TM 55-2840-256-23

TECHNICAL MANUAL

AVIATION UNIT AND AVIATION INTERMEDIATE MAINTENANCE

ENGINE, AIRCRAFT, TURBOSHAFT
NSN 2840-01-131-3350 (T703-AD-700)
NSN 2840-01-333-2064 (T703-AD-700A)
NSN 2840-01-391-4397 (T703-AD-700B)

HEADQUARTERS, DEPARTMENT OF THE ARMY
2 JUNE 1986

CHANGE

NO. 10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 February 2001

Aviation Unit and Aviation Intermediate Maintenance Manual

ENGINE, AIRCRAFT, TURBOSHAFT
NSN 2840-01-131-3350 (T703-AD-700)
NSN 2840-01-333-2064 (T703-AD-700A)
NSN 2840-01-391-4397 (T703-AD-700B)

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Remove pages	Insert pages
a and b	a and b
——	A through D
1-61 and 1-62	1-61 and 1-62
1-87 and 1-88	1-87 and 1-88
1-105 and 1-106	1-105 and 1-106
1-115 and 1-116	1-115 and 1-116
1-117 and 1-118	1-117 and 1-118
1-123 and 1-124	1-123 and 1-124
1-127 and 1-128	1-127 and 1-128
3-15 and 3-16	3-15 and 3-16
3-30.1 and 3-30.2	3-30.1 and 3-30.2
3-30.5 and 3-30.6	3-30.5 and 3-30.6
4-15 and 4-16	4-15 and 4-16
4-41 and 4-42	4-41 and 4-42
4-53 / (4-54 blank)	4-53 / (4-54 blank)
5-19 and 5-20	5-19 and 5-20
6-3 and 6-4	6-3 and 6-4
7-11 and 7-12	7-11 and 7-12
7-25 through 7-28	7-25 through 7-28
7-31 and 7-32	7-31 and 7-32
8-37 through 8-44	8-37 through 8-44
B-13 / (B-14 blank)	B-13 / (B-14 blank)
C-3 / (C-4 blank)	C-3 / (C-4 blank)

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

TM 55-2840-256-23
C10

By Order of the Secretary of the Army:

Official:

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General, United States Army
Chief of Staff

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
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TM 55-2840-256-23
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Change

No. 9

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC 21 October 1998

Aviation Unit and Aviation Intermediate Maintenance Manual

ENGINE, AIRCRAFT, TURBOSHAFT
NSN 2840-01-131-3350 (T703-AD-700)
NSN 2840-01-333-2064 (T703-AD-700A)
NSN 2840-01-391-4397 (T703-AD-700B)

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Remove pages	Insert pages
1-123 and 1-124	1-123 and 1-124

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NO. 8

HEADQUARTERS
DEPARTMENTS OF THE ARMY
WASHINGTON, D.C., 30 May 1997

Aviation Unit and Aviation Intermediate Maintenance

ENGINE, AIRCRAFT, TURBOSHAFT
NSN 2840-01-131-3350 (T703-AD-700)
NSN 2840-01-333-2064 (T703-AD-700A)
NSN 2840-01-391-4397 (T703-AD-700B)

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Remove pages	Insert pages
i and ii	i and ii
1-35 and 1-36	1-35 and 1-36
1-88.5/(1-88.6 blank)	1-88.5/(1-88.6 blank)
- - - - - -	1-88.7/(1-88.8 blank)
7-57 and 7-58	7-57 and 7-58
Cover	Cover

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

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NO. 7

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Aviation Unit and Aviation Intermediate Maintenance

ENGINE, AIRCRAFT, TURBOSHAFT
NSN 2840-01-131 3350 (T703-AD-700)
NSN 2840-01-333-2064 (T703-AD-700A)
NSN 2840-01-391-4397 (T703-AD-700B)

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Remove pages	Insert pages
i through iv	i though iv
1-35 through 1-38	1-35 through 1-38
1-88.3/(1-88.4 blank)	1-88.3 and 1-88.4
------	1-88.5/(1-88.6 blank)
1-93 and 1-94	1-93 and 1-94
1-119 and 1-120	1-119 and 1-120
1-122.1 and 1-122.2	1-122.1 and 1-122.2
------	1-122.3/(1-122.4 blank)
1-127 and 1-128	1-127 and 1-128
1-143 through 1-146	1-143 through 1-146
1-147/(1-148 blank)	1-147 and 1-148
------	1-149 and 1-150
------	1-151/(1-152 blank)
3-13 and 3-14	3-13 and 3-14
3-15 and 3-16	3-15 and 3-16
3-16.1 and 3-16.2	3-16.1 and 3-16.2
3-30.3 through 3-30.6	3-30.3 though 3-30.6
4-5 and 4-6	4-5 and 4-6

TM 55-2840-256-23
C7

Remove pages	Insert pages
4-13 and 4-14	4-13 and 4-14
B-11 and B-12	B-11 and B-12
E-1/(E-2 blank)	E-1 and E-2
------	E-3 and E-4
INDEX-3 through INDEX-6	INDEX-3 through INDEX-6

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TM 55-2840-256-23
C6

CHANGE

NO. 6

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 22 November 1994

Aviation Unit and Aviation Intermediate Maintenance Manual

Engine, Aircraft, Turboshaft
NSN 2840-01-131-3350
Model T703-AD-700

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Remove pages	Insert pages
3-13 and 3-14	3-13 and 3-14
3-14.1 /(3-14.2 blank)	3-14.1 /(3-1 4.2 blank)
C-3 and C-4	C-3/(C-4 blank)

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

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NO. 5

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WASHINGTON, D.C., 29 JULY 1994

Aviation Unit and Aviation Intermediate Maintenance

ENGINE, AIRCRAFT, TURBOSHAFT
NSN 2840-01-131-3350 (T703-AD-700)
NSN 2840-01-333-2064 (T703-AD-700A)
NSN 2840-01-391-4397 (T703-AD-700B)

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Remove pages	**Insert pages**
a and b	a and b
i through vi	i through vi
1-1 and 1-2	1-1 and 1-2
1-4.1/(1-4.2 blank)	1-4.1/(1-4.2 blank)
1-19 and 1-20	1-19 and 1-20
----	1-20.1/(1-20.2 blank)
1-35 through 1-38	1-35 through 1-38
1-49 through 1-52	1-49 through 1-52
1-63 and 1-64	1-63 and 1-64
1-69 and 1-70	1-69 and 1-70
----	1-70.1/(1-70.2 blank)
1-85 through 1-88	1-85 through 1-88
1-88.1/(1-88.2 blank)	1-88.1 and 1-88.2
———	1-88.3/(1-88.4 blank)
1-89 and 1-90	1-89 and 1-90
1-94.1/(1-94.2 blank)	1-94.1/(1-94.2 blank)
1-104.1/(1-104.2 blank)	1-104.1/(1-104.2 blank)
1-113 and 1-114	1-113 and 1-114
1-123 and 1-124	1-123 and 1-124
1-127 through 1-130	1-127 through 1-130
3-1 and 3-2	3-1 and 3-2
3-7 through 3-14	3-7 through 3-14
----	3-14.1/(3-14.2 blank)
3-16.1/(3-16.2 blank)	3-16.1 and 3-16.2
3-17 and 3-18	3-17 and 3-18
3-27 through 3-30	3-27 through 3-30
3-30.1 and 3-30.2	3-30.1 and 3-30.2

Remove pages	Insert pages
3-30.5 and 3-30.6	3-30.5 and 3-30.6
4-33 and 4-34	4-33 and 4-34
5-1 and 5-2	5-1 and 5-2
5-7 and 5-8	5-7 and 5-8
5-31 and 5-32	5-31 and 5-32
5-39 and 5-40	5-39 and 5-40
6-1 through 6-4	6-1 through 6-4
----	6-4.1/(6-4.2 blank)
6-7 and 6-8	6-7 and 6-8
6-31 and 6-32	6-31 and 6-32
6-35 through 6-40	6-35 through 6-40
----	6-40.1/(6-40.2 blank)
7-4.1 through 7-4.4	7-4.1 through 7-4.4
7-5 and 7-6	7-5 and 7-6
7-11 and 7-12	7-11 and 7-12
7-13 and 7-14	7-13 and 7-14
7-17 through 7-20	7-17 through 7-20
7-57 and 7-58	7-57 and 7-58
8-33 and 8-34	8-33 and 8-34
9-1 and 9-2	9-1 and 9-2
9-9 through 9-11/(9-12 blank)	9-9 through 9-12
----	9-13 and 9-14
B-3 through B-13/(B-14 blank)	B-3 through B-13/(B-14 blank)
C-1 and C-2	C-1 and C-2
Index-1 through Index-6	Index-1 through Index-6

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

By Order of the Secretary of the Army:

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

Official:

MILTON H. HAMILTON
Administrative Assistant to the Secretary of the Army
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HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 May 1993

Aviation Unit and Aviation Intermediate Maintenance

ENGINE, AIRCRAFT, TURBOSHAFT
NSN 2840-01-131-3350 (T703-AD-700)
NSN 2840-01-333–2064 (T703-AD-700A)

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Remove pages	Insert pages
i and ii	i and ii
1–1 and 1–2	1–1 and 1–2
1–35 through 1-40	1 –35 through 1–40
1–51 and 1–52	1–51 and 1–52
1-61 and 1-62	1-61 and 1-62
1-85 through 1–88	1-85 through 1–88
– – – – –	1-88.1/(1-88.2 blank)
1-89 and 1–90	1-89 and 1–90
1–1 17 through 1–222	1–117 through 1–222
1–122.1 and 1–122.2	1–122.1 and 1–122.2
1–143/(1–144 blank)	143 through 1–147/(1–148 blank)
3–5 through 3–8	3–5 through 3–8
3–15 and 3–16	3–15 and 3-16
3–16.1/(3–1 6.2 blank)	3–16.1 /(3–16.2 blank)
3-29 and 3–30	3–29 and 3–30
5-15 and 5–16	5–15 and 5-16
5-31 and 5–32	5–31 and 5-32
6-23 and 6-24	6-23 and 6-24
7–5 and 7-6	7–5 and 7-6
7–12.1/(7–1 2.2 blank)	7–12.1/(7–12.2 blank)
7–13 and 7–14	7–13 and 7–14
7–17 through 7–20	7–17 through 7–20
7–23 and 7–24	7–23 and 7–24
7–57 and 7–58	7-57 and 7–58
– – – – –	7-58.1 /(7–58.2 blank)
8-33 through 8–38	8–33 through 8–38
8-41 and 8–42	8–41 and 8-42
A-1 and A-2	A-1 and A-2
B-11 through B-13/(B-14 blank)	B-11 through B-13/(B-14 blank)
C-1 and C-2	C-1 and C-2
Index-1 and Index-2	Index-1 and Index-2

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

By Order of the Secretary of the Army:

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

Official:

MILTON H. HAMILTON
Administrative Assistant to the
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TM 55-2840-256-23
C 3

CHANGE NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 4 November 1991

Aviation Unit and Aviation
Intermediate Maintenance

ENGINE, AIRCRAFT, TURBOSHAFT
NSN 2840-01-131-3350
(T703-AD-700)

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Remove pages	Insert pages
3-7 and 3-8	3-7 and 3-8

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Chief of Staff

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Aviation Unit and Aviation
Intermediate Maintenance

ENGINE, AIRCRAFT, TURBOSHAFT
NSN 2840-01-131-3350
(T703-AD-700)

TM 55-2840-256-23, 2 June 1986, 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
---	c and d
iii and iv	iii and iv
vii/viii	vii/viii
1-1 through l-4	1-1 through 1-4
---	1-4.1/1-4.2
1-5 through 1-18	1-5 through 1-18
1-21 through 1-24	1-21 through 1-24
1-27 through 1-48	1-27 through 1-48
l-69 through 1-72	1-69 through 1-72
1-81 and 1-82	1-81 and 1-82
1-87 through 1-94	1-87 through 1-94
---	1-94.1/1-94.2
1-95 through 1-100	1-95 through 1-100
1-103 and 1-104	1-103 and 1-104
---	1-104.1/1-104.2
1-105 and 1-106	1-105 and 1-106
1-113 through 1-116	1-113 through 1-116
---	1-116.1/1-116.2
1-117 through 1-122	1-117 through 1-122
---	1-122.1 and 1-122.2
1-123 through 1-132	1-123 through 1-132
1-135 through 1-138	1-135 through 1-138
3-1 through 3-4	3-1 through 3-4
3-7 through 3-16	3-7 through 3-16
---	3-16.1/3-16.2
3-19 and 3-20	3-19 and 3-20
3-23 through 3-30	3-23 through 3-30
---	3-30.1 through 3-30.6
4-3 through 4-16	4-3 through 4-16
4-19 through 4-22	4-19 through 4-22
4-33 through 4-36	4-33 through 4-36
4-39 through 4-53/4-54	4-39 through 4-53/4-54
5-1 and 5-2	5-1 and 5-2
5-5 and 5-6	5-5 and 5-6

Remove pages	Insert pages
5-9 and 5-10	5-9 and 5-10
5-13 through 5-18	5-13 through 5-18
5-21 through 5-24	5-21 through 5-24
5-27 and 5-28	5-27 and 5-28
5-39 and 5-40	5-39 and 5-40
6-1 through 6-4	6-1 through 6-4
6-13 through 6-18	6-13 through 6-18
6-23 through 6-28	6-23 through 6-28
6-33 and 6-34	6-33 and 6-34
6-37 through 6-42	6-37 through 6-42
7-1 through 7-4	7-1 through 7-4
---	7-4.1 through 7-4.4
7-5 through 7-8	7-5 through 7-8
7-11 and 7-12	7-11 and 7-12
---	7-12.1/7-12.2
7-13 and 7-14	7-13 and 7-14
7-17 through 7-22	7-17 through 7-20
7-25 and 7-26	7-25 and 7-26
7-29 through 7-38	7-29 through 7-38
7-45 through 7-52	7-45 through 7-52
7-57 and 7-58	7-57 and 7-58
7-63 and 7-64	7-63 and 7-64
8-13 and 8-14	8-13 and 8-14
8-37 through 8-44	8-37 through 8-44
9-3 through 9-6	9-3 through 9-6
A-1 and A-2	A-1 and A-2
B-11 through B-13/B-14	B-11 through B-13/B-14
C-1 through C-4	C-1 through C-4
INDEX 1 through INDEX 6	INDEX 1 through INDEX 6
2028[1] through 2028[8]	2028[1] through 2028[8]

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

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
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URGENT

TM 55-2840-256-23
C 1

CHANGE NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 6 November 1987

Aviation Unit and Aviation
Intermediate Maintenance

ENGINE, AIRCRAFT, TURBOSHAFT
NSN 2840-01-131-3350
(T703-AD-700)

TM 55-2840-256-23, 2 June 1986, is changed as follows:

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Remove pages	Insert pages
7-19 and 7-20	7-19 and 7-20

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By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

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Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
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URGENT

DEFINITIONS:

WARNING

An operating procedure, practice, etc., which, if not correctly followed, could result in a personal injury or loss of life.

CAUTION

An operating procedure, practice, etc., which if not strictly observed, could result in damage to or destruction of equipment.

NOTE

An operating procedure, condition, etc., which is essential to highlight.

WARNINGS IN THIS MANUAL:

Personnel performing operations, procedures, and practices which are included or implied in this manual shall observe the following warnings. Disregard of these warnings and precautionary information can cause serious injury, death, or destruction of material.

WARNING

DANGEROUS CHEMICALS

Dangerous chemicals are used in this equipment. Skin rash may result from contact with lubricating fluids or epoxy resins. Provide adequate ventilation when using solvents, fuels, lubricating oil, or epoxy resins in a closed area.

Lubricating oil contains additives which are poisonous and are readily absorbed throuqh the skin. Avoid prolonged contact with the skin.

Lubricating oils can cause paralysis if swallowed. Use only in area with adequate ventilation. Wash hands thoroughly after handling.

Fire can result if exposed to heat or flame.

WARNING

TOXIC AND FLAMMABLE SOLVENTS

Cleaning solvents are toxic and flammable. Use in well ventilated areas. Avoid prolonged inhalation of fumes or direct contact with skin. Do not use solvents near open flame or in areas where very high temperatures prevail. Solvent flash point must not be less than 100°F. Fire can result from use near heat or open flame.

Wear rubber gloves. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. GET IMMEDIATE MEDICAL ATTENTION FOR THE EYES.

WARNING

TOXIC AND FLAMMABLE FUELS

Turbine fuels are flammable. They cause drying of the skin or eyes. Handle only in well-ventilated areas away from heat and open flame. Store in approved metal safety containers. Avoid prolonged or repeated contact with the skin. Wash contacted areas of skin after handling. DO NOT take internally. GET IMMEDIATE MEDICAL ATTENTION FOR EYES, IRRITATED SKIN, OR IF **TAKEN INTERNALLY.**

When handling components that have been exposed to fuels containing lead, ensure that the poisonous lead residue is not inhaled or taken into the body through cuts or other external openings. If accidental exposure occurs, drench affected area with large amounts of clear water and obtain immediate medical attention. Gloves and goggles shall be worn at all times when handling contaminated parts.

WARNING

ENGINE TEST STAND OPERATION

Test stand shall be operated by authorized personnel only.

WARNING

STARTING ENGINE

Starting and operation of the helicopter will be performed only by authorized personnel in accordance with AR 95-1.

WARNING

COMPRESSED AIR

Do not direct compressed air near or directly against skin. Do not use under high pressure, or from a source not having a moisturetrap when drying parts. Do not roll bearings with compressed air. Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psi and only then with effective chip guarding and personnel protection equipment.

WARNING

NOISE

Operation and maintenance personnel shall wear ear protection devices when working near or around an operating engine test stand.

Noise levels reached during ground runup of Army aircraft may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engine in operation.

WARNING

HOISTING

Hoisting heavy objects must be done very carefully. Injury or death can occur if the following practices are not observed: Ensure that hoisting equipment is serviceable before connecting to object to be lifted. Always have a helper guide the object as it is raised and lowered. Use guide lines if the object is hoisted overhead. DO NOT get under the object while it is suspended on the hoist.

WARNING

HIGH VOLTAGE

High voltage may be stored in the ignition system after operation of the engine. This high voltage can cause injury or death. Allow at least five minutes after shutdown of the ignition system before disconnecting or removing ignition system components. Observe instructions for grounding the power cable to discharge high voltage. FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.

WARNING

BURNS

Avoid contact with anti-ice air coming from vent of anti-ice solenoid valve. This air is hot enough to cause severe burns.

Do not check for escaping combustion air by feel. Air escaping from combustion module is hot enough to cause severe burns.

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with regulations.

NOTE: On a changed page, the portion of the text affected by the latest change is indicated by a vertical line, or other change symbol, in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

Original	2 June 1986	Change 6	22 November 1994
Change 1	6 November 1987	Change 7	30 April 1996
Change 2	5 September 1989	Change 8	30 May 1997
Change 3	4 November 1991	Change 9	21 October 1998
Change 4	28 May 1993	Change 10	28 February 2001
Change 5	29 July 1994		

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b	10
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v	5
vi	0
vii	2
viii blank	2
1-1	5
1-2 – 1-3	2
1-4	0
1-4.1	5
1-4.2 blank	5
1-5 – 1-8	2
1-9	0
1-10 – 1-12	2
1-13	0
1-14 – 1-18	2
1-19	0
1-20 – 1-20.1	5
1-20.2 blank	5
1-21	2
1-22	0
1-23	2
1-24 – 1-26	0
1-27	2
1-28	0
1-29	2
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1-33	2
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1-40 – 1-42	0
1-43	2
1-44	0
1-45	2
1-46 – 1-47	0
1-48	2
1-49	0
1-50 – 1-51	5
1-52	4
1-53 – 1-60	0
1-61	10
1-62	4
1-63	0
1-64	5
1-65 – 1-68	0
1-69 – 1-70.1	5
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1-71 – 1-72	2
1-73 – 1-80	0
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1-82 – 1-84	0
1-85	5

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1-88.7	8
1-88.8 blank	8
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1-116 – 1-116.2	2
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1-135 – 1-136	2
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1-138	2
1-139 – 1-142	0
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3-6	4
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3-9	2
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3-19	2
3-20 – 3-22	0
3-23	2
3-24	0
3-25 – 3-26	2
3-27	0
3-28	5
3-29	4
3-30	5
3-30.1 – 3-30.2	10
3-30.3	2
3-30.4	7
3-30.5 – 3-30.6	10
4-1 – 4-2	0
4-3 – 4-5	2
4-6	7
4-7 – 4-11	2
4-12	0
4-13	7
4-14 – 4-15	2
4-16	10
4-17 – 4-18	0
4-19 – 4-21	2
4-22 – 4-32	0
4-33 – 4-34	5
4-35 – 4-36	2
4-37 – 4-39	0
4-40	2
4-41	10

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4-47	0
4-48	2
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5-8	5
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5-11 – 5-13	0
5-14	2
5-15	4
5-16 – 5-17	2
5-18	0
5-19	10
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5-21	2
5-22	0
5-23 – 5-24	2
5-25 – 5-27	0
5-28	2
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6-2	2
6-3	10
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6-18	2
6-19 – 6-22	0
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6-33	2
6-34	0
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7-7 – 7-8	2
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7-11	10
7-12	2
7-13	4
7-14	5
7-15 – 7-16	0
7-17	5
7-18 – 7-19	4
7-20	5
7-21 – 7-22	0
7-23	4
7-24 – 7-25	0
7-26	10
7-27	0
7-28	10
7-29	0
7-30	2
7-31	0
7-32	10
7-33	2
7-34 – 7-35	0
7-36 – 7-37	2
7-38 – 7-45	0
7-46 – 7-47	2
7-48 – 7-49	0
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8-35	0

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Page No.	*Change No.
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8-42 – 8-44	10
8-45 – 8-48	0
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9-10	0
9-11 – 9-14	5
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B-4 – B-5	0
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B-7	0
B-8	5
B-9	0
B-10	5
B-11	4
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C-1	5
C-2	4
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D-1	0
D-2 blank	0
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*Zero in this column indicates an original page.

TECHNICAL MANUAL
NO. 55-2840-256-23

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 2 JUNE 1986

AVIATION UNIT AND AVIATION INTERMEDIATE MAINTENANCE

ENGINE, AIRCRAFT, TURROSHAFT
NSN 2840-01-131-3350 (T703-AD-700)
NSN 2840-01-333-2064 (T703-AD-700A)
NSN 2840-01-391-4397 (T703-AD-700B)

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 these procedures, please let us know. Mail your letter or 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, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. You may also submit your recommended changes by E-mail directly to <daf2028@dmh1.stl.army.mil>. A reply will be furnished directly to you. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

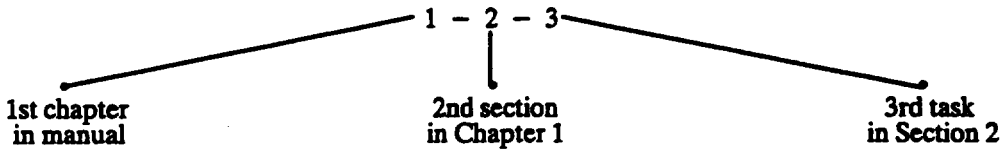
TABLE OF CONTENTS

Page

HOW TO USE THIS MANUAL

1. DESCRIPTION OF MANUAL

This manual provides instructions to AVUM and AVIM personnel for maintenance of the model T703-AD-700 engine. The manual is divided into 9 chapters, each of which is divided into sections. The descriptive sections are divided into **paragraphs**; the maintenance sections are divided into **tasks.** All descriptive paragraphs are identified by the common technical manual two digit number system; i.e., "1-9", "1-10", etc. The first number is the chapter, the second is the paragraph. Maintenance sections use the three digit numbering system to identify tasks. An example is shown below.



An exception to the above description is the numbering of troubleshooting procedures. Those procedures are considered part of paragraph 1-24 and numbered consecutively (1, 2, 3, etc.) after paragraph 1-24.

Appendices A thru E are located after Chapter 9. Each appendix contains specific data that supports and supplements information in chapters 1 thru 9. A list of appendices and description of each is contained in paragraph 2 below.

2. HOW TO FIND WHAT YOU ARE LOOKING FOR

There are four ways to find what your are looking for: (a) the **block access index** on the cover; (b) the **table of contents**, located before the How to Use this manual description; (c) the **list of tasks** located on the first page of each maintenance section; and (d) **alphabetical index.** The alphabetical index and glossary are located in the back of the manual.

a. Block Access Index. The most important and frequently used areas of the manual are identified on the manual cover. The black boxes on the cover line up with corresponding black marks on the edge of the manual to identify location of text.

b. Table of Contents. All Chapters, sections, and appendices are identified.

(1) **Chapter 1** provides general descriptive information and maintenance instructions on the engine as an assembly. Included in these maintenance procedures are Preventive Maintenance Checks and Services (PMCS), Troubleshooting, and Special Inspections

(2) **Chapter 2** provides references to engine assembly maintenance instructions in other areas of this manual and includes information on general shop practice techniques and procedures. Additional instructions are provided for disposition of unserviceable parts.

2. **HOW TO FIND WHAT YOU ARE LOOKING FOR (CONT)**

(3) Chapter 3 thru 9 include instructions for the major modules and systems that comprise the engine. Each chapter is divided into sections by its major components. Example of Chapter 9 division: Section I General Instructions; Section II Anti-Ice Solenoid Valve; Section III Anti-Ice Air Valve Assembly.

(4) **Appendix A - References.** This appendix is a total list of all publications referenced in this manual.

(5) **Appendix B - Maintenance Allocation Chart (MAC).** A description of the MAC is included in this appendix.

(6) **Appendix C - Expendable Supplies and Materials List.** A description of the list is included in this appendix.

(7) **Appendix D - Hiring Diagrams.** This appendix contains the engine/helicopter interconnecting wiring harness electrical diagram to help you understand the engine electrical system.

(8) **Appendix E - Manufactured Items List.** There are no manufactured items required for maintenance of the engine at this date.

(9) **Appendix F - Torque Limits.** The torque limits for all hardware are included in the applicable task.

c. **List of Tasks.** A list is provided at the beginning of each maintenance section that identifies all authorized maintenance.

d. **Glossary.** Definitions of abbreviations and unusual terms contained in the manual are listed here.

e. **Index.** All engine systems, components, and parts are listed in alphabetical order. You will find page references for each entry to specific tasks and subjects; such as, remove, repair, and adjust.

3. USING **THE MANUAL**

To perform maintenance, you will use this manual for three major reasons:

a. **Perform Scheduled Maintenance.** It's called Preventive Maintenance Checks and Services (PMCS) in the manual. The list of Preventive Maintenance Checks and Services (PMCS) is shown in a table in Chapter 1, Section IX. A detailed description of each column in the table is provided on the pages preceding the table.

b. **Troubleshooting.** When you don't know the cause of an engine problem, you must perform troubleshooting procedures to help you find the cause and the corrective action necessary to fix the problem. Troubleshooting procedures are given in Chapter 1, Section VII. When an engine problem exists, look at the TROUBLESHOOTING SYMPTOM INDEX to find the proper procedure to follow; then go to that procedure for Instructions.

3. USING THE MANUAL (CONT)

c. Perform Unscheduled Maintenance Procedures. In this category are inspect, adjust, remove, repair, and install maintenance procedures. These procedures are referred to as tasks. The instructions to perform these tasks are given in a format that provides an INITIAL SETUP followed by step-by-step procedures.

(1) Initial Setup. Initial setup is the first part of every task in the manual. It lists what tools, materials, and parts you will need before you can do the task. The following headings are used when they apply.

(a) Task Title. The task title after the paragraph number describes the job to be done in the task. When ON HELICOPTER TASK of OFF HELICOPTER task follows the title, it means that the procedure must be performed only on helicopter or off helicopter as stated.

(b) Tools. Tool Kits, or shop sets needed to do the task are listed here. If tools from your repairer's tool kit are needed, the kit is listed. Tools you need that are not in the kit or set, are listed by name, type, and size. Special tools and test and support equipment are listed by a T number. Find these items in the Maintenance Allocation Chart (Appendix B, section III).

(c) Materials. Expendable items and support materials are listed under this heading. These are things like solvent, rags, grease, safety wire, etc. They are listed by C number in Appendix C. Example: (C14).

(d) Parts. All mandatory replacement parts are listed under this heading. These are things like gaskets, packings, cotter pins, lockwashers, etc. They are listed by the Repair Parts and Special Tools List (RPSTL) name and part number and may be found in TM 55-2840-256-23P.

(e) Personnel Required. The people needed to do the task are listed under this heading. They are identified by their MOS. When more than one of any MOS is needed, the number needed is shown in parentheses. Other personnel needed are also listed.

(f) References. Related documents and TM's you will need to do the task are listed under this heading. The task steps tell you when these tasks and TM's are needed.

(g) Equipment Condition. All the things to be done before you start the task are listed under this heading.

(h) General Safety Instructions. Warnings and Cautions that apply in general to the complete procedure are described here. They are not repeated in the step-by-step procedures. Make sure you understand and comply with them.

3. USING THE MANUAL (CONT)

(2) Step-by-Step Procedures. Read through the entire procedure once before starting. In particular, review the INITIAL SETUP carefully before starting. It tells you what you will need and what you have to know to start the task. Do not start a task until:

You know what is needed

You have the things you need

You understand what to do

(a) If preliminary procedures are listed under Equipment Condition, be sure the listed tasks are done; then do this task.

(b) Pay attention to WARNINGS, CAUTIONS, and NOTES.

(c) When values are under lined or followed by the word INSPECT, an inspector must OK the completed step.

(d) Major steps and important instructions are printed in bold type.

(e) After completing the task, perform all tasks listed under FOLLOW ON MAINTENANCE.

(f) When Perform MOC is listed in Follow On Maintenance, observe the following:

-Engine installed in helicopter: Insure that pilot performs MOC.

-Engine not installed in helicopter: You must enter requirement for MOC in engine DA form 2404.

CHAPTER 1
INTRODUCTION AND ENGINE-GENERAL

Section I GENERAL INFORMATION AND DATA

1-1. SCOPE

Type of Manual: Aviation Unit and Intermediate Maintenance.

Model Number and Equipment Name: T703-AD-700, T703-AD-700A, and T703-AD-700B Turboshaft Aircraft Engine.

Purpose of Equipment: Helicopter Powerplant.

1-2. MAINTENANCE FORMS, RECORDS AND REPORTS

Department of the Army forms, records, and reporting procedures used for equipment maintenance will be those prescribed by DA PAM 738-751. Functional Users/ Manual for the Army Maintenance Management System - Aviation (TAMMS-A).

1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

NOTE

Decision to destroy engine shall be made by appropriate authority.

Destroy engine to prevent use by enemy when evacuation to safety is not possible. Refer to TM 750-244-1-5.

1-4. PREPARATION FOR STORAGE OR SHIPMENT

This information is detailed in Section XII.

1-5. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Refer to FM 1-511.

1-6. OFFICIAL NOMENCLATURE, NAMES AND DESIGNATIONS

COMMON TERM	DESCRIPTION
Fuel nozzle	Fuel injector
Combustion Module	Combustion Section
Turbine Module	Turbine Assembly
Compressor Module	Compressor Assembly
Accessory Gearbox Module	Accessory Gearbox Assembly
Electronic Supervisory Control (ESC)	Electronic Supervisory Control Assembly

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

If your engine needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you do not like the design. Put it on an SF368, Quality Deficiency Report (QDR). Mail it to us at:

Commander
USAATCOM
ATTN: AMSAT-I-MDO
4300 Goodfellow Blvd.
St. Louis, MO 63120-1798

We will send you a reply.

Section ll EQUIPMENT DESCRIPTION AND DATA

1-8. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

- CHARACTERISTICS:

Compressor - Single stage centrifugal.
Combustion Chamber - Can-type
Turbine - Four stages: two stage gas producer turbine (Ng) and two stage power turbine (Np).
Accessory Gearbox - Two gear trains: one gas producer and one power turbine.

- CAPABILITIES AND FEATURES

Airframe - mounted electronic supervisory control.
Suction type fuel pump.
Integral fuel filter with impending bypass visual pop-up indicator.
Integral oil filter with impending bypass visual pop-up indicator.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

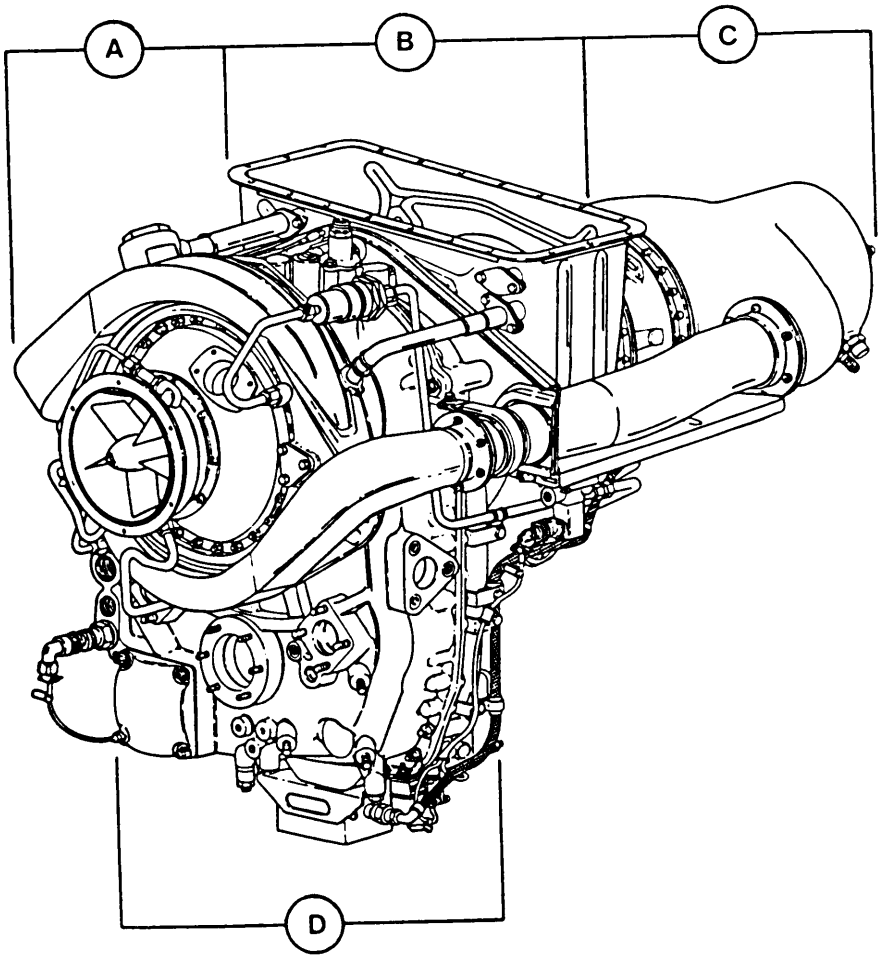
ENGINE MODULES:

(A) Compressor: The compressor module increases the pressure of inlet air to support the combustion process.

(B) Turbine: The turbine module provides power to drive the compressor and the aircraft power train thru the accessory gearbox.

(C) Combustion: The combustion module mixes and ignites fuel and compressed air. The resulting gases expand forward and drive the turbine rotors.

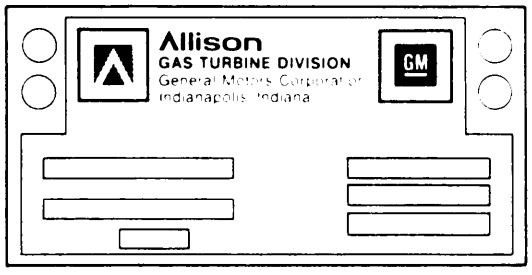
(D) Accessory Gearbox: The accessory gearbox is the primary structural member of the engine. Most engine components and engine mounted accessories are attached to it.



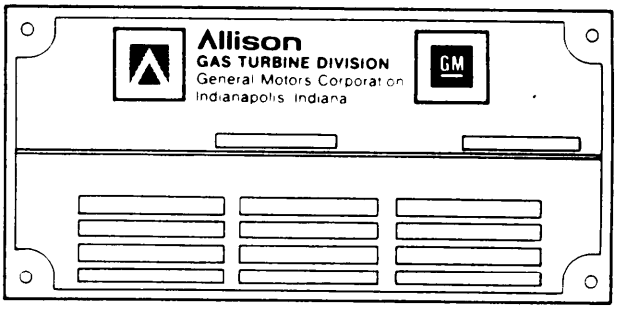
1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

IDENTIFICATION PLATES:

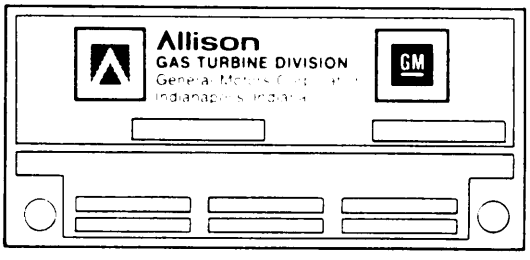
(E) Engine Identification Plate



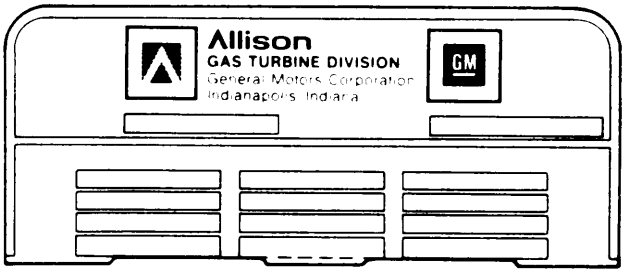
(G) Compressor Identification Plate

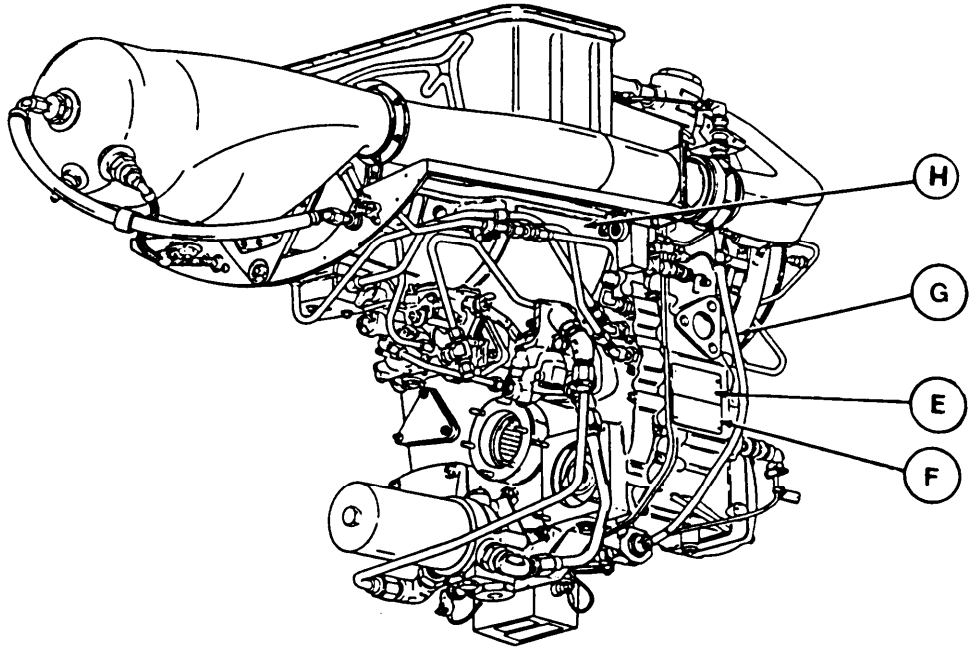


(F) Accessory Gearbox Identification Plate



(H) Turbine Identification Plate





1-10. DIFFERENCES BETWEEN MODELS

T703-AD-700B:

- Compressor bleed air valve
- Rerouting of air lines

1-11. EQUIPMENT DATA

- ENGINE RATING:

Design power output (Takeoff) 650 shp

- DIMENSIONS:

Length. . . . . .43.2 inches
Height. . . . . .25.1 inches
Width . . . . . .22.0 inches

- MAXIMUM ENGINE WEIGHT DRY (INCLUDING ELECTRONIC SUPERVISORY CONTROL): 252 lbs. (T703-AD-700B) : 255 lbs .

PRIMARY FUEL SPECIFICATIONS:

Fuels conforming to the following specification are approved for unlimited use.

MIL-T-5624	JP-4
MIL-T-5624	JP-5
MIL-T-83133	JP-8
ASTM: D-1655	Jet A
ASTM: D-1655	Jet A-1
ASTM: D-1655	Jet B
Arctic Diesel	Fuel DF-A (VV-F-800B)
ASTM: D-1655	*JP-1, Jet A or Jet A-1
ASTM: D-1655	*Diesel No. 1, Jet A or Jet A-1

*Not all JP-1 or Diesel No. 1 fuels conform to ASTM: D-1655 Jet A or Jet A-1.

- COLD WEATHER FUELS

The fuels recommended for consistent cold weather starting (40°F (4°C) and below) are as follows:

MIL-T-5624 JP-4
ASTM: D-1655 JET B

- ALTERNATE COLD WEATHER FUELS (BELOW 40 DEGREES F):

Jet A, Jet A-1 or JP-5 mixture (See TM 55-1520-248-23 for mixing procedures.)

WARNING

Always wear gloves when checking residue-coated turbine or exhaust parts. Handling lead-residue-coated parts by persons with open cuts and scratches on their hands can be extremely dangerous.

Operation on AVGAS (MIL-G-5572) in aircraft that do not have boost pumps can result in unexpected flameout.

CAUTION

MIL-G-5572 fuel containing tricresylphosphate (TCP) additive shall not be used.

NOTE

Operation on AVGAS (MIL-G-5572, all grades) is permitted for a maximum of 6 hours per turbine overhaul period, provided that aircraft boost pumps are available and turned on.

1-11. **EQUIPMENT DATA (CONT)**

- LUBRICATING OIL SPECIFICATIONS AND LIMITATIONS:

CAUTION

Oil consumption in excess of 1 quart in 5 hours of engine operation is indicative of serious internal leakage and must not be permitted. Internal oil leakage can result in undetected internal oil fires and cause disastrous turbine failures.

Normal engines use a minimal amount of oil. Any sudden increase in oil consumption is indicative of oil system problems and must be corrected.

Ambient Temperature/Oil Type

32 degrees F and above: MIL-L-23699
32 degrees F to -40 degrees F: MIL-L-23699 or MIL-L-7808
-40 degrees F and below: MIL-L-7808 only

1-11. EQUIPMENT DATA (CONT)

- TURBINE GAS TEMPERATURE (TGT) LIMITS:

Steady State

Intermediate: 785 degrees C

Max. Continuous: 716 degrees C (Max. continuous is the highest power ordinarily used in regular cruise operation.)

NOTE

The time-at-temperature limits specified below are not additive and may be repeated without restriction.

Momentary peak temperatures of 927 degrees C are permitted for no more than one second.

During Starting and Shutdown

Temp. Range	Time	Maintenance Action
0-785 degrees C	No Limit	None
786-926 degrees C	*Less than 10 sec	None
786-926 degrees C	*over 10 sec	**Inspect turbine
928-999 degrees C	Not Allowed	**Inspect turbine
Over 999 degrees C	Not Allowed	Remove turbine for depot maintenance.

During Power Transients

Temp. Range	Time	Maintenance Action
0-785 degrees C	No Limit	None
786-871 degrees C	Less than 12 sec	None
786-871 degrees C	Over 12 sec	**Inspect turbine
872-927 degrees C	*Not Allowed	**Inspect turbine
Over 927 degrees C	*Not Allowed	Remove turbine for depot maintenance

*Momentary peak temperatures of 927 degrees C are permitted for no more than one second.

** Refer to Special Inspection Section X Record temperature and duration in the Aircraft Log Book.

1-12. EQUIPMENT CONFIGURATIONS

Not applicable.

1-13. SAFETY, CARE, AND HANDLING

Not applicable.

Section III PRINCIPLES OF OPERATION

1-14. ENGINE THEORY

The T703 AD-700 engine is an internal combustion gas turbine consisting of four major modules and accessories. The modules, which are described in para 1-9, are: Compressor, Turbine, Combustion, and Accessory Gearbox. Following are descriptions of the engine by major operating systems.

Airflow and combustion (para 1-15).
Fuel system (para 1-16).
Electrical system (para 1-17).
Lubrication system (para 1-18).
Anti-icing system (para 1-19).

1-15. AIRFLOW AND COMBUSTION

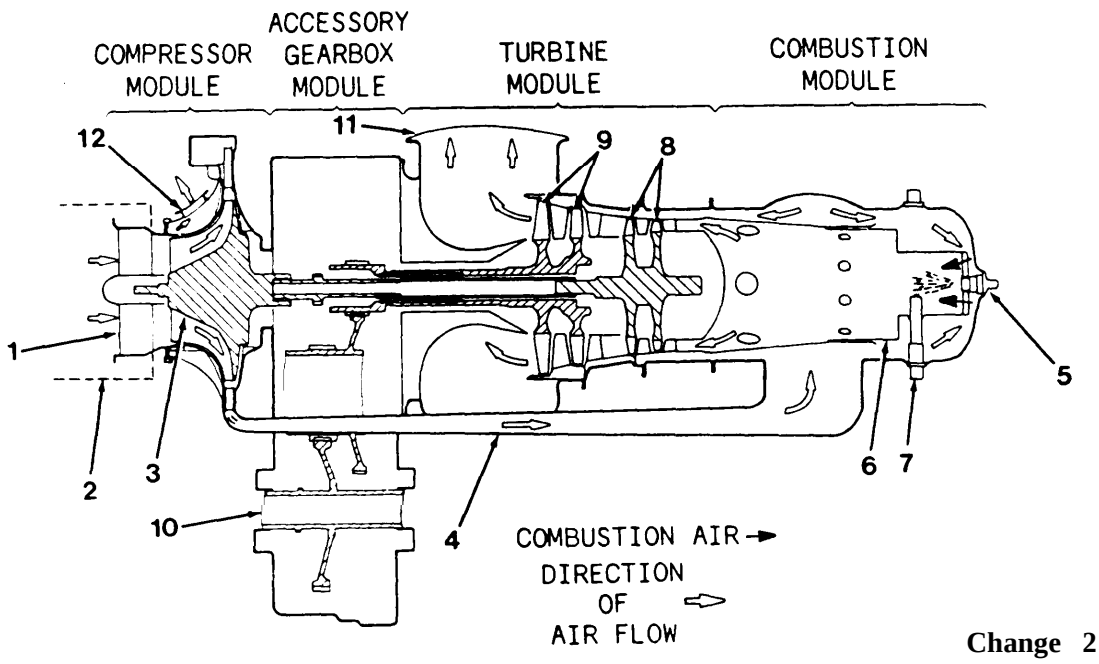
Air enters compressor module air inlet (1) from helicopter mounted particle separator (2). Compressor rotor (3) accelerates inlet air increasing its velocity. The diffuser decreases velocity and increases the temperature and pressure.

Air is directed through compressor discharge air tubes (4) to the combustion module.

In the combustion module, 20% - 25% of compressor discharge air is mixed with fuel from fuel nozzle (5) and ignited in combustion liner (6). The remaining 75% - 80% is used for cooling, anti-icing, and seal pressurization. Spark igniter (7) fires during initial combustion only. After initial combustion, spark igniter (7) is no longer needed, since the combustion process continues as long as fuel and air are supplied.

Combustion gases expand forward and drive two N_g turbine wheels (8) and two N_p turbine wheels (9). N_g turbine wheels (8) drive compressor rotor (3), and accessory gear train inside the accessory gearbox module. N_p turbine wheels (9) drive the power turbine gear train inside the accessory gearbox and power output gear shaft (10). The combustion gases are vented out of the exhaust air outlet (11).

Inducer bleed port (12) discharges air at idle speed and acts as an air intake during high power demands.



1-16. FUEL SYSTEM

SUPPLY AND FLOW

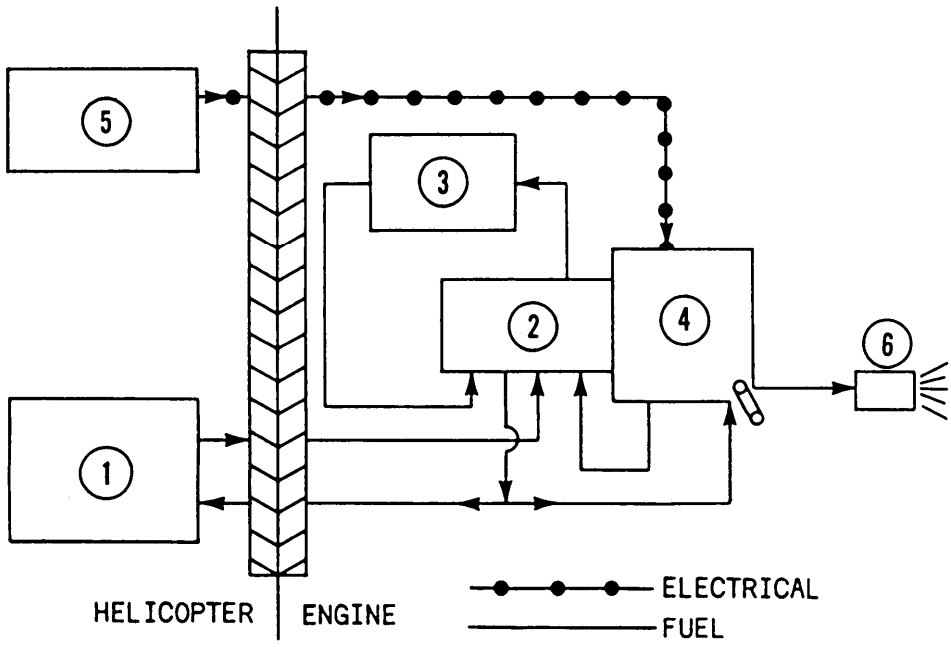
The helicopter fuel system (1) supplies fuel to the engine (1) as follows:

- Fuel is delivered to a jet inducer within the fuel pump (2). The resulting increase in pressure sends the fuel through the fuel filter (3) and returns it to the fuel pump (2).
- A vane type pump then supplies filtered fuel to the fuel control (4).

NOTE

Excess fuel sent to fuel control (4) is routed through an Internal bypass valve in fuel control.

- Electronic supervisory control (5) governs Np turbine speed by scheduling the amount of fuel that fuel control (4) meters to fuel nozzle (6).
- Fuel nozzle (6) sprays fuel into combustion module.



1-16. FUEL SYSTEM (CONT)

CONTROL AND MONITORING

The fuel control (1) and electronic supervisory control (2) govern engine power output by controlling speed of Ng and Np turbine wheels. The major features of control and monitoring are as follows:

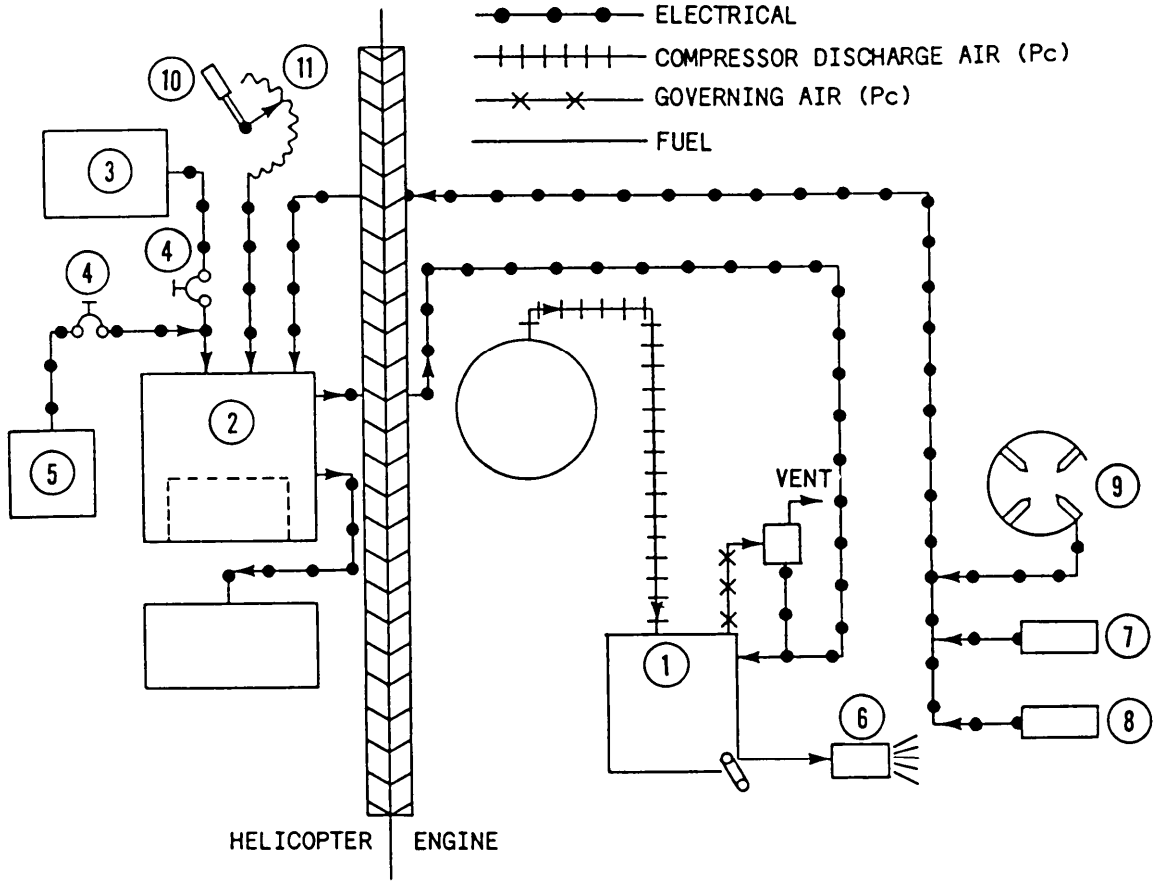
- Electronic supervisory control (2) is powered by helicopter 28 VDC bus (3) through circuit breaker (4). Back-up power, in case of helicopter power failure, is supplied through circuit breaker (4) directly from helicopter battery (5).

Electronic supervisory control (2) uses signals from the following components to determine the amount of fuel that fuel control (1) meters to fuel nozzle (6):

Ž Ng and Np turbine speeds transmitted by Ng (7) and Np (8) magnetic pickups.

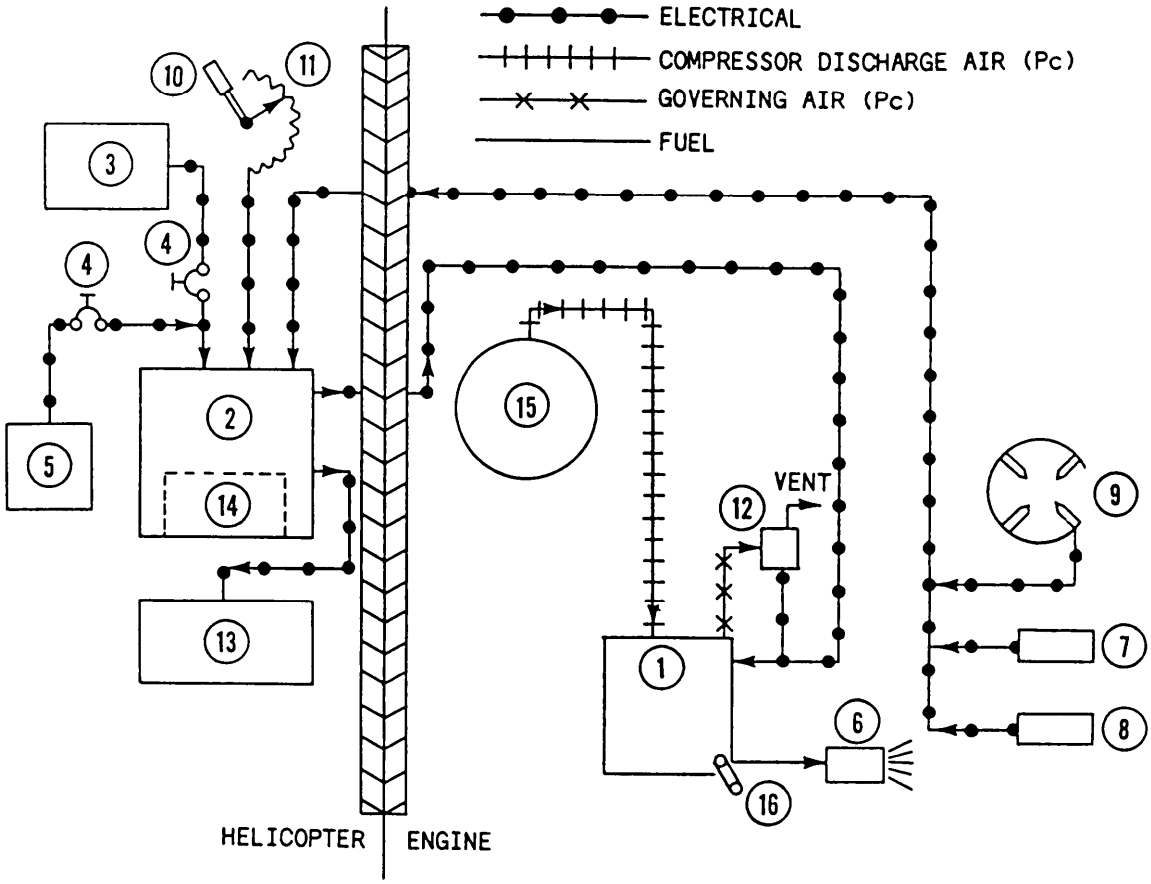
Ž Turbine gas temperature (TGT), transmitted by thermocouples (9).

Ž Pilot's collective lever (10) power demands, transmitted by collective pitch transducer (11).



1-16. FUEL SYSTEM (CONT)

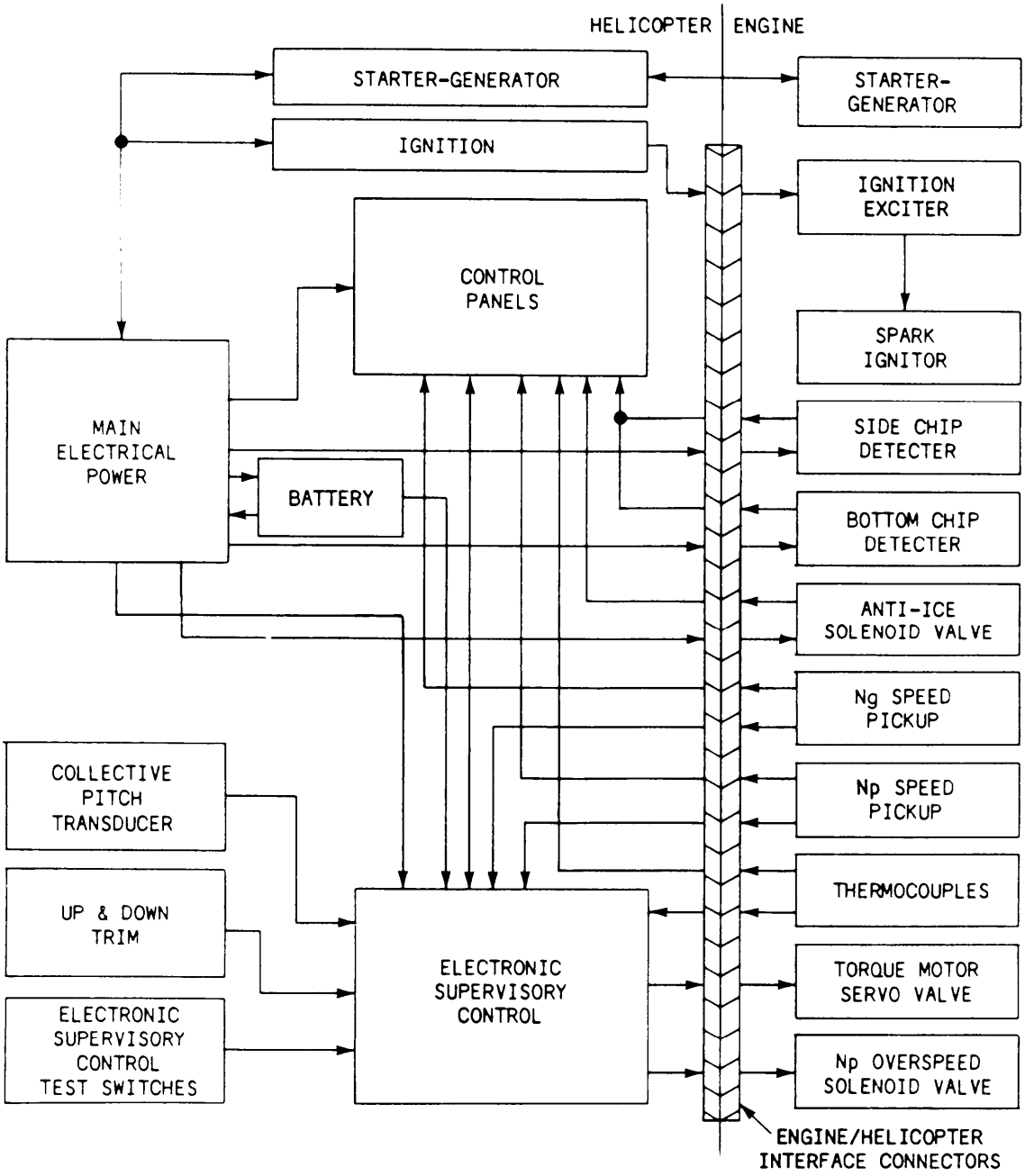
- Electronic supervisory control (2) prevents engine overspeeds by opening N2 overspeed solenoid valve (12) and venting governing air (Py) from fuel control (1) overboard. This causes fuel control (1) to meter fuel to fuel nozzle (6) at minimum flow.
- Electronic supervisory control (2) is self diagnostic and signals control display (13) to warn of malfunction when interrogated (TM 55-1520-248-23).
- Electronic supervisory control (2) has an analog back-up governor (14) that gains control of the engine if the digital section of the control fail s.
- The control system provides a manual mode in event of failure of digital and analog sections of the control. Selection of manual mode de-energizes the electronic control, allowing the pilot to regulate engine power by throttle.
- Fuel control (1) senses compressor discharge air (Pc) pressure through a line connected to the diffuser scroll (15), and uses it to help determine the amount of fuel metered to fuel nozzle (6).
- The helicopter throttle linkage is connected to fuel control throttle lever (16). This enables the pilot to start the engine and take manual control of engine if the electronic supervisory control (2) fails.
- Fuel control (1) has only two on-engine adjustments: the start acceleration schedule and idle speed.



1-17. ELECTRICAL SYSTEM

INTRODUCTION

The engine electrical system is connected to helicopter power, indicating, and control interfaces through the engine electrical harness and the engine/helicopter interface connector. The only exception is the starter-generator circuit, which is directly wired to its helicopter interface. All helicopter electrical circuits that interface engine electrical circuits are described in TM 55-1520-248-23. A wiring diagram of the engine electrical harness is shown in Appendix D. Following are descriptions of the engine electrical harness circuits and the electronic supervisory control circuit.



1-17. ELECTRICAL SYSTEM (CONT)

ENGINE ELECTRICAL HARNESS CIRCUITS

- Ignition exciter (l): When helicopter ignition system is activated, the ignition exciter converts incoming voltage to a high energy charge.

- Spark igniter (2): Receives high energy charge from ignition exciter, which ignites the fuel-air mixture in combustion liner. Once the starter system is deactivated and the engine is advanced to idle rpm, the combustion process is continuous as long as adequate amounts of fuel and air are supplied.

- Magnetic chip detectors (3) & (4): Both magnetic chip detectors (side and bottom) receive electrical power from helicopter electrical system. They extend into the lubrication system within accessory gearbox. Each chip detector has two magnetic poles, and as oil flows by, metal particles within the oil will be attracted to the magnetic poles or "the magnets". When a particle contacts the two magnetic poles it completes a circuit to ground and illuminates the affected warning light on the control panel.

- Anti-ice solenoid valve (5): This valve is the main controlling component of anti-icing system. It receives electrical power from helicopter main electrical power system. It is a fail-safe solenoid and requires electrical power to stop the flow of anti-icing air. If electrical power is lost, anti-icing air is automatically supplied. When anti-icing system is turned ON, a caution will appear on helicopter control panel.

  Ng and Np Speed pick-ups (6) & (7): Sense the speed of the Ng and Np turbine wheels and transmit signals to:

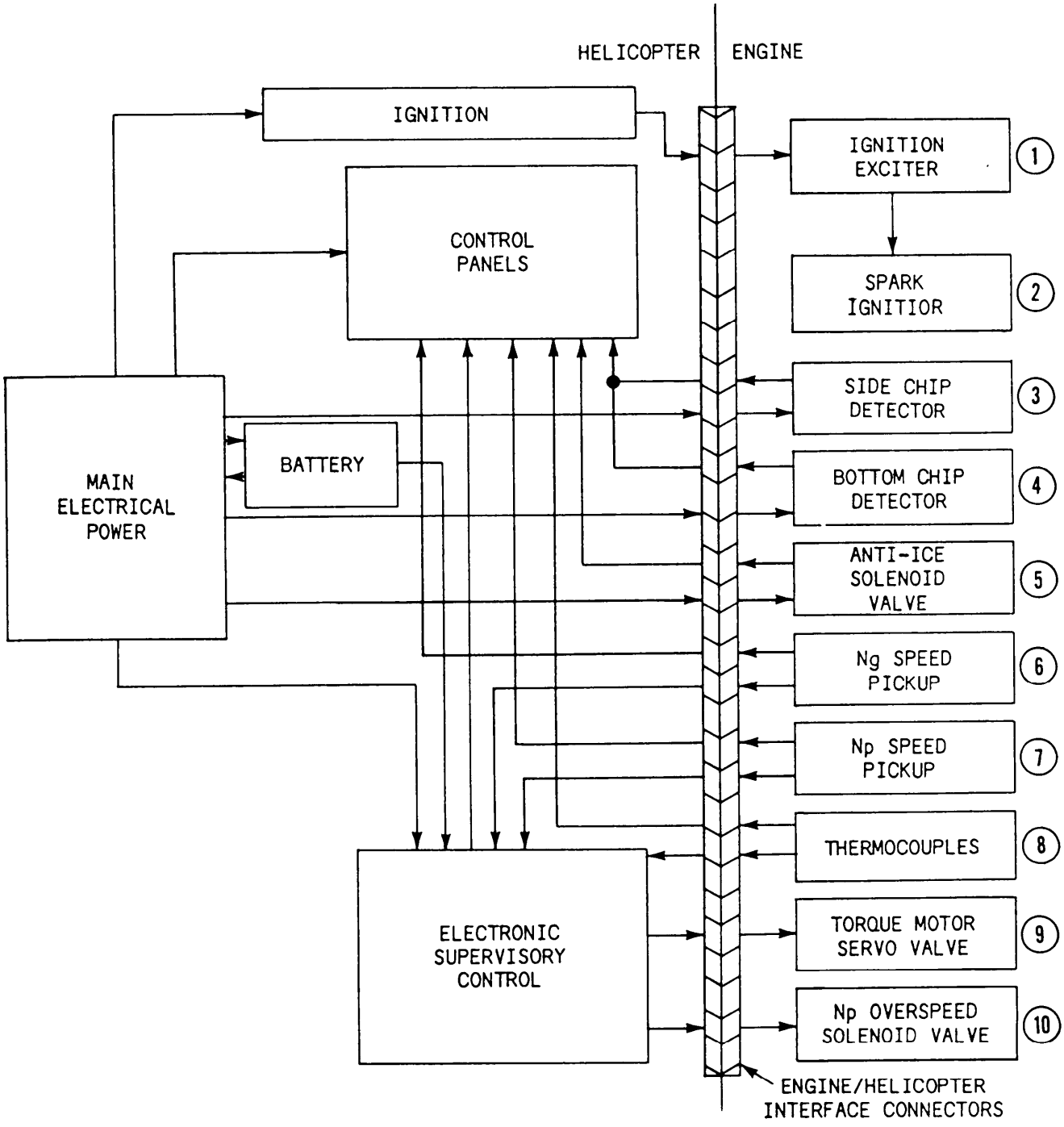
  Electronic supervisory control
  Ng speed indicator
  Np speed indicator

  The speed pick-ups have internal magnetic fields and generate their own current, deleting any requirement for an external power source.

  Thermocouples (8): Consist of four equally spaced thermocouple probes. They extend into turbine module to measure temperature of gases leaving number two Ng gas producer turbine wheel . Each probe is a junction of a positive chromel (CH) and a negative alumel (AL) material. These materials generate a dc voltage which is directly proportional to gas temperatures they sense. This deletes requirement for an outside power source. An average of four voltages is transmitted to turbine gas temperature (TGT) indicator (on control panel) and to the electronic supervisory control.

  Torque motor servo valve (9): Receives electrical power and responds to signals from helicopter mounted electronic supervisory control. Using these signals, it changes the output of fuel from fuel control to fuel nozzle.

  Np overspeed solenoid valve (10): Receives electrical power and responds to signals from helicopter mounted electronic supervisory control. Whenever the electronic supervisory control senses a pending engine overspeed, it signals the Np overspeed solenoid valve to open. This action by the solenoid vents governing air (Py) from fuel control causing the fuel control to reduce fuel flow to limit Np speed.


HELICOPTER
ENGINE
IGNITION
CONTROL PANELS
MAIN ELECTRICAL POWER
BATTERY
ELECTRONIC SUPERVISORY CONTROL
IGNITION EXCITER
1
SPARK IGNITIOR
2
SIDE CHIP DETECTOR
3
BOTTOM CHIP DETECTOR
4
ANTI-ICE SOLENOID VALVE
5
Ng SPEED PICKUP
6
Np SPEED PICKUP
7
THERMOCOUPLES
8
TORQUE MOTOR SERVO VALVE
9
Np OVERSPEED SOLENOID VALVE
10
ENGINE/HELICOPTER INTERFACE CONNECTORS

1-17. ELECTRICAL SYSTEM (CONT)

ELECTRONIC SUPERVISORY CONTROL CIRCUIT

- Electronic supervisory control (1): has two internal circuits, digital (primary) and analog (back-up). Using information from Ng and Np speed pick-ups, and thermocouples, digital circuit controls engine RPM during all phases of engine operation including starting. It controls engine by supervising torque motor servo valve and Np overspeed solenoid valve. The analog circuit gains control of engine when the digital circuit fails. The analog section also provides overspeed protection. If the analog section fails, the pilot can use manual throttle control to regulate power.

- Electronic supervisory control test circuit (2): Starting test function activates the malfunction display system within control. The control will then display malfunction code or no-existing-fault code on control panel. In addition, circuits test the digital and analog overspeed circuits.

Up and down trim switch (3): Activating up switch signals electronic control to increase Np RPM. Activating the down switch signals a decrease in Np RPM.

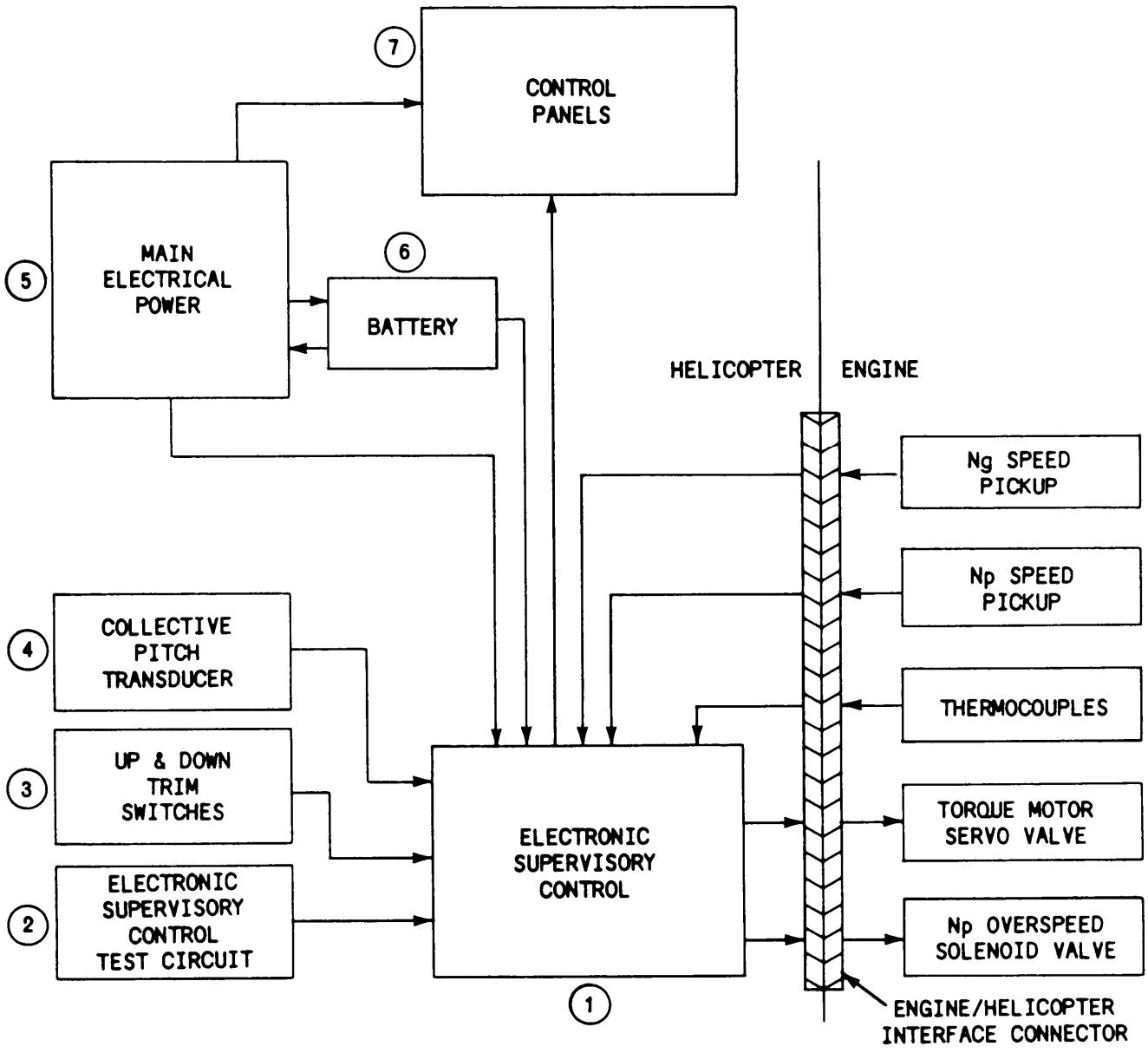
Collective pitch transducer (4): Senses power demands from collective pitch lever and transmits thereto electronic supervisory control.

