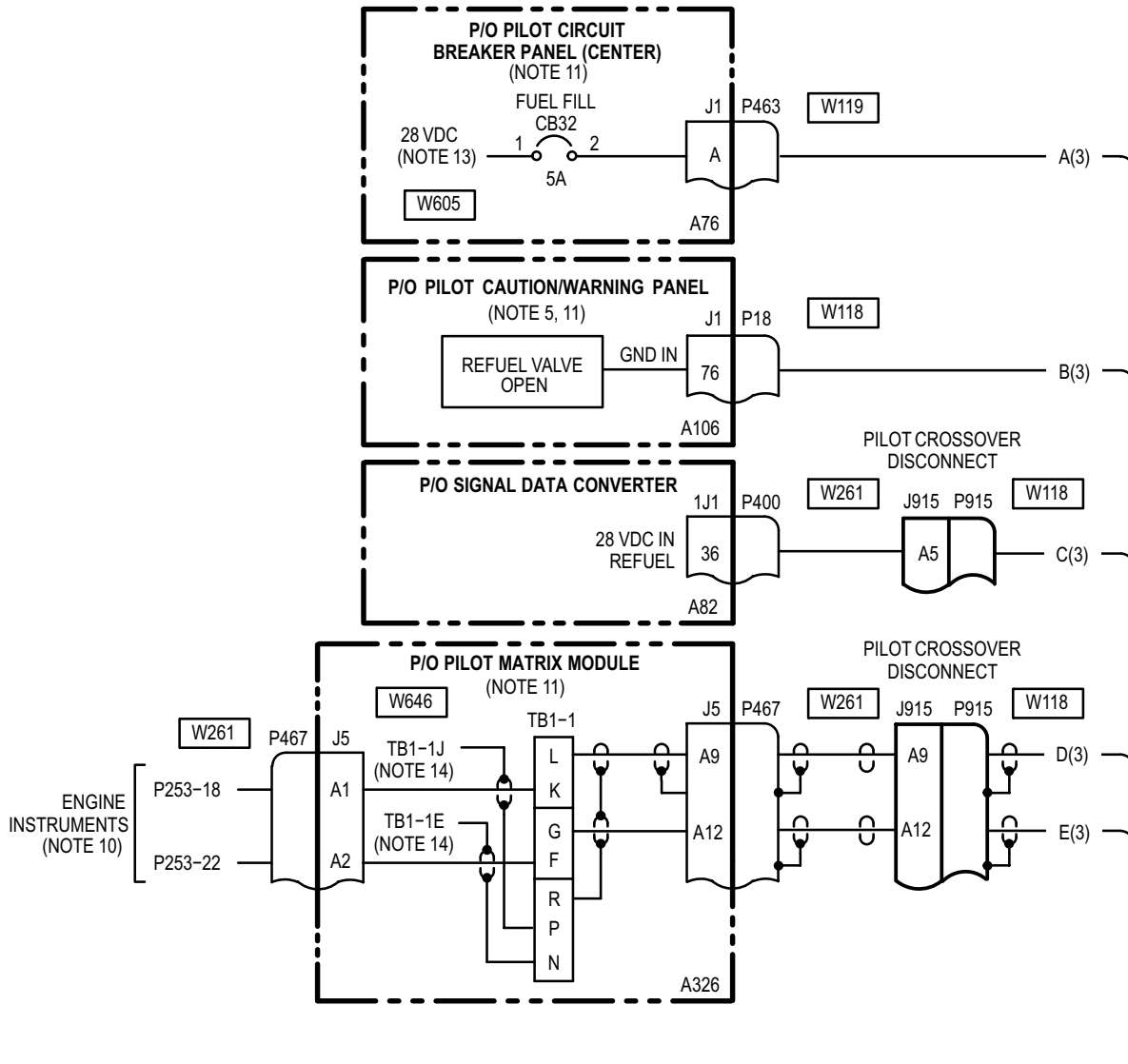
Task	Result
m. Place suitable containers under forward and aft fuel sump drains (fig. 10-83), and drain remaining fuel from fuel sumps (TM 1-1520-238-23).	
n. Repeat steps e. and f.	
o. Perform pressure refueling (TM 1-1520-238-23).	
p. Check forward vent tube for air flow.	If air does not flow through vent tube during pressure refueling, stop refueling immediately, then check vent tube for obstructions/physical damage.
q. During pressure refueling, on refueling panel (fig. 10-79) check FUEL QTY indicator for increase.	If FWD FUEL QTY indicator does not show increase, replace forward fuel cell pilot valve (TM 1-1520-238-23). If AFT FUEL QTY indicator does not show increase, replace aft fuel cell pilot valve (TM 1-1520-238-23).
r. During pressure refueling, check pressure fuel manifold (fig. 10-83), and fuel cells for leakage	If leakage occurs from fuel cells, go to paragraph 10-12. If pressure fuel manifold leaks during refueling, replace pressure fuel manifold (TM 1-1520-238-23).
NOTE	
When fuel cell is full LVL CONT VALVES CLOSED indicator does not light, but fuel stops flowing into that fuel cell. If fuel starts flowing from either fuel cell vent during pressure refueling, replace the fuel level control pilot valve and fuel/defuel shutoff valve in that fuel cell (TM 1-1520-238-23).	
s. When desired fuel has been loaded, set appropriate LVL CONT VALVES switch to CLOSE on refueling panel. The valve CLOSED indicator is lighted, and the FUEL QTY indicator for selected cell stops increasing.	If AFT CLOSED indicator is not lighted with AFT TNK switch set to CLOSE , replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 10-89. If FWD CLOSED indicator is not lighted with FWD TNK set to CLOSE , replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 10-88. If FWD FUEL QTY indication increases with FWD TNK switch set to CLOSE , go to paragraph 10-95.
	If AFT FUEL QTY indication increases with AFT TNK switch set to CLOSE , go to paragraph 10-96.

10-76. PRESSURE REFUELING/DEFUELING – MAINTENANCE OPERATIONAL CHECK (cont)**10-76**

Task	Result
t. When pressure refueling is complete, remove fuel nozzle and secure fuel cell filler cap and pressure fuel manifold cover (R180) (fig. 10-83) (TM 1-1520-238-23).	If cap does not stay on adapter go to paragraph 10-97. If pressure fuel manifold cover (R180) does not stay on manifold go to paragraph 10-98.
u. Set REFUEL VALVE switch to CLOSE . Refuel valve is heard to close and REFUEL VALVE indicator is not lighted.	If REFUEL VALVE indicator is lighted with REFUEL VALVE switched at CLOSE , go to paragraph 10-86.
v. On pilot caution/warning panel (fig. 10-80), check REFUEL VALVE OPEN indicator. Indicator is not lighted.	If REFUEL VALVE OPEN indicator is lighted with REFUEL VALVE switch at CLOSE , go to paragraph 10-86.
w. On pilot ELEC PWR panel (fig. 10-78), set BATT/EXT PWR switch to OFF . On refueling panel (fig. 10-79), set FUEL QTY switch to OFF . AFT and FWD indicators indicate E .	If AFT FUEL QTY indicator does not indicate E with FUEL QTY switch at OFF , go to paragraph 10-84. If FWD FUEL QTY indicator does not indicate E with FUEL QTY switch at OFF , go to paragraph 10-85.

6. Secure R160 door (TM 1-1520-238-23).
7. Remove static ground between helicopter and fuel truck (TM 1-1520-238-23).
8. Remove static ground from fuel truck (TM 1-1520-238-23).
9. Remove fuel truck from vicinity of helicopter.
10. Install ammo storage magazine (TM 9-1090-208-23-1).
11. Check that **BATT/EXT PWR** switch on pilot **ELEC PWR** panel (fig. 10-78) is set to **OFF**.

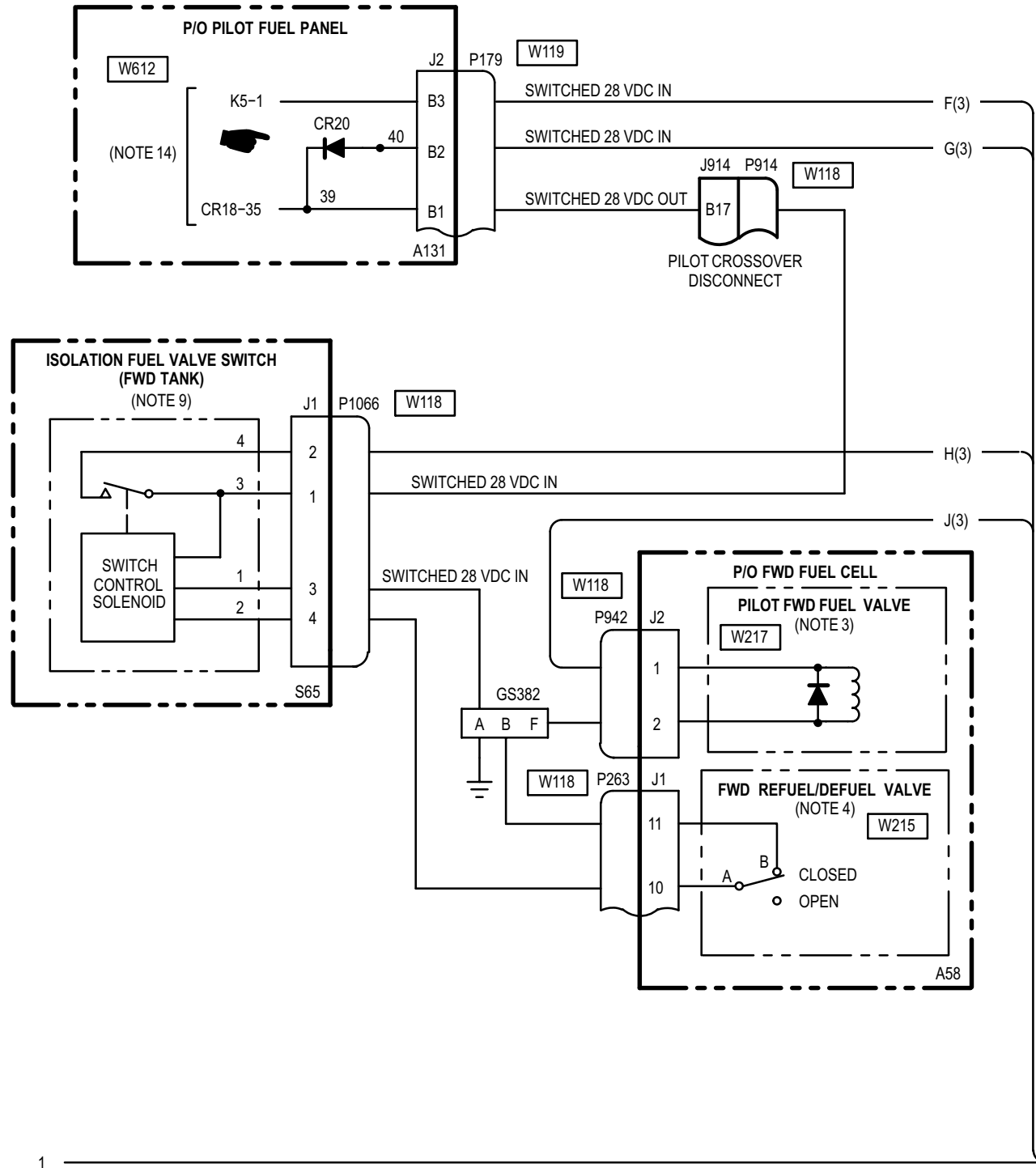
END OF TASK

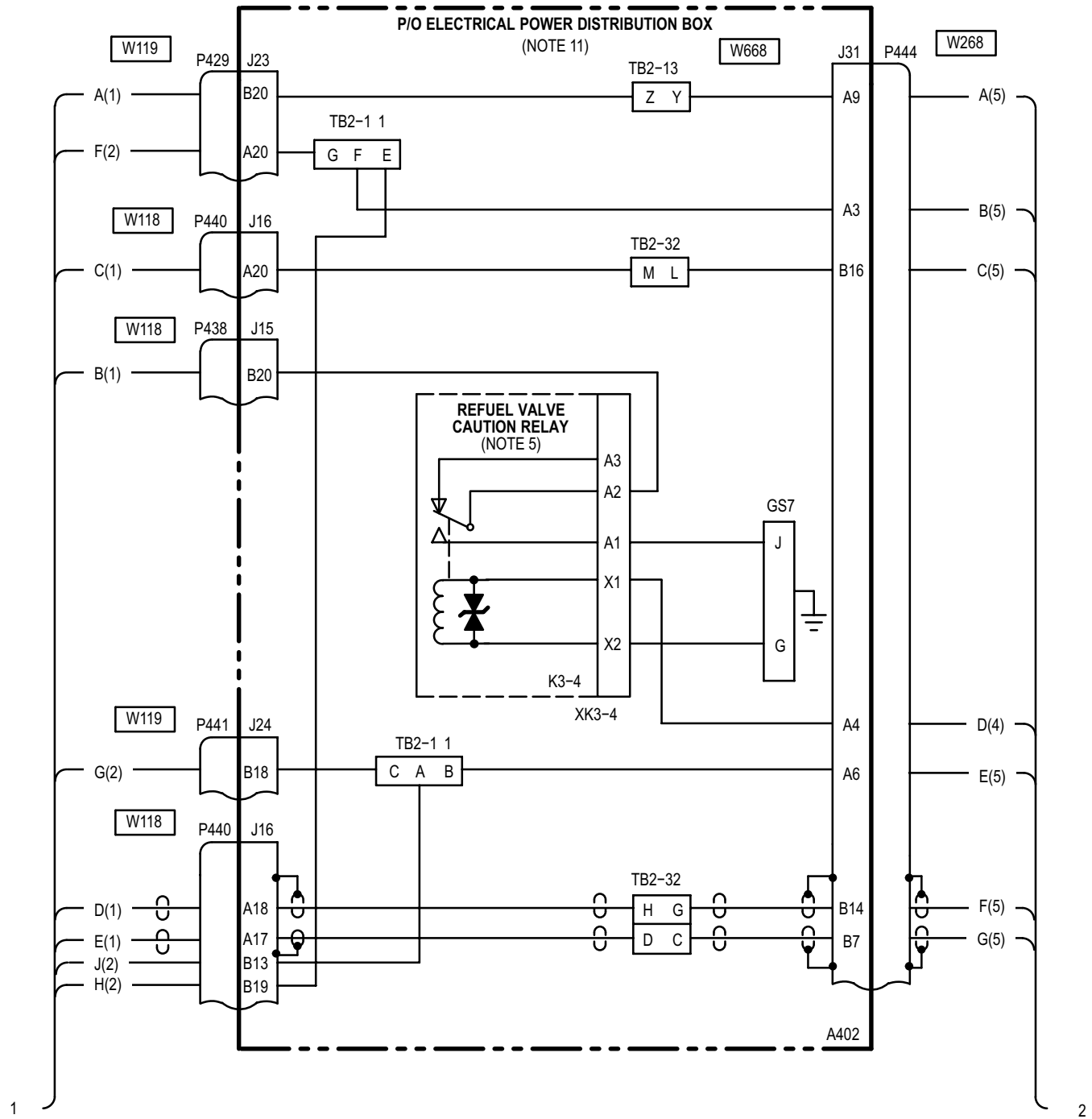


1

10-77. PRESSURE REFUELING/DEFUELING – WIRING INTERCONNECT DIAGRAM (cont)

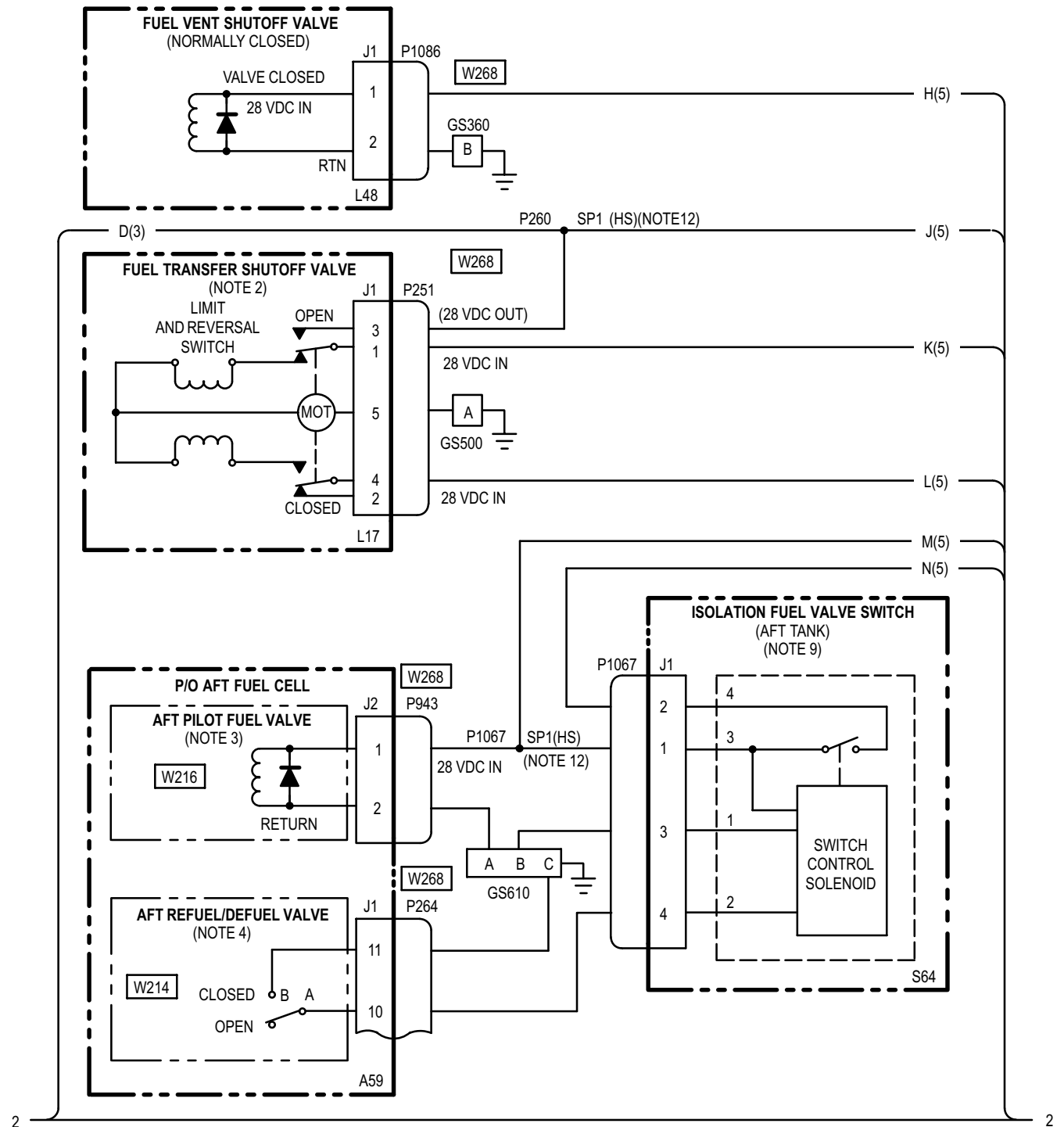
10-77





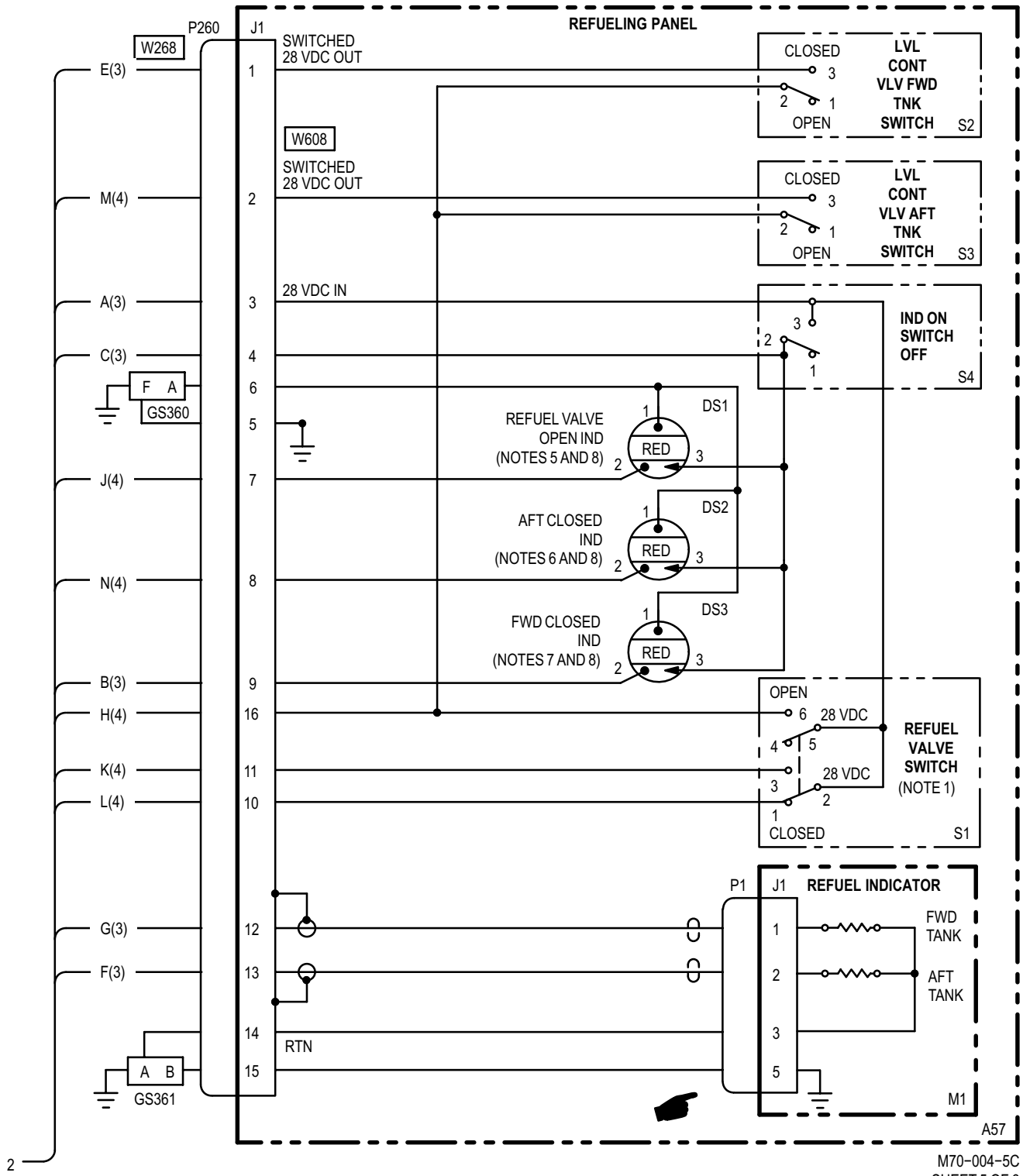
10-77. PRESSURE REFUELING/DEFUELING - WIRING INTERCONNECT DIAGRAM (cont)

10-77



2

2



10-77. PRESSURE REFUELING/DEFUELING – WIRING INTERCONNECT DIAGRAM (cont)

10-77**NOTES:**

HIGHWAY USE: THE ALPHA CHARACTER IDENTIFIES A SPECIFIC LINE, AND THE NUMBER IN PARENTHESIS IDENTIFIES THE SHEET NUMBER WHERE THE SIGNAL TERMINATES.

1. CONTROLS FUEL TRANSFER SHUTOFF VALVE L17.
2. MUST BE CLOSED FOR FUEL TRANSFER (INTERNAL SWITCH SHOWN AT VALVE CLOSED POSITION).
3. CLOSING FLOAT BOWL OUTLET WITH 28 VDC IN TO ALLOW FLOAT AND POPPET TO INCREASE PRESSURE IN PILOT VALVE HOSE. WHEN TANK IS FULL OR WHEN TANK LVL CONT VALVE SWITCH IS AT CLOSE, THE INCREASED PRESSURE CLOSING ASSOCIATED FUEL/DEFUEL VALVE.
4. TANK FILLS THROUGH THIS VALVE WHICH OPENS INTERNAL VALVE SWITCH WHEN FUEL FLOWS. (FUEL/DEFUEL VALVE CONTROLS ISOLATION FUEL VALVE SWITCH.)
5. DS1 AND REFUEL VALVE OPEN INDICATOR LIGHTS WHEN RELAY K3-4 ENERGIZES AT OPEN POSITION OF VALVE L17.
6. LIGHTS AT CLOSING OF AFT FUEL/DEFUEL VALVE BY CLOSING S3 ONLY; WILL NOT LIGHT IF AFT TANK LVL CONT VALVE SWITCH IS IN OPEN POSITION.
7. LIGHTS AT CLOSING OF FWD FUEL/DEFUEL VALVE BY CLOSING S2 ONLY; WILL NOT LIGHT IF FWD TANK LVL CONT VALVE SWITCH IS IN OPEN POSITION.
8. WITH S4 ON, DS1, DS2 AND DS3 LIGHT WHEN PRESSED, THROUGH CONTACT 3 (PRESS TO TEST).
9. GROUND SIGNAL MUST BE PROVIDED THROUGH CONTACT 2 (FROM FUEL/DEFUEL VALVE SWITCH) BEFORE SWITCH CONTROL SOLENOID GROUND CAN BE PROVIDED THROUGH CONTACT 1.
10. INSTRUMENTS (TM 1-1520-238-T-5).
11. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
12. HS DESIGNATES A HARD SPLICE WHICH CANNOT BE DISCONNECTED.
13. AUXILIARY POWER UNIT (TM 1-1520-238-T-8).
14. REFER TO PARAGRAPH 10-49. FUEL QUANTITY INDICATION/TRANSFER – WIRING INTERCONNECT DIAGRAM.

10-78. REFUEL VALVE OPEN INDICATOR ON REFUELING PANEL – IS NOT LIGHTED WITH REFUEL VALVE SWITCH SET TO OPEN

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On refueling panel, with **FUEL QTY** switch at **IND ON** and **REFUEL VALVE** switch at **OPEN**, press **REFUEL VALVE OPEN** indicator.
Does indicator light?
 - YES Go to step 4
 - NO Go to step 2.
2. On pilot center circuit breaker panel, check **FUEL FILL** circuit breaker.
Does circuit breaker stay closed?
 - YES Go to step 3.
 - NO Go to paragraph 10-87.

3. Check for open between: CB32 and (A402)TB2-13-Z, (A402)TB2-13-Y and P260-3.
Does open exist?
 - YES Repair open wire between: CB32 and (A76)J1-A, P463-A and P429-B20, (A402)J23-B20 and (A402)TB2-13-Y, (A402)TB2-13-Y and (A402)J31-A9, P444-A9 and P260-3. Go to paragraph 10-76.
 - NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).
4. Check for open between: P260-11 and P251-1, P251-3 and P444-A4.
Does open exist?
 - YES Repair open wire. Go to paragraph 10-76.
 - NO Go to step 5.
5. With P260 attached to (A57)J1. Check for 28 VDC at P251-1.
Is voltage present?
 - YES Go to step 6.
 - NO Replace refueling panel (TM 1-1520-238-23).
6. Check for 28 VDC at P444-A4.
Is voltage present?
 - YES Go to step 7.
 - NO Replace fuel transfer shutoff valve (TM 1-1520-238-23).

**10-78. REFUEL VALVE OPEN INDICATOR ON REFUELING PANEL – IS NOT LIGHTED
WITH REFUEL VALVE SWITCH SET TO OPEN (cont)**

10-78

7. Check for open between:

P251-3 and P260-7,

P260-5 and ground,

P260-6 and ground.

Does open exist?

YES Repair open wire.
 Go to paragraph 10-76.

NO Replace refueling panel
 (TM 1-1520-238-23).

END OF TASK

10-79. REFUEL VALVE OPEN INDICATOR ON PILOT CAUTION/WARNING PANEL – IS NOT LIGHTED WITH REFUEL VALVE SWITCH SET TO OPEN

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

2. Check for open between:
P18-76 and (A402)K3-4-A2,
(A402)K3-4-X1 and (A402)J31-A4,
(A402)K3-4-X2 and ground,
P444-A4 and P260-7,
P251-3 and P260-7.

Does open exist?

YES	Repair open wire. Go to paragraph 10-76.
NO	Go to step 3.

3. Check resistance between (A402):
K3-4-X1 and K3-4-X2.

Is resistance 316 ±10 ohms?

YES	Replace refueling panel (TM 1-1520-238-23).
NO	Replace relay (A402)K3-4 (TM 1-1520-238-23).

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot master caution/warning panel, press **PRESS TO TEST** indicator.
Is REFUEL VALVE OPEN indicator lighted?

YES	Go to step 2.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot pilot master caution/warning system.

END OF TASK

10-80. AFT FUEL QTY INDICATOR – DOES NOT INDICATE AFT FUEL LOAD WITH FUEL QUANTITY SWITCH SET TO IND ON

10-80

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer
One person to assist

References:

- TM 1-1520-238-T-4
- TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- On refueling panel press each **PRESS TO TEST** indicator.

Do indicators light when pressed?

- YES Go to step 2.
- NO Go to paragraph 10-78 to troubleshoot **REFUEL VALVE OPEN** indicator.

- Check for 28 VDC at (A402)J16-A20.

Is voltage present?

- YES Go to step 3.
- NO Go to step 6.

- Check for open between (A402)J31-B16 and P915-A5.

Does open exist?

- YES Repair open wire between: (A402)J31-B16 and (A402)TB2-32-L, (A402)TB-32-M and (A402)J16-A20, P440-A20 and P915-A5. Go to paragraph 10-76.
- NO Go to step 4.

- Check for 5 VDC at P260-13 while assistant presses bit **TEST** button on FSC.

Is voltage present?

- YES Go to step 5.
- NO Go to paragraph 10-48 to perform fuel quantity system capacitance and indicating test.

- Check for open between P260-14 and P260-15.

Does open exist?

- YES Replace refueling panel (TM 1-1520-238-23).
- NO Repair open wire between: P260-14 and GS361-A, P260-15 and GS361-B. Go to paragraph 10-76.

- Check for open between (A402)J16-A20 and P260-4.

Does open exist?

- YES Repair open wire between P260-4 and P444-B16. Go to paragraph 10-76.
- NO Replace refueling panel (TM 1-1520-238-23).

END OF TASK

10-81. FWD FUEL QTY INDICATOR – DOES NOT INDICATE FWD FUEL LOAD WITH FUEL QUANTITY SWITCH SET TO IND ON

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- On refueling panel, press each **PRESS TO TEST** indicator.
Do indicators light when pressed?
 - YES Go to step 2.
 - NO Go to paragraph 10-78 to troubleshoot **REFUEL VALVE OPEN** indicator.
- Check for 28 VDC at P444-B16.
Is voltage present?
 - YES Go to step 3.
 - NO Go to step 4.

- Check for open between (A402)J31-B16 and P915-A5.

Does open exist?

- YES Repair open wire between: (A402)J31-B16 and (A402)TB2-32-L, (A402)TB2-32-M and (A402)J16-A20, P440-A20 and P915-A5. Go to paragraph 10-76.
- NO Go to step 5.

- Check for open between P444-B16 and P260-4.

Does open exist?

- YES Repair open wire. Go to paragraph 10-76.
- NO Replace refueling panel (TM 1-1520-238-23).

- Check for 5 VDC at P260-12 while assistant presses bit **TEST** button on FSC.

Is voltage present?

- YES Go to step 6.
- NO Go to paragraph 10-47 to troubleshoot fuel quantity indication/transfer system.

- Check for open wire between P260-14 and P260-15.

Does open exist?

- YES Repair open wire between: P260-14 and GS361-A, P260-15 and GS361-B. Go to paragraph 10-76.
- NO Replace refueling panel (TM 1-1520-238-23).

END OF TASK

**10-82. AFT FUEL QTY INDICATOR – DOES NOT INDICATE APPROXIMATELY THE SAME
FUEL LOAD AS PILOT FUEL QUANTITY INDICATOR AFT VERTICAL DISPLAY**

10-82

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

**Turn off power before detaching or
attaching wires and connectors. High
current 28 VDC or 115 VAC is present.
Failure to do so could result in death or
serious injury.**

Have assistant press bit **TEST** button on FSC,
check for 5 VDC at P260-13.

Is voltage present?

YES	Replace refueling panel (TM 1-1520-238-23).
NO	Go to paragraph 10-47 to troubleshoot fuel quantity indication/transfer system.

END OF TASK

**10-83. FWD FUEL QTY INDICATOR – DOES NOT INDICATE APPROXIMATELY THE SAME
FUEL LOAD AS PILOT FUEL QUANTITY INDICATOR FWD VERTICAL DISPLAY**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

Have assistant press bit **TEST** button on FSC, check for 5 VDC at P260-12.

Is voltage present?

YES	Go to paragraph 10-47 to troubleshoot fuel quantity indication/transfer system.
NO	Replace refueling panel (TM 1-1520-238-23).

END OF TASK

10-84. AFT FUEL QTY INDICATOR – DOES NOT INDICATE E WITH FUEL QTY SWITCH SET TO OFF

10-84

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

Check for 0–5 VDC at P260–13.

Is voltage present?

YES	Go to paragraph 10-47 to troubleshoot fuel quantity indication/transfer system.
NO	Replace refueling panel (TM 1-1520-238-23).

END OF TASK

10-85. FWD FUEL QTY INDICATOR – DOES NOT INDICATE E WITH FUEL QUANTITY SWITCH SET TO OFF

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
 One person to assist

References:

TM 1-1520-238-T-4
 TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

Check for 0–5 VDC at P260–12.

Is voltage present?

- YES Go to paragraph 10–47 to troubleshoot fuel quantity indication/transfer system.

- NO Replace refueling panel (TM 1-1520-238-23).

END OF TASK

10-86. REFUEL VALVE OPEN INDICATOR – IS LIGHTED WITH REFUEL VALVE SWITCH SET TO CLOSE

10-86

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On refueling panel, set **FUEL QTY IND** switch to **OFF**.

Is refuel valve indicator lighted?

YES	Replace refueling panel (TM 1-1520-238-23).
NO	Go to step 2.

2. Check for 28 VDC at P251-1.

Is voltage present?

YES	Replace refueling panel (TM 1-1520-238-23).
NO	Go to step 3.

3. Check for open between (L17): J1-4 and J1-3.

Does open exist?

YES	Replace refueling panel (TM 1-1520-238-23).
NO	Replace fuel transfer shutoff valve (TM 1-1520-238-23).

END OF TASK

10-87. FUEL FILL CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH LVL CONT VALVES SWITCHES SET TO OPEN

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On refueling panel, set **REFUEL VALVE** switch on refueling panel to **OPEN**. Attach positive meter lead to P463–A and check for short to ground.
Does short exist?

YES	Go to step 2.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus –pilot station).

2. Detach P260. Check for short between P463–A and ground.
Does short exist?

YES	Go to step 3.
NO	Go to step 4.

3. Detach P429 and P444. Check for short between:
P463–A and ground,
P260–3 and ground.
Does short exist?

YES	Repair shorted wire between: P463–A and P429–B20, P260–3 and P444–A9.
NO	Repair shorted wire between (A402): J23–B20 and TB2–13–Z, J31–A9 and TB2–13–Y. Go to paragraph 10–76.

4. Check for short between (A57):
J1–3 and chassis ground,
J1–4 and chassis ground,
J1–7 and chassis ground,
J1–10 and chassis ground,
J1–11 and chassis ground,
J1–16 and chassis ground.
Does short exist?

YES	Replace refuel panel (TM 1-1520-238-23).
NO	Go to step 5.

5. Check for short between P260–7 and ground.
Does short exist?

YES	Go to step 6.
NO	Go to step 9.

6. Detach P251. Check for short between P260–7 and ground.
Does short exist?

YES	Replace fuel transfer shutoff valve (TM 1-1520-238-23).
NO	Go to step 7.

7. Detach P444. Check for short between P260–7 and ground.
Does short exist?

YES	Repair shorted wire between: P260–7 and P251–3, P260–7 and P444–A4. Go to paragraph 10–76.
NO	Go to step 8.

10-87. FUEL FILL CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH LVL CONT VALVES SWITCHES SET TO OPEN (cont)

10-87

8. Remove relay (A402)XK3-4 (TM 1-1520-238-23). Check for short between (A402)J31-A4 and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire between (A402):
J31-A4 and K3-4-X1.
Go to paragraph 10-76. |
| NO | Replace relay (A402)XK3-4 (TM 1-1520-238-23). |
9. Check for short between P260-11 and ground.
Does short exist?
- | | |
|-----|----------------|
| YES | Go to step 10. |
| NO | Go to step 11. |
10. Detach P251. Check for short between P260-11 and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between P260-11 and P251-1.
Go to paragraph 10-76. |
| NO | Replace fuel transfer shutoff valve (TM 1-1520-238-23). |
11. Check for short between P260-10 and ground.
Does short exist?
- | | |
|-----|----------------|
| YES | Go to step 12. |
| NO | Go to step 13. |
12. Detach P251. Check for short between P260-10 and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between P260-10 and P251-4.
Go to paragraph 10-76. |
| NO | Replace fuel transfer shutoff valve (TM 1-1520-238-23). |
13. Check for short between P260-4 and ground.
Does short exist?
- | | |
|-----|----------------|
| YES | Go to step 14. |
| NO | Go to step 16. |
14. Detach P400. Check for short between P260-4 and ground.
Does short exist?
- | | |
|-----|---------------------------------|
| YES | Go to step 15. |
| NO | Replace SDC (TM 1-1520-238-23). |
15. Detach P440 and P444. Check for short between:
P260-4 and ground,
P400-36 and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between:
P260-4 and P444-B16,
P400-36 and P440-A20.
Go to paragraph 10-76. |
| NO | Repair shorted wire between (A402):
J16-A20 and TB2-32-M,
J31-B16 and TB2-32-L.
Go to paragraph 10-76. |
16. Attach positive meter lead to (L48)J1-1 and check for short to ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire between P260-16 and P1068-1.
Go to paragraph 10-76. |
| NO | Replace fuel vent shutoff valve (TM 1-1520-238-23). |

END OF TASK

**10-88. FWD CLOSED INDICATOR – IS NOT LIGHTED WITH LVL CONT VALVES FWD
TNK SWITCH SET TO CLOSE**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On refueling panel, set **FUEL QTY** switch to **IND ON** and press **FWD CLOSED** indicator.
Is indicator lighted?
 - YES Go to step 2.
 - NO Go to step 8.
2. Apply 28 VDC at P260-1, check for 28 VDC at P260-9.
Is voltage present?
 - YES Replace refueling panel (TM 1-1520-238-23).
 - NO Go to step 3.

3. Check for open between (A58): J1-10 and J1-11.
Does open exist?
 - YES Go to step 4.
 - NO Go to step 5.
4. Check for open between (A58): J2-1 and J2-2.
Does open exist?
 - YES Replace forward fuel cell fuel level control pilot valve (TM 1-1520-238-23).
 - NO Replace forward fuel cell fuel/defuel check valve (TM 1-1520-238-23).
5. Apply 28 VDC at P260-1 and check for 28 VDC at P1066-1.
Is voltage present?
 - YES Go to step 6.
 - NO Go to step 7.
6. Check for open between: P1066-3 and ground, P1066-4 and P263-10, P263-11 and ground, P1066-2 and P440-B19, (A402)J16-B19 and (A402)TB2-11-E, (A402)TB2-11-F and (A402)J31-A3, P444-3 and P260-9.
Does open exist?
 - YES Repair open wire. Go to paragraph 10-76.
 - NO Replace forward fuel cell isolation fuel valve switch (TM 1-1520-238-23).

**10-88. FWD CLOSED INDICATOR – IS NOT LIGHTED WITH LVL CONT VALVES FWD
TNK SWITCH SET TO CLOSE (cont)**

10-88

7. Check for open between:

P260-1 and (A402)TB2-11-B,
(A402)TB2-11-C and P179-B2,
P179-B1 and P1066-1.

Does open exist?

YES Repair open wire between:
 P260-1 and P444-A6,
 (A402)J31-A6 and
 (A402)TB2-11-B,
 (A402)TB2-11-C and
 (A402)J24-B18,
 P441-B18 and P179-B2,
 P179-B1 and J914-B17,
 P914-B17 and P1066-1.
 Go to paragraph 10-76.

NO Replace pilot **FUEL** panel.
 (TM 1-1520-238-23).

8. Check for 28 VDC at P260-3.

Is voltage present?

YES Replace refueling panel.
 (TM 1-1520-238-23).

NO Go to paragraph 10-78 to
 troubleshoot **REFUEL VALVE**
 OPEN indicator.

END OF TASK

**10-89. AFT CLOSED INDICATOR – IS NOT LIGHTED WITH LVL CONT VALVES AFT
TNK SWITCH SET TO CLOSE**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- On refueling panel, set **FUEL QTY** switch to **IND ON** and press **AFT CLOSED** indicator.
Is indicator lighted?

YES Go to step 7.
NO Go to step 2.

- Apply 28 VDC at P260-2 and check for 28 VDC at P260-8.
Is voltage present?

YES Replace refueling panel (TM 1-1520-238-23).
NO Go to step 3.

- Check for open between (A59): J1-10 and J1-11.

Does open exist?

YES Go to step 4.
NO Go to step 5.

- Check for open between (A59): J2-1 and J2-2.

Does open exist?

YES Replace aft fuel cell fuel level control pilot valve (TM 1-1520-238-23).
NO Replace aft fuel cell fuel/defuel check valve (TM 1-1520-238-23).

- Check for open between: P260-2 and P1067-1, P260-8 and P1067-2.

Does open exist?

YES Repair open wire. Go to paragraph 10-76.
NO Go to step 6.

- Check for open between: P1067-3 and ground, P1067-4 and P264-10, P264-11 and ground.

Does open exist?

YES Repair open wire between: P1067-3 and GS610-B, P1067-4 and P264-10, P264-11 and GS610-C. Go to paragraph 10-76.
NO Replace aft fuel cell isolation switch (TM 1-1520-238-23).

- Check for 28 VDC at P260-3.
Is voltage present?

YES Replace refueling panel (TM 1-1520-238-23).
NO Go to paragraph 10-78.

END OF TASK

10-90. FUEL NOZZLE – DOES NOT LOCK ONTO PRESSURE REFUELING ADAPTER

10-90

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Truck, Tank, Fuel Servicing, 2500 gal	M978
Faceshield (2)	L-F-36

2. Obtain replacement SPA/CCA nozzle.
Does replacement SPA/CCA nozzle lock onto adapter?
- | | |
|-----|--|
| YES | Go to step k. of paragraph 10-76. |
| NO | Replace pressure fuel manifold (TM 1-1520-238-23). |

Personnel Required:

- 67R Attack Helicopter Repairer
- 77F Petroleum Supply Specialist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Helicopter static ground installed Access provision – R160 door open, R180 cover removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

NOTE

This procedure may be applied to either the SPA or CCA, as required.

1. Visually check SPA/CCA for physical damage/deformation.
Is adapter damaged?

YES	Replace fuel manifold (TM 1-1520-238-23).
NO	Go to step 2.

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Truck, Tank, Fuel Servicing, 2500 gal	M978
Faceshield (2)	L-F-36

Personnel Required:

67R Attack Helicopter Repairer
77F Petroleum Supply Specialist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- On pilot instrument panel, check **FUEL** quantity indicator.
Does FUEL QTY on refueling panel indicate same fuel load as pilot FUEL quantity indicator?

YES	Go to step 2.
NO	If FWD FUEL QTY indicator does not indicate same fuel load as FWD vertical display, go to paragraph 10-81. If AFT FUEL QTY indicator does not indicate same as AFT vertical display, go to paragraph 10-82.
- Check pressure fuel manifold for leakage.
Does leakage exist?

YES	Replace pressure fuel manifold (TM 1-1520-238-23).
NO	Replace fuel/defuel valve(s) (TM 1-1520-238-23).

END OF TASK

**10-92. FWD FUEL QTY INDICATOR – DOES NOT INDICATE E WITH FUEL TRUCK
UNABLE TO DEFUEL FORWARD FUEL CELL**

10-92

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

On pilot instrument panel, check **FUEL** quantity indicator **FWD** vertical display.

Does FWD vertical display indicate empty fuel cell?

YES	Replace refueling panel (TM 1-1520-238-23).
NO	Replace forward fuel/defuel check valve (TM 1-1520-238-23).

END OF TASK

**10-93. AFT FUEL QTY INDICATOR – DOES NOT INDICATE E WITH FUEL TRUCK
UNABLE TO DEFUEL AFT FUEL CELL**

10-93

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

On pilot instrument panel, check **FUEL** quantity indicator **AFT** vertical display.

Does AFT display indicate empty fuel cell?

YES	Replace refueling panel (TM 1-1520-238-23).
NO	Replace aft fuel/defuel check valve (TM 1-1520-238-23).

END OF TASK

10-94. FUEL FILL CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH LVL CONT VALVES SWITCHES SET TO CLOSE

10-94

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Check for short between (A57):
 J1-1 and chassis ground,
 J1-2 and chassis ground,
 J1-3 and chassis ground,
 J1-4 and chassis ground,
 J1-7 and chassis ground,
 J1-8 and chassis ground,
 J1-9 and chassis ground,
 J1-10 and chassis ground,
 J1-11 and chassis ground,
 J1-16 and chassis ground.
Does short exist?
 YES Replace refueling panel (TM 1-1520-238-23).
 NO Go to step 2.
- Attach positive meter lead to (A131):
 J2-B2 and J2-B3, check for short to chassis ground.
Does short exist?
 YES Replace pilot **FUEL** panel (TM 1-1520-238-23).
 NO Go to step 3.

- Detach P260. Attach positive meter lead to P179-B1, P179-B2 and P179-B3 and check for short to ground.
Does short exist?
 YES Go to step 9.
 NO Go to step 4.
- Check for short between P260-8 and ground.
Does short exist?
 YES Go to step 8.
 NO Go to step 5.
- Attach positive meter lead to P260-2 and check for short to ground.
Does short exist?
 YES Go to step 6.
 NO Go to paragraph 10-87 to troubleshoot **FUEL FILL** circuit breaker (CB32).
- Detach P1067. Attach positive meter lead to P260-2 and check for short to ground.
Does short exist?
 YES Go to step 7.
 NO Replace aft fuel cell isolation switch (TM 1-1520-238-23).
- Detach P943. Check for short between P260-2 and ground.
Does short exist?
 YES Repair shorted wire between: P260-2 and P943-1, P943-1 and P1067-1. Go to paragraph 10-76.
 NO Replace aft fuel cell fuel level control pilot valve (TM 1-1520-238-23).
- Detach P1067. Check for short between P260-8 and ground.
Does short exist?
 YES Repair shorted wire between P260-8 and P1067-2. Go to paragraph 10-76.
 NO Replace aft fuel isolation switch (TM 1-1520-238-23).

10-94. FUEL FILL CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH LVL CONT VALVES SWITCHES SET TO CLOSE (cont)

10-94

9. Check for short between P179-B1 and ground.
Does short exist?
- YES Go to step 10.
- NO Go to step 11.
10. Detach P1066. Check for short between P179-B1 and ground.
Does short exist?
- YES Repair shorted wire between: P179-B1 and J914-B17, P914-B17 and P1066-1. Go to paragraph 10-76.
- NO Replace forward fuel isolation switch (TM 1-1520-238-23).
11. Detach P179. Attach positive meter lead to P260-1 and check for short to ground.
Does short exist?
- YES Go to step 12.
- NO Go to step 15.
12. Detach P440. Check for short between P260-1 and ground.
Does short exist?
- YES Go to step 13.
- NO Go to step 14.
13. Detach P441 and P444. Check for short between: P179-B2 and ground, P260-1 and ground.
Does short exist?
- YES Repair shorted wire between: P179-B2 and P441-B18, P260-1 and P444-A6. Go to paragraph 10-76.
- NO Repair shorted wire between (A402): J24-B18 and TB2-11-C, J31-A6 and TB2-11-B, J16-B13 and TB2-11-A. Go to paragraph 10-76.
14. Detach P942. Check for short between P440-B13 and ground.
Does short exist?
- YES Repair shorted wire between P942-1 and P440-B13. Go to paragraph 10-76.
- NO Replace forward fuel cell fuel level control pilot valve (TM 1-1520-238-23).
15. Detach P440. Check for short between P260-9 and ground.
Does short exist?
- YES Go to step 17.
- NO Go to step 16.
16. Detach P1066 and check for short between P440-B19 and ground.
Does short exist?
- YES Repair shorted wire between P440-B19 and P1066-2. Go to paragraph 10-76.
- NO Replace forward fuel isolation switch (TM 1-1520-238-23).
17. Detach P429, P444 and P440. Check for short between: P179-B3 and ground, P260-9 and ground.
Does short exist?
- YES Repair shorted wire between: P179-B3 and P429-A20, P260-9 and P444-A3. Go to paragraph 10-76.
- NO Repair shorted wire between (A402): J23-A20 and TB2-11-G, J31-A3 and TB2-11-F, J16-B19 and TB2-11-E. Go to paragraph 10-76.

END OF TASK

10-95. FWD FUEL QTY INDICATOR – INCREASES WITH FWD TNK SWITCH SET TO CLOSE

10-95

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Helicopter battery connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

On refueling panel, check **FWD CLOSED** indicator.

Is indicator lighted?

- | | |
|-----|--|
| YES | Replace forward fuel cell fuel level control pilot valve and fuel/defuel shutoff valve (TM 1-1520-238-23). |
| NO | Go to paragraph 10-88 to troubleshoot FWD CLOSED indicator. |

END OF TASK

10-96. AFT FUEL QTY INDICATOR – INCREASES WITH AFT TNK SWITCH SET TO CLOSE

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Helicopter battery connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

On refueling panel, check **AFT CLOSED** indicator.

Is indicator lighted?

- | | |
|-----|--|
| YES | Replace aft fuel cell fuel level control pilot valve and fuel/defuel shutoff valve (TM 1-1520-238-23). |
| NO | Go to paragraph 10-89 to troubleshoot AFT CLOSED indicator. |

END OF TASK

10-97. PRESSURE FUEL ADAPTER CAP – DOES NOT STAY ON

10-97

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

NOTE

If SPA preformed packing is not cut or is missing, replace preformed packing ring only.

Check adapter for deformation/damage.

Is adapter damaged?

YES	Replace pressure fuel manifold (TM 1-1520-238-23).
NO	Replace cap (see NOTE) (TM 1-1520-238-23).

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Personnel Required:

67R Attack Helicopter Repairer

References:TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check pressure fuel manifold for damage.

Is pressure fuel manifold damaged?

YES	Replace pressure fuel manifold (TM 1-1520-238-23).
NO	Go to step 2.

2. Check pressure fuel manifold cover for damaged/missing latch(es).

Are latch(es) intact?

YES	Replace pressure fuel manifold cover (TM 1-1520-238-23).
NO	Replace pressure fuel manifold cover latch(es). (TM 1-1520-238-23).

END OF TASK

10-99. FUEL SYSTEM AIR PRESSURE – IS NOT HEARD VENTING OVERBOARD

10-99

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provision – R160 door open
TM 1-1520-238-T-4	Maintenance headset connected

3. Check for open between P1086-2 and GS360-B.

Does open exist?

YES Repair open wire.
Go to paragraph 10-76.

NO Replace fuel vent shutoff valve (TM 1-1520-238-23).

4. Check for open between P1086-1 and P260-16.

Does open exist?

YES Repair open wire.
Go to paragraph 10-76.

NO Replace refueling panel (TM 1-1520-238-23).



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On refueling panel, with **REFUEL VALVE** switch set to **OPEN**, check **REFUEL VALVE OPEN** indicator.

Is indicator lighted?

YES Go to step 2.

NO Go to paragraph 10-78.

2. Check for 28 VDC at P1086-1.

Is voltage present?

YES Go to step 3.

NO Go to step 4.

END OF TASK

10-100. AUXILIARY FUEL SYSTEM – MAINTENANCE OPERATIONAL CHECK

10-100

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Equipment Conditions: (cont)

<u>Ref</u>	<u>Condition</u>
	Two or four external tanks installed on wing pylons Each external fuel tank serviced to 98 lbs. (15 gal) only Access provisions – LW7, RW7, LW9, RW9 covers removed, L325, T250L, T290L, T290R doors open If four external fuel tanks installed, also remove LW8 and RW8 covers
TM 9-1090-208-23-1	Ammo storage magazine removed
Paragraph 10-10	FUEL SYSTEM – POWER UP completed
Paragraph 10-12	FUEL SYSTEM – VISUAL CHECK completed
TM 1-1520-238-T-4	Maintenance headset connected

Personnel Required:

67R Attack Helicopter Repairer
One person to assist

References:

- TM 1-1520-238-T-4
- TM 1-1520-238-T-5
- TM 1-1520-238-T-6
- TM 9-1090-208-23-1
- TM 1-1520-238-23

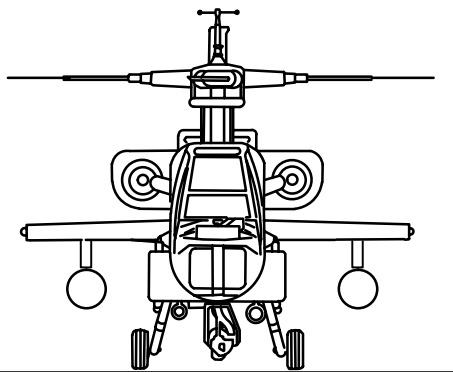
Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Forward fuel cell serviced to less than 800 lbs (123 gal) Aft fuel cell serviced to less than 1200 lbs. (185 gal)

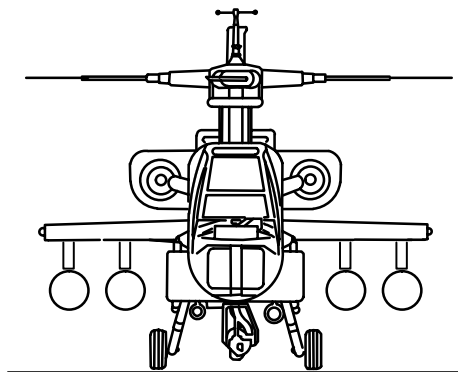
NOTE

The auxiliary fuel system may be installed as four-tank (all pylons) or two-tank (inboard pylons only) configuration (fig 10-84). The following maintenance operational check applies to either configuration.

TWO AUXILIARY TANK SYSTEM



FOUR AUXILIARY TANK SYSTEM

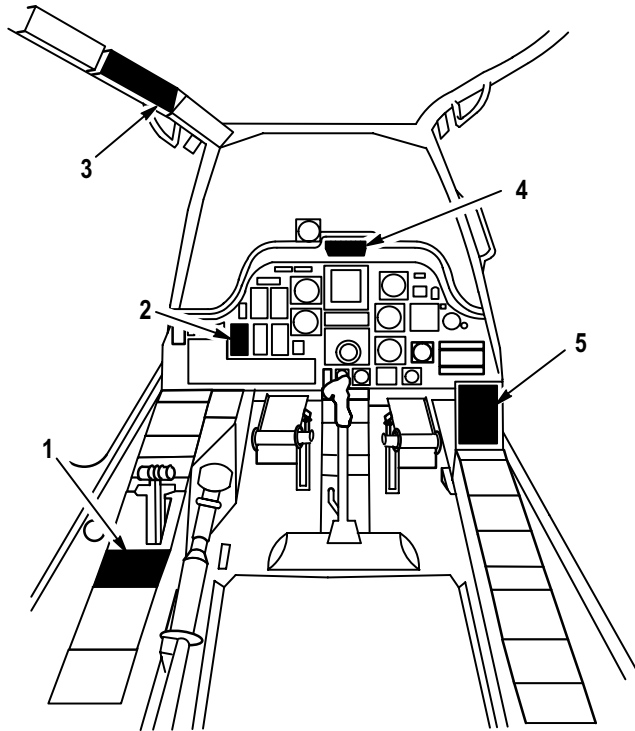


M70-099

Figure 10-84. Auxiliary Fuel Tank Configuration (2 and 4 Tanks)

NOTE

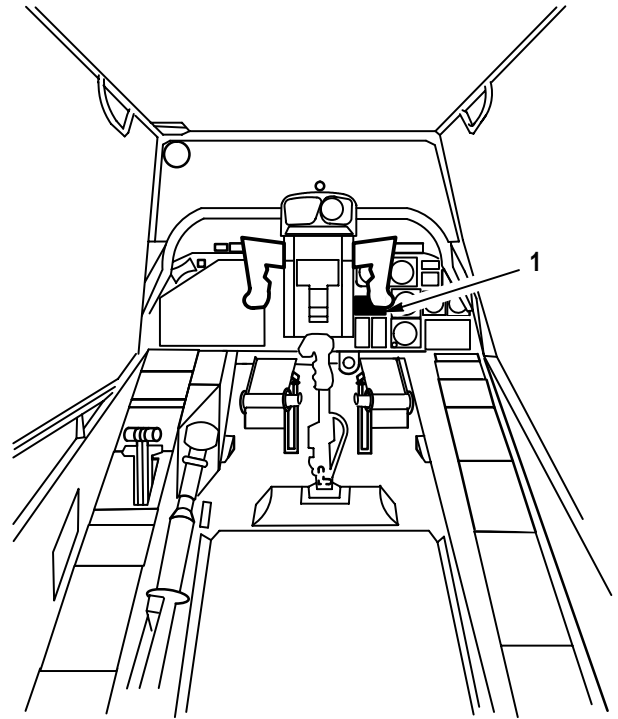
- Refer to pilot station (fig. 10-85) and CPG station (fig. 10-86) for cockpit configuration and equipment.
- If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.



1. PILOT FUEL PANEL
2. PILOT FUEL QUANTITY INDICATOR
3. PILOT CIRCUIT BREAKER PANEL (CENTER)
4. PILOT MASTER CAUTION / WARNING PANEL
5. PILOT CAUTION / WARNING PANEL

M70-100A

Figure 10-85. Pilot Station



1. CPG SELECTABLE DIGITAL DISPLAY

M70-101

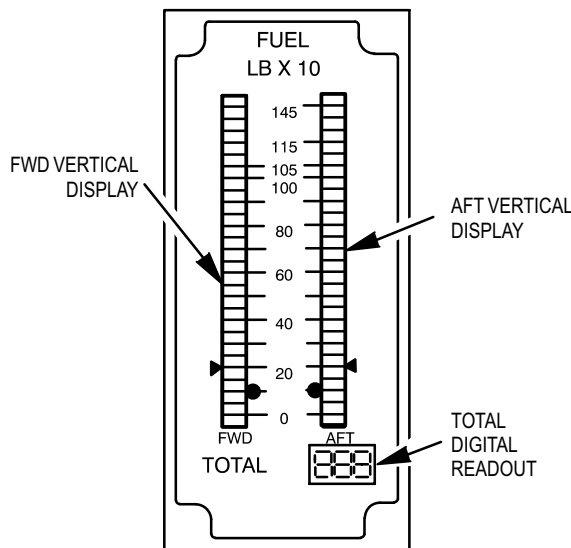
Figure 10-86. CPG Station

WARNING

- **Make sure helicopter safety procedures are accomplished. Observe all safety precaution during troubleshooting or maintenance procedures. Failure to do so could result in death or serious injury.**
- **Jet engine fuel is explosive, flammable, and toxic to skin, eyes, and respiratory tract. Work in a well-ventilated area away from open flames. Wear protective clothing. If fuel comes in contact with eyes or skin, flush with water and get medical aid.**
- **Do not allow sparks or flame near helicopter when servicing or performing maintenance on fuel system.**
- **Make sure helicopter is grounded.**

1. With one person in pilot station and assistant positioned to check edge-lights in CPG station, complete the maintenance operational check as follows:

Task	Result
a. On pilot instrument panel, check that FUEL quantity indicator (fig. 10-87) edge-lights are lighted.	If pilot FUEL quantity indicator edge-lights are not lighted, refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.



M70-102

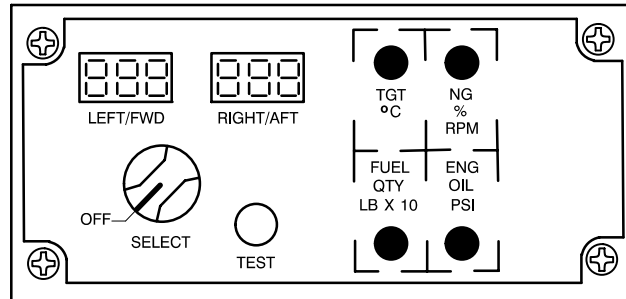
Figure 10-87. Pilot FUEL Quantity Indicator

10-100. AUXILIARY FUEL SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

10-100

Task	Result
------	--------

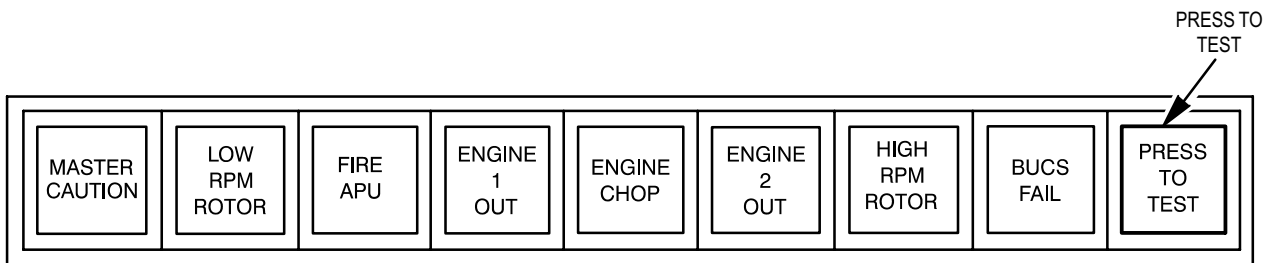
- | | |
|--|---|
| <p>b. On CPG instrument panel, check that selectable digital display (fig. 10-88) edge-lights are lighted.</p> | <p>If CPG selectable digital display edge-light are not lighted, refer to TM 1-1520-238-T-5 to troubleshoot engine instruments.</p> |
|--|---|



M70-103

Figure 10-88. CPG Selectable Digital Display

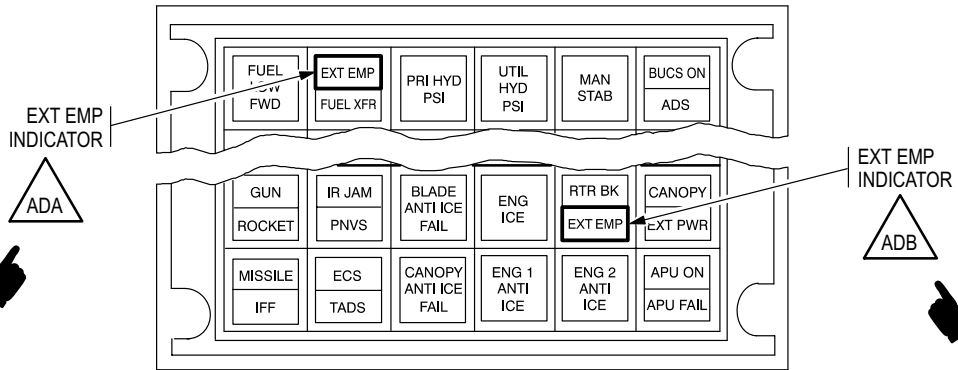
- | | |
|--|--|
| <p>c. On pilot master caution panel (fig. 10-89), press PRESS TO TEST indicator. On pilot caution/warning panel (fig. 10-90) EXT EMP indicator is lighted.</p> | <p>If EXT EMP indicator is not lighted, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.</p> |
|--|--|



M70-104

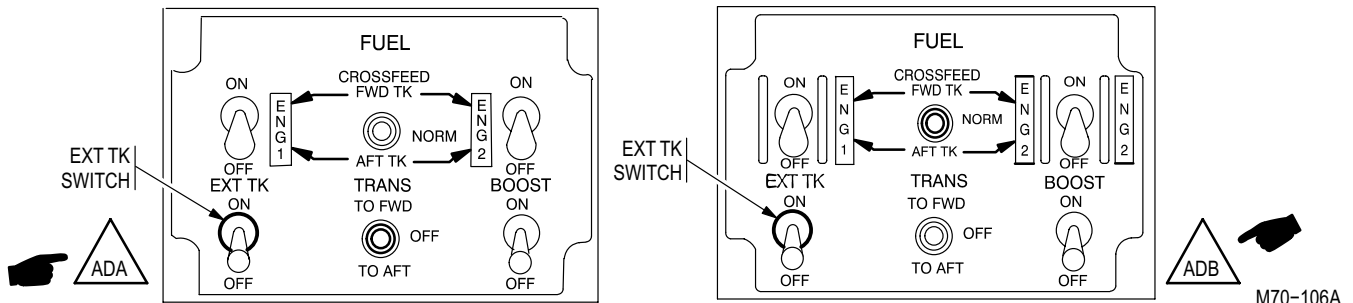
Figure 10-89. Master Caution/Warning Panel

- | | |
|--|---|
| <p>d. On pilot caution/warning panel (fig. 10-90), check that EXP EMP indicator is not lighted.</p> | <p>If EXT EMP indicator is lighted, go to paragraph 10-108.</p> |
| <p>e. On pilot FUEL panel (fig. 10-91), set EXT TK switch to ON.</p> | |
| <p>f. Have assistant on aft deck check auxiliary fuel tank pressure control valve.</p> | <p>If auxiliary fuel tank pressure control valve does not open, go to paragraph 10-102.</p> |
| <p>g. On pilot center circuit breaker panel (fig. 10-92), check FUEL TRANS circuit breaker. Circuit breaker stays closed.</p> | <p>If FUEL TRANS circuit breaker does not stay closed with EXT TK set to ON, go to paragraph 10-103.</p> |



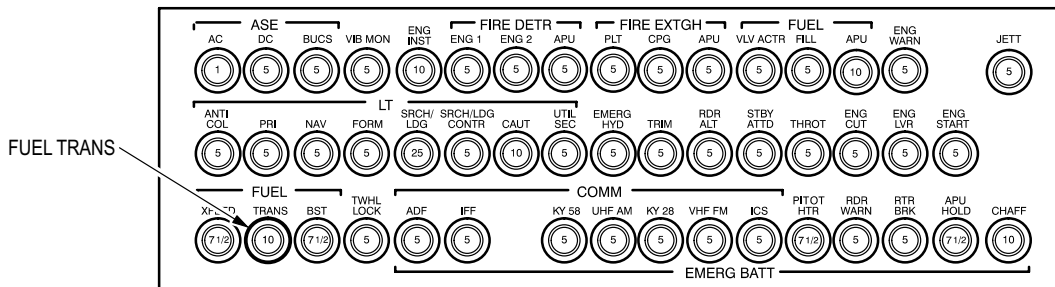
M70-105A

Figure 10-90. Pilot Caution/Warning Panel



M70-106A

Figure 10-91. Pilot FUEL Panel



M70-107

Figure 10-92. Pilot Center Circuit Breaker Panel

Task

Result

h. On pilot caution/warning panel (fig. 10-90), check that **EXT EMP** indicator is not lighted.

If **EXT EMP** is lighted, go to paragraph 10-109.

10-100. AUXILIARY FUEL SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

10-100

Task	Result
------	--------

NOTE

- If result of repeating step h. as directed by paragraph 10-105 or paragraph 10-106 is not satisfactory, refer to TM 1-1520-238-T-5 to troubleshoot PAS. If PAS is satisfactory, refer to TM 1-1520-238-23 to perform fuel quantity indicator system calibration.
- After EXT TK switch is set ON, fuel transfer may be delayed up to 10 minutes while external fuel tanks pressurize.

i. On pilot instrument panel, check that FWD and AFT vertical displays on pilot FUEL quantity indicator (fig. 10-87) show increase.	If both vertical scales on pilot FUEL quantity indicator do not show increase with EXT TK switch to ON , go to paragraph 10-104. If FWD vertical display on pilot FUEL quantity indicator does not show increase with EXT TK switch set to ON , go to paragraph 10-105. If AFT vertical display on pilot FUEL quantity indicator does not show increase with EXT TK switch set to ON , go to paragraph 10-106.
j. With fuel transferring from external tanks, have assistant check both wings and inside ammo bay for leaks.	If leaks are found, replace leaking components (TM 1-1520-238-23).
k. Continue to monitor pilot FUEL quantity indicator until TOTAL digital readout stops increasing.	
l. On pilot caution/warning panel (fig. 10-90), check EXT EMP indicator is lighted.	If EXT EMP indicator does not light with pilot FUEL quantity indicator TOTAL digital readout not increasing, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 10-107.
m. On pilot FUEL panel (fig. 10-91), set EXT TK switch to OFF .	
n. On pilot caution/warning panel, check EXT EMP indicator is not lighted.	If EXT EMP indicator is lighted with EXT TK switch set to OFF , go to paragraph 10-108.

2. Perform FUEL SYSTEM – POWER DOWN (para 10-11).
3. Install ammo storage magazine (TM 9-1090-208-23-1).

10-100. AUXILIARY FUEL SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

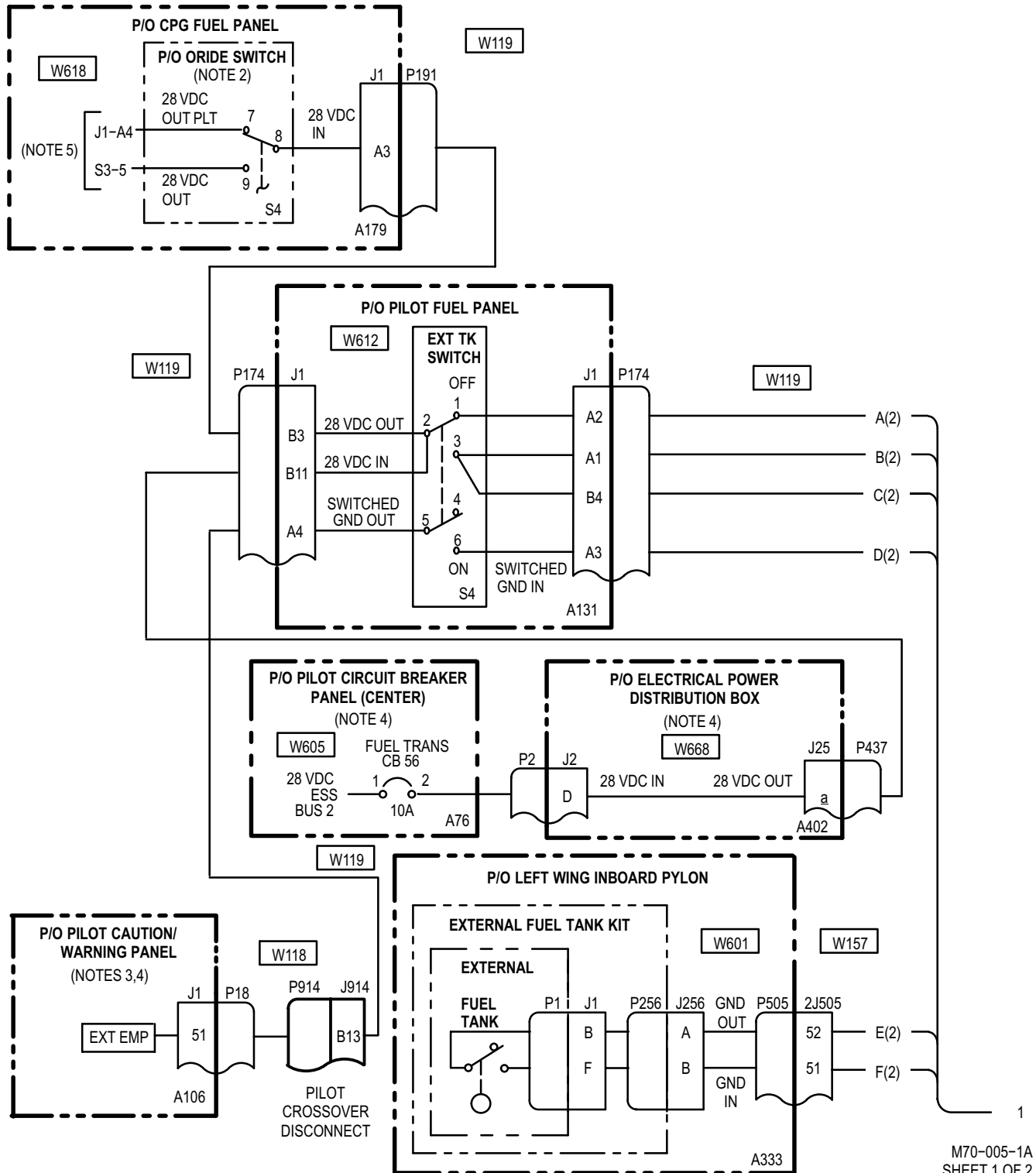
10-100

4. Secure access covers LW7, RW7, LW9, RW9, (LW8 and RW8, if removed), and doors T250L, T290R, T290L and L325 (TM 1-1520-238-23).
5. Disconnect maintenance headset (TM 1-1520-238-T-4).
6. Service fuel system to ferry mission requirements (TM 1-1520-238-23).

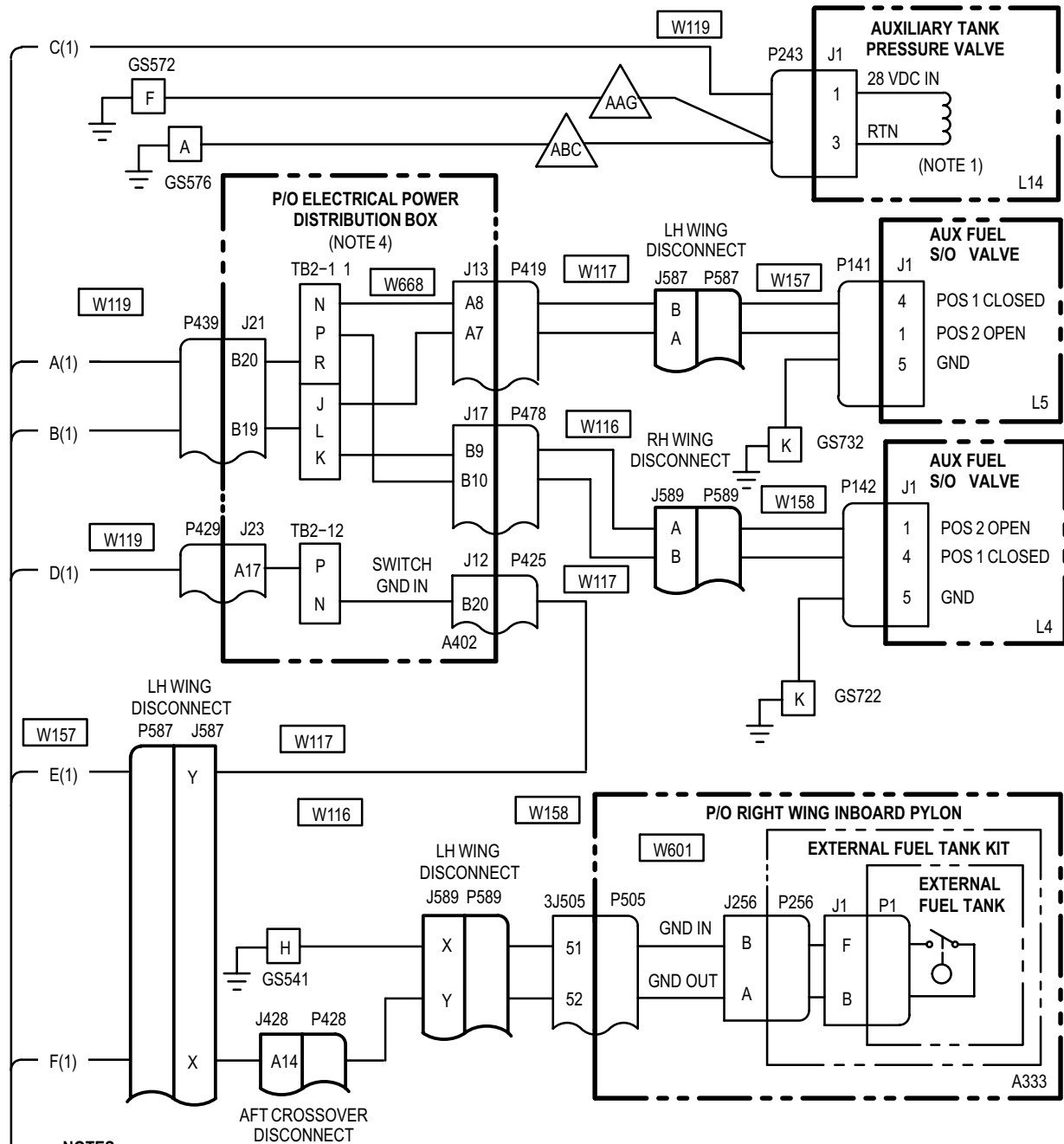
END OF TASK

10-101. AUXILIARY FUEL SYSTEM – WIRING INTERCONNECT DIAGRAM

10-101



M70-005-1A
SHEET 1 OF 2



NOTES:

1. 28 VDC IN OPENS VALVE APPLYING PAS AIR TO OUTERMOST TANKS FOR FUEL TRANSFER.
2. CPG POSITION DISABLES EXT TK SWITCH S4.
(PREVENTS TRANSFER OF REMAINING FUEL IN AUX TANKS).
3. INDICATOR LIGHTS WITH GROUND INPUT.
4. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
5. REFER TO PARAGRAPH 10-49. FUEL QUANTITY INDICATION / TRANSFER - WIRING INTERCONNECT DIAGRAM.

M70-005-2B
SHEET 2 OF 2

10-102. AUXILIARY FUEL TANK PRESSURE CONTROL VALVE – DOES NOT OPEN WITH EXT TK SWITCH SET TO ON

10-102

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L200 cover removed, T250L, T250R, T290L, T290R, and L325 doors open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot **FUEL** panel **EXT TK** switch is set to **ON** position, check for 28 VDC at P243-1.

Is voltage present?

YES	(ABC) Go to step 3. (AAG) Go to step 2.
NO	Go to step 4.

2. **(AAG)** Check for open between P243-3 and GS572-F.

Does open exist?

YES	Repair open wire. Go to paragraph 10-100.
NO	Replace auxiliary tank pressure valve (TM 1-1520-238-23).

3. **(ABC)** Check for open between P243-3 and GS576-A.

Does open exist?

YES	Repair open wire. Go to paragraph 10-100.
NO	Replace auxiliary tank pressure valve (TM 1-1520-238-23).

4. Check for 28 VDC at P174-B11.

Is voltage present?

YES	Go to step 5.
NO	Go to step 6.

5. With **EXT TK** switch set to **ON**, check for open between (A131): J1-B11 and J1-B4.

Does open exist?

YES	Replace pilot FUEL panel (TM 1-1520-238-23).
NO	Repair open wire between P174-B4 and P243-1. Go to paragraph 10-100.

6. Check for 28 VDC at P2-D.

Is voltage present?

YES	Repair open wires between: (A402)J2-D and (A402)J25-a, P437-a and P174-B11. Go to paragraph 10-100.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 2 – pilot station).

END OF TASK

10-103. FUEL TRANS CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH EXT TNK SWITCH SET TO ON

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for short between (A131):
J1-A1 and chassis ground,
J1-B4 and chassis ground.

Does short exist?

- | | |
|-----|---|
| YES | Replace pilot FUEL panel (TM 1-1520-238-23). |
| NO | Go to step 2. |

2. Attach positive meter lead to P174-A1 and check for short.

Does short exist?

- | | |
|-----|---------------|
| YES | Go to step 4. |
| NO | Go to step 3. |

3. Check for short between (L14)J1-1 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace auxiliary tank pressure valve (TM 1-1520-238-23). |
| NO | Repair shorted wire between P174-B4 and P243-1.
Go to paragraph 10-100. |

4. Check for short between (L5)J1-1 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace left wing auxiliary fuel shutoff valve (TM 1-1520-238-23). |
| NO | Go to step 5. |

5. Check for short between (L4)J1-1 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Replace right wing auxiliary fuel shutoff valve (TM 1-1520-238-23). |
| NO | Go to step 6. |

6. Detach P478 and P419. Check for short between (A402)J21-B19 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between (A402):
J21-B19 and TB2-11-L,
J13-A7 and TB2-11-J,
J17-B10 and TB2-11-K.
Go to paragraph 10-100. |
| NO | Repair shorted wire between:
P174-A1 and P439-B19,
P419-A7 and P141-1, P478-B9
and P142-1.
Go to paragraph 10-100. |

END OF TASK

10-104. BOTH VERTICAL DISPLAYS ON PILOT FUEL QUANTITY INDICATOR – DO NOT SHOW INCREASE WITH EXT TK SWITCH SET TO ON

10-104

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-5
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L200, and electrical power distribution box cover removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Have assistant on aft deck to check auxiliary fuel tank pressure control valve. On pilot **FUEL** panel, set **EXT TK** switch to **ON**.

Does auxiliary fuel tank pressure valve open?

YES	Go to step 2.
NO	Go to paragraph 10-102.

2. Apply external pressurized air (TM 1-1520-238-23). Have assistant check tank connections lines, hoses and pressure fuel manifold connections for leaks.

Are leaks present?

YES	Replace leaking component (TM 1-1520-238-23).
NO	Go to step 3.

3. Check for open between P174-A1 and (A402)TB2-11-L.

Does open exist?

YES	Repair open wire. Go to paragraph 10-100.
NO	Refer to TM 1-1520-238-T-5 to troubleshoot PAS.

END OF TASK

10-105. FWD VERTICAL DISPLAY ON PILOT FUEL QUANTITY INDICATOR – DOES NOT SHOW INCREASE WITH EXT TK SWITCH SET TO ON **10-105**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – LW9 access cover removed

3. Have assistant check auxiliary fuel shutoff valve for operation while **EXT TK** switch is cycled.

Does valve operate?

YES	Go to step 4.
NO	Replace left wing auxiliary fuel shutoff valve (TM 1-1520-238-23).

4. Check auxiliary fuel lines for damage.

Are auxiliary fuel lines damaged?

YES	Replace damaged lines (TM 1-1520-238-23).
NO	Replace auxiliary fuel check valve (TM 1-1520-238-23).

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot **FUEL** panel, set **EXT TK** switch to **ON**.
Check for 28 VDC at P141-1.

Is voltage present?

YES	Go to step 2.
NO	Repair wire between P141-1 and (A402)TB2-11-J. Go to paragraph 10-100.

2. Check for open between P141-5 and GS732-K.

Does open exist?

YES	Repair open wire. Go to paragraph 10-100.
NO	Go to step 3.

END OF TASK

10-106. AFT VERTICAL DISPLAY ON PILOT FUEL QUANTITY INDICATOR – DOES NOT SHOW INCREASE WITH EXT TK SWITCH SET TO ON

10-106

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – RW9 Access cover removed

3. Have assistant check auxiliary fuel shutoff valve for operation while **EXT TK** switch is cycled.

Does valve operate?

YES	Go to step 4.
NO	Replace right wing auxiliary fuel shutoff valve (TM 1-1520-238-23).

4. Check auxiliary fuel lines for damage.

Are auxiliary fuel lines damaged?

YES	Replace damaged lines (TM 1-1520-238-23).
NO	Replace auxiliary fuel check valve (TM 1-1520-238-23).

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot **FUEL** panel, set **EXT TK** switch to **ON**.
Check for 28 VDC at P142-1.

Is voltage present?

YES	Go to step 2.
NO	Repair shorted wire between P142-1 and (A402)TB2-11-K. Go to paragraph 10-100.

2. Check for open between P142-5 and GS722-K.

Is voltage present?

YES	Repair open wire. Go to paragraph 10-100.
NO	Go to step 3.

END OF TASK

**10-107. EXT EMP INDICATOR – DOES NOT LIGHT WITH PILOT FUEL QUANTITY
INDICATOR TOTAL DIGITAL READOUT NOT INCREASING**

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – LW9 cover removed

3. On pilot **FUEL** panel, set **EXT TK** switch to **ON**, check for open between P174-A4 and P174-A3.
Does open exist?

YES	Replace pilot FUEL panel (TM 1-1520-238-23).
NO	Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. If two tanks are installed, verify shorting connector installed on J256 of both outboard pylons. Check for open between P256-A and P256-B on each external fuel tank installed.

Does open exist?

YES	Replace external fuel tank (TM 1-1520-238-23).
NO	Go to step 2.

2. Check for open between:
GS541-H and P587-Y,
J587-Y and (A402)TB2-12-N,
(A402)TB2-12-P and P174-A3,
P174-A4 and P18-51.

Does open exist?

YES	Repair open wire. Go to paragraph 10-100.
NO	Go to step 3.

END OF TASK

10-108. EXT EMP INDICATOR – IS LIGHTED WITH EXT TK SWITCH SET TO OFF

10-108

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-6
 TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – LW9 cover removed Simulate auxiliary fuel tanks with jumper plugs

3. Check for continuity between (A131): J1-A4 and J1-A3.

Does continuity exist?

YES	Replace pilot FUEL panel (TM 1-1520-238-23).
NO	Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P18. Check for short between P174-A4 and ground.

Does short exist?

YES	Repair shorted wire between: P18-51 and P914-B13, J914-B13 and P174-A4. Go to paragraph 10-100.
NO	Go to step 2.

2. On pilot **FUEL** panel, **EXT TK** switch is set to **OFF**, check for continuity between (A131)J1-A4 and **FUEL** panel chassis.

Does continuity exist?

YES	Replace pilot FUEL panel (TM 1-1520-238-23).
NO	Go to step 3.

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

On pilot **FUEL** panel, set **EXT TK** switch to **OFF** and check for short between (A131)J1-A3 and fuel panel chassis.

Does short exist?

- | | |
|-----|---|
| YES | Replace pilot FUEL panel.
(TM 1-1520-238-23). |
| NO | Repair shorted wire between:
(A333)J1-B and P256-A,
J256-A and P505-52,
2J505-52 and P587-Y,
J587-Y and P425-B20,
(A402)J12-B20 and
(A402)TB2-12-N,
(A402)TB2-12-P and
(A402)J23-A17,
P429-A17 and P174-A3.
Go to paragraph 10-100. |

END OF TASK

CHAPTER 11

FLIGHT CONTROL SYSTEM

CHAPTER INDEX

<u>Para Title</u>	<u>Para No.</u>
SECTION I. EQUIPMENT DESCRIPTION AND DATA	
Equipment Characteristics, Capabilities, and Features	11-1
Location and Description of Major Components	11-2
Equipment Data	11-3
Equipment Configuration	11-4
Safety, Care and Handling of Equipment	11-5
Controls and Indicators	11-6
SECTION II. THEORY OF OPERATION	
System Description	11-7
Multiplex Read Codes	11-8
SECTION III. TROUBLESHOOTING PROCEDURES	
Electrical Component Location and Configuration (ECLC) Index	11-9
DASE/Stabilator – Power Up	6-10
DASE/Stabilator – Power Down	6-11
Flight Control System – Maintenance Operational Check	11-12
Force Trim – Wiring Interconnect Diagram	11-13
Collective Flight Controls – Rigging Operational Check	11-19
Longitudinal (Cyclic) Flight Controls – Rigging Operational Check	11-20
Lateral (Cyclic) Flight Controls – Rigging Operational Check	11-21
Directional Flight Controls – Rigging Operational Check	11-22
DASE – Maintenance Operational Check	11-23
DASE – Wiring Interconnect Diagram (Pitch) (BUCS Deactivated)	11-24
DASE – Wiring Interconnect Diagram (Roll) (BUCS Deactivated)	11-25
DASE – Wiring Interconnect Diagram (Yaw) (BUCS Deactivated)	11-26
DASE – Wiring Interconnect Diagram (Collective) (BUCS Deactivated)	11-27
DASE – Wiring Interconnect Diagram (BUCS Activated)	11-28
Stabilator – Maintenance Operational Check	11-88
Stabilator – Wiring Interconnect Diagram	11-89

SECTION I. EQUIPMENT DESCRIPTION AND DATA

11-1. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

11-1

a. Characteristics.

- (1) **Force Trim.** The force trim system permits selection of flight control references to allow for limited hands-off flying.
- (2) **Collective Flight Control System.** The collective control system provides mechanical control input to the main rotor system for vertical flight control of the helicopter.
- (3) **Longitudinal (Cyclic) Flight Control System.** The longitudinal (cyclic) flight control system provides mechanical inputs to the main rotor system for longitudinal flight control of the helicopter.
- (4) **Lateral (Cyclic) Flight Control System.** The lateral (cyclic) flight control system provides mechanical inputs to the main rotor system for left and right flight control of the helicopter.
- (5) **Directional Flight Control System.** The directional flight control system provides mechanical input to the tail rotor assembly for directional heading and anti-torque control.
- (6) **Digital Automatic Stabilization Equipment (DASE).** The DASE system receives and transmits flight reference signals for control and stability of the helicopter.
- (7) **Stabilator Control System (SCS).** The SCS provides a means to automatically or manually position the stabilator to enhance helicopter handling characteristics and improve over the nose visibility for landing or nap-of-earth (NOE) operations.

b. Capabilities and Features.

- (1) **Force Trim.** The force trim system holds the cyclic sticks and the directional pedals in a neutral (reference) position selected by the pilot.
- (2) **Collective Flight Control System.** The collective flight control system provides the pilot and CPG with mechanical flight controls. The primary hydraulic system pressure boosts the operation of the collective stick by the use of servocylinders operating at 3000 psi. The utility hydraulic system provides redundant hydraulic power to the servocylinders and utility hydraulic subsystems. Flight can be maintained by use of the fly-by-wire backup control system (BUCS) if mechanical flight control is lost. All mechanical control flight linkages are routed separately from BUCS to preclude the loss of both systems.
- (3) **Longitudinal (Cyclic) Flight Control System.** The longitudinal flight control system provides the same capabilities and features as the collective flight control system.
- (4) **Lateral (Cyclic) Flight Control System.** The lateral flight control system provides the same capabilities and features as the collective and longitudinal flight control systems.
- (5) **Directional Flight Control System.** The directional flight control system provides control for the tail rotor assembly to counteract the torque of the main rotor assembly. The system is power assisted by a hydraulic servocylinder. Control of the directional flight control system can be maintained from either crew station or by BUCS. Adjustable (fore and aft) directional pedals are installed in the pilot and CPG stations. The directional mechanical control linkage is routed through the lower part of the fuselage (left of the centerline) to the aft equipment bay, then along the top of the aft fuselage and tail boom to the servocylinder which is mounted on the tail rotor gearbox. All mechanical flight control linkages are routed separately from BUCS to preclude the loss of both systems.

11-1. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES (cont)

11-1

(6) **DASE.** The DASE system incorporates the stability augmentation system (SAS), the command augmentation system (CAS), attitude hold, turn coordination, the hover augmentation system, heading hold, and BUCS.

(7) **SCS.** The SCS can be operated in automatic or manual mode. The automatic mode is normally used and becomes functional when forward airspeed reaches 30 knots. Manual mode is engaged automatically, when the automatic mode fails, and can only be engaged when airspeed is below 80 knots. The SCS is continuously monitored by the fault detection/location system (FD/LS). The SCS is fail-safe, in that a failure of a stabilator control unit (SCU) cannot cause an aircraft pitch rate in excess of 10° per second. The SCS receives various airspeed information from the air data subsystem (ADSS).

11-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

11-2

a. **Force Trim System.** The force trim system (fig. 11-1) consists of three feel spring and magnetic brake assemblies which are attached to the longitudinal (pitch), lateral (roll), and directional (yaw) flight controls under the pilot's station. When force trim is selected a trim brake relay, located in the electrical power distribution box, engages the magnetic brake assemblies which lock and establish a trim position (reference). The spring assemblies override the magnetic brake assemblies allowing flight control inputs to deviate from the reference force trim setting.

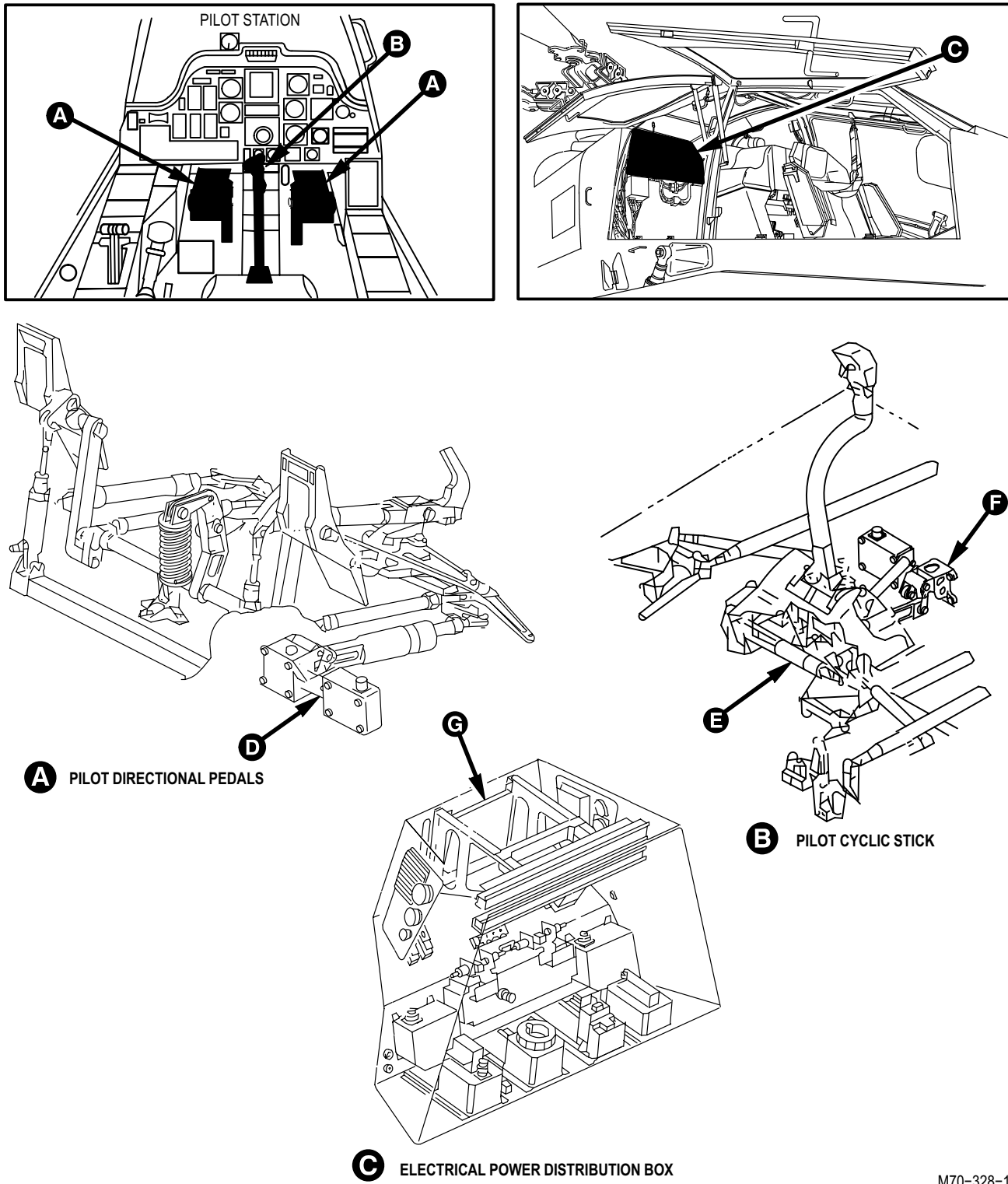
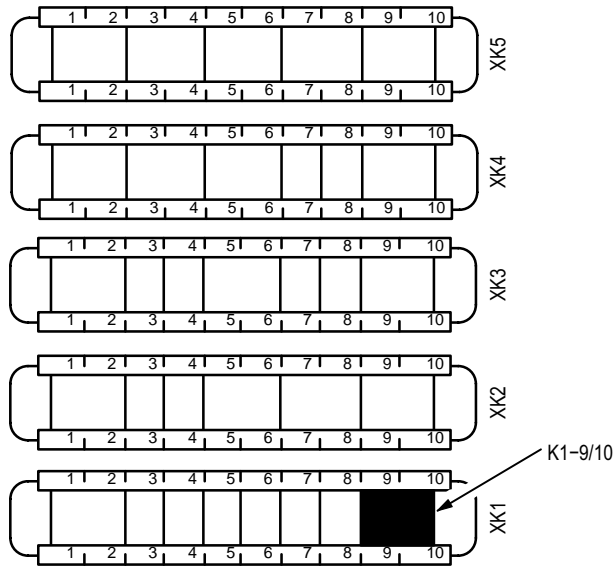
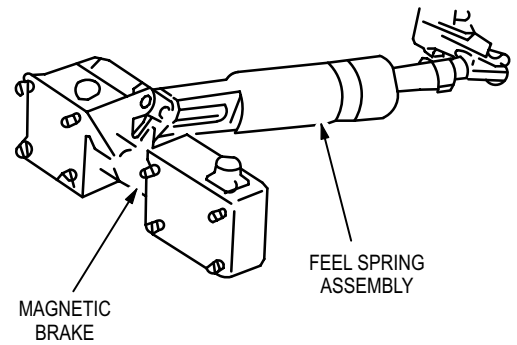


Figure 11-1. Force Trim System Component Location (Sheet 1 of 2)

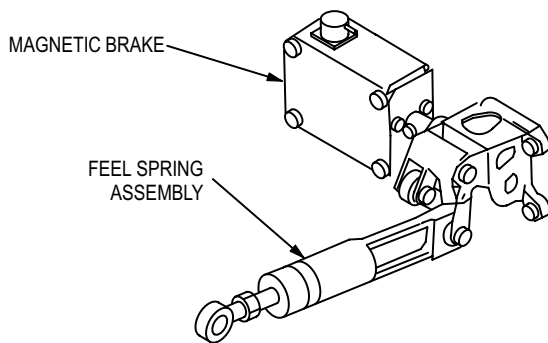
M70-328-1



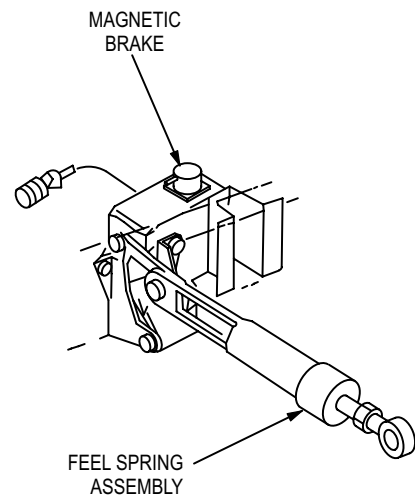
G TRIM BRAKE RELAY K1-9/10



D YAW MAGNETIC BRAKE AND FEEL SPRING ASSEMBLY



F PITCH MAGNETIC BRAKE AND FEEL SPRING ASSEMBLY



E ROLL MAGNETIC BRAKE AND FEEL SPRING ASSEMBLY

M70-328-2

Figure 11-1. Force Trim System Component Location (Sheet 2 of 2)

b. **Collective Flight Control System.** The collective flight control system (fig. 11-2) consists of the pilot and CPG collective sticks, collective linear variable differential transducers (LVDTs), a collective 1G spring assembly, two shear pin actuated decouplers (SPADs), collective mechanical control linkage, collective servocylinder, mixer assembly, swashplate assembly, pitch link assemblies, scissor assemblies, a torque link, and lateral links.

(1) **Collective Stick.** The collective sticks, mounted to the left of the seat in the pilot and CPG stations, contain various switches and controls for aircraft operation.

(a) The friction adjust twist grip, mounted below the grip assembly and forward of the friction guide, frictionally locks the collective stick in a desired position. Rotation of the grip (counterclockwise) applies (pressure) friction through the housing assembly to the slotted friction guide.

(b) The grip assembly, mounted at the forward end of the collective stick, is grasped as a handle for controlling the collective stick and incorporates an engine chop and reset collar which reduces engine rpm to flight idle in the event of an emergency situation. The collar is activated by pushing forward (to unlock) and then rotating 45° right for chop and left 45° for reset.

(c) The switchbox assembly (stabilator manual control panel) is mounted in the upper forward portion of the grip assembly and contains various switches and controls for quick system operation.

(d) The guarded BUCS select trigger switch, mounted in the lower forward portion of the grip assembly (CPG collective stick only) must be raised and the trigger squeezed to activate the BUCS select trigger switch to allow control transfer of BUCS from pilot to CPG's LVDTs.

(2) **Collective LVDTs.** Two collective LVDTs are installed at the canted bulkhead and at the base of the collective stick assembly in the pilot's station. One collective LVDT is installed at the same points in the CPG's station. The LVDT sends a signal to the DASE computer (DASEC) proportional to the amount of its movement.

(3) **Collective 1G Spring Assembly.** The collective 1G spring assembly is connected to each of the collective sticks and bulkheads and provides the means of counterbalancing the weight of the collective stick. The collective 1G spring assembly is a cylinder which contains a spring that, when compressed, exerts a force of approximately 54 lbs.

(4) **Collective SPADs.** The collective SPADs, connected to the output linkage of each collective stick, activates the fly-by-wire BUCS system when the mechanical flight controls are jammed and the shear pin is severed. The SPAD incorporates a mechanical cam lock, a switch, and shear pin that fits into a slot on one of the bellcranks and locks the input and output bellcranks together as a single unit.

(5) **Collective Mechanical Control Linkage.** The collective mechanical control linkage is routed through the left side of the fuselage to the aft side of the canted bulkhead and is then routed up to the collective servocylinder. Movement of the collective stick is transmitted through the mechanical control linkage, collective servocylinder, mixer, torque link, lateral link, swashplate assembly and pitch links, to the main rotor blades. The collective mechanical control linkage incorporates various bellcranks and push-pull tubes. The push-pull tubes have steel self-centering rod end bearings containing teflon. Selected push-pull tubes have adjustable rod end bearings for system rigging.

11-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

11-2

(6) **Collective Servocylinder.** The collective servocylinder, mounted on the transmission deck just left of the centerline and forward of the transmission, provides hydraulic power to assist movements of upper and lower controls. The collective servocylinder receives inputs from either the mechanical controls or electrical components (BUCS and DASE) which cause hydraulic pressure to move the cylinder piston.

(7) **Mixer Assembly.** The mixer assembly, mounted above the main rotor support structure base assembly, receives and combines control inputs from the collective and cyclic sticks for vertical, longitudinal and lateral flight of the helicopter. The collective bellcrank is a component of the mixer assembly and is attached to the collective servocylinder, support bearings, lateral and rear longitudinal bellcrank. It is horn shaped, with the horns facing aft.

(8) **Lateral Links.** Two lateral links, mounted between the mixer assembly and the swashplate assembly, provide vertical and lateral control of the stationary swashplate by inputs received from the collective and cyclic sticks.

(9) **Torque Link.** The torque link, mounted between the mixer assembly and the swashplate assembly, provides vertical and longitudinal control of the stationary swashplate by inputs received from the collective and cyclic sticks.

(10) **Swashplate Assembly.** The swashplate assembly, mounted on the static mast between the mixer assembly and the main rotor head assembly, receives and transmits control inputs from the collective and cyclic sticks to the main rotor head assembly. The swashplate assembly consists of a stationary swashplate, a rotating swashplate, a self-aligning spherical and slider bearing (uniball) and a bearing assembly (double-roll ball bearing). Collective input raises or lowers the swashplate assembly, equally changing the angle of attack of the four main rotor blades.

(a) The stationary swashplate, mounted to the double-roll ball bearing assembly below the rotating swashplate, supports the swashplate assembly and receives control inputs from two lateral links and a torque link. It houses the self-aligning spherical and slider bearing, and attaches to the inner race of the double-roll ball bearing assembly.

(b) The rotating swashplate, mounted to the double-roll ball bearing assembly above the stationary swashplate, transmits control inputs received from the stationary swashplate to the main rotor head assembly via the pitch link assemblies. The rotating swashplate is an aluminum forging with four clevis lugs 90° apart for attachment of the pitch link assemblies. Two of the clevis lugs (180° apart) have attachment pins for two scissor assemblies. The rotating swashplate houses the outer race of the double-roll ball bearing assembly.

(c) The bearing assembly, located between the stationary and rotating swashplate, allows the rotating swashplate to rotate. It is a double-roll ball bearing assembly with a one-piece outer race and a three-piece inner race, with flexible and removable upper and lower seals.

(d) The self-aligning spherical and slider bearing (uniball), located between the stationary and rotating swashplate, allows the swashplate assembly to tilt for cyclic control movements. The slider bearing allows the entire swashplate assembly to move the static mast up or down as a unit for collective control movements. The upper and lower bearing retainers secure the self-aligning spherical and slider bearing and the double-roll ball bearing assembly. The upper bearing retainer mounts to the stationary swashplate. The lower bearing retainer mounts to the rotating swashplate.

11-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

11-2

(11) **Pitch Link Assemblies.** Four adjustable pitch link assemblies, mounted between the swashplate and horns on the pitch housings, receive control inputs from the rotating swashplate and transmit the inputs to the pitch change horns. The pitch link assemblies are adjustable to facilitate main rotor blade tracking procedures.

(12) **Scissor Assemblies.** The scissor assemblies, connected to the swashplate and main rotor hub, consist of a lower arm and an upper arm and transmit power to the rotating swashplate. The load bearing scissor assembly drives the rotating swashplate.

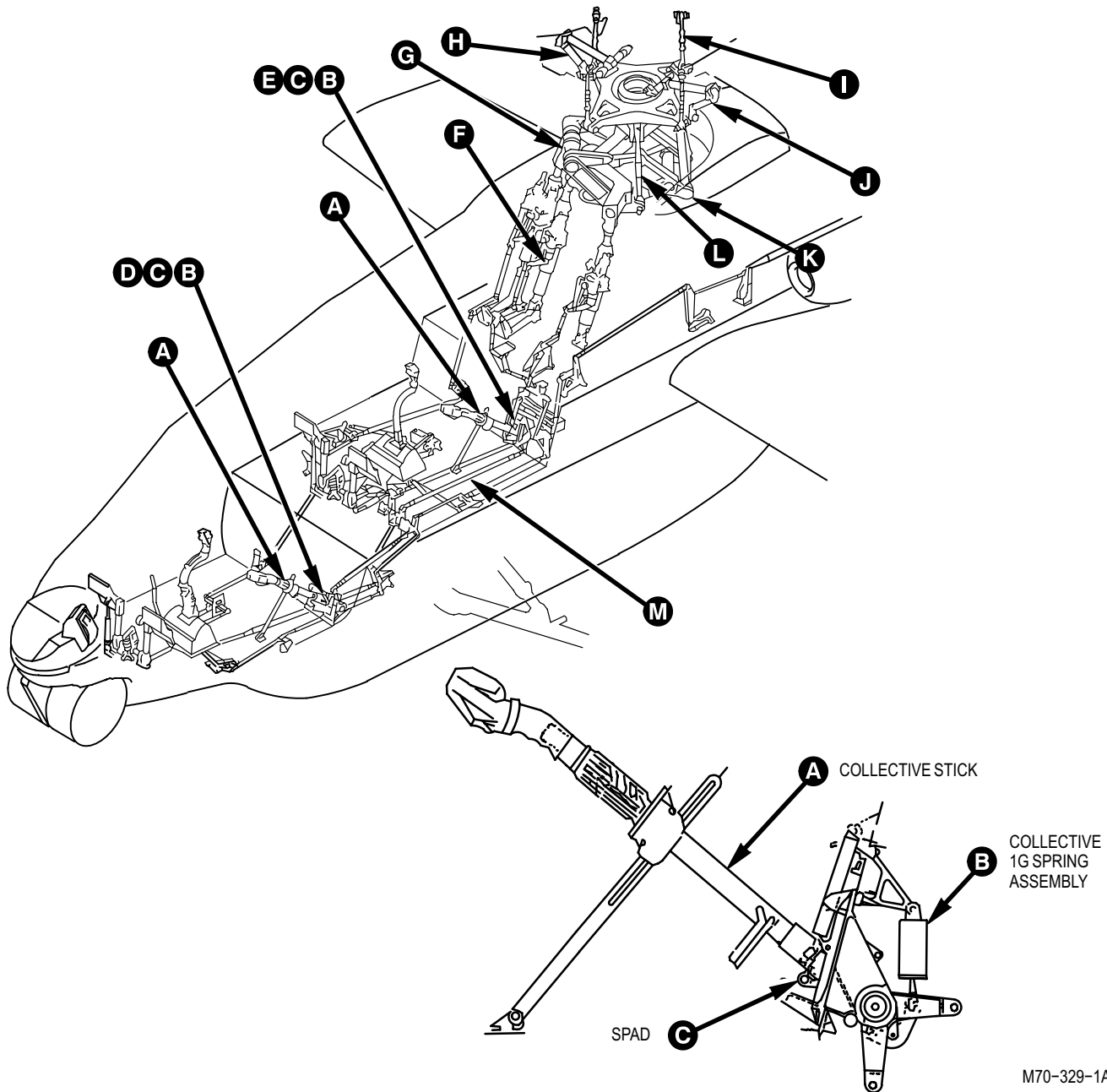
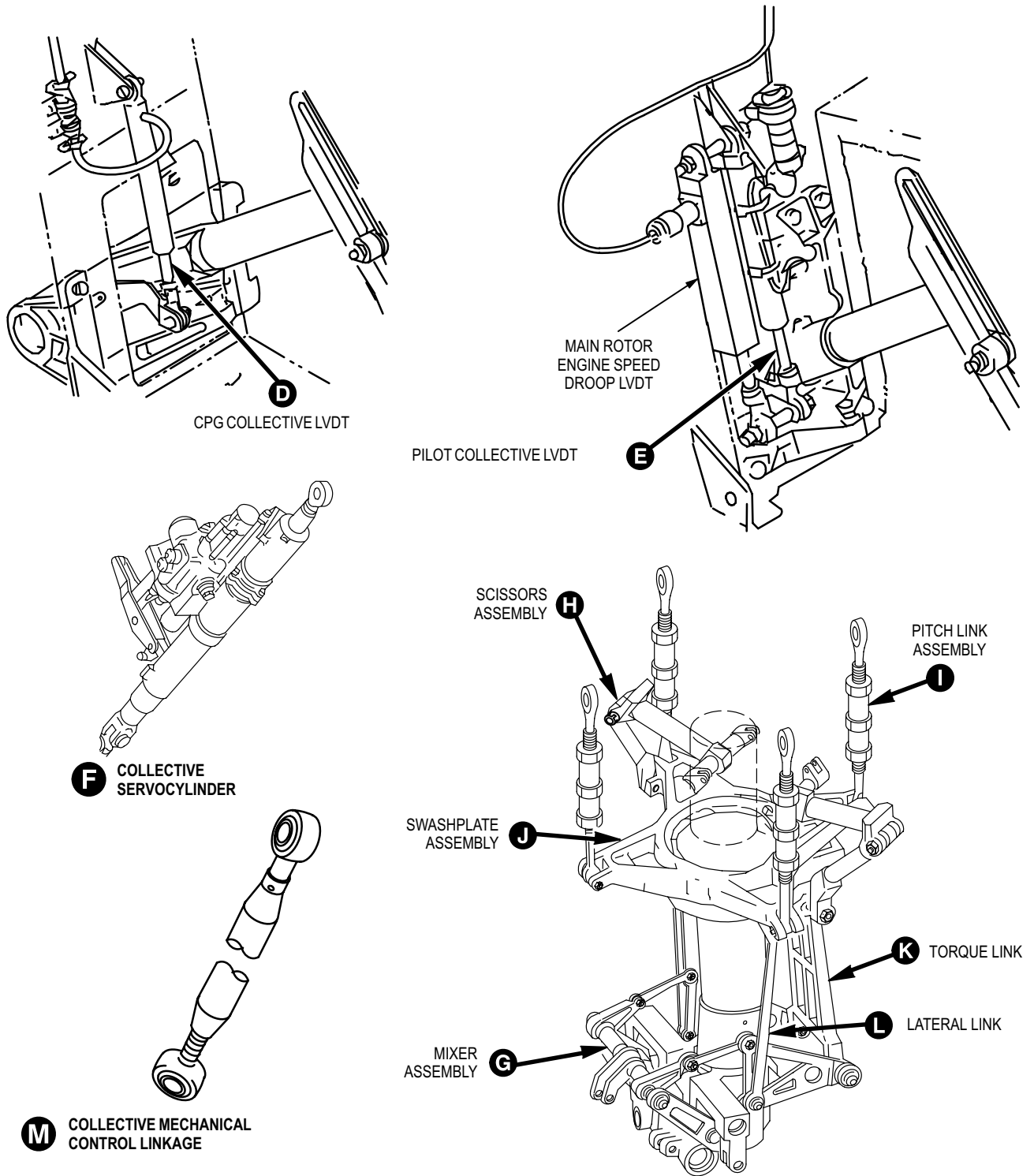


Figure 11-2. Collective Flight Control System Major Component Location (Sheet 1 of 2)



M70-329-2A

Figure 11-2. Collective Flight Control System Major Component Location (Sheet 2 of 2)

c. **Longitudinal (Cyclic) Flight Control System.** The longitudinal flight control system (fig. 11-3) consists of the pilot and CPG cyclic sticks, two LVDTs, two SPADs, feel spring and magnetic brake assemblies, the longitudinal mechanical control linkage, the longitudinal servocylinder, the mixer assembly, and the torque link.

(1) **Pilot and CPG Cyclic Sticks.** The pilot and CPG cyclic sticks, mounted to the floor centerline in each crew station, control the main rotor assembly for longitudinal and lateral flight of the helicopter. The cyclic sticks control longitudinal flight by forward and aft movement. When mechanical control is lost, BUCS maintains longitudinal and lateral control. The cyclic stick consists of the grip, tube, housing, and support assembly.

(a) The grip assembly, mounted at the upper end of the cyclic stick, is a handle used to control the cyclic stick containing various switches and controls.

(b) The tube assembly is the controller for the cyclic control system and is mounted to a fitting assembly, which is supported by the lock and base assemblies. The tube assembly has five welded pieces consisting of a tube, a fitting, a cover, a guide and a support. The upper portion mounts to the grip assembly, while the lower portion mounts to the fitting assembly. A cable assembly is mounted to the upper portion of the tube assembly and releases the lock assembly in the retracted position. The fitting assembly is mounted to the lower portion of the tube assembly to provide mounting for the tube assembly and attachment of the lock assembly. The lock assembly is mounted between the fitting assembly and the base assembly to allow the cyclic stick assembly to be locked in an extended or retracted position.

(c) The base assembly, located at the lower portion of the cyclic assembly, provides mounting of the lock assembly and the lateral pivot point. Links and levers are located and mounted to the fitting, the lock assembly, and the base assembly to provide interconnection between the finger lock release lever and cable assembly, to activate the lock assembly.

(d) The housing assembly, mounted to the support assembly at the floor centerline in each crew station, provides longitudinal and lateral control movement of the cyclic stick assembly.

(e) The support assembly, mounted to the floor centerline in each crew station, provides mounting and support for the housing assembly and the longitudinal SPAD.

(2) **LVDTs.** One lateral and one longitudinal LVDT is installed at the canted bulkhead and is attached to the base of the cyclic stick assembly in each crew station. The LVDTs generate electrical signals that are proportional at the amount of cyclic stick movement. The LVDT sends a signal to the DASEC proportional to its movement.

(3) **SPADs.** The lateral and longitudinal SPADs, attached to the cyclic output bellcrank assembly at each crew station, activate the fly-by-wire BUCS system if the mechanical flight controls are jammed and the shear pin is severed. The SPAD incorporates a mechanical cam lock, switch, and shear pin that fits into a slot on one of the bellcranks and locks the input and output bellcranks together as a single unit.

(4) **Feel Spring and Magnetic Brake Assemblies.** The feel spring and magnetic brake assemblies are installed beneath the pilot's cyclic housing assembly (one set provides trim for both stations) to provide longitudinal and lateral flight trim.

(a) The feel spring assembly, a spring loaded device, overrides the magnetic brake when locked by moving the cyclic stick against the spring.

11-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

11-2

(b) The magnetic brake assembly disengages to enable tracking of cyclic stick position. It reengages to lock the new trim position.

(5) **Longitudinal Mechanical Control Linkage.** The longitudinal mechanical control linkage is transmitted through the right side of the fuselage to the aft side of the canted bulkhead, then routed up to the longitudinal servocylinder. Longitudinal movement of the cyclic stick is transmitted through the mechanical control linkage, longitudinal servocylinder, mixer, lateral links, swashplate assembly and pitch links, to the main rotor blades causing the swashplate assembly and main rotor disk to tilt forward or aft.

(6) **Longitudinal Servocylinder.** The longitudinal servocylinder, mounted on the transmission deck on the right hand side forward of the transmission, provides hydraulic power to assist the longitudinal movements of the mechanical control linkage. The output piston of the longitudinal servocylinder connects directly to the longitudinal bellcrank on the mixer assembly.

(7) **Mixer Assembly.** The mixer assembly, mounted above the main rotor support structure base assembly, receives and combines control inputs from the collective and cyclic sticks for vertical, longitudinal and lateral flight of the helicopter. The longitudinal bellcrank is part of the mixer assembly. It is horned shaped, with both horns facing aft, and is attached to the longitudinal servocylinder, support bearings, and two longitudinal links. Two longitudinal links are connected to the longitudinal bellcrank and the rear longitudinal bellcrank.

(8) **Torque Link.** The torque link, mounted between the mixer assembly and the swashplate assembly, provides vertical and longitudinal control of the stationary swashplate by the inputs received from the collective and cyclic sticks. It also prevents the stationary swashplate from rotating.

(9) **Swashplate Assembly.** The swashplate assembly, mounted on the static mast between the mixer assembly and the main rotor head assembly, receives and transmits control inputs from the collective and cyclic sticks to the main rotor head assembly. The swashplate assembly consists of a stationary swashplate, a rotating swashplate, a self-aligning spherical, a slider bearing (uniball) and a bearing assembly (double-roll ball bearing). Cyclic input tilts the swashplate assembly around the spherical ball (uniball) in the desired direction.

(a) The stationary swashplate, mounted to the double-roll ball bearing assembly below the rotating swashplate, supports the swashplate assembly and receives control inputs from two lateral links and a torque link. The stationary swashplate is an aluminum forging with three clevis lugs to attach the lateral links and a torque link. It houses the self-aligning spherical and slider bearing, which attaches to the inner race of the double-roll ball bearing assembly.

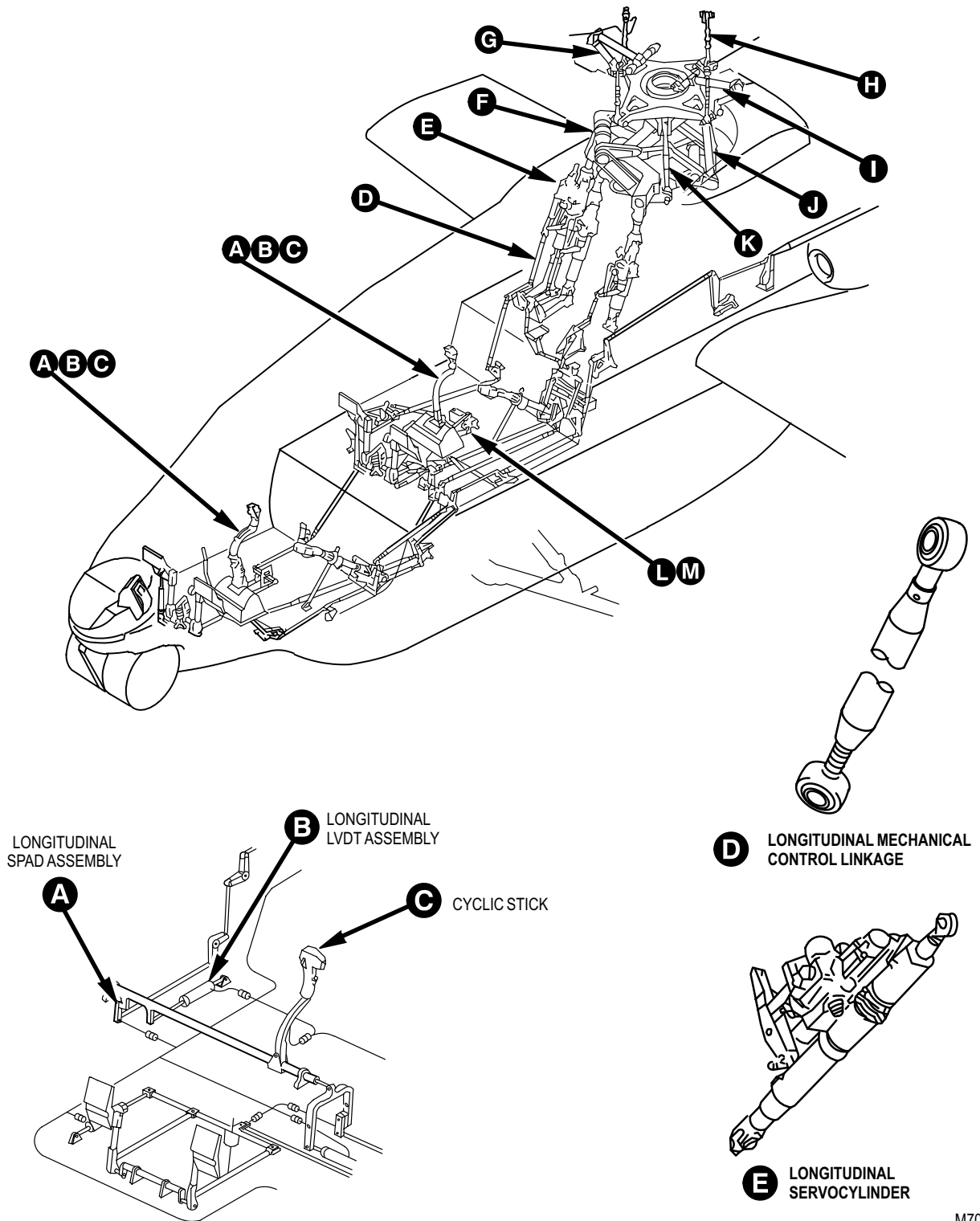
(b) The rotating swashplate, mounted to the double-roll ball bearing assembly above the stationary swashplate, transmits control inputs received from the stationary swashplate to the main rotor head assembly via the pitch link assemblies. The rotating swashplate is an aluminum forging with four clevis lugs 90° apart to attach the pitch link assemblies. Two of the clevis lugs (180° apart) have pins to attach the two scissor assemblies. The rotating swashplate houses the outer race of the double-roll ball bearing assembly.

(c) The bearing assembly, located between the stationary and rotating swashplate, allows the rotating swashplate to rotate. The bearing assembly is a double-roll ball bearing assembly with a one-piece outer race and a three-piece inner race, with flexible and removable upper and lower seals.

(d) The self-aligning spherical and slider bearing (uniball) is located between the stationary and rotating swashplate. The spherical ball allows the swashplate assembly to tilt for cyclic control movements. The slider bearing allows the entire swashplate assembly to control collective movement by moving up or down the static mast as a unit. The upper and lower bearing retainers secure the self-aligning spherical and slider bearing, and the double-roll ball bearing assembly. The upper bearing retainer mounts to the stationary swashplate. The lower bearing retainer mounts to the rotating swashplate.

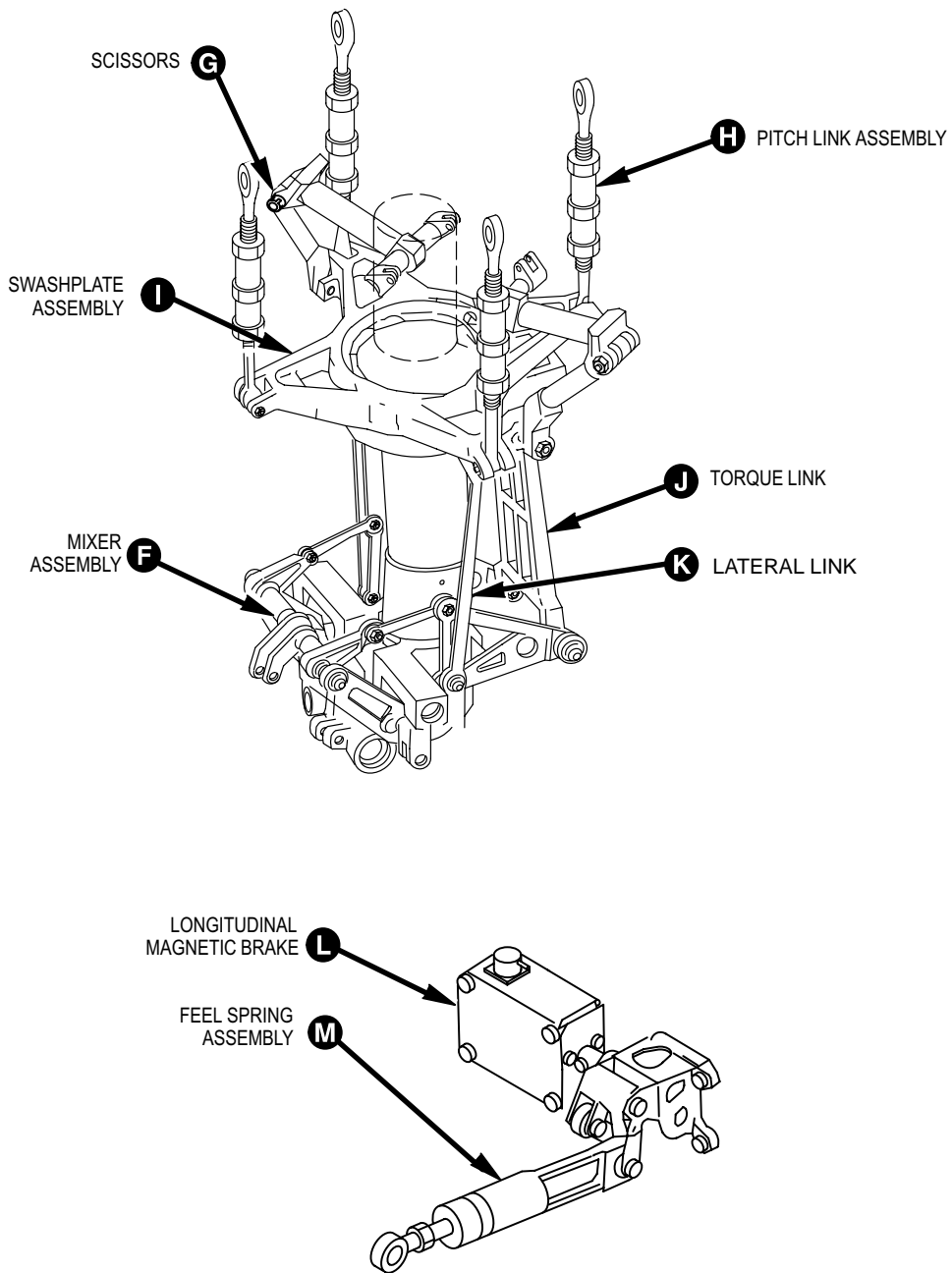
(10) **Pitch Link Assemblies.** Four adjustable pitch link assemblies, mounted between the swashplate and horns on the pitch housings, receive control inputs from the rotating swashplate and transmit the inputs to the pitch change horns. The pitch link assemblies are adjustable to facilitate main rotor blade tracking procedures.

(11) **Scissor Assemblies.** The scissor assemblies, connected to the swashplate and main rotor hub, consist of a lower arm and an upper arm. The scissor assemblies transmit rotational power to the rotating swashplate. The load bearing scissors assembly drives the rotating swashplate.



M70-330-1A

Figure 11-3. Longitudinal (Cyclic) Flight Control System Major Component Location (Sheet 1 of 2)



M70-330-2A

Figure 11-3. Longitudinal (Cyclic) Flight Control System Major Component Location (Sheet 2 of 2)

11-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

11-2

d. **Lateral (Cyclic) Flight Control System.** The lateral (cyclic) flight control system (fig. 11-4) consists of the pilot and CPG cyclic sticks, two LVDTs, two SPADs, feel spring and magnetic brake assemblies, lateral mechanical control linkage, lateral servocylinder, mixer assembly, two lateral links, torque link, swashplate assembly, pitch link assemblies, and scissor assemblies.

(1) **Pilot and CPG Cyclic Sticks.** The pilot and CPG cyclic sticks, mounted to the floor centerline in each crew station, control the main rotor assembly for longitudinal and lateral flight of the helicopter. The cyclic sticks control lateral flight by left and right movement. If mechanical control is lost, BUCS will maintain longitudinal and lateral control. The cyclic stick consists of a grip, tube, base, housing, and support assembly.

(a) The grip assembly, mounted at the upper end of the cyclic stick assembly, is a handle used to control the cyclic stick which contains various switches and controls.

(b) The tube assembly is the controller for the cyclic control system and is mounted to a fitting assembly, which is supported by the lock and base assemblies. The tube assembly has five welded pieces consisting of a tube, fitting, cover, guide and support. The upper portion mounts to the grip assembly, while the lower portion mounts to the fitting assembly. A cable assembly is mounted to the upper portion of the tube assembly and releases the lock assembly in the retracted position. The fitting assembly is mounted to the lower portion of the tube assembly to provide mounting for the tube assembly and attachment of the lock assembly. The lock assembly is mounted between the fitting assembly and the base assembly to allow the cyclic stick assembly to be locked in the extended or retracted position.

(c) The base assembly, located at the lower portion of the cyclic assembly, provides mounting of the lock assembly and the lateral pivot point. Links and levers are located and mounted to the fitting, lock assembly, and the base assembly to provide interconnection between the finger lock release lever and cable assembly, to actuate the lock assembly.

(d) The housing assembly, mounted to the support assembly at the floor centerline in each crew station, provides longitudinal and lateral control movement of the cyclic stick assembly.

(e) The support assembly, mounted to the floor centerline in each crew station, provides mounting and support for the housing assembly and the lateral SPAD.

(2) **LVDTs.** One lateral and one longitudinal LVDT is installed at the canted bulkhead and at the base of the cyclic stick assembly in each crew station. The LVDTs generate electrical signals that are proportional to the amount of cyclic stick movement. The LVDT sends a signal to the DASEC proportional to its movement.

(3) **SPADs.** The lateral and longitudinal SPADs are attached to the cyclic output bellcrank assembly at each crew station. The SPADs activate the fly-by-wire BUCS system if the mechanical flight controls are jammed and the shear pin is severed. The SPAD incorporates a mechanical cam lock, switch, and shear pin that fits into a slot on one of the bellcranks and locks the input and output bellcranks together as a single unit.

(4) **Feel Spring and Magnetic Brake Assemblies.** The feel spring and magnetic brake assemblies are installed beneath the pilot's cyclic housing assembly, one set provides longitudinal and lateral flight trim for both stations.

(a) The feel spring assembly is a spring loaded device which overrides the magnetic brake when locked by moving the cyclic stick against the spring.

(b) The magnetic brake assembly disengages to enable tracking of cyclic stick position and reengages to lock the new trim position.

(5) **Lateral Mechanical Control Linkage.** The lateral mechanical control linkage is transmitted through the lower left side of the fuselage to the aft side of the canted bulkhead, then routed up to the lateral servocylinder. Lateral movement of the cyclic stick is transmitted through the mechanical control linkage, lateral servocylinder, mixer, lateral links, swashplate assembly and pitch links, to the main rotor blades. Lateral movement of the cyclic stick causes the swashplate assembly and main rotor disk to tilt left or right accordingly.

(6) **Lateral Servocylinder.** The lateral servocylinder, mounted on the transmission deck on the left hand side forward of the transmission, provides hydraulic power to assist the lateral movements of the mechanical control linkage. The output piston of the lateral servocylinder directly connects to the lateral bellcrank on the mixer assembly.

(7) **Mixer Assembly.** The mixer assembly, mounted above the main rotor support structure base assembly, receives and combines control inputs from the collective and cyclic sticks for vertical, longitudinal and lateral flight of the helicopter. The lateral bellcrank, part of the mixer assembly, is a long T shape and is attached to the lateral servocylinder, collective bellcrank, and two lateral links. The lateral links transmit linear motion from the lateral bellcrank to the nonrotating swashplate.

(8) **Lateral Links.** Two lateral links, mounted between the mixer assembly and the swashplate assembly, provide vertical and lateral control of the stationary swashplate by the inputs received from the collective and cyclic sticks. The lateral links, along with the torque link, also move the stationary swashplate up or down for vertical flight control of the helicopter. The lateral links also tilt the stationary swashplate right or left for lateral flight of the helicopter.

(9) **Torque Link.** The torque link, mounted between the mixer assembly and the swashplate assembly, provides vertical and longitudinal control of the stationary swashplate by inputs received from the collective and cyclic sticks while preventing the stationary swashplate from rotating.

(10) **Swashplate Assembly.** The swashplate assembly, mounted on the static mast between the mixer assembly and the main rotor head assembly, receives and transmits control inputs from the collective and cyclic sticks to the main rotor head assembly. The swashplate assembly consists of a stationary swashplate, a rotating swashplate, a self-aligning spherical and slider bearing (uniball) and a bearing assembly (double-roll ball bearing). Cyclic input tilts the swashplate assembly around the spherical ball (uniball) in the desired direction.

(a) The stationary swashplate, mounted to the double-roll ball bearing assembly below the rotating swashplate, supports the swashplate assembly and receives control inputs from two lateral links and the torque link. The stationary swashplate, an aluminum forging with three clevis lugs to attach the lateral and torque links, houses the self-aligning spherical and slider bearing, and attaches to the inner race of the double-roll ball bearing assembly.

(b) The rotating swashplate, mounted to the double-roll ball bearing assembly above the stationary swashplate, transmits control inputs received from the stationary swashplate to the main rotor head assembly from the pitch link assemblies. The rotating swashplate is an aluminum forging with four clevis lugs 90° apart to attach the pitch link assemblies. Two of the clevis lugs (180° apart) have attachment pins for the two scissor assemblies. The rotating swashplate houses the outer race of the double-roll ball bearing assembly.

11-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

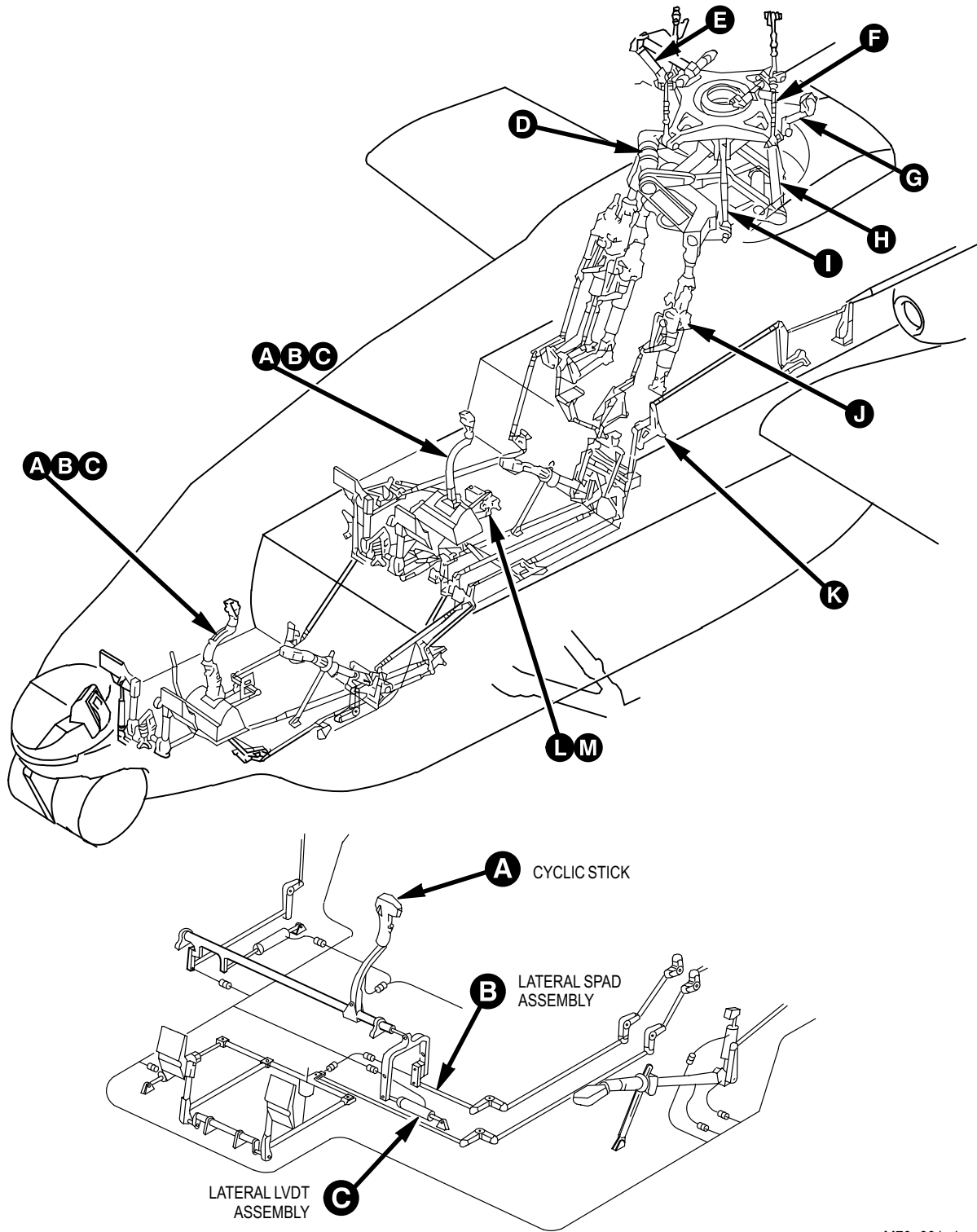
11-2

(c) The bearing assembly, located between the stationary and rotating swashplate, allows the rotating swashplate to rotate. The bearing assembly is a double-roll ball bearing assembly with a one-piece outer race and a three-piece inner race, with flexible and removable upper and lower seals.

(d) The self-aligning spherical and slider bearing (uniball) is located between the stationary and rotating swashplate. The spherical ball allows the swashplate assembly to tilt for cyclic control movements. The slider bearing allows the entire swashplate assembly to move up or down the static mast as a unit, for collective control movements. The upper and lower bearing retainers secure the self-aligning spherical and slider bearing, and the double-roll ball bearing assembly. The upper bearing retainer mounts to the stationary swashplate. The lower bearing retainer mounts to the rotating swashplate.

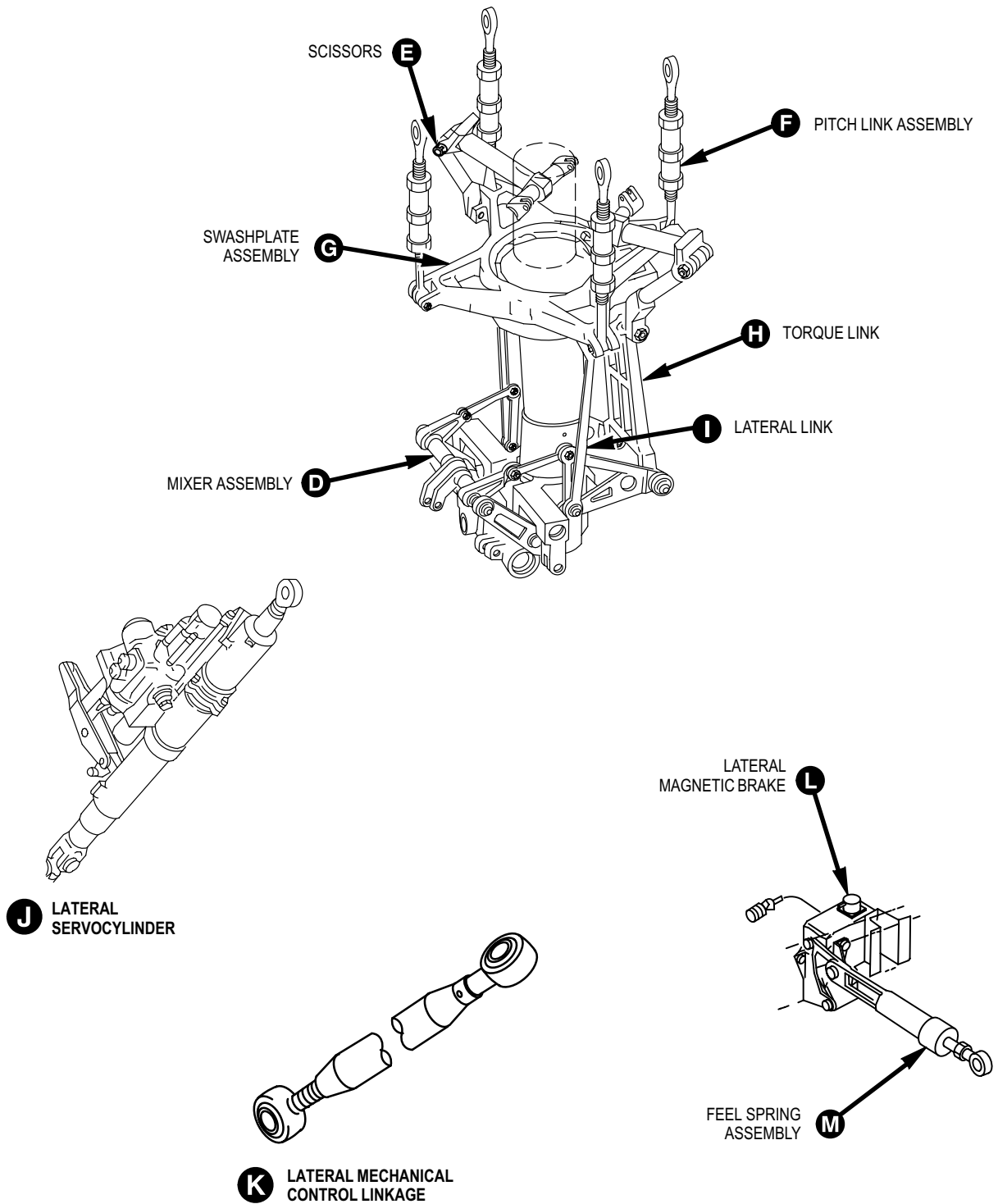
(11) **Pitch Link Assemblies.** Four adjustable pitch link assemblies, mounted between the swashplate and horns on the pitch housings, receive control inputs from the rotating swashplate and transmit the inputs to the pitch change horns. The pitch link assemblies are adjustable to facilitate main rotor blade tracking procedures.

(12) **Scissor Assemblies.** The scissor assemblies, connected to the swashplate and main rotor hub, consist of a lower arm and an upper arm and drive the rotating swashplate. The scissor assemblies transmit rotational power to the rotating swashplate, while the load bearing scissor assembly drives the rotating swashplate.



M70-331-1

Figure 11-4. Lateral (Cyclic) Flight Control System Major Component Location (Sheet 1 of 2)



M70-331-2

Figure 11-4. Lateral (Cyclic) Flight Control System Major Component Location (Sheet 2 of 2)

e. **Directional Flight Control System.** The directional flight control system (fig. 11-5) consists of the pilot and CPG directional pedals, two LVDTs, two SPADs, feel spring and magnetic brake assemblies, the directional mechanical control linkage, the directional servocylinder, the tail rotor swashplate assembly, pitch change links, drive links, and the fork assembly.

(1) **Pilot and CPG Directional Pedals.** The pilot and CPG directional pedals, located at the floor centerline in each crew station, provide directional (yaw) control of the helicopter. They are made of aluminum alloy and incorporate brake pedal control linkage and a reach adjust mechanism.

(2) **LVDTs.** The directional LVDTs, attached to the fuselage and to a riveted arm on the SPAD, generate electrical signals that are proportional to the amount of cyclic stick movement. The LVDT sends a signal to the DASEC proportional to its movement.

(3) **SPADs.** The directional SPADs, attached to a bracket that is mounted on the fuselage bulkhead aft and below the foot pedal assemblies, activate the fly-by-wire BUCS system if the mechanical flight controls are jammed and the shear pin is severed. The SPAD incorporates a mechanical cam lock, switch, and shear pin that fits into a slot on one of the bellcranks and locks the input and output bellcranks together as a single unit.

(4) **Feel Spring and Magnetic Brake Assemblies.** The feel spring and magnetic brake assemblies, attached to the fuselage and a riveted arm assembly of the pilot's SPAD (one directional feel spring and magnetic brake assembly), provide trim for both crew stations.

(a) The feel spring assembly, a spring loaded device, overrides the magnetic brake when locked by moving the cyclic stick against the spring.

(b) The magnetic brake assembly disengages to enable tracking of the cyclic stick position and reengages to lock the new trim position.

(5) **Directional Mechanical Control Linkage.** The directional mechanical control linkage is transmitted through the lower part of the fuselage, left of the centerline, to the aft side equipment bay, then along the top of the aft fuselage and tail boom section, then up the leading edge side of the vertical stabilizer to the directional servocylinder. Movement of the directional pedals is transmitted to the tail rotor assembly for anti-torque (yaw) and directionally controlled flight of the helicopter.

(6) **Directional Servocylinder.** The directional servocylinder, horizontally mounted on top of the tail rotor gearbox on the vertical stabilizer, provides hydraulic power to assist the directional movements of the directional mechanical control linkage.

(7) **Tail Rotor Swashplate Assembly.** The tail rotor swashplate assembly, mounted on the tail rotor gearbox static support, receives and transmits control inputs from the directional pedals to the tail rotor blades via the tail rotor pitch change links. The swashplate assembly consists of a stationary swashplate, a rotating swashplate, an annular double-roll ball bearing assembly, and two sleeve bearings.

(a) The stationary swashplate receives push-pull input from the bellcrank which is attached to the directional servocylinder and the stationary swashplate.

(b) The rotating swashplate, mounted to the double-roll ball bearing assembly above the stationary swashplate, transmits control inputs received from the stationary swashplate to the tail rotor blades via the pitch change link assemblies.

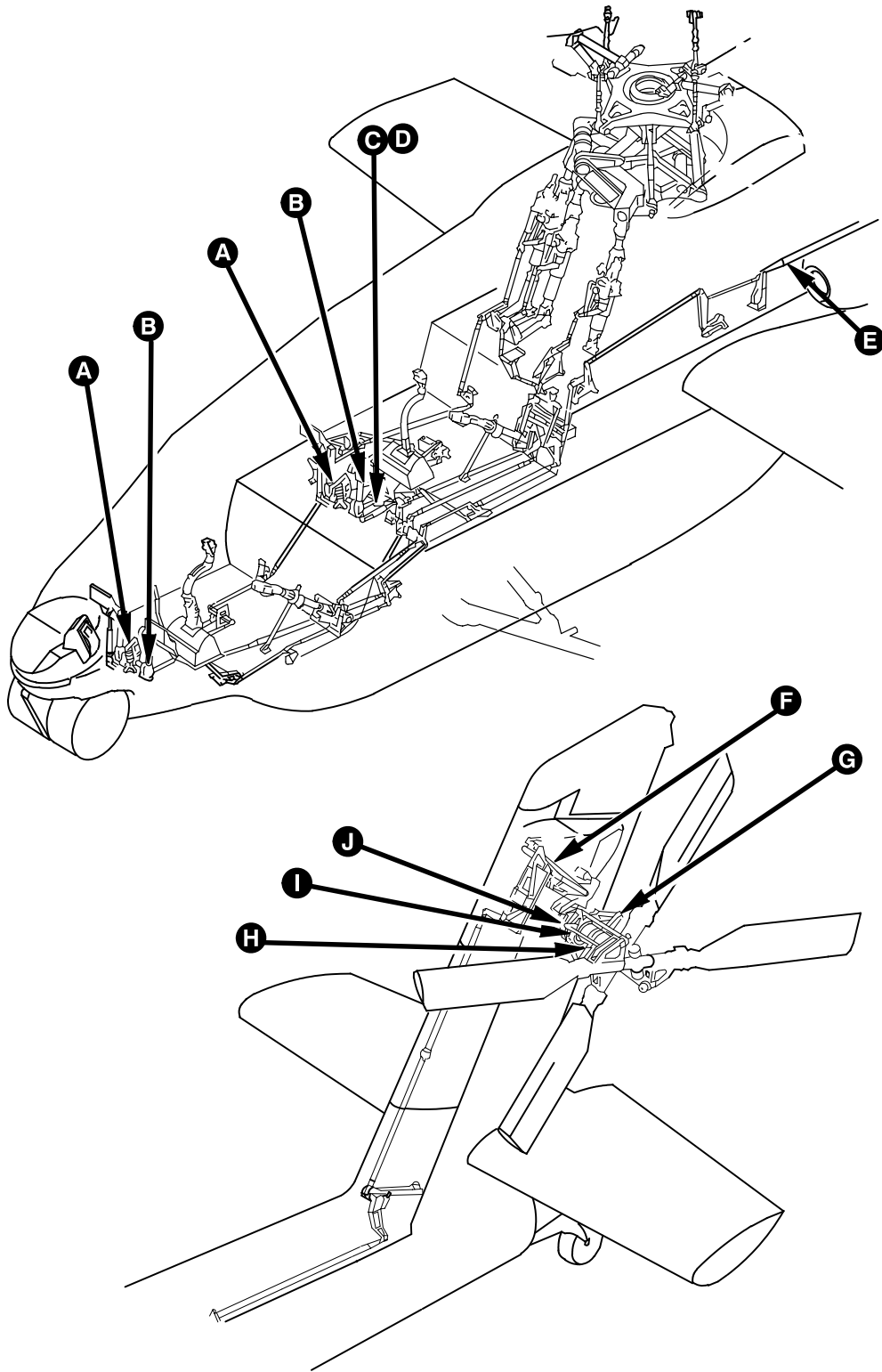
11-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

11-2

(8) **Pitch Change Links.** The pitch change links, mounted between the swashplate assembly (180° apart) and the pitch horns of the tail rotor blades, incorporate two self-aligning bearings, and are nonadjustable.

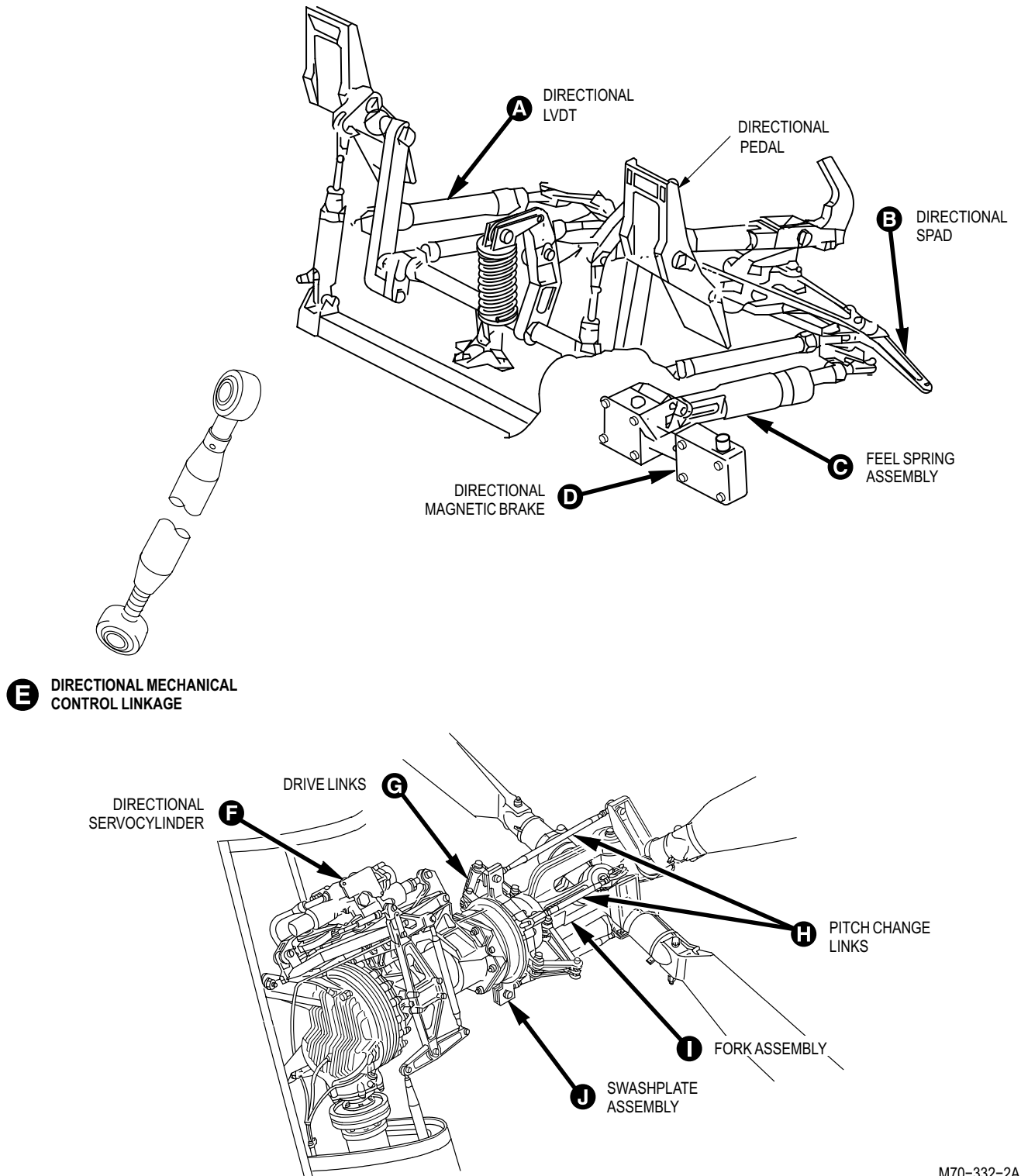
(9) **Drive Links.** The drive links, attached between the rotating swashplate and the tail rotor head assembly, drive the rotating swashplate and are made of aluminum alloy and have sleeve bearings.

(10) **Fork Assembly.** The fork assembly, mounted to the output shaft of the tail rotor gearbox, provides mounting points for the tail rotor hubs and is made of titanium steel. The inboard section of the fork assembly consists of two integral clevises 180° apart which provide attachment for the drive links, and a curving coupling to provide positive interface with the tail rotor gearbox output shaft.



M70-332-1A

Figure 11-5. Directional Flight Control System Major Component Location (Sheet 1 of 2)



M70-332-2A

Figure 11-5. Directional Flight Control System Major Component Location (Sheet 2 of 2)

f. **DASE.** DASE consists of a pilot **ASE** panel, two excitation transformers (**ACA**) or a transformer filter box assembly (**ACB**), the DASEC, four servocylinders, nine LVDTs, and eight SPADs.

(1) **Pilot ASE Panel.** The pilot **ASE** panel (fig. 11-6), located in the left-hand side of the pilot console, provides the DASE system with five magnetic switches (**PITCH, YAW, ROLL, ATTD/HOVER HOLD, and TST BUCS**) for system control and testing.

(2) **Excitation Transformers (ACA).** The excitation transformers (fig. 11-7), located in the aft avionics matrix module in the aft avionics bay, step down 115 VAC to 26 VAC for DASE operation. The excitation transformers are circular, 1.5 inches in diameter, with three electrical leads extending 12 inches out of the transformer case. The electrical leads are colored brown, red, and orange. Input of 115 VAC is applied to the brown and orange leads and an output of 26 VAC is supplied from the red and orange leads.

(3) **Transformer Filter Box Assembly (ACB).** The transformer filter box assembly, located in the aft avionics bay near the aft avionics matrix module, steps down and filters 115 VAC to 26 VAC for DASE and BUCS operation.

(4) **DASEC.** The DASEC, mounted in the aft avionics bay, is a solid state LRU and contains replaceable integrated circuit boards. Five connectors are mounted on the front of the DASEC – four connectors are used for helicopter operation and the fifth connector is used for testing.

(5) **Servocylinders.** Three servocylinders (fig. 11-8), located forward of the main transmission, are used for longitudinal (pitch), collective (vertical), and lateral (roll) control of the helicopter. A fourth servocylinder is mounted on the tail rotor gearbox for directional (yaw) control of the helicopter. The servocylinders control the pitch of the main and tail rotor blades either mechanically or electrically. Electrically, the servocylinders are controlled by DASE or BUCS inputs.

(6) **LVDTs.** The longitudinal (pitch) and lateral (roll) LVDTs (fig. 11-9) are attached to the pilot and CPG cyclic sticks. The collective (vertical) LVDTs are attached to the pilot and CPG collective sticks. The directional (yaw) LVDTs are attached to the pilot and CPG directional pedals. The pilot has an additional LVDT attached to the collective stick for main rotor engine speed droop. The LVDT sends an electrical signal to the DASEC that is proportional to flight control movement.

(7) **SPADs.** One SPAD (fig. 11-10) is located under the floor of each crew station. The longitudinal (pitch) and lateral (roll) SPADs are attached to cyclic stick mechanical control linkages. The collective (vertical) SPADs are attached to the pilot and CPG collective stick mechanical control linkages. The directional (yaw) SPADs are attached to the pilot and CPG directional pedal mechanical control linkages. SPADs are used to disconnect the mechanical flight control linkage and activate BUCS when a respective flight control linkage becomes jammed and the shear pin is severed. Each SPAD consists of a shear pin, a retainer, a switch assembly, a cam assembly and a spring assembly. The retainer is used to hold the shear pin in place. The switch assembly consists of two switches which test and activate BUCS. The cam engages the switch assembly. The spring assembly holds the cam assembly in the engaged position.

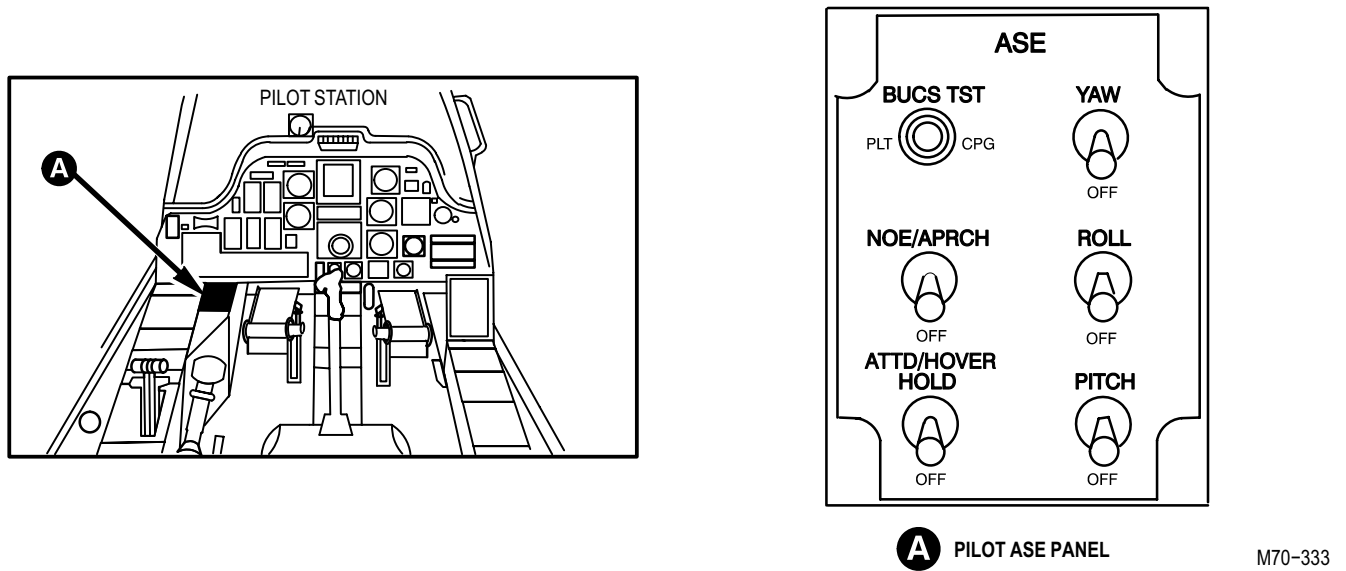


Figure 11-6. ASE Panel Location

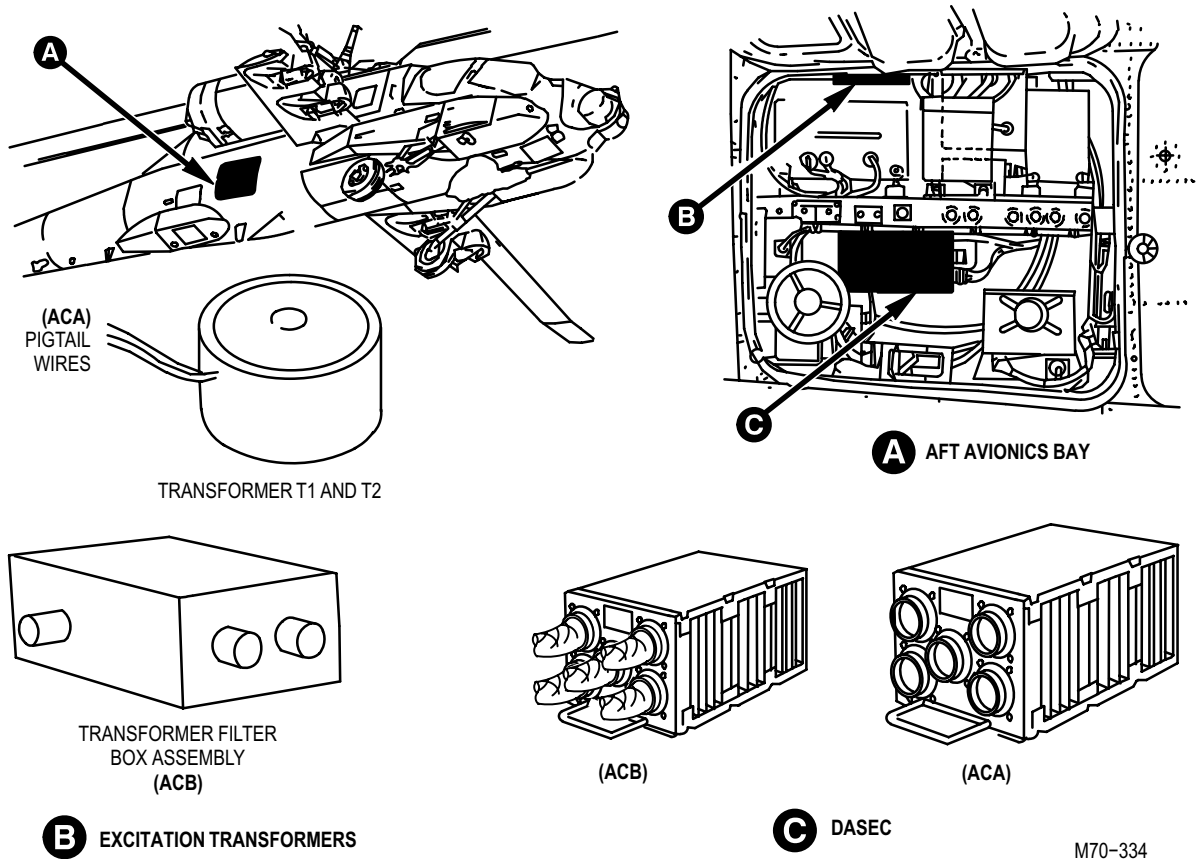


Figure 11-7. Excitation Transformer, Transformer Filter Box Assembly and DASEC Locations

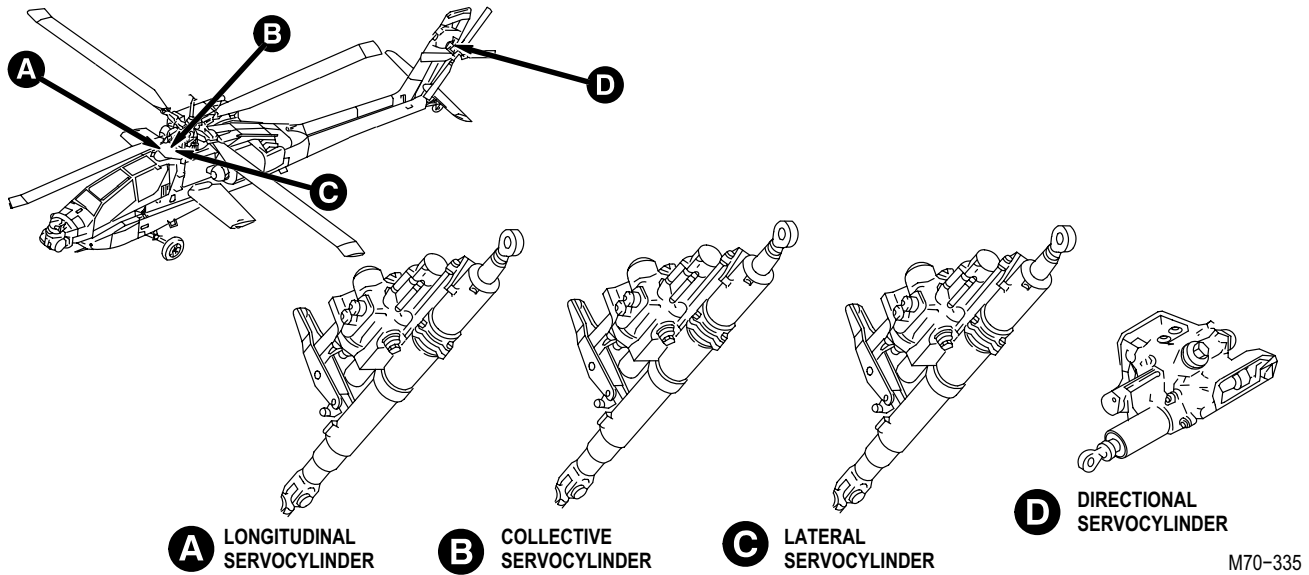


Figure 11-8. Servocylinder Locations

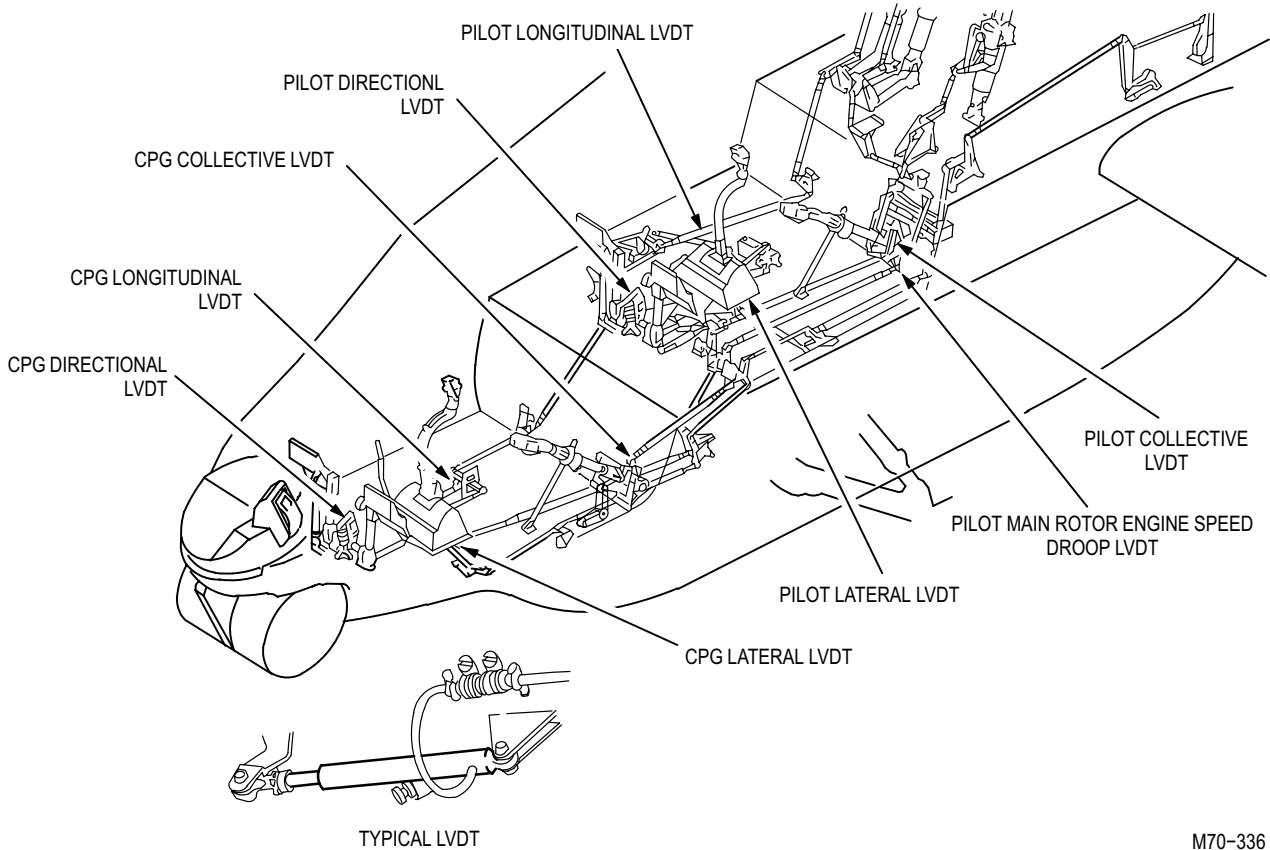


Figure 11-9. LVDT Locations

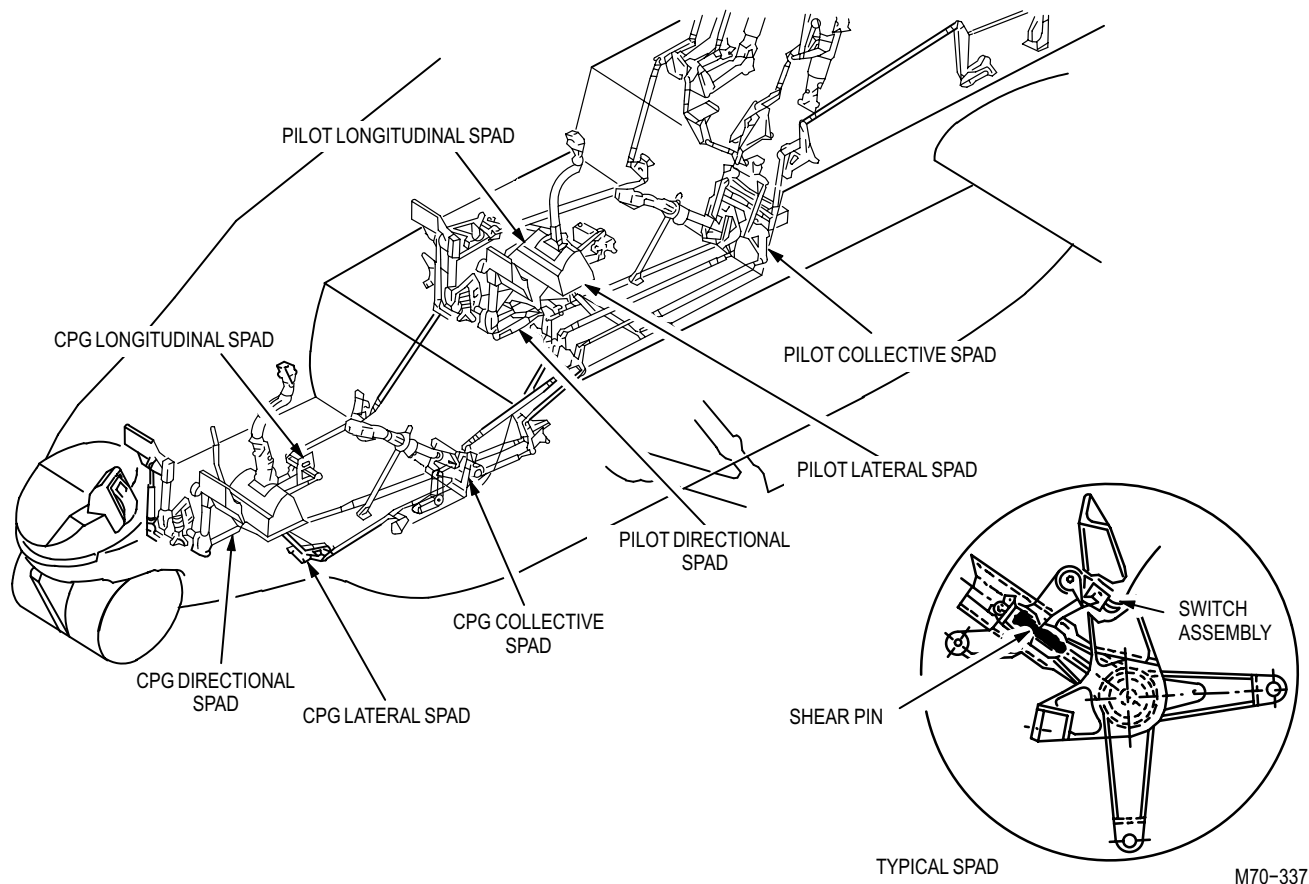


Figure 11-10. SPAD Locations

g. **SCS.** The SCS (fig. 11-11) consists of the stabilator, two pitch rate gyros, two airspeed transducers, the stabilator cylinder assembly, SCUs, stabilator position transducer, **STAB POS** indicators, and the stabilator relay box.

(1) **Stabilator.** The stabilator, located at the base of the vertical stabilizer and mounted to the tail boom, is a wing shaped airfoil and is automatically controlled by two independent electrical control systems: automatic mode (DASE) and manual mode. The SCUs position the stabilator automatically at or above 30 knots forward airspeed.

(2) **Pitch Rate Gyros.** Pitch rate gyro 1 is mounted in the left side of the aft equipment bay. Pitch rate gyro 2 is mounted in the right side of the aft equipment bay. They provide pitch rate signals to the SCUs. The pitch rate gyros are sealed LRUs which are mounted in the pitch axis of the helicopter. When the helicopter deviates from straight and level flight, the gyros develop a signal proportional to the rate and direction of deviation.

(3) **Airspeed Transducers.** Airspeed transducer 1 is mounted in the left side of the aft equipment bay. Airspeed transducer 2 is mounted in the right side of the aft equipment bay. They are sealed LRUs that develop an electrical signal which is proportional to airspeed.

(4) **Stabilator Actuator Assembly.** The stabilator actuator assembly attaches to the tail boom and the stabilator at left butt line 3.5 and positions the stabilator in response to commands from the SCUs. The stabilator actuator assembly consists of two tandem linear actuators mounted back-to-back. Linear actuator 2 comprises the upper half of the actuator assembly when mounted. Linear actuator 1 comprises the bottom half of the actuator assembly. Each linear actuator contains a reversible dc motor, a potentiometer, and internal retract and extend limit switches.

(5) **SCUs.** SCU 1 and 2, located in the left side of the aft equipment bay, control the position of the stabilator in the automatic mode of operation. The SCU is a solid state LRU with four electrical connectors and a handle on the front.

(a) Engagement of the SCU is automatic when electrical power is applied to the helicopter if the ac power monitor and the SCU program monitor are both satisfied, and if 26 VAC demodulator reference is present.

(b) The SCU program monitor checks the feedback position of the two motor actuators at 80 and 110 knots. If the feedback position at 80 knots is more than 30° (8.39 ± 0.4 VDC), the engage logic is commanded to a fail condition within 1.25 seconds. If the feedback position at 110 knots is more than 20° (1.68 ± 0.4 VDC), the engage logic is commanded to a fail condition within 150 milliseconds.

(6) **Stabilator Position Transducer.** The stabilator position transducer, centrally mounted between the stabilator and the fuselage at the pivot point of the stabilator, is a cylindrical synchro transmitter which monitors stabilator position and provides a signal to the pilot and CPG **STAB POS** indicators.

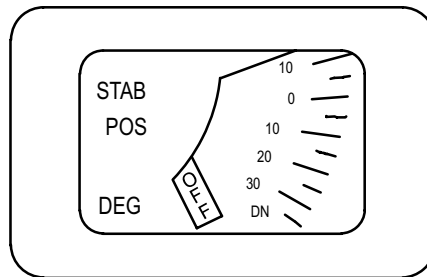
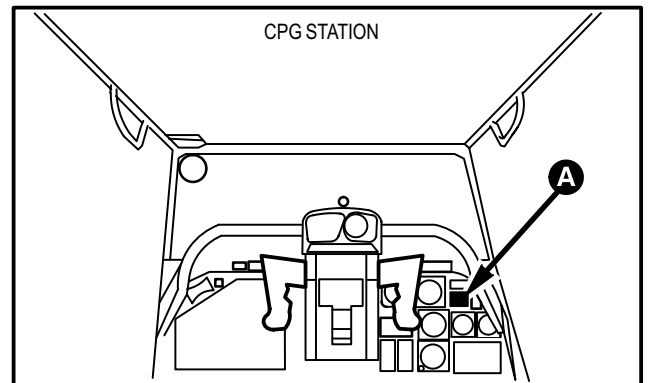
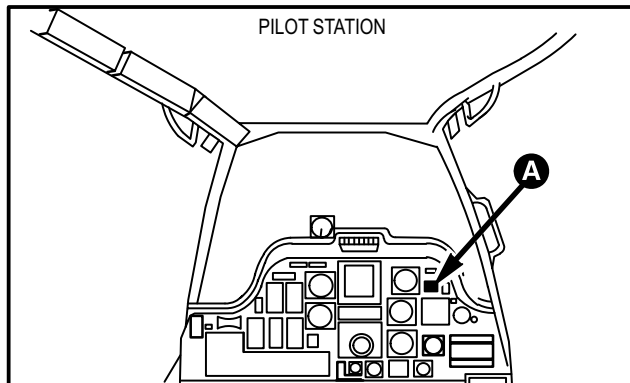
(7) **STAB POS Indicators.** **STAB POS** indicators, located in the upper right side of each crew station, provide a visual indication of stabilator trailing edge position as commanded by the stabilator position transducer.

(8) **Stabilator Relay Box.** The stabilator relay box, mounted in the left side of the aft equipment bay, provides mounting for the SCS relays and contains the following SCS relays:

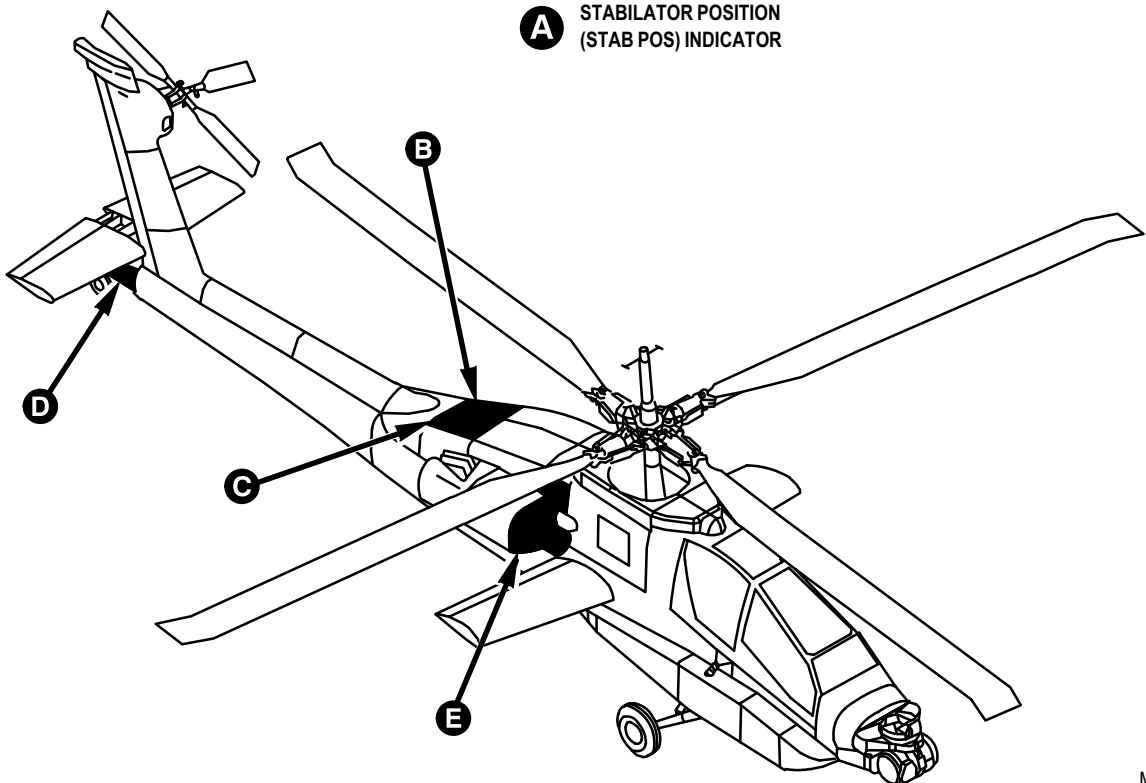
- AUTO/MAN (auto/manual) relay (K1-1/2).
- Manual select relay (K1-3/4).
- Manual control relay (K1-5).
- Auto reset relay (K1-6).
- Approach relay 1 (K1-7).

11-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

11-2



A STABILATOR POSITION (STAB POS) INDICATOR



M70-338-1A

Figure 11-11. SCS Major Component Location (Sheet 1 of 4)

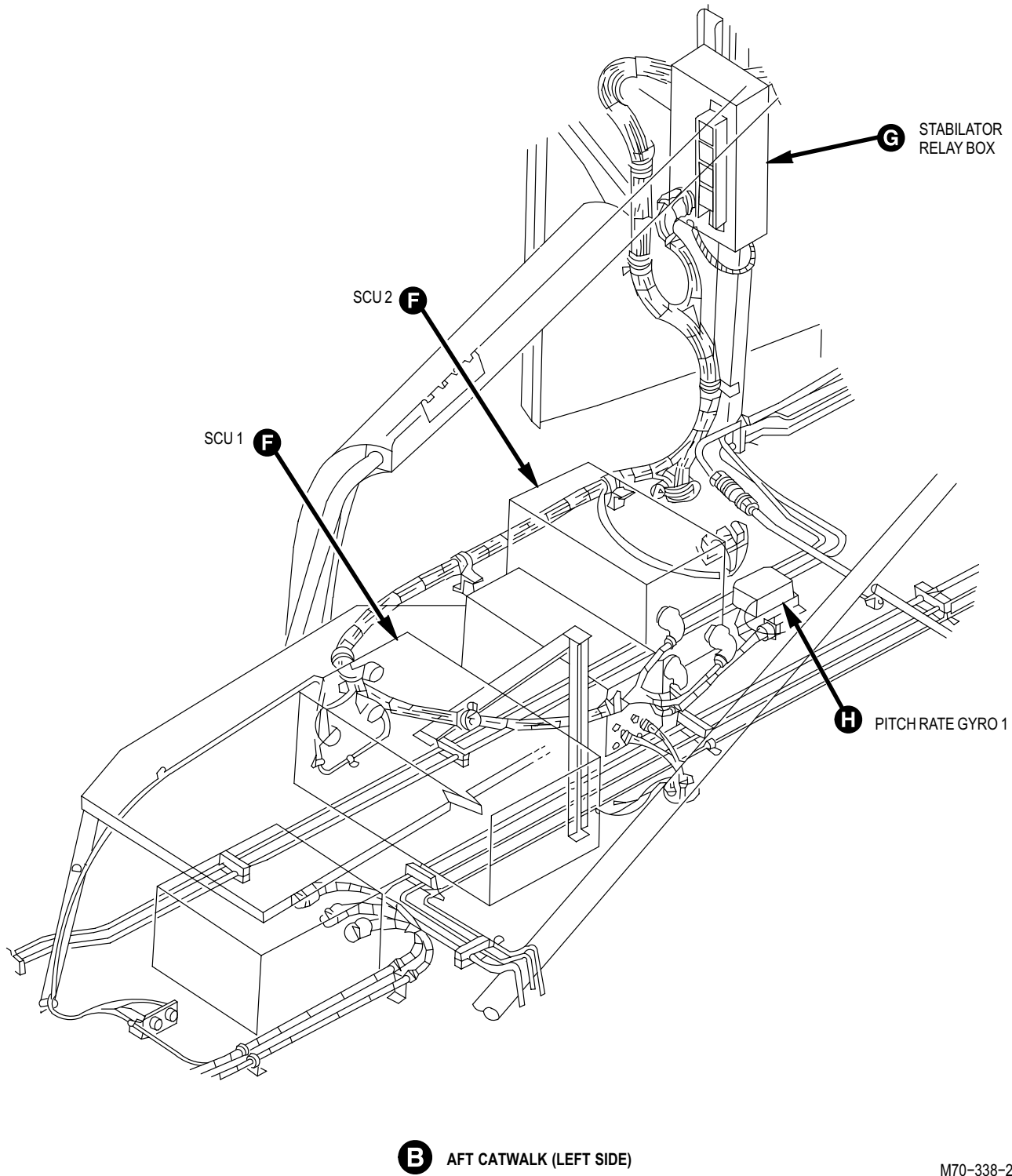
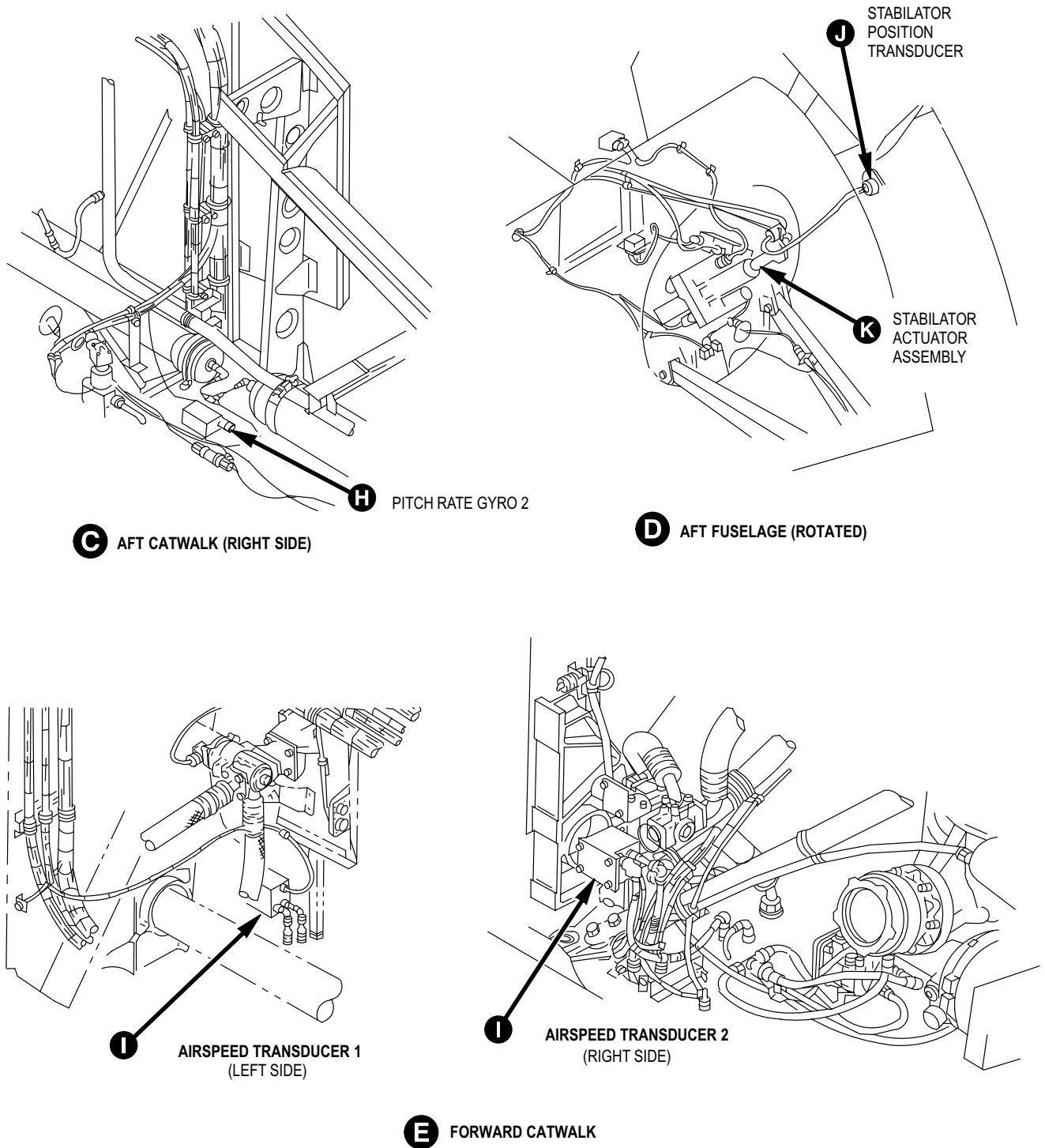


Figure 11-11. SCS Major Component Location (Sheet 2 of 4)

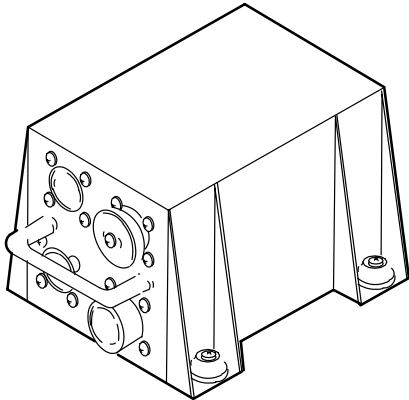
11-2. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

11-2

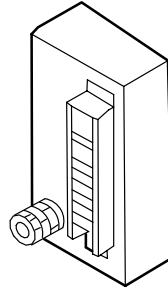


M70-338-3A

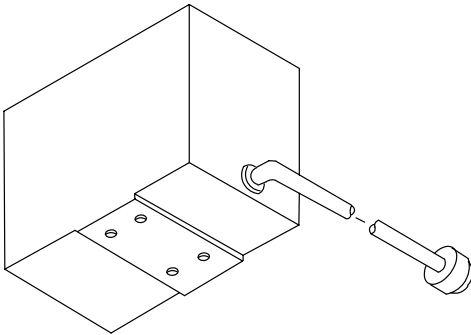
Figure 11-11. SCS Major Component Location (Sheet 3 of 4)



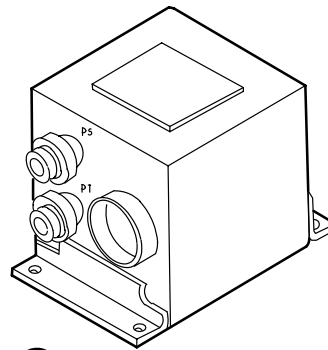
F SCU



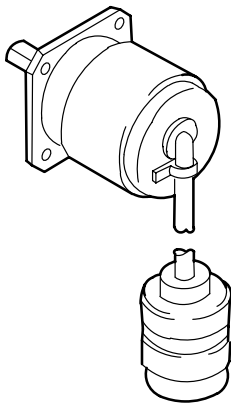
G STABILATOR RELAY BOX



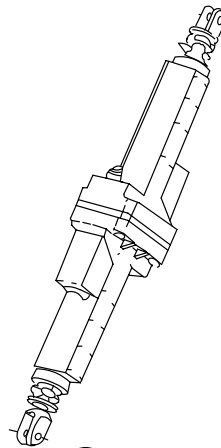
H PITCH RATE GYRO



I AIRSPEED TRANSDUCER



J STABILATOR POSITION TRANSDUCER



K STABILATOR ACTUATOR ASSEMBLY

M70-338-4

Figure 11-11. SCS Major Component Location (Sheet 4 of 4)

11-3. EQUIPMENT DATA

11-3

DASE Equipment (force required to break SPAD and activate BUCS)

Pilot's pitch SPAD	30 to 52 lbs.
Pilot's roll SPAD	18 to 32 lbs.
Pilot's yaw SPAD	54 to 103 lbs.
Pilot's collective SPAD	27 to 56 lbs.
CPG's pitch SPAD	35 to 80 lbs.
CPG's roll SPAD	22 to 38 lbs.
CPG's yaw SPAD	65 to 120 lbs.
CPG's collective SPAD	32 to 66 lbs.

Stabilator Wing Dimensions

Length	10.7 feet
Width at tipcord	2.6 feet
Width at rootcord	3.5 feet

11-4. EQUIPMENT CONFIGURATION

11-4

DASE (**ACB**) excitation transformers are housed in a LRU with four filters. The filters provide electro-magnetic interference (EMI) hardening for the DASEC.

11-5. SAFETY, CARE AND HANDLING OF EQUIPMENT

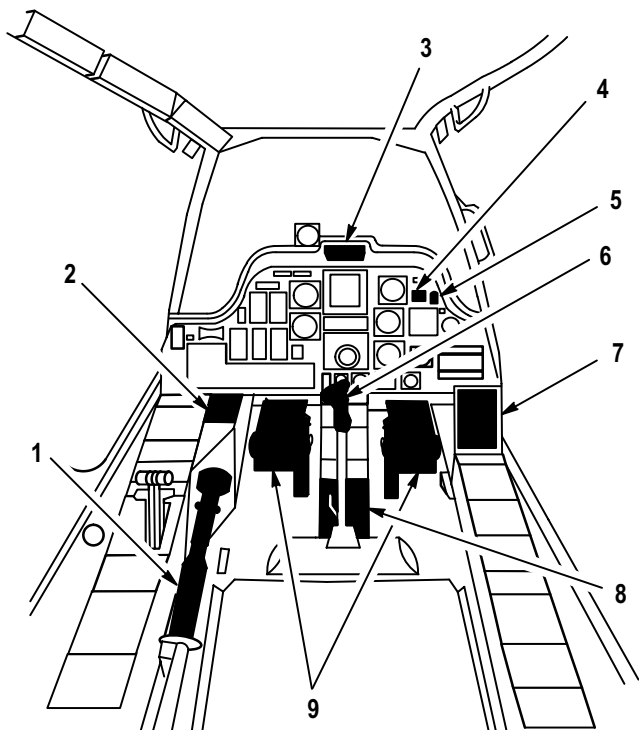
11-5

Not applicable.

11-6. CONTROLS AND INDICATORS

11-6

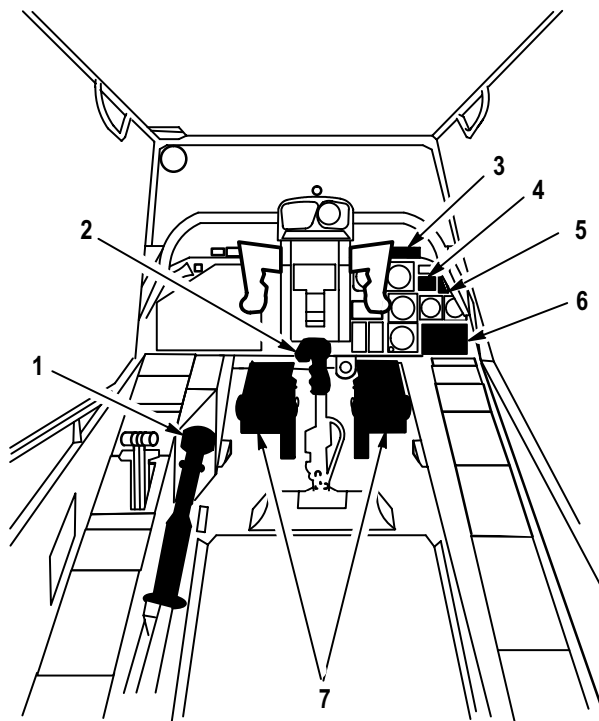
The flight control system receives mode selects and remote switch inputs from various controls located in the pilot station (fig. 11-12) and CPG station (fig. 11-13). Table 11-1 provides a listing of the controls, switches and associated indicators pertaining to the flight control system along with a description of their function.



- 1. PILOT COLLECTIVE STICK
- 2. PILOT ASE PANEL
- 3. PILOT MASTER CAUTION / WARNING PANEL
- 4. PILOT STAB POS INDICATOR
- 5. PILOT STAB DEG / NOM SPD PLACARD PANEL
- 6. PILOT CYCLIC STICK
- 7. PILOT CAUTION / WARNING PANEL
- 8. PILOT PEDAL ADJUSTMENT PLACARD PANEL
- 9. PILOT DIRECTIONAL PEDALS

M70-307A

Figure 11-12. Pilot Station



- 1. CPG COLLECTIVE STICK
- 2. CPG CYCLIC STICK
- 3. CPG MASTER CAUTION / WARNING PANEL
- 4. CPG STAB POS INDICATOR
- 5. CPG STAB DEG / NOM SPD PLACARD PANEL
- 6. CPG CAUTION / WARNING PANEL
- 7. CPG DIRECTIONAL PEDALS

M70-308A

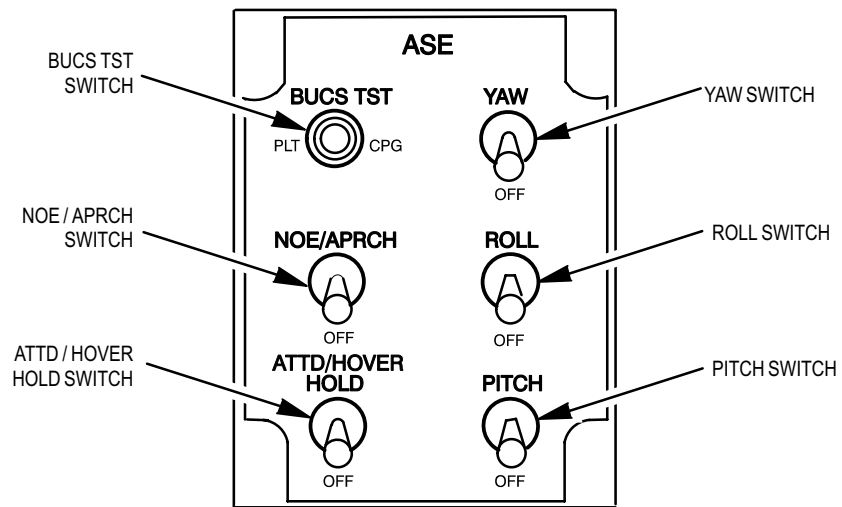
Figure 11-13. CPG Station

Table 11-1. Flight Control System Controls and Indicators

Pilot ASE Panel		
SWITCH/INDICATOR	POSITION	FUNCTION
YAW single-throw, 2-position magnetic switch	YAW	Activates the heading attitude reference set (HARS) yaw signal in DASEC to position directional servocyliner.
	OFF	De-energizes YAW switch.
ROLL single-throw, 2-position magnetic switch	ROLL	Activates HARS roll signal in DASEC to position lateral servocyliner.
	OFF	De-energizes ROLL switch.

Table 11-1. Flight Control System Controls and Indicators (cont)

Pilot ASE Panel (cont)		
SWITCH/INDICATOR	POSITION	FUNCTION
PITCH single-throw, 2-position magnetic switch	PITCH	Activates HARS pitch signal in DASEC to position longitudinal servocylinder.
	OFF	De-energizes PITCH switch.
ATTD/HOVER HOLD single-throw, 2-position magnetic switch	ATTD/HOVER HOLD	Provides pilot with limited station-keeping or velocity-hold during hover or low speed flight.
	OFF	De-energizes ATTD/HOVER HOLD switch.
NOE/APRCH 2-position toggle switch	NOE/APRCH	Positions stabilator 25° trailing edge down by SCUs below 80 kts.
	OFF	Allows normal automatic mode operation of SCS. Spring-loaded to OFF position.
BUCS TST switch	PLT	Allows pilot to perform a go/no-go check of pilot BUCS.
	CPG	Allows pilot to perform a go/no-go check of CPG BUCS.

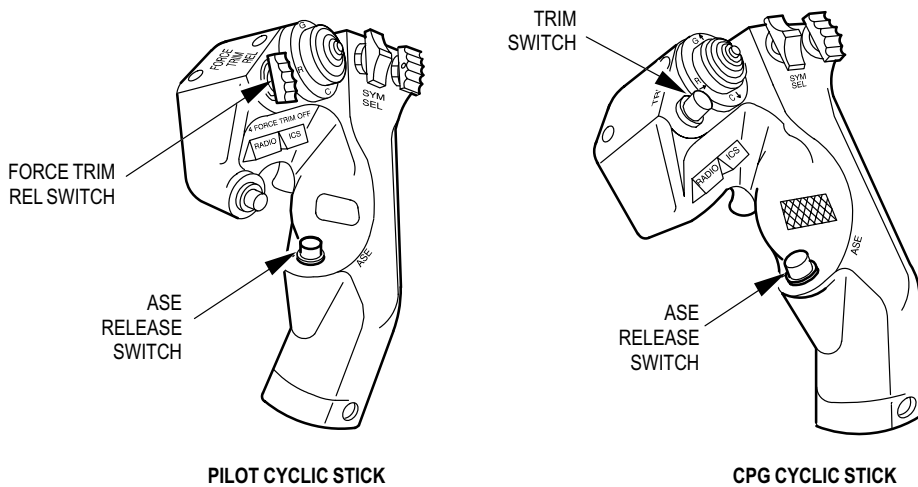


Pilot ASE Panel

M70-309A

Table 11-1. Flight Control System Controls and Indicators (cont)

Cyclic Sticks		
SWITCH/INDICATOR	POSITION	FUNCTION
FORCE TRIM REL 3-position switch (pilot only)	FORCE TRIM OFF	Disengages trim system, a permanent position.
	ON	Engages trim system, a permanent position.
	R	Releases magnetic brakes during maneuvering of helicopter, or establishes new neutral flight control position. A momentary-contact position, spring-loaded to ON position.
TRIM release 2-position switch (CPG only)		Release to engage trim system. Releases magnetic brakes when pressed, allows CPG to establish new stick position.
ASE release spring-loaded button switch		Releases YAW , ROLL and PITCH switches, located on the ASE panel, to return to OFF position.



M70-310

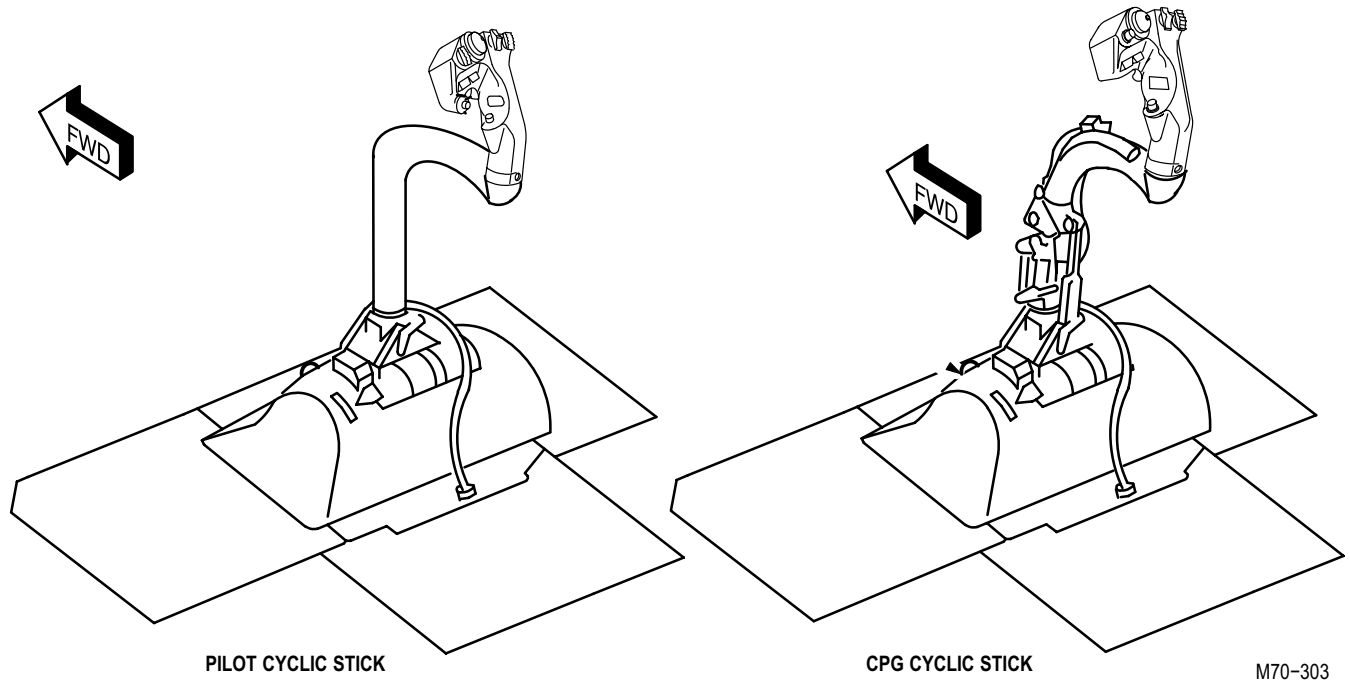
Cyclic Sticks

Cyclic Stick Assembly		
SWITCH/INDICATOR	POSITION	FUNCTION

Cyclic Stick

Movement right and left controls lateral movement of the helicopter.

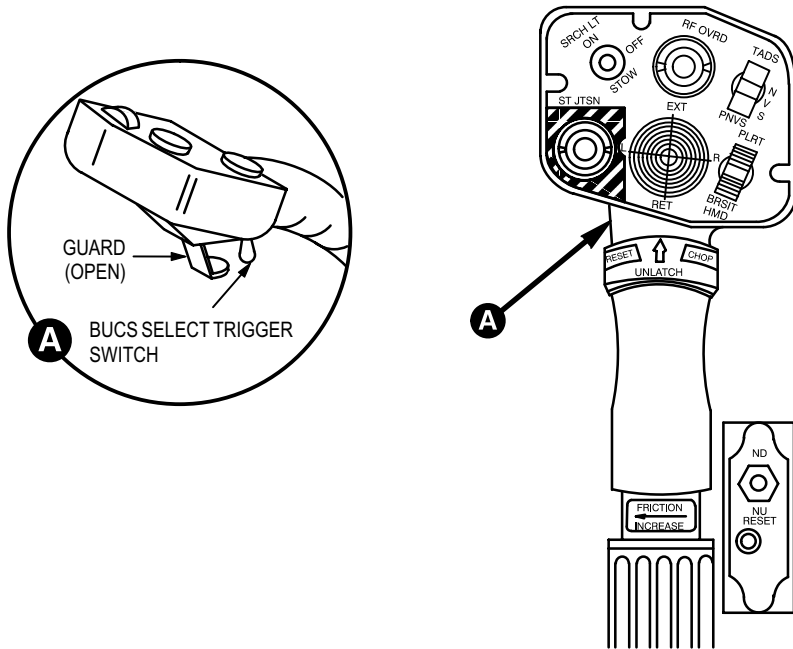
Table 11-1. Flight Control System Controls and Indicators (cont)



Cyclic Stick Assembly

Collective Stick and Stabilator Manual Control Panel		
SWITCH/INDICATOR	POSITION	FUNCTION
BUCS select trigger switch (CPG only)		Press to transfer BUCS control from pilot's to CPG's LVDT when mechanical linkage is severed. Also tests CPG's BUCS when helicopter is on the ground and rotor brake is on.
ND/NU 3-position toggle switch, spring-loaded to off (center) position	NU (Nose Up)	Disengages automatic mode of operation and moves stabilator to desired attitude manually.
	ND (Nose Down)	Disengages automatic mode of operation and moves stabilator to desired attitude manually.
RESET pushbutton		Press to disable audio warning tone.
		Press to engage automatic mode if audio warning tone temporary malfunction.

Table 11-1. Flight Control System Controls and Indicators (cont)



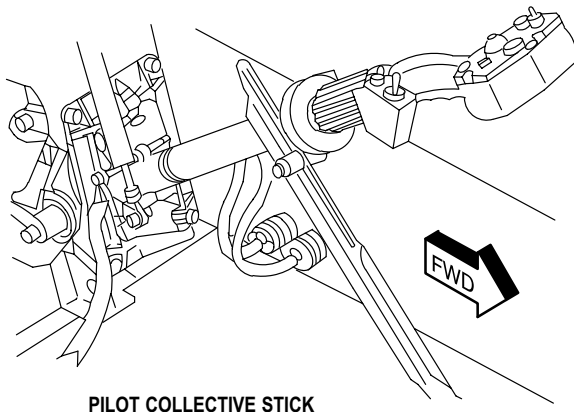
M70-316

Collective Stick and Stabilator Manual Control Panel

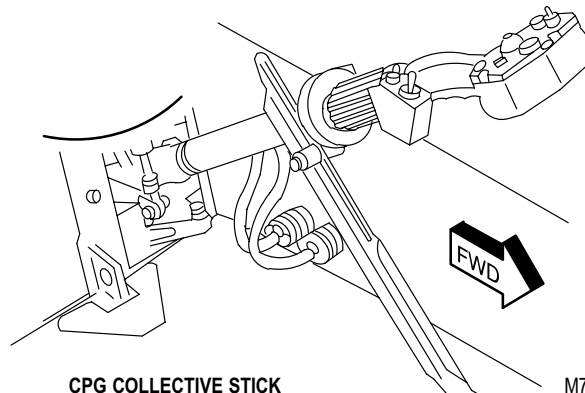
Collective Stick Assembly		
SWITCH/INDICATOR	POSITION	FUNCTION

Collective Stick

Movement up or down controls vertical movement of the helicopter



PILOT COLLECTIVE STICK



CPG COLLECTIVE STICK

M70-306

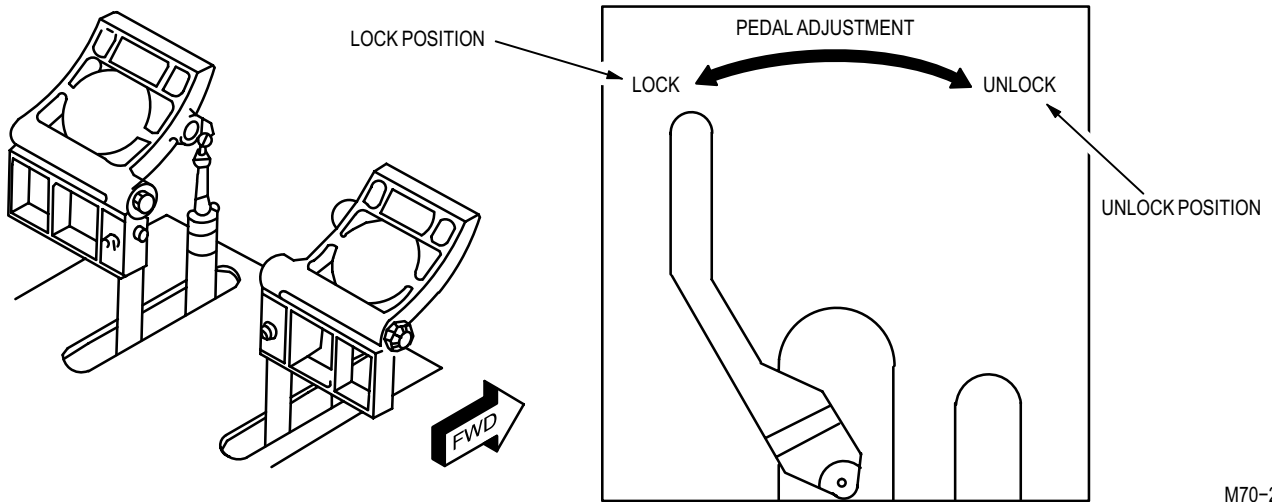
Collective Stick Assembly

Table 11-1. Flight Control System Controls and Indicators (cont)

Directional Pedals		
SWITCH/INDICATOR	POSITION	FUNCTION

Pedals

Controls directional movement of the helicopter by a push-pull action.



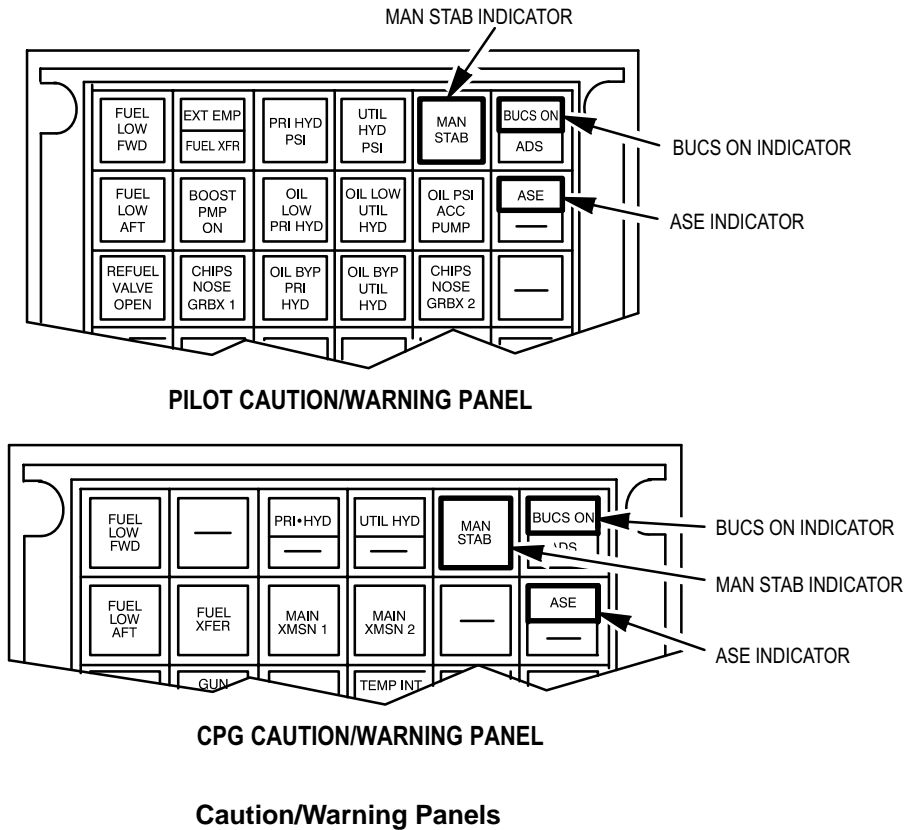
M70-297

Directional Pedals and Pilot Directional Pedal Placard

Caution/Warning Panels		
SWITCH/INDICATOR	POSITION	FUNCTION

ASE indicator	AMBER	Lights when one or more of the ASE switches are OFF and/or one or more of the ASE modes have failed.
BUCS ON indicator	AMBER	Lights when BUCS is engaged.
MAN STAB indicator	AMBER	Lights when SCS failure and/or airspeed is below 80 knots while pilot or CPG manually repositions stabilator.

Table 11-1. Flight Control System Controls and Indicators (cont)



M70-311A

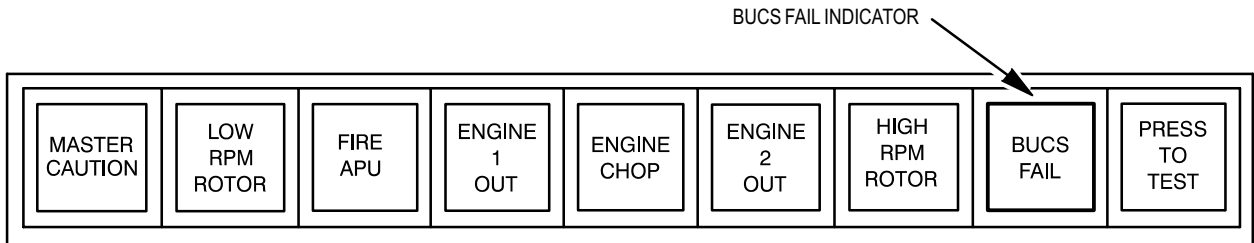
Master Caution/Warning Panel

SWITCH/INDICATOR	POSITION	FUNCTION
------------------	----------	----------

BUCS FAIL indicator

Lights when one or more of the following BUCS components have failed: (control position transducer failure or misadjustment, flight control actuator malfunction, BUCS tracer wire failure, DASEC NO-GO, BUCS select trigger depressed, BUCS circuit breaker out, no ac power to the DASEC, and no primary hydraulic pressure).

Table 11-1. Flight Control System Controls and Indicators (cont)

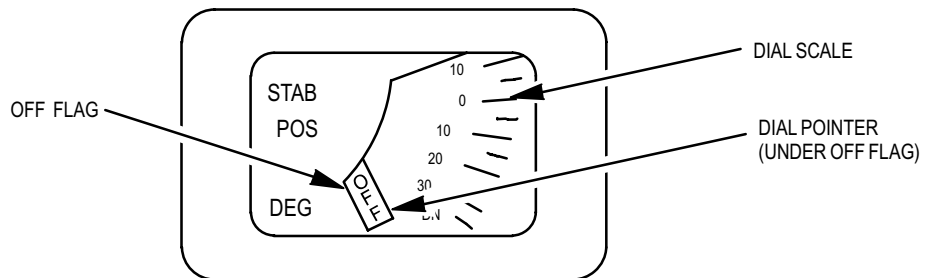


M70-317

Master Caution/Warning Panel

STAB POS Indicator		
SWITCH/INDICATOR	POSITION	FUNCTION

Dial scale	Provides visual indication of stabilator trailing edge from 35° to 10° in 5° increments.
Dial pointer	Indicates position of stabilator trailing edge as commanded by the stabilator position transducer.
OFF flag	Covers dial pointer when inoperative. Retracts out of sight to expose dial pointer when power is applied.



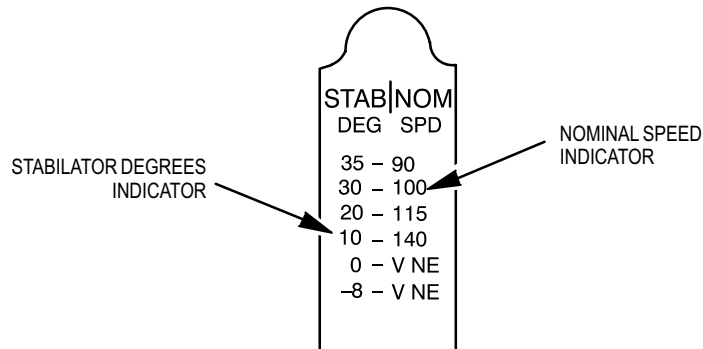
M70-323

STAB POS Indicator

STAB DEG/NOM SPD Placard Panel		
SWITCH/INDICATOR	POSITION	FUNCTION

STAB DEG/NOM SPD indicators	Provides visual indication of stabilator position in degrees in reference to aircraft airspeed.
------------------------------------	---

Table 11-1. Flight Control System Controls and Indicators (cont)



M70-324

STAB DEG/NOM SPD Placard Panel

SECTION II. THEORY OF OPERATION

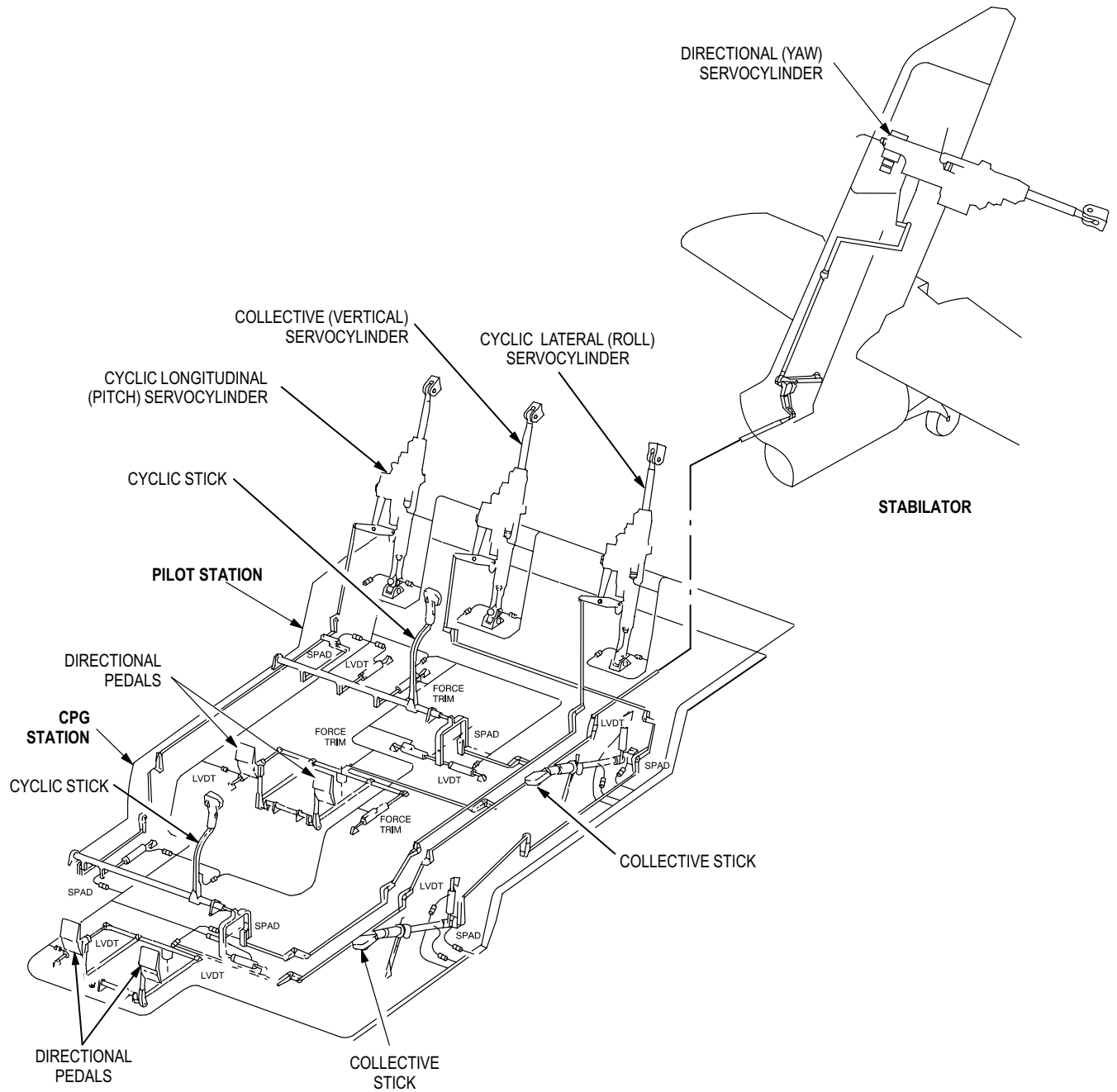
a. **Flight Control System.** The flight control system (fig 11-14) transmits input commands to the main rotor, tail rotor, and stabilator for flight control of the helicopter. Flight control of the helicopter encompasses longitudinal (forward and back), lateral (sideways), collective (up and down), and directional (heading) controls. These controls center around the pitch, roll, and yaw axis (pitch axis has two inputs: cyclic stick longitudinal control, and stabilator pitch movements). All control movements, except stabilator, are assisted by hydraulic servocylinders. The stabilator has two tandem (back to back) electrically actuated servo motors.

(1) Two helicopter flight control sources are provided: mechanical flight controls (for example: control rods and bellcranks) and BUCS (fly-by-wire). SPADs are used to disconnect mechanical flight control linkage and reestablish flight control via BUCS activation. When mechanical flight controls jam, a pull force of approximately 25 to 50 lbs. severs the shear pin and decouples the jammed mechanical flight control. The LVDT(s) then sends electrical control stick displacement signals to the DASEC to control BUCS actuation and response. Mechanical flight control consists of eight SPADs: pilot and CPG longitudinal, lateral, collective, and directional. Cyclic sticks, directional pedals, and collective sticks are linked together via SPAD coupled mechanical linkage.

(2) Cyclic sticks input longitudinal and lateral demands to the main rotor assembly. Collective sticks input vertical demands to the main rotor assembly to increase lift and equally change pitch to the four rotor blades. Directional pedals input anti-torque and directional commands to the tail rotor assembly.

b. **Force Trim System.**

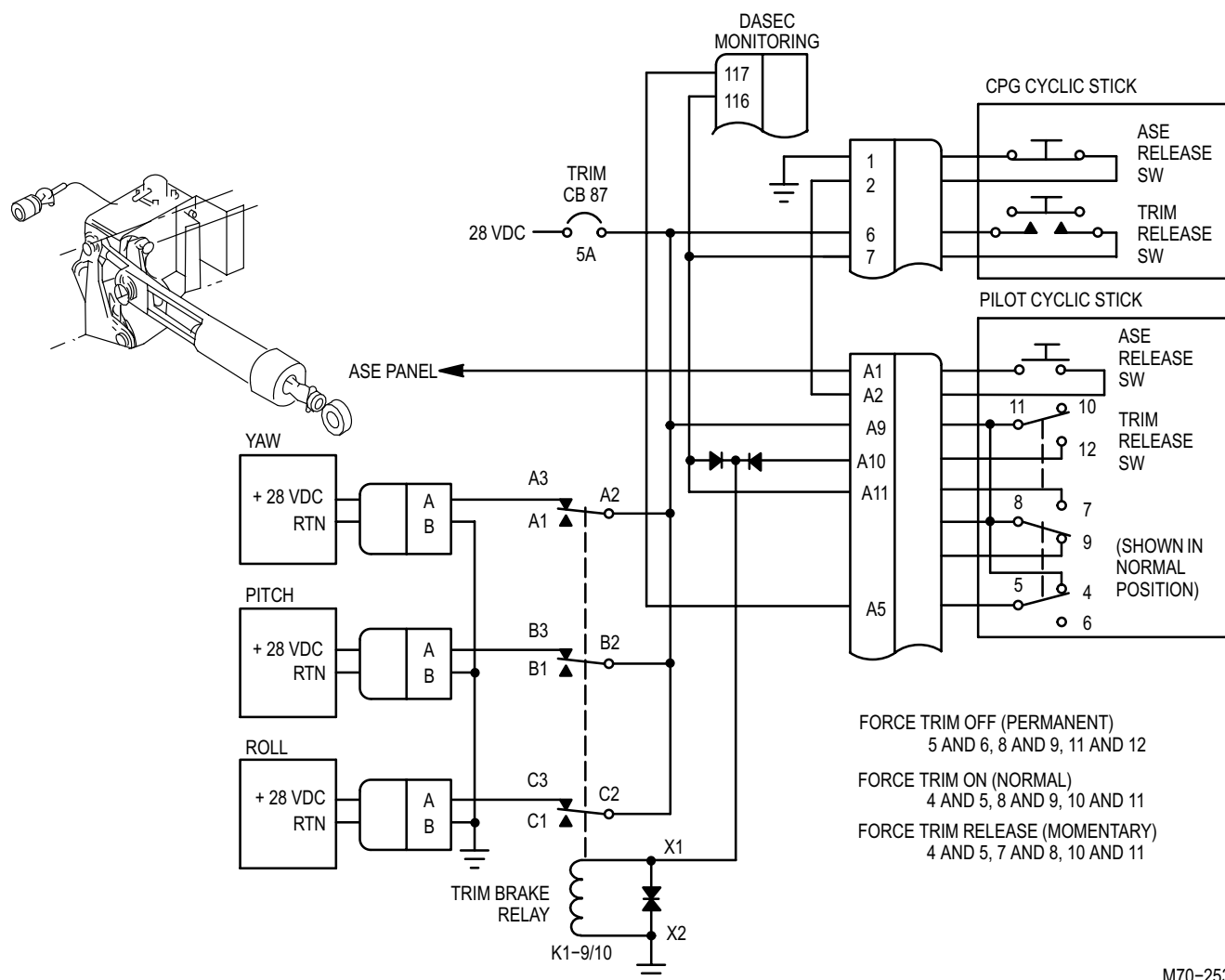
(1) **Purpose.** The purpose of the force trim system is to provide directional, longitudinal and lateral flight trim.



M70-356

Figure 11-14. Flight Control System

(2) **System Operation** (fig. 11-15). The force trim system must be operating for the DASE system to be fully operational. When the pilot's cyclic **FORCE TRIM REL** switch is **OFF**, power is not applied to the magnetic brakes. The pilot and CPG are in full control of the cyclic sticks and directional pedals. When the pilot's cyclic **FORCE TRIM REL** switch is **ON**, force trim power of 28 VDC is applied through the **TRIM** circuit breaker (CB87) to the pilot's cyclic **FORCE TRIM REL** switch, the CPG's cyclic **TRIM** switch, and contacts A2, B2, and C2 of the trim brake relay. Contact A2 mates with A3, B2 mates with B3, and C2 mates with C3, providing 28 VDC to the pitch, roll, and yaw magnetic brakes. The magnetic brakes engage and lock the cyclic sticks and directional pedals in the position selected by the pilot. When the pilot or CPG moves the cyclic stick and directional pedals during force trim operation the feel spring assembly is compressed. The feel spring assembly allows the force trim to be overridden without resetting the force trim. When the cyclic stick and directional pedals are released, the feel trim assemblies return the cyclic sticks and directional pedals to the force trim setting. When the pilot's cyclic **FORCE TRIM REL** switch or the CPG's cyclic **TRIM** switch **RELEASE** position is depressed, a ground is supplied to the trim brake relay. The trim brake relay energizes and removes 28 VDC from the magnetic brakes allowing the pilot and CPG to be in full control of the cyclic sticks and directional pedals. When the switch is released, a new force trim reference is established.



M70-253

Figure 11-15. Force Trim System Functional Block Diagram

11-7. SYSTEM DESCRIPTION (cont)

11-7

c. Collective Flight Control System.

(1) **Purpose.** The purpose of the collective flight control system is to provide mechanical control input to the main rotor system for vertical flight control of the helicopter.

(2) **System Operation.**

(a) The pilot and CPG collective sticks (fig. 11-16) are moved up or down to control vertical movement of the helicopter. The grip assembly is used as a handle to control the collective stick. The friction adjust twist grip and housing assembly locks the collective stick in a desired position. Rotation of the grip (counterclockwise) applies pressure through the housing assembly to the friction guide, holding the collective stick in the desired position. Rotation of the grip (clockwise) releases pressure, allowing the collective stick to move. The guarded BUCS select trigger switch, on the collective stick, is active only in the CPG position. When the guard is raised and the BUCS select trigger switch is depressed, BUCS control is transferred from the pilot to the CPG.

(b) The pilot main rotor engine speed droop LVDT monitors collective stick movements. An electrical signal is developed proportional to collective stick movement and sent to the engine control units to maintain 100 percent rotor rpm. The pilot and CPG collective LVDTs monitor collective stick movements during DASEC, CAS and BUCS operation. An electrical signal is developed proportional to collective stick movement and sent to the collective servocylinder to position the main rotor head.

(c) A 1G spring assembly, connected to each of the collective sticks, provides a force of approximately 54 lbs. to counterbalance the weight of the collective stick.

(d) The SPAD, during normal operation, is part of the mechanical linkage. When jamming prevents normal collective stick movement, a force of 45 foot-lbs. on either collective stick will cause the SPAD shear pin to snap, severing the mechanical linkage and activating BUCS. When the CPG's shear pin snaps, the BUCS select trigger switch on the CPG's collective stick must be closed to activate BUCS. The pilot and CPG caution/warning panels **BUCS ON** indicator lights when BUCS is activated. If BUCS fails, the pilot and CPG master caution/warning panels **BUCS FAIL** indicator lights.

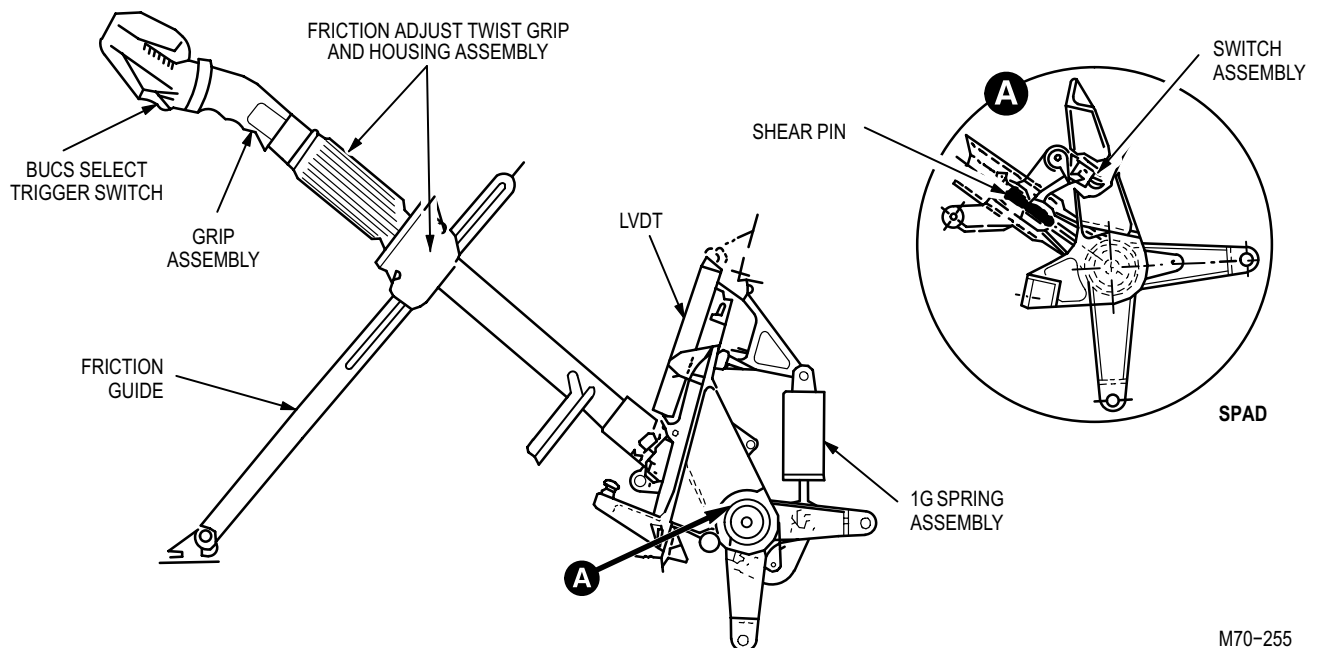
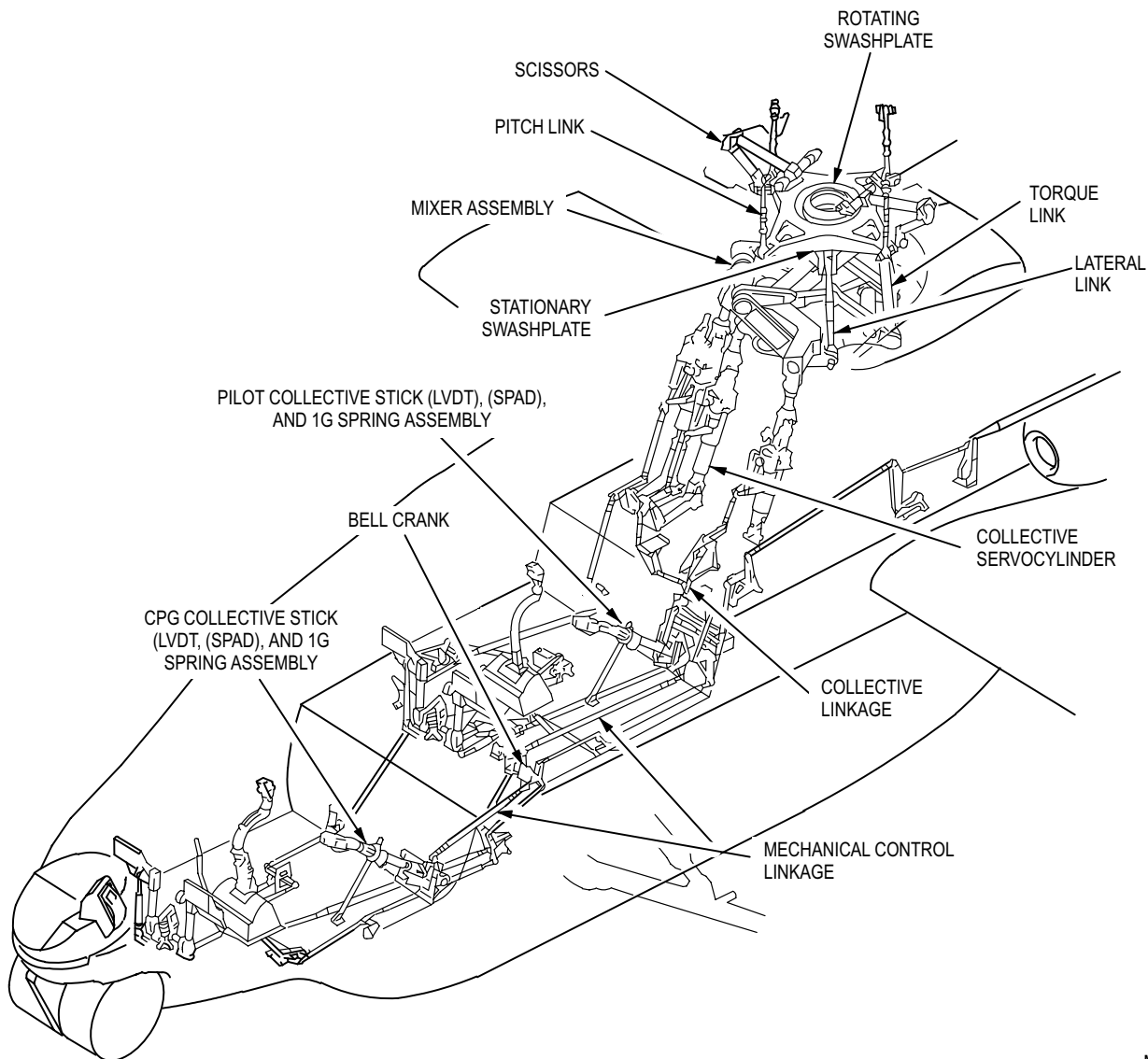


Figure 11-16. Collective Stick Interface Diagram

M70-255

(e) The mechanical control and collective linkage (fig. 11-17) provide an increase or decrease in collective movement to the collective servocylinder. The collective bellcrank provides a pivot point for the mechanical control linkage.

(f) The collective servocylinder, connected to the mixer assembly, hydraulically assists the mechanical linkage by moving the flight controls up or down. The mixer assembly collective bellcrank receives input motion from the collective servocylinder and transmits vertical linear motion to the nonrotating swashplate. An increase in collective mechanical input to the collective servocylinder pivots the collective bellcrank downward. Simultaneously, the two lateral links and torque link moves upward. The combined upward link movements raise the stationary swashplate, equally increasing the blade pitch angle on all four main rotor blades.



M70-254A

Figure 11-17. Collective Flight Control System Interface Diagram

11-7. SYSTEM DESCRIPTION (cont)

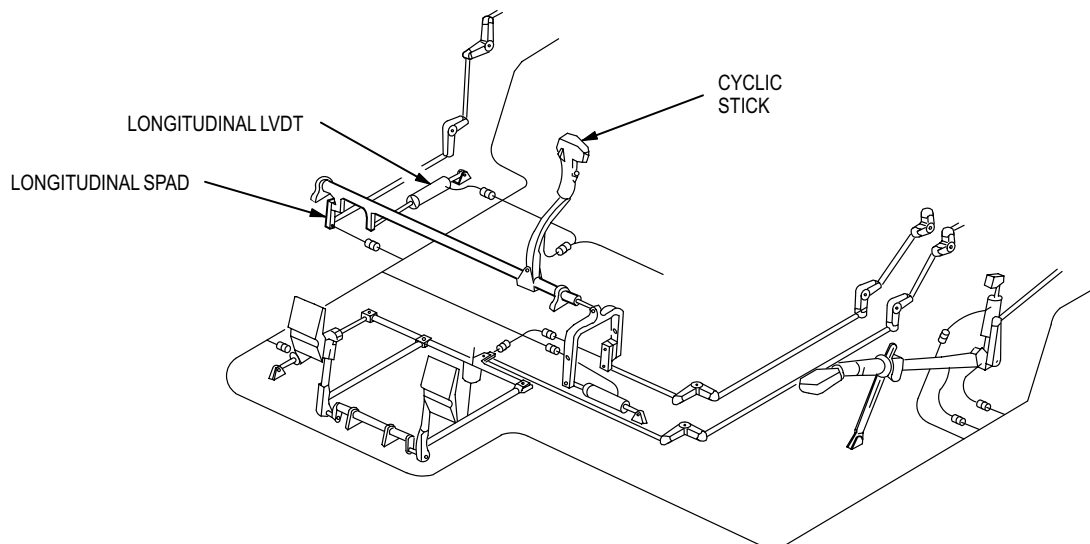
11-7

d. Longitudinal (Cyclic) Flight Control System.

(1) **Purpose.** The purpose of the longitudinal (cyclic) flight control system is to provide mechanical inputs to the main rotor for longitudinal control of the helicopter.

(2) **System Operation.**

(a) The pilot and CPG cyclic sticks (fig. 11-18) are moved forward or aft to control longitudinal movement of the helicopter. The pilot and CPG longitudinal LVDTs monitor cyclic stick movement during DASEC, CAS and BUCS operation. An electrical signal is developed proportional to cyclic stick movement and sent to the longitudinal servocylinder to position the main rotor head. During normal operation, the SPAD is part of the mechanical linkage. When jamming prevents normal cyclic longitudinal stick movement, a force of 30 foot-lbs. on either cyclic control stick causes the SPAD shear pin to snap, severing the mechanical control linkage which activates BUCS. The BUCS select trigger switch, on the CPG's collective stick, must be closed to activate BUCS. When the CPG's shear pin snaps, BUCS is activated and the **BUCS ON** indicator on the pilot and CPG caution/warning panels light. When BUCS fails, the **BUCS FAIL** indicator on the pilot and CPG master caution/warning panels light.

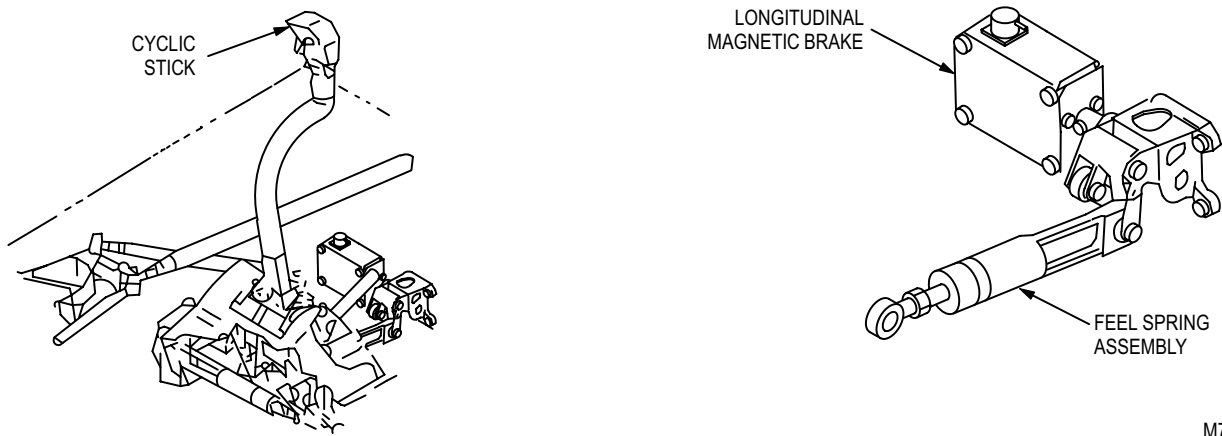


M70-258

Figure 11-18. Cyclic Longitudinal Control System LVDT and SPAD Assemblies

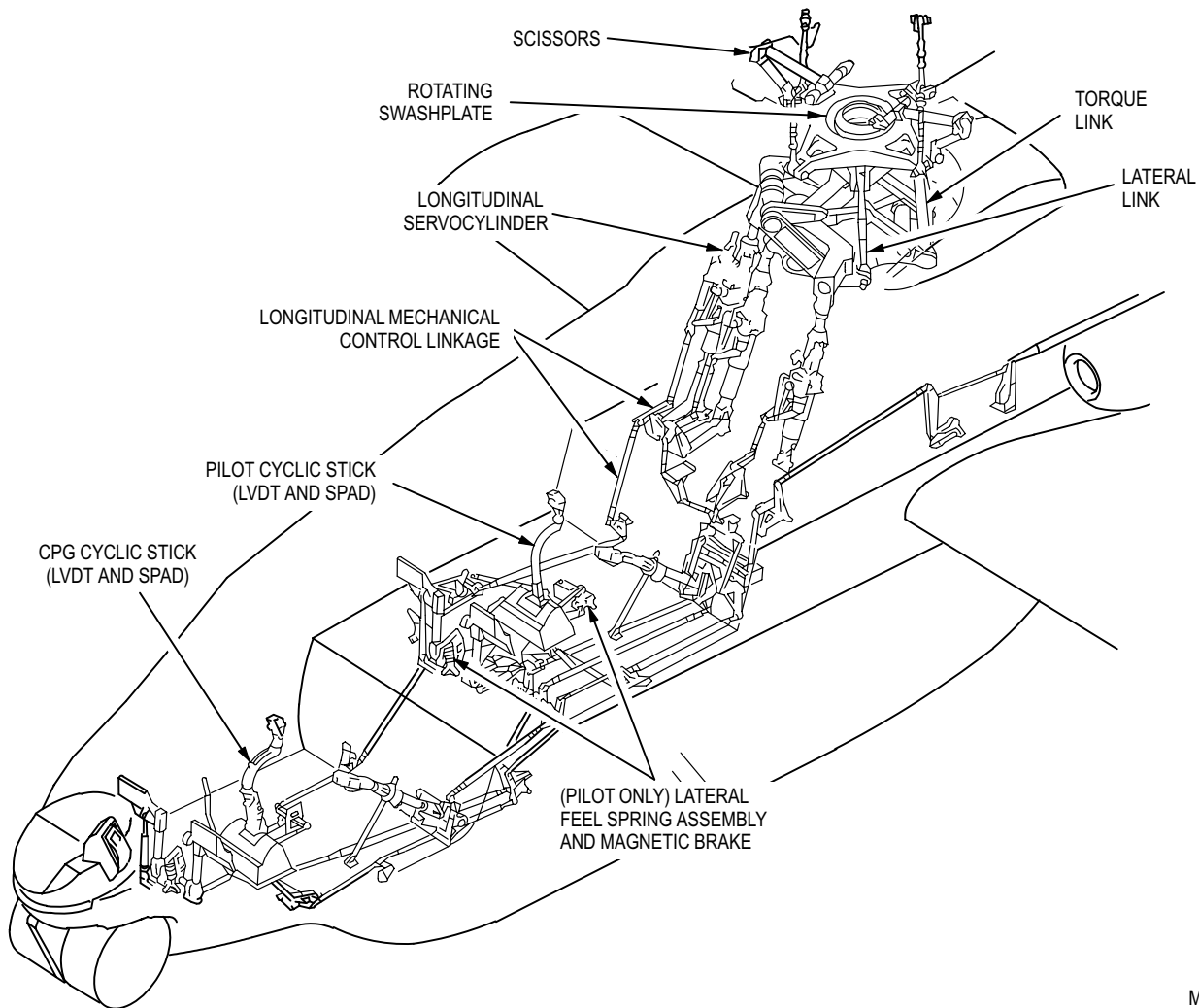
(b) The longitudinal feel spring and magnetic brake assembly (fig. 11-19) are located beneath the pilot's cyclic stick. The longitudinal magnetic brake assembly is a 28 VDC controlled unit that engages to establish a longitudinal trim position. The feel trim assembly is a spring loaded device that overrides the longitudinal magnetic brake assembly when the cyclic stick is moved against the magnetic brake assembly. The feel spring assembly allows cyclic stick inputs to override the longitudinal force trim setting. When the cyclic stick is not engaged against the feel spring assembly, longitudinal flight trim maintains current trim position.

(c) The longitudinal mechanical control linkage (fig. 11-20) provides an increase or decrease in cyclic movement to the longitudinal servocylinder. The longitudinal servocylinder, connected to the mixer assembly, hydraulically assists the mechanical linkage by moving the main rotor swashplate forward or aft, which moves the pitch horns and the blades of the main rotor head.



M70-257

Figure 11-19. Pilot Cyclic Control System Longitudinal Feel Spring and Magnetic Brake Assembly



M70-256A

Figure 11-20. Longitudinal Cyclic Control System Interface Diagram

11-7. SYSTEM DESCRIPTION (cont)

11-7

(d) The mixer assembly longitudinal bellcrank receives input motion from the longitudinal servocylinder and transmits longitudinal linear motion to the rear longitudinal bellcrank through two longitudinal links. An increase in forward motion to the cyclic stick mechanical input causes the longitudinal servocylinder to retract. Retraction of the longitudinal servocylinder pivots the longitudinal bellcrank downward as the two longitudinal links move forward and pivot the rear longitudinal bellcrank upward. The mixer assembly changes the longitudinal linear motion into vertical linear motion which is applied to the torque link. The torque link moves upward, tilting the nonrotating swashplate forward. The nonrotating swashplate transmits the movement to the scissor assemblies. The scissor assemblies transmit rotational power to the rotating swashplate. The rotating swashplate transmits the movement to the pitch link assemblies changing the pitch angle on the main rotor blades.

e. **Lateral (Cyclic) Flight Control System.**

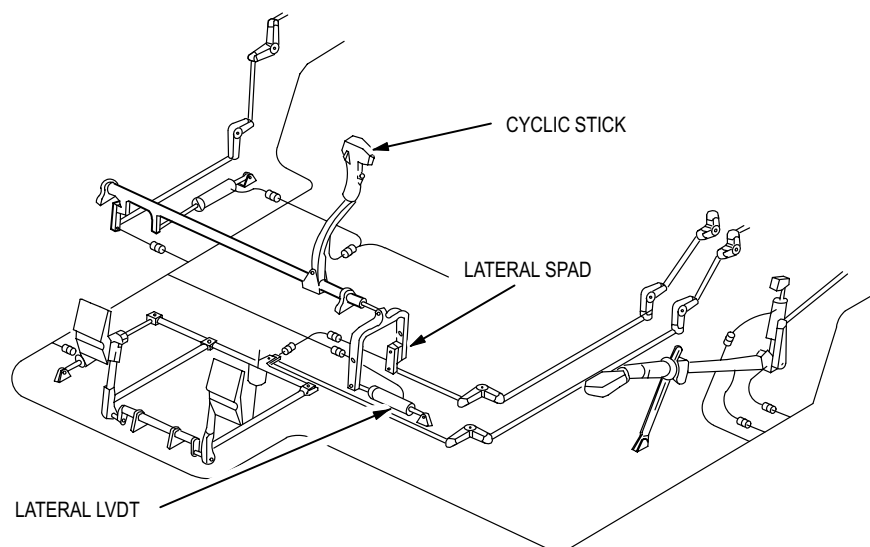
(1) **Purpose.** The purpose of the lateral flight control system is to provide mechanical inputs to the main rotor for lateral control of the helicopter.

(2) **System Operation.**

(a) The pilot and CPG cyclic sticks (fig. 11-21) are moved left or right to control lateral movement of the helicopter.

(b) The lateral LVDTs are located at the base of the pilot's cyclic stick and CPG's collective stick. The pilot and CPG lateral LVDTs monitor cyclic stick movement during DASEC, CAS and BUCS operation. An electrical signal is developed proportional to cyclic stick movement and sent to the lateral servocylinder to position the main rotor head.

(c) During normal operation, the SPAD is part of the mechanical linkage. When jamming prevents normal cyclic lateral stick movement, a force of 30 foot-lbs. on either cyclic stick will cause the SPAD shear pin to snap, severing the mechanical control linkage which activates BUCS. The BUCS select trigger switch on the CPG's collective stick must be closed to activate BUCS. When BUCS is activated, the **BUCS ON** indicator on the pilot and CPG caution/warning panels light. When BUCS fails, the **BUCS FAIL** indicator on the pilot and CPG master caution/warning panels lights.



M70-261

Figure 11-21. Cyclic Lateral Control System LVDT and SPAD Assemblies

(d) The lateral feel spring and magnetic brake assembly (fig. 11-22) are located beneath the pilot's cyclic stick. The lateral magnetic brake assembly is a 28 VDC controlled unit that engages to establish a lateral trim position. The feel trim assembly is a spring loaded device that overrides the lateral magnetic brake assembly when the cyclic stick is moved against the magnetic brake assembly. The feel spring assembly allows cyclic stick inputs to override the lateral force trim setting. When the cyclic stick is not engaged against the feel spring assembly, lateral flight trim maintains current trim position.

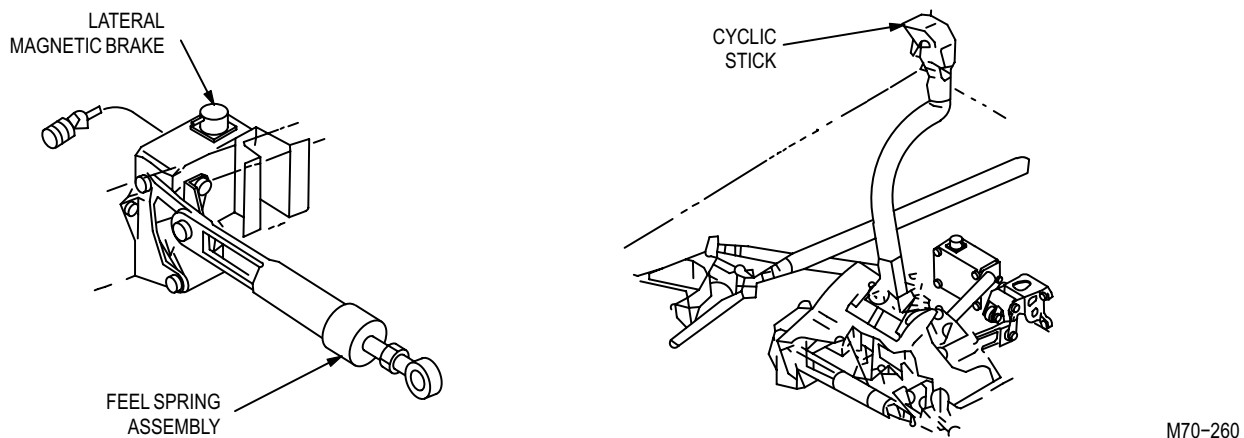


Figure 11-22. Pilot Cyclic Control System Lateral Feel Spring and Magnetic Brake Assembly

(e) The lateral mechanical control linkage (fig. 11-23) provides an increase or decrease in cyclic movement to the lateral servocylinder.

(f) The lateral servocylinder is hydraulically operated and connected to the mixer assembly. The lateral servocylinder hydraulically assists the mechanical control linkage by moving the main rotor swashplate. The swashplate moves pitch horns and blades of the main rotor head left or right. The mixer assembly lateral bellcrank receives input motion from the lateral servocylinder and transmits lateral linear motion through two lateral links to the stationary swashplate. An increase in left motion to the cyclic stick mechanical input causes the lateral servocylinder to retract. Retraction of the lateral servocylinder pivots the lateral bellcrank downward while the left lateral link moves up and the right lateral link moves down, tilting the nonrotating swashplate left. The nonrotating swashplate transmits movement to the scissor assemblies. The scissor assemblies transmit rotational power to the rotating swashplate. The rotating swashplate transmits the movement to the pitch link assemblies, changing the pitch angle on the main rotor blades.

f. Directional Flight Control System.

(1) **Purpose.** The purpose of the directional flight controls is to provide mechanical input to the tail rotor assembly for directional heading and anti-torque control.

(2) System Operation.

(a) The pilot and CPG directional pedals (fig. 11-24) are moved forward or aft, providing a push-pull action, to control directional movement of the helicopter.

(b) The directional LVDTs are located at the base of the pilot's and CPG's directional pedals. The pilot and CPG directional LVDTs monitor pedal movement during DASEC, CAS and BUCS operation. An electrical signal is developed proportional to pedal movement and sent to the directional servocylinder to position the tail rotor.

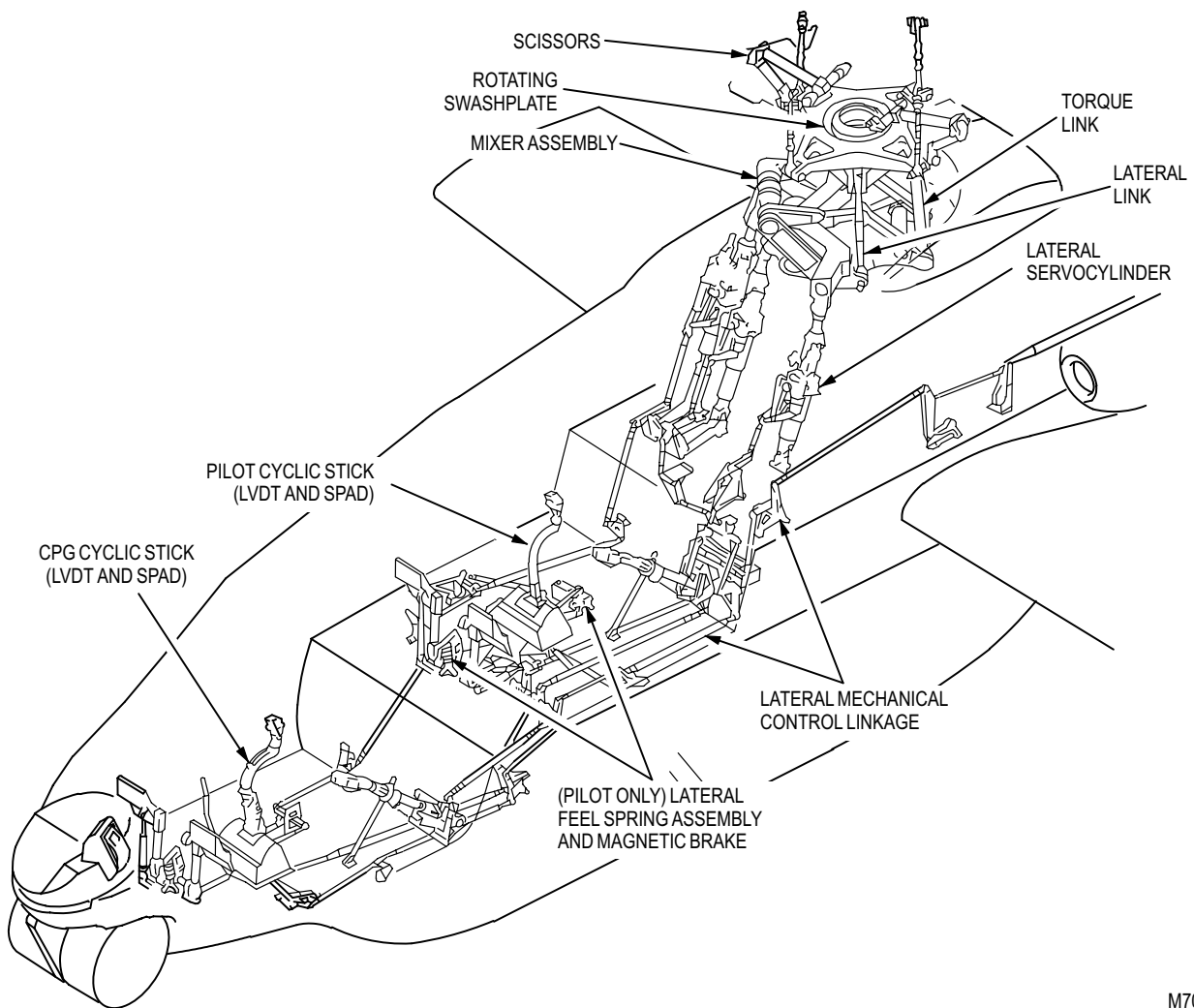
11-7. SYSTEM DESCRIPTION (cont)

11-7

(c) The SPAD, during normal operation, is part of the mechanical control linkage. When jamming prevents normal pedal movement, a force of 90 foot-lbs. on either directional pedal causes the SPAD shear pin to shear, severing the mechanical control linkage. When the pilot's shear pin is severed, BUCS is activated. The BUCS select trigger switch on the CPG's collective switch must be closed to activate BUCS. The **BUCS ON** indicator on the pilot and CPG caution/warning panels lights when BUCS is activated. If BUCS fails, the **BUCS FAIL** indicator on the pilot and CPG master caution/warning panels lights.

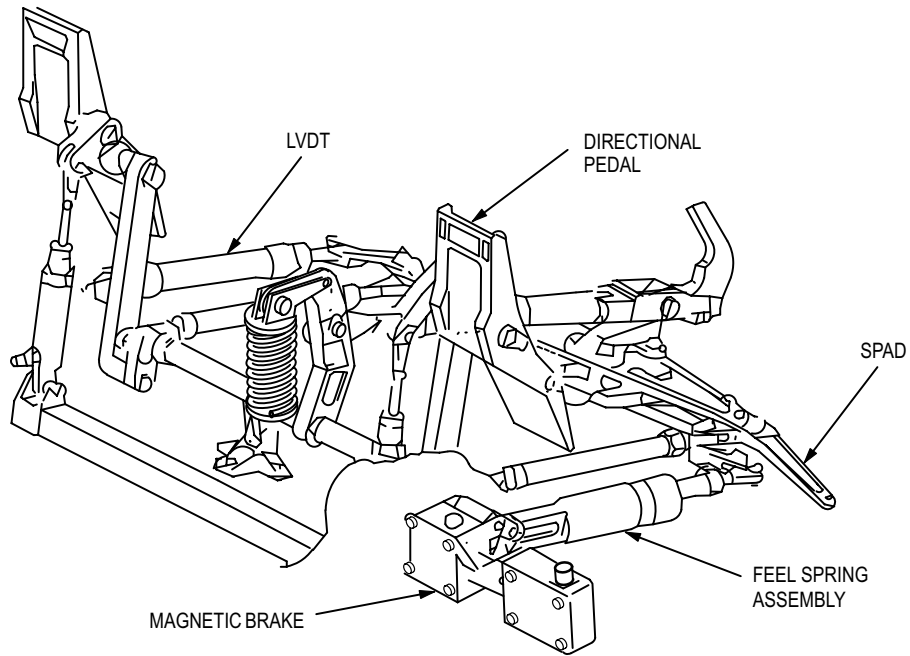
(d) The directional magnetic brake assembly is a 28 VDC controlled unit that engages to establish a directional trim position. The feel trim assembly is a spring loaded device that overrides the directional magnetic brake assembly when the directional pedals are moved against the magnetic brake assembly. The feel spring assembly allows directional pedal inputs to override the directional force trim setting. When the directional pedals are not engaged against the feel spring assembly, directional flight trim maintains current trim position.

(e) The directional mechanical control linkage (fig. 11-25) provides an increase or decrease in directional pedal movement to the directional servocylinder.



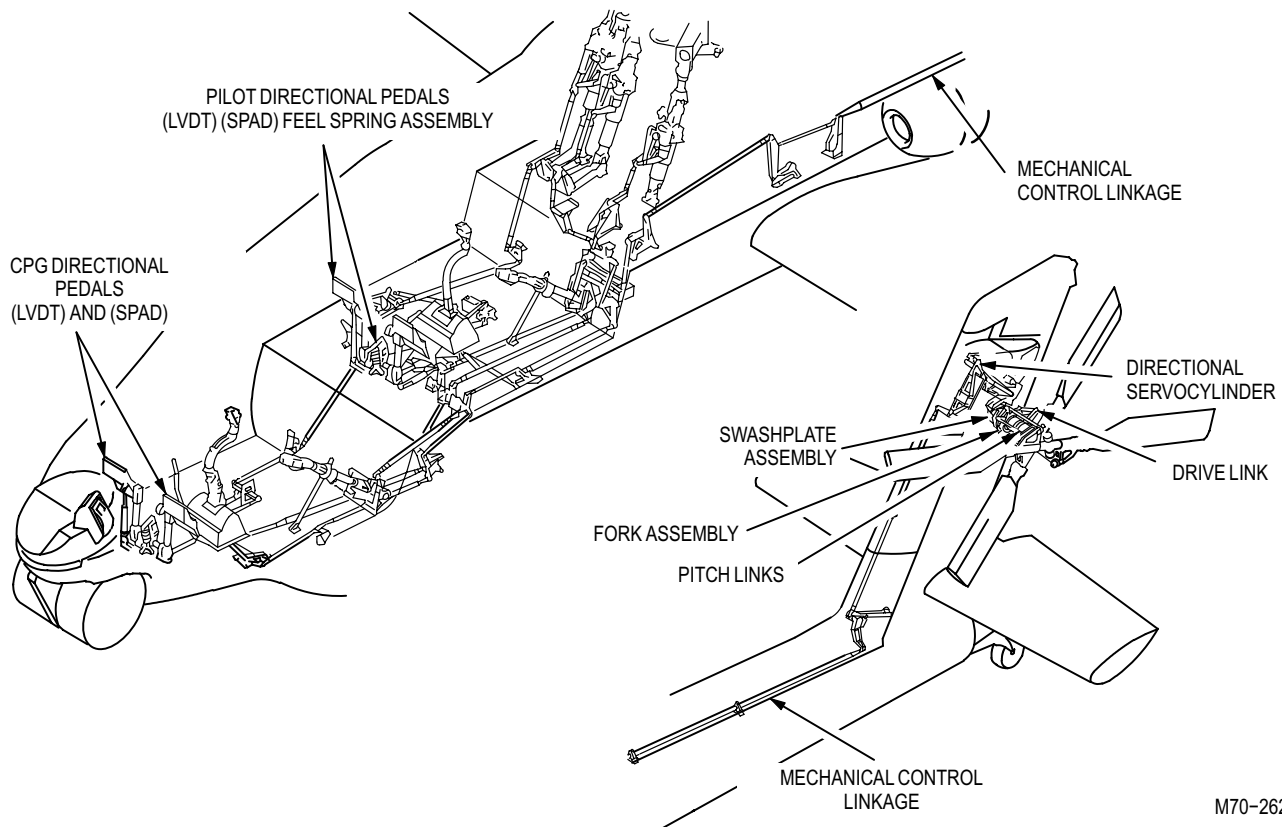
M70-259A

Figure 11-23. Lateral Cyclic Control System Interface Diagram



M70-263A

Figure 11-24. Directional Control System LVDT and SPAD Assemblies



M70-262A

Figure 11-25. Directional Flight Mechanical Control System Interface Diagram

11-7. SYSTEM DESCRIPTION (cont)

11-7

(f) The directional servocylinder (fig. 11-26) is hydraulically operated and connected to the directional bellcrank. The directional servocylinder hydraulically assists the mechanical control linkage by changing pitch on the tail rotor blades. The directional bellcrank provides a push-pull action to the nonrotating swashplate. The drive links transmit nonrotating swashplate motion to the rotating swashplate. The rotating swashplate transmits movement to the pitch change link assemblies, changing pitch angle on the tail rotor blades. The fork assembly provides drive link attachment points and provides mounting for the tail hubs.

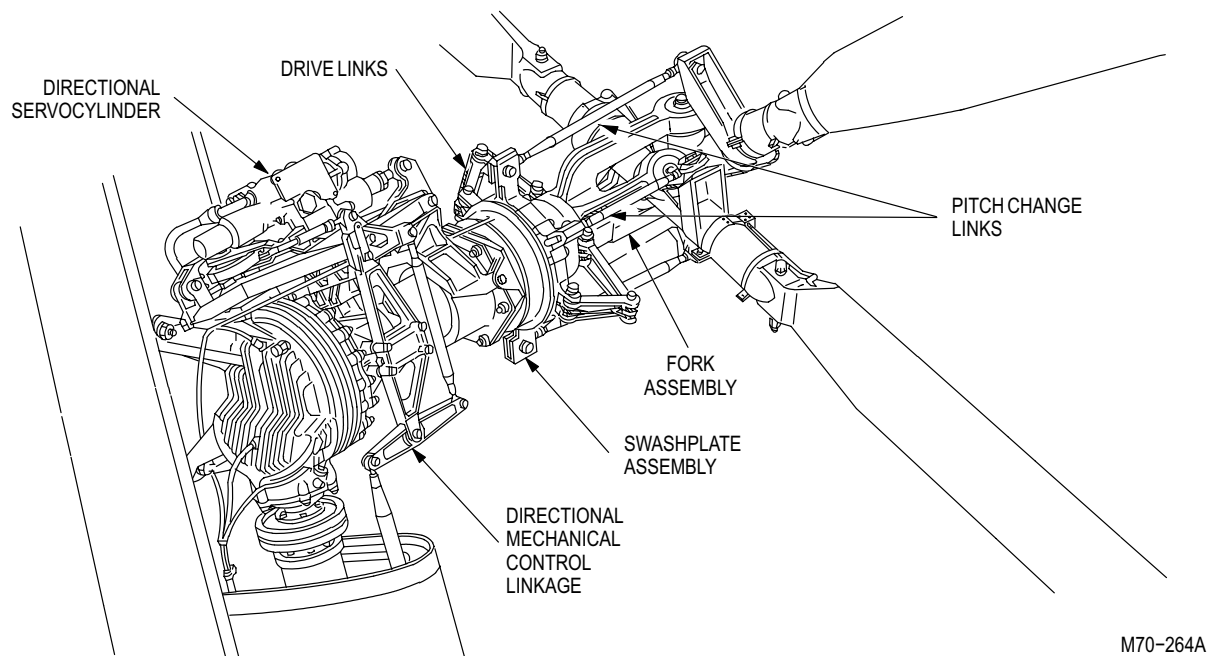


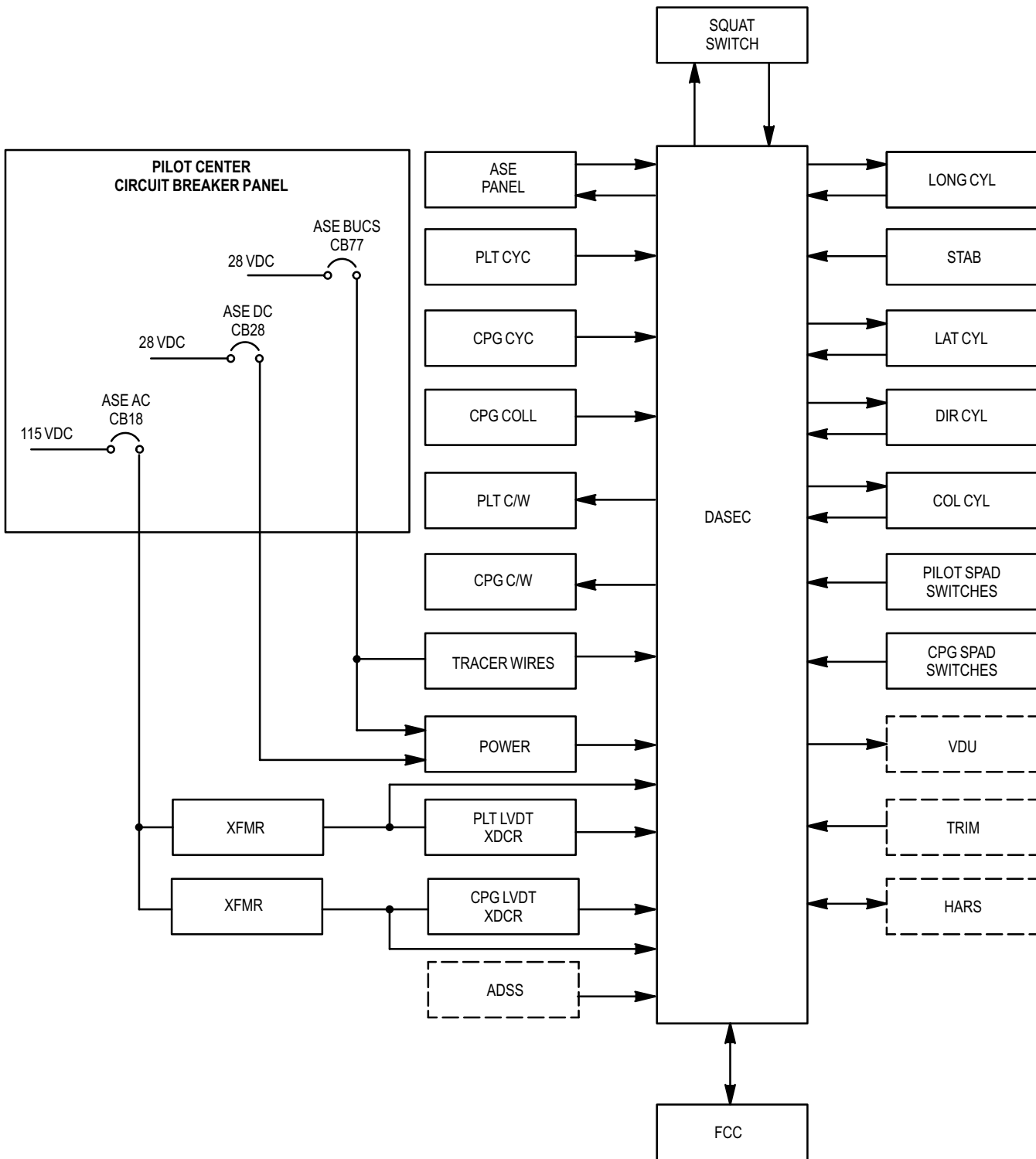
Figure 11-26. Tail Rotor Directional Control System Interface Diagram

g. **DASE.**

(1) **Purpose.** The purpose of the DASE system is to receive and transmit flight reference signals for control and stability of the helicopter.

(2) **System Operation.**

(a) The DASEC (fig. 11-27) is supplied 28 VDC power through the **ASE DC** circuit breaker (CB28). The BUCS and tracer wire severance monitoring is supplied 28 VDC operating power through the **ASE BUCS** circuit breaker (CB77). Two excitation transformers are supplied 115 VAC through the **ASE AC** circuit breaker (CB18). The excitation transformers step down 115 VAC to 26 VAC for DASEC and LVDT operations. (**ACB**) Transformers are housed in a LRU with four filters. The filters are used for EMI hardening.



M70-265

Figure 11-27. DASEC Functional Block Diagram

11-7. SYSTEM DESCRIPTION (cont)

11-7

(b) The squat switch receives inputs from the DASEC and provides output for DASEC yaw CAS disengagement when the helicopter is on the ground. The longitudinal, lateral, directional, and collective servocylinders receive positioning outputs from and provide feedback to the DASEC. The SCUs send status to the DASEC. The pilot and CPG SPAD switches provide inputs to activate the BUCS when flight controls are jammed. The visual display unit (VDU) receives rate-of-turn outputs from the DASEC. Force trim inputs to the DASEC activate the attitude hover/hold (**ATTD/HOVER HOLD**) operation. HARS inputs rate, attitude, heading, velocity and validity signal data to the DASEC. The fire control computer (FCC) communicates with the DASEC to issue instructions and determines system LRU status. The ADSS inputs airspeed and sideslip information. The pilot and CPG LVDTs transmit input from collective stick, cyclic stick and directional pedal movement. The DASEC provides outputs to the pilot's and CPG's caution/warning panels to light the **BUCS ON**, **ASE**, and **BUCS FAIL** indicators.

(c) The CPG collective stick grip provides switchology to enable the CPG's flight controls when BUCS has been activated. The pilot's and CPG's cyclic sticks provide inputs to disengage force trim. The pilot **ASE** panel provides switches to engage **PITCH**, **ROLL**, **YAW**, **ATTD/HOVER HOLD**, and **BUCS TST** (test) functions.

(3) The hydraulic servocylinders (fig. 11-28) are electrically operated in the ASE and BUCS modes.

(a) When ASE is engaged, the SAS solenoid valve is energized opened. The opened SAS solenoid valve sends pressurized hydraulic fluid to the two-stage electro-hydraulic valve (EHV). The EHV is a flapper valve that is controlled by an electrical signal input from the DASEC. When the EHV is in the center (neutral) position, hydraulic pressure is equal on both sides of the SAS cylinder. When the helicopter deviates from the reference attitude, a command signal from the DASEC is applied to the EHV. The flapper valve inside the EHV moves, causing hydraulic pressure to move the SAS cylinder.

(b) Movement of the SAS cylinder opens ports to allow hydraulic pressure to extend or retract the power piston. The SAS LVDT provides a feedback signal of opposite polarity to the DASEC where it is summed with the command signal. The resulting summation signal nulls out the command signal and prevents overcorrection. When the command signal is nulled out, the EHV flapper valve returns to the neutral position. Equalized pressure on the SAS cylinder causes the cylinder movement to stop. As the power piston moves, mechanical feedback is applied to the pilot input lever, causing the lever to pivot around the pilot input point. The mechanical feedback moves the manual servo valve to realign with the new SAS cylinder position. When the SAS cylinder and manual servo valve are aligned, the hydraulic ports close and power piston movement stops.

(c) When the helicopter is returning to attitude, a DASEC command signal of opposite polarity is applied to the EHV. The EHV causes the SAS cylinder to move back toward the neutral position. When the SAS cylinder moves, it displaces the manual servo valve and opens hydraulic ports to the power piston. The power piston moves back toward its original position. As the power piston moves, the mechanical feedback moves the manual servo input arm which moves the manual servo valve back into alignment with the SAS cylinder. When the manual servo valve is aligned with the SAS cylinder, the hydraulic ports are closed and power piston movement stops.

(d) When BUCS is engaged, the SAS and BUCS solenoid valves are energized open. Pressurized hydraulic fluid is applied through the open SAS and BUCS valves to the BUCS plunger. The BUCS plunger is forced out to engage the output arm, locking out manual control inputs. With manual control inputs locked out, the EHV becomes the only source of control for the helicopter. When a cyclic stick, collective stick or directional pedal is moved, a signal is developed by the appropriate LVDT and applied to the DASEC. A command signal from the DASEC is applied to the EHV. The EHV flapper valve is displaced from the neutral position, causing the SAS cylinder to move. Movement of the SAS cylinder opens hydraulic ports to the power piston. The power piston extends or retracts as directed by the EHV flapper valve. As the power piston moves, the power piston severs the BUCS shear pin, separating the servocylinder from the mechanical flight control linkage.

(e) The dual position LVDT provides a feedback signal of opposite polarity to the DASEC where it is summed with the command signal. The resulting summation signal nulls out the command signal. When the command signal is nulled out, the EHV flapper valve returns to the neutral position. Equalized pressure on the SAS cylinder causes cylinder movement to stop and remain in position until another command signal input is received.

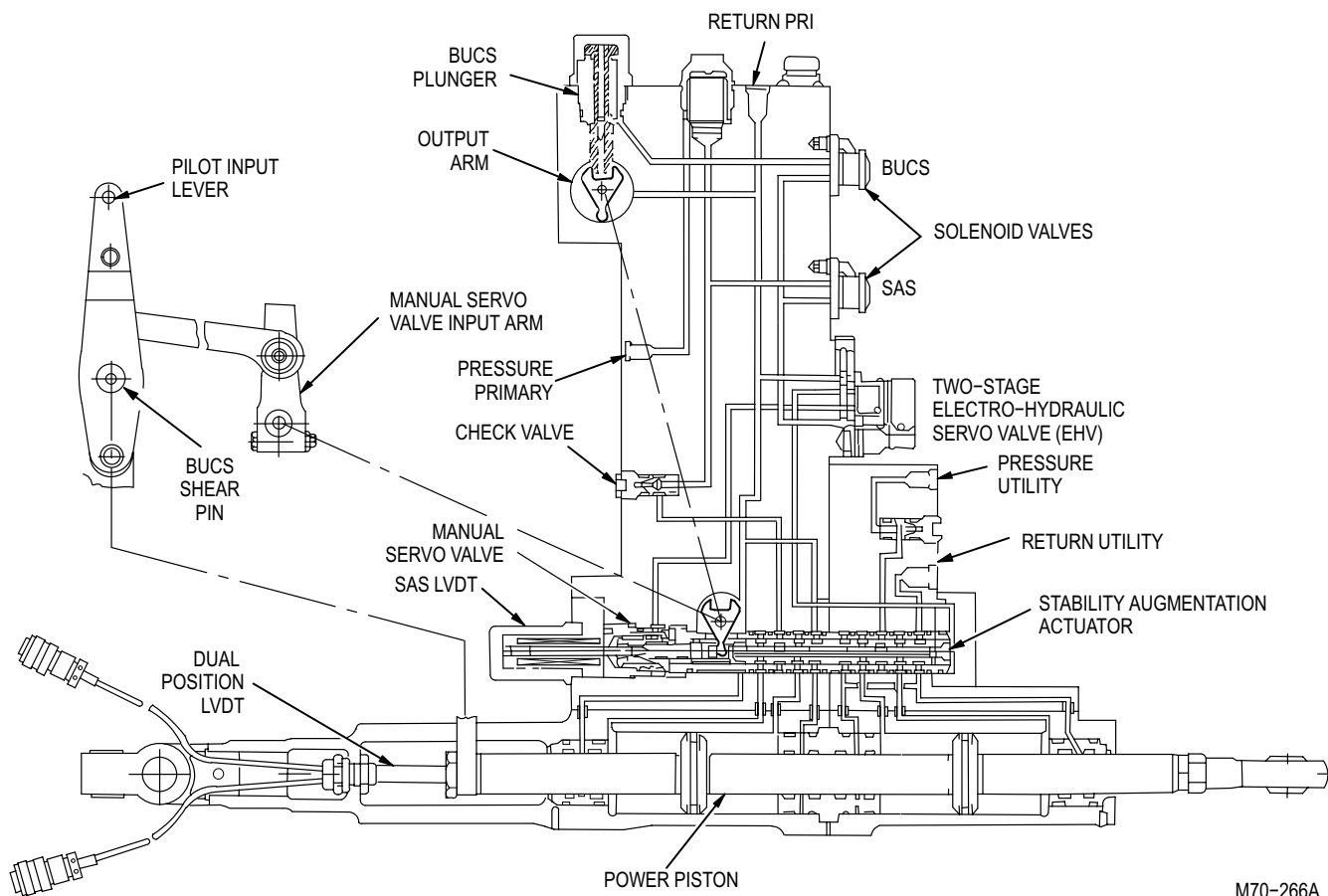


Figure 11-28. Hydraulic Servocylinder DASE and BUCS Interface Diagram

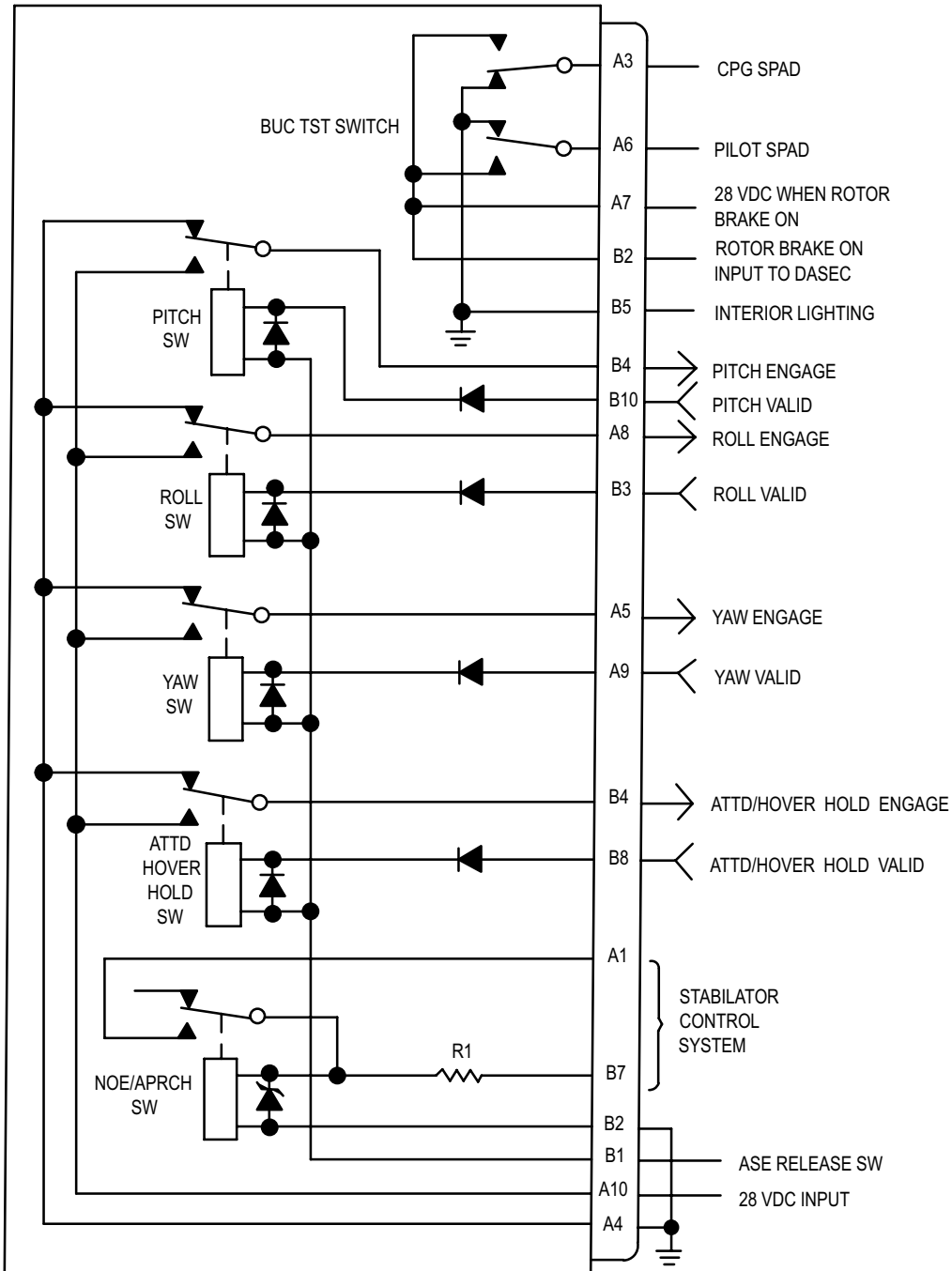
11-7. SYSTEM DESCRIPTION (cont)

11-7

(f) The pilot **ASE** panel (fig. 11-29) controls DASE functions and tests the BUCS system. The operation of the **PITCH**, **ROLL**, **YAW**, and **ATTD/HOVER HOLD** switches are identical. Therefore, only the **YAW** switch shall be discussed. (Refer to stabilator system for discussion of the **NOE/APRCH** switch operation.) When the yaw engage switch is placed to the **YAW** position, contacts close and apply 28 VDC to the DASEC. The DASEC performs a BIT and if the yaw passes BIT, a yaw valid signal is enabled. The yaw valid signal energizes a solenoid that holds the spring-loaded **OFF** yaw engage switch in the **YAW** position. Solenoid ground is provided through the **ASE** release switch on both cyclic sticks. If either crew member depresses the **ASE** release switch, ground for all switches are removed, returning the spring-loaded switches to the **OFF** position. When the **BUCS TST** switch is set to the **PLT** or **CPG** position, the rotor brake (**RTR BK**) on the pilot power quadrant is in the **BRAKE** position, both power levers on the pilot power lever quadrant are set to **IDLE**, and 28 VDC is supplied to the SPADs selected position for testing.

(g) During SAS operation (fig. 11-30), the DASEC monitors the HARS and the ADSS. When a deviation from attitude occurs, HARS and ADSS provide signals to the DASEC that correspond to direction and rate of deviation. The DASEC computes a command signal(s) and applies the signal(s) to the EHV on the servocylinder(s) and a mathematical model inside the DASEC. Movement of the servocylinder(s) cause the main and/or tail rotor to correct pitch for deviation. As the servocylinder moves in response to the command signal, position feedback from the servocylinder LVDT is applied to the DASEC (fig. 11-31). The feedback signal is used to null out the command signal, preventing oscillations due to overcorrection by the SAS, and is then compared to the DASEC mathematical model to verify servocylinder command responses. If the mathematical model command and servocylinder position varies by $\pm 40\%$, the DASEC commands disengagement of that axis. This action lights the **ASE** indicators on the pilot and CPG caution/warning panels.

(h) During CAS operation (fig. 11-30), the DASEC monitors flight controls for movement. When flight controls are moved by either crew member, mechanical control linkage to the servocylinders cause helicopter response. At the same time, LVDTs in both crew stations develop a signal that is proportional to the direction and amount of flight control movement. During CAS, the squat switch disables the yaw channel when the helicopter is on the ground. LVDT signals are sent to the DASEC. The DASEC then computes a command signal(s) proportional to flight control movements and applies the signal(s) to the EHV on the servocylinder(s) and a level detector inside the DASEC. Movement of the servocylinder(s) in response to the command signal(s) cause position feedback from the servocylinder(s) LVDT to the DASEC. The feedback signal is used to null out the command signal.



M70-267

Figure 11-29. ASE Panel Electrical Schematic Diagram

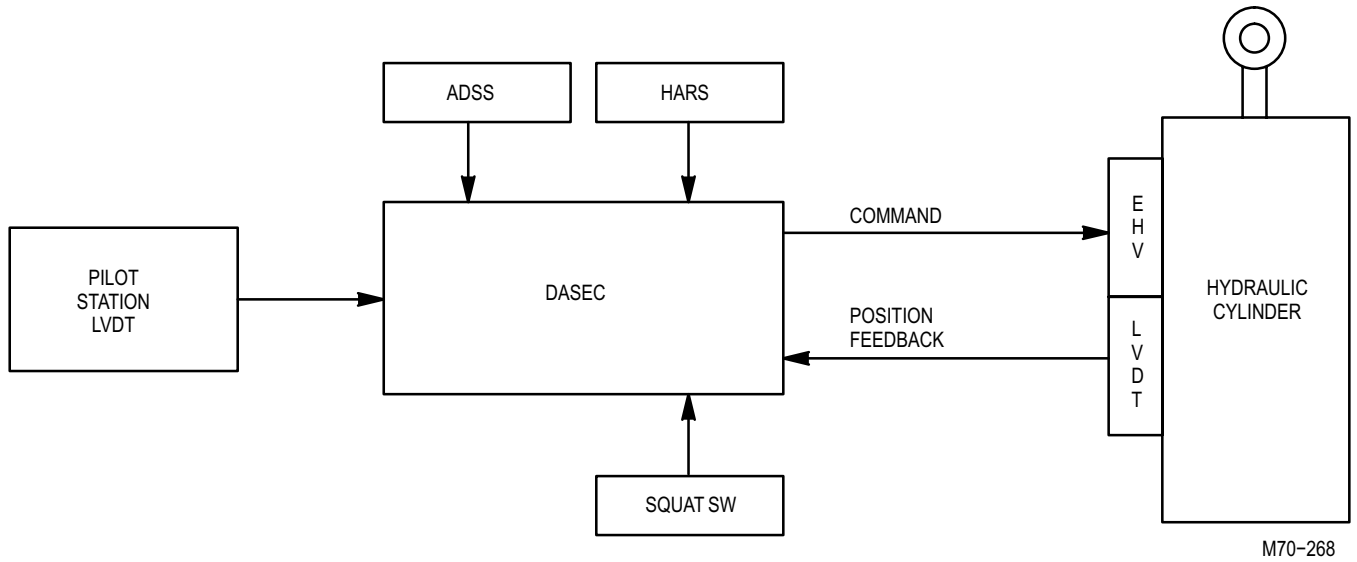


Figure 11-30. SAS/CAS Functional Block Diagram

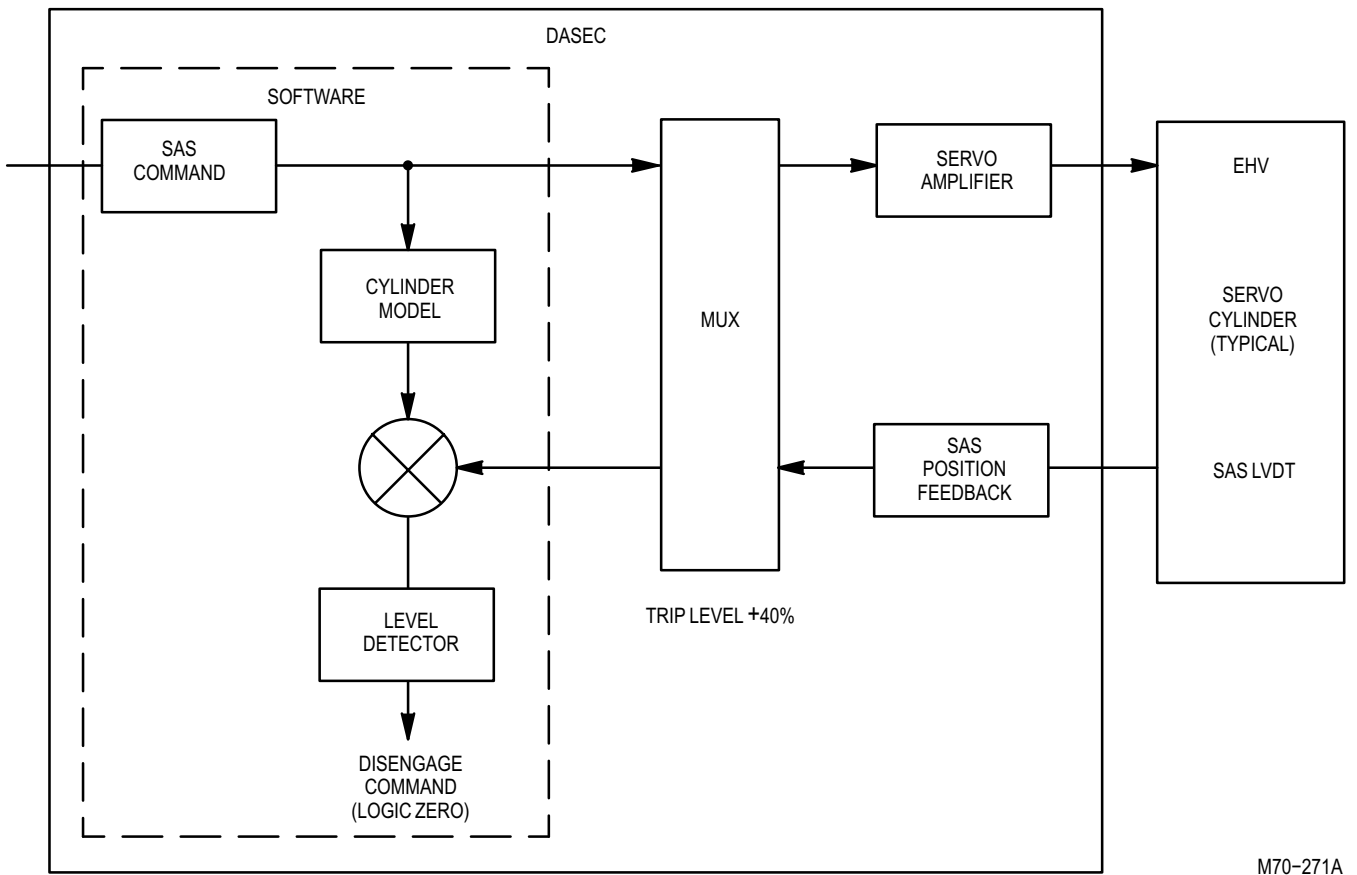
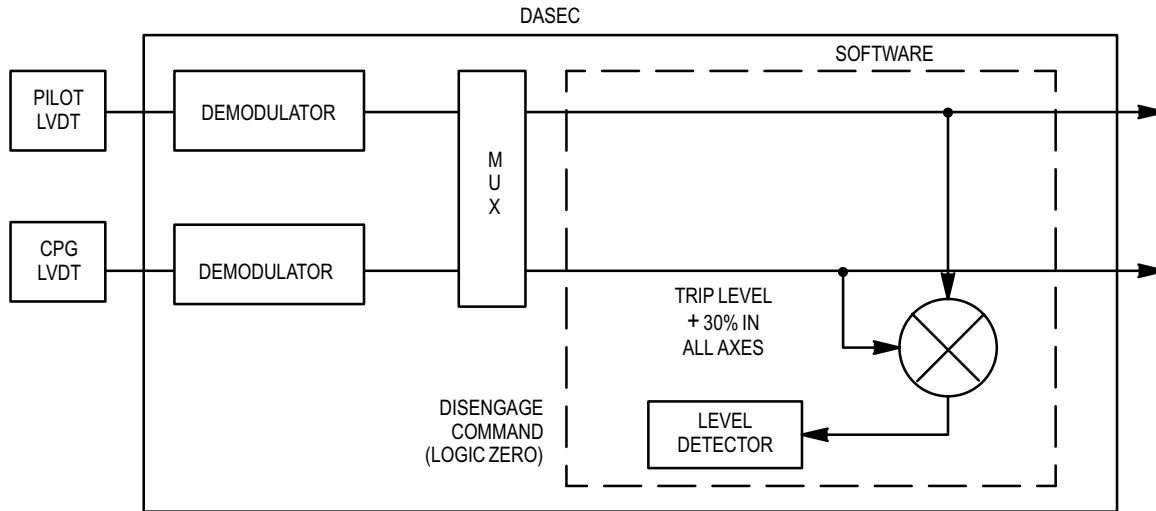


Figure 11-31. SAS Monitor Functional Block Diagram

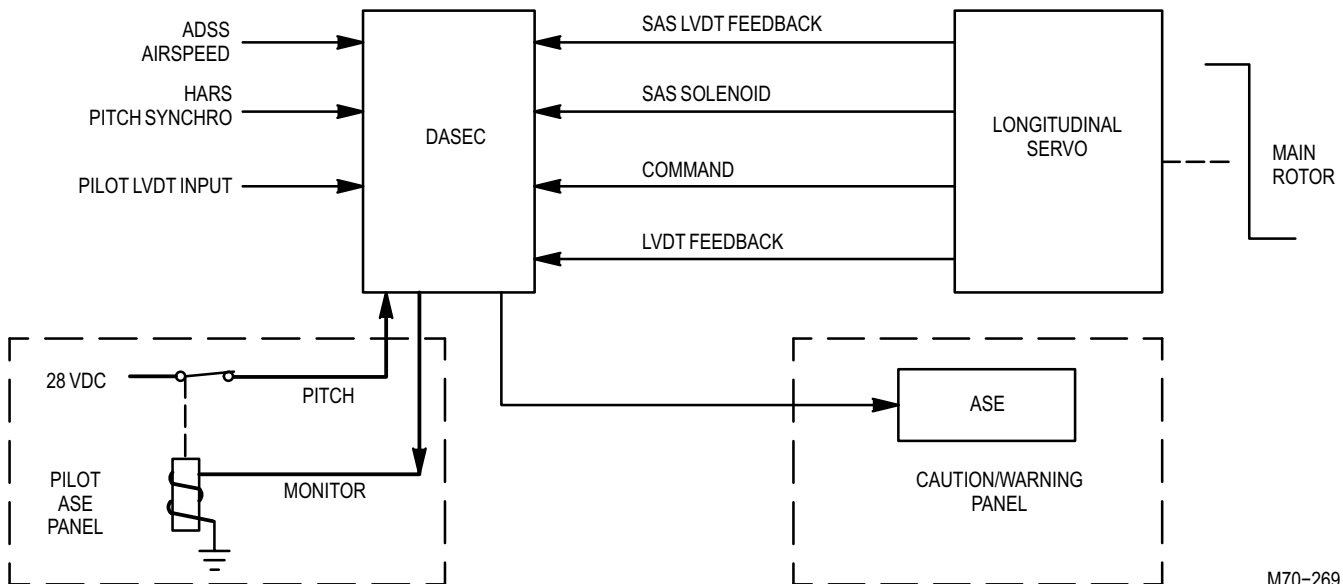
(i) Pilot and CPG LVDT (fig. 11-32) positions are compared by a level detector. If the level detector detects a difference of position of $\pm 40\%$ (mistrack), the DASEC commands disengagement of that axis. This action lights the **ASE** indicators on the pilot and CPG caution/warning panels.



M70-270

Figure 11-32. Position LVDT Monitor Functional Block Diagram

(j) The pitch stability command augmentation system (SCAS) (fig. 11-33) is a combination of SAS and CAS. Pitch SCAS controls the helicopter's pitch axis as a function of rate, attitude and cyclic stick position. When the pitch engage switch on the pilot **ASE** panel is placed in the **PITCH** position, the DASEC latches the switch and engages pitch SCAS. The DASEC disengages pitch SCAS under the following conditions: if HARS or ADSS malfunctions, the SAS servocylinder LVDT feedback does not match the DASEC mathematical model, a mistrack between the pilot's and CPG's LVDTs occurs, a mistrack between dual position 1 (BUCS 1) LVDT and the pilot's LVDT occurs, or a mistrack between dual position 1 (BUCS 1) and dual position 2 (BUCS 2) occurs. Disengagement lights the **ASE** indicators on the pilot and CPG caution/warning panels.



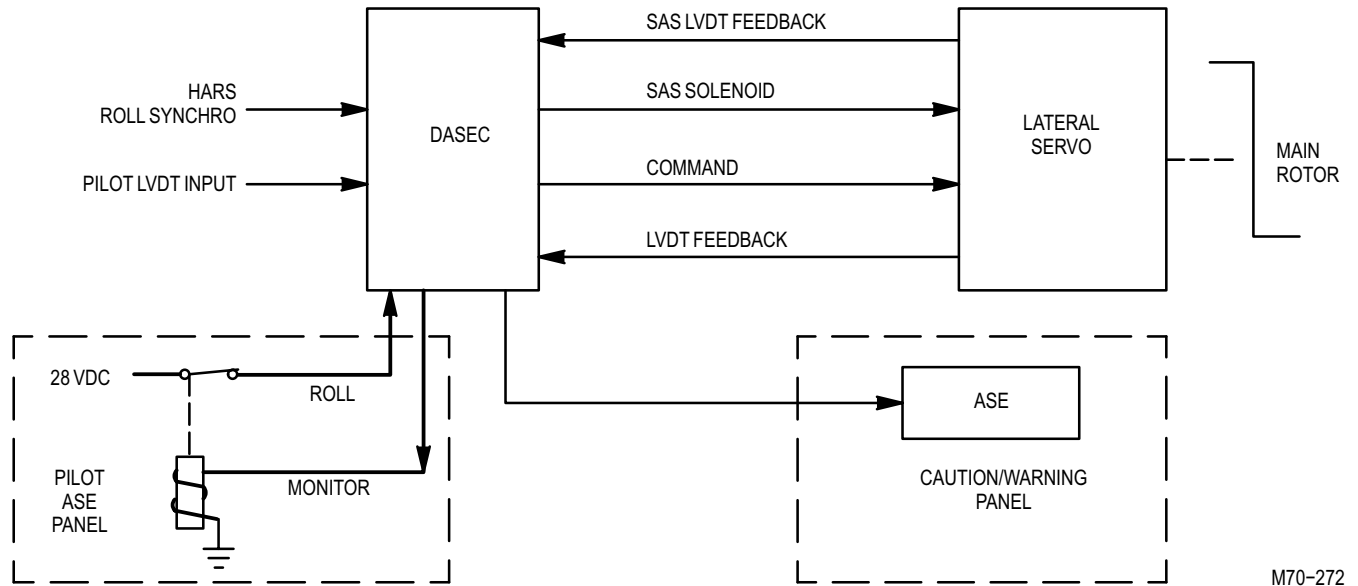
M70-269

Figure 11-33. SAS/CAS Pitch Functional Block Diagram

11-7. SYSTEM DESCRIPTION (cont)

11-7

(k) Roll SCAS (fig. 11-34) is a combination of SAS and CAS. Roll SCAS controls the helicopter's roll axis as a function of rate, attitude and cyclic stick position. When the roll engage switch on the pilot **ASE** panel is placed in the **ROLL** position, the DASEC latches the switch and engages roll SCAS. The DASEC disengages roll SCAS under the following conditions: if HARS malfunctions, the SAS servocylinder LVDT feedback does not match the DASEC mathematical model, a mistrack between the pilot's and CPG's LVDTs occurs, a mistrack between dual position 1 (BUCS 1) LVDT and the pilot's LVDT occurs, or a mistrack between dual position 1 (BUCS 1) and dual position (BUCS 2) occurs. Disengagement lights the **ASE** indicators on the pilot and CPG caution/warning panels.



M70-272

Figure 11-34. SAS/CAS Roll Functional Block Diagram

(l) Yaw SCAS (fig. 11-35) is a combination of SAS and CAS. Yaw SCAS controls the helicopter's vertical axis as a function of rate, attitude and directional pedal position. When the yaw engage switch on the pilot **ASE** panel is placed in the **YAW** position, the DASEC latches the switch and engages yaw SCAS. The DASEC disengages yaw SCAS under the following conditions: if the ADSS malfunctions, the SAS servocylinder LVDT feedback does not match the DASEC mathematical model, a mistrack between the pilot's and CPG's LVDT occurs, a mistrack between dual position 1 (BUCS 1) LVDT and the pilot's LVDT occurs, or a mistrack between dual position 1 (BUCS 1) and dual position 2 (BUCS 2) occurs. Disengagement lights the **ASE** indicators on the pilot and CPG caution/warning panels. The squat switch automatically disengages yaw CAS when the helicopter is on the ground. SAS, however, operates normally if engaged.

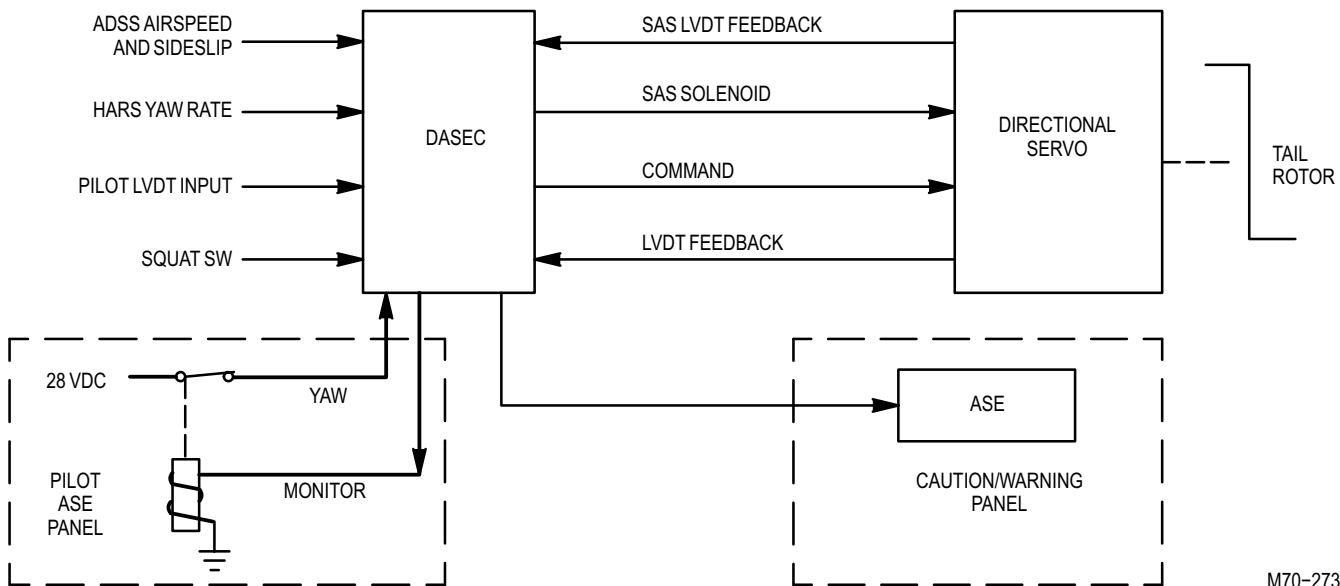


Figure 11-35. SAS/CAS Yaw Functional Block Diagram

(m) Turn coordination (fig. 11-36) is automatic during yaw SCAS operation when the force trim system is operating and ADSS airspeed is above 60 knots. Yaw CAS is inoperable during turn coordination operation. Sideslip signals are sent from the ADSS to the DASEC. Actual sideslip signals are compared to the reference sideslip and the DASEC computes a command which is sent to the directional servocylinder EHV. The EHV moves the SAS servocylinder, which changes pitch on the tail rotor blades, correcting sideslip deviations. The servocylinder provides feedback position to the DASEC. The DASEC then sums the command signals and the LVDT assembly position signals to null out command signals. This returns the SAS cylinder to a centered position which stops servocylinder movements.