Main electrical power (5): Supplies primary electrical power to electronic supervisory control and its related circuits.

Battery (6): Supplies electrical power to the electronic control during starting and also during main electrical power failure.

Control panels (7): Display the following:

Engine indications
Engine cautions/advisories


7
CONTROL PANELS
5
MAIN ELECTRICAL POWER
6
BATTERY
HELICOPTER
ENGINE
Ng SPEED PICKUP
Np SPEED PICKUP
THERMOCOUPLES
TORQUE MOTOR SERVO VALVE
Np OVERSPEED SOLENOID VALVE
ENGINE/HELICOPTER INTERFACE CONNECTOR
4
COLLECTIVE PITCH TRANSDUCER
3
UP & DOWN TRIM SWITCHES
2
ELECTRONIC SUPERVISORY CONTROL TEST CIRCUIT
ELECTRONIC SUPERVISORY CONTROL
1

1-18.1 LUBRICATION SYSTEM

INTRODUCTION

The lubrication system is a circulating dry sump vented system. The oil reservoir and oil cooling system are a part of the helicopter oil supply system. The system furnishes lubrication, scavenging, and cooling as needed for engine bearings, splines, and gears.

SYSTEM OPERATION

- The helicopter oil supply system (1) provides oil to accessory gearbox module (2).

  Pressure pump (3) draws oil from helicopter oil supply system (l), and pumps it to oil filter assembly (4). After being filtered, pressure oil travels through check valve (5) and an oil pressure regulator (located inside the oil filter housing assembly) and on to lubricated engine components (6). Once pressure oil has serviced these components it becomes scavenge oil.

- Three scavenge oil pumps (7) draw the scavenge oil back to the gearbox. Oil accumulated within bottom of accessory gearbox module (2) is pumped past bottom magnetic chip detector (8) by accessory gearbox sump scavenge pump (9).

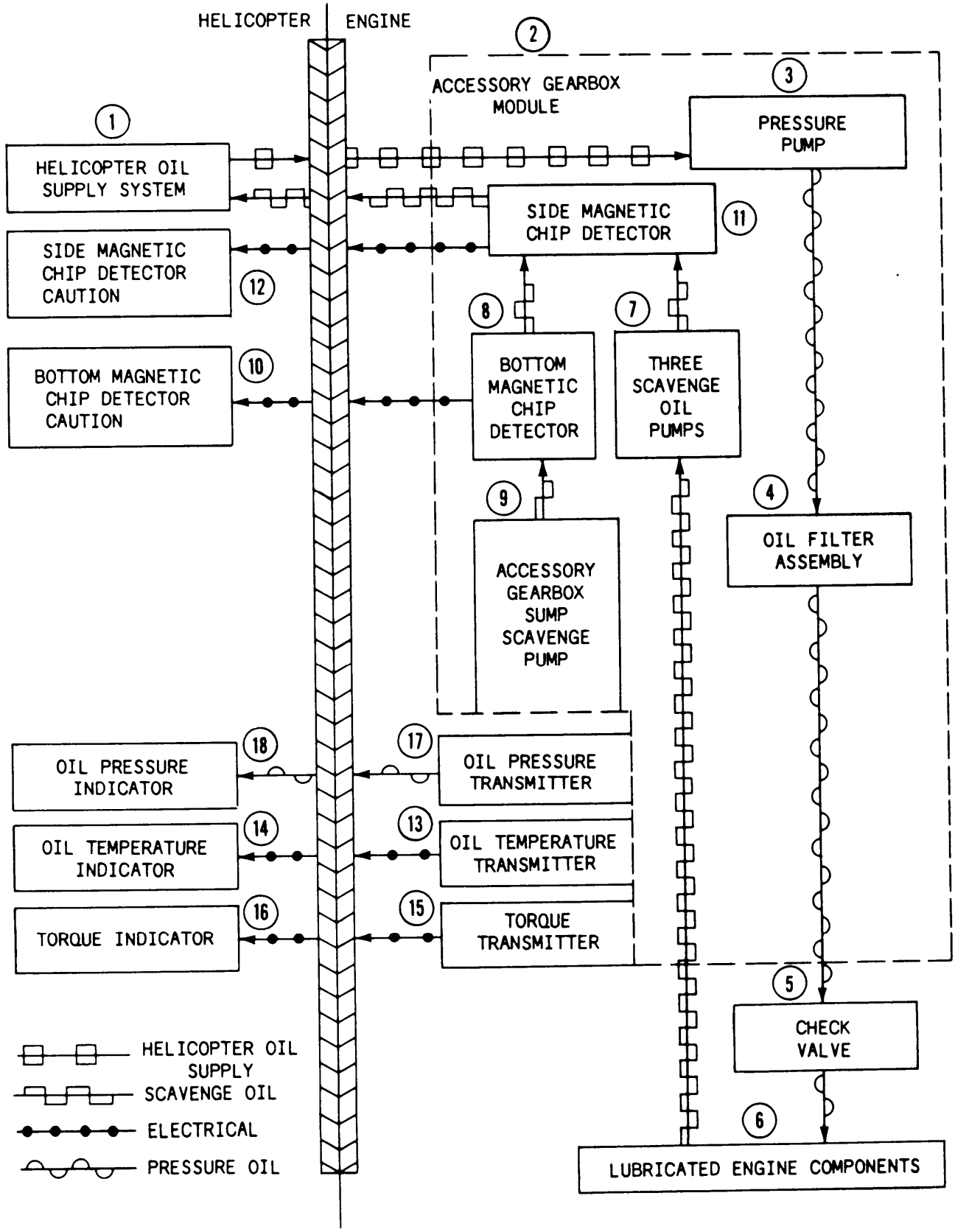
  When a metal particle generated from within the gearbox is detected, a signal is transmitted to illuminate the bottom magnetic chip detector caution (10) on the helicopter control panel. Accessory gearbox scavenge oil, and oil from three scavenge pumps (7), is pumped past the side magnetic chip detector (11).

- When a metal particle is detected, a signal is transmitted to illuminate the side magnetic chip detector caution (12) on helicopter control panel . The scavenge oil is then pumped back to the helicopter oil system (l).

- Oil temperature transmitter (13), mounted in the helicopter oil tank, transmits signals to helicopter oil temperature indicator (14).

  Torque transmitter (15), mounted on the engine forward firewall, transmits signals to helicopter torque indicator (16).

- Oil pressure transmitter (17), mounted on the engine forward firewall, transmits signals to helicopter oil pressure indicator (18).


HELICOPTER
ENGINE
2
ACCESSORY GEARBOX MODULE
3
PRESSURE PUMP
1
HELICOPTER OIL SUPPLY SYSTEM
SIDE MAGNETIC CHIP DETECTOR
11
SIDE MAGNETIC CHIP DETECTOR CAUTION
12
8
7
BOTTOM MAGNETIC CHIP DETECTOR CAUTION
10
BOTTOM MAGNETIC CHIP DETECTOR
THREE SCAVENGE OIL PUMPS
9
4
OIL FILTER ASSEMBLY
ACCESSORY GEARBOX SUMP SCAVENGE PUMP
18
17
OIL PRESSURE INDICATOR
OIL PRESSURE TRANSMITTER
14
13
OIL TEMPERATURE INDICATOR
OIL TEMPERATURE TRANSMITTER
16
15
TORQUE INDICATOR
TORQUE TRANSMITTER
5
CHECK VALVE
6
LUBRICATED ENGINE COMPONENTS
HELICOPTER OIL SUPPLY
SCAVENGE OIL
ELECTRICAL
PRESSURE OIL

1-18. LUBRICATION SYSTEM (CONT)

OIL FILTER ASSEMBLY OPERATION

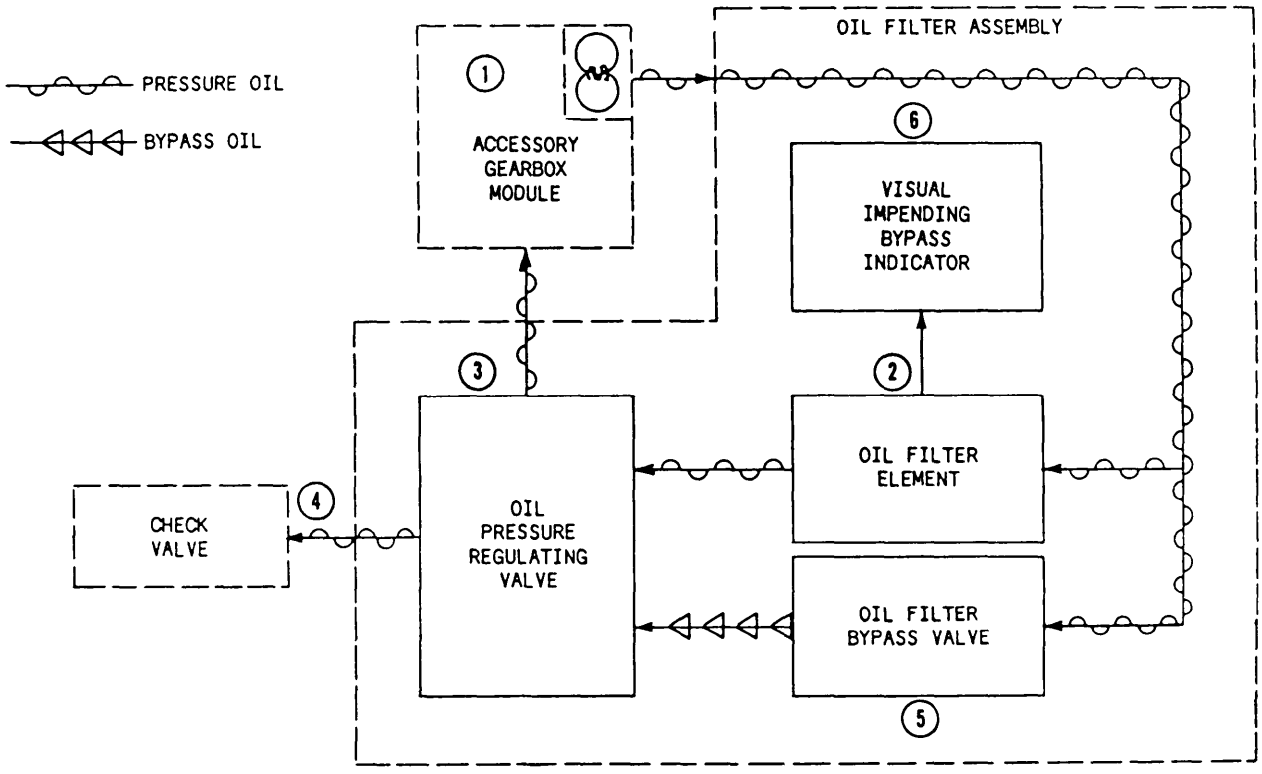
- Normal operation:

  The engine oil pressure pump within accessory gearbox module (1) supplies pressure oil to the oil filter element (2). The element traps contaminants and allows filtered oil to travel to oil pressure regulating valve (3).

  At operating RPM, the engine oil pressure pump supplies oil at a higher pressure than needed. The oil pressure regulating valve (3) maintains engine oil pressure at 115-130 psi when engine is at operating RPM. It maintains oil pressure by returning excess pressure oil to accessory gearbox (1). Oil pressure can be changed by manually adjusting oil pressure regulating valve (3). The regulated oil pressure travels through check valve (4) and on to lubricated engine components. Check valve (4) is spring loaded closed to prevent oil in the helicopter oil system from draining into accessory gearbox module (1) when engine is not operating. Oil pressure of 3 psi or greater is required to open it.

- Bypass operation:

  When oil filter element (2) becomes blocked or clogged the resulting oil pressure buildup opens oil filter bypass valve (5). This allows unfiltered bypass oil to travel to oil pressure regulating valve (3). The visual impending bypass indicator (6), senses difference in pressure across oil inlet and outlet ports of oil filter element (2). When oil pressure differential exceeds a preset value, the red visual indicator button will extend or pop-up. The impending bypass warning system will not function until oil temperature reaches 40 degrees C.



1-18. LUBRICATION SYSTEM (CONT)

LUBRICATED ENGINE COMPONENTS

No. 1 bearing (1) and oil pressure reducer assembly (2):

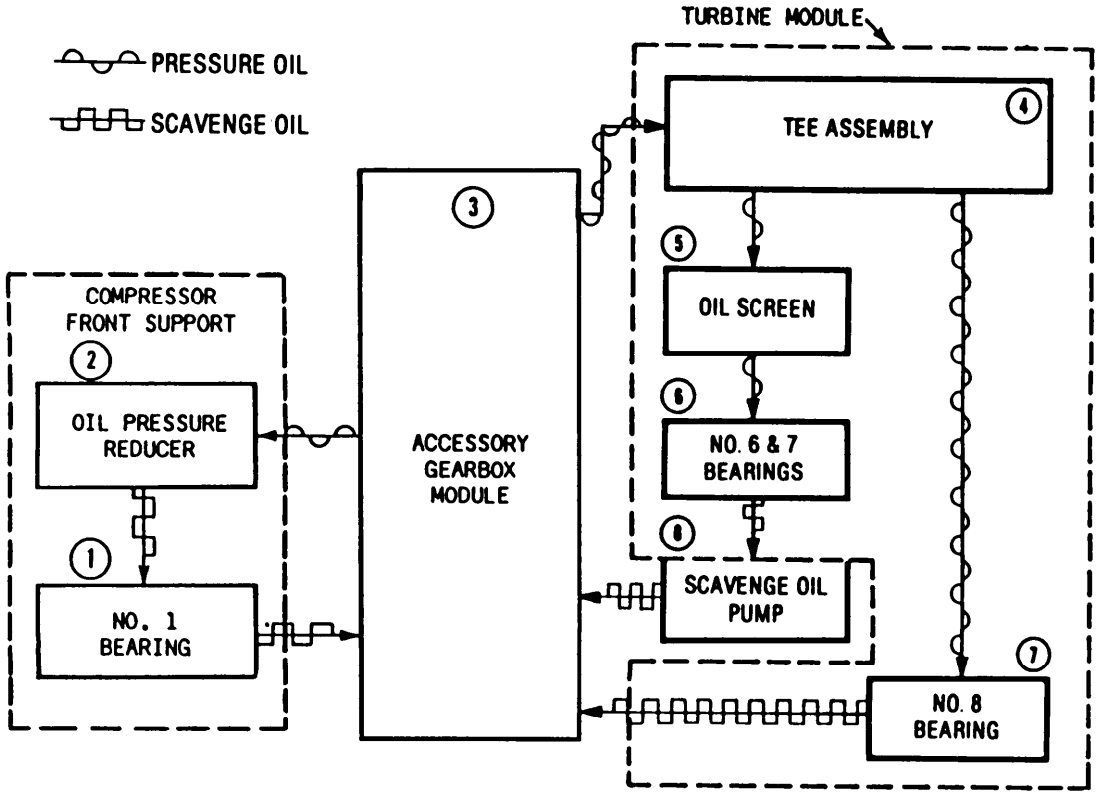
Pressure oil travels from accessory gearbox module (3), through oil pressure reducer (2), to No. 1 bearing (l). Oil pressure reducer (2) reduces flow of oil to No. 1 bearing, metering only the amount needed to cool and lubricate it. After passing through No. 1 bearing (l), oil is returned to accessory gearbox through scavenge oil system.

No. 6 and 7 bearings (6) and No. 8 bearing (7):

Pressure oil from accessory gearbox module (3) travels through a rigid tube to the power turbine pressure oil tee assembly (4). The tee assembly divides the oil for delivery to the No. 6 and 7 bearings and to the No. 8 bearing. An oil screen (5) is located in the base of the tee assembly. Oil flows through the oil screen and is delivered to the No. 6 and 7 bearings (6). The rest of the oil flows through the tee assembly outlet, through a rigid tube, and is delivered to the No. 8 bearing (7). The screen and bearings are all components of the turbine module.

Scavenge oil sump (8):

Prevents internal oil leakage at engine shutdown. The oil sump, which is externally mounted, collects scavenge oil leaving No. 6 and 7 bearings (6).



1-19. ANTI-ICING SYSTEM

INTRODUCTION

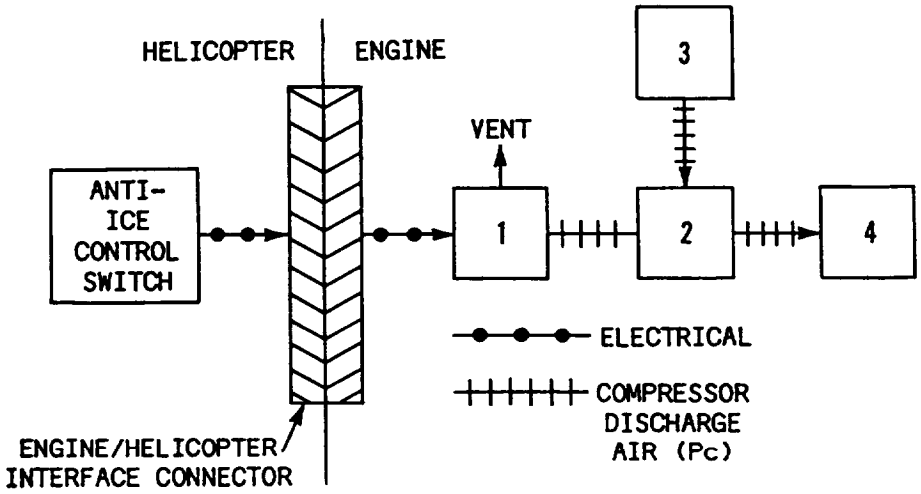
The anti-icing system provides hot air to prevent formation of ice on compressor front support. It is a fail-safe system that automatically provides anti-icing air during an electrical power failure.

OPERATIONAL DESCRIPTION

When the helicopter anti-ice system is turned ON, electrical power to anti-ice solenoid valve (1) is interrupted, allowing it to open. The opening of anti-ice solenoid valve (1) allows anti-icing air valve (2) to open.

Compressor discharge air (Pc) then flows from diffuser scroll (3) through anti-icing air valve (2), to compressor front support (4). This warms the front support and prevents the formation of ice.

When the helicopter anti-ice system is turned OFF, electrical power is supplied to anti-ice solenoid valve (1), and it closes. This creates a pressure build-up between anti-ice solenoid valve (1) and anti-icing air valve (2); causing the anti-icing air valve to close. With the air valve (2) closed, the flow of compressor discharge air (Pc) from scroll (3) is stopped.



1-19. COMPRESSOR BLEED AIRSYSTEM

INTRODUCTION

The compressor bleed air system (T703-AD-700B ONLY) permits rapid engine response. The system consists of a compressor bleed air control valve located on the front face of the scroll and an inducer bleed manifold which encases the slotted compressor shroud housing.

OPERATIONAL DESCRIPTION

The compressor bleed air control valve is open during starting and ground idle operation, and remains open until a predetermined pressure ratio is obtained. At the predetermined pressure ratio, the valve begins to modulate from the open to the closed position. The inducer bleed discharges air to atmosphere at engine idle speed. At higher power settings, flow changes from bleed to intake air.

Section IV REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

1-20. GENERAL DESCRIPTION

Repair parts, special tools, and support equipment are covered In TM 55-2840-256-23P.

Section V SERVICE UPON RECEIPT

This section includes maintenance procedures for inspection of shipping container humidity indicator; removal of shipping container top, and removal of engine from the shipping container. Additional maintenance procedures include activating engine after storage; installation and removal of the engine from the engine turnover stand.

LIST OF TASK

NOTE

If engine is dropped, it must be forwarded to an overhaul facility for inspection/repair.

1-5-1. INSPECT SHIPPING CONTAINER HUMIDITY INDICATOR

INITIAL SETUP

Applicable Configurations:
All

Personnel Required:
68B Aircraft Powerplant Repairer

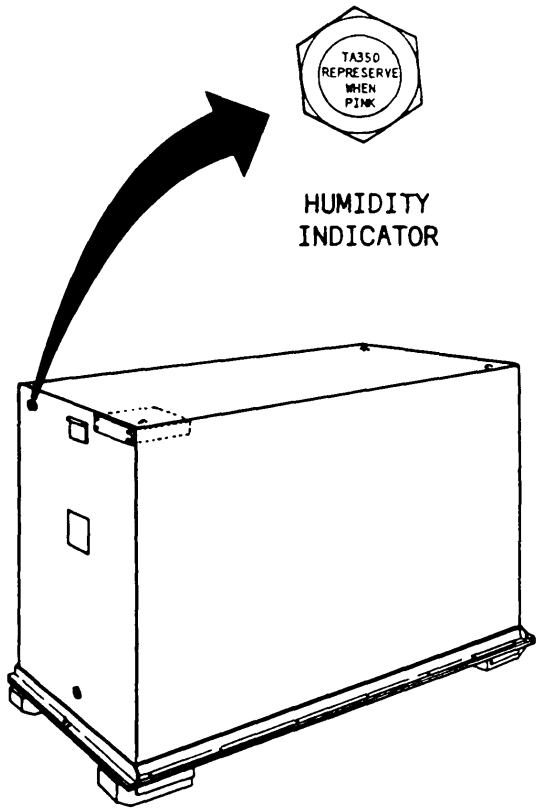
Inspect color of humidity indicator as follows.

-If Indicator is blue, record the date of inspection in the container records.

-If indicator is light lavender or pink, inspect engine in storage (task 1-12-8).

NOTE

See shipping container inspection (task 1-12-3) if the container is damaged.



END OF TASK

1-5-2 REMOVE SHIPPING CONTAINER TOP

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Lift Sling (140)
Torque wrench 30-150 in. lbs
Hoist minimum 500 lb capacity

Materials:
Lockwire (C4)

Personnel Required:
68B Aircraft Powerplant Repairer
Helper

General Safety Instructions:

WARNING

Hoist heavy objects very carefully. Insure that lift equipment is serviceable. Use a helper to guide object being raised or lowered. Use guide lines when hoisting overhead. DO NOT get under the object. Careless hoisting can result in injury or death.

1. Manually press relief valve (1) to allow container pressure to equalize.

2. Remove ten nuts (2) and bolts (3).

3. Connect hoist and sling (T40) (4) to lifting hooks (5).

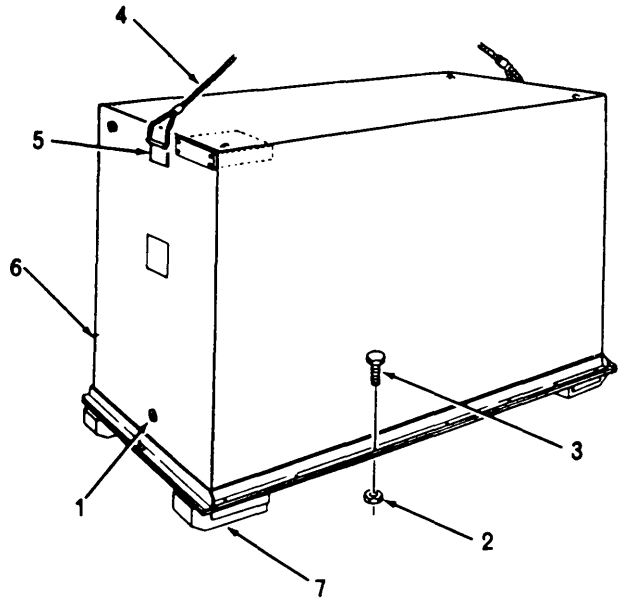
4. Instruct helper to guide top (6) to prevent it from contacting engine during hoisting.

CAUTION

Insure top does not strike engine during hoisting. Damage may result.

5. Slowly hoist top (6) from bottom (7).

6. Move hoist to a clean area; then lower top (6) to ground. Disconnect hoist and sling (T40).



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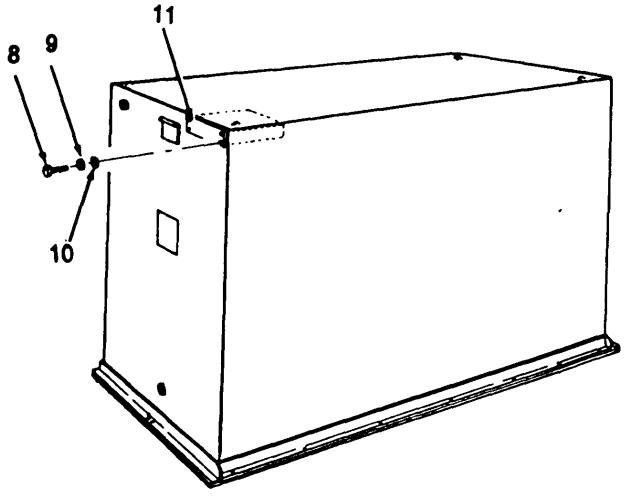
1-5-2. REMOVE SHIPPING CONTAINER TOP (CONT)



7. Remove four screws (8), washers (9), rubber washers (10), and cover (11); then remove engine historical records from records receptacle.

8. Install cover (11), four rubber washers (10), washers (9), and screws (8). Torque 30-40 In. lbs and lockwire (C4).

INSPECT

END OF TASK

1-5-3. REMOVE ENGINE FROM SHIPPING CONTAINER

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Engine Assembly Lift (T9)
Hoist minimum 500 lb capacity

Personnel Required:
68B Aircraft Powerplant Repairer
Helper

Equipment Condition:
Shipping container top removed (task 1-5-2).

General Safety Instructions

WARNING

Hoist heavy objects very carefully. Insure that lift equipment is serviceable. Use a helper to guide object being raised or lowered. Use guide lines when hoisting overhead. DO NOT get under the object. Careless hoisting can result in injury or death.

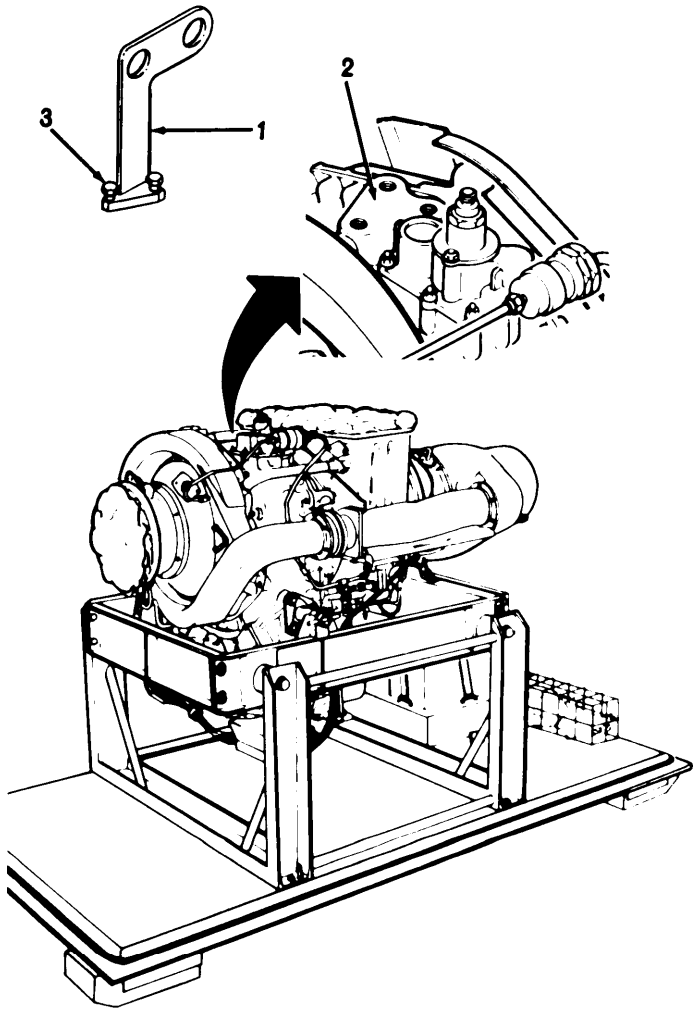
1. Install engine assembly lift (1) on gearbox top mounting pad (2) and tighten three bolts (3).

2. Attach hoist to engine assembly lift (1).

CAUTION

Do not raise engine or place any lifting forces on engine in shipping container. Failure to comply may result in damage to container or engine.

3. Hoist engine only enough to relieve weight from mounting brackets.



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1-5-3. REMOVE ENGINE FROM SHIPPING CONTAINER (CONT)

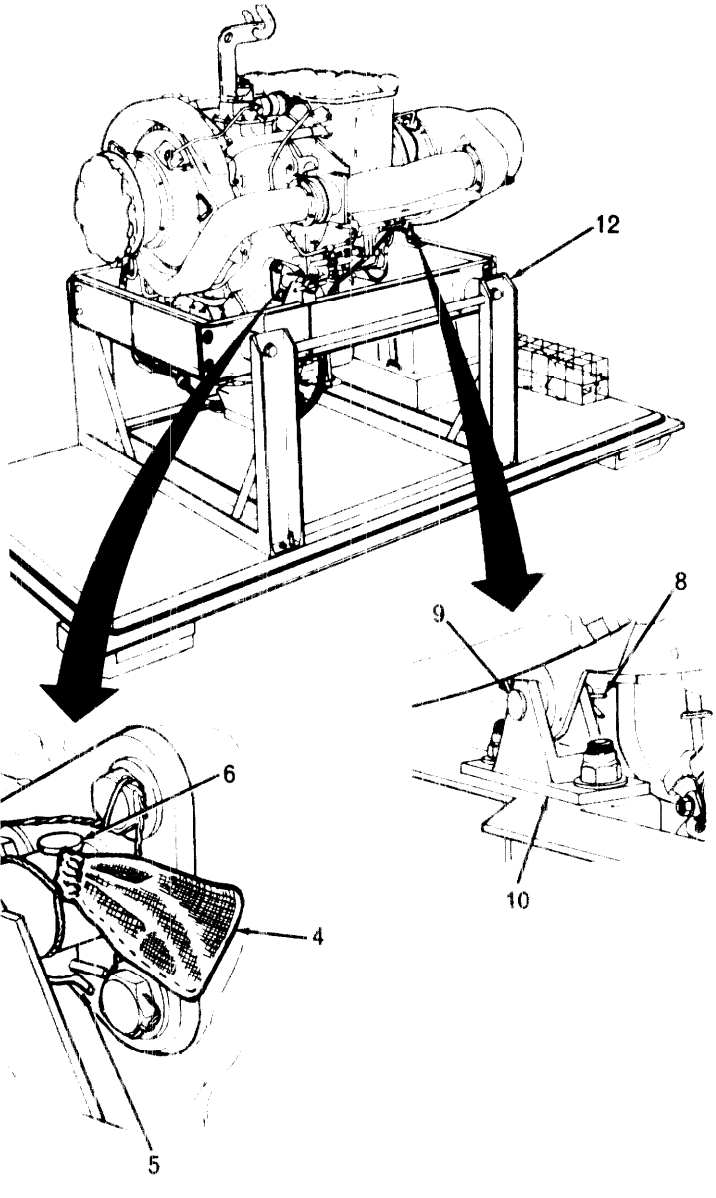
4. Remove cloth sack (4).

5. Remove two cotter pins (5) and pins (6) from each side bracket (7).

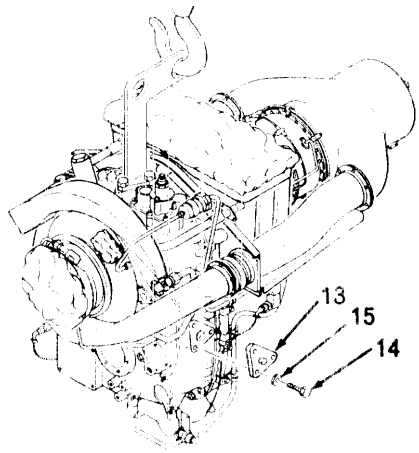
6. Remove cotter pin (8) and pin (9) from rear bracket (10).

7. Remove two retaining tubes (11).

8. Instruct helper to guide engine and prevent engine from striking mount (12) or other objects; then hoist engine out and move it to a clean work area.



9. Remove two mounting bracket adapters (13) by removing six bolts (14) and washers (15).



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1-5-3. REMOVE ENGINE FROM SHIPPING CONTAINER (CONT)

10. Install two retaining tubes (11) and secure each with pin (6) and cotter pin (5).

11. Install two mounting bracket adapters (13) and secure each with pin (6) and cotter pin (5).

12. Install pin (9) and secure with cotter pin (8).

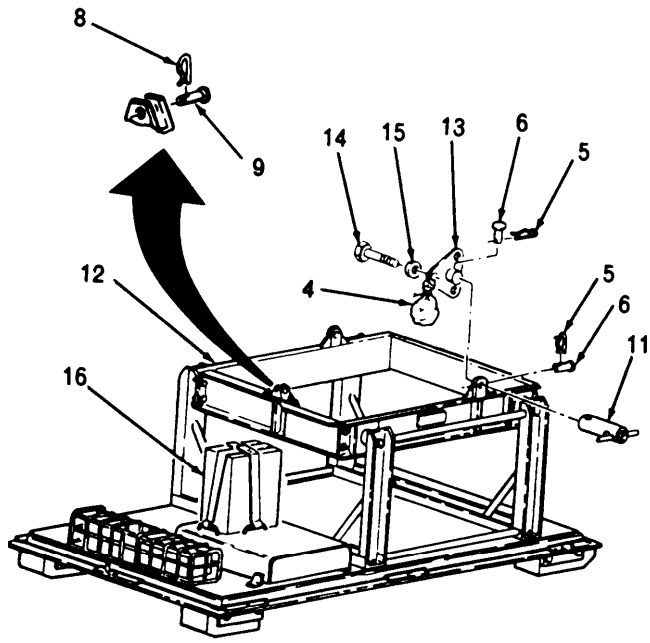
13. Place six bolts (14), washers (15), and any remaining hardware in cloth sack (4). Tie to either mounting bracket adapter (13).

14. Remove electronic supervisory control (16) from mount (12).

FOLLOW ON MAINTENANCE:

Install shipping container top (task 1-12-6).

Install engine in stand (task 1-5-5).



VIEW ROTATED 180° FOR CLARITY

END OF TASK

1-5-4. ACTIVATE ENGINE AFTER STORAGE

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment Condition:
Engine removed from shipping container (task 1-5-3).
Engine installed in turnover stand (task 1-5-5).

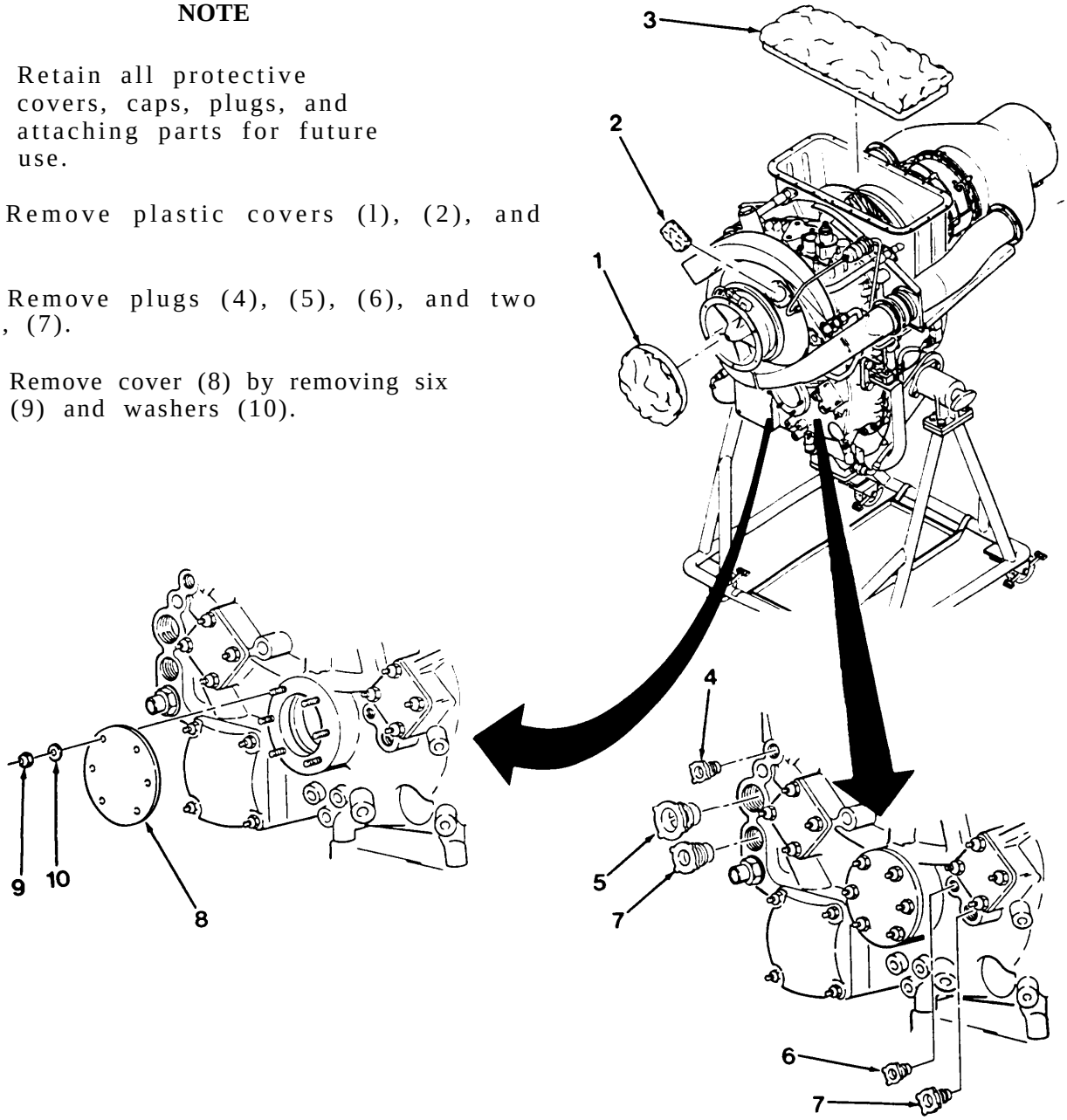
NOTE

Retain all protective covers, caps, plugs, and attaching parts for future use.

1. Remove plastic covers (l), (2), and (3).

2. Remove plugs (4), (5), (6), and two plugs, (7).

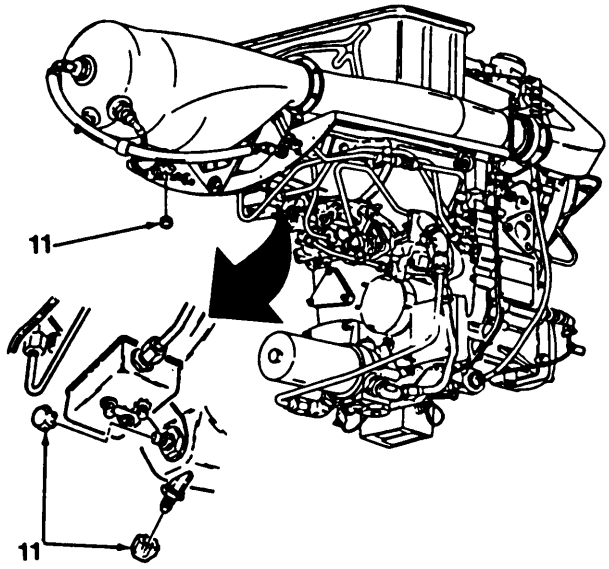
3. Remove cover (8) by removing six nuts (9) and washers (10).



GO TO NEXT PAGE

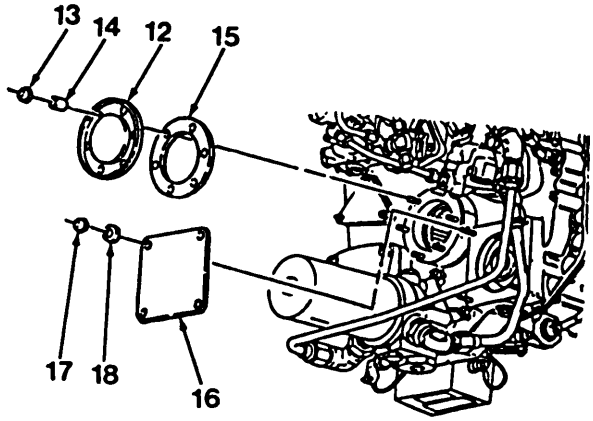
1-5-4. ACTIVATE ENGINE AFTER STORAGE (CONT)

4. Remove three caps (11).



5. Remove cover (12) by removing six nuts (13) and spacers (14). Remove gasket (15).

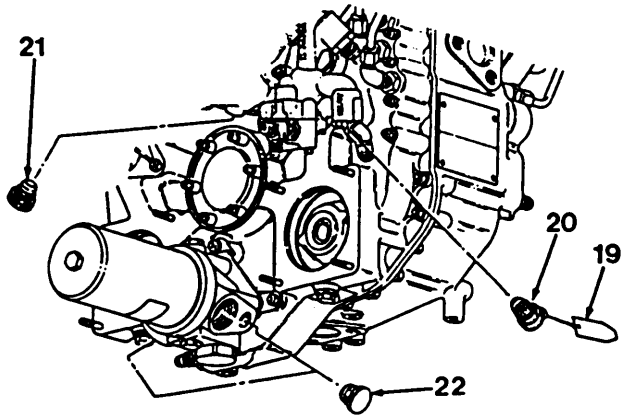
6. Remove cover (16) by removing four nuts (17) and washers (18).



7. Remove tag (19) and plugs (20), (21), and (22).

NOTE

Keep all caps, plugs, covers and attached parts removed from engine for future use. Place in shipping container.



TUBING REMOVED FOR CLARITY

END OF TASK

1-5-5. INSTALL ENGINE INTO ENGINE TURNOVER STAND

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Engine Assembly Lift (T9)

Personnel Required:
68B Aircraft Power Plant Repairer
Helper

Equipment Condition:
Engine suspended on hoist

General Safety Instructions:

WARNING

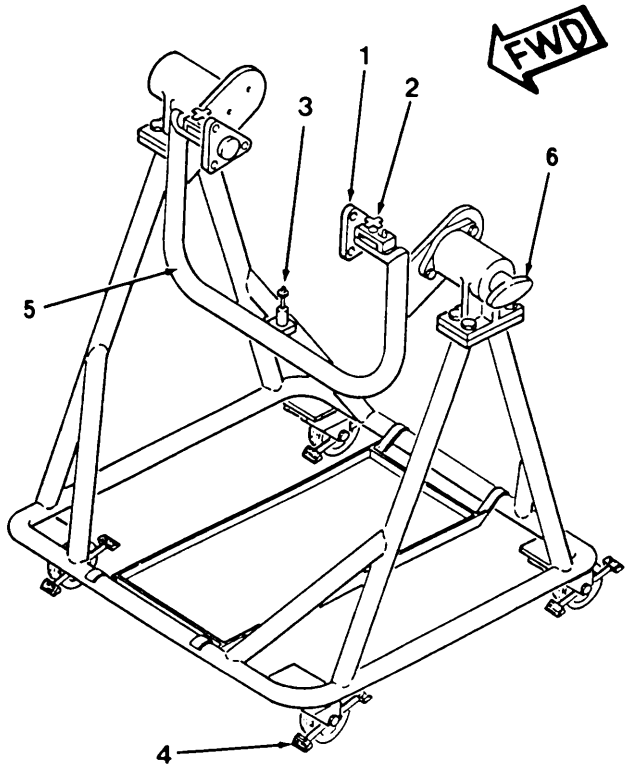
Hoist heavy objects very carefully. Insure that lift equipment is serviceable. Use a helper to guide object being raised or lowered. Use guide lines when hoisting overhead. DO NOT get under the object. Careless hoisting can result in injury or death.

1. Remove two mounting bracket adapters (1) by loosening knobs (2).

2. Remove mounting pin (3).

3. Manually lock four wheel brakes (4).

4. Position engine cradle (5) as shown and lock knob (6).



GO TO NEXT PAGE

1-5-5. INSTALL ENGINE INTO ENGINE TURNOVER STAND (CONT)

CAUTION

Do not use shipping container or helicopter mounting bracket adapters in lieu of turnover stand mounting bracket adapters (1). Failure to comply may result in dropped engine.

5. Install two mounting bracket adapters (l). Ensure dowel in center of bracket is inserted in opening (7); then install six bolts (8) and tighten to 125-135 in. lbs.

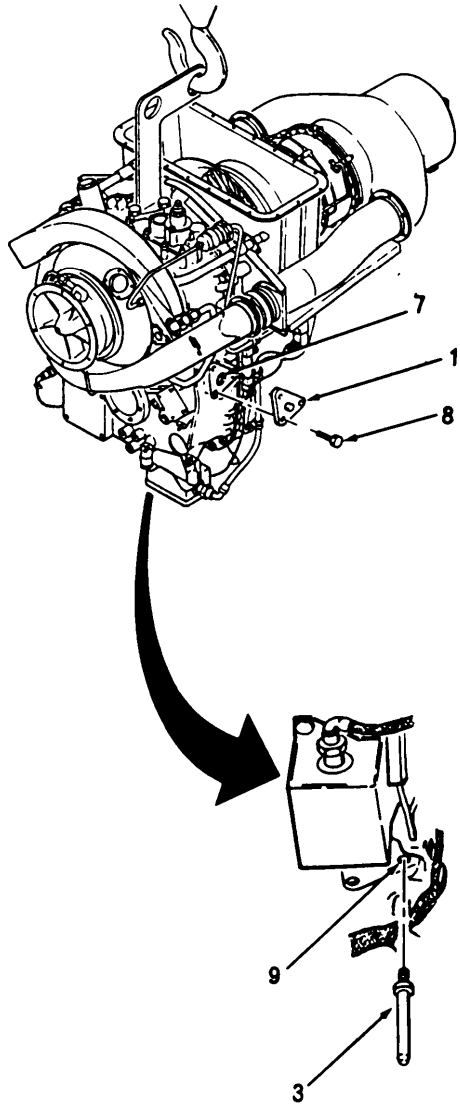
CAUTION

Pin (3) can damage accessory gearbox if not properly installed.

6. Install threaded end of mounting pin (3) in aft threaded opening (9) of engine mounting pad on bottom of accessory gearbox.

CAUTION

Instruct helper to guide engine into turnover stand during lowering of engine and to prevent engine from striking engine turnover stand.



GO TO NEXT PAGE

1-5-5. INSTALL ENGINE INTO ENGINE TURNOVER STAND (CONT)

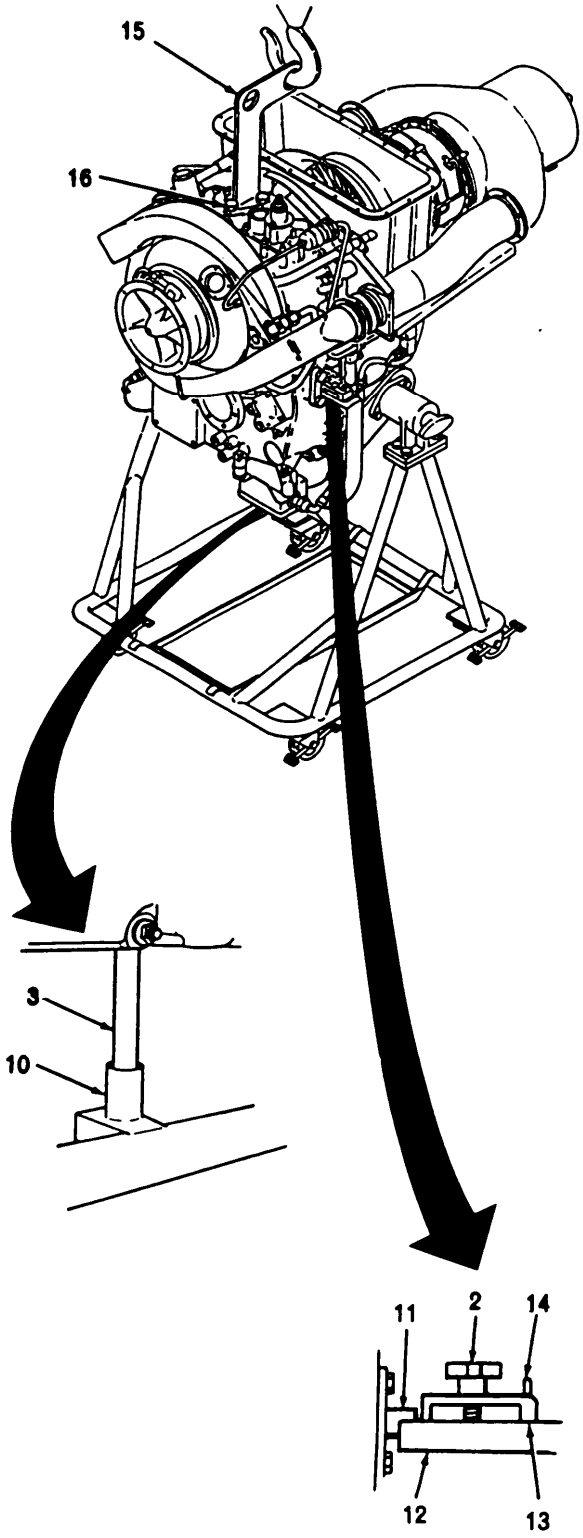
7. Slowly lower engine Into engine turnover stand allowing all mounting hardware to engage while maintaining weight of engine on hoist. Insure pin (3) engages in center of mount (10) and two pins (11) rest in mounts (12).

8. Slide two clamps (13) toward engine until two pins (14) engage.

9. Tighten two knobs (2).

10. Release weight of engine from hoist and disconnect hoist.

11. Remove engine assembly lift (15) by loosening three captive bolts (16).



END OF TASK

1-5-6. REMOVE ENGINE FROM ENGINE TURNOVER STAND

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Engine Assembly Lift (T9)
Hoist, minimum 500 lb capacity

Personnel Required:
68B Aircraft Powerplant Repairer
Helper

General Safety Instructions:

Hoist heavy objects very carefully. Insure that lift equipment is serviceable. Use a helper to guide object being raised, or lowered. Use guide lines when hoisting overhead. DO NOT get under the object. Careless hoisting can result in injury or death.

1. Manually lock four wheel brakes (1) and tighten knob (2).

2. Install engine lift assembly (3) and secure with three bolts (4).

3. Connect hoist to engine lift assembly (3).

CAUTION

Remove slack from hoist.

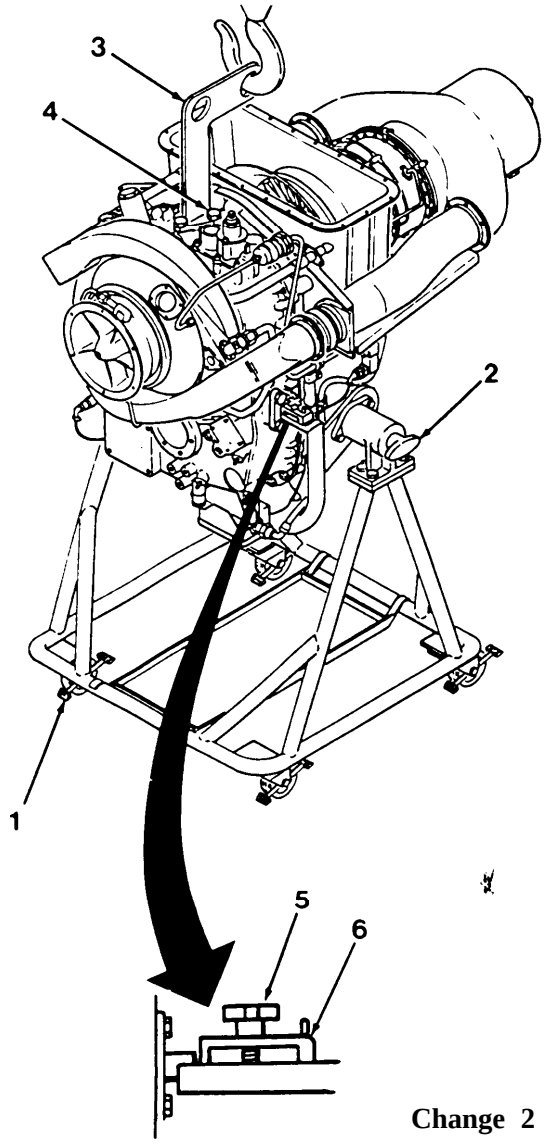
4. Loosen two knobs (5).

5. Slide two clamps (6) outboard (away from engine). Ensure pins are disengaged.

CAUTION

Instruct helper to prevent engine from striking engine turnover stand during hoisting.

6. Deleted.



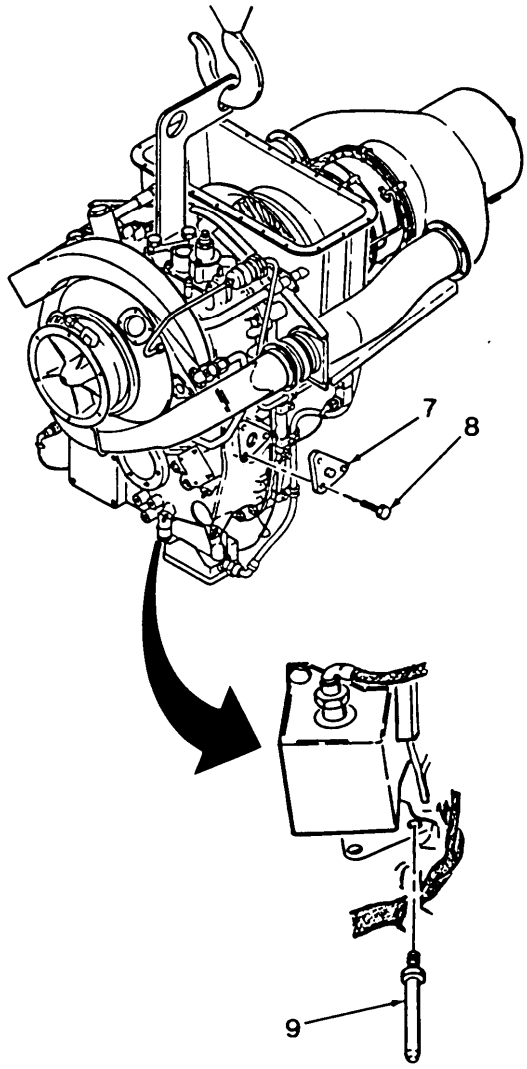
GO TO NEXT PAGE

1-5-6. REMOVE ENGINE FROM ENGINE TURNOVER STAND (CONT)

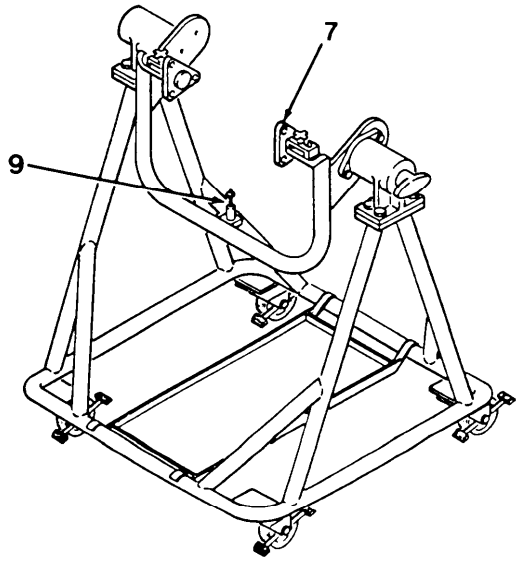
7. Slowly hoist engine clear of turnover stand. Move turnover stand and lower engine to a position where it is easily accessed.

8. Remove two mounting bracket adapters (7) by removing six bolts (8).

9. Remove mounting pin (9).



10. Install two mounting bracket adapters (7) and mounting pin (9) on engine turnover stand.



END OF TASK

Section VI HOISTING

1-23. **SYMPTOM INDEX**

Engine hoisting is described in the following paragraphs where this information is required.

-Removing and installing engine in shipping container (tasks 1-5-3 and 1-12-5).

-Removing and installing engine in turnover stand (taks 1-5-5 and 1-5-6).

- Removing and installing engine in helicopter (TM 55-1520-248-23).

Section VII TROUBLESHOOTING

1-23. **INTRODUCTION**

a. The troubleshooting procedures in this section are presented as a guide for locating and correcting malfunctions. Use of these procedures will reduce delays and maintenance down time and will minimize unnecessary replacement of engine components. Two basic assumptions have been made in preparing these procedures; the correct operating procedures have been followed and the problem is caused by a single failure or malfunction.

b. The symptom index is an index of problem symptoms that are recognizable from engine operation or inspection. When problem symptoms are reported by the flight crew, obtain as much information as possible from the crew and their report. In many cases, this information will define the problem completely; however, the malfunction should be confirmed by a ground run, providing there is no danger of possible engine damage.

c. After locating the specific problem in the Symptom Index, complete the identified procedure to correct the problem. Important considerations, which are not detailed in each procedure, but must be complied with are:

(1) During troubleshooting, it is assumed that the electronic supervisory control is not displaying a fault code on the cockpit control panel. If a fault is displayed, refer to TM 55-1520-248-23.

(2) When a repair, replacement, adjustment or other maintenance is performed, you must demonstrate that the original problem has been corrected before “continue to operate” is applicable.

(3) When instructions are given to “replace” a part, the part may be serviced or repaired in lieu of replacement, provided that service or repair is authorized. (See Maintenance Allocation Chart, Appendix B.)

(4) When a replacement part has been installed, and the problem was not corrected by the replacement part, you must reinstall the original part and continue with the troubleshooting procedure.

1-23. SYMPTOM INDEX

1-23. SYMPTOM INDEX (CONT)

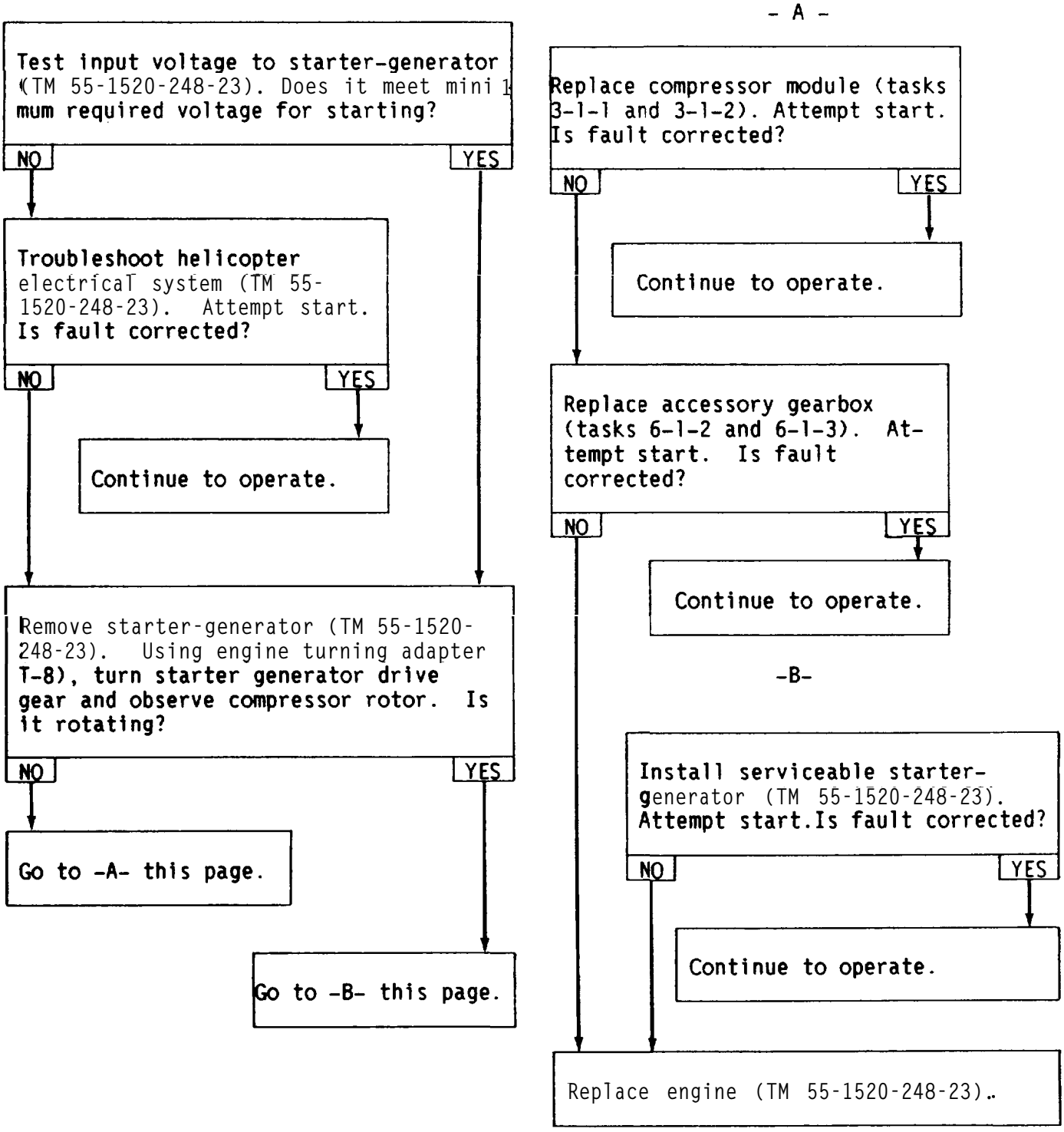
1-24. TROUBLESHOOTING PROCEDURES

Following are troubleshooting procedures 1 thru 54.

1. ENGINE WILL NOT CRANK OR FAILS TO REACH 12% Ng

NOTE

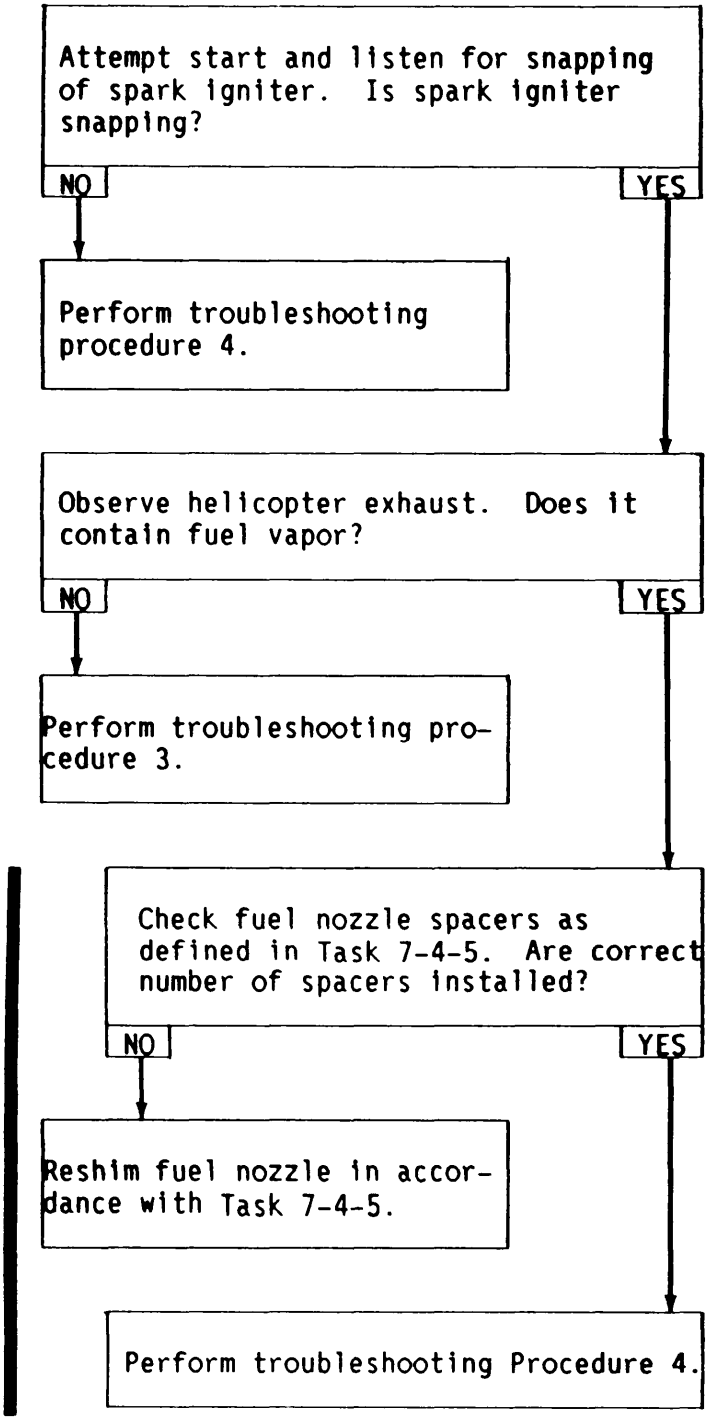
If start is being attempted immediately after shutdown, complete trouble-shooting procedure 39 prior to starting this procedure.



2. ENGINE FAILS TO LIGHT OFF

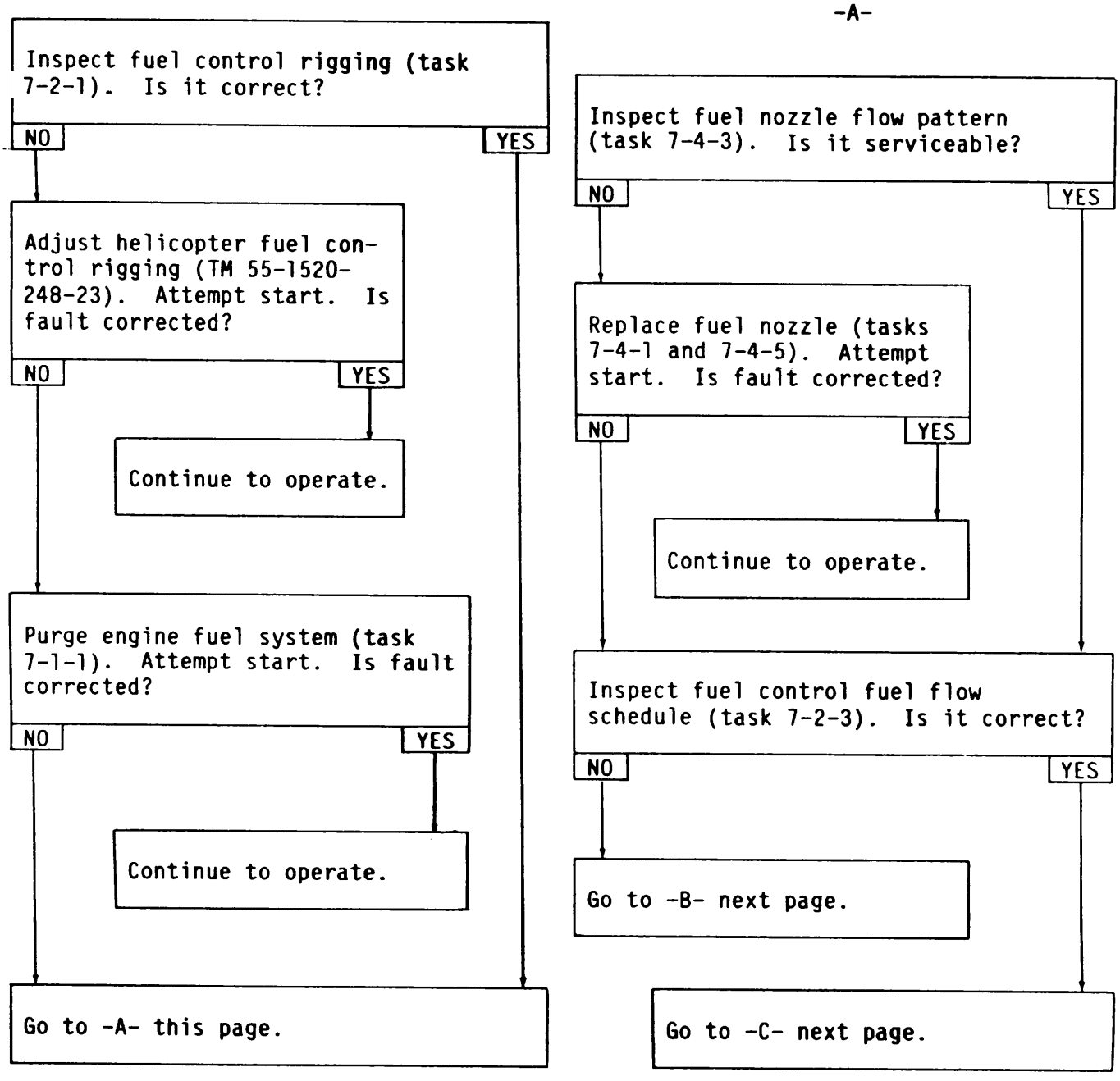
NOTE

Before troubleshooting, **ensure** that there is fuel of the proper type in helicopter fuel tank (TM 55-1520-248-23).

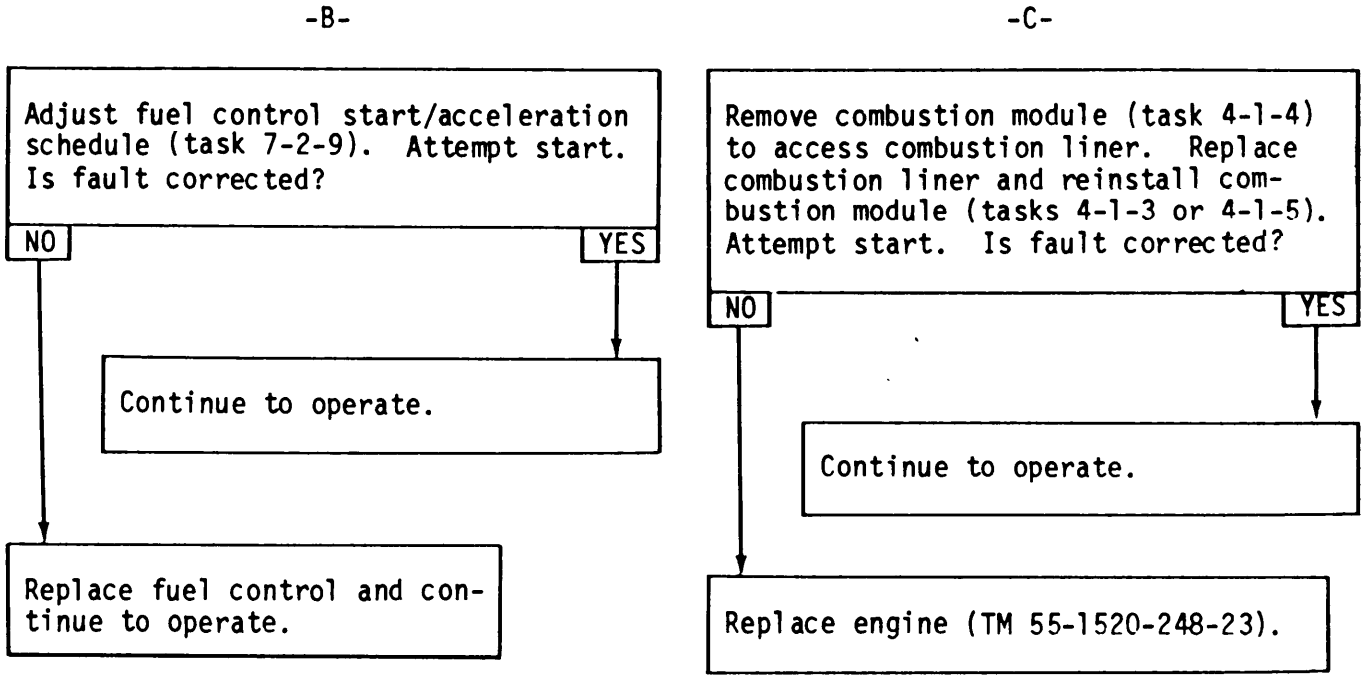


NOTE

Perform troubleshooting procedure 4 prior to starting this procedure unless ignition system serviceability has been verified.