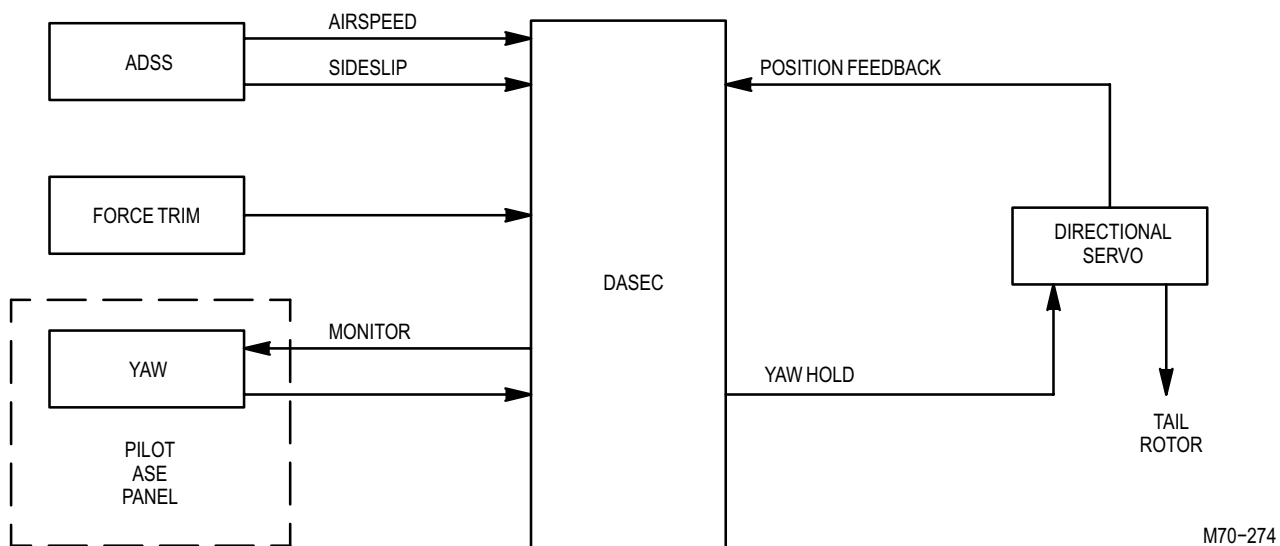


Figure 11-36. Turn Coordination Functional Block Diagram

11-7. SYSTEM DESCRIPTION (cont)

11-7

(n) Hover and attitude hold mode (fig. 11-37) operates automatically during pitch and roll SCAS operation. Hover augmentation system is engaged when the **ATTD/HOVER HOLD** switch on the pilot **ASE** panel is engaged, force trim is on, ADSS airspeed is below 50 knots, and ADSS ground speed is below 15 knots. The hover augmentation system holds the helicopter in a 12-foot radius circle for 20 seconds in a 5 to 10 mph wind, when a slow ascent or descent from 200 feet above the ground is executed. The attitude hold mode is engaged when the **ATTD/HOVER HOLD** switch on the pilot **ASE** panel is engaged, force trim is on, and ADSS airspeed is above 60 knots. The attitude hold mode maintains desired pitch and roll heading. Airspeed is sent to the DASEC from the ADSS. Doppler compensated pitch and roll signals are sent to the DASEC from the HARS. Actual attitude signals are compared to reference attitude, and the DASEC computes a command signal to the longitudinal and lateral servocylinders EHV. The EHV's moves the SAS cylinders which moves the servocylinders, correcting latitude deviations. The servocylinders SAS LVDTs send position feedback signals to the DASEC. The DASEC sums the command signals with the LVDTs position signals to null out the command signals. When the command signals are nulled, the SAS cylinders return to center position and servocylinder movement stops. Momentary release of the **FORCE TRIM** switch on the cyclic sticks resynchronizes the rate signal to the force trim system, establishing a new reference attitude. Disengagement or failure lights the **ASE** indicators on the pilot and CPG caution/warning panels.

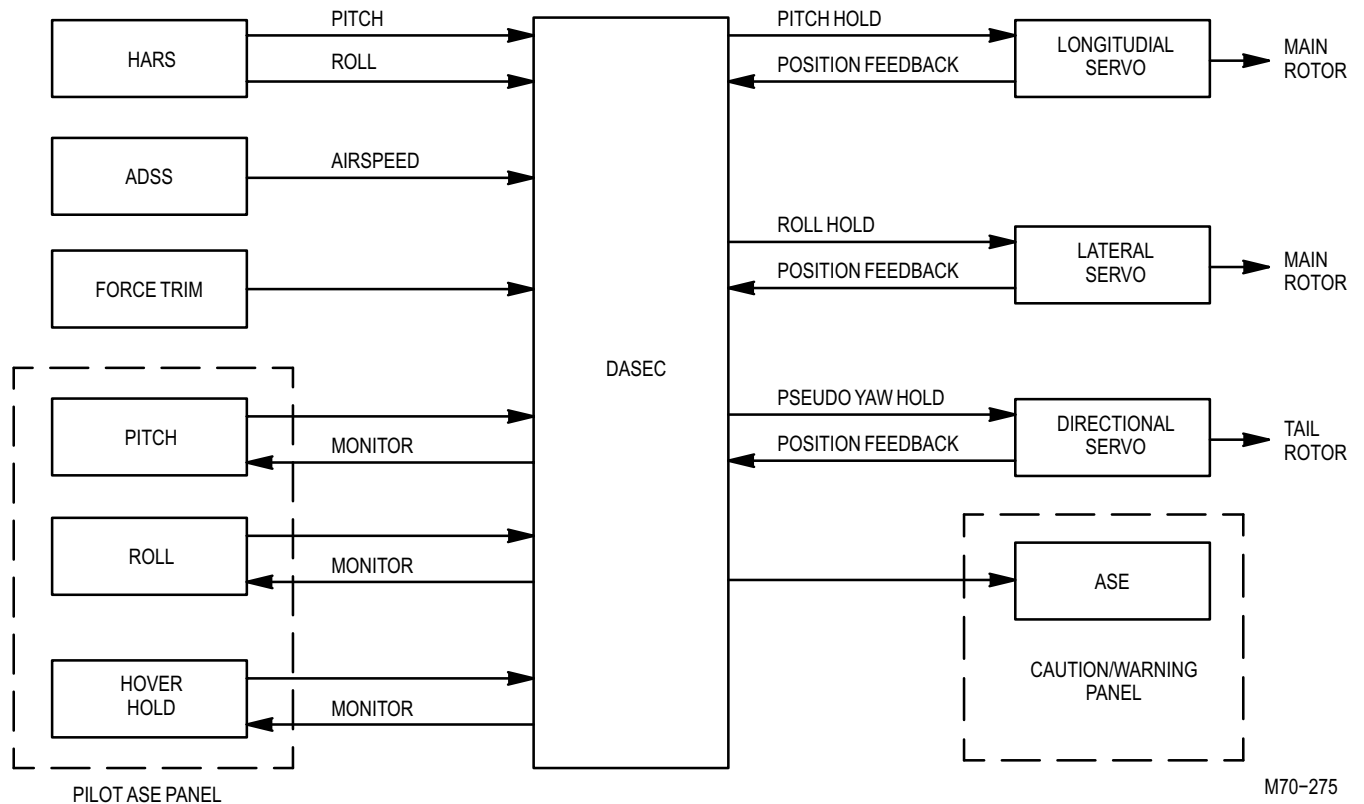
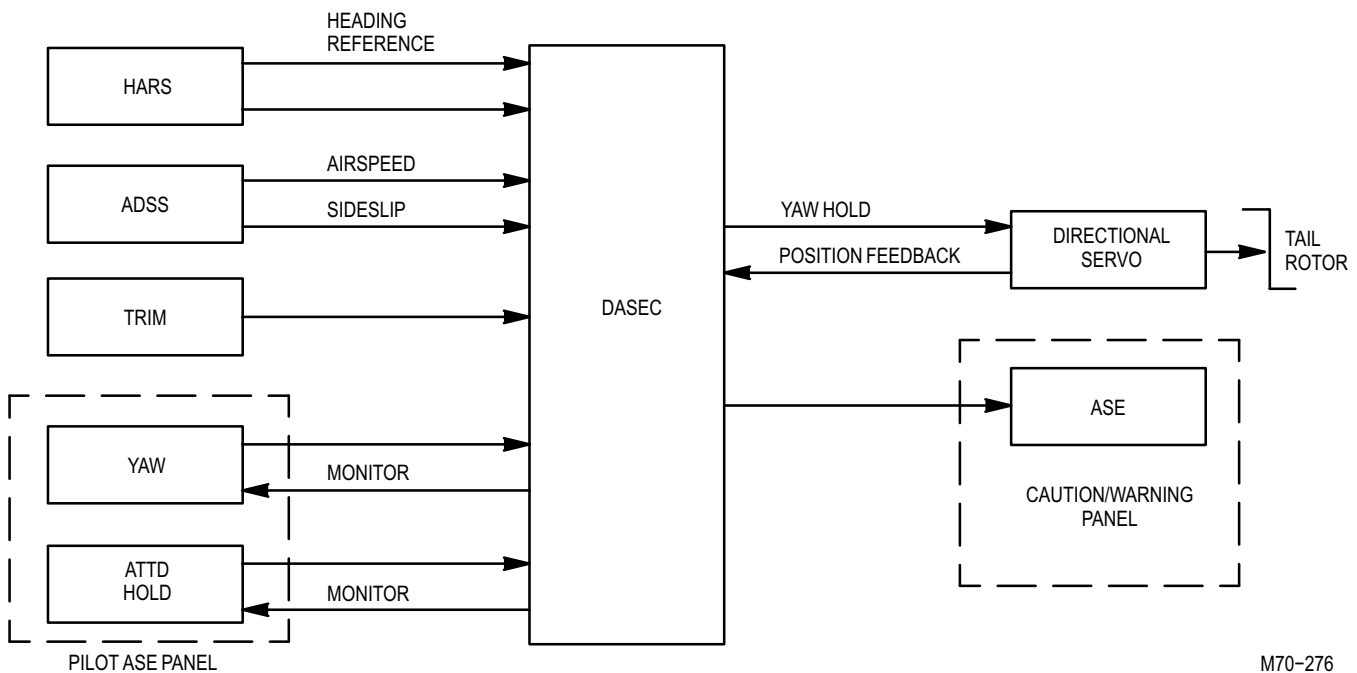


Figure 11-37. Hover Augmentation System and Attitude Hold Functional Block Diagram

M70-275

(o) Heading hold (fig. 11-38) operates automatically during yaw SCAS operation. Heading hold mode is engaged when the **ATTD/HOVER HOLD** switch on the pilot **ASE** panel is engaged, force trim is on, and ADSS airspeed is below 50 knots. The heading hold mode maintains a 1° heading in a 10 to 50 knot wind. Airspeed and sideslip are sent to the DASEC from the ADSS. Doppler compensated heading reference signals are sent to the DASEC from the HARS. The actual heading signals are compared to reference heading, and the DASEC computes a command signal to the directional servocylinder EHV. The EHV moves the SAS cylinder which moves the servocylinder, correcting heading deviations. The servocylinder SAS LVDT sends position feedback signals to the DASEC. The DASEC sums the command signal with the LVDT position signal to null out the command signal. When the command signal is nulled, the SAS cylinder returns to center position and servocylinder movement stops. Momentary release of the **FORCE TRIM** switch on the cyclic sticks resynchronizes the rate signal to the force trim system, establishing a new reference heading. Disengagement or failure lights the **ASE** indicators on the pilot and CPG caution/warning panels.



M70-276

Figure 11-38. Heading Hold Operation Functional Block Diagram

h. Stabilator Control System (SCS).

(1) **Purpose.** The purpose of the SCS is to provide a means to automatically or manually position the stabilator. The stabilator enhances helicopter characteristics and improves over the nose visibility for landing or nap-of-earth (NOE) operations.

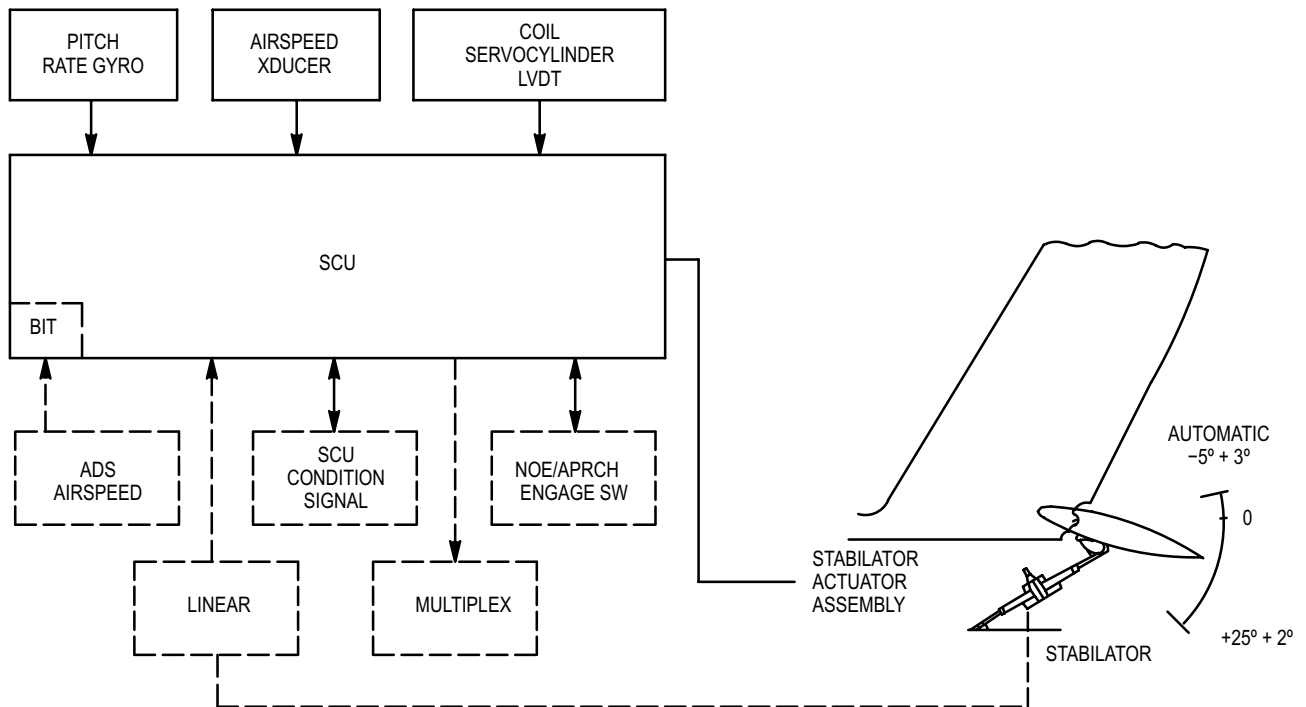
11-7. SYSTEM DESCRIPTION (cont)

11-7

(2) System Operation (fig. 11-39).

(a) The SCS operates in two modes, automatic and manual. Automatic mode is operational when power is applied to the system. The stabilator cylinder assembly is controlled by the SCU 1 which controls the upper half (linear cylinder 1), and SCU 2 which controls the bottom half (linear cylinder 2) of the cylinder assembly. Pitch rate gyros provide an input signal proportional to rate and direction of deviation from the straight and level flight to the respective SCUs. The ADSS provides input to the SCUs when airspeed is between 30 and 58 knots. Above 58 knots airspeed information is received from the airspeed transducer. When the **NOE/APRCH** switch on the pilot's **ASE** panel is engaged, the stabilator will drive up to 25° down when airspeed is below 80 knots. The collective servocylinder LVDT provides continuous position inputs throughout automatic mode operation.

(b) Each SCU monitors itself through a BIT and the SCU condition signal of the other SCU. The SCUs output system/LRU status to the multiplex bus. If any stabilator component malfunctions or the cylinder positions differ by more than 10% the automatic mode disengages, the manual mode engages, a warning tone is heard and the **MAN STAB** indicator on the pilot and CPG caution/warning panels light. The SCUs compute the desired stabilator position from input data and compare the computed signal with the actual position signal. Actual stabilator position is provided from stabilator cylinder assembly feedback. The SCUs then output a signal to the stabilator cylinder assembly to correct stabilator position. In the automatic mode, the stabilator cylinder assembly is positioned by SCUs. Positioning is dependent on the pitch rate signal from the respective pitch rate gyro, airspeed signal and collective stick position. In the manual mode, the stabilator cylinder assembly is positioned by the stabilator manual control switch **NU** (nose up) and **ND** (nose down) positions located on the collective sticks stabilator manual control panel.



M70-277

Figure 11-39. SCU Functional Block Diagram

(c) Automatic mode (fig. 11-40) is operational when electrical power is applied. SCUs receive 28 VDC from the **STAB AUTO DC** circuit breaker (CB3) and 115 VAC from the **STAB AUTO AC** circuit breaker (CB2). The SCUs conduct a self-test, if circuit logic is correct, automatic mode programming of the stabilator starts at 30 knots forward airspeed. SCU inputs which determine circuit logic are airspeed information received from the ADSS, the respective airspeed transducer, collective stick position from the collective servocylinder LVDT, **NOE/APRCH** switch position on the pilot's **ASE** panel, pitch rate input from the respective pitch rate gyro, and the validity of the opposite SCU (reason check). When the SCUs determine that circuit logic is correct, the **AUTO MAN** relay (K1-1/2) energizes. When relay K1-1/2 energizes, power is supplied to the respective actuator motor to drive the stabilator to the position determined by the SCUs. The motor position is fed back to the respective SCU through a 10K ohm potentiometer for comparison by the other SCU. If actuator motor positions disagree by more than 10°, SCU logic generates a fail condition. When a fail condition occurs, the SCUs de-energize relay K1-1/2. The **MAN STAB** indicators on the pilot and CPG caution/warning panels light via a ground received by relay K1-1/2. SCUs generate and send a SCU fail signal to the audio warning system through relay K1-8 for SCU 2 and relay K1-7 for SCU 1 (not shown), enabling the stabilator audio warning tone. Pressing the pilot's or CPG's automatic operation/audio warning **RESET** pushbutton on the stabilator manual control panel disables the audio warning tone and attempts to re-engage the automatic mode. If the fault is not cleared, the stabilator system remains in manual mode. If the fault is cleared, the automatic mode reengages and the **MAN STAB** indicators go out. If the **NOE/APRCH** switch is selected and airspeed is above 80 knots, automatic mode operates normally. If airspeed falls below 80 knots, the stabilator is driven to 25° down. The stabilator remains at 25° down until airspeed is increased above 80 knots.

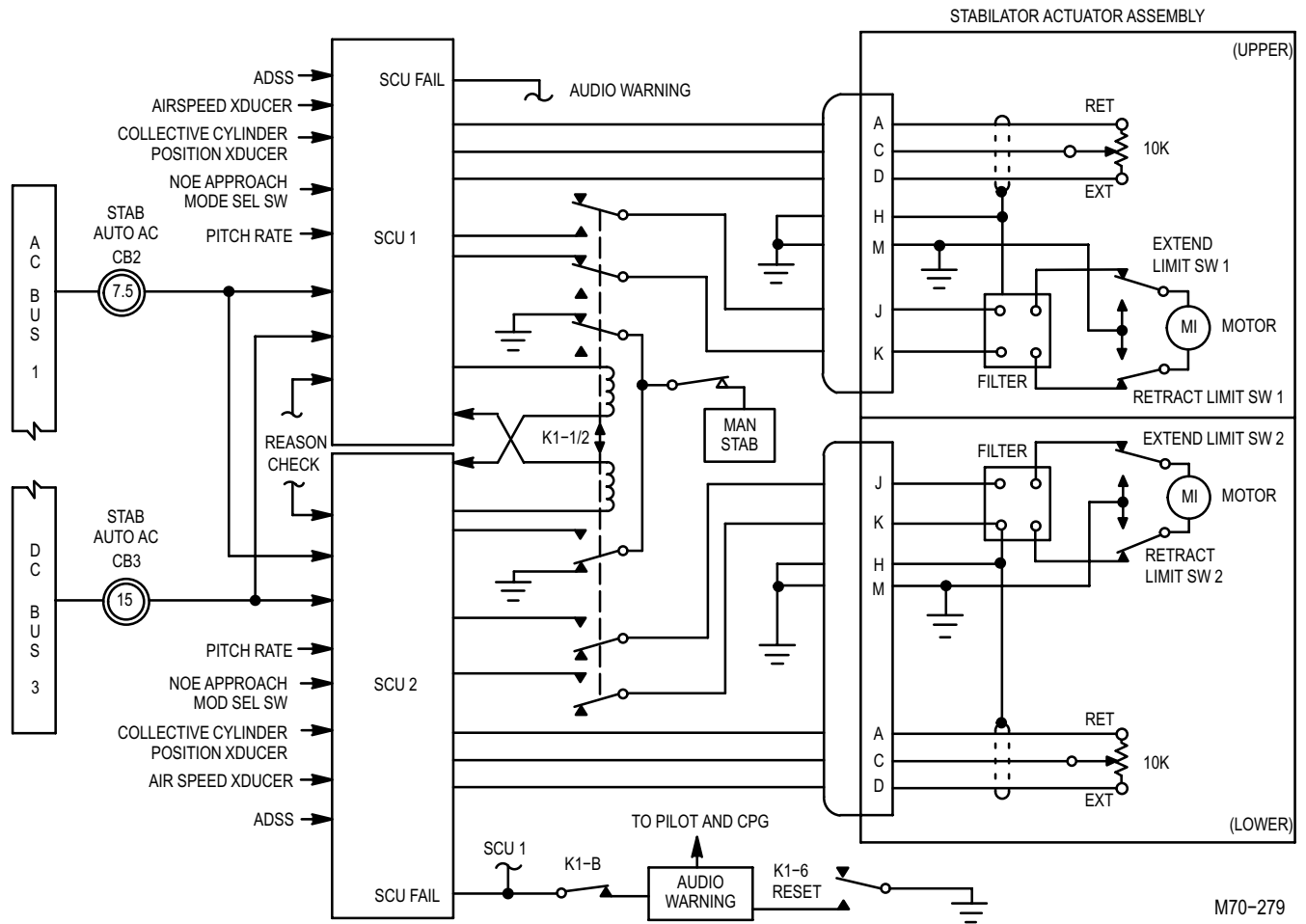
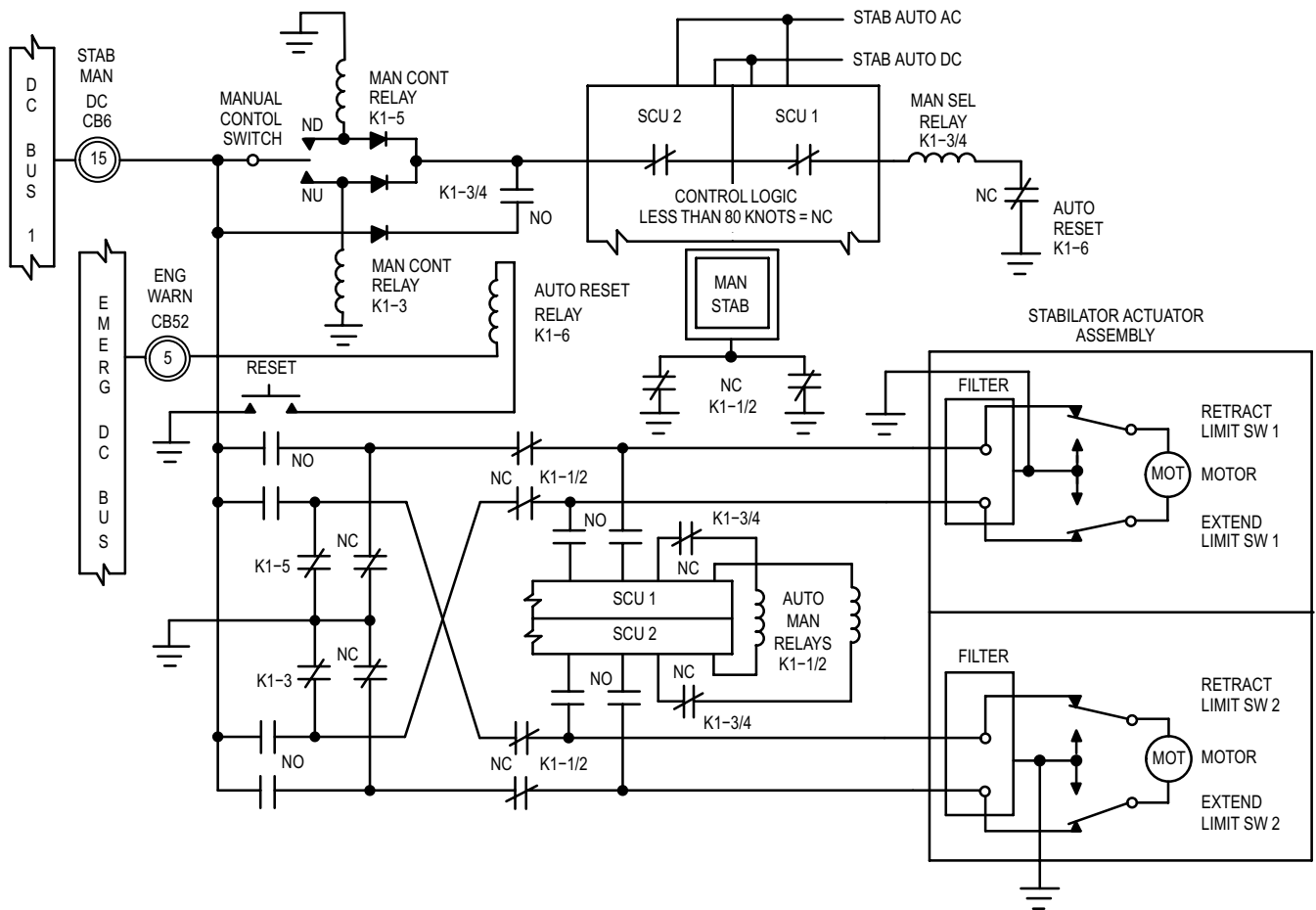


Figure 11-40. Automatic Mode Schematic Diagram

(d) In the manual mode (fig. 11-41) when airspeed is above 80 knots, control logic within the SCUs open the circuit to the MAN SEL relay (K1-3/4) coil. Actuation of the stabilator manual control switch has no effect on the stabilator. When airspeed decreases below 80 knots, control logic inside the SCUs cause internal contacts to close, completing the circuit from the stabilator manual control switch through the relay coil of K1-3/4 and normally closed (NC) contacts of relay K1-6. 28 VDC power is supplied through **STAB MAN DC** circuit breaker (CB6) to the stabilator manual control switch. When either crew member places the **NU/ND** switch on the stabilator manual control panel to **NU**, relay K1-3 energizes. At the same time, voltage passes through the NU diode, SCU control logic, the relay coil of K1-3/4 and the normally closed (NC) contacts of relay K1-6, closing the normally open (NO) contacts of relay K1-3/4, providing a holding circuit to the relay coil of K1-3/4. The NC contacts of relay K1-3/4 open, de-energizing the AUTO MAN relay K1-1/2. When relay K1-1/2 opens, the NO contacts open circuits from the SCUs to the cylinder assembly. Relay K1-1/2 NC contacts enable the **MAN STAB** indicators on the pilot and CPG caution/warning panels and complete a manual mode circuit path to the stabilator cylinder. The motors extend until the **NU/ND** switch is released or the extend limit switches are opened. When either crew member places the **NU/ND** switch on the stabilator manual control panel to **ND**, relay K1-5 energizes. At the same time, voltage passes through the ND diode, SCU control logic, the relay coil of K1-3/4 and the NC contacts of relay K1-6, closing the normally open (NO) contacts of K1-3/4, providing a holding circuit to the relay coil of K1-3/4. The NC contacts of relay K1-3/4 open, de-energizing the AUTO MAN relay K1-1/2. When relay K1-1/2 opens, the NO contacts open circuits from the SCUs to the cylinder assembly. The NC contacts of relay K1-1/2 enable the **MAN STAB** indicators on the pilot and CPG caution/warning panels and completes a manual mode circuit path to the stabilator actuator. The motors will retract until the **NU/ND** switch is released or the retract limit switches are opened. When the stabilator manual control switch is released to the **OFF** position, the **MAN STAB** indicators remain on due to the holding circuit which keeps relay K1-3/4 energized. Depressing the **RESET** pushbutton on the collective stick supplies 28 VDC through the **ENG WARN** circuit breaker (CB52) to energize relay K1-6. Relay K1-6 NC contacts open, removing the holding circuit from relay K1-3/4. Automatic mode is restored and the **MAN STAB** indicators go out.

11-7. SYSTEM DESCRIPTION (cont)



M70-278

Figure 11-41. Manual Mode Schematic Diagram

(3) The pilot's and CPG's stabilator position (**STAB POS**) indicators (fig. 11-42) receive power through the **STAB MAN AC** circuit breaker (CB7) to transformer T3. Transformer T3 steps down the applied 115 VAC to 26 VAC. When 26 VAC is applied to the **STAB POS** indicators the **OFF** flag retracts. The stabilator position transducer also receives 26 VAC excitation voltage from T3. When the stabilator moves, the transducer develops a corresponding synchro voltage which is sent to the **STAB POS** indicators. The synchro signals drive the **STAB POS** indicator pointers to indicate the stabilator trailing edge position.

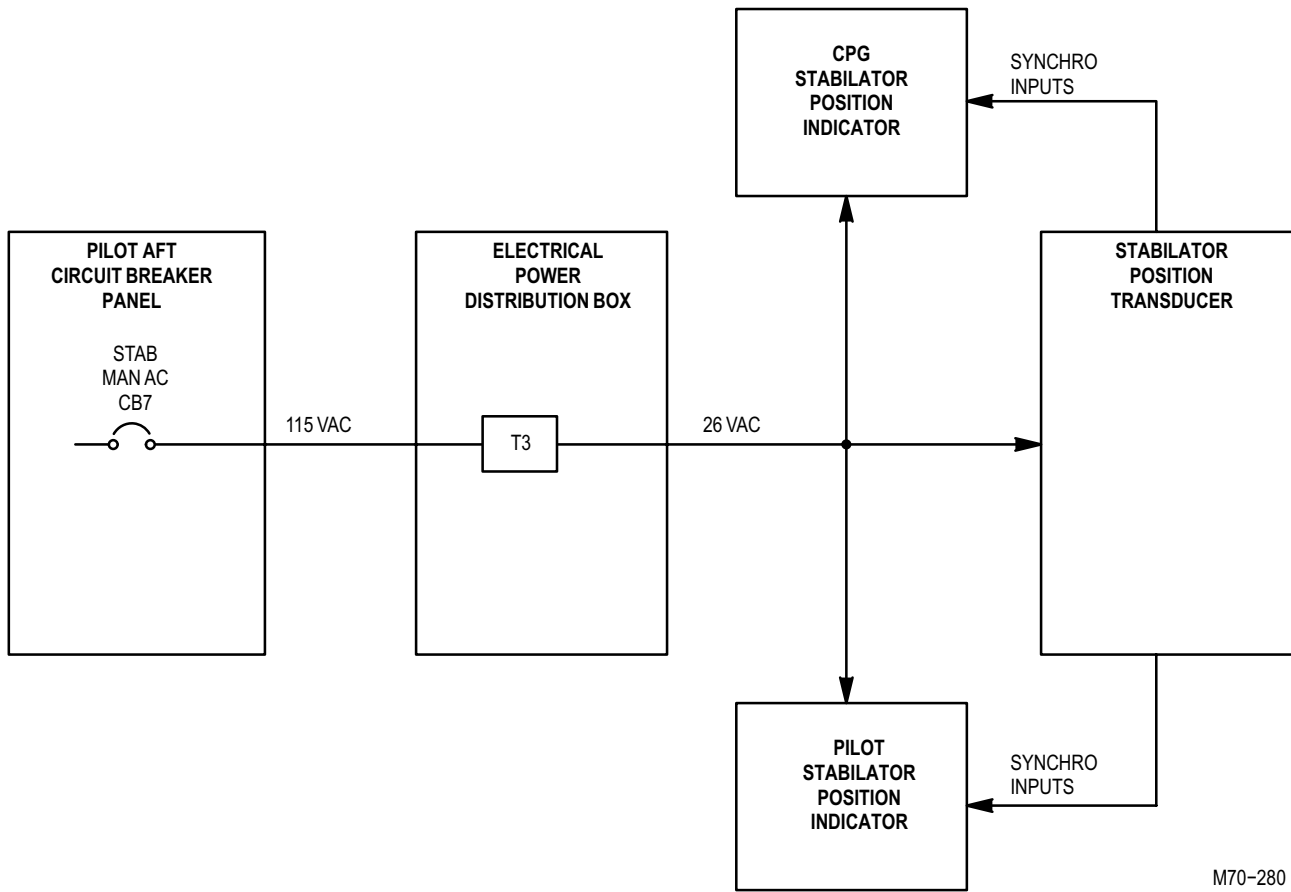


Figure 11-42. STAB POS Indicator Functional Block Diagram

The DASE flight control system communicates with the FCC. The FCC uses multiplex read codes to issue instructions and to determine system/LRU status. See TM 1-1520-238-T-3, to troubleshoot the DASE flight control system.

SECTION III. TROUBLESHOOTING PROCEDURES

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX

11-9

Use the information in Table 11-2 to locate the electrical components and their connectors to perform the troubleshooting tasks in this chapter. Table 11-2 includes locator illustrations which supplement the ECLC listing. The listing entry in the grid area column tells where to locate the component in the illustrations.

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing

FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
J1047	W118		L22	58E	PLT STATION
J1048	W119		L21	49C	PLT STATION
J1049	W118		L23	57B	PLT STATION
J691	W118		DS162	37C	PLT STATION
J692	W118		DS162	10B	CPG STATION
P1	A334	J266	W119	19E	B60 DOOR
P1	A334	J267	W118	17D	B60 DOOR
P1	A334	J268	W119	52D	PLT STATION
P1	A334	J269	W118	56E	PLT STATION
P1	A334	J270	W119	60C	PLT STATION
P1	A334	J271	W118	58E	PLT STATION
P1	A334	J272	W119	25B	PLT STATION
P1	A334	J273	W118	17B	B60 DOOR
P1	A639	J997	W211	84C	L325 DOOR
P1	A640	J998	W102	70E	L325 DOOR
P1	A641	J993	W119	26A	PLT STATION
P1	A641	J994	W119	14B	CPG STATION
P1	DS28	J164	W118	38D	PLT STATION
P1	DS31	J166	W118	11B	CPG STATION
P1	W605/A76	J1	A402	36B	PLT STATION

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
P1076	MT19	J1076	W170	96B	R545 COVER
P1077	W211	J1	A329	82E	L325 DOOR
P108	A80	J108	W119	15B	CPG STATION
P113	A401	J113	W117	21A	PLT STATION
P118	A400	J118	W255	18C	B60 DOOR
P170	W119	J1	A137	24E	PLT STATION
P173	W119	J4	A24	23D	PLT STATION
P18	W118	J1	A106	29D	PLT STATION
P19	W118	J1	A157	1C	R40 COVER
P2	W605/A76	J2	A402	36C	R200 PANEL
P20	W118	J2	A106	29B	PLT STATION
P215	L36	J215	W115	97D	L540 FAIRING
P219	L34	J219	W211	62A	T205R FAIRING
P220	W211	J220	L34	61D	T205R FAIRING
P223	L36	J223	W115	99E	L540 FAIRING
P224	W115	J224	L36	97C	L540 FAIRING
P225	L35	J225	W211	75B	T205L FAIRING
P226	W211	J226	L35	76C	T205L FAIRING
P227	L33	J227	W211	61B	T205R FAIRING
P228	W211	J228	L33	61C	T205R FAIRING
P230	MT8	J230	W119	25C	PLT STATION
P231	MT5	J231	W118	56C	PLT STATION
P232	MT7	J232	W118	60B	PLT STATION
P233	MT6	J233	W119	60E	PLT STATION

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
P235	MT1	J235	W118	19C	B60 DOOR
P236	MT3	J236	W118	18E	B60 DOOR
P237	MT2	J237	W119	17B	B60 DOOR
P31	W118	J2	A157	1B	R40 COVER
P371	W211	J2	A310	91B	R295 DOOR
P402	W170	J402	W211	85E	R295 DOOR
P403	W119	J403	W117	8B	L40 COVER
P407	W117	J407	W255	8C	L40 COVER
P408	L34	J408	W211	61C	T205R FAIRING
P413	W119	J10	A326	43C	CPG STATION
P415	L35	J415	W211	76B	T205L FAIRING
P417	L33	J417	W211	61A	T205R FAIRING
P423	W117	J11	A402	35D	L200 PANEL
P427	W211	J28	A402	33E	L200 PANEL
P429	W119	J23	A402	35D	L200 PANEL
P431	W211	J27	A402	34C	L200 PANEL
P433	W119/S350	J20	A402	35E	L200 PANEL
P435	W261	J7	A326	44C	CPG STATION
P436	W102	J436	W118	61E	T205R FAIRING
P437	W119	J25	A402	33E	R200 PANEL
P441	W119	J24	A402	35D	L200 PANEL
P445	W211	J445	W119	75E	T205L FAIRING
P447	W211	J447	W119	74E	T205L FAIRING
P455	W170	J455	W211	85D	R295 DOOR

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
P456	W118	J456	W211	27E	PLT STATION
P459	W211	J459	W119	74D	T205L FAIRING
P463	W119	J1	A76	28D	PLT STATION
P466	W118	J14	A326	41C	CPG STATION
P469	W119	J2	A326	43C	CPG STATION
P472	W118	J15	A326	42B	CPG STATION
P473	W119	J6	A326	43C	CPG STATION
P481	W119	J13	A326	43C	CPG STATION
P480	W118	J16	A326	41B	CPG STATION
P485	W211	J7	A323	87E	R295 DOOR
P487	W119	J9	A326	43C	CPG STATION
P488	W118	J18	A402	34C	R200 PANEL
P49	W261	J1	A9	47B	L140 FAIRING
P491	W211	J6	A323	85B	R295 DOOR
P493	W211	J4	A323	85C	R295 DOOR
P494	W211	J2	A323	85C	R295 DOOR
P497	W211	J3	A323	85C	R295 DOOR
P498	W102	J1	A323	85C	R295 DOOR
P499	W211	J5	A323	85B	R295 DOOR
P682	W211	J3	A69	92D	R295 DOOR
P683	A706/ W211	J4	A69	92E	R295 DOOR
P686	A707/ W211	J2	A69	91E	R295 DOOR
P688	A708/ W211	J1	A69	90B	R295 DOOR
P692	W211	J1	A342	86E	R295 DOOR

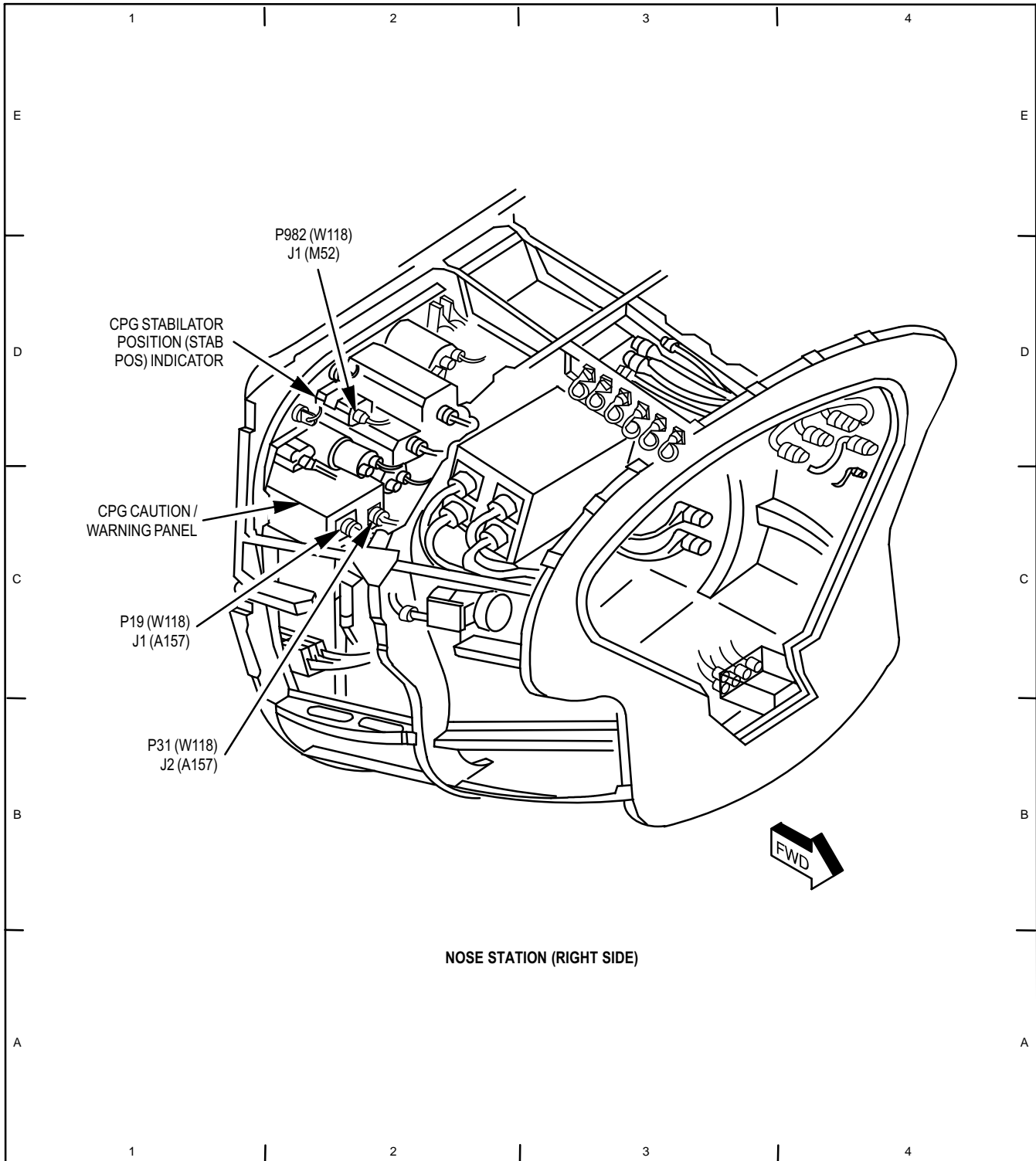
11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

FROM COLUMN		TO COLUMN		Grid Area	Access
Connector Ref Des	Component/Harness	Connector Ref Des	Component/Harness		
P693	W211	J2	A342	86E	R295 DOOR
P694	W211	J3	A342	85E	R295 DOOR
P750	W118	J1	A320	39B	PLT STATION
P756	W115	J756	W170	96D	R545 COVER
P908	W118	J908	W119	13D	CPG STATION
P911	W189	J911	W211	82B	L325 DOOR
P912	W118	J912	W119	13D	CPG STATION
P914	W118	J914	W119	13C	CPG STATION
P919	W102	J919	W211	89D	R295 DOOR
P935	W189	J935	W211	82B	L325 DOOR
P944	W211	J3	A636	88E	R295 DOOR
P981	W119	J1	M51	37D	PLT STATION
P982	W118	J1	M52	2E	R40 COVER
P983	W211	J1	MT17	80D	L325 DOOR
P984	W102	J1	MT18	67B	R200 FAIRING
P985	W211	J1	A637	82C	L325 DOOR
P986	W211	J2	A637	82C	L325 DOOR
P987	W211	J3	A637	82D	L325 DOOR
P989	W211	J1	A638	83C	L325 DOOR
P990	W211	J2	A638	84D	L325 DOOR
P991	W211	J3	A638	84D	L325 DOOR
P995	W189	J995	L46	95C	R545 COVER
P996	W170	J996	L46	95A	R545 COVER

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

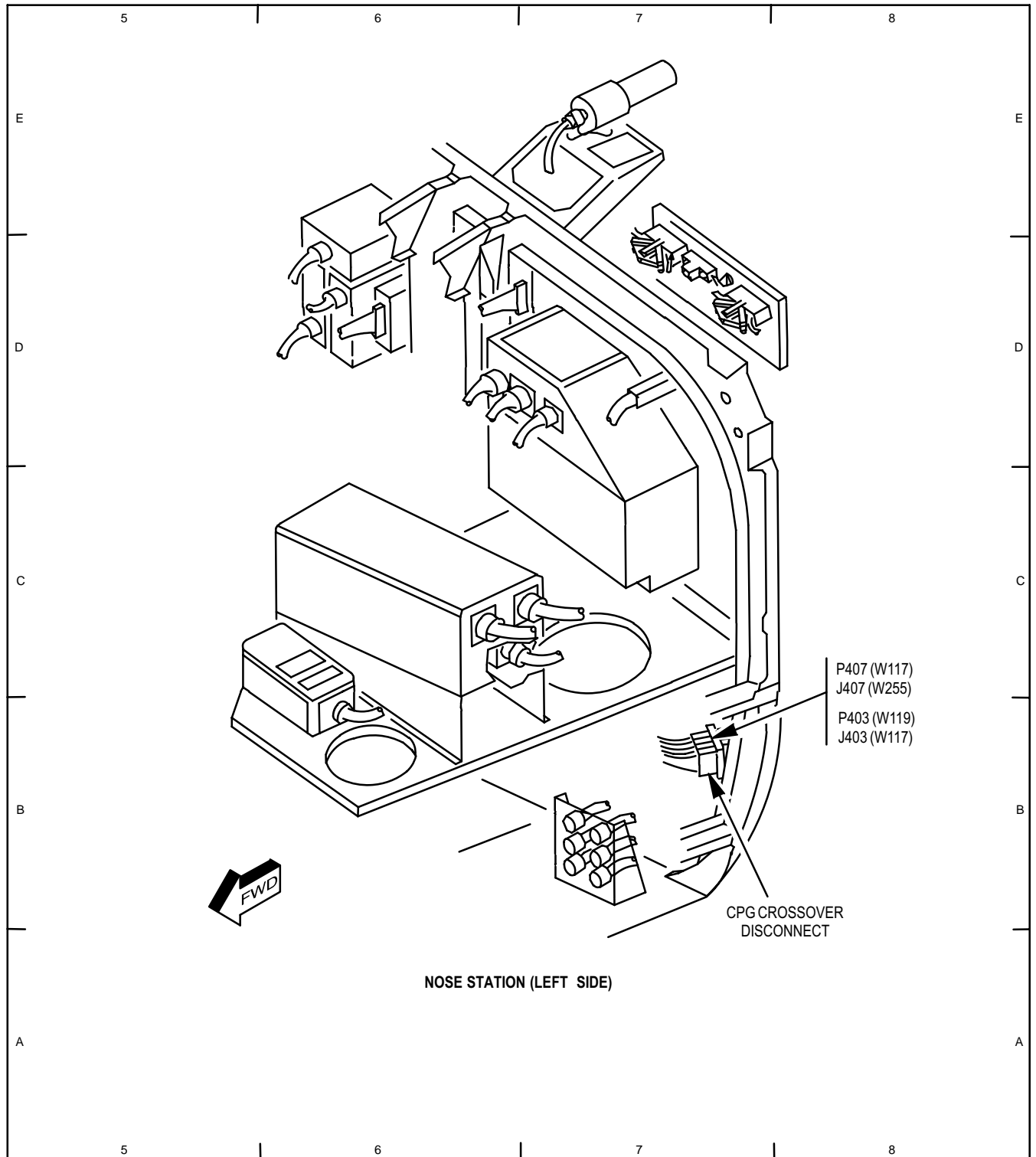


M70-011A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

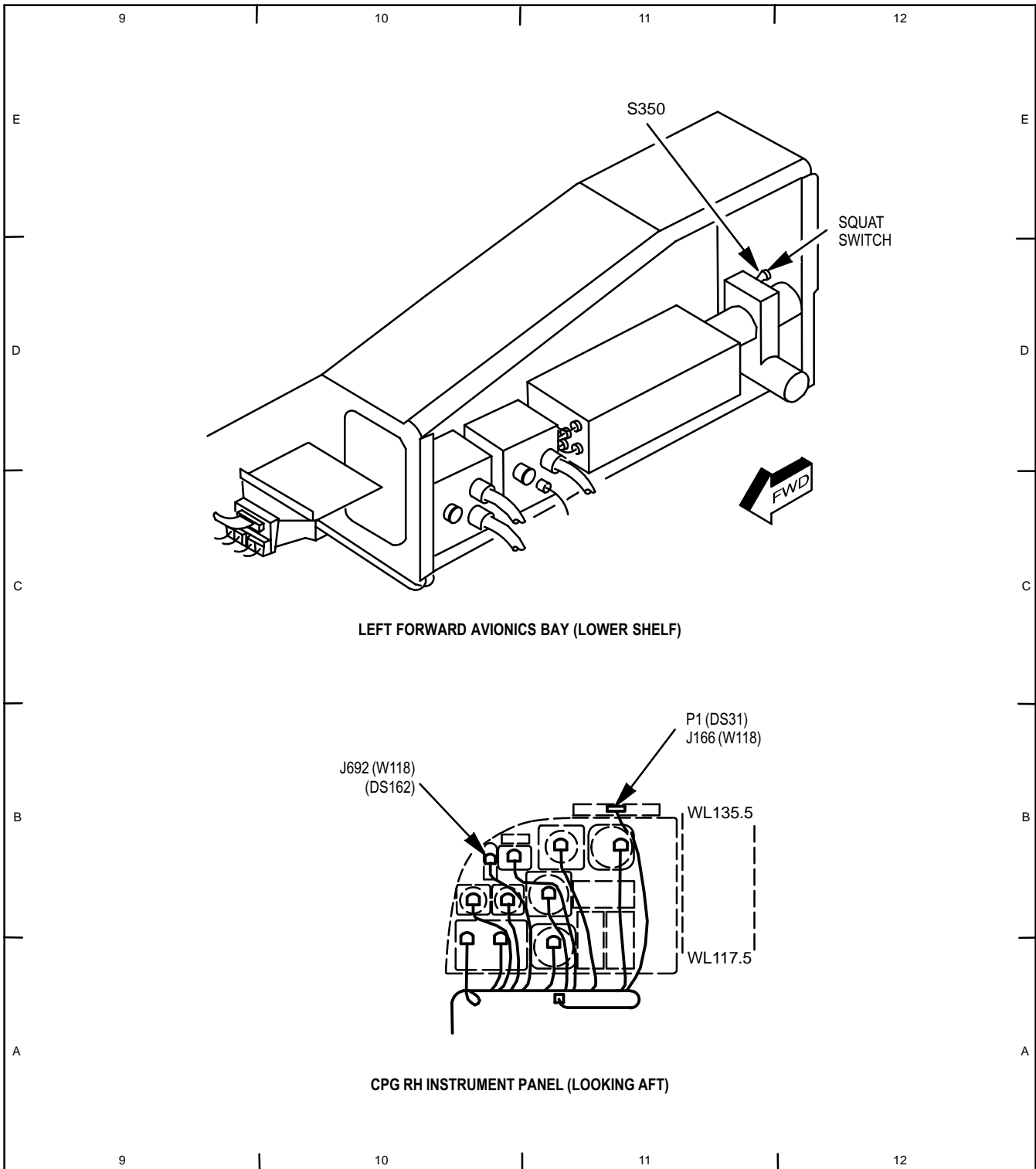
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-012A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

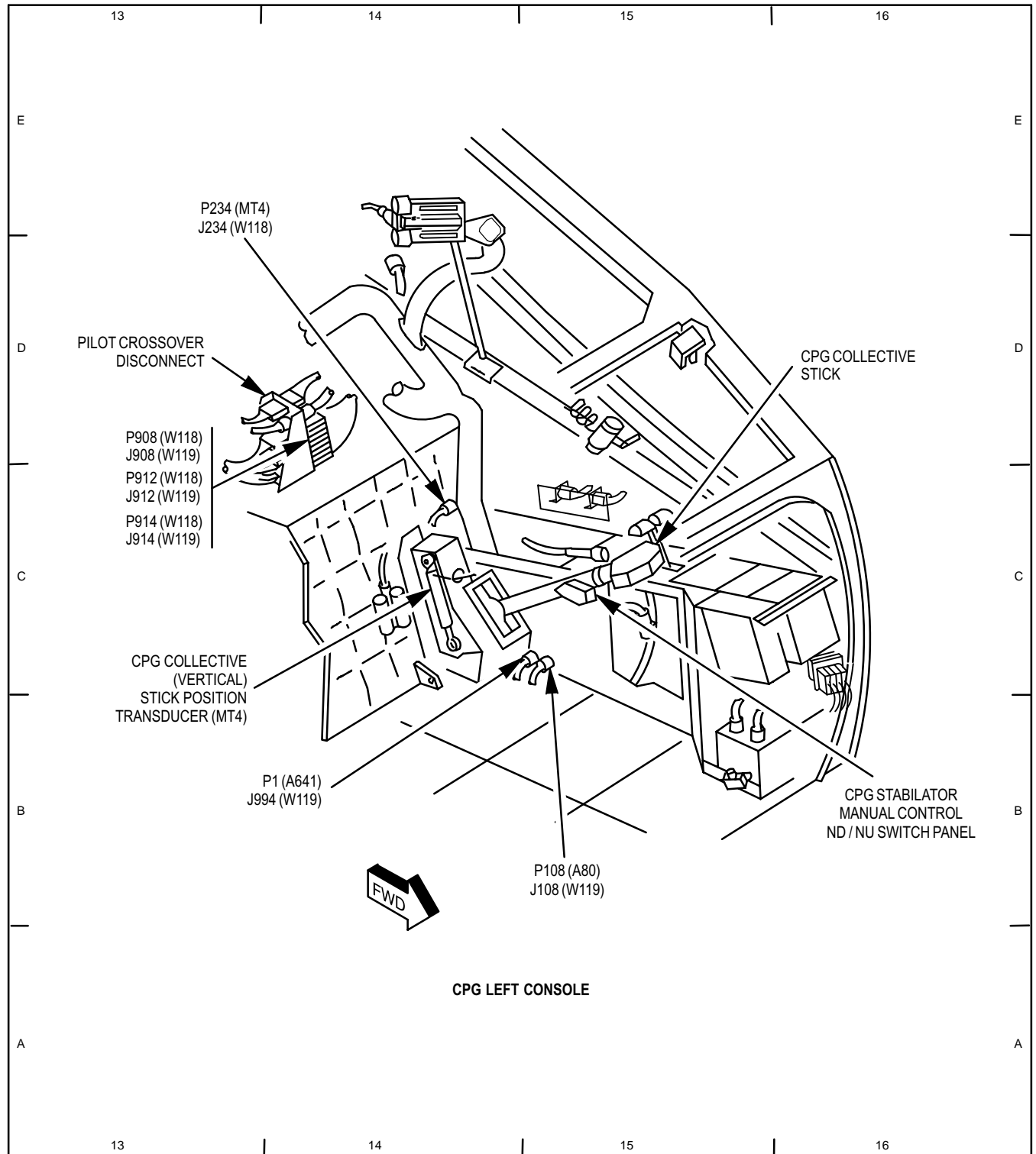


M70-014A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

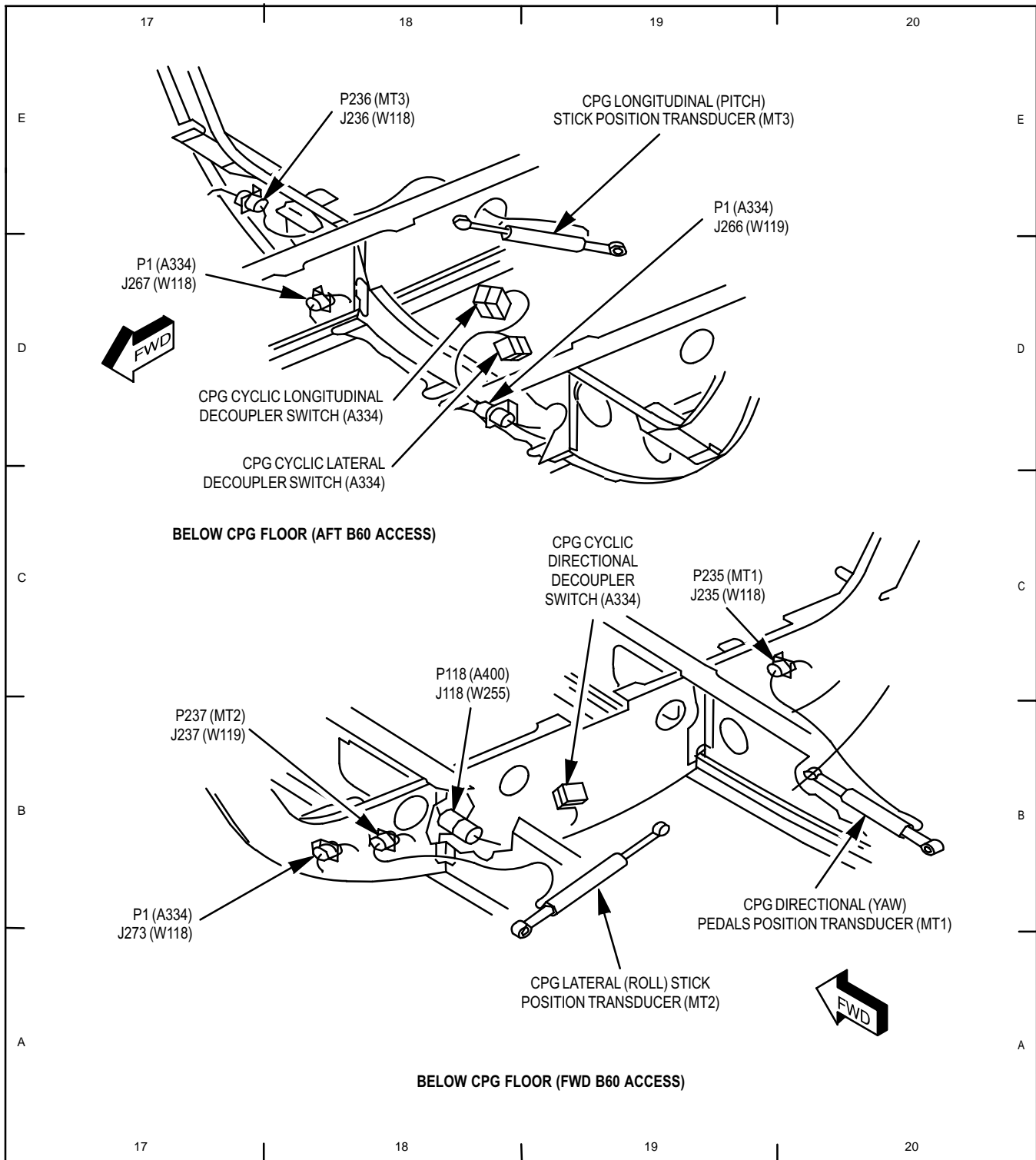
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-016A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

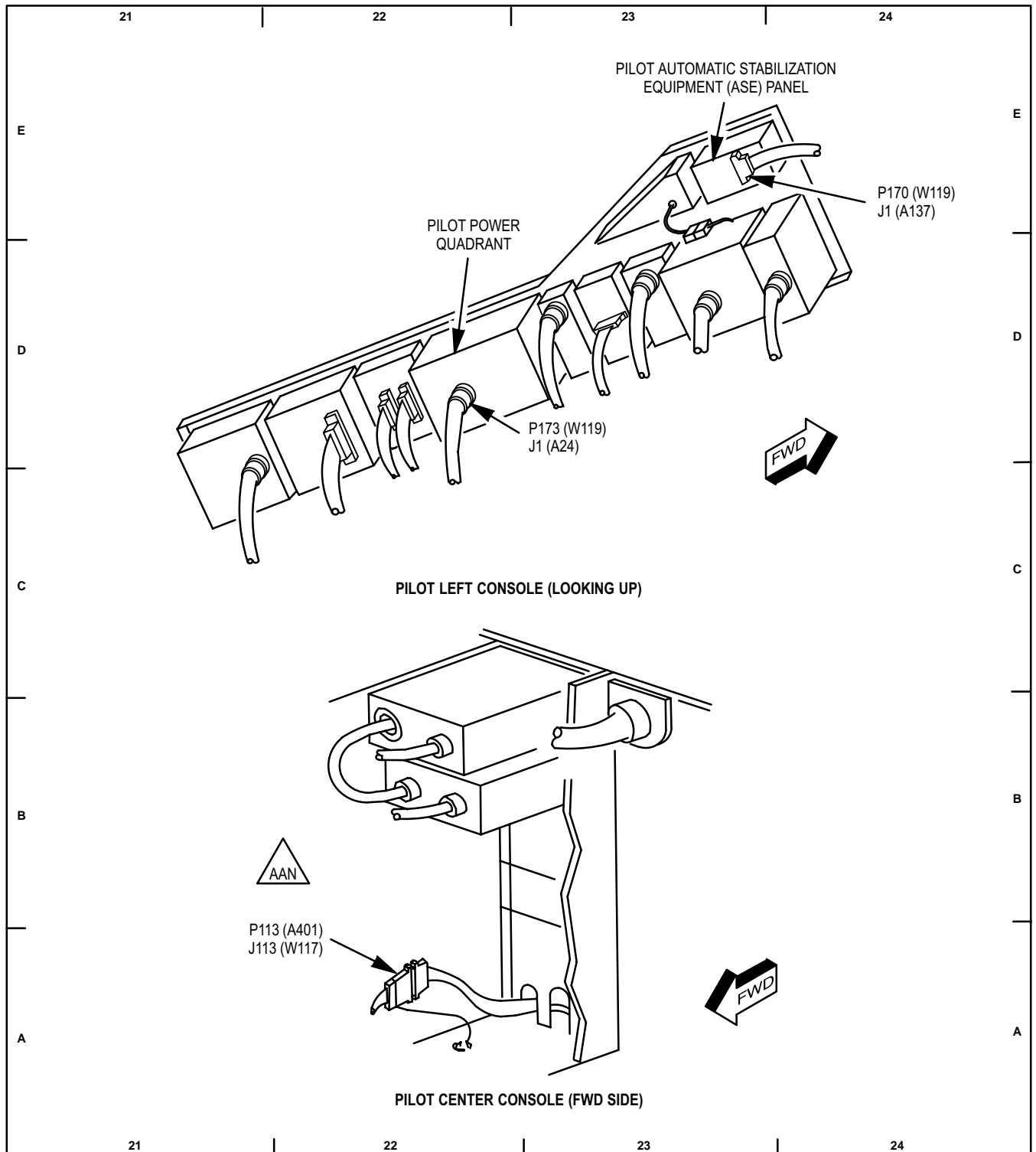


M70-017A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

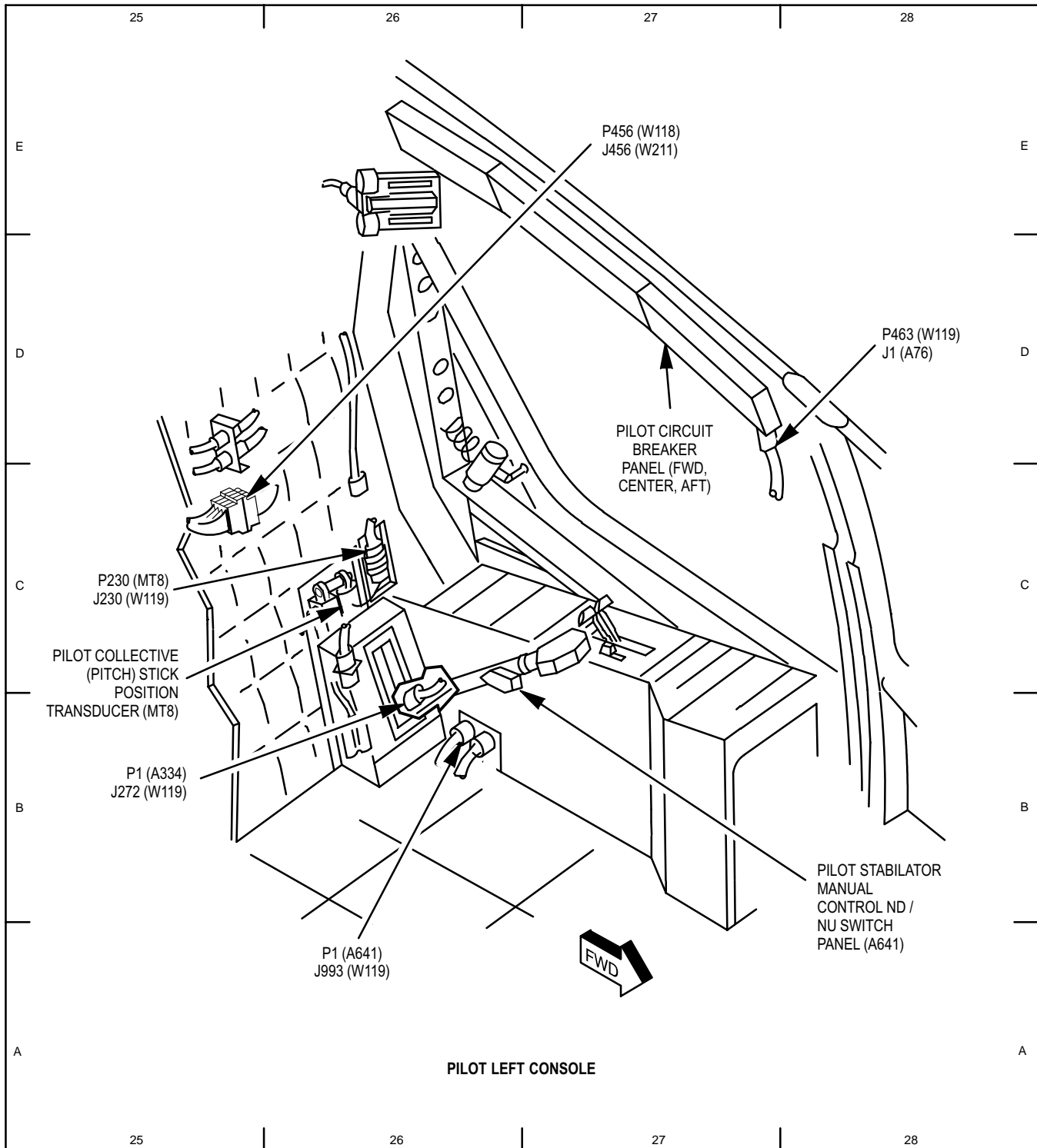
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-018A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

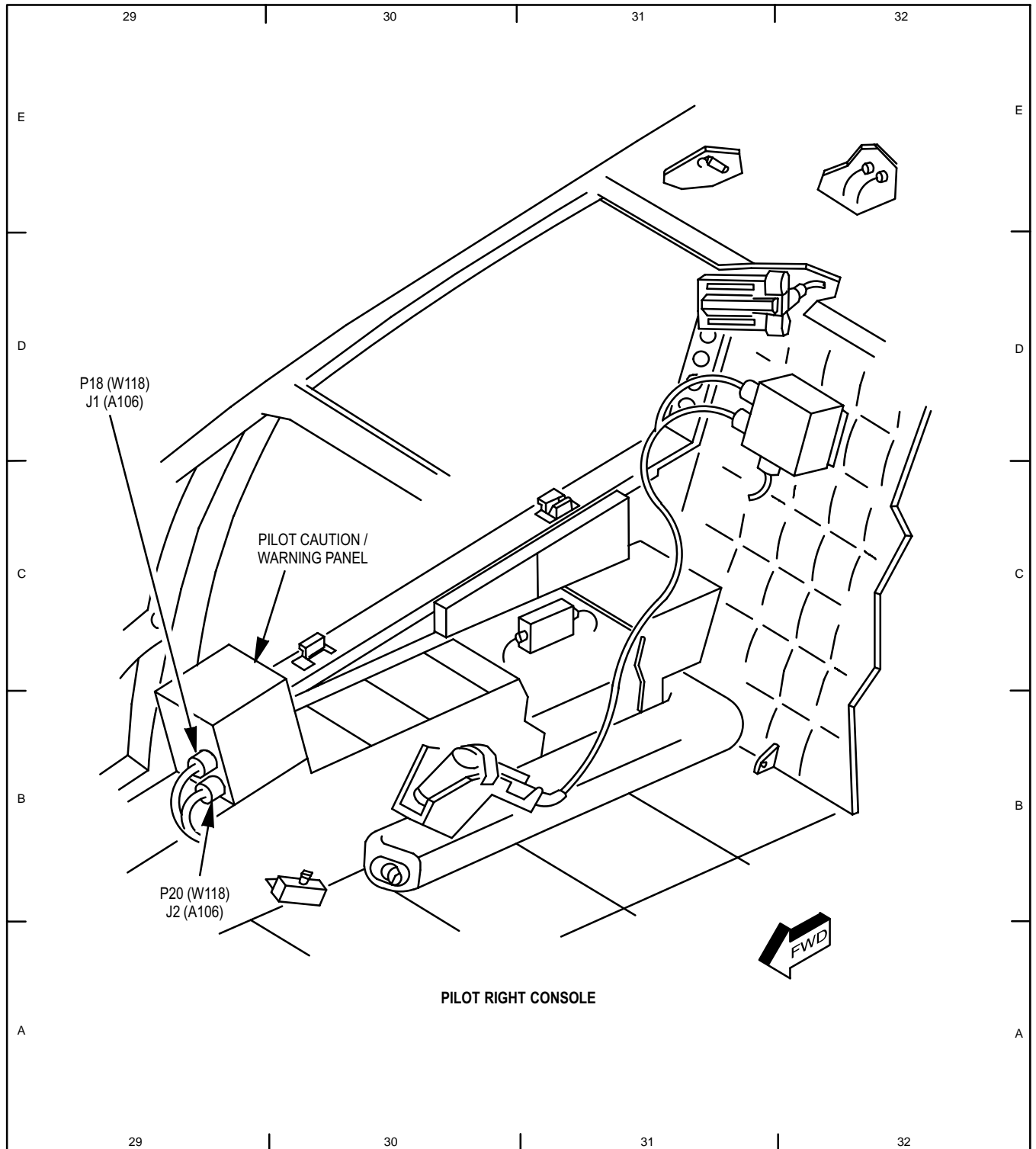


M70-019A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

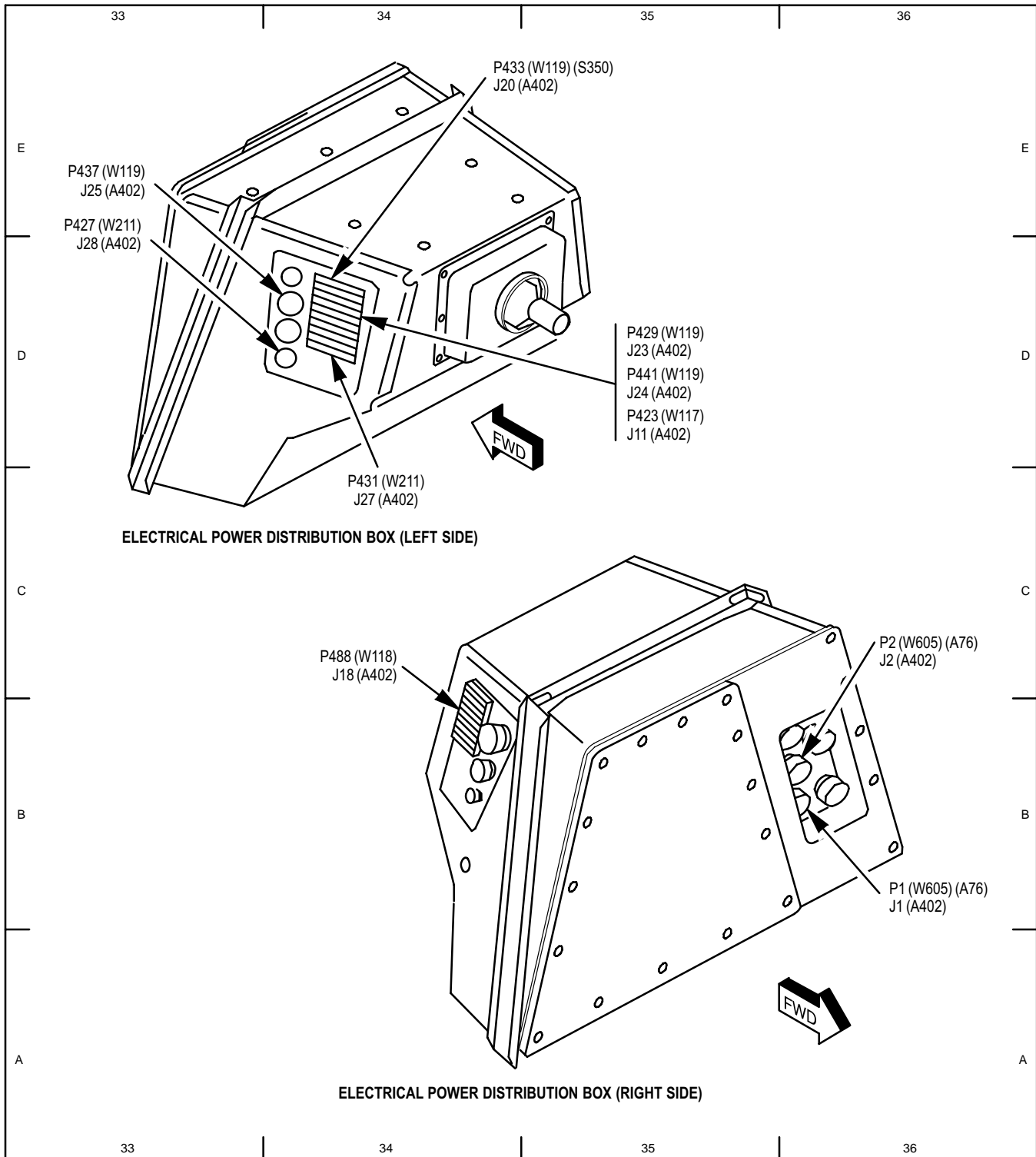
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-020A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

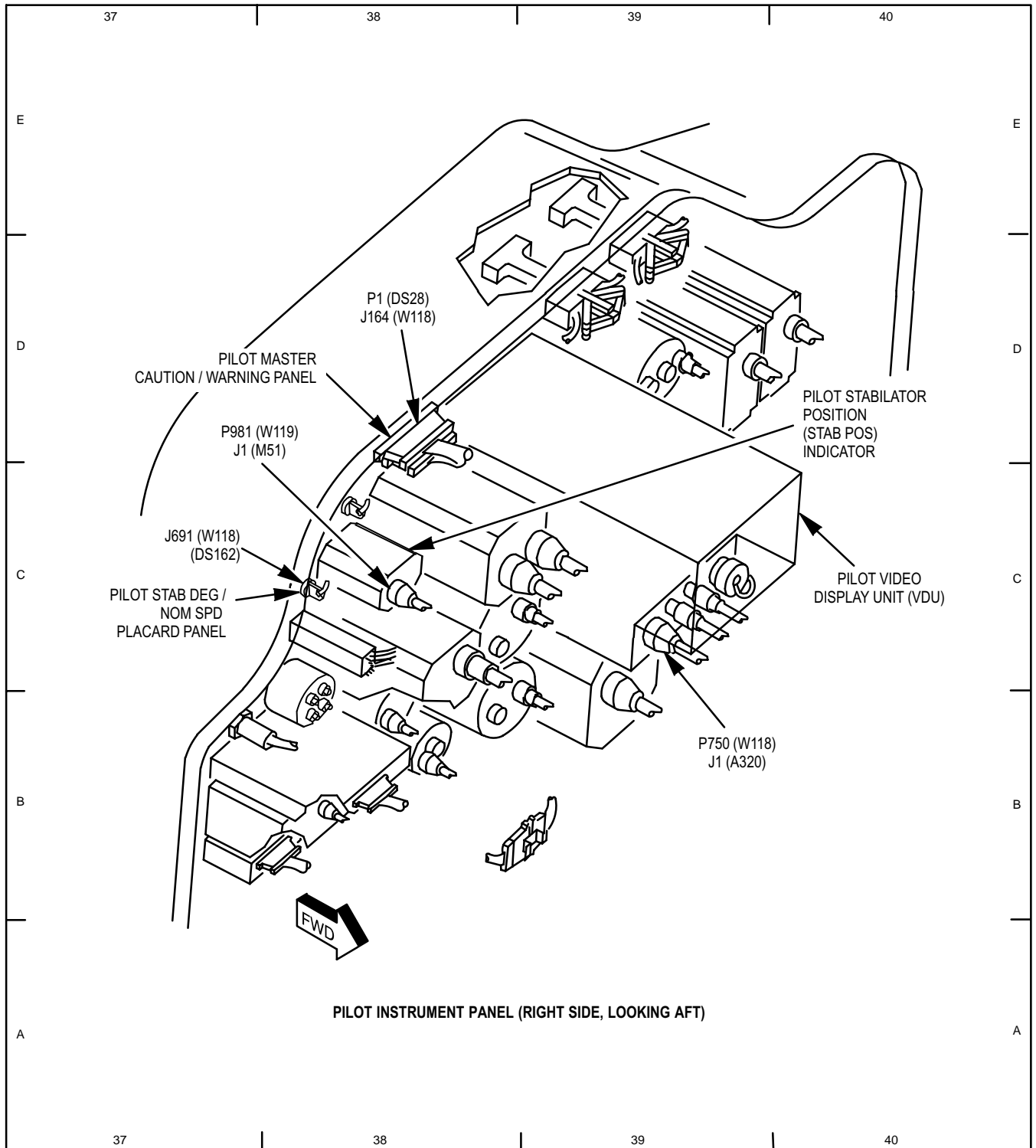


M70-021A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

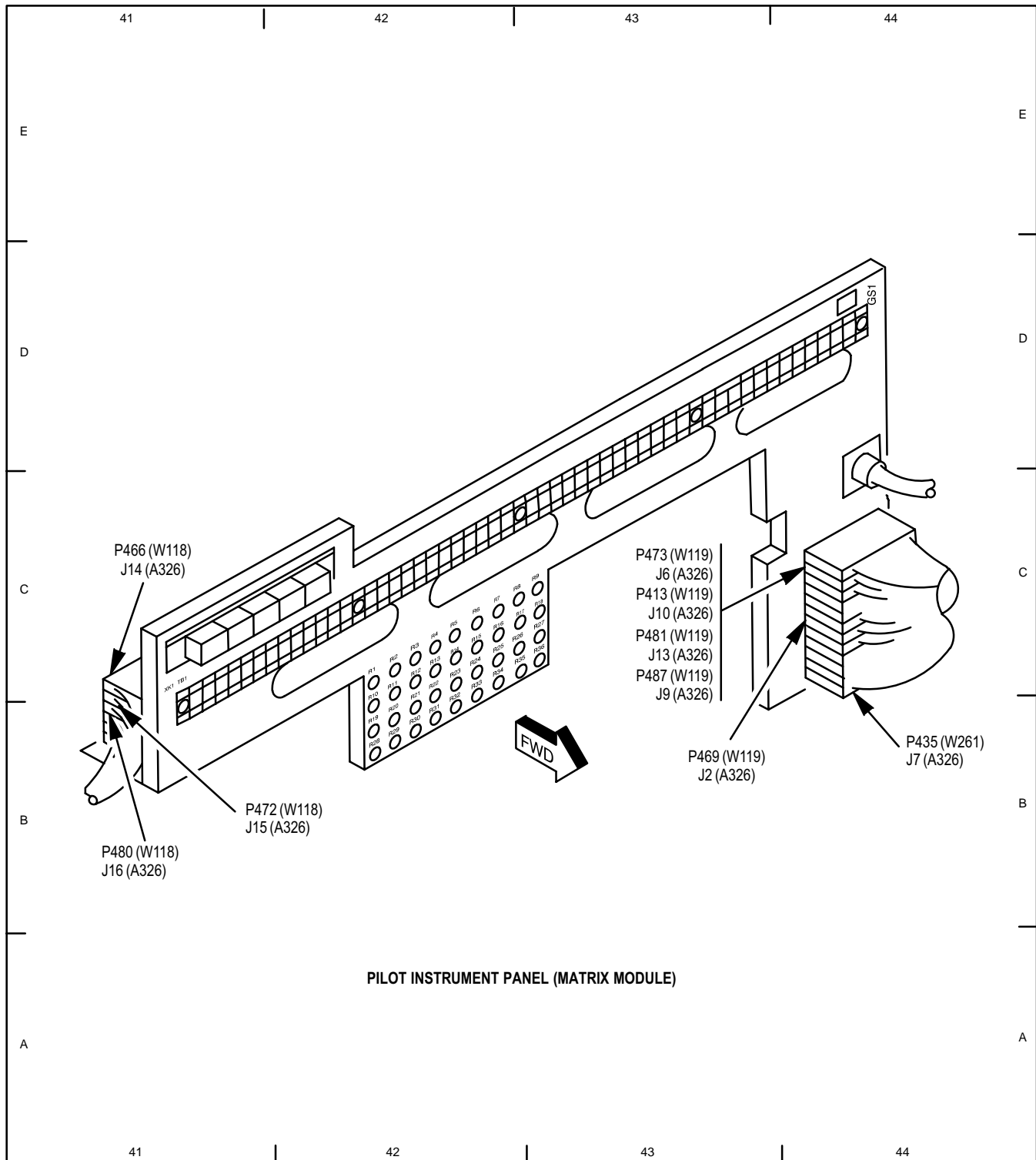
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-023A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

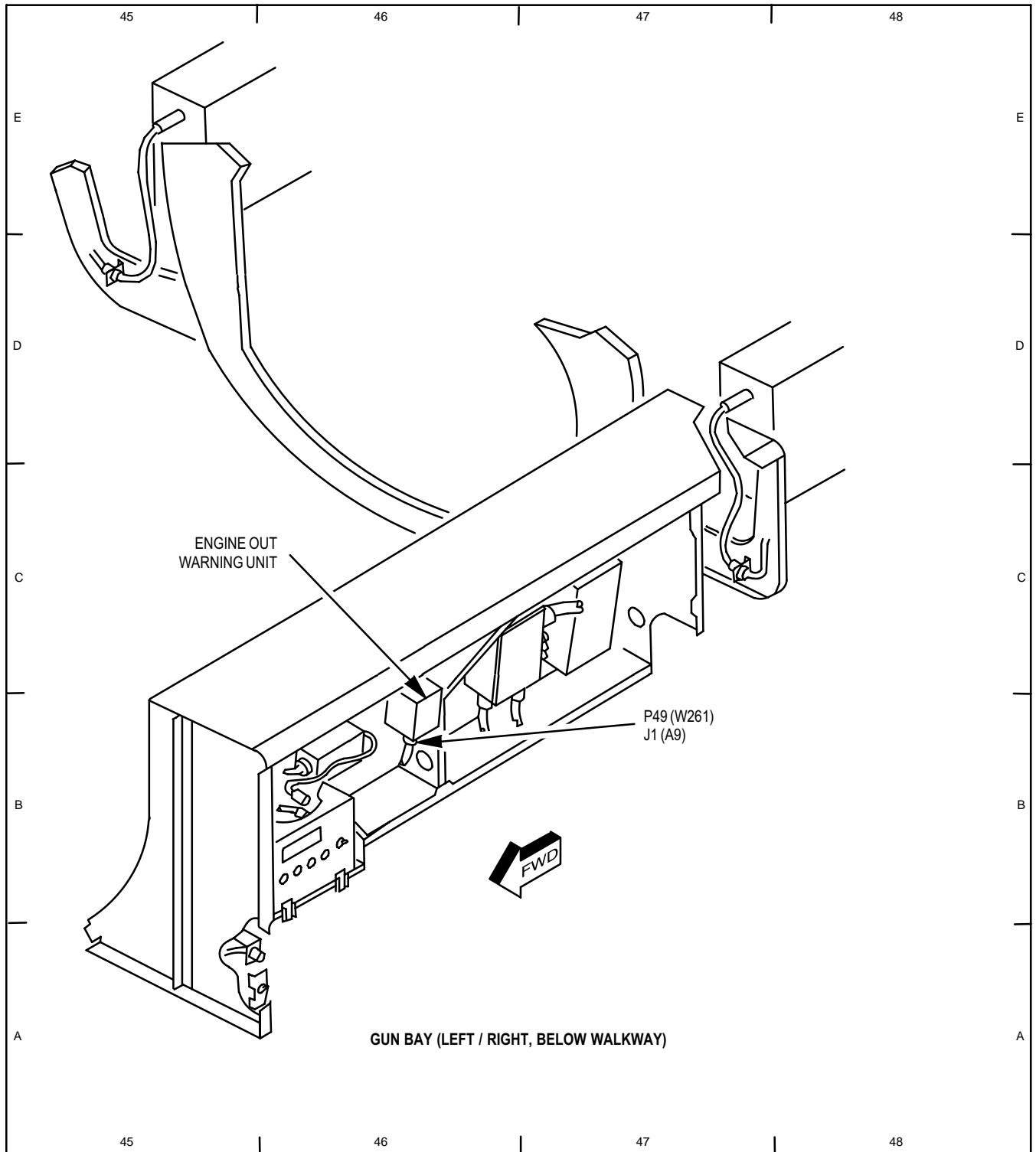


M70-024A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

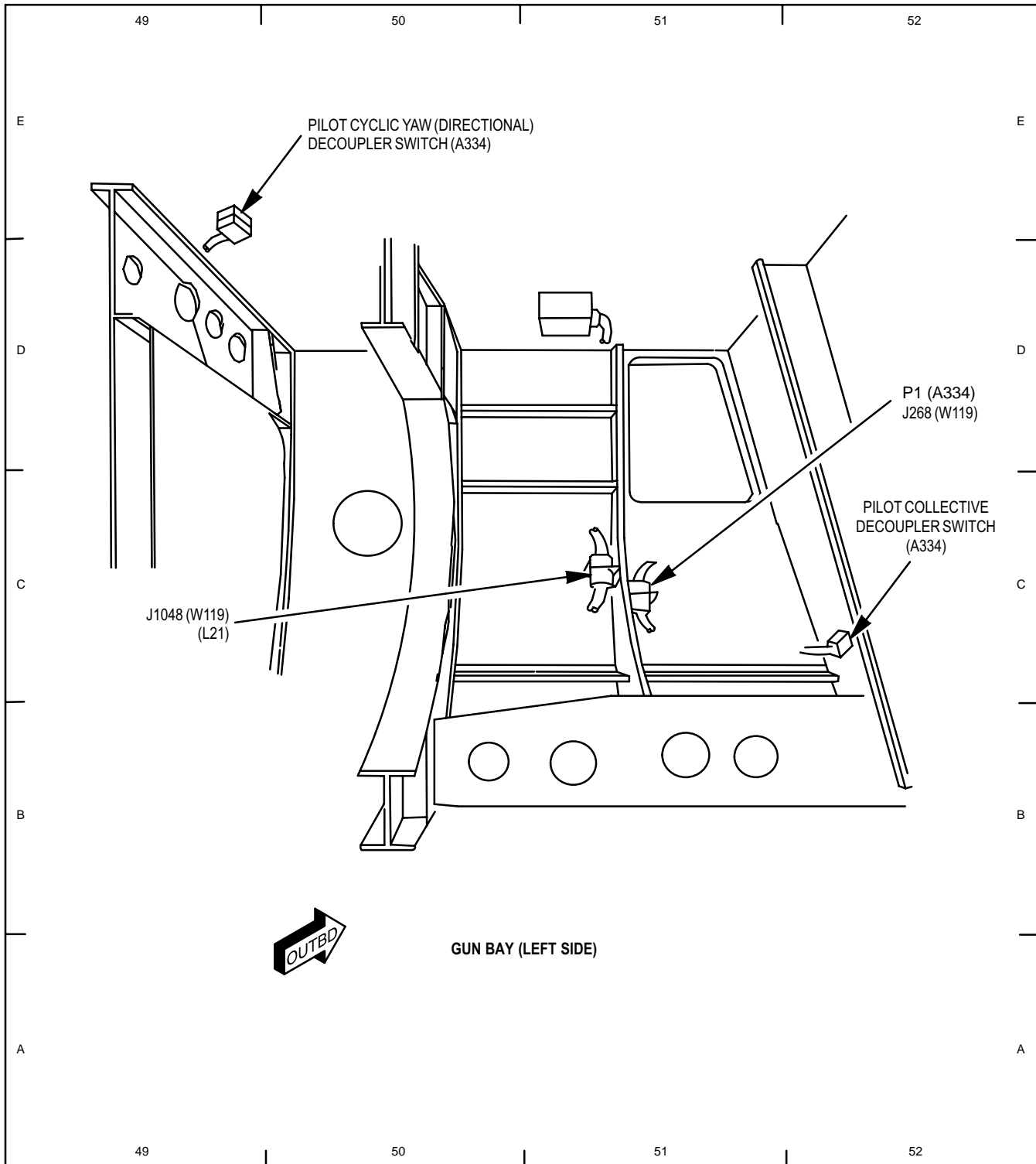
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-025A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

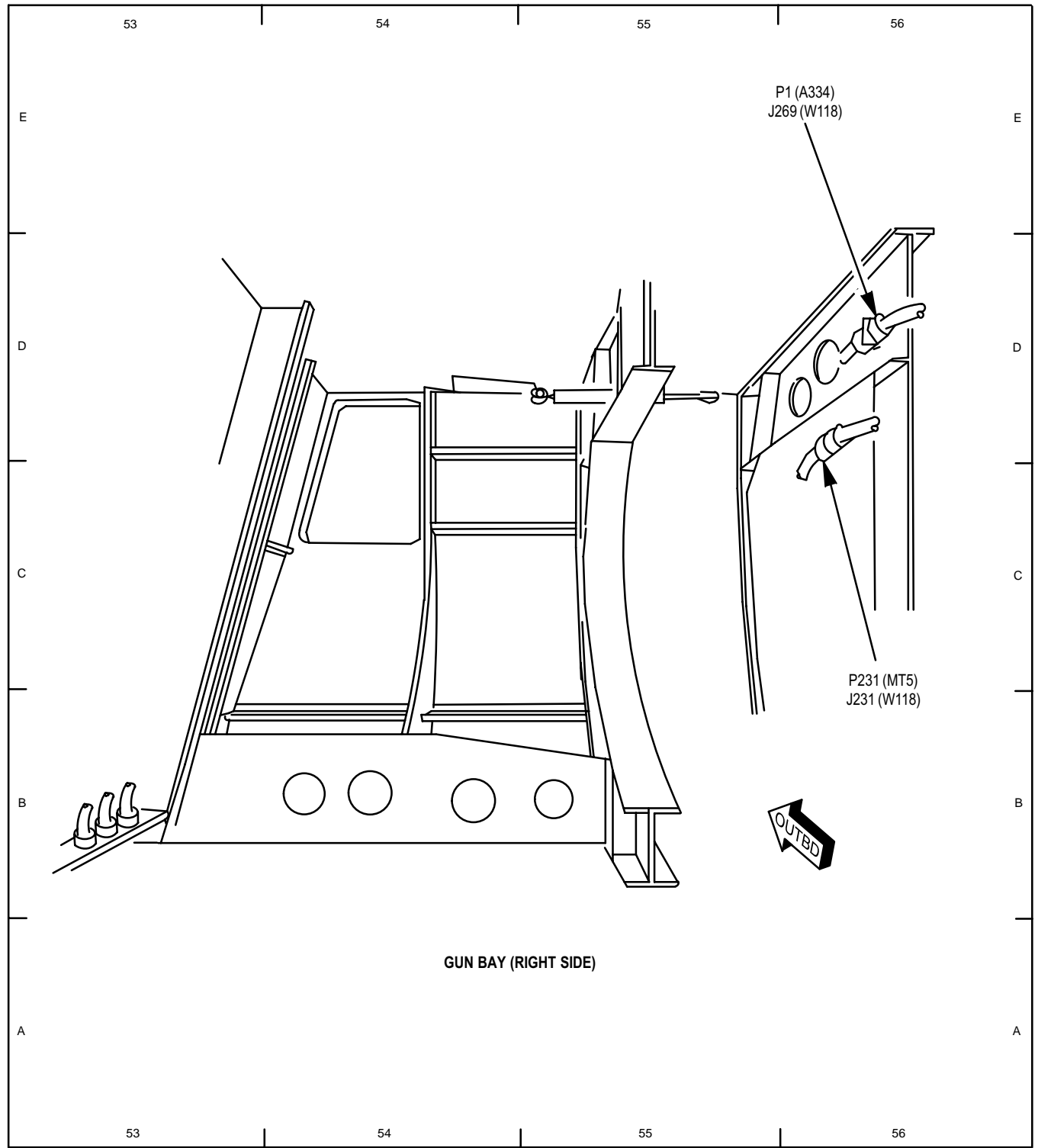


M70-026A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

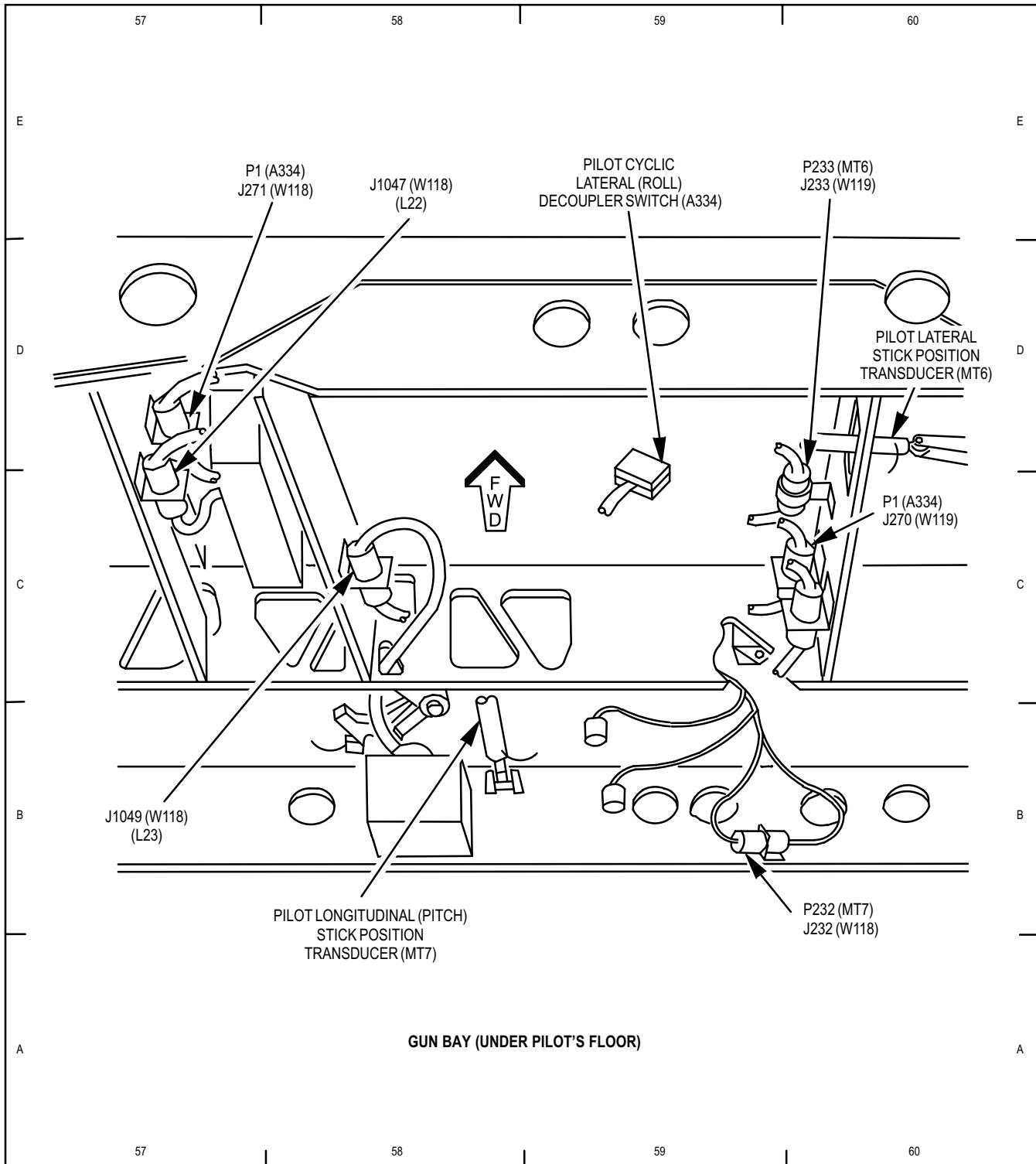
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-027A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

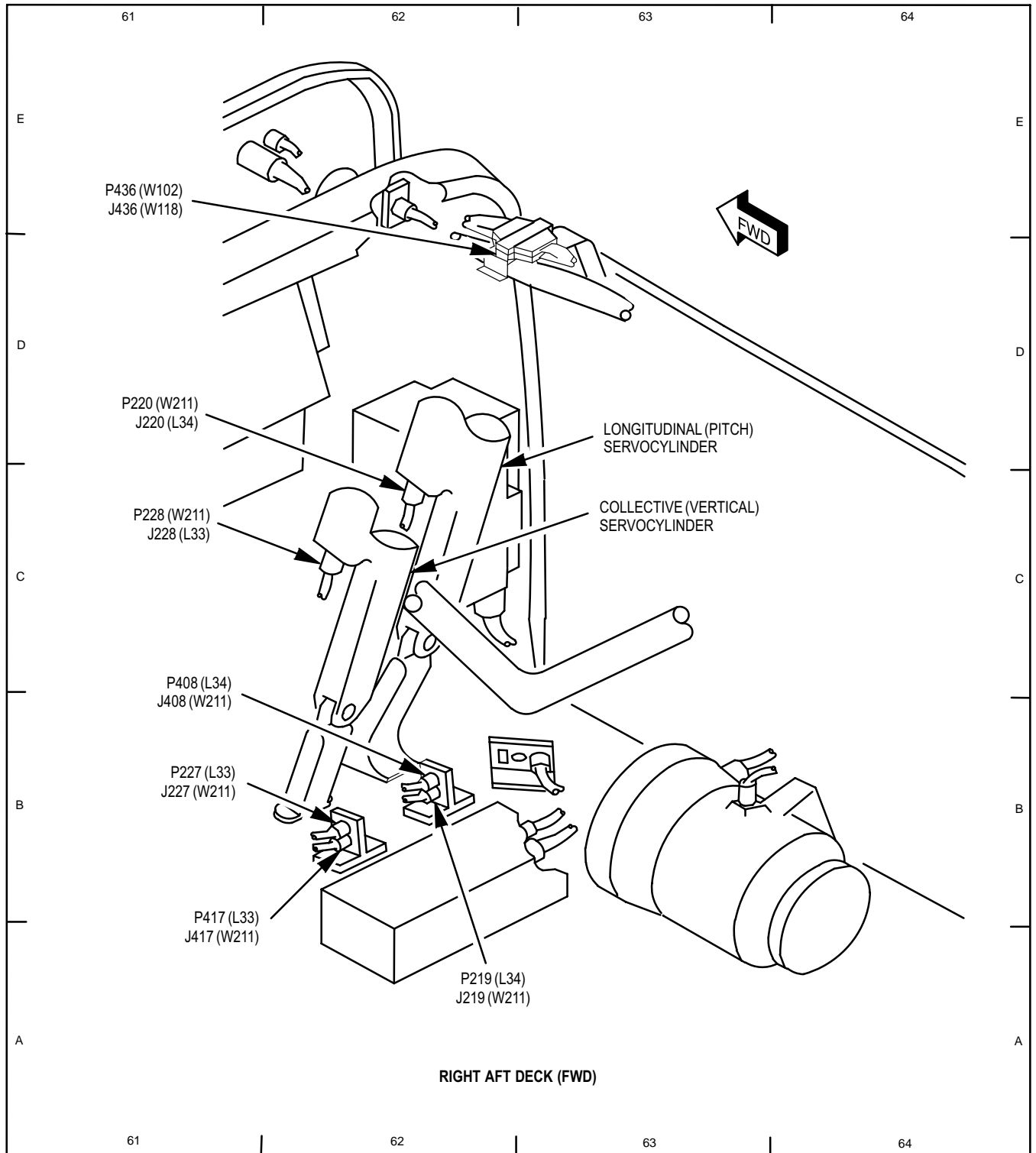


M70-028A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

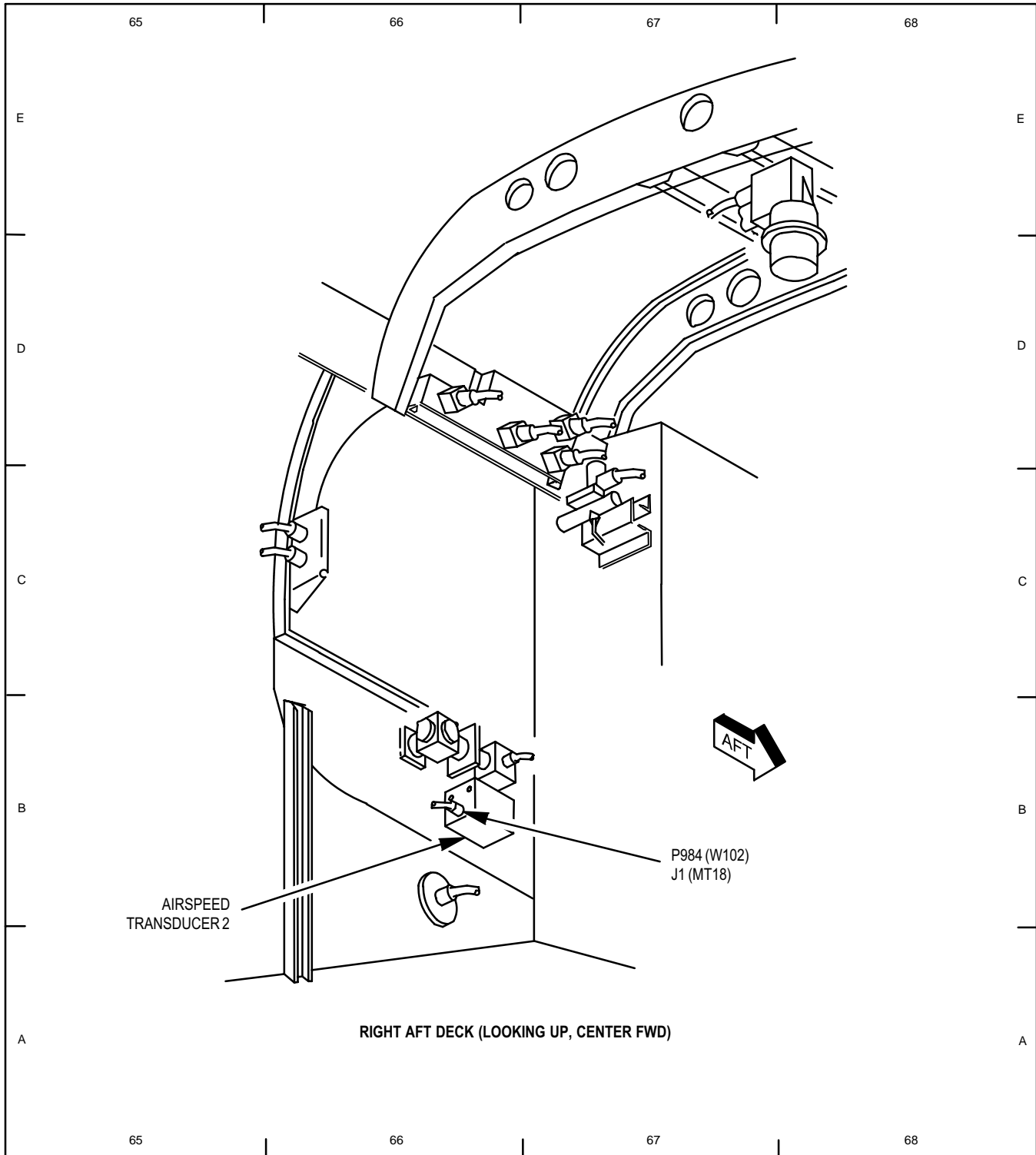
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-029A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

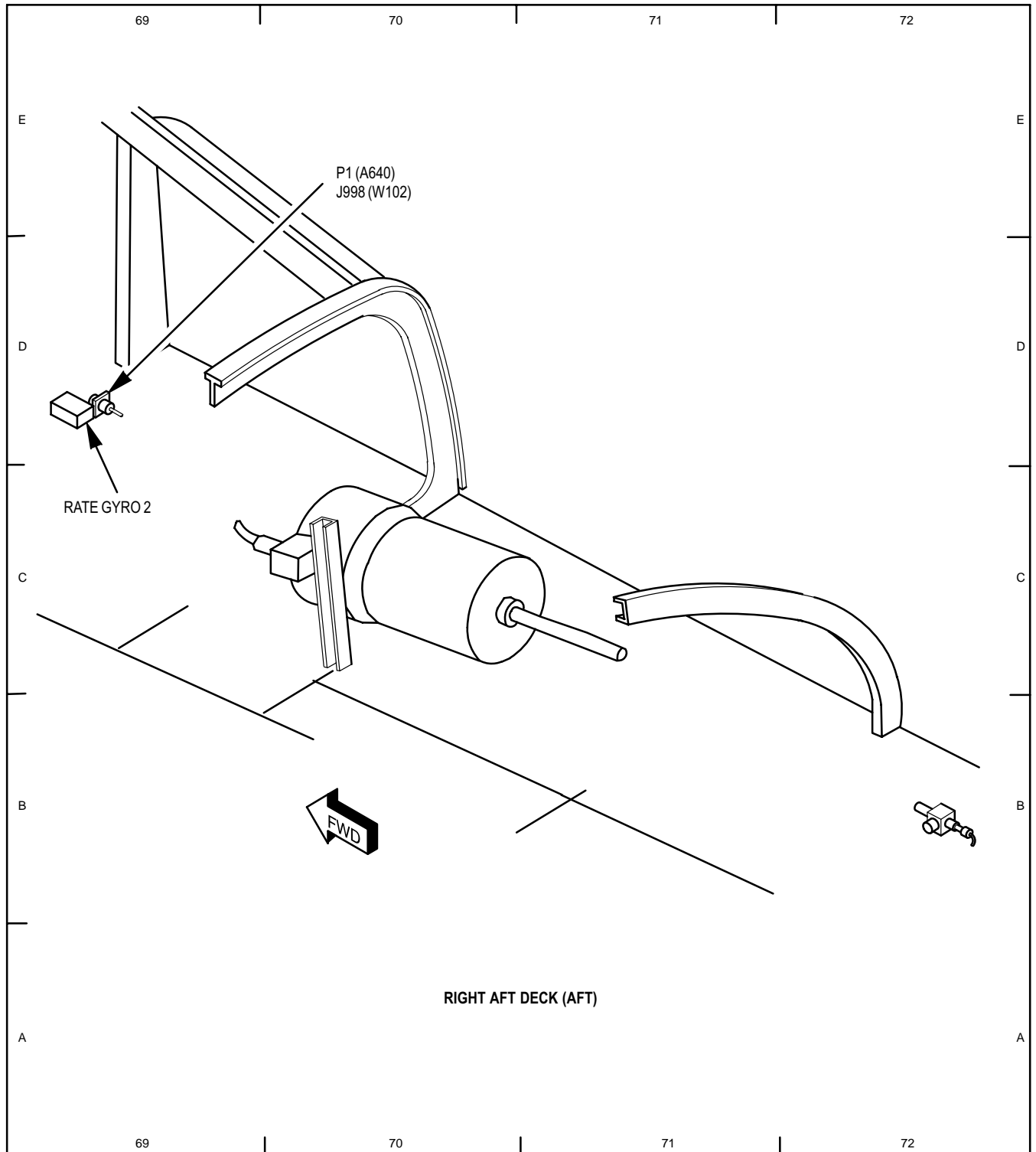


M70-030A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

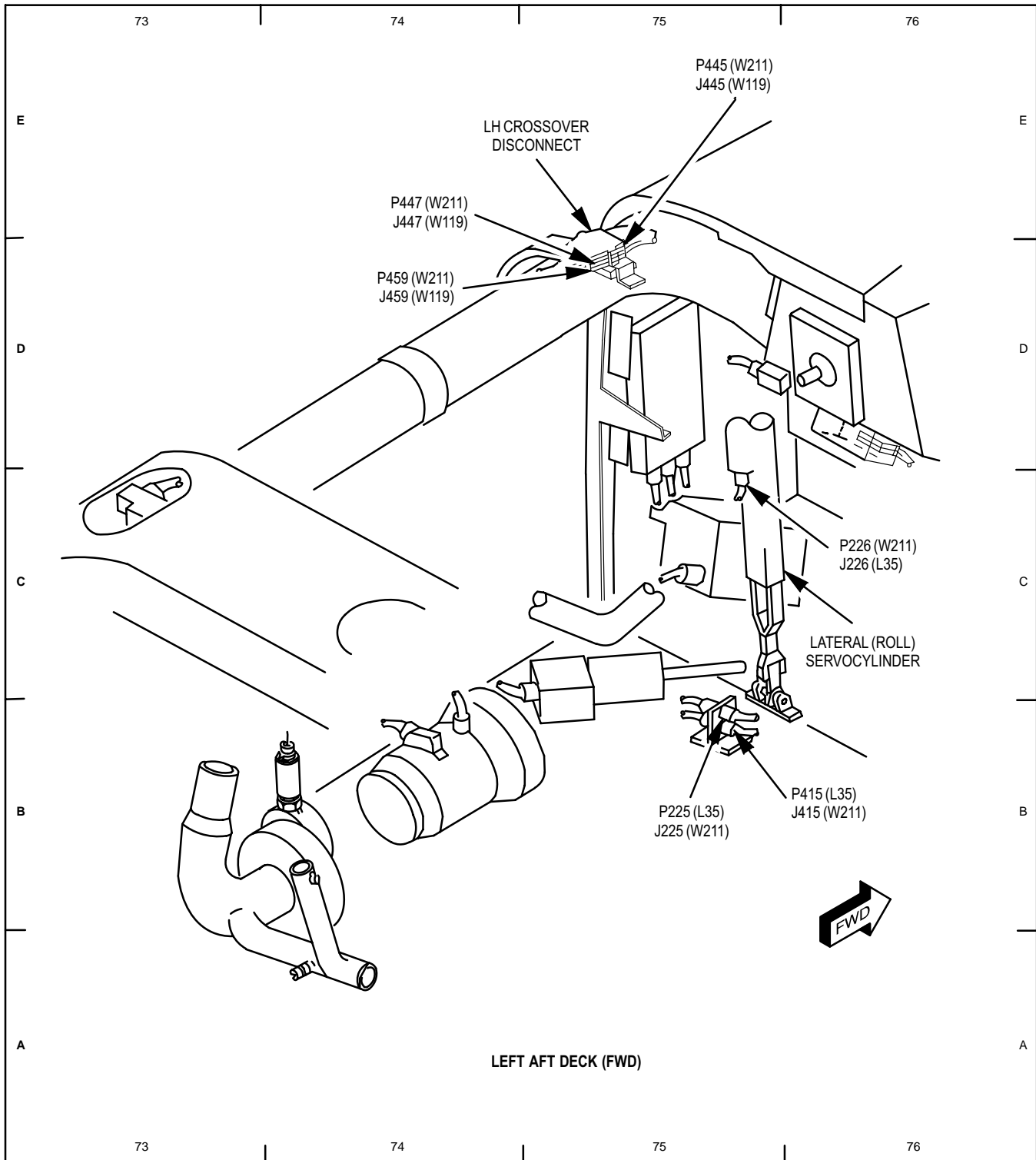
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-032A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

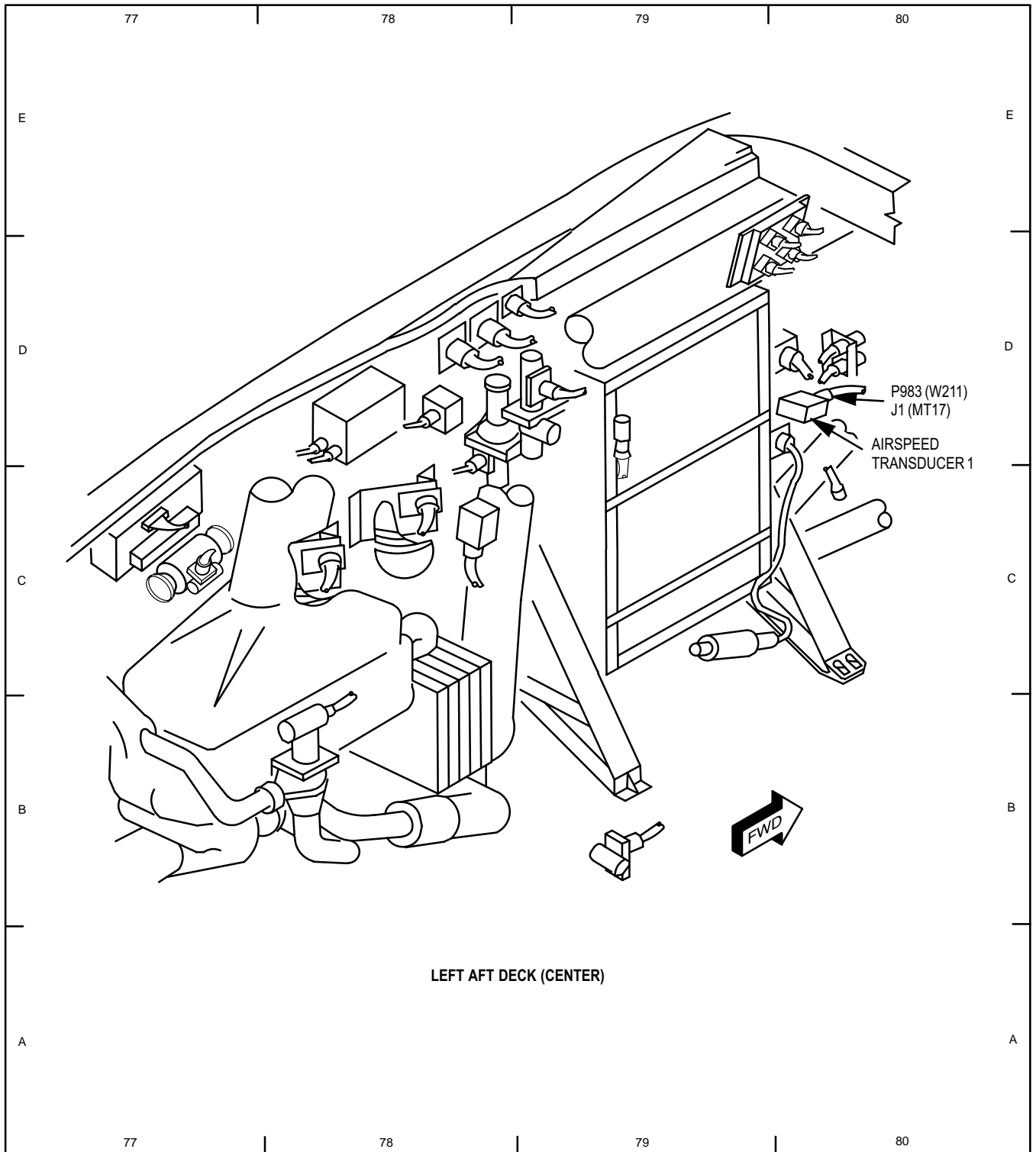


M70-033A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

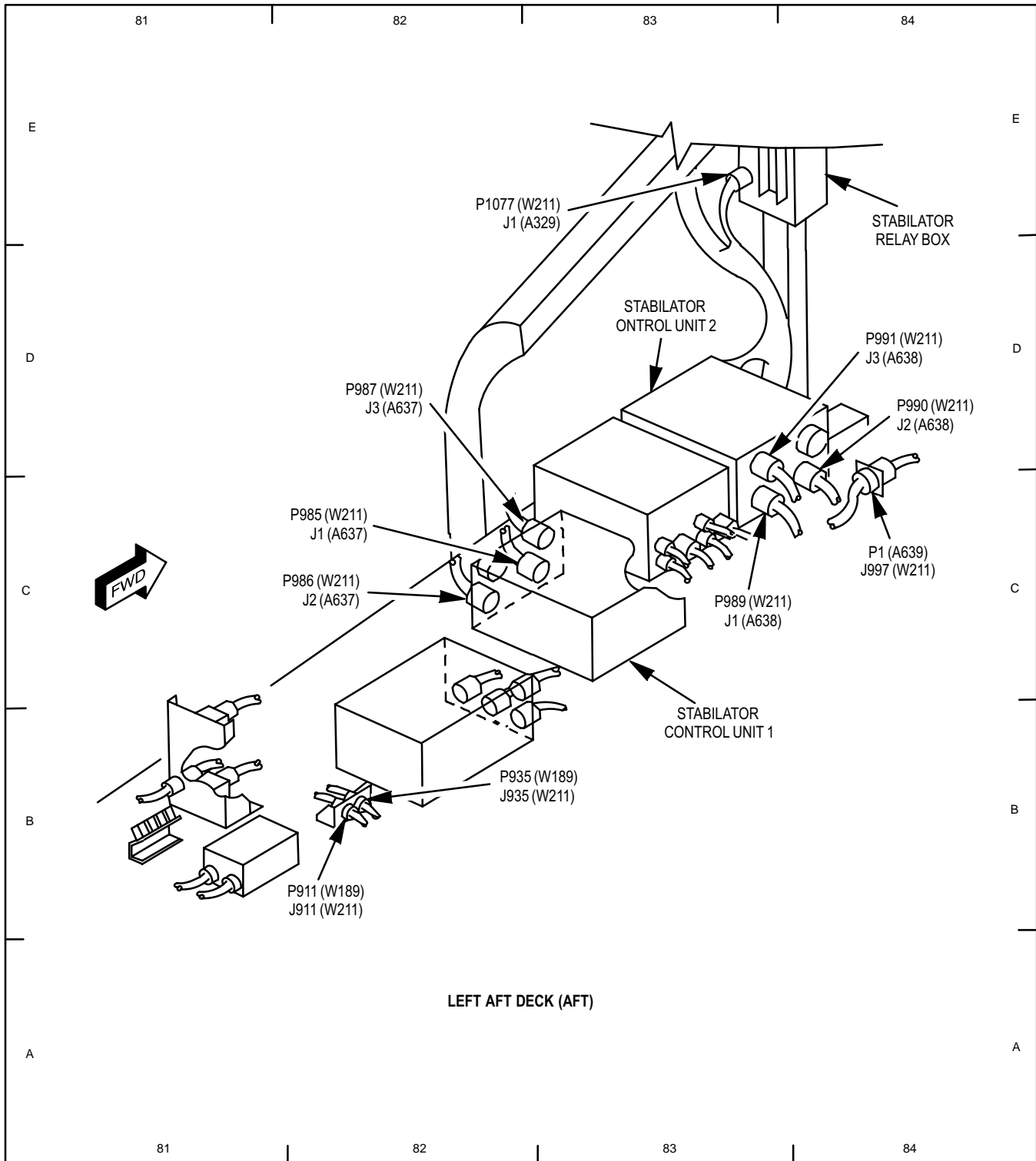
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-034A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)

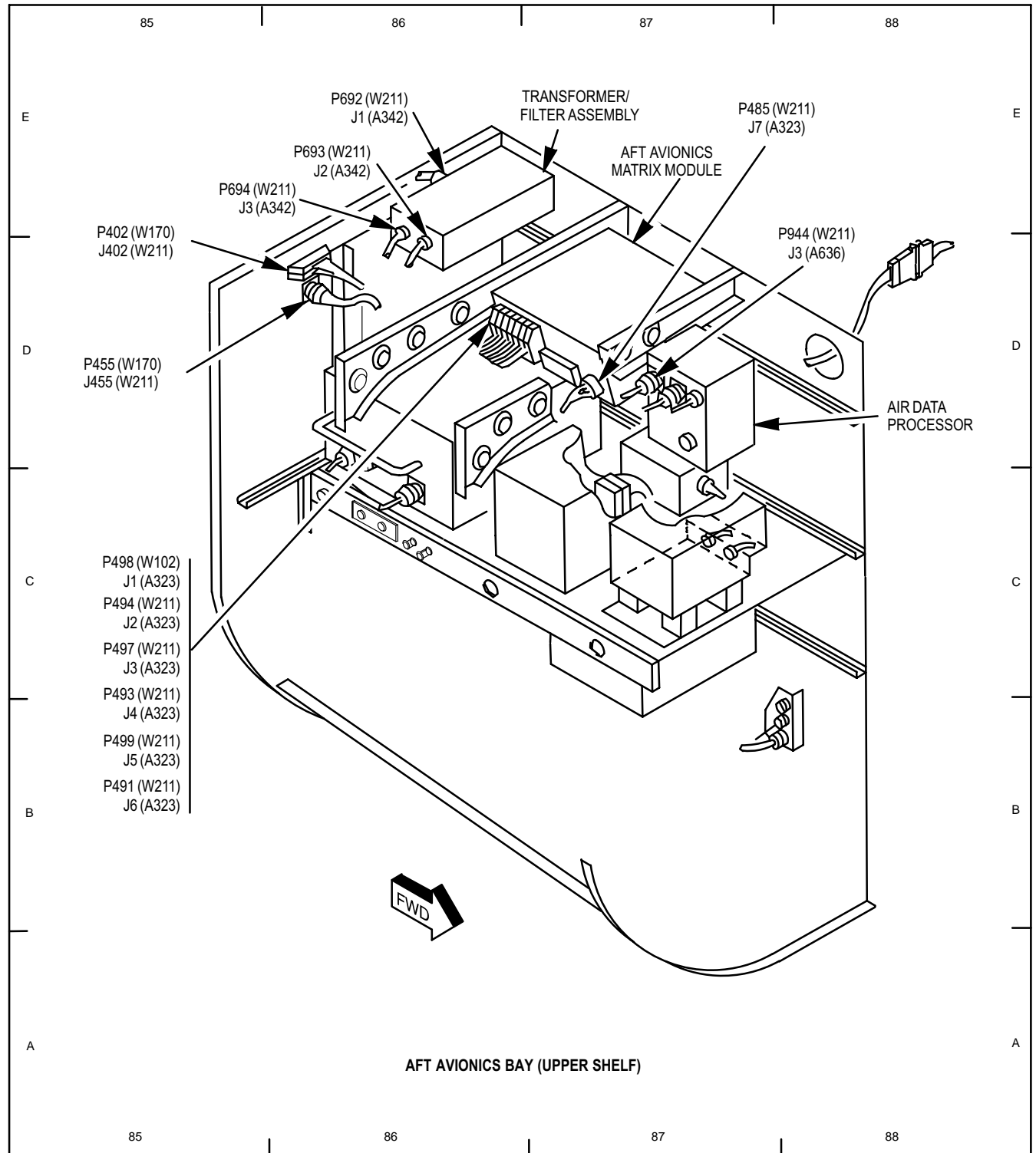


M70-035A

11-9. ELECTRICAL COMPONENT LOCATION AND CONFIGURATION (ECLC) INDEX (cont)

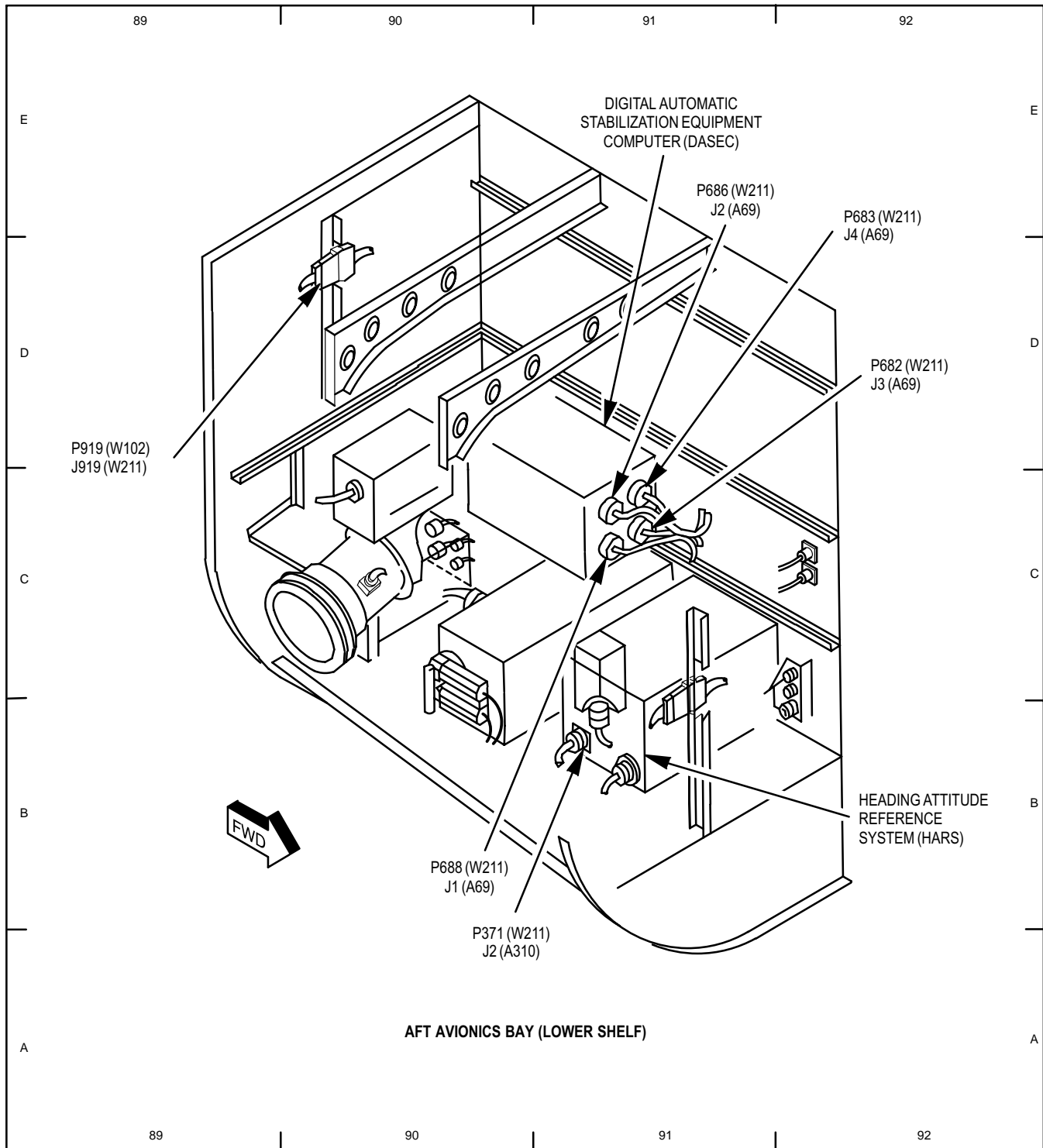
11-9

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



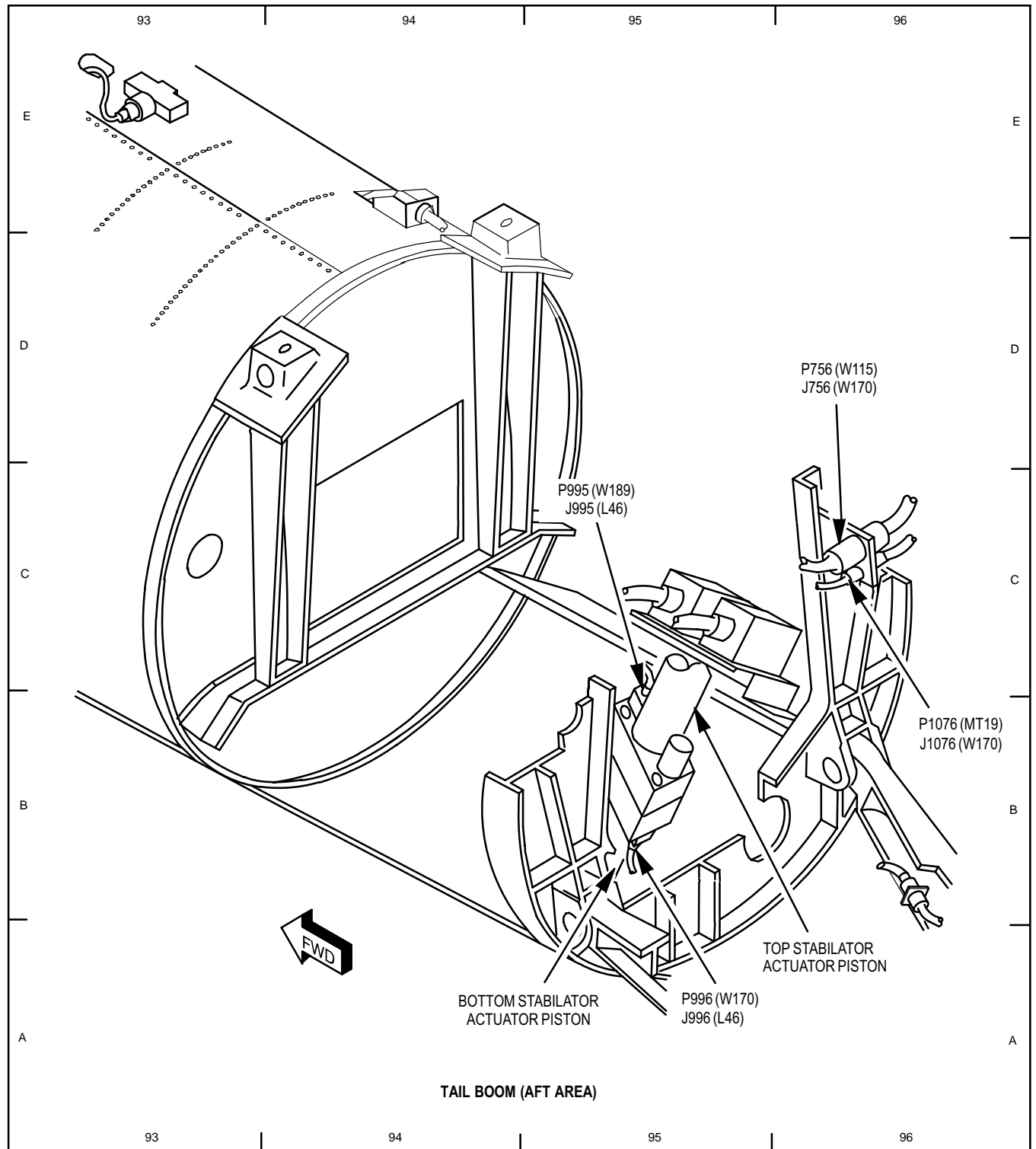
M70-039A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



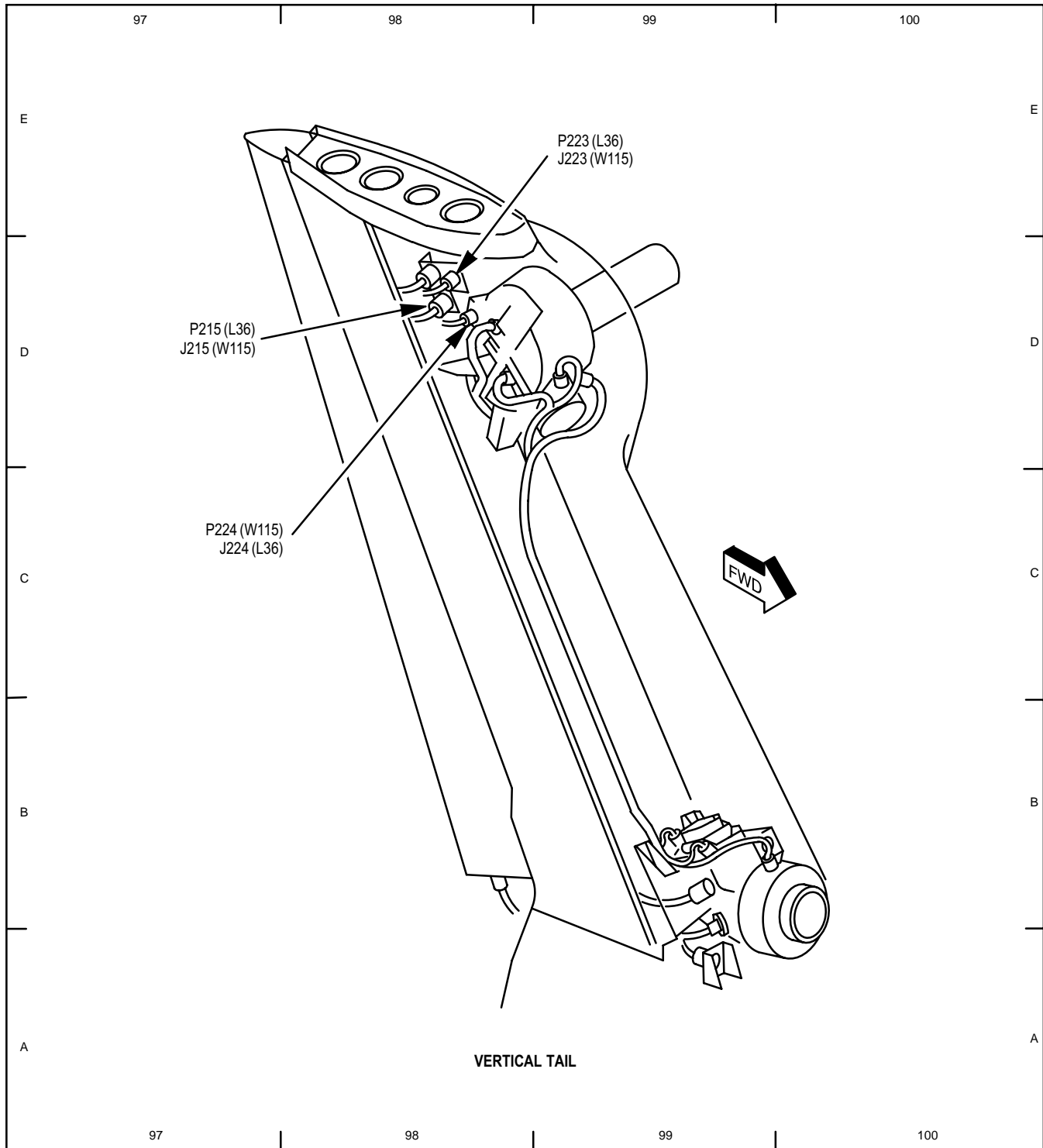
M70-040A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-041A

Table 11-2. Electrical Component Location and Configuration (ECLC) Index Listing (cont)



M70-042A

11-10. DASE/STABILATOR-POWER UP

11-10

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Helicopter safed External power application – Electrical Hydraulic (Primary) Access provisions – R325 and R345 panels removed Maintenance headset connected
TM 1-1520-238-T-4	

Personnel Required:

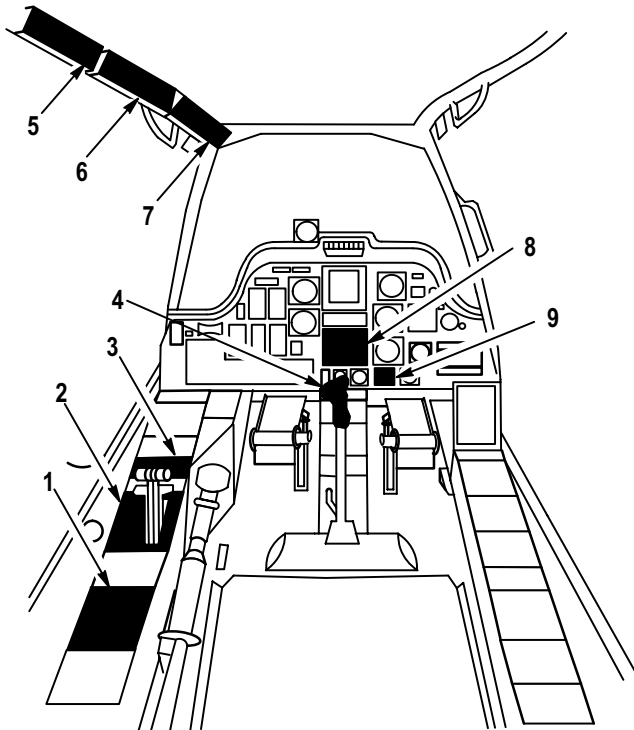
67R Attack Helicopter Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

NOTE

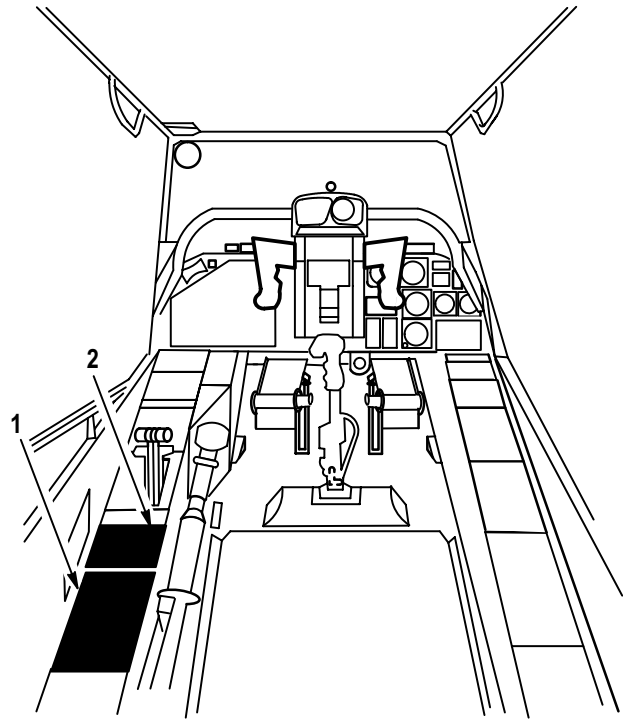
- Perform steps 1 thru 5 to power up for stabilator – maintenance operational check.
- Perform steps 1 thru 11 to power up for DASE – maintenance operational check.
- If AGPU is not available, use helicopter APU to provide electrical/hydraulic power (TM 1-1520-238-23).
- Refer to pilot station (fig. 11-43) and CPG station (fig. 11-44) for cockpit configuration and equipment.



1. PILOT EXT LT / INTR LT PANEL
2. PILOT POWER QUADRANT
3. PILOT ELEC PWR PANEL
4. PILOT CYCLIC STICK
5. PILOT CIRCUIT BREAKER PANEL (AFT)
6. PILOT CIRCUIT BREAKER PANEL (CENTER)
7. PILOT CIRCUIT BREAKER PANEL (FORWARD)
8. PILOT HORIZONTAL SITUATION INDICATOR (HSI)
9. PILOT HARS CONTROL PANEL

M70-115

Figure 11-43. Pilot Station



1. CPG INTR LT PANEL
2. CPG CIRCUIT BREAKER PANEL 1

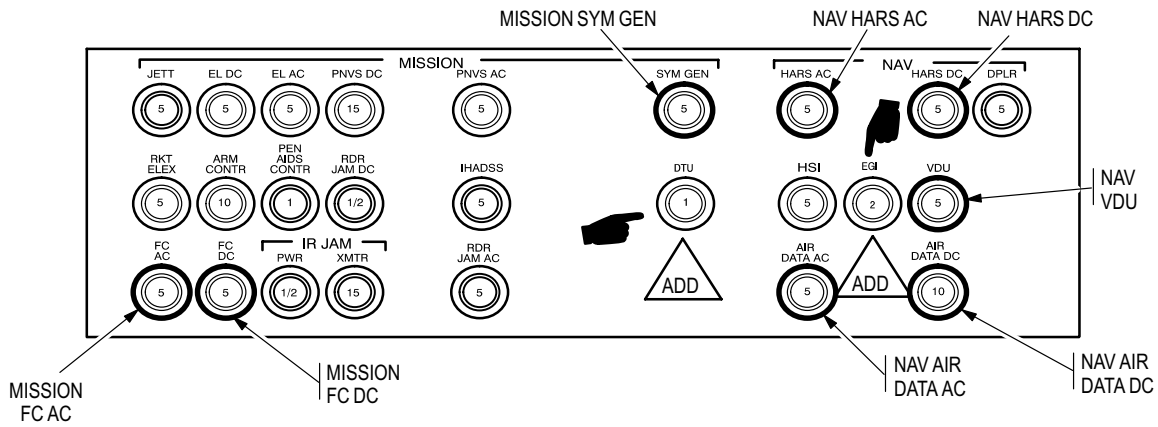
M70-116A

Figure 11-44. CPG Station

1. On pilot forward circuit breaker panel (fig. 11-45), check that the following circuit breakers are closed:

MISSION SYM GEN
NAV HARS AC
NAV HARS DC
NAV VDU

NAV AIR DATA DC
NAV AIR DATA AC
MISSION FC DC
MISSION FC AC



M70-117A

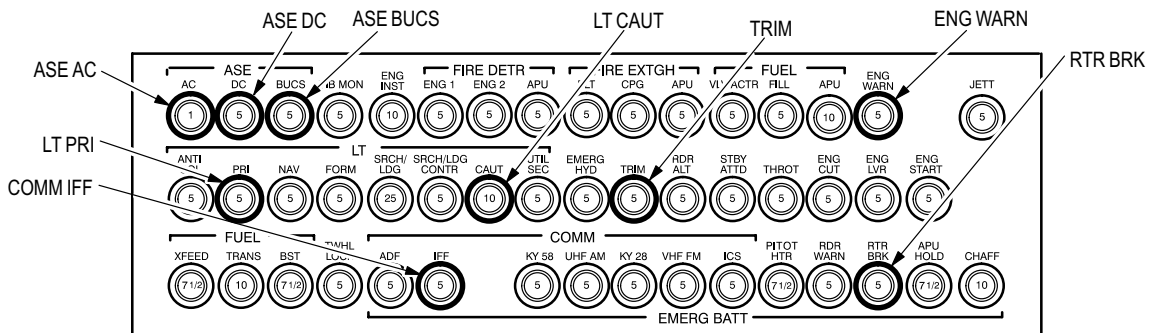
Figure 11-45. Pilot Forward Circuit Breaker Panel

NOTE

Open ASE BUCS circuit breaker if helicopter has BUCS deactivated.

2. On pilot center circuit breaker panel (fig. 11-46), check that the following circuit breakers are closed:

- | | |
|----------------------------|-----------------|
| ASE AC | ENG WARN |
| ASE DC | RTR BRK |
| ASE BUCS (see note) | COMM IFF |
| LT CAUT | LT PRI |
| TRIM | |

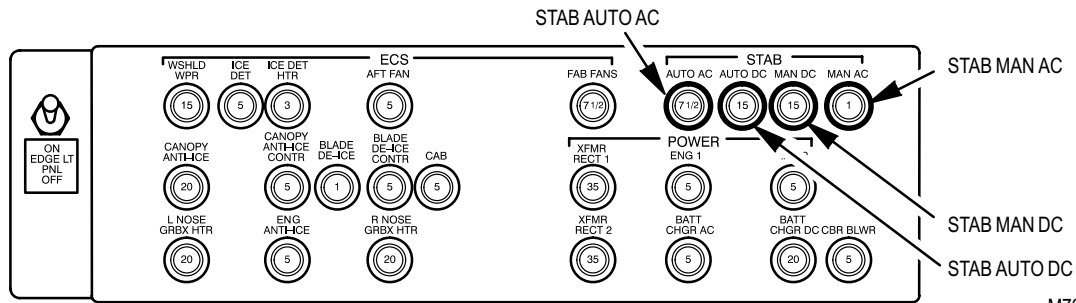


M70-118

Figure 11-46. Pilot Center Circuit Breaker Panel

3. On pilot aft circuit breaker panel (fig. 11-47), check that the following circuit breakers are closed:

- | | |
|---------------------|---------------------|
| STAB AUTO AC | STAB MAN DC |
| STAB MAN AC | STAB AUTO DC |



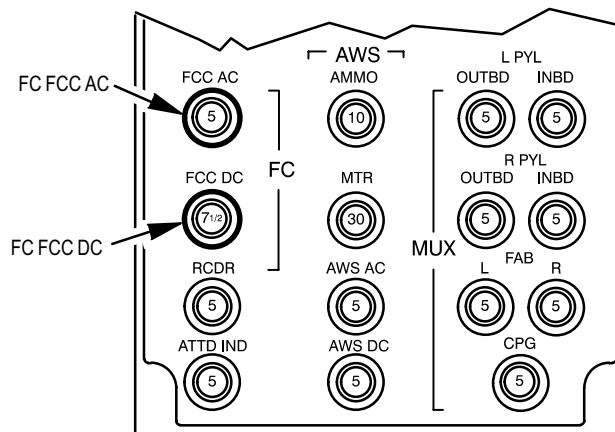
M70-119

Figure 11-47. Pilot Aft Circuit Breaker Panel

4. On CPG circuit breaker panel 1 (fig. 11-48), check that the following circuit breakers are closed:

FC FCC AC

FC FCC DC



M70-120A

Figure 11-48. CPG Circuit Breaker Panel 1

5. On pilot power quadrant (fig. 11-49), set **RTR BK** switch to **LOCK**.
6. On pilot **ELEC PWR** panel (fig. 11-50), set **BATT/EXT PWR** switch to **EXT PWR**.
7. Center pilot cyclic stick (fig. 11-51) and set **FORCE TRIM REL** switch to **ON**.

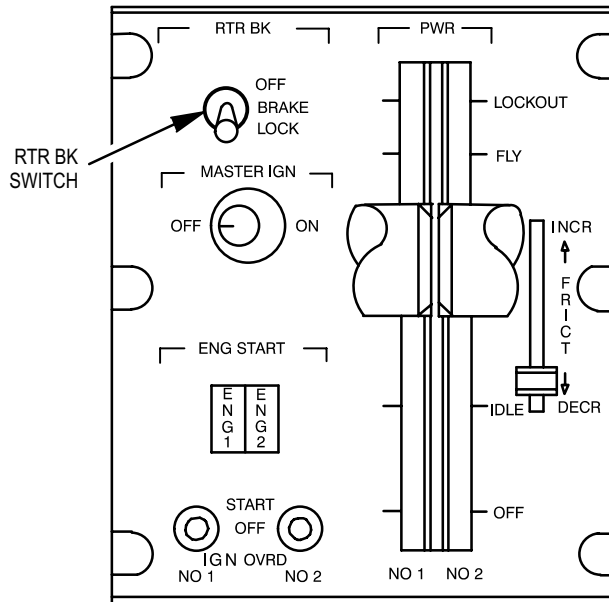


Figure 11-49. Pilot Power Quadrant

M70-121

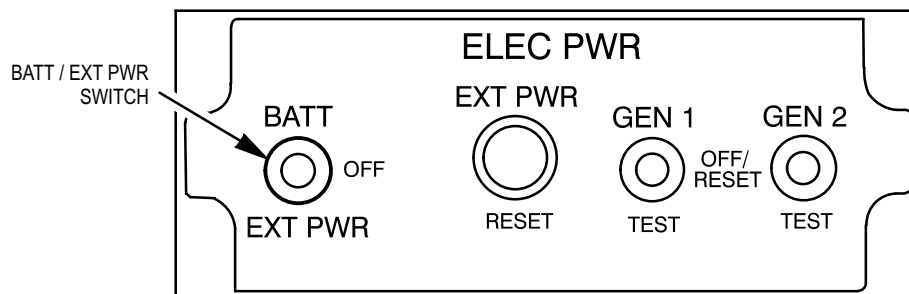


Figure 11-50. Pilot ELEC PWR Panel

M70-122

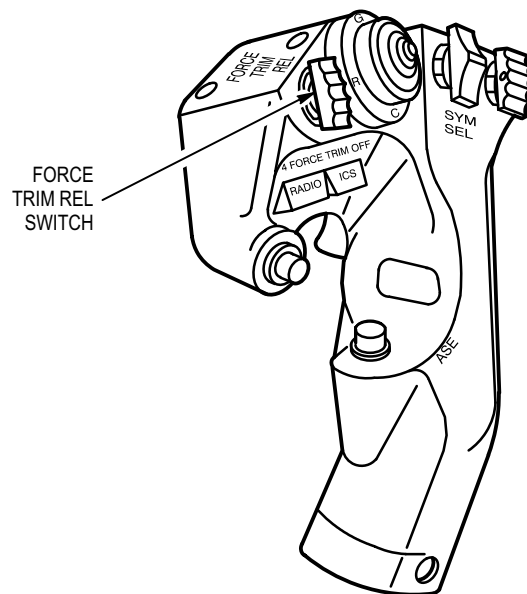
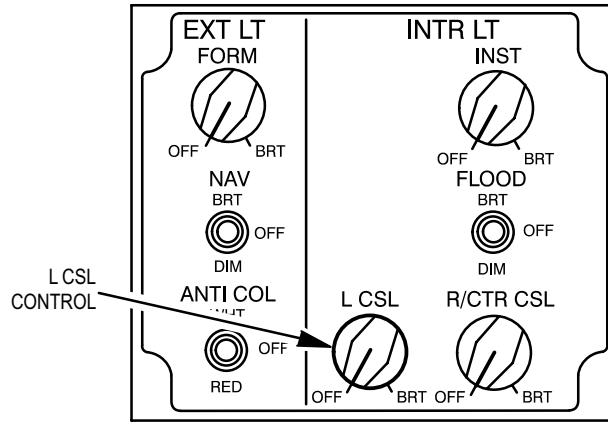


Figure 11-51. Pilot Cyclic Stick

M70-123

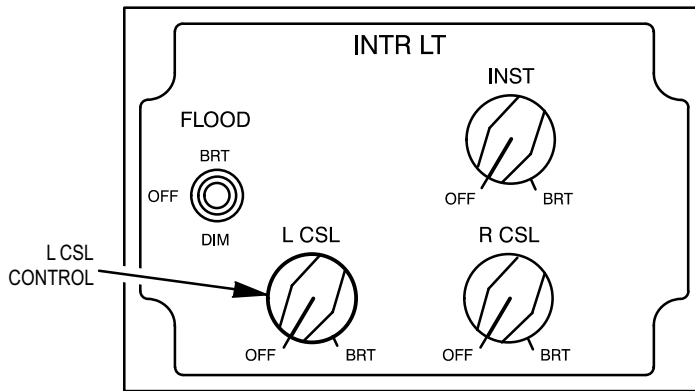
8. Set **L CSL** switch on pilot **EXT LT/INTR LT** panel (fig. 11-52) to **BRT**.



M70-124

Figure 11-52. Pilot EXT LT/INTR LT Panel

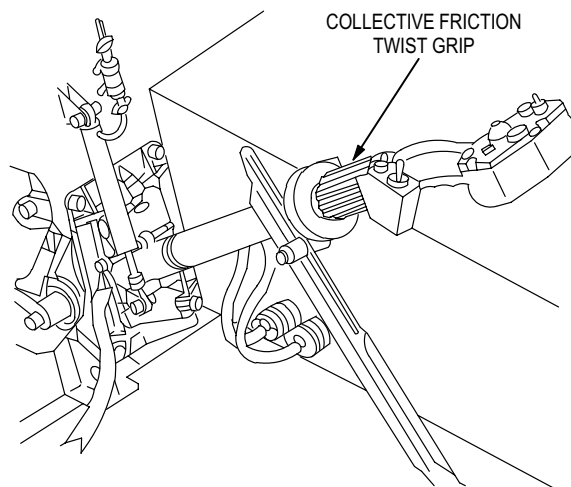
9. Set **L CSL** control on CPG **INTR LT** panel (fig. 11-53) to **BRT**.



M70-125

Figure 11-53. CPG INTR LT Panel

10. Check that pilot collective stick (fig. 11-54) is full down.



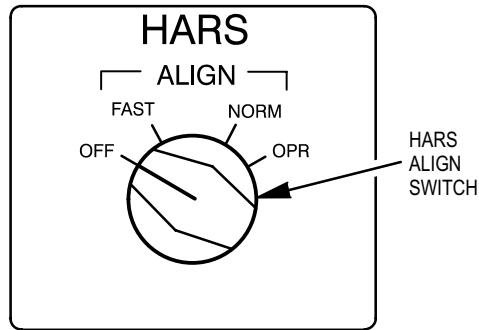
M70-129

Figure 11-54. Pilot Collective Stick

NOTE

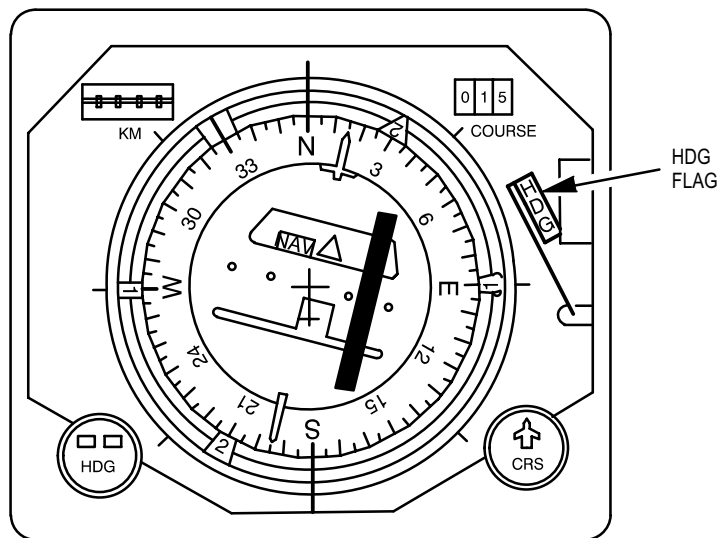
The helicopter must be protected from all physical movement while pilot HARS control panel (fig. 11-55) ALIGN switch is set to FAST. Any helicopter motion will result in an incorrect HARS alignment.

11. On pilot HARS control panel, set ALIGN switch to FAST. When HDG flag is not visible on pilot HSI (fig. 11-56), set HARS ALIGN switch to OPR.



M70-126

Figure 11-55. Pilot HARS Control Panel



M70-127

Figure 11-56. Pilot HSI

END OF TASK

11-11. DASE/STABILATOR – POWER DOWN

11-11

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

Equipment Conditions:

Personnel Required:

67R Attack Helicopter Repairer
One person to assist

<u>Ref</u>	<u>Condition</u>
Paragraph 11-10	DASE/STABILATOR – POWER UP completed

1. On pilot **HARS** control panel (fig. 11-55), set **HARS ALIGN** switch to **OFF**.
2. On pilot **EXT LT/INTR LT** panel (fig. 11-52) and CPG **INTR LT** panel (fig. 11-53), to set **L CSL** controls to **OFF**.
3. On pilot power quadrant (fig. 11-49), set **RTR BRK** switch to **OFF**.
4. On pilot cyclic stick (fig. 11-51), set **FORCE TRIM** switch to **FORCE TRIM OFF**.
5. Shut down APU (if operating) (TM 1-1520-238-23).
6. Remove external power – electrical and hydraulic (primary) (TM 1-1520-238-23).
7. Disconnect maintenance headset (TM 1-1520-238-T-4).

END OF TASK

11-12. FLIGHT CONTROL SYSTEM – MAINTENANCE OPERATIONAL CHECK

11-12

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Flight control system inspection
	External power application
	–
	Electrical
	Hydraulic (Primary)

Personnel Required:

67R Attack Helicopter Repairer
One person to assist

NOTE

- Refer to pilot station (fig. 11-57) for cockpit configuration and equipment.
- If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.

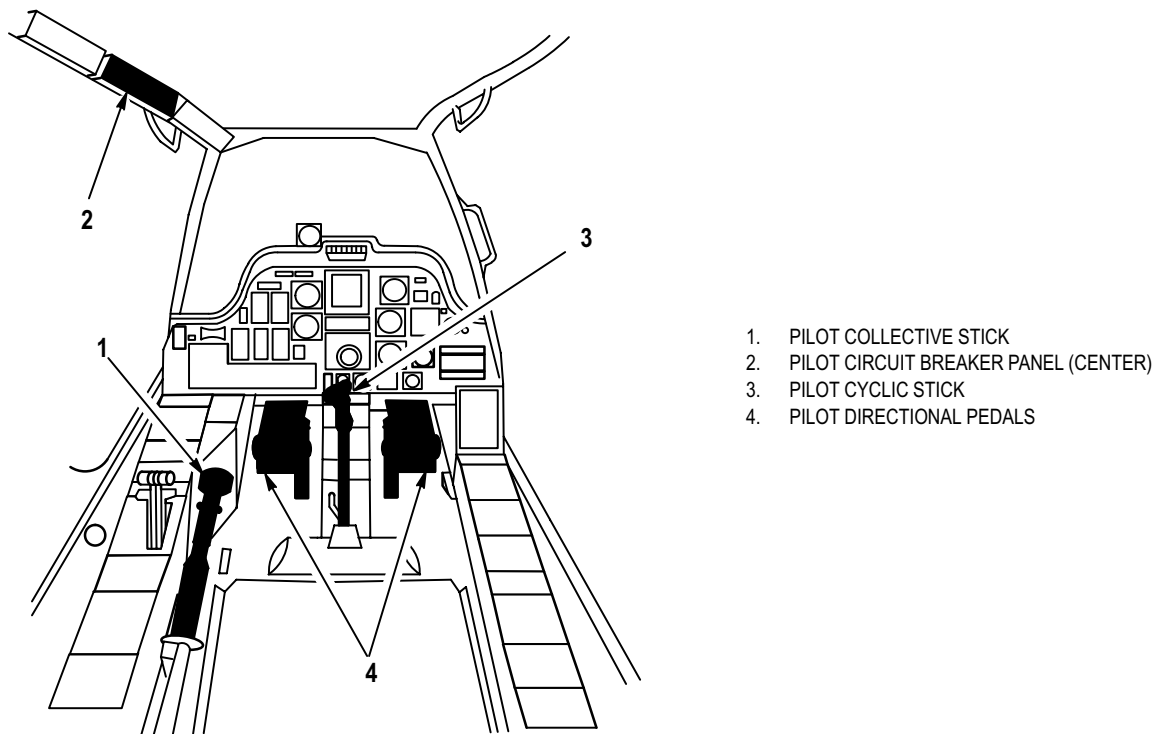


Figure 11-57. Pilot Station

M70-128

WARNING

Maintenance personnel must be warned verbally prior to moving the collective or cyclic stick. Any control activated can result in sudden blade movement that can sever or crush fingers or hands.

CAUTION

If controls bind, check problem prior to continuing procedure. Failure to clear controls of binding may result in sheared pins in the control axis.

NOTE

If TRIM circuit breaker (pilot center circuit breaker panel) (fig. 11-46) does not stay closed, go to paragraph 11-16 if in FORCE TRIM ON, paragraph 11-17 if in FORCE TRIM OFF, or paragraph 11-18 if in FORCE TRIM RELEASE.

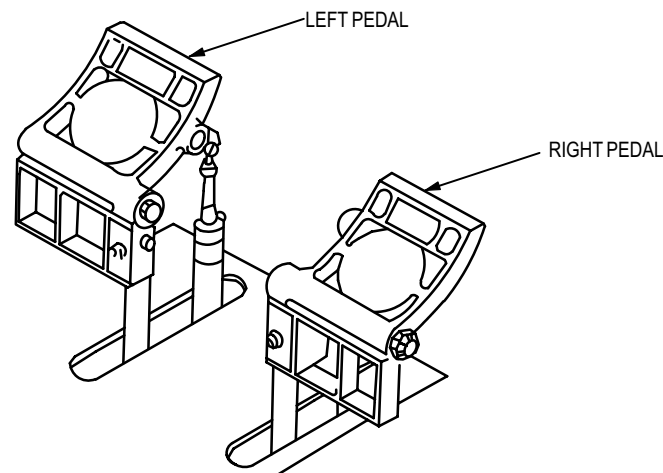
1. Complete maintenance operational check as follows:

Task	Result
a. With collective friction off, move pilot collective stick (fig. 11-54) full up and down.	If collective stick does not move up and down smoothly (excessive force required) or is binding, visually check the collective stick guide for corrosion or other substances which may inhibit stick movement. If such substance is found, remove it and repeat the collective stick movement check. If no such substance is found, check collective adjustment (part of pilot or CPG collective stick assembly installation in TM 1-1520-238-23). If collective stick does not travel full up and down to the respective stop, go to paragraph 11-19.
b. With collective friction off, move pilot collective stick to mid position. Apply collective friction.	If collective stick does not remain in position, check the collective friction adjustment.

11-12. FLIGHT CONTROL SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

11-12

Task	Result
<p>c. On pilot center circuit breaker panel (fig. 11-46), check that TRIM circuit breaker is closed. On pilot cyclic stick (fig. 11-51), set FORCE TRIM switch to OFF. Move pilot cyclic stick full forward and aft. Cyclic stick should move freely and full travel.</p>	<p>If cyclic stick does not travel full forward and aft to the respective stop, go to paragraph 11-20.</p> <p>If force trim does not disengage, go to paragraph 11-14.</p> <p>If binding or chattering occurs, replace longitudinal (pitch) magnetic brake (TM 1-1520-238-23).</p>
<p>d. Move pilot cyclic stick full left and right. Cyclic stick should move freely and have full travel.</p>	<p>If cyclic does not travel full left and right to the respective stop, go to paragraph 11-21.</p> <p>If binding or chattering occurs, replace lateral (roll) magnetic brake (TM 1-1520-238-23).</p>
<p>e. Move pilot left directional pedal (fig. 11-58) full forward. Move pilot right directional pedal full forward. Directional pedals should move freely and have full travel.</p>	<p>If left or right directional pedal does not travel full forward to its stop, go to paragraph 11-22.</p> <p>If binding or chattering occurs, replace directional (yaw) magnetic brake (TM 1-1520-238-23).</p>



M70-132

Figure 11-58. Pilot Directional Pedals

- | | |
|--|---|
| <p>f. Place pilot cyclic stick in center neutral position. Set pilot cyclic stick FORCE TRIM switch to ON.</p> | <p>If force trim does not engage, go to paragraph 11-15.</p> |
| <p>g. Move pilot cyclic stick forward until it contacts forward stops. Allow cyclic stick to slowly return to center neutral position.</p> | <p>If cyclic stick does not return to center neutral position, replace longitudinal (pitch) feel spring cartridge (TM 1-1520-238-23).</p> |
| <p>h. Move pilot cyclic stick aft until it contacts aft stop. Allow cyclic stick to slowly return to center neutral position.</p> | <p>If cyclic stick does not return to center neutral position, replace longitudinal (pitch) feel spring cartridge (TM 1-1520-238-23).</p> |

11-12. FLIGHT CONTROL SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

11-12

Task	Result
i. Move pilot cyclic stick (fig. 11-51) right until it contacts right stop. Allow cyclic stick to slowly return to center neutral position.	If cyclic stick does not return to center neutral position, replace lateral (roll) feel spring cartridge (TM 1-1520-238-23).
j. Move pilot cyclic stick left until it contacts left stop. Allow cyclic stick to slowly return to center neutral position.	If cyclic stick does not return to center neutral position, replace lateral (roll) feel spring cartridge (TM 1-1520-238-23).
k. Move pilot right directional pedal (fig. 11-58) forward until it contacts stop. Allow directional pedal to slowly return to center neutral position.	If pedal does not return to center neutral position, replace directional (yaw) feel spring cartridge (TM 1-1520-238-23).
l. Move pilot left directional pedal forward until it contacts stop. Allow directional pedal to slowly return to center neutral position.	If pedal does not return to center neutral position, replace directional (yaw) feel spring cartridge (TM 1-1520-238-23).
m. Hold pilot cyclic stick FORCE TRIM switch to FORCE TRIM REL.	If force trim does not disengage, go to paragraph 11-14.
n. Move pilot cyclic stick forward approximately 3 or 4 inches. On pilot cyclic stick FORCE TRIM switch, remove pressure from FORCE TRIM REL position.	If cyclic stick does not remain in forward position, replace longitudinal (pitch) magnetic brake (TM 1-1520-238-23).
o. Hold pilot cyclic stick FORCE TRIM switch to FORCE TRIM REL. Move pilot cyclic stick slowly to center neutral position.	If force trim does not disengage, go to paragraph 11-14.
p. Move pilot cyclic stick aft approximately 3 or 4 inches. On pilot cyclic stick FORCE TRIM switch, remove pressure from FORCE TRIM REL position.	If cyclic stick does not remain in aft position, replace longitudinal (pitch) magnetic brake (TM 1-1520-238-23).
q. Hold pilot cyclic stick FORCE TRIM switch to FORCE TRIM REL. Move pilot cyclic stick slowly to center neutral position.	If force trim does not disengage, go to paragraph 11-14.

11-12. FLIGHT CONTROL SYSTEM – MAINTENANCE OPERATIONAL CHECK (cont)

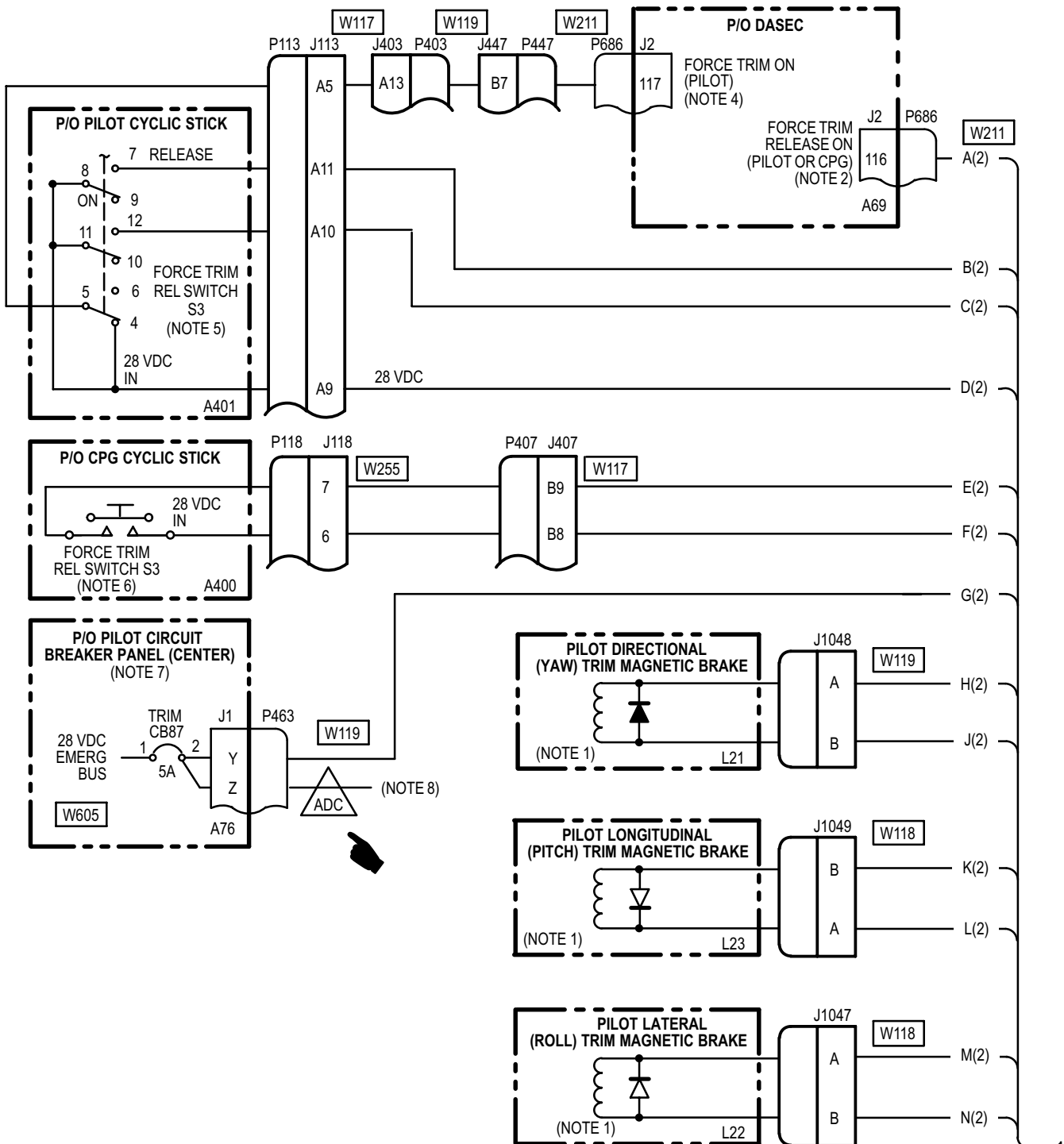
11-12

Task	Result
r. Move pilot cyclic stick to the right approximately 3 to 4 inches. On pilot cyclic stick FORCE TRIM switch, remove pressure from FORCE TRIM REL position.	If cyclic stick does not remain in right position, replace lateral (roll) magnetic brake (TM 1-1520-238-23).
s. Hold pilot cyclic stick FORCE TRIM switch to FORCE TRIM REL . Move pilot cyclic stick slowly to center neutral position.	If force trim does not disengage, go to paragraph 11-14.
t. Move pilot cyclic stick (fig. 11-51) left approximately 3 or 4 inches. On pilot cyclic stick FORCE TRIM switch, remove pressure from FORCE TRIM REL position.	If cyclic stick does not remain in left position, replace lateral (roll) magnetic brake (TM 1-1520-238-23).
u. Hold pilot cyclic stick FORCE TRIM switch to FORCE TRIM REL . Move pilot cyclic stick slowly to center neutral position.	If force trim does not disengage, go to paragraph 11-14.
v. Move pilot right directional pedal (fig. 11-58) to approximately half way forward. On pilot cyclic stick FORCE TRIM switch, remove pressure from FORCE TRIM REL position.	If right directional pedal does not remain in position, replace directional (yaw) magnetic brake (TM 1-1520-238-23).
w. Hold pilot cyclic stick FORCE TRIM switch to FORCE TRIM REL . Move directional pedal slowly to neutral position.	If force trim does not disengage, go to paragraph 11-14.
x. Move pilot left directional pedal to approximately half way forward. On pilot cyclic stick FORCE TRIM switch, remove pressure from FORCE TRIM REL position.	If left directional pedal does not remain in position, replace directional (yaw) magnetic brake (TM 1-1520-238-23).
y. Hold pilot cyclic stick FORCE TRIM switch to FORCE TRIM REL . Move directional pedal slowly to neutral position.	If force trim does not disengage, go to paragraph 11-14.

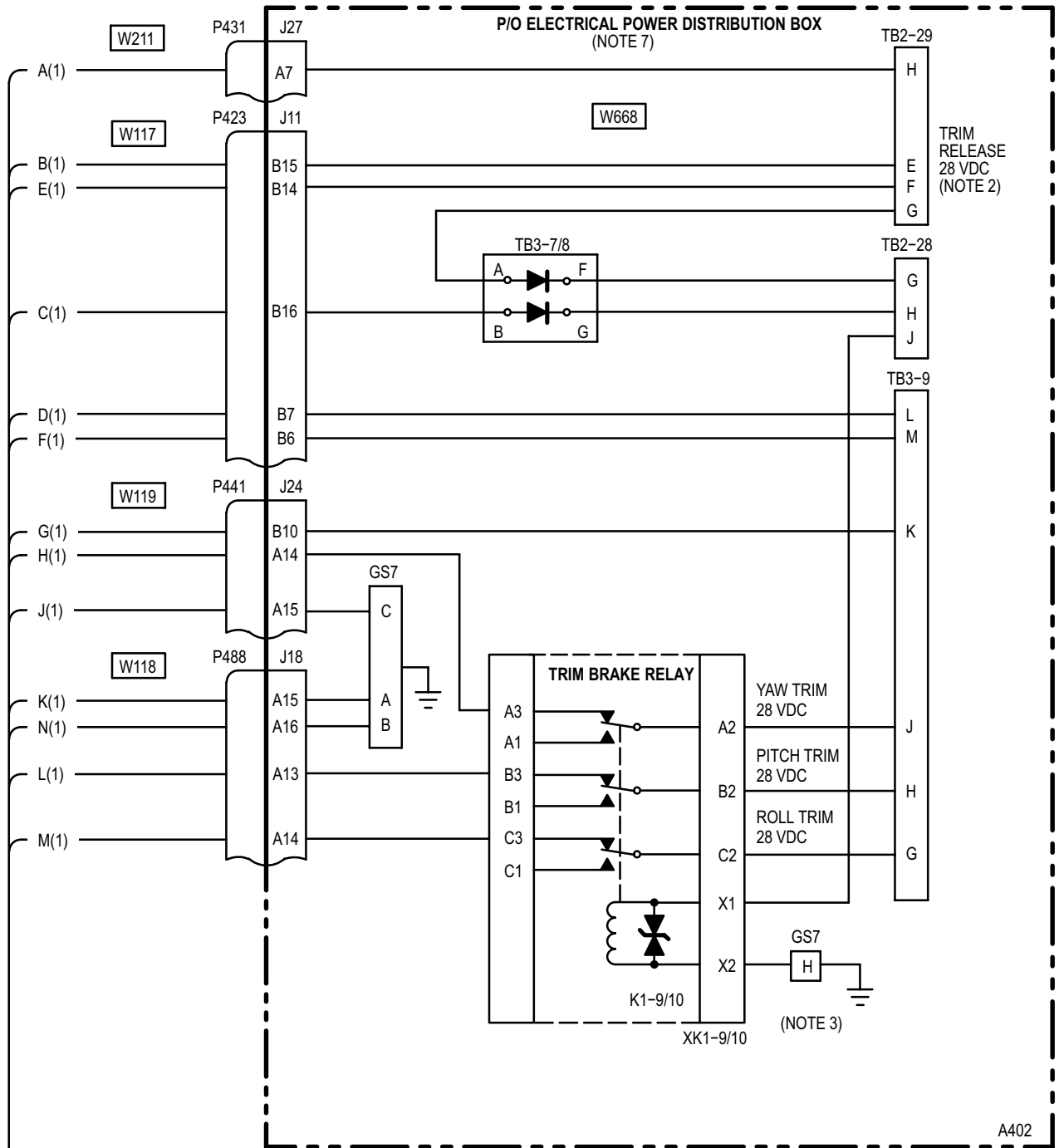
2. On pilot cyclic stick **FORCE TRIM** switch, remove pressure from **FORCE TRIM REL** position.
3. On pilot cyclic stick set **FORCE TRIM** switch to **OFF**.
4. Remove external power – electrical and hydraulic (primary) (TM 1-1520-238-23).

END OF TASK

11-13. FLIGHT CONTROL SYSTEM – WIRING INTERCONNECT DIAGRAM



11-13. FLIGHT CONTROL SYSTEM – WIRING INTERCONNECT DIAGRAM (cont)



1

NOTES:

HIGHWAY USE: THE ALPHA CHARACTER IDENTIFIES A SPECIFIC LINE, AND THE NUMBER IN PARENTHESIS IDENTIFIES THE SHEET NUMBER WHERE THE SIGNAL TERMINATES.

1. 28 VDC INPUT ACTIVITIES MAGNETIC BRAKE (FORCE TRIM ON).
2. PRESENT AT FORCE TRIM RELEASE.
3. WITH PILOT OR CPG FORCE TRIM SWITCH AT FORCE TRIM RELEASE POSITION.
4. WITH PILOT FORCE TRIM SWITCH AT FORCE TRIM ON POSITION.
 ON = 28 VDC
 OFF = OPEN
5. SHOWN AT FORCE TRIM ON POSITION. SPRING LOADED FROM FORCE TRIM RELEASE POSITION TO FORCE TRIM ON POSITION.

SWITCH POSITION	TERMINALS CONNECTED
FORCE TRIM OFF (PERMANENT)	5 TO 6,8 TO 9, 11 TO 12
FORCE TRIM RELEASE (MOMENTARY RELEASE)	4 TO 5,7 TO 8, 10 TO 11
FORCE TRIM ON (NORMAL)	4 TO 5,8 TO 9, 10 TO 11
6. PUSHBUTTON SWITCH, USED ONLY FOR FORCE TRIM RELEASE.
7. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
8. AVIONICS CONFIGURATION HEADING ATTITUDE REFERENCE SYSTEM (HARS) (TM 11-1520-238-23-2).

11-14. FORCE TRIM – DOES NOT DISENGAGE

11-14

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L200 access panel – pilot and CPG cyclic stick covers and angle plates – B60 access panel – electrical power distribution box forward cover removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Verify pilot **FORCE TRIM** switch is set to **OFF**. With relay (A402)XK1-9/10 removed, check for 28 VDC at (A402)K1-9/10-X1.

Is voltage present?

- YES Go to step 2.
- NO Go to step 4.

2. Check for open between (A402)K1-9/10-X2 and ground.

Does open exist?

- YES Repair open wire. Go to paragraph 11-12.
- NO Go to step 3.

3. Check for 28 VDC at J1047-A, J1048-A, and J1049-A.

Is voltage present?

- YES Replace relay (A402)K1-9/10 (TM 1-1520-238-23).
- NO Replace magnetic brakes: Lateral (roll) – J1047-A, Directional (yaw) – J1048-A, Longitudinal (pitch) – J1049-A (TM 1-1520-238-23).

4. Check for 28 VDC at (A402)TB2-28-J.

Is voltage present?

- YES Repair open wire between (A402): TB-28-J and K1-9/10-X1. Go to paragraph 11-12.
- NO Go to step 5.

5. Detach P423. Check for 28 VDC at (A402)J11-B7.

Is voltage present?

- YES Go to step 9.
- NO Go to step 6.

6. Detach P441. Check for 28 VDC at P441-B10.

Is voltage present?

- YES Go to step 7.
- NO Go to step 8.

11-14. FORCE TRIM – DOES NOT DISENGAGE (cont)

11-14

7. Check for 28 VDC at (A402)TB3-9-L.
Is voltage present?
- YES Repair open wire between (A402): TB3-9-L and J11-B7. Go to paragraph 11-12.
 - NO Repair open wire between (A402): TB3-9-K and J24-B10. Go to paragraph 11-12.
8. Detach P463. Check for 28 VDC at (A76)J1-Y.
Is voltage present?
- YES Repair open wire between P463-Y and P441-B10. Go to paragraph 11-12.
 - NO Refer to TM 1-1520-238-T-6 to troubleshoot **TRIM** pilot circuit breaker (CB87), circuit protection system (dc emergency bus – pilot station).
9. Check for open between P423-B7 and P423-B16.
Does open exist?
- YES Go to step 13.
 - NO Go to step 10.
10. Attach P423. Check for 28 VDC at (A402)TB3-7/8-B.
Is voltage present?
- YES Go to step 11.
 - NO Repair open wire between (A402): TB3-7/8-B and J11-B16. Go to paragraph 11-12.
11. Check for 28 VDC at (A402)TB3-7/8-G.
Is voltage present?
- YES Repair open wire between (A402): TB2-28-H and TB3-7/8-G. Go to paragraph 11-12.
 - NO Go to step 12.
12. Detach and tag wires from (A402): TB2-28-G, TB2-28-H and TB2-28-J. With relay (A402)XK1-9/10 removed, check for short between (A402): TB3-7/8-F and ground, TB3-7/8-G and ground, K1-9/10-X1 and ground.
Does short exist?
- YES Repair shorted wire between (A402): TB3-7/8-F and TB2-28-G, TB3-7/8-G and TB2-28-H, TB2-28-J and K1-9/10-X1. Go to paragraph 11-12.
 - NO Go to step 14.
13. Detach (A401)P113. Check for open between (A401): P113-A9 and P113-A10, P113-A9 and P113-A11.
Does open exist?
- YES Replace **FORCE TRIM** switch (A401)S-3 (TM 1-1520-238-23).
 - NO Repair open wire between: J113-A9 and P423-B7, J113-A10 and P423-B16, J113-A11 and P423-B15. Go to paragraph 11-12.
14. Attach wires to (A402): TB2-28-G, TB2-28-H, and TB2-28-J. With relay (A402)XK-9/10 installed, check for short between (A402)TB2-28-J and ground.
Does short exist?
- YES Replace relay (A402)XK-9/10 (TM 1-1520-238-23).
 - NO Replace terminal board (A402)TB3-7/8 (TM 1-1520-238-23).

END OF TASK

11-15. FORCE TRIM – DOES NOT ENGAGE

11-15

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L200 access panel – pilot and CPG cyclic stick covers and angle plates – B60 access panel – electrical power distribution box forward cover removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot cyclic stick, set **FORCE TRIM** switch **ON**. With relay (A402)XK1-9/10 removed, check for 28 VDC at K1-9/10-X1.

Is voltage present?

YES Go to step 11.
NO Go to step 2.

2. Check for 28 VDC at (A402)TB3-9-K.
Is voltage present?

YES Go to step 5.
NO Go to step 3.

3. Check for 28 VDC at P441-B10.
Is voltage present?

YES Repair open wire between (A402): TB3-9-K and J24-B10. Go to paragraph 11-12.
NO Go to step 4.

4. Check for 28 VDC at (A76)J1-Y.
Is voltage present?

YES Repair open wire between P463-Y and P441-B10.
NO Refer to TM 1-1520-238-T-6 to troubleshoot **TRIM** circuit breaker (CB87), circuit protection (dc emergency bus – pilot station).

5. Check for 28 VDC at (A402): K1-9/10-A2, K1-9/10-B2, K1-9/10-C2.
Are all voltages present?

YES Go to step 6.
NO Repair open wire between (A402): K1-9/10-A2 and TB3-9-J, K1-9/10-B2 and TB3-9-H, K1-9/10-C2 and TB3-9-G. Go to paragraph 11-12.

6. Check for open between (A402): K1-9/10-A2 and K1-9/10-A3, K1-9/10-B2 and K1-9/10-B3, K1-9/10-C2 and K1-9/10-C3, K1-9/10-X1 and K1-9/10-X2.
Does open exist?

YES Replace relay XK1-9/10 (TM 1-1520-238-23).
NO Go to step 7.

11-15. FORCE TRIM – DOES NOT ENGAGE (cont)

11-15

7. With relay (A402)XK1-9/10 installed, detach P488. Check for 28 VDC at (A402)J18-A13.

Is voltage present?

- YES Go to step 8.
- NO Repair open wire between (A402):
J18-A14 and K1-9/10-C3,
J18-A13 and K1-9/10-B3.
Go to paragraph 11-12.

8. Check for open between (A402): J24-A14 and J24-B10.

Does open exist?

- YES Repair open wire between (A402):
J24-A14 and K1-9/10-A3,
J24-B10 and TB3-9-K.
Go to paragraph 11-12.
- NO Go to step 9.

9. Attach P488 and P441. Check for 28 VDC at: J1047-A, J1048-A, J1049-A.

Are all voltages present?

- YES Go to step 10.
- NO Repair open wire between: P488-A14 and J1047-A,
P488-A13 and J1049-A,
P441-A14 and J1048-A.
Go to paragraph 11-12.

10. Check for open between:

- J1047-B and ground,
- J1048-B and ground,
- J1049-B and ground.

Does open exist?

- YES Repair open wire between: J1047-B and (A402)GS7-B,
J1048-B and (A402)GS7-C,
J1049-B and (A402)GS7-A. Go to paragraph 11-12.
- NO Replace appropriate magnetic brake:
Lateral = J1047-A,
Directional = J1048-A,
Longitudinal = J1049-A.
Go to paragraph 11-12.

11. Check for short between P423-B7 and P423-B15.

Does short exist?

- YES Go to step 18.
- NO Go to step 12.

12. Check for short between P423-B7 and P423-B16.

Does short exist?

- YES Go to step 17.
- NO Go to step 13.

13. Check for short between P423-B6 and P423-B14.

Does short exist?

- YES Go to step 15.
- NO Go to step 14.

14. Check for short between P686-116 and P686-117.

Does short exist?

- YES Repair shorted wire between P686-116 and (A402)TB2-29-H.
Go to paragraph 11-12.
- NO Replace DASEC (TM 1-1520-238-23).

11-15. FORCE TRIM – DOES NOT ENGAGE (cont)

11-15

15. Check for short between J407-B8 and J407-B9.

Does short exist?

- YES Go to step 16.
- NO Repair shorted wire between
 P407 and P423.
 Go to paragraph 11-12.

16. Check for short between P118-6 and P118-7.

Does short exist?

- YES Replace CPG cyclic stick
 (TM 1-1520-238-23).
- NO Repair shorted wire between:
 J118-6 and J407-B8,
 J118-7 and J407-B9.
 Go to paragraph 11-12.

17. Check for short between P113-A9 and
P113-A10.

Does short exist?

- YES Replace pilot cyclic stick
 (TM 1-1520-238-23).
- NO Repair shorted wire between:
 J113-A10 and P423-B16,
 J113-A9 and P423-B7.
 Go to paragraph 11-12.

18. Check for short between P113-A9 and
P113-A11.

Does short exist?

- YES Replace pilot cyclic stick
 (TM 1-1520-238-23).
- NO Repair shorted wire between:
 J113-A9 and P423-B7,
 J113-A11 and P423-B15.
 Go to paragraph 11-12.

END OF TASK

11-16. TRIM CIRCUIT BREAKER DOES NOT STAY CLOSED – FORCE TRIM ON

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Open **TRIM** circuit breaker (CB87). Check for short between (A76)J1-Y and ground.
Does short exist?
 - YES Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).
 - NO Go to step 2.
- Detach P441. Check for short between P463-Y and ground.
Does short exist?
 - YES Repair shorted wire between P441-B10 and P463-Y. Go to paragraph 11-12.
 - NO Go to step 3.

- Detach wires from (A402): TB3-9-G, TB3-9-H, and TB3-9-J. Check for short between (A402): J24-A14 and ground, J18-A13 and ground, J18-A14 and ground.

Does short exist?

- YES Go to step 4.
- NO Go to step 5.

- Detach wires from (A402): TB3-9-G, TB3-9-J, and TB3-9-H. With relay (A402)XK-9/10 removed, check for short between (A402): J24-A14 and ground, J18-A13 and ground, J18-A14 and ground, wire ends from:

TB3-9-G and ground,
TB3-9-H and ground,
TB3-9-J and ground.

Does short exist?

- YES Repair shorted wire between (A402): J24-A14 and K1-9/10-A3, J18-A13 and K1-9/10-B3, J18-A14 and K1-9/10-C3, TB3-9-G and K1-9/10-C2, TB3-9-H and K1-9/10-B2, TB3-9-J and K1-9/10-A2. Go to paragraph 11-13.
- NO Replace relay (A402)XK-9/10 (TM 1-1520-238-23).

- Detach wires from (A402): TB3-9-K, TB3-9-L and TB3-9-M. Check for short between (A402):

J11-B6 and ground,
J11-B7 and ground,
J24-B10 and ground.

Does short exist?

- YES Repair shorted wire between (A402): J24-B10 and TB3-9-K, J11-B7 and TB3-9-L, J11-B6 and TB3-9-M. Go to paragraph 11-13.
- NO Go to step 6.

11-16. TRIM CIRCUIT BREAKER DOES NOT STAY CLOSED – FORCE TRIM ON (cont)**11-16**

6. Check for short between P488–A14 and ground.
Does short exist?

YES Go to step 7.
NO Go to step 8.

7. Detach J1047. Check for short between P488–A14 and ground.
Does short exist?

YES Repair shorted wire between P488–A14 and J1047–A. Go to paragraph 11–12.
NO Replace pilot lateral (roll) trim magnetic brake (TM 1-1520-238-23).

8. Check for short between P488–A13 and ground.
Does short exist?

YES Go to step 9.
NO Go to step 10.

9. Detach J1049. Check for short between P488–A13 and ground.
Does short exist?

YES Repair shorted wire between P488–A13 and J1049–A. Go to paragraph 11–12.
NO Replace pilot longitudinal (pitch) trim magnetic brake (TM 1-1520-238-23).

10. Check for short between P441–A14 and ground.

Does short exist?

YES Go to step 11.
NO Go to step 12.

11. Detach J1048. Check for short between P441–A14 and ground.
Does short exist?

YES Repair shorted wire between P441–A14 and J1048–A. Go to paragraph 11–12.
NO Replace pilot directional (yaw) trim magnetic brake (TM 1-1520-238-23).

12. Check for short between P423–B6 and ground.
Does short exist?

YES Go to step 13.
NO Go to step 14.

13. Detach J118. Check for short between P423–B6 and ground.
Does short exist?

YES Repair shorted wire between P423–B6 and J118–6. Go to paragraph 11–12.
NO Replace CPG cyclic stick (TM 1-1520-238-23).

14. Detach P686 and J113. Check for short between:
P423–B7 and ground,
J113–A5 and ground.
Does short exist?

YES Repair shorted wire between: P423–B7 and J113–A9, J113–A5 and P686–117. Go to paragraph 11–12.
NO Go to step 15.

15. Check for short between (A401)P113–A9 and ground.
Does short exist?

YES Replace pilot cyclic stick (TM 1-1520-238-23).
NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Electrical power distribution box cover removed



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach wire from (A402)TB3-7/8-B. Check for short between J113-A10 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between: J113-A10 and P423-B16, (A402)J11-B16 and (A402)TB3-7/8-B. Go to paragraph 11-12. |
| NO | Go to step 2. |

2. Check for short between (A401)P113-A10 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace pilot cyclic stick (TM 1-1520-238-23). |
| NO | Go to paragraph 11-16. |

END OF TASK

11-18. TRIM CIRCUIT BREAKER DOES NOT STAY CLOSED – FORCE TRIM RELEASE

11-18

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Electrical power distribution box cover removed



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach and tag wires from (A402): TB2-29-E, TB2-29-F, TB2-29-G, and TB2-29-H. Detach P431, check for short between: P686-116 and ground.

(A402):

J11-B14 and ground,
 J11-B15 and ground,
 J27-A7 and ground,
 TB3-7/8-A and ground.

Does short exist?

YES	Repair shorted wire between: P431-A7 and P686-116. (A402): J11-B15 and TB2-29-E, J11-B14 and TB2-29-F, TB2-29-G and TB3-7/8-A, TB2-29-H and J27-A7. Go to paragraph 11-12.
NO	Go to step 2.

2. Check for short between P423-B15 and ground.
Does short exist?

YES	Go to step 4.
NO	Go to step 3.

3. Detach P118, check for short between P423-B14 and ground.

Does short exist?

YES	Repair shorted wire between P423-B14 and J118-7. Go to paragraph 11-12.
NO	Replace CPG cyclic stick (TM 1-1520-238-23).

4. Detach (A401)P113, check for short between P423-B15 and ground.

Does short exist?

YES	Repair shorted wire between P423-B15 and J113-A11. Go to paragraph 11-12.
NO	Replace pilot cyclic stick (TM 1-1520-238-23).

END OF TASK

11-19. COLLECTIVE FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK

Tools:

Nomenclature	Part Number
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Rigging Kit, Flight Controls	7-262100003

Personnel Required:

- 67R Attack Helicopter Repairer
- One person to assist
- Attack Helicopter Repairer/ Technical Inspector

Equipment Conditions:

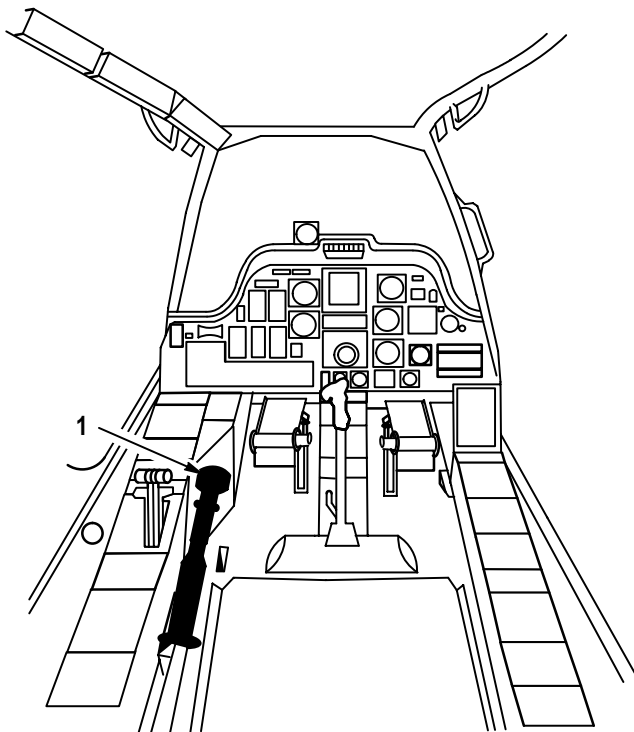
Ref	Condition
TM 1-1520-238-23	Helicopter safed External power application – Electrical Hydraulic (primary) Access provisions – L200 and R200 access panels removed
TM 1-1520-238-T-4	Maintenance headset connected

References:

- TM 1-1520-238-T-4
- TM 1-1520-238-23
- TM 1-1520-238-MTF

NOTE

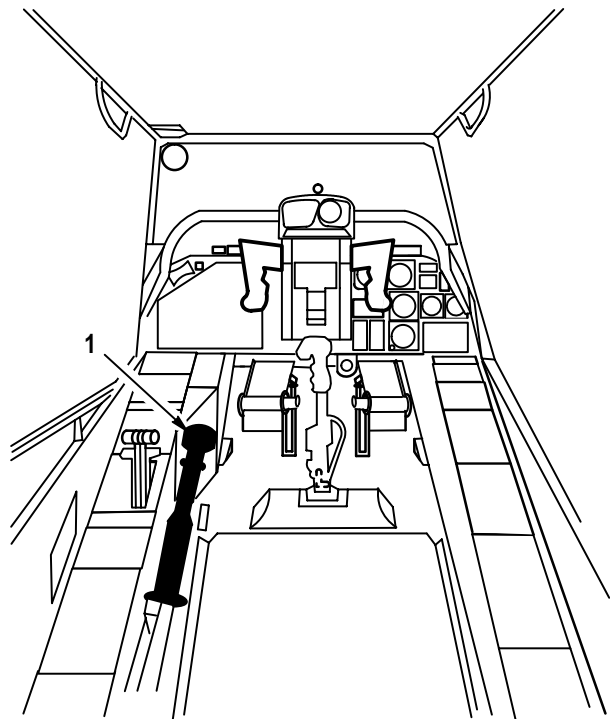
Refer to pilot station (fig. 11-59) and CPG station (fig. 11-60) for cockpit configuration and equipment location. Refer to main rotor servocylinder (fig. 11-61) for component location.



1. PILOT COLLECTIVE STICK

Figure 11-59. Pilot Station

M70-133



1. CPG COLLECTIVE STICK

Figure 11-60. CPG Station

M70-134

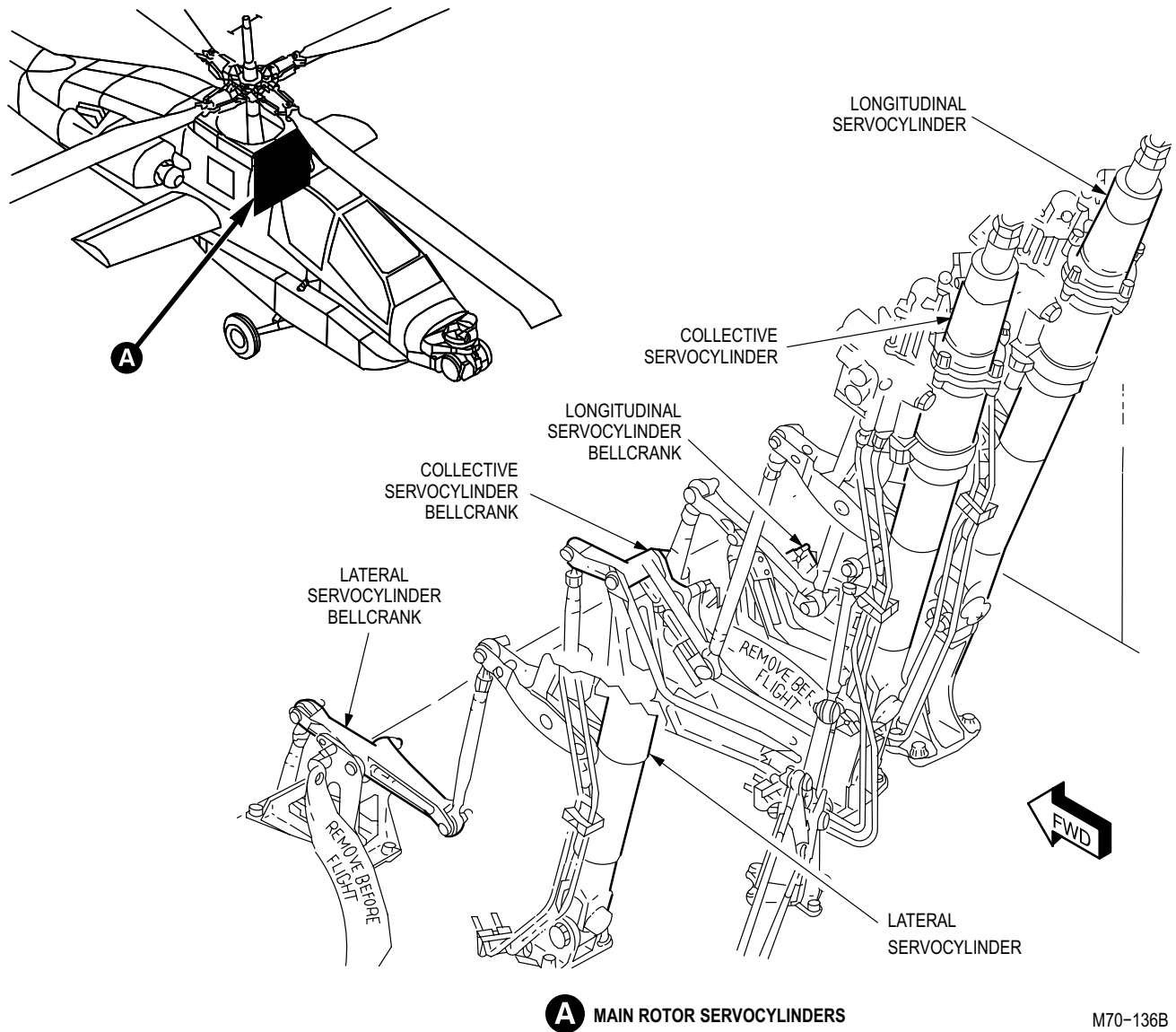


Figure 11-61. Main Rotor Servocylinders

WARNING

Maintenance personnel must be warned verbally prior to moving the collective or cyclic stick. Any control activated can result in sudden blade movement that can sever or crush fingers or hands.

NOTE

If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.

1. Complete the rigging operational check as follows:

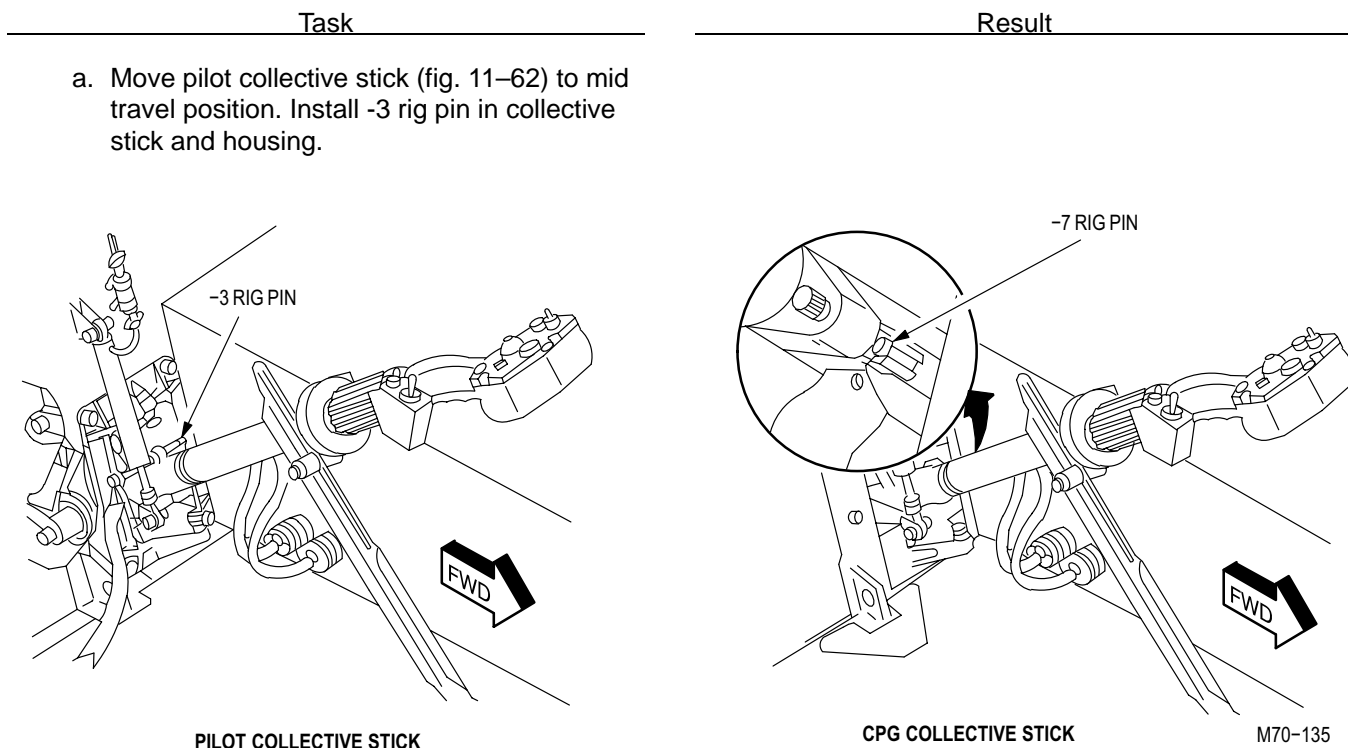


Figure 11-62. Collective Sticks

- b. In CPG collective stick and housing (fig. 11-62), install -7 rig pin and collective stick warning flag.

If rig pin cannot be installed, perform lower collective flight control rigging between pilot and CPG collective sticks (TM 1-1520-238-23).

- c. In collective servocylinder bellcrank (fig. 11-63), install -9 rig pin and collective stick warning flag.

If rig pin cannot be installed, perform lower collective flight control rigging between pilot and CPG collective sticks and collective servocylinder bellcrank (TM 1-1520-238-23).

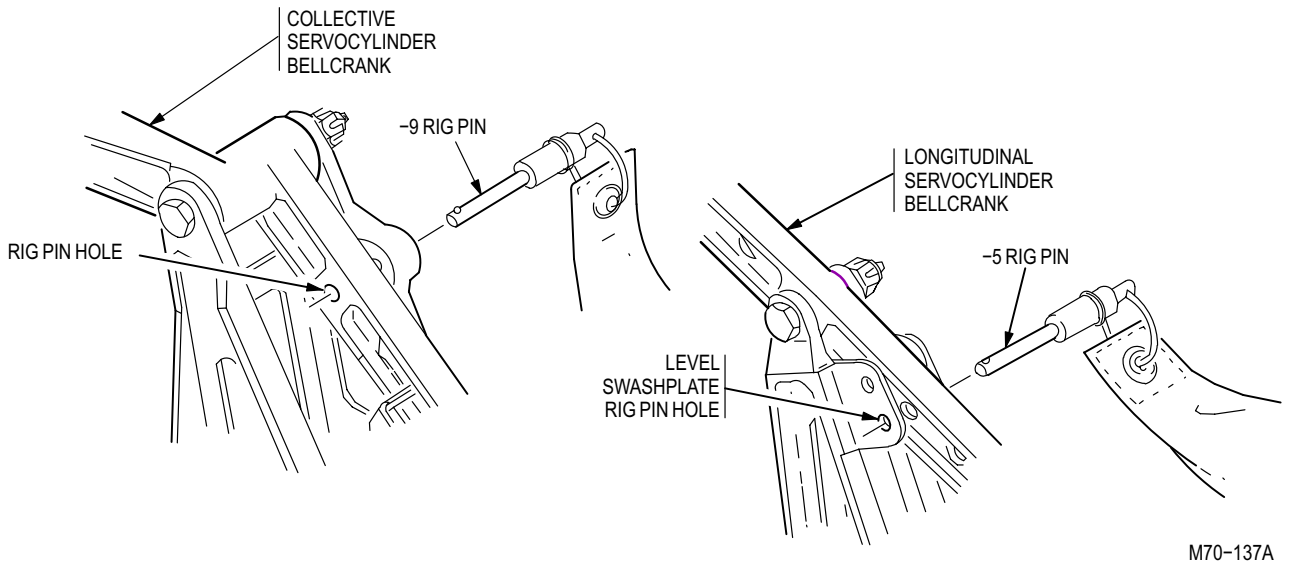


Figure 11-63. Collective and Longitudinal Servocylinder Bellcranks

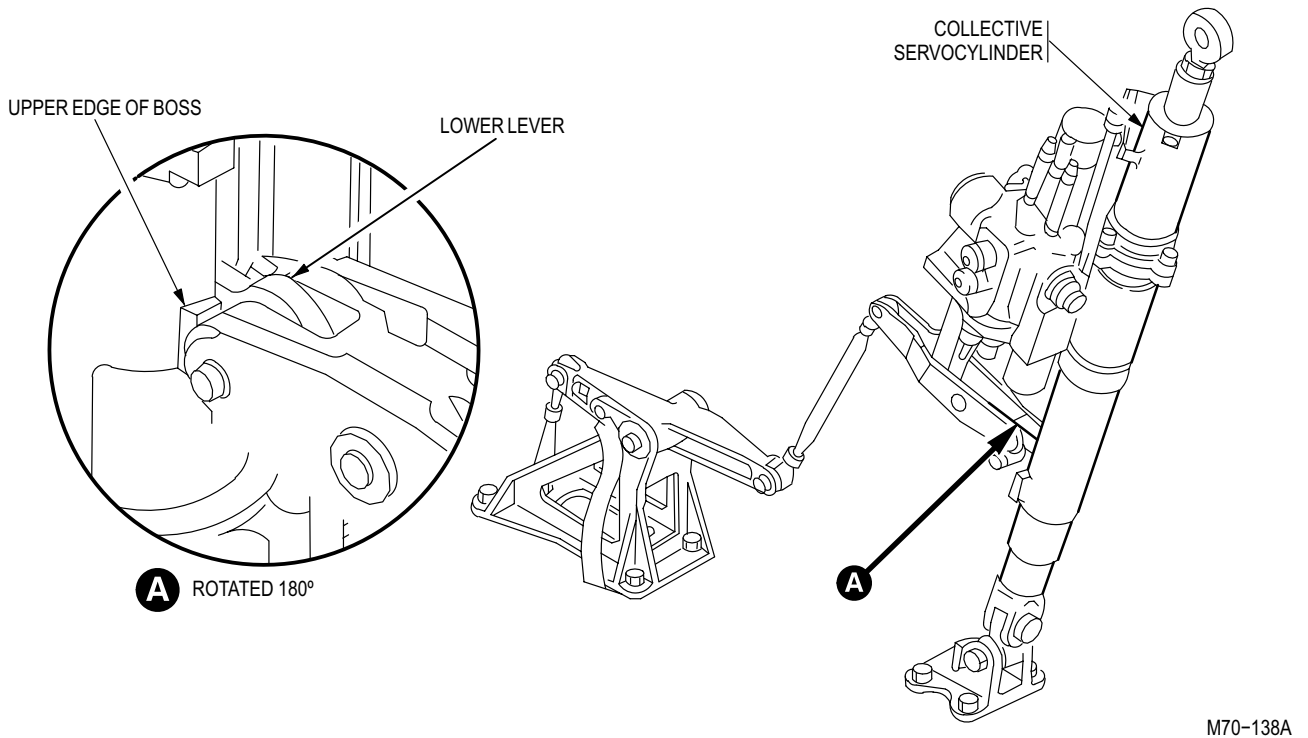


Figure 11-64. Collective Servocylinder Body

Task	Result
d. In lateral servocylinder bellcrank (fig. 11-64.1) install -5 rig pin and cyclic stick warning flag.	If rig pin cannot be installed, perform lower flight control rigging between pilot and CPG cyclic sticks and lateral servocylinder bellcrank (TM 1-1520-238-23).
e. In longitudinal servocylinder bellcrank (fig. 11-63), install -5 rig pin at the level swashplate rig pin hole. Install pilot and CPG cyclic stick warning covers.	
f. On collective servocylinder (fig. 11-64), verify that lower lever is aligned with upper edge of boss on servocylinder body.	If lower lever is not aligned with upper edge of boss, rig collective flight controls between pilot collective stick and collective servocylinder (TM 1-1520-238-23).
g. On right side of mast base (fig. 11-65), install main rotor rigging plate (TM 1-1520-238-23).	
h. In head of mixer support bolt (fig. 11-65), install alignment tool. Place main rotor rigging fixture on main rotor rigging plate next to alignment tool. Loosen thumb screw next to alignment tool. Align BASIC DIM pointer on rigging fixture with center point on alignment tool. Tighten thumbscrew.	

NOTE

The longitudinal bellcrank forward bolt head is located inside of the lateral bellcrank. The measurements are taken between the lateral and longitudinal bellcranks.

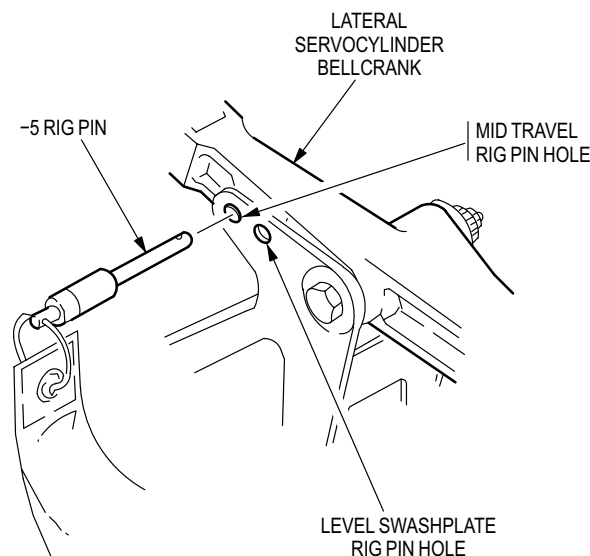
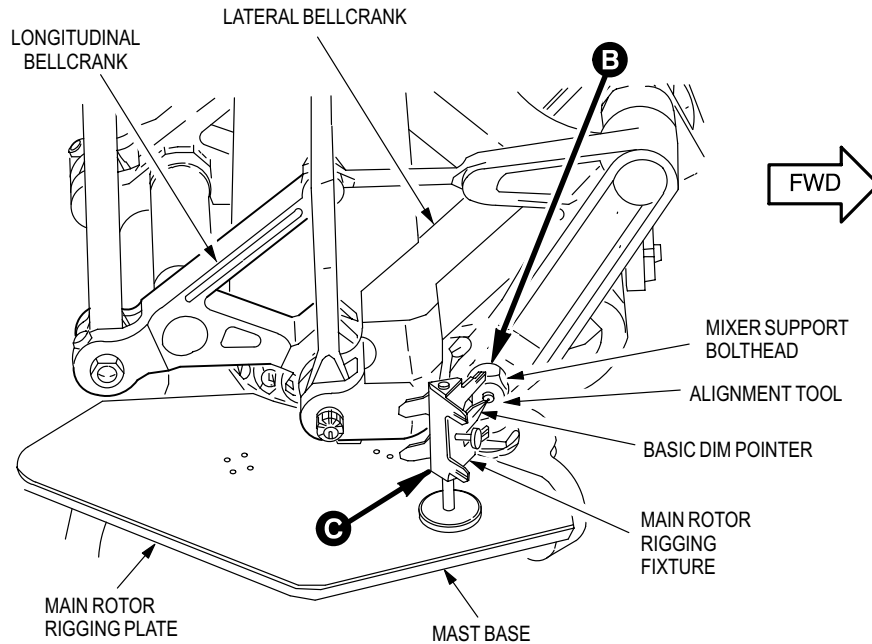
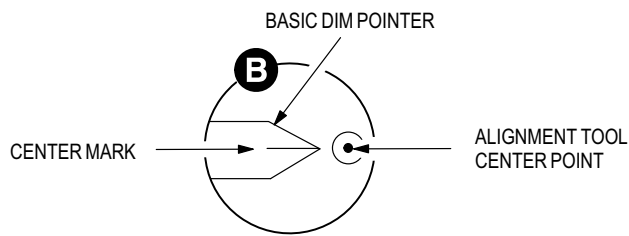
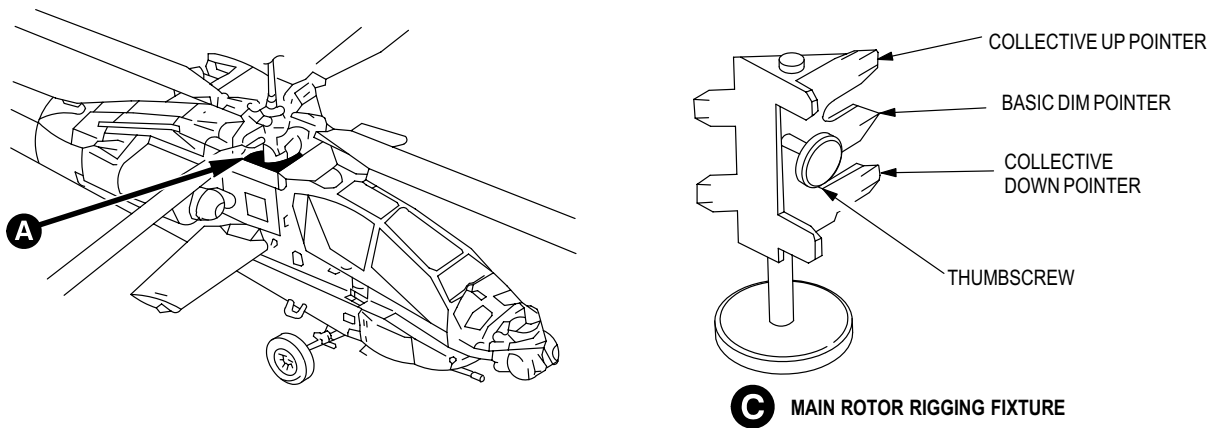


Figure 11-64.1. Lateral Servocylinder Bellcrank

M70-358

11-19. COLLECTIVE FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)



A MAIN ROTOR RIGGING FIXTURE ADJUSTMENT

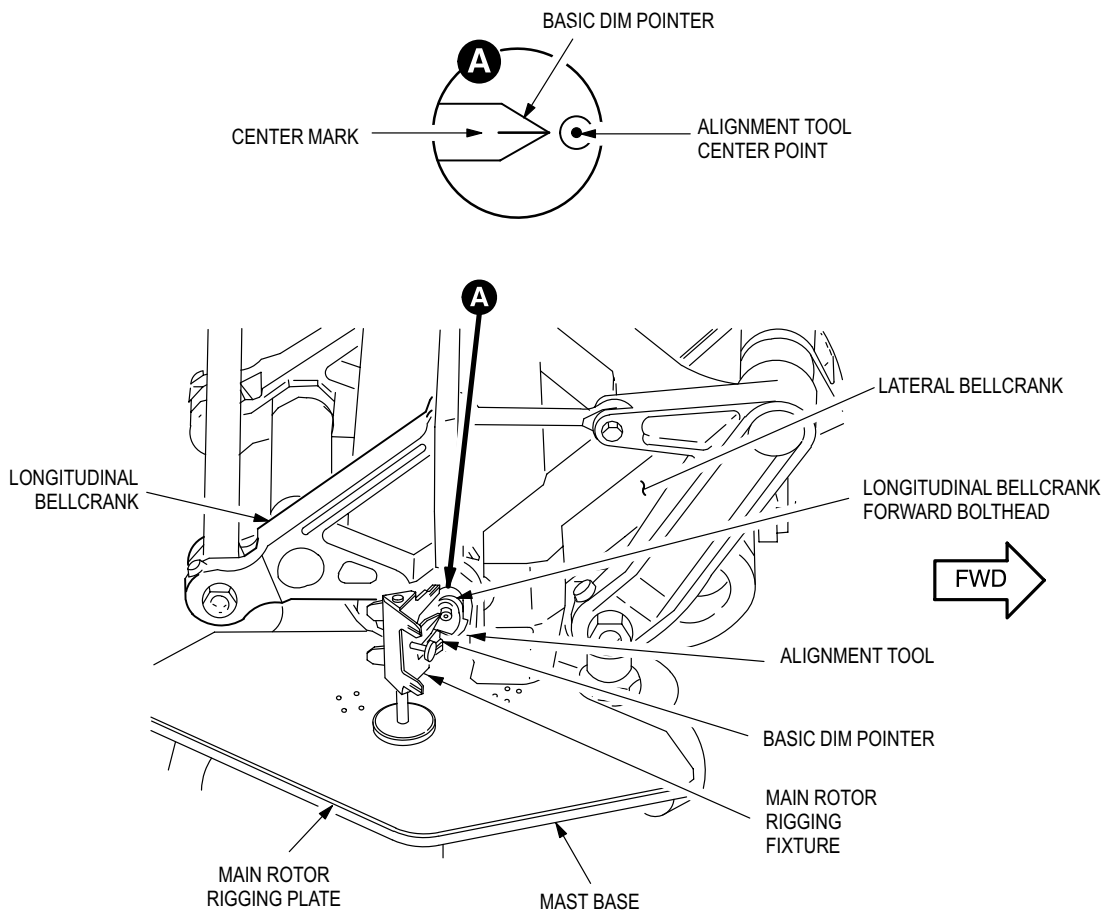
M70-139

Figure 11-65. Main Rotor Rigging Fixture Adjustment

Task	Result
------	--------

- i. Remove rig pin installed in step d.
- j. With assistant holding pilot cyclic stick against left stop, install alignment tool in head of forward bellcrank. Place rigging fixture on rigging plate next to alignment tool. Verify that **BASIC DIM** pointer on rigging fixture aligns with center point on alignment tool (fig. 11-66).

If **BASIC DIM** pointer on rigging fixture does not align with center point of alignment tool, rig upper collective flight controls (TM 1-1520-238-23).



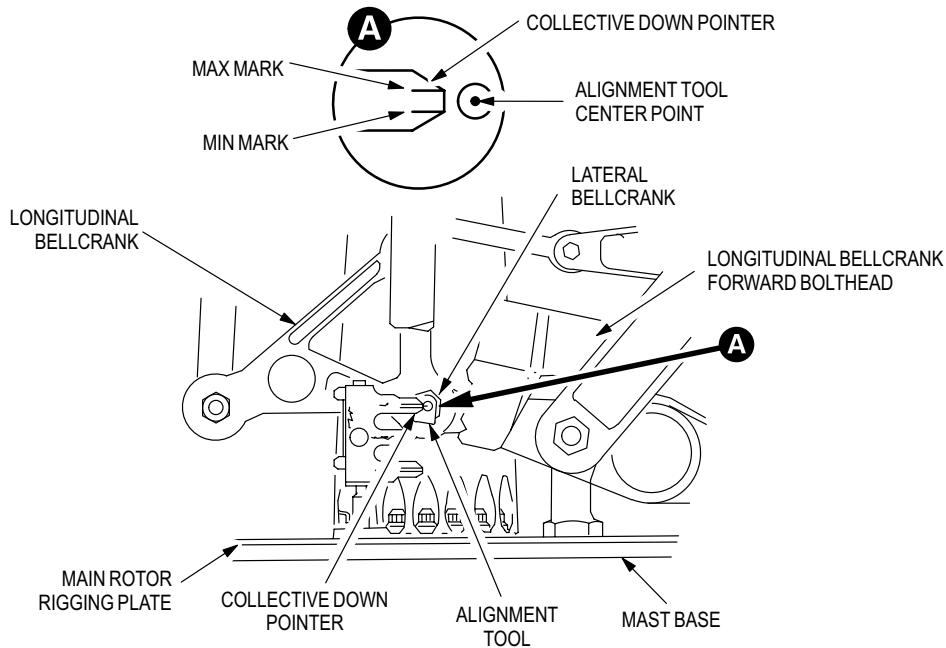
M70-140A

Figure 11-66. Collective Mid-Travel Check

11-19. COLLECTIVE FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)

11-19

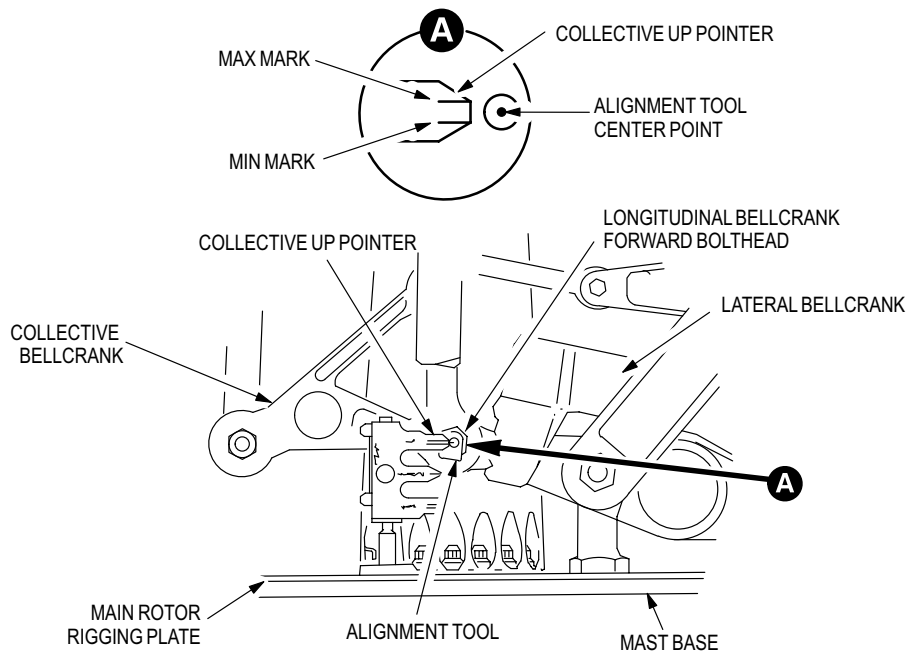
Task	Result
<p>k. Remove rig pins and warning flags installed in steps a through c. Lower collective stick down until it contacts stop. Verify that center point of alignment tool is between MAX and MIN marks on rigging fixture collective DOWN pointer (fig. 11-67).</p>	<p>If center point of alignment tool lies outside the MAX and MIN marks on the collective DOWN pointer, rig collective stick stops (TM 1-1520-238-23).</p> <p>If collective stick stops are rigged correctly, replace collective servocylinder (TM 1-1520-238-23).</p>



M70-141

Figure 11-67. Collective Down Limit Check

<p>l. Move pilot collective stick up until it contacts stop. Verify that center point of alignment tool is between MAX and MIN marks on rigging fixture collective UP pointer (fig. 11-68).</p>	<p>If center point of alignment tool lies outside the MAX and MIN marks on rigging fixture longitudinal AFT pointer, perform rigging of longitudinal cyclic stick stops (TM 1-1520-238-23).</p> <p>If cyclic stick stops are rigged correctly, replace longitudinal servocylinder (TM 1-1520-238-23).</p>
--	--



M70-142A

Figure 11-68. Collective Up Limit Check

2. Remove rig pins and warning covers installed in step d.
3. Remove main rotor rigging fixture and plate (TM 1-1520-238-23) and alignment tool.
4. Perform flight control system maintenance operational check (para 11-12).
5. Disconnect maintenance headset (TM 1-1520-238-T-4).
6. Remove external power – electrical and hydraulic (primary) (TM 1-1520-238-23).
7. Install pilot and CPG collective stick covers (TM 1-1520-238-23).
8. Secure L200 and R200 access panels (TM 1-1520-238-23).
9. Perform maintenance test flight (TM 1-1520-238-MTF).

END OF TASK

11-20. LONGITUDINAL (CYCLIC) FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK

11-20

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Rigging Kit, Flight Controls	7-262100003

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Helicopter safed External power application – Electrical Hydraulic (primary) Access provisions – L200 and R200 access panels removed
TM 1-1520-238-T-4	Maintenance headset connected

Personnel Required:

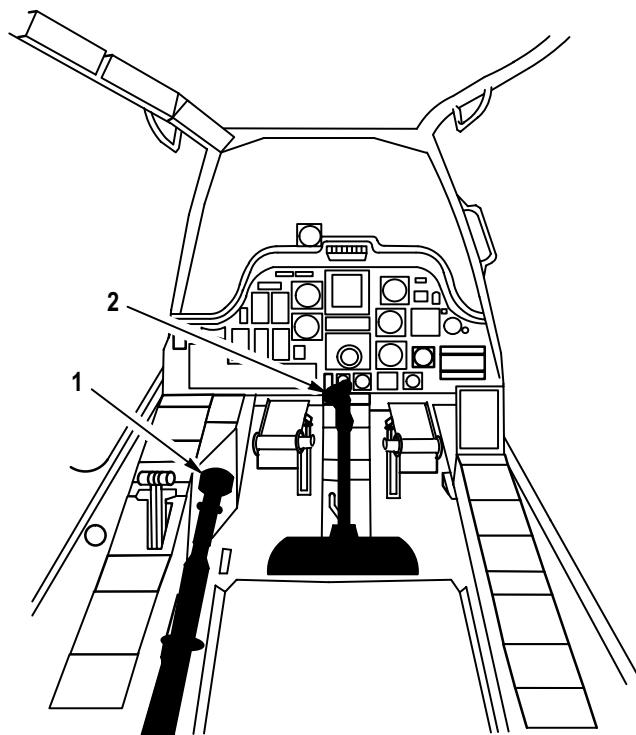
- 67R Attack Helicopter Repairer
- One person to assist
- Attack Helicopter Repairer/
Technical Inspector

References:

- TM 1-1520-238-T-4
- TM 1-1520-238-23
- TM 1-1520-238-MTF

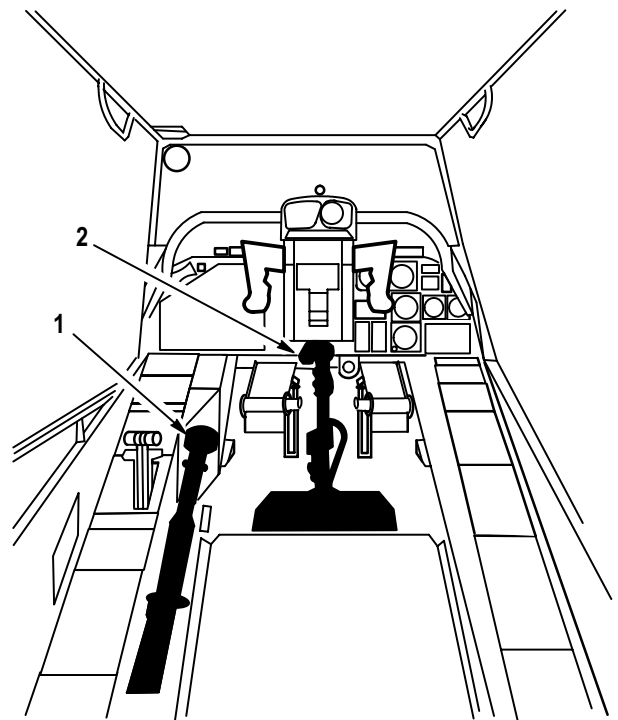
NOTE

Refer to pilot station (fig. 11-69) and CPG station (fig. 11-70) for cockpit configuration and equipment location. Refer to main rotor servocylinder (fig. 11-71) for component location.



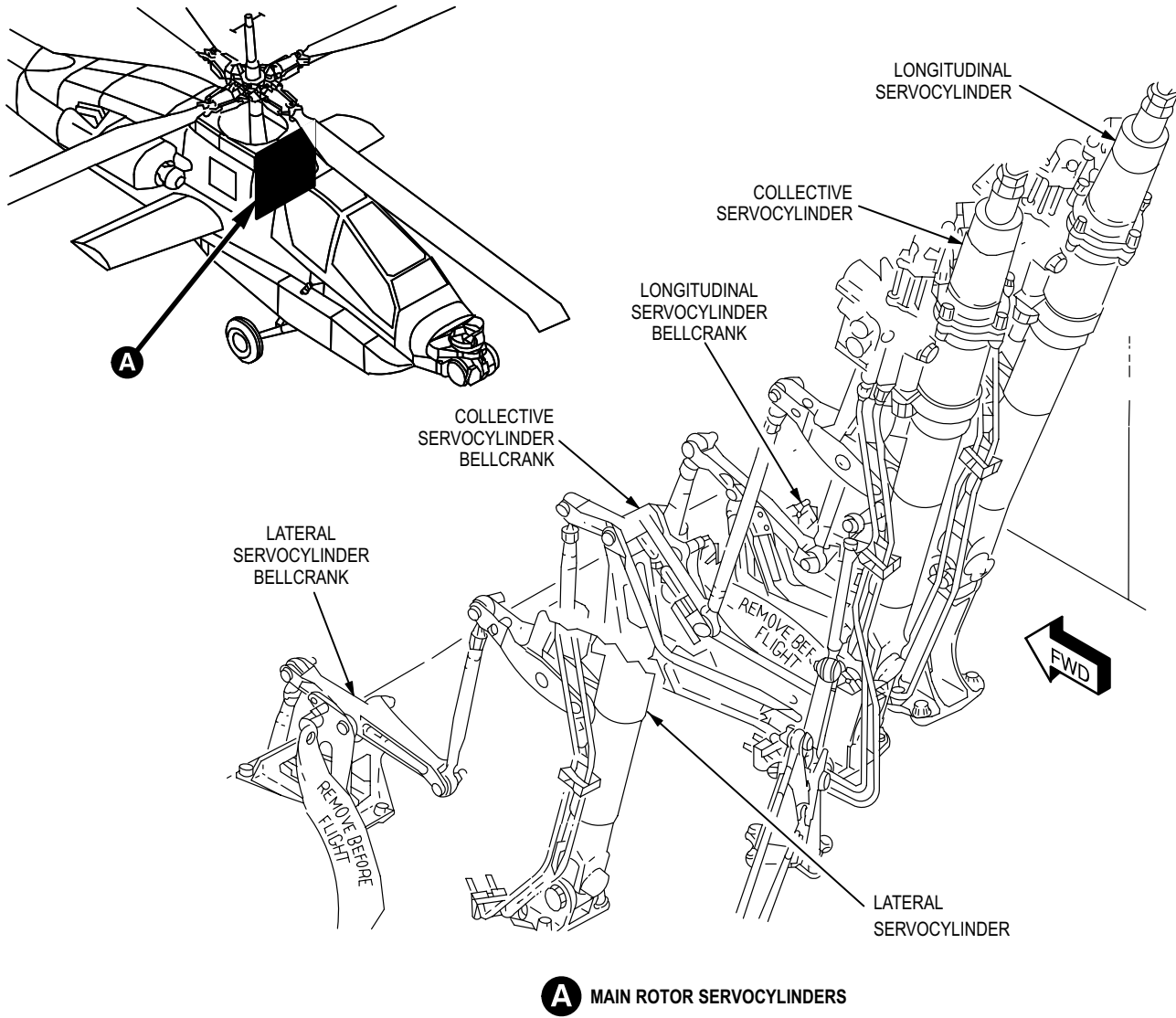
1. PILOT COLLECTIVE STICK
2. PILOT CYCLIC STICK
M70-143

Figure 11-69. Pilot Station



1. CPG COLLECTIVE STICK
2. CPG CYCLIC STICK
M70-144

Figure 11-70. CPG Station



A MAIN ROTOR SERVOCYLINDERS

M70-145A

Figure 11-71. Main Rotor Servocylinders

WARNING

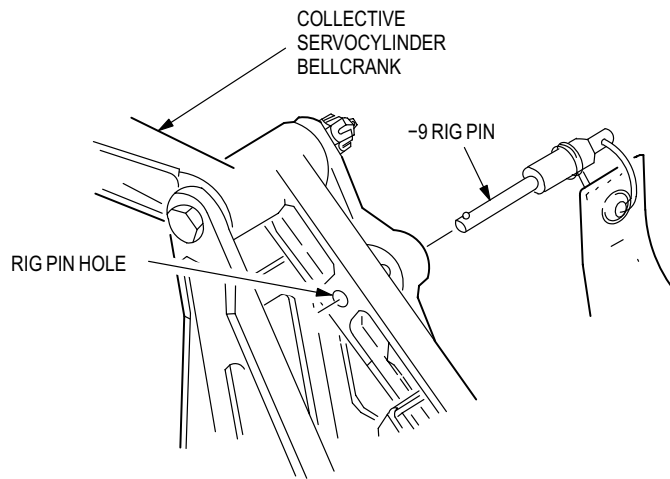
Maintenance personnel must be warned verbally prior to moving the collective or cyclic stick. Any control activated can result in sudden blade movement that can sever or crush fingers or hands.

NOTE

If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.

1. Complete the rigging operational check as follows:

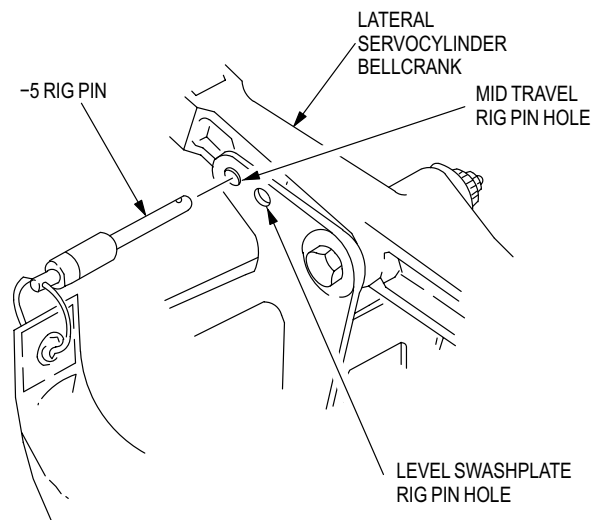
Task	Result
a. Move pilot collective stick to mid travel position. In collective servocylinder bellcrank (fig. 11-72), install -9 rig pin. Install warning flags on pilot/CPG collective sticks.	



M70-146A

Figure 11-72. Collective Servocylinder Bellcrank

- a. Move pilot cyclic stick, as required, to align the LAT zero cyclic indicators. In lateral servocylinder bellcrank (fig. 11-73), install -5 rig pin at level swashplate rig pin hole. Install cyclic stick warning cover.



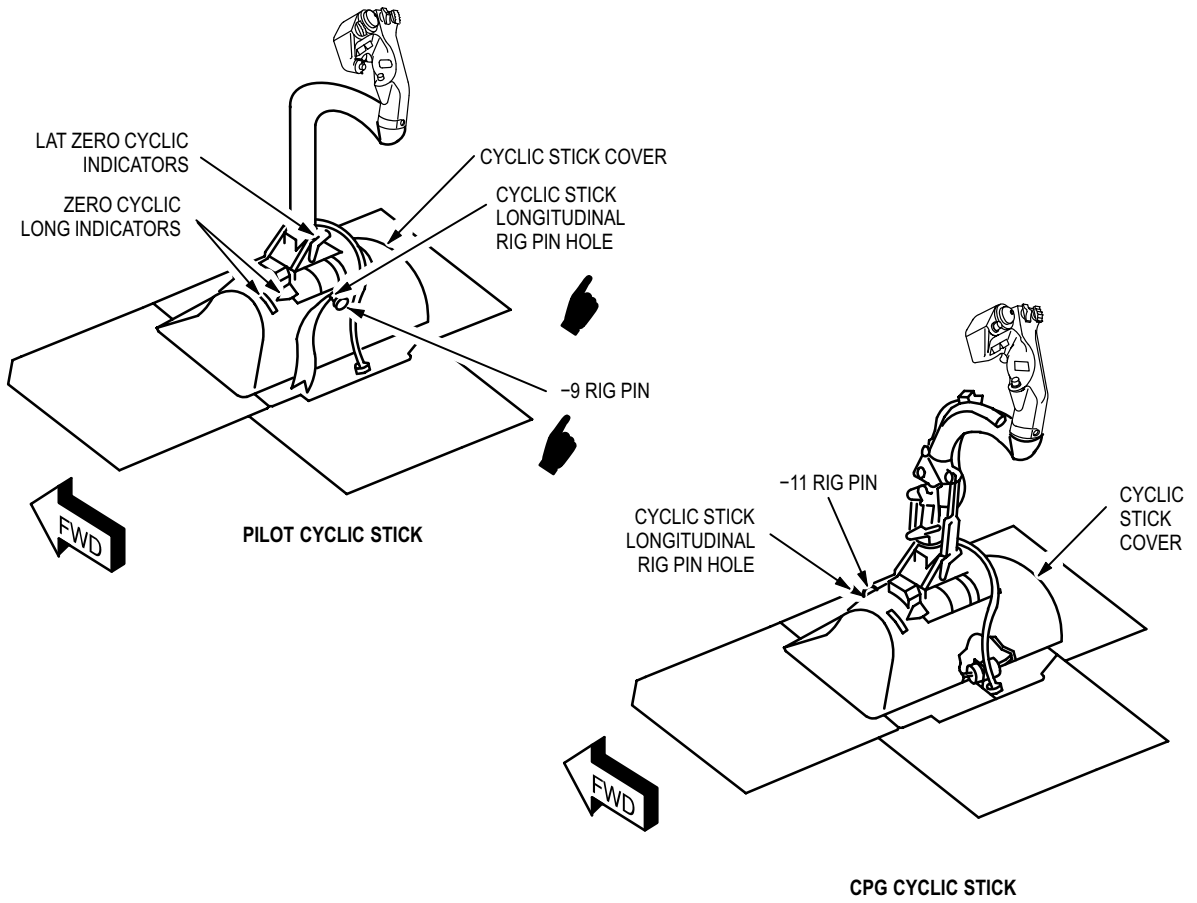
M70-147A

Figure 11-73. Lateral Servocylinder Bellcrank

Task	Result
<p>c. Move pilot cyclic stick to longitudinal mid travel position. Install -9 rig pin in cyclic stick housing cover longitudinal rig pin hole (fig. 11-74).</p>	
<p>d. In CPG cyclic stick housing cover longitudinal rig pin hole (fig. 11-74), install -11 rig pin.</p>	<p>If rig pin cannot be installed, perform lower longitudinal flight control rigging between pilot and CPG cyclic sticks (TM 1-1520-238-23).</p>
<p>e. In longitudinal servocylinder bellcrank mid travel pin hole (fig. 11-75), install - 5 rig pin.</p>	<p>If rig pin cannot be installed, perform lower longitudinal flight control rigging between pilot cyclic stick and longitudinal servocylinder bellcrank (TM 1-1520-238-23).</p>
<p>f. On longitudinal servocylinder, verify that lower lever is aligned with upper edge of boss on servocylinder body (fig. 11-76).</p>	<p>If lower lever is not aligned with upper edge of boss, rig longitudinal flight controls between pilot cyclic stick and longitudinal servocylinder (TM 1-1520-238-23).</p>
<p>g. Remove rig pins installed in steps c. through e. Move pilot cyclic stick to align ZERO CYCLIC LONG indicators (fig. 11-74). In longitudinal servocylinder bellcrank level swashplate rig pin hole, install -5 rig pin.</p>	
<p>h. On mast base (fig. 11-77), install main rotor rigging plate (TM 1-1520-238-23).</p>	

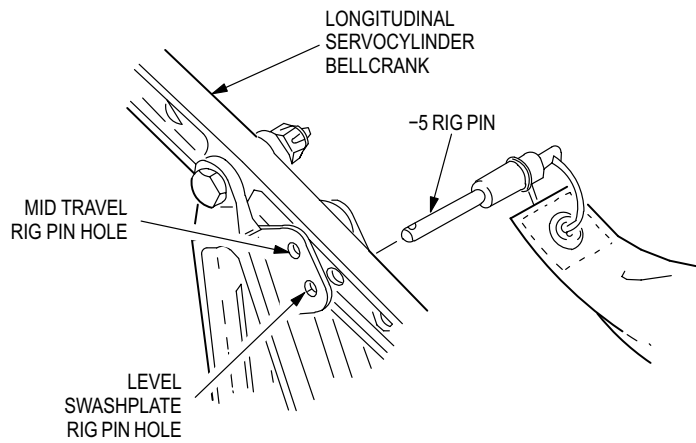
11-20. LONGITUDINAL (CYCLIC) FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)

11-20



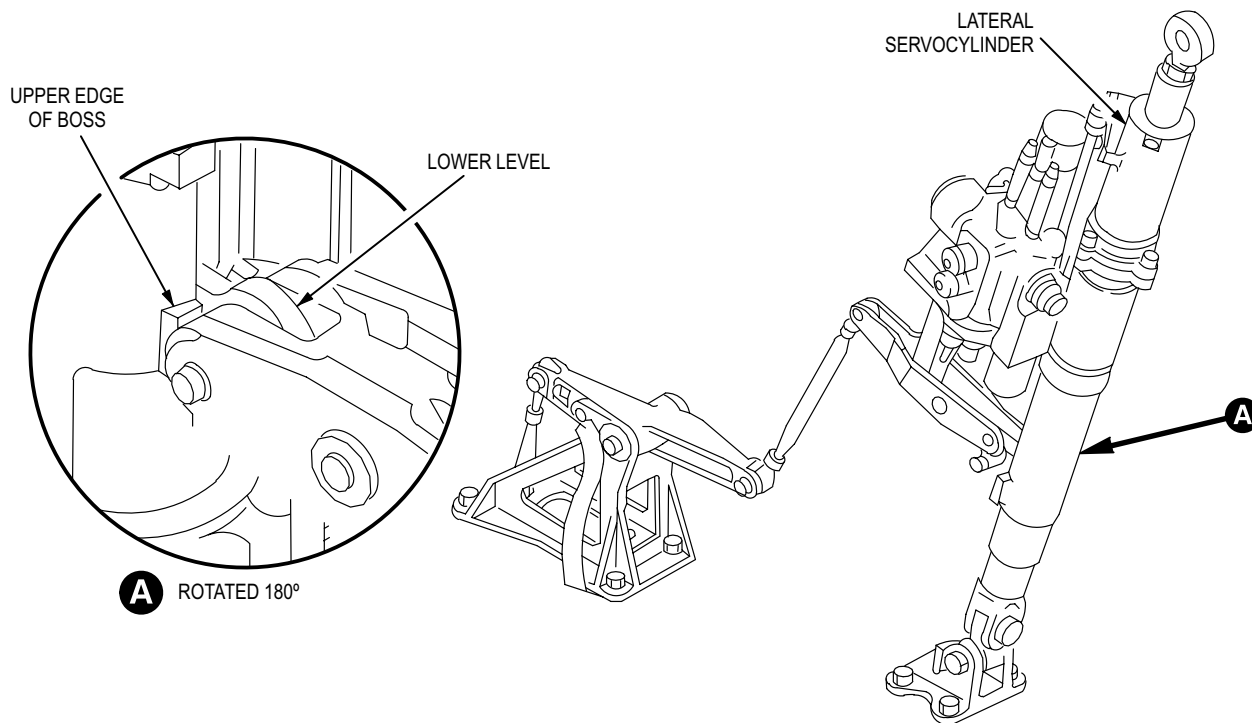
M70-148A

Figure 11-74. Cyclic Sticks



M70-149

Figure 11-75. Longitudinal Servocylinder Bellcrank

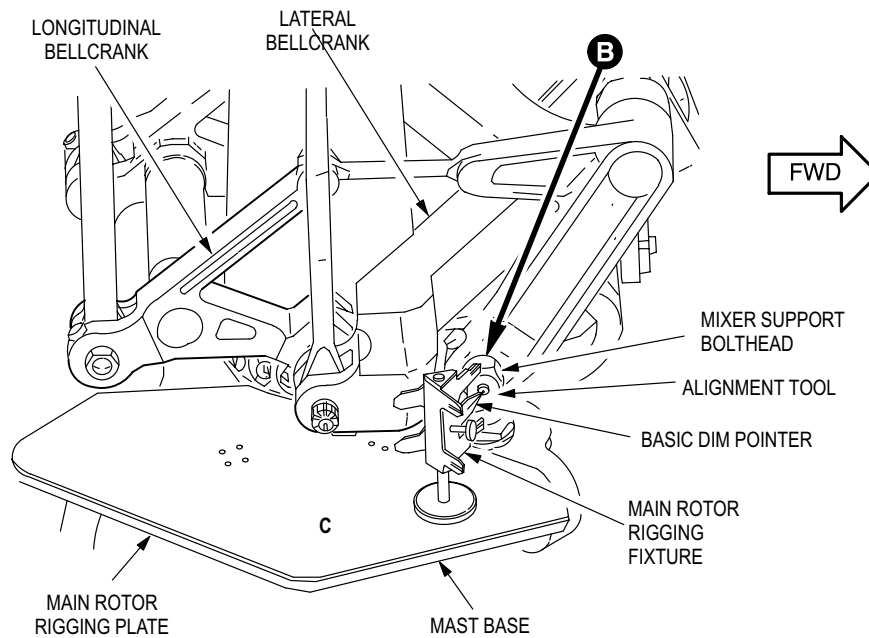
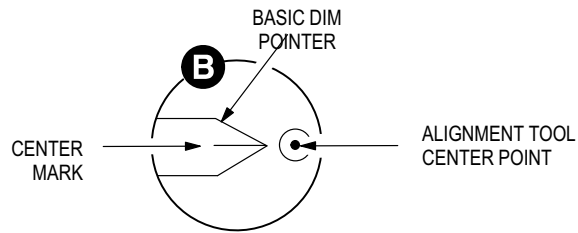
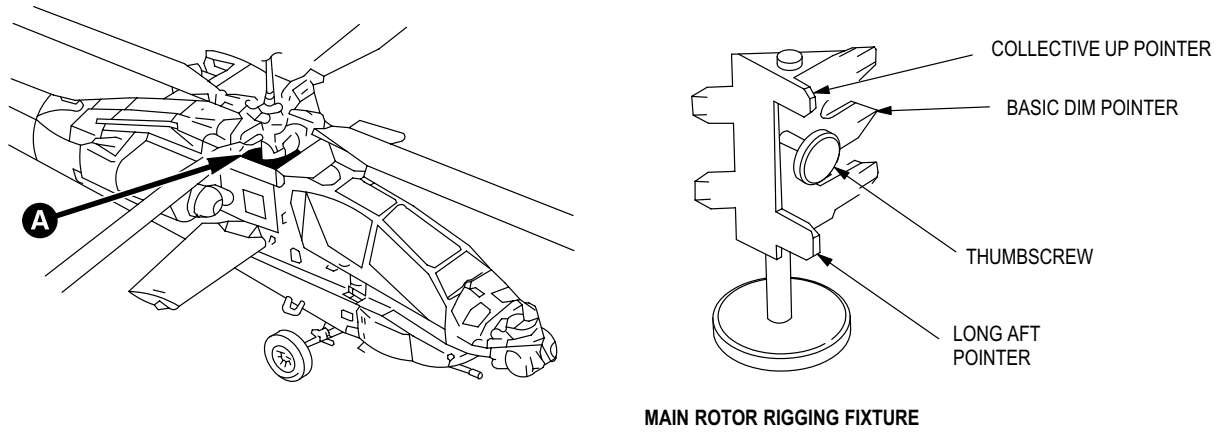


M70-150A

Figure 11-76. Longitudinal Servocylinder Body

- i. In head of mixer support bolt, install alignment tool. Place main rotor rigging fixture on main rotor rigging plate next to alignment tool. Loosen thumb screw on rigging fixture. Align **BASIC DIM** pointer on rigging fixture with center point on alignment tool. Tighten thumbscrew (fig. 11-78).

11-20. LONGITUDINAL (CYCLIC) FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)



A MAIN ROTOR RIGGING FIXTURE ADJUSTMENT

M70-151A

Figure 11-77. Main Rotor Rigging Fixture Adjustment

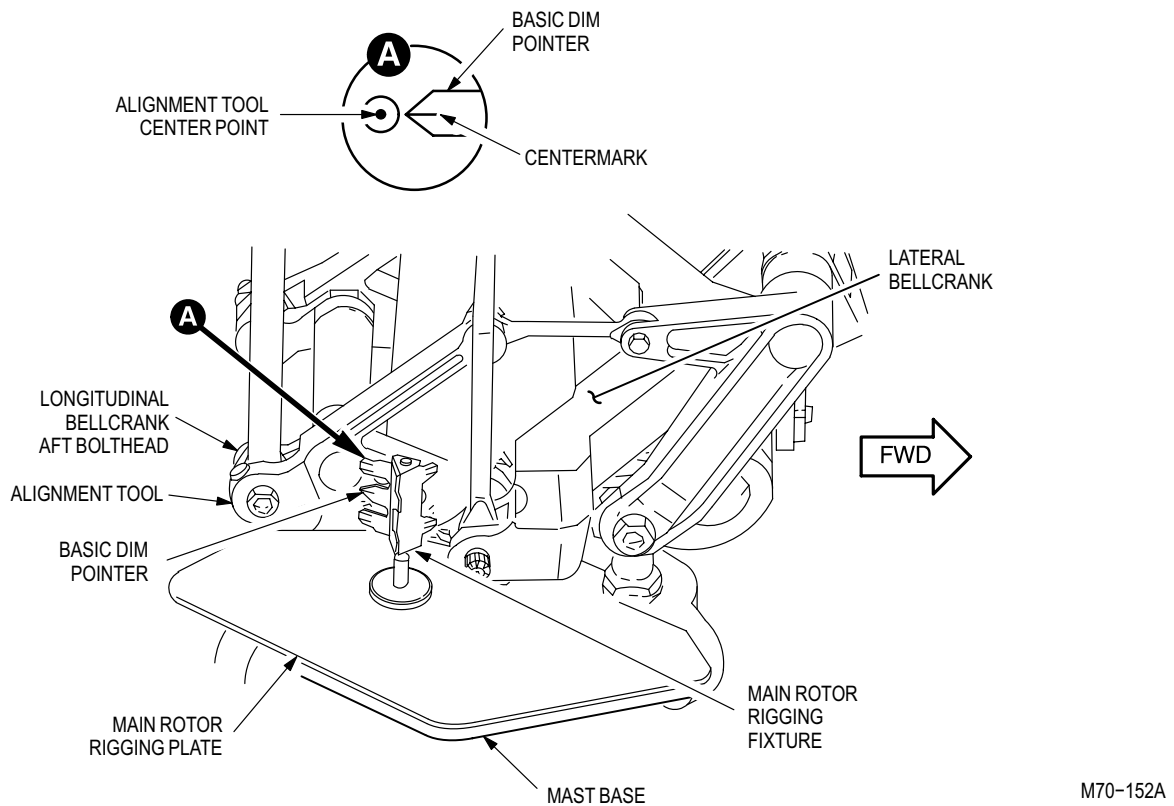
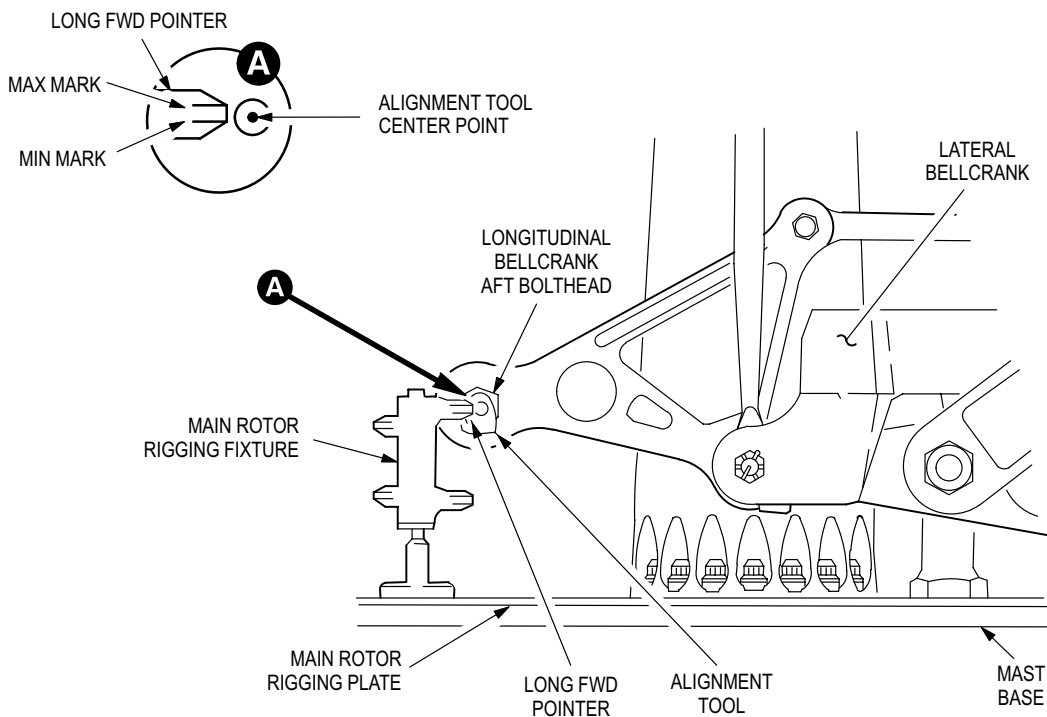


Figure 11-78. Cyclic Long Zero Check

Task	Result
<p>j. In head of longitudinal bellcrank aft bolt (fig. 11-79), install alignment tool. Place rigging fixture on rigging plate next to alignment tool. Verify that BASIC DIM pointer on rigging fixture aligns with center point on alignment tool.</p>	<p>If BASIC DIM pointer on rigging fixture does not align with center point of alignment tool, rig upper longitudinal flight controls (TM 1-1520-238-23).</p>
<p>k. Remove -5 rig pin installed in step g.</p> <p>l. Move pilot cyclic stick forward until it contacts stop. Position rigging fixture to align longitudinal FWD pointer with center point of alignment tool. Verify that center point of alignment tool is between the MAX and MIN marks on rigging fixture longitudinal FWD pointer (fig. 11-79).</p>	<p>If center point of alignment tool lies outside the MAX and MIN marks on rigging fixture longitudinal FWD pointer, perform rigging of longitudinal cyclic stick stops (TM 1-1520-238-23).</p> <p>If cyclic stick stops are rigged correctly, replace longitudinal servocylinder (TM 1-1520-238-23).</p>

11-20. LONGITUDINAL (CYCLIC) FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)

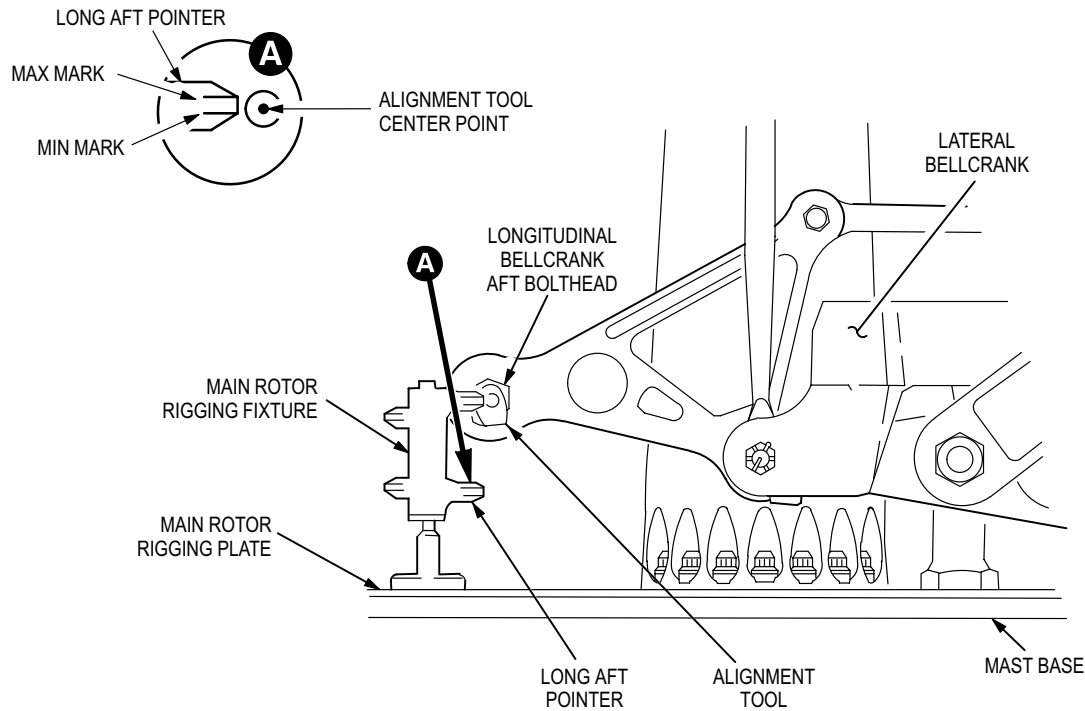
11-20



M70-153A

Figure 11-79. Cyclic FWD Limit Check

Task	Result
<p>m. Move pilot cyclic stick aft until it contacts stop. Position rigging fixture to align longitudinal AFT pointer with center point of alignment tool. Verify that center point of alignment tool is between the MAX and MIN marks on rigging fixture longitudinal AFT pointer (fig. 11-80).</p>	<p>If center point of alignment tool lies outside the MAX and MIN marks on rigging fixture longitudinal AFT pointer, perform rigging of longitudinal cyclic stick stops (TM 1-1520-238-23).</p> <p>If cyclic stick stops are rigged correctly, replace longitudinal servocylinder (TM 1-1520-238-23).</p>



M70-154

Figure 11-80. Cyclic AFT Limit Check

2. Remove rig pins, warning flags and cover installed in steps a and b.
3. Remove rigging fixture and plate (TM 1-1520-238-23) and alignment tool.
4. Perform flight control system maintenance operational check (para 11-12).
5. Disconnect maintenance headset (TM 1-1520-238-T-4).
6. Remove external power – electrical and hydraulic (primary) (TM 1-1520-238-23).
7. Install pilot and CPG collective stick covers (TM 1-1520-238-23).
8. Secure access panels L200 and R200 (TM 1-1520-238-23).
9. Perform maintenance test flight (TM 1-1520-238-MTF).

END OF TASK

11-21. LATERAL (CYCLIC) FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK

11-21

Tools:

Nomenclature	Part Number
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Rigging Kit, Flight Controls	7-262100003

Personnel Required:

- 67R Attack Helicopter Repairer
- One person to assist
- Attack Helicopter Repairer/ Technical Inspector

References:

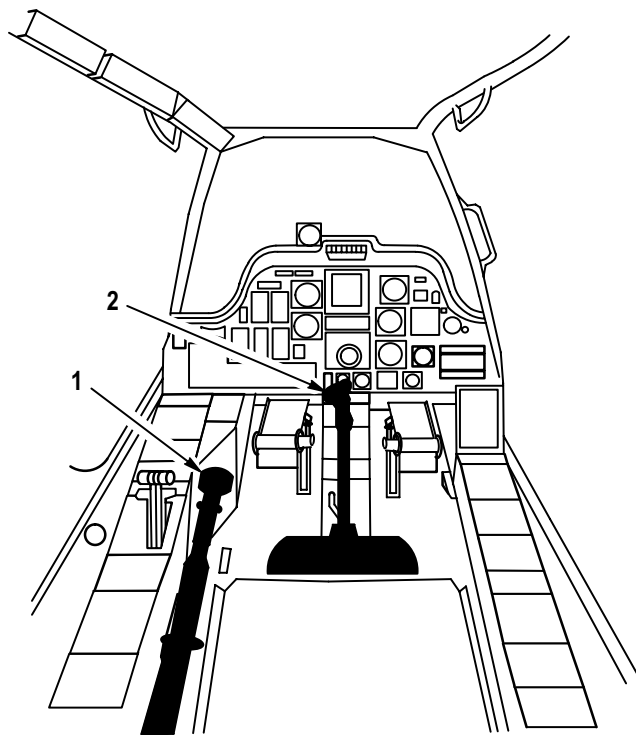
- TM 1-1520-238-T-4
- TM 1-1520-238-23
- TM 1-1520-238-MTF

Equipment Conditions:

Ref	Condition
TM 1-1520-238-23	Helicopter safed External power application – Electrical Hydraulic (primary) Access provisions – L200 and R200 access panels and CPG cyclic stick right shroud cover removed
TM 1-1520-238-T-4	Maintenance headset connected

NOTE

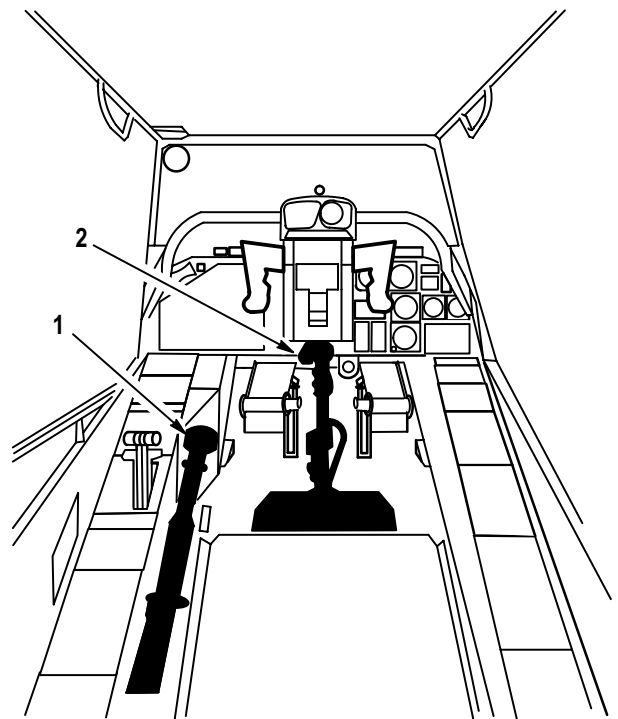
Refer to pilot station (fig. 11-81) and CPG station (fig. 11-82) for cockpit configuration and equipment location. Refer to main rotor servocylinder (fig. 11-83) for component location.



1. PILOT COLLECTIVE STICK
2. PILOT CYCLIC STICK

M70-155

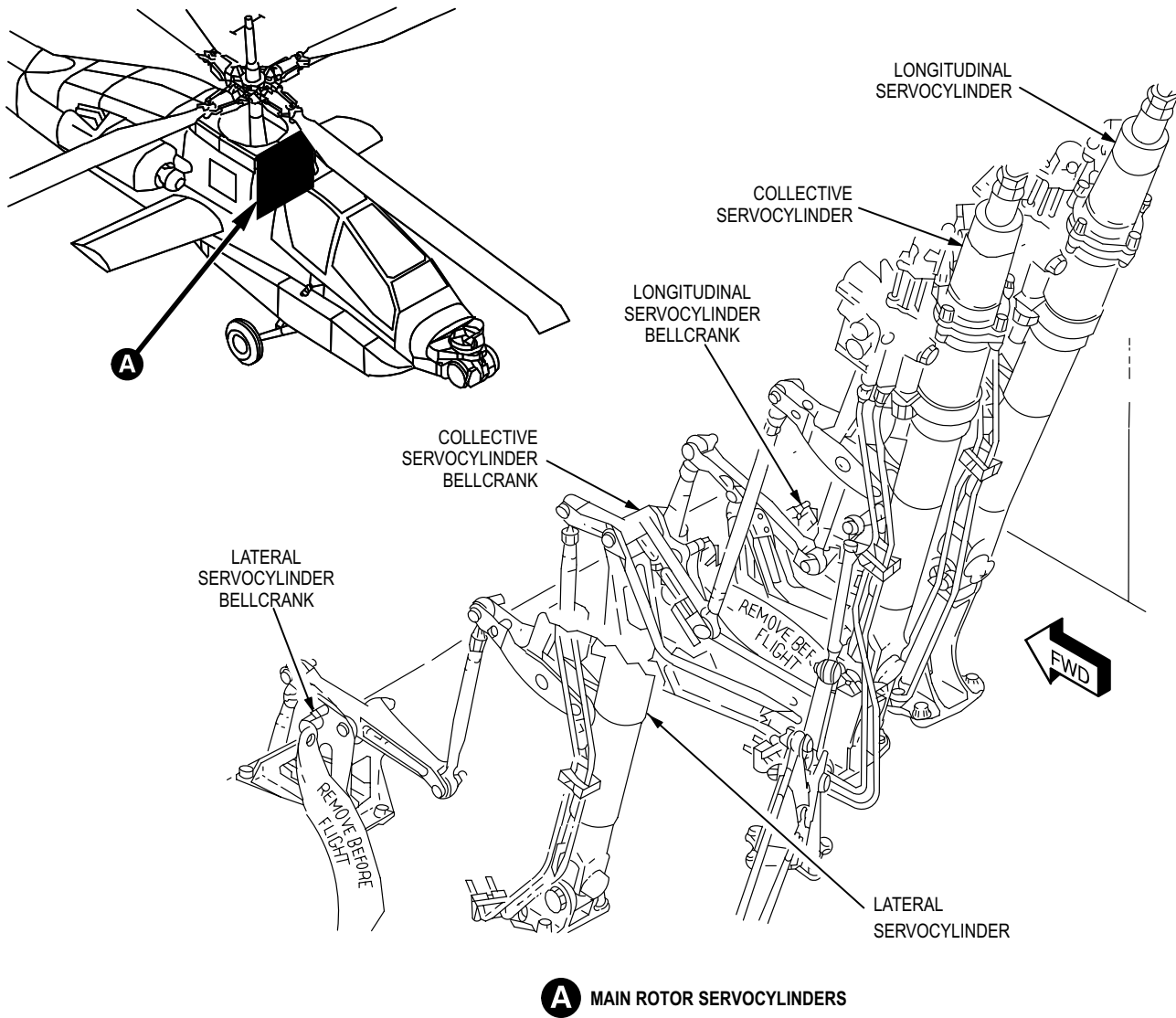
Figure 11-81. Pilot Station



1. CPG COLLECTIVE STICK
2. CPG CYCLIC STICK

M70-156

Figure 11-82. CPG Station



A MAIN ROTOR SERVOCYLINDERS

M70-158A

Figure 11-83. Main Rotor Servocylinders

WARNING

Maintenance personnel must be warned verbally prior to moving the collective or cyclic stick. Any control activated can result in sudden blade movement that can sever or crush fingers or hands.

NOTE

If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.

1. Complete the rigging operational check as follows:

Task	Result
a. Move pilot cyclic stick to lateral mid travel position. In lateral rig pin hole of cyclic housing cover (fig. 11-84), install -3 rig pin. Install warning covers on pilot and CPG cyclic sticks.	
b. In CPG cyclic stick housing cover lateral rig pin hole, install -3 rig pin.	If rig pin cannot be installed, perform lower lateral flight control rigging between pilot and CPG cyclic sticks (TM 1-1520-238-23).
c. Move pilot collective stick to mid travel position. In collective servocylinder bellcrank rig pin hole (fig. 11-85), install -9 rig pin. Attach warning flags to pilot and CPG collective sticks.	
d. Align pilot ZERO CYCLIC LONG indicators (fig. 11-84). In longitudinal servocylinder bellcrank level swashplate rig pin hole (fig. 11-86), install -5 rig pin.	
e. In lateral servocylinder bellcrank mid travel rig pin hole (fig. 11-87), install – 5 rig pin.	If rig pin cannot be installed, perform lower lateral flight control rigging between pilot cyclic stick and lateral servocylinder bellcrank (TM 1-1520-238-23).

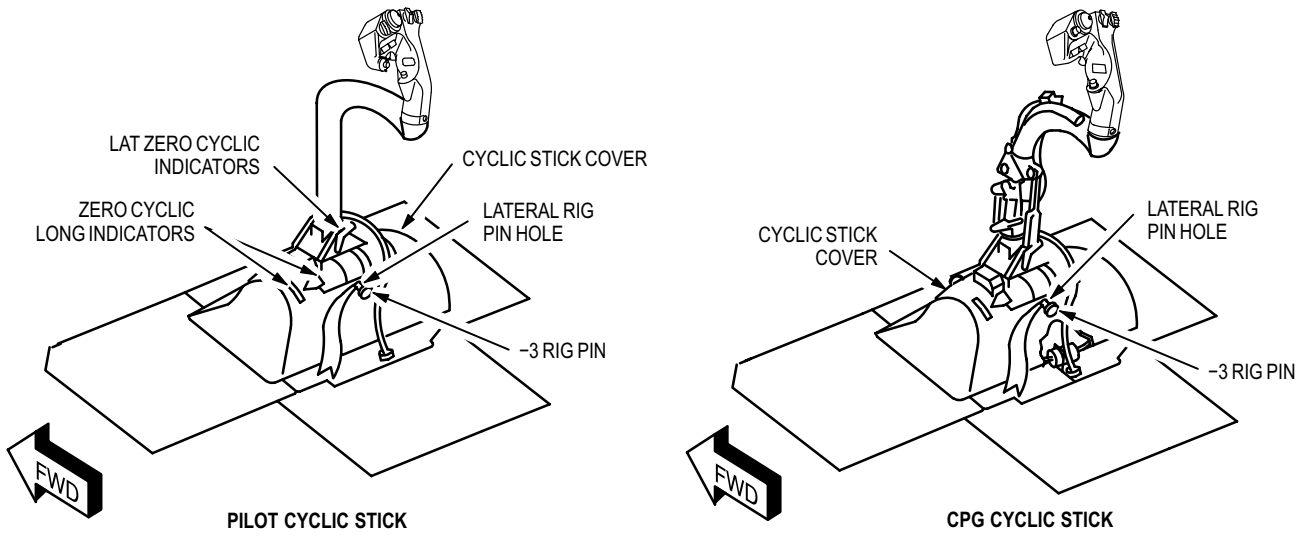


Figure 11-84. Cyclic Sticks

M70-157

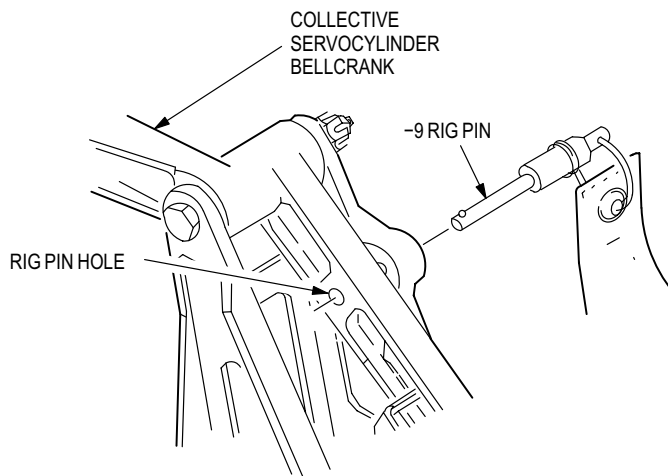


Figure 11-85. Collective Servocylinder Bellcrank -9 Rig Pin

M70-159A

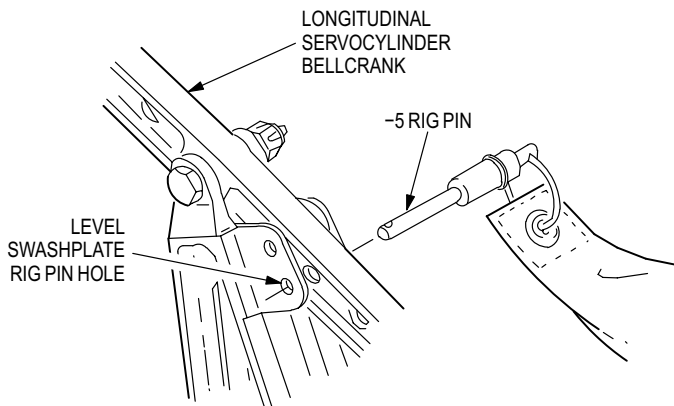
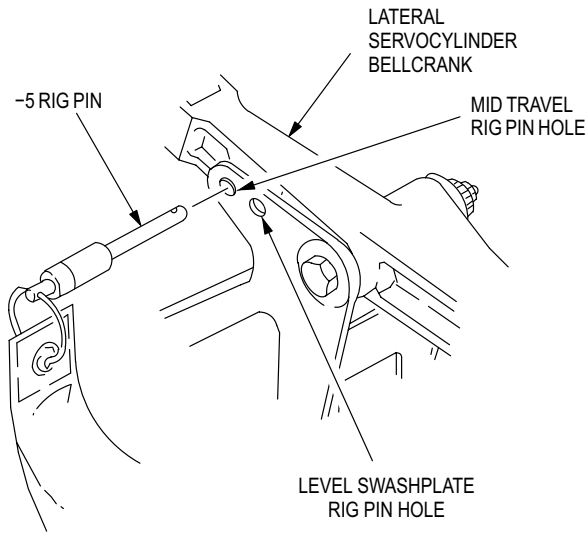


Figure 11-86. Longitudinal Servocylinder Bellcrank -5 Rig Pin

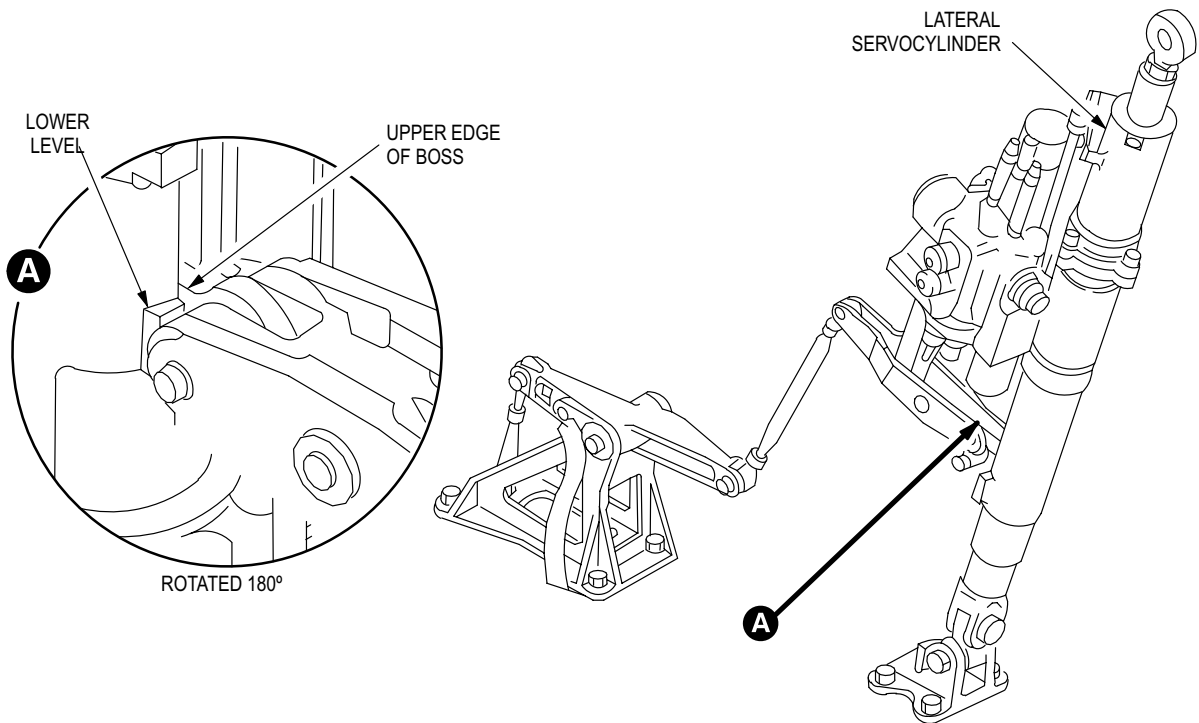
M70-160A



M70-161

Figure 11-87. Lateral Servocylinder Bellcrank -5 Rig Pin

Task	Result
f. On lateral servocylinder, verify that lower lever is aligned with upper edge of boss on servocylinder body (fig. 11-88).	If lower lever is not aligned with upper edge of boss, rig lateral flight controls between pilot cyclic stick and lateral servocylinder (TM 1-1520-238-23).



M70-162

Figure 11-88. Lateral Servocylinder Body

11-21. LATERAL (CYCLIC) FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)

11-21

Task	Result
<p>g. Remove rig pins installed in steps a., b., and e. Align LAT ZERO CYCLIC indicators. In lateral servocylinder bellcrank level swashplate rig pin hole (fig. 11-87), install -5 rig pin.</p>	
<p>h. On right side of mast base (fig. 11-89), install main rotor rigging plate (TM 1-1520-238-23).</p>	
<p>i. Place main rotor rigging fixture on main rotor rigging plate next to right lateral bellcrank link bolt nut. Loosen thumbscrew on rigging fixture. Align BASIC DIM pointer on rigging fixture with center point of right lateral bellcrank bolt. Tighten thumbscrew.</p>	
<p>j. Remove main rotor rigging plate from right side of mast base.</p>	
<p>k. On left side of mast base (fig. 11-90), install main rotor rigging plate (TM 1-1520-238-23).</p>	
<p>l. On rigging plate next to left lateral bellcrank link bolt, place rigging fixture. Verify BASIC DIM pointer aligns with center of left lateral bellcrank link bolt.</p>	<p>If BASIC DIM pointer does not align with center of link bolt, adjust lateral servocylinder rod end to level the lateral bellcrank.</p>
<p>m. Remove main rotor rigging plate from left side of mast base.</p>	
<p>n. On right side of mast base, install main rotor rigging plate (TM 1-1520-238-23).</p>	

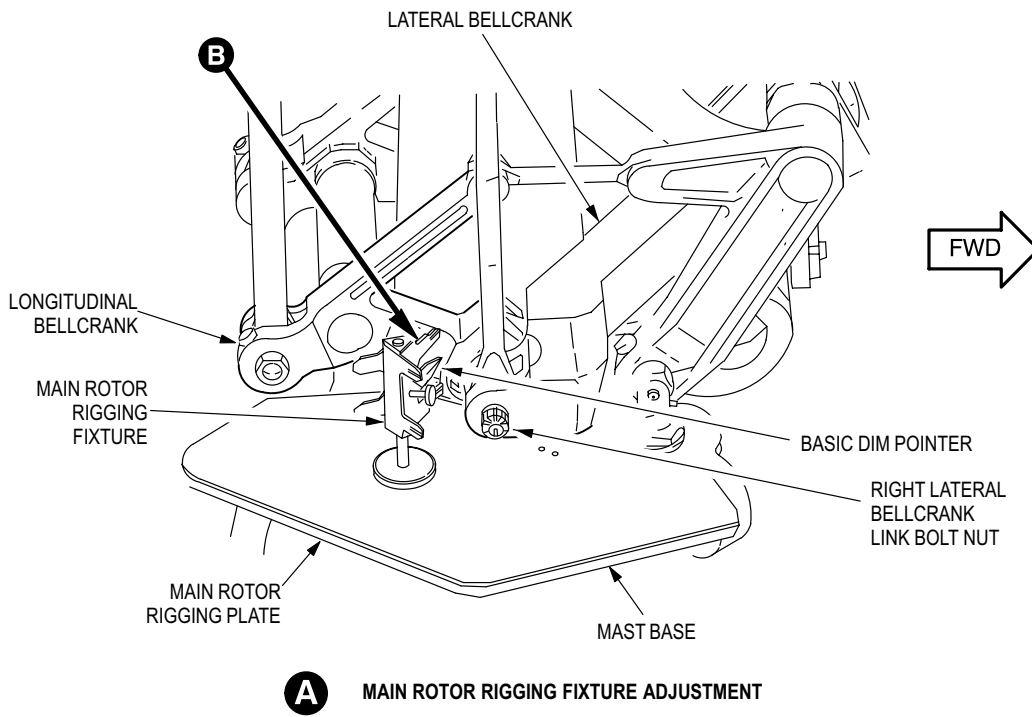
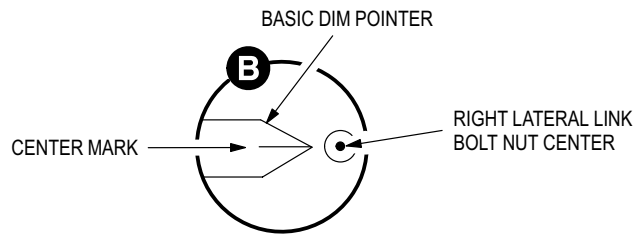
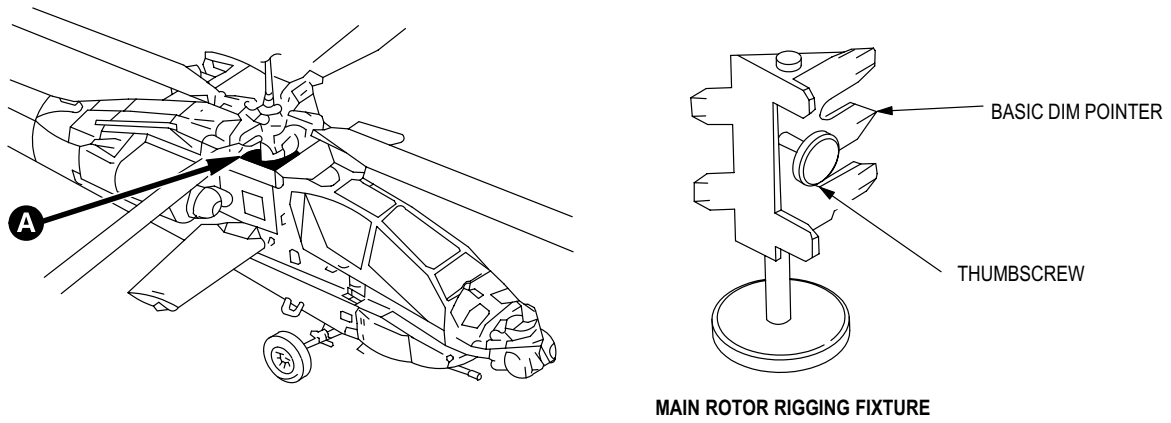
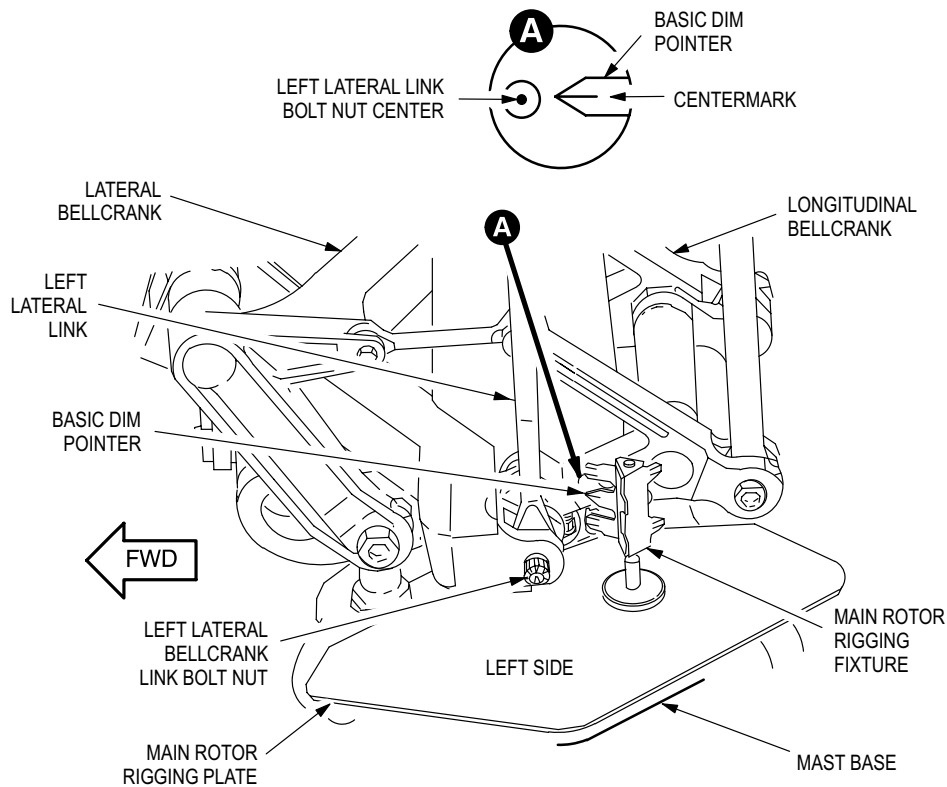


Figure 11-89. Main Rotor Rigging Fixture Adjustment

M70-163A



M70-164

Figure 11-90. Cyclic Latitude Zero Check

Task	Result
<p>o. Remove -5 rig pin installed in step g. Move pilot cyclic stick left until it contacts stop. Position rigging fixture to lateral LEFT pointer next to right lateral bellcrank link bolt (fig. 11-89). Verify that center of the lateral bellcrank link bolt is between the MAX and MIN marks on rigging fixture lateral LEFT pointer (fig. 11-91).</p>	<p>If center of lateral link bolt nut does not lie between MAX and MIN marks, rig pilot and CPG lateral cyclic stick stops (TM 1-1520-238-23).</p> <p>If lateral cyclic stick stops are rigged correctly, replace lateral servocylinder (TM 1-1520-238-23).</p>
<p>p. Move pilot cyclic stick right until it contacts stop. Position rigging fixture to place lateral RIGHT pointer next to right lateral bellcrank link bolt. Verify that center of the lateral bellcrank link bolt is between the MAX and MIN marks on rigging fixture lateral RIGHT pointer (fig. 11-92).</p>	<p>If center of lateral link bolt nut does not lie between MAX and MIN marks, rig pilot and CPG lateral cyclic stick stops (TM 1-1520-238-23).</p> <p>If lateral cyclic stick stops are rigged correctly, replace lateral servocylinder (TM 1-1520-238-23).</p>

11-21. LATERAL (CYCLIC) FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)

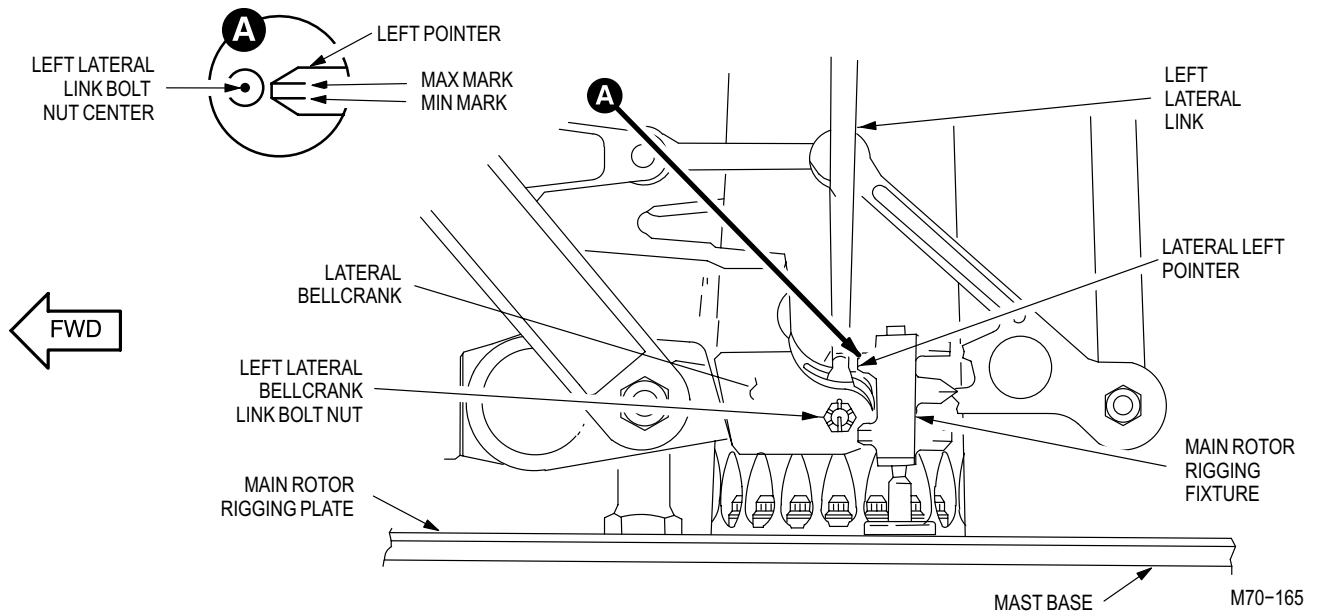


Figure 11-91. Cyclic Left Limit Check

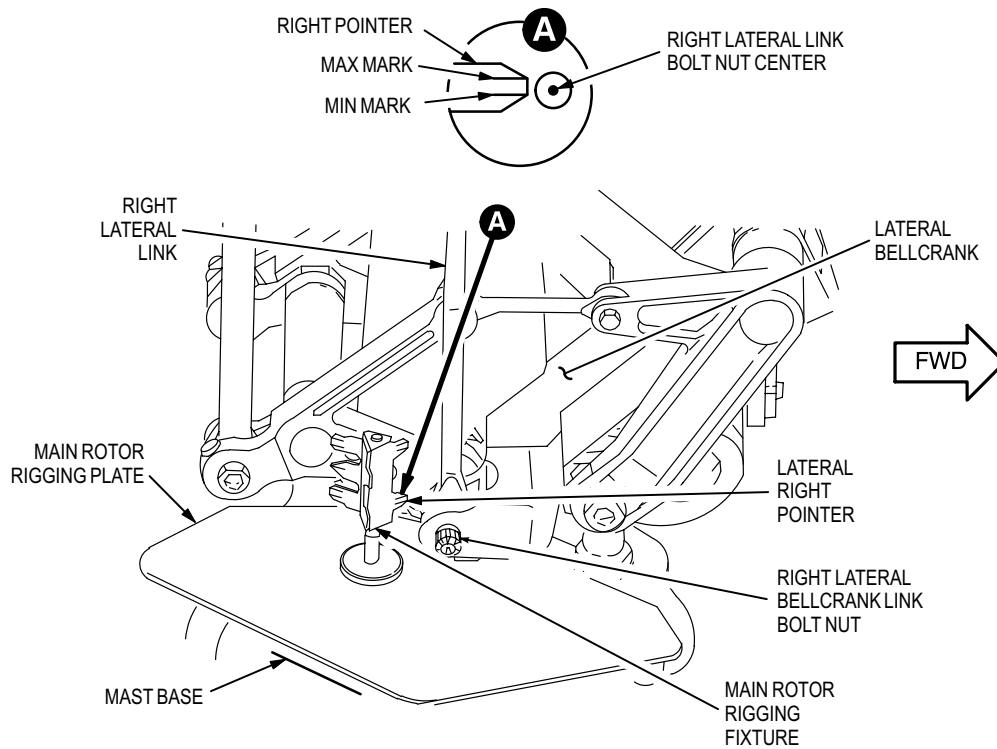


Figure 11-92. Cyclic Right Limit Check

M70-166

11-21. LATERAL (CYCLIC) FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)

11-21

11. Remove rig pins and warning flags installed in steps c. and d.
12. Remove main rotor rigging fixture and plate (TM 1-1520-238-23); and alignment tool.
13. Perform flight control system maintenance operational check (para 11-12).
14. Disconnect maintenance headset (TM 1-1520-238-T-4).
15. Remove external power – electrical and hydraulic (primary) (TM 1-1520-238-23).
16. Secure access panels L200 and R200 (TM 1-1520-238-23).
17. Perform maintenance test flight (TM 1-1520-238-MTF).

END OF TASK

11-22. DIRECTIONAL FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK

11-22

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Rigging Kit, Flight Controls	7-262100003-605

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Helicopter safed External power application – Electrical Hydraulic (primary) Access provisions – B60 and R325 access doors opened – L540 fairing removed
TM 1-1520-238-T-4	Maintenance headset connected
TM 9-1090-208-23-1	Area weapon removed

Personnel Required:

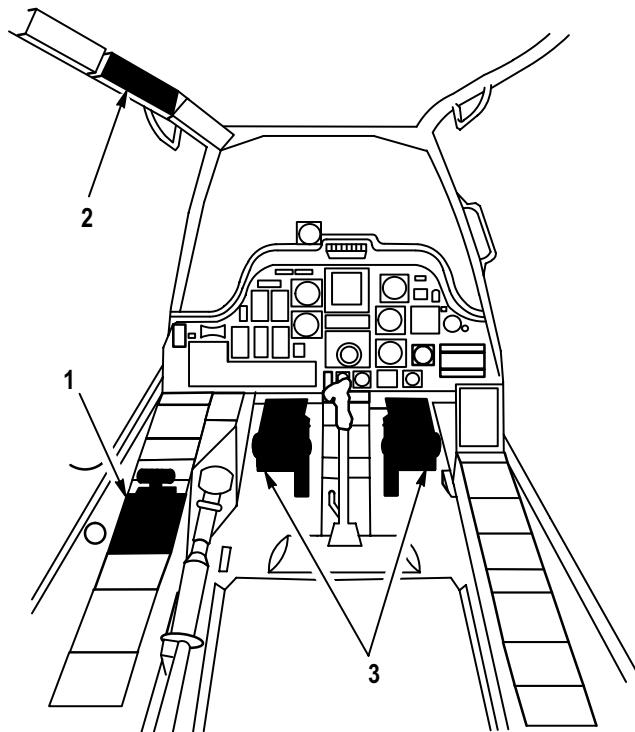
67R Attack Helicopter Repairer
One person to assist
Attack Helicopter Repairer/
Technical Inspector

References:

TM 1-1520-238-T-4
TM 9-1090-208-23-1
TM 1-1520-238-MTF
TM 1-1520-238-23

NOTE

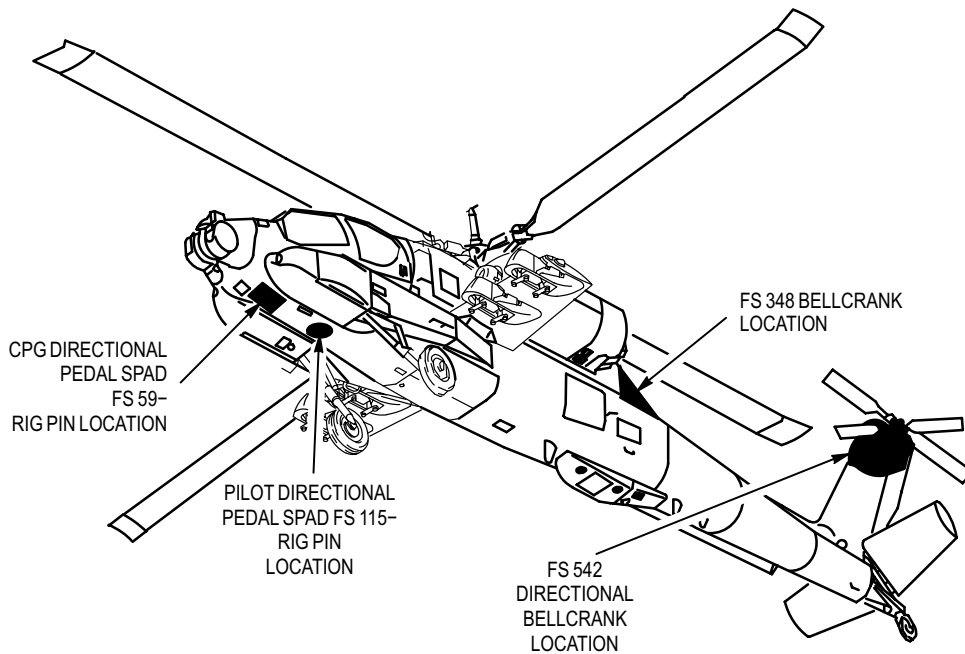
Refer to pilot station (fig. 11-93) for cockpit configuration and equipment location.
Refer to directional pedals, SPADs, and bellcrank (fig. 11-94) for locations.



- 1. PILOT POWER QUADRANT
- 2. PILOT CIRCUIT BREAKER PANEL (CENTER)
- 3. PILOT DIRECTIONAL PEDALS

M70-167A

Figure 11-93. Pilot Station



M70-169

Figure 11-94. Directional Pedal, SPADS, and Bellcrank Location

WARNING

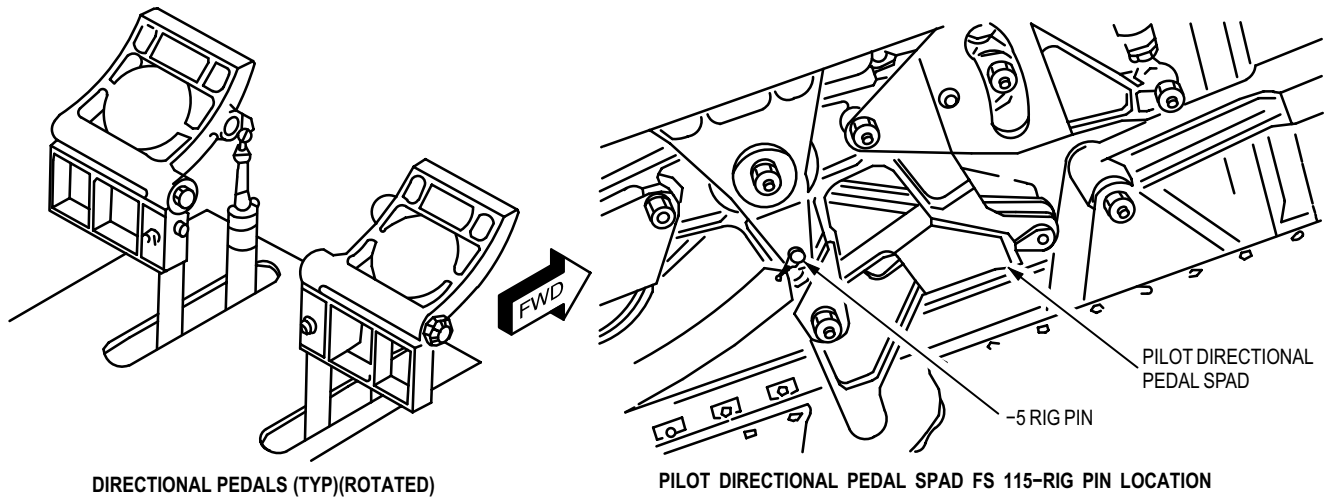
Maintenance personnel must be warned verbally prior to moving the collective or cyclic stick. Any control activated can result in sudden blade movement that can sever or crush fingers or hands.

NOTE

If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.

1. Complete the rigging operational check as follows:

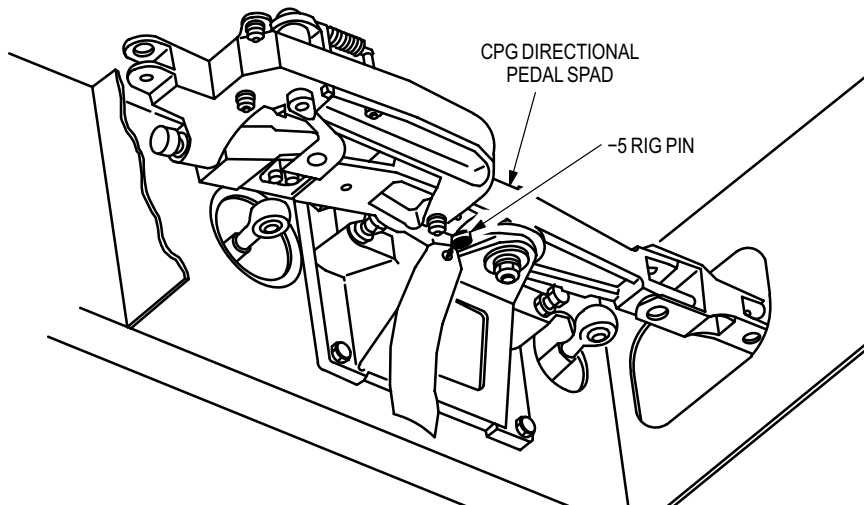
Task	Result
<ol style="list-style-type: none"> a. Center pilot directional pedals. In pilot FS 115 directional SPAD (fig. 11-95), install -5 rig pin. Tie warning flags to pilot and CPG directional pedals. 	



M70-170A

Figure 11-95. Pilot Directional Pedals

Task	Result
b. In CPG FS 59 directional SPAD (fig. 11-96), install -5 rig pin.	If rig pin cannot be installed in CPG directional SPAD, perform directional flight control rigging between pilot and CPG directional pedals (TM 1-1520-238-23).



CPG DIRECTIONAL PEDAL SPAD FS 59 - RIG PIN LOCATION

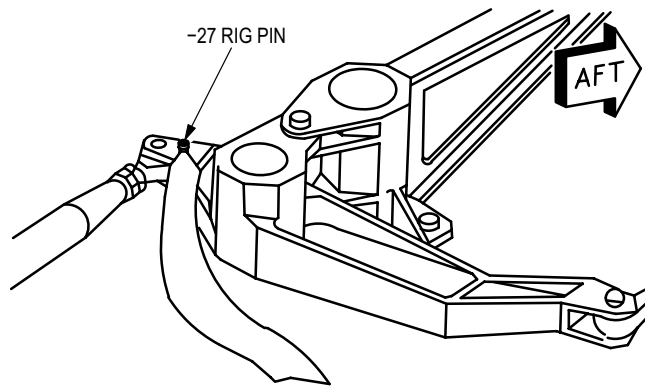
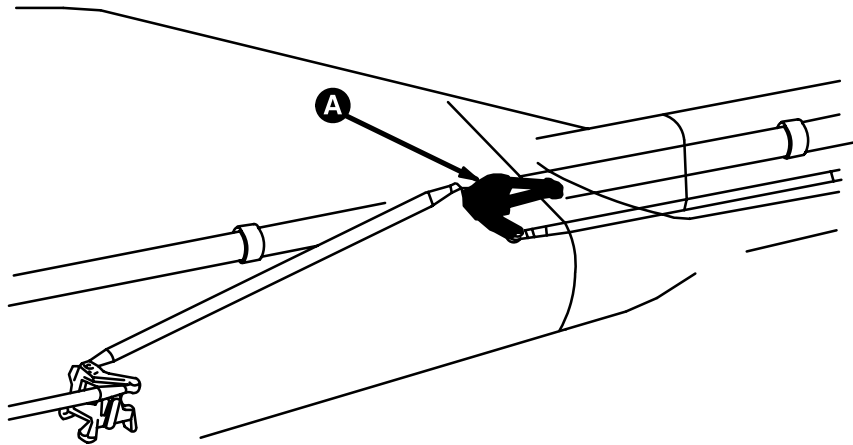
M70-171A

Figure 11-96. CPG Directional Pedals

11-22. DIRECTIONAL FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)

11-22

Task	Result
c. In CPG FS 348 directional bellcrank (fig. 11-97), install -27 rig pin.	If rig pin cannot be installed, perform directional flight control rigging between pilot directional pedals and directional bellcrank FS 348 (TM 1-1520-238-23).



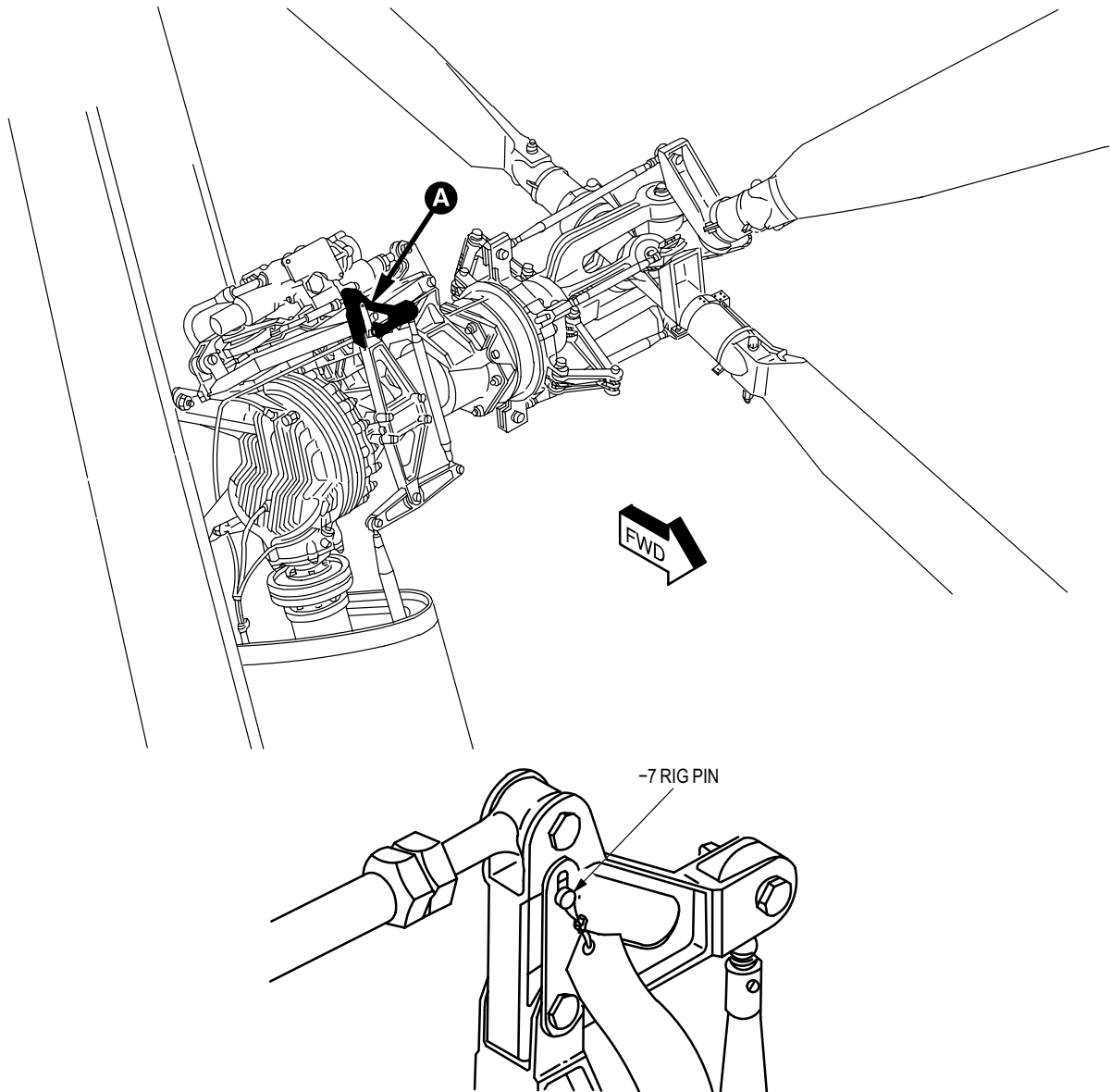
A FS 348 BELLCRANK - RIG PIN LOCATION

M70-172A

Figure 11-97. FS 348 Directional Bellcrank Location

d. In CPG FS 542 directional bellcrank (fig. 11-98), install -7 rig pin.

If rig pin cannot be installed, perform directional flight control rigging between FS 348 and FS 542 directional bellcranks (TM 1-1520-238-23).