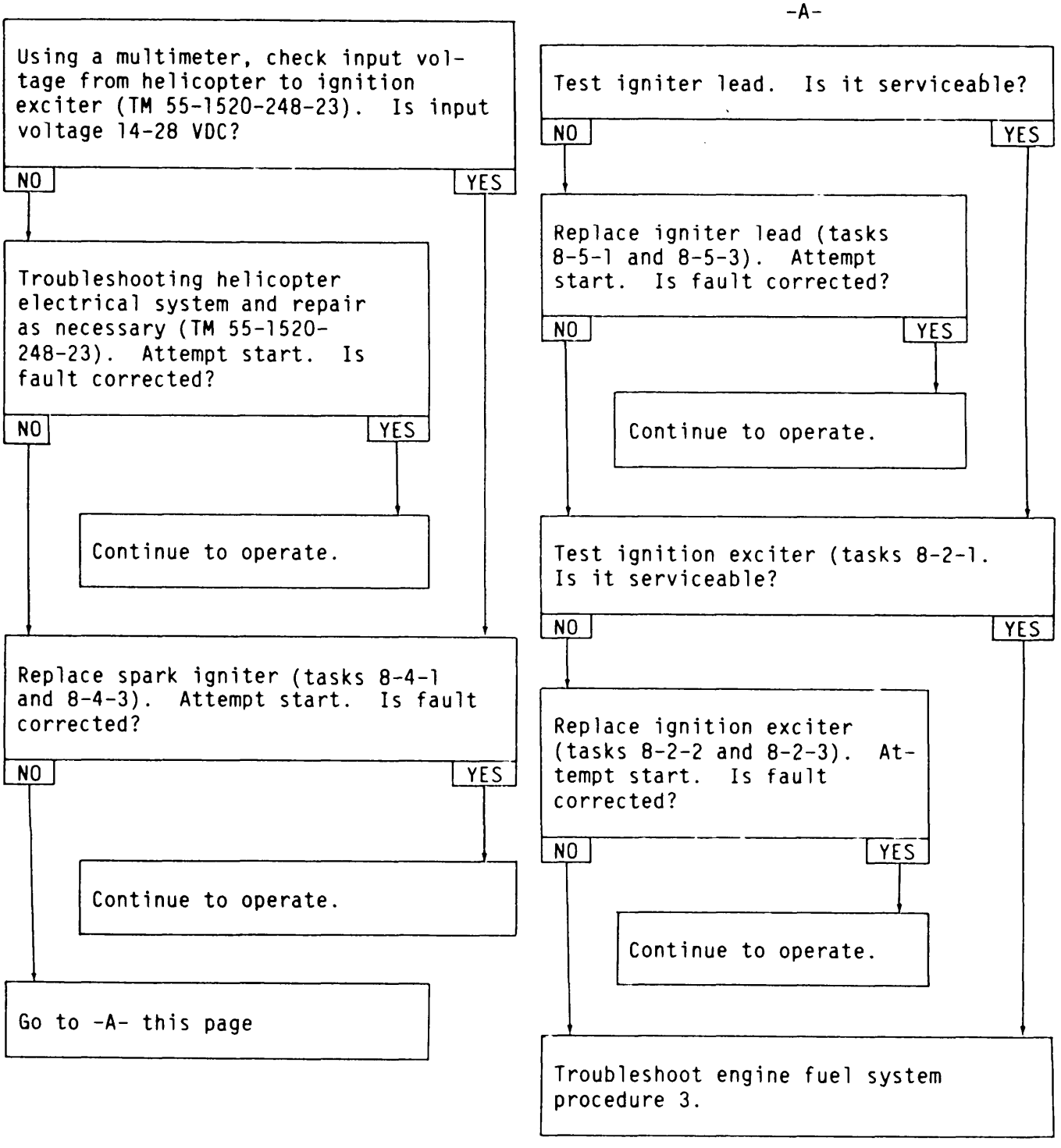
3. FUEL SYSTEM PROBLEMS (CONT)



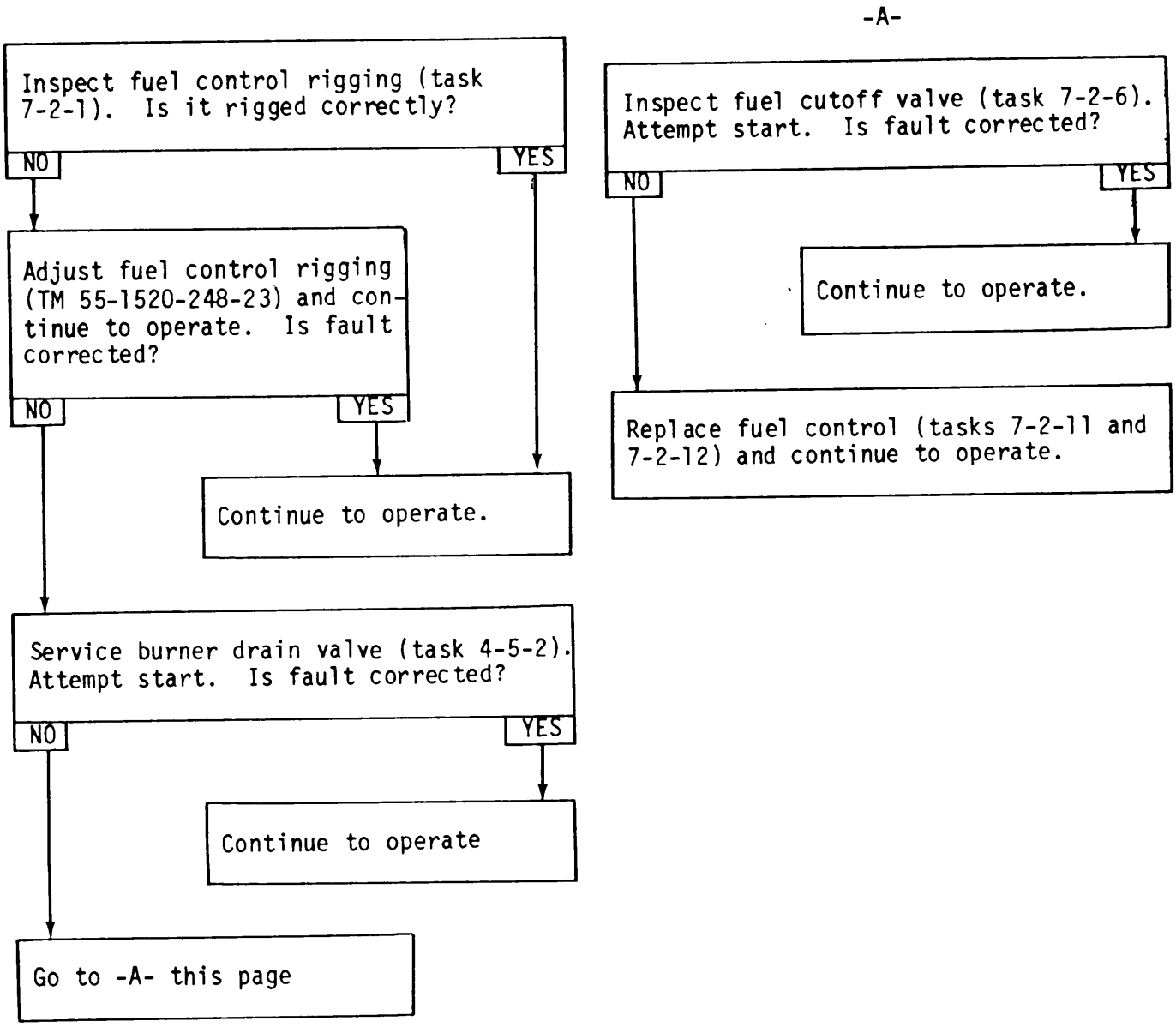
4. IGNITION SYSTEM PROBLEMS

WARNING

Allow at least five minutes after operation of the ignition system before disconnecting or removing components. Failure to allow the high voltage to dissipate can result in injury of death.



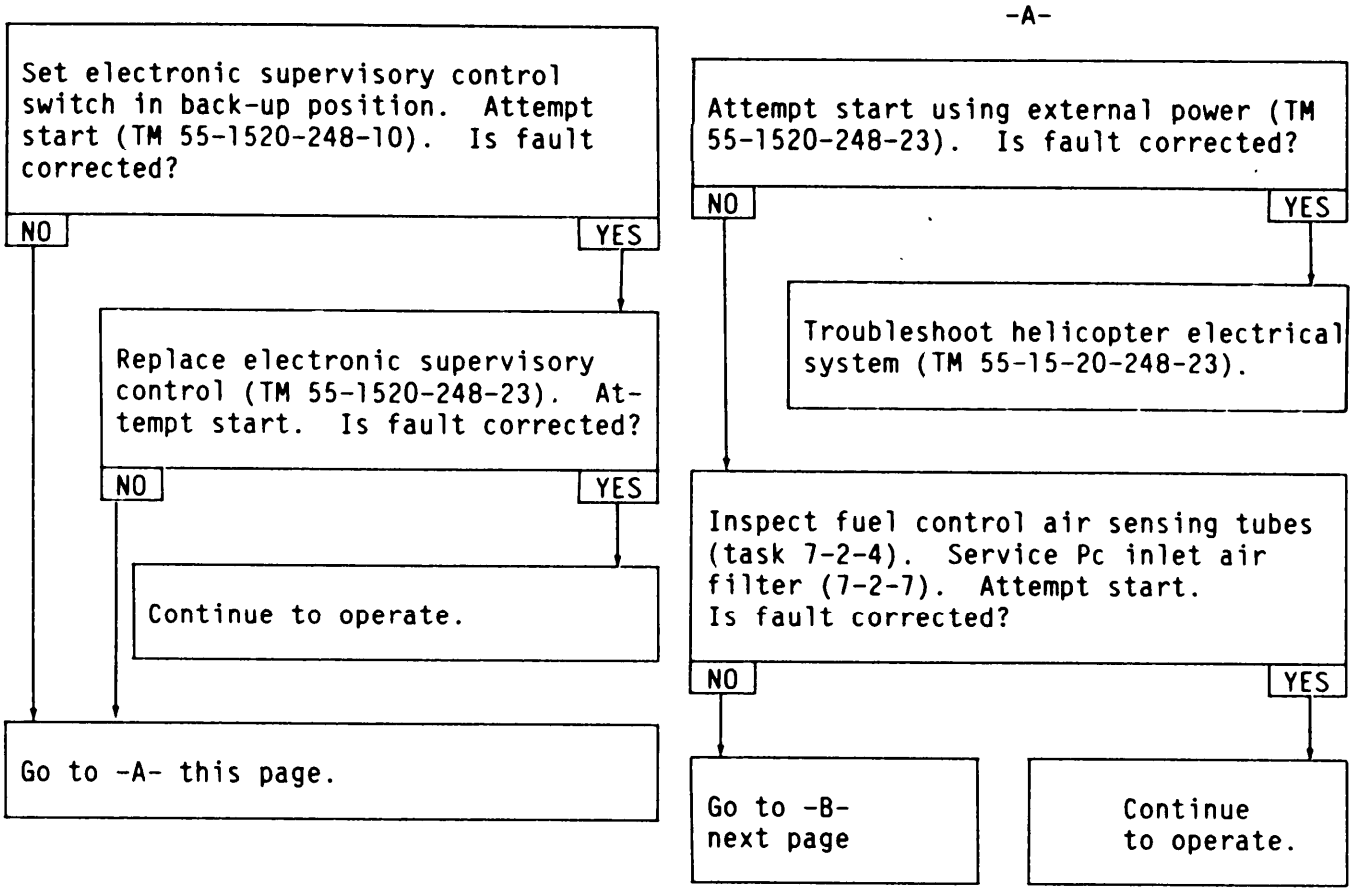
5. ENGINE LIGHTS OFF BEFORE THROTTLE IS OPENED



6. ENGINE LIGHTS OFF BUT WILL NOT ACCELERATE AT NORMAL RATE

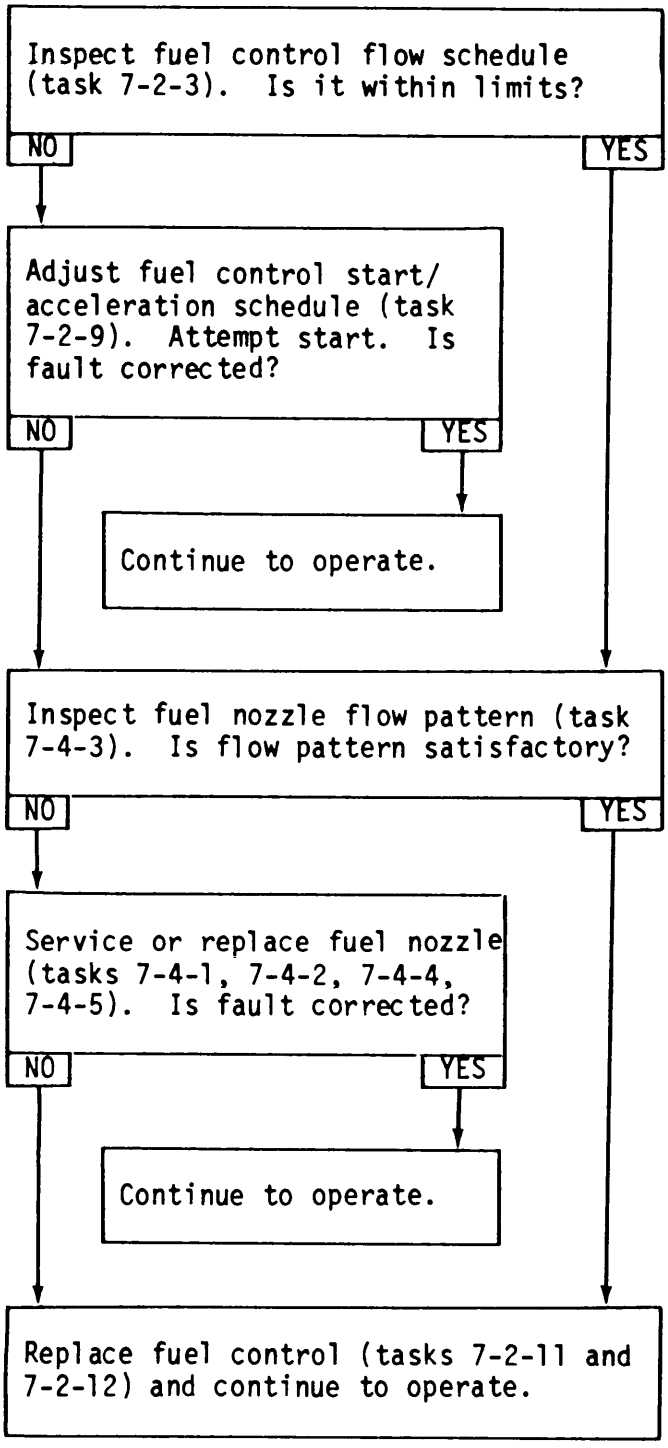
NOTE

Insure helicopter main fuel switch is ON and main fuel valve is serviceable (TM 55-1520-248-23).



6. ENGINE LIGHTS OFF BUT WILL NOT ACCELERATE AT NORMAL RATE (CONT)

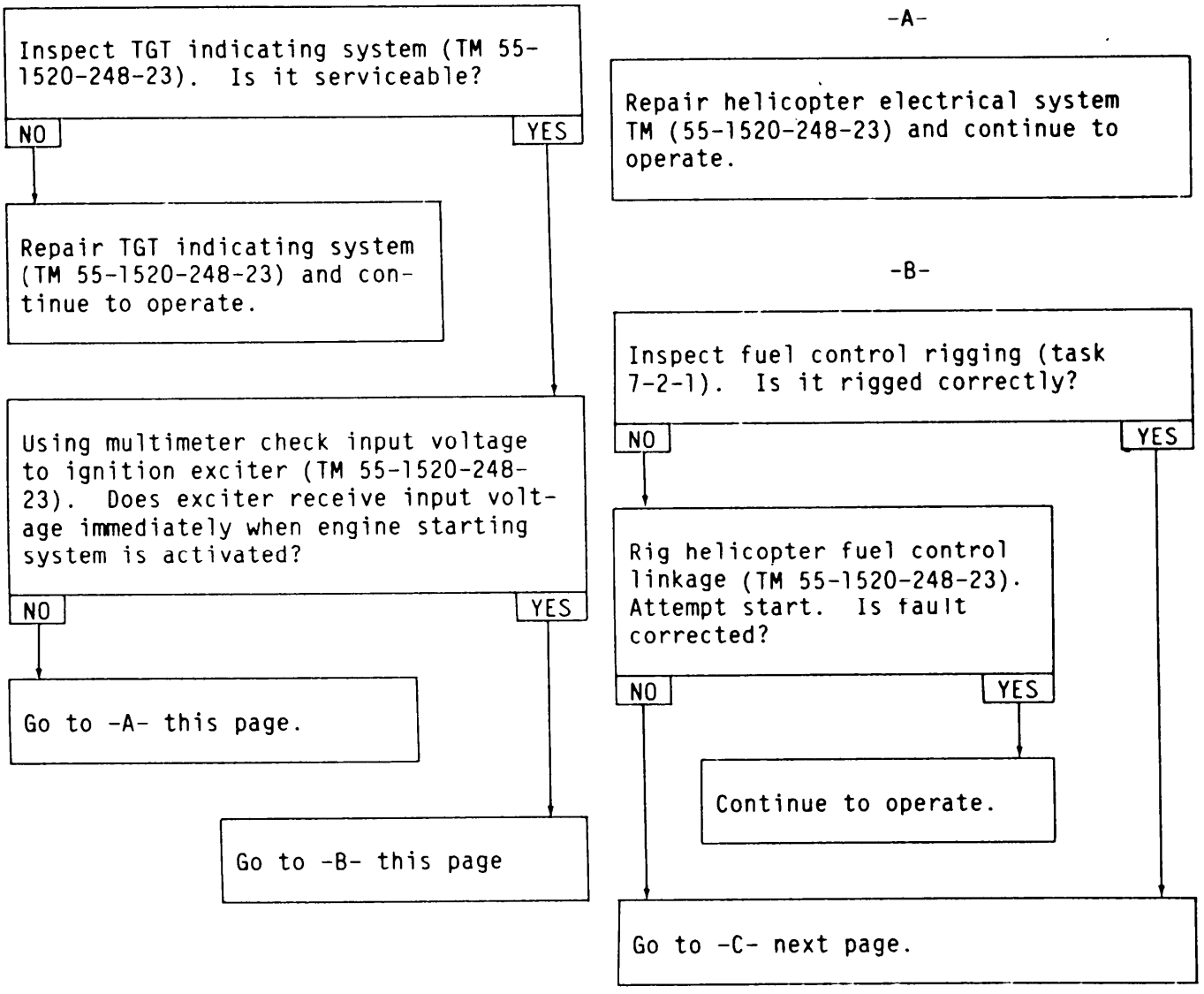
-B-



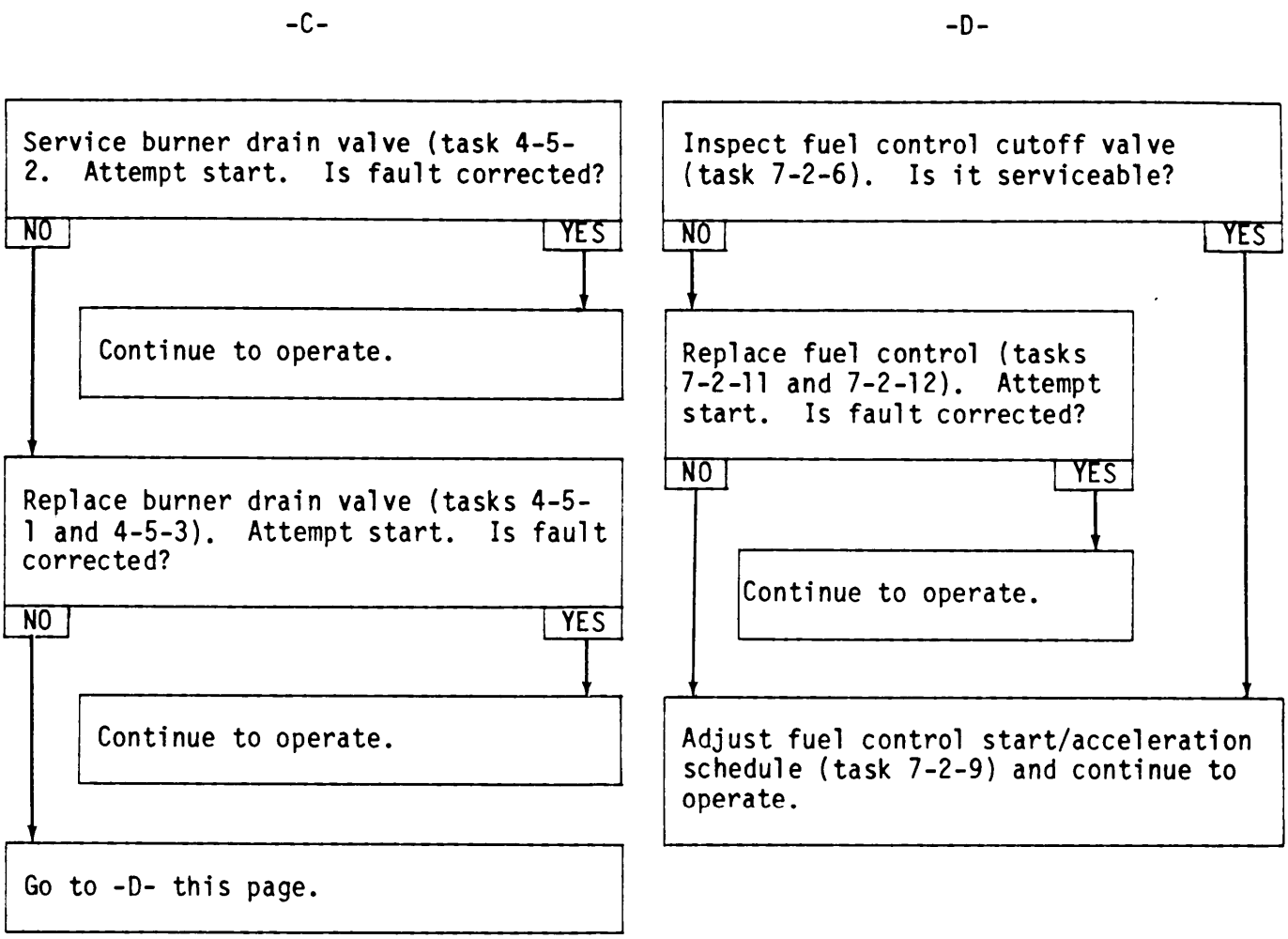
7. LIGHT OFF TEMPERATURE TOO HIGH BELOW 15% NG)

WARNING

TGT temperatures in excess of limitations will cause turbine blade and wheel damage and can cause a section of wheel to break out and exit engine with potentially disastrous results. If TGT exceeds limitations (para 1-11), inspect first stage nozzle shield, nozzle, and turbine wheel (task 5-1-1).



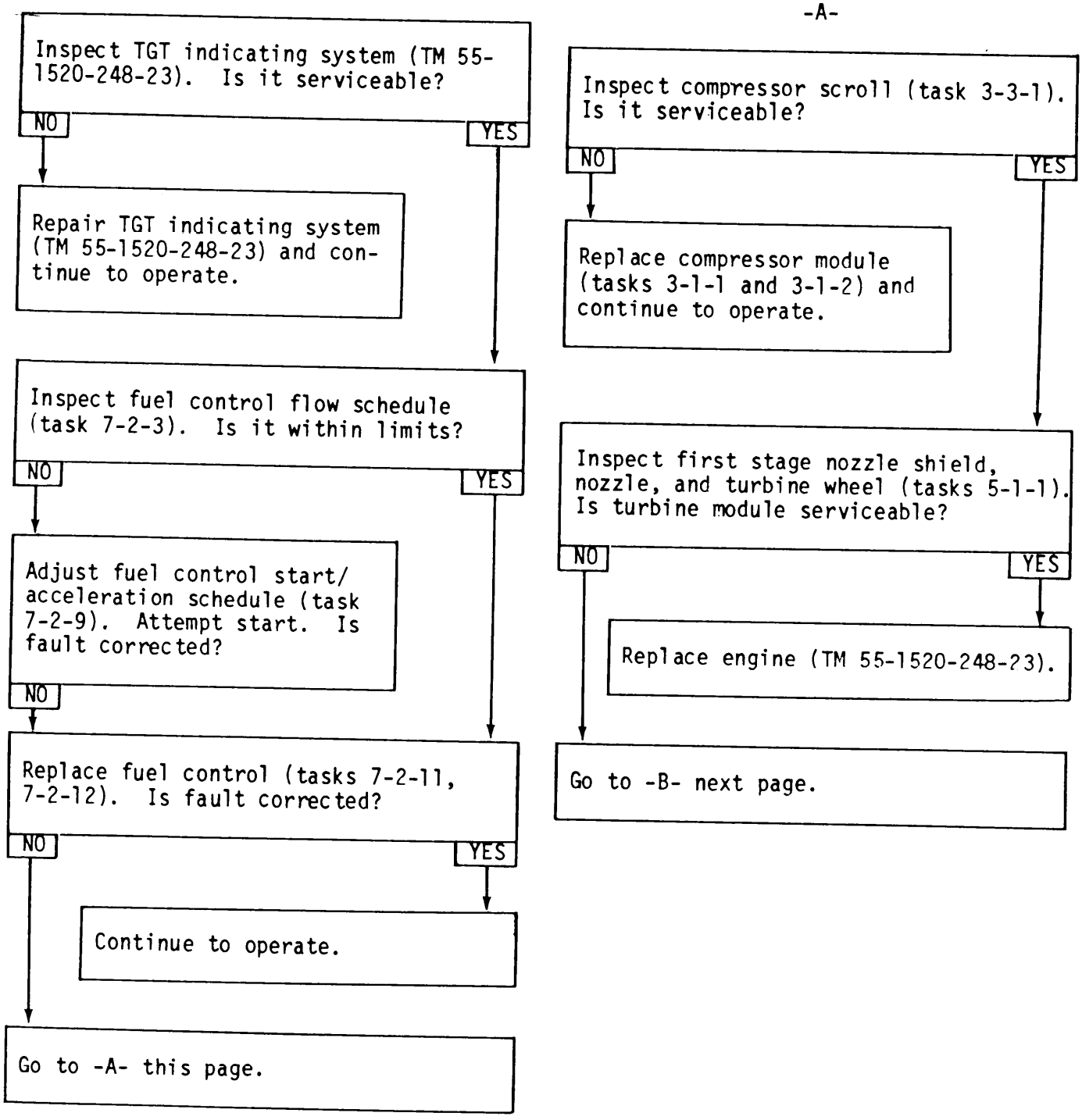
7. LIGHT OFF TEMPERATURE TOO HIGH (BELOW 15% Ng) (CONT)



8. ACCELERATION TEMPERATURE TOO HIGH DURING START (ABOVE 15% Ng)

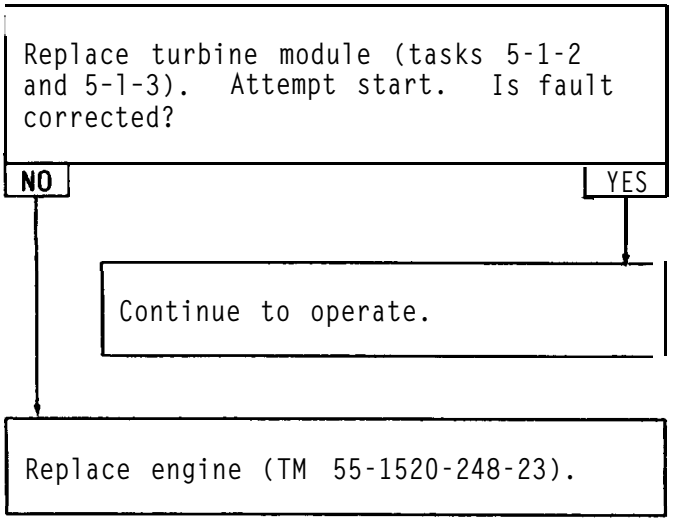
CAUTION

TGT temperatures in excess of limitations will cause turbine blade and wheel damage and can cause a section of wheel to break out and exit engine with potentially disastrous results. If TGT exceeds limitations (para 1-11), inspect first stage nozzle shield, nozzle, and turbine wheel (task 5-1-1).

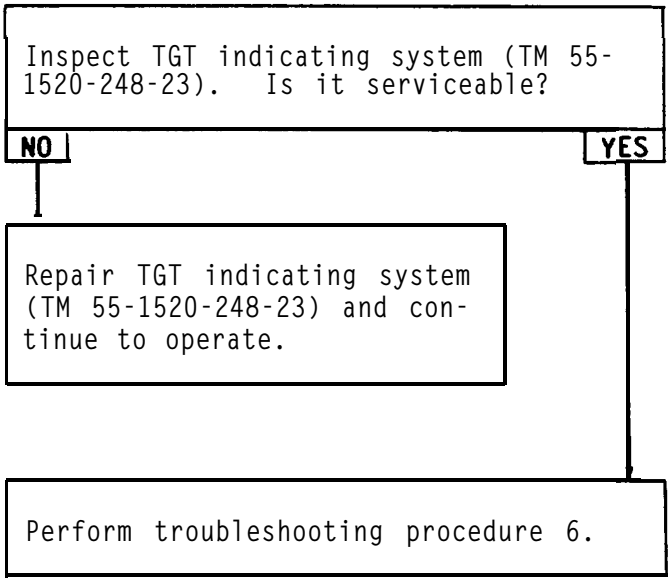


8. ACCELERATION TEMPERATURE TOO HIGH DURING START (ABOVE 15% Ng) (CONT)

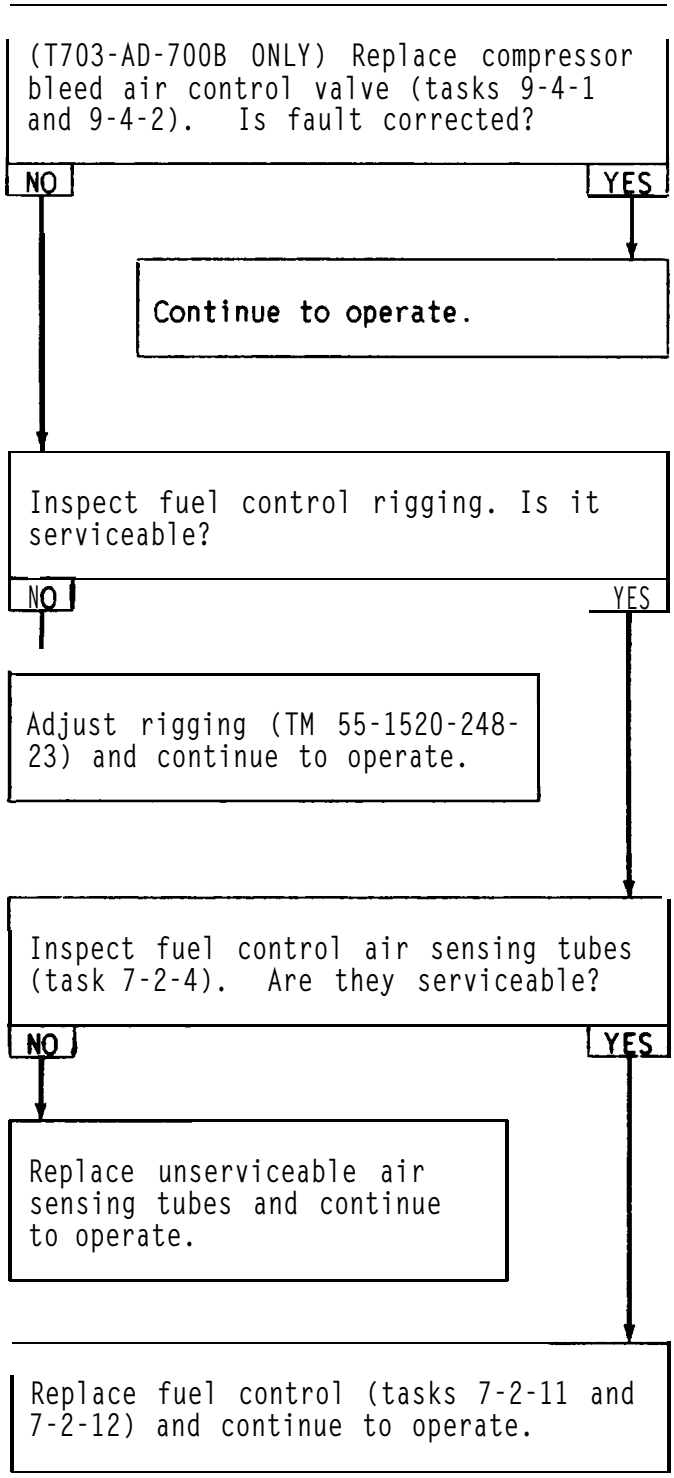
-B-



9. LIGHT OFF OR ACCELERATION TEMPERATURE TOO LOW DURING START APPROX. 550 DEGREES (C)



10. ENGINE SPEED UNSTABLE AT GROUND IDLE (61-65% Ng)



11. ENGINE SPEED UNSTABLE AT FLIGHT IDLE (100% Np)

(T703-AD-700B ONLY) Replace compressor bleed air control valve (tasks 9-4-1 and 9-4-2). Is fault corrected?

NO

YES

Continue to operate.

Set electronic supervisory control in BACKUP position. Operate engine. Is fault corrected?

NO

YES

Go to -B- this page.

Test collective lever potentiometer (TM 55-1520-248-23). Is it serviceable?

NO

YES

Go to -A- this page.

Replace collective lever potentiometer (TM 55-1520-248-23) and continue to operate.

-A-

Inspect fuel control air sensing tubes (task 7-2-4). Is fault corrected?

NO

YES

Continue to operate.

Go to -B- this page.

-B-

Replace electronic supervisory control (TM 55-1520-248-23). Operate engine. Is fault corrected?

NO

YES

Continue to operate.

Replace fuel control (tasks 7-2-11 and 7-2-12) and continue to operate.

12. ENGINE UNSTABLE IN POWER RANGE

Set electronic supervisory control switch in backup position and fly helicopter straight and level without power changes. Is fault corrected?

NO → Go to -A- this page.

YES →

Test collective lever potentiometer (TM 55-1520-248-23). Is it serviceable?

NO →

Replace collective lever potentiometer (TM 55-1520-248-23) and continue to operate.

YES →

Inspect fuel control air sensing tubes (TM 55-1520-248-23). Is condition corrected?

NO →

Replace electronic supervisory control (TM 55-1520-248-23). Fly helicopter. Is fault corrected?

NO →

Replace UP/DOWN trim switch on collective lever (TM 55-1520-248-23) and continue to operate.

YES →

Continue to operate.

YES →

Continue to operate.

-A-

Inspect fuel control rigging (task 7-2-1). Is it correct?

NO →

Adjust fuel control rigging (TM 55-1520-248-23). Fly helicopter. Is fault corrected?

NO →

Replace fuel control (tasks 7-2-11 and 7-2-12) and continue to operate.

YES →

Continue to operate.

YES →

Purge engine fuel system (task 7-1-1). **Operate engine. Is fault corrected?**

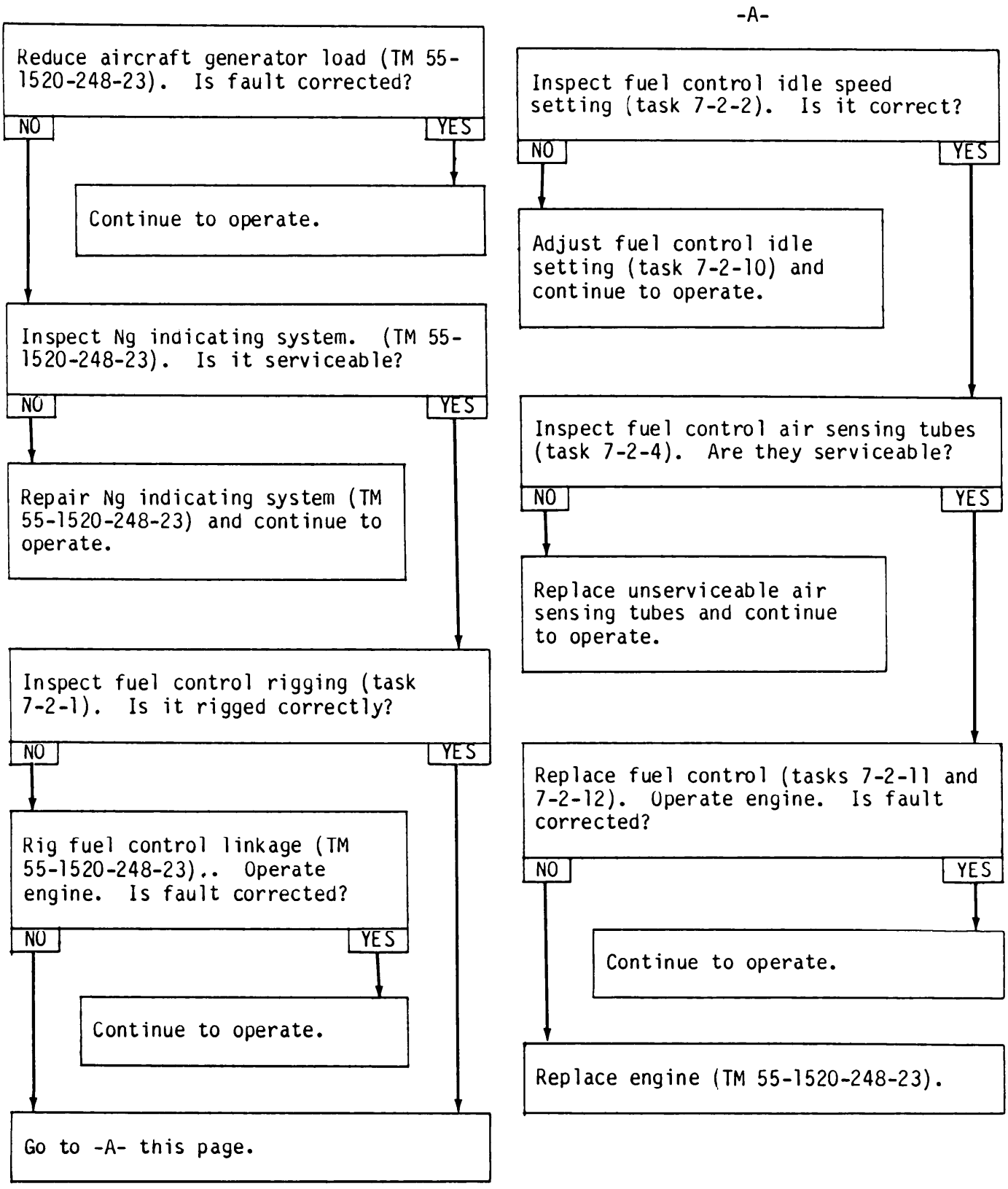
NO →

Replace fuel control (tasks 7-2-11 and 7-2-12) and continue to operate.

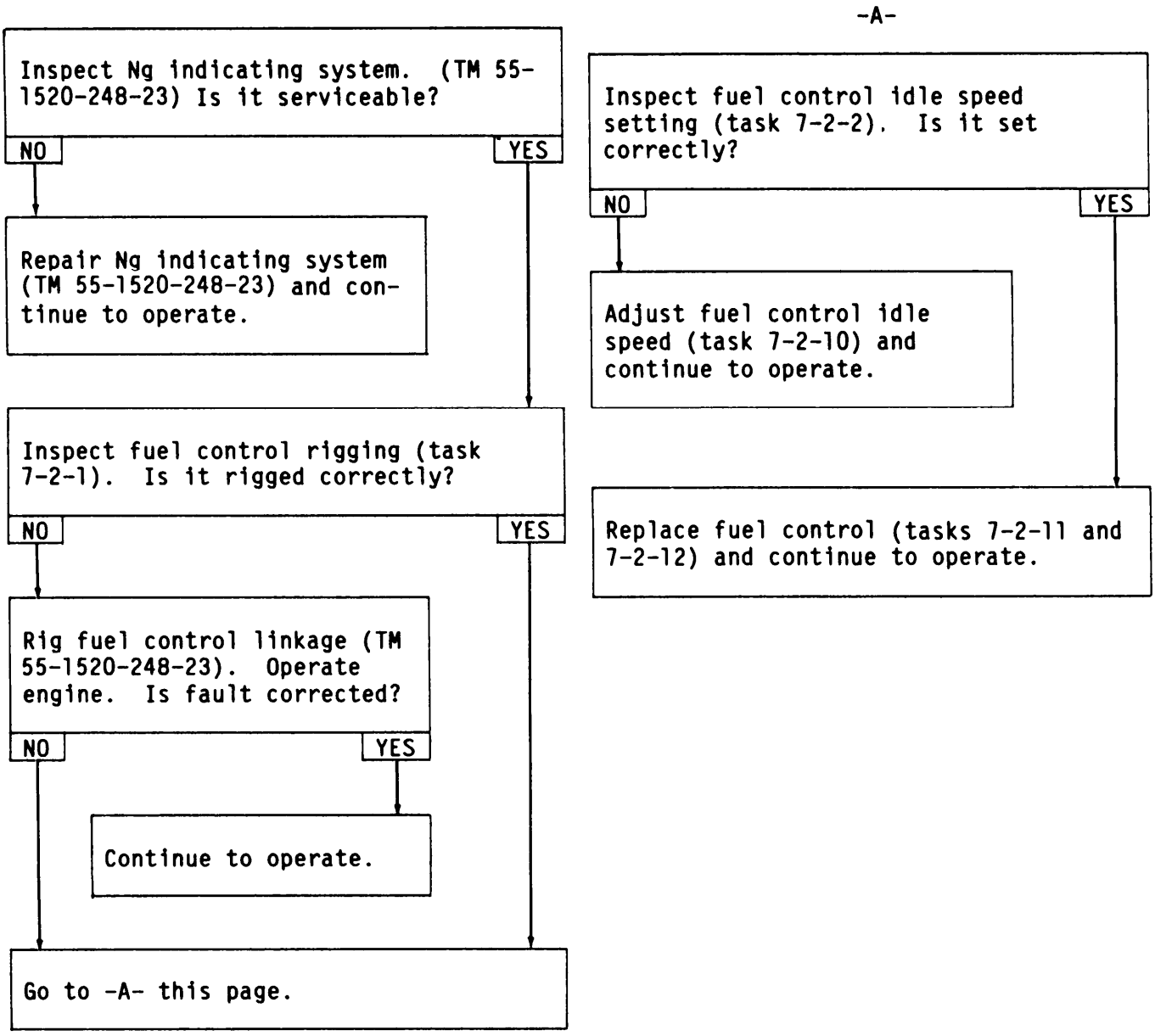
YES →

Continue to operate.

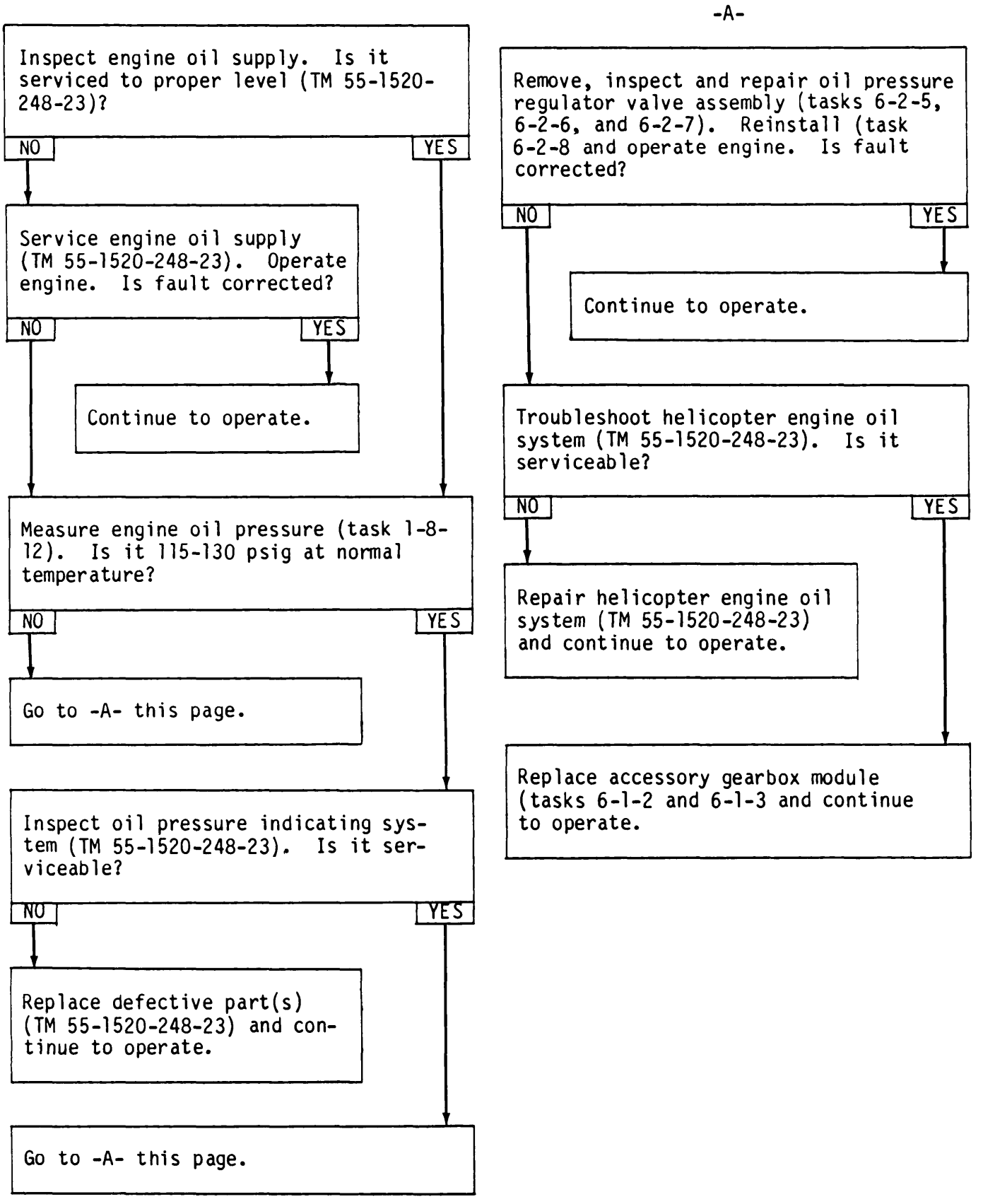
13. GROUND IDLE SPEED (Ng) TOO LOW



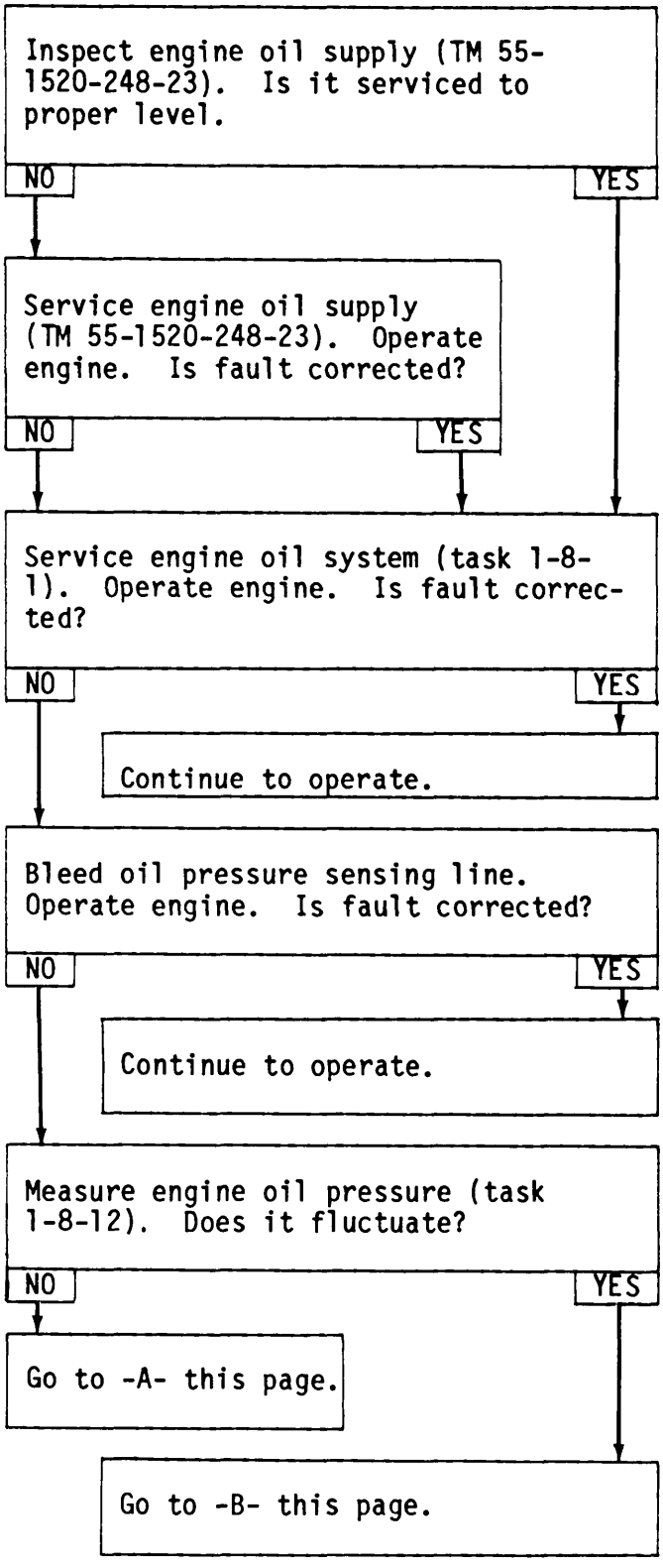
14. GROUND IDLE SPEED (Ng) TOO HIGH OR WILL NOT ADJUST (61-65% Ng)



15. OIL PRESSURE DROPS OFF SEVERELY WITH NORMAL OIL TEMPERATURE



16. OIL PRESSURE FLUCTUATION



-A-

Inspect oil pressure indicating system (TM 55-1520-248-23). Repair and continue to operate.

-B-

Remove, inspect and repair oil pressure regulator assembly (tasks 6-2-5, 6-2-6, and 6-2-7). Reinstall (task 6-2-8) and operate engine. Is fault corrected?

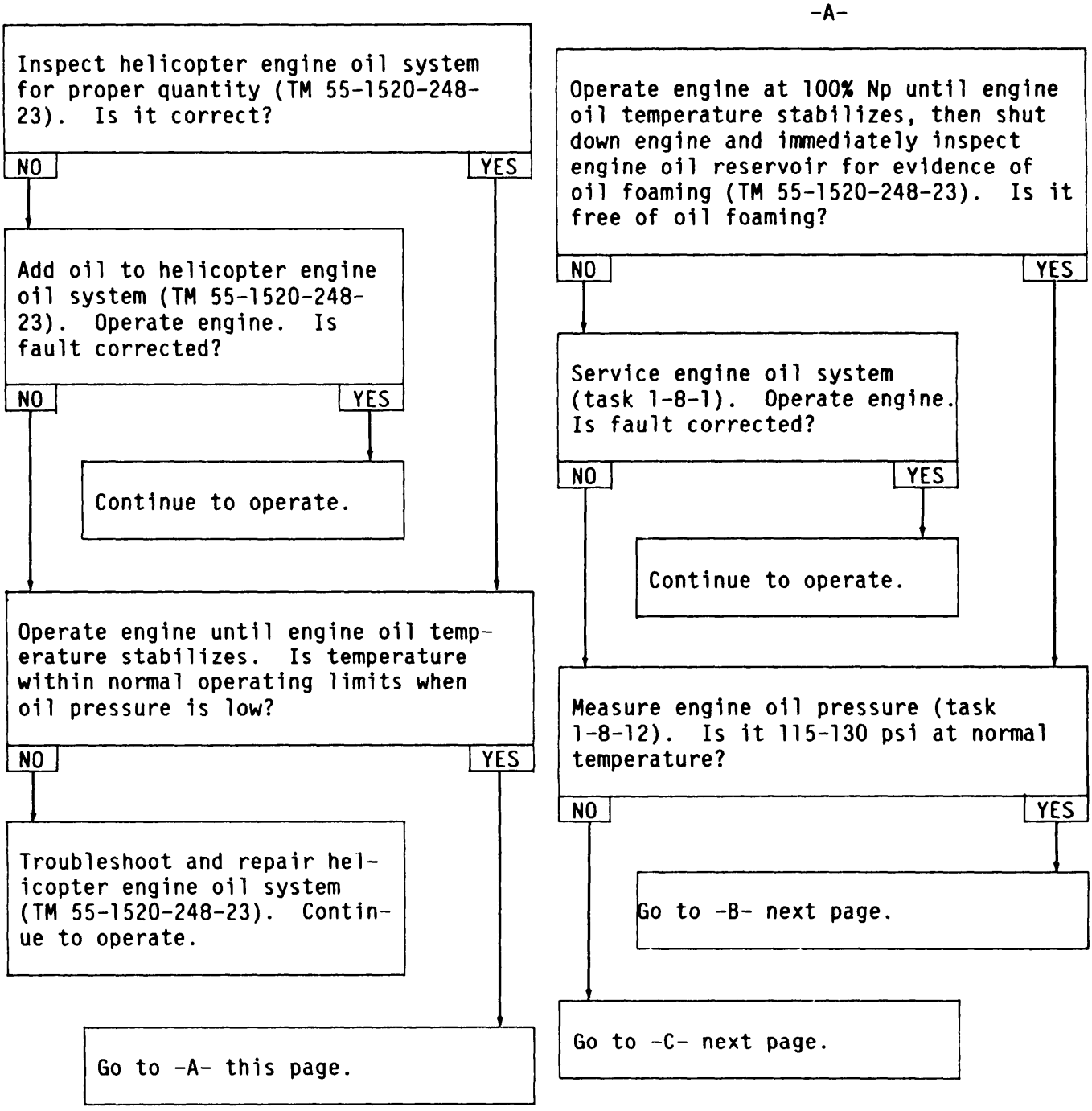
NO

YES

Continue to operate.

Replace accessory gearbox module (tasks 6-1-2 and 6-1-3) and continue to operate.

17. LOW OIL PRESSURE



17. LOW OIL PRESSURE (CONT)

-B-

Inspect oil pressure indicating system (TM 55-1520-248-23). Repair and continue to operate.

-C-

CAUTION

Do not make a pressure regulating valve adjustment to correct for a rapid change in oil pressure. These contitions are cause to suspect other oil system problems have developed.

Adjust engine oil pressure regulator valve (task 6-2-9). Operate engine. Is fault corrected.?

NO

YES

Continue to operate.

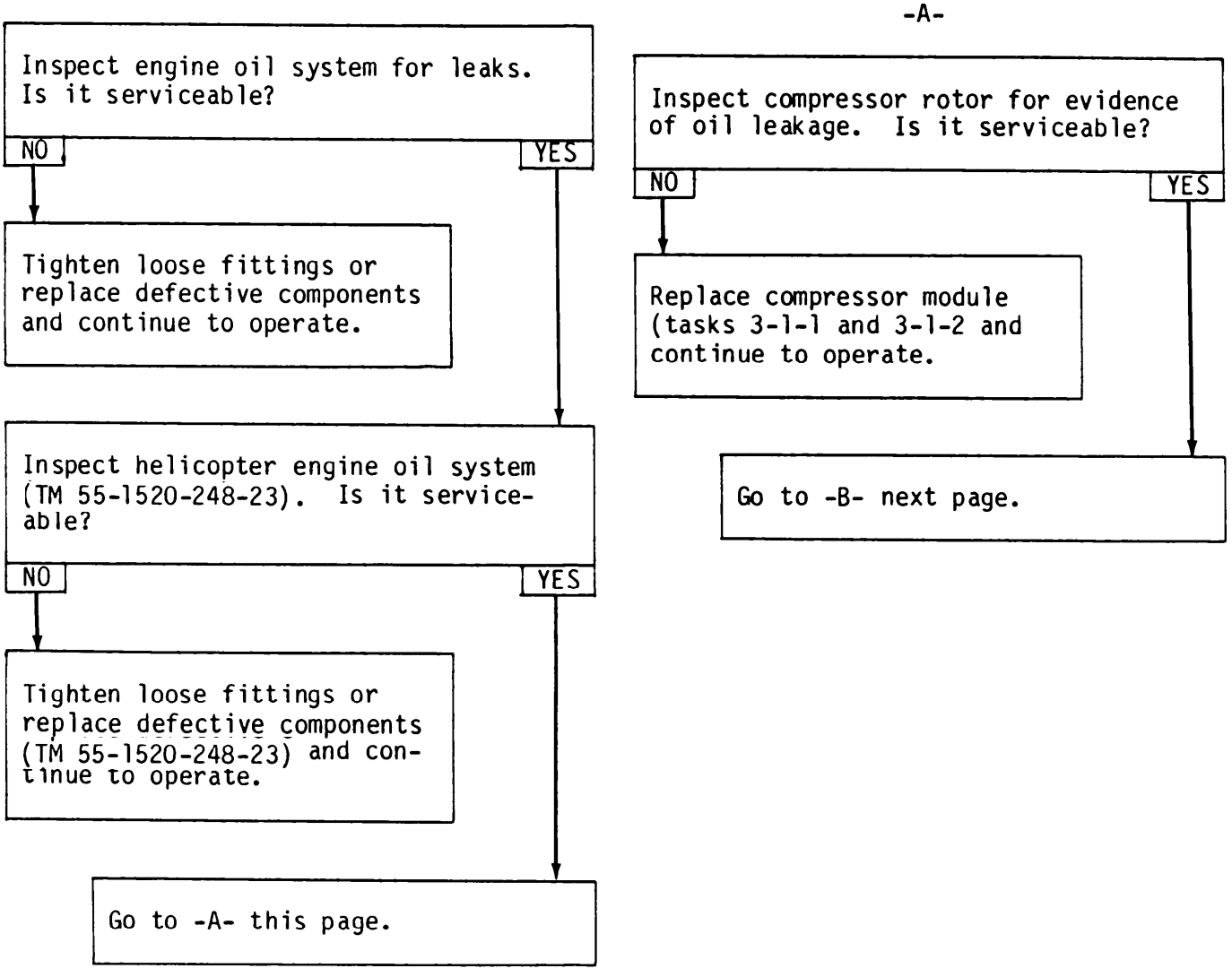
Replace accessory gearbox module (tasks 6-1-2 and 6-1-3) and continue to operate.

18. HIGH OIL CONSUMPTION (EXCEEDING 1 QUART PER 5 HOURS ENGINE OPERATION)

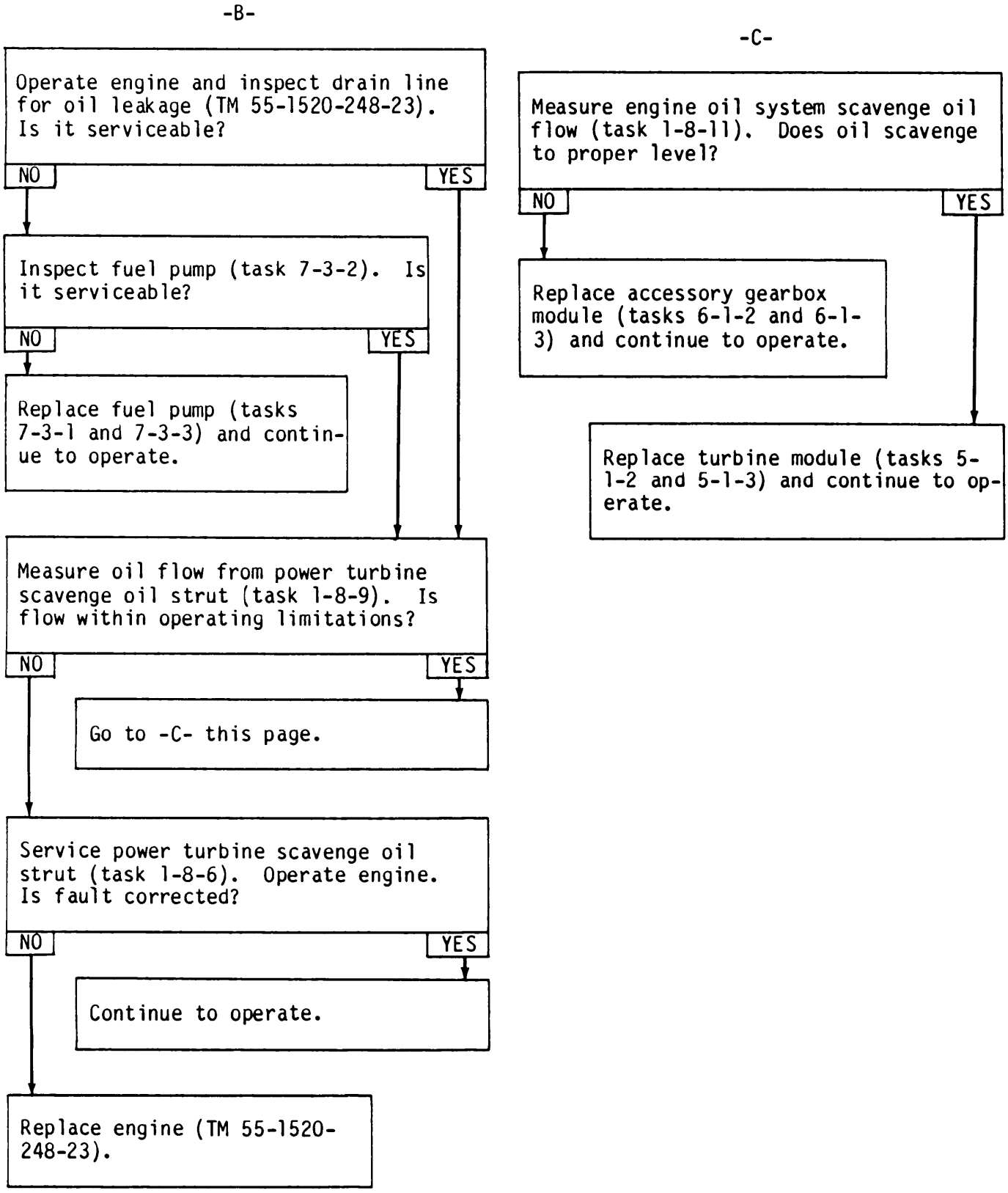
CAUTION

Oil consumption in excess of 1 quart in five hours is indicative of serious internal leakage and must not be permitted. Internal oil leakage can result in undetected internal oil fires and cause disastrous turbine failures.

Normal engines use a minimal amount of oil. However, any sudden increase in oil consumption is indicative of oil system problems and must be corrected. When adding oil to helicopter engine oil supply system, comply with all instructions given in TM 55-1520-248-23.



18. HIGH OIL CONSUMPTION (EXCEEDING 1 QUART PER 5 HOURS ENGINE OPERATION) (CONT)



19. OIL SPEWING OR SEEPAGE FROM DIFFUSER VENT ORIFICE AND TUBING JOINTS

NOTE

Do not install a smaller orifice than that required to stop spewing or smoking at the vent.

Replace diffuser vent orifice with next smaller size orifice (tasks 3-5-1 and 3-5-2). Fly aircraft a minimum of five minutes. Has vent orifice stopped spewing oil?

NO | YES

Continue to operate.

Continue replacing diffuser vent orifice with progressively smaller sizes until there is no smoking or evidence of oil leakage after flight (tasks 3-5-1 and 3-5-2).

20. OIL SPEWING OR SEEPAGE FROM GEARBOX VENT AND TUBING JOINTS

NOTE

Light wisps of smoke from vent are considered normal as long as oil consumption limit is not exceeded.

Replace accessory gearbox seal number 2 (task 6-1-4). Operate engine. Is fault corrected?

NO | YES

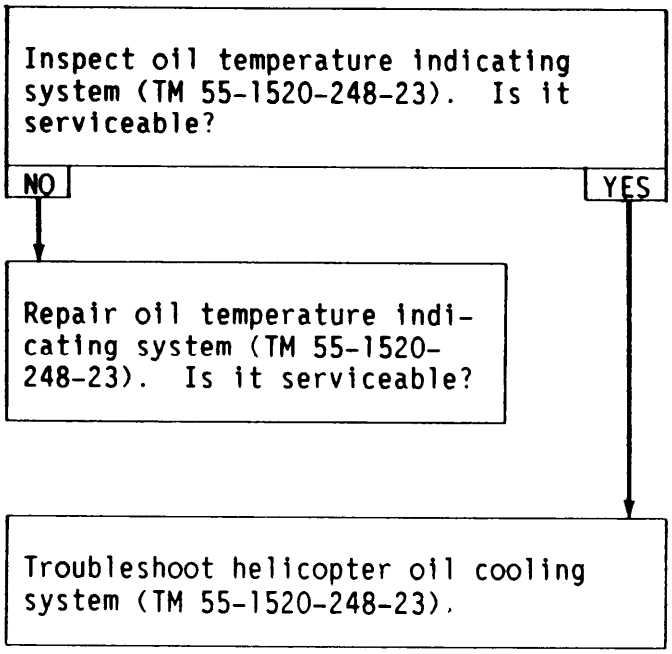
Continue to operate.

Replace accessory gearbox module (tasks 6-1-2 and 6-1-3) and continue to operate.

21. OIL TEMPERATURE EXCEEDS 107 DEGREES C

CAUTION

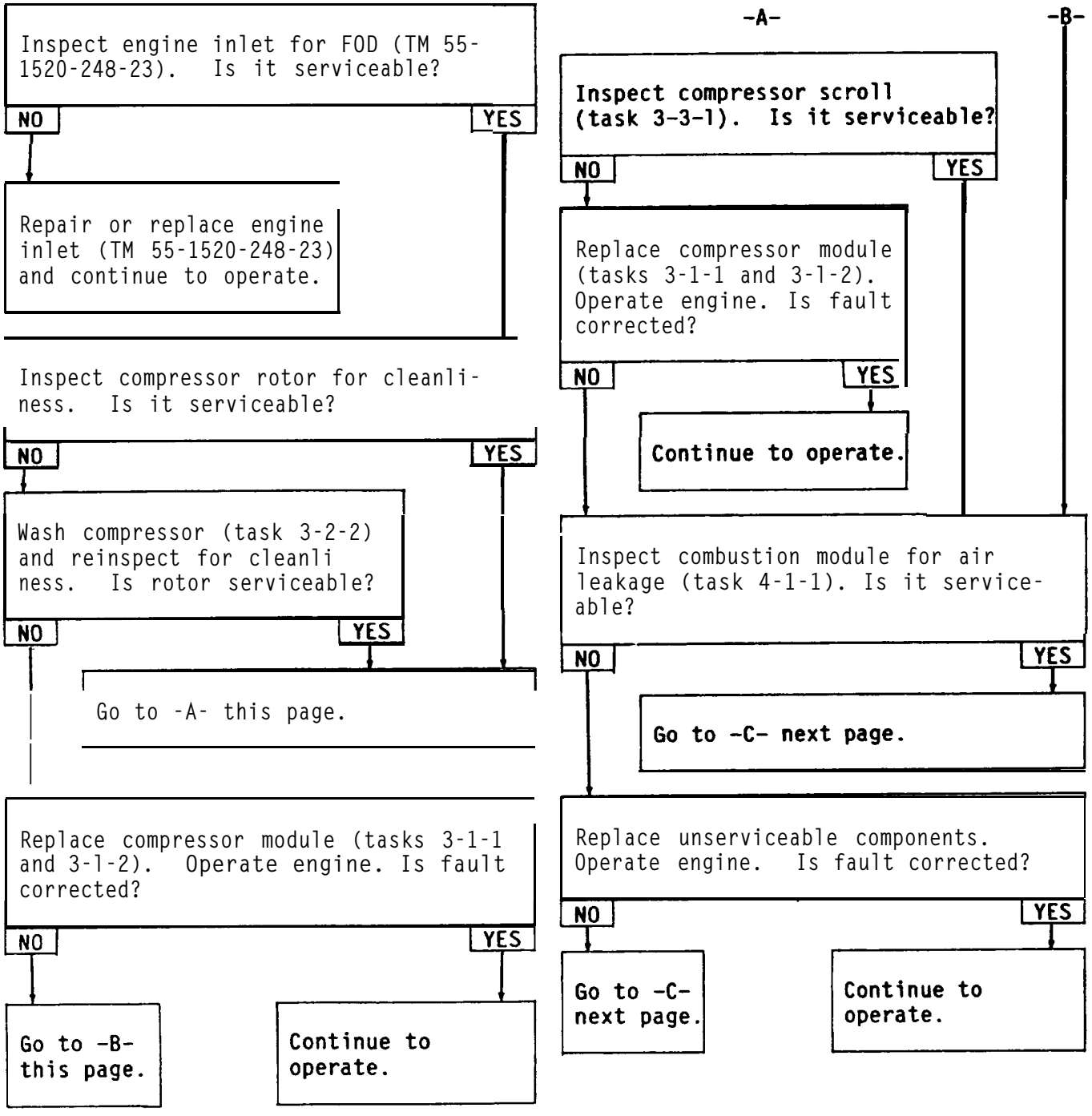
Any time engine oil temperature exceeds 107 degrees C, conduct engine oil overtemperature inspection (para 1-37). Failure to comply may result in internal damage to engine and possible engine failure.



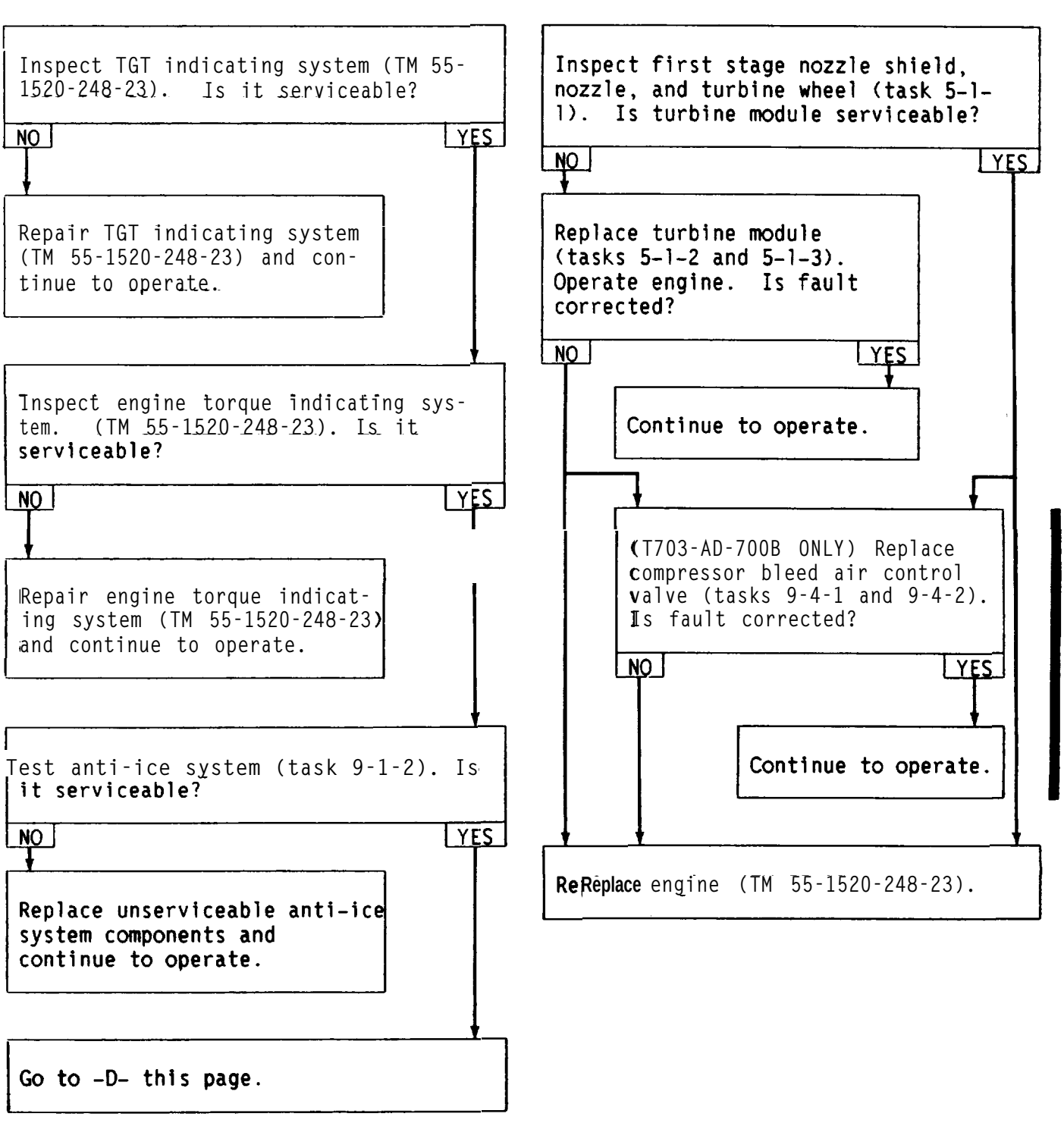
22. LOW POWER WITH HIGH TGT

WARNING

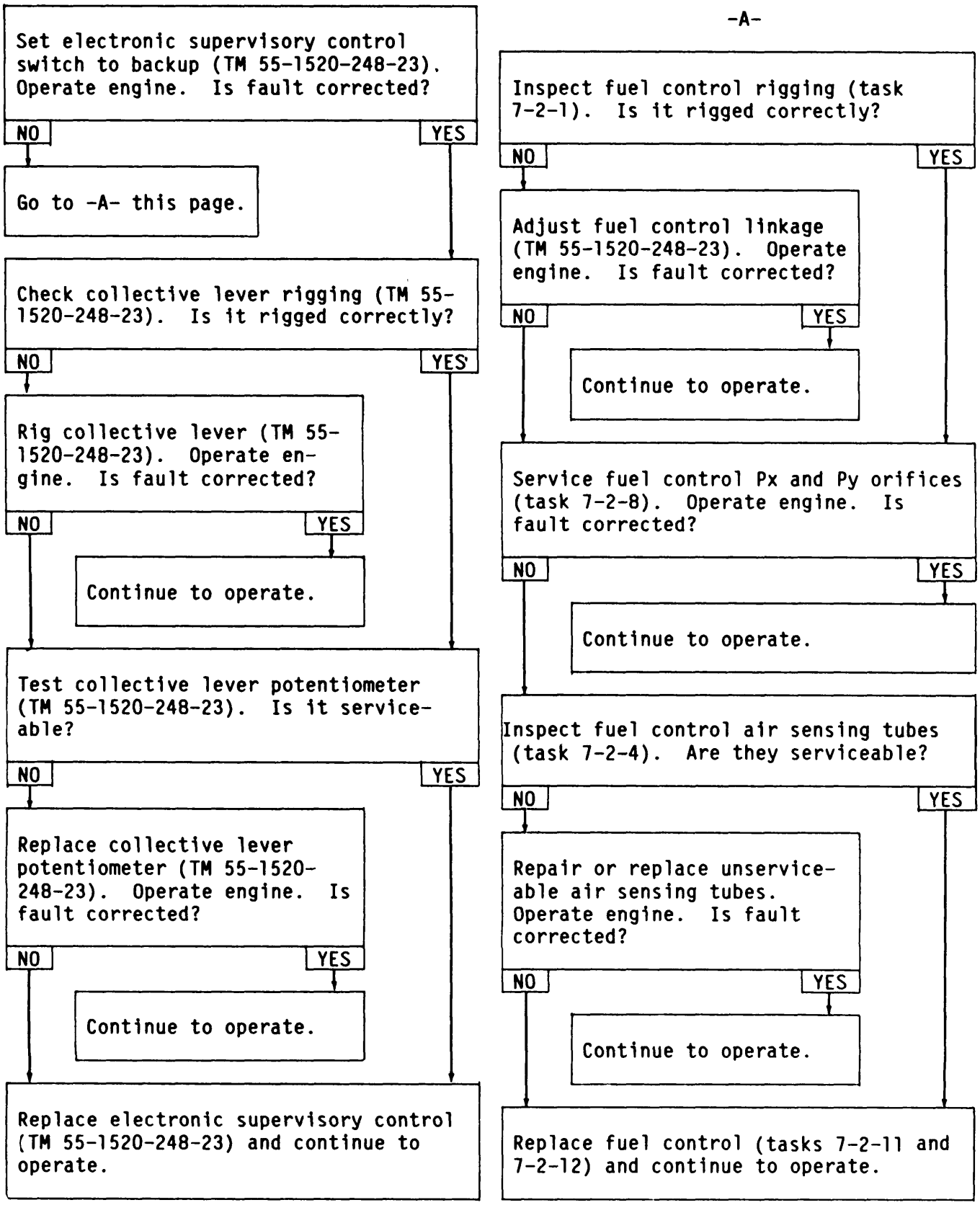
TGT temperatures in excess of operating limitations will cause turbine blade and wheel damage and can cause a section of wheel to break out and exit engine with potentially disastrous results. If TGT exceeds limitations (para 1-11), inspect first stage nozzle shield, nozzle, and turbine wheel (task 5-1-1).