A FS 542 DIRECTIONAL BELLCRANK – RIG PIN LOCATION

M70-173

Figure 11-98. FS 542 Directional Bellcrank Location

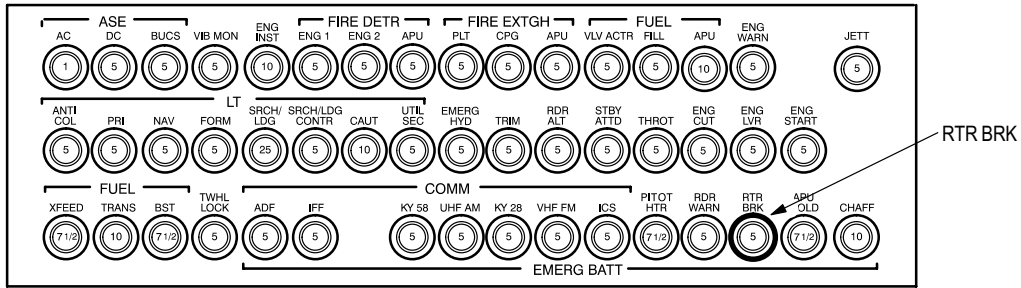
Task

Result

- e. Remove rig pins installed in steps a thru c.

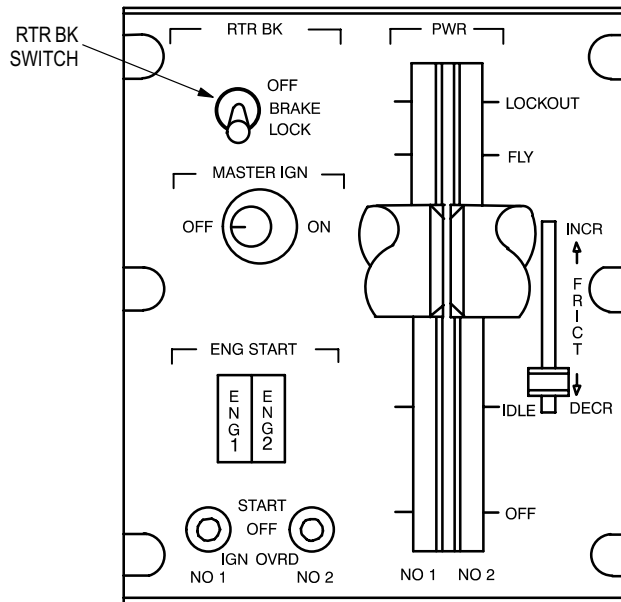
Task	Result
------	--------

- f. On pilot center circuit breaker panel (fig. 11-99), close **RTR BRK** circuit breaker. On pilot power quadrant (fig. 11-100), set **RTR BK** switch to **OFF**. Position both tail rotors approximately horizontal to aft fuselage.



M70-174

Figure 11-99. Pilot Center Circuit Breaker Panel



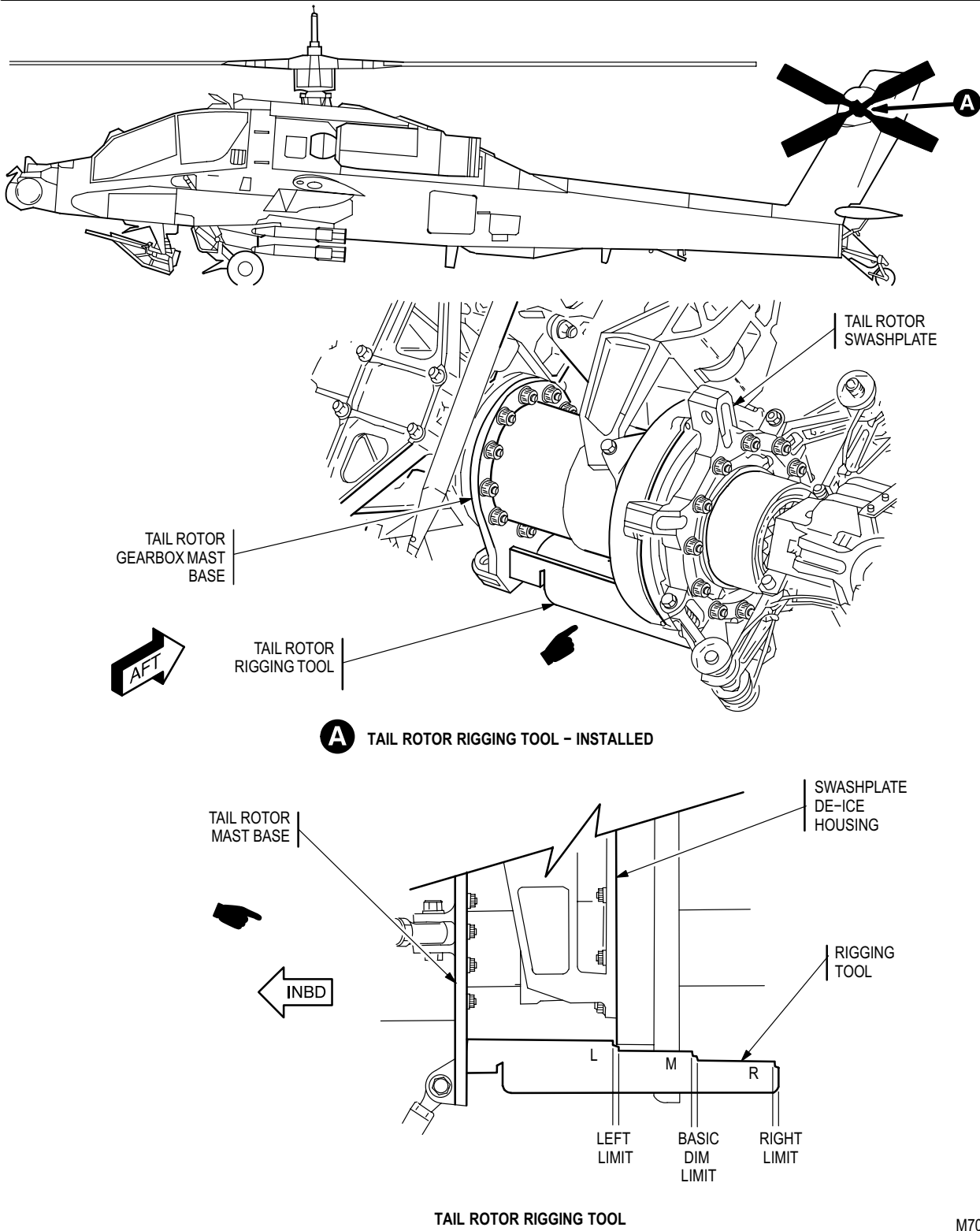
M70-175

Figure 11-100. Pilot Power Quadrant

11-22. DIRECTIONAL FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)

11-22

Task	Result
<p>g. Check BASIC DIM rigging by installing rigging tool. If swashplate de-ice housing is within the “M” limit step on the tool, BASIC DIM is within tolerance. (fig. 11-101).</p>	<p>If tool surfaces are not in contact or if tool cannot be installed, perform BASIC DIM rigging (TM 1-1520-238-23).</p>
<p>h. Remove tool and -7 rig pin from FS 542 directional bellcrank.</p>	
<p>i. Have assistant slowly position and hold pilot left pedal at full forward position. Install rigging tool. If swashplate de-ice housing is within the “L” limit step, the LEFT directional rigging is within tolerance.</p>	<p>If tool surfaces are not in contact or if tool cannot be installed, perform LEFT directional pedal rigging (TM 1-1520-238-23).</p>
<p>j. Remove rigging tool.</p>	
<p>k. Have assistant slowly position and hold pilot right pedal at full forward position. Install rigging tool. If swashplate de-ice housing is within the “R” limit step, the RIGHT directional rigging is within tolerance.</p>	<p>If tool surfaces are not in contact or if tool cannot be installed, perform RIGHT directional pedal rigging (TM 1-1520-238-23).</p>
<p>l. Remove rigging tool.</p>	



M70-176-1A

Figure 11-101. Tail Rotor Rigging Fixture

11-22. DIRECTIONAL FLIGHT CONTROLS – RIGGING OPERATIONAL CHECK (cont)

11-22

2. Remove warning flags from pilot and CPG directional pedals.
3. Perform flight control system maintenance operational check (para 11-12).
4. Disconnect maintenance headset (TM 1-1520-238-T-4).
5. Remove external power – electrical and hydraulic (primary) (TM 1-1520-238-23).
6. Install area weapon (TM 9-1090-208-23-1).
7. Secure access panels B60 and R325 doors, and fairing L540 (TM 1-1520-238-23).
8. Perform maintenance test flight (TM 1-1520-238-MTF).

END OF TASK

11-23. DASE- MAINTENANCE OPERATIONAL CHECK

Tools:		Equipment Conditions:	
<u>Nomenclature</u>	<u>Part Number</u>	<u>Ref</u>	<u>Condition</u>
Tool Kit, Electrical Repairer's	SC518099CLA06	TM 1-1520-238-23	Access provisions – R295 and L200 access panels removed
Personnel Required:			Flight control system inspection
68X Armament/Electrical Systems Repairer	One person to assist	Paragraph 6-10	DASE/STABILATOR – POWER UP completed
References:			
TM 1-1520-238-T-1			
TM 1-1520-238-T-3			
TM 1-1520-238-23			

1. Perform DASE FD/LS check (TM 1-1520-238-T-1).

NOTE

If a discrepancy is noted during the FD/LS check, perform corrective action indicated in TM 1-1520-238-T-1. If the discrepancy still exists after performing the corrective action required, refer to the following listed failure symptoms and perform troubleshooting.

If **CPG DIR LVDT NO-GO CPG COMPARTMENT** appears on heads out display (HOD), refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-55 and perform troubleshooting.

If **DASE COMPUTER NO-GO AFT AVIONICS BAY** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-57 and perform troubleshooting.

If **CPG COLLECTIVE LVDT NO-GO CPG COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-58 and perform troubleshooting.

If **ROTOR BRAKE NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-59 and perform troubleshooting.

If **PILOT CYCLIC GRIP NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-60 and perform troubleshooting.

If **CPG CYCLIC GRIP NO-GO CPG COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-61 and perform troubleshooting.

If **ALL NO-GO MESSAGES EXCEPT GROUP D NO-GO** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-62 and perform troubleshooting.

If **CPG LAT LVDT NO-GO CPG COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-63 and perform troubleshooting.

If **DASE ENGAGE PANEL NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-64 and perform troubleshooting.

If **CPG BUCS SEL NO-GO CPG COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-65 and perform troubleshooting.

If **28 VDC BUCS NO-GO** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-66 and perform troubleshooting.

If **PILOT LONG 1 DCPLR NO-GO PLT COMPARTMENT OR PILOT LONG 2 DCPLR NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-67 and perform troubleshooting.

If **PILOT LAT 1 DCPLR NO-GO PLT COMPARTMENT OR PILOT LAT 2 DCPLR NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-68 and perform troubleshooting.

If **PILOT DIR 1 DCPLR NO-GO PLT COMPARTMENT OR PILOT DIR 2 DCPLR NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-69 and perform troubleshooting.

If **PILOT COLL 1 DCPLR NO-GO PLT COMPARTMENT OR PILOT COLL 2 DCPLR NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-70 and perform troubleshooting.

If **CPG LONG 1 DCPLR NO-GO CPG COMPARTMENT OR CPG LONG 2 DCPLR NO-GO CPG COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-71 and perform troubleshooting.

If **CPG LAT 1 DCPLR NO-GO CPG COMPARTMENT OR CPG LAT 2 DCPLR NO-GO CPG COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-72 and perform troubleshooting.

If **CPG DIR 1 DCPLR NO-GO CPG COMPARTMENT OR CPG DIR 2 DCPLR NO-GO CPG COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-73 and perform troubleshooting.

If **CPG COLL 1 DCPLR NO-GO CPG COMPARTMENT OR CPG COLL 2 DCPLR NO-GO CPG COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-74 and perform troubleshooting.

If **BUCS TRACER NO-GO** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-75 and perform troubleshooting.

If **26 VAC EXCITATION XFMR 1 NO-GO AFT AVIONICS BAY** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-76 and perform troubleshooting.

If **26 VAC EXCITATION XFMR 2 NO-GO AFT AVIONICS BAY** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-77 and perform troubleshooting.

If **LONG ACTUATOR NO-GO** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-78 and perform troubleshooting.

If **LAT ACTUATOR NO-GO** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-79 and perform troubleshooting.

If **DIR ACTUATOR NO-GO** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-80 and perform troubleshooting.

If **COLL ACTUATOR NO-GO** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-81 and perform troubleshooting.

If **PILOT LONG LVDT NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-82 and perform troubleshooting.

If **PILOT LAT LVDT NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-83 and perform troubleshooting.

If **PILOT DIR LVDT NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-84 and perform troubleshooting.

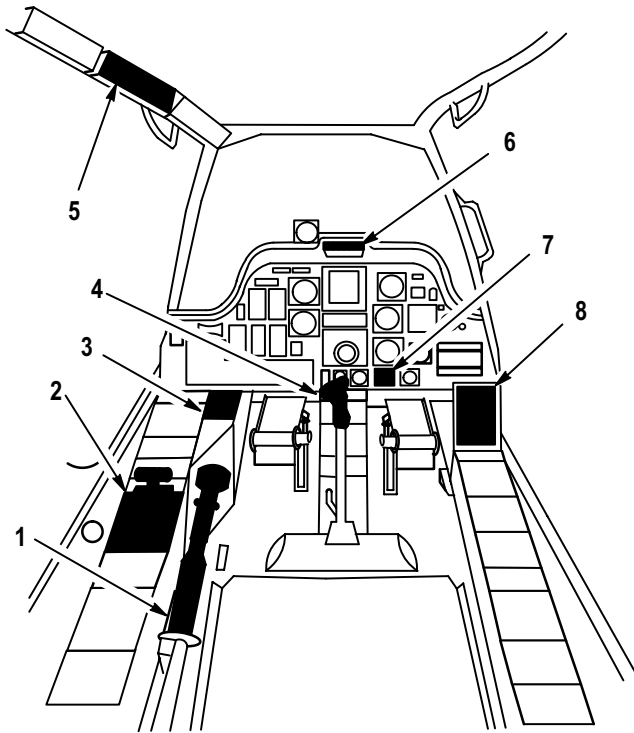
If **PILOT COLL LVDT NO-GO PLT COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-85 and perform troubleshooting.

If **AIR DATA PROCESSOR NO-GO AFT AVIONICS BAY** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-86 and perform troubleshooting.

If **CPG LONG LVDT NO-GO CPG COMPARTMENT** appears on HOD, refer to TM 1-1520-238-T-3, DASE Multiplex Read Codes, and perform troubleshooting. Then, if no fault is found, go to paragraph 11-87 and perform troubleshooting.

NOTE

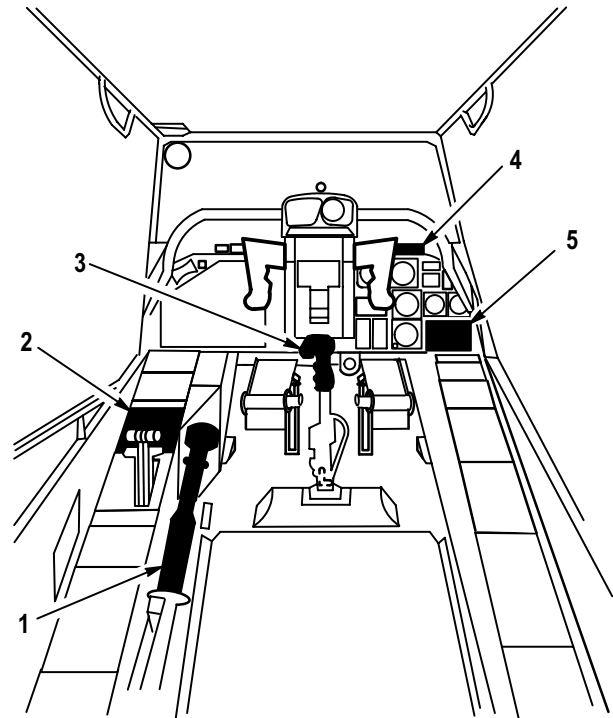
- Refer to pilot station (fig. 11-102) and CPG station (fig. 11-103) for cockpit configuration and equipment location.
- If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.



1. PILOT COLLECTIVE STICK
2. PILOT POWER QUADRANT
3. PILOT ASE PANEL
4. PILOT CYCLIC STICK
5. PILOT CIRCUIT BREAKER PANEL (CENTER)
6. PILOT MASTER CAUTION / WARNING PANEL
7. PILOT HARS CONTROL PANEL
8. PILOT CAUTION / WARNING PANEL

M70-177A

Figure 11-102. Pilot Station



1. CPG COLLECTIVE STICK
2. CPG AUX / ANTI-ICE PANEL
3. CPG CYCLIC STICK
4. CPG MASTER CAUTION / WARNING PANEL
5. CPG CAUTION / WARNING PANEL

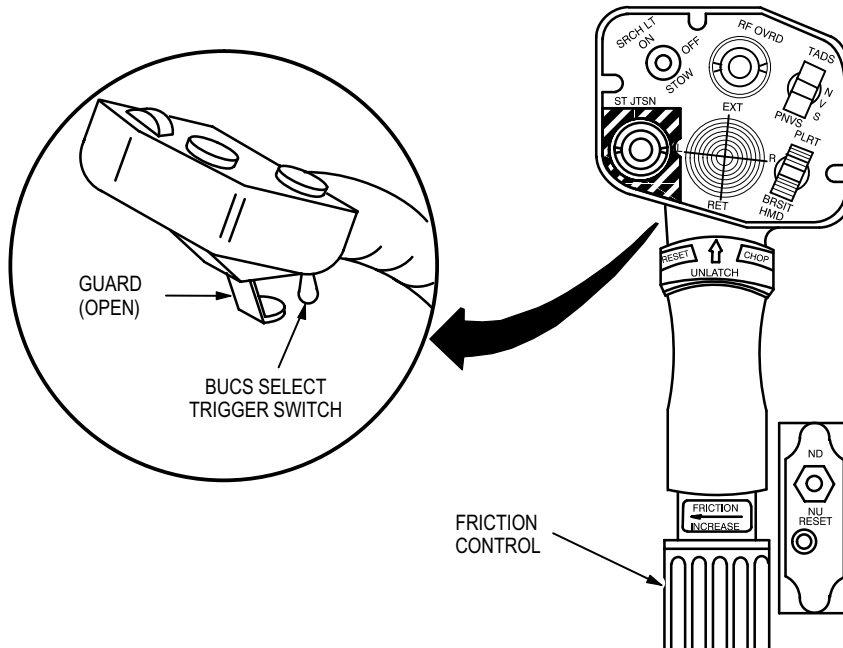
M70-178

Figure 11-103. CPG Station

WARNING

Maintenance personnel must be warned verbally prior to moving the collective or cyclic stick. Any control activated can result in sudden blade movement that can sever or crush fingers or hands.

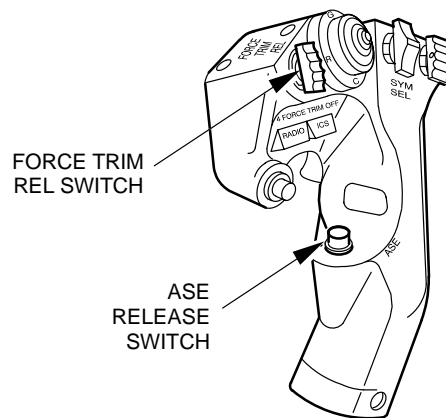
- On pilot and CPG collective sticks (fig. 11-104), check that friction control is set to **0** (zero).



M70-179A

Figure 11-104. Collective Stick

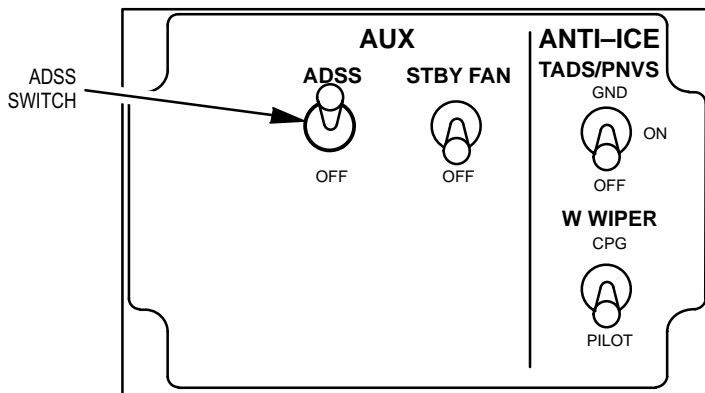
- On pilot cyclic stick (fig. 11-105), check that the **FORCE TRIM REL** switch is set to **ON**.



M70-180

Figure 11-105. Pilot Cyclic Stick

4. On CPG **AUX/ANTI-ICE** panel (fig. 11-106), set **ADSS** switch to **ADSS**.

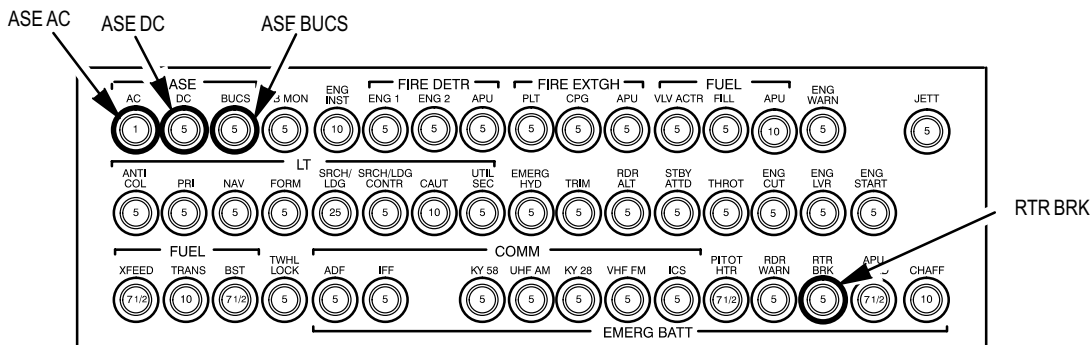


M70-181

Figure 11-106. CPG AUX/ANTI-ICE Panel

5. Complete the maintenance operational check as follows:

Task	Result
a. On pilot center circuit breaker panel (fig. 11-107), check that ASE AC and ASE DC circuit breakers are closed and remain closed.	<p>If ASE AC circuit breaker does not stay closed, go to paragraph 11-29.</p> <p>If ASE DC circuit breaker does not stay closed, go to paragraph 11-30.</p>



M70-182

Figure 11-107. Pilot Center Circuit Breaker Panel

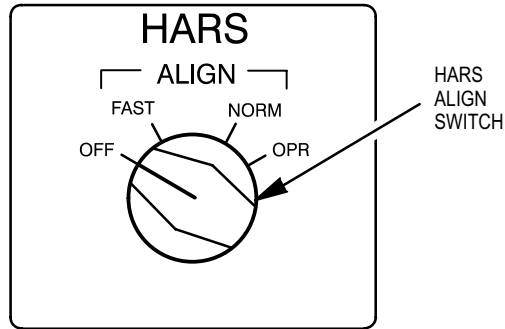
NOTE

- For a helicopter with BUCS deactivated, omit step b.
- To ensure proper ASE panel switch engagement, it may be necessary to position assistant under wing tip to gently rock helicopter while engaging ASE panel switches.

11-23. DASE- MAINTENANCE OPERATIONAL CHECK (cont)

11-23

Task	Result
b. On pilot center circuit breaker panel (fig. 11-107), check that ASE BUCS circuit breaker is closed and remains closed.	If ASE BUCS circuit breaker does not stay closed, go to paragraph 11-31.
c. On pilot HARS control panel (fig. 11-108), set ALIGN switch to OPR .	



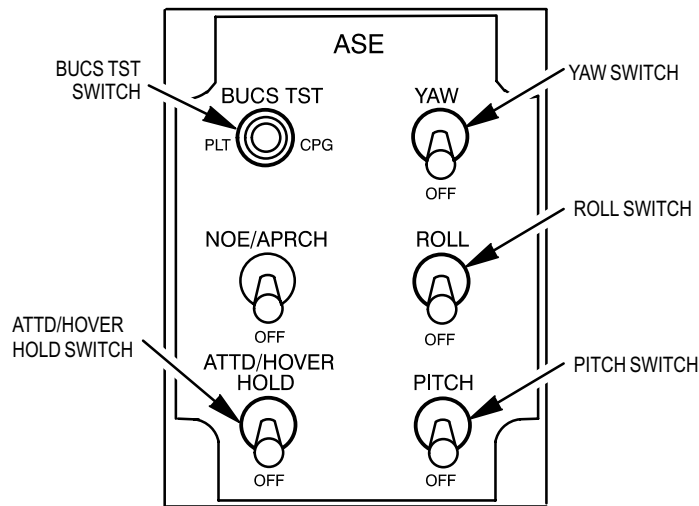
M70-183

Figure 11-108. Pilot HARS Control Panel

NOTE

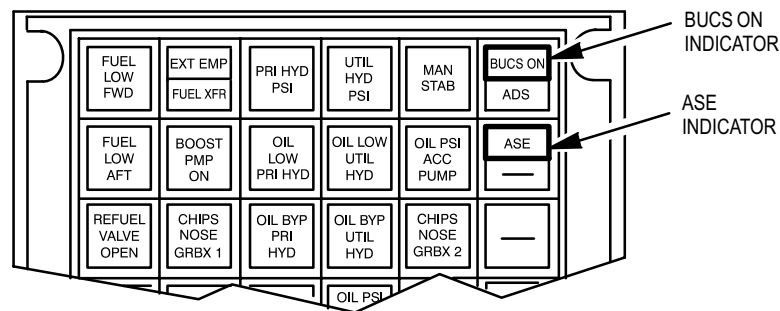
Center all controls before performing step d.

d. On pilot ASE panel (fig. 11-109), set PITCH, ROLL, YAW and ATTD/HOVER HOLD switches to on.	<p>If PITCH, ROLL, YAW and ATTD/HOVER HOLD switches do not stay on, go to paragraph 11-36.</p> <p>If PITCH switch does not stay on and ASE indicator is lighted, go to paragraph 11-37.</p> <p>If ROLL switch does not stay on and ASE indicator is lighted, go to paragraph 11-38.</p> <p>If YAW switch does not stay on and ASE indicator is lighted, go to paragraph 11-39.</p> <p>If ATTD/HOVER HOLD switch does not stay on and ASE indicator is lighted, go to paragraph 11-40.</p>
e. On pilot and CPG caution/warning panels (fig. 11-110 and fig. 11-111), check that ASE indicators are not lighted.	If either ASE indicator is lighted, go to paragraph 11-35.



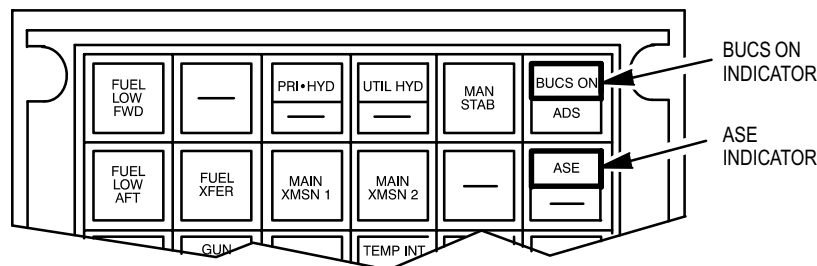
M70-184

Figure 11-109. Pilot ASE Panel



M70-186

Figure 11-110. Pilot Caution/Warning Panel



M70-185

Figure 11-111. CPG Caution/Warning Panel

Task	Result
f. On pilot ASE panel (fig. 11-109), check that edge-light is lighted.	If edge-light is not lighted, go to paragraph 11-34.
g. On pilot cyclic stick (fig. 11-105), press, ASE release switch. Check that PITCH , ROLL , YAW and ATTD/HOVER HOLD switches move to OFF .	If PITCH , ROLL , YAW and ATTD/HOVER HOLD switches remain in the on position, go to paragraph 11-41.

11-23. DASE- MAINTENANCE OPERATIONAL CHECK (cont)

11-23

Task	Result
<p>h. On pilot ASE panel (fig. 11-109), set PITCH, ROLL, YAW and ATTD/HOVER HOLD switches to on.</p> <p>i. On CPG cyclic stick (fig. 11-112), press ASE release switch. Check that PITCH, ROLL, YAW and ATTD/HOVER HOLD switches move to OFF.</p>	<p>If PITCH, ROLL, YAW and ATTD/HOVER HOLD switches remain in the on position, go to paragraph 11-42.</p>

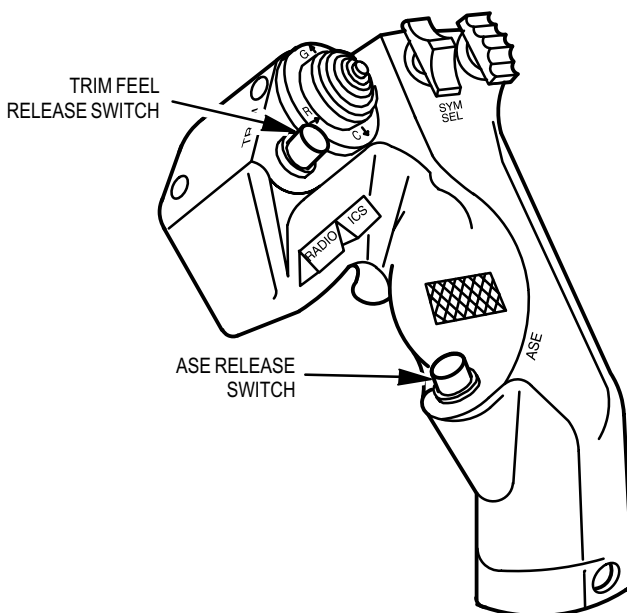


Figure 11-112. CPG Cyclic Stick

M70-187

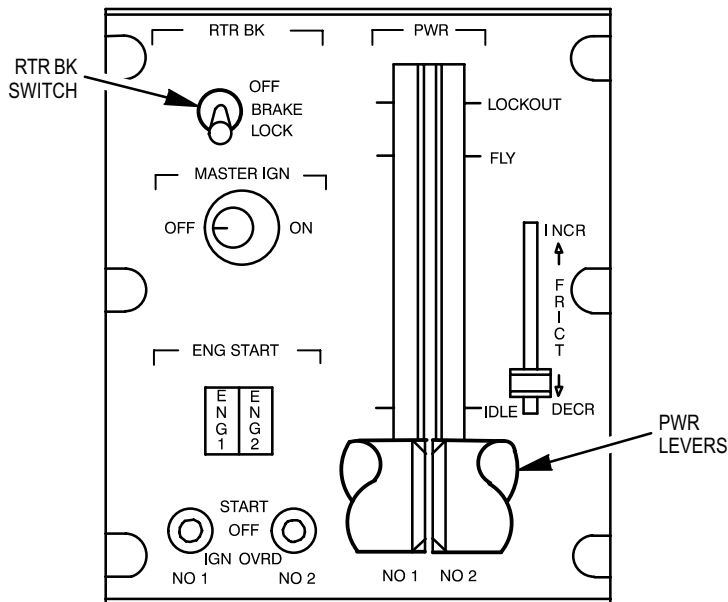
- j. On pilot **HARS** control panel (fig. 11-108), set **ALIGN** switch to **NORM**.

NOTE

For a helicopter with BUCS deactivated, omit steps k. thru v.

- k. On pilot power quadrant (fig. 11-113), set **RTR BK** switch to **BRAKE** and set power levers to **OFF**.
- l. On pilot center circuit breaker panel (fig. 11-107), check that **RTR BRK** circuit breaker is closed and remains closed.
- m. On CPG collective stick (fig. 11-104), swing guard down and hold **BUCS** select trigger switch closed.

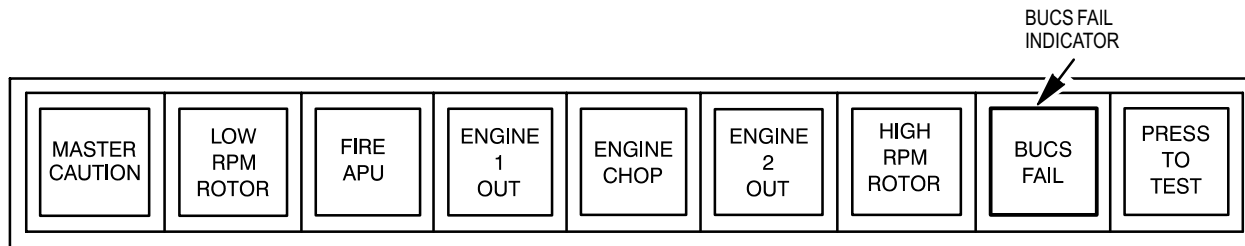
If **RTR BRK** circuit breaker does not stay closed, go to paragraph 7-33.



M70-188A

Figure 11-113. Pilot Power Quadrant

Task	Result
<p>n. On master caution/warning panels (fig. 11-114), check that BUCS FAIL indicators are lighted. On pilot and CPG caution/warning panels (fig. 11-110 and fig. 11-111), check that BUCS ON indicators are not lighted.</p>	<p>If BUCS FAIL indicators and BUCS ON indicators are lighted, replace DASEC (TM 1-1520-238-23).</p> <p>If BUCS FAIL indicators are not lighted, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 11-44.</p> <p>If pilot BUCS FAIL indicator is not lighted, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 11-45.</p> <p>If CPG BUCS FAIL indicator is not lighted, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 11-46.</p>



M70-189

Figure 11-114. Master Caution/Warning Panel

11-23. DASE- MAINTENANCE OPERATIONAL CHECK (cont)

11-23

Task	Result
o. On CPG collective stick (fig. 11-112), release BUCS select trigger switch.	
p. On master caution/warning panels (fig. 11-114), check that BUCS FAIL indicators are not lighted.	<p>If BUCS FAIL indicators are lighted, go to paragraph 11-47.</p> <p>If pilot BUCS FAIL indicator is lighted, go to paragraph 11-48.</p> <p>If CPG BUCS FAIL indicator is lighted, go to paragraph 11-49.</p>

WARNING

Ensure all personnel keep clear of flight controls when **BUCS TST** switch is held in **PLT** or **CPG** position. When performing **BUCS** self test, automatic control motion occurs.

CAUTION

During **BUCS** maintenance operational checks, cyclic sticks, collective sticks, and directional pedals will move. Any restrictions of flight controls may result in damage to the **SPAD** shear pins.

NOTE

Do not release **BUCS TST** switch until **BUCS ON** indicators are no longer lighted. Early release of **BUCS TST** switch will cause **BUCS FAIL** to flash 5 times and test step must be repeated. **BUCS ON** indicators will be lighted for approximately 20 seconds after **BUCS TST** switch is moved to **PLT** or **CPG** position.

- q. Perform all axis control sweep to ensure freedom of controls. Center all controls before performing next step.
- r. On pilot **ASE** panel (fig. 11-109), hold **BUCS TST** switch to **PLT** and perform the following:
- (1) On pilot center circuit breaker panel (fig. 11-107), check that **RTR BRK** circuit breaker is closed and remains closed.

If **RTR BRK** circuit breaker does not stay closed, go to paragraph 11-50.
 - (2) On master caution/warning panels, press **MASTER CAUTION** indicator.

11-23. DASE- MAINTENANCE OPERATIONAL CHECK (cont)

11-23

Task	Result
(3) On pilot and CPG caution/warning panels (fig. 11-110 and fig. 11-111), check that BUCS ON indicators are lighted.	<p>If BUCS ON indicators are not lighted, go to paragraph 11-51.</p> <p>If pilot BUCS ON indicator is not lighted, replace pilot caution/warning panel (TM 1-1520-238-23).</p> <p>If CPG BUCS ON indicator is not lighted, go to paragraph 11-52.</p>
(4) On pilot and CPG caution/warning panels, check that BUCS ON indicators do not remain lighted more than 20 seconds after BUCS TST switch is set to PLT .	<p>If BUCS ON indicators remains lighted, go to paragraph 11-53.</p> <p>If CPG BUCS ON indicator remains lighted, go to paragraph 11-54.</p>
s. On pilot ASE panel (fig. 11-109), return BUCS TST switch to center position. On master caution/warning panels (fig. 11-114), check that BUCS FAIL indicators do not light within 15 seconds after BUCS TST switch is released.	<p>If BUCS FAIL indicators are lighted within 15 seconds, perform DASE – FD/LS check (TM 1-1520-238-T-1).</p>
t. On pilot ASE panel, hold BUCS TST switch to CPG and perform the following:	<p>If RTR BRK circuit breaker does not stay closed, go to paragraph 11-56.</p>
(1) On pilot center circuit breaker panel (fig. 11-107), check that RTR BRK circuit breaker is closed and remains closed.	
(2) On pilot and CPG master caution/warning panels (fig. 11-114), press MASTER CAUTION indicator.	
(3) On pilot and CPG caution/warning panels, check that BUCS ON indicators are lighted.	<p>If BUCS ON indicators are not lighted, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, go to paragraph 11-51.</p> <p>If pilot BUCS ON indicator is not lighted, replace lamp (TM 1-1520-238-23). If lamp is still not lighted, replace pilot caution/warning panel (TM 1-1520-238-23).</p>
(4) On pilot and CPG caution/warning panels, check that BUCS ON indicators do not remain lighted more than 20 seconds after BUCS TST switch is set to CPG .	<p>If CPG BUCS ON indicator does not stay lighted, go to paragraph 11-52.</p> <p>If BUCS ON indicator remains lighted, go to paragraph 11-54.</p>

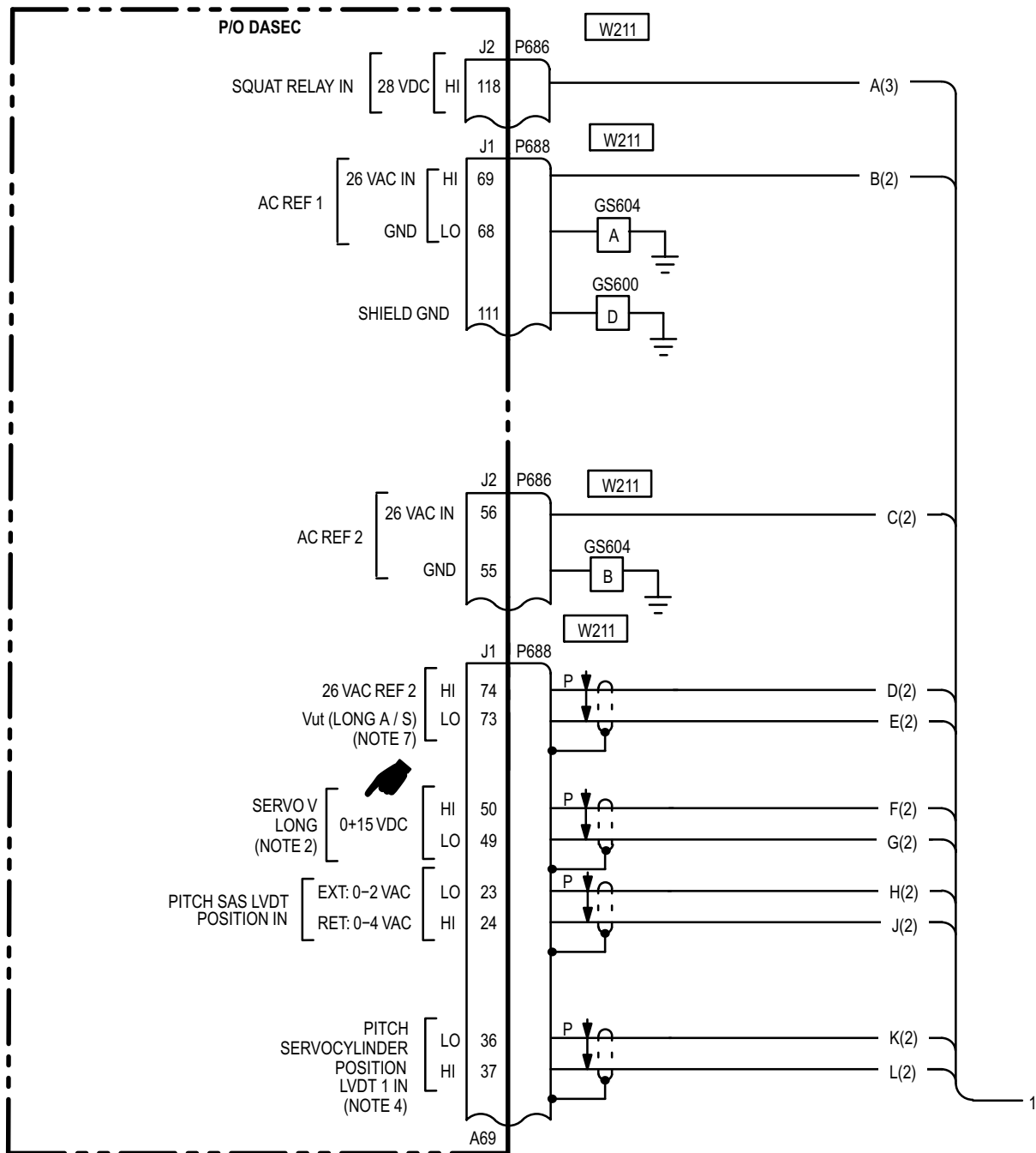
11-23. DASE- MAINTENANCE OPERATIONAL CHECK (cont)

11-23

Task	Result
<ul style="list-style-type: none"> u. On pilot ASE panel (fig. 11-109), return BUCS TST switch to center position. On master caution/warning panels (fig. 11-114), check that BUCS FAIL indicators do not light within 15 seconds after BUCS TST switch is released. v. On pilot power quadrant (fig. 11-113), set RTR BK switch to OFF. 	<p>If BUCS FAIL indicators are lighted within 15 seconds, perform DASE – FD/LS check (TM 1-1520-238-T-1).</p>

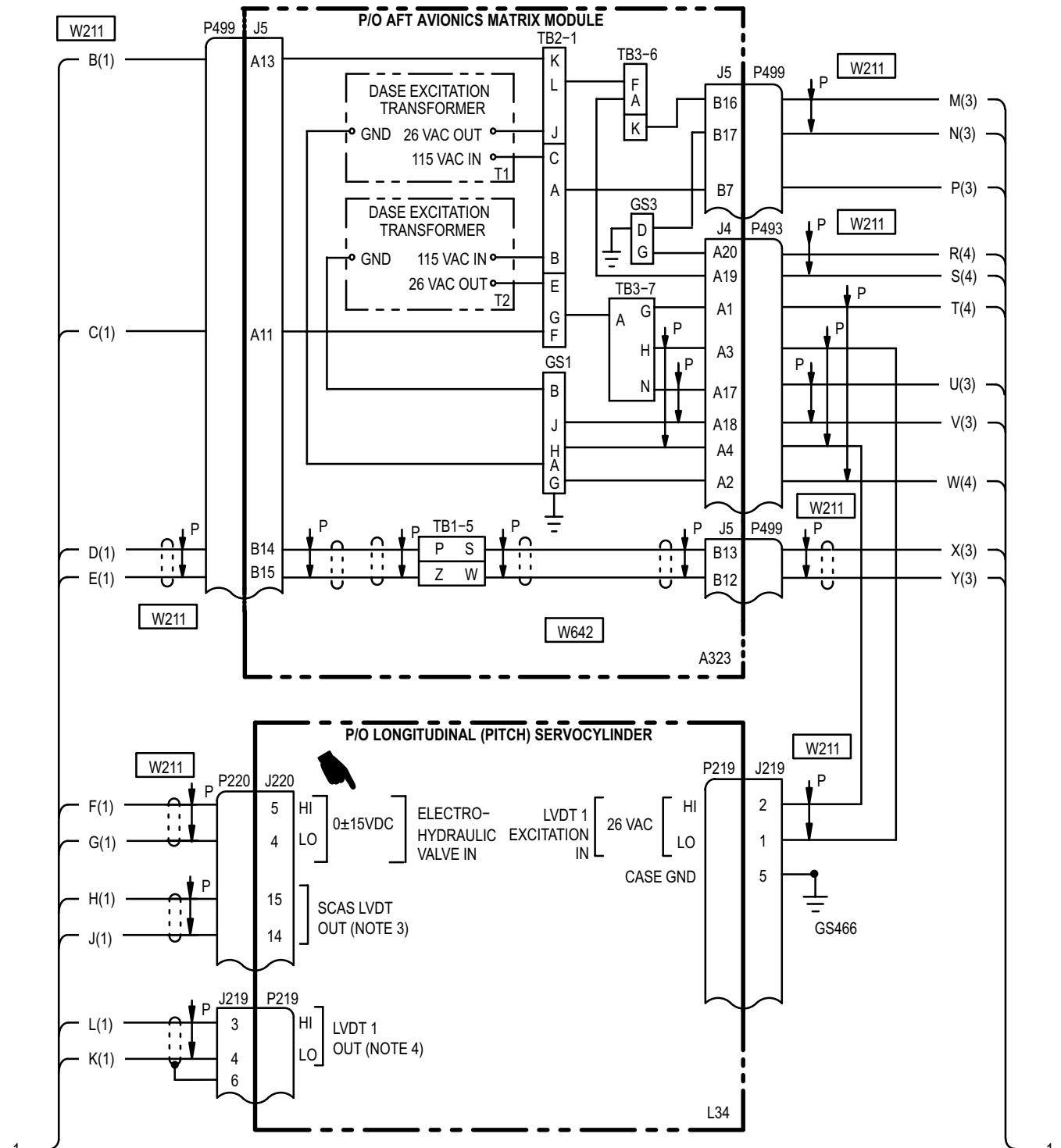
- 6. Secure access door R295 and panel L200 (TM 1-1520-238-23).
- 7. Perform DASE – FD/LS check (TM 1-1520-238-T-1).

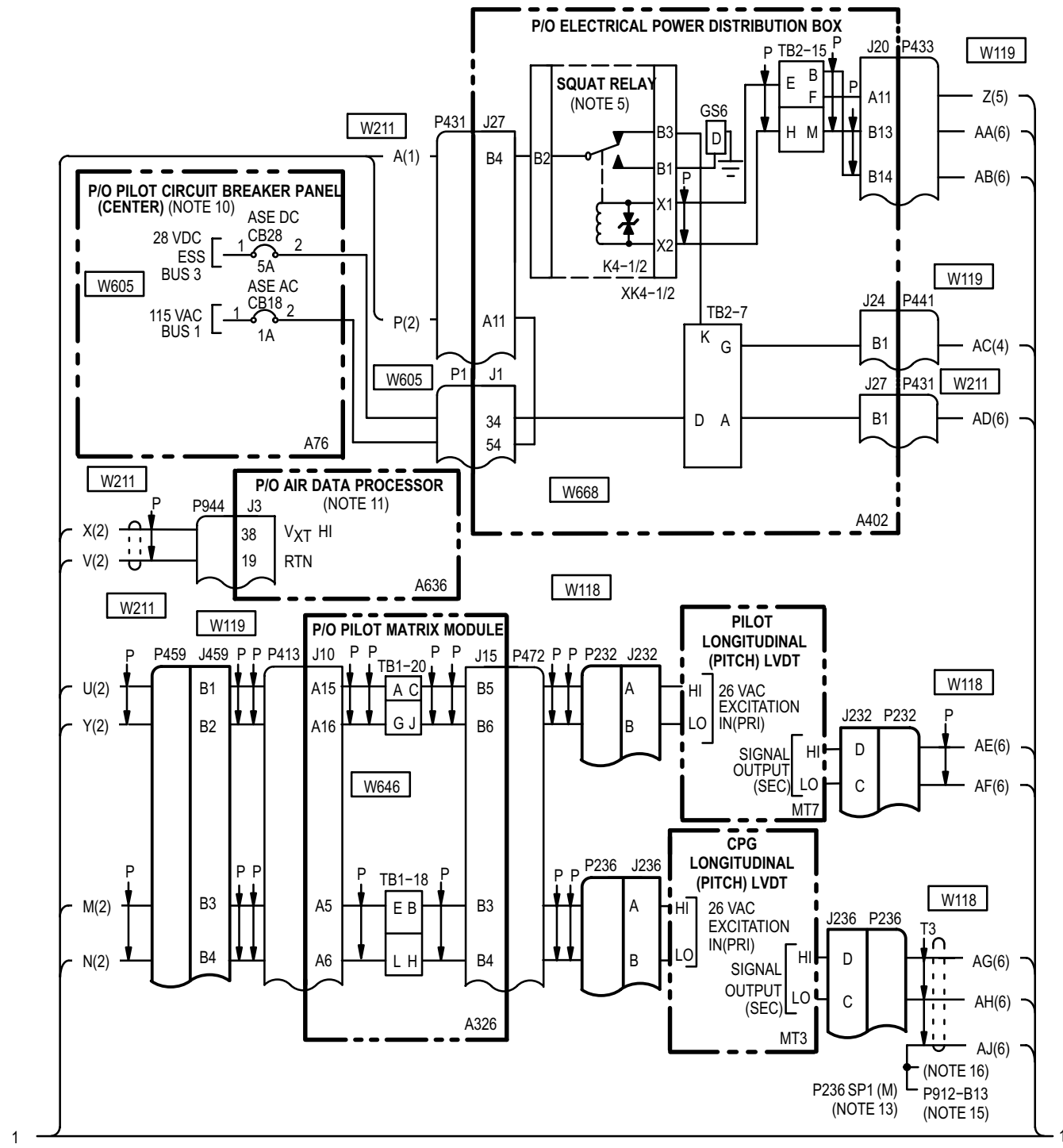
END OF TASK



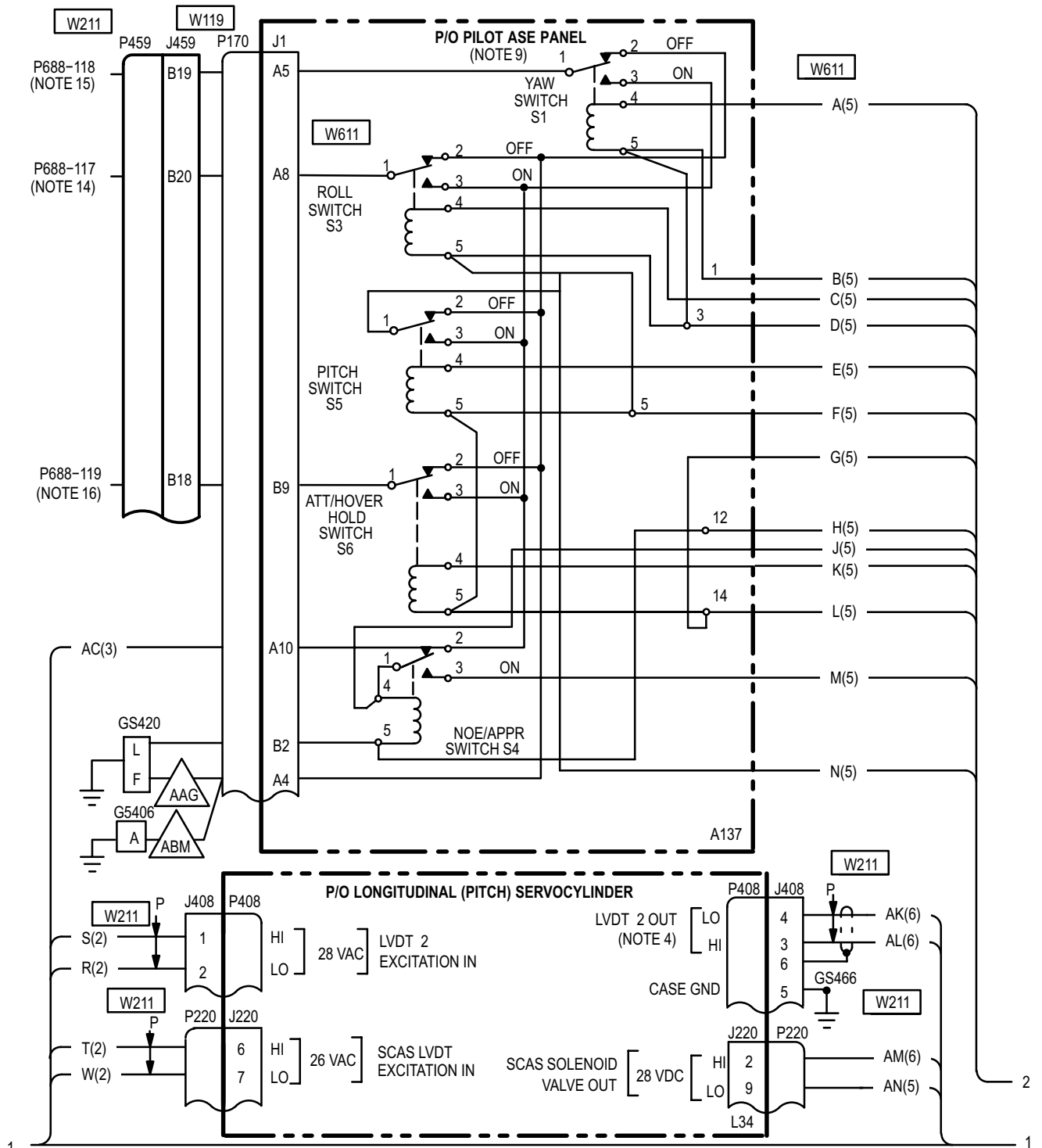
11-24. DASE - WIRING INTERCONNECT DIAGRAM (PITCH) (BUCS DEACTIVATED) (cont)

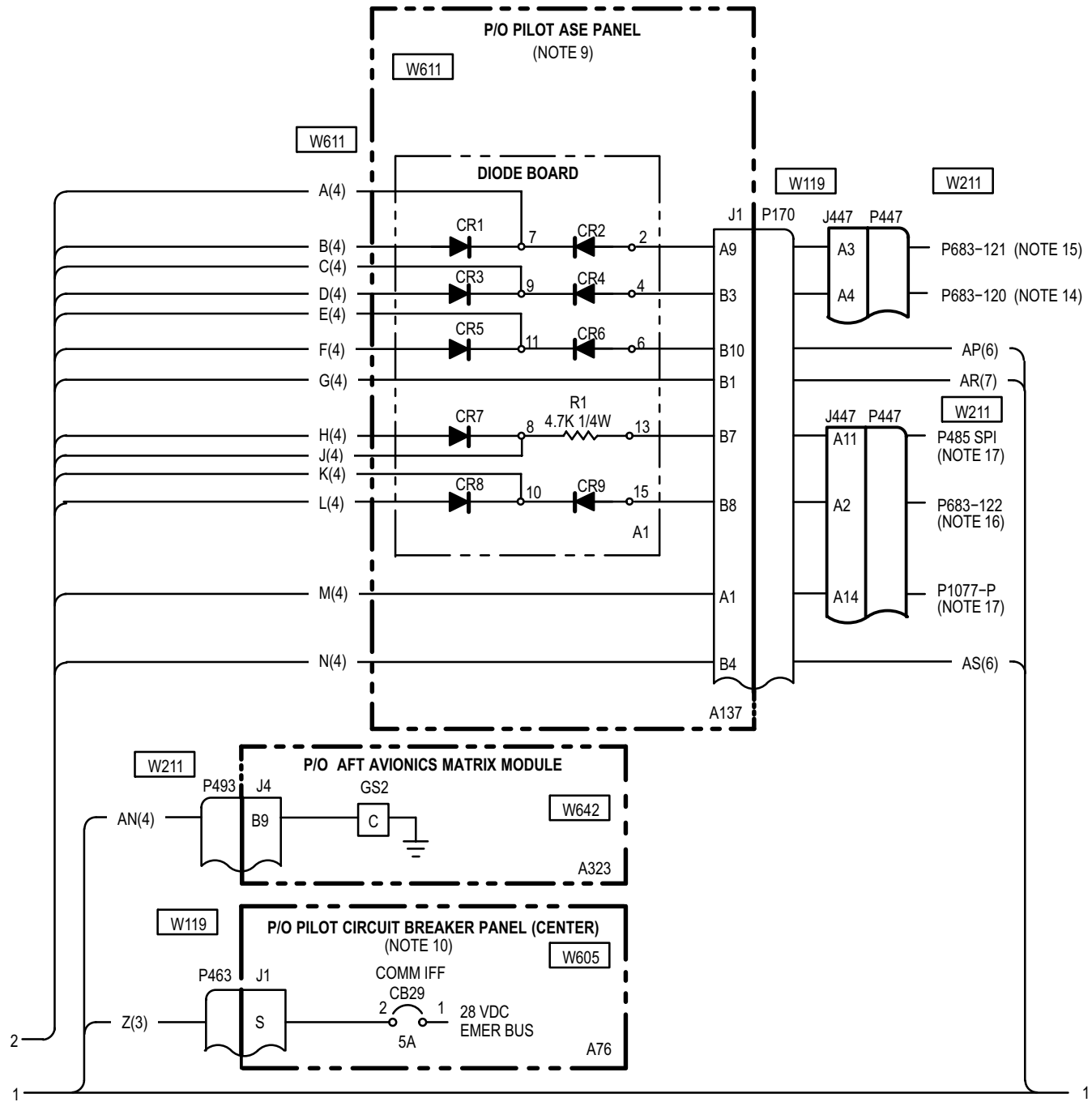
11-24



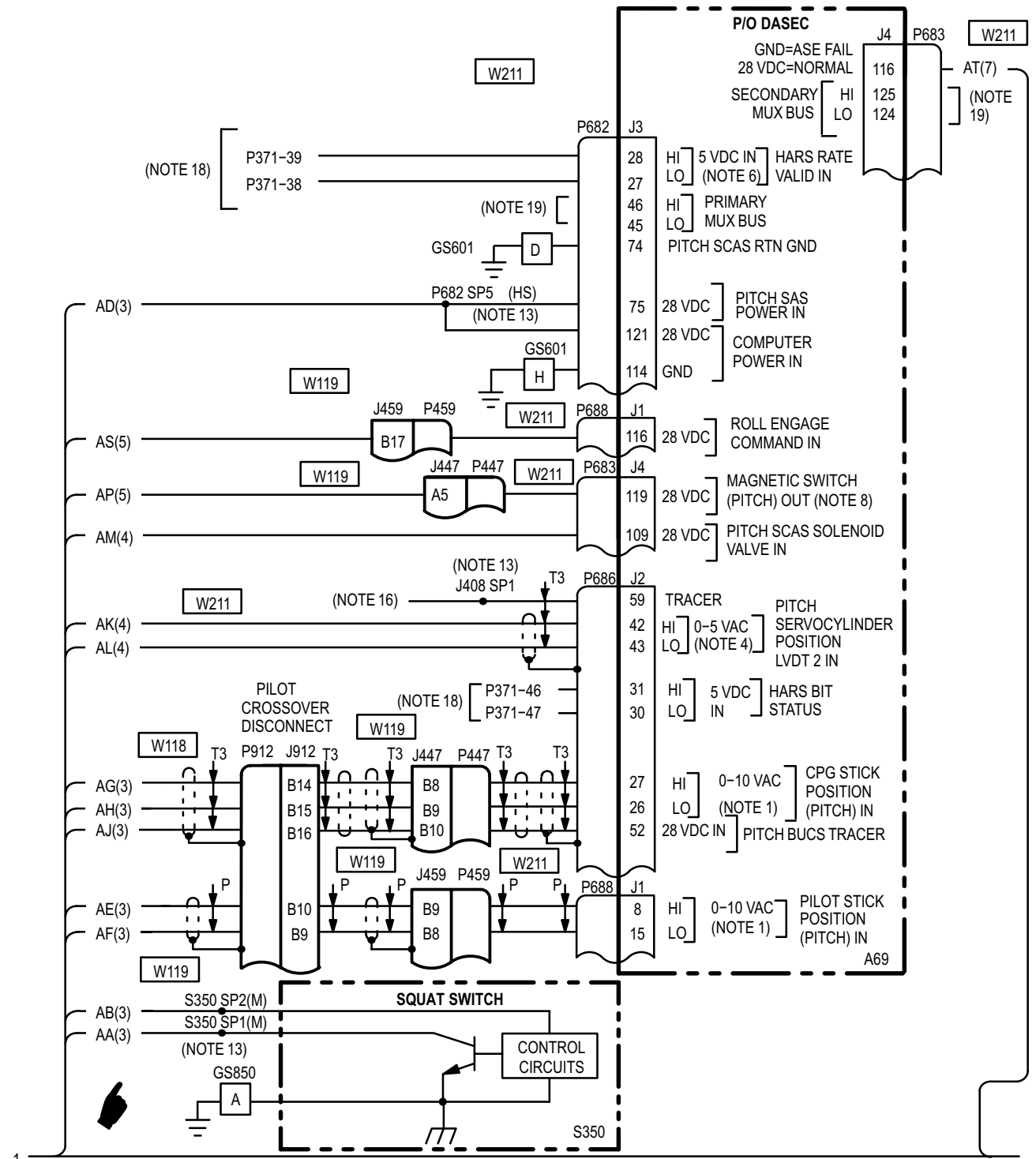


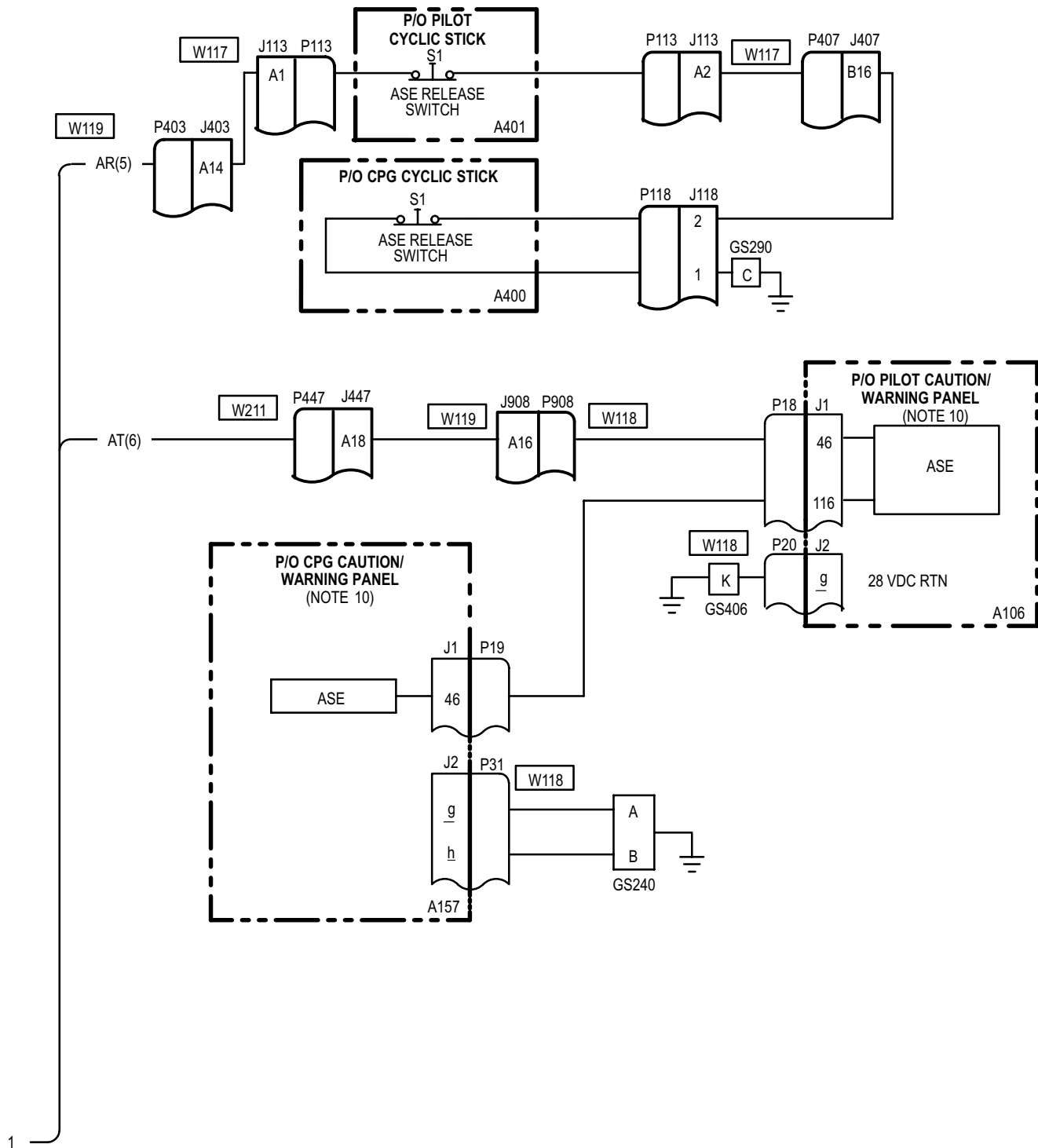
11-24. DASE - WIRING INTERCONNECT DIAGRAM (PITCH) (BUCS DEACTIVATED) (cont)





11-24. DASE – WIRING INTERCONNECT DIAGRAM (PITCH) (BUCS DEACTIVATED) (cont)

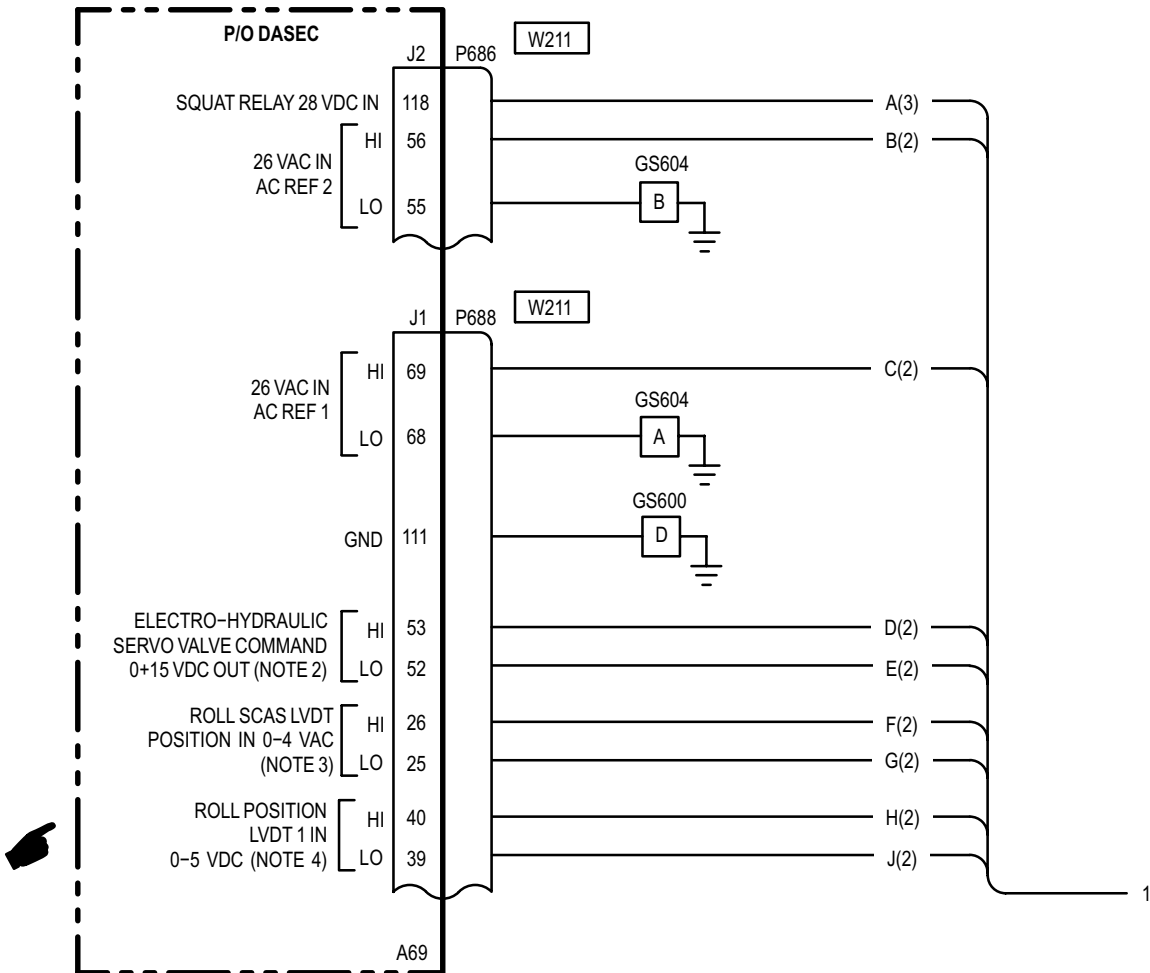




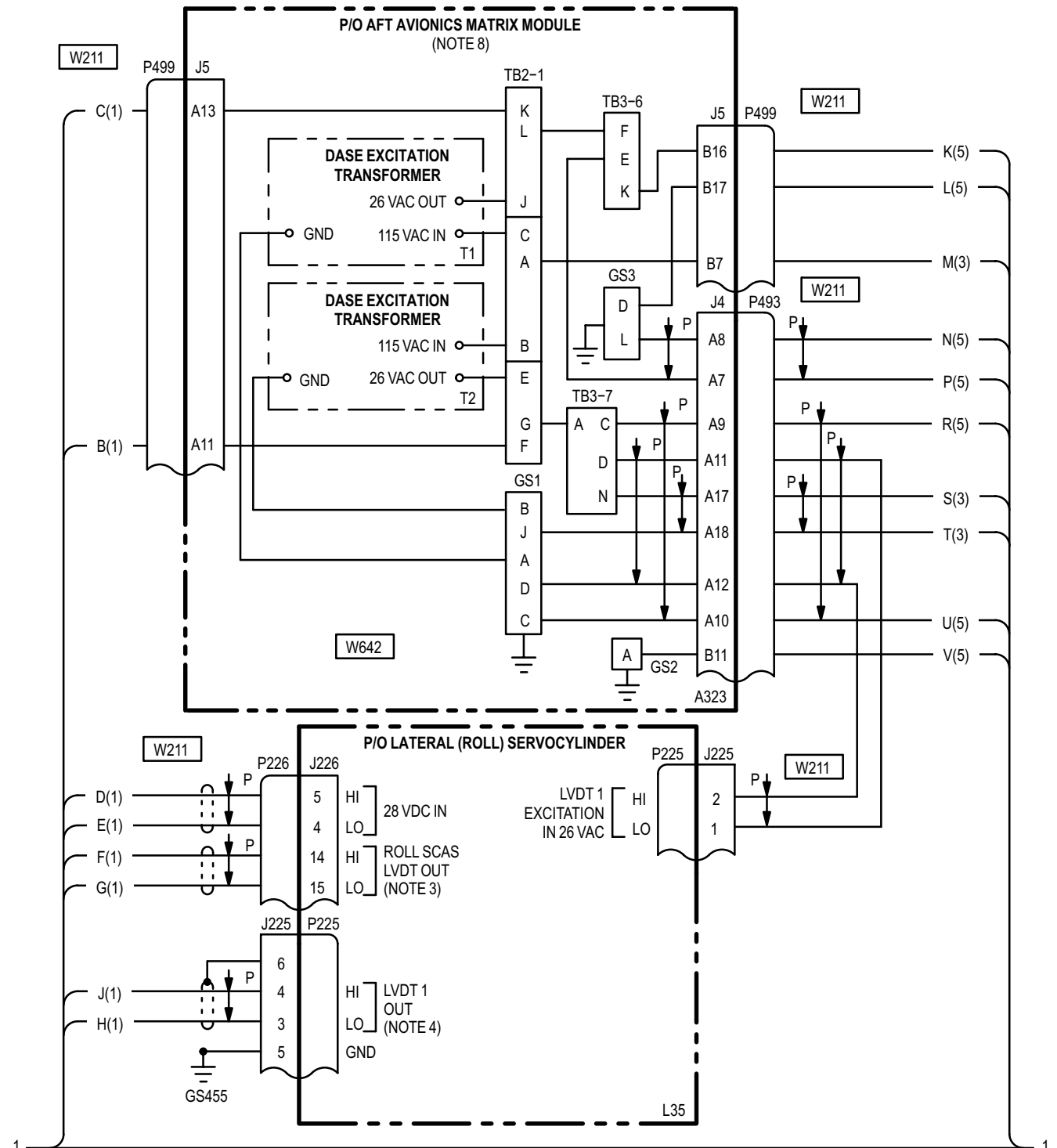
NOTES:

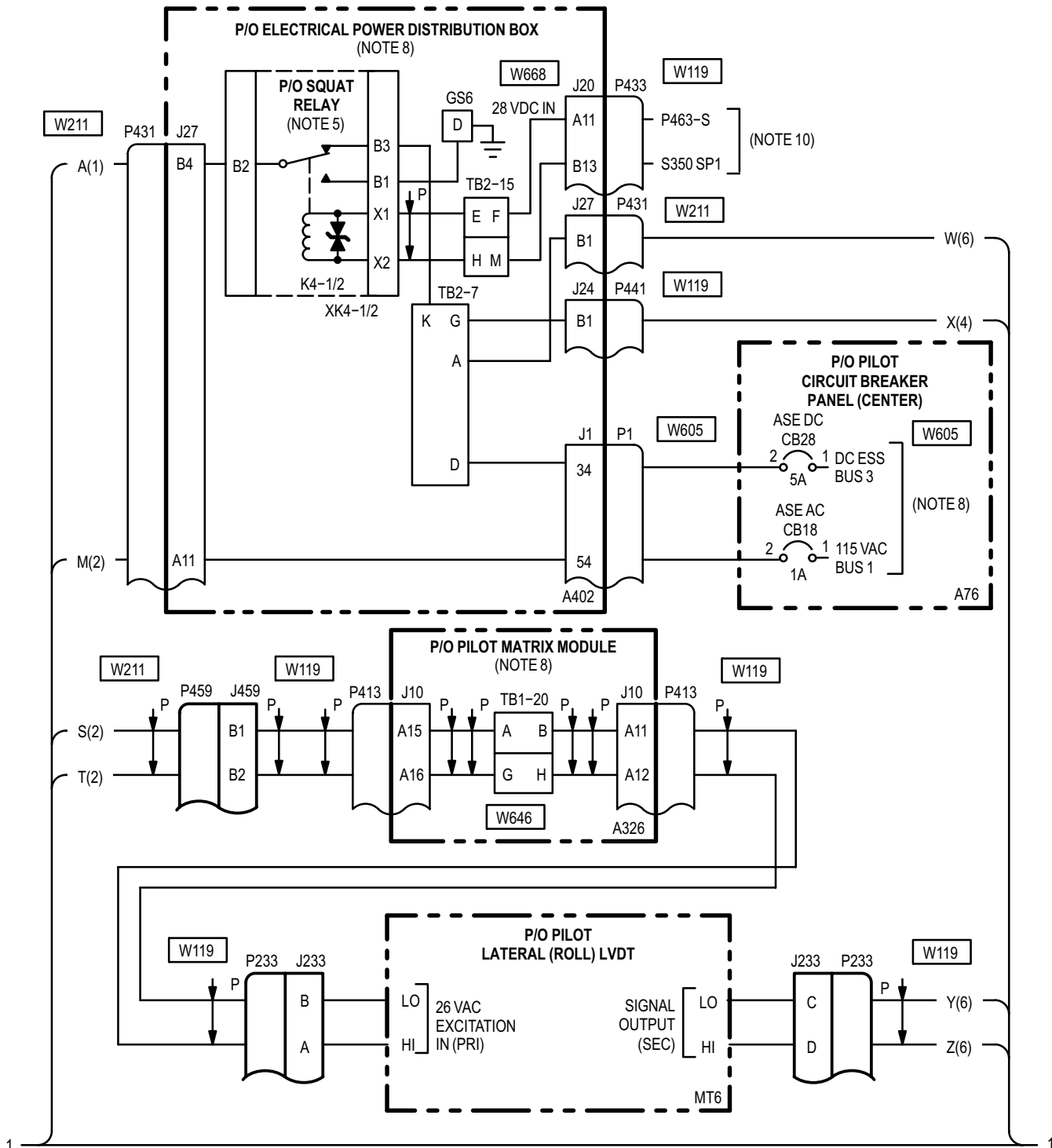
HIGHWAY USE: THE ALPHA CHARACTER IDENTIFIES A SPECIFIC LINE, AND THE NUMBER IN PARENTHESIS IDENTIFIES THE SHEET NUMBER WHERE THE SIGNAL TERMINATES.

1. 0 VAC AT MIDTRAVEL (CYCLIC STICK CENTERED). 10 VAC AT MAXIMUM TRAVEL (CYCLIC STICK FULL FORWARD OR FULL AFT).
2. +4 MA MAXIMUM CURRENT VARIATION.
3. 0 VAC AT MIDTRAVEL, 2.5 VAC AT MAXIMUM TRAVEL.
4. 0 VAC AT MIDTRAVEL, 5 VAC AT MAXIMUM TRAVEL.
5. RELAY ACTUATED BY SQUAT SWITCH S350.
ON GROUND-CONTACTS B2 AND B3 CLOSED, SQUAT RELAY DE-ENERGIZED.
6. AIRBORNE-CONTACTS B2 AND B1 CLOSED, SQUAT RELAY ENERGIZED.
7. VARIES FROM APPROX. 0.5 VDC TO 5 VDC WITH NO CHANGE AT SOURCE.
8. VARIES BETWEEN MAXIMUM LIMITS SHOWN. DEPENDS ON AIRSPEED CHANGE DATA.
9. MAGNETIC SWITCHES, SOLENOID HOLDS SWITCH ON WHEN MANUALLY SET TO ON.
10. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
11. AIR DATA SYSTEM (TM 9-1230-476-20-2).
12. SCAS = STABILITY COMMAND AUGMENTATION SYSTEM.
13. HS DESIGNATES A HARD SPLICE WHICH CANNOT BE DISCONNECTED.
M DESIGNATES A SOFT SPLICE WHICH MAY BE DISCONNECTED FOR A WIRING CHECK.
14. REFER TO PARAGRAPH 11-25. DASE-WIRING INTERCONNECT DIAGRAM (ROLL) (BUCS DEACTIVATED).
15. REFER TO PARAGRAPH 11-26. DASE-WIRING INTERCONNECT DIAGRAM (YAW) (BUCS DEACTIVATED).
16. REFER TO PARAGRAPH 11-27. DASE-WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED).
17. REFER TO PARAGRAPH 11-89. STABILATOR-WIRING INTERCONNECT DIAGRAM.
18. AVIONICS CONFIGURATION HEADING ATTITUDE REFERENCE SYSTEM (HARS) (TM 11-1520-238-23-2).
19. FIRE CONTROL SYSTEM-MULTIPLEX SUBSYSTEM (TM 9-1230-476-20-2).

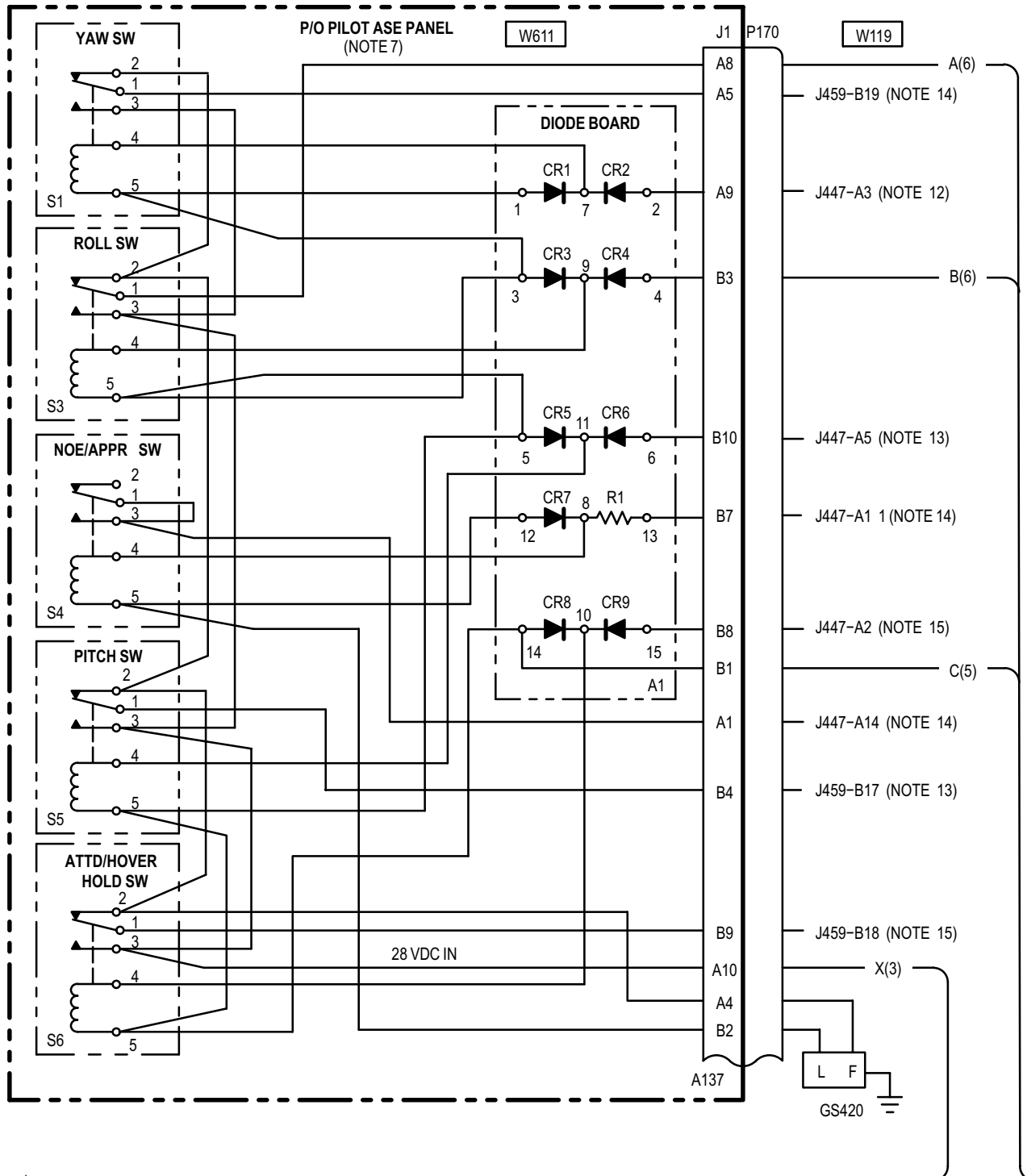


11-25. DASE – WIRING INTERCONNECT DIAGRAM (ROLL) (BUCS DEACTIVATED) (cont)



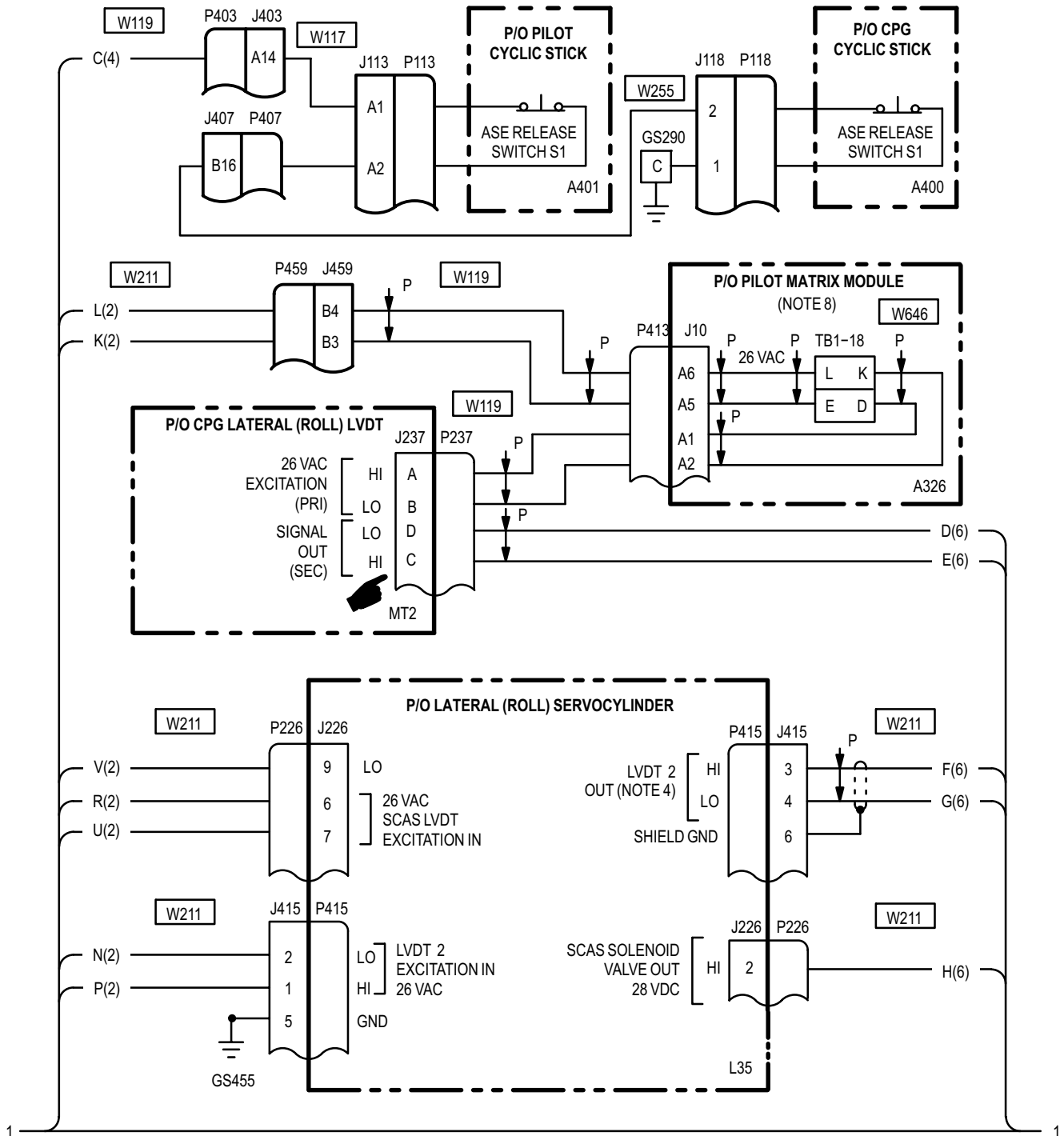


11-25. DASE - WIRING INTERCONNECT DIAGRAM (ROLL) (BUCS DEACTIVATED) (cont)

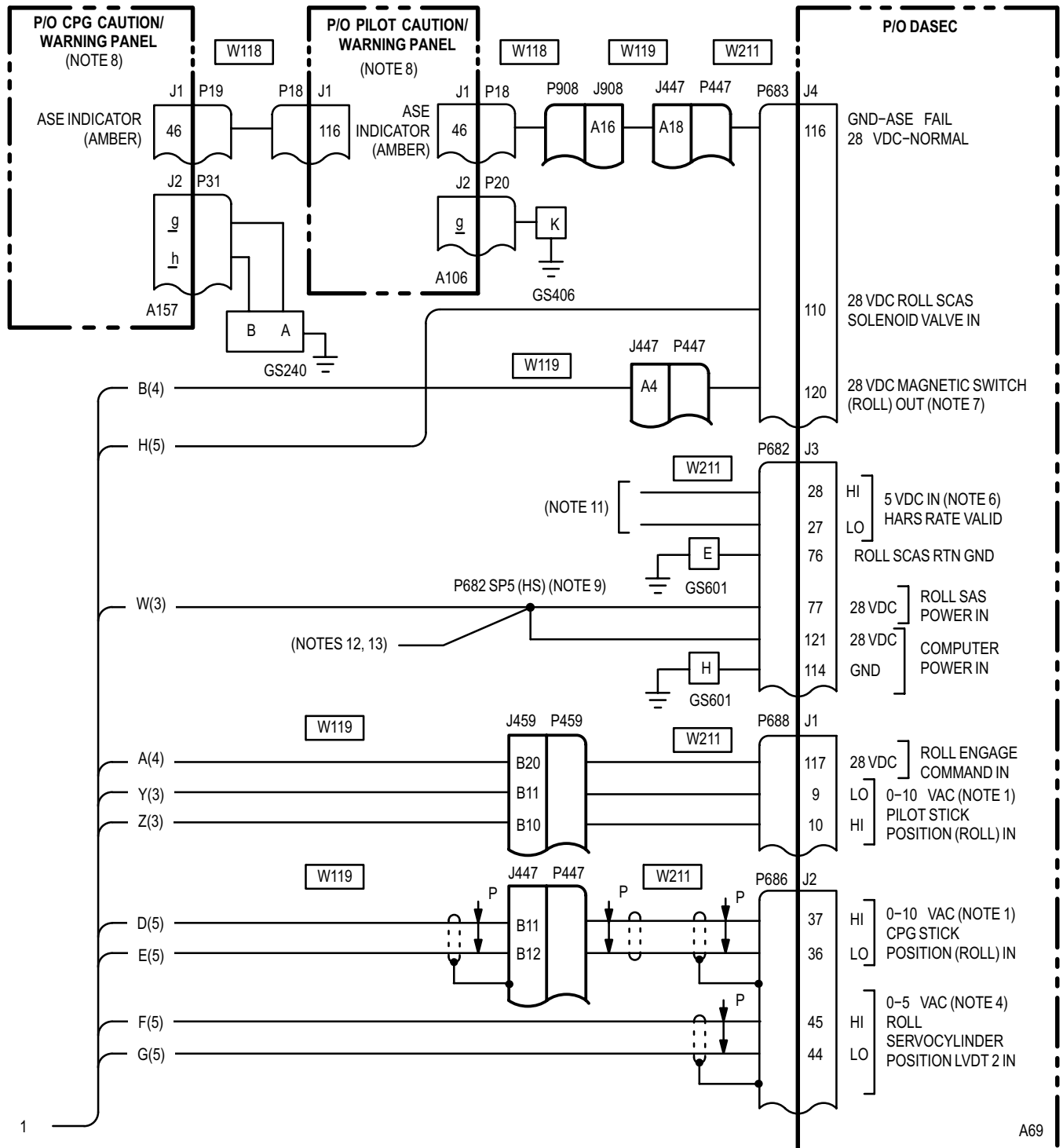


1

1



11-25. DASE – WIRING INTERCONNECT DIAGRAM (ROLL) (BUCS DEACTIVATED) (cont)



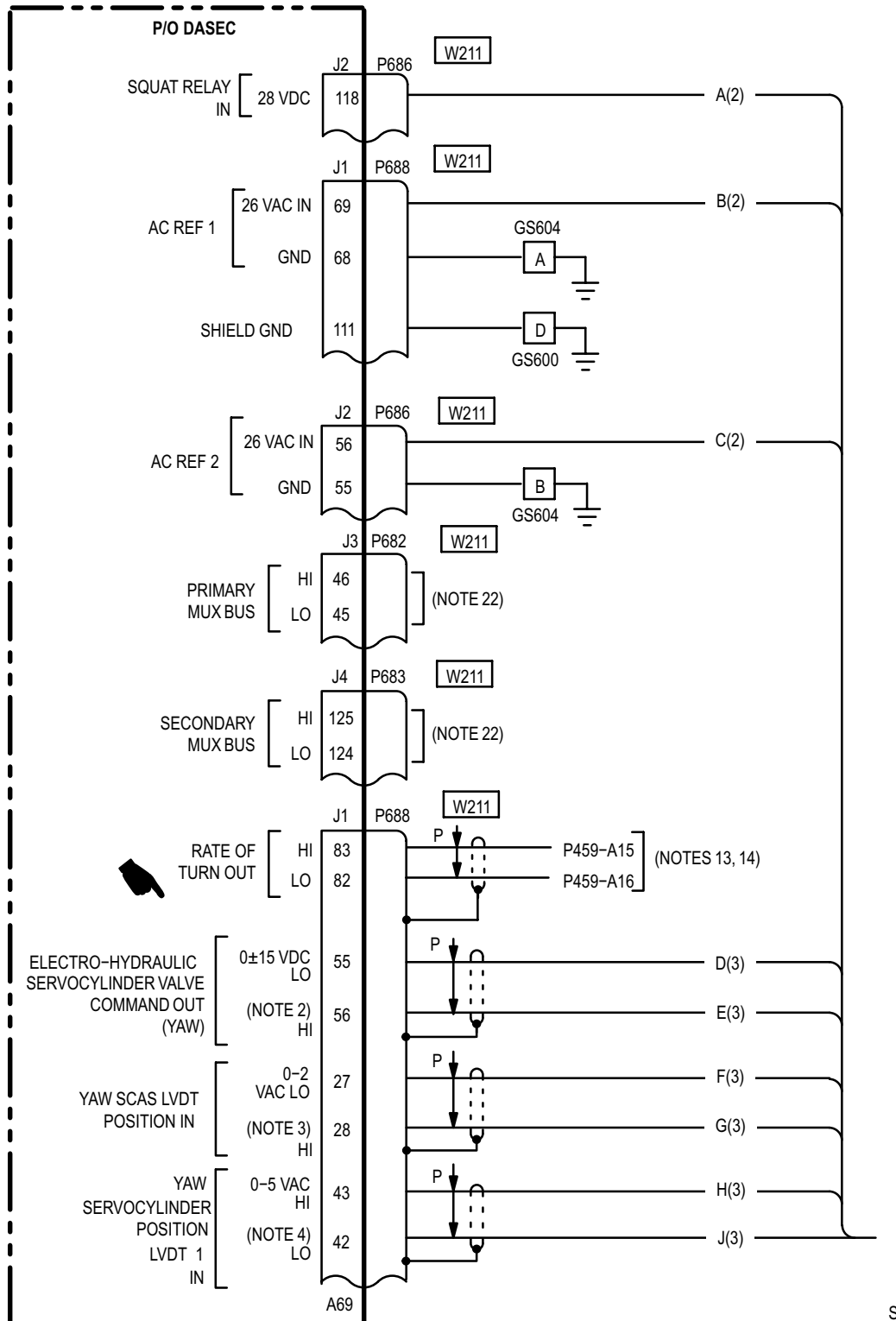
1

NOTES:

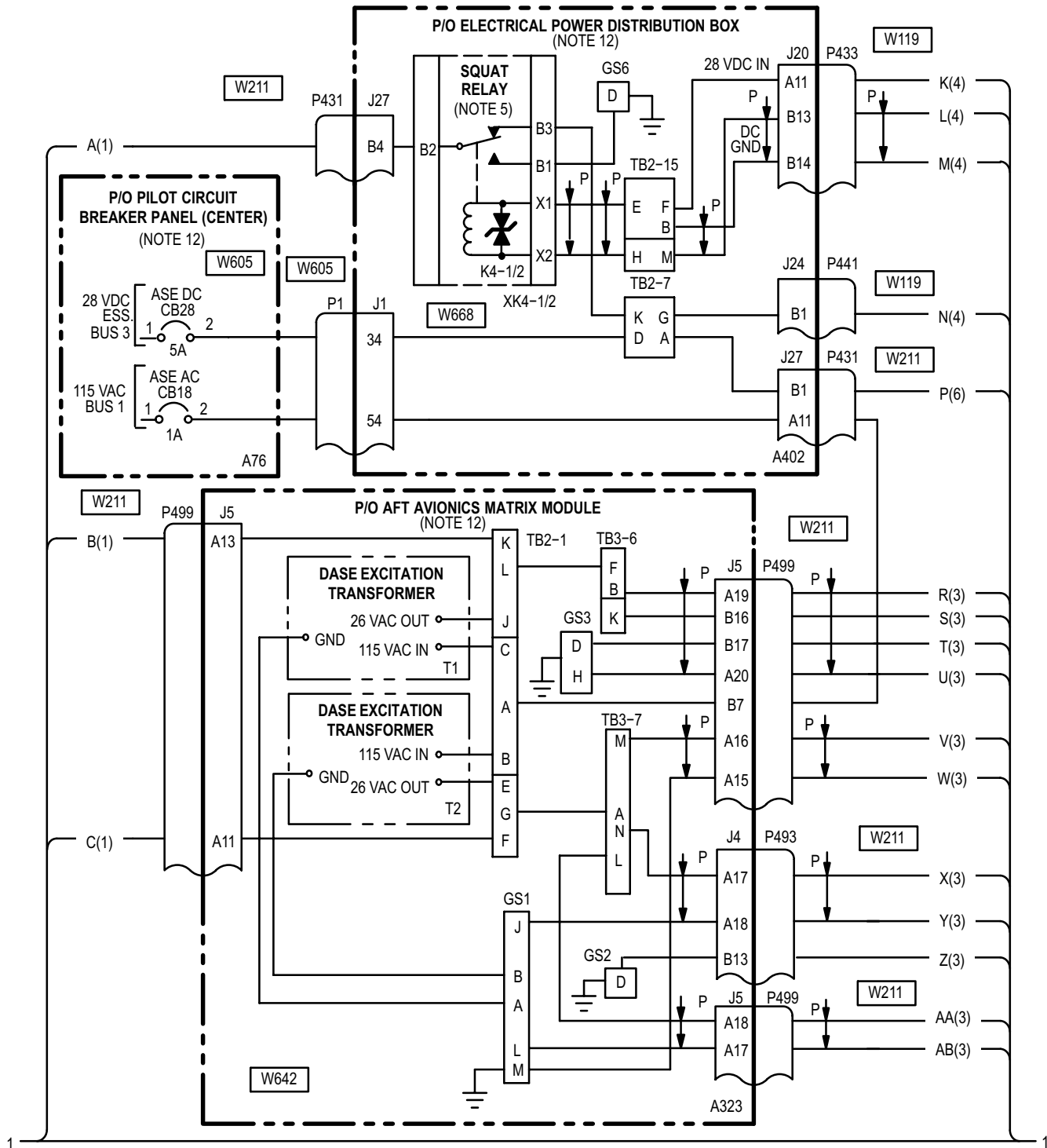
HIGHWAY USE: THE ALPHA CHARACTER IDENTIFIES A SPECIFIC LINE, AND THE NUMBER IN PARENTHESIS IDENTIFIES THE SHEET NUMBER WHERE THE SIGNAL TERMINATES.

1. 0 VAC AT MID TRAVEL (CYCLIC STICK CENTERED).
10 VAC AT MAX TRAVEL (CYCLIC STICK FULL LEFT OR RIGHT).
2. ± 4 MA MAX CURRENT VARIATION.
3. 0 VAC AT MID TRAVEL, 2.5 VAC AT MAX TRAVEL.
4. 0 VAC AT MID TRAVEL, 5 VAC AT MAX TRAVEL.
5. RELAY ACTUATED BY SQUAT SWITCH S350.
ON GROUND – CONTACTS B2 AND B3 CLOSED, SQUAT RELAY DE-ENERGIZED.
AIRBORNE – CONTACTS B2 AND 1 CLOSED, SQUAT RELAY ENERGIZED.
6. VARIES FROM APPROX. 0.5 VDC TO 5 VDC WITH NO CHANGE AT SOURCE.
7. MAGNETIC SWITCHES; SOLENOID HOLDS SWITCH ON WHEN MANUALLY SET TO ON.
8. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
9. HS REPRESENTS A HARD SPLICE WHICH CANNOT BE DISCONNECTED.
M DESIGNATES A SOFT SPLICE WHICH MAY BE DISCONNECTED FOR A WIRING CHECK.
10. AVIONICS CONFIGURATION IDENTIFICATION FRIEND OR FOE (IFF) (TM 11-1520-238-23-2).
11. AVIONICS CONFIGURATION HEADING ATTITUDE REFERENCE SYSTEM (HARS) (TM 11-1520-238-23-2).
12. REFER TO PARAGRAPH 11-26. DASE (YAW) (BUCS DEACTIVATED) – WIRING INTERCONNECT DIAGRAM.
13. REFER TO PARAGRAPH 11-24. DASE (PITCH) (BUCS DEACTIVATED) – WIRING INTERCONNECT DIAGRAM.
14. REFER TO PARAGRAPH 11-89. STABILATOR – WIRING INTERCONNECT DIAGRAM.
15. REFER TO PARAGRAPH 11-27. DASE (COLLECTIVE) (BUCS DEACTIVATED) – WIRING INTERCONNECT DIAGRAM.

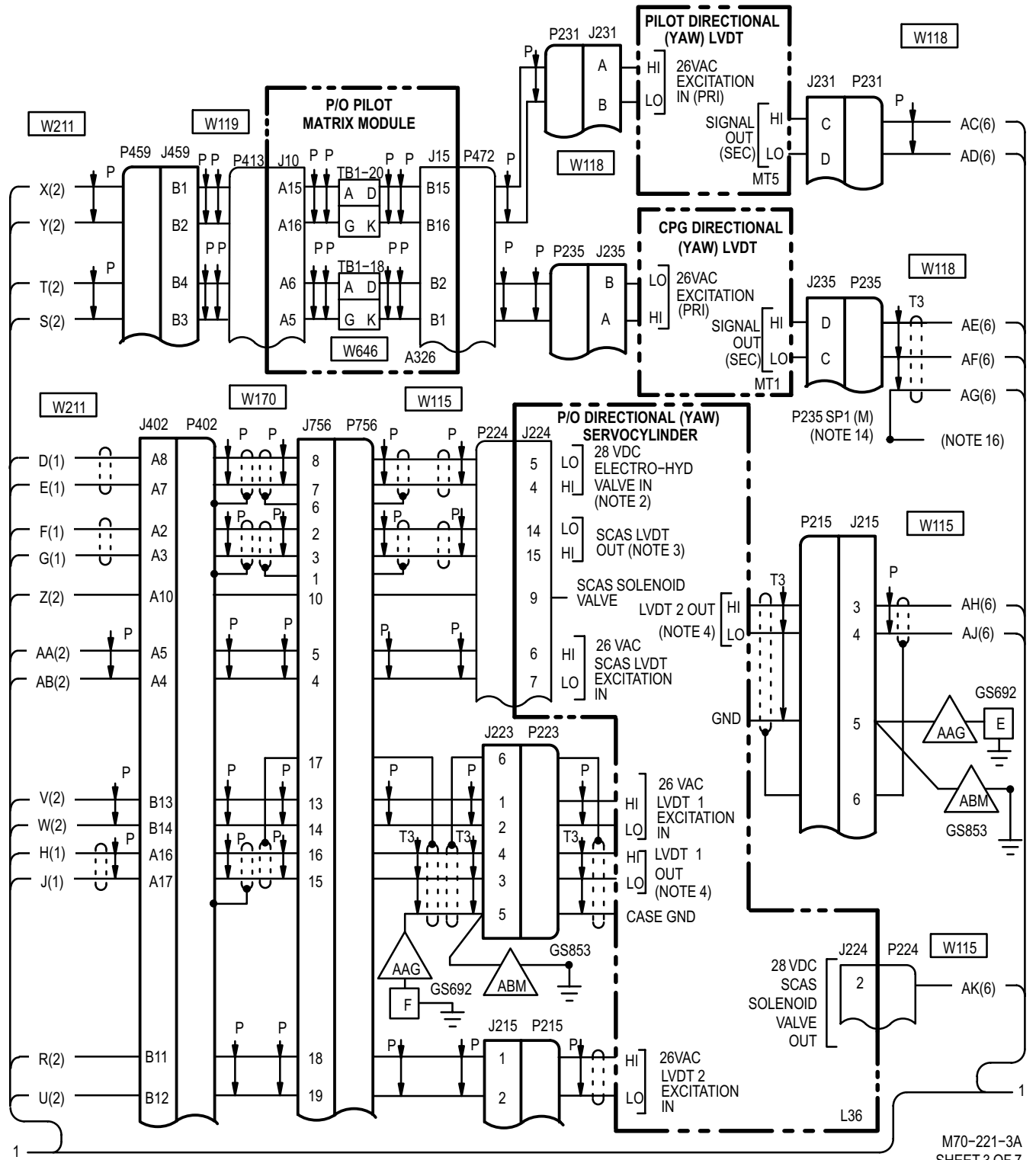
11-26. DASE – WIRING INTERCONNECT DIAGRAM (YAW) (BUCS DEACTIVATED)

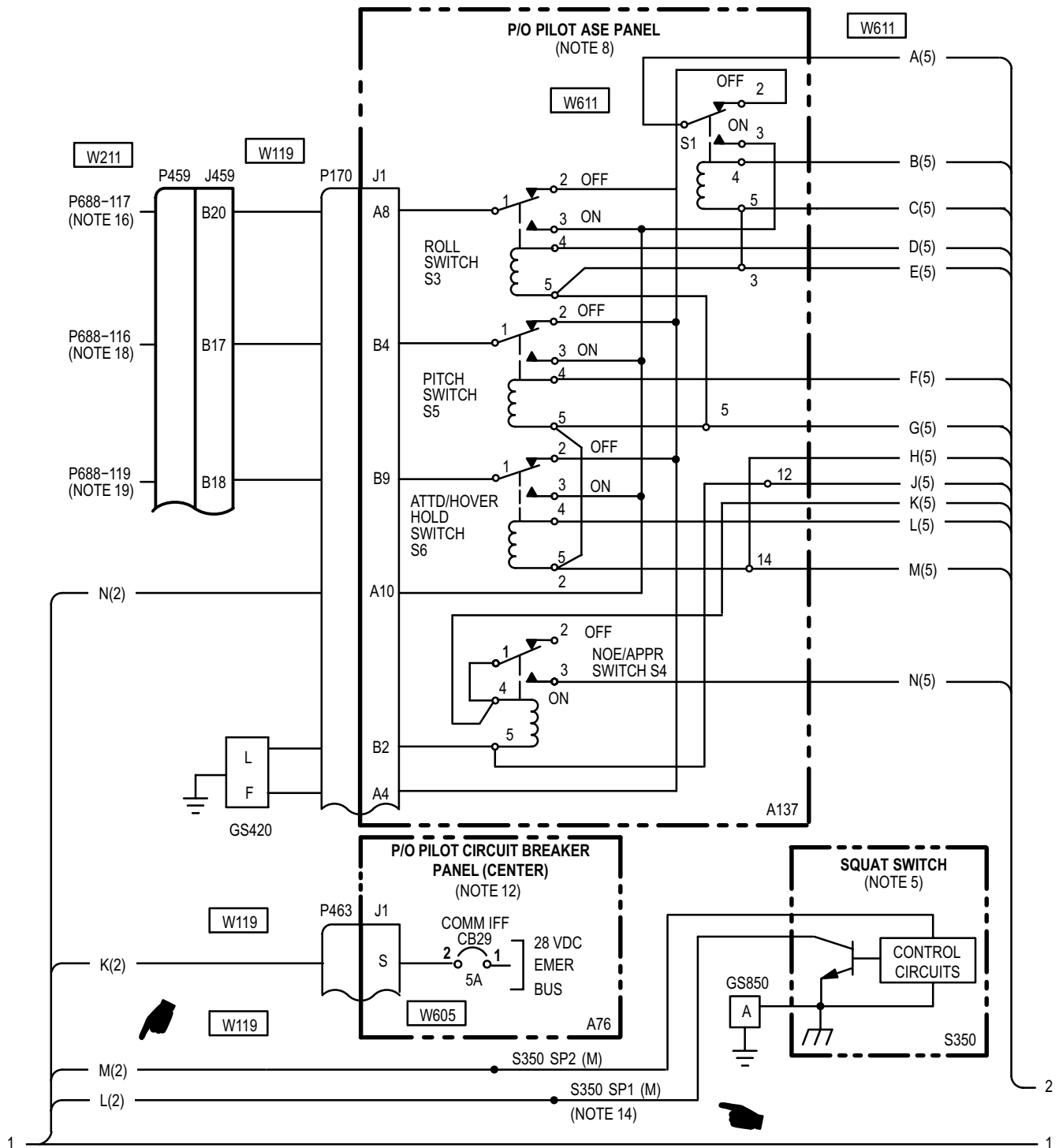


M70-221-1B
SHEET 1 OF 7

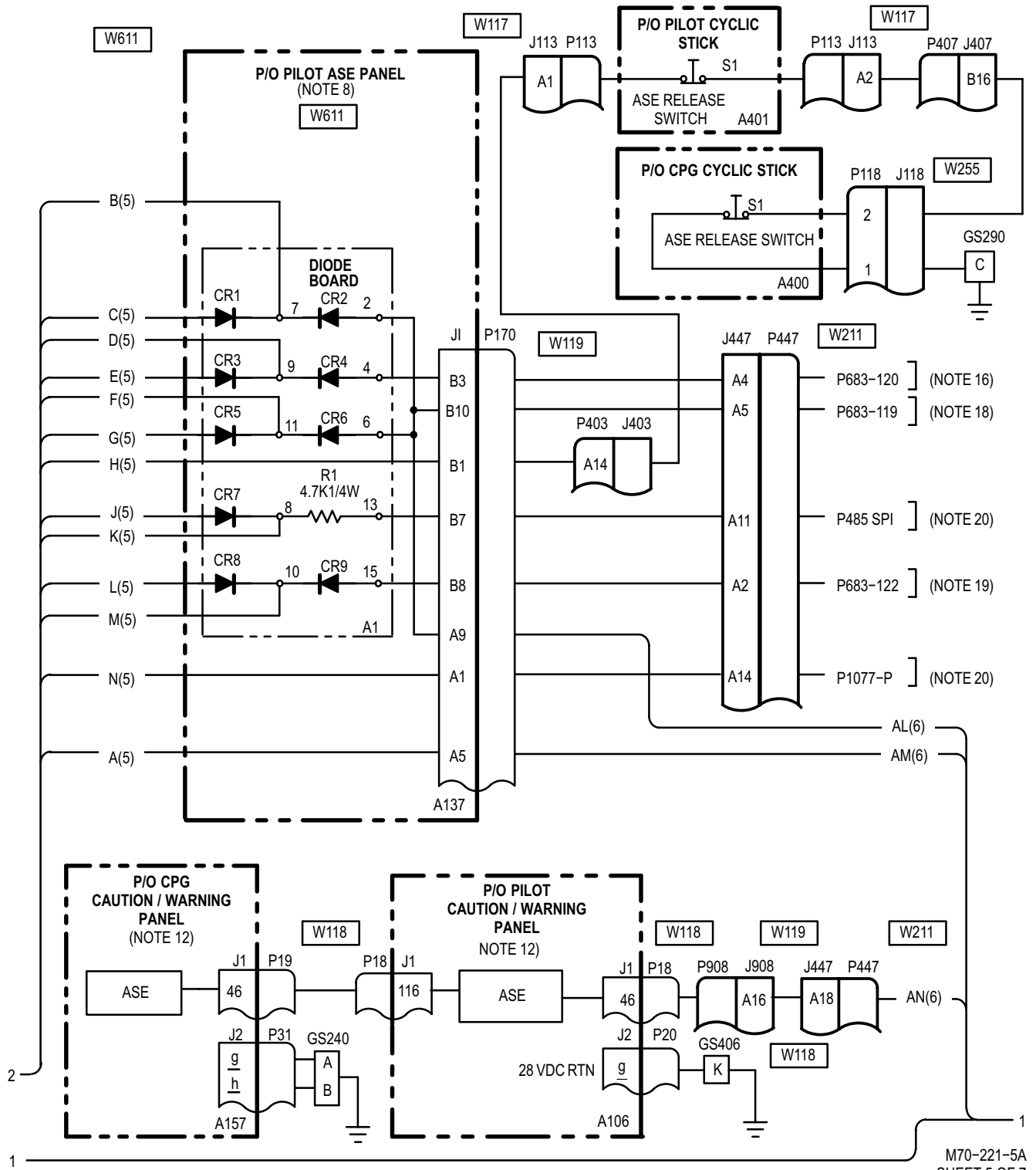


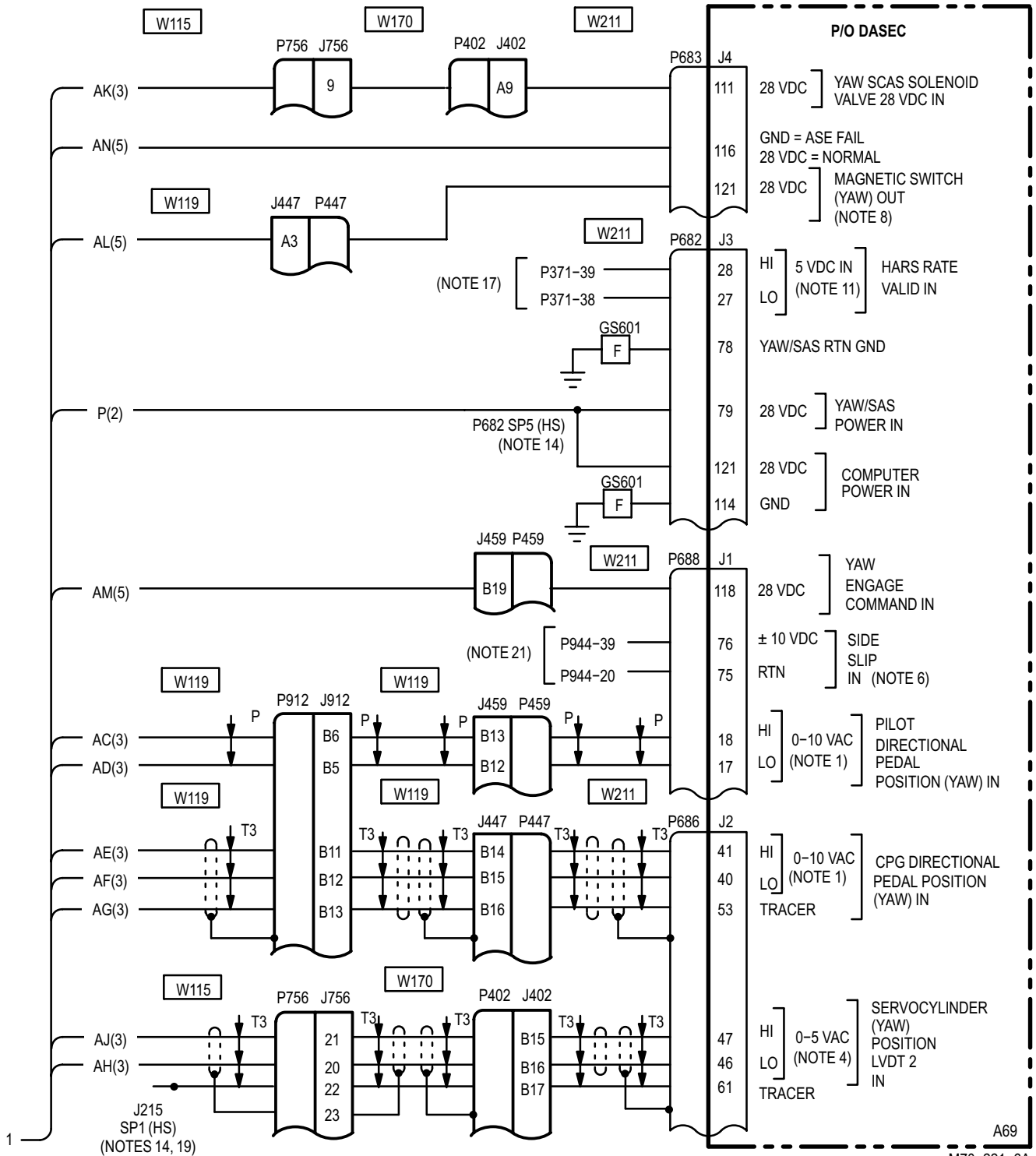
11-26. DASE - WIRING INTERCONNECT DIAGRAM (YAW) (BUCS DEACTIVATED) (cont)





11-26. DASE – WIRING INTERCONNECT DIAGRAM (YAW) (BUCS DEACTIVATED) (cont)

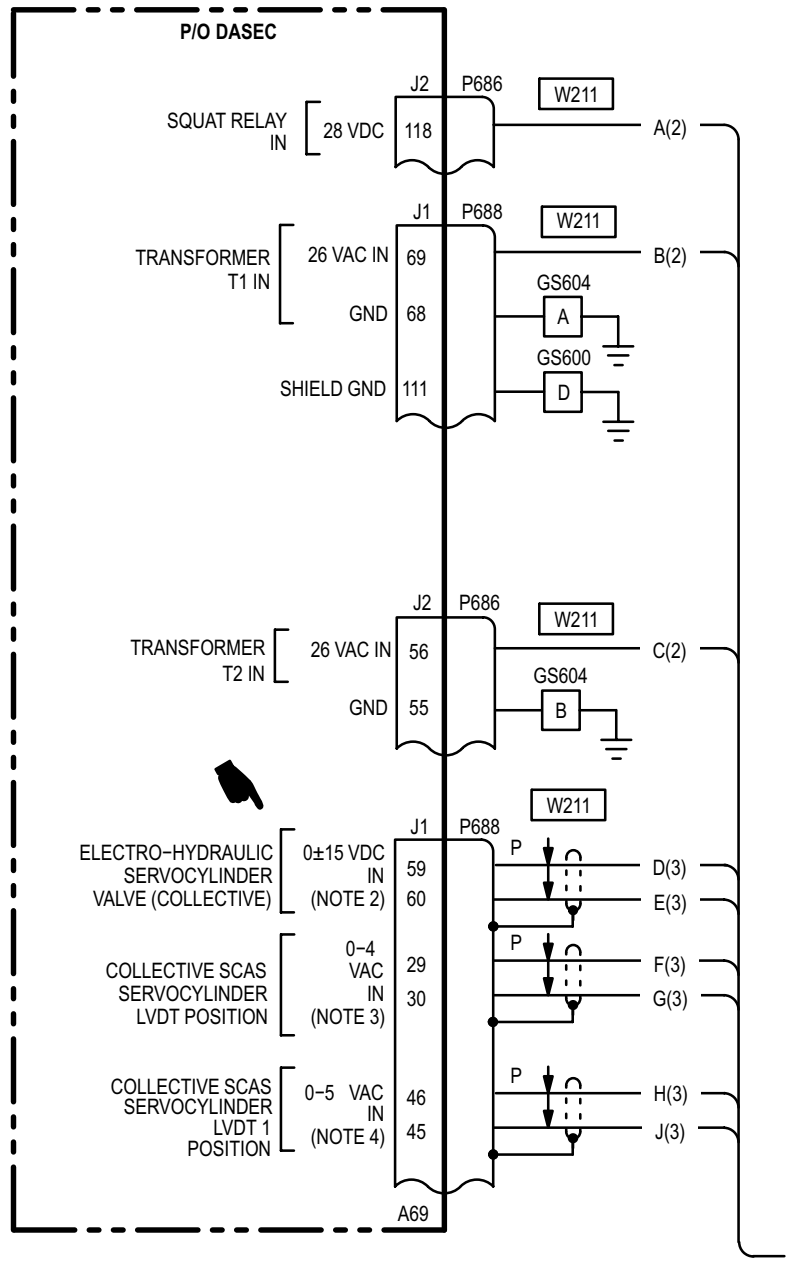




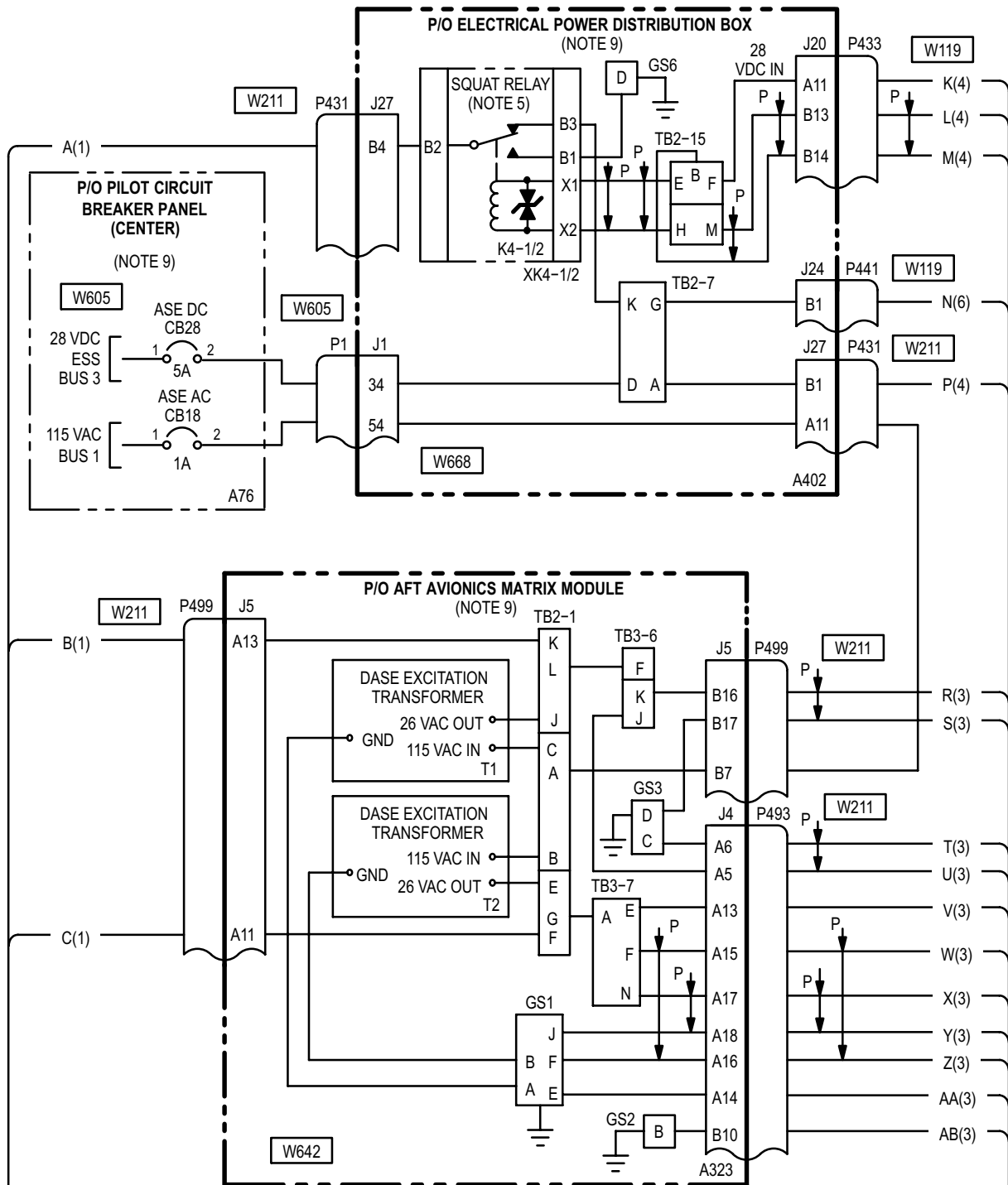
NOTES:

HIGHWAY USE: THE ALPHA CHARACTER IDENTIFIES A SPECIFIC LINE, AND THE NUMBER IN PARENTHESIS IDENTIFIES THE SHEET NUMBER WHERE THE SIGNAL TERMINATES.

1. 10 VAC WITH DIRECTIONAL PEDALS FULL LEFT OR FULL RIGHT.
2. ± 4 MA MAXIMUM CURRENT VARIATION.
3. 0 VAC AT MIDTRAVEL. 2.5 VAC AT MAXIMUM TRAVEL.
4. 0 VAC AT MIDTRAVEL. 5 VAC AT MAXIMUM TRAVEL.
5. RELAY ACTUATED BY SQUAT SWITCH S350. ON GROUND-CONTACTS B2 AND B3 CLOSED. SQUAT RELAY DE-ENERGIZED. AIRBORNE-CONTACTS B1 AND B2 CLOSED. SQUAT RELAY ENERGIZED.
6. VARIES BETWEEN MAXIMUM LIMITS SHOWN. DEPENDS ON AIRSPEED CHANGE DATA.
7. ABOVE 60 KNOTS PROVIDES AUTOMATIC TURN COORDINATION 25° MAXIMUM RANGE.
8. MAGNETIC SWITCHES, SOLENOID HOLDS SWITCH ON WHEN MANUALLY SET TO ON.
9. TWO-MINUTE TURN RATE: 2.6 VDC MINIMUM.
10. ASE INDICATORS LIGHT WHEN DASEC REMOVES 28 VDC.
11. VARIES BETWEEN APPROXIMATELY 0.5 VDC TO 5 VDC WITH NO CHANGE AT SOURCE.
12. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
13. AVIONICS CONFIGURATION VIDEO DISPLAY UNIT (TM 11-1520-238-23-2).
14. HS DESIGNATES A HARD SPLICE WHICH CANNOT BE DISCONNECTED.
M DESIGNATES A SOFT SPLICE WHICH MAY BE DISCONNECTED FOR A WIRING CHECK.
15. SCAS = STABILITY COMMAND AUGMENTATION SYSTEM.
16. REFER TO PARAGRAPH 11-25. DASE – WIRING INTERCONNECT DIAGRAM (ROLL) (BUCS DEACTIVATED) .
17. AVIONICS CONFIGURATION HEADING ATTITUDE REFERENCE SYSTEM (HARS) (TM 11-1520-238-23-2).
18. REFER TO PARAGRAPH 11-24. DASE – WIRING INTERCONNECT DIAGRAM (PITCH) (BUCS DEACTIVATED).
19. REFER TO PARAGRAPH 11-27. DASE – WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED).
20. REFER TO PARAGRAPH 11-89. STABILATOR-WIRING INTERCONNECT DIAGRAM.
21. AIR DATA SYSTEM (TM 9-1230-476-20-2).
22. FIRE CONTROL SYSTEM-MULTIPLEX SUBSYSTEM (TM 9-1230-476-20-2).

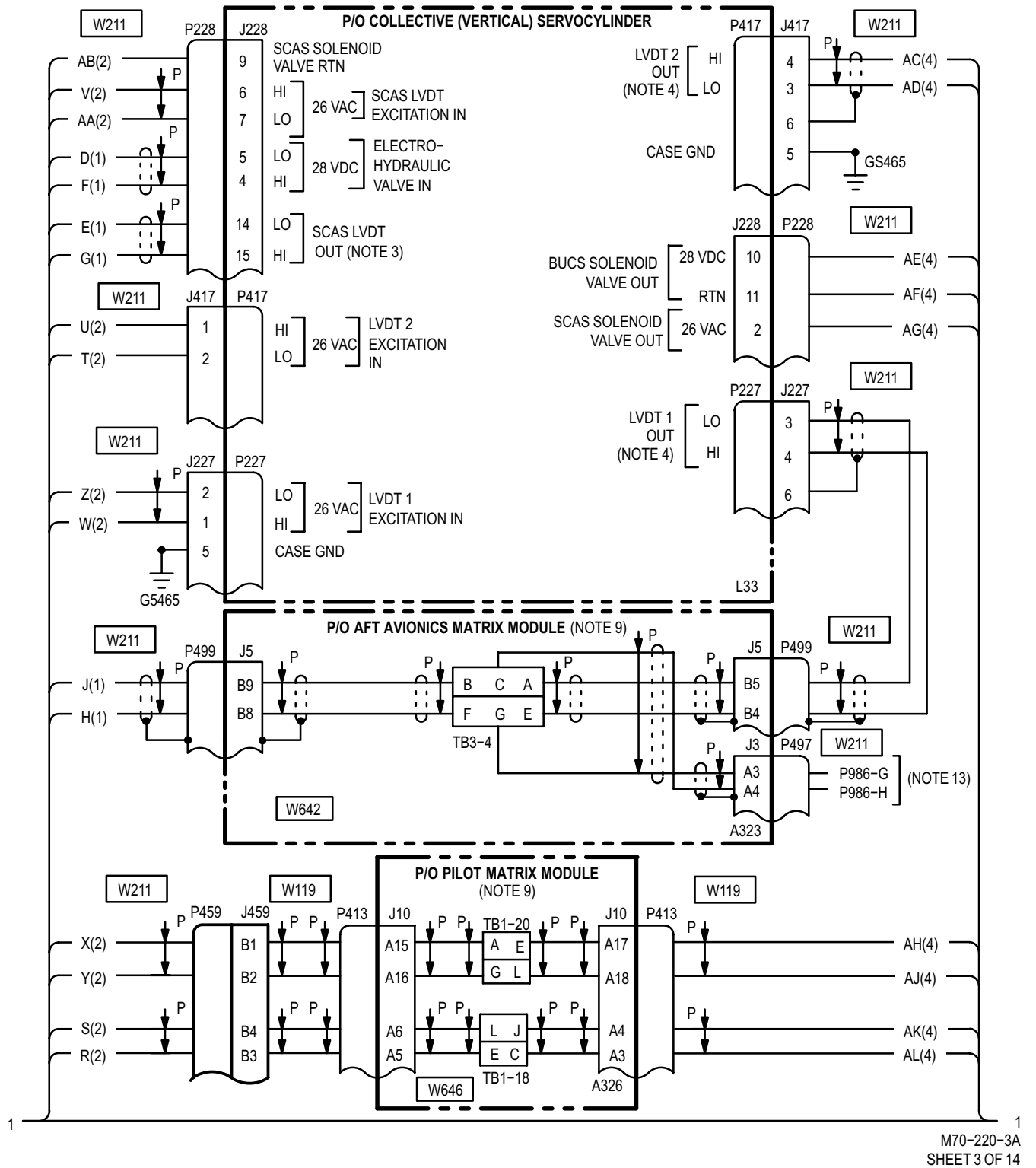


11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27

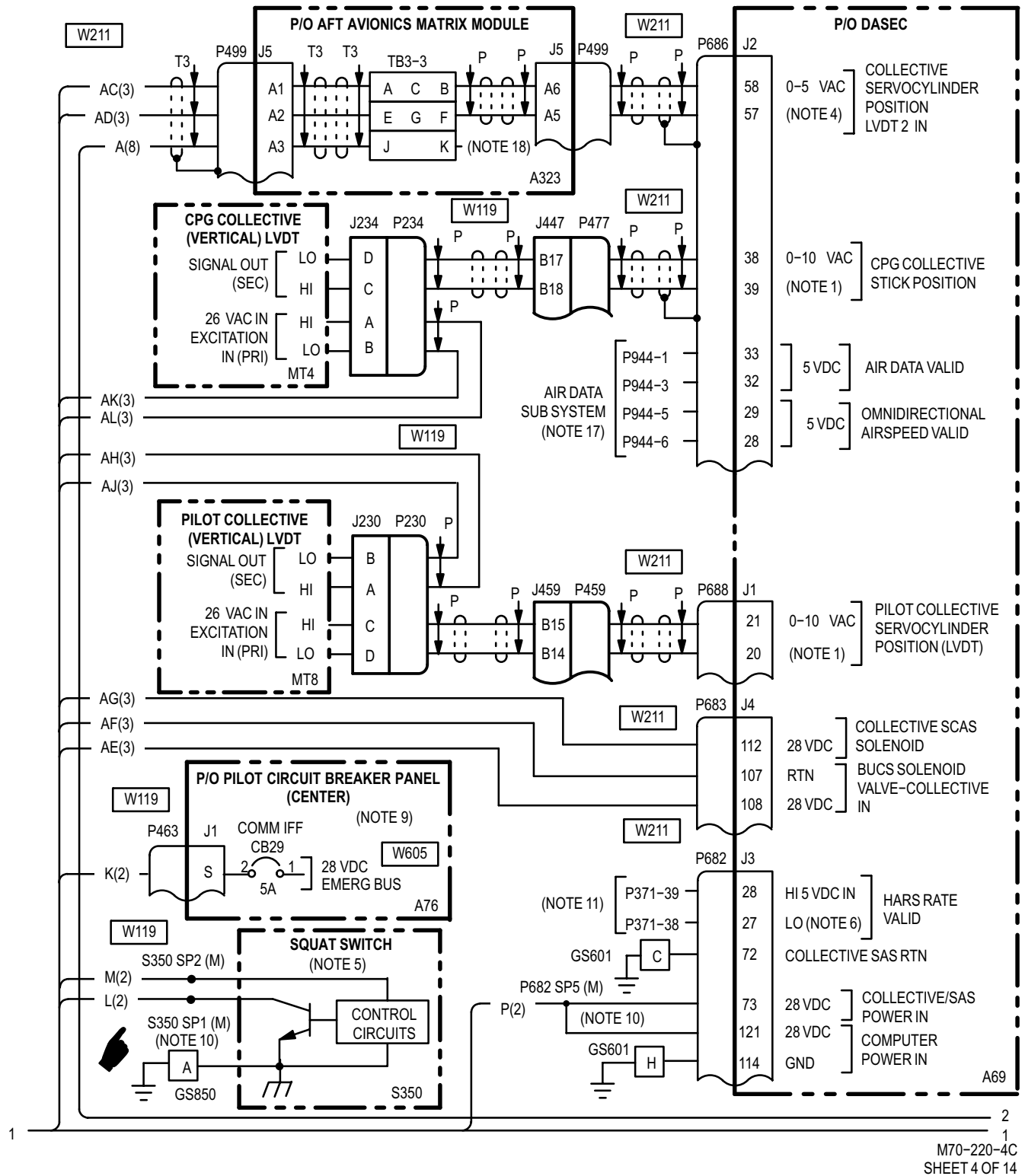


1

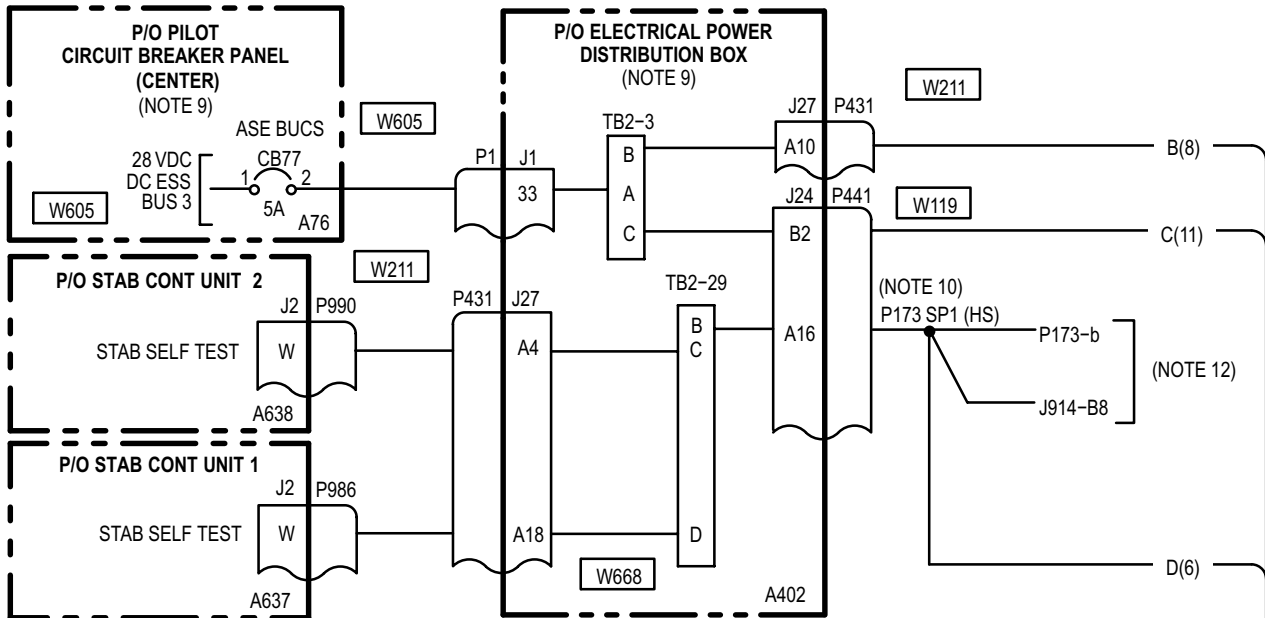
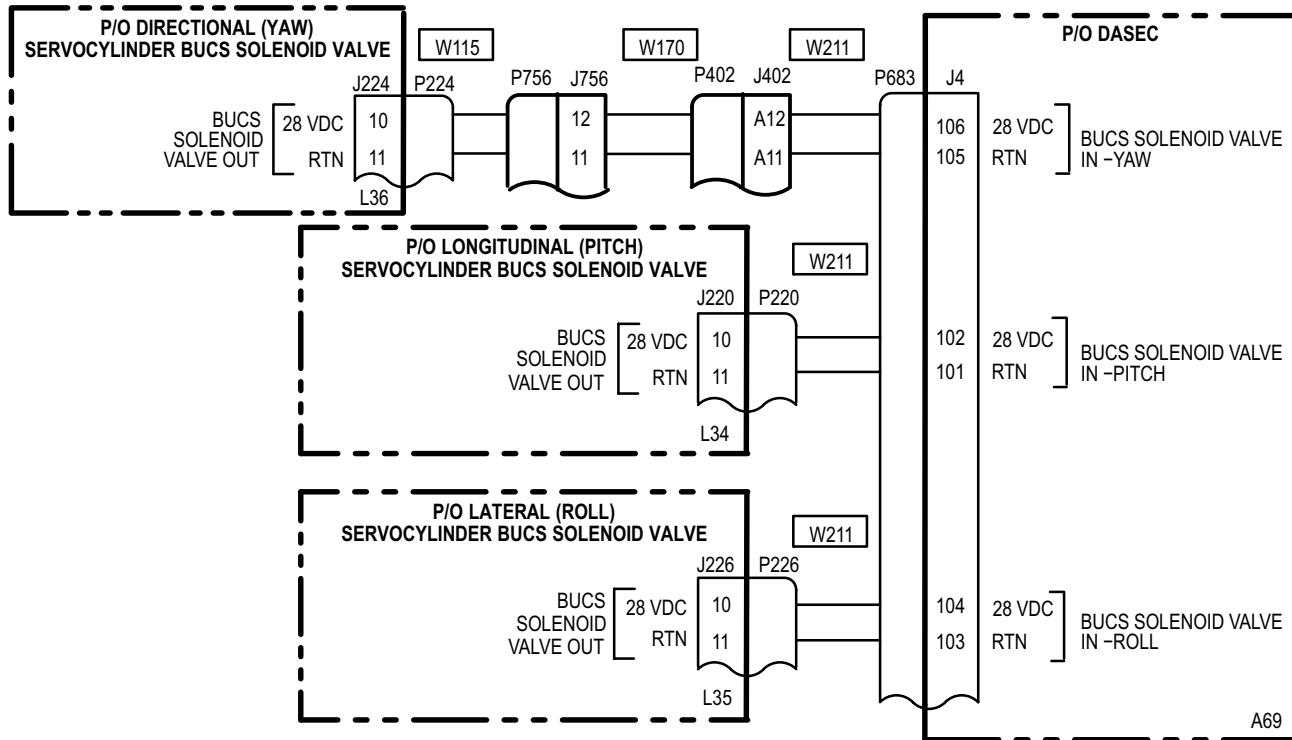
11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27



11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27

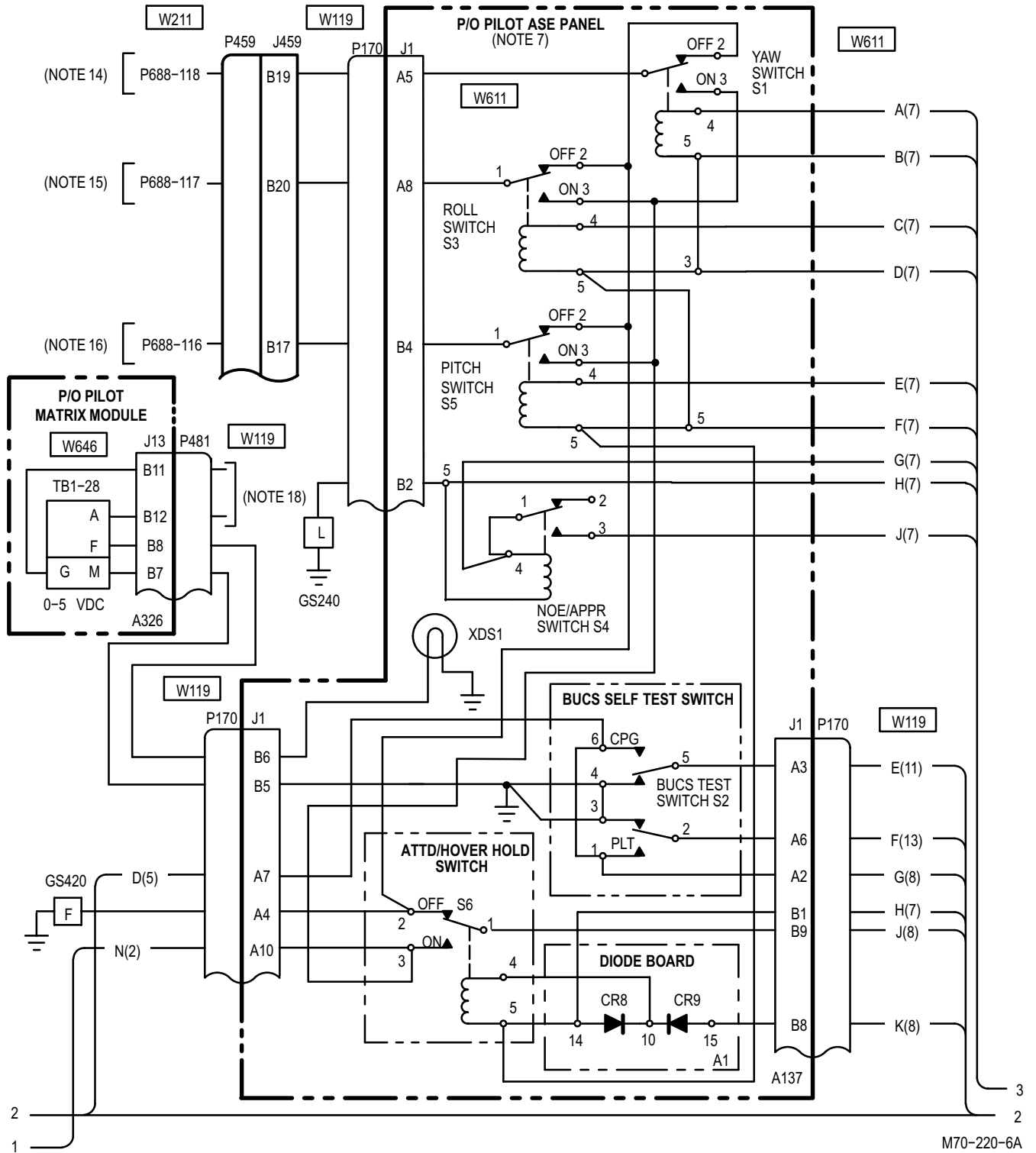


11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27

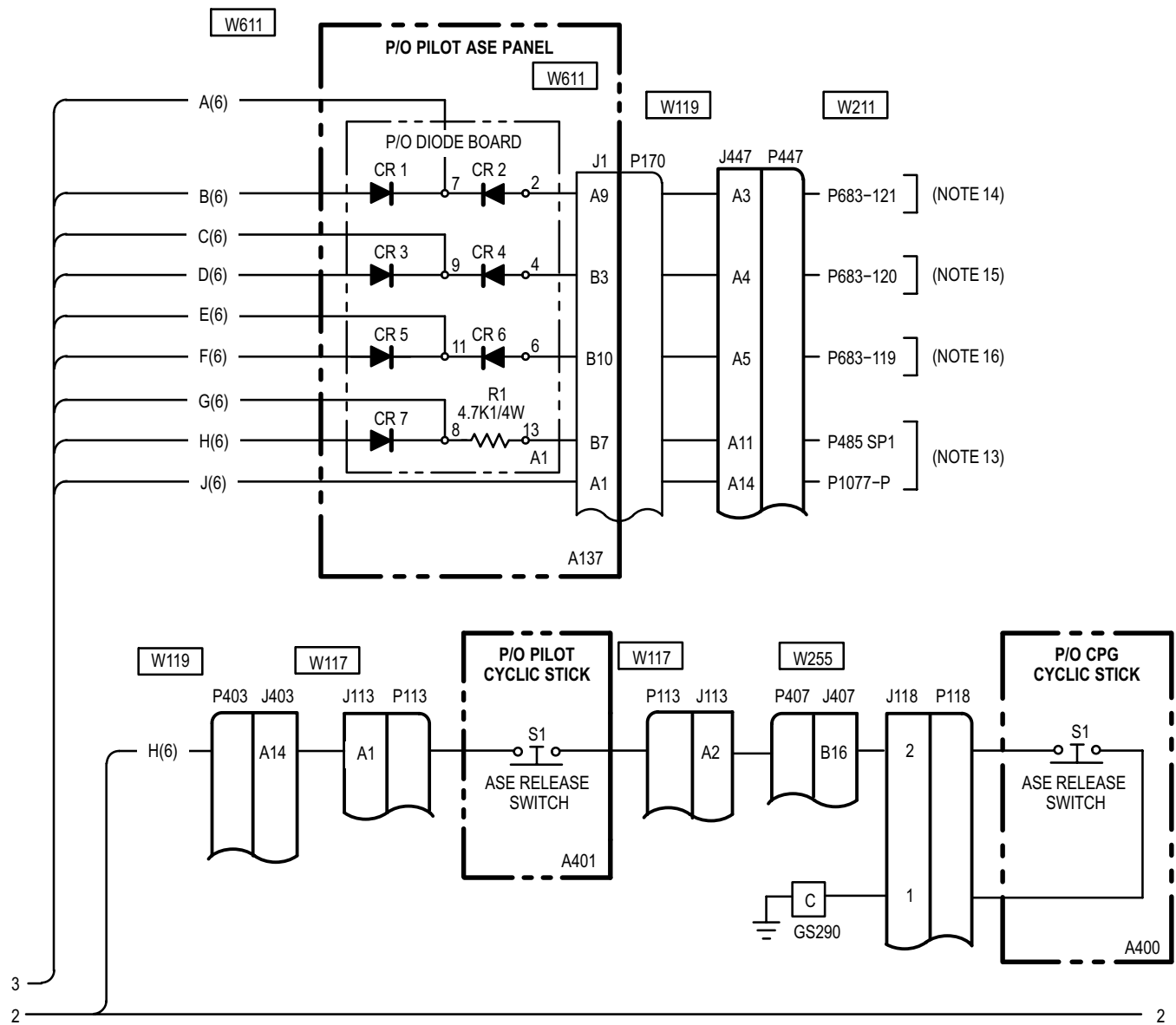


2 _____ 2
 1 _____ 1

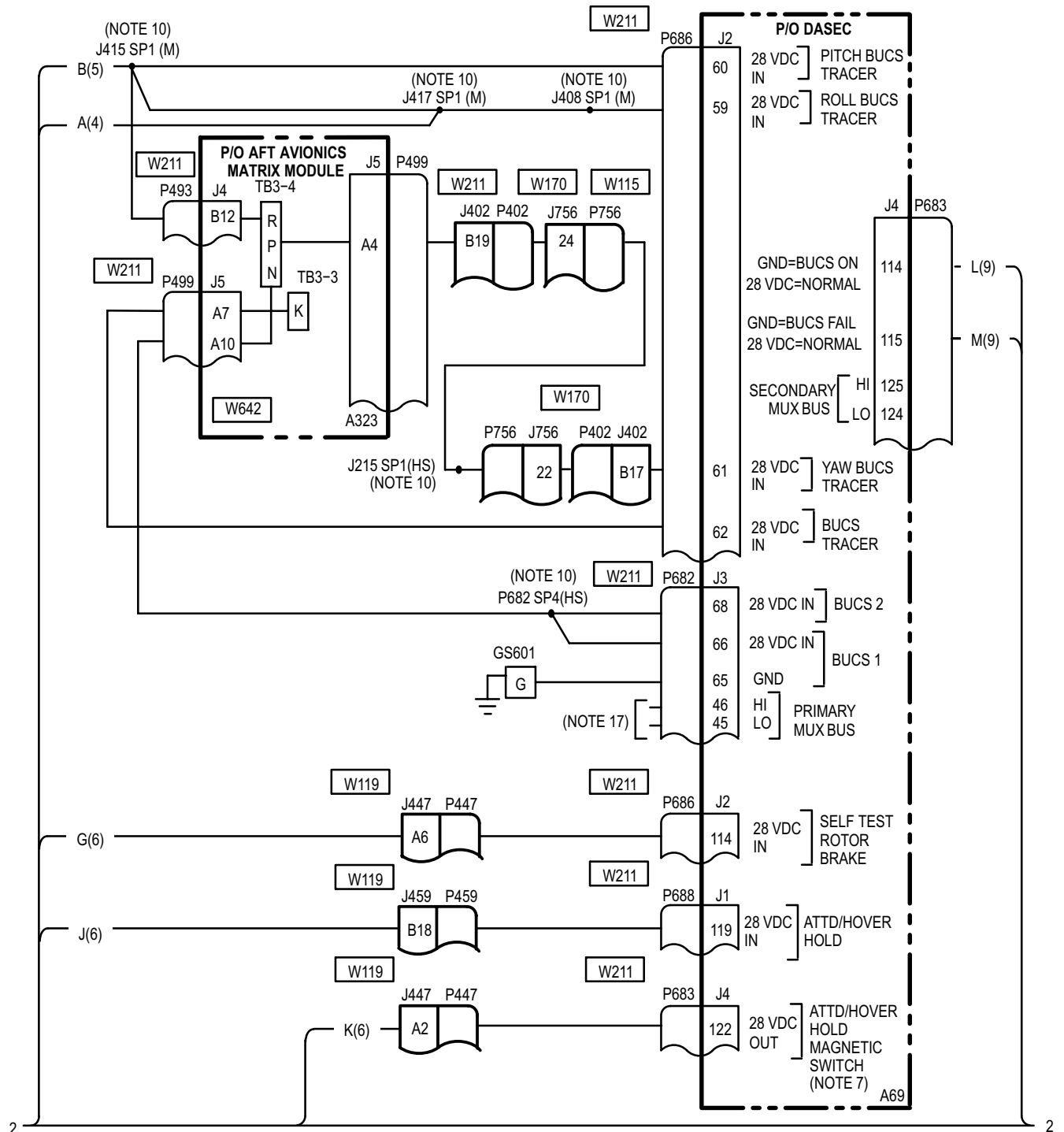
11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27



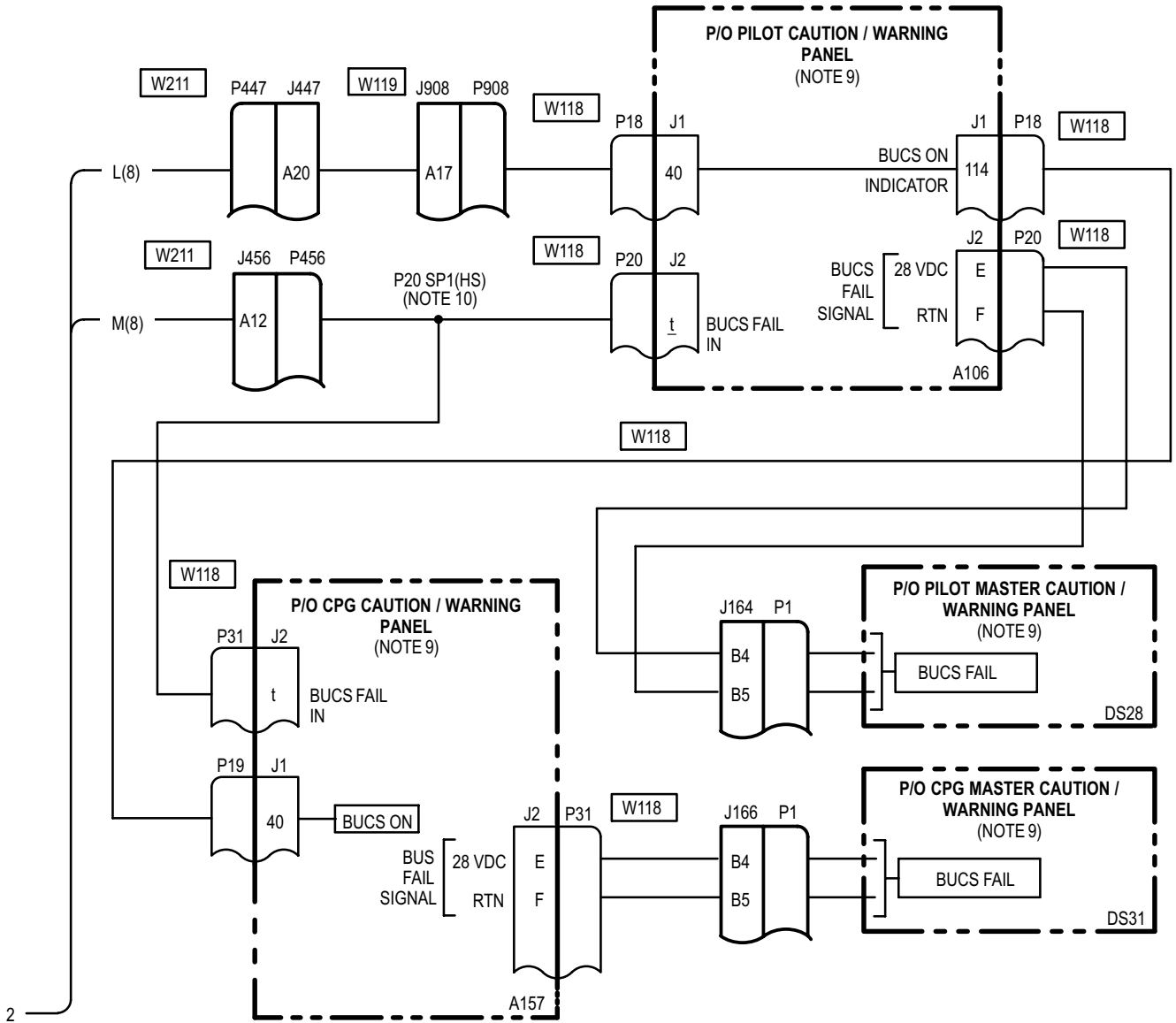
11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27