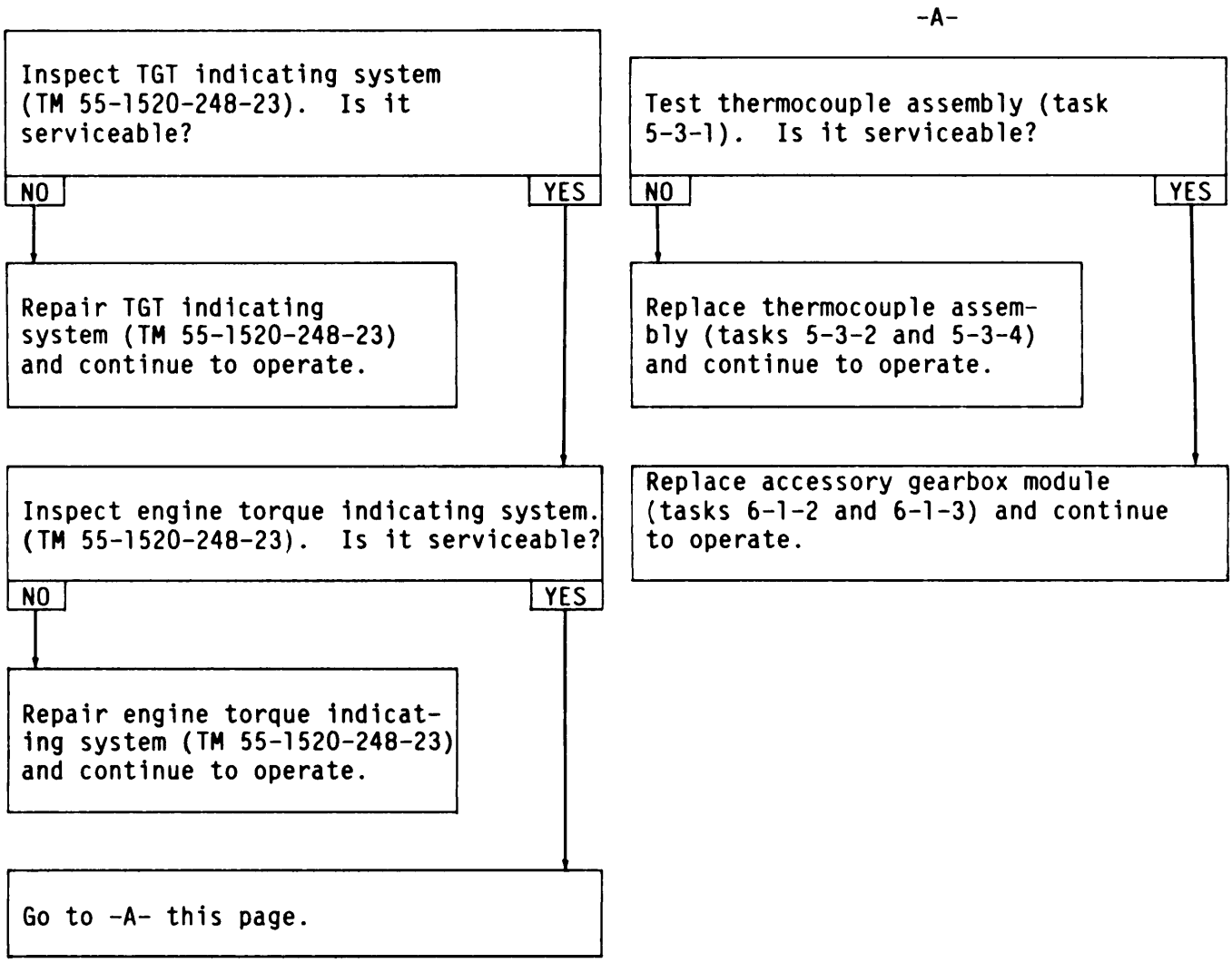
22. LOW POWER WITH HIGH TGT (CONT)



23. LOW POWER WITH TGT BELOW MAXIMUM LIMIT



24. LOW MEASURED TGT AT NORMAL OR HIGH TORQUEMETER INDICATIONS



25. ENGINE Ng OR Np OVERSPEEDS

WARNING

When making operational checks while troubleshooting, use care when advancing twist grip to prevent exceeding operational limitations. If operational limitations are exceeded, conduct overspeed inspection(s) (para 1-29 and/or 1-30). Failure to comply may result in internal damage to engine and possible engine failure.

Set electronic supervisory control switch to backup (TM 55-1520-248-23). Operate engine. Is fault corrected?

NO

Replace fuel control (tasks 7-2-11 and 7-2-12) and continue to operate.

YES

Test engine electrical wiring harness (task 8-1-1). Is it serviceable?

NO

Replace wiring harness (tasks 8-1-2 and 8-1-3) and continue to operate.

YES

Check helicopter to engine wiring harness (TM 55-1520-248-23). Is it serviceable?

NO

Go to -A- this page.

YES

Go to -B- this page.

-A-

Repair helicopter to engine wiring harness (TM 55-1520-248-23) and continue to operate.

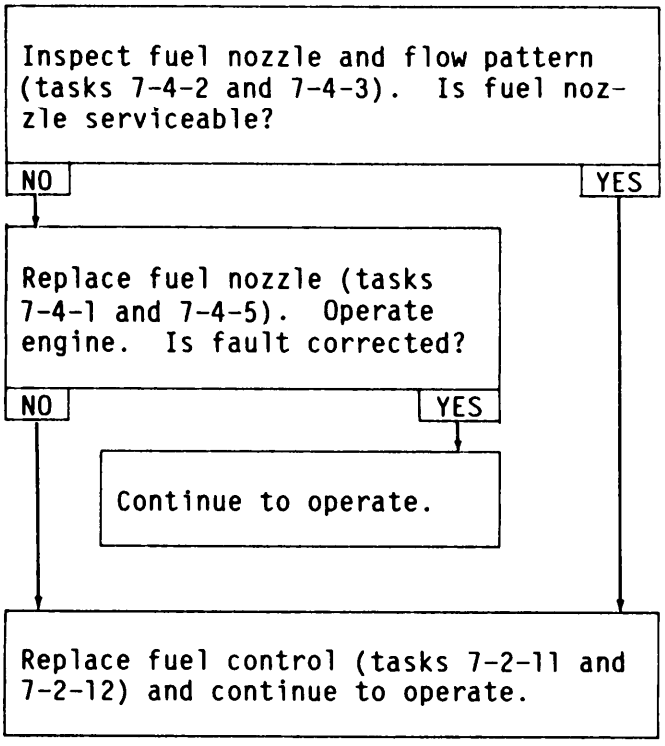
-B-

Replace electronic supervisory control (TM 55-1520-248-23) and continue to operate.

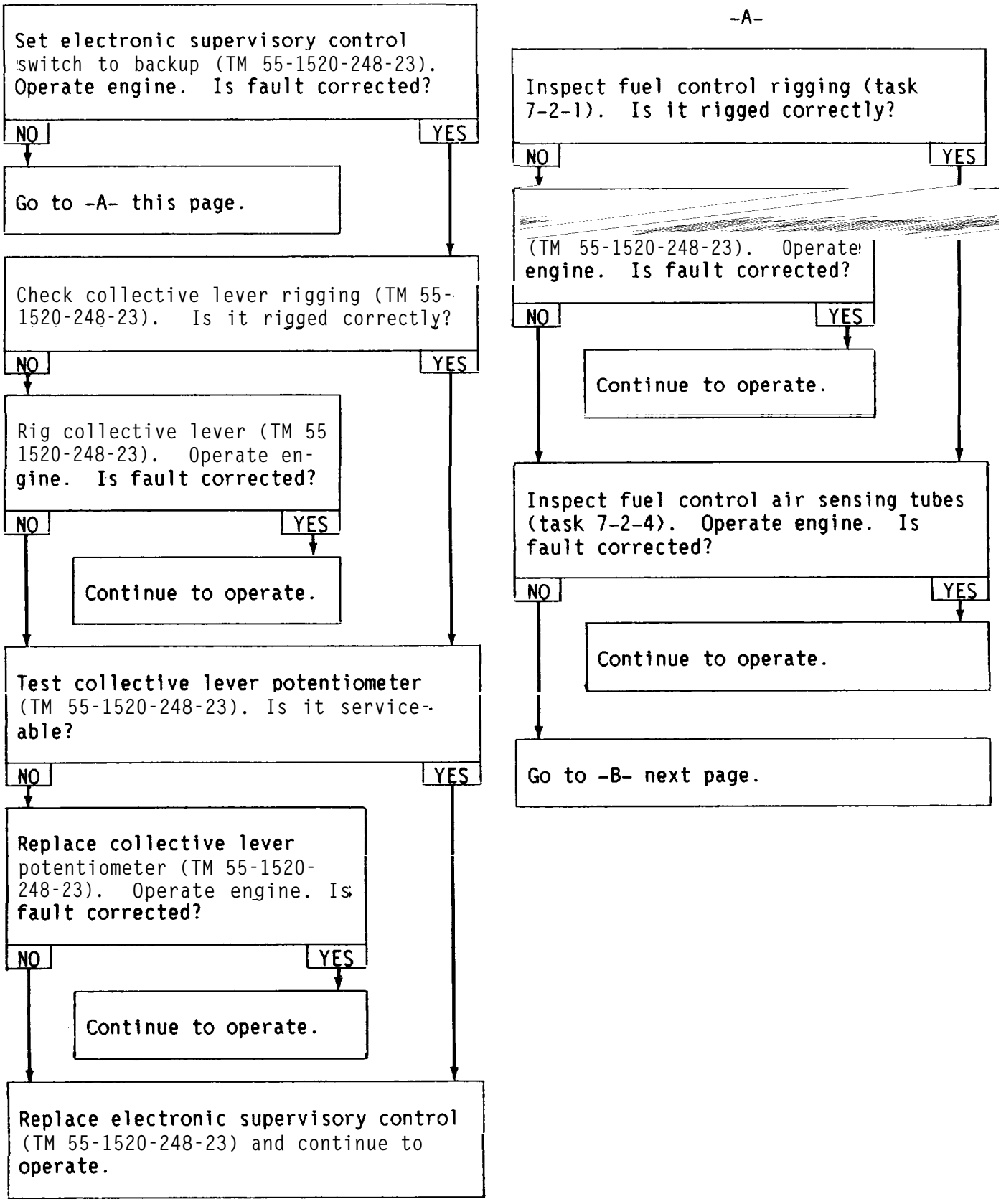
26. EXHAUST TORCHING DURING TRANSIENTS

WARNING

After completing this procedure, you must inspect first stage nozzle shield, nozzle, and turbine wheel (task 5-1-1).

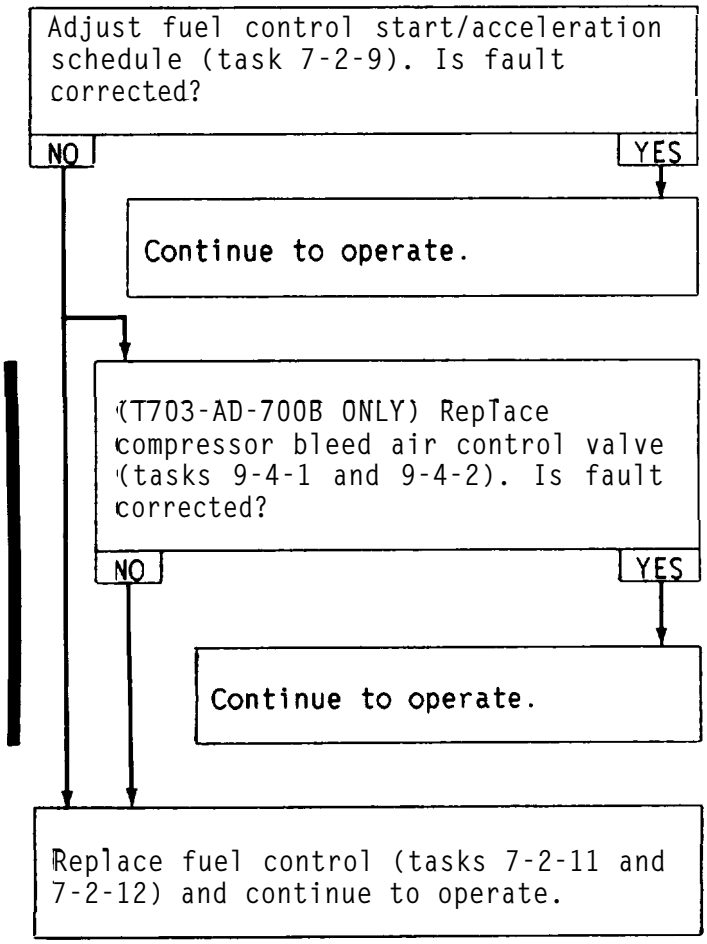


27. SLOW ACCELERATION/NP DROOP



27. SLOW ACCELERATION/NP DROOP (CONT)

-B-

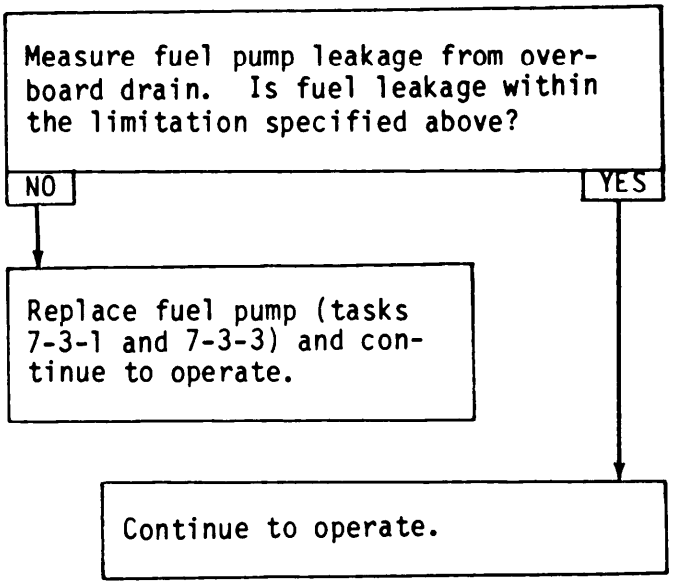


29. FUEL LEAKING FROM FUEL PUMP OVERBOARD DRAIN PORTS

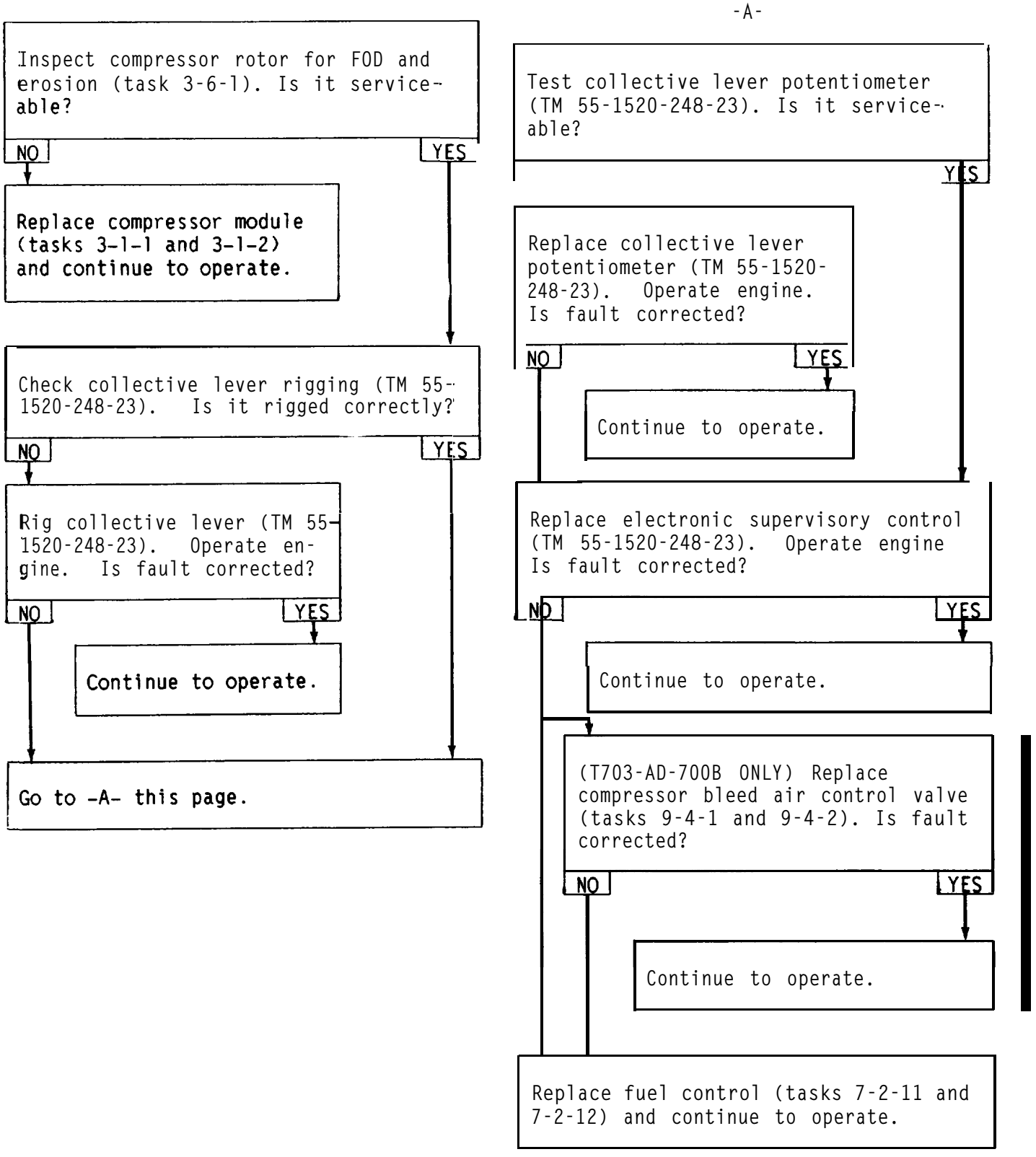
NOTE

The limitation for fuel leakage from the fuel pump overboard drain ports is: 10 drops per minute. If this limit is exceeded, the fuel pump must be replaced (tasks 7-3-1 and 7-3-3).

If oil is found leaking from fuel pump overboard drain ports, complete troubleshooting procedure 30.



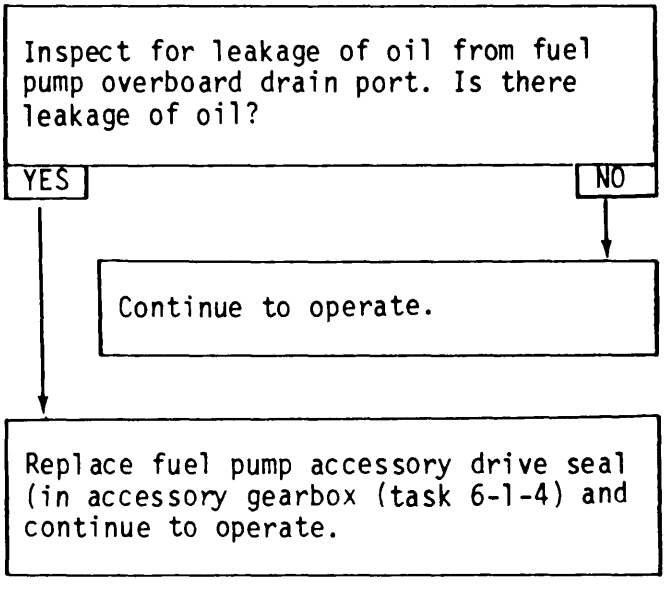
28. COMPRESSOR SURGE/STALL



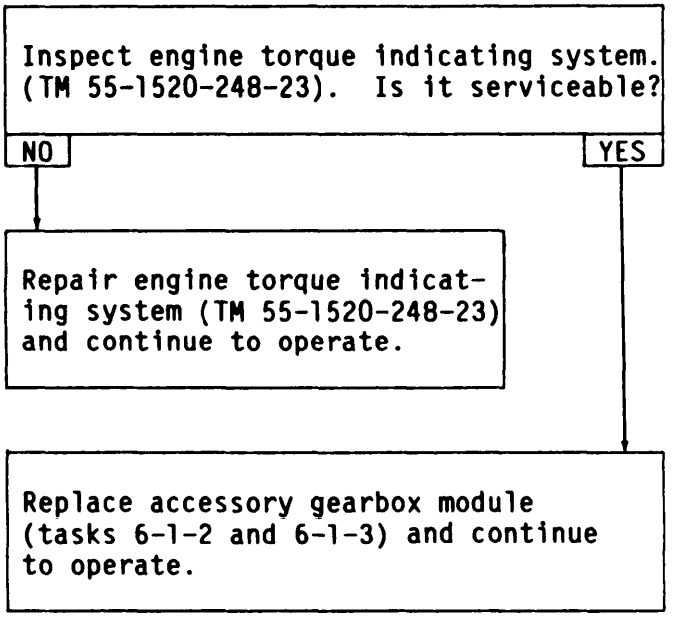
30. OIL LEAKING FROM FUEL PUMP OVERBOARD DRAIN PORTS

NOTE

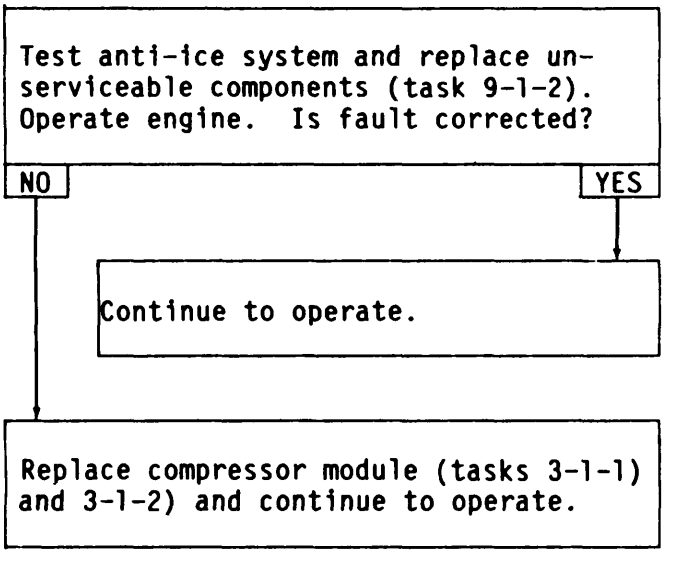
If fuel is found leaking from fuel pump overboard drain ports, complete troubleshooting procedure 29.



31. FAULTY TORQUEMETER INDICATIONS



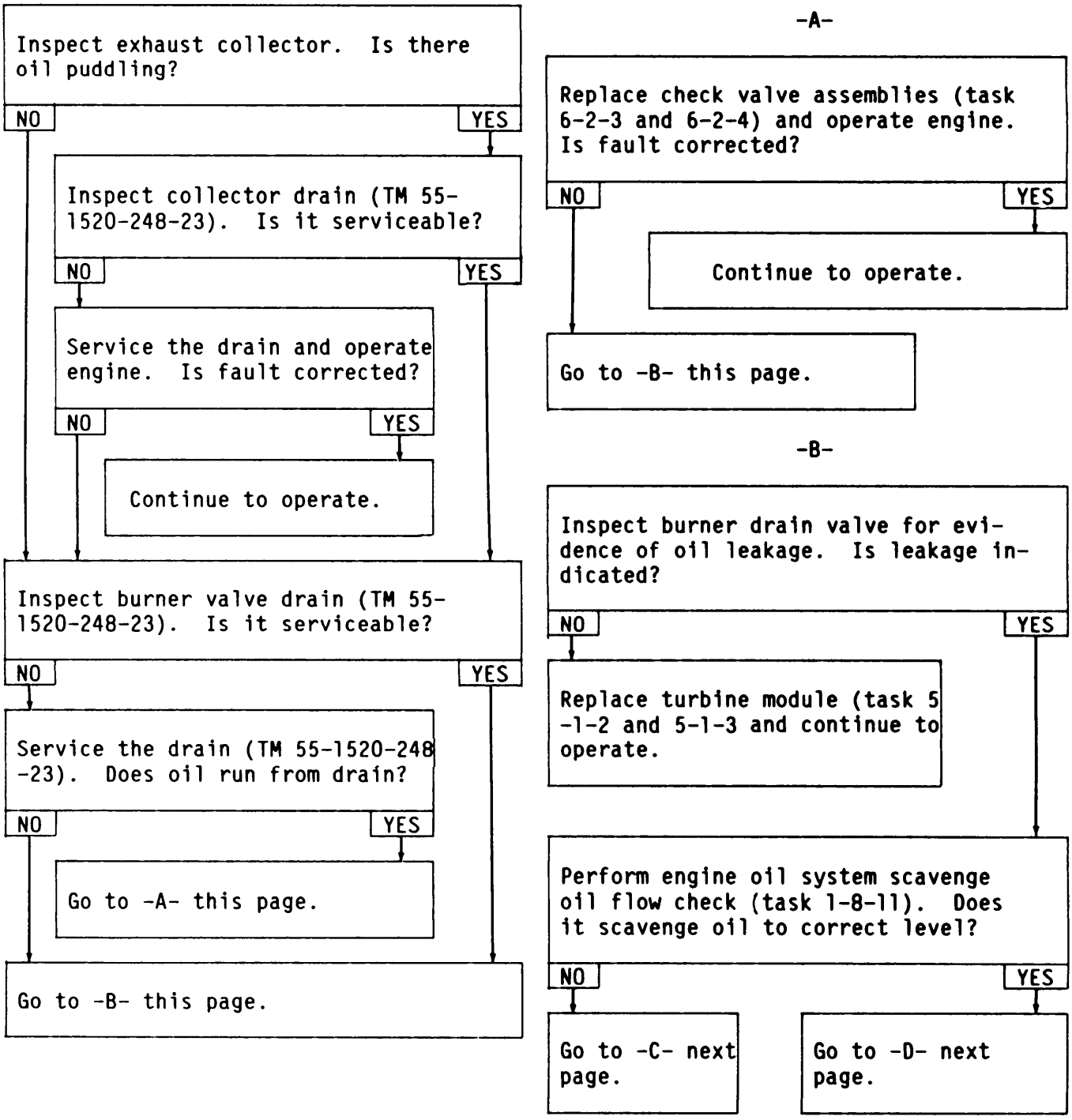
32. ANTI-ICING AIR NOT OPERATING



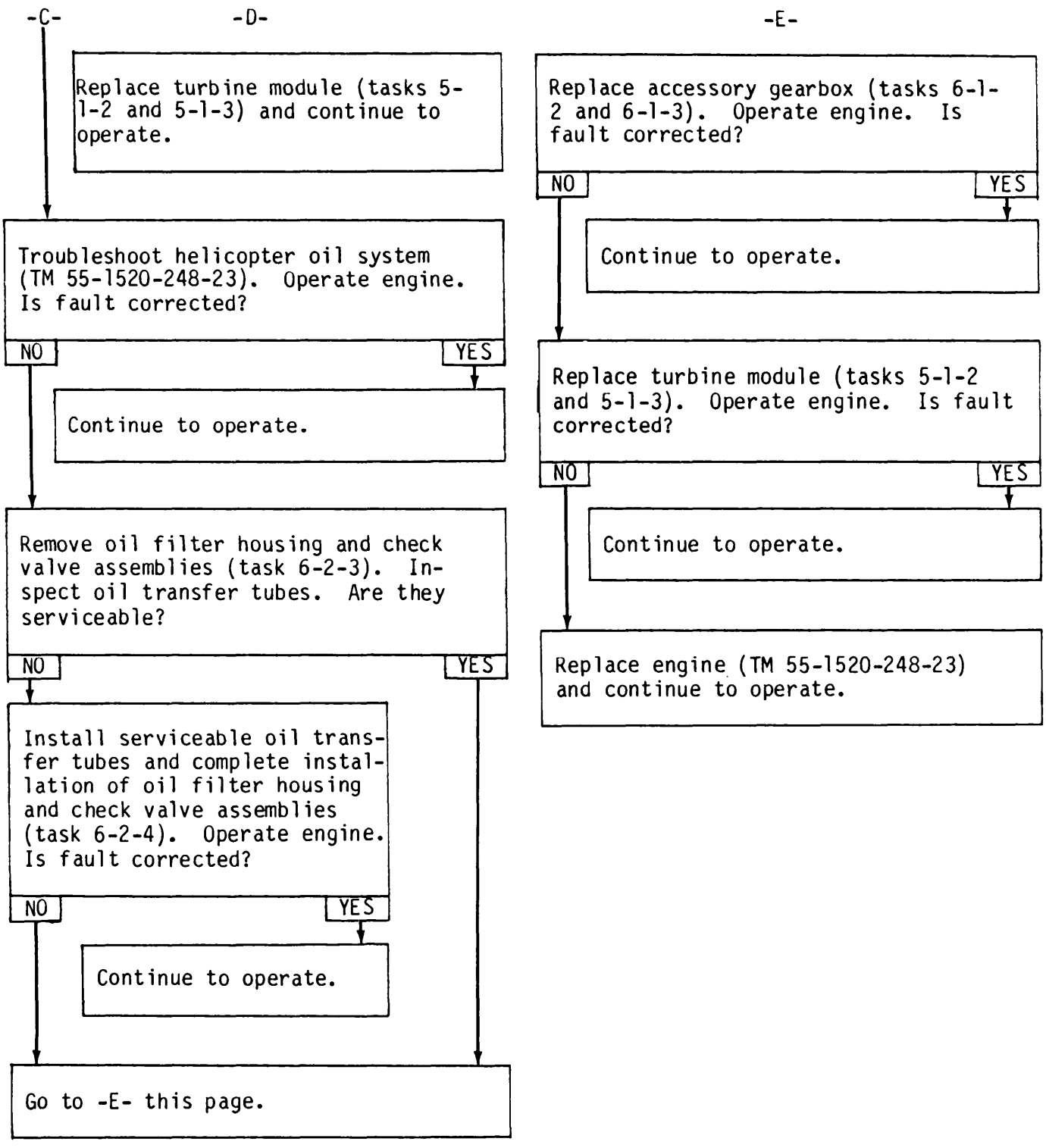
33. ENGINE SMOKING DURING SHUTDOWN

NOTE

A brief puff of smoke during deceleration or shutdown and light wisps of smoke from exhaust collector after shutdown are considered normal. If smoke is observed after fuel cutoff and during engine coastdown that lasts more than three seconds, complete this procedure.



33. ENGINE SMOKING DURING SHUTDOWN (CONT)



34. ENGINE SMOKING DURING TRANSIENT

NOTE

A brief puff of smoke during deceleration or shutdown and light wisps of smoke from the exhaust collector after shutdown are considered normal.

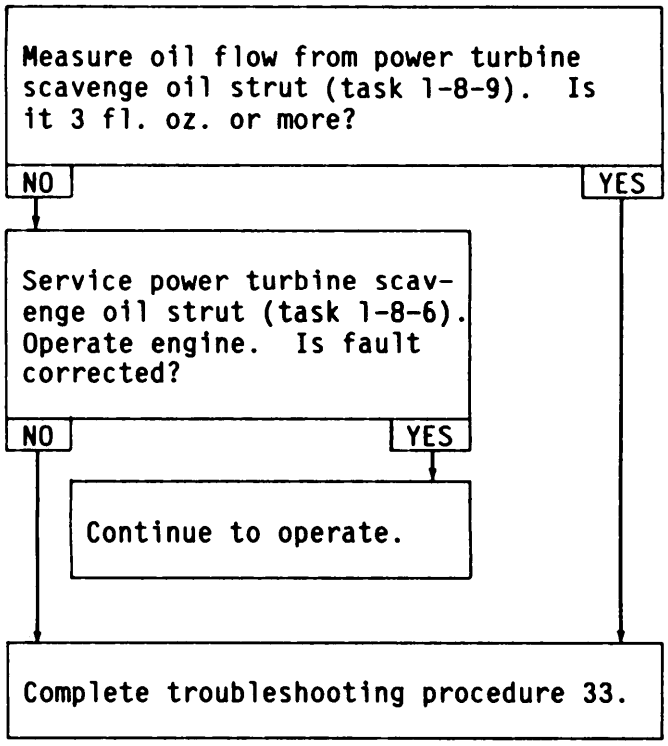
If continuous puffs of smoke are seen during deceleration, complete troubleshooting procedure 33.

35. ENGINE SMOKING DURING STEADY STATE OPERATIONS

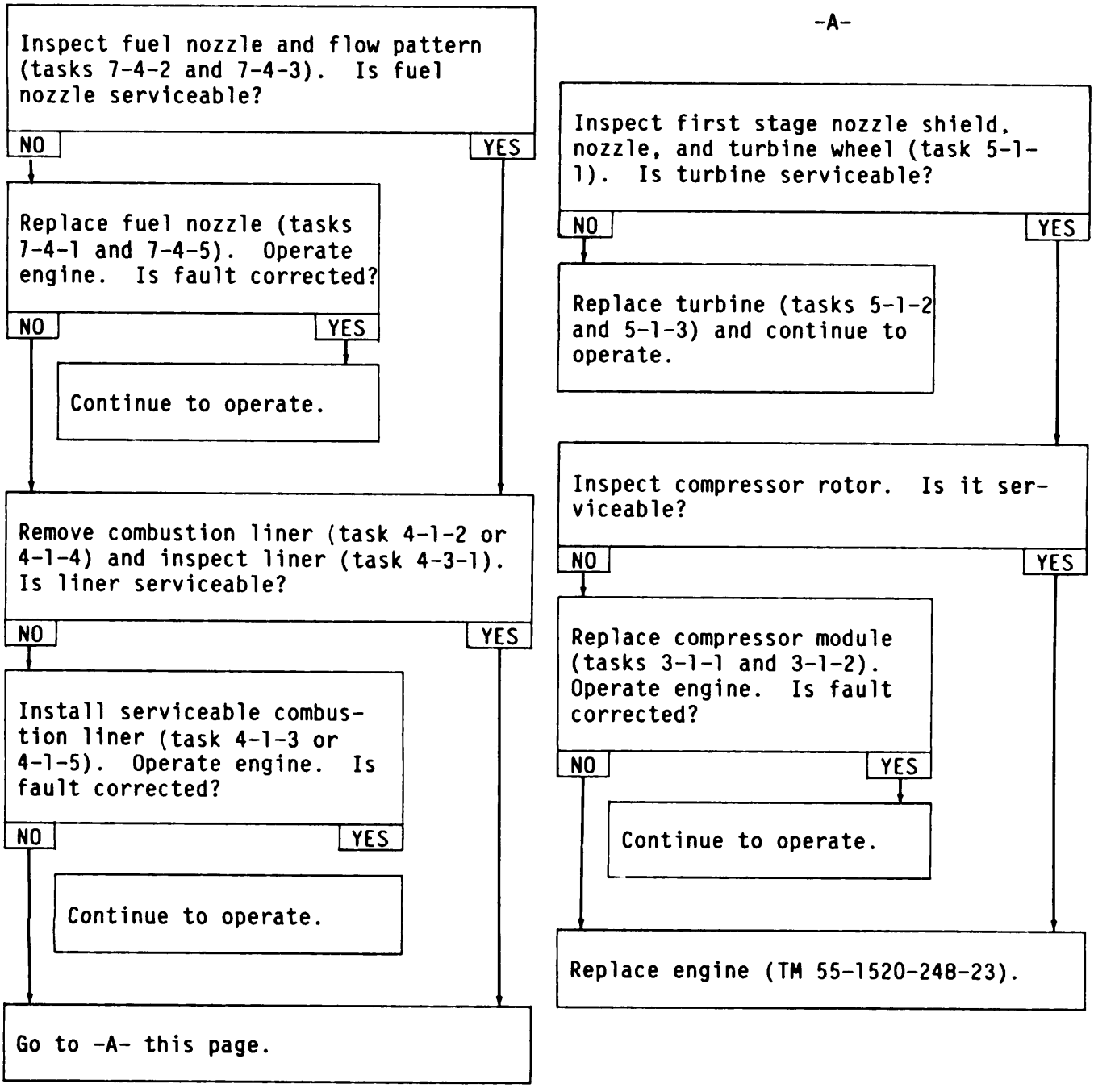
NOTE

Light wisps of smoke are normal and not cause for engine rejection unless oil consumption limits (para 1-11) are exceeded.

If continuous puffs of smoke lasting more than three seconds occur while engine is operating at a steady state, or if oil consumption has exceeded limitations or exhibited rapid change, complete this procedure.



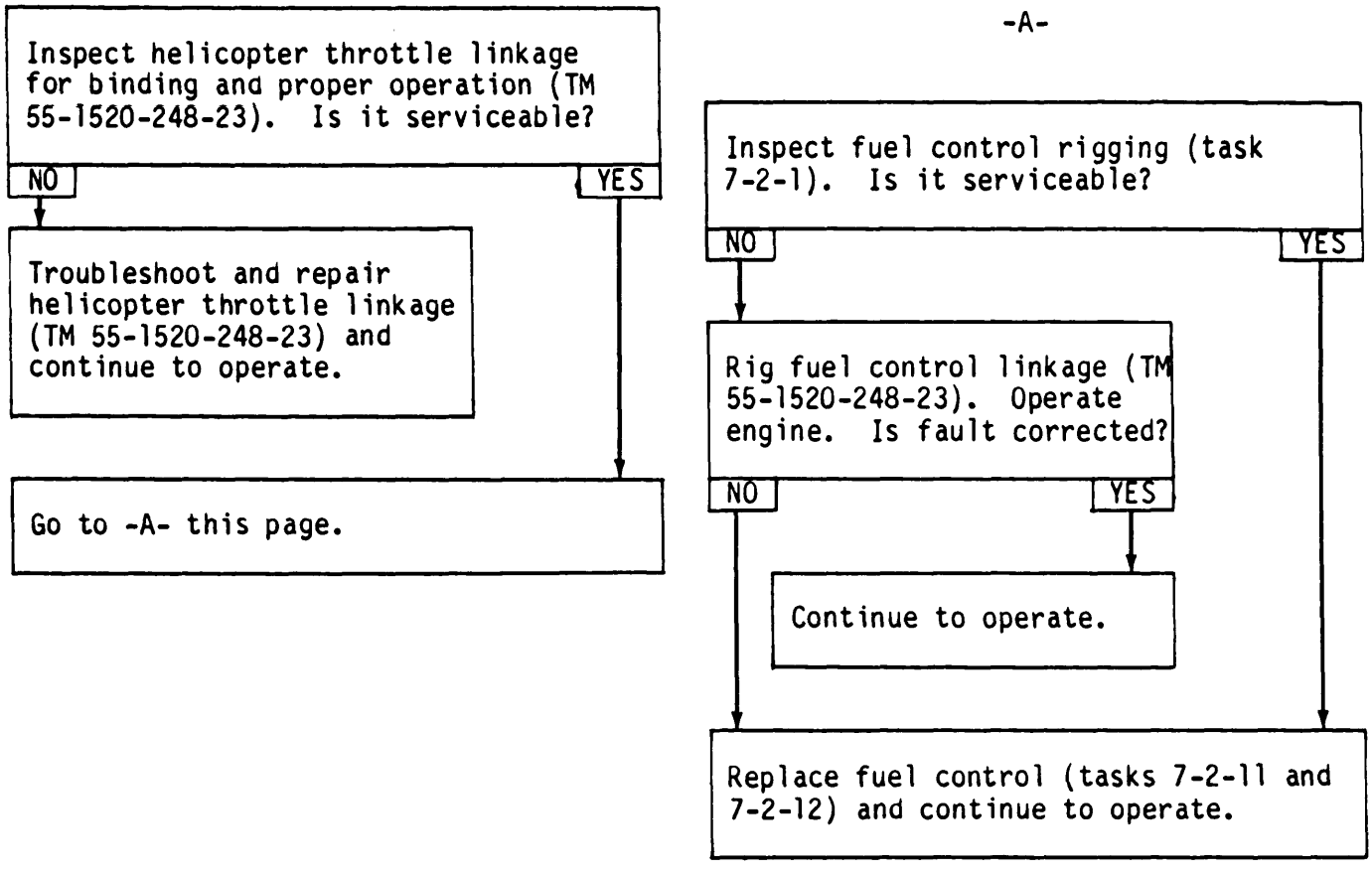
36. EXHAUST DUCT EMITTING SPARKS



37. UNABLE TO STOP ENGINE NORMALLY

NOTE

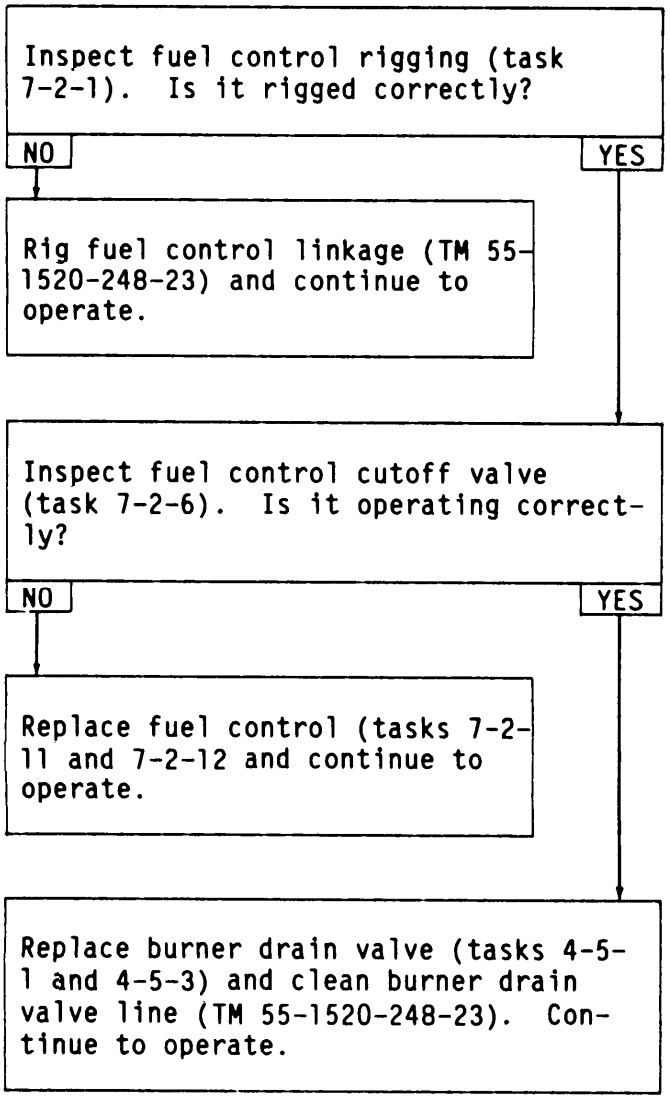
Engine will normally continue to operate for approximately two minutes after main fuel switch is OFF.



38. AFTERFIRE (RISING TGT AFTER SHUTDOWN

WARNING

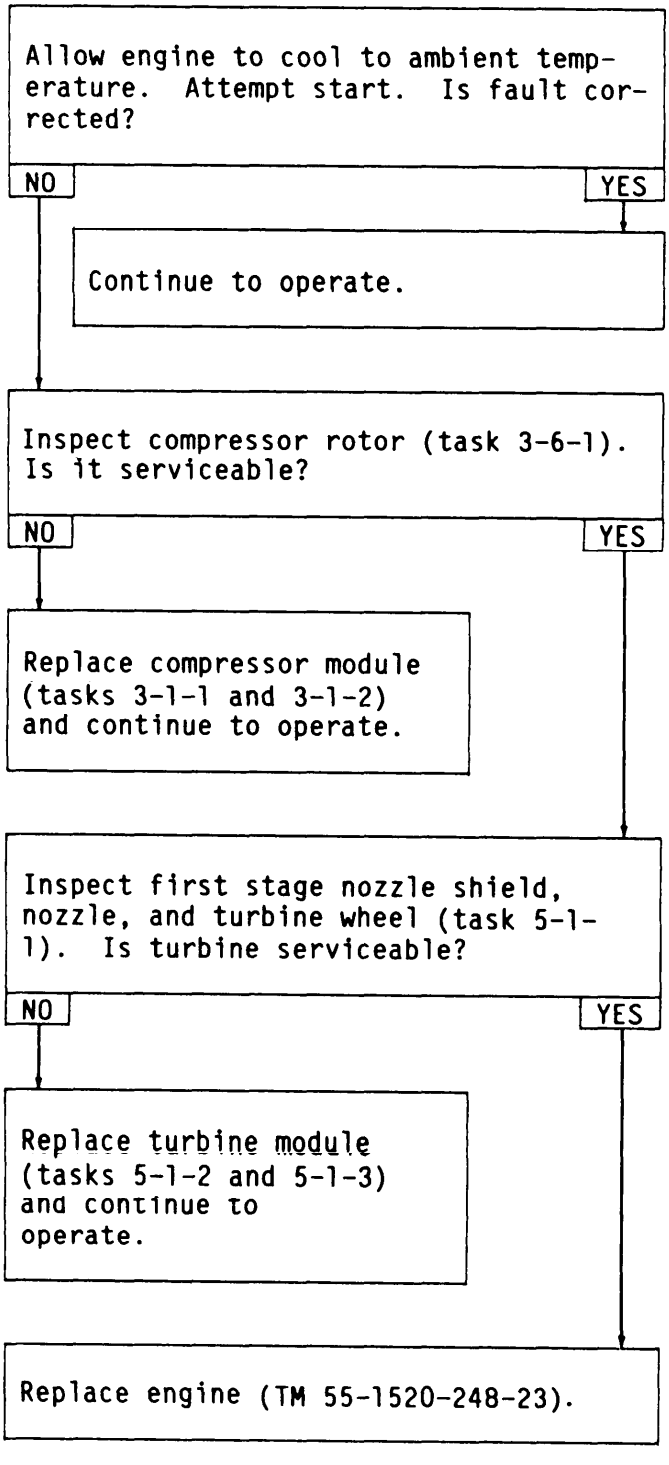
Fires after shutdown will cause turbine blade and wheel damage and can cause a section of wheel to break out and exit engine with potentially dangerous results. If TGT exceeds limitations (para 1-11), inspect first stage nozzle shield, nozzle, and turbine wheel (task 5-1-1). Do not operate engine until instructed to by this procedure. Failure to comply may result in another afterfire.



39. STARTER WILL NOT ROTATE ENGINE IMMEDIATELY AFTER SHUTDOWN

NOTE

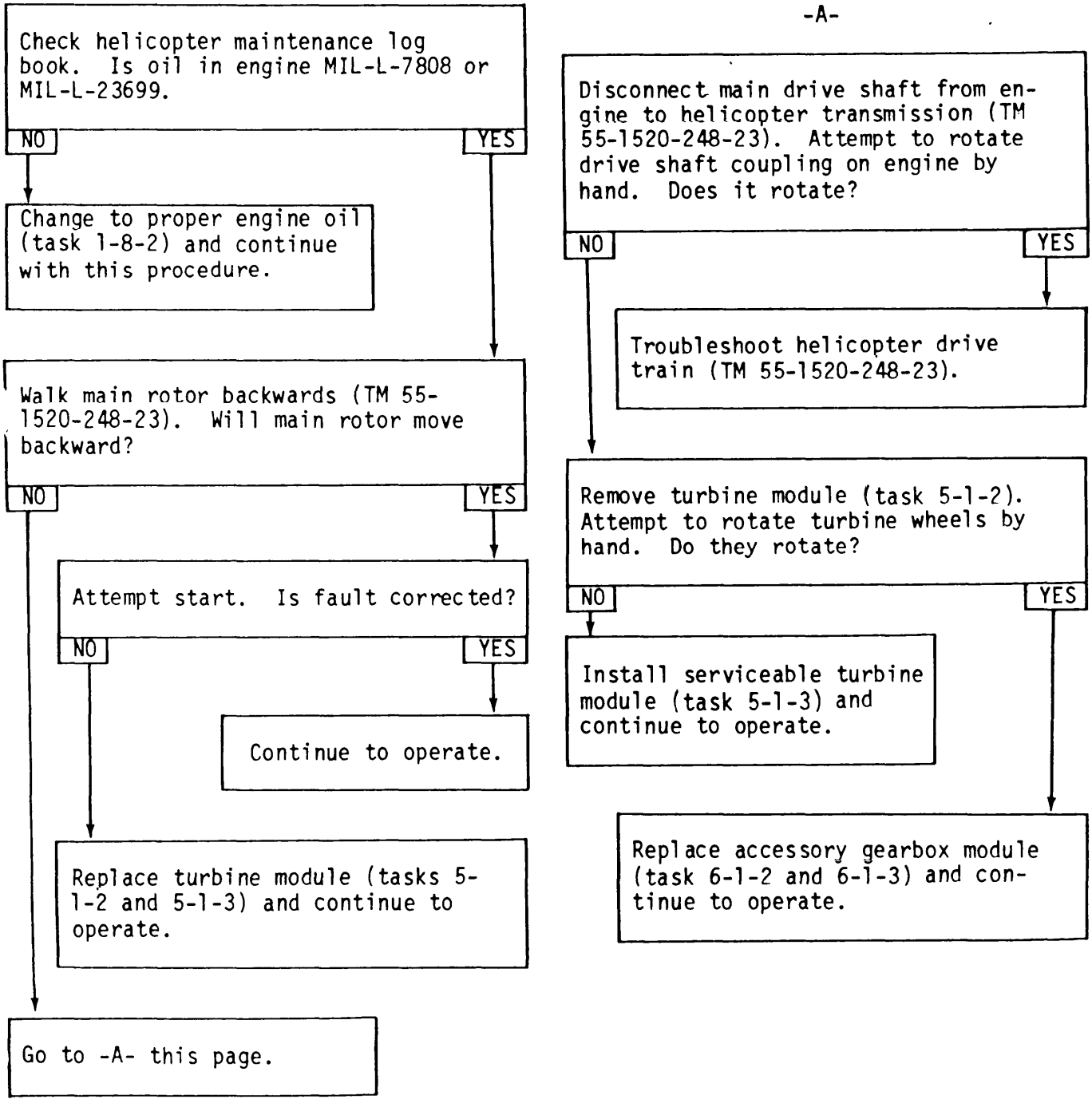
Turbine blade tip clearance is reduced by heat expansion and can result in the engine locking temporarily.



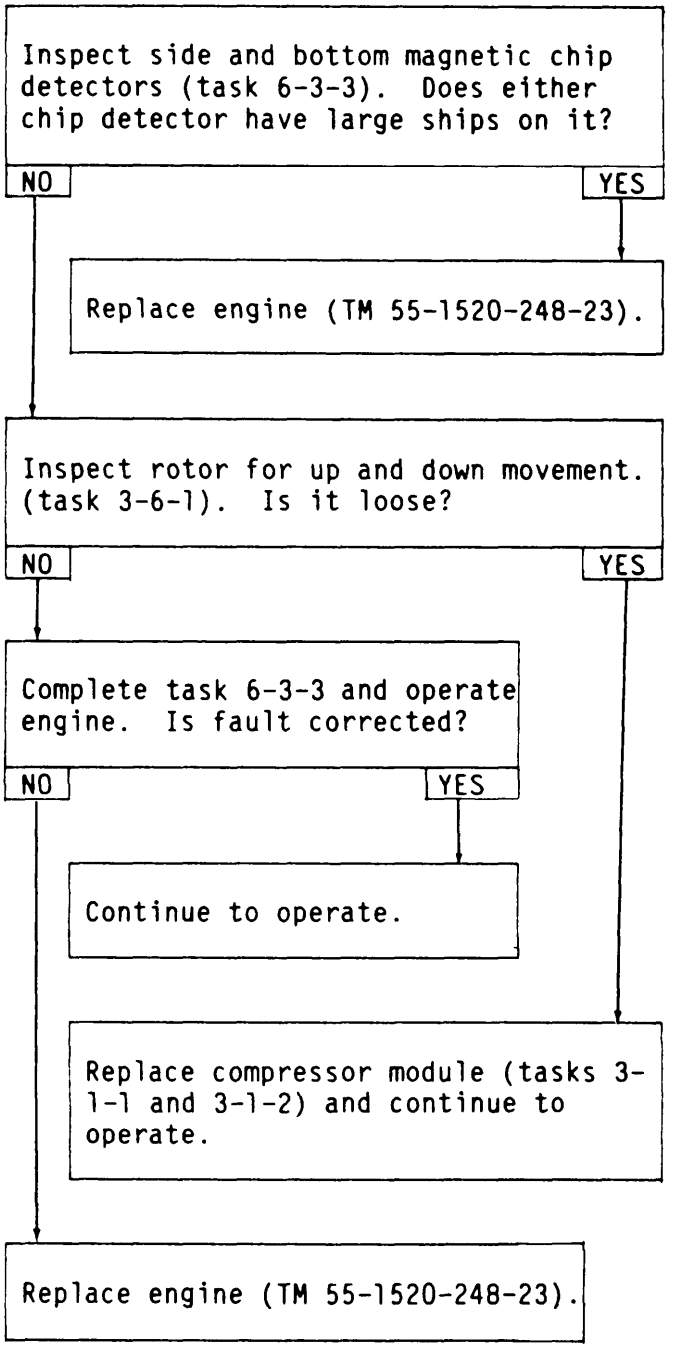
40. Nr AND/OR Np DO NOT ROTATE BY 25% Ng DURING START

NOTE

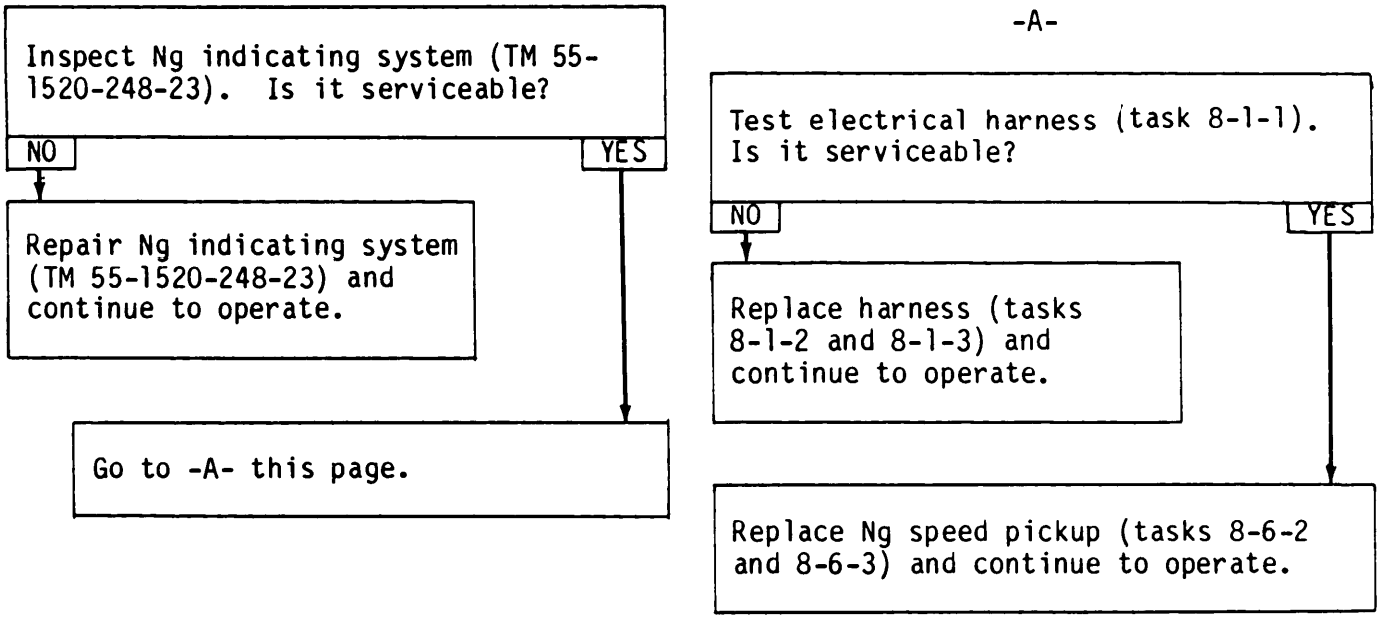
To help prevent turbine rub or carbon buildup which prevents main rotor and Np from turning by 25% Ng speed, walk main rotor backwards after start attempt and/or while engine is cooling down. If chatter is encountered, go to -A- this page.



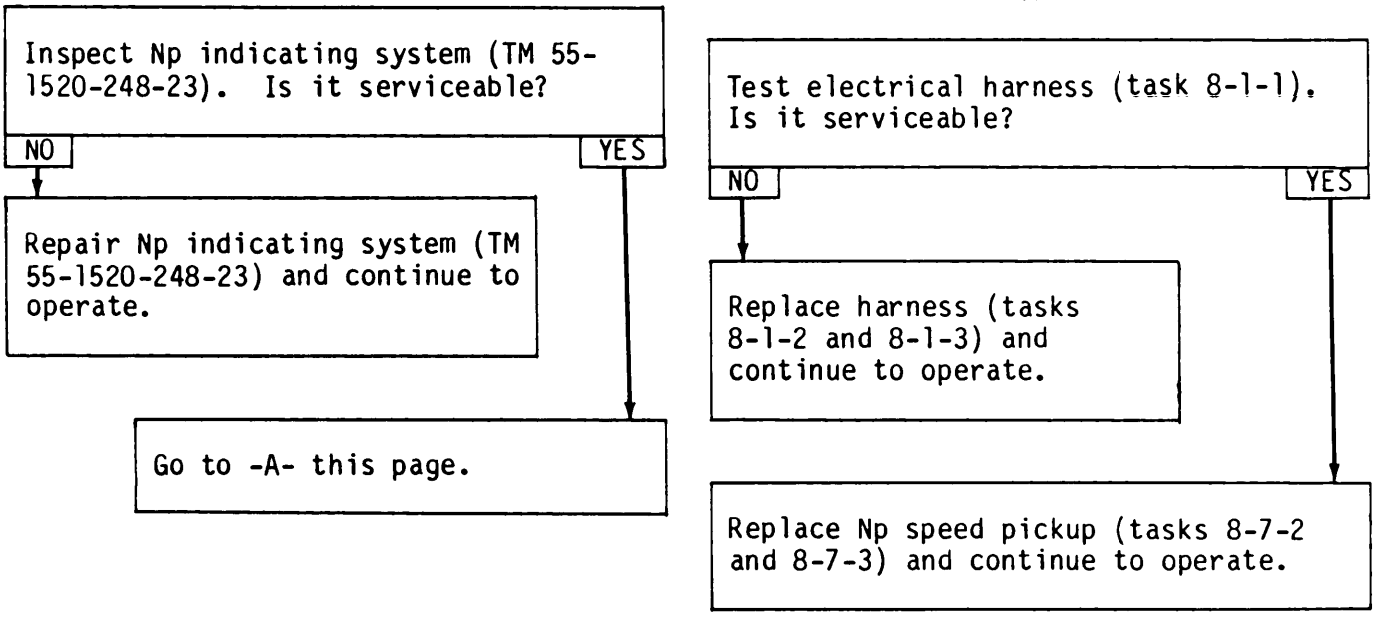
41. COMPRESSOR BEARING NOISE AND/OR LOOSE COMPRESSOR ROTOR



42. NO Ng SPEED INDICATION



43. NO Np SPEED INDICATION



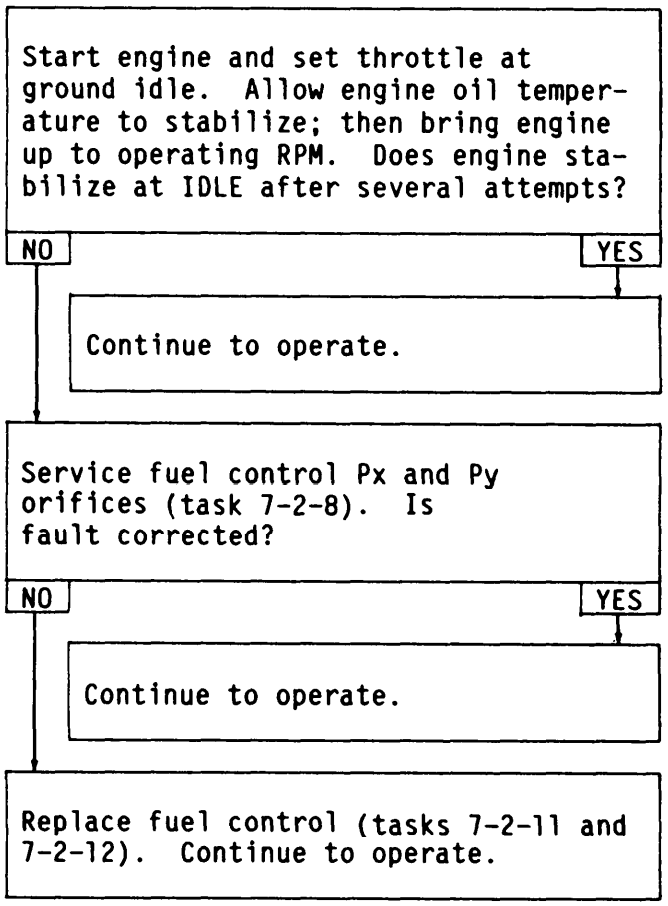
44. ENGINE ACCELERATES TO OVERSPEED DURING START

CAUTION

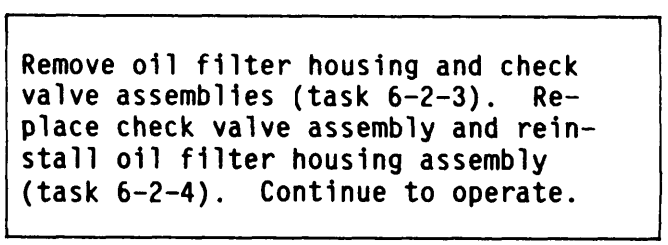
If operational limitations (para 1-11) are exceeded, conduct overspeed inspection (para 1-29 and/or 1-30). Failure to comply may result in turbine failure.

NOTE

This condition is more likely to occur under high relative humidity and low ambient temperature, or after engine is cold soaked.



45. OIL RUNS FROM BURNER DRAIN VALVE AFTER SHUTDOWN



46. OIL LEAKING FROM STARTER-GENERATOR DRIVE SEAL DRAIN

Remove starter-generator (TM 55-1520-248-23). Replace seal in accessory gearbox starter-generator mount pad (task 6-1-4). Install new packing on starter-generator drive shaft and install starter-generator (TM 55-1520-248-23).

47. MAGNETIC CHIP DETECTOR WARNING LIGHT ILLUMINATED

Disconnect magnetic chip detector connectors (see illustrations in tasks 6-3-1 and 6-3-2). Is warning light still on?

NO

YES

Troubleshoot helicopter electrical system (TM 55-1520-248-23).

Remove (tasks 6-3-1 and 6-3-2) and service magnetic chip detectors (task 6-3-4); then reinstall (tasks 6-3-5 and 6-3-61. Continue to operate.

48. OIL RESERVOIR ENGINE FILLS DURING FLIGHT AS HELICOPTER TRANSMISSION OIL RESERVOIR EMPTIES

Inspect/replace drive seals (task 6-1-4) . Is fault corrected?

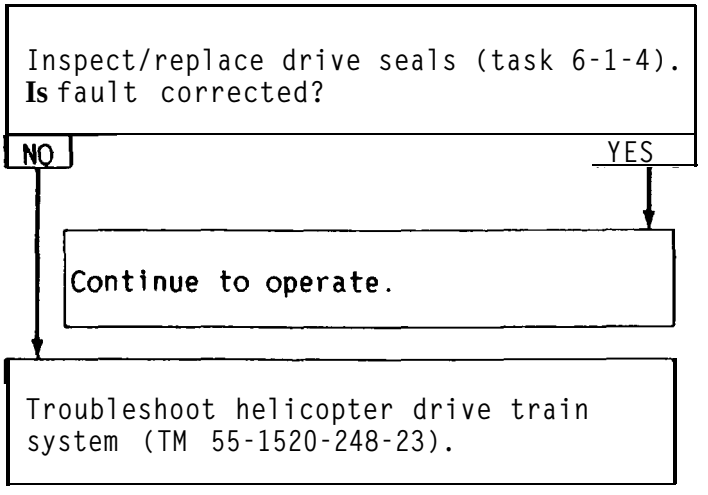
NO

YES

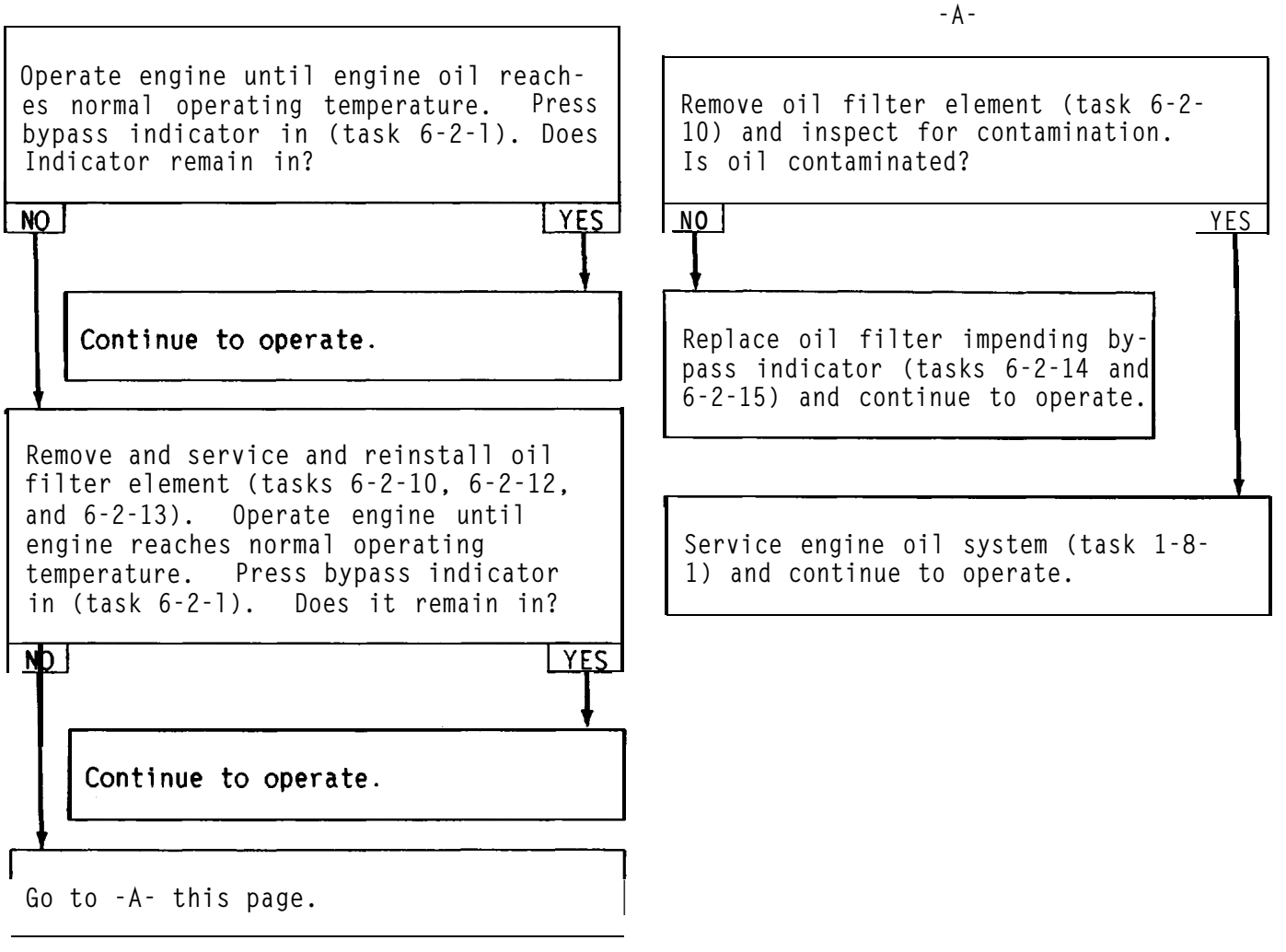
Continue to operate.

Troubleshoot helicopter drive train system (TM 55-1520-248-23).

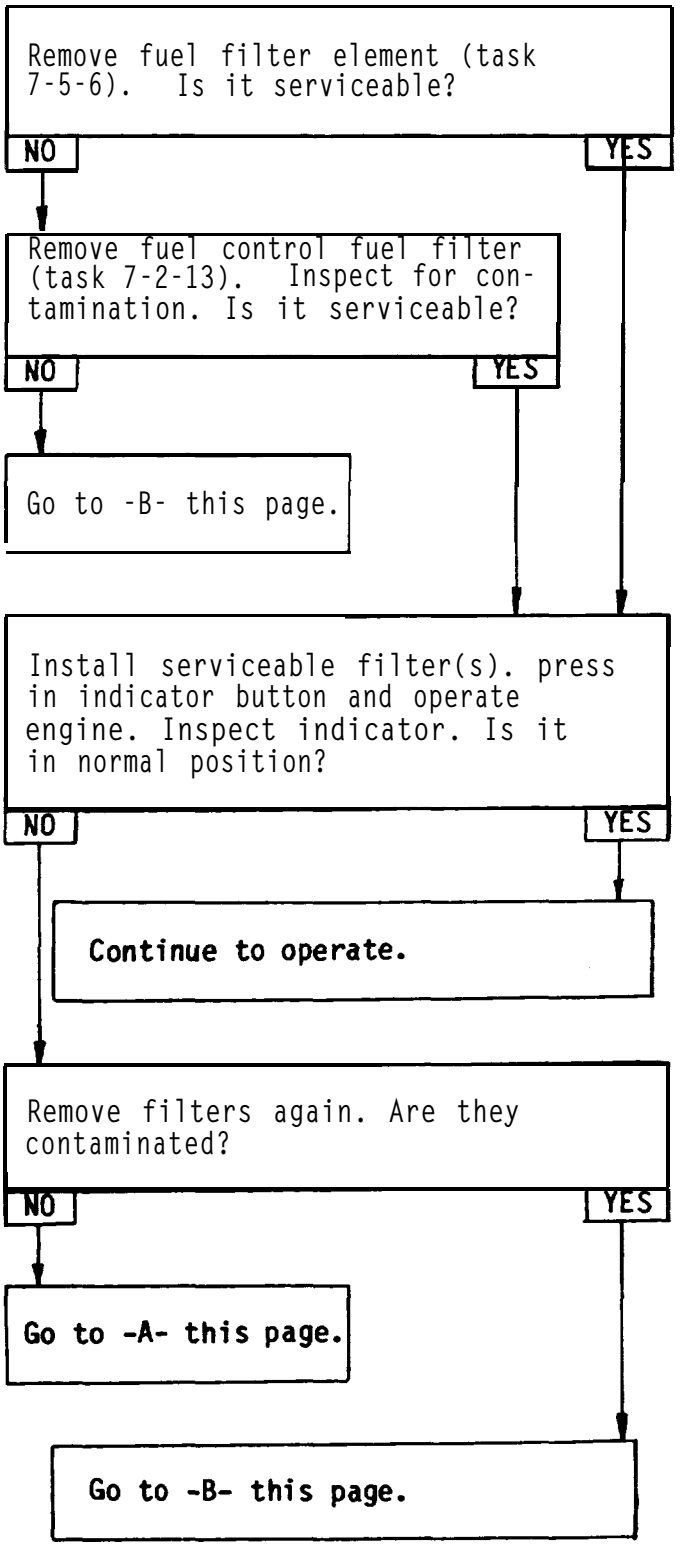
49. HELICOPTER TRANSMISSION OIL RESERVOIR FILLS DURING FLIGHT AS ENGINE OIL RESERVOIR EMPTIES



50. OIL FILTER IMPENDING BYPASS INDICATOR EXTENDED



51. FUEL FILTER IMPENDING BYPASS INDICATOR EXTENDED



-A-

Install filters. Replace fuel filter impending bypass indicator (tasks 7-5-8 and 7-5-9) and continue to operate.

-B-

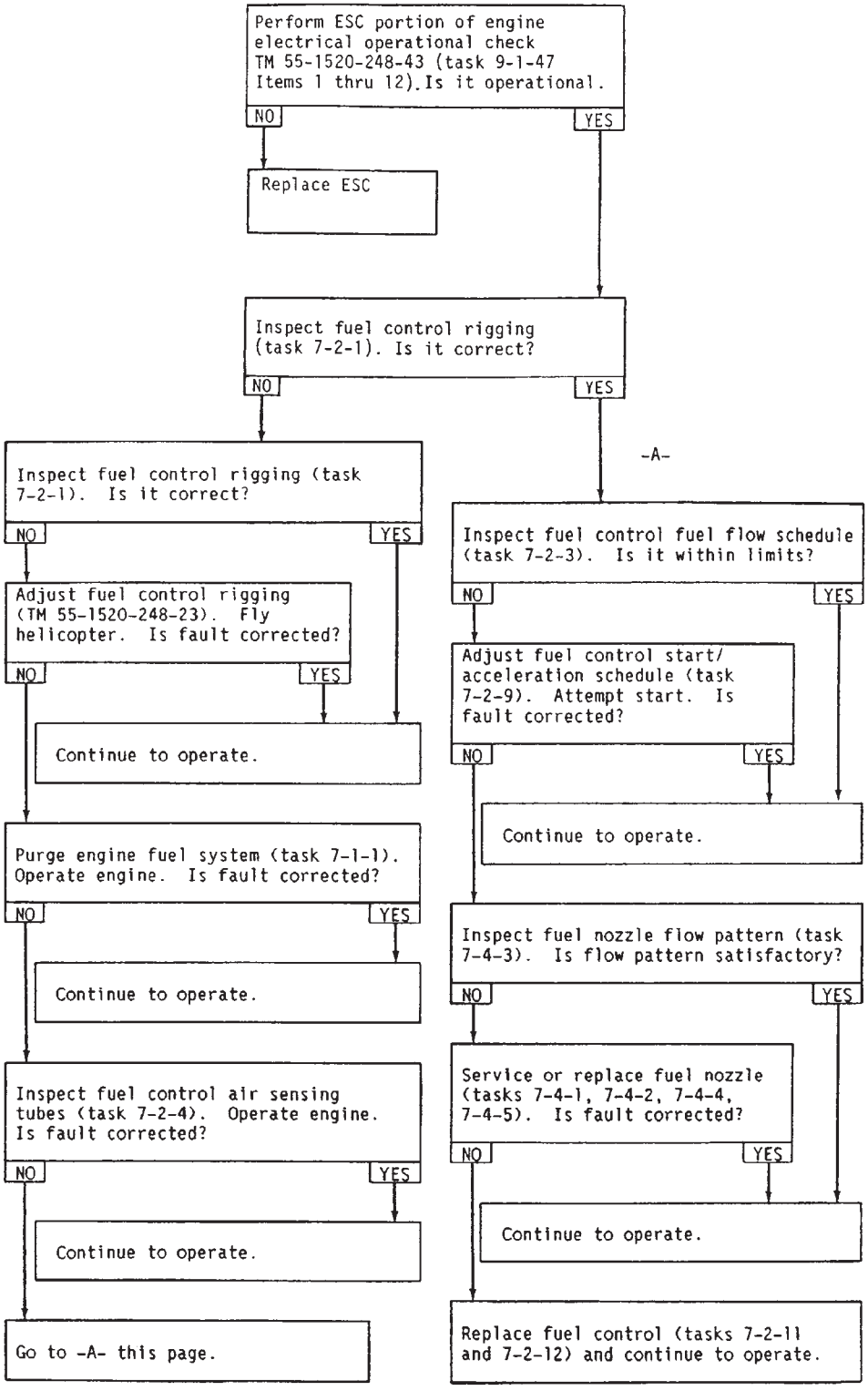
Locate and remove contamination from helicopter fuel system (TM 55-1520-248-23), then perform the following:

Replace fuel control (tasks 7-2-11 and 7-2-12).

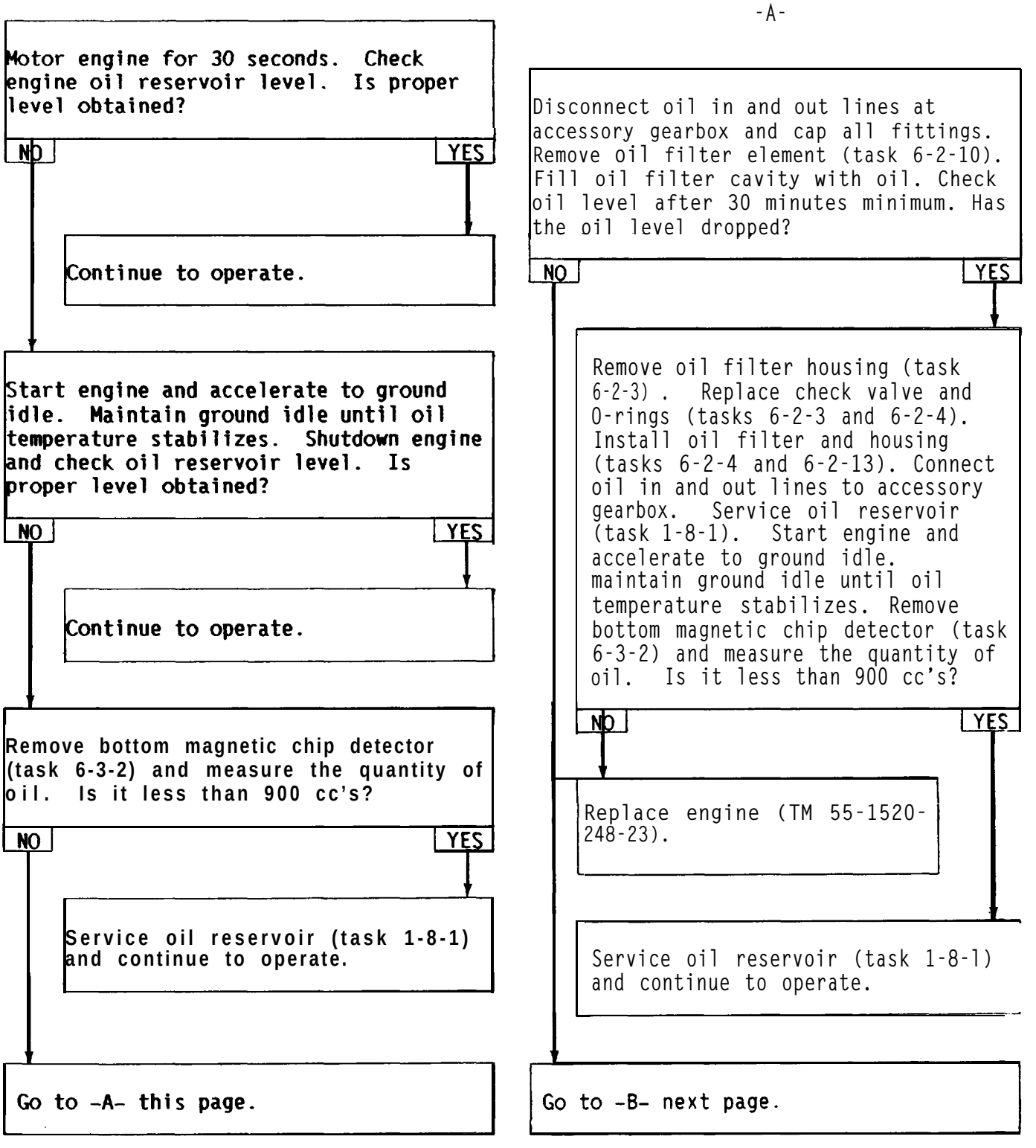
Install new fuel filter element (task 7-5-7).

Replace fuel nozzle (tasks 7-4-1 and 7-4-5) and continue to operate.

52. ENGINE UNDERSPEED OR FLAME OUT

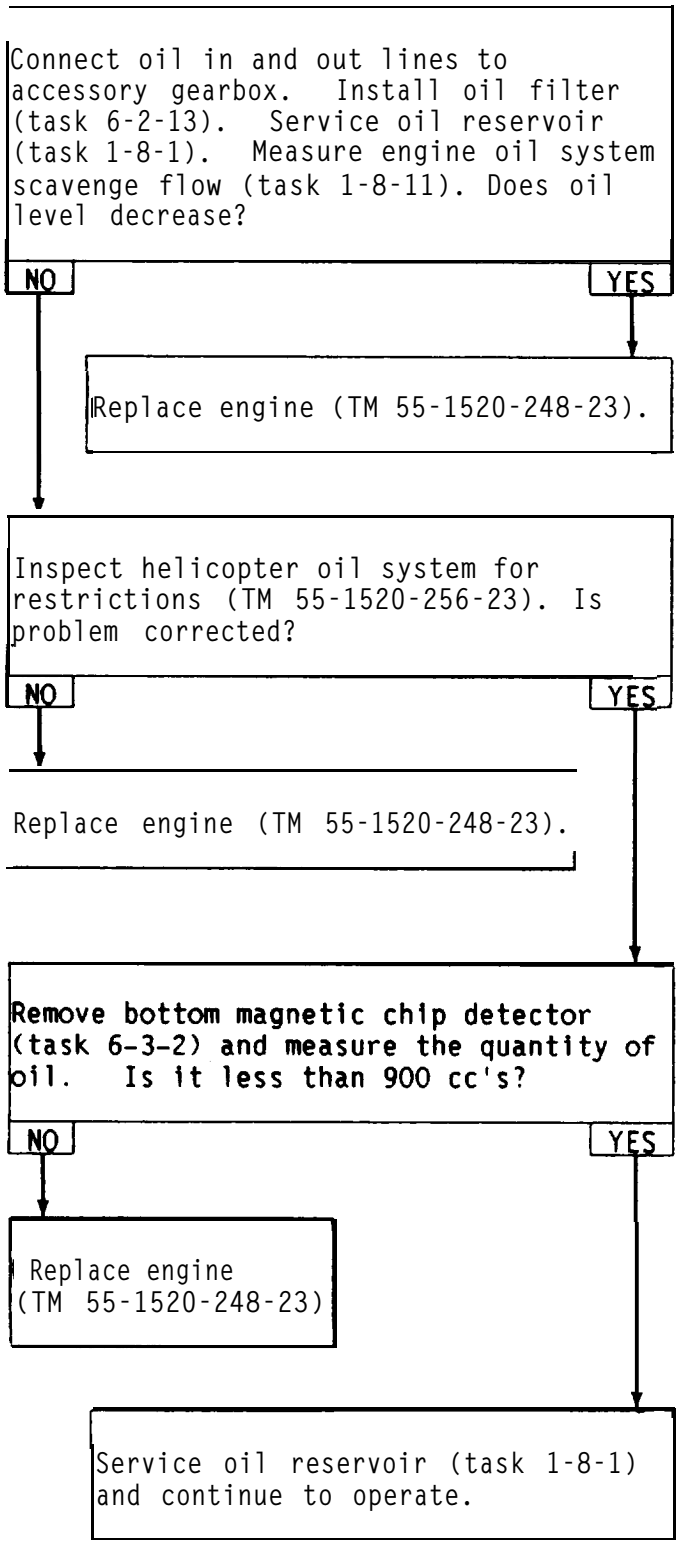


53. OIL RESERVOIR LEVEL LOWERING WITH ENGINE INOPERATIVE

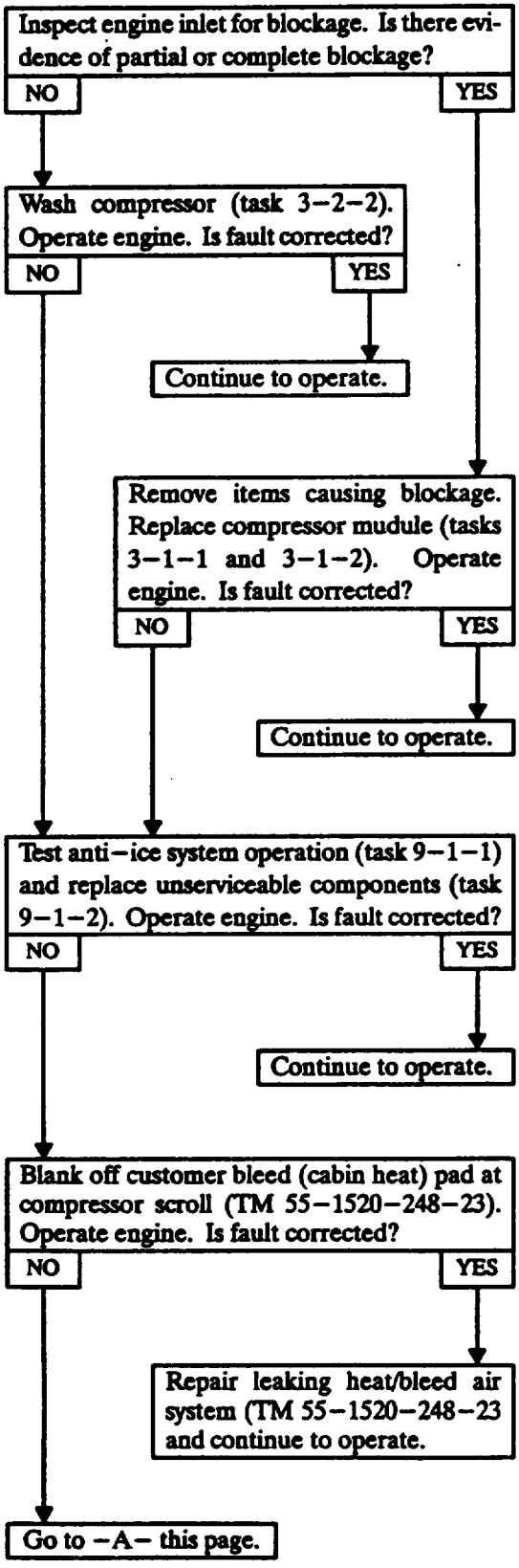


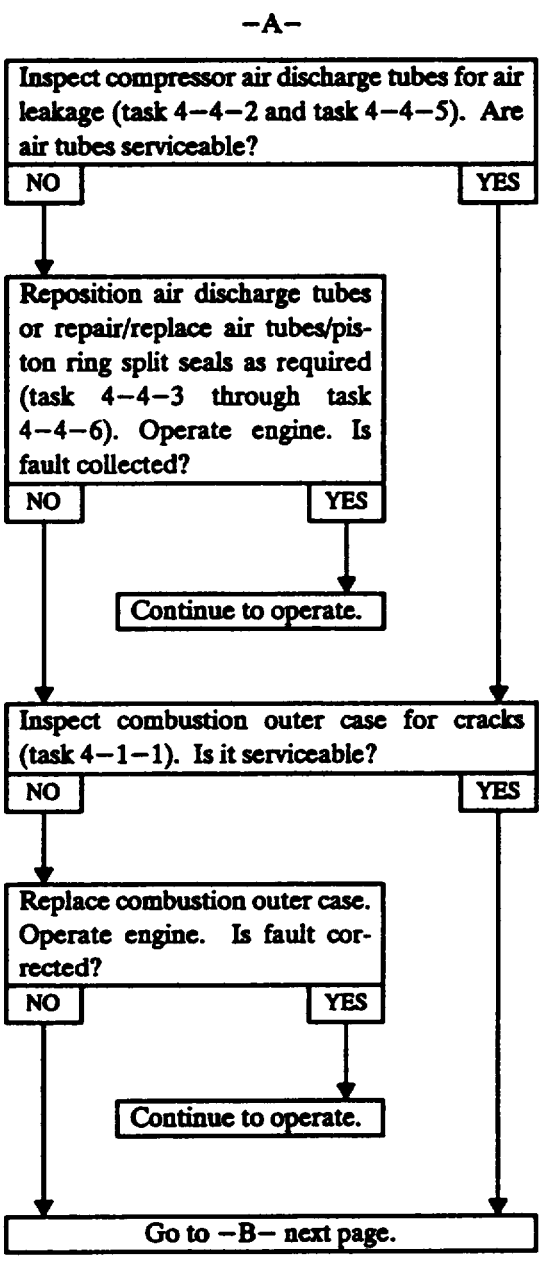
53. **OIL RESERVOIR LEVEL LOWERING WITH ENGINE INOPERATIVE (CONT)**

-B-

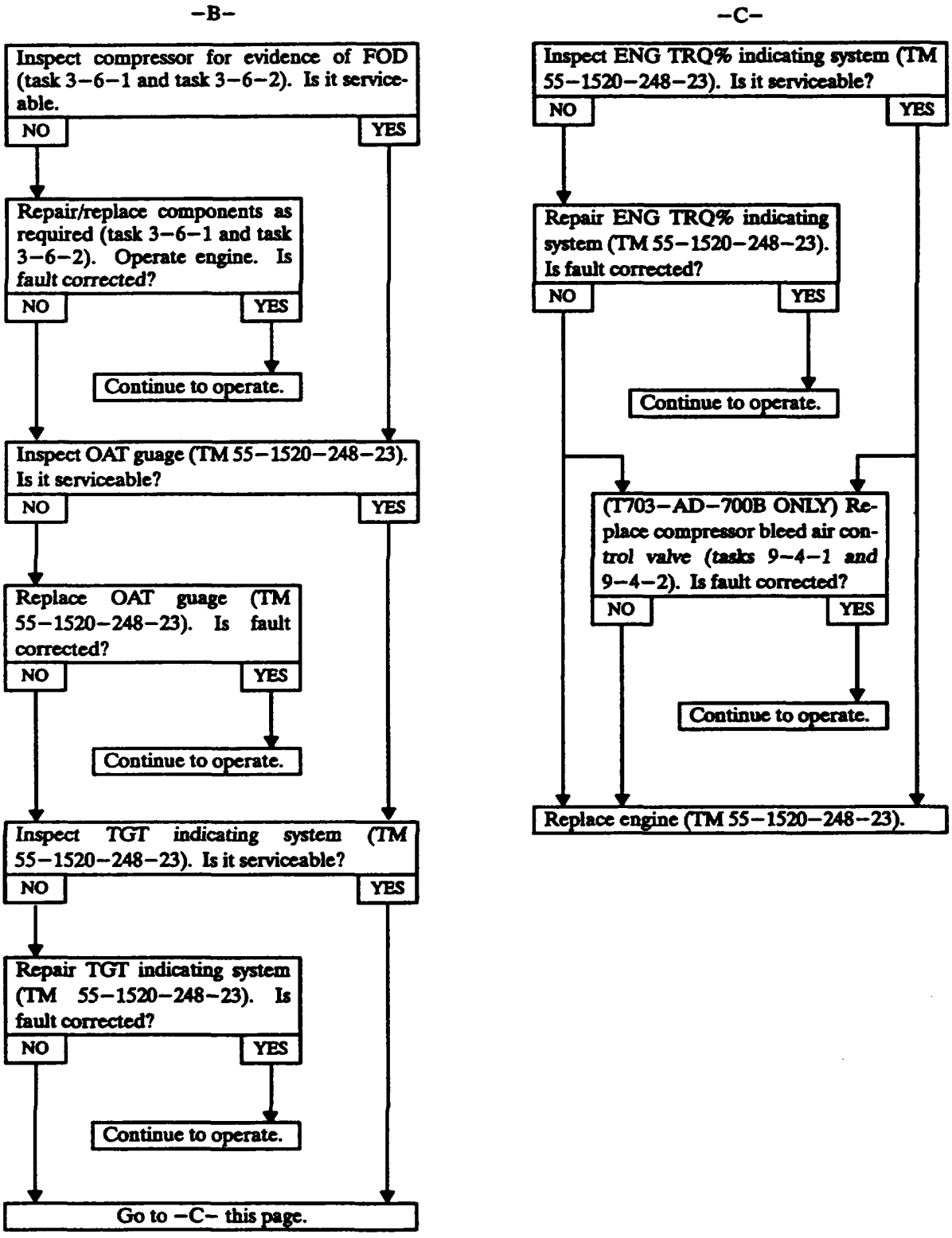


54. NOGO POWER ASSURANCE

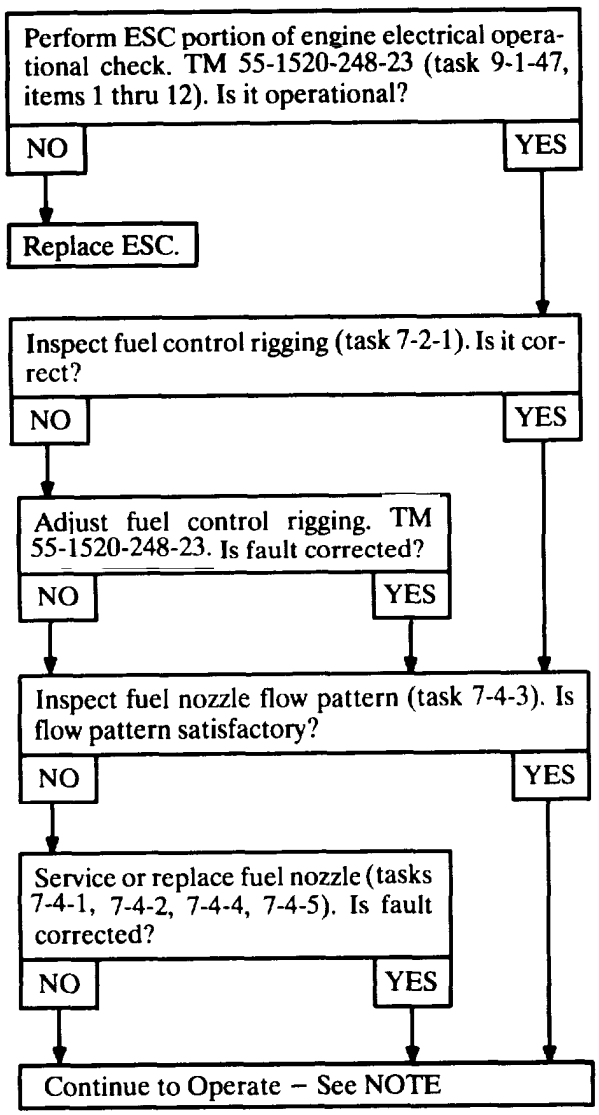




54. NOGO POWER ASSURANCE (CONT)



55. ENGINE FLAMEOUT DURING FUEL CONTROL OVERSPEED CHECK



NOTE

If all the above mechanical settings are correct, the engine flameout was most probably due to lean fuel mixture blowout. As long as flameout occurs only during fuel control overspeed checks, the engine may remain in service. The fuel mixture conditions and air pressure differentials achieved in the combustion section during the fuel control overspeed check are not attainable during normal engine operations or actual overspeed conditions.

Section VIII SERVICING

This section includes maintenance procedures for servicing engine oil system; and removal and installation of power turbine pressure oil fitting, screen, and nozzle. Additional maintenance procedures include: servicing and measuring of oil flow of the power turbine scavenge oil strut; servicing, removal, and installation of scavenge oil sump; and measuring engine oil system scavenge oil flow.

LIST OF TASKS

1-8-1. SERVICE ENGINE OIL SYSTEM

This task covers: On Helicopter Servicing

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Materials:
Wiping Rags (Cl)

Personnel Required:
67S Helicopter Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
Engine Cowling Removed.
(TM 55-1520-248-23)

NOTE

If the helicopter has been modified to incorprate the engine scavenge oil filter (airframe mounted), this task interval shall be 200 hours.

NOTE

Check the helicopter oil quantity within 15 minutes of engine shutdown to avoid false indication of excessive oil consumption. If the 15 minutes has been exceeded, motor engine for 30 seconds with starter before checking tank quantity. Motoring engine scavenges oil from gearbox back to helicopter oil tank.

1. Drain helicopter engine oil supply system (TM 55-1520-248-23).

2. Inspect oil tank for carbon, foreign substances, and/or sludge deposits (TM 55-1520-248-23).

3. Remove oil filter element (task 6-2-10).

4. Inspect and service oil filter element (tasks 6-2-11 and 6-2-12).

5. Clean oil filter housing assembly (task 6-2-2).

6. Install oil filter element (task 6-2-13).

7. Remove side and bottom magnetic chip detectors (tasks 6-3-1 and 6-3-2) and allow all engine oil to drain. Drain all oil through clean wiping rags (Cl) and check rags for foreign substances, sludge, or carbon deposits. If deposits are found, measure oil flow from power turbine scavenge oil strut (task 1-8-1 1).

8. If contaminants have been found, clean and inspect oil pressure reducer assembly (task 3-4-2); then flush helicopter lines, oil cooler and oil tank (TM 55-1520-248-23).

9. Inspect and service side and bottom magnetic chip detectors (tasks 6-3-3 and 6-3-4).

FOLLOW ON MAINTENANCE:

Service scavenge oil filter and helicopter engine oil supply system (TM 55-1520-248-23).
Install engine cowling (TM 55-1520-248-23).

END OF TASK

1-8-2. CHANGE ENGINE OIL FROM ONE MIL-SPEC TO ANOTHER

This task covers: On Helicopter Servicing

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
67S Helicopter Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed. (TM 55-1520-248-23).

General Safety Instructions:

WARNING

Noise levels reached during ground runup of Army helicopter are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on helicopter with engines in operation.

CAUTION

Mixing of engine oils MIL-L-23699 (C-30) and MIL-L-7808 (C-31) is permitted only in an emergency. Use of mixed oils in engine is limited to five hours total running time during overhaul period. Record all mixed engine oil operating times in engine historical records.

1. Service engine oil system (task 1-8-1).

2. Service scavenge oil sump (task 1-8-8).

3. Service helicopter oil supply (TM 55-1520-248-23).

4. Pilot: Operate engine for a minimum of thirth minutes and a maximum of sixty minutes.

5. Pilot: Shutdown engine.

6. Remove, inspect, service and install engine oil filter element (tasks 6-2-10 thru 6-2-13).

NOTE

If filter element is not contaminated do not perform step 7, but continue with step 8 and complete task.

7. If engine oil filter is contaminated service engine oil system (task 1-8-1).

8. Enter a requirement in helicopter logbook to service engine oil system after five hours of engine operatin.

9. Enter a requirement in helicopter logbook, to remove, inspect, clean, and install engine oil filter, fifteen hours after last servicing of oil system.

END OF TASK

1-8-3. REMOVE POWER TURBINE PRESSURE OIL FITTING , SCREEN , AND NOZZLE

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine Cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

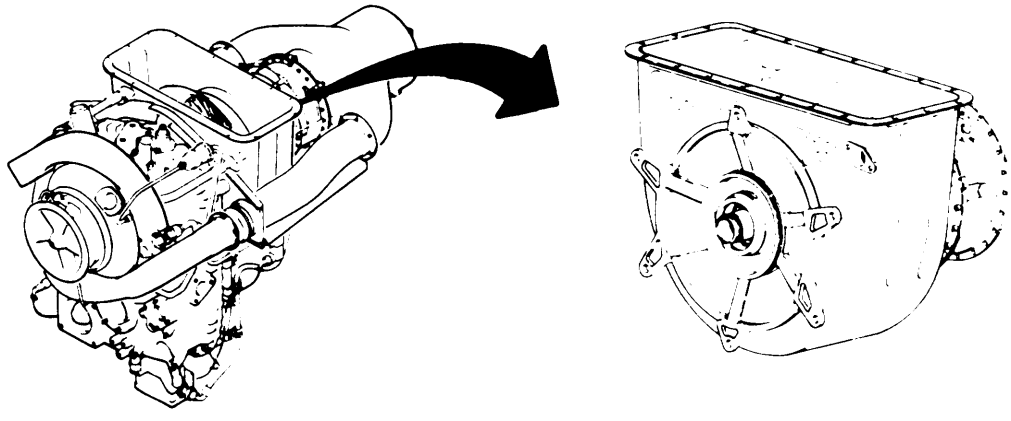
General Safety Instructions:

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

CAUTION

Lubricating oil may soften paint upon contact. If lubricating oil is spilled on painted surfaces, these surfaces should be thoroughly washed.



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1-8-3 REMOVE POWER TURBINE PRESSURE OIL FITTING, SCREEN, AND NOZZLE (CONT)

CAUTION

Use back up wrench when disconnecting coupling nuts.

7. Disconnect coupling nuts (1), (2), and (12). Remove line (6).

2. Loosen bracket (3) by loosening nut (4).

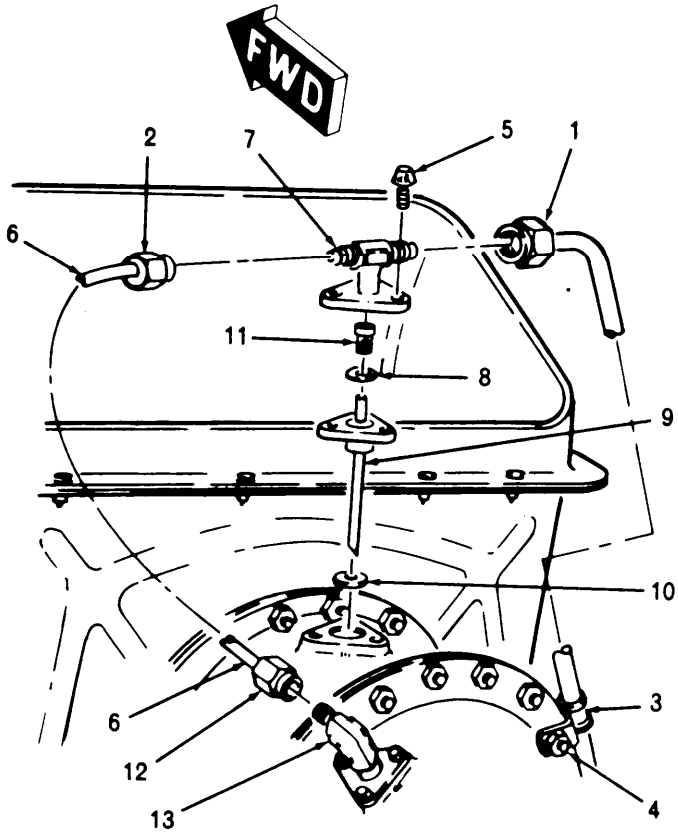
3. Remove lockwire and three bolts (5).

CAUTION

Do not remove fitting (13). Removing fitting can loosen deposits and cause bearing failure. Insure that no foreign material enters fitting (13). If fitting is removed or foreign material enters fitting, turbine module must be replaced.

4. Remove tee fitting (7) and metal seal (8). Discard seal (8).

5. Plug fitting (13).



Don't twist or use force to remove nozzle (9). It can be serviced in place. Failure to comply may result in damage to nozzle or other internal components.

6. Remove nozzle (9) and metal seal (10). Discard seal (10).

7. Remove screen (11) from inside of tee fitting (7).

END OF TASK

1-8-4. SERVICE POWER TURBINE PRESSURE OIL FITTING, SCREEN, AND NOZZLE

INITIAL SETUP

Applicable Configuration
All

Tools:
Power Plant Tool Kit
Hand Oiler
Respirator
Cleaning Kit (T34)
Rubber Gloves
MS 9320-09 Washers (6)

Materials:
Engine Oil (C30 or C31) currently used in engine.
Cleaning Solvent (C-23)
Dry Cleaning Solvent (C8)

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

Use extreme caution when handling cleaning materials. Wear tight goggles, respirators, rubber gloves, and other protective devices. Cleaning areas shall be free from fire hazards, and should be equipped with health hazard devices, such as combustible or poisonous gas indicators and oxygen deficiency indicators. Dry cleaning solvent (C8) is flammable and toxic. It can irritate skin and cause burns. Use only in well ventilated area away from heat and open flame. Wear rubber gloves. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention or eyes.

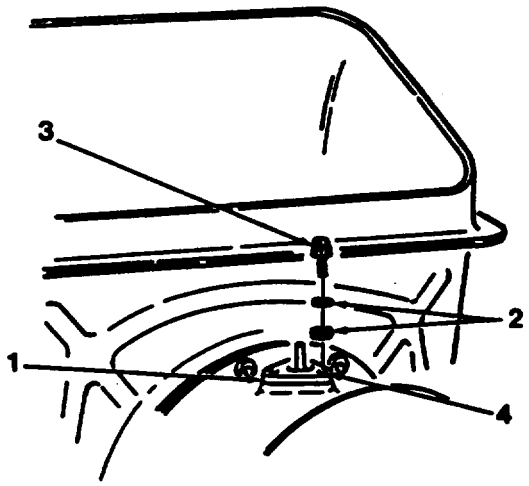
GO TO NEXT PAGE

1-8-4. SERVICE POWER TURBINE PRESSURE OIL FITTING, SCREEN, AND NOZZLE (CONT)

1. Remove scavenge oil sump (task 1-8-7).

2. Remove power turbine pressure oil fitting, screen, and nozzle (task 1-8-3). Nozzle (1) maybe removed or remain in engine to complete this task.

3. If nozzle (1) could not be removed, install two MS 9320-09 washers (2) on each of three bolts (3) finger tight into three mount holes (4).

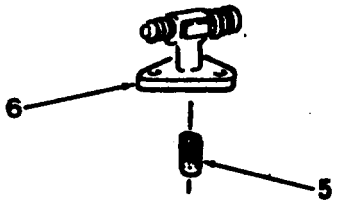


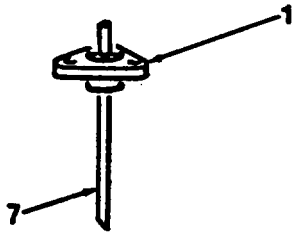
4. Clean exterior of screen (5) and tee fitting (6) with cleaning solvent (C23). Soak screen (5) and tee fitting (6) for one hour, inspect to insure carbon is removed. If necessary, continue to soak until carbon is removed. Use No. 12 drill and No. 162D pin vise in cleaning kit (T34) to remove carbon from inside tee fitting (6).

5. Clean nozzle (1) as follows:

a. Remove carbon from interior of nozzle (1) (shown removed) using No. 52 drill and No. 162C pin vise in cleaning kit (T34).

b. If nozzle is removed, dean exit hole (7) using No. 56 drill and No. 162B pin vise.





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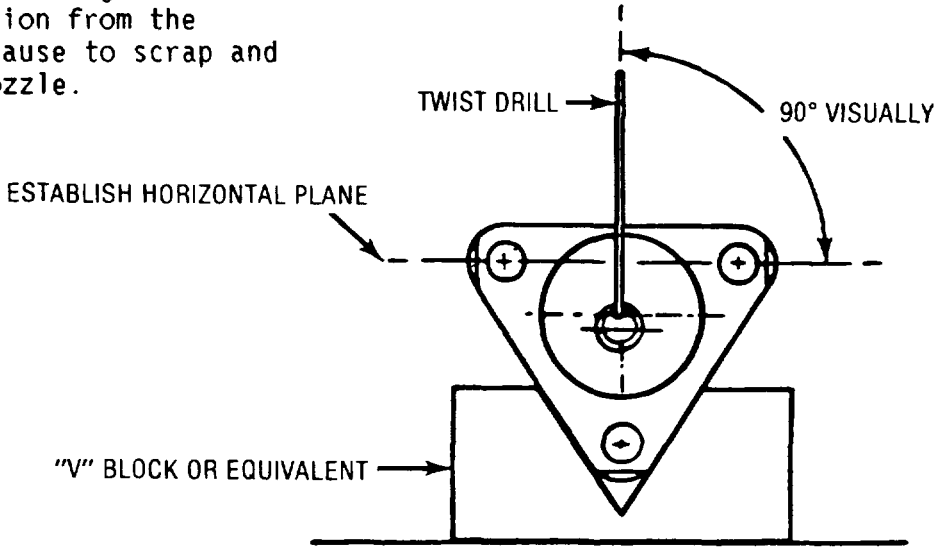
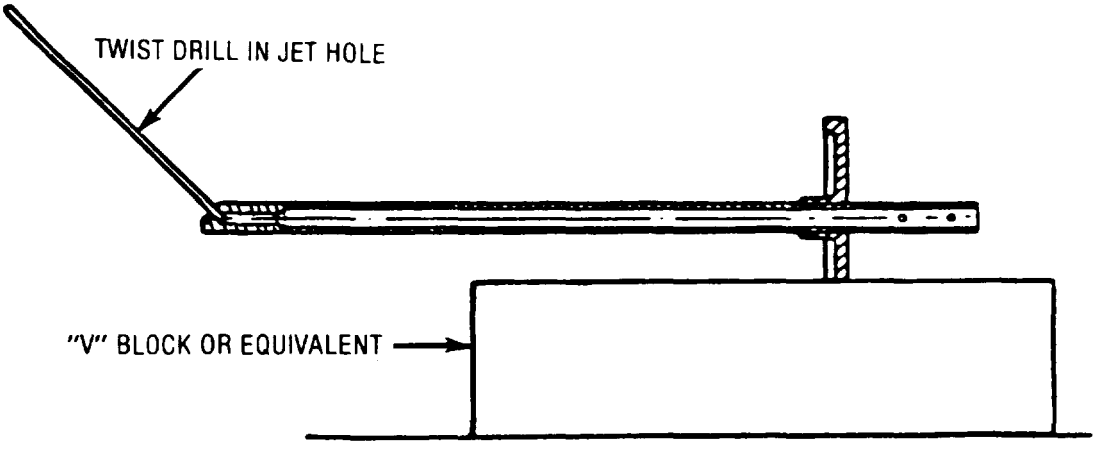
1-8-4. SERVICE POWER TURBINE PRESSURE OIL FITTING, SCREEN, AND NOZZLE (CONT)

c. Reverse the twist drill and insert the shank end In the jet hole.

d. Establish the alignment holes on a horizontal plane in the manner illustrated.

e. Visually inspect for perpendicularity of the jet hole wire. Any visible deviation from the perpendicular is cause to scrap and replace the jet nozzle.





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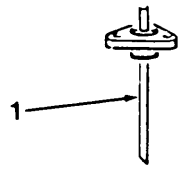
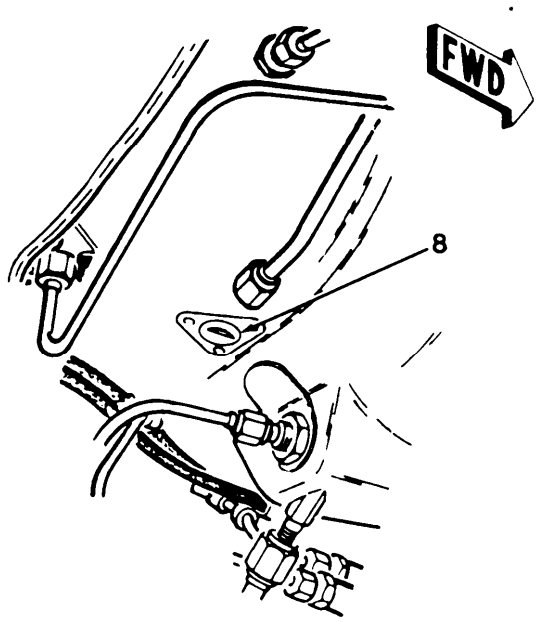
1-8-4. SERVICE POWER TURBINE PRESSURE OIL FITTING, SCREEN, AND NOZZLE (CONT)

CAUTION

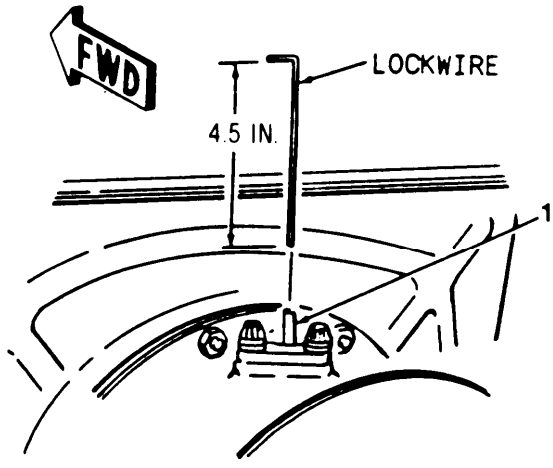
You must use oil currently used in engine (C30 or C31). Failure to comply with oil mixing restrictions can result in an engine failure.



6. Using a hand oiler, pump engine oil into nozzle (1). Oil shall flow through nozzle (l). If nozzle is installed on engine, oil shall flow from bottom of scavenge oil strut (8). If oil does not flow, repeat step 5; then repeat this step.



7. Using lockwire from cleaning kit (T34), bend at 4-1/2 in. and insert into nozzle (1) (shown installed). Lockwire must enter nozzle at least 4-1/2 in. (to bend).



FOLLOW ON MAINTENANCE:

Service power turbine scavenge oil strut (task 1-8-6).

END OF TASK

1-8-5. INSTALL POWER TURBINE PRESSURE OIL FITTING, SCREEN, AND NOZZLE

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Air Compressor Unit
Air blow Gun
Torque Wrench 30-150 in. lbs

Materials:
Lockwire (C4)
Antiseize Compound (C19)
Petrolatum (C34)

Parts:
Metal Seal

Personnel Required:
68B Aircraft Power Plant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).
Scavenge oil sump removed (task 1-8-7).

CAUTION

Insure that no foreign material enters fittings or lines. If foreign material enters fitting (6), remove fitting and remove foreign material. If foreign material enters fitting (16) the turbine module must be replaced.

N O T E

If nozzle (1) is removed, proceed to step 2.

1. Remove three bolts (2) and six washers (3) (installed as tools in task 1-8-4) and proceed to step 3.

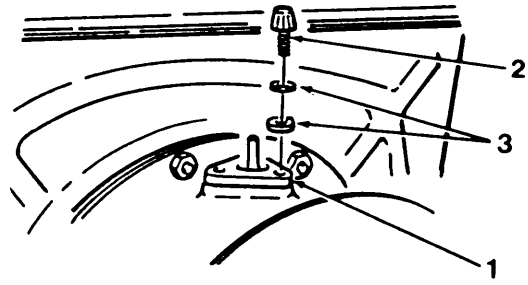
2. Coat new metal seal (4) with petrolatum. (C34); then install seal (4) and nozzle (l).

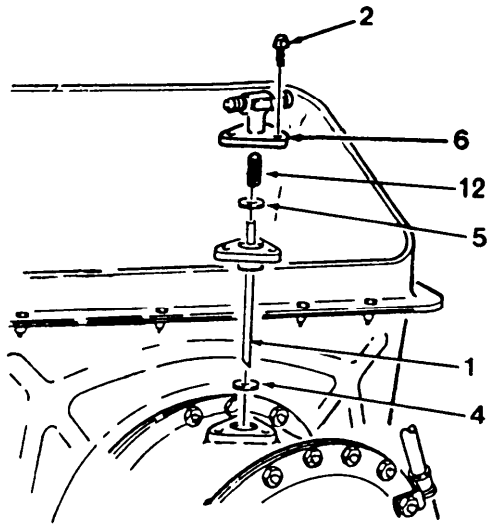
3. Lightly coat new metal seal (5) with petrolatum (C34) and install in seat of tee fitting (6).

4. Install screen (12) into tee fitting (6).

5. Coat threads of bolts (2) with anti-seize compound (C19).

6. Install tee fitting (6) and three bolts (2). Torque to 35-40 in. lbs and lockwire (C4).





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1-8-5. INSTALL POWER TURBINE PRESSURE OIL FITTING, SCREEN, AND NOZZLE (CONT)

7. Make sure bracket (7) is loose by loosening nut (8).

8. Move line (9) away from fitting (6).

WARNING

Use goggles to protect eyes and face when using compressed air. Do not exceed 30 psig. Do not direct airstream towards yourself or another person. Failure to comply may result in injury to personnel.

9. Using air blow gun and air compressor unit, spray compressed air into one opening of tee fitting (6) and block other opening. Air must flow through to bottom of scavenge oil strut (11). If air does not flow through, service pressure oil fitting, screen, and nozzle (task 1-8-4); then repeat this step.

CAUTION

Use back up wrench when tightening coupling nuts.

10. Remove plug from fitting (16). Install line (10) and connect coupling nuts (13) and (15). Tighten coupling nuts (13) and (15) to 80-120 in. lbs.

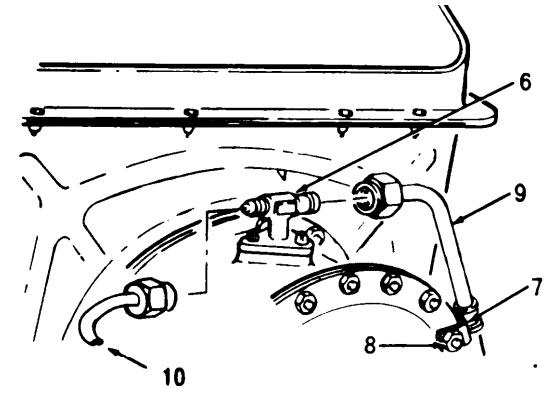
11. Connect coupling nut (14). Tighten coupling nut (14) to 200-250 in. lbs.

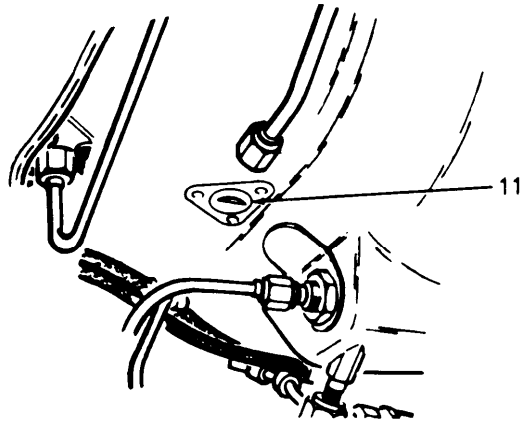
12. Secure bracket (7) by tightening nut (8) to 35-40 in. lbs.

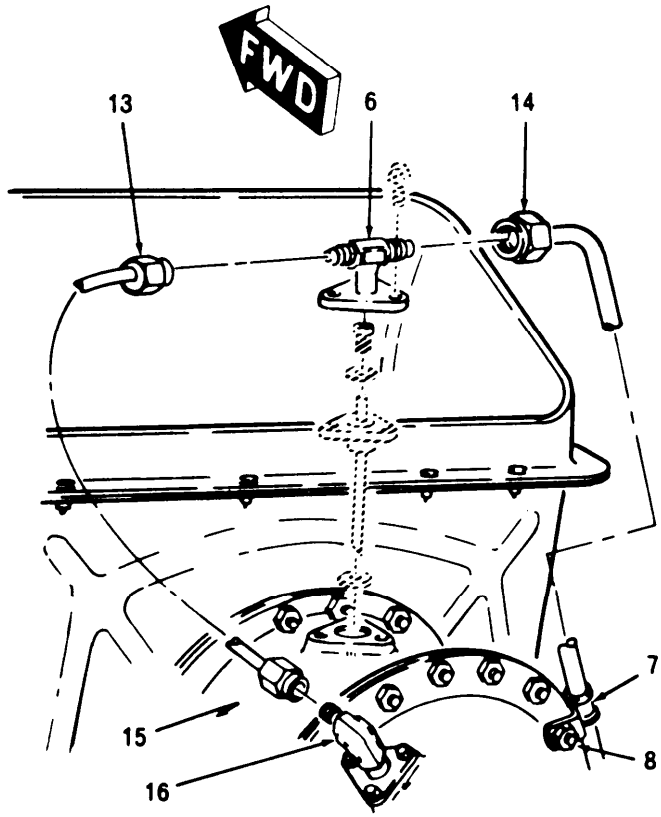
INSPECT

FOLLOW ON MAINTENANCE:
Service and install scavenge oil sump (task 1-8-8 and 1-8-10).

END OF TASK







1-8-6. SERVICE POWER TURBINE SCAVENGE OIL STRUT

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Air Blow Gun
Air Compressor Unit
Cleaning Kit (T34)
Goggles
Hand Oiler

Materials:
Engine Oil (C30 or C31) currently used in engine.

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter Engine cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).
Pressure oil nozzle serviced (task 1-8-4).
Scavenge oil sump serviced (task 1-8-8).

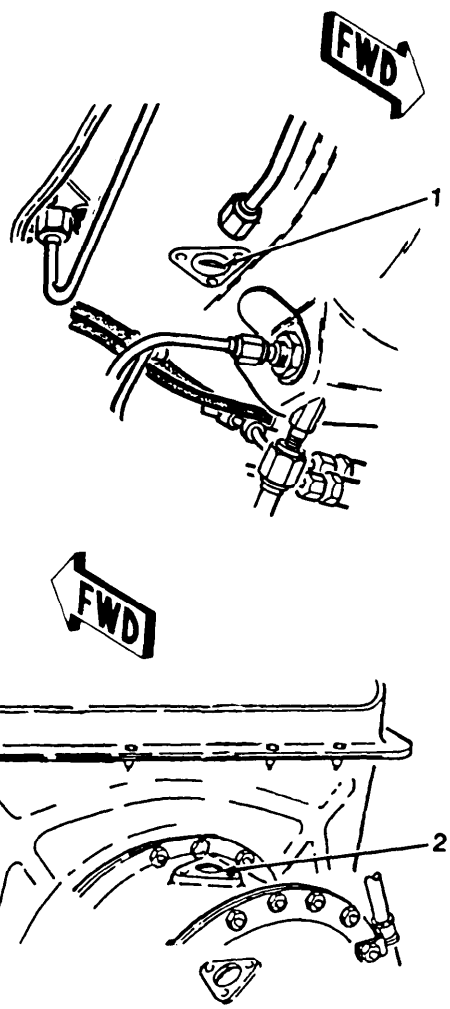
Remove lines as necessary to facilitate completion of this task.

1. Wearing goggles and using a flashlight and mirror, inspect for carbon deposits inside scavenge oil strut (1).

WARNING

Use goggles to protect eyes and face when using compressed air. Do not exceed 30 psig. Do not direct airstream towards yourself or another person. Failure to comply may result in injury to personnel.

2. Using air blow gun and air compressor, spray air through opening (2) (or nozzle if installed) to remove loose carbon particles.



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1-8-6. SERVICE POWER TURBINE SCAVENGE OIL STRUT (CONT)

CAUTION

Do not use a power drill to remove carbon. Failure to comply could result in turbine module damage.

You must use oil currently used in engine (C30 or C31). Failure to comply with oil mixing restrictions can result in an engine failure.

3. Clean strut oil passage as follows:

a. Use one-half of a spiral hacksaw blade and No. 162C pin vise, a series of drill bits, or a knife blade with a hook ground on the tip, to pull carbon downward away from the bearing area.

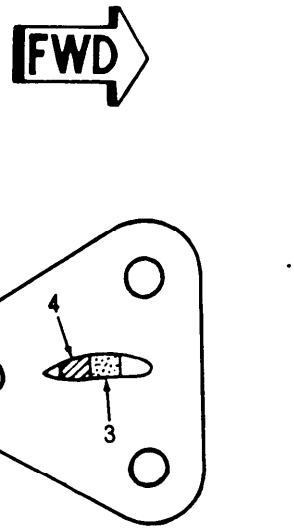
b. Flush passage by pumping engine oil into opening (2) (or nozzle if installed) with a hand oiler.

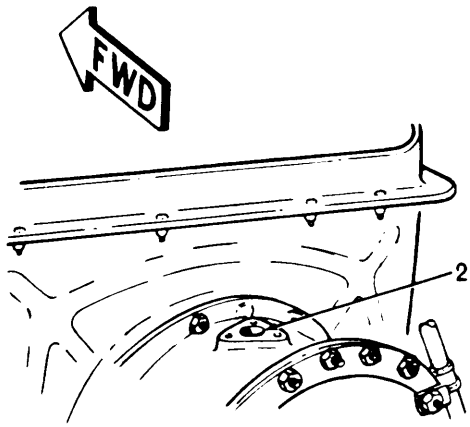
c. Clean rear (4) of passage using 1/8 in. drill and No. 162C pin vise. Rotate by hand to remove carbon. Drill will enter passage about 3-1/2 in. when area is free of deposits. Flush as in b.

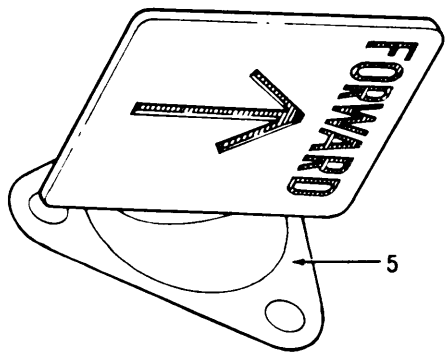
d. Clean reminder of passage using spiral saw blade and No. 162C pin vise. Flush as in b.

4. Spray compressed air through opening (2) (or nozzle if installed) to remove loose carbon particles.

5. Insert gage from cleaning kit (T34) into passage as shown. Gage should contact sump flange (5) if passage is clean. Repeat steps 3 and 4 if further deposits are indicated.







END OF TASK

1-8-7 REMOVE SCAVENGE OIL SUMP

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Suitable Container 1 qt Capacity

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

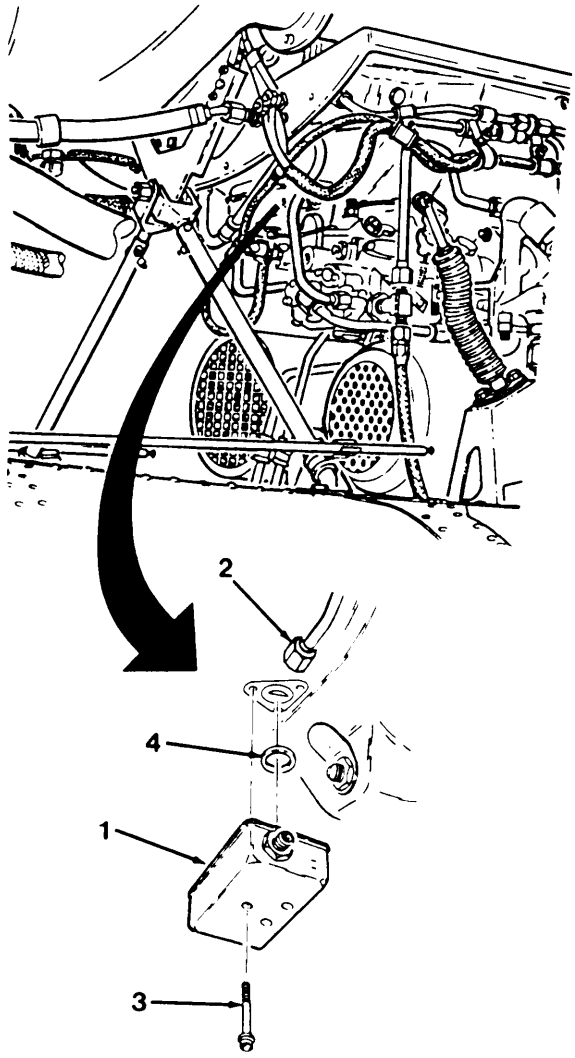
Equipment Condition:
On Helicopter: Engine Access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

CAUTION

Lubricating oil may soften paint upon contact. If lubricating oil is spilled on painted surfaces, these surfaces should be thoroughly washed.



1. Place container directly below external sump (1) to catch draining oil.

2. Disconnect coupling nut (2). Use wrench to support mating fitting (5) (Ref. Task 1-8-10, pg 1-106) on scavenge sump (l).

3. Remove lockwire; then remove three bolts (3), external sump (l), and metal packing (4). Discard packing (4).

END OF TASK

1-8-8. SERVICE SCAVENGE OIL SUMP

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 150-750 in. lbs
Air Compressor Unit
Air Blow Gun
Rubber Gloves
Respirator

Materials:
Dry Cleaning Solvent (C8)
Carbon Removal Compound (C33)

Personnel Required:
686 Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
Scavenge oil sump removed (task 1-8-7.

General Safety Instructions:

WARNING

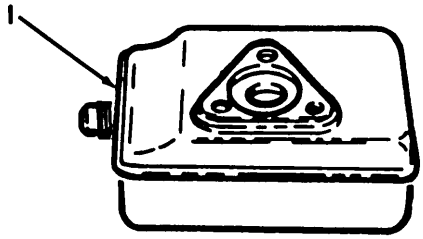
Observe extreme caution when handling cleaning materials. Wear tight goggles, respirators, rubber gloves, and other protective devices. Cleaning areas shall be free from fire hazards, and should be equipped with health hazard devices, such as combustible or poisonous gas indicators and oxygen deficiency indicators. The ingredients in removal compound (C33) are poisonous and caustic. Proper precautions shall be taken to prevent contact with skin and clothing and to avoid inhalation of the vapors. If eye or skin contact should occur, wash the affected area immediately with water. Call a physician as soon as possible.

Lubricating oils contain materials hazardous to health. they produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

GO TO NEXT PAGE

1-8-8. SERVICE SCAVENGE OIL SUMP (CONT)

1. Inspect interior of scavenge oil sump (1) for carbon deposits.



a. If carbon deposits are found, go to step 2 and complete this entire task. If carbon deposits are not found, complete sub step b.

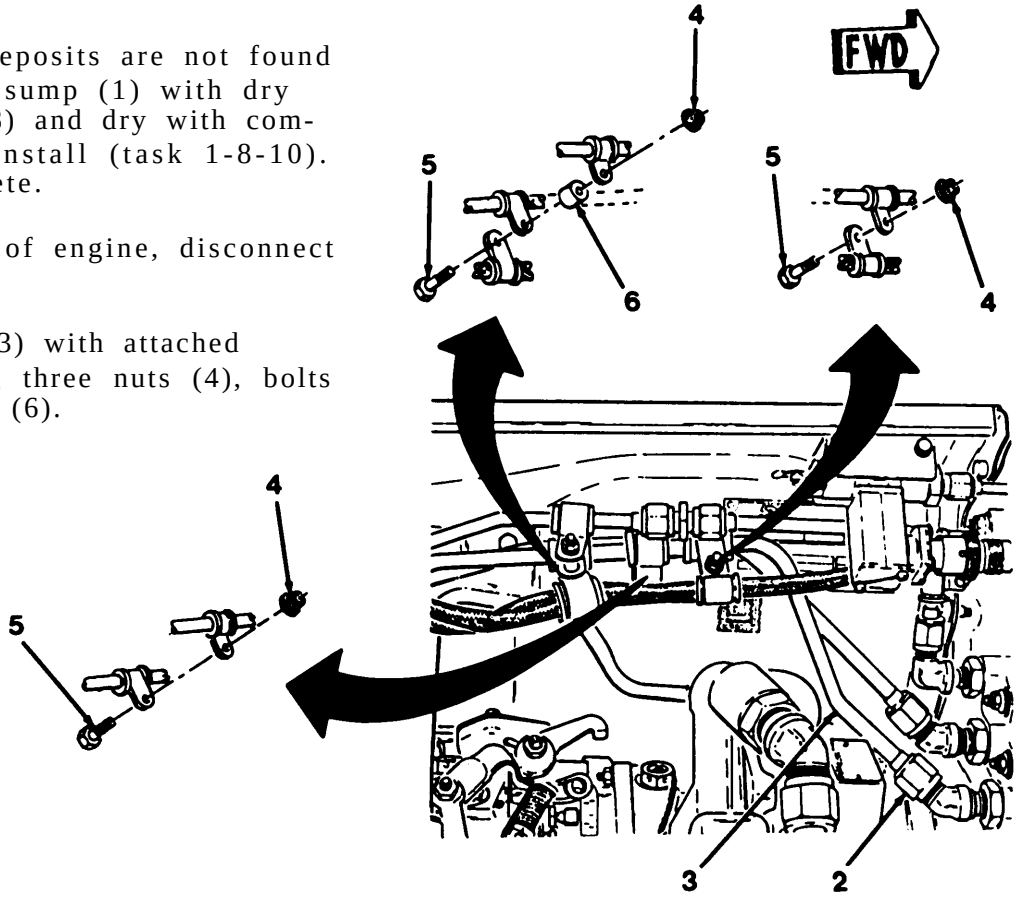
WARNING

Use goggles to protect eyes and face when using compressed air. Do not exceed 30 psig. Do not direct airstream toward yourself or another person. Failure to comply may result in injury to personnel.

b. If carbon deposits are not found flush Inside of oil sump (1) with dry cleaning solvent (C8) and dry with compressed air; then Install (task 1-8-10). This task is complete.

2. On right side of engine, disconnect coupling nut (2).

3. Remove tube (3) with attached clamps by removing three nuts (4), bolts (5) and one spacer (6).



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1-8-8. SERVICE SCAVENGE OIL SUMP (CONT)

4. Flush inside of tube (3) with carbon removal compound (C33). Insure all carbon deposits are removed.

5. Clean inside of oil sump (1) with carbon removal compound (C33). Insure all carbon deposits are removed.

WARNING

Use goggles to protect eyes and face when using compressed air. Do not exceed 30 psig. Do not direct airstream toward yourself or another person. Failure to comply may result in injury to personnel.

6. Flush inside of tube (3) and oil sump with dry cleaning solvent (C8); then dry with compressed air.

7. Install tube (3) and connect but do not tighten coupling nut (2).

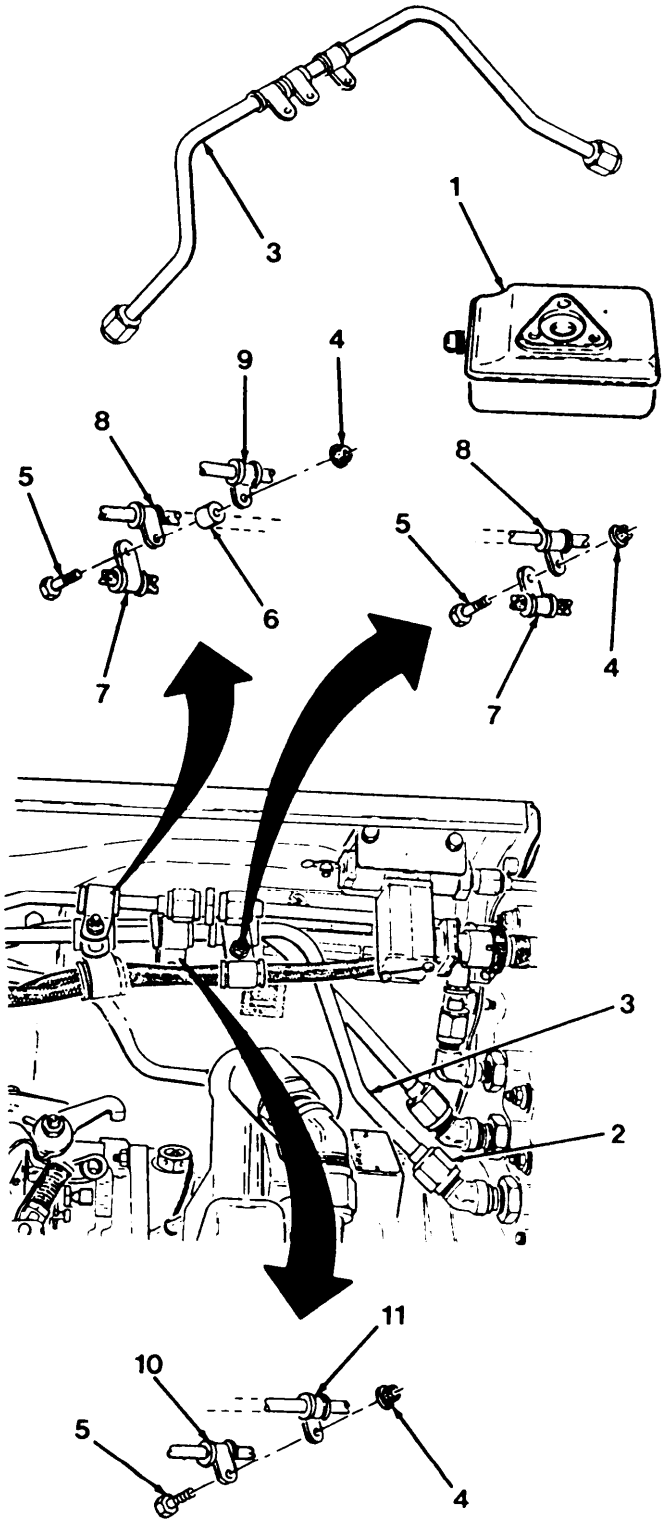
8. Secure tube (3) in two places with clamps (7), (8), and (9); bolts (5), one spacer (6) and nuts (4).

9. Install clamps (10) and (11) and secure with bolt (5) and nut (4).

10. Torque coupling nut (2) to 150-200 in. lbs.

11. Install scavenge oil sump (task 1-8-10).

INSPECT



END OF TASK

1-8-9. MEASURE OIL FLOW FROM POWER TURBINE SCAVENGE OIL STRUT

This task covers: On Helicopter Measurement

INITIAL SETUP

applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Generator Set

Materials:
Suitable container capable of measuring 3 fl. oz (B42)
Wiping Rags (C1)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector
Pilot

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panel open/cowling removed (TM 55-1520-248-23). Warm engine (see glossary). Scavenge oil sump removed (task 1-8-7)*.

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

Wear goggles to protect eyes from carbon particles.

*** NOTE**

This task can also be accomplished without removing the scavenge oil sump.

GO TO NEXT PAGE

1-8-9. MEASURE OIL FLOW FROM POWER TURBINE SCAVENGE OIL STRUT (CONT)

NOTE

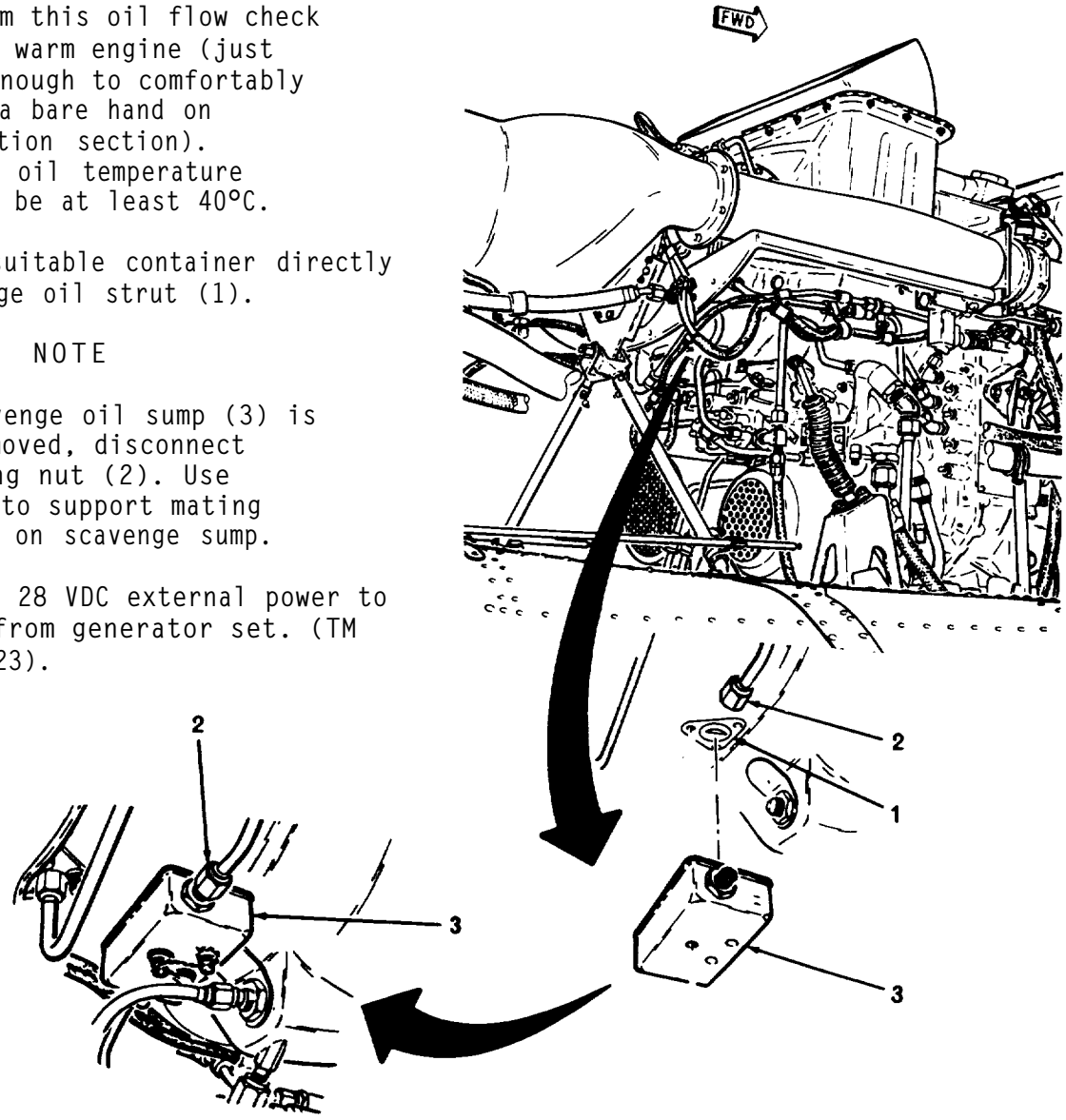
Perform this oil flow check with a warm engine (just cool enough to comfortably place a bare hand on combustion section). Engine oil temperature should be at least 40°C.

1. Place suitable container directly below scavenge oil strut (1).

NOTE

If scavenge oil sump (3) is not removed, disconnect coupling nut (2). Use wrench to support mating fitting on scavenge sump.

2. Connect 28 VDC external power to helicopter from generator set. (TM 55-1520-248-23).



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1-8-9. MEASURE OIL FLOW FROM POWER TURBINE SCAVENGE OIL STRUT (CONT)

WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

3. Pilot: Open all ignition system circuit breakers.

4. Engage starter and catch the oil using the first cup to minimize oil mess.

5. When Ng reaches 16% Ng, insert the empty second cup and begin oil sample collection (limit Ng speed to 16-18% by interrupting the starter current).

6. Motor the engine at 16-18% Ng for 15 seconds and collect oil.

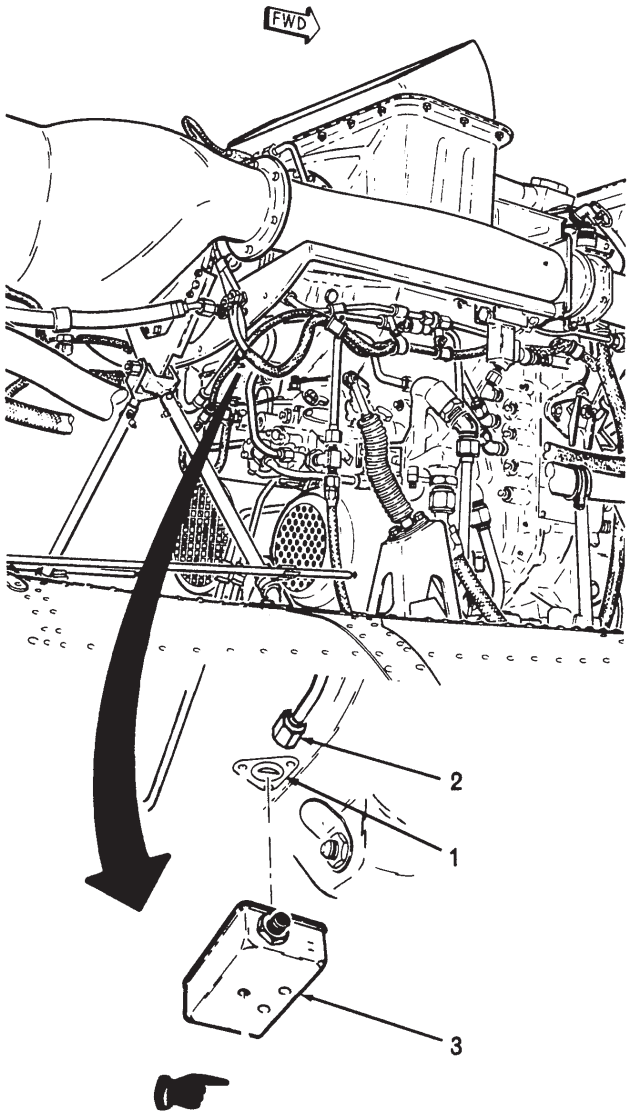
7. Stop motoring engine, but continue to collect oil during coast down until rotation stops. It is not necessary to collect minor drops.