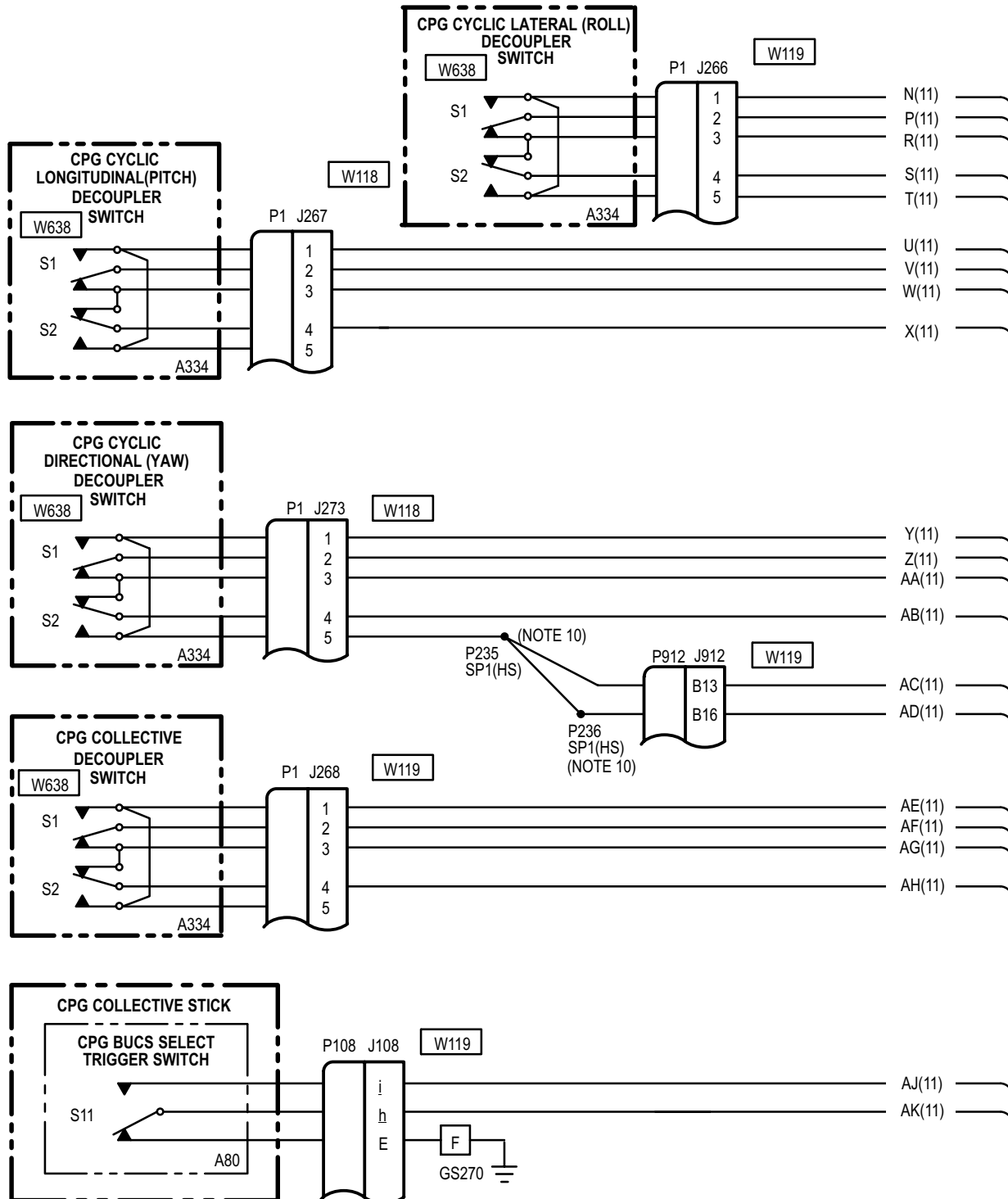
11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27



11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27

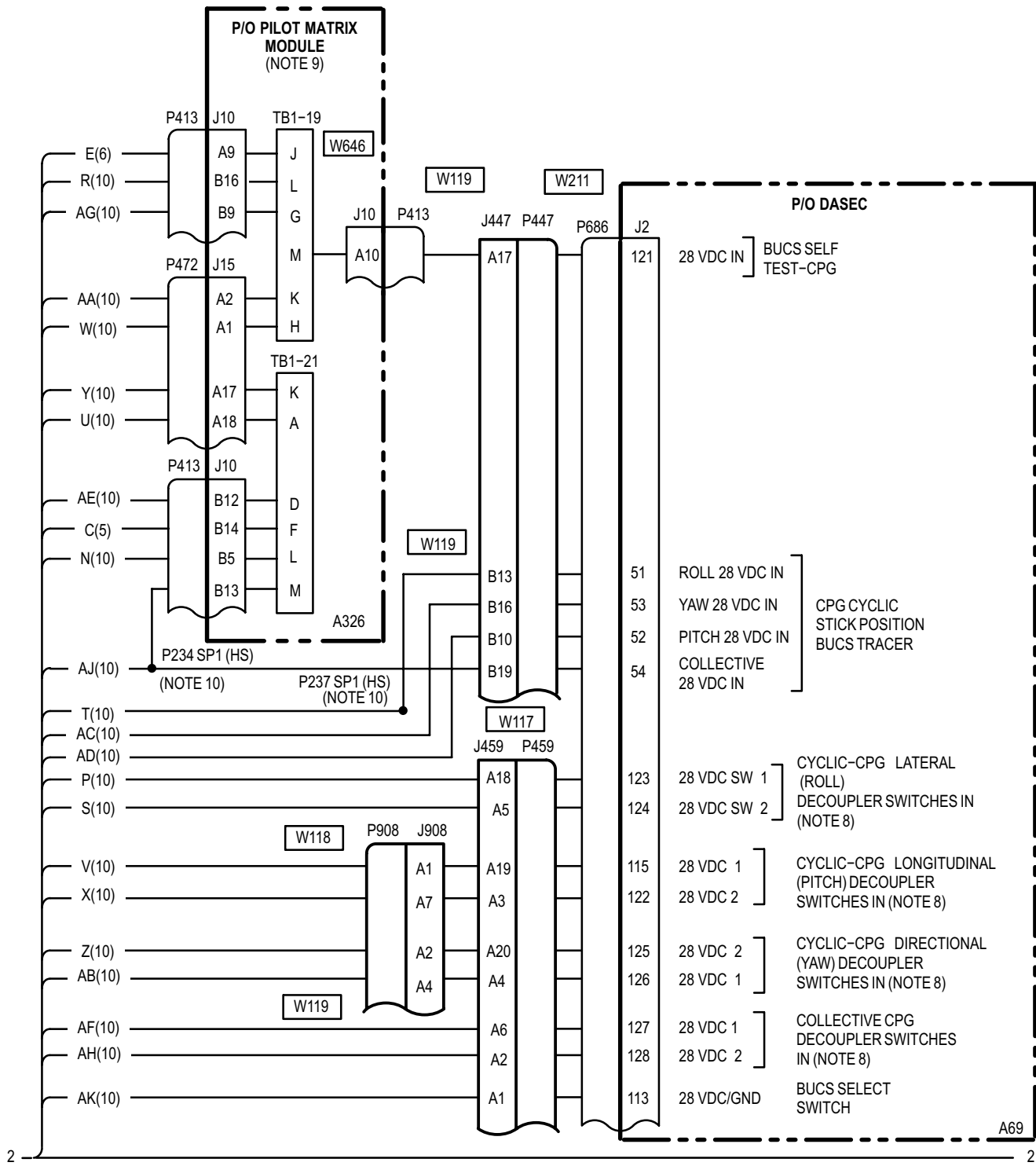


11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27

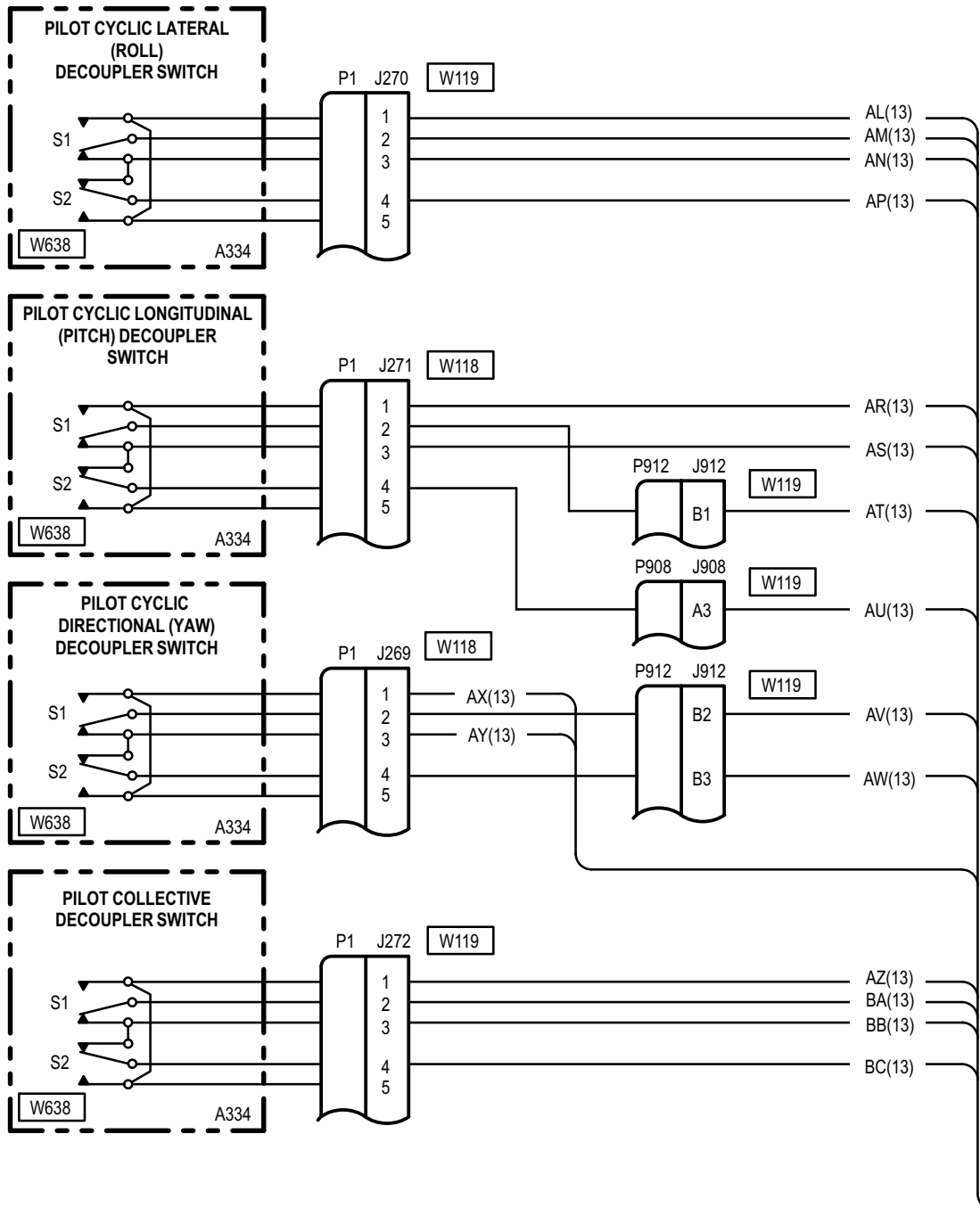


2

11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27



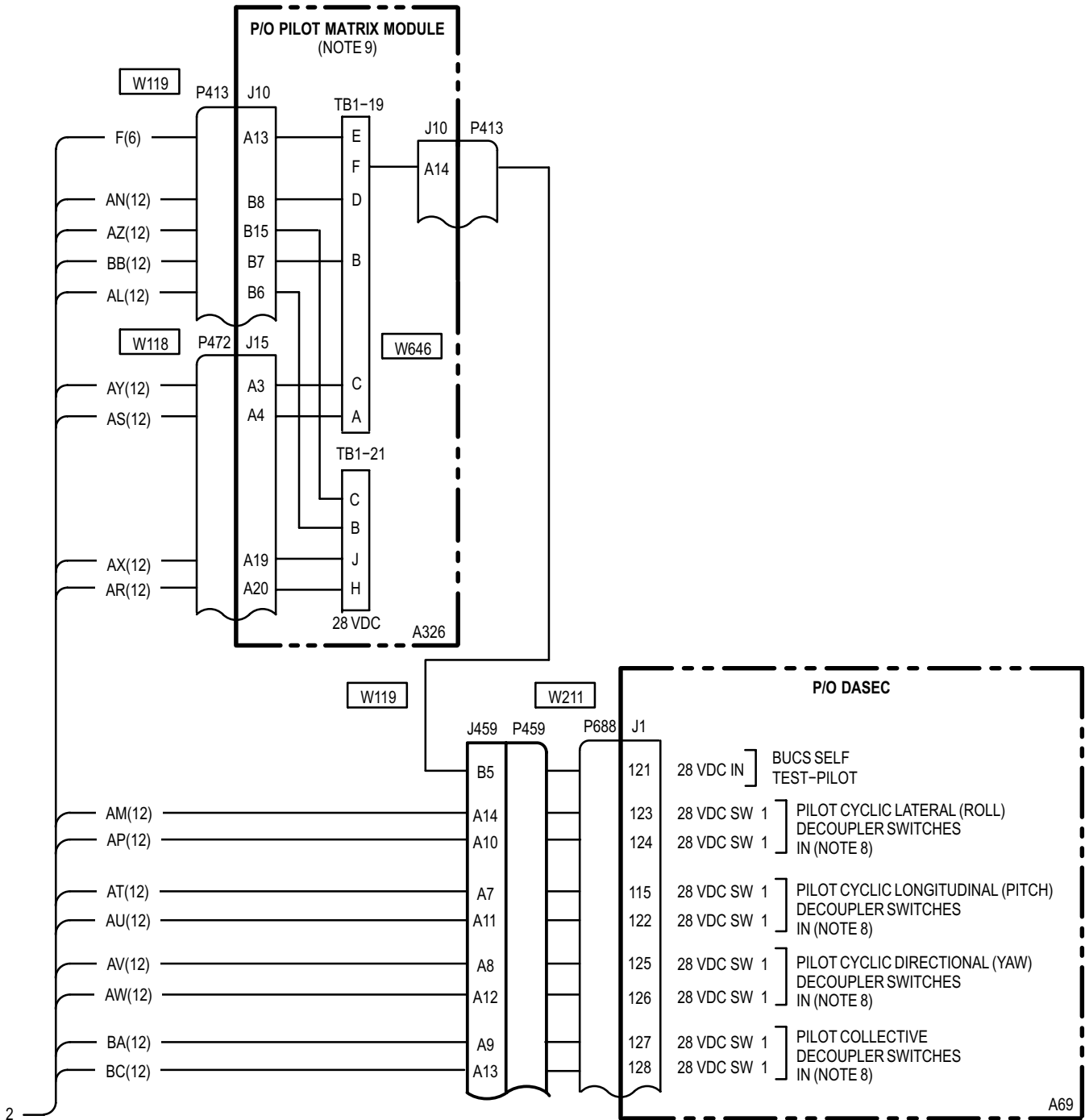
11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27



2

2

11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27



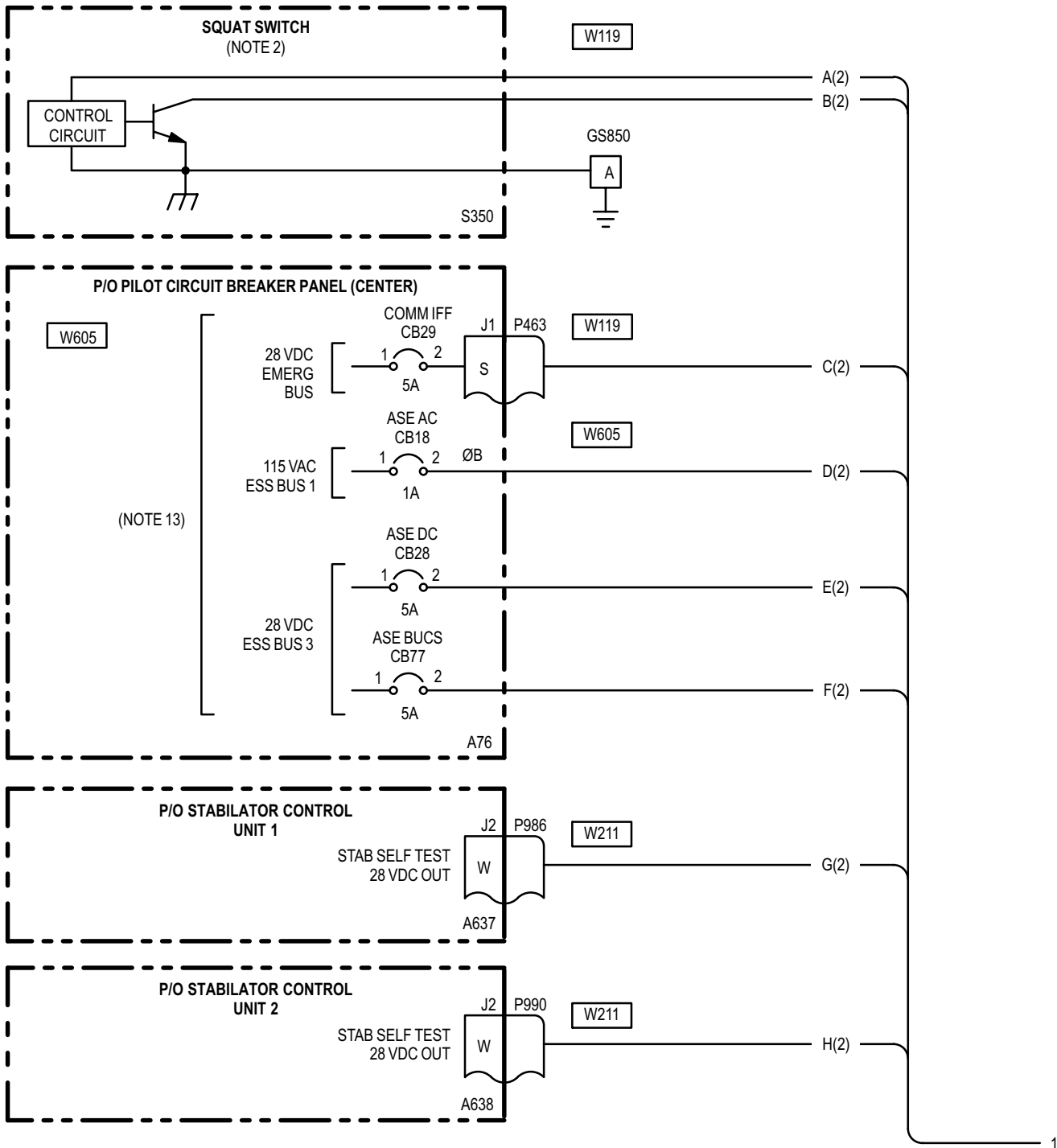
11-27. DASE- WIRING INTERCONNECT DIAGRAM (COLLECTIVE) (BUCS DEACTIVATED) (cont) 11-27

NOTES:

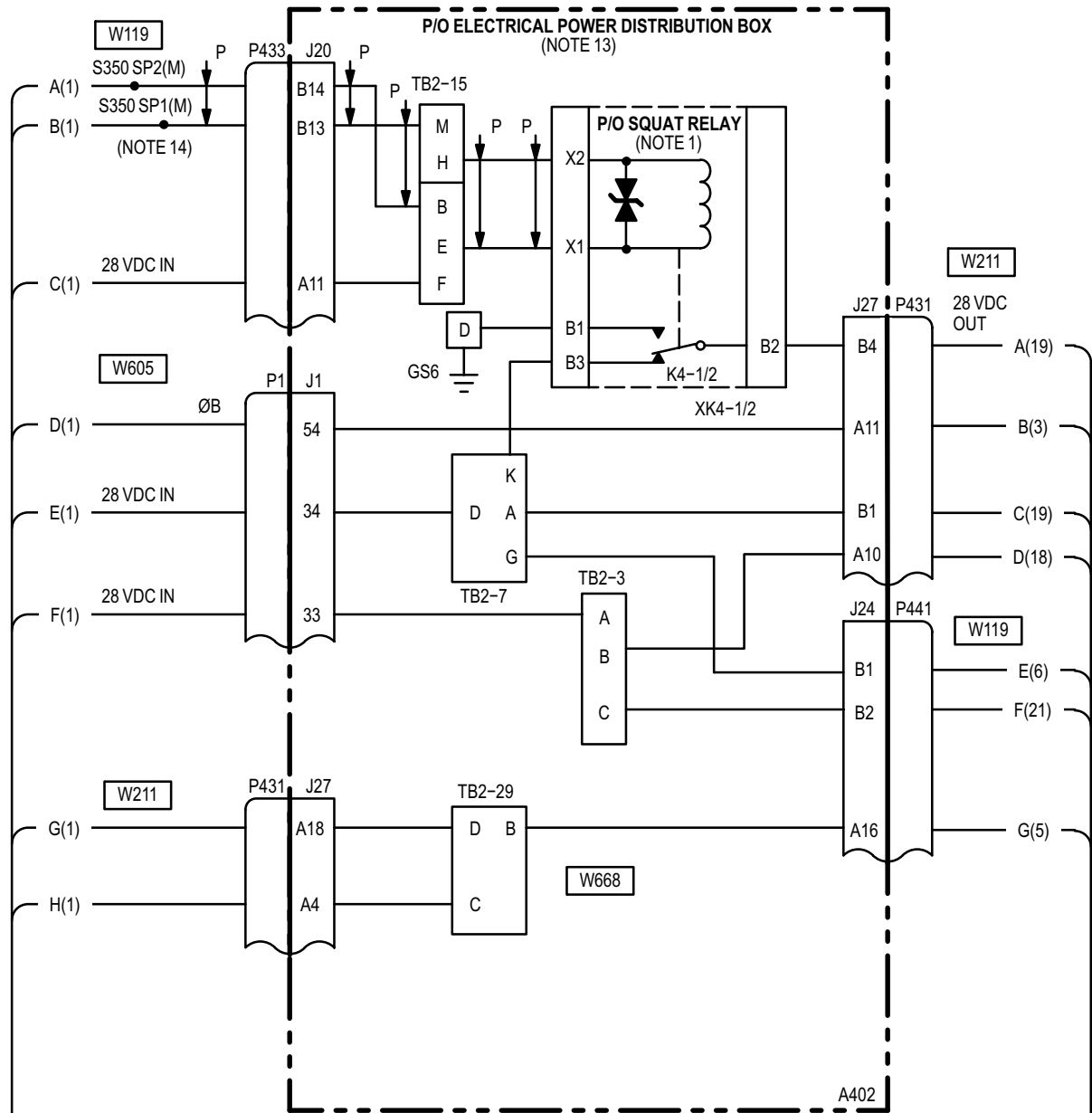
HIGHWAY USE: THE ALPHA CHARACTER IDENTIFIES A SPECIFIC LINE, AND THE NUMBER IN PARENTHESIS IDENTIFIES THE SHEET NUMBER WHERE THE SIGNAL TERMINATES.

1. 0 VAC AT MID TRAVEL; 10 VAC WITH COLLECTIVE STICK FULLY UP OR DOWN.
2. ± 4 MA MAXIMUM CURRENT VARIATION.
3. 0 VAC AT MID TRAVEL; 2.5 VAC AT MAXIMUM TRAVEL.
4. 0 VAC AT MID TRAVEL; 5 VAC AT MAXIMUM TRAVEL.
5. RELAY ACTUATED BY SQUAT SWITCH S350. ON GROUND-CONTACTS B2 AND B3 CLOSED, SQUAT RELAY DE-ENERGIZED. AIRBORNE-CONTACTS B2 AND B1 CLOSED, SQUAT RELAY DE-ENERGIZED.
6. VARIES FROM APPROX. 0.5 VDC TO 5 VDC; WITH NO CHANGE AT SOURCE.
7. MAGNETIC SWITCHES; SOLENOID HOLDS SWITCH ON WHEN MANUALLY SET TO ON.
8. 28 VDC IN ONLY WHEN BUCS SELF TEST SWITCH IS HELD IN PLT OR CPG POSITION.
9. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
10. HS DESIGNATES A HARD SPLICE WHICH CANNOT BE DISCONNECTED.
M DESIGNATES A SOFT SPLICE WHICH MAY BE DISCONNECTED FOR A WIRING CHECK.
11. AVIONICS CONFIGURATION HEADING ATTITUDE REFERENCE SYSTEM (HARS) (TM 11-1520-238-23-2).
12. HYDRAULIC SYSTEM (TM 1-1520-238-T-5).
13. REFER TO PARAGRAPH 11-89. STABILATOR-WIRING INTERCONNECT DIAGRAM.
14. REFER TO PARAGRAPH 11-26. DASE-WIRING INTERCONNECT DIAGRAM (YAW) (BUCS DEACTIVATED).
15. REFER TO PARAGRAPH 11-25. DASE-WIRING INTERCONNECT DIAGRAM (ROLL) (BUCS DEACTIVATED).
16. REFER TO PARAGRAPH 11-24. DASE-WIRING DIAGRAM (PITCH) (BUCS DEACTIVATED).
17. FIRE CONTROL SYSTEM-MULTIPLEX SUBSYSTEM (TM 9-1230-476-20-2).
18. REFER TO PARAGRAPH 11-28. BUCS ACTIVATED - WIRING INTERCONNECT DIAGRAM.

11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED)

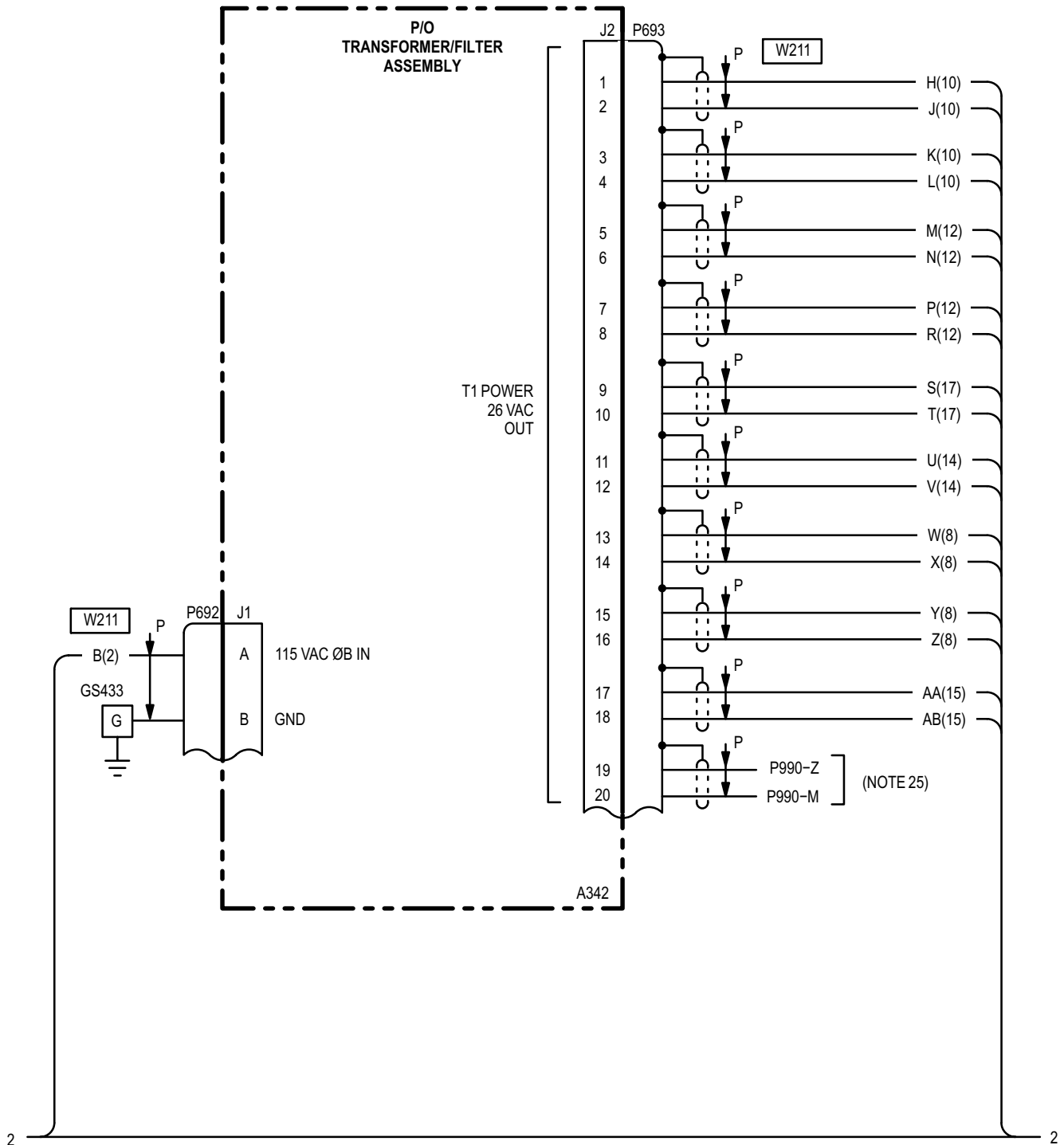


11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)



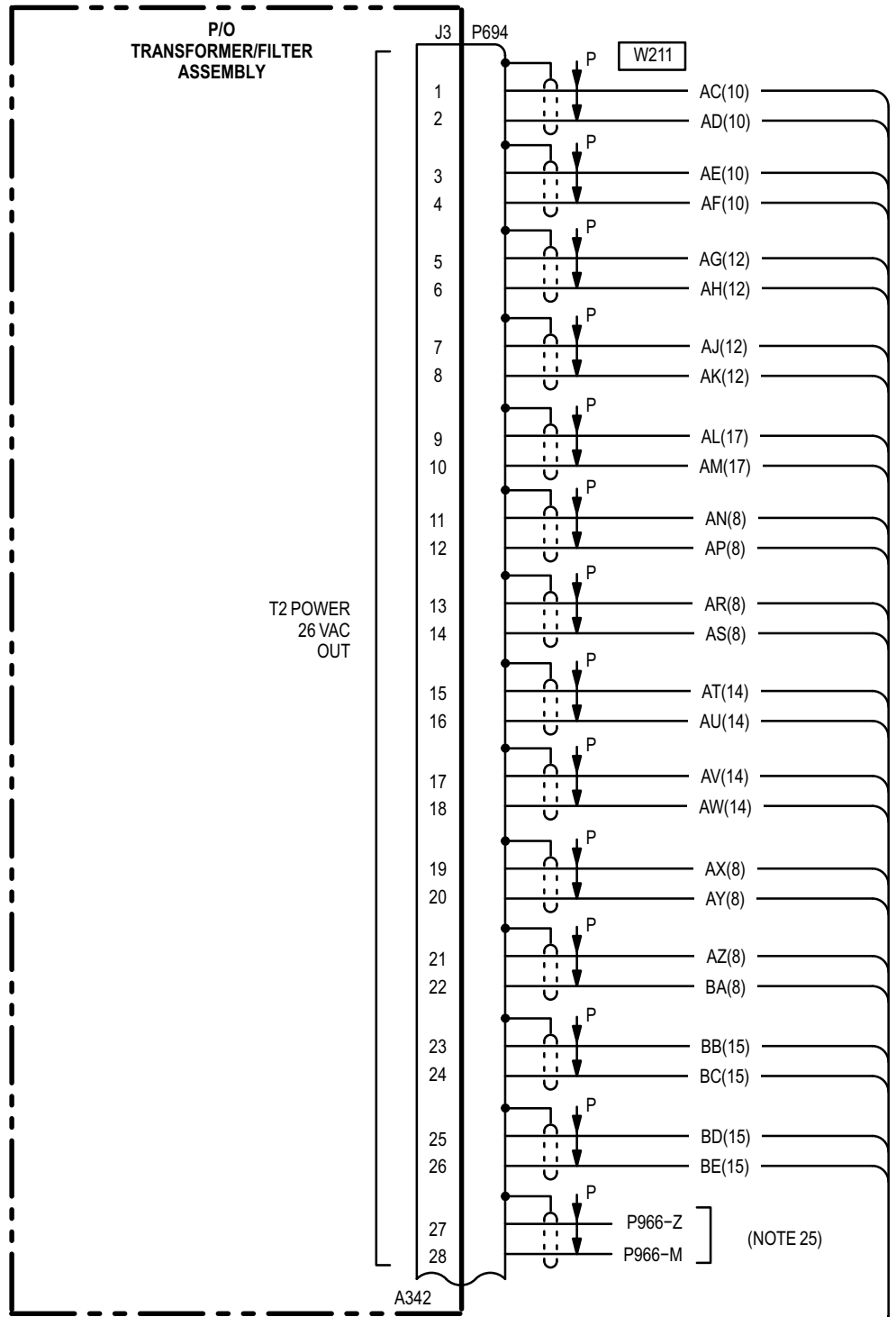
1

2



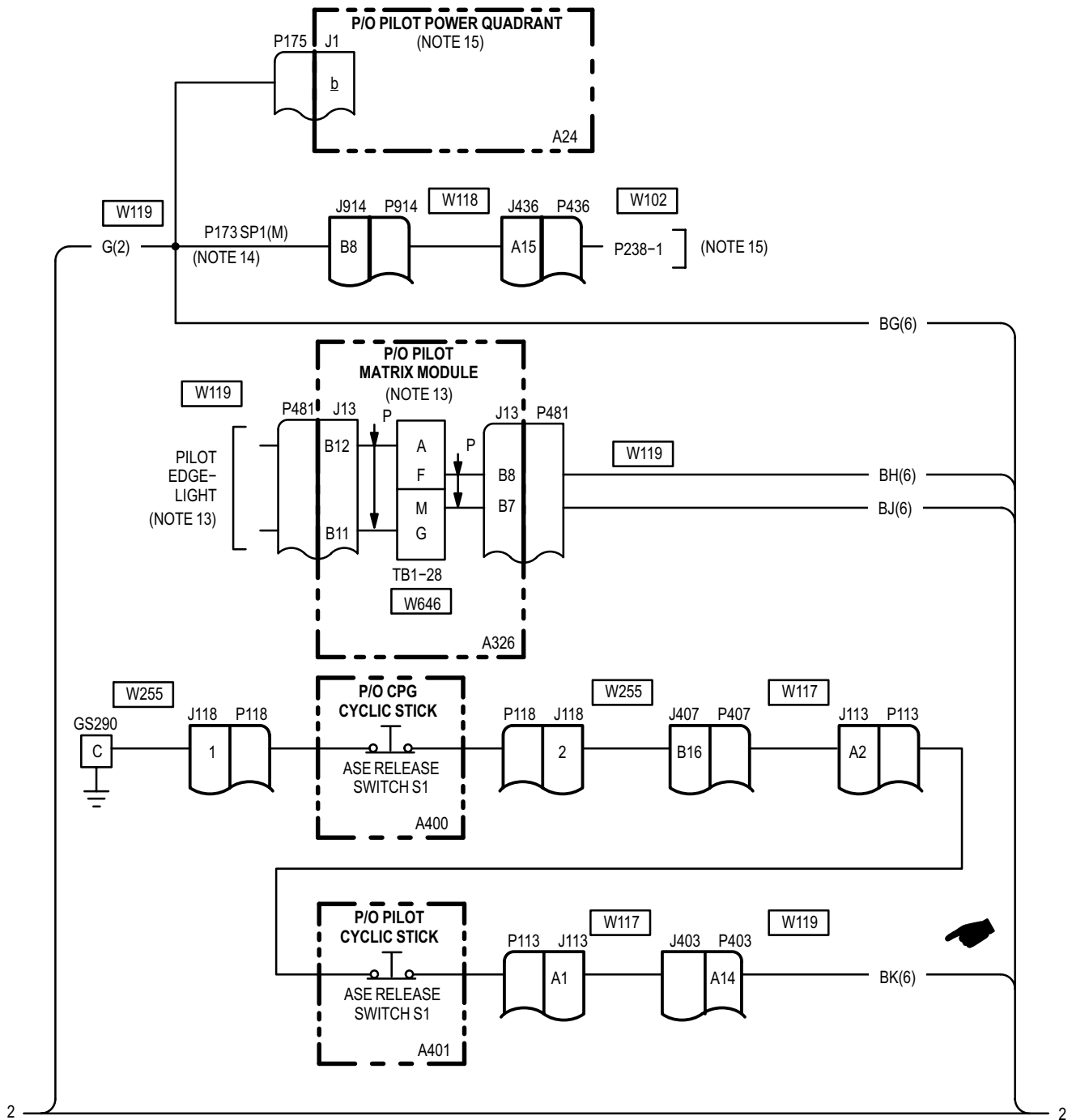
11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

11-28

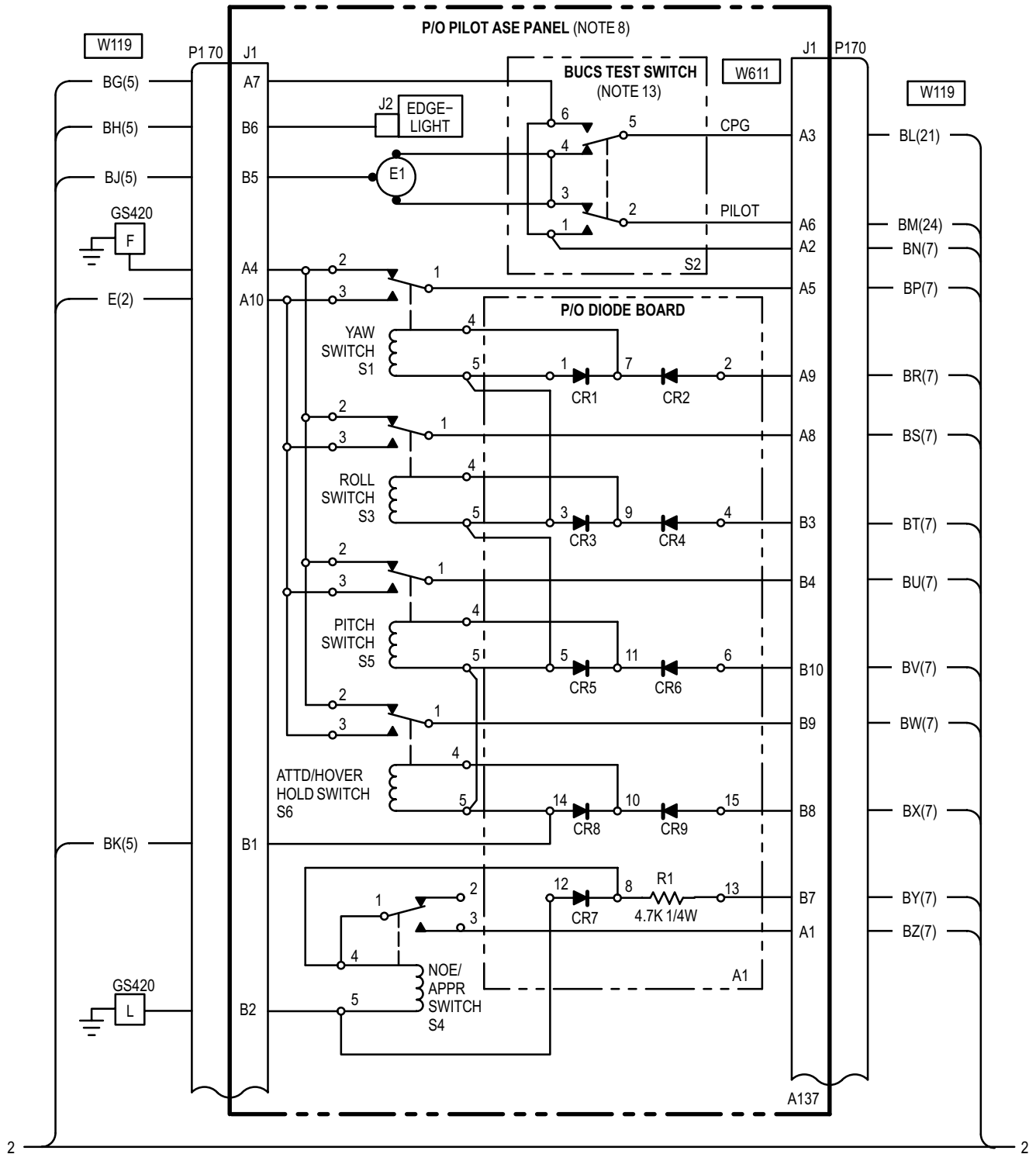


2

2
M70-327-4A
SHEET 4 OF 29

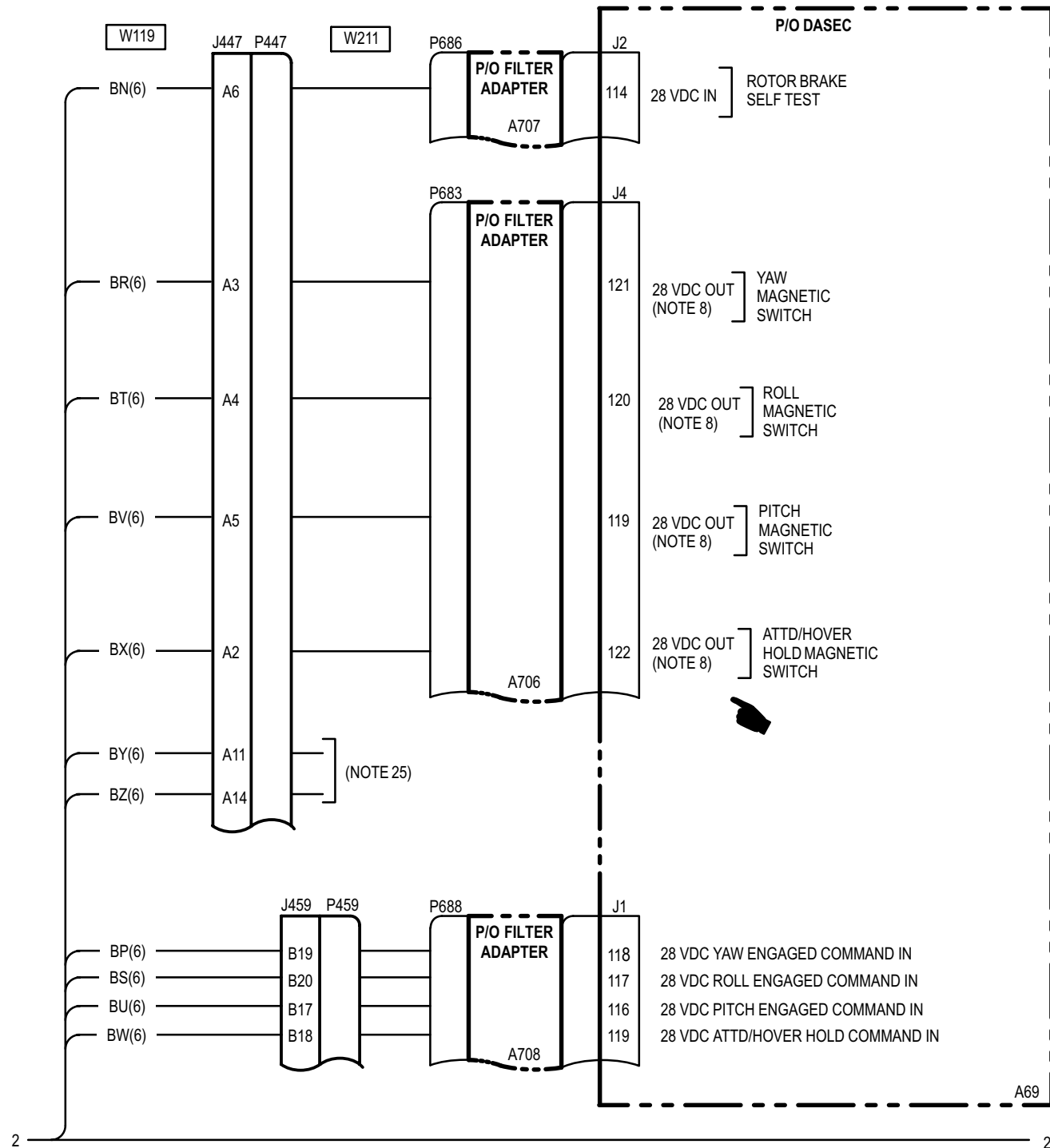


11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

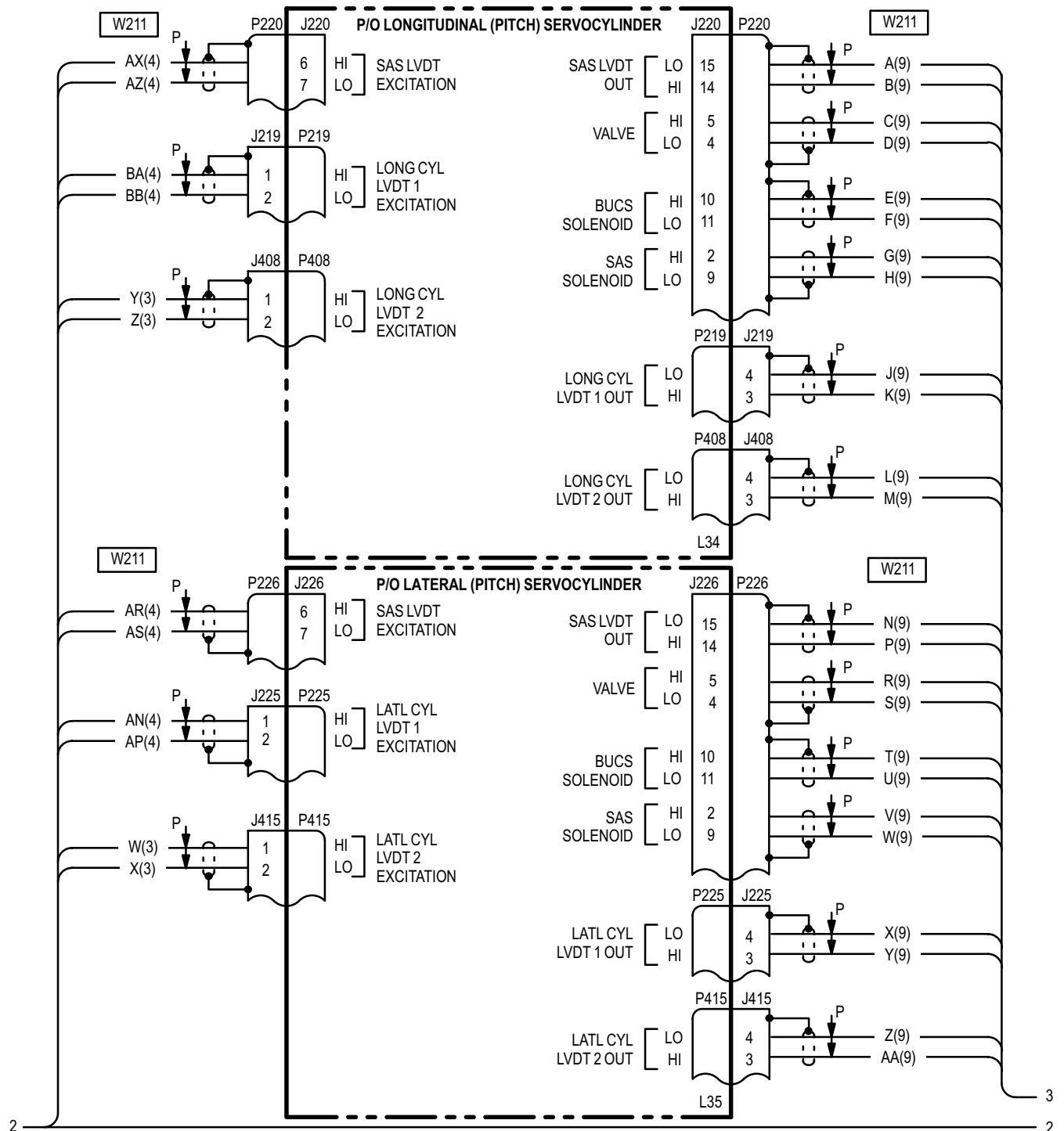


2

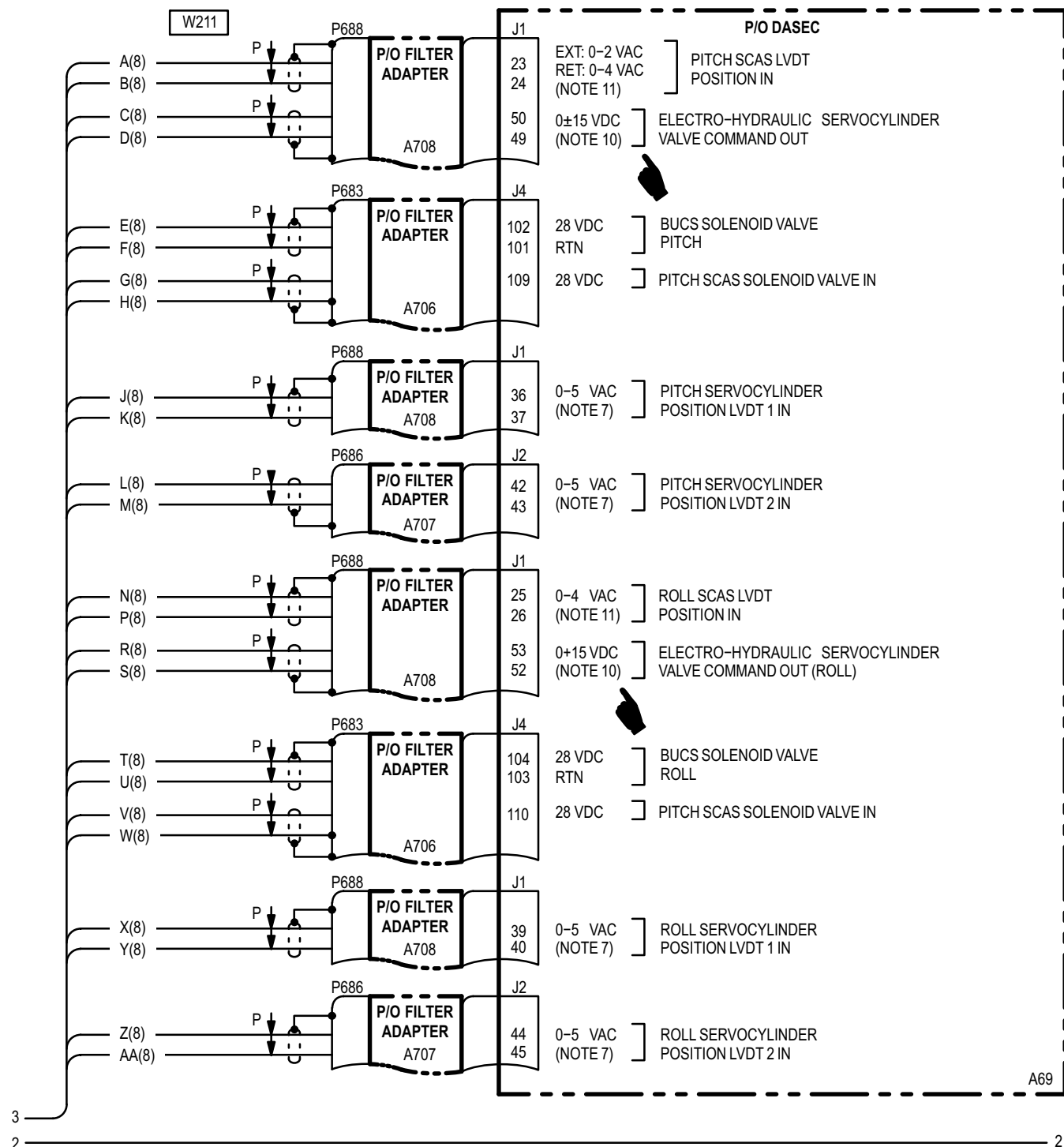
11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)



11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

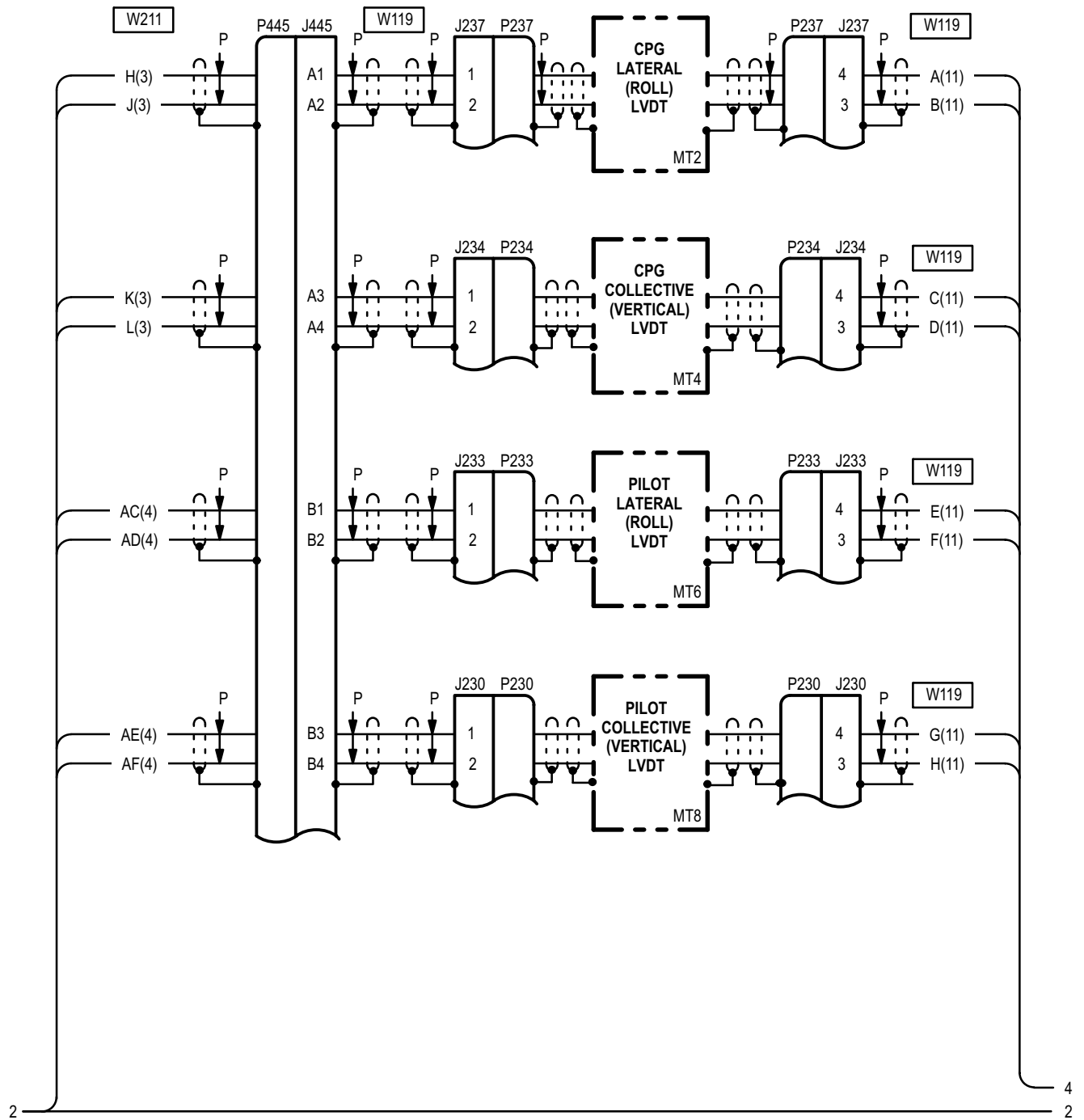


11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

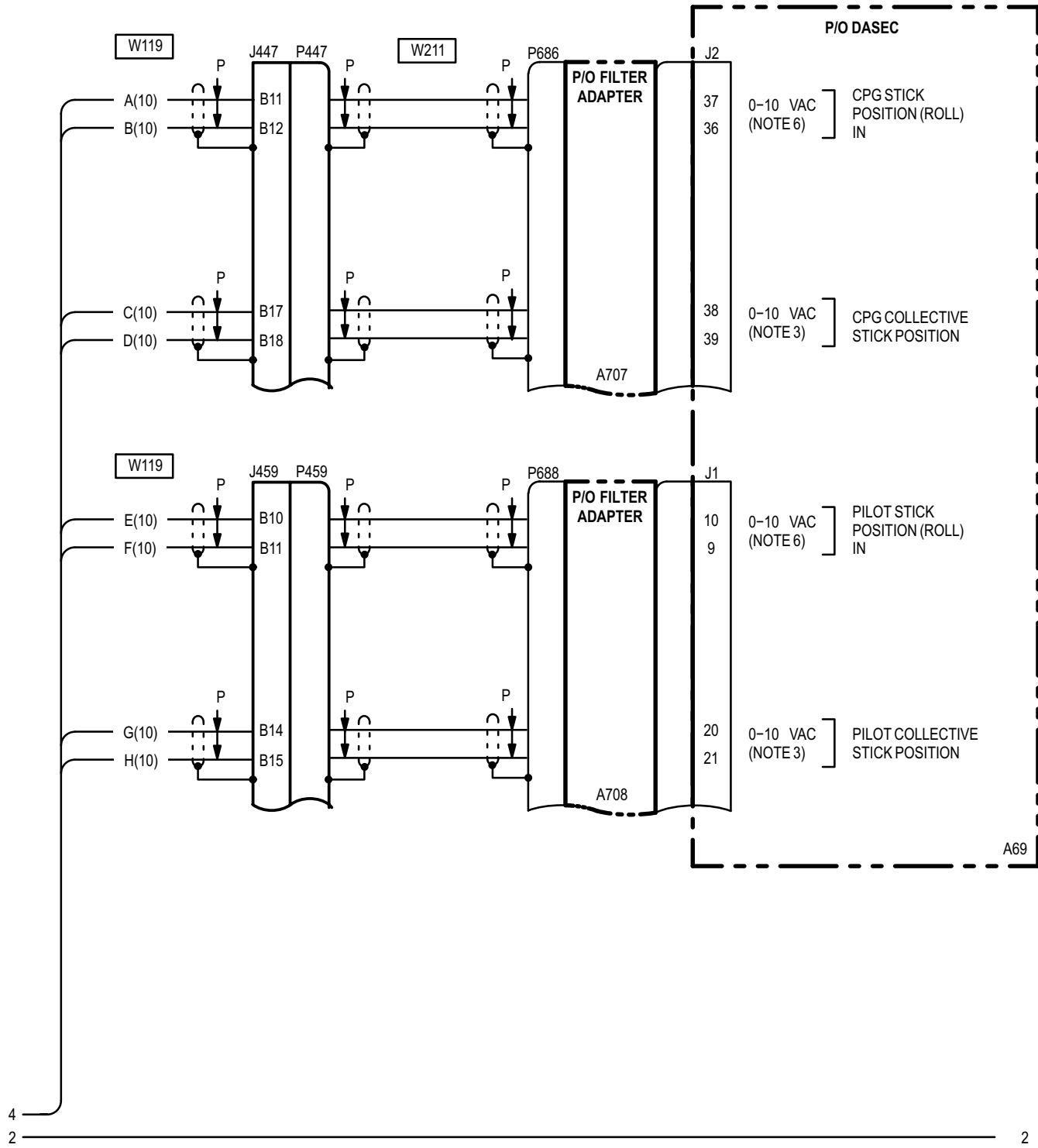


11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

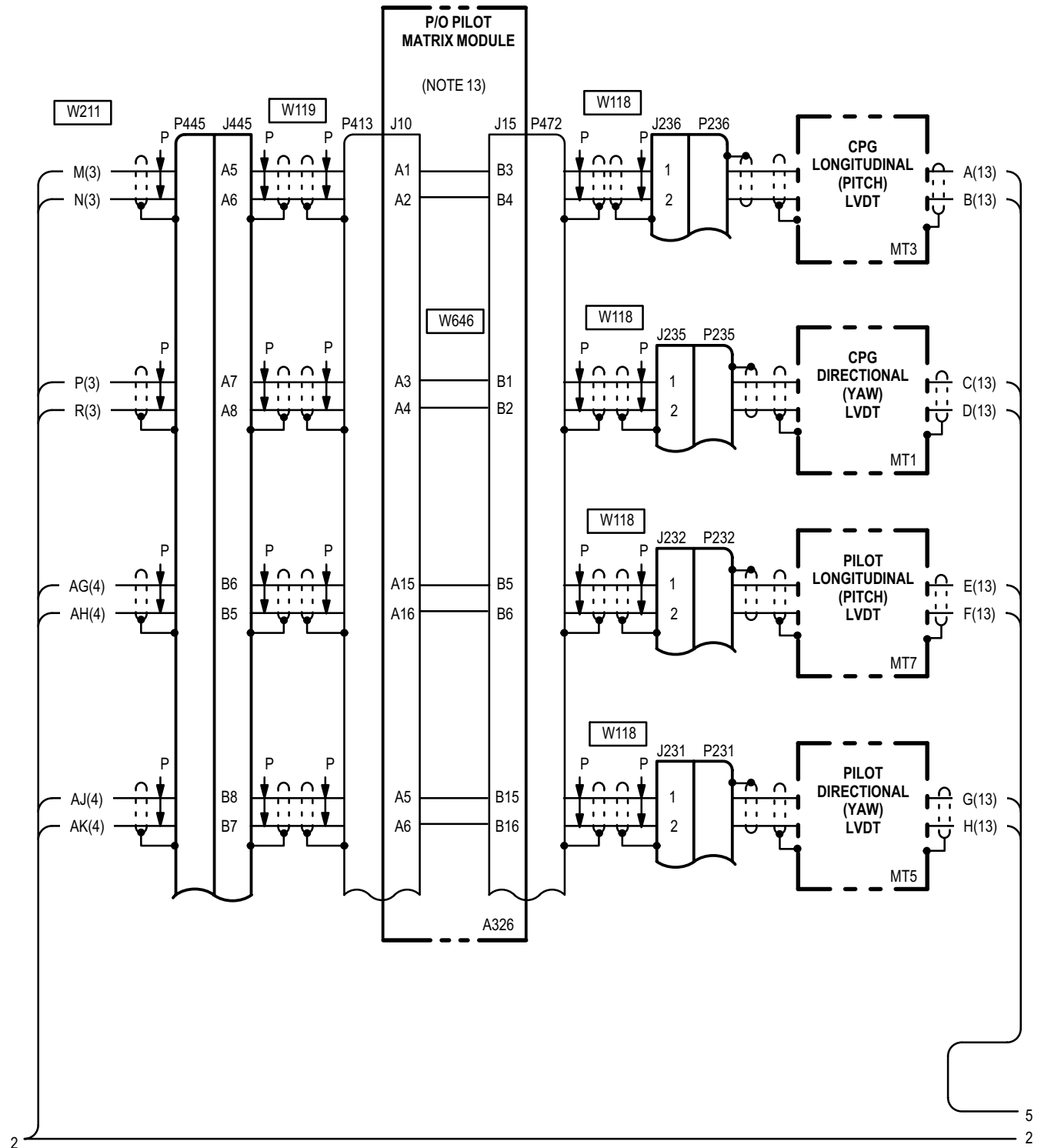
11-28



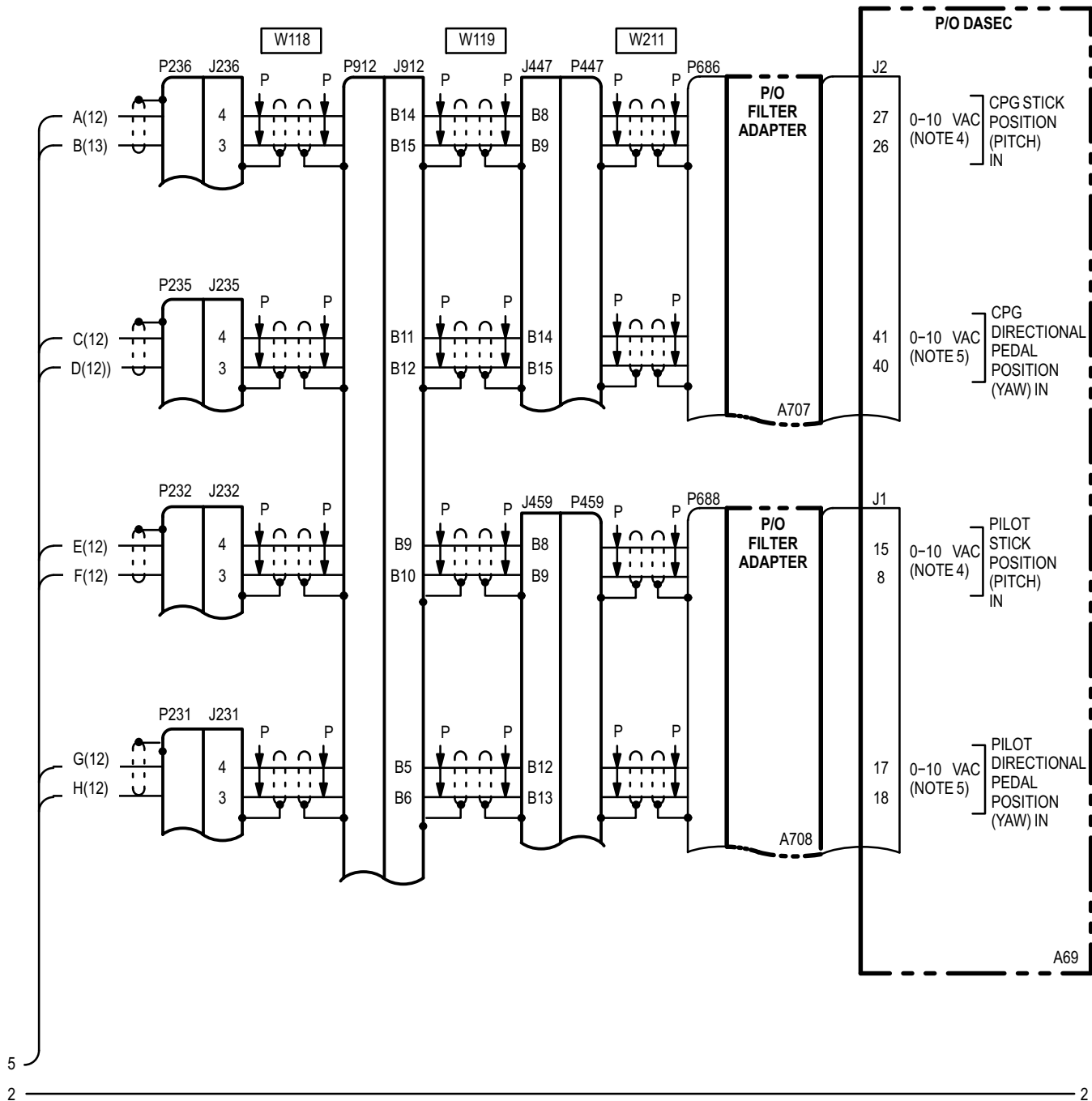
11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)



11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)



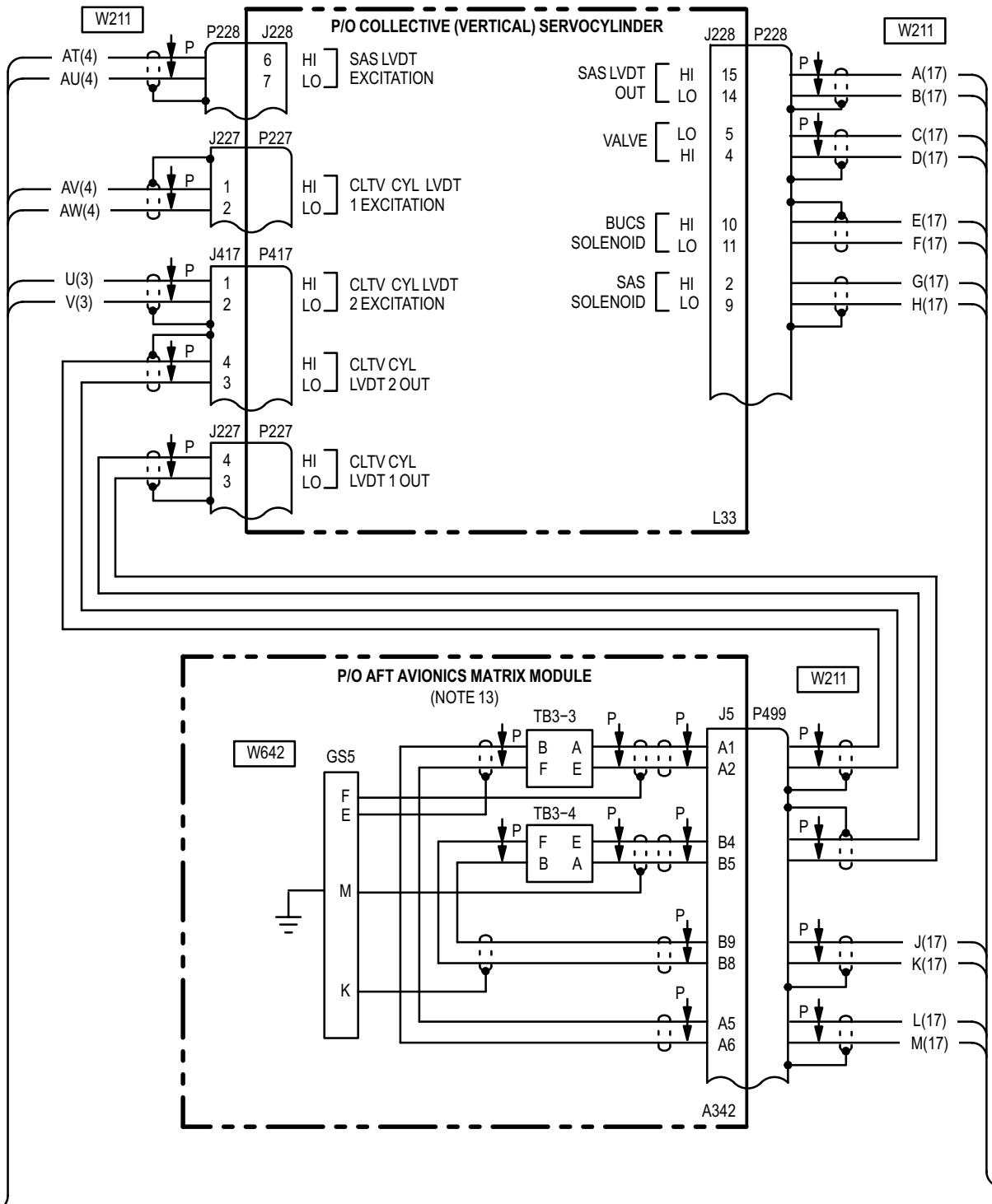
11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)



5
2

11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

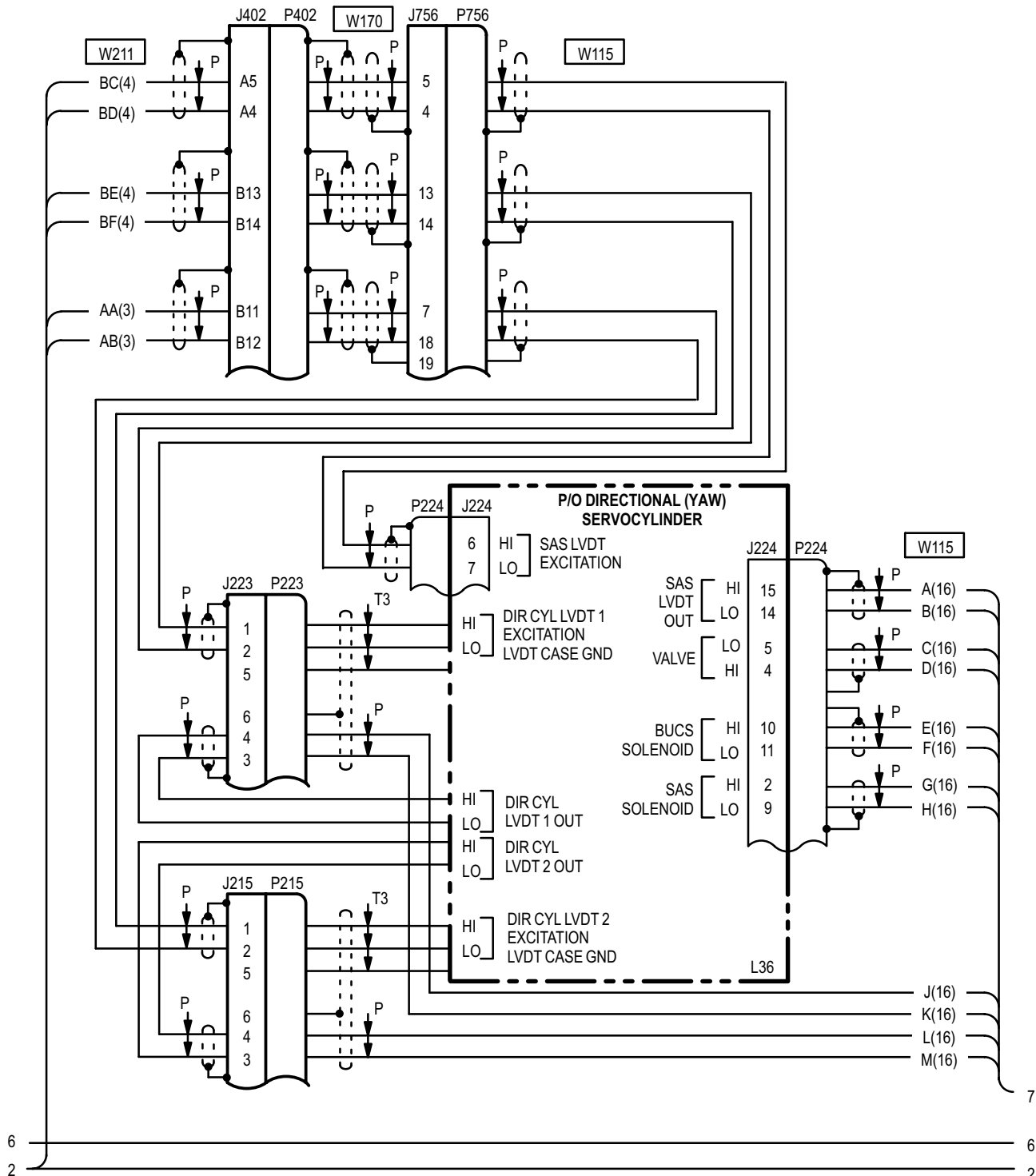
11-28



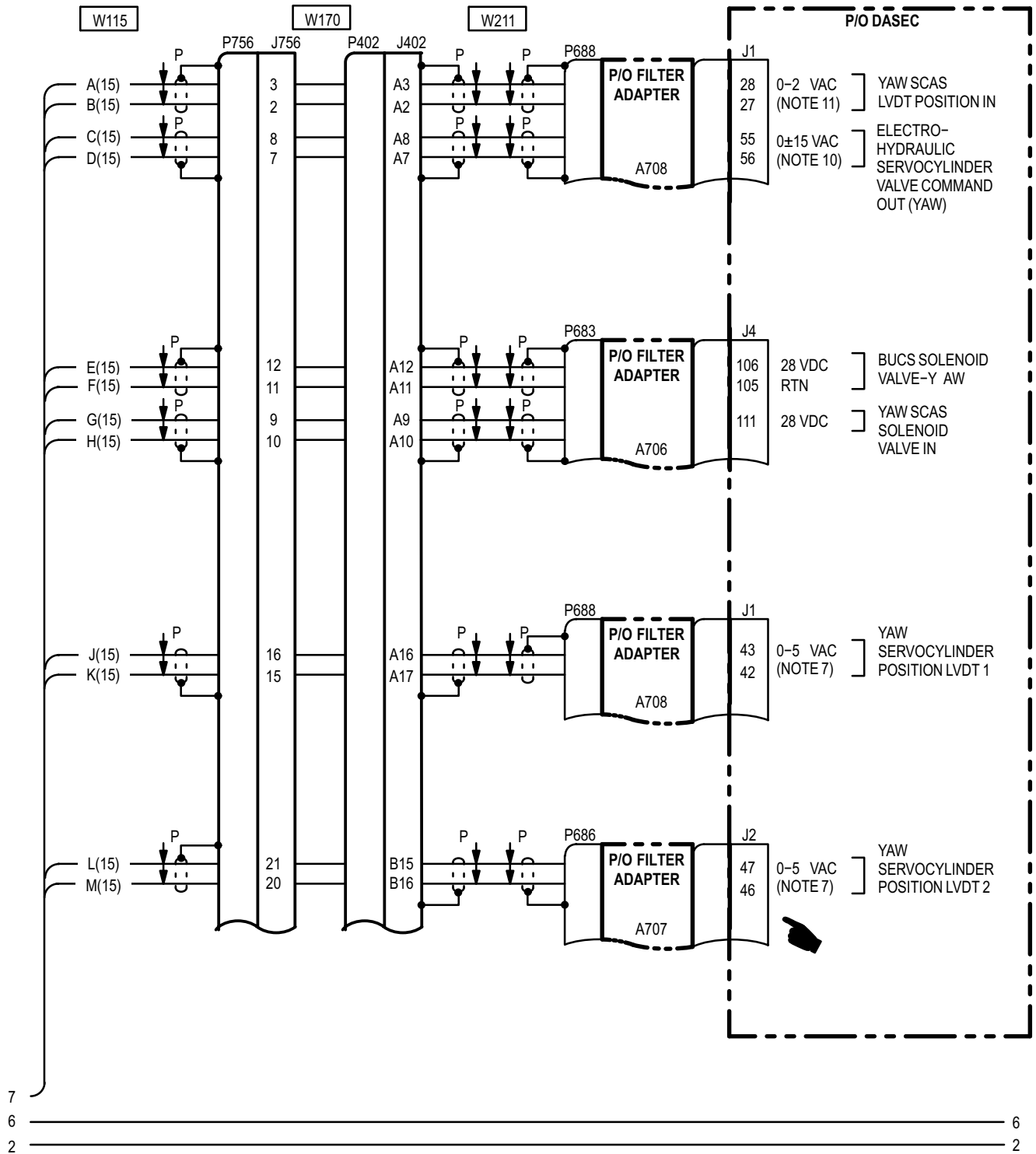
2

6
2

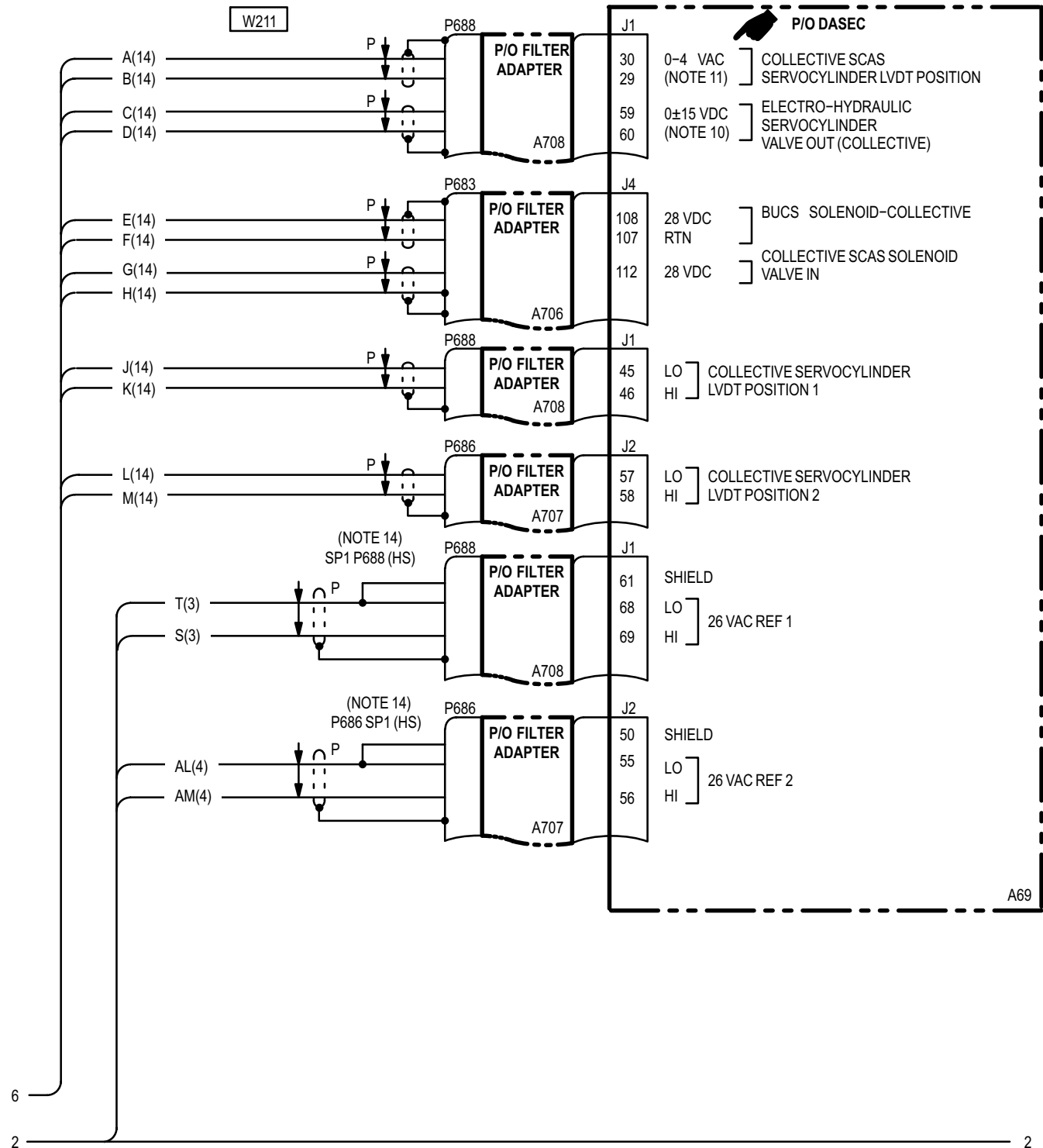
11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)



11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

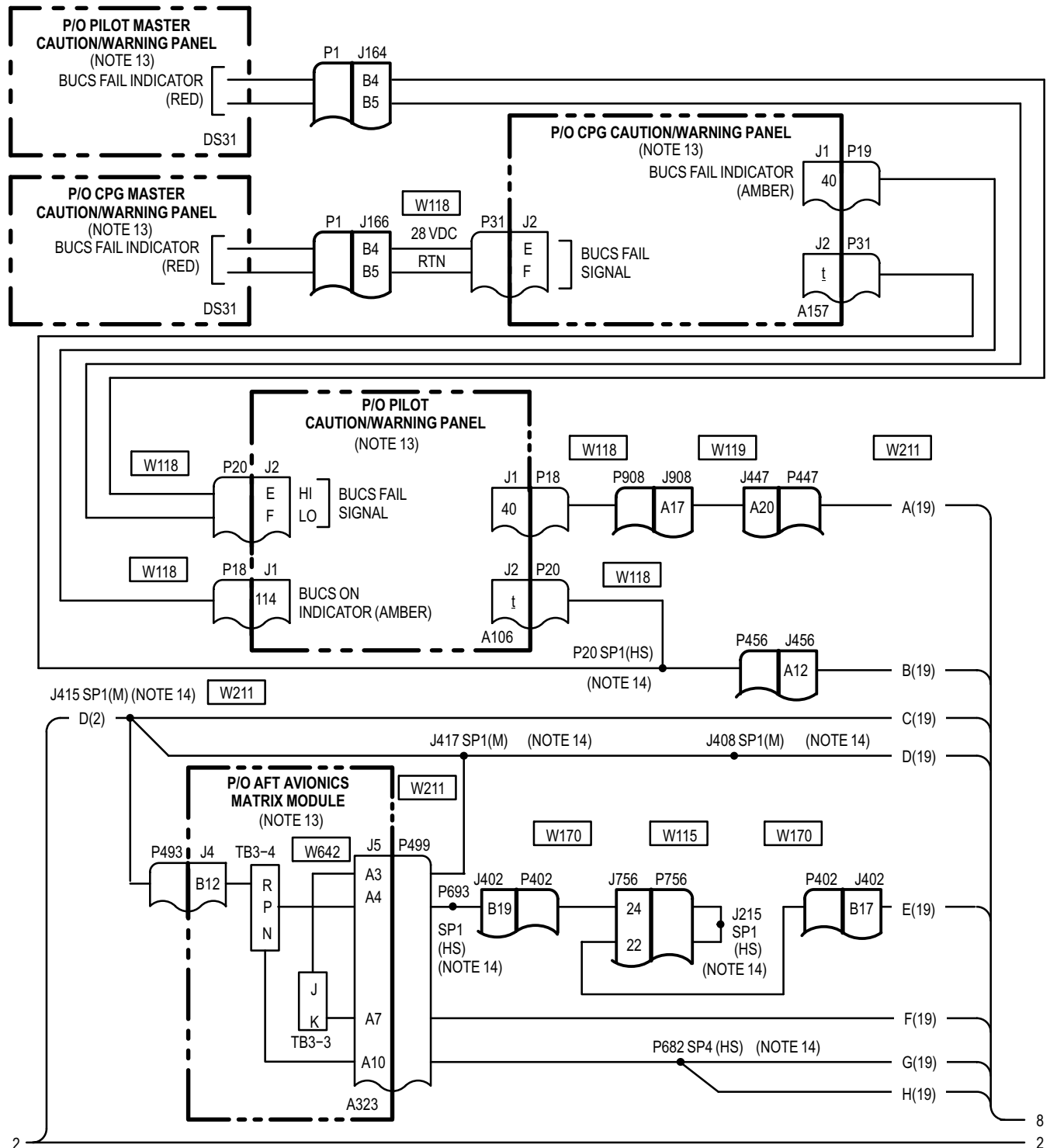


11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)



11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

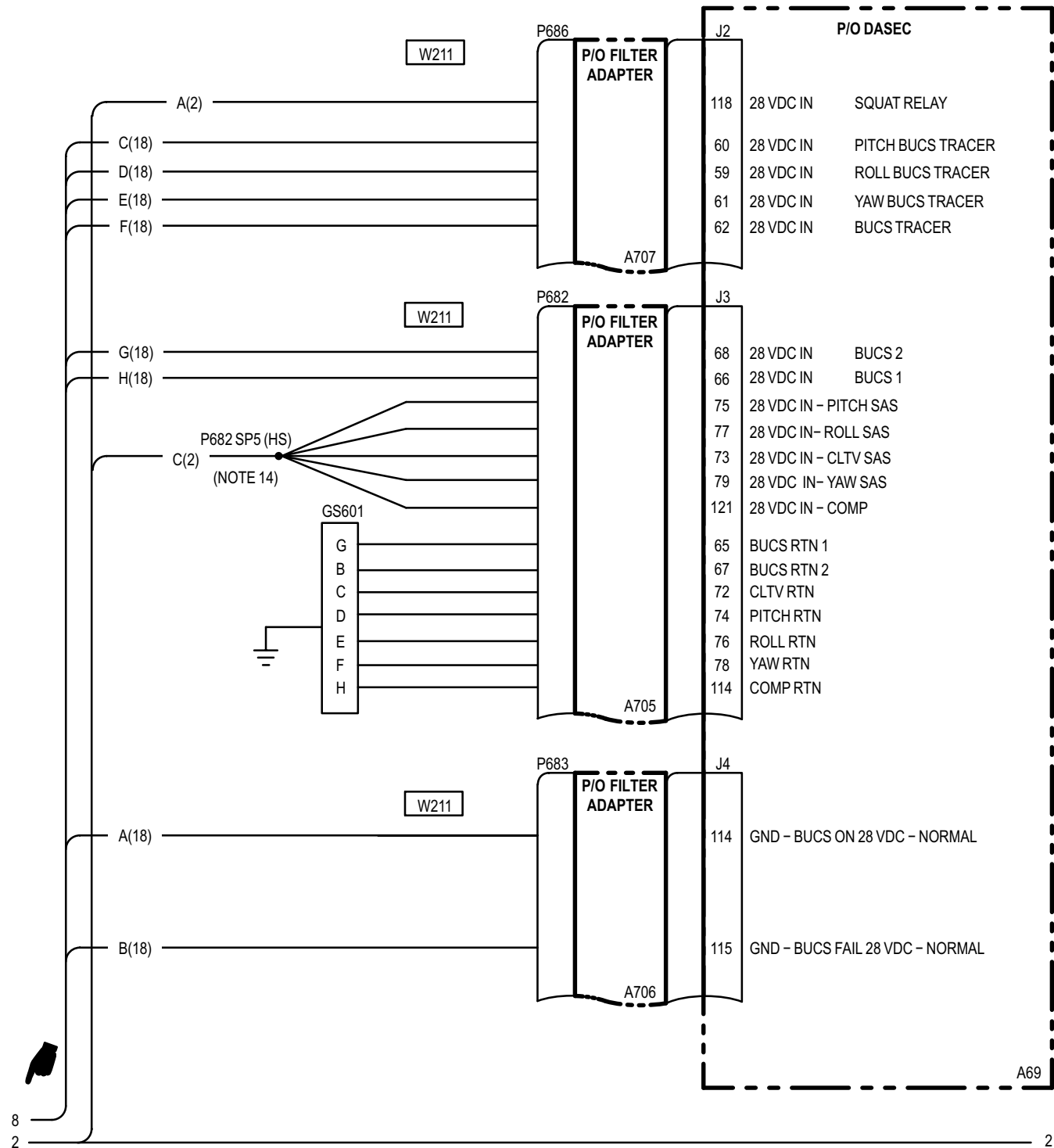
11-28



2

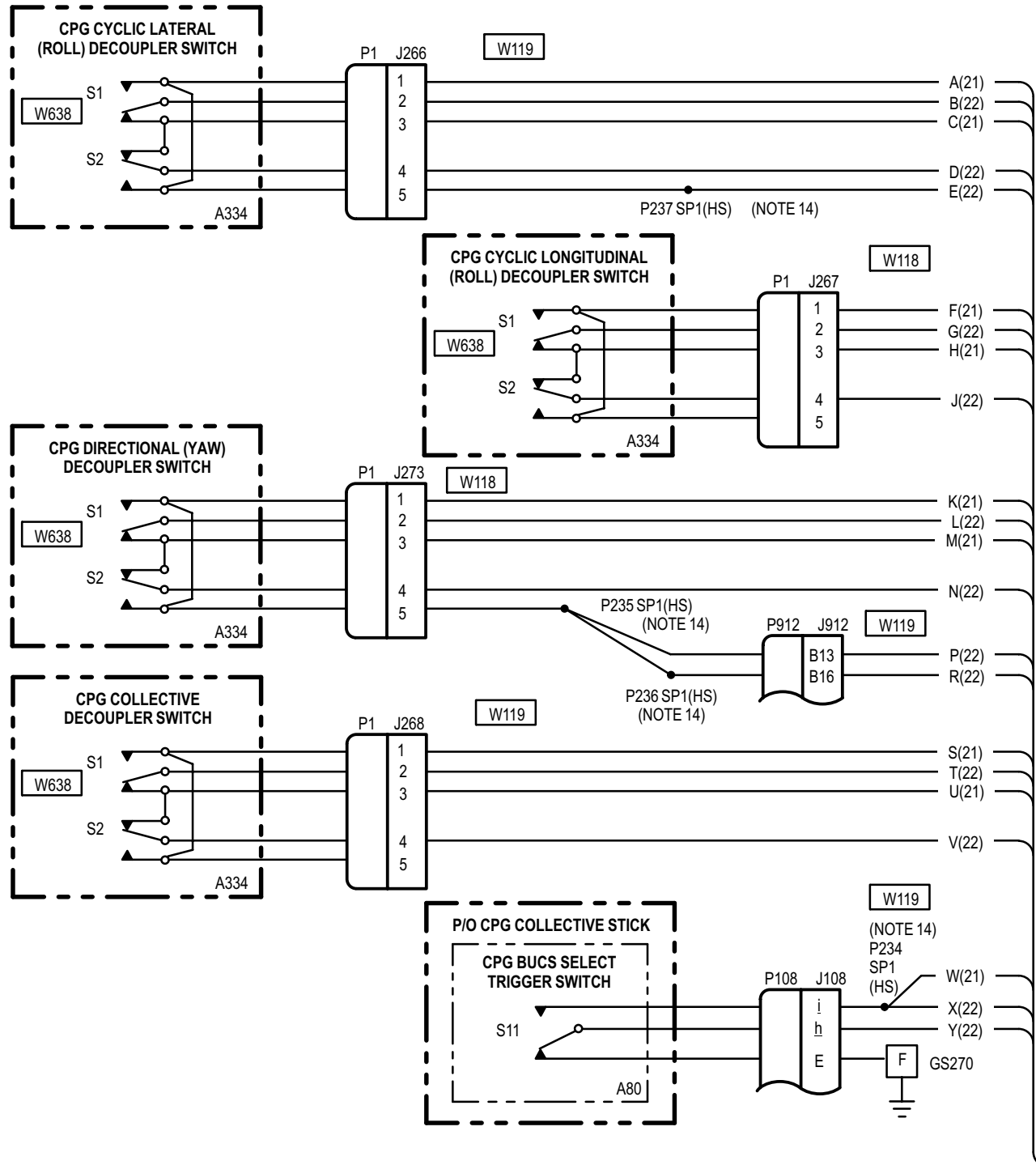
8
2

11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)



11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

11-28

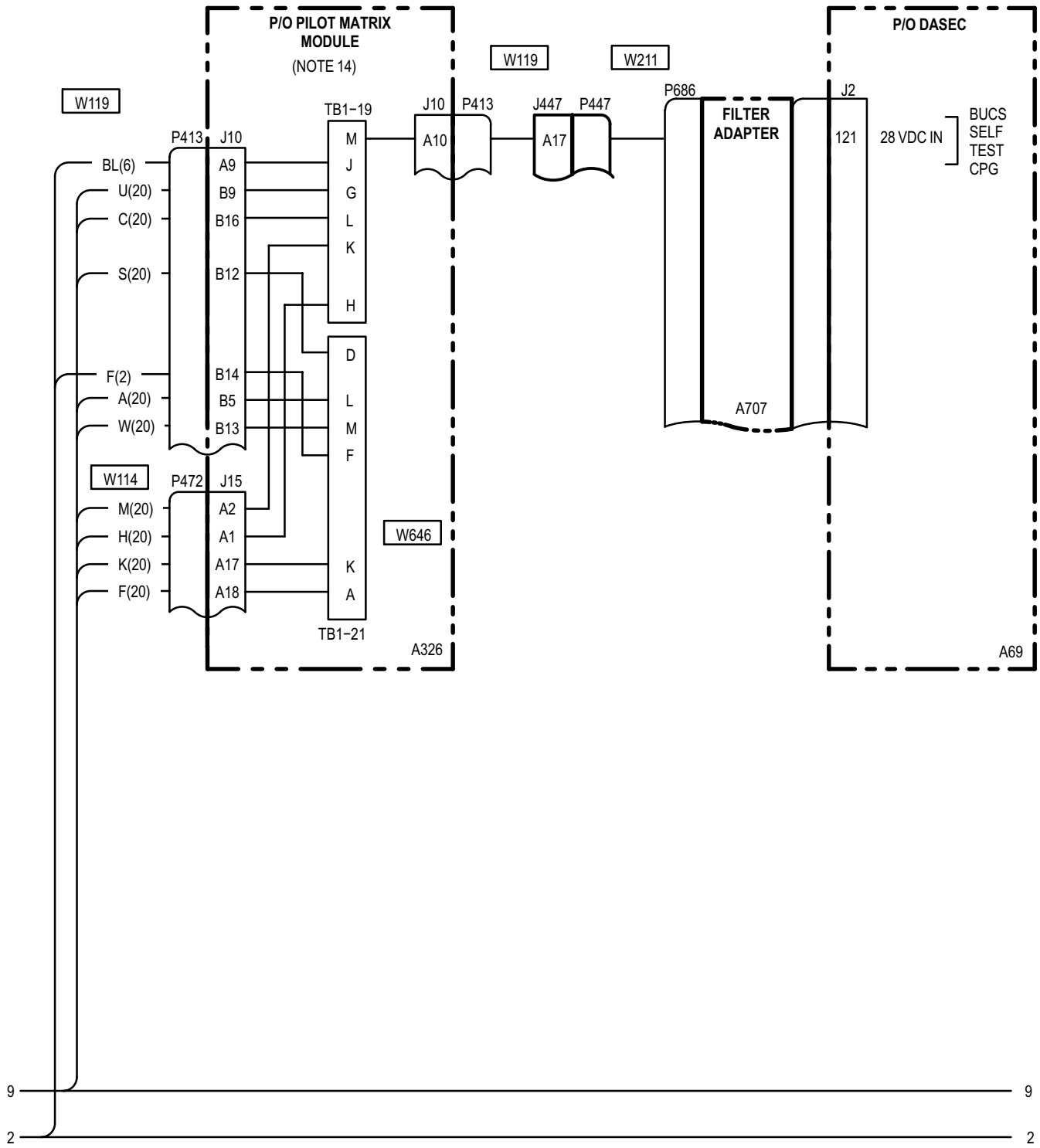


2

9

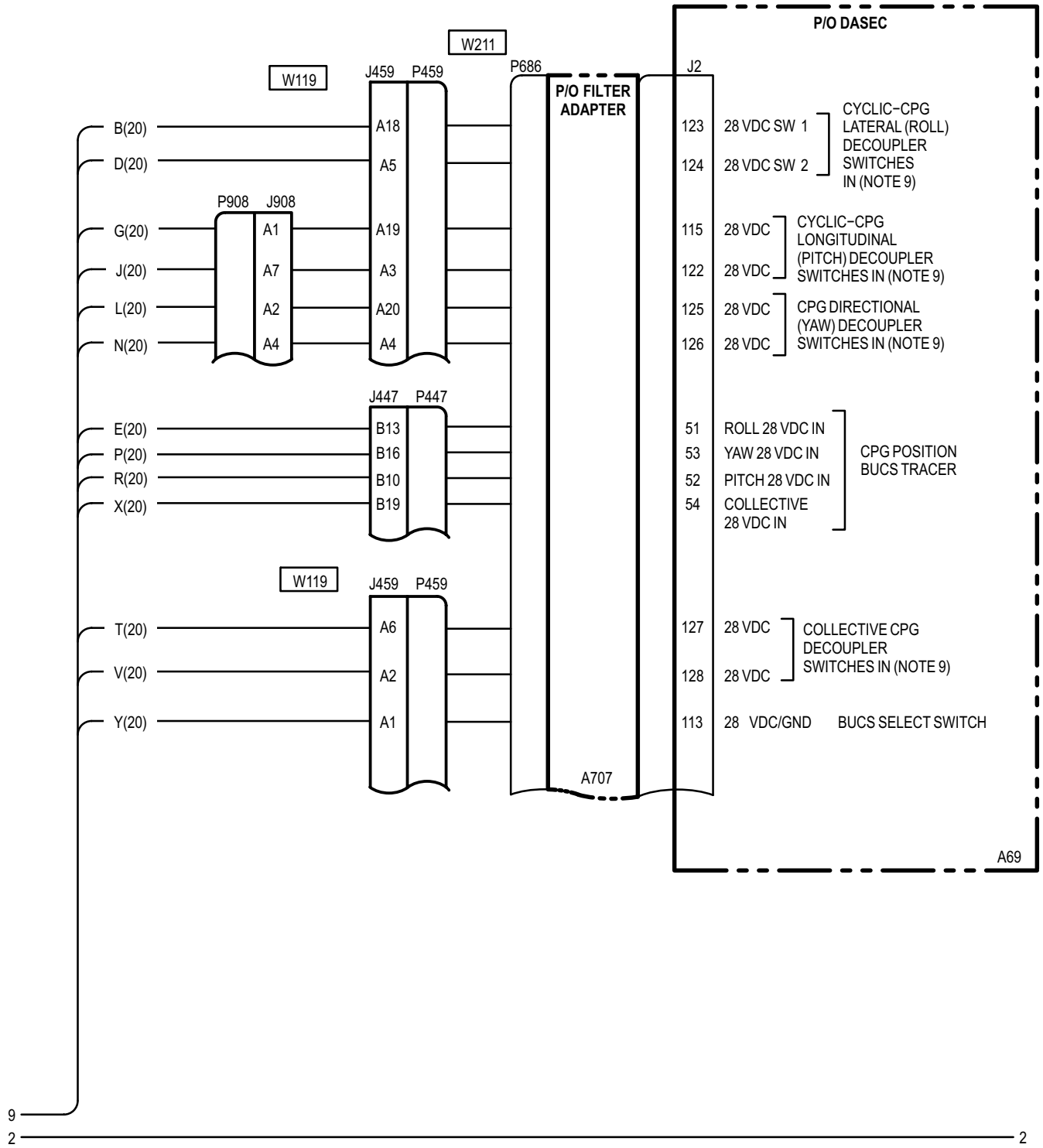
2

11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

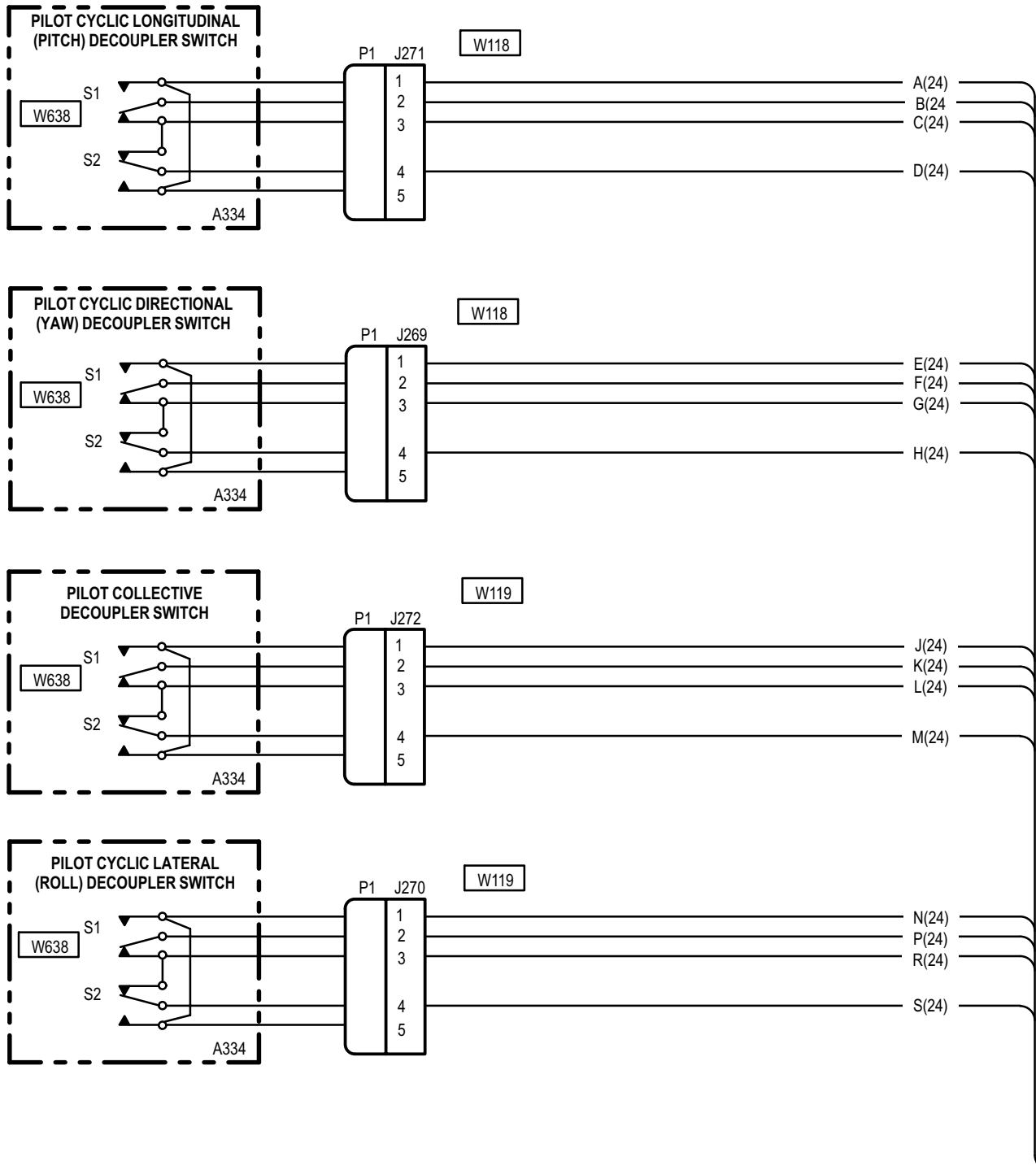


11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

11-28



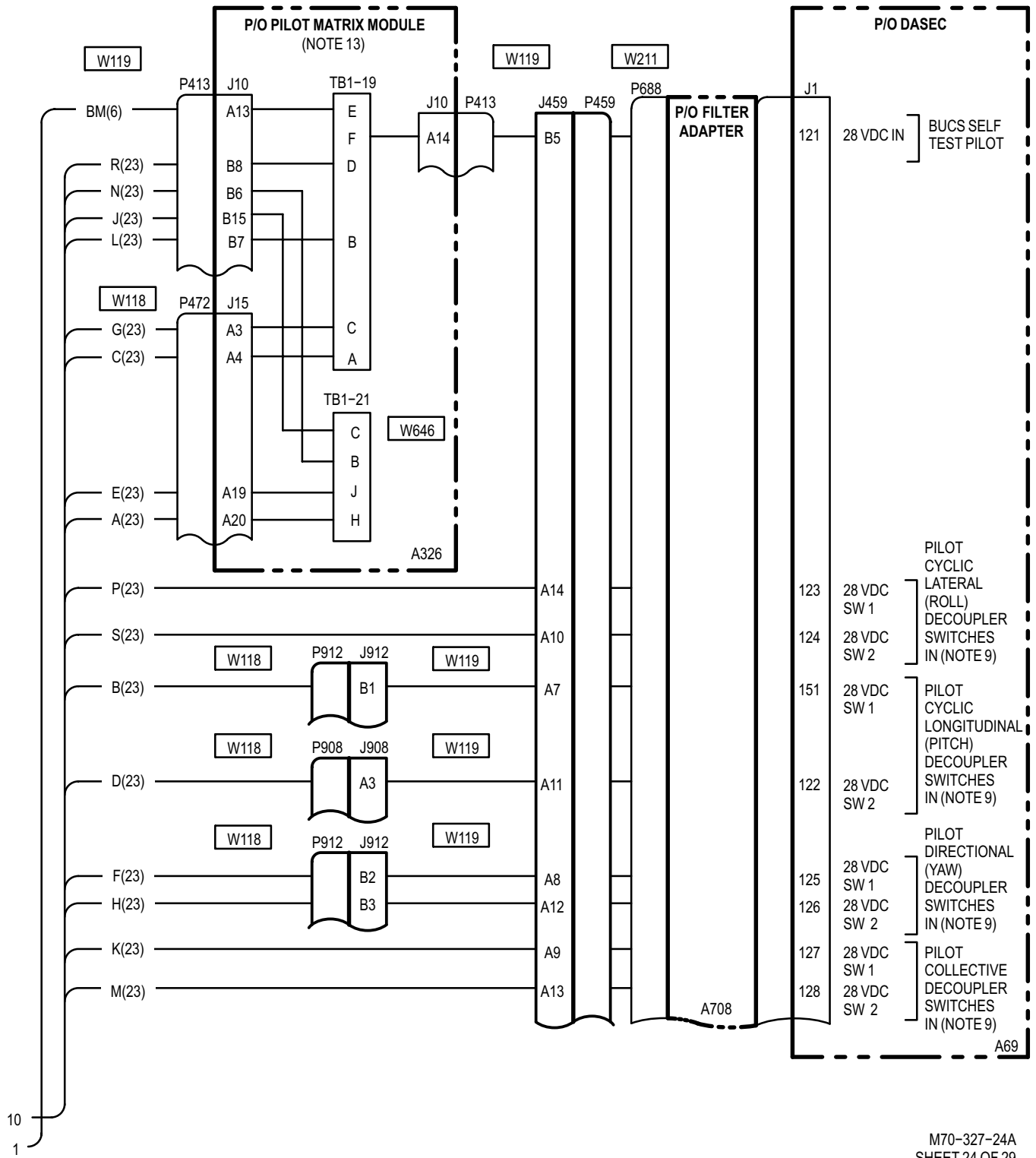
11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

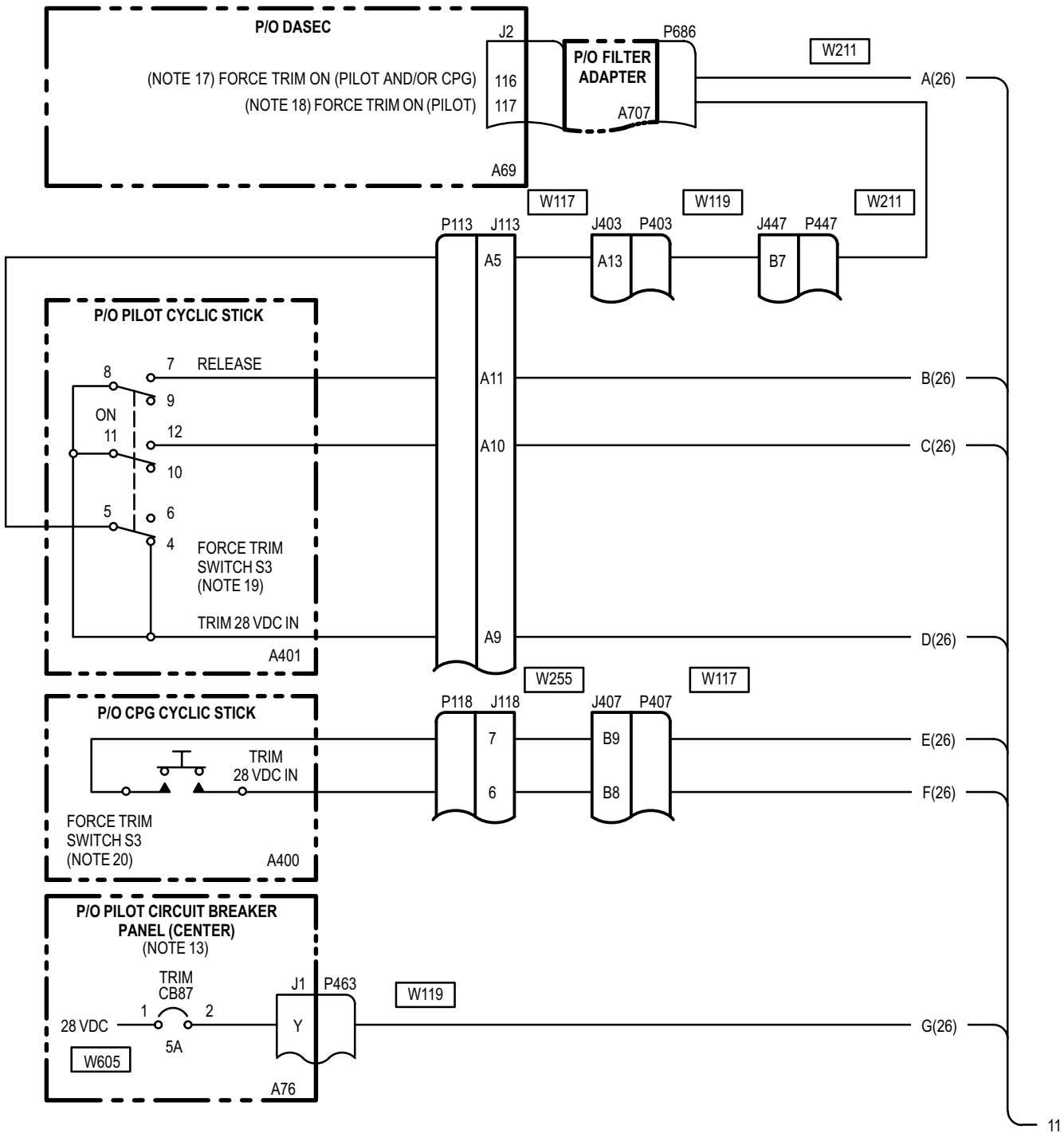


2

10
2

11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

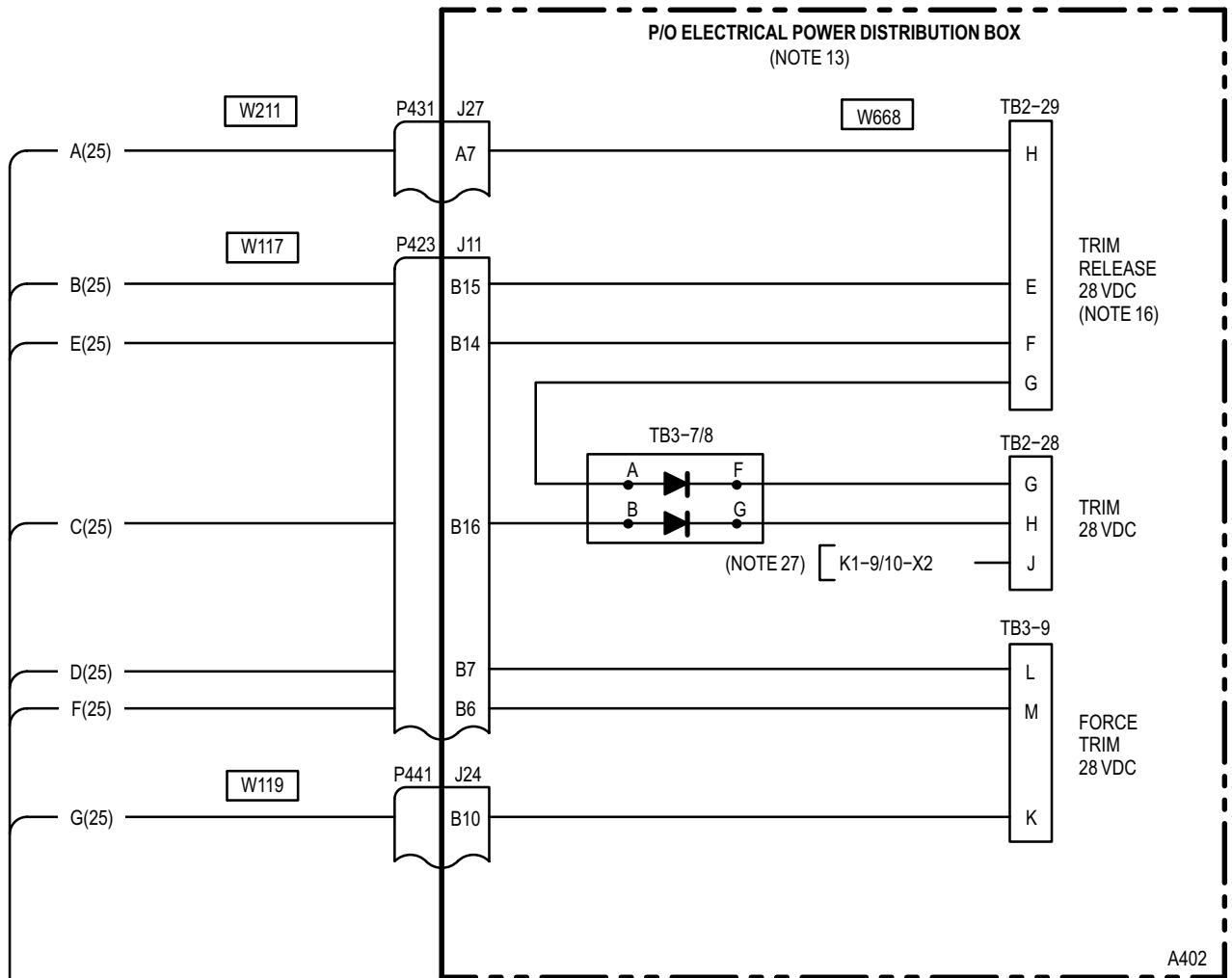




11

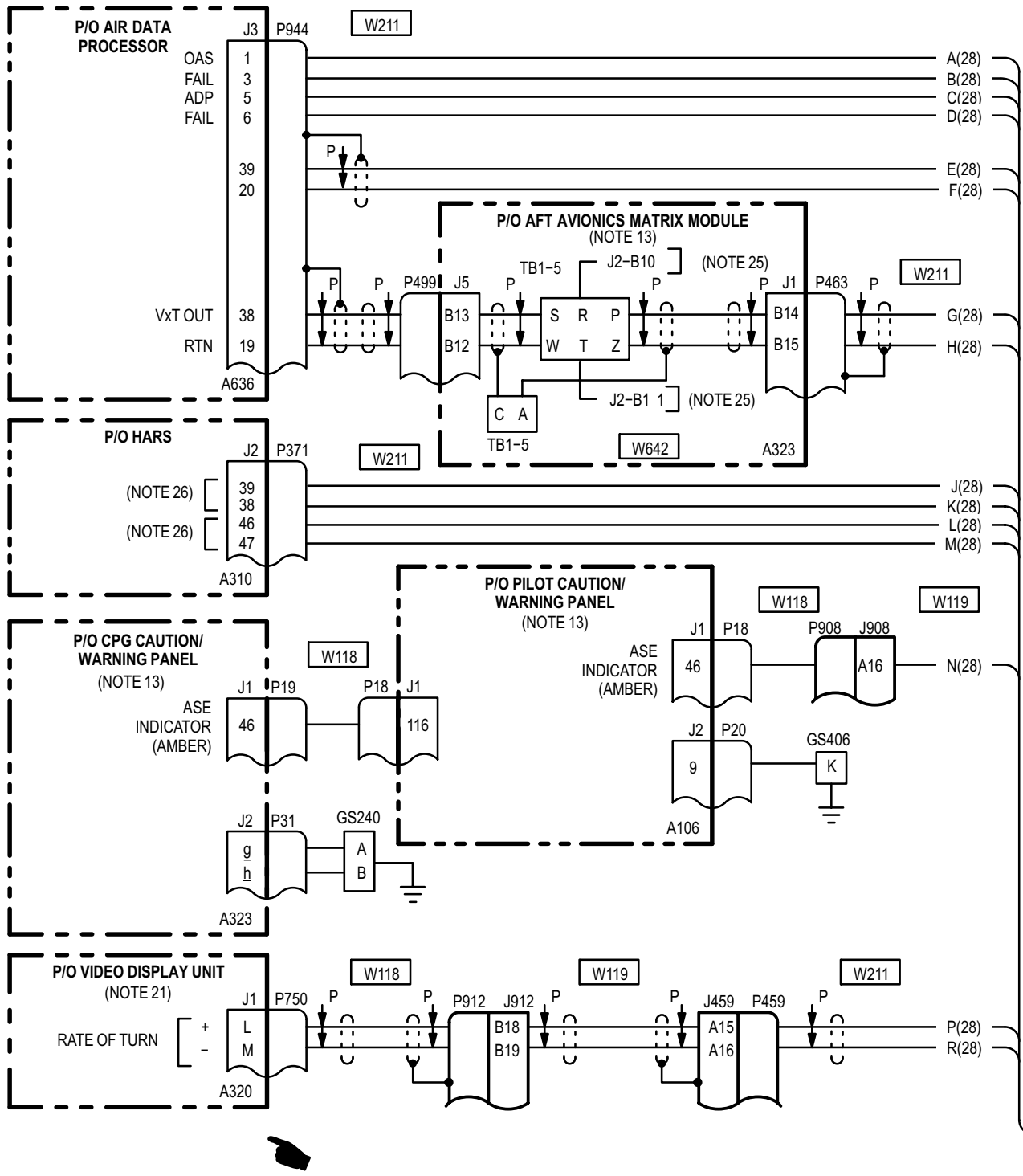
11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

11-28



11

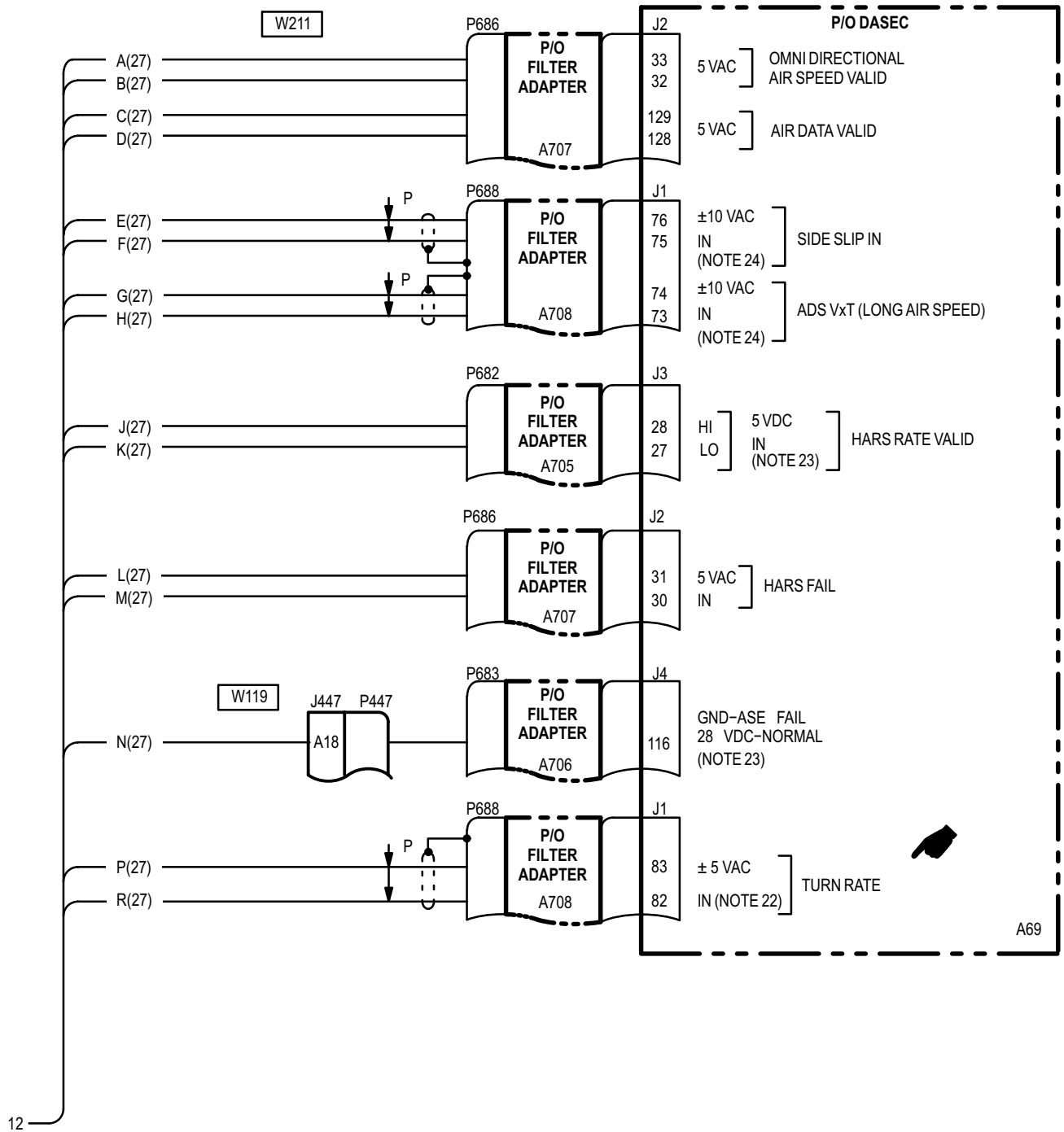
11-28. DASE - WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)



12

11-28. DASE – WIRING INTERCONNECT DIAGRAM (BUCS ACTIVATED) (cont)

11-28



NOTES:

HIGHWAY USE: THE ALPHA CHARACTER IDENTIFIES A SPECIFIC LINE, AND THE NUMBER IN PARENTHESIS IDENTIFIES THE SHEET NUMBER WHERE THE SIGNAL TERMINATES.

1. RELAY ACTUATED BY SQUAT SWITCH S350. ON GROUND – CONTACTS B2 AND B3 CLOSED, SQUAT RELAY DE – ENERGIZED.
2. WITH AIRCRAFT ON GROUND. AIRBORNE CONDITION SIMULATED WHEN SQUAT SWITCH FIXTURE IS INSTALLED.
3. 0 VAC AT MID TRAVEL: 10 VAC WITH COLLECTIVE STICK FULL UP OR FULL DOWN.
4. 0 VAC AT MIDTRAVEL: 10 VAC WITH CYCLIC STICK FULL FORWARD OF FULL AFT.
5. 0 VAC AT MIDTRAVEL: 10 VAC WITH DIRECTIONAL PEDALS FULL LEFT OR RIGHT.
6. 0 VAC AT MIDTRAVEL: 10 VAC WITH CYCLIC STICK FULL LEFT OR RIGHT.
7. 0 VAC AT MIDTRAVEL : 5 VAC AT MAXIMUM TRAVEL.
8. MAGNETIC SWITCHES: SOLENOID HOLDS SWITCH ON WHEN MANUALLY SET TO ON.
9. 28 VDC IN ONLY WHEN BUCS SELF TEST SWITCH IS HELD IN PLT OR CPG POSITION.
10. ± 4 MA MAXIMUM CURRENT VARIATION.
11. 0 VAC MIDTRAVEL: 2.5 VAC AT MAXIMUM TRAVEL.
12. BUCS TST SWITCH PLT – CONTACTS 1-2 AND 4-5 CLOSED CENTER – CONTACTS 2-3 AND 4-5 CLOSED
CPG – CONTACTS 2-3 AND 5-6 CLOSED.
13. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
14. HS DESIGNATES A HARD SPLICE WHICH CANNOT BE DISCONNECTED.
M DESIGNATES A SOFT SPLICE WHICH MAY BE DISCONNECTED FOR A WIRING CHECK.
15. HYDRAULIC SYSTEM (TM 1-1520-238-T-5).
16. PRESENT AT FORCE TRIM RELEASE.
17. WITH PILOT OR CPG FORCE TRIM SWITCH AT FORCE TRIM RELEASE POSITION.
18. WITH PILOT FORCE TRIM SWITCH AT FORCE TRIM ON POSITION.
19. SHOWN AT FORCE TRIM ON POSITION SPRING LOADED FROM FORCE TRIM RELEASE POSITION TO FORCE TRIM ON POSITION.

<u>SWITCH POSITION</u>	<u>TERMINALS CONNECTED</u>
FORCE TRIM OFF	5 TO 6.8 TO 9, 11 TO 12
FORCE TRIM RELEASE (MOMENTARY RELEASE)	4 TO 5.7 TO 8, 10 TO 11
FORCE TRIM ON (NORMAL)	4 TO 5.8 TO 9, 10 TO 11

20. PUSHBUTTON SWITCH USED ONLY FOR FORCE TRIM RELEASE.
21. ABOVE 60 KNOTS PROVIDES AUTOMATIC TURN COORDINATION ± 2.6 VDC MINIMUM.
22. ASE INDICATORS LIGHT WHEN 28 VDC IS REMOVED.
23. VARIES FROM APPROXIMATELY 0.5 VDC TO 5.0 VDC. 5 VDC WITH NO CHANGE AT SOURCE.
24. VARIES BETWEEN LIMITS SHOWN. DEPENDS ON AIRSPEED CHANGE DATA.
25. REFER TO PARAGRAPH 11-89. STABILATOR – WIRING INTERCONNECT DIAGRAM.
26. AVIONICS CONFIGURATION – HEADING ATTITUDE REFERENCE SYSTEM (HARS) (TM 11-1520-238-23-2).
27. REFER TO PARAGRAPH 11-13. FLIGHT CONTROL SYSTEM – WIRING INTERCONNECT DIAGRAM.

11-29. ASE AC CIRCUIT BREAKER – DOES NOT STAY CLOSED

11-29

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-6
 TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

NOTE

Unless otherwise indicated, components and wires specified are common to all DASE interconnection diagrams (pitch, roll, yaw and collective/BUCS).

1. Open **ASE AC** circuit breaker. Check for short between P1-54 and ground.

Does short exist?

YES	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (ac essential bus 1 – pilot station).
NO	Go to step 2.

2. Check for short between:
(ACA) Wire end (A323)TB2-1-A and ground.
(ACB) P692-A and ground.

Does short exist?

YES	Repair shorted wire between (A402): J27-A11 and J1-54. (ACA) P499-B7 and P431-A11, (A323): TB2-1-A and J5-B7. (ACB) P692-A and P431-A11. Go to paragraph 11-23.
NO	(ACA) Go to step 3. (ACB) Replace isolation transformer/filter assembly box (TM 1-1520-238-23).

3. **(ACA)** Check for 13.5 ohms between wire end (A323):
 TB2-1-C and GS1-A.

Is resistance present?

YES	Replace 26 VAC excitation transformer (A323)T2. (TM 1-1520-238-23).
NO	Replace 26 VAC excitation transformer (A323)T1 (TM 1-1520-238-23).

END OF TASK

11-30. ASE DC CIRCUIT BREAKER – DOES NOT STAY CLOSED

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

- TM 1-1520-238-T-6
- TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **ASE DC** circuit breaker. Check for short between P1-34 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 3 – pilot station). |
| NO | Go to step 2. |

2. Check for short between P441-B1 and ground.

Does short exist?

- | | |
|-----|---------------|
| YES | Go to step 3. |
| NO | Go to step 4. |

3. Check for short between (A137)J1-A10 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace pilot ASE panel (TM 1-1520-238-23). |
| NO | Repair shorted wire between P441-B1 and P170-A10. Go to paragraph 11-23. |

4. Detach P431 and P441. Check for short between (A402)J1-34 and ground.

Does short exist?

- | | |
|-----|---------------|
| YES | Go to step 6. |
| NO | Go to step 5. |

5. Detach P682. Check for short between P431-B1 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between: P682 SP5 and P682-75, P682 SP5 and P682-121, P682 SP5 and P682-73, P682 SP5 and P682-79, P682 SP5 and P682-77, P431-B1 and P682 SP5. Go to paragraph 11-23. |
| NO | (ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 7. |

6. Check for short between (A402): Wire end K4-1/2-B3 and ground, wire end K4-1/2-B2 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between (A402): TB2-7-D and J1-34, TB2-7-G and J24-B1, TB2-7-A and J27-B1, TB2-7-K and K4-1/2-B3, J27-B4 and K4-1/2-B2. Go to paragraph 11-23. |
| NO | Replace relay XK4-1/2 (TM 1-1520-238-23). |

7. **(ACB)** Attach P682. Detach filter adapter A705. Check for short between P431-B1 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Replace DASEC (TM 1-1520-238-23). |

END OF TASK

11-31. ASE BUCS CIRCUIT BREAKER – DOES NOT STAY CLOSED

11-31

Tools:

Nomenclature	Part Number
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-6
 TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **ASE BUCS** circuit breaker. Check for short between (A76)P1-33 and ground.

Does short exist?

YES	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 3 – pilot station).
NO	Go to step 2.

2. Detach P431 and P441. Check for short between (A402)J27-A10 and ground.

Does short exist?

YES	Repair shorted wire between: (A402)J27-A10 and (A402)TB2-3-B, (A402)J1-33 and (A402)TB2-3-A, (A402)J24-B2 and (A402)TB2-3-C. Go to paragraph 11-23.
NO	Go to step 3.

3. Check for short between P431-A10 and ground.
Does short exist?

YES	Go to step 4.
NO	Go to step 5.

4. Detach P682 and P686. Check for short between P686-60 and ground.

Does short exist?

YES	Go to step 7.
NO	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 6.

5. Detach P686. Check for short between P441-B2 and ground.

Does short exist?

YES	Go to step 8.
NO	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 6.

6. **(ACB)** Attach P686. Detach filter adapter A707. Check for short between A707-60 and ground.

Does short exist?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Replace DASEC (TM 1-1520-238-23).

7. Detach P493 and P499. Check for short between P686-60 and ground.

Does short exist?

YES	Repair shorted wire between: P493-B12 and J415 SP1, P431-A10 and J415 SP1, P499-A3 and J417 SP1, P686-60 and J415 SP1, P686-59 and J417 SP1, J417-SP1 and J415 SP1. Go to paragraph 11-23.
NO	Go to step 9.

11-31. ASE BUCS CIRCUIT BREAKER – DOES NOT STAY CLOSED

11-31

8. Detach P413. Check for short between P441-B2 and ground.

Does short exist?

YES Repair shorted wire between P441-B2 and P413-B14.
Go to paragraph 11-23.

NO Go to step 12.

9. Check for short between:
(A323) J5-A3 and ground,
(A323) J5-A4 and ground.

Does short exist?

YES Repair shorted wire between:
(A323):
J5-A3 and TB3-3-J,
J5-A7 and TB3-3-K,,
J4-B12 and TB3-4-R,
J5-A4 and TB3-4-P,
J5-A10 and TB3-4-N.
Go to paragraph 11-23.

NO Go to step 10.

10. Attach P493. Check for short between:
P499-A4 and ground,
P499-A10 and ground.

Does short exist?

YES Repair shorted wire between:
P682-68 and P682 SP4,
P682-66 and P682 SP4,
P499-A10 and P682 SP4,
P686-61 and J402-B17,
P402-B17 and J756-22,
J215-SP1 and P756-24,
P756-22 and J215-SP1,
J756-24 and P402-B-19,
J402-B19 and P499-A4.
Go to paragraph 11-23.

NO Go to step 11.

11. Check for short between P686-61 and ground.

Does short exist?

YES Go to step 14.

NO Repair shorted wire between P499-A7 and P686-62.
Go to paragraph 11-23.

12. Detach P472. Check for short between (A326)J10-B12 ground.

Does short exist?

YES Repair shorted wire between (A326):
J10-B12 and TB1-21-D,
J10-B14 and TB1-21-F,
J10-B5 and TB1-21-L,
J10-B13 and TB1-21-M,
J10-B15 and TB1-21-C,
J10-B6 and TB1-21-B,
J15-A17 and TB1-21-K,
J15-A18 and TB1-21-A,
J15-A19 and TB1-21-J,
J15-A20 and TB1-21-H.
Go to paragraph 11-23.

NO Go to step 13.

13. Check for short between:
P413-B5 and ground,
P472-A17 and ground,
P413-B12 and ground,
P472-A18 and ground,
P413-B13 and ground.

Does short exist?

YES Go to paragraph 11-32.

NO Go to paragraph 11-33.

11-31. ASE BUCS CIRCUIT BREAKER – DOES NOT STAY CLOSED

11-31

- 14. Detach P756. Check for short between J756-22 and ground.

Does short exist?

- YES Repair shorted wire between:
P756-24 and J215 SP1,
P756-22 and J215 SP1,
P756-22 and P402-B17,
P686-61 and J402- B17.
Go to paragraph 11-23.
- NO Repair shorted wire between:
P756-24 and P402-B19,
(**ACA**) J402-B19 and P499-A4,
(**ACB**) J402-B19 and
P693 SP1,
P693 SP1 and P499-A4.
Go to paragraph 11-23.

END OF TASK

11-32. ASE BUCS CIRCUIT BREAKER DOES NOT STAY CLOSED – FAULT IN CPG BUCS WIRING

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Non-transparent barrier removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P413. Check for short between P413-B5 and ground.
Does short exist?
 YES Go to step 2.
 NO Go to step 3.

2. Check for short between J266-1 and ground.
Does short exist?
 YES Repair shorted wire between P413-B5 and J266-1. Go to paragraph 11-23.
 NO Go to step 5.

3. Check for short between P413-B12 and ground.
Does short exist?
 YES Go to step 4.
 NO Go to step 6.

4. Check for short between J268-1 and ground.
Does short exist?
 YES Repair shorted wire between P413-B12 and J268-1. Go to paragraph 11-23.
 NO Replace CPG collective SPAD (TM 1-1520-238-23).

5. Detach P686. Check for short between J266-5 and ground.
Does short exist?
 YES Repair shorted wire between: J266-5 and P237 SP1, P237 SP1 and J447-B13, P447-B13 and P686-51. Go to paragraph 11-23.
 NO Replace CPG lateral SPAD (TM 1-1520-238-23).

6. Check for short between P413-B13 and ground.
Does short exist?
 YES Go to step 7.
 NO Go to step 9.

7. Detach P447 and P108. Check for short between P413-B13 and ground.
Does short exist?
 YES Repair shorted wire between: P413-B13 and P234 SP1, J108-i and P234 SP1, J447-B19 and P234 SP1. Go to paragraph 11-23.
 NO Go to step 8.

8. Check for short between P686-54 and ground.
Does short exist?
 YES Repair shorted wire between P686-54 and P447-B19. Go to paragraph 11-23.
 NO Replace CPG BUCS select trigger switch (TM 1-1520-238-23).

**11-32. ASE BUCS CIRCUIT BREAKER DOES NOT STAY CLOSED – FAULT IN CPG
BUCS WIRING (cont)**

11-32

9. Check for short between P472-A17 and ground.

Does short exist?

YES Go to step 10.

NO Go to step 13.

10. Detach J273. Check for short between J273-1 and ground.

Does short exist?

YES Repair shorted wire between
P472-A17 and J273-1.
Go to paragraph 11-23.

NO Go to step 11.

11. Check for short between J273-5 and ground.

Does short exist?

YES Go to step 12.

NO Replace CPG directional SPAD
(TM 1-1520-238-23).

12. Check for short between P912-B13 and ground.

Does short exist?

YES Repair shorted wire between:
P912-B13 and P235 SP1,
P235 SP1 and J273-5,
P235 SP1 and P236 SP1,
P236 SP1 and P912-B16.
Go to paragraph 11-23.

NO Repair shorted wire between:
P912-B13 and J447-B16,
P447-B16 and P686-53,
J912-B16 and J447-B10,
P447-B10 and P686-52.
Go to paragraph 11-23.

13. Check for short between J267-1 and ground.

Does short exist?

YES Repair shorted wire between
P472-A18 and J267-1.
Go to paragraph 11-23.

NO Replace CPG longitudinal SPAD
(TM 1-1520-238-23).

END OF TASK

11-33. ASE BUCS CIRCUIT BREAKER DOES NOT STAY CLOSED – FAULT IN PILOT BUCS WIRING

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Non-transparent barrier removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P413. Check for short between P413-B6 and ground.

Does short exist?

- YES Go to step 2.
- NO Go to step 3.

2. Check for short between J270-1 and ground

Does short exist?

- YES Repair shorted wire between P413-B6 and J270-1. Go to paragraph 11-23.
- NO Replace pilot longitudinal SPAD (TM 1-1520-238-23).

3. Check for short between P413-B15 and ground.

Does short exist?

- YES Go to step 4.
- NO Go to step 5.

4. Check for short between J272-1 and ground.

Does short exist?

- YES Repair shorted wire between P413-B15 and J272-1. Go to paragraph 11-23.
- NO Replace pilot collective SPAD (TM 1-1520-238-23).

5. Check for short between P472-A19 and ground.

Does short exist?

- YES Go to step 6.
- NO Go to step 7.

6. Check for short between J269-1 and ground.

Does short exist?

- YES Repair shorted wire between P472-A19 and J269-1. Go to paragraph 11-23.
- NO Replace pilot directional SPAD (TM 1-1520-238-23).

7. Check for short between J271-1 and ground.

Does short exist?

- YES Repair shorted wire between P472-A20 and J271-1. Go to paragraph 11-23.
- NO Replace pilot longitudinal SPAD (TM 1-1520-238-23).

END OF TASK

11-34. ASE PANEL EDGE-LIGHT – DOES NOT LIGHT

11-34

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Non-transparent barrier removed

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot **EXT LT/INTR LT** panel, rotate **INST** control to **BRT**. Check for 5 VDC at wire end (A326)TB1-28-F.

Is voltage present?

- | | |
|-----|---|
| YES | Go to step 2. |
| NO | Refer to TM 1-1520-238-T-6 to troubleshoot pilot edge-lights. |

2. Check for open between P481-B8 and P170-B6.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace pilot ASE panel (TM 1-1520-238-23). |

END OF TASK

11-35. PILOT AND CPG CAUTION/WARNING PANEL – ASE INDICATOR IS LIGHTED

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

- TM 1-1520-238-T-6
- TM 1-1520-238-23

3. (ACB) Attach P683. Detach filter adapter A706. Check for short between A706-116 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23).
Go to paragraph 11-23. ■ |
| NO | Replace DASEC (TM 1-1520-238-23).
Go to paragraph 11-23. ■ |



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P18.

Is ASE indicator still lighted?

- | | |
|-----|--|
| YES | Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.
Go to paragraph 11-23. |
| NO | Go to step 2. |

2. Detach P683. Check for short between P18-46 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between: P18-46 and P908-A16, J908-A16 and J447-A18, P447-A18 and P683-116,
Go to paragraph 11-23. |
| NO | (ACA) Replace DASEC (TM 1-1520-238-23)
(ACB) Go to step 3. |

END OF TASK

11-36. ASE PANEL PITCH, ROLL, YAW AND ATTD/HOVER HOLD SWITCHES
- DO NOT STAY ON

11-36

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Close **ASE DC** circuit breaker. Check for 28 VDC at P1-34.
Is voltage present?

YES	Go to step 2.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 3 – pilot station).
- Check for open between (A402)J1-34 and P170-A10.
Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 3.
- Check for open between P170-B1 and GS290-C.
Does open exist?

YES	Go to step 4.
NO	Replace pilot ASE panel (TM 1-1520-238-23).
- Check for open between (A400): P118-1 and P118-2.
Does open exist?

YES	Replace CPG cyclic stick grip (TM 1-1520-238-23).
NO	Go to step 5.
- Check for open between J113-A2 and J118-2.
Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 6.
- Check for open between (A401): P113-A2 and P113-A1.
Does open exist?

YES	Replace pilot cyclic stick grip (TM 1-1520-238-23).
NO	Repair open wire between: P170-B1 and P403-A14, J403-A14 and J113-A1. Go to paragraph 11-23.

END OF TASK

11-37. ASE PANEL PITCH SWITCH – DOES NOT STAY ON

11-37

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

3. **(ACB)** Attach P683. Detach filter adapter A706. Check for open between A706–119 and P170–B10.

Does open exist?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Replace DASEC (TM 1-1520-238-23).

WARNING

- Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.
- To prevent the possibility of shorting, use extreme care when checking voltage at mass termination connectors. Failure to do so could result in damage to equipment or possible injury to personnel.

1. Check for 28 VDC at P170–B10.

Is voltage present?

YES	Replace pilot ASE panel (TM 1-1520-238-23).
NO	Go to step 2.

2. Check for open between P170–B10 and P683–119.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 3.

END OF TASK

11-38. ASE PANEL ROLL SWITCH – DOES NOT STAY ON

11-38

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

3. **(ACB)** Attach P683. Detach filter adapter A706. Check for open between A706-120 and P170-B3.

Does open exist?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Replace DASEC (TM 1-1520-238-23).

WARNING

- Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.
- To prevent the possibility of shorting, use extreme care when checking voltage at mass termination connectors. Failure to do so could result in damage to equipment or possible injury to personnel.

1. Check for 28 VDC at P170-B3.

Is voltage present?

YES	Replace pilot ASE panel (TM 1-1520-238-23).
NO	Go to step 2.

2. Check for open between P170-B3 and P683-120.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 3.

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
 One person to assist

References:

TM 1-1520-238-23

3. **(ACB)** Detach filter adapter A706. Check for open between A706-121 and P170-A9.

Does open exist?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Replace DASEC (TM 1-1520-238-23).

WARNING

- Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.
- To prevent the possibility of shorting, use extreme care when checking voltage at mass termination connectors. Failure to do so could result in damage to equipment or possible injury to personnel.

1. Check for 28 VDC at P170-A9.

Is voltage present?

YES	Replace pilot ASE panel (TM 1-1520-238-23).
NO	Go to step 2.

2. Check for open between P170-A9 and P683-121.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 3.

END OF TASK

11-40. ASE PANEL ATTD/HOVER HOLD SWITCH – DOES NOT STAY ON

11-40

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

3. **(ACB)** Attach P683. Detach filter adapter A706. Check for open between A706-122 and P170-B8.

Does open exist?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Replace DASEC (TM 1-1520-238-23).

WARNING

- Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.
- To prevent the possibility of shorting, use extreme care when checking voltage at mass termination connectors. Failure to do so could result in damage to equipment or possible injury to personnel.

1. Check for 28 VDC at P170-B8.

Is voltage present?

YES	Replace pilot ASE panel (TM 1-1520-238-23).
NO	Go to step 2.

2. Check for open between P170-B8 and P683-122.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 3.

END OF TASK

**11-41. PITCH, ROLL, YAW AND ATTD/HOVER HOLD SWITCHES ON ASE PANEL –
REMAIN ON WITH PILOT (DASE) ASE RELEASE SWITCH PRESSED**

11-41

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Check for short between (A137)J1-B1 and ground.
Does short exist?

YES	Replace pilot ASE panel (TM 1-1520-238-23).
NO	Go to step 2.
- With pilot cyclic stick **ASE** release switch pressed, check for short between P170-B1 and ground.
Does short exist?

YES	Repair shorted wire between: P170-B1 and P403-A14, J403-A14 and J113-A1. Go to paragraph 11-23.
NO	Replace pilot cyclic stick (TM 1-1520-238-23).

END OF TASK

**11-42. PITCH, ROLL, YAW AND ATTD/HOVER HOLD SWITCHES ON ASE PANEL –
REMAIN ON WITH CPG (DASE) ASE RELEASE SWITCH PRESSED**

11-42

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

With CPG cyclic stick **ASE** release switch pressed, check for short between J113-A2 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between:
J113-A2 and P407-B16,
J407-B16 and J118-2.
Go to paragraph 11-23. |
| NO | Replace CPG cyclic stick
(TM 1-1520-238-23). |

END OF TASK

11-43. RTR BRK CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH RTR BK SWITCH SET TO BRAKE AND POWER LEVERS SET TO OFF

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-5
 TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Open **RTR BRK** circuit breaker (CB37). Check for short between (A402)J24–A16 and ground.
Does short exist?
 YES Go to step 5.
 NO Go to step 2.
- Detach P170, P173 and P436. Check for short between P441–A16 and ground.
Does short exist?
 YES Repair shorted wire between: P441–A16 and P173 SP1, P173 SP1 and P173–b, P173 SP1 and J914–B8, P914–B8 and J436–A15, P173 SP1 and P170–A7. Go to paragraph 11–23.
 NO Go to step 3.
- Check for short between P436–A15 and ground.
Does short exist?
 YES Refer to TM 1-1520-238-T-5 to troubleshoot hydraulic and pneumatic system.
 NO Go to step 4.

- Check for short between (A137)J1–A2 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace pilot ASE panel (TM 1-1520-238-23). |
| NO | Go to step 6. |

- Detach P990 and P986. Check for short between (A402)J24–A16 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between: P990–W and P431–A4, P986–W and P431–A18. (A402): J27–A18 and TB2–29–D, J24–A14 and TB2–29–B, J27–A4 and TB2–29–C. Go to paragraph 11–23. |
| NO | Go to paragraph 11–88. |

- Attach P173. Check for short between P170–A7 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace pilot power quadrant (TM 1-1520-238-23). |
| NO | Go to step 7. |

- Detach P686. Check for short between P170–A2 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between: P170–A2 and J447–A6, P447–A6 and P686–114. Go to paragraph 11–23. |
| NO | (ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 8. |

11-43. RTR BRK CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH RTR BK SWITCH SET TO BRAKE AND POWER LEVERS SET TO OFF (cont)

7-33

8. (ACB) Detach filter adapter A707. Check for short between A707-114 and case.

Does short exist?

- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Replace DASEC (TM 1-1520-238-23). |

END OF TASK

11-44. PILOT AND CPG BUCS FAIL INDICATORS – ARE NOT LIGHTED WITH CPG BUCS SELECT TRIGGER SWITCH PULLED

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-4
 TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 access door open
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With CPG BUCS select trigger switch pulled, check for 28 VDC at P686-113.

Does open exist?

- YES Go to step 3.
- NO Go to step 2.

2. Check for 28 VDC at J108-i.

Does open exist?

- YES Go to step 4.
- NO Repair open wire between J108-i and P234 SP1. Go to paragraph 11-23.

3. Check for open between: P683-115 and J456-A12, P456-A12 and P20-t.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO **(ACA)** Replace DASEC (TM 1-1520-238-23).
(ACB) Go to step 5.

4. With CPG BUCS select trigger switch pulled, check for open between (A80): P108-i and P108-h.

Does open exist?

- YES Replace CPG BUCS select trigger switch (TM 1-1520-238-23).
- NO Repair open wire between: J108-h and J459-A1, P458-A1 and P686-113. Go to paragraph 11-23.

5. **(ACB)** Detach filter adapter A706. Check for open through pin A706-115.

Does open exist?

- YES Replace filter adapter (TM 1-1520-238-23).
- NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-45. PILOT BUCS FAIL INDICATOR – IS NOT LIGHTED WITH CPG BUCS SELECT TRIGGER SWITCH PULLED

11-45

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6

2. Check for open between:
P20-t and P20 SP1,
P20-E and J164-B4,
P20-F and J164-B5

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.

WARNING

- Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.
- To prevent the possibility of shorting, use extreme care when checking voltage at mass termination connectors. Failure to do so could result in damage to equipment or possible injury to personnel.

1. With CPG BUCS select trigger switch pulled, check for 28 VDC between J164-B4 and J164-B5.

Is voltage present?

YES	Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.
NO	Go to step 2.

END OF TASK

11-46. CPG BUCS FAIL INDICATOR – IS NOT LIGHTED WITH CPG BUCS SELECT TRIGGER SWITCH PULLED

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6

2. Check for open between:

P31-t and P20 SP1,
P31-t and P683-115,
P31-E and J166-B4,
P31-F and J166-B5.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.

WARNING

- Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.
- To prevent the possibility of shorting, use extreme care when checking voltage at mass termination connectors. Failure to do so could result in damage to equipment or possible injury to personnel.

1. With CPG BUCS select trigger switch pulled, check for 28 VDC between J164-B4 and J164-B5.

Is voltage present?

YES	Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.
NO	Go to step 2.

END OF TASK

**11-47. PILOT AND CPG BUCS FAIL INDICATORS-- ARE LIGHTED WITH CPG BUCS
SELECT TRIGGER SWITCH RELEASED**

11-47

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P686-113.

Does short exist?

YES Go to step 3.
NO Go to step 2.

2. Check for 5 to 30 VDC at P20-t.

Does short exist?

YES Refer to TM 1-1520-238-T-6 to
 troubleshoot pilot
 caution/warning system.
NO Go to step 4.

3. Detach P686 and P413. Check for short between J108-i and J108-h.

Does short exist?

YES Repair shorted wire between:
 J108-i and P234 SP1,
 J108-h and J459-A1,
 P234 SP1 and P413-B13,
 P234 SP1 and J447-B19,
 P459-A1 and P686-13,
 P447-B19 and P686-54.
 Go to paragraph 11-23.

NO Replace CPG BUCS select
 trigger switch
 (TM 1-1520-238-23).

4. Check for short between:
P683-115 and ground,
P20-t and ground.

Does short exist?

YES Repair shorted wire between:
 P20-t and P20 SP1,
 P456-A12 and P20 SP1,
 P31-t and P20 SP1,
 P456-A12 and P683-115.
 Go to paragraph 11-23.

NO **(ACA)** Replace DASEC
 (TM 1-1520-238-23).
 (ACB) Go to step 5.

5. **(ACB)** Detach filter adapter A706. Check for short between A706-115 and case.

Does short exist?

YES Replace filter adapter
 (TM 1-1520-238-23).

NO Replace DASEC
 (TM 1-1520-238-23).

END OF TASK

11-48. PILOT BUCS FAIL INDICATOR – IS LIGHTED WITH CPG BUCS SELECT TRIGGER SWITCH RELEASED

11-48

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-6

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

Detach J164 and P20. Check for short between J164-B5 and ground.

Does short exist?

YES	Repair shorted wire between J164-B5 and P20-F. Go to paragraph 11-23.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.

END OF TASK

11-49. CPG BUCS FAIL INDICATOR – IS LIGHTED WITH CPG BUCS SELECT TRIGGER SWITCH RELEASED

11-49

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-6

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

Detach J166 and P31. Check for short between J166-B5 and ground.

Does short exist?

YES	Repair shorted wire between J166-B5 and P31-F. Go to paragraph 11-23.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot CPG caution/warning system.

END OF TASK

11-50. RTR BRK CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH BUCS TST SWITCH SET TO PLT

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot **ASE** panel, hold **BUCS TST** switch in **PLT** position. Check for short between (A137): J1-A6 and J1-B5.

Does short exist?

- YES Replace pilot **ASE** panel (TM 1-1520-238-23).
- NO Go to step 2.

2. Detach P688. Check for short between P170-A6 and ground.

Does short exist?

- YES Go to step 3.
- NO (**ACA**) Replace DASEC (TM 1-1520-238-23).
(**ACB**) Go to step 5.

3. Detach P413. Check for short between P170-A6 and ground.

Does short exist?

- YES Repair shorted wire between P170-A6 and P413-A13. Go to paragraph 11-23.
- NO Go to step 4.

4. Detach P472. Check for short between (A326)J10-A13 and ground.

Does short exist?

- YES Repair shorted wire between (A326):
J10-A13 and TB1-19-E,
J10-A14 and TB1-19-F
J10-B8 and TB1-19-D,
J10-B7 and TB1-19-B,
J15-A3 and TB1-19-C,
J15-A4 and TB1-19-A.
Go to paragraph 11-23.
- NO Go to step 6.