8. Remove external power source and shut down generator set (TM 55-1520-248-23).

9. Deleted.

10. Remove container without losing any oil.

11. Oil volume collected in step 7 shall be at least 3 fl. oz. If flow is not 3 fl. oz.; service power turbine scavenge oil strut (task 1-8-6) and repeat this task.



INSPECT

FOLLOW ON MAINTENANCE:
Install scavenge oil sump (task 1-8-10) or coupling nut (2), depending on degree of sump disassembly.

END OF TASK

1-8-10. INSTALL SCAVENGE OIL SUMP

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs

Materials:
Lockwire (C4)
Petrolatum (34)

Parts:
Metal Seals

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

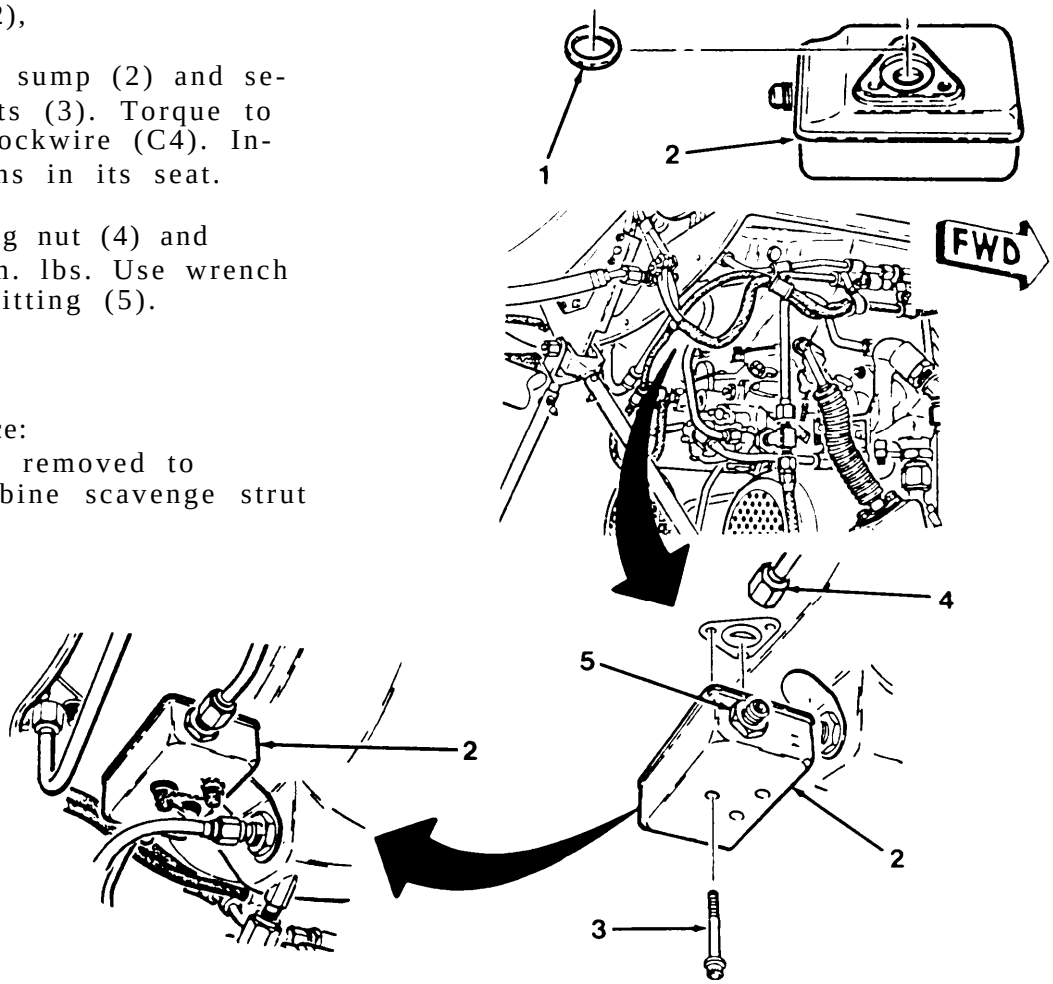
References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Lubricate new metal seal (1) with petrolatum (C34) and install in seat of scavenge oil sump (2),

2. Install external sump (2) and secure with three bolts (3). Torque to 70-85 in. lbs and lockwire (C4). Insure seal (1) remains in its seat.

3. Connect coupling nut (4) and torque to 150-200 in. lbs. Use wrench to support mating fitting (5).



INSPECT

Follow on Maintenance:
Reinstall all lines removed to facilitate power turbine scavenge strut servicing.

END OF TASK

1-8-11. MEASURE ENGINE OIL SYSTEM SCAVENGE OIL FLOW

This task covers: On Helicopter Measurement

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 150-750 in. lbs

Materials:
Two Containers Minimum 1 qt. capacity (C16)
One quart Engine Oil (C30 or C31) currently used in engine
Tape (C36)
Four 3 ft lengths of Transparent Tubing (C37)
MS 33656-G5 Fittings (4)

Personnel Required:
686 Aircraft Powerplant Repairer
66S Inspector
Pilot

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

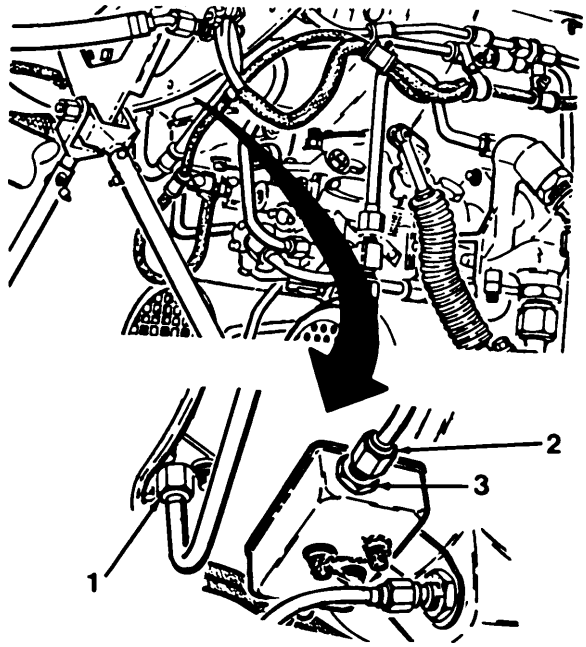
CAUTION

Lubricating oil may soften paint upon contact. If lubricating oil is spilled on painted surfaces, these surfaces should be thoroughly washed.

NOTE

The purpose of this procedure is to determine that scavenge oil flow exceeds supply.

1. Disconnect coupling nuts (1) and (2). Use wrench to support mating fitting on external sump.



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1-8-11. MEASURE ENGINE OIL SYSTEM SCAVENGE OIL FLOW (CONT)

2. Disconnect coupling nuts (3) and (4)

3. Remove four nuts (5), one spacer (6), and four bolts (7).

4. Remove tubes (8) and (9) with attached clamps.

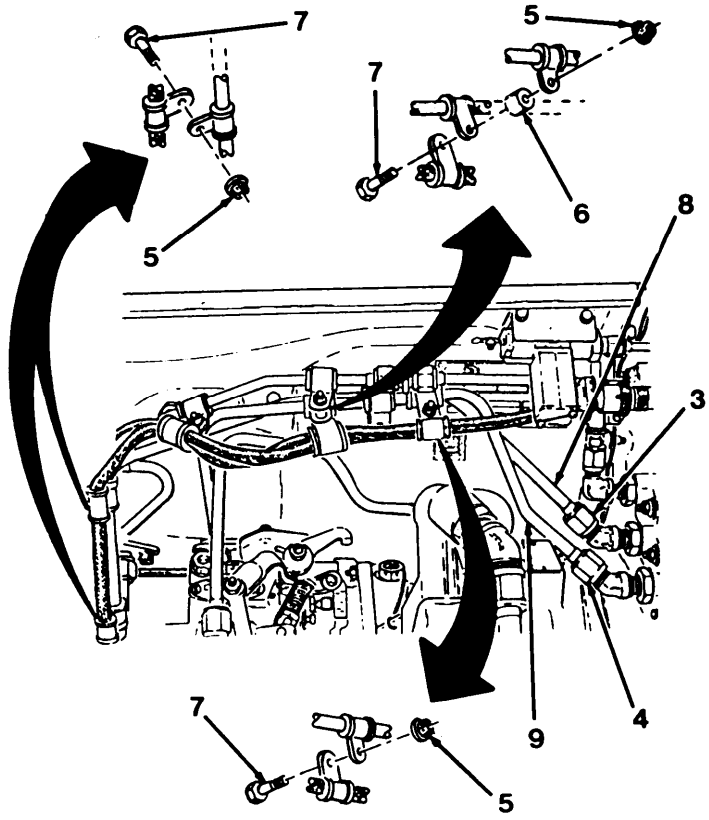
NOTE

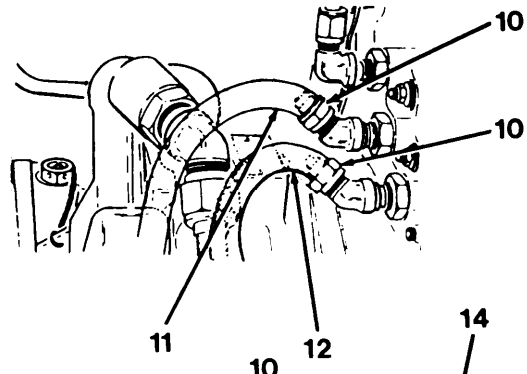
This task may be completed with tubes (8) and (9) in place. Loosen nuts (5) and move tubes aside.

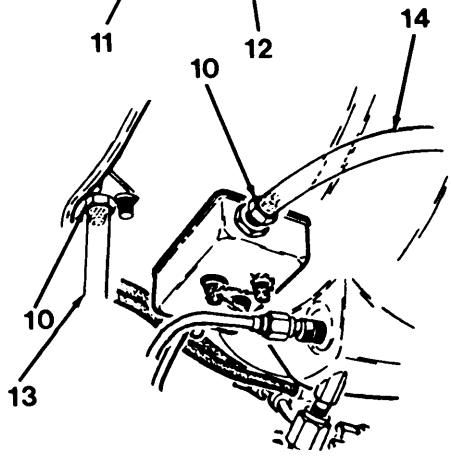
5. Install four MS33656-G5 fittings (10); then install four transparent tubes (11), (12), (13), and (14).

NOTE

Tubes and containers used for this measurement should be kept for later use.







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1-8-11. MEASURE ENGINE OIL SYSTEM SCAVENGE OIL FLOW

CAUTION

Failure to comply with oil mixing restrictions can result in an engine failure.

6. Place one pint of engine oil (C30 or C31) in each container (C16) (15) and (16).

1. Place ends of transparent tubes (11) and (13) in container (15).

8. Place ends of transparent tubes (12) and (14) in container (16).

CAUTION

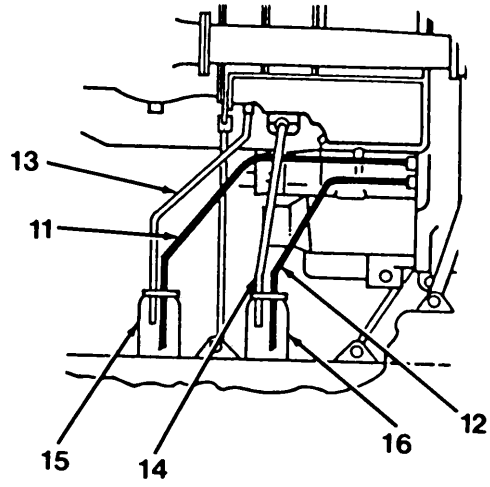
Do not crimp or kink tubing (C37). Tubes (11) and (12) must be well secured to container lid to insure accurate measurement.

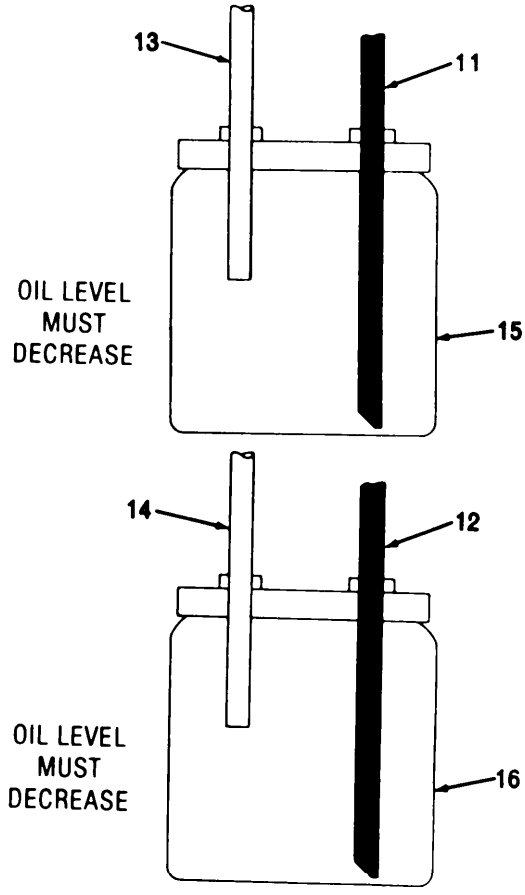
9. Position tubes (11), (12), (13), and (14) in containers (15) and (16) as illustrated. Secure tubing to-container lid with tape (C36) or other suitable item.

WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

10. Pilot: Open all ignition system circuit breakers; then motor engine to 16-18% Ng and immediately disengage starter.





11. Observe scavenge oil in containers (15) and (16). Oil level shall decrease.

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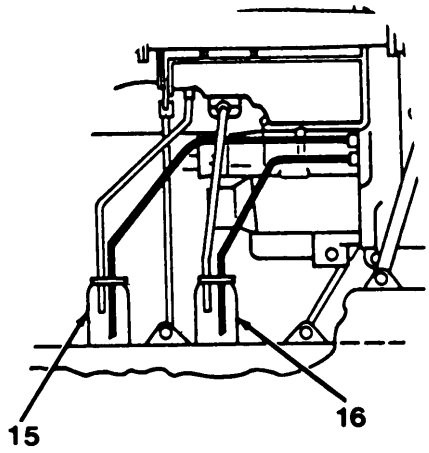
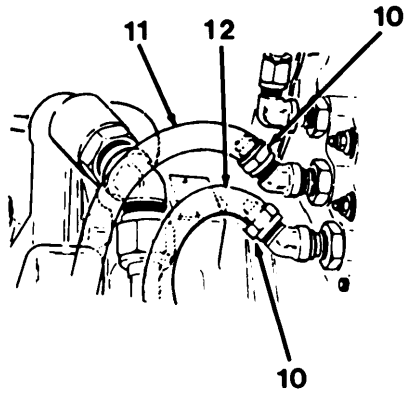
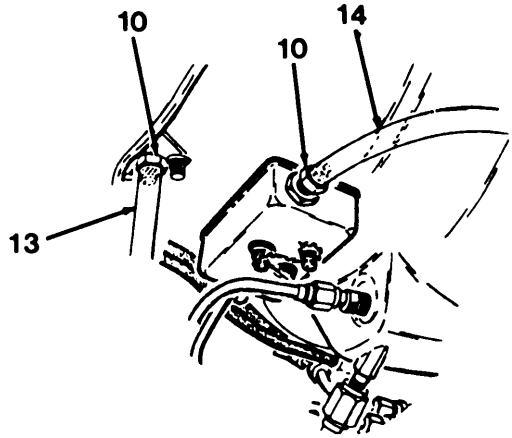
1-8-11. MEASURE ENGINE OIL SYSTEM SCAVENGE OIL FLOW (CONT)

12. Remove containers (15) and (16). Store for later use.



13. Remove tubes (11), (12), (13), and (14) with four fittings (10). Store for later use.





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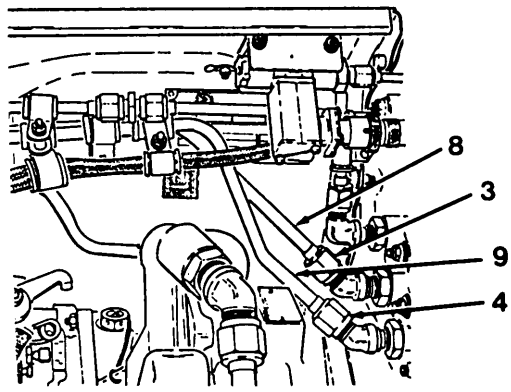
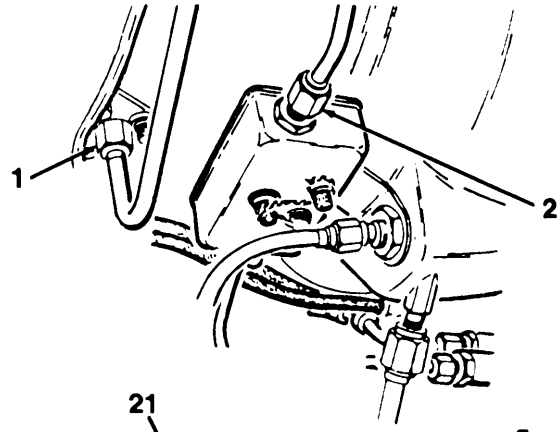
1-8-11. MEASURE ENGINE OIL SYSTEM SCAVENGE OIL FLOW (CONT)

14. Install tubes (8) and (9). Torque coupling nuts (l), (2), (3), and (4) to 150-200 in. lbs. Use wrench to support mating fitting on external sump.



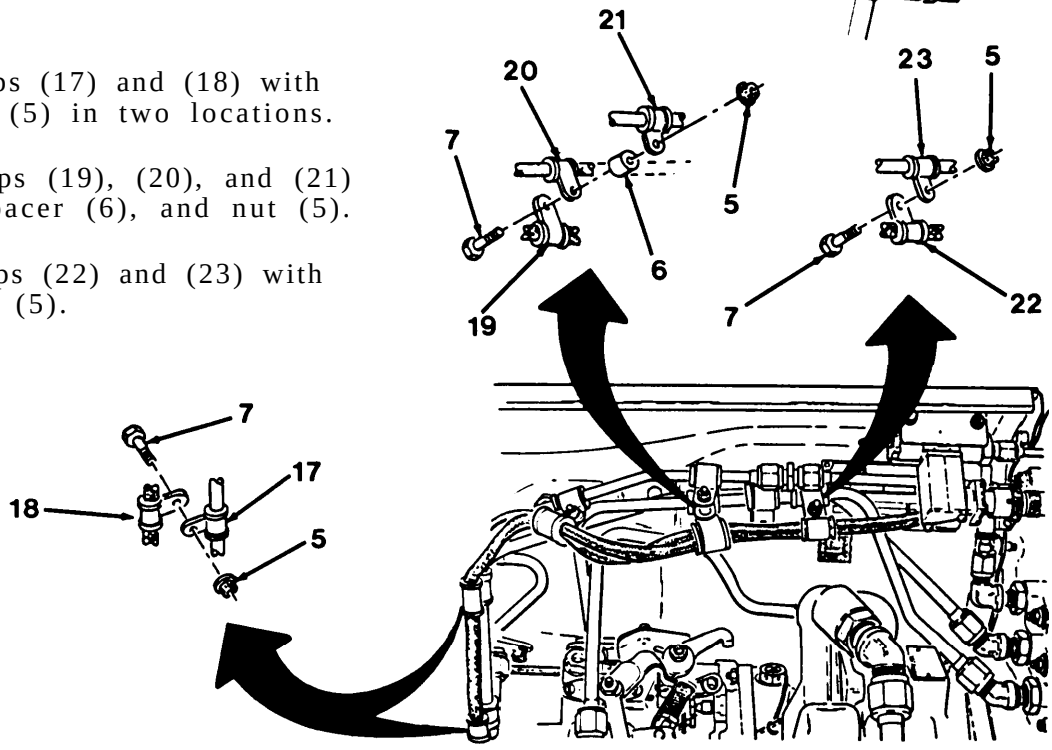


15. Secure clamps (17) and (18) with bolt (7) and nut (5) in two locations.

16. Secure clamps (19), (20), and (21) with bolt (7), spacer (6), and nut (5).

17. Secure clamps (22) and (23) with bolt (7) and nut (5).

INSPECT



END OF TASK

1-8-12. MEASURE ENGINE OIL PRESSURE

This task covers: On Helicopter Measurement

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Dial Indicating Pressure Gage
0-200 psi

Materials:
AN816-4-4 Fitting
Wiping rags (Cl)

Personnel Required:
688 Aircraft Powerplant Repairer
66S Inspector
Pilot

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

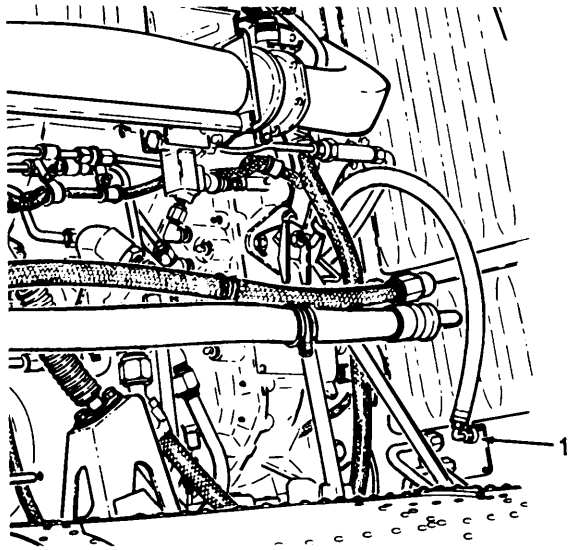
WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may Irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

CAUTION

Lubricating oil may soften paint upon contact. If lubricating oil is spilled on painted surfaces, these surfaces should be thoroughly washed.

1. Disconnect coupling nut (l).



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1-8-12. MEASURE ENGINE OIL PRESSURE (CONT)

2. Install pressure gage (2) into adapter fitting (3).

NOTE

Perform oil pressure transducer check (TM 55-1520-248-23) in conjunction with this task.

3. Attach coupling nut (1) to adapter (3) and tighten.

WARNING

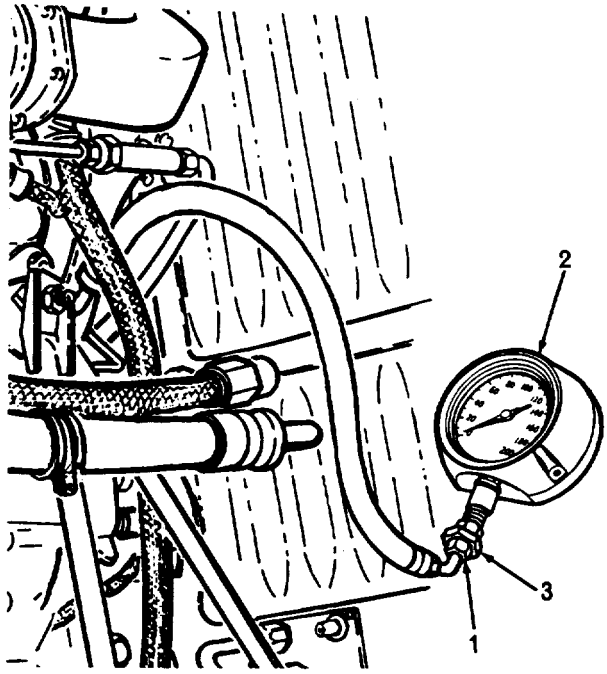
Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

4. Pilot: **Operate engine at 100% Np and allow engine oil temperature to stabilize at 107 degrees C.**

CAUTION

A sudden drop or fluctuation in engine oil pressure indicates a serious lubrication problem. Do not continue to operate in this condition.

5. Observe gage (2). Indicated oil pressure shall be 115-130 psig at or above 94% Ng. If oil pressure is not 115-130 psig adjust oil pressure (task 6-2-9) .



NOTE

Gage (2) and adapter (3) may be left assembled for later use.

6. Pilot: Shut down engine.

7. Disconnect coupling nut (1). Remove adapter (3) from gage (2).

GO TO NEXT PAGE

1-8-12. MEASURE ENGINE OIL PRESSURE (CONT)

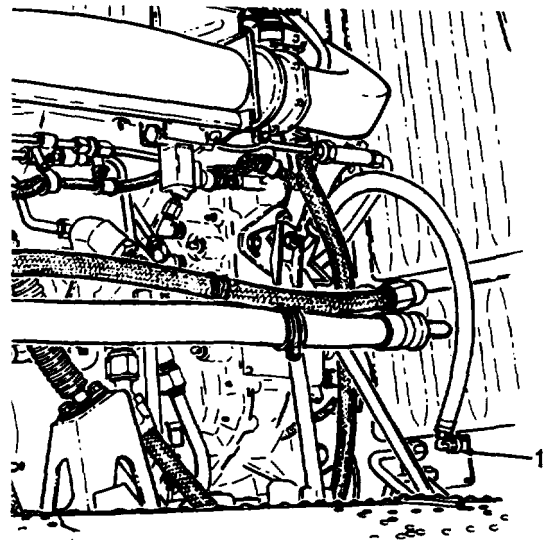
8. Connect coupling nut (1). Do not tighten.

9. Pilot: Motor engine until repairer signals.

10. Observe oil flow around loosely installed coupling nut (1). Signal pilot to stop motoring when air bubbles no longer appear in oil flow.

11. Torque coupling nut (1) to 80-120 in. lbs.

INSPECT



END OF TASK

Section IX PREVENTIVE MAINTENANCE CHECKS AND SERVICES

1-25. GENERAL DESCRIPTION

a. The preventive maintenance checks and services (PMCS) listed in the table below are tasks that must be performed at the intervals specified or at the closest PPM not to exceed the PMCS Table.

b. If, during performance of PMCS, the engine does not operate properly, refer to troubleshooting, Section VII.

c. Report all problems using the proper forms (refer to DA PAM 738-751).

1-26. DESCRIPTION OF PMCS TABLE

a. Step number column: This column lists the order that the scheduled tasks are performed. The column shall be used as a source of item numbers for the TM Number Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.

b. Interval column: This column defines the interval, in hours/time of engine operation, that all tasks must be performed. (Exceptions are described in the REMARKS column.) The helicopter log will be used to determine hours of engine operation.

c. Item to be inspected column: This column describes the item to be inspected (or serviced).

d. Task column: This column assigns responsibility for performing each task to either AVUM or AVIM. An "X" indicates that a description of the task is provided in the REMARKS column. A task number indicates a description of the task is given in that procedure.

e. Remarks column: this column provides supplementary information relating to the interval of performing certain tasks. In addition, when an "X" is indicated in the TASK column, a description of the task is given in the REMARKS column.

1-27. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Following are the preventive maintenance checks and services used for scheduled maintenance of the engine.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

ITEM NO.	INTERVAL 20 HRS 15 DAYS	100 HRS	300 HRS	600 HRS	ITEM TO BE INSPECTED	TASK AVUM	TASK AVIM	REMARKS
					ENGINE ASSEMBLY			
1	•				Inspect	X		Inspect engine assembly for general condition and security, loose or missing bolts, broken, loose or damaged electrical connections, security of mounting accessories, security of lockwiring and other retaining hardware, damage to lines, hoses, and fittings, fuel, air, and oil leakage, excessive wear of components, evidence of FOD, dirty components, cracks, dents, nicks, or chaffing of components, condition of all welded joints (ref. TM and TM 55-1500-204-25/1).
2					Inspect in storage	1-12-8		For engine in storage only, inspect every 30 days. Inspect more often if stored outside or in corrosive environment.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

ITEM NO.	INTERVAL 20 HRS T5 DAYS	100 HRS	300 HRS	600 HRS	ITEM TO BE INSPECTED	TASK AVUM	TASK AVIM	REMARKS
					LUBRICATION SYSTEM			NOTE
3		•			Service Engine Oil System	1-8-1		If the aircraft has been modified to incorporate the engine scavenge oil filter (airframe mounted), this task interval shall be 200 hours.
4			•		Service Power Turbine Pressure Oil Fitting, Screen, and Nozzle	1-8-4		Also service when oil flow below minimum.
5			•		Service Power Turbine Scavenge Oil Strut	1-8-6		
6			•		Service Scavenge Oil Sump	1-8-8		
7		•			Measure Oil Flow From Power Turbine Scavenge Oil Strut	1-8-9		NOTE If the aircraft has been modified to incorporate the engine scavenge oil filter (airframe mounted), this task interval shall be 200 hours.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

ITEM NO.	INTERVAL 20 HRS / 15 DAYS	100 HRS	300 HRS	600 HRS	ITEM TO BE INSPECTED	TASK AVUM	TASK AVIM	REMARKS
					COMPRESSOR MODULE			
8	●				Inspect	X		Inspect for general condition and security.
					COMPRESSOR ASSEMBLY			
9			●		Inspect	X		Inspect for dirt and soot accumulation and for cracks or breakouts; none are allowed. If operating in erosive environment (sand or dust) more frequent inspection for erosion, and compressor washes should be performed.
10					Rinse	3-2-1		Rinse compressor rotor as necessary. Rinse daily after last flight of day if operating in corrosive or erosive environment such as: dust, sand, salt water, chemical, pesticide, or herbicide.
11		●			Wash	3-2-2		Wash as required by dirt and soot accumulation or performance degradation. Wash as required after operating in high density smog environment or within 200 miles of volcanic activity.
					COMPRESSOR SCROLL			
12	●				Inspect	3-3-1		Also inspect whenever compressor module is removed.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

ITEM NO.	INTERVAL 20 HRS/15 DAYS	100 HRS	300 HRS	600 HRS	ITEM TO BE INSPECTED	TASK AVUM	TASK AVIM	REMARKS
					OIL PRESSURE REDUCER ASSEMBLY			
13			•		Repair	3-4-2		Also repair whenever engine oil system is contaminated.
					COMPRESSOR INLET			
14		•			Inspect	3-6-1		Also inspect whenever particle separator is removed or if FOD is suspected.
15					Deleted			
					COMBUSTION MODULE			
					COMBUSTION OUTER CASE			
16				•	Inspect	4-2-1		Also inspect whenever outer case is removed.
					COMBUSTION LINER			
17				•	Inspect	4-3-1		Also inspect whenever liner is removed.
					COMPRESSOR DISCHARGE AIR TUBES			
18				•	Inspect	4-4-2		Also inspect whenever tubes are removed.
					BURNER DRAIN VALVE			
19		•			Service	4-5-2		
					ENGINE REAR MOUNT			
20				•	Inspect Bearing	4-6-1		
					TURBINE MODULE			
21					Inspect First Stage Nozzle Shield, Nozzle, and Turbine Wheel.	5-1-1		Whenever combustion module is removed.
					HORIZONTAL FIREWALL SHIELD			
22	•				Inspect	5-2-1		Also inspect whenever shield is removed.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

ITEM NO.	INTERVAL 20 HRS 15 DAYS	100 HRS	300 HRS	600 HRS	ITEM TO BE INSPECTED	TASK AVUM	AVIM	REMARKS
					VERTICAL FIRE-WALL SHIELD			
23	•				Inspect for cracks	5-4-1		Also inspect whenever shield is removed.
					ACCESSORY GEAR-BOX MODULE			
24	•				Inspect	X		Inspect for oil leaks and loose component mounting hardware.
25		•			Inspect accessory gear-box attaching nuts	6-1-1		
					OIL FILTER HOUSING ASSEMBLY			
26	•				Inspect Impending Bypass Indicator	6-2-1		
27		•			Service Oil Filter Element	6-2-12		
					MAGNETIC CHIP DETECTORS			
28		•			Inspect	6-3-3		
29		•			Service	6-3-4		
					FUEL SYSTEM			
30		•			Inspect Fuel Control Idle Speed Setting	7-2-2		
		•			Inspect Fuel Control Air Sensing Tubes	7-2-4		
		•			Inspect Fuel Control Cut-off Valve	7-2-6		
					FUEL CONTROL			
31		•			Inspect Rigging	7-2-1		
32	•				Inspect Weep Holes	7-2-5		
33		•			Service External Pc Inlet Air Filter Assembly	7-2-7		
33.1	•				Inspect FCU Heater	X		If installed inspect for general condition and security of lines, fittings and hardware.

PREVENTIVE MAINTENANCE CHECKS AND SERVICES

ITEM NO.	INTERVAL 20 HRS 15 DAYS	100 HRS	300 HRS	600 HRS	ITEM TO BE INSPECTED	TASK AVUM	TASK AVIM	REMARKS
34			•		Service Internal Fuel Control Inlet Filter	7-2-14		
					FUEL NOZZLE			
35			•		Inspect	7-4-2		
36			•		Service Fuel Nozzle	7-4-4		
					FUEL FILTER			
37	•				Inspect Bypass Indicator	7-5-1		
37.1					Install Fuel Filter Element	7-5-7		Every 200 hours.
					ELECTRICAL SYSTEM			
					ELECTRICAL HARNESS			
38	•				Inspect	X		Refer to TM 55-1500-204-25/1.
					IGNITER LEAD			
39	•				Inspect	X		Refer to TM 55-1500-204-25/1.
40			•		ANTI-ICING VALVE AND SOLENOID Inspect	9-1-1		

Section X SPECIAL INSPECTIONS

1-28. GENERAL INFORMATION

This section supplements the PMCS as outlined in Section IX. This section also includes inspection of items which are required to be inspected at intervals not compatible with engine operating time or engine Inspection intervals. Typical of this type of inspection requirement are hard landings, overspeed, and sudden stoppage. After this type of Incident, immediate inspection is required. Refer to DA PAM 738-751 for applicable forms, records, and worksheets.

1-29. Ng OVERSPEED (AVIM)

For this condition, refer to troubleshooting procedure No. 25 (para 1-24). If Ng speed indicates 105-106% for more than ten seconds, or exceeds 106%, replace turbine module (tasks 5-1-2 and 5-l-3) and compressor module (tasks 3-1-1 and 3-l-2).

1-30. Np OVERSPEED (AVIM)

For this condition, refer to trouble-shooting procedure No. 25, para 1-24.

a. Continuous Np speed limits vary linearly from 114% Np at flight autorotation to 107.1% at 30 minute intermediate power (See Engine Torque & Np Speed Limits chart). If these Np limits are exceeded, replace turbine module (tasks 5-1-2 and 5-1-3).

b. Maximum transient Np speeds for 15 seconds vary linearly from 119% at flight autorotation to 109% at 30 minute intermediate power (See Engine Torque & Np Engine Speed Limits chart). If these Np limits are exceeded, replace turbine module (task 5-1-2 and 5-1-3).

c. If a complete loss of output shaft load occurs, or Np speed exceeds 120%, replace turbine module (tasks 5-1-2 and 5-1-3) and accessory gearbox module (tasks 6-1-2 and 6-1-3).

d. Deleted.

1-31. ENGINE G LOADS

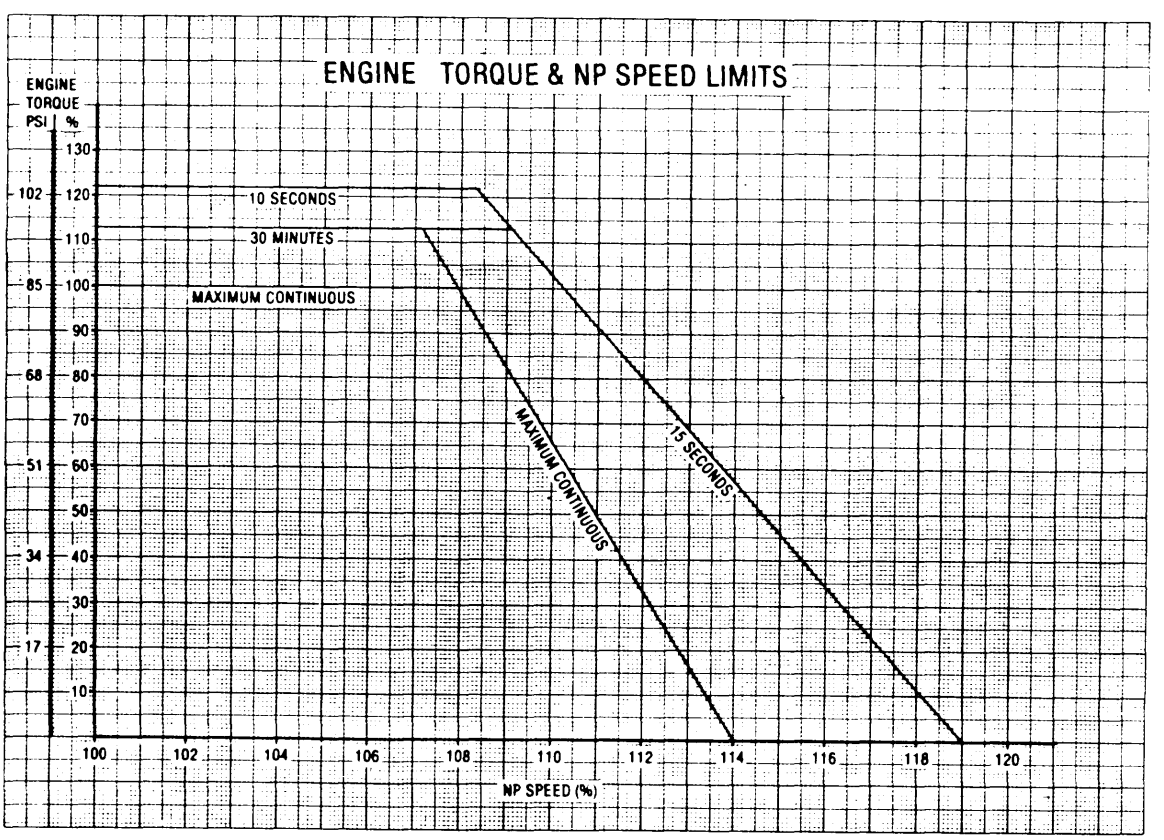
If an engine is subjected to "G" loads greater than 10g's, replace engine (TM 55-1520-248-23). Use the helicopter condition to determine If the 10g force limit has been exceeded. If the helicopter landing skids and cross tubes are deformed to a degree that the fuselage touches (or shows evidence of having touched) the ground, the 10g limit has been exceeded.

1-32. POWER TURBINE OVERTORQUE

If torque limits in chart below are exceeded, replace accessory gearbox module (tasks 6-1-2 and 6-1-3).

Output Shaft Torque Limit

Torque ft lbs	Press. psi	Power (100% Np) hp	Torque (% gage)	Time Limit
637	104	730	121	10 seconds
590	96	674	112	30 mins. (Intermediate)
524	85	600	100	None (Max Continuous)



1-33. OIL CONTAMINATION

If 011 contamination is found, service engine oil system (task 1-8-1).

1-34. FOREIGN OBJECT DAMAGE (FOD)

a. If foreign object damage Is evident complete the followlng:

-Inspect compressor module.
-Inspect first stage nozzle shield, nozzle, and turbine wheel (task 5-1-1).

b. If engine was operated with Inlet air restricted by foreign objects replace compressor module (tasks 3-1-1 and 3-1-2).

1-35. SUSPECTED ENGINE COMPRESSOR STALL (SURGE)

For this condition, refer to trouble-shooting procedure No. 28 (para 1-24).

1-36. TGT OVERTEMPERATURE INSPECTION

If TGT exceeds starting or operating limitations (para 1-11), Inspect first stage nozzle shield, nozzle, and turbine wheel (task 5-1-1).

1-37. ENGINE OIL OVERTEMPERATURE INSPECTION

NOTE

Corrective action for engine oil overtemperatures are described for three different conditions.

a. CONDITION: Engine oil temperature exceeds 107 degrees C for more than 10 seconds but less than ten minutes, but does not exceed 120 degrees C and engine oil pressure does not exceed operating limitations. Perform Procedure No. 1 (para d).

b. CONDITION: Engine oil temperature exceeds 107 degrees C for ten minutes or less, but does not exceed 120 degrees C and engine oil pressure exceeds operating limitations. Perform Procedure No. 2 (para e).

c. CONDITION: Engine oil temperature exceeds 107 degrees C for more than ten minutes or exceeds 120 degrees C. Perform Procedure No. 3 (para f).

d. PROCEDURE NO. 1.

(1) Service engine oil system (task 1-8-1).

(2) Pilot: Ground run engine for ten minutes with as high a power setting as possible within normal operating limits and without helicopter lifting off .

(3) Remove and Inspect engine oil filter element (tasks 6-2-10 and 6-2-11).

(4) Remove and Inspect side and bottom magnetic chip detectors (tasks 6-3-1, 6-3-2, and 6-3-3).

NOTE

If carbon deposits are found in steps (3) or (4), repeat this procedure. If carbon deposits are not found, Install engine oil filter element (task 6-2-13), side and bottom magnetic chip detectors (tasks 6-3-5 and 6-3-6), service helicopter engine oil system to proper level (TM 55-1520-248-23) and proceed to (5).

(5) Return engine to service and list a requirement in aircraft log book to remove and inspect engine oil filter element, and side and bottom magnetic chip detectors after five hours of engine operation. If carbon deposits are found after five hours of engine operation, service engine oil system (task 1-8-1).

e. PROCEDURE NO. 2.

Replace oil filter housing assembly (tasks 6-2-3 and 6-2-4); then perform Procedure 1 of this inspection.

f. PROCEDURE NO. 3

Replace engine (TM 55- 1520-248-23).

1-37.1. **VIBRATION TABLE**

a. This table provides vibration limits for the compressor, turbine, and gearbox. A vibration test is required after every installation of an engine in the aircraft, or when excessive vibration is suspected. If table limits are exceeded, shut down engine immediately and investigate to determine cause. A 200 cps filter is used in the following maximum vibration test:

b. Install vibration monitoring kit, tool no. 171170-0104, in accordance with TM 55-4920-243-15. Locally manufacture vibration check components (tool nos. 23032992, 23032993 and 23034204) in accordance with data in Appendix E.

c. Use the following test procedure for vibration testing of an engine installed in an aircraft.

(1) Steady state points:

(a) Throttle full open. 100% NP, flat pitch, stabilized for 30 seconds, record reading.

(b) Throttle full open, 100% NP, increase collective until skids are light, stabilize for 30 seconds, record reading.

(2) Transient data points:

(a) Throttle at idle, flat pitch, increase throttle to full open, 100% NP, record the peak reading.

(b) Throttle full open, 100% NP, flat pitch, increase collective until skids are light, record the peak reading

Item	Limit (Maximum Vibration)	
TRANSIENT	**TEST STAND**	**AIRFRAME**
Compressor	1.2 in./sec	2.0 in./sec
Turbine	1.8 in./sec	3.0 in./sec
Gearbox	1.0 in./sec	1.7 in./sec
STEADY STATE		
Compressor	0.6 in./sec	0.9 in./sec
Turbine	0.9 in./sec	1.5 in./sec
Gearbox	0.5 in./sec	0.8 in./sec

1-37.2. SUDDEN ENGINE STOPPAGE

If a drive system component malfunctions or the main rotor strikes an object ding operation or sustains damage which permits continued service or field repair in accordance with airframe manual (TM 55-1520-248-23), perform the following:

a. Inspect magnetic chip detectors for metal accumulation.

b. Inspect engine inlet for foreign objects.

c. Inspect compressor for foreign object damage.

d. Motor engine and listen for unusual noises

e. Install vibration monitoring equipment and operate engine at power required to make aircraft light on skids for 30 minute. Verify that vibration is within limits.

f. Shut down engine and check magnetic chip detectors for metal accumulation.

If a drive system component malfunctions or the main rotor strikes an object during operation that requires its removal from service for depot repair, or the engine or transmission mounts are fractured or misaligned send engine to depot.

1-37.3. POWER ASSURANCE CHECK

The Power Assurance Check (PAC) is a method by which the aircrew verifies a GO/NOGO criteria for engine performance. If indicated ENG TRQ% is equal to or greater than the value shown on the Power Assurance Chart, the engine can meet the performance data contained in the aircraft operators manual. This would indicate a GO criteria. If indicated ENG TRQ% is less than the value shown on the Power Assurance Chart, the engine may not meet the performance data. This would indicate a NOGO criteria. A DA Form 2408-13-1 entry will be made and the aircraft not flown until maintenance action is performed After performing required maintenance, a PAC will be performed to confirm corrections.

1-37.4. POWER ASSURANCE CHECK LOG

A Power Assurance Check Log will be maintained in the aircraft historical logbook. This log will be used by maintenance personnel as an aid in monitoring engine health trend data. Entries will be made in the Log by Maintenance Test Pilots (MTP) during each PPM cycle, after compressor wash, and at the discretion of the MTP.

a. The Power Assurance Check Log provides a method for the maintainer to monitor engine health. The check will also allow the maintainer to more effectively predict when preventative maintenance is required and schedule maintenance actions that were formerly unscheduled.

b. Trend checks can be used to monitor the health of the engine on a day to day basis. However, trending is best used to determine engine health over longer periods of sustained operation. The key to interpreting the data is a basic understanding of the engine characteristics.

c. Turbine engines will degrade or lose power as operational hours accumulate over the service life of the engine. Degradation is also affected by operation in erosive environments (sand, volcanic ash), .excessive operation at high temperature, over temperature conditions, and other abnormal conditions. The more erosive the environment, the longer the high temperature was maintained or the higher the over temperature, the faster the performance will degrade.

d. When engine performance degrades beyond the limits allowed in the aircraft operators manual, maintenance shall be performed. Each time that engine maintenance is performed, some measure of performance may be recovered. Following maintenance the engine may not recover to the power levels experienced when the engine was new or overhauled without replacing or reworking of components to like new condition.

e. Short term degradation can be caused by operating the engine in contaminated atmospheric conditions. Dust, smoke and other industrial contaminants can cause this type of power loss. Aircraft oil leaks, when they mix with the air entering the engine, can also result in a loss of power. This type of degradation can take place in minutes or hours and is generally corrected by washing the engine. Following the engine wash, it is normal to expect power would return to the previous baseline. If power is not recovered following a wash of a dirty engine, another problem may be indicated.

f. Engine components which are in process of failing can also appear as short term degradation. When engine performance degrades over a short period of time, and washing the engine does not recover the performance loss, a component failure should be investigated and corrected. Following maintenance it would be normal to expect power would be recovered.

g. Inaccuracies in the TGT, OAT, and ENG TRQ% indication systems could appear as engine performance degradation. Check OAT gauge calibration. Check ENG TRQ% and TGT indicating systems for accuracy (TM 55-1520-248-23).

POWER ASSURANCE CHECK LOG

ACFT HOURS	OAT	TGT	PA	ENGINE TORQUE	CHART TORQUE	REMARKS

Section XI OVERHAUL AND RETIREMENT SCHEDULE

1-38. INTRODUCTION

This section lists units of operating equipment that are to be overhauled or retired at the period specified. Removal of equipment for overhaul may be accomplished at inspection nearest the time when overhaul is due unless otherwise specified in TM 1-1500-328-23.

1-39. OVERHAUL TABLE

All items listed below shall be overhauled as specified below.

Item	Overhaul Interval (hours of operation)
Turbine Assembly (Except Turbine Wheels)	On Condition
Compressor Assembly (Except Impeller Assembly)	On Condition
Gearbox Assembly	On Condition
Fuel Pump Assembly (Except CECO Pump)	3000
Fuel Pump Assembly (CECO, P/N: 23057340)	3500
Fuel Control Assembly	1500
Fuel Nozzle	2000
Compressor Bleed Valve	On Condition
Compressor Bleed Valve T703-AD-700B Engine Only	On Condition

1-40. RETIREMENT TABLE

This table prescribes the maximum operating limitations for engine parts which are life limited. Parts life limits are based on either total hours or total cycles or hot section factor counts, whichever occurs first. A cycle is a start or attempted start. Cycles are recorded in the appropriate logbook. All items listed below shall be retired as specified.

Component/ Assembly	Hours	Cycles	HSFC
Gas Producer Turbine Assembly			
#1 Turbine Wheel	1500	2000	118500
#2 Turbine Wheel	1500	2000	118500
Power Turbine Assembly			
#3 Turbine Wheel	3000	4500	N/A
#4 Turbine Wheel	3000	4500	N/A
Compresser Impeller Assembly			
T703-AD-700	10000	20000	N/A
T703-AD-700A	10000	20000	N/A
T703-AD-700B	7500	15000	N/A

Section XII PREPARATION FOR STORAGE OR SHIPMENT

This section includes maintenance procedures for preserving engine for storage; preparation and inspection of reuseable shipping container and preparing engine for storage or shipment. Additional maintenance procedures include installation of engine into shipping container; installation of shipping container top; marking shipping container for shipment: and inspection of engine in storage.

LIST OF TASKS

1-12-1. PRESERVE ENGINE FOR STORAGE (LESS THAN 45 DAYS)

This task covers: On or Off Helicopter Preservation

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Utility Pail one gallon capacity
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs

Materials:
Lockwire (C4)

Parts:
Packing

Personnel Required:
688 Aircraft Powerplant Repairer
66S Inspector

Equipment Condition:
Engine mounted in engine turnover stand (task 1-5-5).

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

1. Place utility pail directly below chip detector (1).

2. Disconnect electrical connector (2).

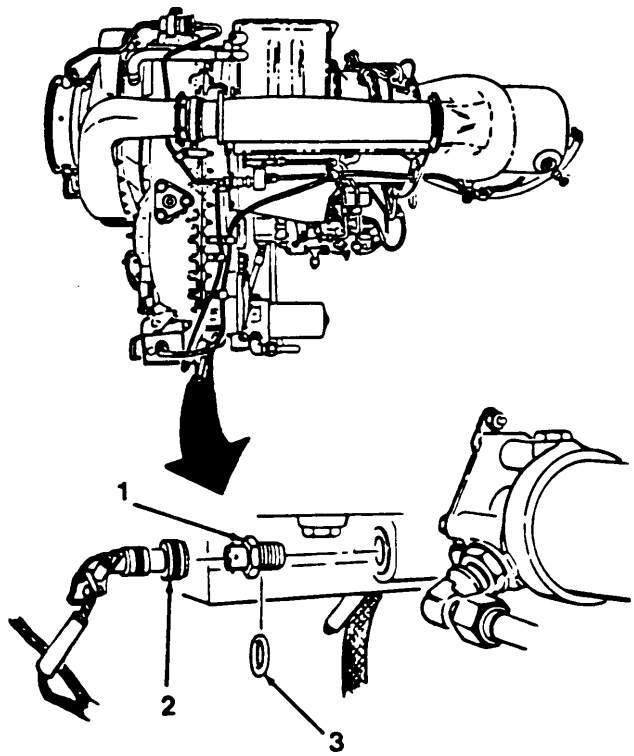
3. Remove lockwire, chip detector (1) and packing (3). Discard packing (3). Allow all oil to drain.

4. Inspect chip detector (task 6-3-3

5. Install new packing (3) on chip detector (1).

6. Install chip detector (1) and torque 60-80 in. lbs. Lockwire (C4).

7. Connect electrical connector (2).



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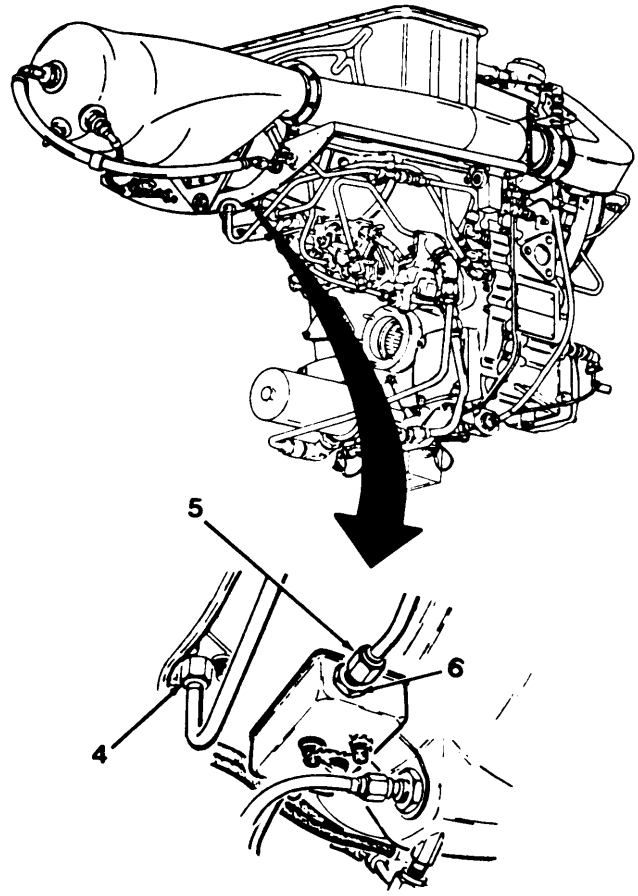
1-12-1. PRESERVE ENGINE FOR STORAGE (LESS THAN 45 DAYS) (CONT)

8. Place utility pail directly below coupling nuts (4) and (5).

9. Disconnect coupling nuts (4) and (5). Use wrench to support mating fitting (6) on scavenge sump. **Allow all oil to drain.**

10. Connect coupling nuts (4) and (5). Torque to 150-200 in. lbs. Use wrench to support mating fitting (6) on scavenge sump.



INSPECT

FOLLOW ON MAINTENANCE:

Prepare engine for shipment or storage (task 1-12-4).

END OF TASK

1-12-2. PRESERVE ENGINE FOR STORAGE (45 DAYS OR LONGER)

This task covers: On or Off Helicopter Preservation

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs
Oil and Water Separator
Utility Pail 1 gallon capacity
Engine Turning Adapter
Speed Handle
Crow's Foot (3/4 in.)

Materials:
Lockwire (C4)
Oil (C21)
Engine oil (C30 or C31)

Parts:
Cap
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
67S Inspector

References:
TM 55-2840-248-23
TM 55-1520-248-23

Equipment Condition:
Engine mounted in aircraft
Engine mounted in engine turnover stand (task 1-5-5)

General Safety Instructions:

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

NOTE

Fuel and oil systems may be preserved before engine is removed from helicopter (TM 55-2840-248-S).

FUEL SYSTEM PRESERVATION

1. Remove lockwire and disconnect coupling nut (1). Place end of hose (2) in utility pail.

WARNING

Allow at least five minutes after operation of ignition system before disconnecting or removing components. Failure to allow high voltage to dissipate can result in injury or death.

GO TO NEXT PAGE

1-12-2. PRESERVE ENGINE FOR STORAGE (45 DAYS OR LONGER) (CONT)

2. Disconnect engine fuel pump inlet line (3A) using crow's foot

3. Deleted.

4. Supply filtered oil (C21) to fuel pump inlet (3).

5. Move fuel control lever (7) to full open position (100 degrees).

6. Open ignition circuit breakers and motor engine with starter until system is preserved as evidenced by a continuous flow of oil from fuel line (2) into container.

7. Stop motoring and move fuel control lever (7) to off position (0 degrees).

8. Allow excess oil to drain from hose (2).

9. Reinstall fuel pump inlet line (3A) to fuel pump (TM 55-1520-248-23).

10. Connect coupling nut (1) to fuel nozzle (9). Torque to 80-120 in. lbs. Lockwire (C4).

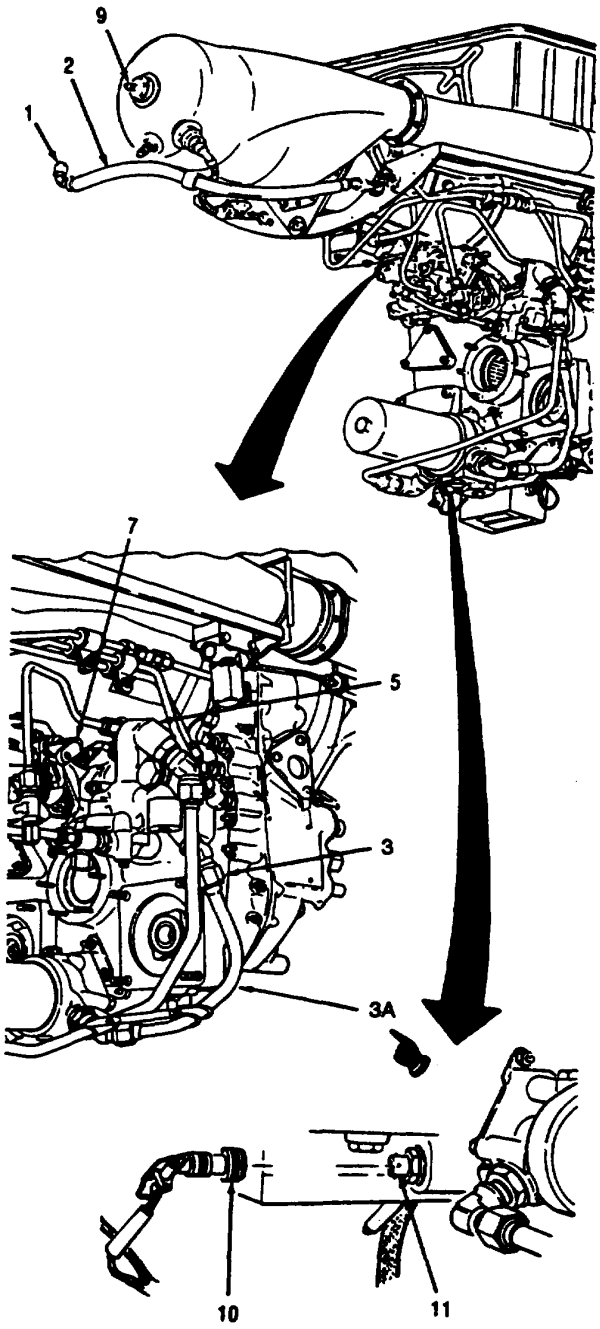
10A. Tag engine indicating fuel system preservation complete.

OIL SYSTEM PRESERVATION

11. Remove oil filter element (task 6-2-10).

12. Disconnect electrical connector (10).

13. Place utility pail directly below chip detector (11).



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1-12-2. PRESERVE ENGINE FOR STORAGE (45 DAYS OR LONGER) (CONT)

14. Remove lockwire, chip detector (11) and packing (12). Discard packing.

14A. Remove starter/generator (TM 55-1520-248-23).

15. Install engine turning adapter (T8) and speed handle in gear (13).

16. Pour engine oil (C30 or C31) into oil filter housing. Rotate engine using speed handle. Continue pouring oil and rotating engine until clean oil drains into pail.

17. Install new packing (12) on chip detector (11).

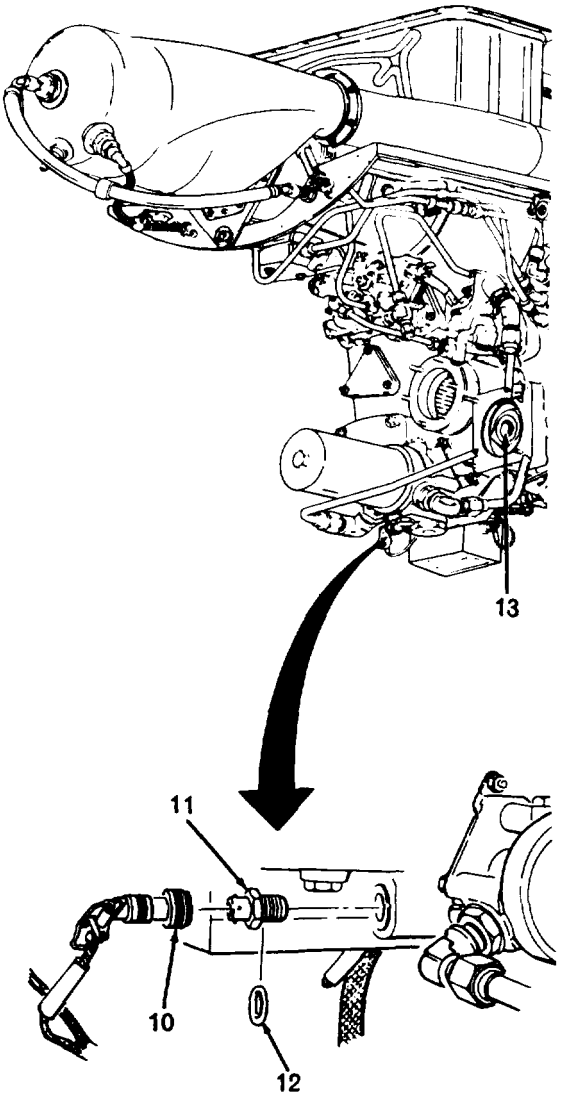
18. Install chip detector (11) and torque to 60-80 in. lbs. Lockwire (C4).

19. Connect electrical connector (10).

20. Install oil filter element (task 6-2-13).

21. Reinstall starter/generator (TM 55-1520-248-23).

22. Tag engine indicating oil system preservation complete.



INSPECT

FOLLOW ON MAINTENANCE:
Prepare engine for shipment or storage (task 1-12-4).

END OF TASK

1-12-3. PREPARE AND INSPECT REUSABLE SHIPPING CONTAINER

INITIAL SETUP

Applicable Configurations:
All

Personnel Required:
686 Aircraft Powerplant Repairer

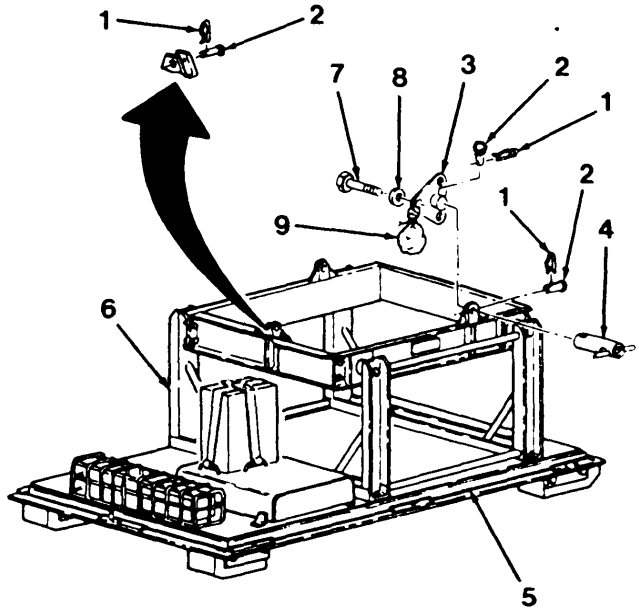
Tools:
Power Plant Tool Kit

References:
TB 55-8100-200-24

1. Remove shipping container top (task 1-5-2).

2. Inspect following components for cracks (cotter pins (1) must be discarded if removed.): Five pins (2), two mounting bracket adapters (3), two retaining tubes (4), gasket (5), and all structural components of mounting assembly (6). No cracks are acceptable.

3. Inspect six bolts (7) and washers (8) in cloth sack (9). Thread damage and cracks are unacceptable.

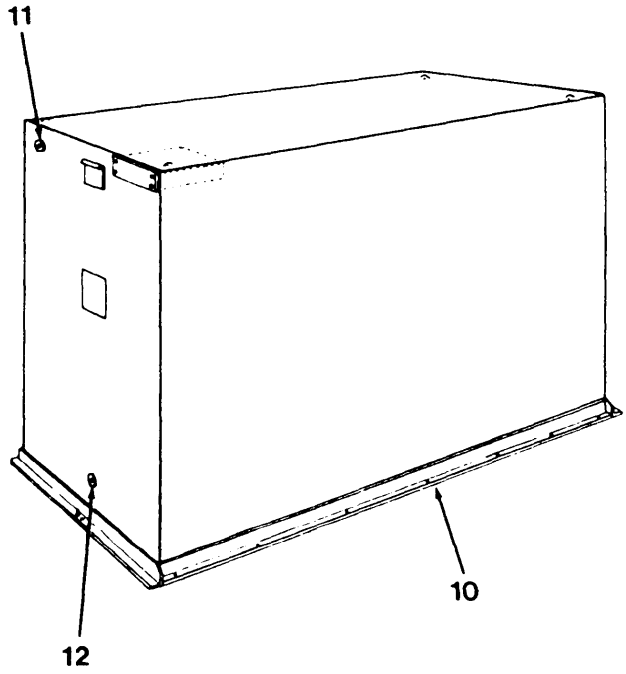


4. Inspect shipping container top (10) for cracks and dents. No cracks are acceptable. Dents are acceptable provided that no dent protrudes beyond surface more than 1 inch.

5. Inspect humidity indicator (11) for tightness in container top (10).

6. Inspect pressure relief valve (12) for tightness in container top (lo).

7. Check pressure relief valve (12) for proper operation by depressing outside button. Observe that button returns to extended position when released.



END OF TASK

1-12-4. PREPARE ENGINE FOR STORAGE OR SHIPMENT

This task covers: Off Helicopter Preparation

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Materials:
Engine Oil (C30 or C31) currently used in engine

Parts:
Caps
P1ugs
Gasket

Personnel Required:
68B Aircraft Powerplant Repairer

References:
DA PAM 738-751

Equipment Condition:
Engine installed in engine turnover stand (task 1-5-5).
Preserve engine for storage 45 days or longer (task 1-12-2).

General Safety Instructions:

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

NOTE

The forms, records and reports that are to be used by maintenance personnel when preparing an engine or engine component for storage or shipment are prescribed by DA PAM 738-751.

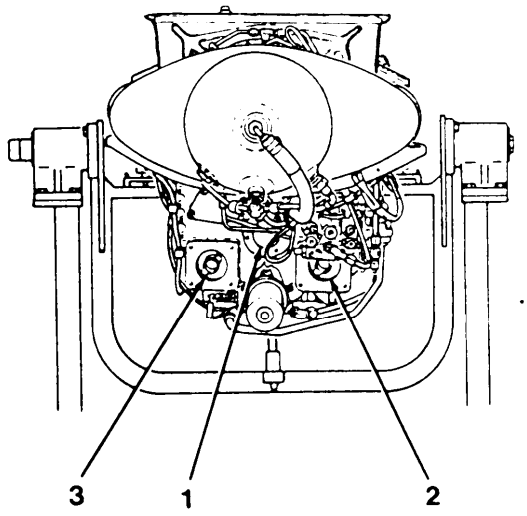
GO TO NEXT PAGE

1-12-4. PREPARE ENGINE FOR STORAGE OR SHIPMENT (CONT)

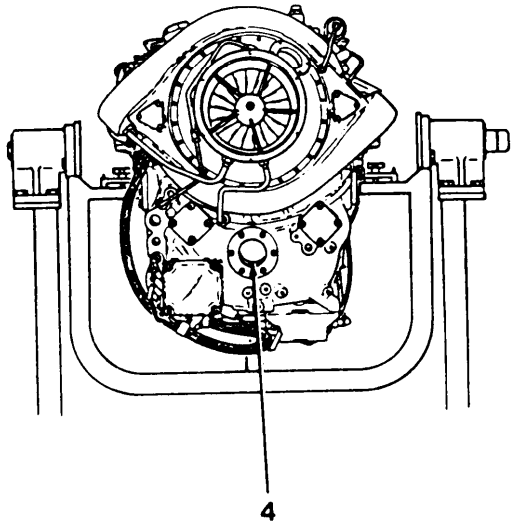
NOTE

Tighten all aluminum and plastic shipping caps and plugs finger tight.

All shipping parts except accessory drive pad covers for openings (1), (2). (3) and (4) shall be identified by a light yellow color. Color may be paint or any other acceptable process which is noncorrosive, permanent, and not subject to deterioration by engine fluids and solvents.



1. Coat accessory drive internal splines in openings (1), (2), (3), and (4) with engine oil (C30 or C31).



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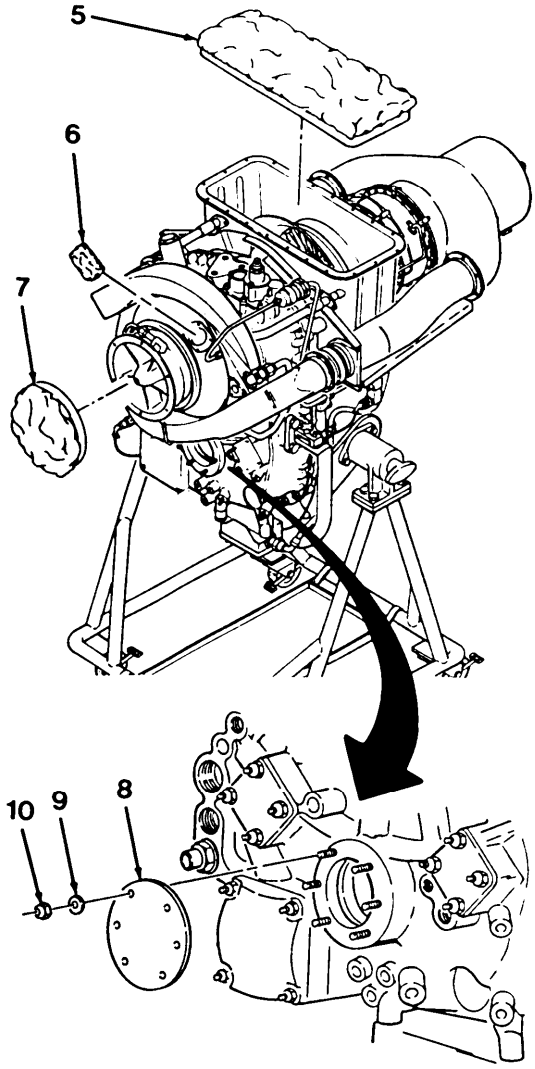
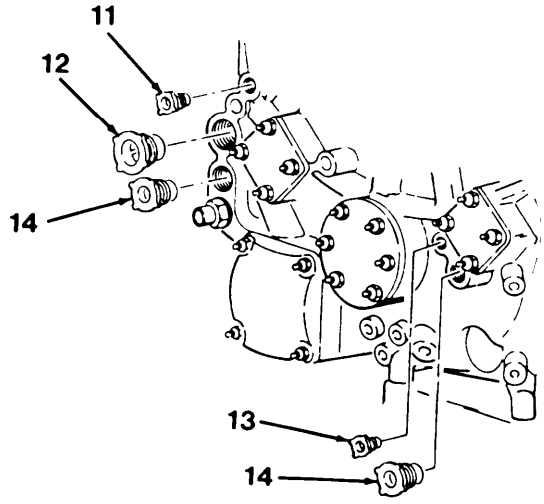
1-12-4. PREPARE ENGINE FOR STORAGE OR SHIPMENT (CONT)

2. Install plastic covers (5), (6), and (7).

3. Install cover (8) and secure with SIX washers (9) and nuts (10).



4. Install plugs (11), (12), (13), and two plugs (14).



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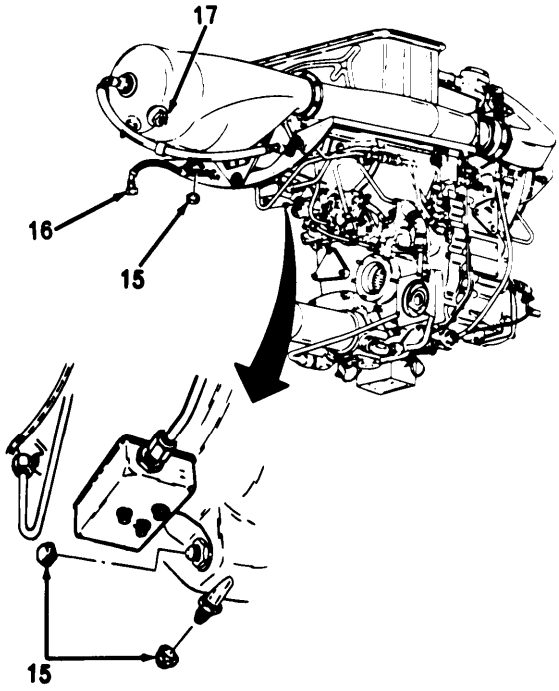
1-12-4. PREPARE ENGINE FOR STORAGE OR SHIPMENT (CONT)

5. Install three caps (15).

6. Disconnect Igniter lead (16) from igniter (17).

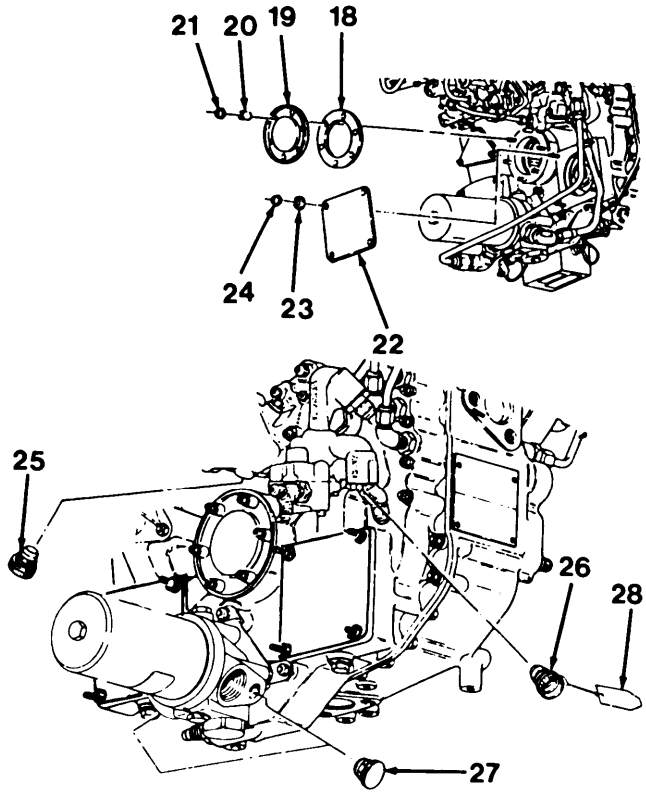


7. Install new gasket (18) and cover (19). Secure with six spacers (20) and nuts (21).

8. Install cover (22) and secure with four washers (23) and nuts (24).

9. Install plugs (25), (26), and two plugs (27).

10. Install tag (28) on plug (26).



TUBING REMOVED FOR CLARITY

END OF TASK

1-12-5 INSTALL ENGINE INTO SHIPPING AND STORAGE CONTAINER

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs
Engine Assembly Lift (T9)

Materials:
Lockwire (C4)
Dehydrating Agent (C25)
Corrosion Preventive Compound (C27)

Personnel Required:
686 Aircraft Powerplant Repairer
Helper

Equipment Condition:
Shipping container prepared and inspected (task 1-12-3).

Equipment Condition (cent):
Engine prepared for storage or shipment (task 1-12-4).
Engine removed from stand (task 1-5-6).

General Safety Instructions:

WARNING

Hoist heavy objects very carefully. Insure that lift equipment is serviceable. Use a helper to guide object being raised or lowered. Use guide lines when hoisting overhead. DO NOT get under the object. Careless hoisting can result in injury or death.

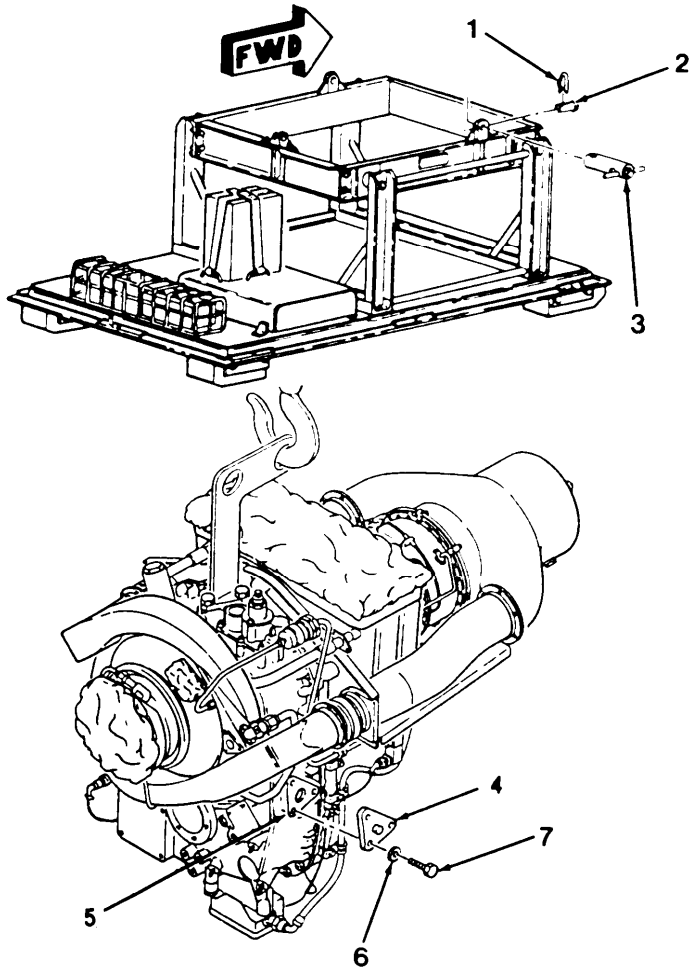
1. Remove shipping container top (task 1-5-2).

2. Remove two cotter pins (l), pins (2), and retaining tubes (3).

CAUTION

Do not use engine turnover stand or engine mounting brackets in lieu of shipping container mounting bracket adapters (4). Failure to comply may result in dropped engine.

3. Install two mounting bracket adapters (4) on engine mount pads (5) and secure with three washers (6) and bolts (7) from cloth sack (17). Torque to 125-135 in. lbs and lockwire (C4).



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1-12-5. INSTALL ENGINE INTO SHIPPING AND STORAGE CONTAINER (CONT)

WARNING

The fuel system of all engines placed in containers (less accident-involved engines) shall be thoroughly drained, purged, and preserved (task 1-12-2). All disconnected lines shall be capped or plugged. Tape will not be used in lieu of caps or plugs. Failure to comply may result in fire.

4. Instruct helper to guide engine during hoisting to prevent engine from striking mounting assembly (8).

CAUTION

Do not apply forward and/or aft loads on engine rear mount plate (9). Failure to comply may result in damage to rear mount plate (9).

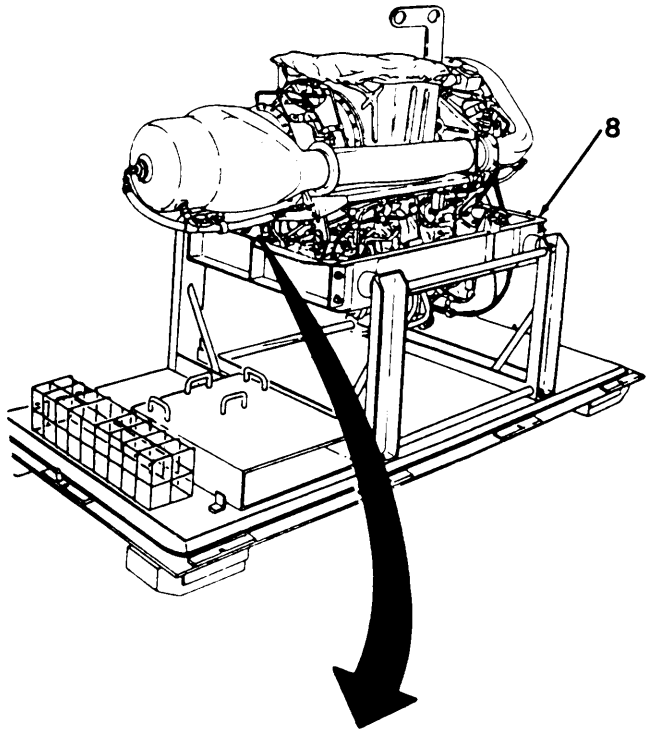
5. Lower engine into mounting assembly (8), while maintaining weight of engine on hoist. Insure that engine rear mount plate (9) aligns with, and does not touch, rear mount (10).

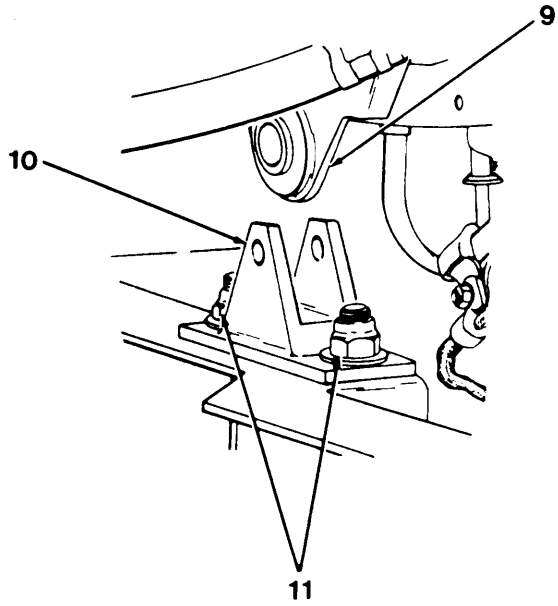
6. If engine rear mount plate (9) will not align with rear mount (10), complete a thru c. If it is correctly aligned, go to step 7.

a. Loosen, but do not remove, two nuts (11).

b. Move rear mount bracket (10) to align with engine rear mount plate (9).

c. Tighten two nuts (11).





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1-12-5. INSTALL ENGINE INTO SHIPPING AND STORAGE CONTAINER (CONT)

7. Align two mounting bracket adapters (4) with hole in mount (12); then insert two retaining tubes (3). Insure tubes (3) overlap pins on mounts (4).

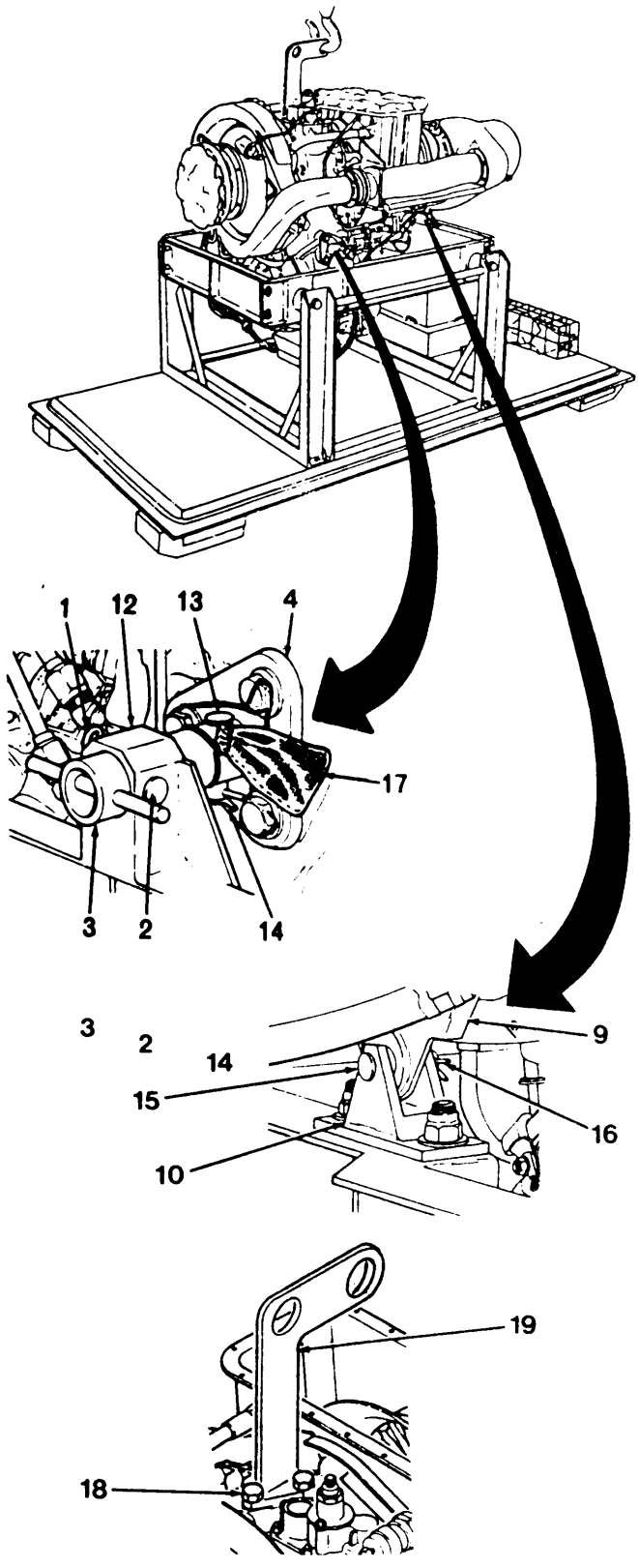
8. Install two pins (2) through mounts (12) and tubes (3); then Install cotter pin (1) through each pin (2).

9. Install two pins (13) through tubes (3) and adapters (4); then install cotter pin (14) through each pin (13).

10. Install pin (15) through mount (10) and mount plate (9); then install cotter pin (16) in pin (15).

11. Release weight of engine from hoist and disconnect hoist from engine.

12. Attach cloth sack (17) to right retaining tube (3).



13. Loosen three captive bolts (18) and remove lift (T9) (19).

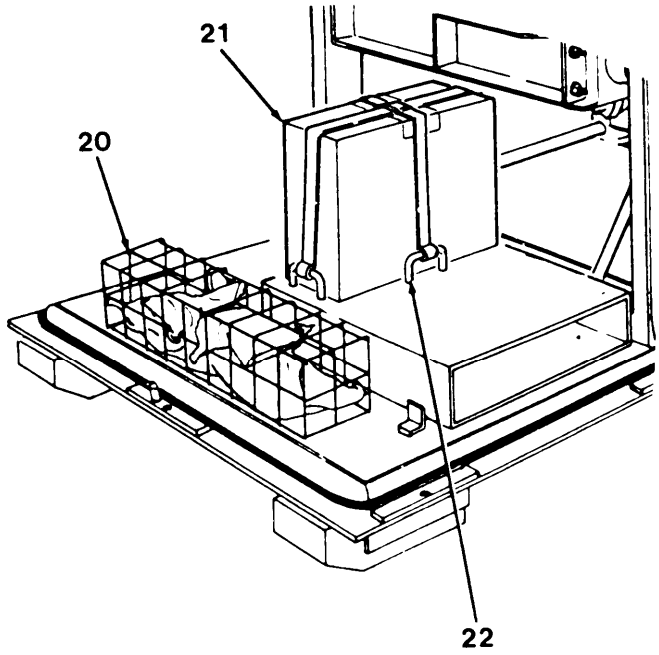
GO TO NEXT PAGE

1-12-5. INSTALL ENGINE INTO SHIPPING AND STORAGE CONTAINER (CONT)

14. Install 16 units of dessicant (C25) into receptacle (20).

15. Install package containing electronic supervisory control (21) and secure to four receptacle tie down bars (22) with tie downs, inapplicable.

16. Install shipping container top (task 1-12-6).



END OF TASK

1-12-6. INSTALL SHIPPING CONTAINER TOP

INITIAL SETUP

Application Configurations:
Al1

Tools:
Power Plant Tool Kit
Lift Sling (T40)
Hoist minimum 500 lb capacity
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs

Materials:
Lockwire (C4)
Lead Seals (C26)
Corrosive Preventative Compound (C27)

Personnel Required:
686 Aircraft Powerplant Repairer
66S Inspector
Helper

References:
PAM 738-751

General Safety Instructions:

WARNING

Hoist heavy objects very carefully. Insure that lift equipment is serviceable. Use a helper to guide object being raised or lowered. Use guide lines when hoisting overhead. DO NOT get under the object. Careless hoisting can result in injury or death.

1. Connect hoist and sling (T40) (1) to lifting hooks (2).

2. Instruct helper to prevent top (3) from striking engine during installation.

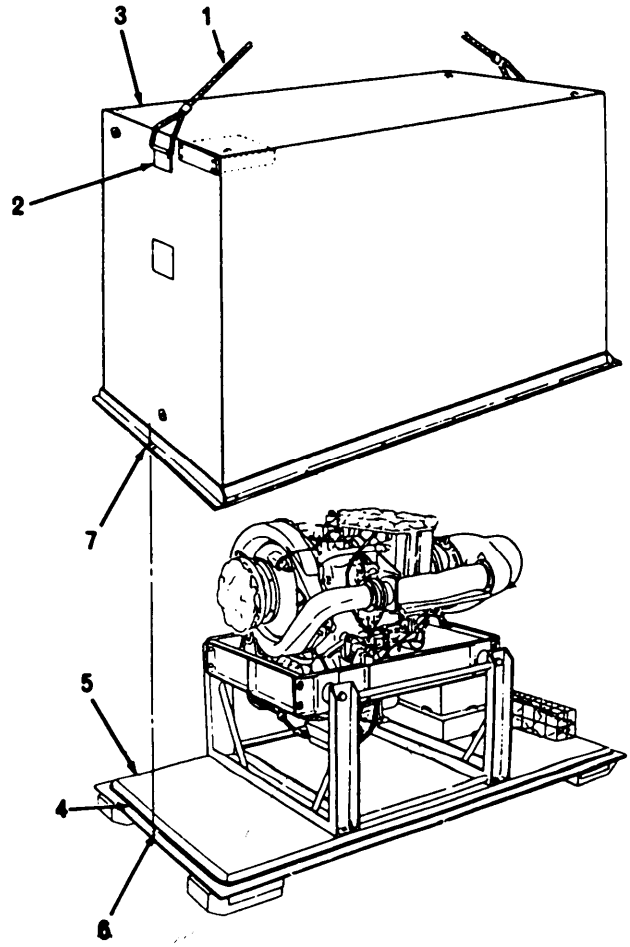
CAUTION

Insure top does not strike engine during installation. Damage may result and render engine unserviceable.

3. Position gasket (4) on bottom.

4. Hoist top (3) to a height just above engine, then lower top onto bottom (5).

5. Insure two locating pins (6) extend through lip (7) on to (3).



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1-12-6. INSTALL SHIPPING CONTAINER TOP (CONT)

6. Insure gasket (4) has not moved from its seat.

7. Disconnect hoist from lifting hooks (2).

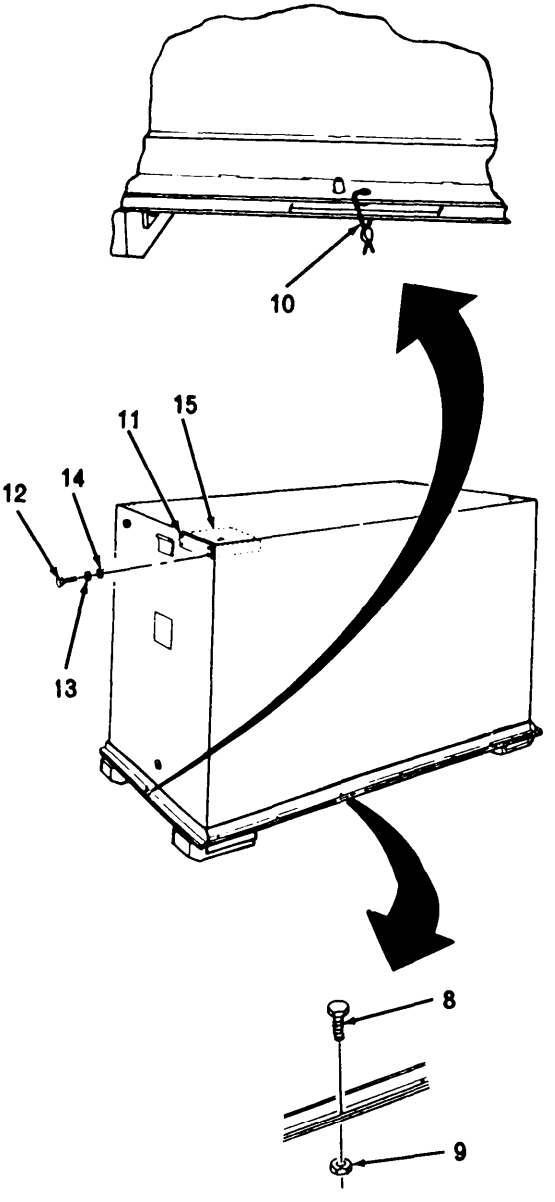
8. Install six bolts (8) and nuts (9) Torque to 150-165 in. lbs; then coat each nut (9) and bolt (8) with corrosion preventive compound (C27).

9. Install one lead seal (C26) (10) on each end of shipping container.

10. Remove cover (11) by removing four screws (12), washers (13), and rubber washers (14).

11. Place engine historical records in receptacle (15).

12. Install cover (11), four rubber washers (14), washers (13), and screws (12). Torque to 30-40 in. lbs and lockwire (C4).



INSPECT

FOLLOW ON MAINTENANCE:
Mark shipping container for shipment (task 1-12-7).

END OF TASK

1-12-7. MARK SHIPPING CONTAINER FOR SHIPMENT

INITIAL SETUP

Applicable Configuration:
All

Tools:
Power Plant Tool Kit

Materials:
Wiping Rags (Cl)
Stencil Brush (C3)
Methylethylketone (C7)
Glove (C9)

Materials: (cont)
White Stencil Ink (C28)

Personnel Required:
68B Aircraft Powerplant Repairer

References:
PAM 738-751
MIL-STD-129

WARNING

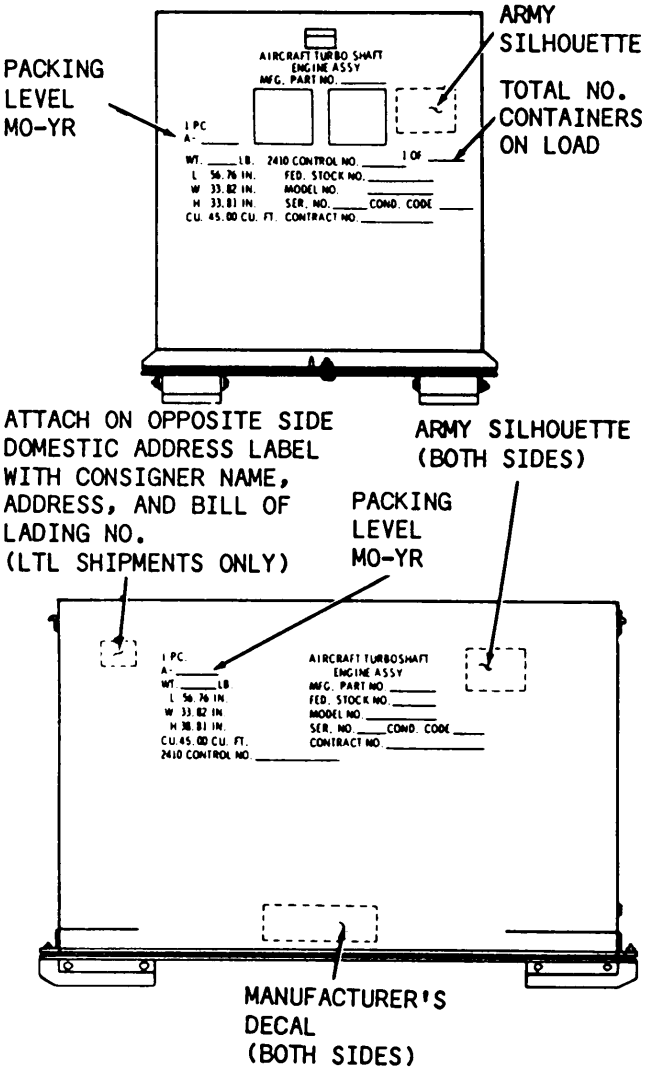
MEK (C7) is flammable and toxic. It can irritate and cause burns. Use only in well ventilated areas, away from heat or open flame. Wear gloves (C9) and goggles. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Remove old markings that do not apply using wiping rags (Cl) and methylethylketone (C7).

2. Mark shipping container as illustrated using stencil brush (C44), 1/2 in. high stenciled block letters, and white stencil ink (C28).

NOTE

Additional requirements for marking are contained in MIL-STD-129 and PAM 738-751.



END OF TASK

1-12-8. INSPECT ENGINE IN STORAGE

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Materials:
Humidity indicator (C13)
Dessicant (C25)

Personnel Required:
688 Aircraft Powerplant Repairer
Pilot

References:
TM 55-1520-248-23
TM 55-1500-333-24

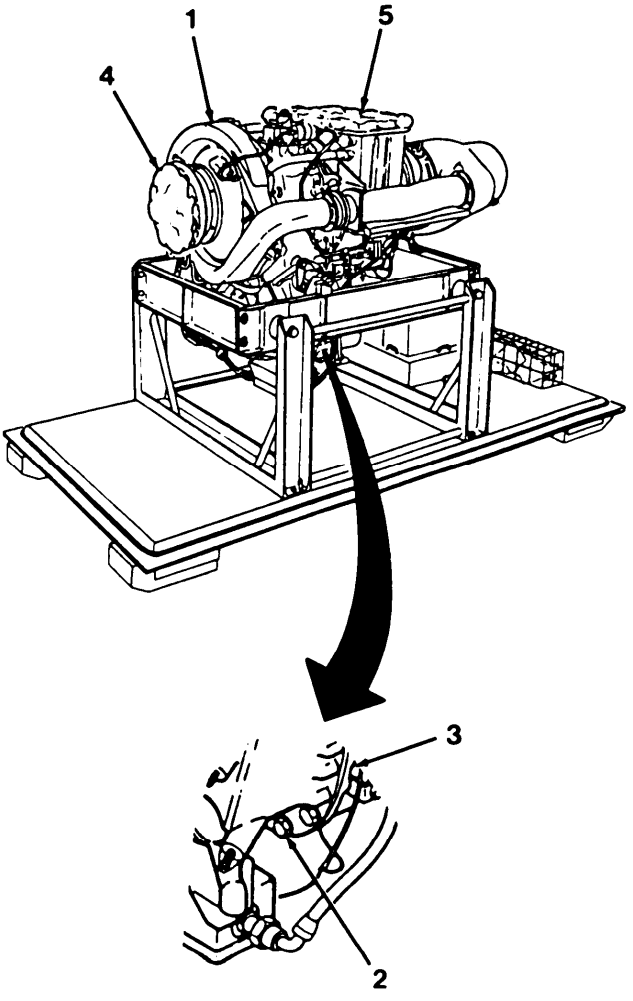
Equipment Condition:
Shipping container top removed (task 1-5-2).

1. Inspect all visible surfaces of engine (1) for evidence of moisture and/or corrosion. Pay particular attention to areas having dissimilar metals In contact with each other. Example: steel bolts (2) contacting the magnesium gearbox module (3). Engine is unserviceable if corrosion is found on inlet, compressor housing, turbine blades or vanes, or other visible exterior surfaces.

2. Remove covers (4) and (5).

3. Inspect compressor inlet and exhaust collector.

4. Reinstall covers (4) and (5).



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1-12-8. INSPECT ENGINE IN STORAGE (CONT)

3. If moisture and/or corrosion are not evident, replace humidity indicator (C13) (6) as follows:

a. Remove nut (7), gasket (8), and humidity indicator (C13) (6) from end wall of shipping container top. discard humidity Indicator (C13) (6).

b. Install new humidity indicator (C13) (6) and secure with gasket (8) and nut (7).

c. Remove and discard 16 bags of dessicant (C25) from receptacle (9). Install 16 new bags of dessicant (C25).

d. Install shipping container top (task 1-12-6); then this task is complete.

4. If corrosion is found, remove engine from shipping container (task 1-5-3); then complete steps a thru h below.

a. Clean or replace corroded parts (TM 55-1500-333-24).

b. Activate engine after storage (task 1-5-4).

c. Install engine in helicopter (TM 55-1520-248-23).

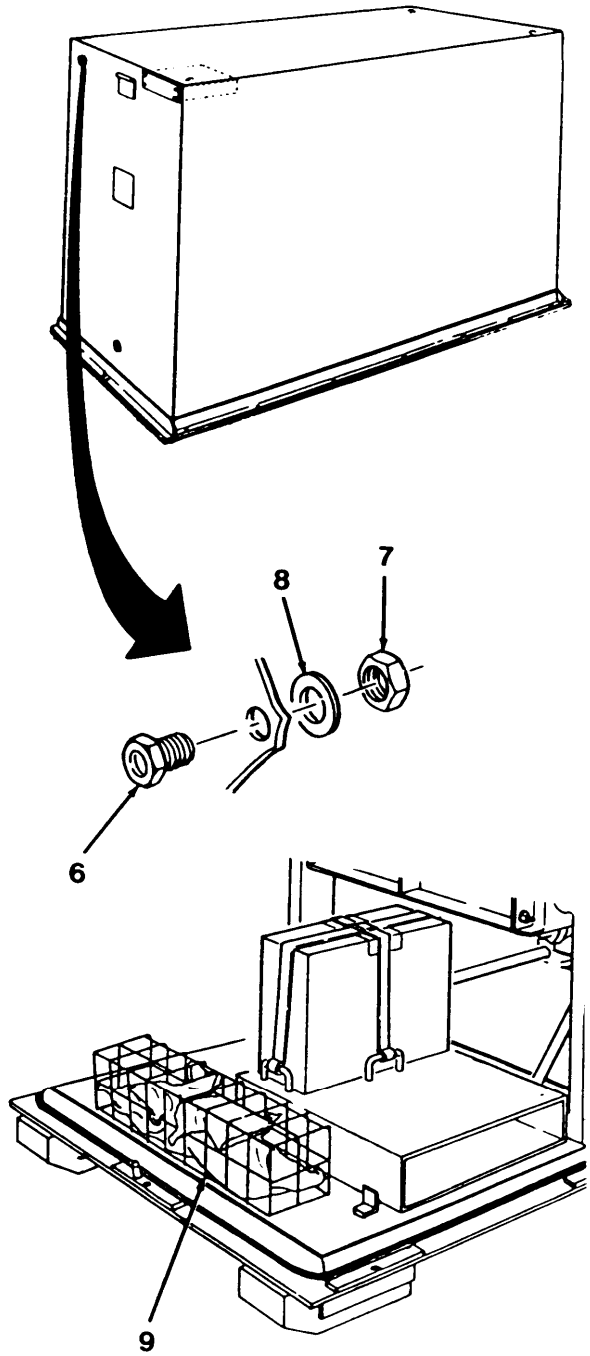
d. Pilot: Operate engine at ground idle or higher for a minimum of five minutes, then shut down engine.

e. Preserve engine (task 1-12-1 or 1-12-2).

f. Prepare engine for storage or shipment (task 1-12-4).

g. Install engine in shipping container (task 1-12-5).

h. Record preservation in engine records.



END OF TASK

Section XIII ENGINE STARTING PROCEDURES

WARNING

To ensure adequate warning of possible emergency engine operating conditions, verify that the engine warning devices (engineout horn, filter bypass light and chip detector light) are operable before each flight.

CAUTION

Never attempt to start the engine with a battery or starter that is known or suspected to be defective, inadequately charged, or improperly maintained.

To do so may result in severe damage to the engine because conditions that are detrimental to engine operation may go undetected due to inaccurate operation of indicating instruments at depressed voltage levels which occur during the start cycle.

To prevent overtemperatures during a start following a false start, purge the engine before the restart is attempted. Purge by motoring the engine with the starter, motor without ignition and with the throttle lever in cutoff. Accelerate to 15% N_1 speed; then allow the engine to coast to a stop before continuing with the normal start.

Certain cold weather conditions require that a ground warm-up run be performed to avoid auto-(spontaneous) acceleration of the engine.

Fuel icing under certain cold weather conditions require that a ground warm-up be performed to avoid a possible flame out

1-41. **STARTING MODES**

CAUTION

Overtemperature starts or afterfires after shutdown will cause cracks in the first-stage wheel rim. These cracks can eventually cause a section of the wheel to break out and exit the engine with potentially disastrous result. Stating procedures are given for bothautomatic and modulated modes.

a. Modulated Start Mode.

A modulated start is recommended when it is anticipated that the starting peak TOT may be higher than normal. A higher than normal peak starting TOT may be expected if one or more of the following conditions exist:

- low battery voltage
- extreme ambient temperatures
- high altitudes (above 5000 ft)
- low N_1 light off speed

A modulated start has the advantage of being able to reduce the maximum start temperature by varying the throttle position.

NOTE

The modulated start mode is the preferred method for starting the engine.

b. Start the engine as follows:

CAUTION

During a start, throttle must never be advanced out of the FUEL OFF position until after the starter and ignition exciter have been energized and the minimum desired cranking speed of 12-16% has been attained. To do so might result in an explosive lightoff or an overtemperature start.

GO TO NEXT PAGE

CAUTION

An engine fire (with the resultant flame emanating from the tailpipe) can occur during start if the combustion chamber becomes overloaded with fuel before ignition takes place. To extinguish the fire, continue to motor the engine using the starter, with the throttle fully closed and the main fuel switch off.

Monitor oil pressure during start. Damage to rotor bearings can result if a positive indication of oil pressure is not obtained by the time idle speed is reached.

(1) Position the throttle or power lever at FUEL OFF.

(2) Place the aircraft collective pitch control in the minimum position.

(3) Turn on the aircraft switches required to provide fuel to the engine.

CAUTION

Abort the start if the N_2 turbine is not rotating by 25% N_1 speed. A second or third start attempt may be made. If the condition still exists, refer to item 40 of troubleshooting procedures.

A start should not be attempted at N_1 speeds below 12%. Starting at N_1 speeds less than 12% increases the possibility of exceeding engine temperature limits.

CAUTION

Engine starts below 760°C TOT increase the engine start time and can cause a shift in the combustor flame pattern that damages turbine components.

(4) Energize the starter motor and ignition exciter.

NOTE

It is recommended that residual TOT be no more than 150°C when the throttle is opened and lightoff is attempted. Residual TOT can be readily reduced to or below 150°C by motoring engine with the starter.

(5) When the desired N_1 cranking speed of 12-16% is reached, advance the throttle toward Idle until the engine lights off. Lightoff is evidenced by combustion noise and/or by an Increase in TOT. From this point, TOT is controlled directly by the throttle; Increase or decrease by throttle movement, as required.

NOTE

To properly start the engine, pilots should modulate the throttle to maintain 760-820°C TOT during the start cycle. Use of this procedure will result in a 20-40 second engine start time under standard day conditions.

(6) Monitor TOT and N_1 speed. Increase both at a steady rate. The rate of throttle opening action determines the maximum TOT and N_1 speed increase.

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CAUTION

If the engine has been shut down for more than 15 minutes, stabilize at idle speed for one minute before increasing power.

(7) Continue advancing the throttle until the IDLE detent is reached.

(8) De-energize the starter and ignition exciter when 55% N_1 speed is reached. The start is completed when a stabilized N_1 speed of 63-65% is reached. Completion of the start normally occurs 20 to 40 seconds after starter engagement. A positive indication of oil pressure must be obtained by this point in the start. If it is not, immediately shut down the engine and check to be sure that oil is available at the power and accessory gearbox inlet. Monitor the measured gas temperature; do not exceed the limits.

(9) Monitor N_1 when activating the generator switch. If N_1 decays below 58%, turn off the generator and accelerate N_1 to 70%; then, reactivate the generator.

c. Automatic Start Mode.

The automatic start procedure is the same as the modulated start procedure, including notes, cautions, and warnings, except the throttle or power lever is moved to the IDLE detent when the desired N_1 cranking speed is reached. For an automatic start, advance the throttle as follows:

CAUTION

Engine starts below 760°C TOT increase the engine start time and can cause a shift in the combustor flame pattern that damages turbine components.

(1) When the desired N_1 cranking speed of 12-16% is reached, advance the throttle to the IDLE detent.

(2) Monitor TOT and N_1 speed

NOTE

A positive indication of oil pressure must be obtained at this step. If not, immediately shutdown the engine. Check for availability of oil at the gearbox inlet.

d. Cold Weather Starts.

If all of the following weather conditions exist, perform a ground warm-up at idle speed for a period of 15-20 minutes (engines without fuel control heater installed) or 5 minutes (engines with fuel control heater installed) prior to any further movement of the throttle.

- Low ambient temperature, 0°C (32°F) or lower.
- High relative humidity, 45% or higher.
- The aircraft has not been hangared or has otherwise been allowed to cold soak.

If an auto-(spontaneous) acceleration occurs during warm-up run, close the throttle and shutdown engine. Subsequently restart and resume the warm-up run.

If all of the following weather conditions exist, perform a ground warm-up at idle speed for a period of 5 minutes prior to any further movement of the throttle.

- Low ambient temperature, 4°C (40°F) or lower.
- No anti-icing additive has been added to the fuel.
- The aircraft has not been hangared or has otherwise been allowed to cold soak.

Some general practices recommended for improved cold weather operation of the engines are as follows:

(1) When the aircraft is not in operation, use appropriate covers over the inlet duct, exhaust stacks, etc.

(2) At temperatures below 4°C use JP-4 or commercial Jet B fuel if available. As an alternate, use the AVGAS-jet fuel mixture described in TM 55-1520-248-23.

NOTE

Use fuel containing anti-icing additive whenever engine operations are conducted below 4°C.

(3) If equipment is available and conditions allow, when the aircraft has been cold soaked at temperatures below 4°C, use an auxilliary power source for faster more satisfactory starts.

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CAUTION

Do not use an open flame heater to preheat the engine or battery.

(4) If the aircraft has been cold soaked at temperatures below minus 18°C (0°F) and a battery start must be made, preheat the engine fuel control area and battery, if equipment is available and conditions allow, in order to Improve engine starts.

(5) If the aircraft has been cold soaked and a battery start must be made without preheating the battery, remove and store the battery, if possible, until it is required for aircraft starting. Store the battery in an area where it can be maintained or warmed to a temperature above ambient outside conditions or to approximately 21°C (70°F).

NOTE

Due to the variation in jet fuels available for commercial operation, in cold weather the engine may experience a short delay before light-off after the throttle is advanced to the IDLE position. This delay should be less than three seconds regardless of the type of fuel used. If the lightoff delay exceeds three seconds, return the throttle to FUEL OFF and continue to motor the engine with the starter for thirty seconds to remove excess fuel from the combustion section.

In some instances N_1 may accelerate slowly through the 25-30% speed range on a battery start after an engine has been cold soaked and not preheated. If the start is not completed within the starter engagement time limits, shut down the engine. Before attempting the next start, wait for the starter duty cycle limits to pass or for one minute, whichever is longer. This wait will allow residual heat from the previous start attempt to soak back into the engine and Improve conditions for the next start attempt.

e. Stagnated Starts.

If a stagnated start is experienced, shut down then repeat start procedure. If it appears that an overtemperature will occur during the start:

- Retard the throttle to achieve a manually operated trim on fuel flow. When the temperature is reduced, advance the throttle toward IDLE to complete the start.

OR

- Position the throttle to FUEL OFF and motor the engine without Ignition for ten seconds; then repeat the start.

- If the start is aborted, turn the throttle to FUEL OFF and motor the engine for 10 seconds without ignition.

END OF TASK

Section XIV HEALTH INDICATOR TEST (H.I.T.)

1-42. **INTRODUCTION**

The Health Indicator Test (H.I.T) is the method by which a pilot, in day-to-day flying, monitors the aircraft engine condition. This is accomplished by the pilot selecting an NG setting (%) based on the existing outside air temperature (OAT) observed on the aircraft OAT gauge. The TGT indicated at that NG setting must then relate to the predicted value (Baseline TGT Value) found on the HIT Log. This log is then used by maintenance personnel as an aid in monitoring engine health trend data.

CAUTION

Readings less than the established baseline value ("minus" indications) could be the result of a faulty indicating system and should be investigated and corrected or engine damage may result.

When a difference between an indicated TGT and baseline TGT is ± 20°C, the pilot will make an entry on DA FORM 2408-13 to notify the maintenance officer. A difference of ± 40°C is cause for grounding the aircraft. Readings greater than the established baseline value ("plus" indications) are an indication of possible engine degradation, bleed air problems, or an indicating system error. These conditions must be investigated and corrected before possible catastrophic degradation occurs. HIT checks which yield indications from 20-39°C variation from the baseline value do not immediately ground the aircraft. However, troubleshooting, diagnosis, and corrective action should be completed prior to further use of that aircraft for training/operations missions.

a. Establishing new HIT Baseline TGT Values.

NOTE

Prior to establishing new HIT Baseline Values. clean the compressor and check the accuracy of OAT instument system.

New baseline values for HIT will be established when an engine has been replaced or when any maintenance which affects engine airflow has been performed. Examples include:

- Replacement or repair of the compressor.

- Replacement of the airframe supplied particle separator or swirl tubes.

- Discharge tube/seals replacement.

- Replacement or repair of components in the combustion section to include liner, fuel nozzle, and thermocouple harness assembly.

NOTE

Under no circumstance will a new Baseline HIT Value be established without first successfully completing a Power Assurance Check.

(1) Perform normal engine run-up and cockpit procedures in accordance with applicable - 10 manual.

(2) Maintain NP at 100% and stabilize instruments.

NOTE

Perform HIT procedures with a fully charged electrical system (generator load less than 35%).

(3) If generator load is greater than 35% turn generator off.

(4) Turn off all bleed air.

(5) Read free air temperature on cockpit OAT gauge.

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(6) Using a blank IHT Baseline TGT Worksheet, locate OAT in first column, nearest the free air temperature read on the cockpit OAT gauge. Circle this OAT.

(7) Set NG% at the value indicated in column two opposite this OAT Allow TGT to stabilize.

(8) Read TGT from indicator. Record TGT beside the circled OAT.

(9) Apply the delta TGT A Correction Factor in column three adjacent to the circled OAT to indicated TGT and record the result in the open space in column four.

(10) Apply the delta TGT B Correction Factor in column five to the TGT to column four. Record results of calculations for each of the OAT/NG combinations shown in column six.

(11) Enter baseline information in the respective columns of the HIT TGT Log.

(12) The HIT TGT Log should be placed in the log book where pilots can utilize it in accordance with applicable -10 manual directions The HIT TGT Work Sheet should be retained with engine Historical Records and discarded only after the completion of the next successive HIT TGT Baseline. The current HIT TGT Log and Work Sheet should accompany the Historical Records when the engine is removed for any reason.

b. Adjusting HIT TGT Baseline Values.

Baseline TGT Values will be adjusted, rather than establishing a new baseline, when inlet scoop fairings are removed/installed. An engine power assurance check is not required for a baseline adjustment.

(1) Perform three successive Health Indicator Test (HII) Checks in accordance with HIT TGT Log instructions, immediately prior to and after inlet scoop fairings installation/removal.

(2) Adjust the baseline TGT values on the HIT TGT Log to reflect the difference in HIT.

(3) Check reading. For example:

(a) The HIT Check after installation of inlet scoop fairing is 3°C TGT higher than before the installation. Add 3°C to each of the Baseline TGT values of the Original HIT Log and enter the adjusted TGT values on the Reverse Flow Inlet TGT Baseline Worksheet.

(b) Transcribe the TGT values from the worksheet to the new HIT TGT Log (Inlet Scoop Fairings installed). This HIT TGT Log now reflects TGT Values adjusted to compensate for the installation of the fairings.

NOTE

The pilot will use whichever HIT TGT Log is applicable at the time.

(c) Install both HIT TGT Logs in the aircraft logbook, and retain the Adjusted HIT TGT Worksheet with the engine historical records. Discard only after the completion of the next successive HIT TGT Baseline.

c. Verification of Baseline HIT Values.

When corrective action is taken to bring the HIT TGT Log values back in tolerance with Baseline TGT Values, verification of the Baseline TGT is required.

(1) Perform a normal HIT Check in accordance with instruction on the HIT Log.

(2) Compare actual HIT TGT value when Baseline HIT TGT value.

NOTE

If variations between actual TGT and Baseline TGT values are within acceptable tolerance, then the Baseline TGT Values are verified.

(3) If variations are not acceptable, perform a Power Assurance Check to ensure proper engine operation/health and establish a New Engine TGT Baseline.

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OH-58D HIT TGT WORKSHEET (TEST)

Instructions for Maintenance Officer

1. Maintain NR/NP at 100% and stabilize all instruments.
2. Turn off an bleed air.
3. With rotor turning, read free air temperature from OAT gauge.
4. Enter line 1 at OAT nearest free air temperature (FAT).
5. Set NG at value indicated in line 2.
6. Read TGT from indicator.
7. Apply Delta TGT-A correction factor in line 3 to indicated TGT and record the result in box in the center of line 4.
8. Apply each of the Delta-B correction factors in line 5 to the corrected TGT in line 4 and record the result in each of the blank spaces in line 6.
9. Enter aircraft and engine hours and the word “Baseline” in the log section at bottom of Engine HIT Log.

Aircraft S/N:_____
Engine S/N:_____
Aircraft Hours:_____
Engine Hours:_____

6 BASE LINE	5 DELTA TGT−B	4 TGT 0	3 DELTA TGT−A	2 NG %	1 OAT
	−86		86	82.9	−12
	−80		80	83.2	−10
	−74		74	83.5	−8
	−67		67	83.8	−6
	−61		61	84.1	−4
	−55		55	84.3	−2
	−48		48	84.6	0
	−42		42	84.9	2
	−36		36	85.2	4
	−29		29	85.5	6
	−23		23	85.8	8
	−17		17	86	10
	−10		10	86.3	12
	−4		4	86.6	14
			0		15
	3		−3	86.9	16
	9		−9	87.1	17
	15		−15	87.4	20
	22		−22	87.7	22
	28		−28	88	24
	34		−34	88.2	26
	41		−41	88.5	28
	47		−47	88.8	30
	54		−54	89	32
	66		−66	89.3	34

GO TO NEXT PAGE

OH-58D ENGINE HIT LOG (TEST)

Instructions:

1. Maintain NR/NP at 100% and stabilize all instruments.
2. Turn off an bleed air.
3. With rotor turning, read free air temperature from OAT indicator.
4. Enter OAT line at value nearest to free air temperature read on OAT indicator.
5. Set NG at value indicated in NG line. Allow TGT to stabilize.
6. Read TGT from indicator.
7. Compare this TGT with value recorded in line labeled Baseline TGT and NG utilized.
8. Record aircraft or engine hours and difference (+ /-) between indicated TGT and Baseline TGT on Engine HIT Log
9. If difference between indicated TGT and Baseline TGT is:
   A. ± 20°C to ± 39°C or greater enter on DA Form 2408-13.
   B. ± 40°C or greater, Aircraft should not be flown until cause for excessive TGT is determined. Enter on DA Form 2408-13.

Aircraft S/N:_____
Engine S/N:_____

BASELINE TGT	NG %	OAT DEG C
	82.9	
	83.2	
	83.5	
	83.8	
	84.1	
	84.3	
	84.6	
	84.9	
	85.2	
	85.5	
	85.8	
	86.0	
	86.3	
	86.6	
	86.9	
	87.1	
	87.4	
	87.7	
	88.0	
	88.2	
	88.5	
	88.8	
	89.0	
	89.3	

ACFT HOURS	BASELINE DIFF.	ACFT HOURS	BASELINE DIFF.

END OF TASK

CHAPTER 2
ENGINE ASSEMBLY MAINTENANCE

Section I GENERAL INSTRUCTIONS

2-1. ENGINE ASSEMBLY MAINTENANCE

To perform maintenance on the engine assembly, refer to the following sections in this manual.

- Troubleshooting (Chapter 1, Section VII).
- Servicing (Chapter 1, Section VIII).
- Preventive Maintenance Checks and Service (PMCS) (Chapter 1, Section IX).
- Special Inspection (Chapter 1, Section X).

2-2. STANDARD MAINTENANCE PRACTICES

The following are considered standard maintenance practices. Instructions about these practices will not normally be included in maintenance procedure task steps.

- Lines will be tagged before they are disconnected. Tubes and parts will be capped or plugged when they are disconnected.
- Used preformed packings, retainers, gaskets, cotter pins, lockwashers, etc. are discarded. New parts shall be installed.
- Packings are coated before installation. Specific instructions are provided in each maintenance procedure.

Tubes and related parts will be tied out of the way with twine, not lockwire.

Disassembly procedures reflect disassembly needed to support total authorized repair. You may not need to disassemble a part as far as described in the task. Follow the steps to disassemble as far as needed to repair/replace worn or damaged parts.

Before a component or the disassembled parts of a component are inspected, they are cleaned as required.

Components and mating surface areas will be inspected for serviceable condition before installation.

Guide lines will be used when any item is hoisted overhead.

When a nut is tightened or loosened on a bolt, the bolt head will be held with a wrench.

When a coupling nut on a line is tightened or loosened, the mating fitting will be held with a wrench.

A special torque will be cited when the words TORQUE TO are used. A standard torque is required when no specific torque is given. Standard torque information is in TM 55-1500-204-25/1.

- When torquing hardware, observe compliance with drag torque as required. To determine drag torque, thread nut onto screw or bolt until at least two threads protrude. The nut shall not contact the mating part. The torque necessary to begin turning the nut is the drag torque.

2-3. UNSERVICEABLE PARTS DISPOSITION

Unserviceable parts must be tagged as unserviceable and returned to base supply. Refer to PAM 738-751 for forms, records, and reporting procedures.

CHAPTER 3
COMPRESSOR MODULE MAINTENANCE

Section I GENERAL INSTRUCTIONS

This section includes maintenance procedures for removal and installation of compressor module.

LIST OF TASKS

3-1.1 REMOVE COMPRESSOR MODULE (AVIM)

This task covers: Off Helicopter Removal

INITIAL SETUP

Applicable Configurations:
All

Tools :
Power Plant Tool Kit

Materials:
Wiping Rags (C1)

Personnel Required:
68B Aircraft Powerplant Repairer
Helper

Equipment Condition:
Engine mounted in engine turnover stand (task 1-5-5).

1. Remove tube (1) by disconnecting coupling nuts (2) and (3). (T703-AD-700B ONLY) Remove clamp (1A), bolt (1B), and nut (1C).

2. Remove tube (4) by disconnecting coupling nuts (5) and (6).

3. Remove tube (7) by disconnecting coupling nuts (8) and (9).

4. Remove oil pressure reducer assembly (task 3-4-1).

5. Remove anti-icing air valve assembly (task 9-3-1).

6. Remove diffuser vent orifice (10), and record orifice size.

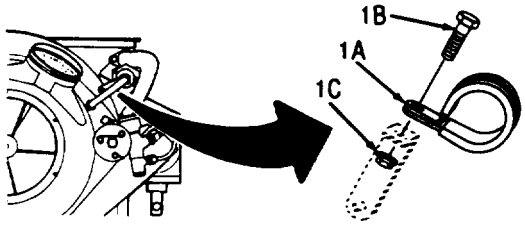
6A. (T703-AD-700B ONLY) Remove compressor bleed air valve (task 9-4-1).

7. Remove bolt (11), nut (12), spacer (13) and retaining clamp (14) on electrical harness (15).

NOTE

Lock turbine (task 5-1-2, steps 1 and 2) prior to removing compressor.

8. Remove compressor module (16) with aid from helper, by removing six nuts (17).



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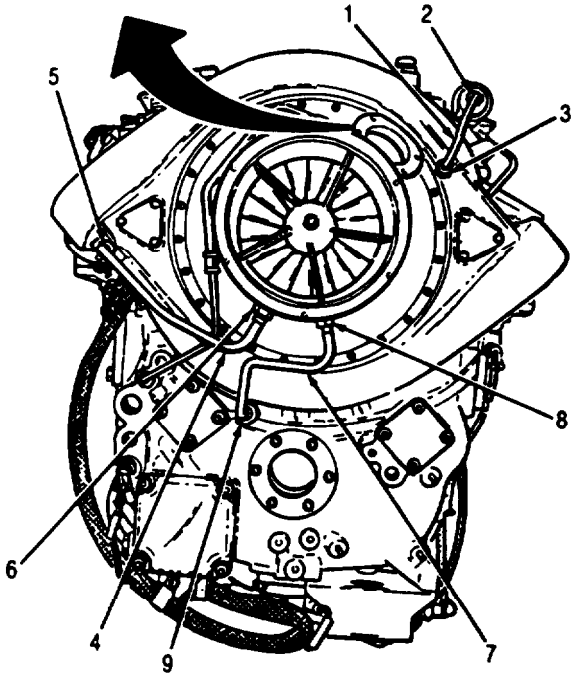

T703-AD-700

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3-1-1. REMOVE COMPRESSOR MODULE (AVIM) (CONT)

CAUTION

Guard against the turbine-to-compressor coupling falling out of the gearbox if the engine is turned to the turbine up position while the compressor is removed.

NOTE

Shims may stick to compressor module during removal. Do not remove shims on mounting studs between compressor module and accessory gearbox module until step 9 has been completed.

9. Record location of shims (18) as removed from mounting pads (19).

10. Remove and discard packing (20).

CAUTION

Failure to match mark may result in higher engine vibration.

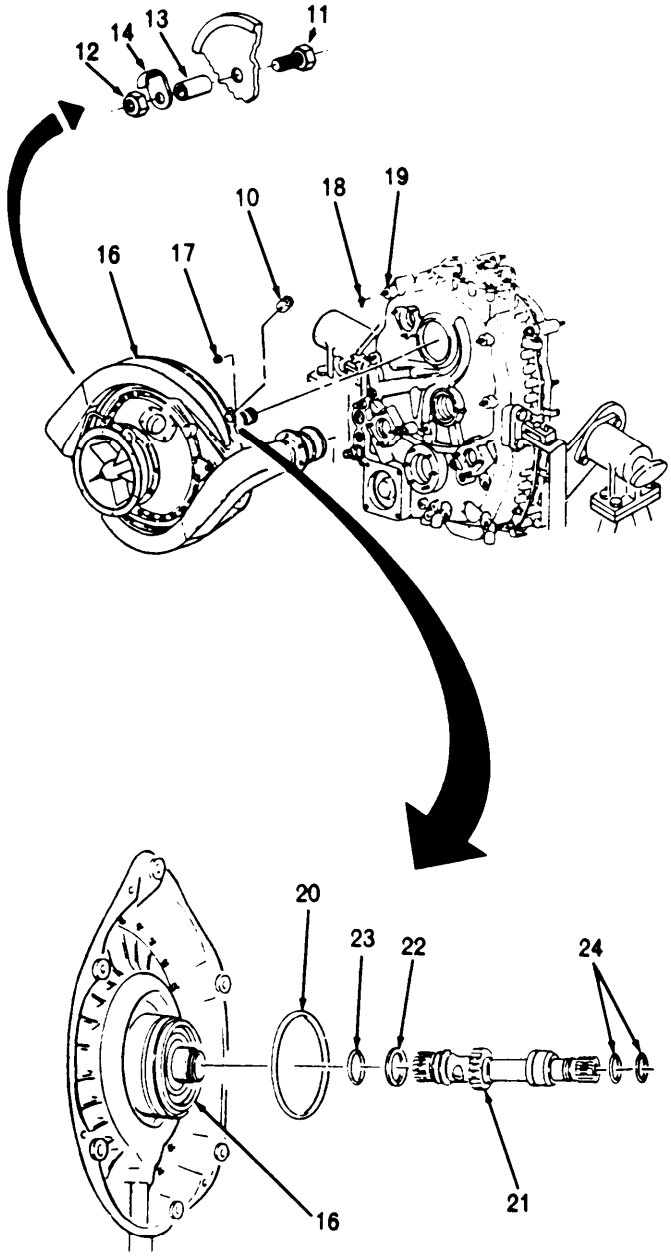
Ensure spur adapter gearshaft (21) is match marked prior to removal.

11. Remove spur adapter gearshaft (21) by removing internal retaining ring (22) and pulling spur adapter gearshaft away from aft end of compressor module (16).

12. Remove and discard split seal piston ring (23).

13. Remove and discard two packings (24).

14. Remove turbine module (task 5-1-2).



END OF TASK

3-1-2. INSTALL COMPRESSOR MODULE (AVIM)

This task covers: Off Helicopter Installation

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs
Torque wrench 150-750 in. lbs
Spur Adapter Gearshaft Bearing Guide (T26)
Fuel Pump Adapter Wrench (T32)
Retaining Ring Gage (T35)

Materials:
Engine Oil (C30 or C31)
Petrolatum (C34)

Parts:
Packings
Split Seal Piston Ring
Shims

Personnel Required:
68B Aircraft Power Plant Repairer
66S Inspector
Helper

Equipment Condition:
Engine mounted in engine turnover stand (task 1-5-5).
Compressor scroll-to-discharge air tube flange adapter inspected (task 3-3-2).
Turbine module removed (task 5-1-2).

General Safety Instructions:

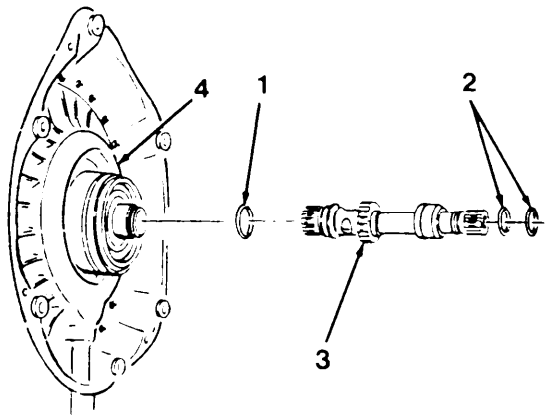
WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

1. Lubricate split seal piston ring (1) and packing (2) with petrolatum (C34).

2. Install split seal piston ring (1) and two packings (2) on spur adapter gearshaft (3).

3. Install spur adapter gearshaft (3) into compressor module splined adapter (4).



NOTE

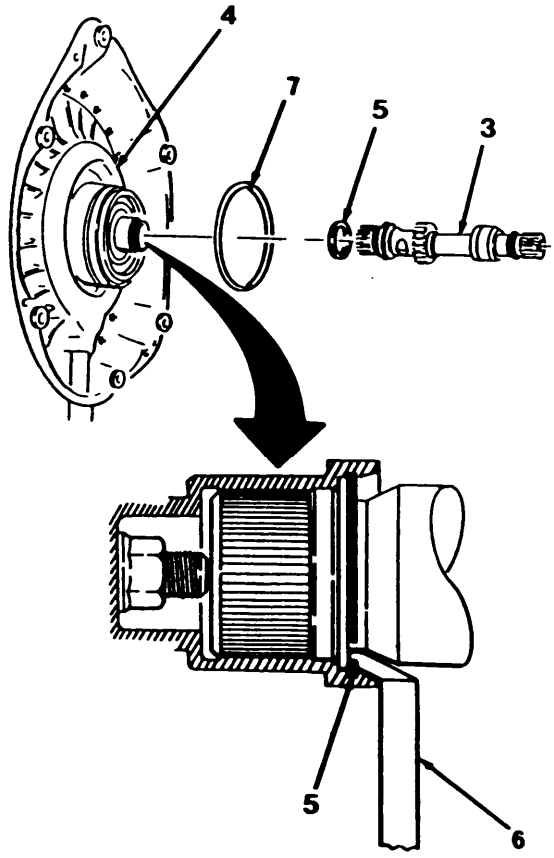
Ensure match marks are aligned.

GO TO NEXT PAGE

3-1-2. INSTALL COMPRESSOR MODULE (AVIM) (CONT)

4. Secure spur adapter gearshaft (3) with retaining ring (5). Ensure that the retaining ring (5) is secured and expanded in the retaining ring groove using retaining ring gage (T35) (6).

5. Lubricate rear support packing (7) with petrolatum (C34), then install in seat on compressor (4).

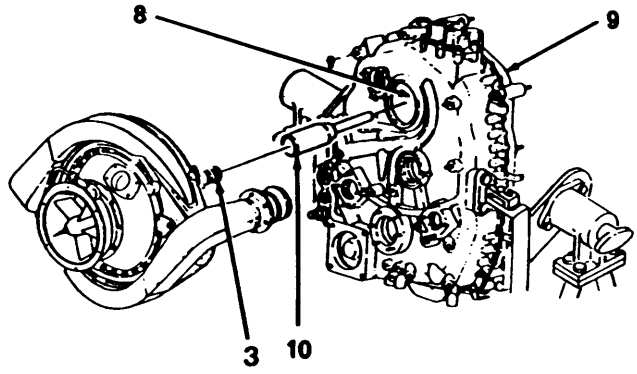


6. Lubricate rollers of roller bearing (8) in accessory gearbox (9) with petrolatum (C34). Use only enough petrolatum to hold rollers out against bearing outer race.

CAUTION

Failure to comply with oil mixing restrictions can result in an engine failure.

7. Lubricate spur adapter gearshaft bearing guide (T26) (10) with engine oil Currently in engine (C30 or C31); then install on spur adapter gearshaft (3).



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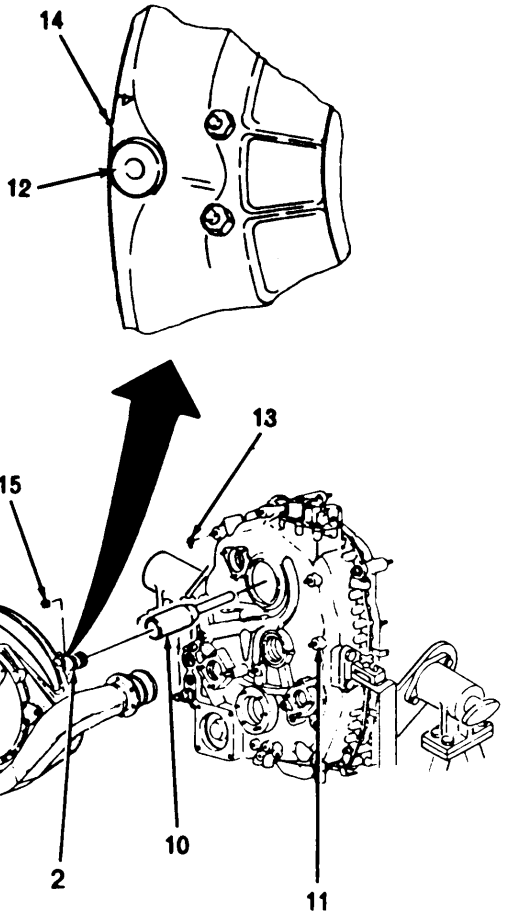
3-1-2. INSTALL COMPRESSOR MODULE (AVIM) (CONT)

8. Insure six accessory gearbox mounting pads (11) and flanges (12) on compressor are clean and free of foreign materials.



CAUTION

Failure to properly shim compressor module at Installation can cause spur adapter gearshaft to fail which may result in sudden engine stoppage.

9. If installing the same compressor module that was removed, Install shims (13) in locations recorded during compressor module removal (task 3-1-1). If shim location is unknown or a new compressor module is being Installed, install shims in accordance with total number marked on flange (14).

CAUTION

Ensure spur adapter gear-shaft properly meshes with mating gear in accessory gearbox before tightening retaining nuts. Failure to comply may cause damage to spur adapter gearshaft.

10. Install compressor module (4) and secure with six nuts (15). Using adapter wrench (T32), torque nuts (15) to 70-85 in. lbs above drag torque. Minimum drag torque is 3.5 in. lbs.

11. Remove spur adapter gearshaft bearing guide (10); then Inspect two packings (2) and replace if damaged.

GO TO NEXT PAGE

3-1-2. INSTALL COMPRESSOR MODULE (AVIM) (CONT)

NOTE

If compressor module is being replaced, use largest size of diffuser vent orifice and perform troubleshooting procedure 19 (para 1-24).

12. Install bolt (16), spacer (17), nut (18) and clamp (19) to secure electrical harness (20).

13. Install diffuser vent orifice (21).

14. Install turbine module (task 5-1-3).

15. Install combustion module (task 4-1-5).

15A. (T703-AD-700B ONLY) Install compressor bleed air valve (task 9-4-2).

16. Install anti-icing air valve assembly (task 9-3-2).

17. Install oil pressure reducer assembly (task 3-4-3).

18. Install tube (22) and connect coupling nuts (23) and (24). Torque to 150-200 in. lbs.

19 Install tube (25) and coupling nuts (26) and (27). Torque to 200-250 in. lbs.

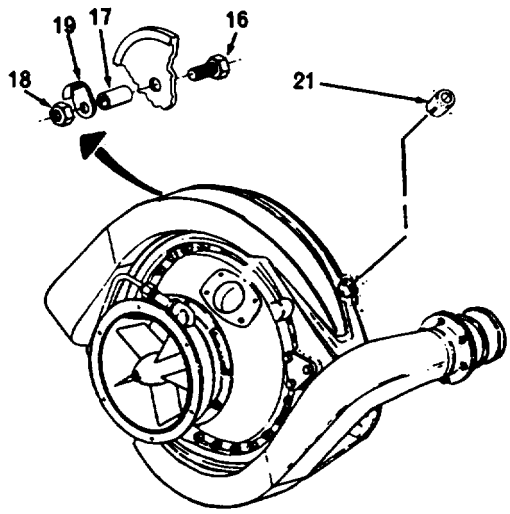
20 Install tube (28) and connect coupling nuts (29) and (30). Torque to 80-120 in. lbs. (T703-AD-700B ONLY) Install clamp (28A), bolt (28B), and nut (28C).

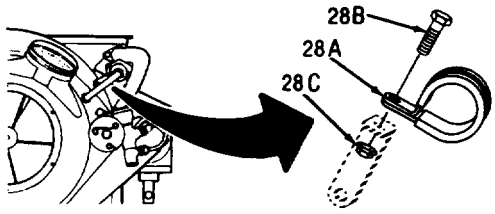
INSPECT

FOLLOW ON MAINTENANCE:

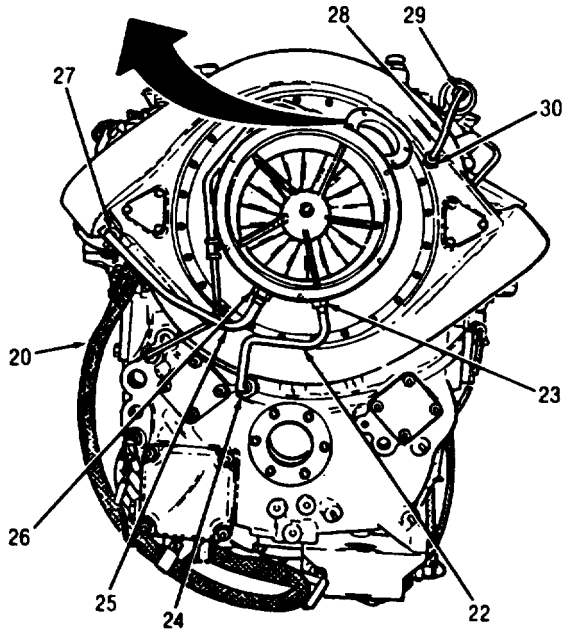
If compressor module was replaced, enter a requirement to determine proper size diffuser vent orifice (task 3-5-2). Enter a requirement for an MOC. Ensure proper Electronic Supervisory Control Unit (ESCU) for P/N compressor is installed. (Reference TM 55-2840-256-23P.)

END OF TASK





T703-AD-700B



T703-AD-700

Section II COMPRESSOR ROTOR ASSEMBLY

This section Includes maintenance procedures for rinsing and washing the compresser.

LIST OF TASKS

3-2-1. RINSE COMPRESSOR ROTOR

This task covers: On Helicopter Servicing

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Generator Set
Air Compressor Unit
Spray Unit (B41)

References:
TM 55-1520-248-23
TM 55-1520-248-10

Materials:
Clean Water (C39)
Methyl Alcohol (C40) (below 40 degrees F only)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector
Pilot

Equipment Condition:
Compressor wash access panel opened (TM 55-1520-248-23).
Warm engine (ref. Glossary).

General Safety Instructions:

CAUTION

If ambient temperature is below 40 degrees F, one half of water used in washing solution must be replaced with methyl alcohol (C40). If not added, water may freeze in engine and cause internal damage.

GO TO NEXT PAGE

3-2-1. RINSE COMPRESSOR ROTOR (CONT)

1. Supply two quarts or more of clean water (C39) to spray unit; then start air compressor unit and set at 55 psi.

2. Connect external power to helicopter (TM 55-1520-248-23).

CAUTION

Do not spray water into a hot engine. It may cause internal damage to engine. Engine temperature must be as required for warm engine (ref. Glossary).

3. Open all ignition system circuit breakers and set anti-ice switch to OFF.

3A. (T703-AD-700B ONLY) Retain bleed valve in closed position to protect valve internal passages from damage caused by rinse solution. Close valve as follows:

a. Remove bleed valve jumper tube (task 9-4-1).

b. Install cap on lower bleed valve banjo fitting to prevent contaminants from entering valve.

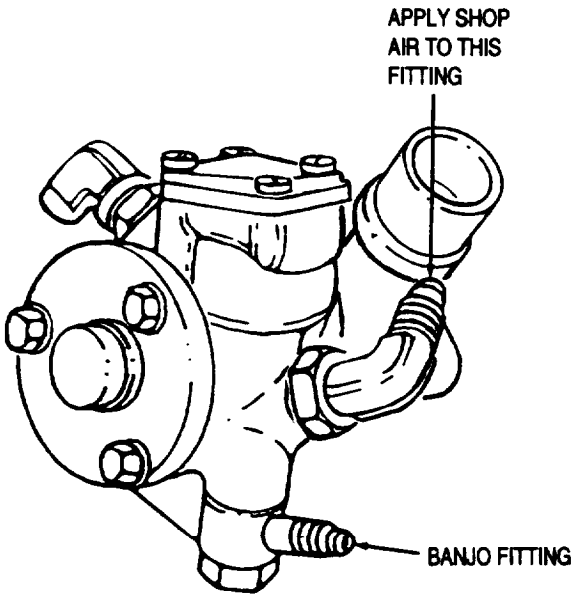
NOTE

If shop air is not available for bleed valve pressurization, bleed valve must be removed (task 9-4-1) and bleed pad cover P/N 6893689) installed in its place prior to washing compressor.

WARNING

Do not exceed 100 psi.

c. Slowly apply air elbow in outboard side of valve. Bleed valve should reach fully closed position when 65 psi is applied at sea level or when 55 psi is applied at 5000 ft, or not more than 100 psi. Ensure poppet valve is closed by viewing through outboard bleed air outlet port.



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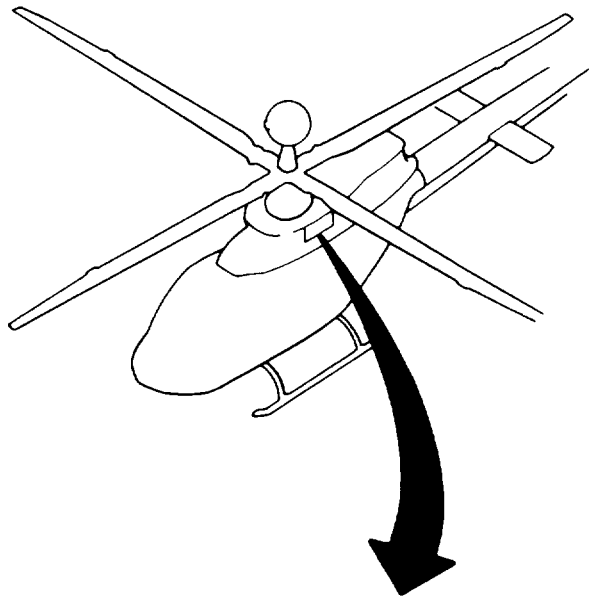
3-2-1. RINSE COMPRESSOR ROTOR (CONT)

4. Remove plug (1) and connect spray nit outlet to water wash line connector (2).

5. Begin spraying rinse into wash line for approx. three seconds.

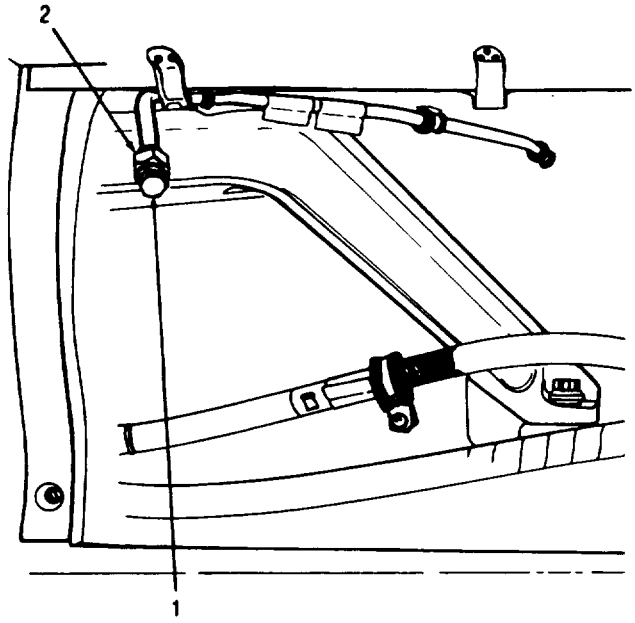


WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

CAUTION

To prevent possible blade damage and insure adequate rinse at base of compressor rotor blades, Ng shall not exceed 10%. If Ng reaches 10%, release starter and continue water spray. Allow Ng to reduce to approximately 5%, then re-energize starter to obtain a full ten seconds of engine rotation while water is sprayed. Starter limits must not be exceeded (TM 55-1520-248-10).



6. Begin motoring engine three seconds after spraying has begun and continue for a full ten seconds.

GO TO NEXT PAGE

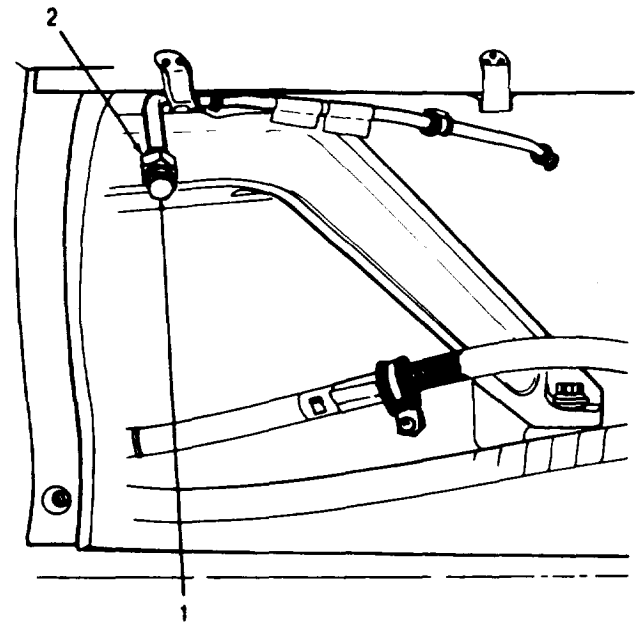
3-2-1. RINSE COMPRESSOR ROTOR (CONT)

7. Continue spraying until engine coasts down after motoring. Do not spray after engine has stopped rotating.

8. Allow engine to drain and shut down air compressor unit.

9. Shut down engine.

10. Disconnect spray unit outlet from water wash line connector (2) and install plug (1).



10A. (T703-AD-700B ONLY) Reconnect bleed valve as follows:

a. Remove shop air from elbow.

b. Remove cap from lower bleed valve banjo fitting.

c. Install bleed valve jumper tube (task 9-4-2).