5. (**ACB**) Detach filter adapter A708. Check for short between A708-121 and case.

Does short exist?

- YES Replace filter adapter (TM 1-1520-238-23).
- NO Replace DASEC (TM 1-1520-238-23).

6. Check for short between P413-A14 and ground.

Does short exist?

- YES Repair shorted wire between: P413-A14 and J459-B5,
P459-B5 and P688-121.
Go to paragraph 11-23.
- NO Go to step 7.

7. Check for short between P413-B7 and ground.

Does short exist?

- YES Go to step 8.
- NO Go to step 11.

8. Detach P1 from J272. Check for short between P413-B7 and ground.

Does short exist?

- YES Repair shorted wire between P413-B7 and J272-3. Go to paragraph 11-23.
- NO Go to step 9.

11-50. RTR BRK CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH BUCS TST SWITCH SET TO PLT (cont)

11-50

- | | |
|---|---|
| <p>9. Check for short between between P688-127 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P688-127 and P459-A9 J459-A9 and J272-2. Go to paragraph 11-23.</p> <p>NO Go to step 10.</p> | <p>14. Check for short between P688-124 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P688-124 and P459-A10, J459-A10 and J270-4. Go to paragraph 11-23.</p> <p>NO Replace pilot lateral SPAD (TM 1-1520-238-23).</p> |
| <p>10. Check for short between P688-128 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P688-128 and P459-A13, P459-A13 and J272-4. Go to paragraph 11-23.</p> <p>NO Replace pilot collective SPAD (TM 1-1520-238-23).</p> | <p>15. Check for short between P472-A3 and ground.
Does short exist?</p> <p>YES Go to step 16.</p> <p>NO Go to step 19.</p> |
| <p>11. Check for short between P413-B8 and ground.
Does short exist?</p> <p>YES Go to step 12.</p> <p>NO Go to step 15.</p> | <p>16. Detach P1 from J269. Check for short between P472-A3 and ground.
Does short exist?</p> <p>YES Repair shorted wire between P472-A3 and J269-3. Go to paragraph 11-23.</p> <p>NO Go to step 17.</p> |
| <p>12. Detach P1 from J270. Check for short between P413-B8 and ground.
Does short exist?</p> <p>YES Repair shorted wire between P413-B8 and J270-3. Go to paragraph 11-23.</p> <p>NO Go to step 13.</p> | <p>17. Check for short between P688-125 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P688-125 and P459-A8, J459-A8 and J912-B2, J912-B2 and J269-2. Go to paragraph 11-23.</p> <p>NO Go to step 18.</p> |
| <p>13. Check for short between P688-123 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P688-123 and P459-A14, J459-A14 and J270-2. Go to paragraph 11-23.</p> <p>NO Go to step 14.</p> | <p>18. Check for short between P688-126 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P688-126 and P459-A12, J459-A12 and J912-B3, P912-B3 and J269-4. Go to paragraph 11-23.</p> <p>NO Replace pilot directional SPAD (TM 1-1520-238-23).</p> |

11-50. RTR BRK CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH BUCS TST SWITCH SET TO PLT (cont)

11-50

19. Detach P1 from J271. Check for short between P472-A4 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between P472-A4 and J271-3.
Go to paragraph 11-23. |
| NO | Go to step 20. |

20. Check for short between P688-115 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between:
P688-115 and P459-A7,
J459-A7 and P912-B1,
P912-B1 and J271-2.
Go to paragraph 11-23. |
| NO | Go to step 21. |

21. Check for short between P688-122 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between:
P688-122 and P459-A11,
J459-A11 and J908-A3,
P908-A3 and J271-4.
Go to paragraph 11-23. |
| NO | Replace pilot longitudinal SPAD (TM 1-1520-238-23). |

END OF TASK

11-51. BUCS ON INDICATORS – ARE NOT LIGHTED WITH BUCS TST SWITCH SET TO PLT OR CPG

11-51

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot power quadrant, set **RTR BK** switch to **BRAKE**. With **BUCS TST** switch held to **PLT**, check for 28 VDC at P688-121.
Is voltage present?
 - YES Go to step 4.
 - NO Go to step 2.
2. Check for open between P688-121 and P170-A6.
Does open exist?
 - YES Repair open wire between: P170-A6 and P413-A13, P413-A14 and J459-B5, P459-B5 and P688-121. (A326): J10-A13 and TB1-19-E, J10-A14 and TB1-19-F. Go to paragraph 11-23.
 - NO Go to step 3.
3. Check for open between P170-A7 and P173-b.
Does open exist?
 - YES Repair open wire between: P170-A7 and P173 SP1, P173 SP1 and P173-b. Go to paragraph 11-23.
 - NO Replace pilot **ASE** panel (TM 1-1520-238-23).
4. With **BUCS TST** switch on pilot **ASE** panel held to **CPG**, check for 28 VDC at P686-121.
Is voltage present?
 - YES Go to step 6.
 - NO Go to step 5.
5. Check for open between P686-121 and P170-A3.
Does open exist?
 - YES Repair open wire between: P170-A3 and P413-A9, P413-A10 and J447-A17, P447-A17 and P686-121. (A326): J10-A9 and TB1-19-J, J10-A10 and TB1-19-M. Go to paragraph 11-23.
 - NO Replace pilot **ASE** panel (TM 1-1520-238-23).
6. With **BUCS TST** switch held to **PLT** or **CPG** on pilot **ASE** panel, check for 0.5 VDC at P18-40.
Is voltage present?
 - YES Refer to TM 1-1520-238-T-6 to troubleshoot pilot caution/warning system.
 - NO Go to step 7.

**11-51. BUCS ON INDICATORS – ARE NOT LIGHTED WITH BUCS TST SWITCH SET TO
PLT OR CPG (cont)**

11-51

7. Check for open between P683-114 and P18-40.

Does open exist?

YES Repair open wire between:
 P18-40 and P908-A17,
 J908-A17 and J447-A20,
 P447-A20 and P683-114.
 Go to paragraph 11-23.

NO **(ACA)** Replace DASEC
 (TM 1-1520-238-23).
 (ACB) Go to step 8.

8. **(ACB)** Detach filter adapter A706. Check for
open through pin A706-114.**Does open exist?**

YES Replace filter adapter
 (TM 1-1520-238-23).

NO Replace DASEC
 (TM 1-1520-238-23).

END OF TASK

11-52. CPG BUCS ON INDICATOR – IS NOT LIGHTED WITH BUCS TST SWITCH SET TO PLT OR CPG

11-52

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-6

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

Check for open between P18-114 and P19-40.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot CPG caution/warning system.

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With **BUCS TST** switch held to **PLT** or **CPG** on pilot **ASE** panel, check for short between (A137): J1-A3 and J1-A6.

Does short exist?

- | | |
|-----|--|
| YES | Replace pilot ASE panel (TM 1-1520-238-23). |
| NO | Go to step 2. |

2. Detach P18. Check for short between P683-114 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between: P683-114 and P447-A20, J447-A20 and J908-A17, P908-A17 and P18-40. Go to paragraph 11-23. |
| NO | Replace pilot caution/warning panel (TM 1-1520-238-23). |

END OF TASK

11-54. CPG BUCS ON INDICATOR – REMAINS LIGHTED

11-54

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:TM 1-1520-238-T-6

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for short between P19-40 and ground.

Does short exist?

YES	Go to step 2.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot CPG caution/warning system.

2. Detach P18. Check for short between P19-40 and ground.

Does short exist?

YES	Repair shorted wire between P19-40 and P18-114. Go to paragraph 11-23.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot CPG caution/warning system.

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Place CPG directional pedals to full right or full left. Detach P686. Check for 10 VAC at P686-41.

Is voltage present?

YES	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 2.
NO	(ACA) Go to step 3. (ACB) Go to step 4.

- (ACB) Attach P686. Detach filter adapter A707. Check for 10 VAC at A707-41.

Is voltage present?

YES	Replace DASEC (TM 1-1520-238-23).
NO	Replace filter adapter (TM 1-1520-238-23).

- (ACA) Detach P686. Check for short between: P235-C and ground, P235-D and ground.

Does short exist?

YES	Repair shorted wire between: P235-D and J912-B11, P235-C and J912-B12, P912-B11 and J447-B14, P912-B12 and J447-B15, P447-B14 and P686-41, P447-B15 and P686-40. Go to paragraph 11-23.
NO	Go to step 5.

- (ACB) Detach P686. Check for short between: J235-3 and ground, J235-4 and ground.

Does short exist?

YES	Repair shorted wire between: J235-4 and J912-B11, J235-3 and J912-B12, P912-B11 and J447-B14, P912-B12 and J447-B15, P447-B14 and P686-41, P447-B15 and P686-40. Go to paragraph 11-23.
NO	Go to step 6.

- (ACA) Check for open between: P235-C and P686-40, P235-D and P686-41.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 7.

- (ACB) Check for open between: J235-3 and P686-40, J235-4 and P686-41.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 9.

11-55. CPG DIR LVDT NO-GO CPG COMPARTMENT – APPEARS ON HOD (cont)

11-55

7. **(ACA)** Attach P686. Check for 26 VAC at P235-A.

Is voltage present?

YES Go to step 8.

NO Go to step 11.

8. **(ACA)** Check for open between P235-B and P499-B17.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-23.

NO Replace CPG directional (yaw)
 LVDT (TM 1-1520-238-23).

9. **(ACB)** Attach P686. Check for 26 VAC at J235-1.

Is voltage present?

YES Go to step 10.

NO Go to step 12.

10. **(ACB)** Check for open between 235-2 and P693-8.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-23.

NO Replace CPG directional (yaw)
 LVDT (TM 1-1520-238-23).

11. **(ACA)** Check for open between P235-A and P499-B16.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-23.

NO Go to paragraph 11-76.

12. **(ACB)** Check for open between 235-1 and P693-7.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-23.

NO Go to paragraph 11-76.

END OF TASK

11-56. RTR BRK CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH BUCS TST SWITCH SET TO CPG

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot **ASE** panel, hold **BUCS TST** switch in **CPG** position. Check for short between (A137): J1-A3 and J1-B5.

Does short exist?

- | | |
|-----|--|
| YES | Replace pilot ASE panel (TM 1-1520-238-23). |
| NO | Go to step 2. |

2. Detach P686. Check for short between P170-A3 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Go to step 3. |
| NO | (ACA) Replace DASEC (TM 1-1520-238-23).
(ACH) Go to step 5. |

3. Detach P413. Check for short between P170-A3 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between P170-A3 and P413-A9. Go to paragraph 11-23. |
| NO | Go to step 4. |

4. Detach P472. Check for short between (A326)J10-A9 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between (A326): J10-A9 and TB1-19-J, J10-A10 and TB1-19-M, J10-B9 and TB1-19-G, J10-B16 and TB1-19-L, J15-A1 and TB1-19-H, J15-A2 and TB1-19-K. Go to paragraph 11-23. |
| NO | Go to step 6. |

5. **(ACH)** Detach filter adapter A707. Check for short between A707-121 and case.

Does short exist?

- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Replace DASEC (TM 1-1520-238-23). |

6. Check for short between P413-A10 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between: P413-A10 and J447-A17, P447-A17 and P686-121. Go to paragraph 11-23. |
| NO | Go to step 7. |

7. Check for short between P413-B9 and ground.

Does short exist?

- | | |
|-----|----------------|
| YES | Go to step 8. |
| NO | Go to step 11. |

8. Detach P1 from J268. Check for short between P413-B9 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between P413-B9 and J268-3. Go to paragraph 11-23. |
| NO | Go to step 9. |

11-56. RTR BRK CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH BUCS TST SWITCH SET TO CPG (cont)

11-56

- | | |
|---|---|
| <p>9. Check for short between between P686-127 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P686-127 and P459-A6, J459-A6 and J268-2. Go to paragraph 11-23.</p> <p>NO Go to step 10.</p> | <p>14. Check for short between P686-124 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P686-124 and P459-A5, J459-A5 and J266-4. Go to paragraph 11-23.</p> <p>NO Replace CPG lateral SPAD (TM 1-1520-238-23).</p> |
| <p>10. Check for short between P686-128 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P686-127 and P459-A2, P459-A2 and J268-4. Go to paragraph 11-23.</p> <p>NO Replace CPG collective SPAD (TM 1-1520-238-23).</p> | <p>15. Check for short between P472-A2 and ground.
Does short exist?</p> <p>YES Go to step 16.</p> <p>NO Go to step 19.</p> |
| <p>11. Check for short between P413-B16 and ground.
Does short exist?</p> <p>YES Go to step 12.</p> <p>NO Go to step 15.</p> | <p>16. Detach J273. Check for short between P472-A2 and ground.
Does short exist?</p> <p>YES Repair shorted wire between P472-A2 and J273-3. Go to paragraph 11-23.</p> <p>NO Go to step 17.</p> |
| <p>12. Detach P1 from J266. Check for short between P413-B16 and ground.
Does short exist?</p> <p>YES Repair shorted wire between P413-B16 and J266-3. Go to paragraph 11-23.</p> <p>NO Go to step 13.</p> | <p>17. Check for short between P686-125 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P686-125 and P459-A20, J459-A20 and J908-A2, P908-A2 and J273-2. Go to paragraph 11-23.</p> <p>NO Go to step 18.</p> |
| <p>13. Check for short between P686-123 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P686-123 and P459-A18, J459-A18 and J266-2. Go to paragraph 11-23.</p> <p>NO Go to step 14.</p> | <p>18. Check for short between P686-126 and ground.
Does short exist?</p> <p>YES Repair shorted wire between: P686-126 and P459-A4, J459-A4 and J908-A4, P908-A4 and J273-4. Go to paragraph 11-23.</p> <p>NO Replace CPG directional SPAD (TM 1-1520-238-23).</p> |

11-56. RTR BRK CIRCUIT BREAKER – DOES NOT STAY CLOSED WITH BUCS TST SWITCH SET TO CPG (cont)

11-56

19. Detach P1 from J267. Check for short between P472-A1 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between P472-A1 and J267-3.
Go to paragraph 11-23. |
| NO | Go to step 20. |

20. Check for short between P686-115 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between: P686-115 and P459-A19, J459-A19 and J908-A1 and J627-2.
Go to paragraph 11-23. |
| NO | Go to step 21. |

21. Check for short between P686-122 and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between: P686-122 and P459-A3, J459-A3 and J908-A7, P908-A7 and J267-4.
Go to paragraph 11-23. |
| NO | Replace CPG longitudinal SPAD (TM 1-1520-238-23). |

END OF TASK

11-57. DASE COMPUTER NO-GO AFT AVIONICS BAY – APPEARS ON HOD

11-57

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 11-1520-238-23-2
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at:
P682-73,
P682-75,
P682-77,
P682-79.

Is voltage present?

YES Go to step 4.
NO Go to step 2.

2. Check for open between all combinations of the following:
P682-73,
P682-75,
P682-77,
P682-79,
P682-121.

Does open exist?

YES Repair open wire between:
P682 SP5 and P682-73,
P682 SP5 and P682-75,
P682 SP5 and P682-77,
P682 SP5 and P682-79.
Go to paragraph 11-23.

NO **(ACA)** Replace DASEC
(TM 1-1520-238-23).
(ACB) Go to step 3.

3. **(ACB)** Detach filter adapter A705. Check for open through pins:
A705-73,
A705-75,
A705-77,
A705-79,
A705-121.

Does open exist?

YES Replace filter adapter
(TM 1-1520-238-23).

NO Replace DASEC
(TM 1-1520-238-23).

4. Detach P750. Check for short between:
P688-83 and ground,
P688-82 and ground.

Does short exist?

YES Repair shorted wire between:
P688-83 and P459-A15,
P688-82 and P459-A16,
J459-A15 and J912-B18,
J459-A16 and J912-B19,
P912-B18 and P750-L,
P912-B19 and P750-M.
Go to paragraph 11-23.

NO Go to step 5.

5. Check for open between:

P688-83 and P750-L,
P688-82 and P750-M.

Does open exist?

YES Repair shorted wire between:
 P688-83 and P459-A15,
 P688-82 and P459-A16,
 J459-A15 and J912-B18,
 J459-A16 and J912-B19,
 P912-B18 and P750-L,
 P912-B19 and P750-M.
 Go to paragraph 11-23.

NO Go to step 6.

6. Check for 970 to 1030 ohms between P750-L and P750-M.

Is resistance present?

YES **(ACB)** Go to step 7.
 (ACA) Replace DASEC
 (TM 1-1520-238-23).

NO Refer to TM 11-1520-238-23-2
 to troubleshoot video display
 unit (VDU).

7. **(ACB)** Detach filter adapter A708. Check for open through pins:
A708-82 and A708-83.**Does open exist?**

YES Replace filter adapter
 (TM 1-1520-238-23).

NO Replace DASEC
 (TM 1-1520-238-23).

END OF TASK

11-58. CPG COLL LVDT NO-GO CPG COMPARTMENT – APPEARS ON HOD

11-58

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Place CPG collective stick to full up or full down. Detach P686. Check for 10 VAC at P686-39.
Is voltage present?
 - YES (ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 2.
 - NO (ACA) Go to step 3. (ACB) Go to step 4.
- (ACB) Attach P686. Detach filter adapter A707. Check for 10 VAC at A707-39.
Is voltage present?
 - YES Replace DASEC (TM 1-1520-238-23).
 - NO Replace filter adapter (TM 1-1520-238-23).

- (ACA) Check for short between: P234-C and ground, P234-D and ground.
Does short exist?
 - YES Repair shorted wire between: P234-D and J447-B17, P234-C and J447-B18, P447-B17 and P686-38, P447-B18 and P686-39. Go to paragraph 11-23.
 - NO Go to step 5.
- (ACB) Check for short between: J234-3 and ground, J234-4 and ground.
Does short exist?
 - YES Repair shorted wire between: J234-4 and J447-B17, J234-3 and J447-B18, P447-B17 and P686-38, P447-B18 and P686-39. Go to paragraph 11-23.
 - NO Go to step 6.
- (ACA) Check for open between: P234-C and P686-39, P234-D and P686-38.
Does open exist?
 - YES Repair open wire. Go to paragraph 11-23.
 - NO Go to step 7.
- (ACB) Check for open between: J234-3 and P686-39, J234-4 and P686-38.
Does open exist?
 - YES Repair open wire. Go to paragraph 11-23.
 - NO Go to step 9 .
- (ACA) Attach P686. Check for 26 VAC at P234-A.
Is voltage present?
 - YES Go to step 8.
 - NO Go to step 11.

8. **(ACA)** Check for open between P234–B and P499–B17.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Replace CPG collective
(vertical) LVDT
(TM 1-1520-238-23). |

9. **(ACB)** Attach P686. Check for 26 VAC at J234–1.

Is voltage present?

- | | |
|-----|----------------|
| YES | Go to step 10. |
| NO | Go to step 12. |

10. Check for open between J234–2 and P693–4.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Replace CPG collective
(vertical) LVDT
(TM 1-1520-238-23). |

11. **(ACA)** Check for open between P234–A and P499–B16.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Go to paragraph 11–76. |

12. **(ACB)** Check for open between 234–1 and P693–3.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Go to paragraph 11–76. |

END OF TASK

11-59. ROTOR BRAKE NO-GO PLT COMPARTMENT – APPEARS ON HOD

11-59

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-5
 TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



- Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.
- To prevent the possibility of shorting, use extreme care when checking voltage at mass termination connectors. Failure to do so could result in damage to equipment or possible injury to personnel.

1. On pilot power quadrant, with **RTR BK** switch set to **BRAKE**, check for 28 VDC at P170-A7.

Is voltage present?

YES Go to step 3.
 NO Go to step 2.

2. Check for open between P173-b and P170-A2.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-23.
 NO Refer to TM 1-1520-238-T-5 to troubleshoot hydraulic and pneumatic system.

3. Check for 28 VDC at P686-114.

Is voltage present?

YES **(ACA)** Replace DASEC (TM 1-1520-238-23).
 (ACB) Go to step 5.
 NO Go to step 4.

4. Check for open between: P170-A2 and J447-A6, P447-A6 and P686-114.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-23.
 NO Replace pilot **ASE** panel (TM 1-1520-238-23).

5. **(ACB)** Detach filter adapter A707. Check for open through pin A707-114.

Does open exist?

YES Replace filter adapter (TM 1-1520-238-23).
 NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

- TM 1-1520-238-T-6
- TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot cyclic stick, set **FORCE TRIM REL** switch to **OFF**. Check for 28 VDC at P686-117.
Is voltage present?

YES	Go to step 2.
NO	Go to step 3.

2. Check for short between (A401): P113-A9 and P113-A5, P113-A10 and P113-A5, P113-A11 and P113-A5.
Does short exist?

YES	Replace pilot cyclic stick (TM 1-1520-238-23).
NO	Repair shorted wire between: J113-A5 and J403-A13, P403-A13 and J447-B7, P447-B7 and P686-117, J113-A11 and P423-B15, J113-A10 and P423-B16, J113-A9 and P423-B7. Go to paragraph 11-23.
3. Check for 28 VDC at P686-116.
Is voltage present?

YES	Go to step 4.
NO	Go to step 8.
4. With positive meter lead at (A402): TB3-7/8-F, check for short between TB3-7/8-F and TB3-7/8-A.
Does short exist?

YES	Replace terminal board (electronic module) (A402)TB3-7/8 (TM 1-1520-238-23).
NO	Go to step 5.
5. Check for short between (A402): J11-B15 and J11-B14.
Does short exist?

YES	Repair shorted wire between (A402): J11-B15 and TB2-29-E, J11-B14 and TB2-29-F. Go to paragraph 11-23.
NO	Go to step 6.

11-60. PILOT CYCLIC GRIP NO-GO PLT COMPARTMENT – APPEARS ON HOD (cont)

11-60

6. Check for short between J113–A11 and J113–A10.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between: J113–A11 and P423–B15, J113–A10 and P423–B16. Go to paragraph 11–23. |
| NO | Go to step 7. |
7. Check for short between J113–A11 and J113–A9.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between: J113–A11 and P423–B15, J113–A9 and P423–B7. Go to paragraph 11–23. |
| NO | Replace pilot cyclic stick (TM 1-1520-238-23). |
8. With pilot cyclic stick **FORCE TRIM REL** switch set to **ON**, check for 28 VDC at P686–117.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 13. |
| NO | Go to step 9. |
9. Check for 28 VDC at (A76)J1–Y.
Is voltage present?
- | | |
|-----|--|
| YES | Go to step 10. |
| NO | Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station). |
10. Check for open between wire end (A402)TB3–9–K and P463–Y.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–23. |
| NO | Go to step 11. |
11. Check for open between wire end (A402)TB3–9–L and J113–A9.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–23. |
| NO | Go to step 12. |
12. Check for open between J113–A5 and P686–117.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–23. |
| NO | Replace pilot cyclic stick (TM 1-1520-238-23). |
13. With pilot cyclic stick **FORCE TRIM REL** switch held to **FORCE TRIM REL**, check for 28 VDC at P686–116.
Is voltage present?
- | | |
|-----|---|
| YES | (ACA) Replace DASEC (TM 1-1520-238-23).
(ACB) Go to step 15. |
| NO | Go to step 14. |
14. Check for open between P686–116 and J113–A11.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–23. |
| NO | Replace pilot cyclic stick (TM 1-1520-238-23). |
15. **(ACB)** Detach filter adapter A707. Check for open through pin A707–116.
Does open exist?
- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Replace DASEC (TM 1-1520-238-23). |

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On CPG cyclic stick, press and hold **TRIM** switch, check for 28 VDC at P686–116.

Is voltage present?

YES	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 3.
NO	(ACB) Go to step 2.

2. (**ACB**) Check for open between: P686–116 and J118–7, J118–6 and (A402)TB3–9–M.

Does open exist?

YES	Repair open wire. Go to paragraph 11–23.
NO	Replace CPG cyclic stick (TM 1-1520-238-23).

3. (**ACB**) Detach filter adapter A707. Check for open through pin A707–116.

Does open exist?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-62. ALL NO-GO MESSAGES EXCEPT GROUP D NO-GO – APPEARS ON HOD

11-62

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P686-118.

Is voltage present?

YES	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 5.
NO	Go to step 2.

2. Check for open between (A402)TB2-7-K and P686-118.

Does open exist?

YES	Go to step 4.
NO	Go to step 3.

3. Check for open between (A402): TB2-7-D and J1-34.

Does open exist?

YES Repair open wire.
Go to paragraph 11-23.

NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 3 – pilot station).

4. Check for open between (A402): K4-1/2-B2 and J27-B4.

Does open exist?

YES Repair open wire.
Go to paragraph 11-23.

NO Go to step 6.

5. (**ACB**) Detach filter adapter A707. Check for open through pin A707-118.

Does open exist?

YES Replace filter adapter (TM 1-1520-238-23).

NO Replace DASEC (TM 1-1520-238-23).

6. Check for open between (A402): TB2-7-K and K4-1/2-B3.

Does open exist?

YES Repair open wire.
Go to paragraph 11-23.

NO Replace relay (A402)XK4-1/2 (TM 1-1520-238-23).

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Place CPG cyclic stick to full right or full left. Detach P688. Check for 10 VAC at P686-37.
Is voltage present?

YES (ACA) Replace DASEC (TM 1-1520-238-23).
(ACB) Go to step 2.

NO (ACA) Go to step 3.
(ACB) Go to step 4.

- (ACB) Attach P686. Detach filter adapter A707. Check for 10 VAC at A707-37.

Is voltage present?

YES Replace DASEC (TM 1-1520-238-23).

NO Replace (TM 1-1520-238-23).

- (ACA) Detach P686. Check for short between: P237-C and ground, P237-D and ground.

Does short exist?

YES Repair shorted wire between: P237-D and J447-B11, P237-C and J447-B12, P447-B11 and P686-37, P447-B12 and P686-36. Go to paragraph 11-23.

NO Go to step 5.

- (ACB) Detach P686. Check for short between: J237-3 and ground, J237-4 and ground.

Does short exist?

YES Repair shorted wire between: J237-4 and J447-B11, J237-3 and J447-B12, P447-B11 and P686-37, P447-B12 and P686-36. Go to paragraph 11-23.

NO Go to step 6.

- (ACA) Check for open between: P237-C and P686-36, P237-D and P686-37.

Does open exist?

YES Repair open wire. Go to paragraph 11-23.

NO Go to step 7.

- (ACB) Check for open between: J237-3 and P686-36, J237-4 and P686-37.

Does open exist?

YES Repair open wire. Go to paragraph 11-23.

NO Go to step 9.

- (ACA) Attach P686. Check for 26 VAC at P237-A.

Is voltage present?

YES Go to step 8.

NO Go to step 11.

11-63. CPG LAT LVDT NO-GO CPG COMPARTMENT – APPEARS ON HOD (cont)

11-63

8. **(ACA)** Check for open between P237-B and P499-B17.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace CPG lateral (roll) LVDT
(TM 1-1520-238-23). |

9. **(ACB)** Attach P686. Check for 26 VAC at J237-1.

Is voltage present?

- | | |
|-----|----------------|
| YES | Go to step 10. |
| NO | Go to step 12. |

10. **(ACB)** Check for open between 237-2 and P693-2.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace CPG lateral (roll) LVDT
(TM 1-1520-238-23). |

11. **(ACA)** Check for open between P237-A and P499-B16.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Go to paragraph 11-76. |

12. **(ACB)** Check for open between J237-1 and P693-1.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Go to paragraph 11-76. |

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot **ASE** panel, set **PITCH** switch to on.
Does PITCH switch stay engaged?
 - YES Go to step 4.
 - NO Go to step 2.
2. With **PITCH** switch held to on position, check for 28 VDC at P688-116.
Is voltage present?
 - YES Go to step 7.
 - NO Go to step 3.
3. Check for open between P170-B4 and P688-116.
Does open exist?
 - YES Repair open wire. Go to paragraph 11-23.
 - NO Replace pilot **ASE** panel (TM 1-1520-238-23).
4. On pilot **ASE** panel, set **ROLL** switch to on.
Does ROLL switch stay engaged?
 - YES Go to step 11.
 - NO Go to step 5.
5. With **ROLL** switch held to on position, check for 28 VDC at P688-117.
Is voltage present?
 - YES Go to step 8.
 - NO Go to step 6.
6. Check for open between P688-117 and P170-A8.
Does open exist?
 - YES Repair open wire. Go to paragraph 11-23.
 - NO Replace pilot **ASE** panel (TM 1-1520-238-23).
7. Check for open between P170-B10 and P638-119.
Does open exist?
 - YES Repair open wire. Go to paragraph 11-23.
 - NO **(ACA)** Replace DASEC (TM 1-1520-238-23). **(ACB)** Go to step 9.
8. Check for open between P170-B3 and P683-120.
Does open exist?
 - YES Repair open wire. Go to paragraph 11-23.
 - NO **(ACA)** Replace DASEC (TM 1-1520-238-23). **(ACB)** Go to step 10.
9. **(ACB)** Detach filter adapter A706. Check for open through pin A706-119.
Does open exist?
 - YES Replace filter adapter (TM 1-1520-238-23).
 - NO Replace DASEC (TM 1-1520-238-23).

11-64. DASE ENGAGE PANEL NO-GO PLT COMPARTMENT – APPEARS ON HOD (cont)

11-64

10. (ACB) Detach filter adapter A706. Check for open through pin A706-120.
Does open exist?
- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Replace DASEC (TM 1-1520-238-23). |
11. On pilot ASE panel, set YAW switch to on.
Does YAW switch stay engaged?
- | | |
|-----|----------------|
| YES | Go to step 14. |
| NO | Go to step 12. |
12. With YAW switch held to the on position, check for 28 VDC at P688-118.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 17. |
| NO | Go to step 13. |
13. Check for open between P688-118 and P170-A5.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace pilot ASE panel (TM 1-1520-238-23). |
14. On pilot ASE panel, hold ATTD/HOVER HOLD switch to on.
Does ATTD/HOVER HOLD switch stay engaged?
- | | |
|-----|----------------|
| YES | Go to step 15. |
| NO | Go to step 16. |
15. On pilot ASE panel, move BUCS TST switch to PLT, CPG, and center position. Check that BUCS ON indicators on the pilot and CPG caution/warning panels light.
Are BUCS ON indicators lighted?
- | | |
|-----|-----------------------------------|
| YES | Replace DASEC (TM 1-1520-238-23). |
| NO | Go to paragraph 11-52. |
16. With ATTD/HOVER HOLD switch held to on position, check for 28 VDC at P688-119.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 19. |
| NO | Go to step 17. |
17. Check for open between P688-119 and P170-B9.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace pilot ASE panel (TM 1-1520-238-23). |
18. Check for open between P683-121 and P170-A9.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | (ACA) Replace DASEC (TM 1-1520-238-23).
(ACB) Go to step 21. |
19. Check for open between P170-B8 and P683-122.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | (ACA) Replace DASEC (TM 1-1520-238-23).
(ACB) Go to step 20. |
20. (ACB) Detach filter adapter A706. Check for open through pin A706-122.
Does open exist?
- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Replace DASEC (TM 1-1520-238-23). |

11-64. DASE ENGAGE PANEL NO-GO PLT COMPARTMENT – APPEARS ON HOD (cont)

11-64

21. (ACB) Detach filter adapter A706. Check for open through pin A706-121.

Does open exist?

YES Replace filter adapter
(TM 1-1520-238-23).

NO Replace DASEC
(TM 1-1520-238-23).

END OF TASK

11-65. CPG BUCS SEL NO-GO CPG COMPARTMENT – APPEARS ON HOD

11-65

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

3. Check for open between J108-h and P686-113.
Does open exist?

YES Repair open wire.
Go to paragraph 11-23.

NO Replace BUCS select trigger switch (TM 1-1520-238-23).

4. (ACA) Detach filter adapter A707. Check for open through pin A707-113.

Does open exist?

YES Replace DASEC (TM 1-1520-238-23).

NO Replace filter adapter (TM 1-1520-238-23).



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On CPG collective stick, press and hold BUCS select trigger switch. Check for 28 VDC at P686-113.

Is voltage present?

YES (ACA) Go to step 4.
(ACB) Replace DASEC (TM 1-1520-238-23).

NO Go to step 2.

2. Check for open between wire end (A326)TB1-21-M and J108-i.

Does open exist?

YES Repair open wire.
Go to paragraph 11-23.

NO Go to step 3.

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. On pilot circuit breaker panel, close **ASE BUCS** circuit breaker. Check for 28 VDC at P1-33.
Is voltage present?

YES	Go to step 2.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 3 – pilot station).

2. Check for 28 VDC at P682-68.
Is voltage present?

YES	Go to step 3.
NO	Go to step 4.

3. Check for open between: P682-67 and GS601-B, P682-65 and GS601-G.
Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 6.

4. Check for open between (A402): J1-33 and J27-A10.
Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 5.

5. Check for open between: P431-A10 and P493-B12, P499-A10 and P682-68, and P499-A10 and P682-66.
Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Repair open wire between (A323): J4-B12 and TB3-4-R, J5-A10 and TB3-4-N. Go to paragraph 11-23.

6. **(ACB)** Detach filter adapter A705. Check for open through pins: A705-65, A705-66, A705-67, A705-68.

Does open exist?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-67. PILOT LONG 1 DCPLR NO-GO PLT COMPARTMENT OR PILOT LONG 2 DCPLR NO-GO PLT COMPARTMENT – APPEARS ON HOD

11-67

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With **BUCS TST** switch held in **PLT** or **CPG** position, check for 28 VDC at P688-115 and P688-122.
Is voltage present?
 - YES Go to step 2.
 - NO Go to step 4.
2. Check pilot cyclic longitudinal SPAD shear pin condition (TM 1-1520-238-23).
Is shear pin sheared?
 - YES Replace SPAD shear pin (TM 1-1520-238-23).
 - NO Go to step 3.

3. Detach P472 and P459. Check for short between:

J271-1 and J271-2,
J271-1 and J271-4.

Does short exist?

YES Repair shorted wire between:
J271-1 and P472-A20,
J271-2 and P912-B1,
J271-4 and P908-A3,
J912-B1 and J459-A7,
J908-A3 and J459-A11.
Go to paragraph 11-23.

NO Replace longitudinal SPAD (TM 1-1520-238-23).

4. Check for open between:

J271-2 and P688-115,
J271-4 and P688-122.

Does open exist?

YES Repair open wire.
Go to paragraph 11-23.

NO Go to step 5.

5. Check for open between:

P1-2 and P1-3,
P1-3 and P1-4.

Does open exist?

YES Replace longitudinal SPAD (TM 1-1520-238-23).

NO **(ACA)** Replace DASEC (TM 1-1520-238-23).
(ACB) Go to step 6.

6. **(ACB)** Detach filter adapter A708. Check for open through pins A708-115 and A708-122.

Does open exist?

YES Replace filter adapter (TM 1-1520-238-23).

NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-68. PILOT LAT 1 DCPLR NO-GO PLT COMPARTMENT OR PILOT LAT 2 DCPLR NO-GO PLT COMPARTMENT – APPEARS ON HOD 11-68

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With **BUCS TST** switch held in **PLT** or **CPG** position, check for 28 VDC at P688-123 and P688-124.

Is voltage present?

- YES Go to step 2.
- NO Go to step 4.

2. Check pilot cyclic lateral SPAD shear pin condition (TM 1-1520-238-23).

Is shear pin sheared?

- YES Replace shear pin (TM 1-1520-238-23).
- NO Go to step 3.

3. Detach P413 and P459. Check for short between:

J270-1 and J270-2,
J270-1 and J270-4.

Does short exist?

- YES Repair shorted wire between: J270 and P413-B6, J270-2 and J459-A14, J270-4 and J459-A10. Go to paragraph 11-23.
- NO Replace pilot cyclic housing (TM 1-1520-238-23).

4. Check for open between:

J270-2 and P688-123,
J270-4 and P688-124.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Go to step 5.

5. Check for open between:

P1-2 and P1-3,
P1-3 and P1-4.

Does open exist?

- YES Replace pilot cyclic housing (TM 1-1520-238-23).
- NO **(ACA)** Replace DASEC (TM 1-1520-238-23). **(ACB)** Go to step 6.

6. **(ACB)** Detach filter adapter A708. Check for open through pins A708-123 and A708-124.

Does open exist?

- YES Replace filter adapter (TM 1-1520-238-23).
- NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-69. PILOT DIR 1 DCPLR NO-GO PLT COMPARTMENT OR PILOT DIR 2 DCPLR NO-GO PLT COMPARTMENT – APPEARS ON HOD

11-69

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With **BUCS TST** switch held in **PLT** or **CPG** position, check for 28 VDC at P688-125 and P688-126.

Is shear pin sheared?

- YES Go to step 2.
- NO Go to step 4.

2. Check pilot directional SPAD shear pin condition (TM 1-1520-238-23).

Does short exist?

- YES Replace SPAD shear pin (TM 1-1520-238-23).
- NO Go to step 3.

3. Detach P472 and P459. Check for short between:

J269-1 and J269-2,
J269-1 and J269-4.

Does short exist?

- YES Repair shorted wire between: J269-1 and P472-A19, J269-2 and P912-B2, J269-4 and P912-B3, J912-B2 and J459-A8, J912-B3 and J459-A12. Go to paragraph 11-23.
- NO Replace directional SPAD (TM 1-1520-238-23).

4. Check for open between:

J269-2 and P688-125,
J269-4 and P688-126.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Go to step 5.

5. Check for open between:

P1-2 and P1-3,
P1-3 and P1-4.

Does open exist?

- YES Replace directional SPAD (TM 1-1520-238-23).
- NO **(ACA)** Replace DASEC (TM 1-1520-238-23). **(ACB)** Go to step 6.

6. **(ACB)** Detach filter adapter A708. Check for open through pins A708-125 and A708-126.

Does open exist?

- YES Replace filter adapter (TM 1-1520-238-23).
- NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-70. PILOT COLL 1 DCPLR NO-GO PLT COMPARTMENT OR PILOT COLL 2 DCPLR NO-GO PLT COMPARTMENT - APPEARS ON HOD

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer
- One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- With **BUCS TST** switch held in **PLT** or **CPG** position, check for 28 VDC at P688-127 and P688-128.

Is voltage present?

- YES Go to step 2.
- NO Go to step 4.

- Check pilot collective SPAD shear pin condition (TM 1-1520-238-23).

Is shear pin sheared?

- YES Replace SPAD shear pin (TM 1-1520-238-23).
- NO Go to step 3.

- Detach P413 and P459. Check for short between:
J272-1 and J272-2,
J272-1 and J272-4.

Does short exist?

- YES Repair shorted wire between:
J272-1 and P413-B15,
J272-2 and J459-A9,
J272-4 and J459-A13.
Go to paragraph 11-23.

- NO Replace pilot collective housing (TM 1-1520-238-23).

- Check for open between:
J272-2 and P688-127,
J272-4 and P688-128.

Does open exist?

- YES Repair open wire.
Go to paragraph 11-23.

- NO Go to step 5.

- Check for open between:
P1-2 and P1-3,
P1-3 and P1-4.

Does open exist?

- YES Replace pilot collective housing (TM 1-1520-238-23).

- NO **(ACA)** Replace DASEC (TM 1-1520-238-23).
(ACB) Go to step 6.

- (ACB)** Detach filter adapter A708. Check for open through pins A708-127 and A708-128.

Does open exist?

- YES Replace filter adapter (TM 1-1520-238-23).

- NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-71. CPG LONG 1 DCPLR NO-GO CPG COMPARTMENT OR CPG LONG 2 DCPLR NO-GO CPG COMPARTMENT – APPEARS ON HOD

11-71

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With **BUCS TST** switch held in **PLT** or **CPG** position, check for 28 VDC at P686-115 and P686-122.

Is voltage present?

- YES Go to step 2.
- NO Go to step 4.

2. Check CPG longitudinal SPAD shear pin condition (TM 1-1520-238-23).

Is shear pin sheared?

- YES Replace SPAD shear pin (TM 1-1520-238-23).
- NO Go to step 3.

3. Detach P472 and P459. Check for short between:

J271-1 and J271-2,
J271-1 and J271-4.

Does short exist?

- YES Repair shorted wire between: J267-1 and P472-A18, J267-2 and P908-A1, J267-4 and P908-A7, J908-A1 and J459-A19, J908-A7 and J459-A3. Go to paragraph 11-23.
- NO Replace CPG cyclic housing (TM 1-1520-238-23).

4. Check for open between:

J267-2 and P686-115,
J267-4 and P686-122.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Go to step 5.

5. Check for open between:

P1-2 and P1-3,
P1-3 and P1-4.

Does open exist?

- YES Replace CPG cyclic housing (TM 1-1520-238-23).
- NO **(ACA)** Replace DASEC (TM 1-1520-238-23). **(ACB)** Go to step 6.

6. **(ACB)** Detach filter adapter A707. Check for open through pins A707-115 and A707-122.

Does open exist?

- YES Replace filter adapter (TM 1-1520-238-23).
- NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-72. CPG LAT 1 DCPLR NO-GO CPG COMPARTMENT OR CPG LAT 2 DCPLR NO-GO CPG COMPARTMENT – APPEARS ON HOD

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer
- One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- With **BUCS TST** switch held in **PLT** or **CPG** position, check for 28 VDC at P686-123 and P686-124.

Is voltage present?

- YES Go to step 2.
- NO Go to step 4.

- Check CPG lateral SPAD shear pin condition (TM 1-1520-238-23).

Is shear pin sheared?

- YES Replace SPAD shear pin (TM 1-1520-238-23).
- NO Go to step 3.

- Detach P413 and P459. Check for short between:

J266-1 and J266-2,
J266-1 and J266-4.

Does short exist?

- YES Repair shorted wire between: J266-1 and P413-B5, J266-2 and J459-A18, J266-4 and J459-A5. Go to paragraph 11-23.

- NO Replace CPG cyclic housing (TM 1-1520-238-23).

- Check for open between:

J266-2 and P686-123,
J266-4 and P686-124.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.

- NO Go to step 5.

- Check for open between:

P1-2 and P1-3,
P1-3 and P1-4.

Does open exist?

- YES Replace CPG cyclic housing (TM 1-1520-238-23).

- NO **(ACA)** Replace DASEC (TM 1-1520-238-23). **(ACB)** Go to step 6.

- (ACB)** Detach filter adapter A708. Check for open through pins A707-123 and A707-124.

Does open exist?

- YES Replace filter adapter (TM 1-1520-238-23).

- NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-73. CPG DIR 1 DCPLR NO-GO CPG COMPARTMENT OR CPG DIR 2 DCPLR NO-GO CPG COMPARTMENT – APPEARS ON HOD

11-73

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. With **BUCS TST** switch held in **PLT** or **CPG** position, check for 28 VDC at P686-125 and P686-126.

Is voltage present?

- YES Go to step 2.
- NO Go to step 4.

2. Check CPG directional SPAD shear pin condition (TM 1-1520-238-23).

Is shear pin sheared?

- YES Replace shear pin (TM 1-1520-238-23).
- NO Go to step 3.

3. Detach P472 and P459. Check for short between:

J273-1 and J273-2,
J273-1 and J273-4.

Does short exist?

- YES Repair shorted wire between: J273-1 and P472-A17, J273-2 and P908-A2, J273-4 and P908-A4, J908-A2 and J459-A20, J908-A4 and J459-A4. Go to paragraph 11-23.
- NO Replace directional SPAD (TM 1-1520-238-23).

4. Check for open between:

J273-2 and P686-125,
J273-4 and P686-126.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Go to step 5.

5. Check for open between:

P1-2 and P1-3,
P1-3 and P1-4.

Does open exist?

- YES Replace directional SPAD (TM 1-1520-238-23).
- NO **(ACA)** Replace DASEC (TM 1-1520-238-23). **(ACB)** Go to step 6.

6. **(ACB)** Detach filter adapter A707. Check for open through pins A707-125 and A707-126.

Does open exist?

- YES Replace filter adapter (TM 1-1520-238-23).
- NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-74. CPG COLL 1 DCPLR NO-GO CPG COMPARTMENT OR CPG COLL 2 DCPLR NO-GO CPG COMPARTMENT – APPEARS ON HOD

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer
- One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- With **BUCS TST** switch held in **PLT** or **CPG** position, check for 28 VDC at P686-127 and P686-128.

Is voltage present?

- YES Go to step 2.
- NO Go to step 4.

- Check CPG collective SPAD shear pin condition (TM 1-1520-238-23).

Is shear pin sheared?

- YES Replace SPAD shear pin (TM 1-1520-238-23).
- NO Go to step 3.

- Detach P413 and P459. Check for short between:

J268-1 and J268-2,
J268-1 and J268-4.

Does short exist?

- YES Repair shorted wire between: J268-1 and P413-B12, J268-2 and J459-A6, J268-4 and J459-A2. Go to paragraph 11-23.
- NO Replace CPG collective support housing (TM 1-1520-238-23).

- Check for open between:

J268-2 and P686-127,
J268-4 and P686-128.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Go to step 5.

- Check for open between:

P1-2 and P1-3,
P1-3 and P1-4.

Does open exist?

- YES Replace CPG collective support housing (TM 1-1520-238-23).
- NO **(ACA)** Replace DASEC (TM 1-1520-238-23). **(ACB)** Go to step 6.

- (ACB)** Detach filter adapter A707. Check for open through pins A707-127 and A707-128.

Does open exist?

- YES Replace filter adapter (TM 1-1520-238-23).
- NO Replace DASEC (TM 1-1520-238-23).

END OF TASK

11-75. BUCS TRACER NO-GO – APPEARS ON HOD

11-75

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 28 VDC at P686-60.

Is voltage present?

- | | |
|-----|--|
| YES | Go to step 2. |
| NO | Repair open wire between J415 SP1 and P686-60.
Go to paragraph 11-23. |

2. Check for 28 VDC at P686-59.

Is voltage present?

- | | |
|-----|--|
| YES | Go to step 3. |
| NO | Repair open wire between J415 SP1 and J417 SP1, J417 SP1 and J408 SP1, J408 SP1 and P686-59.
Go to paragraph 11-23. |

3. Check for 28 VDC at P686-61.

Is voltage present?

- | | |
|-----|---------------|
| YES | Go to step 5. |
| NO | Go to step 4. |

4. Check for 28 VDC at J756-24.

Is voltage present?

- | | |
|-----|---|
| YES | Repair open wire between: P756-24 and J215 SP1, J215 SP1 and J756-22, J756-22 and P402-B17, J402-B17 and P686-61.
Go to paragraph 11-23. |
| NO | Repair open wire between: J756-24 and P402-B19. (A323): J5-A4 and TB3-4-P. (ACA) J402-B19 and P499-A4. (ACB) J402-B19 and P693 SP1, P693 SP1 and P499-A4.
Go to paragraph 11-23. |

5. Check for 28 VDC at P686-62.

Is voltage present?

- | | |
|-----|--|
| YES | Go to step 6. |
| NO | Repair open wire between: J417 SP1 and P449-A3, P499-A7 and P686-62. (A323): J5-A3 and TB3-3-J, TB3-3-K and J5-A7.
Go to paragraph 11-23. |

6. Check for 28 VDC at P686-51.

Is voltage present?

- | | |
|-----|----------------|
| YES | Go to step 10. |
| NO | Go to step 7. |

7. Check for 28 VDC at J266-1.

Is voltage present?

- | | |
|-----|---------------|
| YES | Go to step 8. |
| NO | Go to step 9. |

11-75. BUCS TRACER NO-GO – APPEARS ON HOD (cont)

11-75

- | | |
|---|---|
| <p>8. Check for open between J266-5 and P686-51.
Does open exist?</p> <p>YES Repair open wire between:
 J266-5 and P237 SP1,
 P237 SP1 and J447-B13,
 P447-B13 and P686-51.
 Go to paragraph 11-23.</p> <p>NO Replace CPG lateral SPAD
 (TM 1-1520-238-23).</p> | <p>12. Check for open between J273-5 and P686-52.
Does open exist?</p> <p>YES Repair open wire between:
 J273-5 and P235 SP1,
 P235 SP1 and P236 SP1,
 P236 SP1 and P912-B16,
 J912-B16 and J447-B10,
 J447-B10 and P686-52.
 Go to paragraph 11-23.</p> <p>NO Replace CPG directional SPAD
 (TM 1-1520-238-23).</p> |
| <p>9. Check for 28 VDC at P413-B14.
Is voltage present?</p> <p>YES Repair open wire between:
 P413-B5 and J266-1.
 (A326):
 J10-B14 and TB1-21-F,
 TB1-21-L and J10-B5.
 Go to paragraph 11-23.</p> <p>NO Repair open wire between:
 P413-B14 and P441-B2.
 (A402):
 J24-B2 and TB2-3-C.
 Go to paragraph 11-23.</p> | <p>13. Check for 28 VDC at P686-53.
Is voltage present?</p> <p>YES Go to step 14.</p> <p>NO Repair open wire between:
 P235 SP1 and P912-B13,
 J912-B13 and J447-B16,
 P447-B16 and P686-53.
 Go to paragraph 11-23.</p> |
| <p>10. Check for 28 VDC at P686-52.
Is voltage present?</p> <p>YES Go to step 13.</p> <p>NO Go to step 11.</p> | <p>14. Check for 28 VDC at P686-54.
Is voltage present?</p> <p>YES (ACA) Replace DASEC
 (TM 1-1520-238-23).
 (ACB) Go to step 15.</p> <p>NO Repair open wire between:
 P234 SP1 and J447-B19,
 P413-B13 and P234 SP1,
 P447-B19 and P686-54.
 (A326):
 J10-B13 and TB1-21-M.
 Go to paragraph 11-23.</p> |
| <p>11. Check for 28 VDC at J273-1.
Is voltage present?</p> <p>YES Go to step 12.</p> <p>NO Repair open wire between:
 P472-A17 and J273-1.
 (A326):
 J15-A17 and TB1-21-K.
 Go to paragraph 11-23.</p> | |

11-75. BUCS TRACER NO-GO – APPEARS ON HOD (cont)

11-75

15. (ACB) Detach filter adapter A707. Check for open through pins:

A707-51,
A707-52,
A707-53,
A707-54,
A707-59,
A707-60,
A707-61,
A707-62.

Does open exist?

- | | |
|-----|---|
| YES | Replace filter adapter
(TM 1-1520-238-23). |
| NO | Replace DASEC
(TM 1-1520-238-23). |

END OF TASK

11-76. 26 VAC EXCITATION XFMR 1 NO-GO AFT AVIONICS BAY – APPEARS ON HOD

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 21 to 26 VAC between P688–68 and P688–69.

Is voltage present?

YES	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 4.
NO	(ACA) Go to step 5. (ACB) Go to step 2.

2. (**ACB**) Check for open between: P688–69 and P693–9, P688–68 and P693–10.

Does open exist?

YES	Repair open wire. Go to paragraph 11–23.
NO	Go to step 3.

3. Check for open through pins A708–68 and A708–69.

Does open exist?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Go to step 6.

4. (**ACB**) Attach P688. Detach filter adapter A708. Check for 21 to 26 VAC between A708–68 and A708–69.

Is voltage present?

YES	Replace DASEC (TM 1-1520-238-23).
NO	Replace filter adapter (TM 1-1520-238-23).

5. (**ACA**) Check for open between: P688–69 and (A323)TB2–1–K, P688–68 and GS604–A.

Does open exist?

YES	Repair open wire. Go to paragraph 11–23.
NO	Go to step 9.

6. Check for 115 VAC at P692–A.

Is voltage present?

YES	Go to step 8.
NO	Go to step 7.

7. Check for open between: P692–A and (A402)J1–54, P692–B and GS433–G.

Does open exist?

YES	Repair open wire. Go to paragraph 11–23.
NO	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (ac essential bus 1 – pilot station).

**11-76. 26 VAC EXCITATION XFMR 1 NO-GO AFT AVIONICS BAY –
APPEARS ON HOD (cont)**

11-76

- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|----------------------|----|---|-----|----------------|----|----------------|-----|---|----|--|-----|----------------|----|----------------|-----|---|----|--|-----|----------------|----|----------------|---|-----|--|----|---|-----|--|----|----------------|-----|---|----|----------------------|-----|----------------|----|----------------|-----|--|----|----------------|
| <p>8. Check for 21 to 26 VAC between (A342): J2-9 and J2-10.
Is voltage present?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>(ACB) Go to step 11.</td> </tr> <tr> <td>NO</td> <td>Replace isolation transformer/filter assembly box (TM 1-1520-238-23).</td> </tr> </table> <p>9. (ACA) Check for 115 VAC at P499-B7.
Is voltage present?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>Go to step 13.</td> </tr> <tr> <td>NO</td> <td>Go to step 10.</td> </tr> </table> <p>10. Check for open between P499-B7 and (A402)J1-54.
Does open exist?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>Repair open wire.
Go to paragraph 11-23.</td> </tr> <tr> <td>NO</td> <td>Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (ac essential bus 1 – pilot station).</td> </tr> </table> <p>11. (ACB) Check for short between A708-69 and ground.
Does short exist?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>Go to step 12.</td> </tr> <tr> <td>NO</td> <td>Go to step 15.</td> </tr> </table> <p>12. Detach P688. Check for short between P688-69 and P693-9.
Does short exist?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>Repair shorted wire between P688-69 and P693-9.
Go to paragraph 11-23.</td> </tr> <tr> <td>NO</td> <td>Replace filter adapter (TM 1-1520-238-23).</td> </tr> </table> <p>13. Check for 21 to 26 VAC between wire end (A323)TB2-1-J and GS1-A.
Is voltage present?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>Go to step 17.</td> </tr> <tr> <td>NO</td> <td>Go to step 14.</td> </tr> </table> | YES | (ACB) Go to step 11. | NO | Replace isolation transformer/filter assembly box (TM 1-1520-238-23). | YES | Go to step 13. | NO | Go to step 10. | YES | Repair open wire.
Go to paragraph 11-23. | NO | Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (ac essential bus 1 – pilot station). | YES | Go to step 12. | NO | Go to step 15. | YES | Repair shorted wire between P688-69 and P693-9.
Go to paragraph 11-23. | NO | Replace filter adapter (TM 1-1520-238-23). | YES | Go to step 17. | NO | Go to step 14. | <p>14. Check for 115 VAC at (A323)TB2-1-C.
Is voltage present?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>Replace 26 VAC excitation transformer (A323)T1 (TM 1-1520-238-23).</td> </tr> <tr> <td>NO</td> <td>Repair open wire.
Go to paragraph 11-23.</td> </tr> </table> <p>15. Check for short between P693-1 and ground.
Does short exist?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>Repair shorted wire between: P693-3 and P445-A3, J445-A3 and J234-1.
Go to paragraph 11-23.</td> </tr> <tr> <td>NO</td> <td>Go to step 16.</td> </tr> </table> <p>16. Check for short between P693-3 and ground.
Does short exist?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>Repair shorted wire between: P693-3 and P445-A3, J445-A3 and P413-A1.
Go to paragraph 11-23.</td> </tr> <tr> <td>NO</td> <td>(ACB) Go to step 19.</td> </tr> </table> <p>17. Attach wire to (A323)TB2-1-J. Detach P493 and wire from (A323): TB3-6-K and TB3-6-B. Check for 21 to 26 VAC at P688-69.
Is voltage present?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>Go to step 20.</td> </tr> <tr> <td>NO</td> <td>Go to step 18.</td> </tr> </table> <p>18. Detach P499. Check for short between P499-A13 and ground.
Does short exist?</p> <table border="0"> <tr> <td style="padding-right: 20px;">YES</td> <td>Repair shorted wire between P499-A13 and P688-9.
Go to paragraph 11-23.</td> </tr> <tr> <td>NO</td> <td>Go to step 21.</td> </tr> </table> | YES | Replace 26 VAC excitation transformer (A323)T1 (TM 1-1520-238-23). | NO | Repair open wire.
Go to paragraph 11-23. | YES | Repair shorted wire between: P693-3 and P445-A3, J445-A3 and J234-1.
Go to paragraph 11-23. | NO | Go to step 16. | YES | Repair shorted wire between: P693-3 and P445-A3, J445-A3 and P413-A1.
Go to paragraph 11-23. | NO | (ACB) Go to step 19. | YES | Go to step 20. | NO | Go to step 18. | YES | Repair shorted wire between P499-A13 and P688-9.
Go to paragraph 11-23. | NO | Go to step 21. |
| YES | (ACB) Go to step 11. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | Replace isolation transformer/filter assembly box (TM 1-1520-238-23). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YES | Go to step 13. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | Go to step 10. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YES | Repair open wire.
Go to paragraph 11-23. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (ac essential bus 1 – pilot station). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YES | Go to step 12. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | Go to step 15. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YES | Repair shorted wire between P688-69 and P693-9.
Go to paragraph 11-23. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | Replace filter adapter (TM 1-1520-238-23). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YES | Go to step 17. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | Go to step 14. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YES | Replace 26 VAC excitation transformer (A323)T1 (TM 1-1520-238-23). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | Repair open wire.
Go to paragraph 11-23. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YES | Repair shorted wire between: P693-3 and P445-A3, J445-A3 and J234-1.
Go to paragraph 11-23. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | Go to step 16. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YES | Repair shorted wire between: P693-3 and P445-A3, J445-A3 and P413-A1.
Go to paragraph 11-23. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | (ACB) Go to step 19. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YES | Go to step 20. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | Go to step 18. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| YES | Repair shorted wire between P499-A13 and P688-9.
Go to paragraph 11-23. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NO | Go to step 21. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**11-76. 26 VAC EXCITATION XFMR 1 NO-GO AFT AVIONICS BAY –
APPEARS ON HOD (cont)**

11-76

- | | |
|--|---|
| <p>19. Check for short between P693-5 and ground.
Does short exist?</p> <p>YES Repair shorted wire between:
 P693-5 and P445-A5,
 J445-A5 and P413-A1.
 Go to paragraph 11-23.</p> <p>NO Go to step 22.</p> <p>20. Check for short between P493-A19 and ground.
Does short exist?</p> <p>YES Repair shorted wire between
 P493-A19 and J408-1.
 Go to paragraph 11-23.</p> <p>NO Go to step 23.</p> <p>21. Detach wire from (A323)TB3-6-F. Check for
short between wire end and ground.
Does short exist?</p> <p>YES Repair shorted wire between
 (A323):
 TB3-6-A and J4-A19,
 TB3-6-E and J4-A7,
 TB3-6-J and J4-A5.
 Go to paragraph 11-23.</p> <p>NO Repair shorted wire between
 (A323):
 TB3-6-F and TB2-1-L,
 TB2-K and J5-A13.
 Go to paragraph 11-23.</p> <p>22. Check for short between P693-7 and ground.
Does short exist?</p> <p>YES Repair shorted wire between:
 P693-7 and P445-A7,
 J445-A7 and P413-A2.
 Go to paragraph 11-23.</p> <p>NO Repair shorted wire between:
 P693-11 and J417-1,
 P693-13 and J415-1,
 P693-15 and J408-1,
 P693-17 and J215-1.
 Go to paragraph 11-23.</p> | <p>23. Check for short between P493-A7 and ground.
Does short exist?</p> <p>YES Repair shorted wire between
 P493-A7 and J415-1.
 Go to paragraph 11-23.</p> <p>NO Go to step 24.</p> <p>24. Check for short between P493-A5 and ground.
Does short exist?</p> <p>YES Repair shorted wire between
 P493-A5 and J417-1.
 Go to paragraph 11-23.</p> <p>NO Go to step 25.</p> <p>25. Check for short between wire end (A323)TB3-6
and P688-69.
Is voltage present?</p> <p>YES Repair shorted wire between:
 J402-B11 and P499-A19,
 P402-B11 and J756-A8,
 P756-18 and J215-1.
 (A323):
 J5-A19 and TB3-6-B.
 Go to paragraph 11-23.</p> <p>NO Go to step 26.</p> <p>26. Check for short between P413-A5 and ground.
Is voltage present?</p> <p>YES Repair shorted wire between:
 J459-B3 and P413-A5,
 P499-B16 and P459-B3.
 (A323):
 J5-B16 and TB3-6-K.
 Go to paragraph 11-23.</p> <p>NO Repair shorted wire between:
 P472-B3 and P236-A,
 P413-A1 and P237-A,
 P472-B1 and P235-A,
 P413-A3 and P234-A.
 (A326):
 J10-A5 and TB1-18-E,
 J15-B3 and TB1-18-B,
 J10-A1 and TB1-18-D,
 J15-B1 and TB1-18-A,
 J10-A3 and TB1-18-C.
 Go to paragraph 11-23.</p> |
|--|---|

END OF TASK

11-77. 26 VAC EXCITATION XFMR 2 NO-GO AFT AVIONICS BAY – APPEARS ON HOD

11-77

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P686. Check for 21 to 26 VAC at P686-56.

Is voltage present?

YES	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 3.
NO	Go to step 2.

2. Check for open between:
(ACA) P686-56 and (A323)TB2-1-F, P686-55 and GS604-B.
(ACB) P686-56 and P694-9, P686-55 and P964-10.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	(ACA) Go to step 5. (ACH) Go to step 4.

3. (ACB) Attach P686. Detach filter adapter A707. Check for 21 to 26 VAC between A707-56 and A707-55.

Is voltage present?

YES	Replace DASEC (TM 1-1520-238-23).
NO	Replace filter adapter (TM 1-1520-238-23).

4. (ACB) Attach P686. Detach filter adapter A707. Check for open between:
A707-56 and P964-9,
A707-55 and P964-10.

Does open exist?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Go to step 8.

5. (ACA) Detach wire from (A323)TB2-1-E. Check for 21 to 26 VAC between wire end (A323)TB2-1-E and GS1-B.

Is voltage present?

YES	Go to step 7.
NO	Go to step 6.

6. (ACA) Check for 115 VAC at (A323)TB2-1-B.

Is voltage present?

YES	Replace 26 VAC excitation transformer (TM 1-1520-238-23).
NO	Repair open wire between (A323): TB2-1-A and J5-B7. Go to paragraph 11-23.

7. (ACA) Attach wire to (A323)TB2-1-E. Detach P493, (A323): TB3-7-M and TB3-7-L. Check for 21 to 26 VAC at P686-56.

Is voltage present?

YES	Go to step 12.
NO	Go to step 9.

**11-77. 26 VAC EXCITATION XFMR 2 NO-GO AFT AVIONICS BAY –
APPEARS ON HOD (cont)**

11-77

8. **(ACB)** Check for 26 VAC between (A342): J3-9 and J3-10.
Is voltage present?
- | | |
|-----|---|
| YES | Go to step 10. |
| NO | Replace isolation transformer/filter assembly box (TM 1-1520-238-23). |
9. **(ACA)** Check for short between P499-A11 and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between P499-A11 and P686-56.
Go to paragraph 11-23. |
| NO | Go to step 13. |
10. **(ACB)** With P686 connected, check for short between A707-56 and ground.
Does short exist?
- | | |
|-----|----------------|
| YES | Go to step 16. |
| NO | Go to step 11. |
11. **(ACB)** Detach P686. Check for short between P686-56 and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between P686-56 and P694-9.
Go to paragraph 11-23. |
| NO | Replace filter adapter (TM 1-1520-238-23). |
12. **(ACA)** Check for short between P493-A1 and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between P493-A1 and P220-6.
Go to paragraph 11-23. |
| NO | Go to step 14. |
13. **(ACA)** Detach wire from (A323): TB3-7-A and TB3-7-R. Check for short between wire end (A323)TB3-7-A and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire between (A323): TB3-7-A and TB2-1-G, TB2-1-F and J5-A11.
Go to paragraph 11-23. |
| NO | Go to step 15. |
14. **(ACA)** Check for short between P493-A3 and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between P493-A3 and J219-1.
Go to paragraph 11-23. |
| NO | Go to step 17. |
15. **(ACA)** Check for short between wire end (A323)TB3-7-R and ground.
Does short exist?
- | | |
|-----|--|
| YES | Refer to paragraph 11-88. |
| NO | Repair shorted wire between (A323): TB3-7-C and J4-A9, TB3-7-D and J4-A11, TB3-7-N and J4-A17, TB3-7-E and J4-A13, TB3-7-F and J4-A15, TB3-7-G and J4-A1, TB3-7-H and J4-A3.
Go to paragraph 11-23. |
16. **(ACB)** Check for short between P694-1 and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire between: P694-1 and P445-B1, J445-B1 and J233-1.
Go to paragraph 11-23. |
| NO | Go to step 18. |

**11-77. 26 VAC EXCITATION XFMR 2 NO-GO AFT AVIONICS BAY –
APPEARS ON HOD (cont)**

11-77

17. **(ACA)** Check for short between P493–A9 and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between P493–A9 and P226–6.
Go to paragraph 11–23. |
| NO | Go to step 19. |
18. **(ACB)** Check for short between P694–3 and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire between: P694–3 and P445–B3, J445–B3 and J230–1.
Go to paragraph 11–23. |
| NO | Go to step 20. |
19. **(ACA)** Check for short between P493–A11 and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire between P493–A11 and J225–a. |
| NO | Go to step 21. |
20. **(ACB)** Check for short between P694–5 and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire between: P694–5 and P445–B6, J445–B6 and P413–A15, P472–B5 and J232–1.
(A326):
J10–A15 and J15–B5.
Go to paragraph 11–23. |
| NO | Go to step 22. |
21. **(ACA)** Check for short between wire end (A323)TB3–7–M and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between: P402–B13 and J756–13, P499–A16 and J402–B13, P756–13 and J223–1.
(A323):
J5–A16 and TB3–7–M.
Go to paragraph 11–23. |
| NO | Go to step 23. |
22. **(ACB)** Check for short between P694–7 and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire between: P694–7 and P445–B8, J445–B8 and P413–A5, P472–B15 and J231–1.
(A326):
J10–A5 and J15–B15.
Go to paragraph 11–23. |
| NO | Go to step 24. |
23. **(ACA)** Check for short between wire and (A323)TB3–7–L and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between: P499–A18 and J402–A5, P402–A5 and J756–5, P756–5 and P224–6.
(A323):
J5–A18 and TB3–7–L.
Go to paragraph 11–23. |
| NO | Go to step 25. |
24. **(ACB)** Check for short between P694–23 and ground.
Is voltage present?
- | | |
|-----|--|
| YES | Repair shorted wire between: P694–23 and J402–A5, P402–A5 and J756–5, P756–5 and P224–6.
Go to paragraph 11–23. |
| NO | Go to step 26. |

**11-77. 26 VAC EXCITATION XFMR 2 NO-GO AFT AVIONICS BAY –
APPEARS ON HOD (cont)**

11-77

25. **(ACA)** Check for short between P493–A13 and ground.

Is voltage present?

- YES Repair shorted wire between P493–A13 and P228–6.
Go to paragraph 11–23.
- NO Go to step 27.

26. **(ACB)** Check for short between P694–25 and ground.

Is voltage present?

- YES Repair shorted wire between: P694–25 and J402–B13, P402–B13 and J233–1.
Go to paragraph 11–23.
- NO Repair shorted wire between: P694–11 and J225–1, P694–13 and P226–6, P694–15 and P228–6, P694–17 and J227–1, P694–19 and P220–6, P694–21 and J219–1.
Go to paragraph 11–23.

27. **(ACA)** Check for short between P493–A15 and ground.

Is voltage present?

- YES Repair shorted wire between P493–A15 and J227–1.
Go to paragraph 11–23.
- NO Go to step 28.

28. **(ACA)** Check for short between P413–15 and ground.

Is voltage present?

- YES Repair shorted wire between: P413–A14 and J459–B1, P459–B1 and P493–A17.
Go to paragraph 11–23.
- NO Repair shorted wire between: P472–B5 and P232–A, P413–A11 and P233–A, P472–B15 and P231–A, P413–A7 and P230–A.
(A326):
J10–A15 and TB1–20–A, J10–A11 and TB1–20–B, J15–B5 and TB1–20–C, J10–A17 and TB1–20–E.
Go to paragraph 11–23.

END OF TASK

11-78. LONG ACTUATOR NO-GO – APPEARS ON HOD

11-78

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 1800 to 2200 ohms between P688-49 and P688-50.

Is resistance present?

- | | |
|-----|---------------|
| YES | Go to step 3. |
| NO | Go to step 2. |

2. Check for open between: P220-4 and P688-49, P220-5 and P688-50.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace longitudinal servocylinder (TM 1-1520-238-23). |

3. Check for 90 to 100 ohms between: (ACA) P683-109 and P493-B9. (ACB) P683-109 and ground.

Is resistance present?

- | | |
|-----|---------------|
| YES | Go to step 5. |
| NO | Go to step 4. |

4. Check for open between: P683-109 and P220-2. (ACA) P493-B9 and P220-9. (ACB) P220-9 and ground.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace longitudinal servocylinder (TM 1-1520-238-23). |

5. Check for 90 to 100 ohms between P683-101 and P683-102.

Is resistance present?

- | | |
|-----|---------------|
| YES | Go to step 7. |
| NO | Go to step 6. |

6. Check for open between: P683-101 and P220-11, P683-102 and P220-10.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace longitudinal servocylinder (TM 1-1520-238-23). |

7. Check for 364 to 424 ohms between P688-23 and P688-24.

Is resistance present?

- | | |
|-----|---------------|
| YES | Go to step 9. |
| NO | Go to step 8. |

11-78. LONG ACTUATOR NO-GO – APPEARS ON HOD (cont)

- | | |
|---|---|
| <p>8. Check for open between:
P688-23 and P220-15,
P688-24 and P260-14.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-23.</p> <p>NO Replace longitudinal
 servocylinder
 (TM 1-1520-238-23).</p> <p>9. Check for 28 to 42 ohms between P688-36 and
P688-37.
Is resistance present?</p> <p>YES Go to step 11.</p> <p>NO Go to step 10.</p> <p>10. Check for open between:
P688-36 and P219-4,
P688-37 and P219-3.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-23.</p> <p>NO Replace longitudinal
 servocylinder
 (TM 1-1520-238-23).</p> <p>11. Check for 28 to 42 ohms between P686-42 and
P686-43.
Is resistance present?</p> <p>YES Go to step 13.</p> <p>NO Go to step 12.</p> <p>12. Check for open between:
P686-42 and J408-4,
P686-43 and J408-3.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-23.</p> <p>NO Replace longitudinal
 servocylinder
 (TM 1-1520-238-23).</p> | <p>13. Check for 73 to 91 ohms between:
(ACA) Wire ends (A323)TB3-7-G and GS1-G.
(ACB) P694-19 and P694-20.
Is resistance present?</p> <p>YES Go to step 15.</p> <p>NO Go to step 14.</p> <p>14. Check for open between:
(ACA) J220-6 and (A323)TB3-7-G,
 J220-7 and GS1-G.
(ACB) P220-6 and P694-19,
 P220-7 and P694-20.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-23.</p> <p>NO Replace longitudinal
 servocylinder
 (TM 1-1520-238-23).</p> <p>15. Check for 292 to 438 ohms between:
(ACA) Wire ends (A323)TB3-7-H and GS1-G.
(ACB) P694-21 and P694-22.
Is resistance present?</p> <p>YES Go to step 17.</p> <p>NO Go to step 16.</p> <p>16. Check for open between:
(ACA) J219-1 and (A323)TB3-7-H,
 J219-2 and GS1-H.
(ACB) J219-1 and P694-21,
 J219-2 and P694-22.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-23.</p> <p>NO Replace longitudinal
 servocylinder
 (TM 1-1520-238-23).</p> |
|---|---|

11-78. LONG ACTUATOR NO-GO – APPEARS ON HOD (cont)

11-78

17. Check for 292 to 438 ohms between:
(ACA) Wire ends (A323)TB3-6-A and GS3-G.
(ACB) P693-15 and P693-16.
Is resistance present?
- | | |
|-----|---|
| YES | (ACB) Go to step 19.
(ACA) Replace DASEC (TM 1-1520-238-23). |
| NO | Go to step 18. |
18. Check for open between:
(ACA) J408-1 and (A323)TB3-6-A, J408-2 and GS3-G.
(ACB) J408-1 and P693-15, J408-2 and P693-16.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace longitudinal servocylinder (TM 1-1520-238-23). |
19. Detach filter adapter A708. Check for open through pins:
A708-23,
A708-24,
A708-36,
A708-37,
A708-49,
A708-50.
Does open exist?
- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Go to step 20. |
20. Detach filter adapter A707. Check for open through pins
A707-42 and A707-43.
Does open exist?
- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Go to step 21. |
21. Detach filter adapter A706. Check for open through pins:
A706-101,
A706-102,
A706-109.
Does open exist?
- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Go to step 22. |
22. Has longitudinal Linear Variable Differential Transducer (LVDT) adjustment been performed?
- | | |
|-----|---|
| YES | Replace DASEC (TM 1-1520-238-23). |
| NO | Perform LVDT adjustment (TM 1-1520-238-23). |

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 1800 to 2200 ohms between P688-52 and P688-53.

Is resistance present?

- YES Go to step 3.
- NO Go to step 2.

2. Check for open between: P226-4 and P688-52, P226-5 and P688-53.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Replace lateral servocylinder (TM 1-1520-238-23).

3. Check for 90 to 100 ohms between: (ACA) P683-110 and P493-B11. (ACB) P683-110 and ground.

Is resistance present?

- YES Go to step 5.
- NO Go to step 4.

4. Check for open between: P683-110 and P226-2. (ACA) P493-B11 and P226-9. (ACB) P226-9 and ground.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Replace lateral servocylinder (TM 1-1520-238-23).

5. Check for 90 to 100 ohms between P683-103 and P683-104.

Is resistance present?

- YES Go to step 7.
- NO Go to step 6.

6. Check for open between: P683-103 and P226-11, P683-104 and P226-10.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Replace lateral servocylinder (TM 1-1520-238-23).

7. Check for 364 to 424 ohms between P688-25 and P688-26.

Is resistance present?

- YES Go to step 9.
- NO Go to step 8.

11-79. LAT ACTUATOR NO-GO – APPEARS ON HOD (cont)

11-79

8. Check for open between:
P688-25 and P226-15,
P688-26 and P266-14.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace lateral servocylinder
(TM 1-1520-238-23). |
9. Check for 28 to 42 ohms between P688-39 and P688-40.
Is resistance present?
- | | |
|-----|----------------|
| YES | Go to step 11. |
| NO | Go to step 10. |
10. Check for open between:
P688-39 and J225-4,
P688-40 and J225-3.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace lateral servocylinder
(TM 1-1520-238-23). |
11. Check for 28 to 42 ohms between P686-44 and P686-45.
Is resistance present?
- | | |
|-----|----------------|
| YES | Go to step 13. |
| NO | Go to step 12. |
12. Check for open between:
P686-44 and J415-4,
P686-45 and J415-3.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace lateral servocylinder
(TM 1-1520-238-23). |
13. Check for 73 to 91 ohms between:
(ACA) Wire ends (A323)TB3-7-C and GS1-C.
(ACB) P694-13 and P694-14.
Is resistance present?
- | | |
|-----|----------------|
| YES | Go to step 15. |
| NO | Go to step 14. |
14. Check for open between:
(ACA) P226-6 and (A323)TB3-7-C,
P226-7 and GS1-C.
(ACB) P226-6 and P694-13,
P226-7 and P694-14.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace lateral servocylinder
(TM 1-1520-238-23). |
15. Check for 292 to 438 ohms between:
(ACA) Wire ends (A323)TB3-7-D and GS1-D.
(ACB) P694-11 and P694-12.
Is resistance present?
- | | |
|-----|----------------|
| YES | Go to step 17. |
| NO | Go to step 16. |
16. Check for open between:
(ACA) J225-1 and (A323)TB3-7-C,
J225-2 and GS1-C.
(ACB) J225-1 and P694-11,
J225-2 and P694-12.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace lateral servocylinder
(TM 1-1520-238-23). |

11-79. LAT ACTUATOR NO-GO – APPEARS ON HOD (cont)

11-79

17. Check for 292 to 438 ohms between:
(ACA) Wire ends (A323)TB3-6-E and GS3-L.
(ACB) P693-13 and P693-14.

Is resistance present?

- YES **(ACA)** Replace DASEC
 (TM 1-1520-238-23).
(ACB) Go to step 19.
- NO Go to step 18.

18. Check for open between:
(ACA) J415-1 and GS3-L,
 J415-2 and (A323)TB3-6-E.
(ACB) J415-2 and P693-14,
 J415-1 and P693-13.

Does open exist?

- YES Repair open wire.
 Go to paragraph 11-23.
- NO Replace lateral servocylinder
 (TM 1-1520-238-23).

19. **(ACB)** Detach filter adapter A708. Check for
 open through pins:
 A708-25,
 A708-26,
 A708-39,
 A708-40,
 A708-52,
 A708-53.

Does open exist?

- YES Replace filter adapter
 (TM 1-1520-238-23).
- NO Go to step 20.

20. Detach filter adapter A707. Check for open
 through pins A707-44 and A707-45.

Does open exist?

- YES Replace filter adapter
 (TM 1-1520-238-23).
- NO Go to step 21.

21. Detach filter adapter A706. Check for open
 through pins:
 A706-103,
 A706-104,
 A706-110.

Does open exist?

- YES Replace filter adapter
 (TM 1-1520-238-23).
- NO Go to step 22.

22. Has lateral Linear Variable Differential
 Transducer (LVDT) adjustment been performed?

- YES Replace DASEC
 (TM 1-1520-238-23).
- NO Perform LVDT adjustment
 (TM 1-1520-238-23).

END OF TASK

11-80. DIR ACTUATOR NO-GO – APPEARS ON HOD

11-80

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 1800 to 2200 ohms between P688-55 and P688-56.

Is resistance present?

- YES Go to step 3.
- NO Go to step 2.

2. Check for open between: P224-4 and P688-56, P224-5 and P688-55.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Replace directional servocylinder (TM 1-1520-238-23).

3. Check for 90 to 100 ohms between: (ACA) P683-111 and P493-B13. (ACB) P683-111 and ground.

Is resistance present?

- YES Go to step 5.
- NO Go to step 4.

4. Check for open between: P683-111 and P224-2. (ACA) P224-9 and P493-B13. (ACB) P224-9 and ground.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Replace directional servocylinder (TM 1-1520-238-23).

5. Check for 90 to 100 ohms between P683-105 and P683-106.

Is resistance present?

- YES Go to step 7.
- NO Go to step 6.

6. Check for open between: P683-105 and P224-11, P683-106 and P224-10.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Replace directional servocylinder (TM 1-1520-238-23).

7. Check for 364 to 424 ohms between P688-27 and P688-28.

Is resistance present?

- YES Go to step 9.
- NO Go to step 8.

11-80. DIR ACTUATOR NO-GO – APPEARS ON HOD (cont)

- | | |
|--|--|
| <p>8. Check for open between:
P688-27 and P224-14,
P688-28 and P224-15.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-23.</p> <p>NO Replace directional
 servocylinder
 (TM 1-1520-238-23).</p> <p>9. Check for 58.4 to 87.6 ohms between P688-42
and P688-43.
Is resistance present?</p> <p>YES Go to step 11.</p> <p>NO Go to step 10.</p> <p>10. Check for open between:
P688-42 and J223-3,
P688-43 and J223-4.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-23.</p> <p>NO Replace directional
 servocylinder
 (TM 1-1520-238-23).</p> <p>11. Check for 58.4 to 87.6 ohms between P686-46
and P686-47.
Is resistance present?</p> <p>YES Go to step 13.</p> <p>NO Go to step 12.</p> <p>12. Check for open between:
P686-46 and J215-3,
P686-47 and J215-4.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-23.</p> <p>NO Replace directional
 servocylinder
 (TM 1-1520-238-23).</p> | <p>13. Check for 73 to 91 ohms between:
(ACA) Wire ends (A323)TB3-7-L and GS1-L.
(ACB) P694-23 and P694-24.
Is resistance present?</p> <p>YES Go to step 15.</p> <p>NO Go to step 14.</p> <p>14. Check for open between:
(ACA) P224-6 and (A323)TB3-7-L,
P224-7 and GS1-L.
(ACB) P224-6 and P694-23,
P224-7 and P694-24.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-23.</p> <p>NO Replace directional
 servocylinder
 (TM 1-1520-238-23).</p> <p>15. Check for 688 to 1032 ohms between:
(ACA) Wire ends (A323)TB3-7-M and GS1-M.
(ACB) P694-25 and P694-26.
Is resistance present?</p> <p>YES Go to step 17.</p> <p>NO Go to step 16.</p> <p>16. Check for open between:
(ACA) J223-1 and (A323)TB3-7-M,
J223-2 and GS1-M.
(ACB) J223-1 and P694-25,
J223-2 and P694-26.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-23.</p> <p>NO Replace directional
 servocylinder
 (TM 1-1520-238-23).</p> |
|--|--|

11-80. DIR ACTUATOR NO-GO – APPEARS ON HOD (cont)

11-80

17. Check for 688 to 1032 ohms between:
(ACA) Wire ends (A323)TB3-6-B and GS3-H.
(ACB) P693-17 and P693-18.
Is resistance present?
- | | |
|-----|---|
| YES | (ACB) Go to step 19.
(ACA) replace DASEC (TM 1-1520-238-23). |
| NO | Go to step 18. |
18. Check for open between:
(ACA) J215-1 and (A323)TB3-6-B, J215-2 and GS3-H.
(ACB) J215-1 and P693-17, J215-2 and P693-18.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace directional servocylinder (TM 1-1520-238-23). |
19. **(ACB)** Detach filter adapter A708. Check for open through pins:
A708-27,
A708-28,
A708-42,
A708-43,
A708-55,
A708-56.
Does open exist?
- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Go to step 20. |
20. Detach filter adapter A707. Check for open through pins A707-46 and A707-47.
Does open exist?
- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Go to step 21. |
21. Detach filter adapter A706. Check for open through pins:
A706-105,
A706-106,
A706-111.
Does open exist?
- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Go to step 22. |
22. Has directional Linear Variable Differential Transducer (LVDT) adjustment been performed?
- | | |
|-----|---|
| YES | Replace DASEC (TM 1-1520-238-23). |
| NO | Perform LVDT adjustment (TM 1-1520-238-23). |

END OF TASK

11-81. COLL ACTUATOR NO-GO – APPEARS ON HOD

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 1800 to 2200 ohms between P688-59 and P688-60.

Is resistance present?

- YES Go to step 3.
- NO Go to step 2.

2. Check for open between: P228-5 and P688-59, P228-4 and P688-60.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Replace collective servocylinder (TM 1-1520-238-23).

3. Check for 90 to 100 ohms between: (ACA) P683-112 and P493-B10. (ACB) P683-112 and ground.

Is resistance present?

- YES Go to step 5.
- NO Go to step 4.

4. Check for open between: P683-112 and P228-2. (ACA) P228-9 and P493-B10. (ACB) P228-9 and ground.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Replace collective servocylinder (TM 1-1520-238-23).

5. Check for 90 to 100 ohms between P683-108 and P683-107.

Is resistance present?

- YES Go to step 7.
- NO Go to step 6.

6. Check for open between: P683-108 and P228-10, P683-107 and P228-11.

Does open exist?

- YES Repair open wire. Go to paragraph 11-23.
- NO Replace collective servocylinder (TM 1-1520-238-23).

7. Check for 364 to 424 ohms between P688-29 and P688-30.

Is resistance present?

- YES Go to step 9.
- NO Go to step 8.

11-81. COLL ACTUATOR NO-GO – APPEARS ON HOD (cont)

11-81

8. Check for open between:
P688-30 and P228-15,
P688-29 and P266-14.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace collective servocylinder
(TM 1-1520-238-23). |
9. Check for 28 to 42 ohms between P688-45 and P688-46.
Is resistance present?
- | | |
|-----|----------------|
| YES | Go to step 11. |
| NO | Go to step 10. |
10. Check for open between:
J227-3 and P688-45,
J227-4 and P688-46.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace collective servocylinder
(TM 1-1520-238-23). |
11. Check for 28 to 42 ohms between P686-57 and P686-58.
Is resistance present?
- | | |
|-----|----------------|
| YES | Go to step 13. |
| NO | Go to step 12. |
12. Check for open between:
P686-58 and J417-4,
P686-57 and J417-3.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace collective servocylinder
(TM 1-1520-238-23). |
13. Check for 73 to 91 ohms between:
(ACA) Wire ends (A323)TB3-7-E and GS1-E.
(ACB) P694-15 and P694-16.
Is resistance present?
- | | |
|-----|----------------|
| YES | Go to step 15. |
| NO | Go to step 14. |
14. Check for open between:
(ACA) P228-6 and (A323)TB3-7-E,
P228-7 and GS1-E.
(ACB) P228-6 and P694-15,
P228-7 and P694-16.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace collective servocylinder
(TM 1-1520-238-23). |
15. Check for 292 to 438 ohms between:
(ACA) Wire ends (A323)TB3-7-F and GS1-F.
(ACB) P694-17 and P694-18.
Is resistance present?
- | | |
|-----|----------------|
| YES | Go to step 17. |
| NO | Go to step 16. |
16. Check for open between:
(ACA) J227-1 and (A323)TB3-7-F,
J227-2 and GS1-F.
(ACB) J227-1 and P694-17,
J227-2 and P694-18.
Does open exist?
- | | |
|-----|---|
| YES | Go to step 18. |
| NO | Replace collective servocylinder
(TM 1-1520-238-23). |
17. Check for 292 to 438 ohms between:
(ACA) Wire ends (A323)TB3-6-J and GS3-C.
(ACB) P693-11 and P693-12.
Is resistance present?
- | | |
|-----|--|
| YES | (ACA) Replace DASEC
(TM 1-1520-238-23).
(ACB) Go to step 19. |
| NO | Go to step 18. |

11-81. COLL ACTUATOR NO-GO – APPEARS ON HOD (cont)

11-81

18. Check for open between:
(ACA) J417-1 and (A323)TB3-6-J,
 J417-2 and GS3-C.
(ACH) J417-1 and P693-11,
 J417-2 and P693-12.
Is voltage present?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace collective servocylinder
(TM 1-1520-238-23). |

22. Has collective Linear Variable Differential Transducer (LVDT) adjustment been performed?
- | | |
|-----|--|
| YES | Replace DASEC
(TM 1-1520-238-23). |
| NO | Perform LVDT adjustment
(TM 1-1520-238-23). |

19. **(ACB)** Detach filter adapter A708. Check for open through pins:
 A708-29,
 A708-30,
 A708-45,
 A708-46,
 A708-59
 A708-60.
Is voltage present?
- | | |
|-----|---|
| YES | Replace filter adapter
(TM 1-1520-238-23). |
| NO | Go to step 20. |

20. Detach filter adapter A707. Check for open through pins:
 A707-107,
 A707-108,
 A707-112.
Is voltage present?
- | | |
|-----|---|
| YES | Replace filter adapter
(TM 1-1520-238-23). |
| NO | Go to step 21. |

21. Detach filter adapter A706. Check for open through pins A706-57 and A706-58.
Is voltage present?
- | | |
|-----|---|
| YES | Replace filter adapter
(TM 1-1520-238-23). |
| NO | Go to step 22. |

END OF TASK

11-82. PILOT LONG LVDT NO-GO PLT COMPARTMENT – APPEARS ON HOD

11-82

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Place pilot cyclic stick to full forward or full aft. Detach P688. Check for 10 VAC at P688-15. **Is voltage present?**

YES (ACA) Replace DASEC (TM 1-1520-238-23).
(ACB) Go to step 2.

NO (ACA) Go to step 3.
(ACB) Go to step 4.

- (ACB) Attach P688. Detach A708. Check for 10 VAC at A708-15. **Is voltage present?**

YES (Replace DASEC (TM 1-1520-238-23).

NO (Replace filter adapter (TM 1-1520-238-23).

- (ACA) Check for short between: P232-C and ground, P232-D and ground. **Does short exist?**

YES Repair shorted wire between: P232-D and P912-B9, P232-C and P912-B10, J912-B9 and J459-B8, J912-B10 and J459-B9, P459-B8 and P688-15, P459-B9 and P688-8. Go to paragraph 11-23.

NO Go to step 5.

- (ACB) Check for short between: J232-3 and ground, J232-4 and ground. **Does short exist?**

YES Repair shorted wire between: J232-4 and P912-B9, J232-3 and P912-B10, J912-B9 and J459-B8, J912-B10 and J459-B9, P459-B8 and P688-15, P459-B9 and P688-8. Go to paragraph 11-23.

NO Go to step 6.

- (ACA) Check for open between: P232-C and P688-8, P232-D and P688-15. **Does open exist?**

YES Repair open wire. Go to paragraph 11-23.

NO Go to step 7.

- (ACB) Check for open between: J232-3 and P688-8, J232-4 and P688-15. **Does open exist?**

YES Repair open wire. Go to paragraph 11-23.

NO Go to step 9.

7. **(ACA)** Attach P688. Check for 26 VAC at P232–A.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 8. |
| NO | Go to step 11. |
8. **(ACA)** Check for open between P232–B and P493–A18.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Replace pilot longitudinal (pitch) LVDT
(TM 1-1520-238-23). |
9. **(ACB)** Attach P688. Check for 26 VAC at J232–1.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 10. |
| NO | Go to step 12. |
10. **(ACB)** Check for open between J232–2 and P694–6.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Replace pilot longitudinal (pitch) LVDT
(TM 1-1520-238-23). |
11. **(ACA)** Check for open between J232–A and P493–A17.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Go to paragraph 11–77. |
12. **(ACB)** Check for open between J232–1 and P694–5.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Go to paragraph 11–77. |

END OF TASK

11-83. PILOT LAT LVDT NO-GO PLT COMPARTMENT – APPEARS ON HOD

11-83

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Place pilot cyclic stick to full right or full left. Detach P688. Check for 10 VAC at P688.

Is voltage present?

YES	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 2.
NO	(ACA) Go to step 3. (ACB) Go to step 4.

- (ACB) Attach P688. Detach filter adapter A708. Check for 10 VAC at A708-10.

Is voltage present?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Replace DASEC (TM 1-1520-238-23).

- (ACA) Check for short between: P233-C and ground, P233-D and ground.

Does short exist?

YES	Repair shorted wire between: P233-D and J459-B10, P233-C and J459-B11, P459-B10 and P688-10, P459-B11 and P688-9. Go to paragraph 11-23.
NO	Go to step 5.

- (ACB) Check for short between: J233-3 and ground, J233-4 and ground.

Does short exist?

YES	Repair shorted wire between: J233-4 and J459-B10, J233-3 and J459-B11, P459-B10 and P688-10, P459-B11 and P688-9. Go to paragraph 11-23.
NO	Go to step 6.

- Check for open between: P233-C and P688-9, P233-D and P688-10.

Is voltage present?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 7.

- (ACB) Check for open between: J233-3 and P688-9, J233-4 and P688-10.

Is voltage present?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 9.

11-83. PILOT LAT LVDT NO-GO PLT COMPARTMENT – APPEARS ON HOD (cont)

11-83

7. **(ACA)** Attach P688. Check for 26 VAC at P233-A.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 8. |
| NO | Go to step 11. |
8. **(ACA)** Check for open between P233-B and P493-A18.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace pilot lateral (roll) LVDT
(TM 1-1520-238-23). |
9. **(ACB)** Attach P688. Check for 26 VAC at J233-1.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 10. |
| NO | Go to step 12. |
10. **(ACB)** Check for open between between J233-2 and P694-2.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace pilot lateral (roll) LVDT
(TM 1-1520-238-23). |
11. **(ACA)** Check for open between P233-A and P493-A17.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Go to paragraph 11-77. |
12. **(ACB)** Check for open between J233-1 and P694-1.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Go to paragraph 11-77. |

END OF TASK

11-84. PILOT DIR LVDT NO-GO PLT COMPARTMENT – APPEARS ON HOD

11-84

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Place pilot directional pedals to full right or full left. Check for 10 VAC at P688-18.

Is voltage present?

YES	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 2.
NO	(ACA) Go to step 3. (ACB) Go to step 4.

- (ACB)** Attach P688. Detach filter adapter A708. Check for 10 VAC at A708-15.

Is voltage present?

YES	Replace filter adapter (TM 1-1520-238-23).
NO	Replace DASEC (TM 1-1520-238-23).

- (ACA)** Detach P688. Check for short between: P231-C and ground, P231-D and ground.

Does short exist?

YES	Repair shorted wire between: P231-D and P912-B5, P231-C and P912-B6, J912-B5 and J459-B12, J912-B6 and J459-B13, P459-12 and P688-17, P459-13 and P688-18. Go to paragraph 11-23.
NO	Go to step 5.

- (ACB)** Detach P688. Check for short between: J231-3 and ground, J231-4 and ground.

Does short exist?

YES	Repair shorted wire between: J231-4 and P912-B5, J231-3 and P912-B6, J912-B5 and J459-B12, J912-B6 and J459-B13, P459-12 and P688-17, and P459-13 and P688-18. Go to paragraph 11-23.
NO	Go to step 6.

- (ACA)** Check for open between: P231-C and P688-18, P231-D and P688-17.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 7.

- (ACB)** Check for open between: J231-3 and P688-18, J231-4 and P688-17.

Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 9.

7. **(ACA)** Attach P688. Check for 26 VAC at P231-A.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 8. |
| NO | Go to step 11. |
8. **(ACA)** Check for open between P231-B and P493-A18.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace pilot directional (yaw)
LVDT (TM 1-1520-238-23). |
9. **(ACB)** Attach P688. Check for 26 VAC at J231-1.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 10. |
| NO | Go to step 12. |
10. **(ACB)** Check for open between J231-2 and P694-8.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Replace pilot directional (yaw)
LVDT (TM 1-1520-238-23). |
11. **(ACA)** Check for open between P231-A and P493-A17.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Go to paragraph 11-77. |
12. **(ACB)** Check for open between J231-1 and P694-7.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Go to paragraph 11-77. |

END OF TASK

11-85. PILOT COLL LVDT NO-GO PLT COMPARTMENT – APPEARS ON HOD

11-85

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Place pilot collective stick to full up or full down. Check for 10 VAC at P688-21.
Is voltage present?

YES	(ACA) Replace DASEC (TM 1-1520-238-23). (ACB) Go to step 2.
NO	(ACA) Go to step 3. (ACB) Go to step 4.

2. (ACB) Attach P688. Detach filter adapter A708. Check for 10 VAC at A708-21.
Is voltage present?

YES	Replace DASEC (TM 1-1520-238-23).
NO	Replace filter adapter (TM 1-1520-238-23).

3. (ACA) Detach P688. Check for short between: P230-C and ground, P230-D and ground.
Does short exist?

YES	Repair shorted wire between: P230-D and J459-B14, P230-C and J459-B15, P459-B14 and P688-20, P459-B15 and P688-21. Go to paragraph 11-23.
NO	Go to step 5.

4. (ACB) Check for short between: J230-3 and ground, J230-4 and ground.
Does short exist?

YES	Repair shorted wire between: J230-4 and J459-B14, J230-3 and J459-B15, P459-B14 and P688-20, P459-B15 and P688-21. Go to paragraph 11-23.
NO	Go to step 6.

5. (ACA) Check for open between: P230-C and P688-21, P230-D and P688-20.
Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 7.

6. (ACB) Check for open between: J230-3 and P688-21, J230-4 and P688-20.
Does open exist?

YES	Repair open wire. Go to paragraph 11-23.
NO	Go to step 9.

7. (ACA) Attach P688. Check for 26 VAC at P230-A.
Is voltage present?

YES	Go to step 8.
NO	Go to step 11.

8. **(ACA)** Check for open between P230–B and P493–A18.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Replace pilot collective
(vertical) LVDT
(TM 1-1520-238-23). |

9. **(ACB)** Attach P688. Check for 26 VAC at J230–1.

Is voltage present?

- | | |
|-----|----------------|
| YES | Go to step 10. |
| NO | Go to step 12. |

10. **(ACB)** Check for open between J230–2 and P694–4.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Replace pilot collective (lateral)
LVDT
(TM 1-1520-238-23). |

11. **(ACA)** Check for open between P230–A and P493–A17.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Go to paragraph 11–77. |

12. **(ACB)** Check for open between J230–1 and P694–3.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11–23. |
| NO | Go to paragraph 11–77. |

END OF TASK

11-86. AIR DATA PROCESSOR NO-GO AFT AVIONICS BAY – APPEARS ON HOD

11-86

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 9-1230-476-20-1
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open

3. **(ACB)** Attach P686. Detach filter adapter A707, check for open between: A707-28 and P944-6, A707-29 and P944-5.

Does open exist?

- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Go to step 4. |

4. **(ACB)** Check for short between: A707-28 and ground, A707-29 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace filter adapter (TM 1-1520-238-23). |
| NO | Replace DASEC (TM 1-1520-238-23). |



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for open between: P686-28 and P944-6, P686-29 and P944-5.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-23. |
| NO | Go to step 2. |

2. Detach P686. Check for short between: P944-6 and ground, P944-5 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Replace air data processor (TM 9-1230-476-20-1). |
| NO | (ACA) Replace DASEC (TM 1-1520-238-23).
(ACB) Go to step 3. |

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

- 68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 door open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Place CPG cyclic stick to full forward or full aft. Check for 2.5 VAC at P688-27.

Is voltage present?

YES (ACA) Replace DASEC (TM 1-1520-238-23).
(ACB) Go to step 2.

NO (ACA) Go to step 3.
(ACB) Go to step 4.

- (ACB) Attach P686. Detach filter adapter A707. Check for 10 VAC at A707-27.

Is voltage present?

YES Replace DASEC (TM 1-1520-238-23).

NO Replace filter adapter (TM 1-1520-238-23).

- (ACA) Detach P686. Check for short between: P236-C and ground, P236-D and ground.

Does short exist?

YES Repair shorted wire between: P236-D and P912-B14, P236-C and P912-B15, J912-B14 and J447-B8, J912-B15 and J447-B9, P447-B8 and P686-27, P447-B9 and P686-26. Go to paragraph 11-23.

NO Go to step 5.

- (ACB) Check for short between: J236-3 and ground, J236-4 and ground.

Does short exist?

YES Repair shorted wire between: J236-4 and P912-B14, J236-3 and P912-B15, J912-B14 and J447-B8, J912-B15 and J447-B9, P447-B8 and P686-27, P447-B9 and P686-26. Go to paragraph 11-23.

NO Go to step 6.

- (ACA) Check for open between: P236-C and P686-26, P236-D and P686-27.

Does open exist?

YES Repair open wire. Go to paragraph 11-23.

NO Go to step 7.

- (ACB) Check for open between: J236-3 and P686-26, J236-4 and P686-27.

Does open exist?

YES Repair open wire. Go to paragraph 11-23.

NO Go to step 9.

11-87. CPG LONG LVDT NO-GO CPG COMPARTMENT – APPEARS ON HOD (cont)

11-87

7. **(ACA)** Attach P686. Check for 26 VAC at P236-A.

Is voltage present?

YES Go to step 8.

NO Go to step 11.

8. **(ACA)** Check for open between P236-B and P499-B17.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-23.

NO Replace CPG longitudinal
 (pitch) LVDT
 (TM 1-1520-238-23).

9. **(ACB)** Attach P686. Check for 26 VAC at J236-1.

Is voltage present?

YES Go to step 10.

NO Go to step 12.

10. **(ACB)** Check for open between J236-2 and P693-6.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-23.

NO Replace CPG longitudinal
 (pitch) LVDT
 (TM 1-1520-238-23).

11. **(ACA)** Check for open between J236-A and P499-B16.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-23.

NO Go to paragraph 11-77.

12. **(ACB)** Check for open between J236-1 and P693-5.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-23.

NO Go to paragraph 11-77.

END OF TASK

11-88. STABILATOR – MAINTENANCE OPERATIONAL CHECK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Aircraft Mechanic's	SC518099CLA01
Tool Kit, Electrical Repairer's	SC518099CLA06
Flight Control Rigging Kit	7-26210000-605

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Stabilator inspection and rigging performed
Paragraph 11-10	Pilot collective stick and collective servocylinder rigging performed
TM 1-1520-238-T-4	DASE/STABILATOR – POWER UP completed
TM 55-4920-400-13	Maintenance headset connected
TM 1-1520-238-T-1	Pitot-static test set connected to helicopter
	Perform STAB – Interactive FD/LS check

Personnel Required:

- 67R Attack Helicopter Repairer
- 68X Armament/Electrical Systems Repairer
- One person to assist

References:

- TM 1-1520-238-T-1
- TM 1-1520-238-T-3
- TM 1-1520-238-T-4
- TM 1-1520-238-T-6
- TM 1-1520-238-23
- TM 9-1230-476-20-2
- TM 55-4920-400-13

NOTE

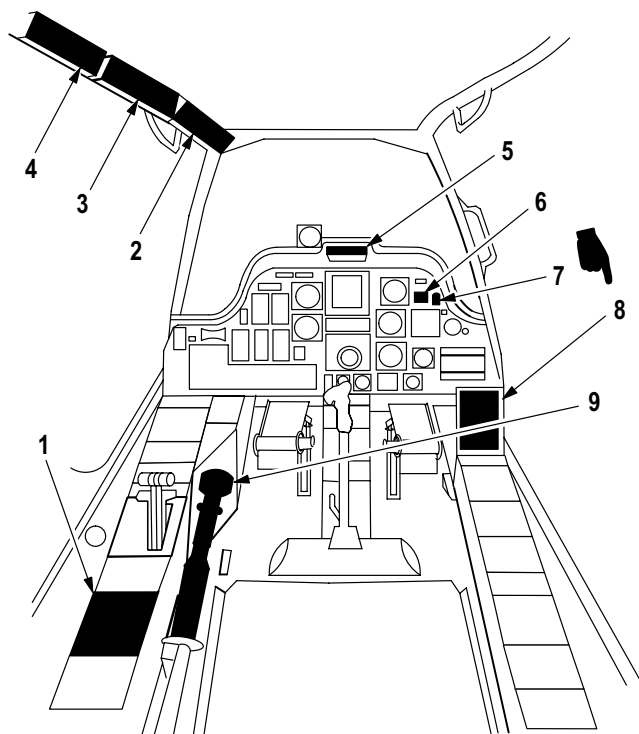
Perform stabilator FD/LS check to verify a malfunction (TM 1-1520-238-T-1).



To prevent damage to stabilator during movement, be sure stabilator is clear of all obstructions before proceeding.

NOTE

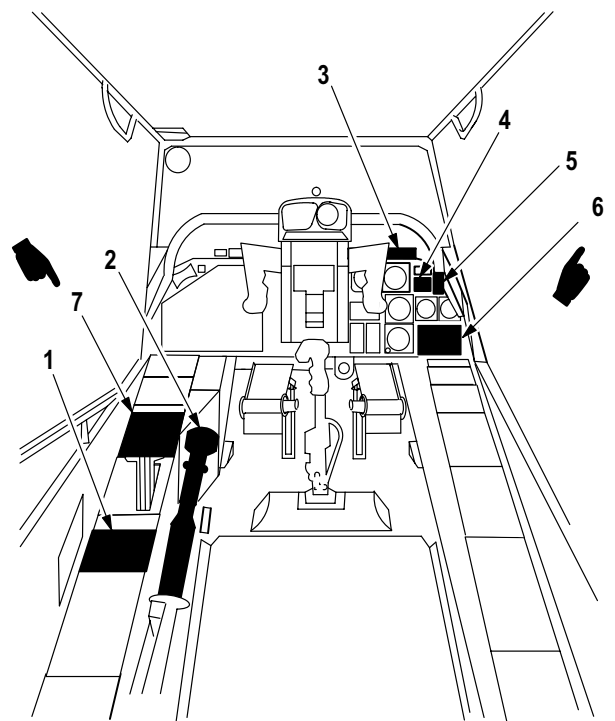
- Refer to pilot station (fig. 11-118) and CPG station (fig. 11-119) for cockpit configuration and equipment location.
- If referenced out of one paragraph or volume and into another for additional troubleshooting, upon completion of the task, return to the maintenance operational check for the original paragraph or volume.



1. PILOT EXT LT/INTR LT PANEL
2. PILOT CIRCUIT BREAKER PANEL (FORWARD)
3. PILOT CIRCUIT BREAKER PANEL (CENTER)
4. PILOT CIRCUIT BREAKER PANEL (AFT)
5. PILOT MASTER CAUTION/WARNING PANEL
6. PILOT STAB POS INDICATOR
7. PILOT STAB/DEG NOM/SPD PLACARD PANEL
8. PILOT CAUTION/WARNING PANEL
9. PILOT COLLECTIVE STICK

M70-190A

Figure 11-118. Pilot Station



1. CPG INTR LT PANEL
2. CPG COLLECTIVE STICK
3. CPG MASTER CAUTION/WARNING PANEL
4. CPG STAB POS INDICATOR
5. CPG STAB/DEG NOM/SPD PLACARD PANEL
6. CPG CAUTION/WARNING PANEL
7. CPG AUX/ANTI-ICE CONTROL PANEL

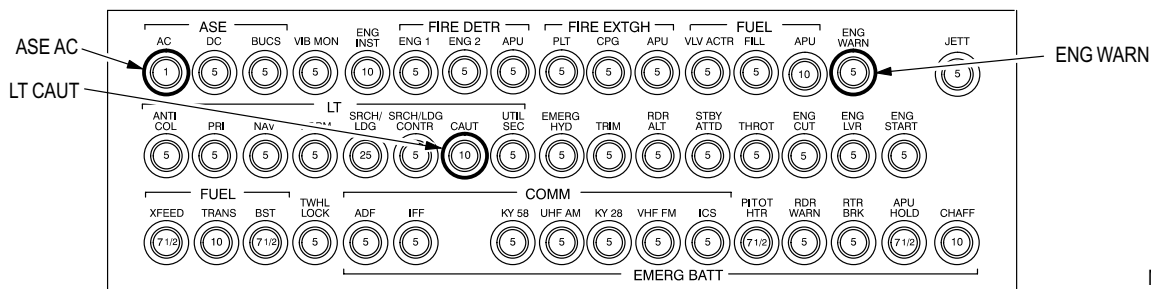
M70-191A

Figure 11-119. CPG Station

1. Complete the maintenance operational check as follows:

Task	Result
------	--------

- a. On pilot center circuit breaker panel (fig. 11-120), open **ENG WARN** circuit breaker.



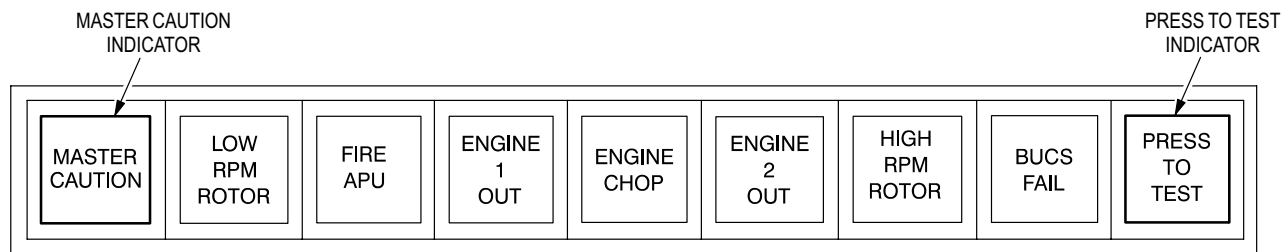
M70-193

Figure 11-120. Pilot Center Circuit Breaker Panel

- b. On pilot and CPG master caution/warning panels (fig. 11-121), depress **PRESS TO TEST** indicator.

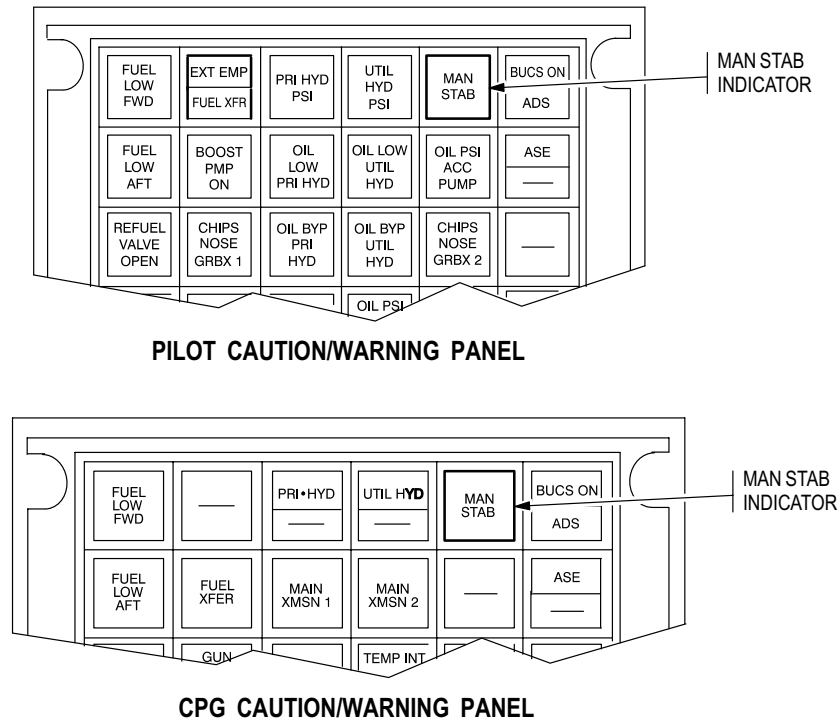
If **MASTER CAUTION** indicators on master caution/warning panels do not flash, replace lamps (TM 1-1520-238-23). If lamps are still not lighted, refer to TM 1-1520-238-T-6 to troubleshoot pilot and CPG caution/warning system.

If caution/warning **MAN STAB** indicators on pilot and CPG caution/warning panels (fig. 11-122) do not light, replace lamps (TM 1-1520-238-23). If lamps are still not lighted, refer to TM 1-1520-238-T-6 to troubleshoot pilot and CPG caution/warning system.



M70-200

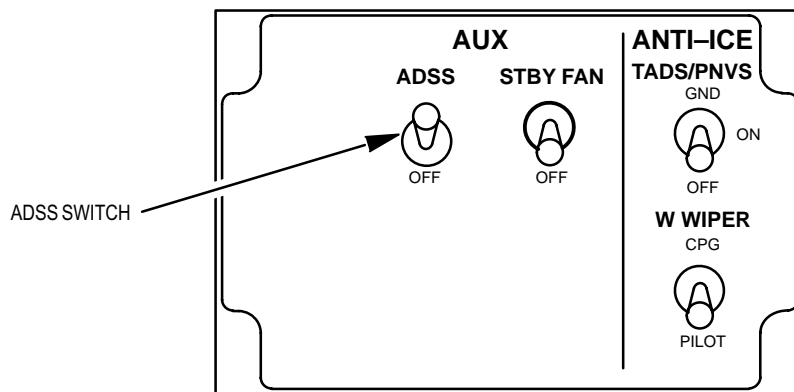
Figure 11-121. Master Caution/Warning Panel



M70-293

Figure 11-122. CAUTION/WARNING Panels

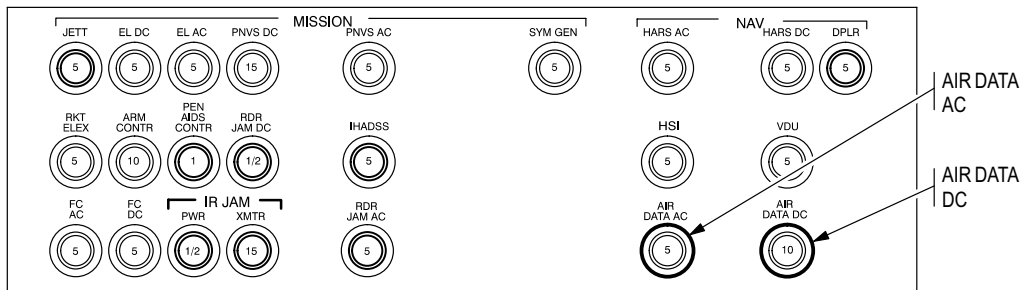
Task	Result
c. Turn CPG AUX/ANTI-ICE CONTROL panel (fig. 11-123) ADSS switch to ON .	If ADS indicator remains lighted, refer to TM 9-1230-476-20-2 to troubleshoot air data system.



M70-375

Figure 11-123. CPG AUX/Anti-Ice Control Panel

Task	Result
<p>d. On pilot forward circuit breaker panel (fig. 11-124), check that the AIR DATA AC and AIR DATA DC circuit breakers are closed and remain closed.</p>	<p>If AIR DATA AC or AIR DATA DC circuit breakers do not stay closed, refer to TM 9-1230-476-20-2 to troubleshoot circuit breaker.</p>
<p>e. Turn CPG AUX/Anti-Ice control panel ADSS (fig. 11-123) switch to OFF.</p>	<p>If ADS indicator on pilot or CPG caution/warning panel does not light when CPG AUX/Anti-Ice control panel ADSS switch is off, refer to TM 9-1230-476-20-2 to troubleshoot air data system.</p>
<p>f. Open AIR DATA AC and AIR DATA DC circuit breakers (fig. 11-124).</p>	



M70-192

Figure 11-124. Pilot Forward Circuit Breaker Panel

<p>g. On pilot center circuit breaker panel (fig. 11-120), check that the ASE AC and LT CAUT circuit breakers are closed and remain closed.</p>	<p>If ASE AC circuit breaker does not stay closed, go to paragraph 11-29.</p>
	<p>If LT CAUT circuit breaker does not stay closed, refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system.</p>

Task	Result
------	--------



To prevent damage to stabilator during movement, be sure stabilator is clear of all obstructions before proceeding.

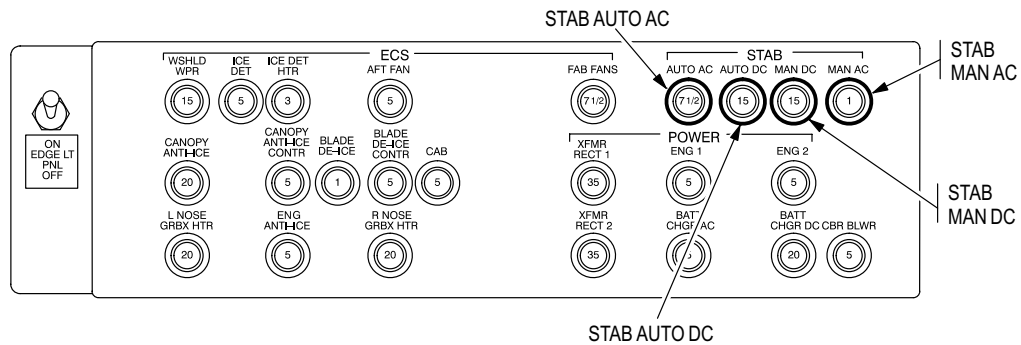
- h. On pilot aft circuit breaker panel (fig. 11-125), open **STAB MAN AC**, **STAB MAN DC**, **STAB AUTO AC**, and **STAB AUTO DC** circuit breakers. Close the circuit breakers in the following order:

- (1) **STAB MAN AC**
- (2) **STAB MAN DC** (Briefly toggle **PLT NU/ND** between **NU** and **ND**)

If **STAB MAN AC** circuit breaker does not stay closed, go to paragraph 11-90.

If **STAB MAN DC** circuit breaker does not stay closed, go to paragraph 11-91.

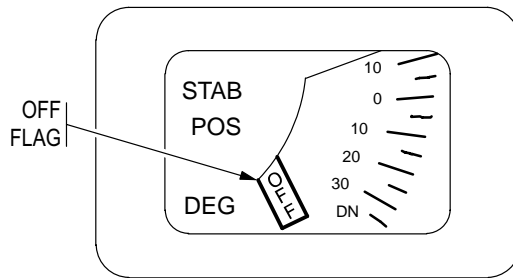
If caution/warning panel **MAN STAB** indicators (fig. 11-122) are not lighted, go to paragraph 11-119.



M70-194

Figure 11-125. Pilot Aft Circuit Breaker Panel

Task	Result
(3) On pilot and CPG STAB POS indicators (fig. 11-126), check that OFF flags are not visible.	<p>If OFF flag on pilot STAB POS indicator is visible, go to paragraph 11-100.</p> <p>If OFF flag on CPG STAB POS indicator is visible, go to paragraph 11-100.</p>



M70-198

Figure 11-126. STAB POS Indicator

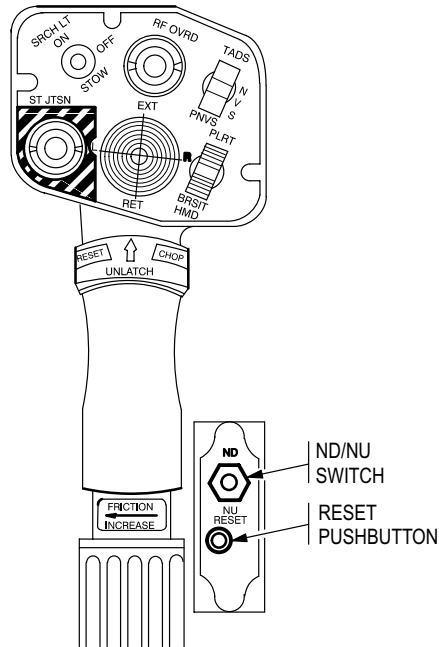


To prevent damage to stabilator during movement, be sure stabilator is clear of all obstructions before proceeding.

NOTE

- The pulsing of the ND/NU switch will be done only enough to verify upward/downward movement of the stabilator.
- Position assistant to observe and verify stabilator actuator piston movement during stabilator ND/NU movement.

<p>(4) On pilot collective stick (fig. 11-127):</p> <p>(a) Pulse ND/NU switch to NU to verify upward movement.</p> <p>(b) Pulse ND/NU switch to NU until STAB POS indicator (fig. 11-126) indicates full up position ($9 \pm 2^\circ$).</p>	<p>If stabilator does not move up, go to paragraph 11-133.</p> <p>If top piston fails to move stabilator (only bottom piston of actuator moves), go to paragraph 11-101.</p> <p>If bottom piston fails to move stabilator (only top piston of actuator moves), go to paragraph 11-102.</p> <p>If pilot and CPG STAB POS indicators do not indicate $9 \pm 2^\circ$ NU, go to paragraph 11-100.</p> <p>If stabilator does not move to within $9 \pm 2^\circ$ NU, refer to TM 1-1520-238-23 to rerig stabilator.</p>
---	---



M70-199

Figure 11-127. Collective Stick

Task

Result


CAUTION

To prevent damage to stabilator during movement, be sure stabilator is clear of all obstructions before proceeding.

- | | |
|--|--|
| <p>(c) Pulse ND/NU switch to ND to verify downward movement.</p> <p>(d) Pulse ND/NU switch to ND until STAB POS indicator (fig. 11-126) indicates $(35 \pm 2^\circ)$ ND position.</p> | <p>If stabilator does not move down, go to paragraph 11-134.</p> <p>If top piston fails to move stabilator (only bottom piston of actuator moves), go to paragraph 11-125.</p> <p>If bottom piston fails to move stabilator (only top piston of actuator moves), go to paragraph 11-126.</p> <p>If pilot and CPG STAB POS indicators do not indicate $35 \pm 2^\circ$ ND, go to paragraph 11-100.</p> <p>If stabilator does not move to $35 \pm 2^\circ$ ND, refer to TM 1-1520-238-23 to rerig stabilator.</p> |
|--|--|

11-88. STABILATOR – MAINTENANCE OPERATIONAL CHECK (cont)

11-88

Task	Result
(5) On pilot aft circuit breaker panel (fig. 11-125), close circuit breakers in the following order:	
(a) STAB AUTO AC	If STAB AUTO AC circuit breaker does not stay closed, go to paragraph 11-92.
(b) STAB AUTO DC	If STAB AUTO DC circuit breaker does not stay closed, go to paragraph 11-97.
(c) Verify STAB POS indicator (fig. 11-126) indicates $(25 \pm 2^\circ)$ ND position.	If MAN STAB indicators (fig. 11-125) remain lighted and STAB POS indicators are not $(25 \pm 2^\circ)$ ND position, go to paragraph 11-116.
	
<p>To prevent damage to stabilator during movement, be sure stabilator is clear of all obstructions before proceeding.</p>	
<p>NOTE</p>	
<ul style="list-style-type: none"> • When operating stabilator with stabilator manual control panel ND/NU switch, use pulsating switch action to allow slow movement of stabilator. Stabilator ND and NU means trailing edge down and trailing edge up, respectively. • Audio tone must be manually reset. Closing circuit breakers will not reset audio tone. 	
(6) On pilot center circuit breaker panel (fig. 11-120), close ENG WARN circuit breaker.	(AAV) If ENG WARN circuit breaker does not stay closed, go to paragraph 11-124.
(7) Press ENG 1 OUT or ENG 2 OUT (fig. 11-121) pushbutton to suppress engine out audio warning tone.	If engine out warning audio tone does not come on or cannot be reset, go to TM 1-1520-238-T-6.
(8) On pilot aft circuit breaker panel (fig. 11-125), open STAB AUTO AC and STAB AUTO DC circuit breakers.	If audio tone is not heard, go to paragraph 11-120.
(9) On pilot collective stick (fig. 11-127), press RESET pushbutton.	If audio tone is still heard, go to paragraph 11-117.
(10) Pull pilot collective stick (fig. 11-127) to full up stop.	
(11) Close STAB AUTO AC and STAB AUTO DC circuit breakers (fig. 11-125).	

11-88. STABILATOR – MAINTENANCE OPERATIONAL CHECK (cont)

11-88

Task

Result

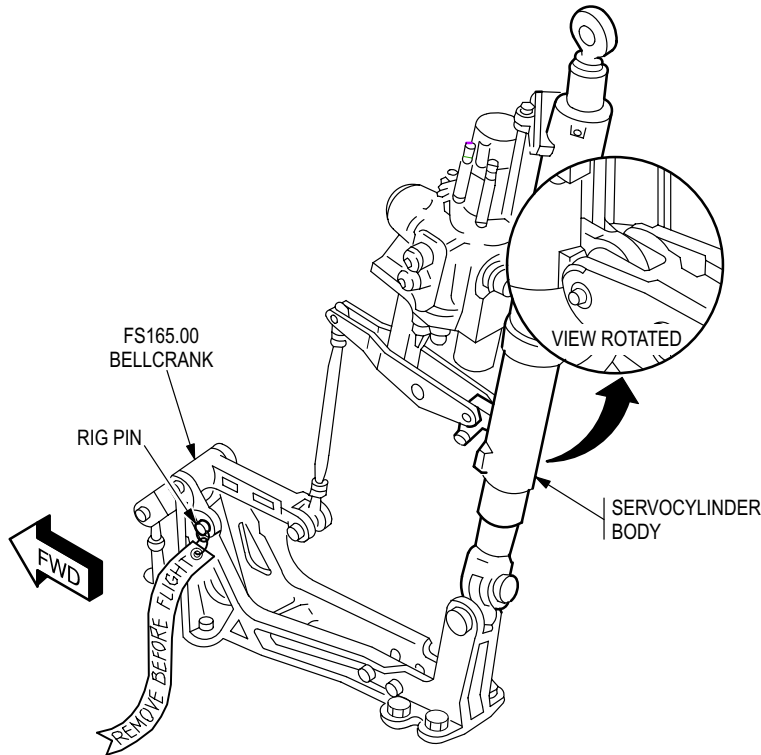


To prevent damage to stabilator during movement, be sure stabilator is clear of all obstructions before proceeding.

- | | |
|--|--|
| (12) On pilot collective stick (fig. 11-127): | If stabilator does not move either up or down or STAB MAN DC circuit breaker does not stay closed, go to paragraph 11-98. |
| (a) Toggle ND/NU switch up and down. Verify stabilator moves up and down. | |
| (b) Open then close STAB MAN DC circuit breaker. Toggle ND/NU switch up. Verify stabilator moves up. | If stabilator moves up (verify either actuator extends) but not down, go to paragraph 11-127. |
| (c) Open then close STAB MAN DC circuit breaker. Toggle ND/NU switch down. Verify stabilator moves down. | If stabilator moves down (verify either actuator retracts) but not up, go to paragraph 11-128. |
| (d) Release ND/NU switch. Verify pilot and CPG MAN STAB indicators remain lighted. | If MAN STAB indicator on pilot and CPG caution/warning panel does not remain lighted when ND/NU switch is released, go to paragraph 11-99. |

Task	Result
------	--------

- i. Press pilot **RESET** pushbutton. **STAB POS** indicator will return to $25 \pm 2^\circ$ **ND**.
- j. Slowly move collective input servocylinder input linkage to align and install -9 rig pin with F. S. 165 bellcrank rig pin hole (fig. 11-128).



M70-374

Figure 11-128. Collective Stick Housing Rig Pin Installation

NOTE

Increasing pitot tester airspeed will decrease STAB POS indicator readings.

- k. On pitot tester, set airspeed to zero (0) knots and connect right pitot tester hose to right pitot tube and left pitot tester hose to left pitot tube TM 55-4920-400-13.

11-88. STABILATOR – MAINTENANCE OPERATIONAL CHECK (cont)

11-88

Task	Result
------	--------

- i. Slowly increase tester airspeed to obtain between 68 and 72 knots while monitoring **STAB POS** indicators (fig. 11-126).

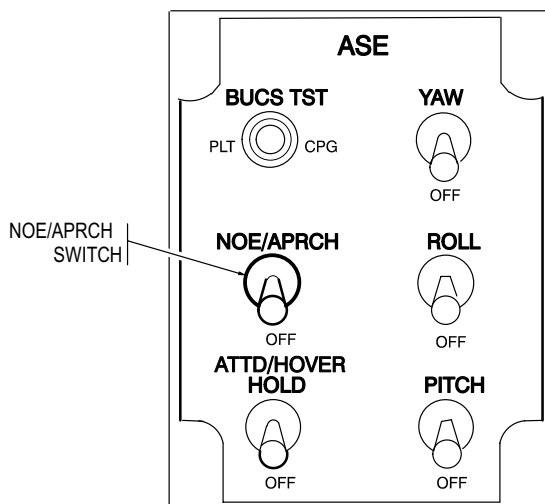
If **STAB POS** indicators do not indicate $19 \pm 2^\circ$ **ND**, or **MAN STAB** illuminates, go to paragraph 11-132.



To prevent damage to stabilator during movement, be sure stabilator is clear of all obstructions before proceeding.

- m. On pilot **ASE** panel (fig. 11-129), set **NOE/APRCH** switch to **NOE/APRCH**.

If **NOE/APRCH** switch disengages or if **STAB POS** indicators do not indicate $25 \pm 2^\circ$ **ND**, go to paragraph 11-122.



M70-294

Figure 11-129. Pilot ASE Panel

- n. On CPG collective stick (fig. 11-127), press **RESET** pushbutton on CPG stabilator manual control panel. **NOE/APRCH** switch toggles back automatically.

If **NOE/APRCH** switch does not reset or **STAB POS** indicators do not indicate $19 \pm 2^\circ$ **ND**, go to paragraph 11-129.

- o. Adjust pitot tester airspeed to obtain between 163 and 167 knots.

If **STAB POS** indicators do not indicate $2 \pm 2^\circ$ **NU**, go to paragraph 11-131.

11-88. STABILATOR – MAINTENANCE OPERATIONAL CHECK (cont)

11-88

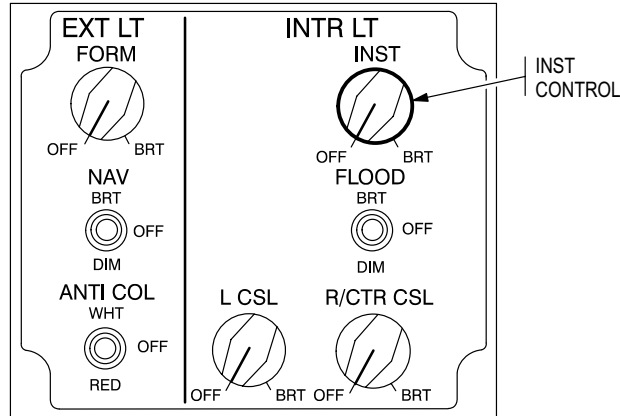
Task	Result
<p>p. Reduce airspeed to zero (0) knots (TM 55-4920-400-13).</p> <p>q. Remove -9 rig pin from F.S. 165 bellcrank (fig. 11-128).</p> <p>r. Push pilot and CPG collective stick (fig. 11-127) to full down position.</p> <p>s. With Pitot tester connected to right side pitot tube, remove and seal left side pitot tester hose. Slowly increase airspeed to obtain between 148 and 152 knots (TM 55-4920-400-13). The STAB POS indicator (fig. 11-126) will move up to $15 \pm 2^\circ$ and MAN STAB indicator (fig. 11-122) will flash.</p> <p>t. Reduce airspeed to zero (0) knots (TM 55-4920-400-13).</p> <p>u. Pulse pilot ND/NU switch to ND until pilot STAB POS indicator indicates $35 \pm 2^\circ$ full down position.</p> <p>v. Press pilot RESET pushbutton. Verify MAN STAB indicator (fig. 11-122) goes out and stabilator moves to $25 \pm 2^\circ$.</p> <p>w. On CPG collective stick (fig. 11-127), pulse ND/NU switch between ND and NU and verify stabilator indicators move both up and down.</p> <p>x. On CPG collective stick (fig. 11-127), press RESET pushbutton.</p>	<p>If MAN STAB indicator (fig. 11-125) does not go out and stabilator does not move to $25 \pm 2^\circ$ ND, go to paragraph 11-104.</p> <p>If MAN STAB indicator (fig. 11-125) does not light or STAB POS indicators do not indicate both UP and DOWN movement, go to paragraph 11-130.</p>

11-88. STABILATOR – MAINTENANCE OPERATIONAL CHECK (cont)

11-88

Task	Result
------	--------

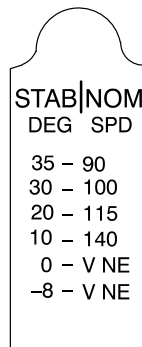
- y. On pilot **EXT LT/INTR LT** panel (fig. 11-130), rotate **INST** control clockwise to **BRT**.



M70-195

Figure 11-130. Pilot EXT LT/INTR LT Panel

- z. On pilot instrument panel, check that **STAB DEG/NOM SPD** placard panel (fig. 11-131) and **STAB POS** indicator (fig. 11-126) edge-lights are lighted.
 - If pilot **STAB DEG/NOM SPD** placard panel edge-light does not light, go to paragraph 11-94.
 - If pilot **STAB POS** indicator edge-light does not light, go to paragraph 11-96.
- aa. On pilot **EXT LT/INTR LT** panel (fig. 11-130), rotate **INST** control counter-clockwise to **OFF**.

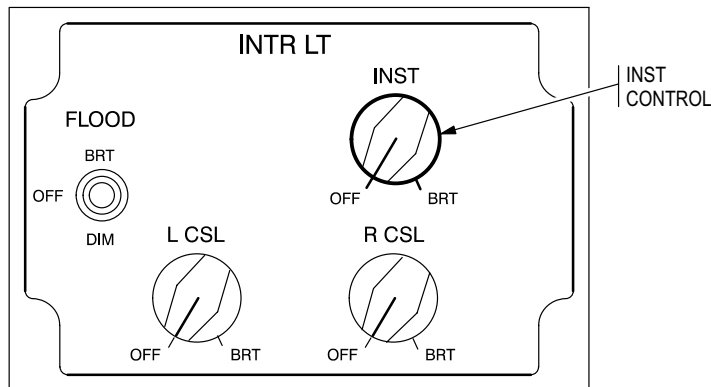


M70-196

Figure 11-131. STAB DEG/NOM SPD Placard Panel

Task	Result
------	--------

- ab. On CPG **INTR LT** panel (fig. 11-132), rotate **INST** control clockwise to **BRT**.



M70-197

Figure 11-132. CPG INTR LT Panel

- ac. On CPG instrument panel, check that **STAB DEG/NOM SPD** placard panel (fig. 11-131) and **STAB POS** indicator (fig. 11-126) edge-lights are lighted.
- ad. On CPG **INTR LT** panel (fig. 11-132), rotate **INST** control counter-clockwise to **OFF**.

If CPG **STAB POS** indicator edge-light does not light, go to paragraph 11-95.

If CPG **STAB DEG/NOM SPD** placard panel edge-light does not light, go to paragraph 11-93.

NOTE

If a discrepancy is noted during the FD/LS check, perform corrective action indicated in TM 1-1520-238-T-1. If the discrepancy still exists after performing the corrective action required, refer to the following listed failure symptoms and perform troubleshooting.

2. Perform stabilator FD/LS check (TM 1-1520-238-T-1).

If **SCU 1 NO-GO LH CATWALK** appears on HOD, go to paragraph 11-106 and perform troubleshooting.

If **SCU 2 NO-GO LH CATWALK** appears on HOD, go to paragraph 11-107 and perform troubleshooting.

11-88. STABILATOR – MAINTENANCE OPERATIONAL CHECK (cont)

11-88

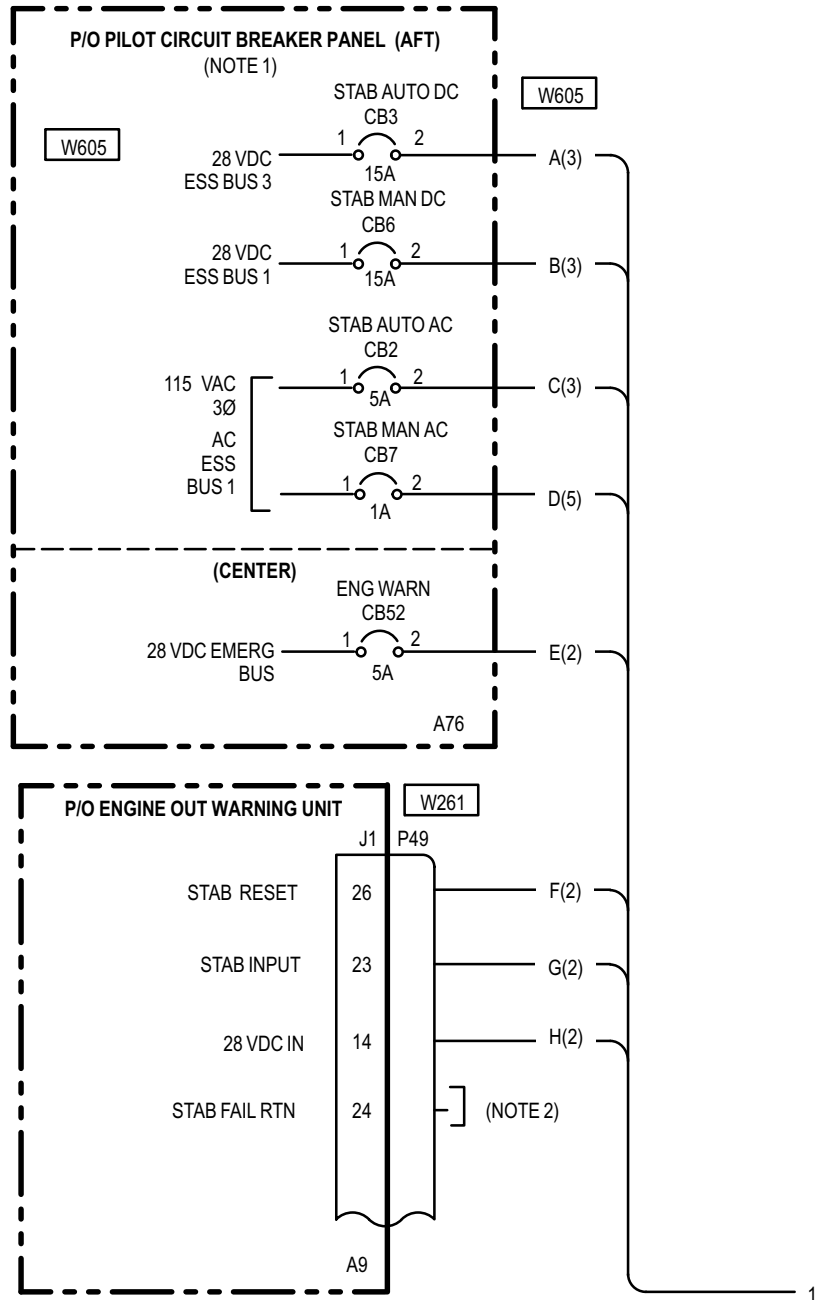
Task	Result
	If TOP STAB ACTUATOR NO-GO TAIL SECTION appears on HOD, go to paragraph 11-112 and perform troubleshooting.
	If BOTTOM STAB ACTUATOR NO-GO TAIL SECTION appears on HOD, go to paragraph 11-113 and perform troubleshooting.
	If AIRSPEED TRANSDUCER 2 NO-GO RH XMSN BAY appears on HOD, go to paragraph 11-108 and perform troubleshooting.
	If AIRSPEED TRANSDUCER 1 NO-GO LH XMSN BAY appears on HOD, go to paragraph 11-109 and perform troubleshooting.
	If RATE GYRO 2 NO-GO RH AFT CATWALK appears on HOD, go to paragraph 11-110 and perform troubleshooting.
	If RATE GYRO 1 NO-GO LH AFT CATWALK appears on HOD, go to paragraph 11-111 and perform troubleshooting.

3. Perform DASE/STABILATOR – POWER DOWN (para 11-11).
4. Disconnect pitot-static test set (TM 55-4920-400-13), and reinstall Pitot covers (TM 1-1520-238-23).
5. Disconnect maintenance headset (TM 1-1520-238-T-4).

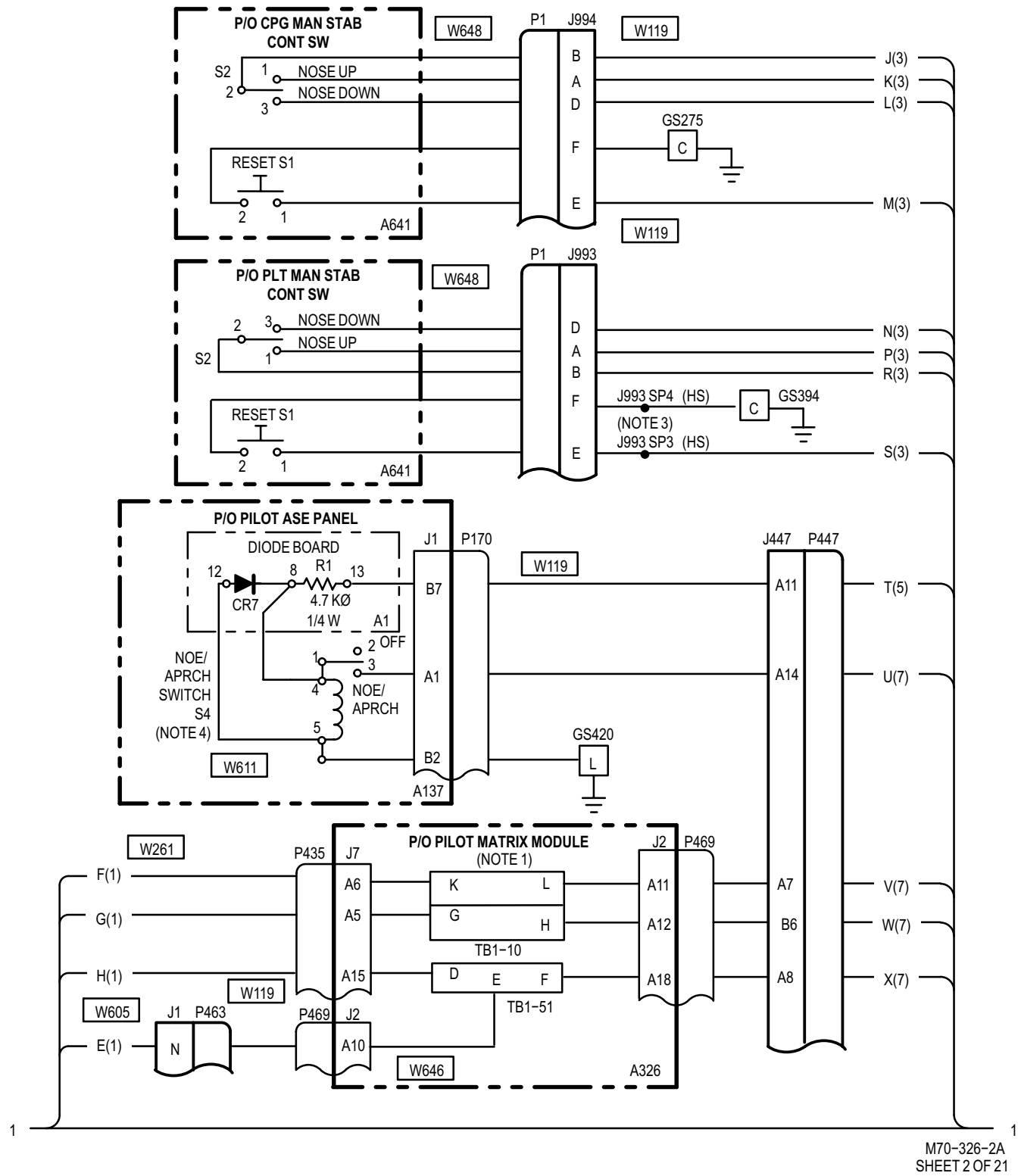
END OF TASK

11-89. STABILATOR – WIRING INTERCONNECT DIAGRAM

11-89

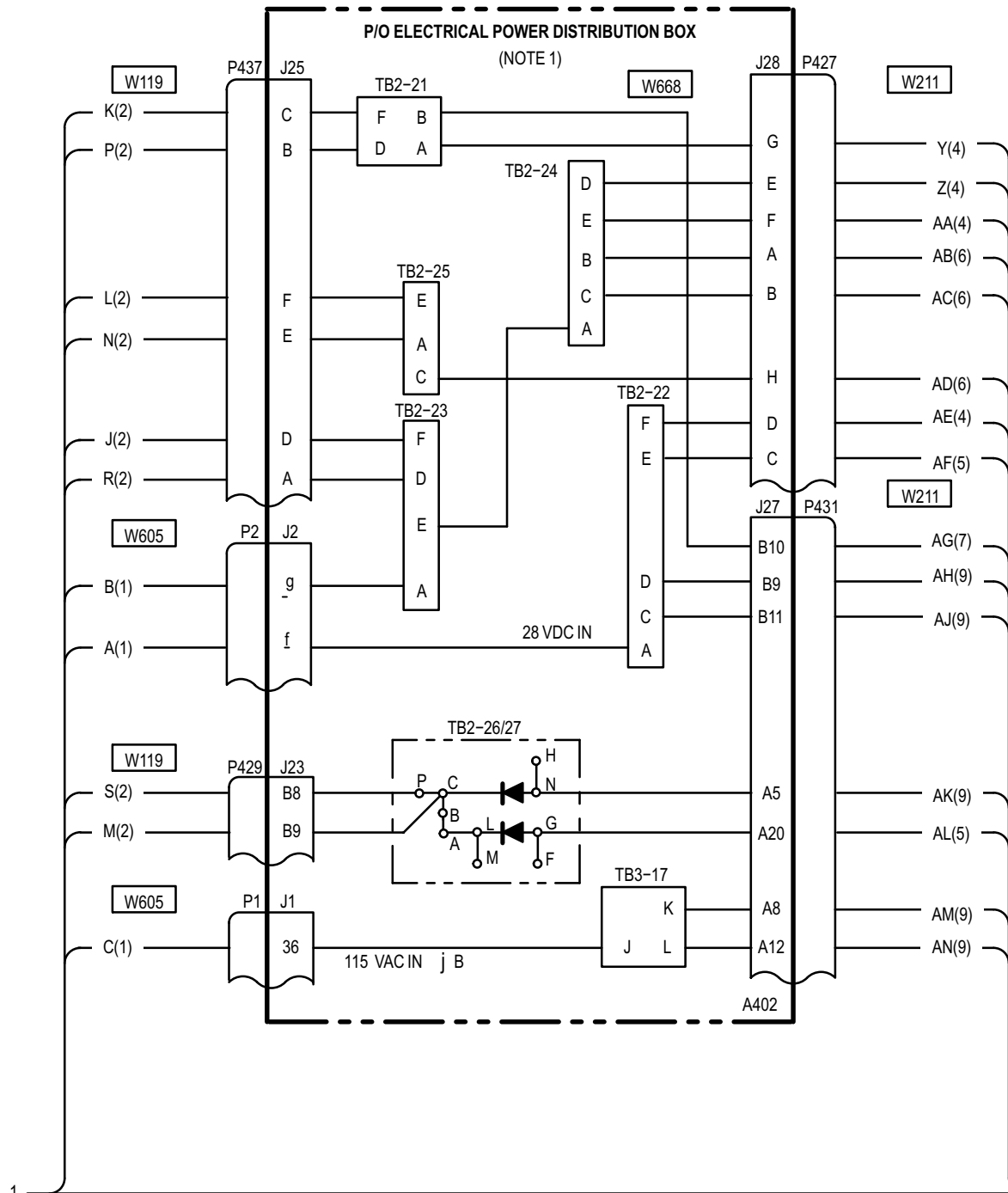


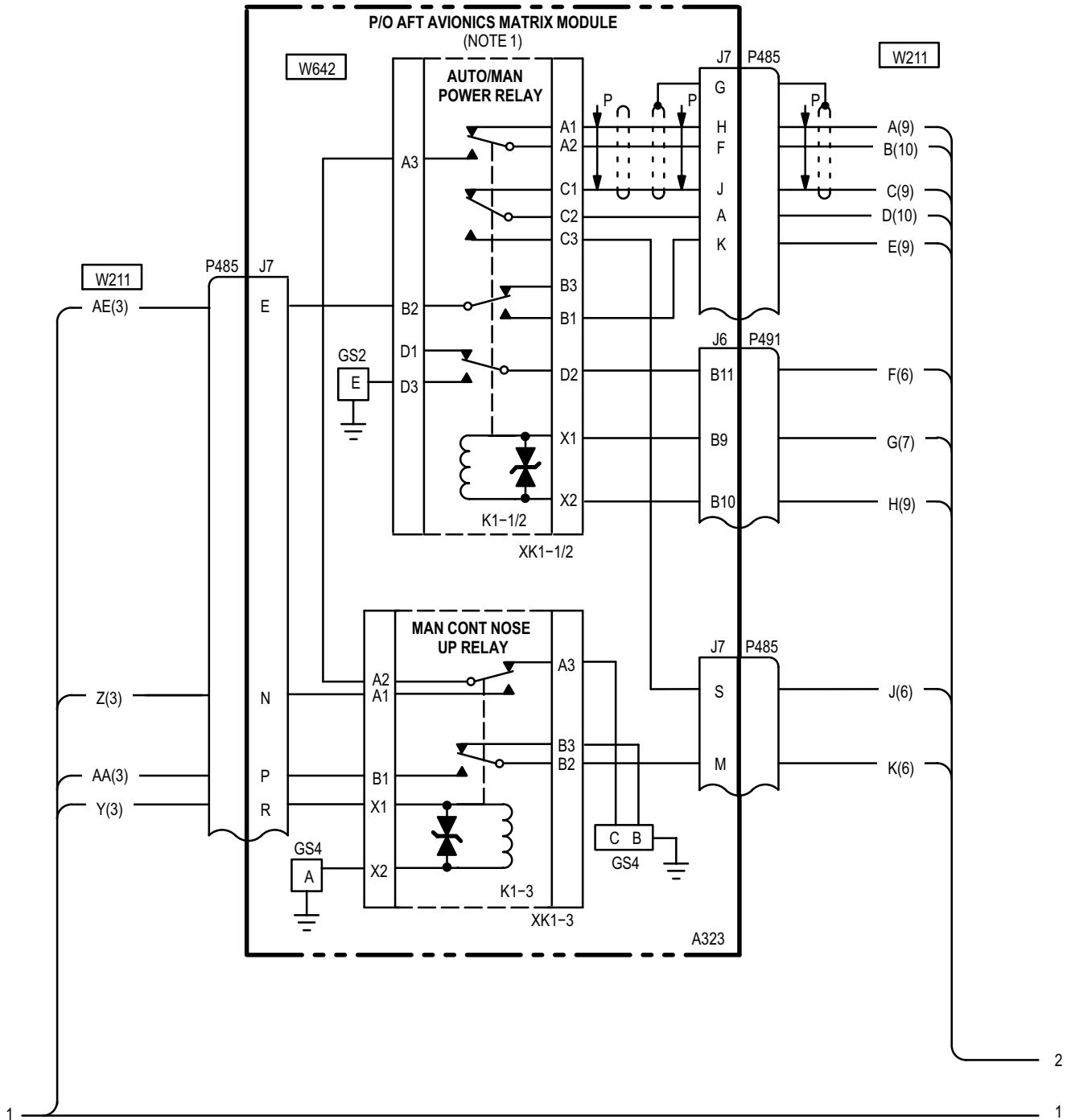
11-89. STABILATOR - WIRING INTERCONNECT DIAGRAM (cont)



11-89. STABILATOR - WIRING INTERCONNECT DIAGRAM (cont)

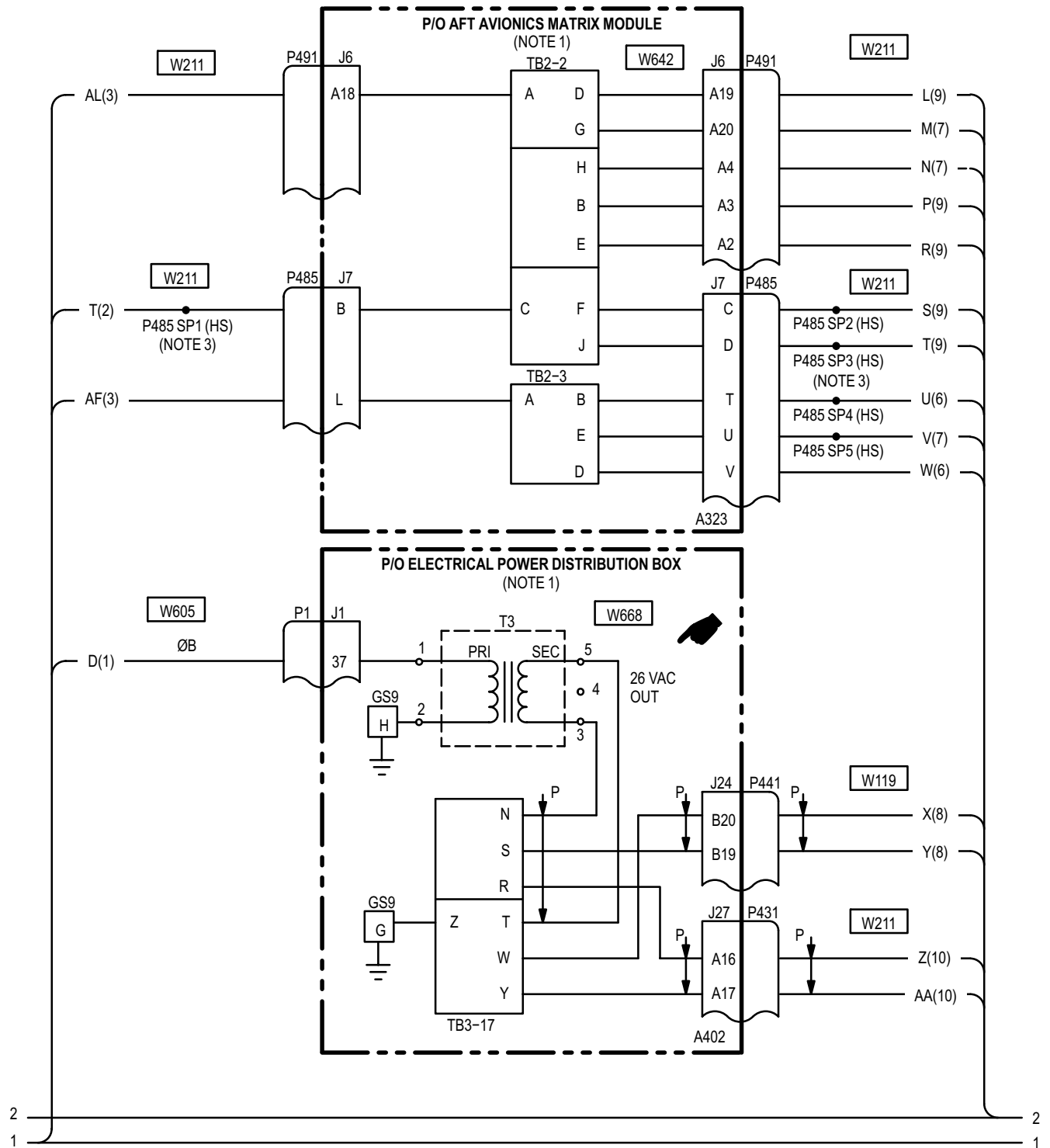
11-89

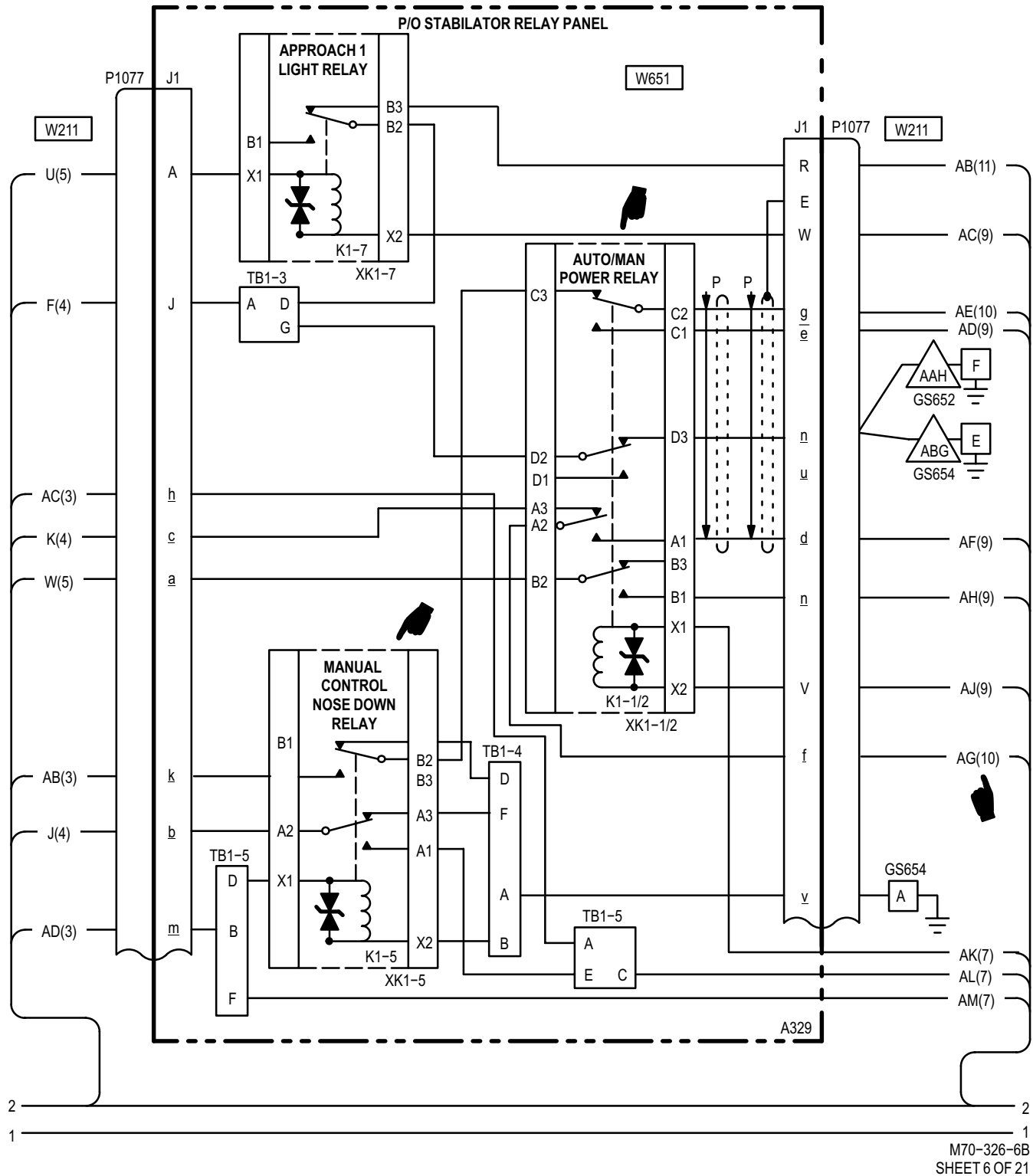




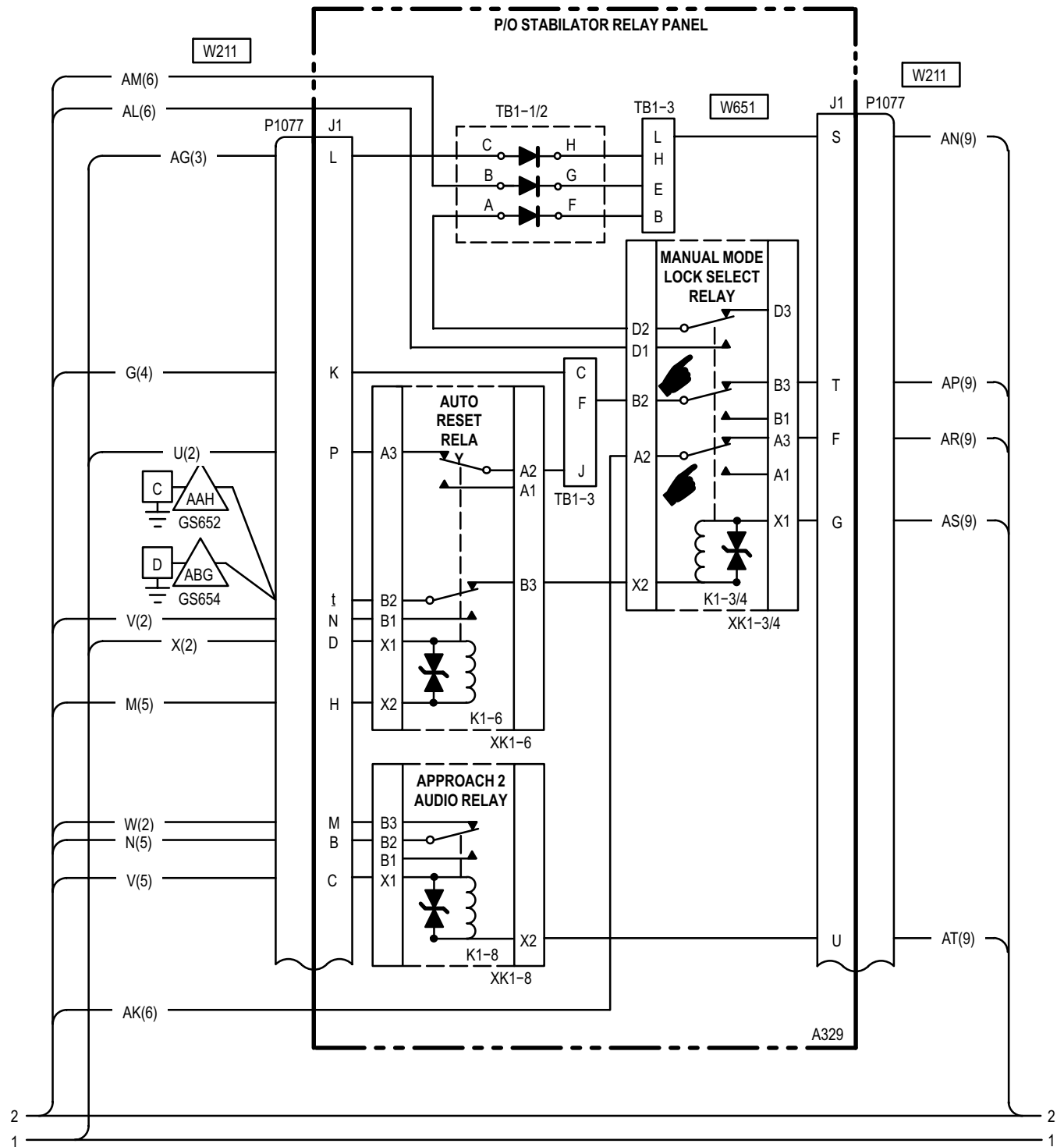
11-89. STABILATOR – WIRING INTERCONNECT DIAGRAM (cont)

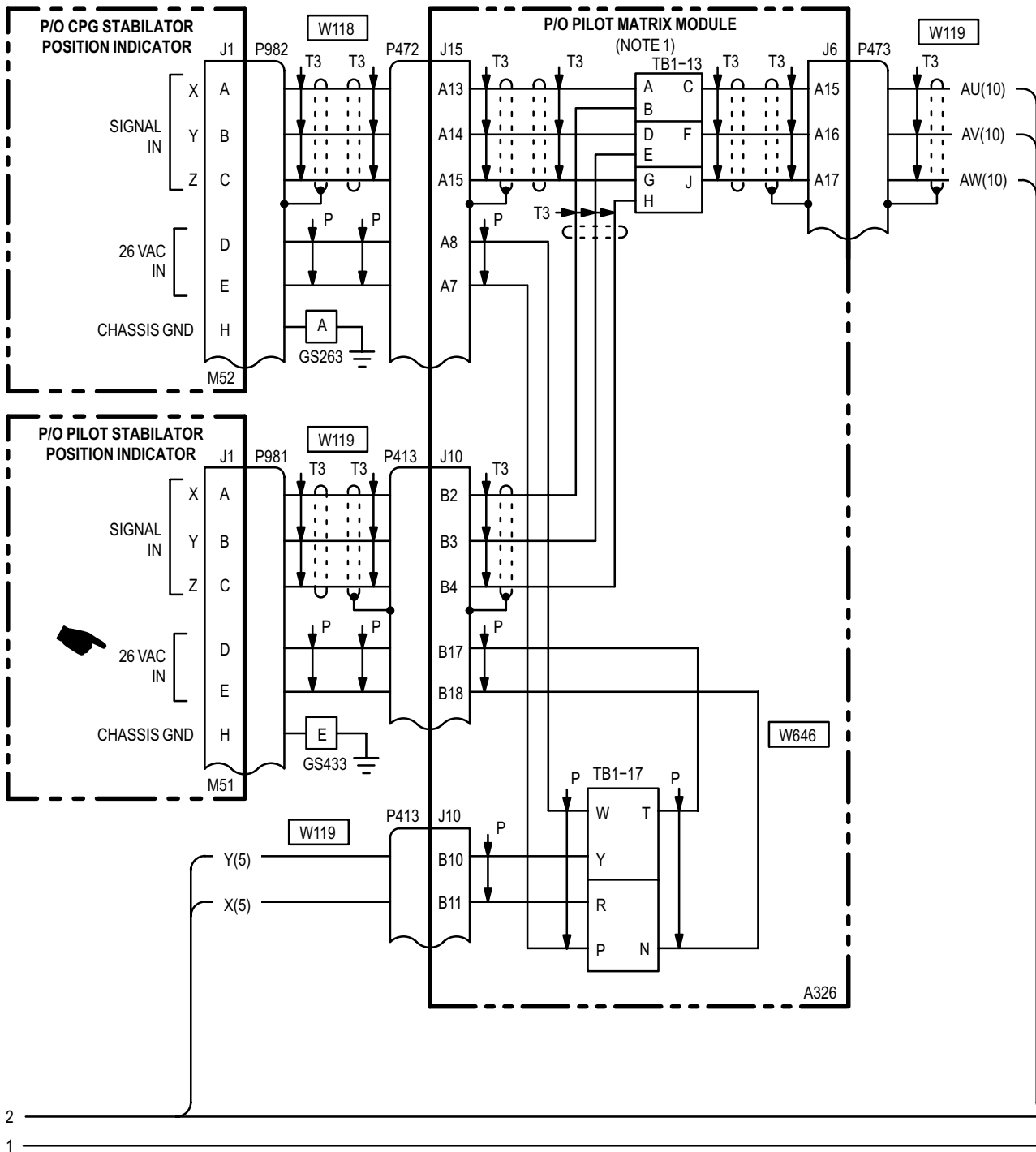
11-89





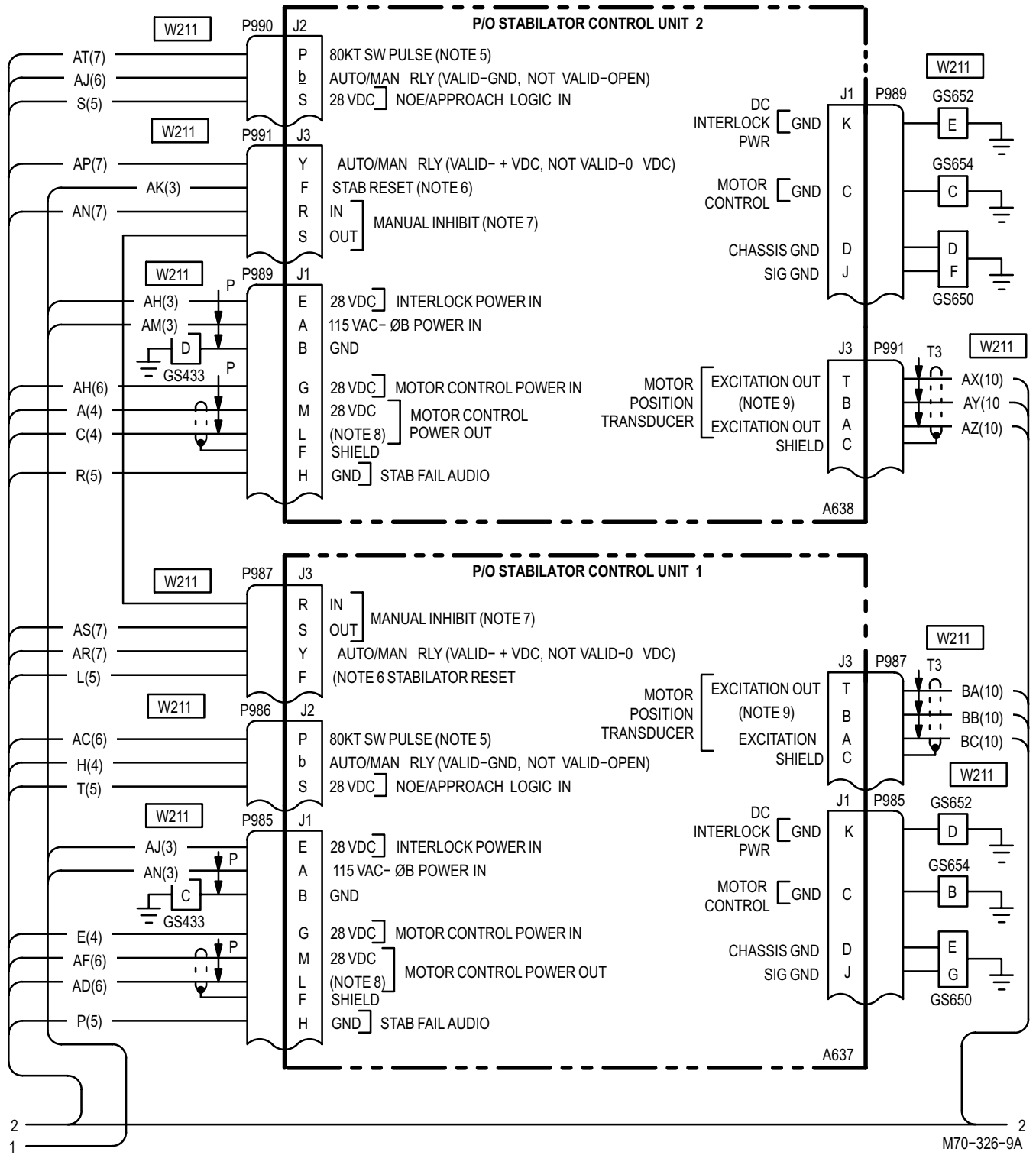
11-89. STABILATOR – WIRING INTERCONNECT DIAGRAM (cont)



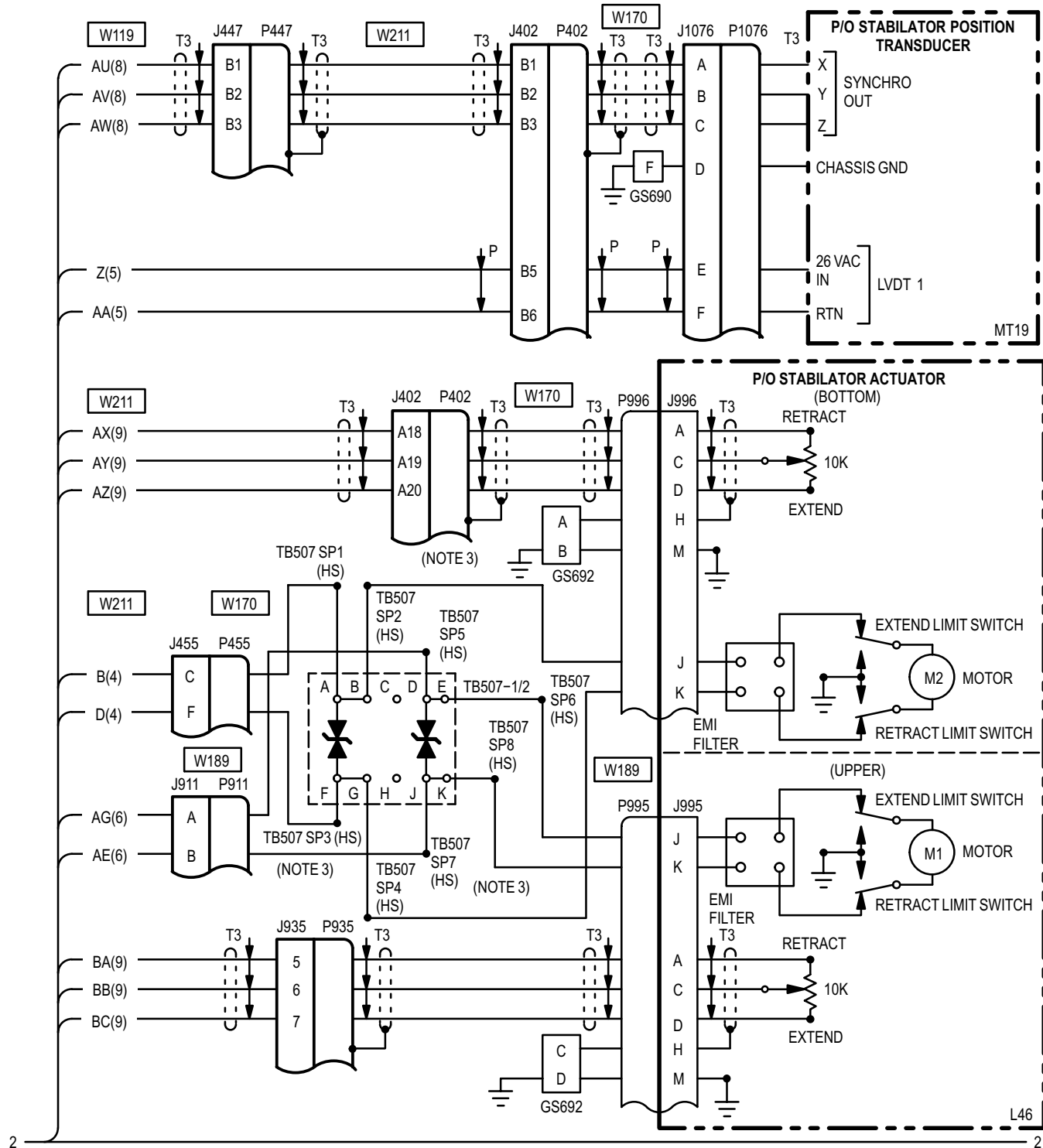


11-89. STABILATOR – WIRING INTERCONNECT DIAGRAM (cont)

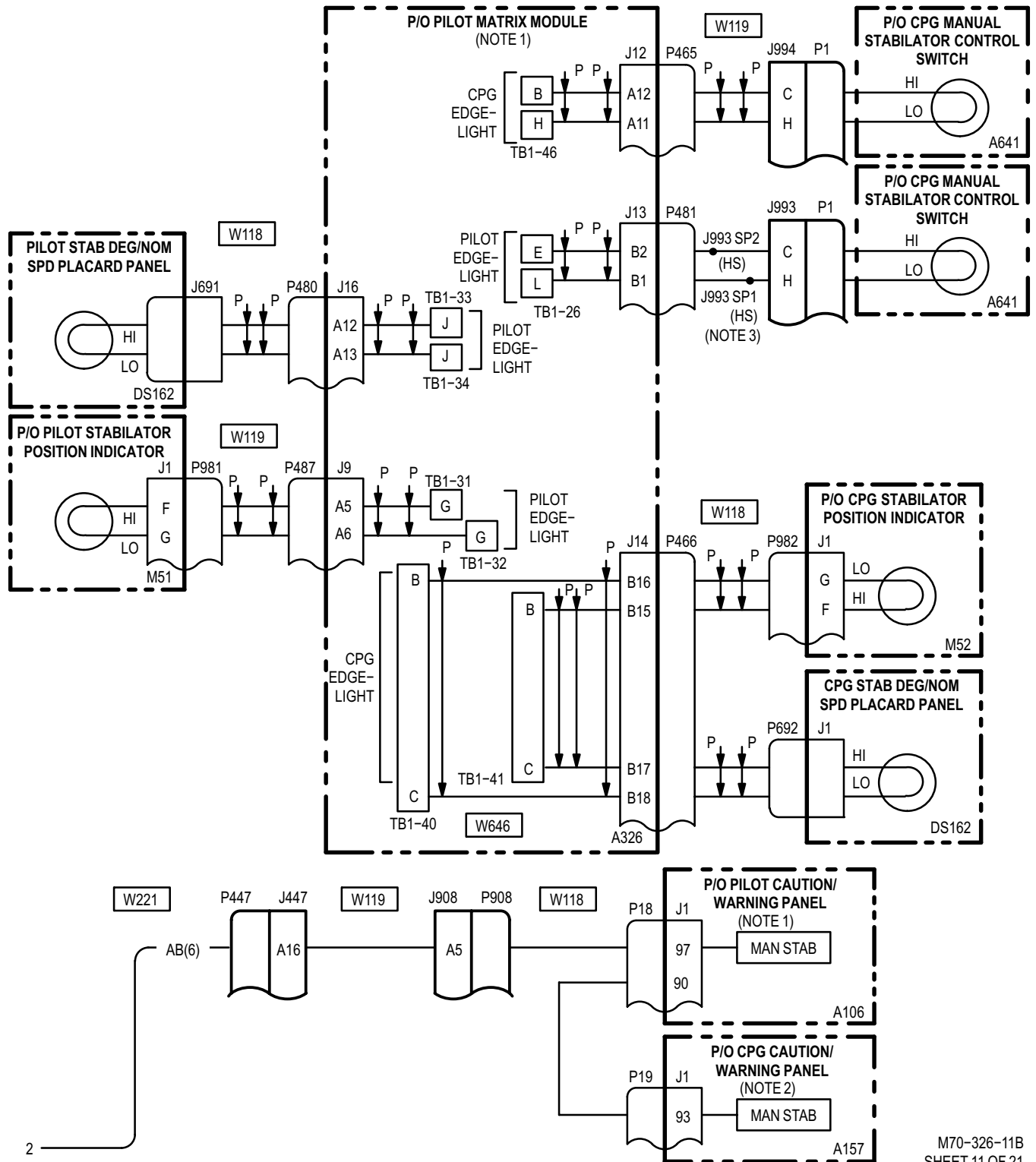
11-89



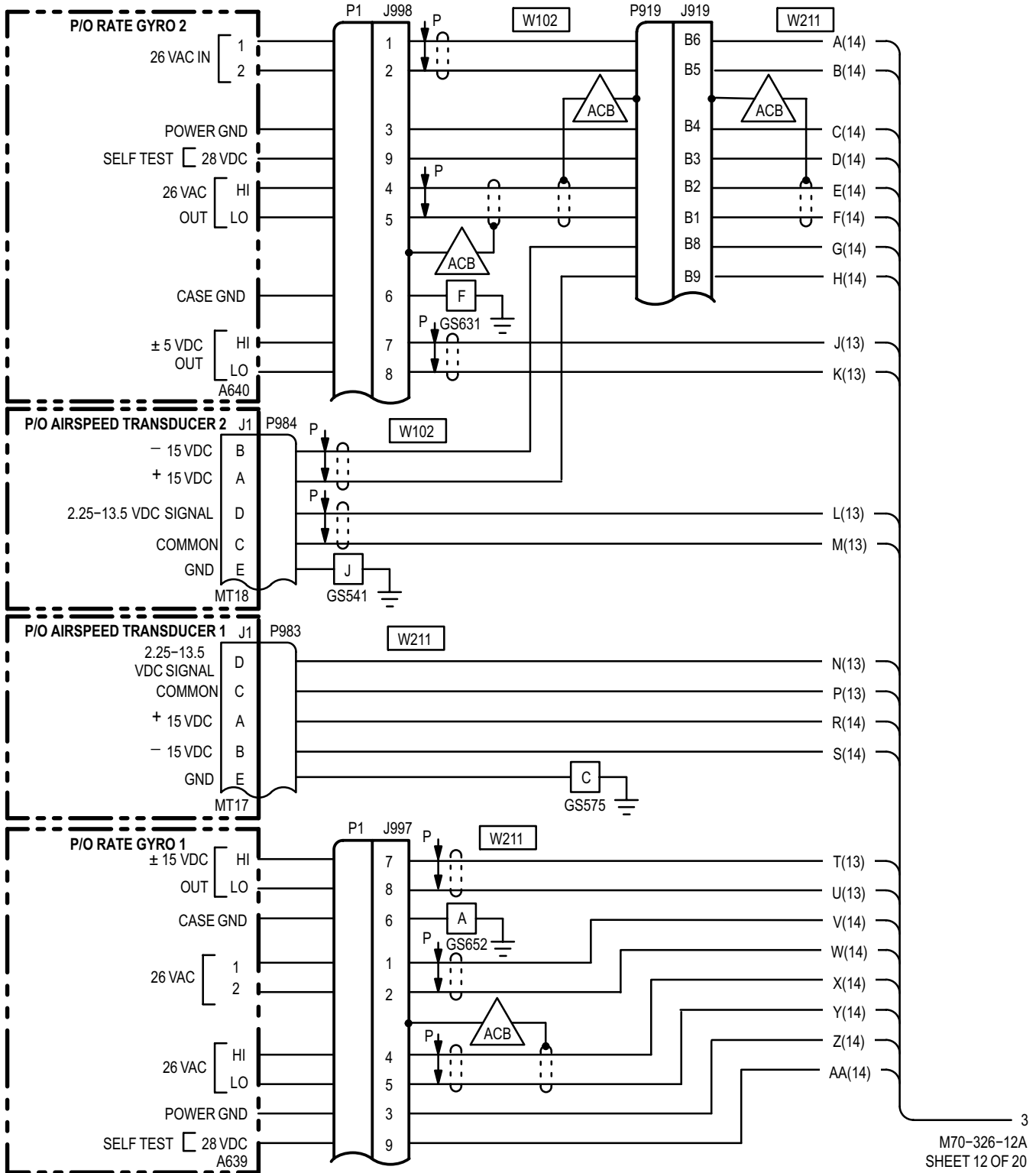
11-89. STABILATOR - WIRING INTERCONNECT DIAGRAM (cont)



11-89. STABILATOR – WIRING INTERCONNECT DIAGRAM (cont)



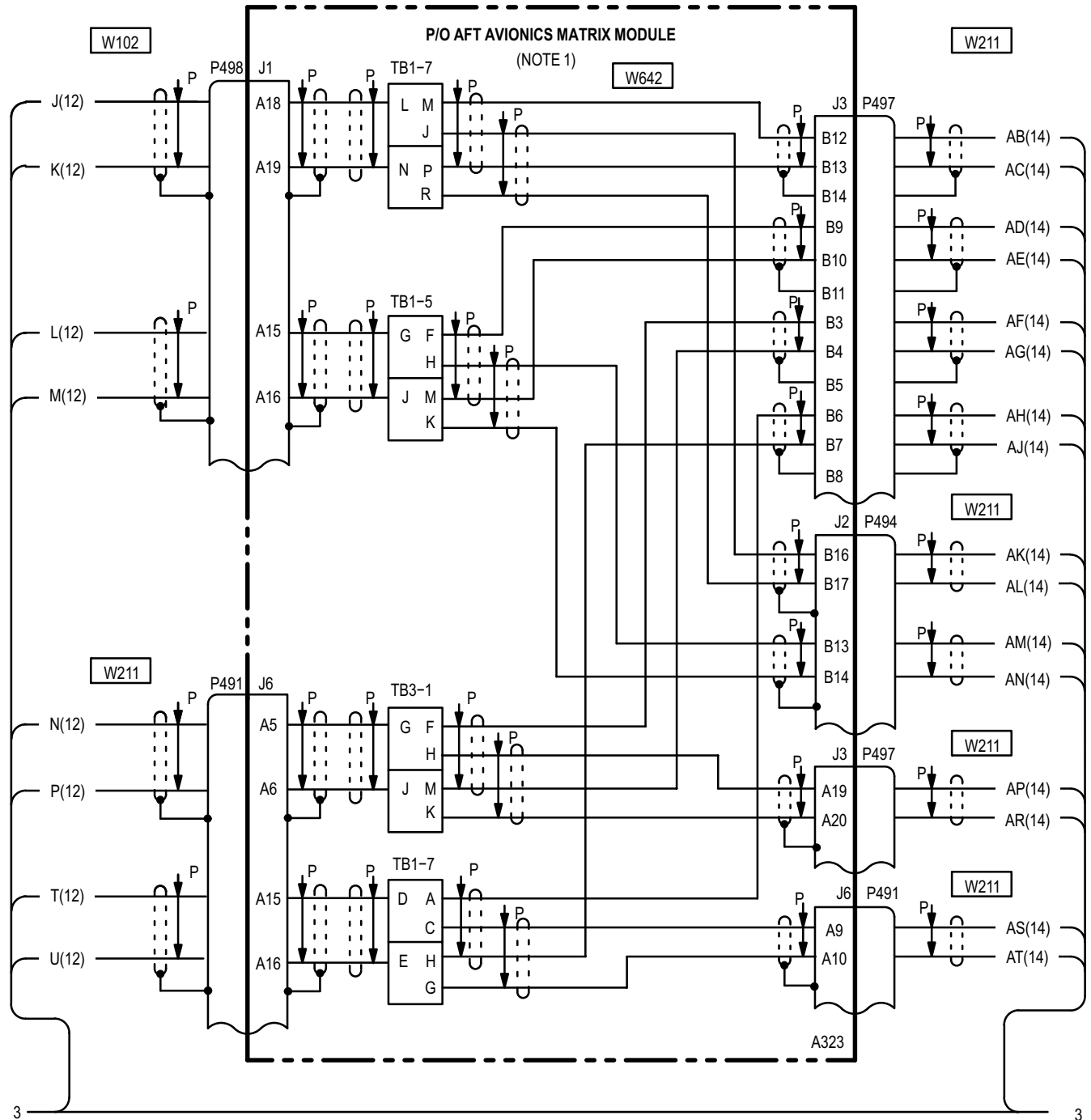
11-89. STABILATOR - WIRING INTERCONNECT DIAGRAM (cont)



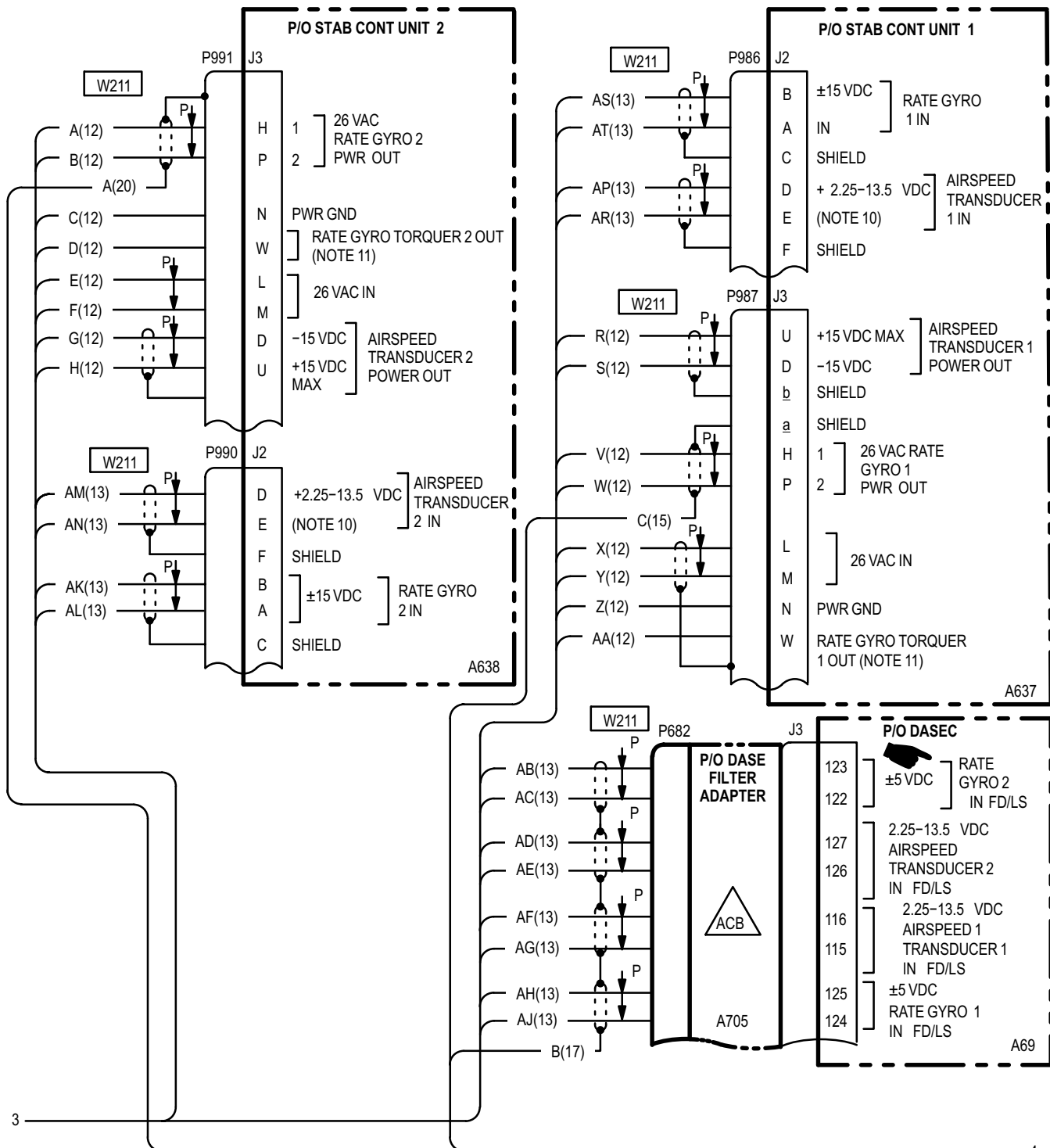
3

M70-326-12A
SHEET 12 OF 20

11-89. STABILATOR - WIRING INTERCONNECT DIAGRAM (cont)



11-89. STABILATOR – WIRING INTERCONNECT DIAGRAM (cont)

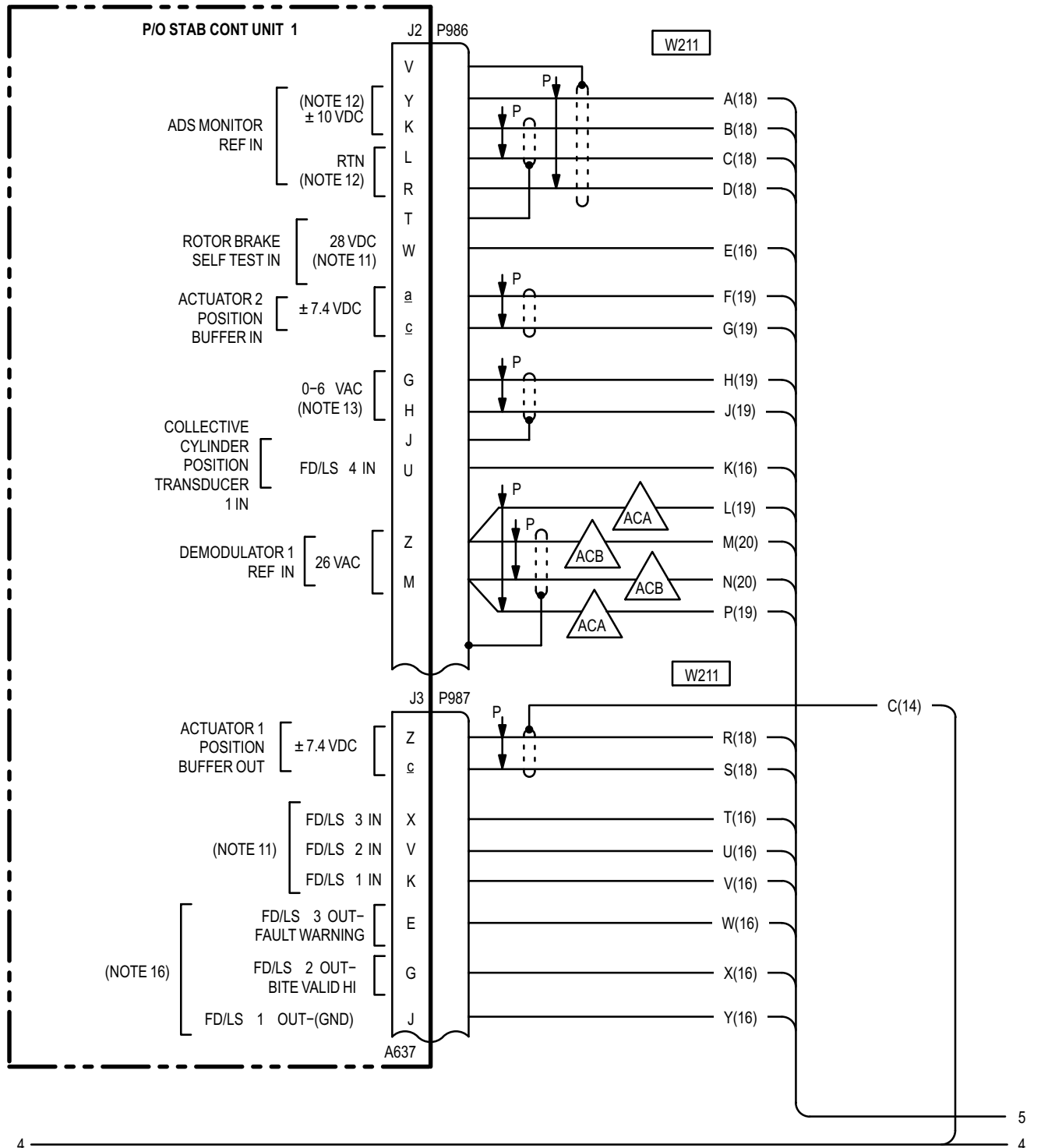


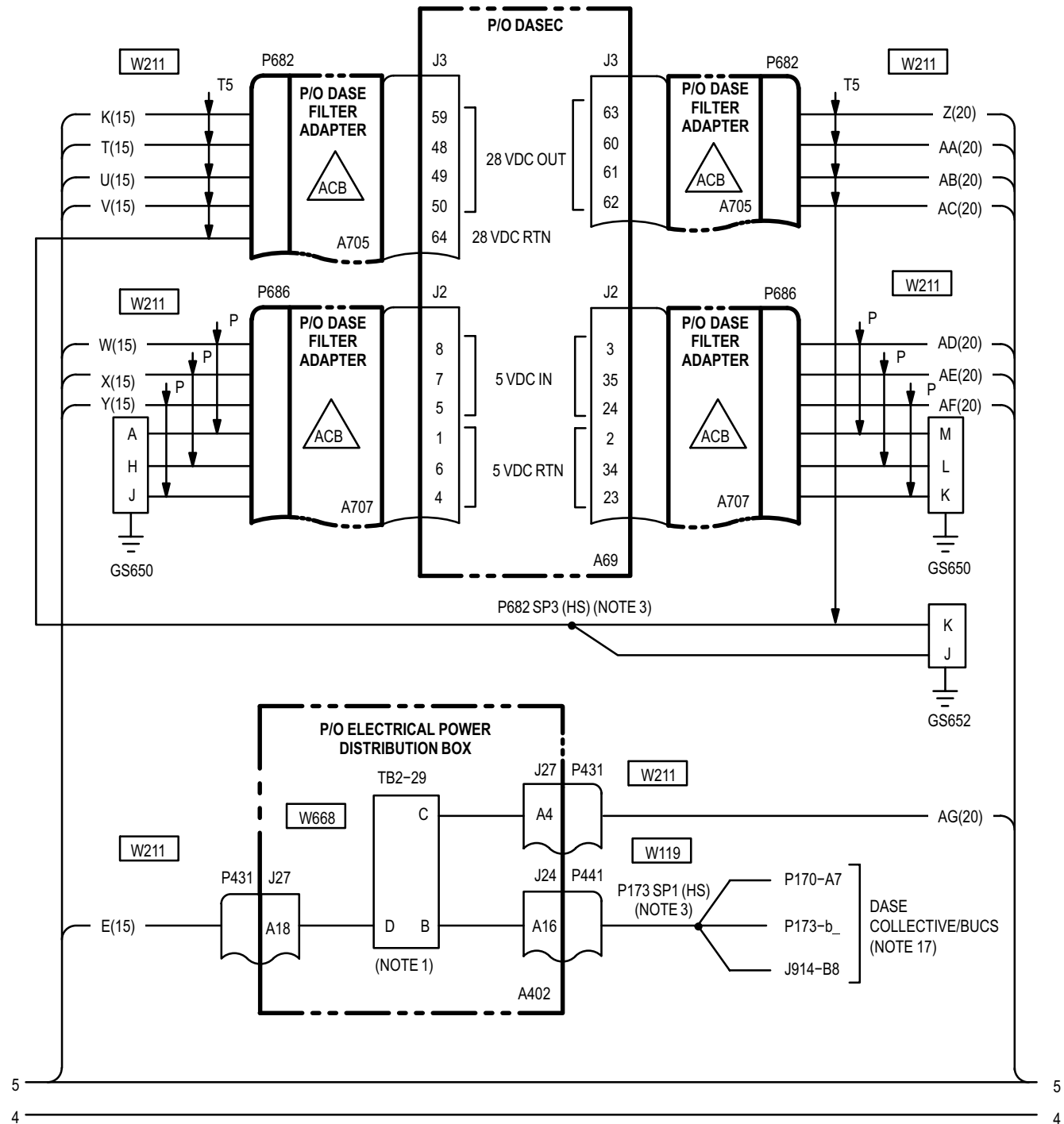
3

4

11-89. STABILATOR - WIRING INTERCONNECT DIAGRAM (cont)

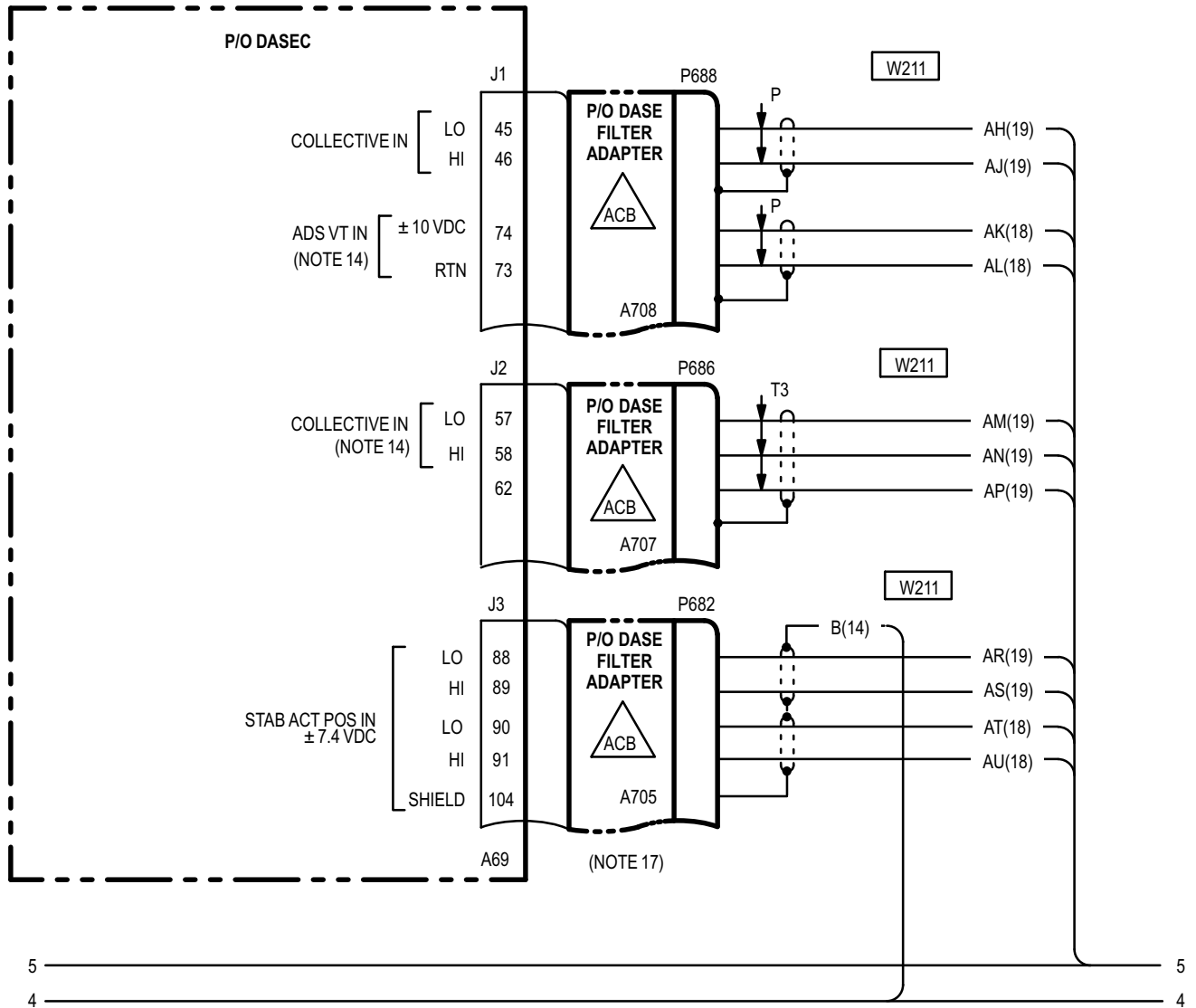
11-89

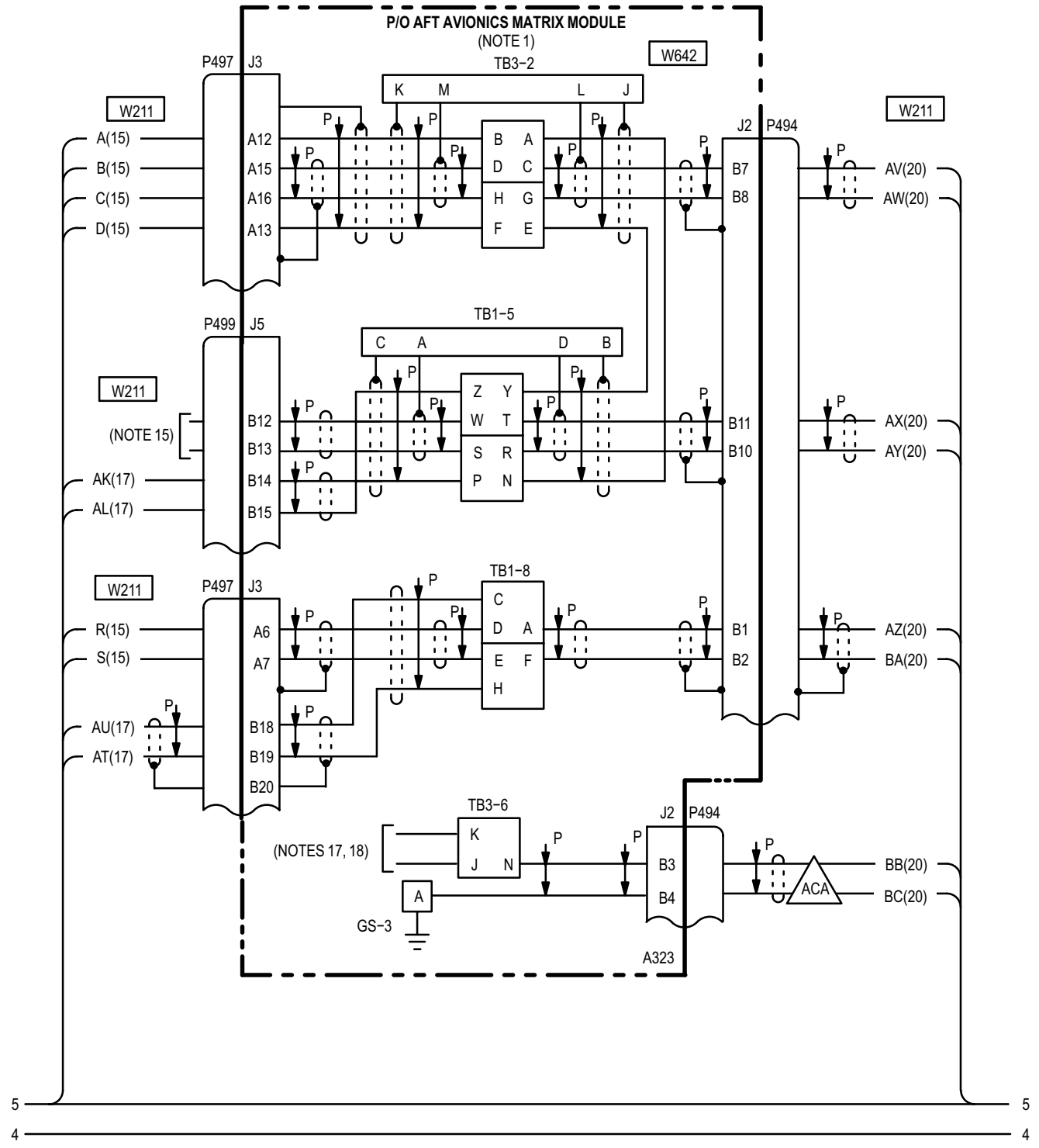




11-89. STABILATOR - WIRING INTERCONNECT DIAGRAM (cont)

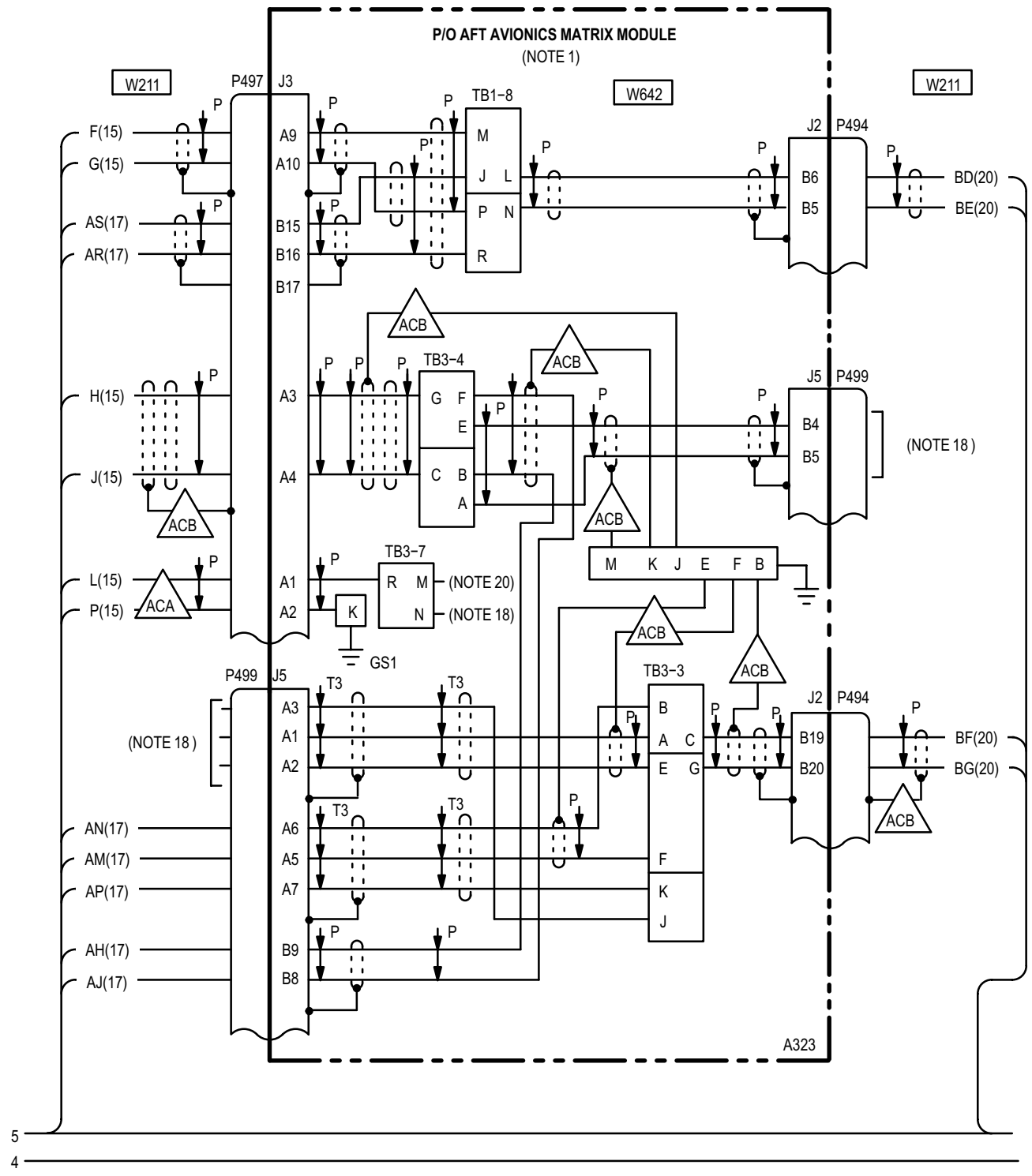
11-89





11-89. STABILATOR - WIRING INTERCONNECT DIAGRAM (cont)

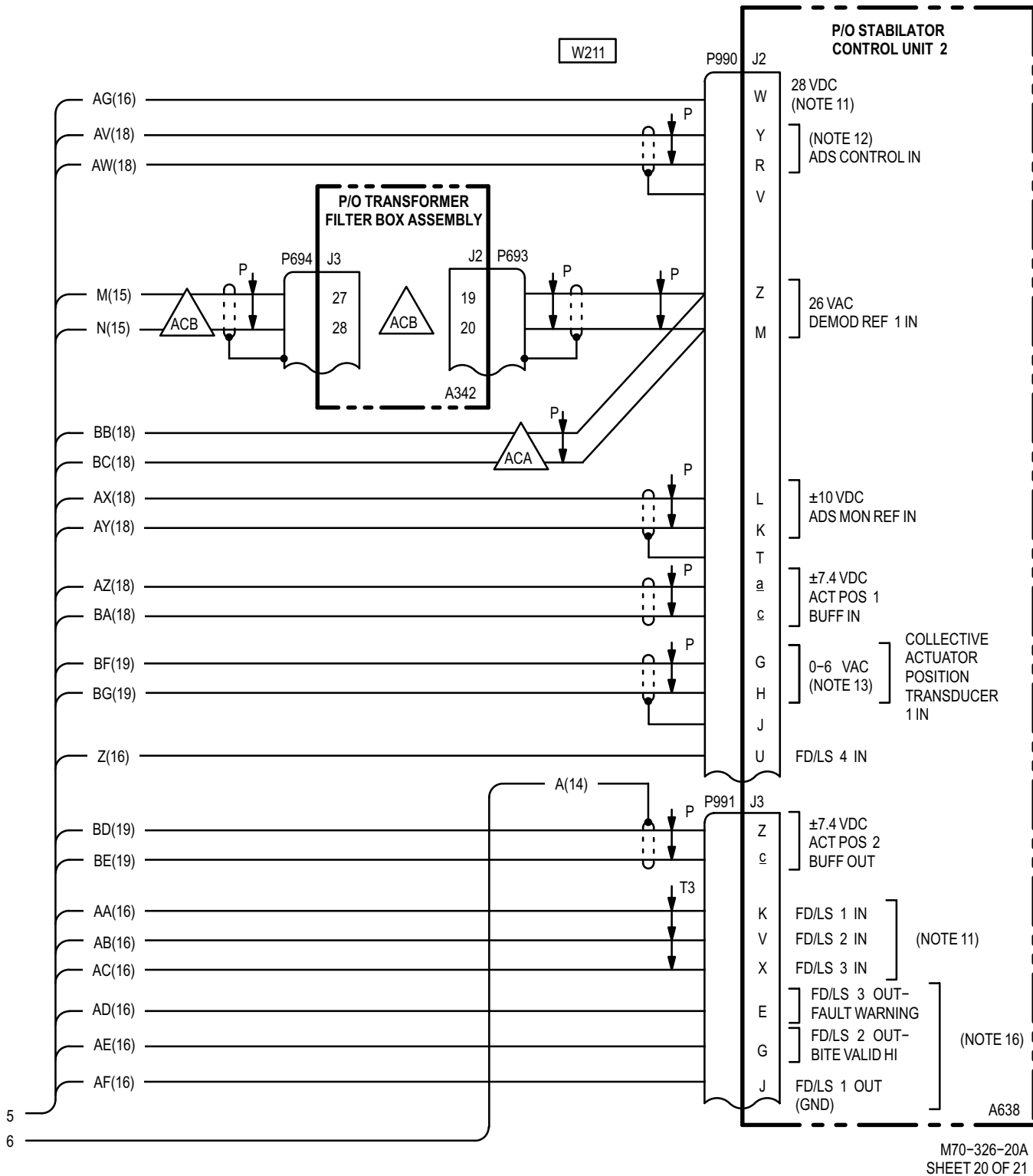
11-89



5
4

5
4

11-89. STABILATOR – WIRING INTERCONNECT DIAGRAM (cont)




11-89. STABILATOR – WIRING INTERCONNECT DIAGRAM (cont)

11-89

NOTES:

HIGHWAY USE: THE ALPHA CHARACTER IDENTIFIES A SPECIFIC LINE, AND THE NUMBER IN PARENTHESIS IDENTIFIES THE SHEET NUMBER WHERE THE SIGNAL TERMINATES.

1. ELECTRICAL SYSTEM (TM 1-1520-238-T-6).
2. AVIONICS CONFIGURATION-INTERCOMMUNICATION SYSTEM (TM 11-1520-238-23-2).
3. HS DESIGNATES A HARD SPLICE WHICH CANNOT BE DISCONNECTED.
M DESIGNATES A SOFT SPLICE WHICH MAY BE DISCONNECTED FOR A WIRING CHECK.
4. SWITCH IS MAGNETICALLY HELD IN NOE/APRCH POSITION AFTER IT IS MANUALLY SET TO ON.
5. NORMALLY OPEN. GROUND INPUT FOR ± 0.25 WHEN ACCELERATING THROUGH 80 KNOTS (RESET TO AUTO).
6. GROUND WHEN RESET SWITCH ON PILOT OR CPG COLLECTIVE STICK DEPRESSED.
7. PINS SHORTED BELOW 80 KNOTS; PINS OPEN ABOVE 80 KNOTS.
8. POLARITY REVERSES WITH CHANGE FROM EXTEND TO RETRACT.
9. MOTOR POSITION XD CR EXCITATION:
 - 15 VDC MAX (HI OUTPUT)
 - 15 VDC MAX (LO OUTPUT)
 - ± 7.4 VDC MAX (SIG IN).
10. 2.25 VDC-0 TO-30 KNOTS.
11. 28 VDC ON GROUND; 0 VDC AIRBORNE.
12. 0 VDC-0 KNOTS
2 VDC-50 KNOTS.
13.5 VDC-210 KNOTS
13. 5 TO 6 VAC AT COLLECTIVE MAX TRAVEL.
14. COLLECTIVE ACTUATOR LVDT SIGNAL IN; 5 TO 6 VAC AT COLLECTIVE FULL DOWN.
15. FIRE CONTROL SYSTEM-AIR DATA SUBSYSTEM (TM 9-1230-476-20-2)
16. NO FAILURE-5 VDC; FAILURE-GND.
17. DASE FILTER ADAPTER EFFECTIVE
STABILATOR -BUCS ACTIVATED. 
18. REFER TO PARAGRAPH 11-27. DASE (COLLECTIVE) (BUCS DEACTIVATED)-WIRING INTERCONNECT DIAGRAM.
19. REFER TO PARAGRAPH 11-28. DASE (BUCS ACTIVATED)-WIRING INTERCONNECT DIAGRAM.
20. REFER TO PARAGRAPH 11-26. DASE (YAW) (BUCS DEACTIVATED)- WIRING INTERCONNECT DIAGRAM.

11-90. STAB MAN AC CIRCUIT BREAKER – DOES NOT STAY CLOSED

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

TM 1-1520-238-T-6
 TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L200 panel removed



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN AC** (A76)CB7 circuit breaker. Detach P1 from (A402)J1. Check for short between P1-37 and ground.
Does short exist?

YES	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (ac essential bus 1 – pilot station).
NO	Go to step 2.

2. (AAG) Depin (A402)GS1-H. Check for short between (A402)J1-37 and ground.
Does short exist?

YES	Repair shorted wire in A402. Go to paragraph 11-88, or replace (A402)T3 (TM 1-1520-238-23).
NO	Go to step 3.
3. (ABC) Depin (A402)GS9-H. Check for short between (A402)J1-37 and ground.
Does short exist?

YES	Repair shorted wire in A402. Go to paragraph 11-88, or replace (A402)T3 (TM 1-1520-238-23).
NO	Go to step 4.
4. Depin (A402)TB3-17-T. Detach: P441 from (A402)J24, P431 from (A402)J27. Check for short between (A402)J24-B19 and ground.
Does short exist?

YES	Repair shorted wire between (A402): J24-B19 and TB3-17-S, J27-A16 and TB3-17-R. TB3-17-N and ground. Go to paragraph 11-88, or replace T3 (TM 1-1520-238-23).
NO	Go to step 5.
5. Check for short between P441-B19 and ground.
Does short exist?

YES	Go to step 6.
NO	Go to step 10.

11-90. STAB MAN AC CIRCUIT BREAKER – DOES NOT STAY CLOSED (cont)

11-90

6. Detach P413 from (A326)J10.
Check for short between P413-B10 and ground.
Does short exist?

YES Repair shorted wire between
P441-B19 and P413-B10.
Go to paragraph 11-88.

NO Go to step 7.

7. Detach P472 from (A326)J15.
Check for short between (A326)J15-A8 and
ground.
Does short exist?

YES Repair shorted wire between
(A326):
J10-B10 and TB1-17-Y,
TB1-17-T and J10-B17,
TB1-17-W and J15-A8.
Go to paragraph 11-88.

NO Go to step 8.

8. Detach P982 from (M52)J1.
Check for short between P982-D and ground.
Does short exist?

YES Repair shorted wire between
P982-D and P472-A8.
Go to paragraph 11-88.

NO Go to step 9.

9. Detach P981 from (M51)J1.
Check for short between P981-D and ground.
Does short exist?

YES Repair shorted wire between
P981-D and P413-B17.
Go to paragraph 11-88.

NO Replace pilot **STAB POS IND**
(M51) or CPG **STAB POS IND**
(M52)
(TM 1-1520-238-23).

10. Detach (MT19)P1076 from J1076.
Check for short between P431-A16 and ground.
Does short exist?

YES Repair shorted wire between:
J402-B5 and P431-A16.
P402-B5 and J1076-E.
Go to paragraph 11-88.

NO Replace **STAB POS TRANS**
transducer (MT19)
(TM 1-1520-238-23).

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

- TM 1-1520-238-T-6
- TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Does **STAB MAN DC** circuit breaker (A76)CB6 open only when **PLT NU/ND** switch is pressed to **NU** or **ND**.

YES	Go to step 11.
NO	Go to step 2.

2. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach P2 from (A402)J2. Check for short between P2-g and ground.

Does short exist?

YES	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (ac essential bus 1 – pilot station).
NO	Go to step 3.

3. Detach P427 from (A402)J28. Check for short between (A402)J2-g and ground.

Does short exist?

YES	Go to step 4.
NO	Go to step 8.

4. Detach P437 from (A402)J25. Check for short between (A402)J2-g and ground.

Does short exist?

YES	Repair shorted wire between (A402): J2-g and TB2-23-A, J25-A and TB2-23-D, J25-D and TB2-23-F, TB2-23-E and TB2-24-A, TB2-24-D and J28-E, TB2-24-E and J28-F, TB2-24-B and J28-A, TB2-24-C and J28-B. Go to paragraph 11-88.
NO	Go to step 5.

5. Check for short between P437-D and ground.

Does short exist?

YES	Go to step 6.
NO	Go to step 7.

6. Detach J994 from (A641)P1. Check for short between P437-D and ground.

Does short exist?

YES	Repair shorted wire between P437-D and J994-B. Go to paragraph 11-88.
NO	Replace CPG MAN STAB CONT SW (A641) (TM 1-1520-238-23).

7. Detach J993 from (A641)P1. Check for short between P437-A and ground.

Does short exist?

YES	Repair shorted wire between P437-A and J993-B. Go to paragraph 11-88.
NO	Replace pilot MAN STAB CONT SW (A641) (TM 1-1520-238-23).

8. Check for short between: P427-E and ground, P427-F and ground.

Does short exist?

YES	Go to step 9.
NO	Go to step 10.

11-91. STAB MAN DC CIRCUIT BREAKER – DOES NOT STAY CLOSED (cont)

11-91

9. Detach P485 from (A323)J7.

Check for short between:

P427-E and ground,

P427-F and ground.

Does short exist?

YES Repair shorted wire between:
P427-E and P485-N,
P427-F and P485-P.
Go to paragraph 11-88.

NO Repair shorted wire between
(A323):
J7-N and XK1-3-A1,
J7-P and XK1-3-B1,
go to paragraph 11-88, or
replace **MAN CONT NOSE UP**
relay (A323)K1-3
(TM 1-1520-238-23).

10. Detach P1077 from (A329)J1.

Check for short between:

P427-A and ground,

P427-B and ground.

Does short exist?

YES Repair shorted wire between:
P427-A and P1077-k,
P427-B and P1077-h.
Go to paragraph 11-88.

NO Repair shorted wire between
(A329):
J1-k and XK1-5-B1,
J1-h and TB1-5-A,
TB1-5-E and XK1-5-A1,
TB1-5-C and XK1-3/4-D1.
Go to paragraph 11-88, or
replace:
MAN CONT NOSE DOWN relay
(A329)K1-5, or
MAN MODE LOCK SEL relay
(A329)K1-3/4
(TM 1-1520-238-23).

11. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.

Detach (A402):

P437 from J25,

P427 from J28,

P431 from J27.

Check for short between:

J25-C and ground,

J25-F and ground.

Does short exist?

YES Repair shorted wire between
(A402):

J25-C and TB2-21-F,

J25-B and TB2-21-D,

TB2-21-A and J28-G,

J25-F and TB2-25-E,

J25-E and TB2-25-A,

TB2-25-C and J28-H,

TB2-21-B and J27-B10.

Go to paragraph 11-88.

NO Go to step 12.

12. Check for short between:

P437-C and ground,

P437-F and ground.

Does short exist?

YES Go to step 13.

NO Go to step 14.

13. Detach J994 from (A641)P1.

Check for short between:

P437-C and ground,

P437-F and ground.

Does short exist?

YES Repair shorted wire between:
P437-C and J994-A,
P437-F and J994-D.
Go to paragraph 11-88.

NO Replace **CPG MAN STAB CONT** switch (A641)
(TM 1-1520-238-23).

11-91. STAB MAN DC CIRCUIT BREAKER – DOES NOT STAY CLOSED (cont)

11-91

14. Check for short between:
P437-E and ground,
P437-B and ground.
Does short exist?
- YES Go to step 15.
NO Go to step 16.
15. Detach J993 from (A641)P1.
Check for short between:
P437-E and ground,
P437-B and ground.
Does short exist?
- YES Repair shorted wire between
P437-E and J993-D,
P437-B and J993-A.
Go to paragraph 11-88.
- NO Replace **PLT MAN STAB CONT**
switch (A641)
(TM 1-1520-238-23).
16. Check for short between P427-G and ground.
Does short exist?
- YES Go to step 17.
NO Go to step 19.
17. Detach P485 from (A323)J7.
Check for short between P427-G and ground.
Does short exist?
- YES Repair shorted wire between
P427-G and P485-R.
Go to paragraph 11-88.
- NO Go to step 18.
18. With **MAN CONT NOSE UP** (A323)K1-3 relay removed,
check for short between (A323)J7-R and ground.
Does short exist?
- YES Repair shorted wire between
(A323)J7-R and XK1-3-X1.
Go to paragraph 11-88.
- NO Replace **MAN CONT NOSE UP**
relay (A323)K1-3
(TM 1-1520-238-23).
19. Check for short between P431-B10 and ground.
Does short exist?
- YES Go to step 20.
NO Go to step 23.
20. Detach P1077 from (A329)J1.
Check for short between P431-B10 and ground.
Does short exist?
- YES Repair shorted wire between
P431-B10 and P1077-L.
Go to paragraph 11-88.
- NO Go to step 21.
21. Check for short from P1077-S and ground.
Does short exist?
- YES Go to step 22.
NO Repair shorted wire between
(A329):
TB1-3-E and TB1-1/2-G,
TB1-3-B and TB1-1/2-F,
J1-L and TB1-1/2-C,
TB1-1/2-H and TB1-3-H,
TB1-3-L and J1-S,
Go to paragraph 11-88.

11-91. STAB MAN DC CIRCUIT BREAKER – DOES NOT STAY CLOSED (cont)

11-91

22. Detach P991 from (A638)J3-R.
Check for short between P1077-S and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between P1077-R and P991-R.
Go to paragraph 11-88. |
| NO | Replace STAB CONT UNIT 2 (A638) (TM 1-1520-238-23). |
23. Attach P1077 to (A637)J3.
Check for short between P427-H and ground.
Does short exist?
- | | |
|-----|----------------|
| YES | Go to step 24. |
| NO | Go to step 25. |
24. Detach P1077 from (A637)J3.
Check for short between P427-H and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between P427-H and P1077-m.
Go to paragraph 11-88. |
| NO | Repair shorted wire between (A329):
J1-m and TB1-5-B,
TB1-5-F and TB1-1/2-B,
TB1-5-D and (XK1-5)X1.
Go to paragraph 11-88.
or replace MAN CONT NOSE DOWN relay (A329)K1-5 (TM 1-1520-238-23). |
25. Detach P996 from (L46)J996.
Check for short between (L46)J996-J and (L46)J996-K.
Does short exist?
- | | |
|-----|---|
| YES | Replace bottom STABILATOR ACTUATOR (L46) (TM 1-1520-238-23). |
| NO | Go to step 26. |
26. Detach P995 from (L46)J995.
Check for short between (L46)J995-J and (L46)J995-K.
Does short exist?
- | | |
|-----|--|
| YES | Replace top STABILATOR ACTUATOR (L46) (TM 1-1520-238-23). |
| NO | Go to step 27. |
27. Remove **MAN CONT NOSE UP** (A323)K1-3.
Check for short between:
(A323)XK1-3-B2 and ground,
P485-M and ground,
(A329)J1-c and ground,
(A329)XK1-1/2-A2 and ground,
P1077-f and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between:
(A323)XK1-3-B2 and
(A323)J7-M,
P485-M and P1077-c,
(A329)J1-c and XK1-1/2-A3,
(A329)XK1-1/2-A2 and J1-f,
P1077-f and P995-J.
Go to paragraph 11-88. |
| NO | Go to step 28. |
28. Check for short between:
(A323)XK1-3-A2 and ground,
(A323)XK1-1/2-A2 and ground,
P485-F and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between:
(A323)XK1-3-A2 and
XK1-1/2-A3,
(A323)XK1-1/2-A2 and J7-F,
P485-F and P996-J.
Go to paragraph 11-88. |
| NO | Go to step 29. |

29. Remove **MAN CONT NOSE DOWN** (A329)K1-5

relay. Check for short between:

(A329)XK1-5-B2 and ground,
(A329)XK1-1/2-C2 and ground,
P1077-g and ground.

Does short exist?

YES Repair shorted wire between:
(A329)XK1-5-B2 and
XK1-1/2-C3,
(A329)XK1-1/2-C2 and J1-g,
P1077-g and P995-K.
Go to paragraph 11-88.

NO Go to step 30.

30. Check for short between:

(A329)XK1-5-A2 and ground,
P1077-b and ground,
(A323)J7-s and ground,
(A323)XK1-1/2-C2,
P485-A and ground.

Does short exist?

YES Repair shorted wire between:
(A329)XK1-5-A2 and J1-b,
P1077-b and P485-S,
(A323)J7-s and XK1-1/2-C3,
(A323)XK1-1/2-C2 and J7-A,
P485-A and P996-K.
Go to paragraph 11-88.

NO Replace:
AUTO/MAN PWR relay
(A323)K1-1/2, or
AUTO/MAN PWR relay
(A329)K1-1/2
(TM 1-1520-238-23).

END OF TASK

11-92. STAB AUTO AC CIRCUIT BREAKER – DOES NOT STAY CLOSED

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

- TM 1-1520-238-T-6
- TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

3. Detach P985 from (A637)J1 and P989 from (A638)J1. Check for short between: P431-A8 and ground, P431-A12 and ground.

Does short exist?

- YES Repair shorted wire between: P431-A8 and P989-A, P431-A12 and P985-A. Go to paragraph 11-88.
- NO Go to step 4.

4. Check for short between (A637)J1-A and ground.

Does short exist?

- YES Replace **STAB CONT UNIT 1** (A637) (TM 1-1520-238-23).
- NO Replace **STAB CONT UNIT 2** (A638) (TM 1-1520-238-23).

1. Open **STAB AUTO AC** circuit breaker (A76)CB2. Detach P1 from (A402)J1. Check for short between P1-36 and ground.

Does short exist?

- YES Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (ac essential bus 1 – pilot station).
- NO Go to step 2.

2. Detach P431 from (A402)J27. Check for short between (A402)J1-36 and ground.

Does short exist?

- YES Repair shorted wire between (A402): TB3-17-J and J1-36, TB3-17-K and J27-A8, TB3-17-L and J27-A12. Go to paragraph 11-88.
- NO Go to step 3.

END OF TASK

11-93. CPG STAB DEG/NOM SPD PLACARD PANEL EDGE-LIGHT – DOES NOT LIGHT

11-93

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

3. Check for short between P692–HI and ground.
Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire.
Go to paragraph 11-88. |
| NO | Go to step 4. |

4. Check for open between P692–LO and (A326)TB1-40-C.
Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Troubleshoot CPG edge lights
TM 1-1520-238-T-6. |



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P692 from (DS162)J692.
Check for 5 VDC between P692–HI and P692–LO.

Is voltage present?

- | | |
|-----|---|
| YES | Replace CPG STAB DEG/NOM SPD placard panel (DS162) (TM 1-1520-238-23). |
| NO | Go to step 2. |

2. On **CPG INTR LT** panel, rotate **INTR CONTROL** switch CCW to **OFF**.

Check for open between P692–HI and (A326)TB1-41-C.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 3. |

END OF TASK

11-94. PILOT STAB DEG/NOM SPD PLACARD PANEL EDGE-LIGHT – DOES NOT LIGHT

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

3. Check for short between P691-HI and ground.

Does short exist?

YES	Repair shorted wire. Go to paragraph 11-88.
NO	Go to step 4.

4. Check for open wire between P691-LO and (A326)TB1-34-J.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Troubleshoot pilot edge lights (TM 1-1520-238-T-6).

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P691 from (DS162)J691.
Check for 5 VDC between P691-HI and P691-LO.

Is voltage present?

YES	Replace pilot STAB DEG/NOM SPD placard panel (DS162) (TM 1-1520-238-23).
NO	Go to step 2.

2. On pilot **EXT LT/INTR LT** panel, rotate **INST** control CCW to **OFF**.
Check for open between P691-HI and (A326)TB1-33-J.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 3.

END OF TASK

11-95. CPG STAB POS INDICATOR EDGE-LIGHT – DOES NOT LIGHT

11-95

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

3. Check for short between P982-F and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire.
Go to paragraph 11-88. |
| NO | Go to step 4. |

4. Check for open between P982-G and (A326)TB1-40-B.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Troubleshoot CPG edge lights (TM 1-1520-238-T-6) |

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P982 from (M52)J1.
Check for 5 VDC between P982-F and P982-G.
Is voltage present?

- | | |
|-----|---|
| YES | Replace CPG STAB POS indicator (M52) (TM 1-1520-238-23). |
| NO | Go to step 2. |

2. On CPG **INTR LT** panel rotate **INST** control CCW to **OFF**.
Check for open between P982-F and (A326)TB1-41-B.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 3. |

END OF TASK

11-96. PILOT STAB POS INDICATOR EDGE-LIGHT – DOES NOT LIGHT

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

3. Check for short between:

P981-F and ground,
(A326)TB1-31-G and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire.
Go to paragraph 11-88. |
| NO | Go to step 4. |

4. Check for open between P981-G and (A326)TB1-32-G.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Troubleshoot pilot edge lights (TM 1-1520-238-T-6). |

1. Detach P981 from (M51)J1.
Check for 5 VDC between P981-F and P981-G.
Is voltage present?

- | | |
|-----|---|
| YES | Replace pilot STAB POS indicator (M51) (TM 1-1520-238-23). |
| NO | Go to step 2. |

2. On pilot **EXT LT/INTR LT** panel, rotate **INST** control CCW to **OFF**.

Check for open between P981-F and (A326)TB1-31-G.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 3. |

END OF TASK

11-97. STAB AUTO DC CIRCUIT BREAKER – DOES NOT STAY CLOSED

11-97

Tools:

Nomenclature	Part Number
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer

References:

- TM 1-1520-238-T-6
- TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2 and **ENG WARN** (A76)CB52 circuit breakers. Detach P2 from (A402)J2. Check for short between (A402)P2-f and ground.
Does short exist?
 - YES Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc essential bus 3 – pilot station).
 - NO Go to step 2.
- Detach (A402): P427 from J28, P431 from J27. Check for short between J2-f and ground.
Does short exist?
 - YES Repair shorted wire between: TB2-22-A and J2-f, TB2-22-C and J27-B11, TB2-22-D and J27-B9, TB2-22-E and J28-C, TB2-22-F and J28-D. Go to paragraph 11-88.
 - NO Go to step 3.

- Check for short between P431-B9 and ground.
Does short exist?
 - YES Go to step 4.
 - NO Go to step 5.
- Detach P989 from (A638)J1. Check for short between P431-B9 and ground.
Does short exist?
 - YES Repair shorted wire between P989-E and P431-B9. Go to paragraph 11-88.
 - NO Replace **STAB CONT UNIT 2** (A638) (TM 1-1520-238-23).
- Check for short between P431-B11 and ground.
Does short exist?
 - YES Go to step 6.
 - NO Go to step 7.
- Detach P985 from (A637)J1. Check for short between P431-B11 and ground.
Does short exist?
 - YES Repair shorted wire between P985-E and P431-B11. Go to paragraph 11-88.
 - NO Replace **STAB CONT UNIT 1** (A637) (TM 1-1520-238-23).
- Detach P485 from (A323)J7. Check for short between P427-D and ground.
Does short exist?
 - YES Repair shorted wire between P485-E and P427-D. Go to paragraph 11-88.
 - NO Go to step 8.

11-97. STAB AUTO DC CIRCUIT BREAKER – DOES NOT STAY CLOSED (cont)

- | | |
|---|--|
| <p>8. Check for short between (A323):
J7-E and ground,
J7-K and ground.
Does short exist?</p> <p>YES Repair shorted wire (A323):
 J7-E and XK1/2-B2,
 J7-K and XK1/2-B1.
 Go to paragraph 11-88.</p> <p>NO Go to step 9.</p> <p>9. Check for short between P485-K and ground.
Does short exist?</p> <p>YES Go to step 10.</p> <p>NO Go to step 11.</p> <p>10. Detach P985 from (A637)J1.
Check for short between P485-K and ground.
Does short exist?</p> <p>YES Repair shorted wire between
 P985-G and P485-K.
 Go to paragraph 11-88.</p> <p>NO Replace STAB CONT UNIT 1
 (A637)
 (TM 1-1520-238-23).</p> <p>11. Detach P485 from (A323)J7.
Check for short between P427-C and ground,
Does short exist?</p> <p>YES Repair shorted wire between
 P485-L and P427-C.
 Go to paragraph 11-88.</p> <p>NO Go to step 12.</p> <p>12. (AAT) Check for short between (A323)J7-L and
ground.
Does short exist?</p> <p>YES Repair shorted wire between
 (A323)TB2-3-C and
 (A323)J6-B12.
 Go to paragraph 11-88.</p> <p>NO Go to step 13.</p> | <p>13. Check for short between (A323)J7-L and
ground.
Does short exist?</p> <p>YES Repair shorted wire between
 (A323):
 J7-L and TB2-3-A,
 TB2-3-B and J7-T,
 TB2-3-E and J7-U,
 TB2-3-D and J7-V.
 Go to paragraph 11-88.</p> <p>NO Go to step 14.</p> <p>14. (AAT)Detach P1077 from (A329)J1.
Check for short between P491-B12 and ground.
Does short exist?</p> <p>YES Repair shorted wire between
 P491-B12 and P1077-D.
 Go to paragraph 11-88.</p> <p>NO Go to step 15.</p> <p>15. Detach P1077 from (A329)J1.
Check for short between:
P485-T and ground,
P485-U and ground,
P485-V and ground.
Does short exist?</p> <p>YES Repair shorted wire between:
 P485-T and P1077-A,
 P485-U and P1077-C,
 P485-V and P1077-a.
 Go to paragraph 11-88.</p> <p>NO Go to step 16.</p> <p>16. (AAT)Check for short between (A329)J1-a and
ground.
Does short exist?</p> <p>YES Repair shorted wire between
 (A329)J1-D and
 (A329)XK1-6-X1.
 Go to paragraph 11-88.</p> <p>NO Go to step 17.</p> |
|---|--|

11-97. STAB AUTO DC CIRCUIT BREAKER – DOES NOT STAY CLOSED (cont)

11-97

17. Check for short between (A329):

J1-a and ground,
J1-n and ground,
J1-C and ground,
J1-A and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between (A329):
J1-A and XK1-7-X1,
J1-C and XK1-8-X1,
J1-a and XK1-1/2-B2,
XK1-1/2-B1 and J1-n,
or replace: APPROACH 1
LIGHT relay (K1-7) or
AUTO/MAN PWR relay
(K1-1/2) or APPROACH 2
AUDIO relay (K1-8).
Go to paragraph 11-88. |
| NO | Go to step 18. |

18. Detach P989. Check for short between P1077-n and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between P989-G and P1077-n.
Go to paragraph 11-88. |
| NO | Replace STAB CONT UNIT 2
(A638)
(TM 1-1520-238-23). |

END OF TASK

11-98. STABILATOR – DOES NOT MOVE EITHER UP OR DOWN OR STAB MAN DC CIRCUIT BREAKER – DOES NOT STAY CLOSED

11-98

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L325 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO AC** (A76)CB2, and **STAB AUTO DC** (A76)CB3 circuit breakers. Detach P1077 from (A3129)J1. Check for open between (A329)TB1-3-L and (A329)J1-S.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 2. |

2. Detach P991 from (A638)J3. Check for open between P1077-S and P991-R.
Does open exist?
YES Repair open wire.
Go to paragraph 11-88.
NO Go to step 3.
3. Detach P991 from (A638)J3. Check for open between P1077-S and P991-R.
Does open exist?
YES Repair open wire.
Go to paragraph 11-88.
NO Go to step 4.
4. Check for open between P987-S and P1077-G.
Does open exist?
YES Repair open wire.
Go to paragraph 11-88.
NO Go to step 5.
5. Check for open between (A329)J1-G and (A329)XK1-3/4-X1.
Does open exist?
YES Repair open wire.
Go to paragraph 11-88.
NO Go to step 6.

**11-98. STABILATOR – DOES NOT MOVE EITHER UP OR DOWN OR STAB MAN DC CIRCUIT
BREAKER – DOES NOT STAY CLOSED (cont)**

11-98

6. Detach P1077 from (A329)J1.

Check for short between:

P991-S and ground,

P987-S and ground,

(A329)J1-G and ground,

(A329)TB1-1/2-A and ground.

Does short exist?

YES Repair shorted wire between:
 P991-S and P987-R,
 P987-S and P1077-G,
 (A329)J1-G and
 (A329)XK1-3/4-X1,
 (A329)XK1-3/4-D2 and
 (A329)TB1-1/2-A.
 Go to paragraph 11-88.

NO Go to step 7.

7. Check for open between (A329)XK1-3/4-X2
and (A329)XK1-6-B3.**Does open exist?**

YES Repair open wire.
 Go to paragraph 11-88.

NO Replace **AUTO RESET** relay
 (A329)K1-6, or
 MAN MODE LOCK SELECT
 relay (A329)K1-3/4, or
 STAB CONT UNIT 1 (A637), or
 STAB CONT UNIT 2
 (TM 1-1520-238-23).

END OF TASK

11-99. MAN STAB INDICATOR – DOE NOT REMAIN LIGHTED WHEN ND/NU SWITCH IS RELEASED

11-99

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L325 door open

3. Set multimeter for diode check. Attach positive meter lead on wire end at (A329)TB1-1/2-A. Check for open between (A329)TB1-1/2-A and (A329)TB1-1/2-F.

Does open exist?

YES Replace terminal board (A329)TB1-1/2 (TM 1-1520-238-23).

NO Go to step 4.

4. Check for open between (A329)TB1-5-C and (A329)XK1-3/4-D1.

Does open exist?

YES Repair open wire. Go to paragraph 11-88.

NO Replace **MAN SELECT** relay (A329)K1-3/4.



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6 , **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Check for open between (A329)XK1-3/4-D2 and wire ends at (A329)TB1-1/2-a.

Does open exist?

YES Repair open wire. Go to paragraph 11-88.

NO Go to step 2.

2. Check for open between (A329)TB1-1/2-F and (A329)TB1-3-B.

Does open exist?

YES Repair open wire. Go to paragraph 11-88.

NO Go to step 3.

END OF TASK

11-100. PILOT AND/OR CPG STAB POS INDICATORS – DO NOT INDICATE FULL NOSE UP POS (9 ±2°), FULL DOWN (35 ±2°), OR OFF FLAG APPEARS 11-100

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L325 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 115 VAC at (A76)P1-37.

Is voltage present?

YES Go to step 2.

NO Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (ac essential bus 1– pilot station).

2. Open **STAB MAN AC** (A76)CB7 circuit breaker. Check for open between: (A402)J1-37 and T3-1, (A402)T3-2 and GS9-H, P962-H and GS-263-A, P961-H and GS433-E, P1076-D and GS89-F.

Does open exist?

YES Repair open wire. Go to paragraph 11-88.

NO Go to step 3.

3. Close **STAB MAN AC** (A76)CB7 circuit breaker. Detach P441 from (A402)J24. Check for 26 VAC between (A402): J24-B20 and J24-B19.

Is voltage present?

YES Go to step 4.

NO Repair open wire between (A402): T3-3 and TB3-17-N, TB3-17-S and J24-B19, T3-5 and TB3-17-T, TB3-17-W and J24-B20, TB3-17-Z and GS9-G. Go to paragraph 11-88, or replace transformer (A402)T3 (TM 1-1520-238-23).

11-100. PILOT AND/OR CPG STAB POS INDICATORS – DO NOT INDICATE FULL NOSE UP POS (9 ±2°), FULL DOWN (35 ±2°), OR OFF FLAG APPEARS (cont)

11-100

4. Attach P441 to (A402)J24. Detach P413 from (A326)J10.
Check for 26 VAC between P413-B10 and P413-B11.

Is voltage present?

- YES Go to step 5.
- NO Repair open wire between: P413-B10 and P441-B19, P413-B11 and P441-B20. Go to paragraph 11-88.

5. Attach P413 to (A326)J10. Detach P981 from (M51)J1.
Check for 26 VAC between P981-D and P981-E.

Is voltage present?

- YES Go to step 6.
- NO Repair open wire between: P981-D and P413-B17, (A326)J10-B17 and (A326)TB1-17-T, (A326)TB1-17-Y and (A326)J10-B10, P981-E and P413-B18, (A326)J10-B18 and (A326)TB1-17-R, (A326)TB1-17-R and (A326)J10-B11. Go to paragraph 11-88.

6. Detach P982 from (M52)J1.
Check for 26 VAC between J1076-E and J1076-F.

Is voltage present?

- YES Go to step 7.
- NO Repair open wire between: P982-D and P472-A8, (A326)J15-A8 and (A326)TB1-17-W, J1076-F and P431-A17, (A402)J27-A17 and (A402)TB3-17-Y. Go to paragraph 11-88.

7. Detach (MT19)P1076 from J1076.
Check for 26 VAC between J1076-E and J1076-F.

Is voltage present?

- YES Go to step 8.
- NO Repair open wire between: P1076-E and P431-A16, (A402)J27-A16 and (A402)TB3-17-R, P1076-F and P431-A17, P431-A17 and (A4023)TB3-17-Y. Go to paragraph 11-88.

11-100. PILOT AND/OR CPG STAB POS INDICATORS – DO NOT INDICATE FULL NOSE UP POS (9 ±2°), FULL DOWN (35 ±2°), OR OFF FLAG APPEARS (cont)

8. Attach (MT19)P1076 to J1076. Detach P473 from (A326)J6.
 Check for 4 VAC minimum between:
 P473-A15 and P473-A16,
 P473-A15 and P473-A17,
 P473-A16 and P473-A17.

Is voltage present?

YES Go to step 9.

NO Repair open wire between:
 J1076-A and P473-A15,
 J1076-B and P473-A16,
 J1076-C and P473-A17.
 Go to paragraph 11-88.

9. Attach P473 to (A326)J6. Detach P982 from (M52)J1.
 Check for 4 VAC minimum between:
 P982-A and P982-B,
 P982-A and P982-C,
 P982-B and P982-C.

Is voltage present?

YES Go to step 10.

NO Repair open wire between:
 P982-A and P472-A13,
 P982-B and P472-A14,
 P982-C and P472-A15,
 (A326)J15-A13 and
 (A326)TB1-13-A,
 (A326)J15-A14 and
 (A326)TB1-13-D,
 (A326)J15-A15 and
 (A326)TB1-13-G,
 (A326)TB1-13-C and
 (A326)J6-A15,
 (A326)TB1-13-F and
 (A326)J6-A16,
 (A326)TB1-13-J and
 (A326)J6-A17.
 Go to paragraph 11-88.

10. Attach P982 to (M52)J1. Detach P981 from (M51)J1.
 Check for 4 VAC minimum between:
 P981-A and P981-B,
 P981-A and P981-C,
 P981-B and P981-C.

Move stabilator slightly to observe sine wave voltage. Use collective NU and ND switch.

Is voltage present?

YES Go to step 11.

NO Repair open wire between:
 P981-A and P413-B2,
 P981-B and P413-B3,
 P981-C and P413-B4,
 (A326)J10-B2 and
 (A326)TB1-13-B,
 (A326)J10-B3 and
 (A326)TB1-13-E,
 (A326)J10-B4 and
 (A326)TB1-13-H.
 Go to paragraph 11-88.

11. Does **STAB POS** indicator track stabilator position?

YES Replace CPG **STAB POS** indicator (M52) (TM 1-1520-238-23).

NO Replace pilot **STAB POS** indicator (M51) (TM 1-1520-238-23).

END OF TASK

**11-101. ND/NU SWITCH SET TO NU – TOP PISTON FAILS TO MOVE STABILATOR
(BOTTOM STAB ACTUATOR EXTENDS FULLY)**

11-101

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L325 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P995 from (L46)J995. Momentarily press pilot collective **NU/ND** switch to **NU**. Check for 28 VDC between P995–J(HI) and P995–K(LO).
Is voltage present?

YES	Replace top STAB ACTUATOR (L46) (TM 1-1520-238-23).
NO	Go to step 2.

2. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach P427 from (A402)J28.

Check for open between (A402):
TB2–24–E and J28–F.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
-----	---

NO	Go to step 3.
----	---------------

3. Detach P485 from (A323)J7. Check for open between P427–F and P485–P.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
-----	---

NO	Go to step 4.
----	---------------

4. Check for open between (A323):
J7–P and XK1–3–B1.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
-----	---

NO	Go to step 5.
----	---------------

5. Check for open between (A323):
XK1–3–B2 and J7–M.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
-----	---

NO	Go to step 6.
----	---------------

6. Detach P1077 from (A329)J1. Check for open between P485–M and P1077–c.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
-----	---

NO	Go to step 7.
----	---------------

**11-101. ND/NU SWITCH SET TO NU – TOP PISTON FAILS TO MOVE STABILATOR
(BOTTOM STAB ACTUATOR EXTENDS FULLY) (cont)**

11-101

- | | |
|---|--|
| <p>7. Check for open between (A329):
J1-c and XK1-1/2-A3.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-88.</p> <p>NO Go to step 8.</p> | <p>13. Check for open between (A329):
XK1-5-B3 and TB1-4-D.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-88.</p> <p>NO Replace AUTO/MAN PWR relay
(A329)K1-1/2,
 or MAN CONT NOSE DOWN
 relay (A329)K1-5 relay, or
 MAN CONT NOSE UP relay
(A323)K1-3 relay
(TM 1-1520-238-23).</p> |
| <p>8. Check for open between (A329):
XK1-1/2-A2 and J1-f.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-88.</p> <p>NO Go to step 9.</p> | |
| <p>9. Check for open between P1077-f and P995-J.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-88.</p> <p>NO Go to step 10.</p> | |
| <p>10. Check for open between P1077-g and P995-K.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-88.</p> <p>NO Go to step 11.</p> | |
| <p>11. Check for open between (A329):
J1-g and XK1-1/2-C2.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-88.</p> <p>NO Go to step 12.</p> | |
| <p>12. Check for open between (A329):
XK1-1/2-C3 and XK1-5-B2.
Does open exist?</p> <p>YES Repair open wire.
 Go to paragraph 11-88.</p> <p>NO Go to step 13.</p> | |

END OF TASK

11-102. ND/NU SET TO NU – BOTTOM PISTON FAILS TO MOVE STABILATOR (TOP STABILATOR ACTUATOR EXTENDS FULLY) 11-102

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L325 door open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P996 from (L46)J998. Momentarily press pilot collective **NU/ND** switch to **NU**. Check for 28 VDC at P996–J(HI) and P996–K(LO).
Is voltage present?

- | | |
|-----|---|
| YES | Replace bottom STAB ACTUATOR (L46) (TM 1-1520-238-23). |
| NO | Go to step 2. |

2. Open **STAB MAN DC** (A76)CB6 , **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach P427 from (A402)J28. Check for open between (A402): TB2–24–D and J28–E.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–88. |
| NO | Go to step 3. |

3. Detach P485 from (A323)J7. Check for open between P427–E and P485–N.
Is voltage present?

- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–88. |
| NO | Go to step 4. |

4. Check for open between (A323): J7–N and XK1–3–A1.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–88. |
| NO | Go to step 5. |

5. Check for open between (A323): XK1–3–A2 and XK1–1/2–A3.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–88. |
| NO | Go to step 6. |

6. Check for open between (A323): XK1–1/2–A2 and J7–F.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–88. |
| NO | Go to step 7. |

7. Check for open between P485–F and P996–J.
Does open exist?

- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–88. |
| NO | Go to step 8. |

8. Check for open between P996–K and P485–A.
Does open exist?

- | | |
|-----|--|
| YES | Repair open wire. Go to paragraph 11–88. |
| NO | Go to step 9. |

11-102. ND/NU SET TO NU – BOTTOM PISTON FAILS TO MOVE STABILATOR (TOP STABILATOR ACTUATOR EXTENDS FULLY) (cont)

9. Check for open between (A323):
J7-A and XK1-1/2-C2.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 10. |
10. Check for open between (A323):
XK1-1/2-C3 and J7-S.
Does open exist?
- | | |
|-----|--|
| YES | Replace open wire.
Go to paragraph 11-88. |
| NO | Go to step 11. |
11. Detach P1077 from (A329)J1.
Check for open between P485-S and P1077-b.
Does open exist?
- | | |
|-----|--|
| YES | Replace open wire.
Go to paragraph 11-88. |
| NO | Go to step 12. |
12. Check for open between (A329):
J1-b and XK1-5-A2.
Does open exist?
- | | |
|-----|--|
| YES | Replace open wire.
Go to paragraph 11-88. |
| NO | Go to step 13. |
13. Check for open between (A329):
XK1-5-A3 and TB1-4-F.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Replace MAN CONT NOSE UP relay (A323)K1-3, or AUTO MAN PWR relay (A323)K1-1/2, or MAN CONT NOSE DOWN relay (A329)K1-5 (TM 1-1520-238-23). |

END OF TASK

Paragraph 11-103 and all data on pages 11-393 and 11-394 deleted.

**11-104. PILOT STAB POS INDICATOR – DOES NOT INDICATE 25 ± 2° WHEN RESET
PUSHBUTTON IS PRESSED**

11-104

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L325, T290R and T290L doors open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.

Detach:

P491 from (A323)J6,
P987 from (A637)J3.

Check for open between:

(A323)TB2-2-D and (A323)J6-A19,
P491-A19 and P987-F.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 2. |

2. Set multimeter to diode check.
Attach negative meter lead on wire end at (A402)TB2-26/27-P.

Check for continuity between (A402):
TB2-26/27-N and TB2-26/27-P.

Does continuity exist?

- | | |
|-----|---|
| YES | Go to step 3. |
| NO | Repair open wire.
Go to paragraph 11-88, or
replace (A402) diode
(TM 1-1520-238-23). |

3. Detach P431 from (A402)J27.
Check for open between (402):
TB7-26/27-N and J27-A5.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 4. |

4. Detach P991 from (A638)J3. Check for open between P431-A5 and P991-F.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Replace STAB CONT UNIT 1 (A637) or
STAB CONT UNIT 2 (A638)
(TM 1-1520-238-23). |

END OF TASK

Paragraph 11-105 and all data on pages 11-397 and 11-398 deleted.

11-395/(11-396 blank)

11-106. SCU 1 NO-GO LH CATWALK – APPEARS ON HOD (AAC)

11-106

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-4
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – electrical power distribution box cover removed
TM 1-1520-238-T-4	Maintenance headset connected

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.

Detach:

P682 from (A705)J3,
P986 from (A637)J2,
P987 from (A637)J3.

Check for open between:

P682-50 and P987-K,
P682-49 and P987-V,
P682-48 and P987-X,
P431-A18 and P986-W,
(A402)TB2-29-D and (A402)J27-A18,
(A402)TB2-29-B and (A402)J27-A16.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 2.

2. Check for short between:
P987-K and ground,
P987-V and ground,
P987-X and ground.

Does short exist?

YES	Repair shorted wire. Go to paragraph 11-88.
NO	Go to step 3.

3. Check for open between P682-64 and ground.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 4.

4. Detach P686 from (A707)J2.

Check for open between:

P987-E and P686-8,
P987-G and P686-7.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 5.

5. Check for short between:

P987-E and ground,

P987-G and ground.

Does short exist?

YES Repair shorted wire.
 Go to paragraph 11-88.

NO Go to step 6.

6. Check for open between:

P686-1 and ground,

P686-6 and ground.

Does open exist?

YES Repair open wire.
 Go to paragraph 11-88.

NO Replace **STAB CONT UNIT 1**
 (A637)
 (TM 1-1520-238-23).

END OF TASK

11-107. SCU 2 NO-GO LH CATWALK – APPEARS ON HOD (AAC)

11-107

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L200 cover removed and L295 and L325 doors open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.

Detach:

P682 from (A705)J3,
P990 from (A638)J2,
P991 from (A638)J3.

Check for open between:

P682-62 and P991-X,
P682-61 and P991-V,
P682-60 and P991-K,
P431-A4 and P990-W,
(A402)TB2-29-C and (A402)J27-A4.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 2. |

2. Check for short between:
P991-X and ground,
P991-V and ground,
P991-K and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire.
Go to paragraph 11-88. |
| NO | Go to step 3. |

3. Check for open between P682-64 and ground.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 4. |

4. Detach P686 from (A707)J2.

Check for open between:
P991-E and P686-3,
P991-G and P686-35.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 5. |

5. Check for short between:

P991-E and ground,
P991-G and ground.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 6. |

6. Check for open between:

P686-2 and ground,
P686-34 and ground.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Replace STAB CONT UNIT 2 (A638) (TM 1-1520-238-23). |

END OF TASK

11-108. AIRSPEED TRANSDUCER 2 NO-GO RH XMSN BAY – APPEARS ON HOD

11-108

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R200 panel removed and R295, L235, T290L and T290R doors open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.
Detach:
P497 from (A323)J3,
P682 from (A69)J3.
Check for open between:
(A323)TB1-5-F and (A323)J3-B9,
P497-B9 and P682-127,
(A323)TB1-5-M and (A323)J3-B10,
P497-B10 and P682-126.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Replace AIRSPEED TRANSDUCER 2 (MT18) (TM 1-1520-238-23).

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R200 panel removed and R295 and L325 doors open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.

Detach:

P497 from (A323)J3,

P682 from (A69)J3.

Check for open between:

(A323)TB3-1-F and (A323)J3-B3,

P497-B3 and P682-116,

(A323)TB3-1-M and (A323)J3-B4,

P497-B4 and P682-115.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Replace **AIRSPEED TRANSDUCER 1** (MT18) (TM 1-1520-238-23).

END OF TASK

11-110. RATE GYRO 2 NO-GO RH AFT CATWALK – APPEARS ON HOD

11-110

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L325, T325, T290L T290R, T250L and T250R doors open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach J998 from (A640)P1.
Close **STAB AUTO AC** circuit breaker (A76)CB2.
Check for 26 VAC between:
J998-1 and J998-3,
J998-2 and J998-3.
Is voltage present?
YES Go to step 2.
NO Go to step 5.

2. Detach J998 from (A640)P1.
Check for 26 VAC between J998-4 and J998-5.
Is voltage present?
YES Go to step 7.
NO Go to step 3.

3. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.
Detach J998 from (A640)P1.
Check for open between:
P991-L and J998-4,
P991-M and J998-5.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 4. |

4. Detach P991 from (A638)J3.
Check for short between:
J998-4 and ground,
J998-5 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between:
J998-4 and P919-B2,
J919-B2 and P992-L,
J998-5 and P919-B1,
J919-B1 and P992-M,
Go to paragraph 11-88. |
| NO | Replace STAB CONT UNIT 2 (A638) (TM 1-1520-238-23). |

11-110. RATE GYRO 2 NO-GO RH AFT CATWALK – APPEARS ON HOD (cont)

11-110

5. Open **STAB AUTO AC** (A76)CB2 circuit breaker.
Detach J998 from (A640)P1.

Check for open between:
P991-H and J998-1,
P991-P and J998-2.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Go to step 6.

6. Detach P991 from (A638)J3.

Check for short between:
J998-1 and ground,
J998-2 and ground.

Does short exist?

YES Repair shorted wire between:
J998-1 and P919-B6,
J919-B-6 and P992-H,
J998-2 and P919-B5,
J919-B5 and P992-P.
Go to paragraph 11-88.

NO Replace **STAB CONT UNIT 2**
(A638) (TM 1-1520-238-23).

7. Open **STAB AUTO AC** (A76)CB2 circuit breaker.

Check for open between:
J998-6 and ground,
J998-9 and P991-W,
J998-3 and P991-N
J998-6 and GS-631-F.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Go to step 8.

8. Detach P991 from (A638)J3. Check for short between J998-9 and ground.

Does short exist?

YES Repair shorted wire between:
J998-9 and P919-B3,
J919-B3 and P991-W.
Go to paragraph 11-88.

NO Go to step 9.

9. Check for short between J998-7 and ground.
Does short exist?

YES Go to step 10.

NO Go to step 12.

10. Detach P990 from (A638)J2.
Check for short between J998-7 and ground.

Does short exist?

YES Go to step 11.

NO Replace **STAB CONT UNIT 2**
(A638) (TM 1-1520-238-23).

11. Detach P682 from (A69)J3.
Check for short between J998-7 and ground.

Does short exist?

YES Repair shorted wire between:
J998-7 and P498-A18
(A323)J1-A18 and
(A323)TB1-7-L,
(A323)TB1-7-M and
(A323)J3-B12,
P497-B12 and P682-123,
(A323)TB1-7-J and
(A323)J2-B16,
P494-B16 and P990-B.
Go to paragraph 11-88.

NO Replace **DASEC** (A69)
(TM 1-1520-238-23).

12. Check for open between:
J998-7 and P498-A18,
(A323)TB1-7-M and P682-123,
J998-8 and P498-A19,
(A323)TB1-7-P and P682-122,
(A323)J1-A18 and (A323)TB1-7-L,
(A323)J1-A19 and (A323)TB1-7-N,
(A323)TB1-7-J and (A323)J2-B16,
(A323)TB1-7-R and (A323)J2-B17,
P494-B16 and P990-B,
P494-B17 and P990-A.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Replace **RATE GYRO 2** (A640)
(TM 1-1520-238-23).

END OF TASK

11-111. RATE GYRO 1 NO-GO LH AFT CATWALK – APPEARS ON HOD

11-111

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R295 and L325 doors open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach J997 from (A639)P1.
Close **STAB AUTO AC** circuit breaker (A76)CB2.
Check for 26 VAC between:
J997-1 and J997-3,
J997-2 and J997-3.
Is voltage present?

YES	Go to step 2.
NO	Go to step 5.

2. Detach J997 from (A639)P1.
Check for 26 VAC between P997-4 and P997-5.
Is voltage present?

YES	Go to step 7.
NO	Go to step 3.

3. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.
Detach J997 from (A639)P1.
Check for open between:
P987-L and J997-4,
P987-M and J997-5.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 4. |

4. Detach P987 from (A637)J3.
Check for short between:
J997-4 and ground,
J997-5 and ground.

Does short exist?

- | | |
|-----|--|
| YES | Repair shorted wire between:
J997-4 and P987-L,
J997-5 and P987-M.
Go to paragraph 11-88. |
| NO | Replace STAB CONT UNIT 1 (A637) (TM 1-1520-238-23). |

5. Open **STAB AUTO AC** (A76)CB2 circuit breaker.
Detach J997 from (A639)P1.
Check for open between:
P987-H and J997-1,
P987-P and J997-2.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 6. |

11-111. RATE GYRO 1 NO-GO LH AFT CATWALK – APPEARS ON HOD (cont)

11-111

6. Detach P987 from (A637)J3. Check for short between:

J997-1 and ground,
J997-2 and ground.

Does short exist?

YES Repair shorted wire between:
J997-1 and P987-H,
J997-2 and P987-P.
Go to paragraph 11-88.

NO Replace **STAB CONT UNIT 1**
(A637) (TM 1-1520-238-23).

7. Open **STAB AUTO AC** (A76)CB2 circuit breaker.

Check for open between:

J997-9 and P987-W,
J997-3 and P987-N,
J997-6 and GS652-A.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Go to step 8.

8. Detach P987 from (A637)J3. Check for short between J997-9 and ground.

Does short exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Go to step 9.

9. Check for short between J997-7 and ground.

Does short exist?

YES Go to step 10.

NO Go to step 12.

10. Detach P986 from (A637)J2.

Check for short between J997-7 and ground.

Does short exist?

YES Go to step 11.

NO Replace **STAB CONT UNIT 1**
(A637) (TM 1-1520-238-23).

11. Detach P682 from (A69)J3.

Check for short between J997-7 and ground.

Does short exist?

YES Repair shorted wire between:
J997-7 and P491-A15,
(A323)J6-A15 and
(A323)TB1-7-D,
(A323)TB1-7-A and
(A323)J3-B6,
P497-B6 and P682-125,
(A323)TB1-7-C and
(A323)J6-A9,
P491-A9 and P996-B.
Go to paragraph 11-88.

NO Replace **DASEC** (A69)
(TM 1-1520-238-23).

12. Check for open between:

J997-7 and P491-A15,
(A323)TB1-7-A and P682-125,
J997-8 and P491-A16,
(A323)TB1-7-H and P682-124,
(A323)J6-A15 and (A323)TB1-7-D,
(A323)J6-A16 and (A323)TB1-7-E,
(A323)TB1-7-C and (A323)J6-A9,
(A323)TB1-7-G and (A323)J6-A10,
P491-A9 and P986-B,
P491-A10 and P986-A.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Replace **RATE GYRO 1** (A639)
(TM 1-1520-238-23).

END OF TASK

11-112. TOP STAB ACTUATOR NO-GO TAIL SECTION – APPEARS ON HOD

11-112

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R545 and L545 doors open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, and **STAB AUTO AC** (A76)CB2 circuit breakers. Detach:
P682 from (A69)J3,
P497 from (A323)J3.
Check for open between:
P682-90 and P497-B19,
P682-91 and P497-B18,
(A323)J3-B19 and (A323)TB1-8-H,
(A323)J3-B18 and (A323)TB1-8-C.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Replace top STAB ACTUATOR (L46) (TM 1-1520-238-23).

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
 One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – R545 and L545 doors open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, and **STAB AUTO AC** (A76)CB2 circuit breakers. Detach:
 P682 from (A69)J3,
 P497 from (A323)J3.
 Check for open between:
 P682-88 and P497-B16,
 P682-89 and P497-B15,
 (A323)J3-B16 and (A323)TB1-8-R,
 (A323)J3-B15 and (A323)TB1-8-J.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Replace bottom STAB ACTUATOR (L46) (TM 1-1520-238-23)

END OF TASK

Paragraphs 11-114 and 11-115, and all data on pages 11-407 and 11-408 deleted

11-116. MAN STAB INDICATORS ON – AUTO MODE DOES NOT ENGAGE AND STAB POS INDICATORS DO NOT GO TO 25 ±2° ND

11-116

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23
TM 1-1520-238-T-6

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L325, T290L and T290R doors open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach P1077 from (A329)J1. Check for short between P1077-R and ground.
Does short exist?

YES	Go to step 2.
NO	Go to step 3.

2. Detach J908 from P908. Check for short between: P1077-R and ground, P908-A5 and ground.

Does short exist?

YES	Repair shorted wire. Go to paragraph 11-88.
NO	Troubleshoot pilot and CPG CAUTION/WARNING system (TM 1-1520-238-T-6).

3. Detach: P2 from (A402)J2, P427 from (A402)J28, P431 from (A402)J27, P485 from (A323)J7, P985 from (A637)J1, P989 from (A638)J1. Check for open between: **STAB AUTO DC** (A76)CB3 and P2-f, (A402)J2-f and (A402)TB2-22-A, (A402)TB2-22-D and (A402)J27-B9, (A402)TB2-22-C and (A402)J27-B11, (A402)TB2-22-E and (A402)J28-C, (A402)TB2-22-F and (A402)J28-D, P427-D and P485-E, (A323)J7-E and (A323)XK1-1/2-B2, (A323)XK1-1/2-B1 and (A323)J7-K, P485-K and P985-G, P427-C and P485-L, (A323)J7-L and (A323)TB2-3-A, (A323)TB2-3-D and (A323)J7-V, P485-V and P1077-a, (A329)J1-a and (A329)XK1-1/2-B2, (A329)XK1-1/2-B1 and (A329)J1-n, P1077-n and P989-G, P431-B9 and P989-E, P431-B11 and P985-E.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 4.

11-116. MAN STAB INDICATORS ON – AUTO MODE DOES NOT ENGAGE AND STAB POS INDICATORS DO NOT GO TO 25 ±2° ND (cont)

11-116

4. Detach:
 P1077 from (A329)J1,
 P991 from (A638)J3,
 P491 from (A323)J6,
 P986 from (A637)J2,
 P987 from (A637)J3,
 P990 from (A638)J2.
 Check for open between:
 P991-Y and P1077-T,
 (A329)J1-T and (A329)XK1-3/4-B3,
 (A329)XK1-3/4-B2 and (A329)TB1-3-F,
 (A329)TB1-3-C and (A329)J1-K,
 P1077-K and P491-B9,
 (A323)J6-B9 and (A323)XK1-1/2-X1,
 (A323)XK1-1/2-X2 and (A323)J6-B10,
 P491-B10 and P986-b,
 P987-Y and P1077-F,
 (A329)J1-F and (A329)XK1-3/4-A3,
 (A329)XK1-3/4-A2 and (A329)XK1-1/2-X1,
 (A329)XK1-1/2-X2 and (A329)J1-V,
 P1077-V and P990-b.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 5. |

5. Check for short between:
 P991-Y and ground,
 (A329)J1-T and ground,
 (A323)J6-B9 and ground,
 P1077-K and ground,
 P1077-P and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between:
P991-Y and P1077-T,
(A329)XK1-3/4-B3 and
(A329)J1-T,
(A329)XK1-3/4-B2 and
(A323)TB1-3-F,
(A329)TB1-3-C and
(A329)J1-K,
(A329)TB1-3-J and
(A329)XK1-6-A2,
(A329)XK1-6-A3 and
(A329)J1-P,
P1077-K and (A323)P491-B9,
(A323)J6-B9 and
(A323)XK1-1/2-X1,
P1077-P and P170-A1.
Go to paragraph 11-88. |
| NO | Go to step 6. |

6. Check for short between:
 P987-Y and ground,
 (A329)J1-F and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between:
P987-Y and P1077-F,
(A329)J1-F and
(A329)XK1-3/4-A3,
(A329)XK1-3/4-A2 and
(A329)XK1-1/2-X1.
Go to paragraph 11-88. |
| NO | Go to step 7. |

11-116. MAN STAB INDICATORS ON – AUTO MODE DOES NOT ENGAGE AND STAB POS INDICATORS DO NOT GO TO 25 ±2° ND (cont)

11-116

7. (ACB) Detach:

P694 from (A342)J3,

P693 from (A342)J2.

Check for open between:

P694-27 and P986-Z,

P694-28 and P986-M,

P693-19 and P990-Z,

P693-20 and P990-M.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Go to step 8.

8. (ACA) Detach:

P497 from (A323)J3,

P494 from (A323)J2.

Check for open between:

P986-Z and P497-A1,

(A323)J3-A1 and (A323)TB3-7-R,

P986-M and P497-A2,

(A323)J3-A2 and (A323)GS1-K

P990-Z and P494-B3,

(A323)J2-B3 and (A323)TB3-6-N,

P990-M and P494-B4,

(A323)J2-B4 and (A323)GS3-A.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Go to step 9.

9. Check for open between:

P985-B and GS433-C,

P985-K and GS652-D,

P985-C and GS654-B,

P985-D and GS650-E,

P985-J and GS650-G,

P989-B and GS433-G,

P989-K and GS652-E,

P989-C and GS650-D,

P989-J and GS650-F,

P989-C and GS654-C,

(AAH) P989-C and GS652-H,

(ABG) P989-D and GS652-C.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Go to step 10.

11-116. MAN STAB INDICATORS ON – AUTO MODE DOES NOT ENGAGE AND STAB POS INDICATORS DO NOT GO TO 25 ±2° ND (cont)

10. Detach:
 P1 from (A402)J1,
 P497 from (A323)J3,
 P494 from (A323)J2.
 Check for open between:
 P987-Z and P497-A6,
 (A323)J3-A6 and (A323)TB1-8-D,
 (A323)TB1-8-A and (A323)J2-B1,
 P494-B1 and P990-a,
 P987-c and P497-A7,
 (A323)J3-A7 and (A323)TB1-8-E,
 (A323)TB1-8-F and (A323)J2-B2,
 P494-B2 and P990-c,
 P986-a and P497-A9,
 (A323)J3-A9 and (A323)TB1-8-M,
 (A323)TB1-8-L and (A323)J2-B6,
 P494-B6 and P991-Z,
 P986-c and P497-A10,
 (A323)J3-A10 and (A323)TB1-8-P,
 (A323)TB1-8-N and (A323)J2-B5,
 P494-B5 and P991-c,
STAB AUTO AC circuit breaker (A76)CB2 and
 P1-36,
 (A402)J1-36 and (A402)TB3-17-J,
 (A402)TB3-17-K and (A402)J27-A8,
 (A402)TB3-17-L and (A402)J27-A12,
 P431-A8 and P989-A,
 P431-A12 and P985-A.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 11. |

11. Detach:
 P990 from (A638)J2,
 P991 from (A638)J3,
 P986 from (A637)J2,
 P987 from (A637)J3.
 Check for short between:
 P991-Z and ground,
 P987-Z and ground.
Does short exist?
- | | |
|-----|----------------|
| YES | Go to step 12. |
| NO | Go to step 13. |

12. Detach P682 from (A69)J3.
 Check for short between:
 P991-Z and ground,
 P987-Z and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire between:
P991-Z and P986-a,
P987-Z and P990-a,
(A323)TB1-8-J and P682-89,
(A323)TB1-8-C and P682-91.
Go to paragraph 11-88. |
| NO | Replace DASEC (A69)
(TM 1-1520-238-23). |

13. Detach P1077 from (A329)J1. Remove
 (A329)K1-1/2.
 Check for short between (A329)J1-R and
 ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire between:
(A329)J1-R and
(A329)XK1-7-B3,
(A329)XK1-7-B2 and
(A329)TB1-3-D,
(A329)TB1-3-G and
(A329)XK1-1/2-D2,
(A329)TB1-3-A and
(A329)J1-J.
Go to paragraph 11-88. |
| NO | Go to step 12. |

14. Detach:
 P1077 from (A329)J1,
 P491 from (A323)J6. Remove (A323)K1-1/2.
 Check for short between:
 P1077-J and ground,
 (A323)J6-B11 and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire. Go to
paragraph 11-88. |
| NO | Go to step 15. |

11-116. MAN STAB INDICATORS ON – AUTO MODE DOES NOT ENGAGE AND STAB POS INDICATORS DO NOT GO TO 25 ±2° ND (cont)

11-116

15. Detach :
 P991 from (A638)J3,
 P987 from (A637)J3,
 P996 from (L46)J996,
 P995 from (L46)J995.
 Check for open between:
 P991-T and P996-A,
 P991-A and P996-D,
 P991-B and P996-C,
 P987-T and P995-A,
 P987-A and P995-D,
 P987-B and P995-C.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 16. |

16. Detach:
 P989 from (A638)J1,
 P985 from (A637)J1,
 P485 from (A323)J7,
 P1077 from (A329)J1.
 Check for open between:
 P989-M and P485-H,
 (A323)J7-H and (A323)XK1-1/2-A1,
 P989-L and P485-J,
 (A323)J7-J and (A323)XK1-1/2-C1,
 P985-M and P1077-d,
 P985-L and P1077-e,
 (A329)J1-e and (A329)XK1-1/2-C1,
 (A329)J1-d and (A329)XK1-1/2-A1.
Does open exist?
- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 17. |

17. Detach P991 from (A638)J3.
 Check for short between:
 P991-T and ground,
 P991-A and ground,
 P991-B and ground.
Does short exist?
- | | |
|-----|----------------|
| YES | Go to step 18. |
| NO | Go to step 19. |

18. Detach P996 from (L46)J996.
 Check for short between:
 P991-T and ground,
 P991-A and ground,
 P991-B and ground.
Does short exist?
- | | |
|-----|---|
| YES | Repair shorted wire.
Go to paragraph 11-88. |
| NO | Replace bottom STAB ACTUATOR (L46) (TM 1-1520-238-23). |

19. Detach P987 from (A637)J3.
 Check for short between:
 P987-T and ground,
 P987-A and ground,
 P987-B and ground.
- | | |
|-----|----------------|
| YES | Go to step 20. |
| NO | Go to step 21. |

20. Detach P995 from (L46)J995.
 Check for short between:
 P987-T and ground,
 P987-A and ground,
 P987-B and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire.
Go to paragraph 11-88. |
| NO | Replace top STAB ACTUATOR (L46) (TM 1-1520-238-23). |

21. Detach P991 from (A638)J3.
 Check for short between:
 P991-D and ground,
 P991-U and ground.
Does short exist?
- | | |
|-----|----------------|
| YES | Go to step 22. |
| NO | Go to step 23. |

**11-116. MAN STAB INDICATORS ON – AUTO MODE DOES NOT ENGAGE AND STAB POS
INDICATORS DO NOT GO TO 25 ±2° ND (cont)**

11-116

22. Detach P984 from (MT18)J1.
Check for short between:
P991-D and ground,
P991-U and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire.
Go to paragraph 11-88. |
| NO | Replace AIRSPEED
TRANSDUCER NO. 2 (MT18)
(TM 1-1520-238-23). |
23. Detach P987 from (A637)J3.
Check for short between:
P987-D and ground,
P987-U and ground.
Does short exist?
- | | |
|-----|----------------|
| YES | Go to step 24. |
| NO | Go to step 25. |
24. Detach P983 from (MT17)J1.
Check for short between:
P987-D and ground,
P987-U and ground.
Does short exist?
- | | |
|-----|--|
| YES | Repair shorted wire.
Go to paragraph 11-88. |
| NO | Replace AIRSPEED
TRANSDUCER NO. 1 (MT17)
(TM 1-1520-238-23). |
25. Attach P991 to (A638)J3.
Detach P990 from (A638)J2.
Close **STAB AUTO AC** (A76)CB2 circuit
breaker. Check for 2.6 VDC maximum between
P990-D (HI) and P990-E (LO).
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 27. |
| NO | Go to step 26. |
26. Open **STAB AUTO AC** (A76)CB2 circuit breaker.
Check for open between P991-D and P984-B.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Replace AIRSPEED
TRANSDUCER NO. 2 (MT18)
(TM 1-1520-238-23). |
27. Attach P987 to (A637)J3.
Detach P986 from (A637)J2.
Close **STAB AUTO AC** (A76)CB2 circuit
breaker. Check for 2.6 VDC maximum between
P986-D (HI) and P986-E (LO).
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 29. |
| NO | Go to step 28. |
28. Open **STAB AUTO AC** (A76)CB2 circuit breaker.
Check for open between P987-D and P983-B.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Replace AIRSPEED
TRANSDUCER NO. 1 (MT17)
(TM 1-1520-238-23). |
29. Attach P991 to (A638)J3.
Detach P990 from (A638)J2.
Close **STAB AUTO AC** (A76)CB2 circuit
breaker. Check for 0.4 VDC between P990-B
and P990-A.
Is voltage present?
- | | |
|-----|--|
| YES | Replace RATE GYRO NO. 2
(A640) (TM 1-1520-238-23). |
| NO | Go to step 30. |
30. Detach P987 from (MT18)J1.
Close **STAB AUTO AC** (A76)CB2 circuit
breaker. Check for -15 ±2 VDC between
P984-B and ground.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 32. |
| NO | Go to step 31. |

11-116 MAN STAB INDICATORS ON – AUTO MODE DOES NOT ENGAGE AND STAB POS INDICATORS DO NOT GO TO 25 ±2° ND (cont)

11-116

31. Detach P991 from (A638)J3.
Check for open between P991–D and P984–B.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11–88. |
| NO | Replace STAB CONT UNIT 2
(TM 1-1520-238-23). |
32. Detach P983 from (MT17)J1.
Close **STAB AUTO AC** (A76)CB2 circuit breaker. Check for –15 ±2 VDC between P983–B and ground.
Is voltage present?
- | | |
|-----|----------------|
| YES | Go to step 34. |
| NO | Go to step 33. |
33. Detach 987 from (A637)J3.
Check for open between P987–D and P983–B.
Does open exist?
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11–88. |
| NO | Replace AIRSPEED TRANSDUCER NO. 2 (MT18)
(TM 1-1520-238-23). |
34. Attach P987 to (A637)J3.
Detach P986 from (A637)J2.
Close **STAB AUTO AC** (A76)CB2 circuit breaker. Check for 0.4 VDC between P986–B and P986–A.
- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11–88. |
| NO | Replace AIRSPEED TRANSDUCER NO. 2 (MT18)
(TM 1-1520-238-23). |
- Is voltage present?**
- | | |
|-----|---|
| YES | Replace RATE GYRO NO. 1
(A639) (TM 1-1520-238-23). |
| NO | Replace AUTO MAN PWR relay
(A323)XK1–1/2, or
AUTO/MAN PWR relay
(A329)XK1–1/2, or
MAN MODE LOCK SELECT
relay (A329)XK1–3/4, or
APPROACH 1 LIGHT relay
(A329)XK1–7, or
STAB CONT UNIT 1 (A637), or
STAB CONT UNIT 2 (A638)
(TM 1-1520-238-23). |

END OF TASK

11-117. AUDIO TONE – IS STILL HEARD AFTER RESET PUSHBUTTON IS PRESSED

11-117

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L325, T290L, T290R and L140 doors open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach J993 from (A641)P993. Check for open between J993-F and GS394-C.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 2.

2. On **PLT MAN STAB CONT** switch (A641), hold pilot **RESET** switch ON. Check for open between P993-F and P993-E.
Does open exist?

YES	Replace pilot RESET switch (A641) (TM 1-1520-238-23).
NO	Go to step 3.

3. Detach P429 from (A402)J23. Check for open between J993-E and P429-B8.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 4.

4. Detach P431 from (A402)J27. Set multimeter to diode setting. Place black meter lead on (A402)J23-B8. Check for open between (A402)J23-B8 and (A402)J27-A20.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88, or replace diode (TM 1-1520-238-23).
NO	Go to step 5.

5. Detach: P431 from (A402)J27, P491 from (A402)J8, P1077 from (A329)J2, P469 from (A326)J2. Check for open between: P431-A20 and P491-A18, (A323)J6-A18 and (A323)TB2-2-A, (A323)TB2-2-G and (A323)J6-A20, P491-A20 and P1077-H, (A329)J1-H and (A329)XK1-6-X2, (A329)P1077-D and (A329)XK1-6-X1, P1077-D and P469-A18, (A326)J2-A18 and (A326)TB1-51-F.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 6.

11-117. AUDIO TONE – IS STILL HEARD AFTER RESET PUSHBUTTON IS PRESSED (cont)

11-117

6. (AAH) Check for open between P1077-t and GS-652-C.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 7. |

7. (ABG) Check for open between P1077-t and GS-654-D.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 8. |

8. Detach:

P1077 from (A329)J1,

P435 from (A326)J7,

P49 from (A9)J1.

Check for open between:

(A329)J1-t and (A329)XK1-6-B2,

(A329)XK1-6-B1 and (A329)J1-N,

P1077-N and P469-A11,

(A326)J2-A11 and (A326)J7-A6,

P435-A6 and P49-26.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 9. |

9. Attach all detached connectors except for P49.

Close **ENG WARN** (A76)CB52 circuit breaker.

On **PLT MAN STAB CONT** switch (A641), hold pilot **RESET** switch ON.

Check for open between P49-26 and ground.

Does open exist?

- | | |
|-----|---|
| YES | Replace AUTO RESET relay
(A329)XK1-6
(TM 1-1520-238-23). |
| NO | Troubleshoot engine out
warning system
(TM 1-1520-238-T-6). |

END OF TASK

Paragraph 11-118 and all data on pages 11-415 and 11-416 deleted

Change 5

11-413/(11-414 blank)

11-119. MAN STAB AND MASTER CAUTION INDICATORS – DO NOT FLASH

11-119

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L200 cover removed and L295 and L325 doors open

2. Check for open between (A329):
J1-R and XK1-7-B3,
XK1-7-B2 and TB1-3-D.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Replace **APPROACH 1 LIGHT** relay (A329)K1-7 (TM 1-1520-238-23).

3. Detach J908. Check for open between:
P1077-R and J908-A5.

Does open exist?

YES Repair open wire.
Go to paragraph 11-88.

NO Troubleshoot caution/warning system (TM 1-1520-238-T-6).



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach P1077 from (A329)J1.
Check for continuity between J1077-R and (A329)TB1-3-D.

Does continuity exist?

YES Go to step 3.
NO Go to step 2.

END OF TASK

11-120. AUDIO TONE – IS NOT HEARD IN BOTH CREW STATIONS

11-120

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

- TM 1-1520-238-T-6
- TM 1-1520-238-23
- TM 11-1520-238-23-2

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Access provisions – L200 cover removed and L295 and L325 doors open

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **ENG WARN** (A76)CB52 circuit breaker.

Detach:
P447 from J447,
P1077 from (A329)J1,
P491 from (A323)J6.
Check for open between:
P49-23 and P435-A5,
(A326)J7-A5 and (A326)TB1-10-G,
(A326)TB1-10-H and (A326)J2-A12,
P469-A12 and and J447-B6,
P447-B6 and P1077-M,
(A329)J1-M and (A329)XK1-8-B3,
(A329)XK1-8-B2 and (A329)J1-B,
P1077-B and P491-A4,
(A323)J6-A4 and (A323)TB2-2-H.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 2. |

2. Check for continuity between (A329):
XK1-8-B2 and XK1-8-B3.

Does continuity exist?

- | | |
|-----|--|
| YES | Go to step 3. |
| NO | Replace APPROACH 2 AUDIO
relay (A329)K1-8
(TM 1-1520-238-23). |

3. Close **ENG WARN** (A76)CB52 circuit breaker.
Check for continuity between P49-26 and ground.

Does continuity exist?

- | | |
|-----|---|
| YES | Go to step 4. |
| NO | Refer to TM 1-1520-238-T-6 to
troubleshoot engine out warning
system. |

11-120. AUDIO TONE – IS NOT HEARD IN BOTH CREW STATIONS (cont)

11-120

- | | |
|---|--|
| <p>4. Open ENG WARN (A76)CB52 circuit breaker. Detach J993 from (A641)P1. Check for continuity between P993-F and P993-E.
Does continuity exist?</p> <p>YES Replace pilot RESET switch (A641) (TM 1-1520-238-23).</p> <p>NO Go to step 5.</p> | <p>8. Detach P491 from (A323)J6. Check for short between P431-A20 and ground.
Does short exist?</p> <p>YES Repair shorted wire between P431-A20 and P491-A18. Go to paragraph 11-88.</p> <p>NO Go to step 9.</p> |
| <p>5. Detach J994 from (A641)P1. Check for continuity between P994-F and P994-E.
Does continuity exist?</p> <p>YES Replace CPG RESET switch (A641) (TM 1-1520-238-23).</p> <p>NO Go to step 6.</p> | <p>9. Check for short between (A323)J6-A18 and ground.
Does short exist?</p> <p>YES Repair shorted wire between (A323) J6-A18 and J6-A19. Go to paragraph 11-88.</p> <p>NO Go to step 10.</p> |
| <p>6. Attach:
P1077 to (A329)J1,
P491 to (A323)J6.
Detach P429 from (A402)J23. Check for short between:
J993-E and ground,
J994-E and ground.
Does short exist?</p> <p>YES Repair shorted wire between. J993-E and P429-B8, J994-E and P429-B9. Go to paragraph 11-88.</p> <p>NO Go to step 7.</p> | <p>10. Check for short between P491-A19 and ground.
Does short exist?</p> <p>YES Go to step 11.</p> <p>NO Go to step 12.</p> |
| <p>7. Detach P431 from (A402)J27. Check for short between (A402)J27-A20 and ground.
Does short exist?</p> <p>YES Repair shorted wire between (A402): J27-A20 and TB2-26/27-G, TB2-26/27-A and TB2-26/27-B, TB2-26/27-P and J23-B8, TB2-26/27-C and J23-B9.</p> <p>NO Go to step 8.</p> | <p>11. Detach P987 from (A637-J3). Check for short between P491-A19 and ground.
Does short exist?</p> <p>YES Repair shorted wire between P491-A19 and P987-E. Go to paragraph 11-88.</p> <p>NO Replace STAB CONT UNIT 1 (A637) (TM 1-1520-238-23).</p> |
| | <p>12. Detach P1077 from (A329)J1. Check for short between P491-A20 and ground.
Does short exist?</p> <p>YES Repair shorted wire between P491-A20 and P1077-H. Go to paragraph 11-88.</p> <p>NO Go to step 13.</p> |

11-120. AUDIO TONE – IS NOT HEARD IN BOTH CREW STATIONS (cont)

11-120

13. Check for short between:

(A329)J1-H and ground,
XK1-6-X2 and ground.**Does short exist?**

- YES Repair shorted wire between
 (A329)J1-H and XK1-6-X2.
 Go to paragraph 11-88.
- NO Go to step 14.

14. Check for short between P49-26 and ground.

Does short exist?

- YES Repair shorted wire between
 P49-26 and P435-A6.
 Go to paragraph 11-88.
- NO Go to step 15.

15. Check for short between (A326) J7-A6 and ground.

Does short exist?

- YES Repair shorted wire between
 (A326):
 J7-A6 and J2-11.
 Go to paragraph 11-88.
- NO Go to step 16.

16. Check for short between:
P469-A11 and P1077-N.**Does short exist?**

- YES Repair shorted wire between:
 P469-A11 and P1077-N.
 Go to paragraph 11-88.
- NO Go to step 17.

17. Remove (A329)K1-6.

Check for short between (A329)J1-N and ground.

Does short exist?

- YES Repair shorted wire between
 (A329)J1-N and XK1-6-B1.
 Go to paragraph 11-88.
- NO Replace **AUTO RESET** relay
 (A329)K1-6
 (TM 1-1520-238-23).

END OF TASK

Paragraph 11-121 and all data on pages 11-419 and 11-420 deleted

11-122. NOE/APRCH SWITCH – DISENGAGES OR STAB POS INDICATORS DO NOT INDICATE 25 ± 2°

11-122

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Supply, Power	6269B
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach P1077 from (A329)J1. Check for open between (A329): J1-P and XK1-6-A3, XK1-6-A2 and TB1-3-J.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 2.

2. Check for open between (A329)XK1-6-A2 and (A329)XK1-6-A3.
Does open exist?

YES	Replace AUTO RESET relay (A329)K1-6 (TM 1-1520-238-23).
NO	Go to step 3.

3. Detach: P447 from J447, J170 from (A137)J1. Check for open between: P1077-P and P447-A14, J447-A14 and P170-A1, P170-B2 and GS420-L.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 4.

4. Detach: P485 from (A323)J7, P990 from (A638)J2, P986 from (A637)J2. Check for open between: P170-B7 and J447-A11, P447-A11 and P485-B, (A323)J7-B and (A323)TB2-2-C, (A323)TB2-2-F and (A323)J7-C, (A323)TB2-2-J and (A323)J7-D, P485-C and P990-S, P485-D and P986-S.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 5.

11-122. NOE/APRCH SWITCH – DISENGAGES OR STAB POS INDICATORS DO NOT INDICATE $25 \pm 2^\circ$ (cont)

11-122

5. Apply 28 VDC to (A137) J1-A1 and 28 VDC return to (A137) J1-B2.

Set **NOE/APRCH** switch to **NOE/APRCH**.

Remove pilot **ASE** panel (A137) for J1-B7 (HI) and J1-B2 (LO) voltage measurement.

Check for 28 VDC between (A137) J1-B7 (HI) and J1-B2 (LO).

Does NOE/APRCH switch remain set and is voltage present?

YES Go to step 6.

NO Replace pilot **ASE** panel (A137) (TM 1-1520-238-23).

6. Detach:

P990 from (A638)J2,

P986 from (A637)J2.

Check for short between P170-B7 and ground.

Does short exist?

YES Repair shorted wire between:
P170-B7 and J447-A11,
P447-A11 and P485-B,
(A323)J7-B and
(A323)TB2-2-C,
(A323)TB2-2-F and
(A323)J7-C,
(A323)TB2-2-J and
(A323)J7-D,
P485-C and P990-S,
P485-D and P986-S.
Go to paragraph 11-88.

NO Replace **STAB CONT UNIT 1** (A637) or **STAB CONT UNIT 2** (A638) (TM 1-1520-238-23).

END OF TASK

Paragraph 11-123 deleted

11-124. ENG WARN CIRCUIT BREAKER – DOES NOT STAY CLOSED

11-124

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-T-6
TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	Non-transparent barrier removed Access provisions – L325, T290L, T290R, T250L and T250R doors open



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach P469 from (A326)J2. Check for short between P469–A10 and ground.
Does short exist?

YES	Go to step 2.
NO	Go to step 3.

2. Detach P463 from (A76)J1. Check for short between P469–A10 and ground.
Does short exist?

YES	Repair shorted wire between P469–A10 and P463–N. Go to paragraph 11–88.
-----	---

NO	Refer to TM 1-1520-238-T-6 to troubleshoot circuit protection system (dc emergency bus – pilot station).
----	--

3. (AAV)Detach: P469 from (A326)J2, P435 from (A326)J7. Check for short between (A329)J1–D and ground.
Does short exist?

YES	Repair shorted wire between (A326): TB1–51–F and J2–A18. Go to paragraph 11–88.
-----	---

NO	Go to step 4.
----	---------------

4. Detach: P469 from (A326)J2, P435 from (A326)J7. Check for short between (A326)J7–A15 and ground.
Does short exist?

YES	Repair shorted wire between (A326): J7–A15 and TB1–51–D, TB1–51–E and J2–A10. Go to paragraph 11–88.
-----	--

NO	Go to step 5.
----	---------------

11-124. ENG WARN CIRCUIT BREAKER – DOES NOT STAY CLOSED (cont)

11-124

5. Detach P1077 from (A323)J2).

Check for short between (A329)J1-D and ground.

Does short exist?

YES Repair shorted wire between:
P469-A18 and J447-A8,
P447-A8 and P1077-D,
(A329)J1-D and
(A329)XK1-6-X1.
Go to paragraph 11-88, or
replace **AUTO RESET**
(A329)XK1-6 relay
(TM 1-1520-238-23).

NO Go to step 6.

6. Detach P49 from (A9)J1. Check for short between P435-A15 and ground.

Does short exist?

YES Repair shorted wire.
Go to paragraph 11-88.

NO Replace **ENG OUT WARN** unit
(A9) (TM 1-1520-238-23).

END OF TASK

11-125. ND/NU SET TO ND – TOP PISTON FAILS TO MOVE STABILATOR

11-125

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

- Detach P995 from (L46)J995. Momentarily press PLT **NU/ND** switch to **ND**. Check for 28 VDC between P995-K(HI) and P995-J(LO).
Is voltage present?

YES	Replace top STAB ACTUATOR (L46) (TM 1-1520-238-23).
NO	Go to step 2.
- Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach P427 from (A402)J28. Check for open between (A402): J28-A and TB2-24-B.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 3.

- Detach P1077 from (A329)J1. Check for open between P427-A and P1077-k.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 4.
- Check for open between (A329): J1-k and XK1-5-B1.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 5.
- Check for open between (A323)XK1-3-B3 and GS4-B.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Replace MAN CONT NOSE DOWN relay (A329)K1-5, or AUTO/MAN PWR relay (A329)K1-1/2, or MAN CONT NOSE UP relay (A323)K1-3 (TM 1-1520-238-23).

END OF TASK

11-126. ND/NU SET TO ND – BOTTOM PISTON FAILS TO MOVE STABILATOR

11-126

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach P996 from (L46)J996. Move pilot **NU/ND** switch to **ND**. Check for 28 VDC between P996-K(HI) and P996-J(LO).

Is voltage present?

YES	Replace bottom STAB ACTUATOR (L46) (TM 1-1520-238-23).
NO	Go to step 2.

2. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach P427 from (A402)J28. Check for open between (A402): J28-B and TB2-24-C.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 3.

3. Detach P1077 from (A329)J1. Check for open between P427-B and P1077-h.
Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 4.

4. Check for open between P1077-h and (A329)TB1-5-A.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 5.

5. Check for open between (A329): TB1-5-E and XK1-5-A1.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 6.

6. Check for open between (A323): XK1-3-A3 and GS4-C.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Replace MAN CONT NOSE DOWN relay (A329)K1-5, or AUTO MAN PWR relay (A323)K1-1/2, or MAN CONT NOSE UP relay (A323)K1-3. (TM 1-1520-238-23).

END OF TASK

11-127. MAN STAB MOVES UP BUT NOT DOWN

11-127

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.

Check for open between (A329):
TB1-5-F and TB1-1/2-B.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 2. |

2. Set multimeter to diode setting. Place black meter lead on (A329)TB1-1/2-G. Check for open between (A329):

TB1-1/2-B and TB1-1/2-G.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire,
Go to paragraph 11-88, or
replace diode
(TM 1-1520-238-23). |
| NO | Repair open wire between
(A329):
TB1-1/2-G and TB1-3-E.
Go to paragraph 11-88. |

END OF TASK

11-128. MAN STAB MOVES DOWN BUT NOT UP

11-128

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers. Detach P431 from (A402)J27.

Check for open between (A402):
TB2-21-B and J27-B10.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 2. |

2. Detach P1077 from (A329)J1. Check for open between P431-B10 and P1077-L.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 3. |

3. Check for open between (A329):
J1-L and TB1-1/2-C.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Go to step 4. |

4. Set multimeter to diode setting. Place black meter lead on (A329)TB1-1/2-H. Check for open between (A329):
TB1-1/2-C and TB1-1/2-H.

Does open exist?

- | | |
|-----|--|
| YES | Repair open wire.
Go to paragraph 11-88, or replace diode (TM 1-1520-238-23). |
| NO | Repair open wire between (A329):
TB1-1/2-H and TB1-3-H.
Go to paragraph 11-88. |

END OF TASK

11-129. CPG RESET INOPERATIVE – STAB POS INDICATORS NOT 19 ±2° ND

11-129

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

3. Check for open between (A402):
J23-B9 and TB2-26/27-C.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Replace AUTO RESET relay (A402)K1-6 (TM 1-1520-238-23).

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.

Detach:

J994 from (A641)P1,
P429 from (A402)J23.

Check for open between:

J994-F and GS275-C,
J994-E and P429-B9.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 2.

2. Hold CPG **STAB RESET** switch.
Check for open between (A641)P1-F and P994-E.

Does open exist?

YES	Replace CPG MAN STAB RESET switch (A641) (TM 1-1520-238-23).
NO	Go to step 3.

END OF TASK

11-130. CPG NU/ND INOPERATIVE – STAB POS INDICATORS DO NOT MOVE

11-130

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23



Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6, **STAB AUTO DC** (A76)CB3, **STAB AUTO AC** (A76)CB2, and **ENG WARN** (A76)CB52 circuit breakers.

Detach:

P437 from (A402)J25,
J994 from (A641)P994.

Check for open between:

(A402)TB2-23-F and (A402)J25-D,
(A402)TB2-21-F and (A402)J25-C,
(A402)TB2-25-E and (A402)J25-F,
P437-D and J994-B,
P437-C and J994-A,
P437-F and J994-D.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Replace CPG MAN STAB CONT switch (A641)
(TM 1-1520-238-23). |

END OF TASK

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Detach:

P986 from (A637)J2,
P990 from (A638)J2.
Check for $12.4 \pm .30$ VDC between
P986-D(HI) and P986-E(LO).

Is voltage present?

YES	Go to step 2.
NO	Replace AIRSPEED TRANSDUCER 1 (MT17) (TM 1-1520-238-23).

2. Check for $12.4 \pm .30$ VDC between
P990-D(HI) and P990-E(LO).**Is voltage present?**

YES	Replace STAB CONT UNIT 1 (A637), or STAB CONT UNIT 2 (A638) (TM 1-1520-238-23).
NO	Replace AIRSPEED TRANSDUCER 2 (MT18) (TM 1-1520-238-23).

END OF TASK

11-132. STAB POS NOT 19 ±2° NU FOR 70 KNOTS AND COLLECTIVE CENTERED

11-132

Tools:

Nomenclature	Part Number
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Check for 5.25 ± .30 VDC between P990-D(HI) and P990-E(LO).
Is voltage present?

YES	Go to step 2.
NO	Go to step 3.
2. Check for 5.25 ±.30 VDC between P986-D(HI) and P986-E(LO).
Is voltage present?

YES	Replace STAB CONT UNIT 1 (A637) or STAB CONT UNIT 2 (TM 1-1520-238-23).
NO	Go to step 10.

3. Detach P984 from (MT18)J1.
Close **STAB AUTO AC** (A76)CB2 circuit breaker. Check for +15 ±2 VDC between P984-A and ground.

Is voltage present?

- | | |
|-----|---------------|
| YES | Go to step 5. |
| NO | Go to step 4. |

4. Detach P991 from (A638)J3.

Check for open between:

P991-U and P984-A,
P991-U and P986-D,
P983-C and P986-E.

Does open exist?

- | | |
|-----|---|
| YES | Repair open wire.
Go to paragraph 11-88. |
| NO | Replace STAB CONT UNIT 2 (TM 1-1520-238-23). |

5. Check for short between P984-D and ground.

Does short exist?

- | | |
|-----|---------------|
| YES | Go to step 6. |
| NO | Go to step 8. |

6. Detach P990 from (A638)J2.

Check for short between P984-D and ground.

Does short exist?

- | | |
|-----|---|
| YES | Go to step 7. |
| NO | Replace STAB CONT UNIT 2 (TM 1-1520-238-23). |

7. Detach P682 from (A69)J3.

Check for short between P984-D and ground.

Does short exist?

- | | |
|-----|---|
| YES | Repair shorted wire between: P984-D and P498-A15, (A323)J498-A15 and (A323)TB1-5-G, (A323)TB1-5-F and (A323)J3-B9, P497-B9 and P682-127, (A323)TB1-5-H and (A323)J2-B13, P494-B13 and P990-D.
Go to paragraph 11-88. |
| NO | Replace DASEC (A69) (TM 1-1520-238-23). |

11-132. STAB POS NOT 19 ±2° NU FOR 70 KNOTS AND COLLECTIVE CENTERED (cont)

11-132

- | | |
|--|--|
| <p>8. Check for open between P984-E and ground.
Does open exist?</p> <p> YES Repair open wire.
 Go to paragraph 11-88.</p> <p> NO Go to step 9.</p> <p>9. Check for open between:
P984-D and P990-D,
P984-C and P990-E.
Does open exist?</p> <p> YES Repair open wire between:
 P984-D and P498-A15,
 (A323)J1-A15 and
 (A323)TB1-5-G,
 (A323)TB1-5-H and
 (A323)J2-B13,
 P494-B13 and P990-D,
 P984-c and P498-A16,
 (A323)J1-A16 and
 (A323)TB1-5-J,
 (A323)TB1-5-K and
 (A323)J3-B14,
 P494-B14 and P990-E.
 Go to paragraph 11-88.</p> <p> NO Replace AIRSPEED
 TRANSDUCER 2 (MT18)
 (TM 1-1520-238-23).</p> <p>10. Detach P983 from (MT17)J1.
Close STAB AUTO AC (A76)CB2 circuit
breaker. Check for +15 ±2 VDC between
P983-A and ground.
Is voltage present?</p> <p> YES Go to step 12.</p> <p> NO Go to step 11.</p> | <p>11. Detach 987 from (A637)J3.
Check for open between:
P987-U and P983-A.
Does open exist?</p> <p> YES Repair open wire.
 Go to paragraph 11-88.</p> <p> NO Replace STAB CONT UNIT 1
 (A637) (TM 1-1520-238-23).</p> <p>12. Check for short between P983-D and ground.
Does short exist?</p> <p> YES Go to step 13.</p> <p> NO Go to step 15.</p> <p>13. Detach P986 from (A637)J986.
Check for short between P983-D and ground.
Does short exist?</p> <p> YES Go to step 14.</p> <p> NO Replace STAB CONT UNIT 2
 (A638) (TM 1-1520-238-23).</p> <p>14. Detach P682 from (A69)J3.
Check for short between P983-D and ground.
Does short exist?</p> <p> YES Repair shorted wire between:
 P983-D and P491-A5,
 (A323)J6-A5 and
 (A323)TB3-1-G,
 A323)TB3-1-F and
 (A323)J3-B3,
 P497-B3 and P682-116,
 (A323)TB3-1-H and
 (A323)J3-A19,
 P497-A19 and P986-D.
 Go to paragraph 11-88.</p> <p> NO Replace DASEC (A69)
 (TM 1-1520-238-23).</p> |
|--|--|

11-132. STAB POS NOT $\pm 2^\circ$ NU FOR 70 KNOTS AND COLLECTIVE CENTERED (cont)

11-132

15. Check for open between P983-E and GS575-C.

Does open exist?YES Repair open wire.
 Go to paragraph 11-88.

NO Go to step 16.

16. Check for open between:

P983-D and P986-D,

P983-C and P986-E.

Does open exist?YES Repair open wire between:
 P983-D and P491-A5,
 (A323)J6-A5 and
 (A323)TB3-1-G,
 (A323)TB3-1-H and
 (A323)J3-A19,
 P497-A19 and P986-A6,
 P983-C and P491-A6,
 (A323)J6-A6 and
 (A323)TB3-1-J,
 (A323)TB3-1-K and
 (A323)J3-A20,
 P497-A20 and P986-E.
 Go to paragraph 11-88.NO Replace **AIRSPEED**
 TRANSDUCER 1 (MT17)
 (TM 1-1520-238-23).

END OF TASK

11-133. PILOT ND/NU SWITCH DOES NOT MOVE STAB UP – STAB AUTO AC (CB2) AND STAB AUTO DC (CB3) CIRCUIT BREAKERS OPEN 11-133

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6 and **STAB MAN AC** (A76)CB7 circuit breakers.

Detach:

P2 from (A402)J2,
P437 from (A402)J25,
P427 from (A402)J28.

Check for open between:

STAB MAN DC (A76)CB6 and P2-g,
(A402)J2-g and (A402)TB2-23-A,
(A402)TB2-23-D and (A402)J25-A,
(A402)P437-A and J993-B,
(A402)TB2-23-E and (A402)TB2-24-A.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 2.

2. Hold pilot collective **ND/NU** switch on to **NU**.
Check for open between (A641):
J993-B and J993-A.

Does open exist?

YES	Replace pilot MAN STAB switch (TM 1-1520-238-23).
NO	Go to step 3.

3. Detach P1077. Check for open between (A329):
TB1-4-A and J1-v,
P1077-v and GS4-A.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Go to step 4.

4. Check for open between:
(A641)J993-A and P437-B,
(A402)J25-B and (A402)TB2-21-D,
(A402)TB2-21-A and (A402)J28-G,
(A402)P427-G and (A323)P485-R,
(A323)J7-R and (A323)XK1-3-X1,
(A323)XK1-3-X2 and GS-4-A.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Replace MAN CONT NOSE UP relay (A323)K1-3 (TM 1-1520-238-23).

END OF TASK

11-134. PILOT ND/NU SWITCH DOES NOT MOVE STAB DOWN – STAB AUTO AC (CB2) AND STAB AUTO DC (CB3) CIRCUIT BREAKERS OPEN 11-134

Tools:

<u>Nomenclature</u>	<u>Part Number</u>
Tool Kit, Electrical Repairer's	SC518099CLA06
Multimeter, Digital	AN/PSM-45
Extractor, Relay	CTJ-RO6

Personnel Required:

68X Armament/Electrical Systems Repairer
One person to assist

References:

TM 1-1520-238-23

Equipment Conditions:

<u>Ref</u>	<u>Condition</u>
TM 1-1520-238-23	

2. Check for open between:

J993-D and P437-E,
(A402)J25-E and (A402)TB2-25-A,
(A402)TB2-25-C and (A402)J28-H,
P427-H and P1077-m,
(A329)J1-m and (A329)TB1-5-B,
(A329)TB1-5-D and (A329)XK1-5-X1,
(A329)XK1-5-X2 and (A329)TB1-4-B.

Does open exist?

YES	Repair open wire. Go to paragraph 11-88.
NO	Replace (A329)K1-5 MAN CONT NOSE DOWN relay (TM 1-1520-238-23).

WARNING

Turn off power before detaching or attaching wires and connectors. High current 28 VDC or 115 VAC is present. Failure to do so could result in death or serious injury.

1. Open **STAB MAN DC** (A76)CB6 and **STAB MAN AC** (A76)CB7 circuit breakers.

Detach:

P437 from (A402)J25,
P427 from (A402)J28,
J993 from (A641)J1.

Hold pilot **ND/NU** to **ND**.

Check for open between (A641):

J993-B and J993-D.

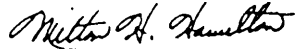
Does open exist?

YES	Replace pilot MAN STAB switch (TM 1-1520-238-23).
NO	Go to step 2.

END OF TASK

By Order of the Secretary of the Army:

Official:



MILTON H. HAMILTON

*Administrative Assistant to the
Secretary of the Army*

01692

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

DISTRIBUTION :

To be distributed in accordance with DA Form 12-31-E, block no. 3123, AVUM and AVIM maintenance requirements for TM 1-1520-238-T-7.

These are the instructions for sending an electronic 2028

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@avma27.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.



THEN ... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

PFC John DOE
CO 4 3rd Engineer Bn
Ft. Leonardwood, MD 63108

DATE SENT

10 January 1999

PUBLICATION NUMBER

TM 1-1520-238-T-7

PUBLICATION DATE

30 December 1998

PUBLICATION TITLE

Troubleshooting Manual for AH-64

BE EXACT PIN-POINT WHERE IT IS

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	

In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.

Callout 16 in figure 4-3 is pointed at a bolt. In key to figure 4-3, item 16 is called a shim. Please correct one or the other

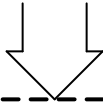
PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

JOHN DOE, PFC (268) 317-7111

SIGN HERE

JOHN DOE *John Doe*

FILL IN YOUR
UNITS ADDRESS



FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U.S. ARMY AVIATION AND MISSILE COMMAND
ATTN: AMSAM-MMC-MA-NP
REDSTONE ARSENAL, AL 35898-5230

TEAR ALONG PERFORATED LINE



THEN ... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

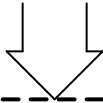
PUBLICATION NUMBER PUBLICATION DATE PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS				IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

FILL IN YOUR
UNITS ADDRESS



FOLD BACK

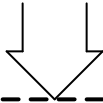
DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

COMMANDER
U.S. ARMY AVIATION AND MISSILE COMMAND
ATTN: AMSAM-MMC-MA-NP
REDSTONE ARSENAL, AL 35898-5230

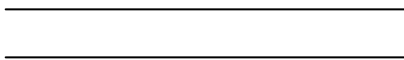
TEAR ALONG PERFORATED LINE

FILL IN YOUR
UNITS ADDRESS



FOLD BACK

DEPARTMENT OF THE ARMY



OFFICIAL BUSINESS

COMMANDER
U.S. ARMY AVIATION AND MISSILE COMMAND
ATTN: AMSAM-MMC-MA-NP
REDSTONE ARSENAL, AL 35898-5230

TEAR ALONG PERFORATED LINE

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

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigrams = .035 ounce
 1 decagram = 10 grams = .35 ounce
 1 hectogram = 10 decagrams = 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

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 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

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	6.451	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
---	---------------------------	-------------------------------	------------------------	---

PIN: 069969-009