NOTE

If bleed valve was removed because shop air was not available, remove bleed pad cover and reinstall bleed valve (task 9-4-2).

11. Pilot: Within 15 minutes after rinsing, operate engine for five minutes at ground idle and operate anti-ice system for at least one minute; then shut down engine.

INSPECT

END OF TASK

3-2-2. WASH COMPRESSOR ROTOR

This task cover: On Helicopter Servicing

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Generator Set
Air Compressor Unit
Spray Unit NSN 3740-641-4719-00
Torque Wrench 30-150 in. lbs
10X Magnifying Glass

Materials:
Cleaning Solvent (C23)
Clean Water (C39)
Methyl Alcohol (C40) (below 40 degrees F only)

Personnel Required
68B Aircraft Powerplant Repairer
67S Inspector
Pilot

Reference
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).
Compressor wash access panel removed.
Warm engine (ref. Glossary).
Burner drain valve removed (task 4-5-1).

General safety Instructions:

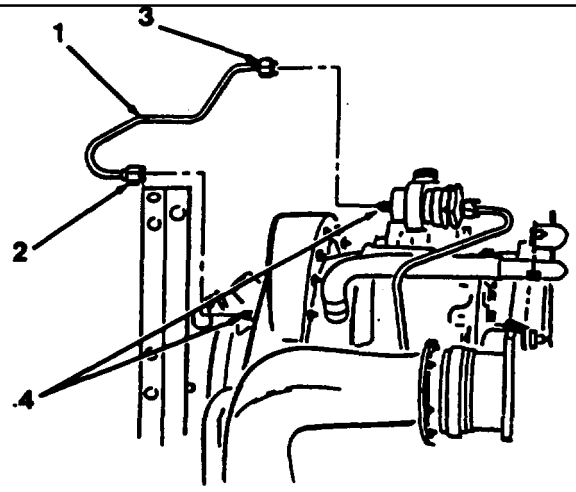
CAUTION

Cleaning solvent (C23) must not be allowed to remain in compressor module. When washing procedure is started, it must be completed without delay. Failure to comply may result in damage to the engine.

If ambient temperature is below 40 degrees F, one half of water used in washing solution must be replaced with methyl alcohol (C40). If not added, water may freeze in engine and cause internal damage.

1. (T703-AD-700 ONLY) Disconnect coupling nut (3) at Pc air filter. Loosen coupling nut (2) at compressor scroll and rotate tube (1) away from Pc air filter.

2. (T703-AD-700 ONLY) Cap Pc air filter fitting. Plug tube end (3)



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3-2-2. WASH COMPRESSOR ROTOR (CONT)

2A. (T703-AD-700B ONLY) Remove Pc air tube bolt (4B) and nut (4C) at support bracket. Disconnect coupling nut (4D) at Pc air filter. Loosen coupling nut (4E) at compressor scroll and rotate tube (4A) away from Pc air filter. Cap Pc air fitting. Plug tube end (4D).

3. Remove anti-ice tube (5) by disconnecting coupling nuts (6) and (7). Cap fittings in compressor for coupling nuts (6) and (7).

CAUTION

Do not spray washing solution into a hot engine. It may cause internal damage to engine. Engine temperature shall be as required for a warm engine.

NOTE

If possible, water used in washing solution should be hot

4. Mix two quarts of washing solution. Add one part cleaning solvent (C23) to six parts clean water (C39); then supply washing solution to spray unit.

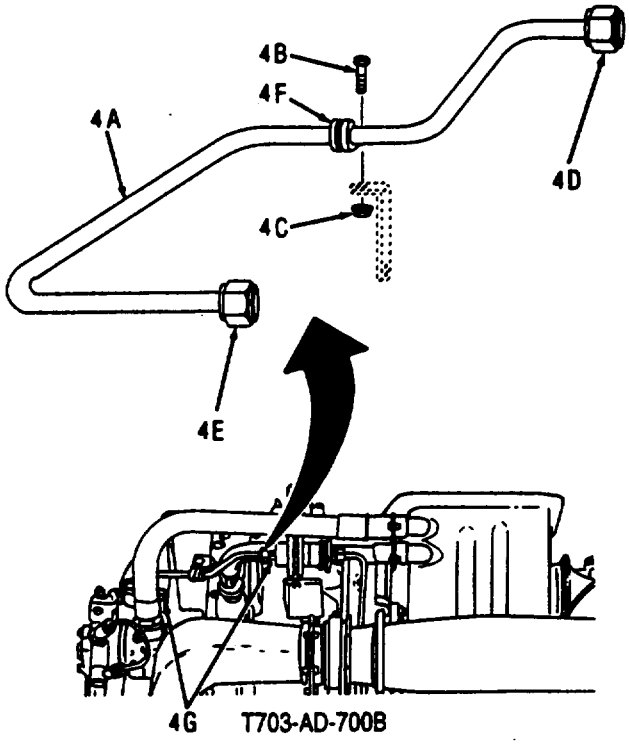
5. Connect spray unit to air compressor unit then start air compressor unit and set at 55 psi.

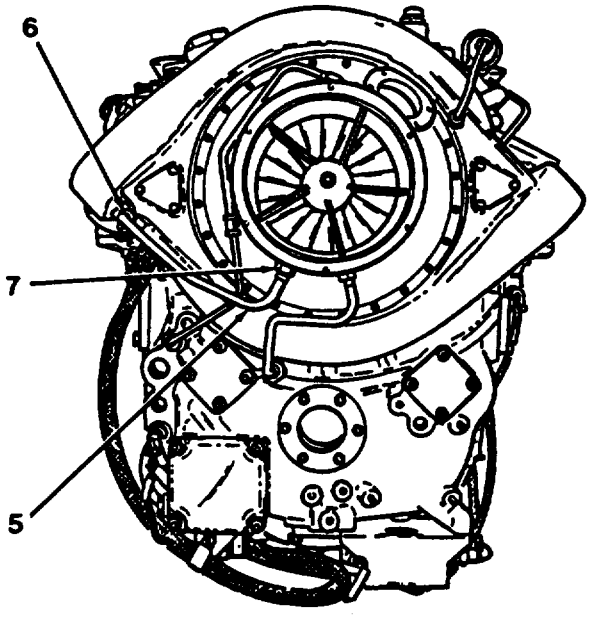
6. Connect external power to helicopter (TM 55-1520-248-23).

7. Open all ignition system circuit breakers and set anti-ice switch OFF.

7A. (T703-AD-700B ONLY) Retain bleed valve in closed position to protect valve internal passages from damage caused by rinse solution. Close valve as follows:

a. Remove bleed valve jumper tube (task 9-4-1).





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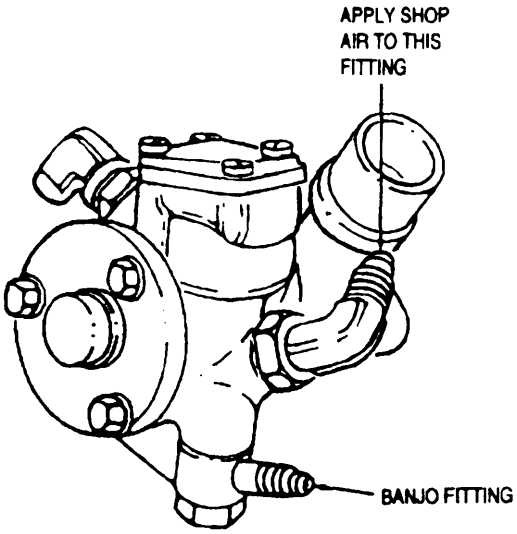
3-2-2. WASH COMPRESSOR ROTOR (CONT)

b. Install cap on lower bleed valve banjo fitting to prevent contaminants from entering valve.

NOTE

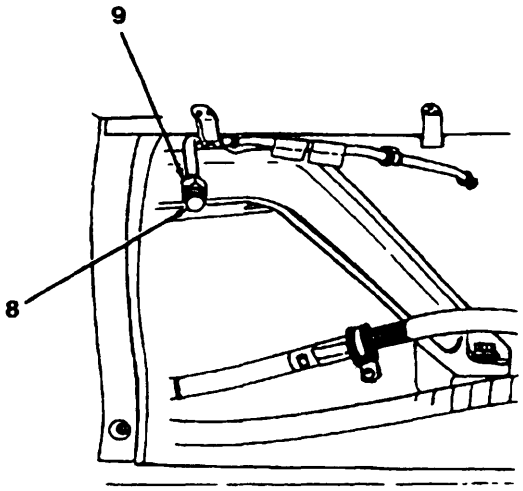
If shop air is not available for bleed valve pressurization, bleed valve must be removed (task 9-4-1) and bleed pad cover (P/N 6893698) installed in its place prior to washing compressor.

c. Slowly apply air to elbow in outboard side of valve. Bleed valve should reach fully closed position when 65 psi is applied at sea level or when 55 psi is applied at 5000 ft. or not more than 100 psi. Ensure poppet valve is closed by viewing through outboard bleed air outlet port.



8. Remove plug (8) and connect spray unit outlet to water wash line connector (9).

9. Begin spraying cleaning solvent (C23, C47, or C49) into wash line for approx. three seconds.



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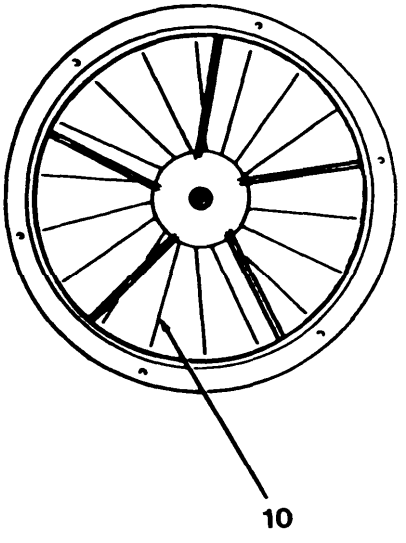
3-2-2. WASH COMPRESSOR ROTOR (CONT)

WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

CAUTION

To prevent possible blade damage and insure adequate wash at base of compressor rotor blades, Ng shall not exceed 10%. If Ng reaches 10%, release starter and continue water spray. Allow Ng to reduce to approximately 5%; then re-energize starter to obtain a full ten seconds of engine rotation while washing solution is sprayed. Starter limits must not be exceeded (TM 55-1520-248-10).



10. Begin motoring engine three seconds after spraying has begun and continue for a full ten seconds; then shutdown engine.

11. Continue spraying until engine coasts down after motoring. Do not spray after engine has stopped rotating.

NOTE

It may be necessary to wash compressor again to ensure it is completely clean. If it is clean, proceed to step 14.

12. Remove particle separator cowling (TM 55-1520-248-23).

13. Clean all accessible areas of compressor rotor blades (10) using a suitable brush and washing solution described in step 4. Pay close attention to cleaning leading edges and outer one and one half inches of each blade.

GO TO NEXT PAGE

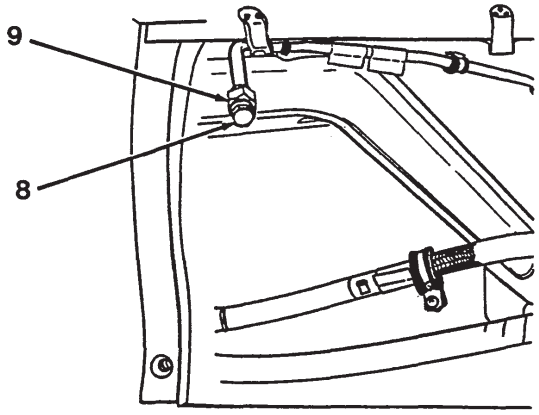
3-2-2. WASH COMPRESSOR ROTOR (CONT)

14. Install particle separator cowling (TM 55-1520-248-23).

15. Rinse compressor rotor again (task 3-2-1).

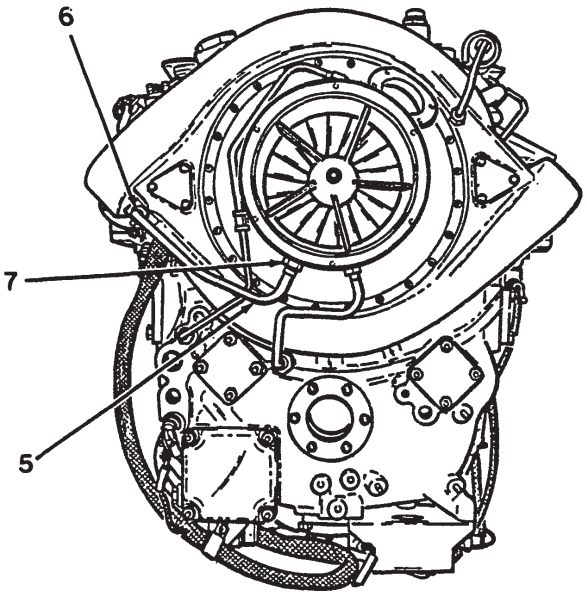
16. Allow engine to drain and shut down air compressor unit.

17. Disconnect spray unit outlet from water wash line (9) and install plug (8).



18. Remove two caps in fittings on compressor for coupling nuts (6) and (7).

19. Install anti-ice tube (5) and connect coupling nuts (6) and (7). Torque to 150-200 in. lbs.

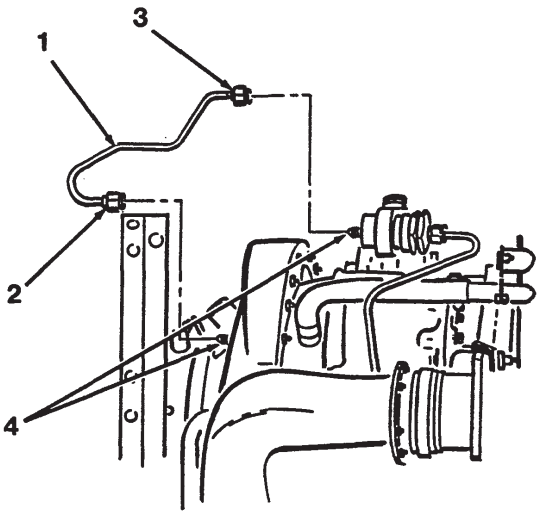


20. Remove cap at Pc air filter fitting. Remove plug at coupling nut (3).

21. Inspect tube (1) for cracks using 10X magnifying glass. Pay particular attention to the flared ends of the tube for cracks, and to the areas beneath the floating ferrules for excessive fretting damage. Tubes found to contain cracks and/or fretting damage are to be replaced by new parts of the same part number as removed.

NOTE

Excessive fretting is present when the ferrule has chafed the tube sufficiently to wear a step in the tube that can be felt with a thumbnail or other inspection aid.



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3-2-2. WASH COMPRESSOR ROTOR (CONT)

22. Using 10X magnifying glass, inspect fittings (4) for distress or cracks and the elbow in the scroll for distress, cracks or proper alignment. No cracks are permissible in either the Pc filter or the compressor scroll elbow.

CAUTION

Install coupling nut (2) (T703-AD-700) or coupling nut (40) (T703-AD-700B) first to avoid damaging compressor scroll

NOTE

Failure to properly install, align and tighten fuel oil and air fittings and tubes could result in an engine failure.

23. (T703-AD-700 ONLY) Rotate tube (1) back into position and connect coupling nut (3) at Pc air filter. Tighten coupling nut (2). Torque to 80- 120 in. lbs.

23A. (T703-AD-700B ONLY) Rotate tube (4A) back into position and connect coupling nut (4D) at Pc air filter. Tighten coupling nut (4E) at compressor scroll. Torque coupling nuts to 80-120 in. lbs. Install clamp (4F) on tube (4A).

24. Install burner drain valve (task 4-5-3).

24A. (T703-AD-700B ONLY) Reconnect bleed valve as follows:

a. Remove shop air from elbow.

b. Remove cap from lower bleed valve banjo fitting.

c. Install bleed valve jumper tube (task 9-4- 2).

NOTE

If bleed valve was removed because shop air was not available, remove bleed pad cover and reinstall bleed valve (task 9-4-2).

25. Pilot: Within 15 minutes after washing operate engine at ground idle, operate anti-ice system for at least 1 minute; then shut down engine.

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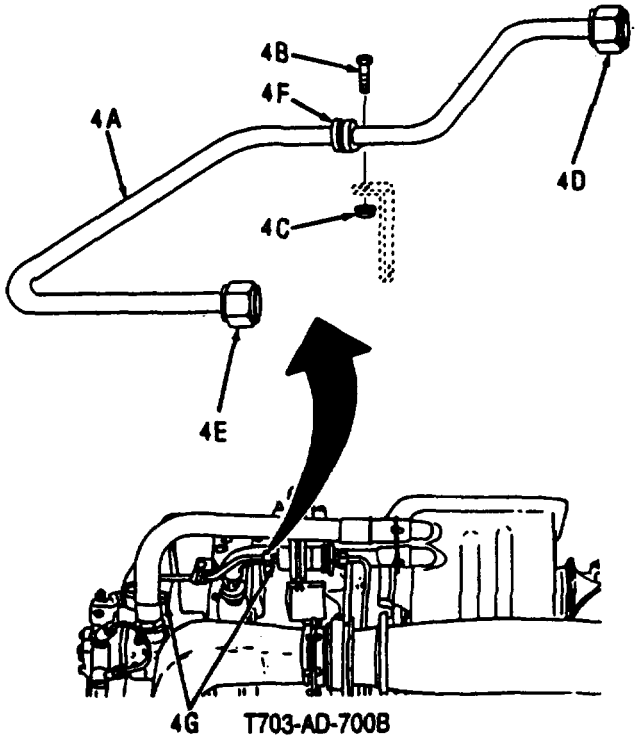
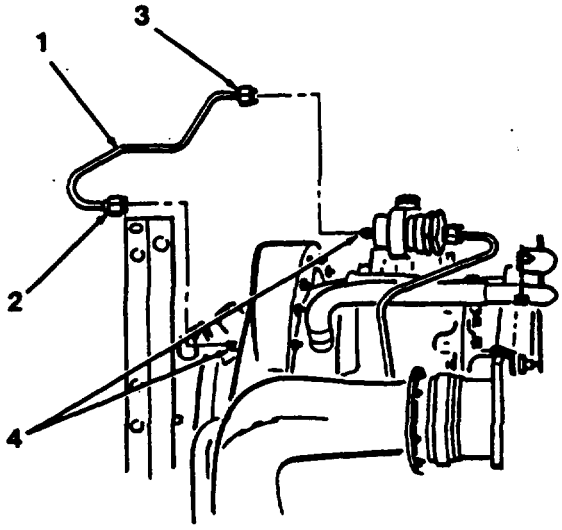




3-2-2. HASH COMPRESSOR ROTOR (CONT)

INSPECT

FOLLOW ON MAINTENANCE:
Inspect fuel control air sensing tubes
(task 7-2-4).

END OF TASK

Section III COMPRESSOR SCROLL

This section includes maintenance procedures for inspection of the compressor scroll and the compressor scroll-to-discharge air tube flange adapters.

LIST OF TASKS

3-3-1. INSPECT COMPRESSOR SCROLL

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

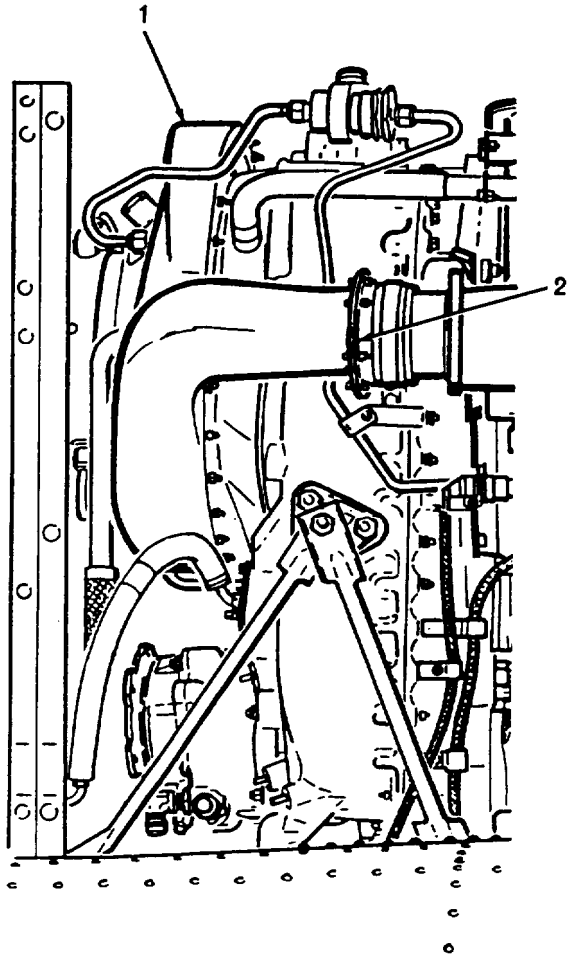
References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

Inspect compressor scroll (1) for cracks, dents or punctures that could cause air leakage. Pay particular attention to all welds and attachment areas. No cracks or punctures allowed. Dents are acceptable so long as each is not deeper than 1/8 in. nor longer than 2 in. Dents shall not have sharp edges.

NOTE

Areas of compressor scroll (1) suspected of air leakage shall be checked while inspecting combustion module for air leakage (task 4-1-1). That inspection includes scroll to flange adapter joint (2).



END OF TASK

3-3-2. INSPECT COMPRESSOR SCROLL-TO-DISCHARGE AIR TUBE FLANGE ADAPTERS

This task covers: Off Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Telescoping Gage
Outside Micrometer Caliper

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment Condition:
Compressor discharge air tubes removed (task 4-4-1).

NOTE

Mating surface flange (1) is serviceable if adapter to scroll leakage is within limits (task 4-1-1).

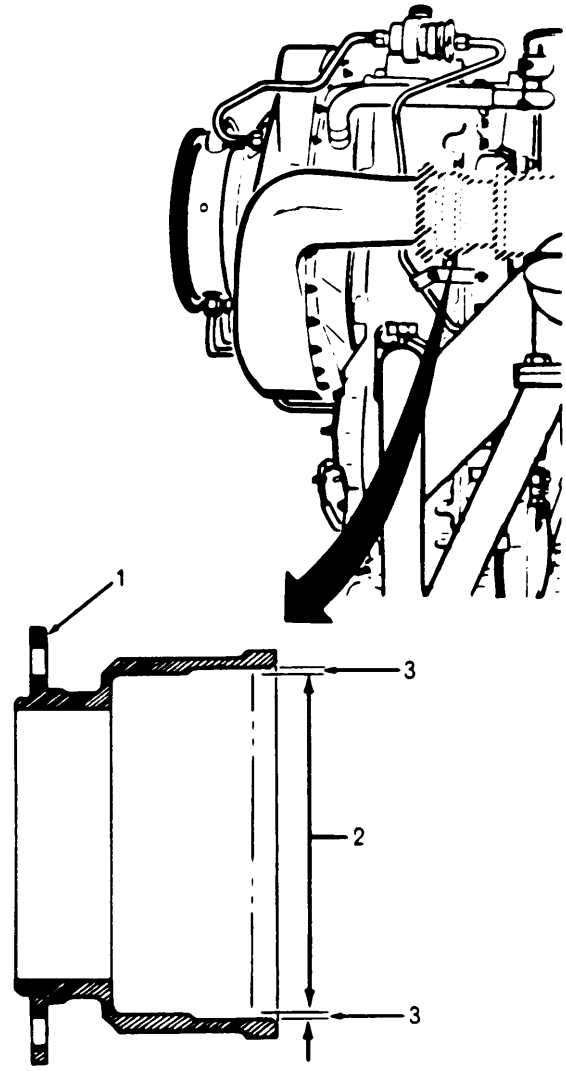
1. Inspect flange (1) for cracks or breaks. None allowed.

NOTE

Flange adapter must be checked in three equally spaced locations along inside diameter, but not in the wear step areas.

2. Measure inside diameter (2) of both adapters with telescoping gage and outside micrometer caliper. Maximum inside diameter is 2.804 in. If diameter exceeds limitations, replace adapter.

3. Inspect to determine that wear step (3) maximum dimension is 0.004 in.



FOLLOW ON MAINTENANCE:

Install compressor discharge air tubes (task 4-4-6).

END OF TASK

Section IV OIL PRESSURE REDUCER ASSEMBLY

This section includes maintenance procedures for removal, repair and installation of the oil pressure reducer assembly.

LIST OF TASKS

3-4-1. REMOVE OIL PRESSURE REDUCER ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

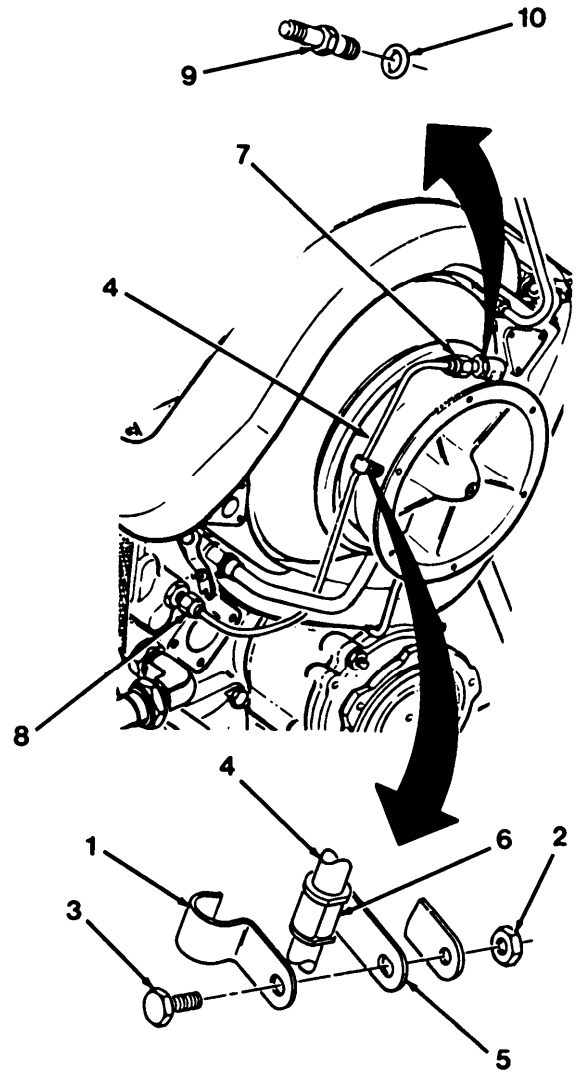
Equipment Condition:
On helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

WARNING

Lubricating Oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

CAUTION

Lubricating oil may soften paint upon contact. If lubricating oil is spilled on painted surfaces, these surfaces should be thoroughly washed.



1. Remove clip (1) by removing nut (2) and bolt (3).

2. Remove tube (4) with attached clip (5) and bushing (6) by disconnecting coupling nuts (7) and (8).

3. Remove oil pressure reducer assembly (9) and packing (10). Discard packing (10).

END OF TASK

3-4-2. REPAIR OIL PRESSURE REDUCER ASSEMBLY

This task covers: Off Helicopter Repair

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Acid Swabbing Brush

Materials:
Dry Cleaning Solvent (C8)
Gloves (C9)

Parts:
Retaining Ring

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

General Safety Instructions:

WARNING

Dry-cleaning solvent (C8) is flammable and toxic. It can irritate skin and cause burns. Use only in well ventilated area away from heat and open flame. Wear gloves. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Remove and discard internal retaining ring (l).

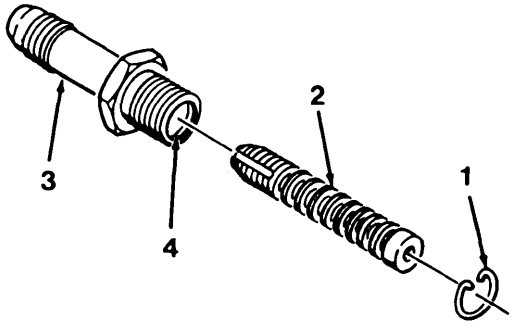
2. Using scribe, or other suitable tool, remove restrictor (2) from body (3).

3. Clean restrictor (2) and body (3) in dry cleaning solvent (C8); then allow components to air dry.

4. Inspect restrictor (2) for burrs, damaged threads, or other visible damage. No damage allowed.

5. Inspect body (3) for damaged threads and cracks. No damage allowed.

6. Install restrictor (2), threaded end first, into body (3).



7. Install new retaining ring (l). Insure retaining ring (1) is completely seated in groove (4) inside body (3). If retaining ring (1) does not fit securely in groove (4), replace retaining ring (l).

INSPECT

END OF TASK

3-4-3. INSTALL OIL PRESSURE REDUCER ASSEMBLY

INITIAL SETUP

Applicable Configurations:
Al1

Tool S :
Power Plant Tool Kit,
Torque Wrench 30-150 in. lbs

Materials:
Petrolatum (C34)

Parts:
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

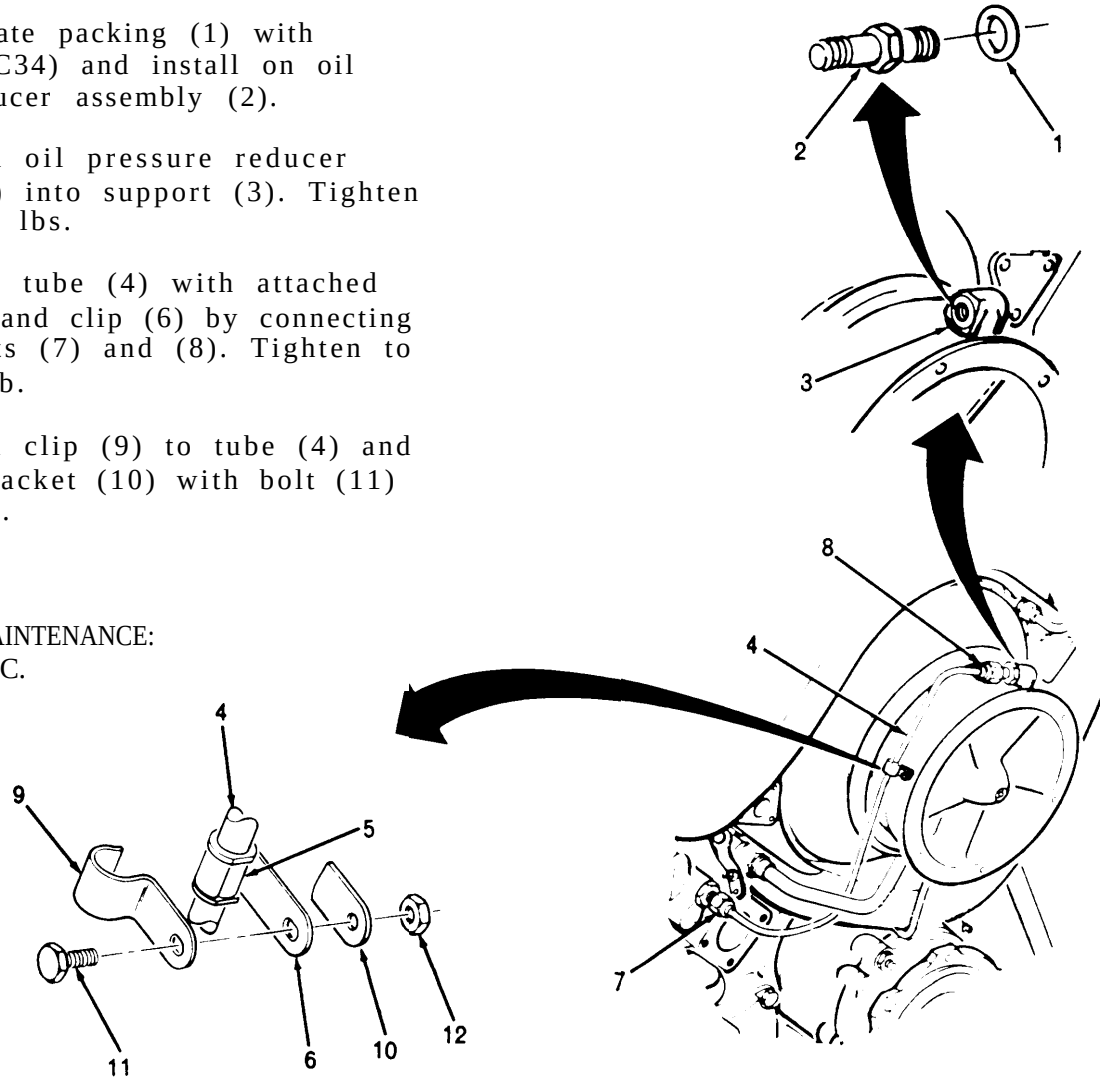
Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Lubricate packing (1) with petrolatum (C34) and install on oil pressure reducer assembly (2).

2. Install oil pressure reducer assembly (2) into support (3). Tighten to 50-75 in. lbs.

3. Install tube (4) with attached bushing (5) and clip (6) by connecting coupling nuts (7) and (8). Tighten to 65-100 in. lb.

4. Install clip (9) to tube (4) and secure to bracket (10) with bolt (11) and nut (12).



INSPECT

FOLLOW ON MAINTENANCE:
Perform MOC.

END OF TASK

Section V DIFFUSER VENT ORIFICE

This section includes maintenance procedures for removal and installation of the diffuser vent orifice.

LIST OF TASKS

3-5-1. REMOVE DIFFUSER VENT ORIFICE

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

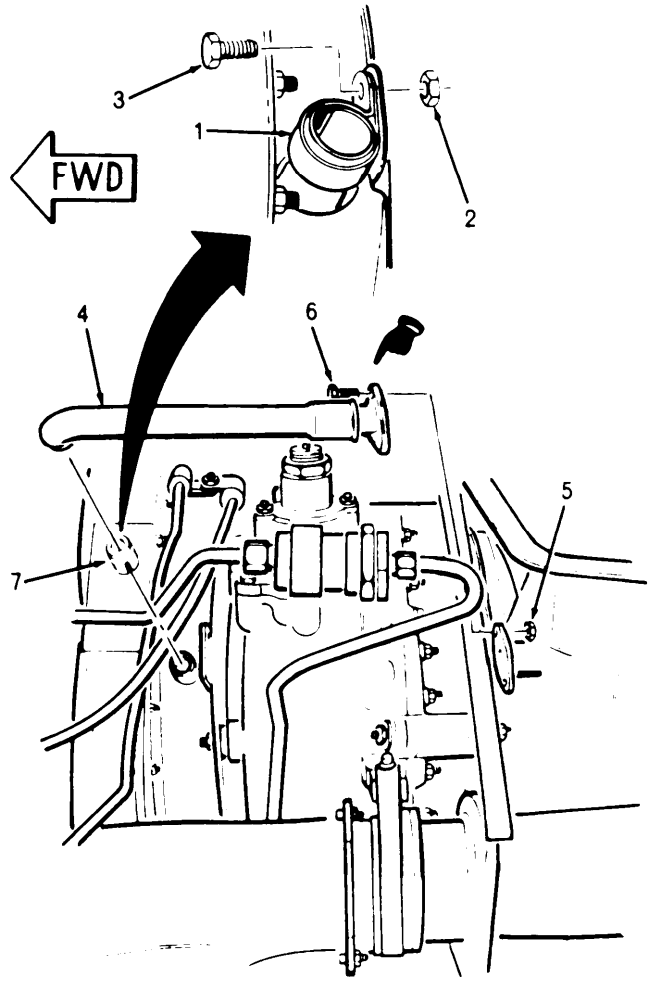
References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (l-5-5).

1. Remove clamp (1) by removing nut (2) and bolt (3).

2. Remove tube (4) by removing two nuts (5) and bolts (6).

3. Remove diffuser vent orifice (7) and record size.



END OF TASK

3-5-2. INSTALL DIFFUSER VENT ORIFICE

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Wiping Rags (C1)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23
TM 55-2840-256-23P

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (1-5-5).

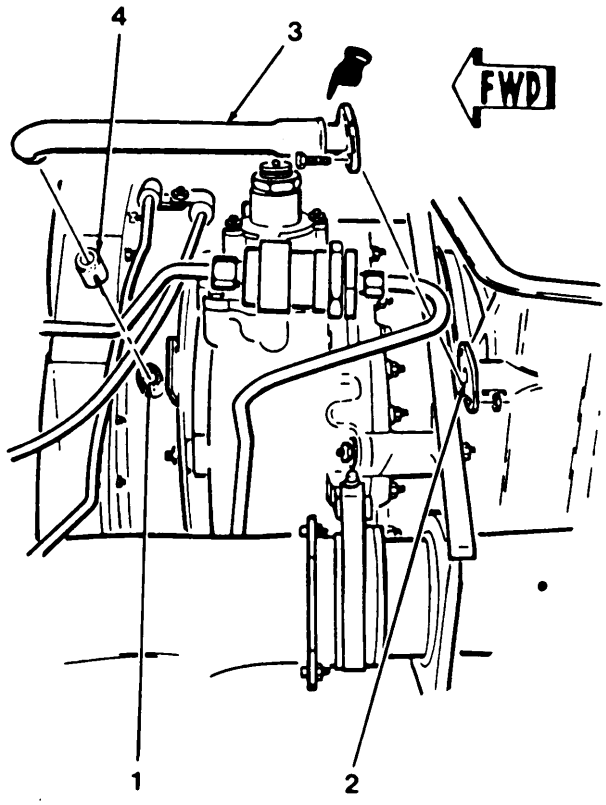
1. Clean all oil from openings (1) and (2), and surrounding areas using wiping rags (C1).

2. Clean all oil from tube (3) using wiping rags (C1).

NOTE

There are five different sizes of diffuser vent orifices listed in TM 55-2840-256-23P. If diffuser vent orifice is being replaced to correct an engine operating problem, perform troubleshooting procedure 19 (para 1-24).

3. Install diffuser vent orifice (4).



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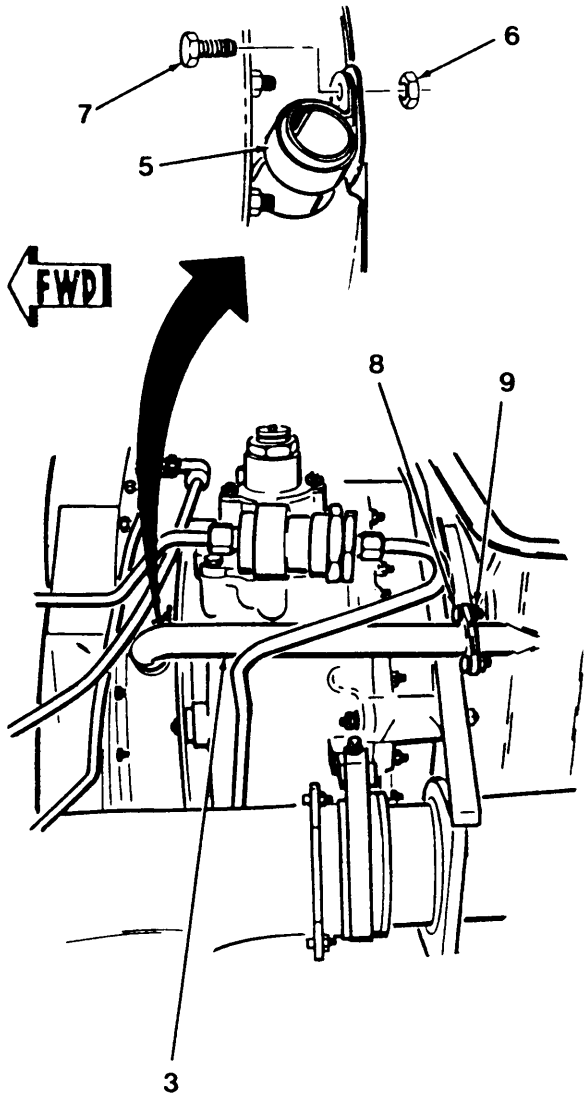
3-5-2. INSTALL DIFFUSER VENT ORIFICE (CONT)

4. Install tube (3) and clamp (5). Secure with nut (6) and bolt (7).

5. Install two bolts (8) and nuts (9). Torque to 35-40 in. lbs.

INSPECT

FOLLOW ON MAINTENANCE:
Off Helicopter: Enter a requirement for MOC and determination of proper size diffuser vent orifice.



END OF TASK

Section VI COMPRESSOR FRONT SUPPORT

This section includes maintenance procedures for inspection of the compressor front support and compressor impeller.

LIST OF TASKS

3-6-1. INSPECT COMPRESSOR FRONT SUPPORT

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Dial Indicating Depth GAge

Personnel Required:
67S Helicopter Powerplant Repairer

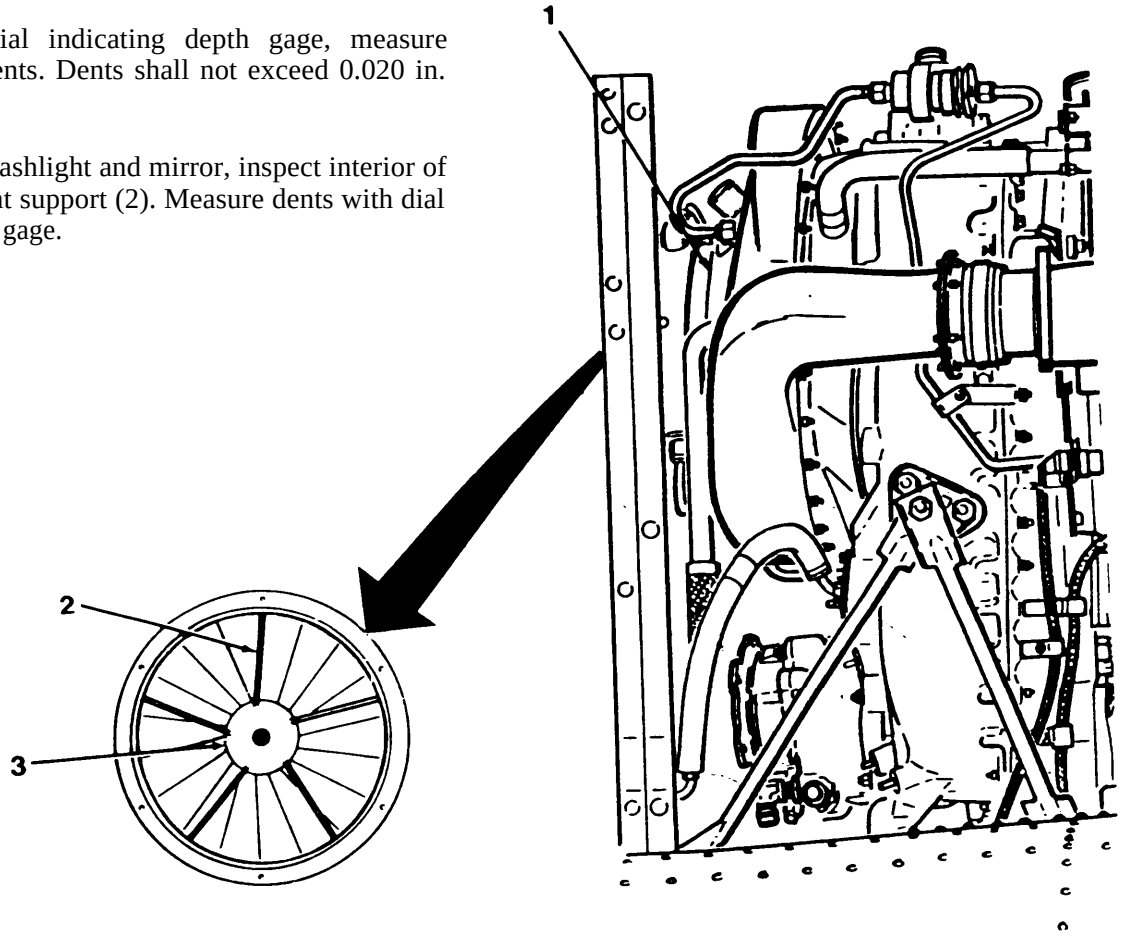
References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter Engine access panels open/cowling removed (TM 55-1502-248-23)
Particle separator cowling removed.
Off Helicopter: Engine mounted in engine turnover stand (1-5-5).

1. Inspect exterior of compressor front support (1) for cracks, punctures, or dents. Cracks and punctures are not acceptable.

2. Using dial indicating depth gage, measure depths of all dents. Dents shall not exceed 0.020 in. depth.

3. Using a flashlight and mirror, inspect interior of compressor front support (2). Measure dents with dial indicating depth gage.



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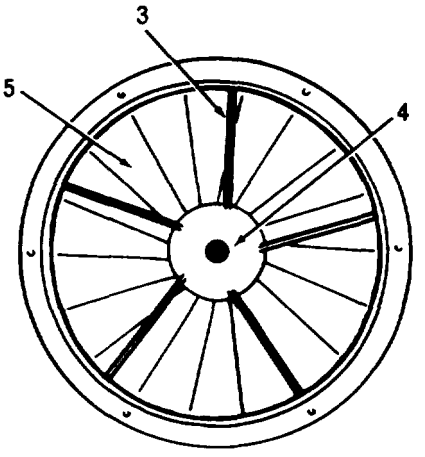
3-6-1. INSPECT COMPRESSOR FRONT SUPPORT (CONT)

NOTE

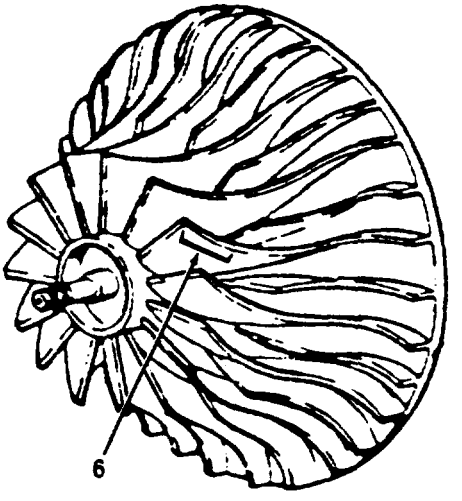
If punctures, dents or other evidence of a foreign object having passed through the compressor is found, or if any impeller blade has a section broken out, perform task 5-1-1.

a. Inspect support struts (3) for cracks, punctures, or dents. Inspect strut braze joints and air outlets for cracks. No cracks or punctures are allowed. Dents shall not exceed 0.020 in. in depth.



b. Inspect bullet nose (4) for cracks, punctures or dents. No cracks or punctures are allowed. Dents shall not exceed 0.020 in. in depth.

c. Inspect visible part of impeller (5) for cracks and breakouts. None are allowed. Inspect impeller leading edges (6) for any thinned areas. Thinning indicates erosion and should be blended. Inspect impeller for movement up and down. No movement allowed.



d. If minor nicks, dents or thinning are observed, remove front support assembly (task 3-6-3) and blend impeller leading edges (task 3-6-2).

FOLLOW ON MAINTENANCE:

Inspect impeller blade edges (task 3-6-2) .

Install particle separator cowling (TM 55-1520-248-23).

END OF TASK

3-6-2. BLEND IMPELLER LEADING EDGES (AVIM)

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Dial Indicating Depth Gage

Personnel Required:
68B Aircraft Powerplant Repairer
67S Inspector

References:
TM 55-1520-248-23

Equipment Conditions:
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).
Front support assembly removed (task 3-6-3).
On Helicopter: Engine access panels open/cowling removed. Particle separator cowling removed. Engine bell mouth removed (TM 55-1520-248-23).

CAUTION

Impeller is made of titanium, handling with bare hands shall be kept to a minimum. Any contact with impeller should be accomplished while wearing clean lint-free gloves.

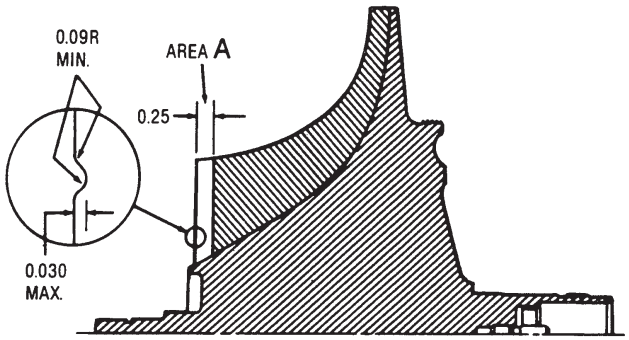
NOTE

The primary concern of the inspection is to make sure that foreign objects have not damaged the impeller to the degree that bits or pieces of metal could break off and go through the compressor where they might inflict further damage.

1. Visually inspect the impeller blade edges through the front support for nicks, cracks, or breakouts. No cracks or breakouts are acceptable.

2. Deleted.

3. If minor nicks or dents are observed, blend the primary blades (area A only) in accordance with figure this page.



LEADING EDGE — RADIUS AND FILLET RADIUS OF BLADES MUST BE MAINTAINED. NICKS AND DENTS MAY BE BLENDED TO A MAX DEPTH OF 0.030 IN. SCALLOP CUTS A FULL 0.09 IN. RADIUS MINIMUM. BLEND EDGE OF SCALLOP TO RESTORE LEADING EDGE RADIUS.

AREA A — BLENDING OF INDICATIONS NO GREATER THAN 0.25 IN. DIA x 0.005 IN. DEPTH IS ACCEPTABLE.

NOTES:
DYE CHECK INDICATIONS OF ANY NATURE ARE NOT ACCEPTABLE. POLISH ALL REWORK AREAS USING 320 GRIT OR FINER CLOTH. POLISH LONGITUDINALLY ON ON THE LEADING EDGE. DYE CHECK AFTER REWORK CLEAN REPAIRED AREA WITH MINERAL SPIRITS.

GO TO NEXT PAGE

3-6-2. BLEND IMPELLER LEADING EDGES (AVIM) (CONT)

WARNING

Observe extreme caution when blending impeller blades to prevent FOD. Vacuum area to ensure all FOD has been removed.

4. After blending polish all reworked areas using 320 grit or finer cloth. Polish longitudinally on the leading edge. Dye check blended area after rework making sure to apply masking tape prior to applying dye penetrant.

5. Clean repaired area with mineral spirits, remove masking tape and rinse.

6. Install the front support assembly (task 3-6-4).

FOLLOW ON MAINTENANCE:
CHECK RUN ENGINE AND CHECK FOR OIL LEAKS.

END OF TASK

3-6-3. REMOVE COMPRESSOR FRONT SUPPORT ASSEMBLY (AVIM)

This task covers: Off Helicopter Removal

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Materials:
Wiping Rags (C1)
Shim Material (C46)

Personnel Required:
68B Aircraft Powerplant Repairer
Helper

Equipment Condition:
Engine mounted in engine turnover stand (horizontal) (task 1-5-5).

1. Remove tube (1) by disconnecting coupling nuts (2) and (3).

2. Remove tube (4) by disconnecting coupling nuts (5) and (6).

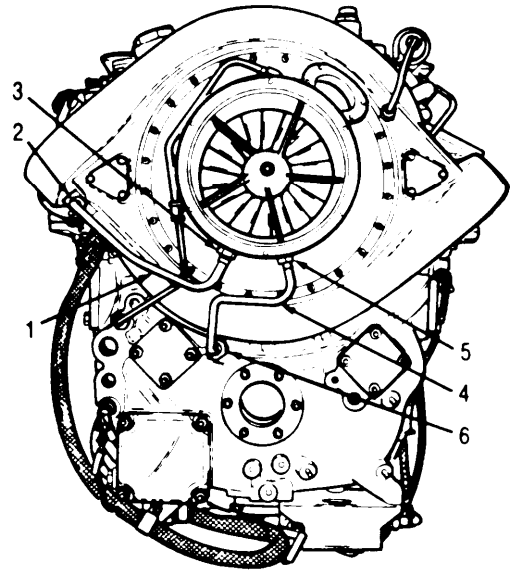
3. Remove oil pressure reducer assembly (task 3-4-1).

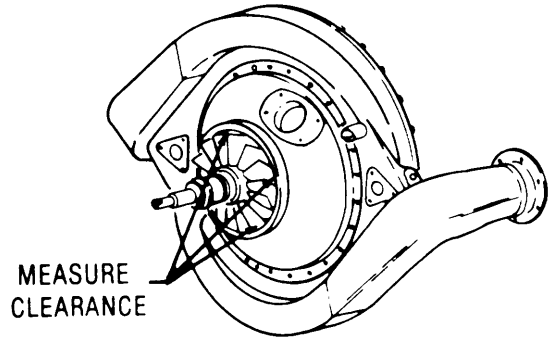
4. With feeler gauge, measure compressor impeller clearance between impeller blade tips and shroud housing at 2, 6 and 10 o'clock positions.

NOTE

This shimming retains the impeller in the correct position during removal and installation of the compressor front support assembly.

5. Using shim material (C46), insert a shim of corresponding thickness at the three measured positions.





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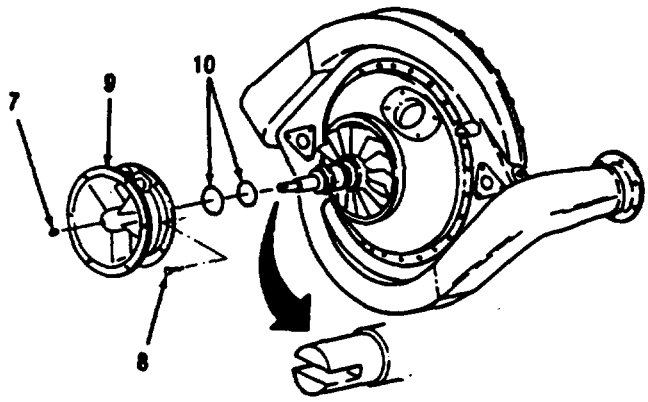
3-6-3. REMOVE COMPRESSOR FRONT SUPPORT ASSE

6. Remove the front support hub nut (7) and the six front support attachment bolts(8).



CAUTION

Insure bearing support to outer bearing race alignment pin does not be come dislodged during removal of the front support

7. Carefully remove the front compressor sup port assembly (9) by gently pulling on the front support. Discard the two packings (10).

8. Tape around bearing housing to insure pin does not fall out during maintenance. Masking tape or equivalent may be used.

END OF TASK

3-6-4. INSTALL COMPRESSOR FRONT SUPPORT ASSEMBLY (AVIM)

INITIAL SETUP

Applicable Configurations:

All

Equipment Condition:

Engine mounted in engine turnover stand (horizontal) (task 1-5-5).

Off Helicopter:

Engine mounted in engine turnover stand (horizontal) (task 1-5-5).

Tools:

Power Plant Tool Kit

Torque Wrench 30-150 in. lbs

Torque Wrench 150-750 in. lbs

Materials:

Engine Oil (C30or C31)

Petrolatum (C34)

Parts:

Packings

Personnel Required:

68B Aircraft Power Plant Repairer

67S Inspector

Helper

General Safety Instruction:

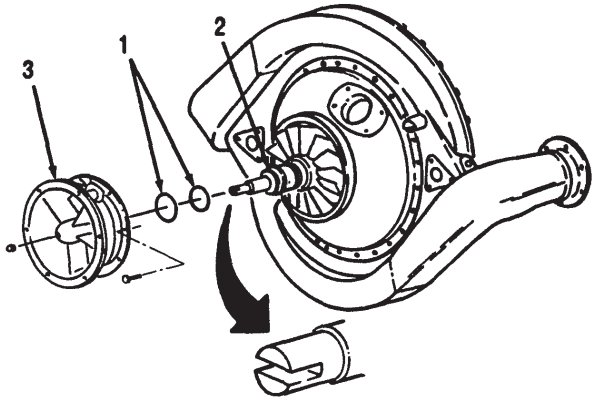
WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

1. Lubricate two new packings (1) with petrolatum (C34) and install on beating housing (2).

2. Index the bearing housing (2) so that the retaining ring tangs are at the 12 o'clock position. Remove tape from bearing housing. Use caution to insure pin does not dislodge from housing during installation of front support.

3. Install the compressor front support assembly (3) over the bearing housing (2), while indexing the oil inlet fittings approximately 12 degrees to the left of 12 o'clock position. Engage tangs of retaining ring in slots of front support.



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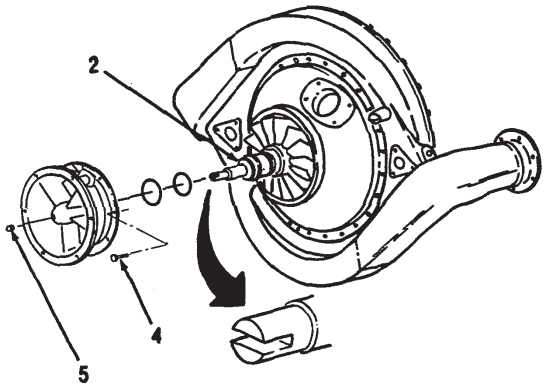
3-6-4. INSTALL COMPRESSOR FRONT SUPPORT (CONT)

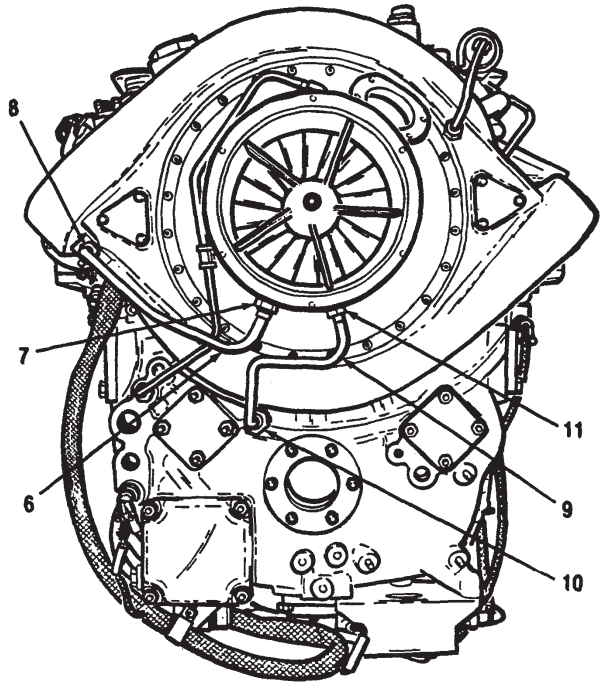
4. Use a screwdriver in the stud slot to rotate the bearing housing)2) back and forth while applying light hand force on the front support to feel the retaining ring tangs engage. When engaged, the bearing housing will no longer rotate.



5. Use a mirror to determine that the tangs and the slots are properly engaged.

6. Install the six front support attachment bolts (4). The longest bolt (4) attaches the 90 degree bracket at the 4 o'clock position. Tighten bolts to 12-15 in. lbs. above drag torque.

7. Install hub nut (5) and tighten to 35-40 in. lbs. above drag torque.



8. Remove shim material.

9. Install tube (6) and coupling nuts (7) and (8). Tighten to 200-250 in. lbs.

10. Install tube (9) and coupling nuts (10) and (11). Tighten to 150-200 in. lbs.

11. Install pressure reducer assembly (task 3-4-3).

FOLLOW ON MAINTENANCE:
CHECK RUN ENGINE AND CHECK FOR OIL LEAKS

END OF TASK

CHAPTER 4
COMBUSTION MODULE MAINTENANCE

Section 1 GENERAL INSTRUCTIONS

This section includes maintenance procedures for inspection, removal, and installation of combustion module.

LIST OF TASKS

4-1-1. INSPECT COMBUSTION MODULE FOR AIR LEAKAGE

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Hand Oiler

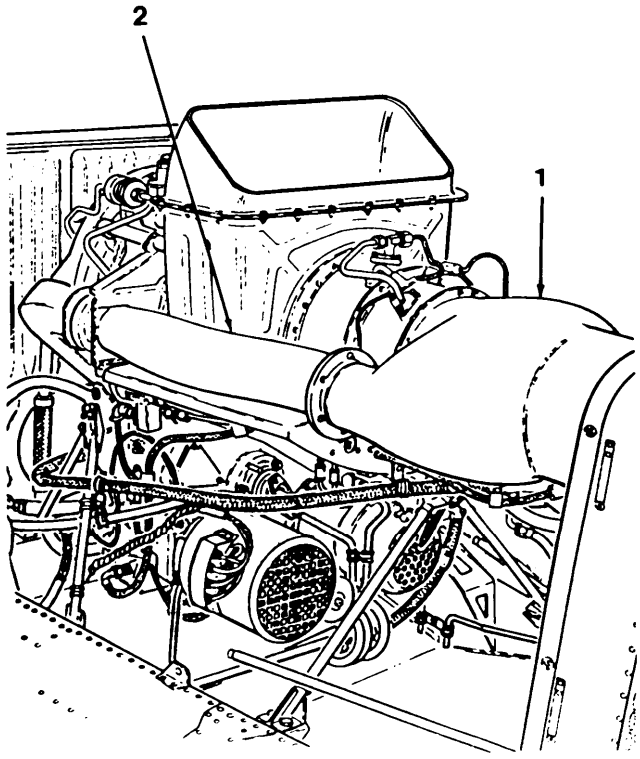
Materials:
Soap Solution (C22)

Personnel Required:
68B Aircraft Powerplant Repairer
Pilot

References:
TM 55-1520-248-23

Equipment Condition:
Engine Cowllng Removed.
(TM 55-1520-248-23).

1. Inspect exterior of combustion outer case (1) and compressor discharge air tubes (2) for dents, cracks, punctures, evidence of leakage and security of all components. No cracks or punctures allowed.



2. If damage is found, inspect combustion outer case (task 4-2-1), combustion liner (task 4-3-1), or compressor discharge air tubes (task 4-4-2 and 4-4-5). Correct all faults found prior to continuing with this procedure.

WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

3. Pilot: Operate engine at ground idle.

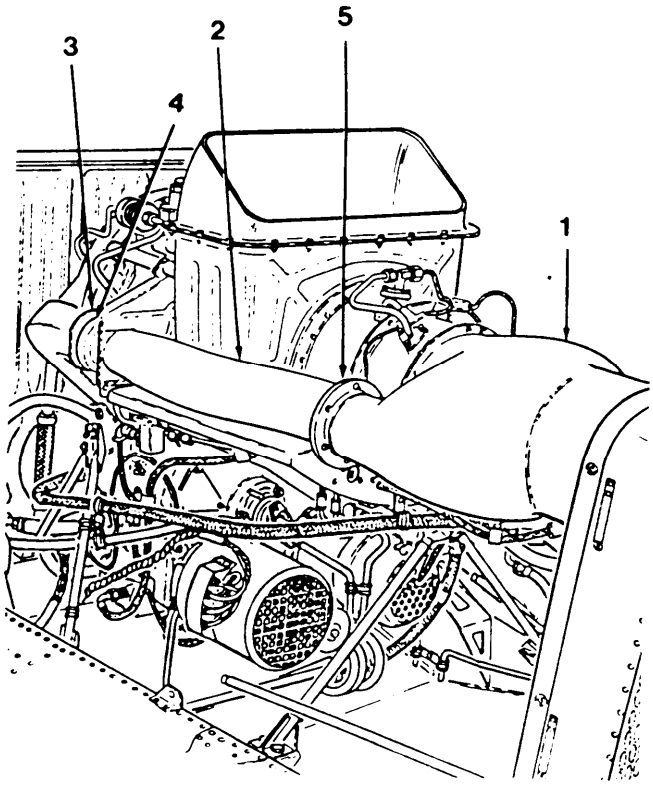
GO TO NEXT PAGE

4-1-1. INSPECT COMBUSTION MODULE FOR AIR LEAKAGE (CONT)

NOTE

Areas of compressor scroll suspected of leakage (task 3-3-1) shall be checked while performing this task. Leak check as in step 4.

4. Using hand oiler, apply soap solution (C22) to any area of combustion outer case (1) suspected of leakage. Pay close attention to weld seams. No leakage allowed.



WARNING

Do not check for escaping air by feel. Air escaping from combustion module is hot enough to cause severe burns.

5. Using hand oiler, apply soap solution to any areas of compressor discharge tubes (2) suspected of leakage. Pay close attention to joints (3), (4) and (5). Observe the following to determine acceptable condition:

- no leakage allowed from tubes
- a few soap bubbles at joints are OK.

6. Pilot: Shut down engine.

FOLLOW ON MAINTENANCE:
Install engine cowling (TM 55-1520-248-23).

END OF TASK

4-1-2. REMOVE COMBUSTION MODULE (ON HELICOPTER)

This task covers: On Helicopter Removal

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Engine Assembly Lift (T9)
Hoist

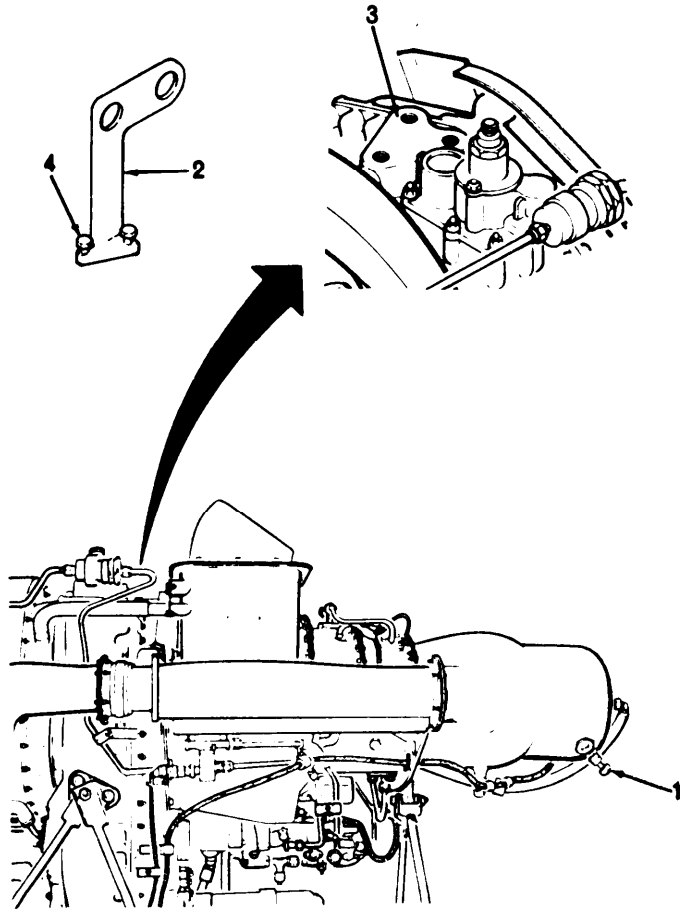
Materials:
Marking Pencil (C12)

Personnel Required:
68B Aircraft Powerplant Repairer
Helper

References:
TM 55-1520-248-23

Equipment Condition:
Engine Cowling Removed (TM 55-1520-248-23).

1. Remove fuel nozzle (task 7-4-1).
2. Remove spark igniter (task 8-4-1).
3. Remove burner drain valve (task 4-5-1).
4. Remove (or disconnect) both compressor discharge air tubes (task 4-4-1).
5. Remove lockwire and dummy spark igniter plug (1).
6. Install engine assembly lift (2) on gearbox top mounting pad (3) and tighten three bolts (4).
7. Attach hoist to engine assembly lift (2).
8. Hoist engine only enough to relieve weight from engine mount.
9. Remove engine legs in accordance with TM 55-1520-248-23, as required.



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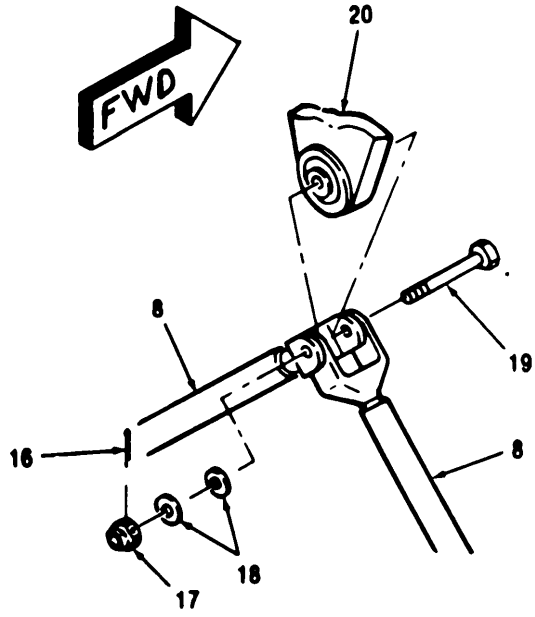
4-1-2. REMOVE COMBUSTION MODULE (ON HELICOPTER) (CONT)

CAUTION

Shims between legs and trunnions are for engine transmission alignment. Loose shims are to be rebonded in place immediately. If removal required, identify shims insure reinstallation to original positions for proper alignment. Loss or intermixing of shims will require realignment of engine to transmission (TM 55-2840-248-23).

10. Remove cotter pin (16), nut (17), two washers (18) and bolt (19) from rear engine mount (20). Remove aft leg (8). Discard cotter pin (16).



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4-1-2. REMOVE COMBUSTION MODULE (ON HELICOPTER) (CONT)

11. From right side of engine, remove rear engine mount assembly (20) by removing six nuts (21) and tee head bolts (22).

12. Loosen but do not remove nut (21) at twelve o'clock position (23) of splitline.

13. Mark an alignment line across top of combustion outer case (24) and power turbine case (25) with pencil (C12). This will aid in reassembly.

CAUTION

Do not remove tee head bolt and nut at twelve o'clock position of split line until combustion outer case is manually supported by helper. If outer case drops onto liner, one or both may be damaged.

14. Remove seventeen nuts (21) and tee head bolts (22).

15. Instruct helper to manually support combustion outer case (24). Remove nut (21) and tee head bolt (22) from twelve o'clock position (23) of splitline.

CAUTION

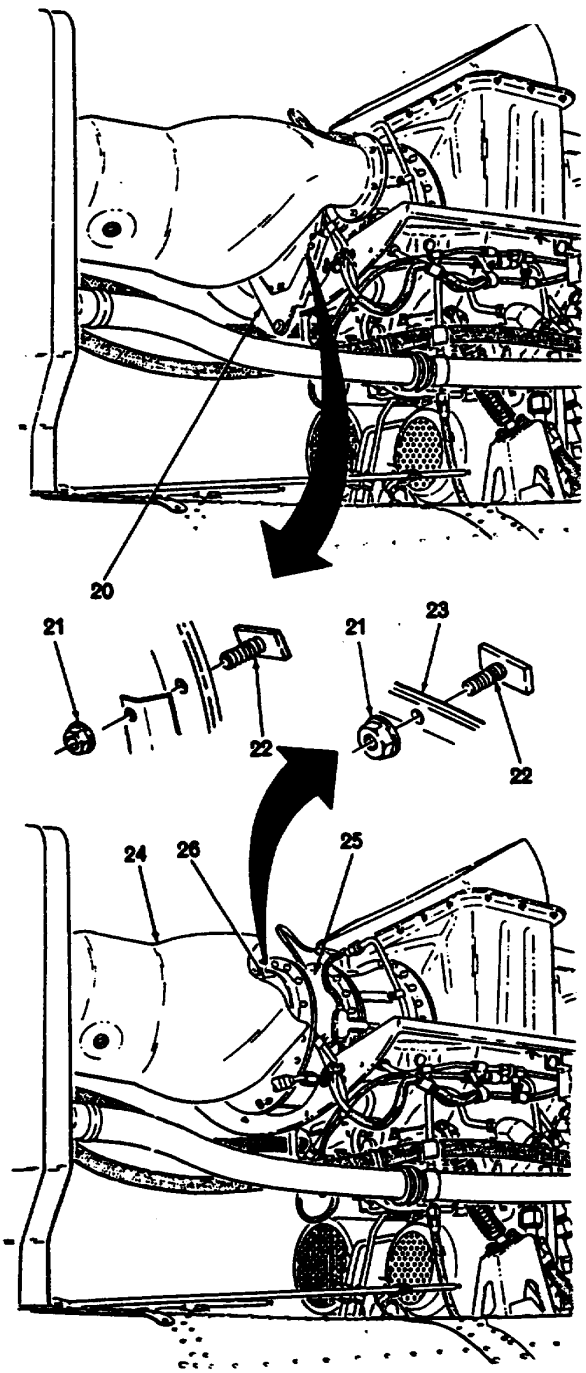
Use care to prevent combustion liner from falling out of combustion outer case during removal Damage may re-suit.

NOTE

Whenever combustion liner is re-moved, inspect turbine module first stage nozzle shield, nozzle and turbinewheel (task 5-1-1).

16. Slide combustion outercase (24) aft enough to reach combustion liner (26); then gently slide liner (26) aft to disconnect it from engine. Remove combustion outer case (24) and combustion liner (26) at same time.

17. Combustion liner must be inspected whenever it is removed (task 4-3-1).



END OF TASK

4-1-3. INSTALL COMBUSTION MODULE (ON HELICOPTER)

This task covers: On Helicopter Installation

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit,
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs

Materials:
Lockwire (C5)
Anti-seize compound (C19)

Parts:
Cotter Pins

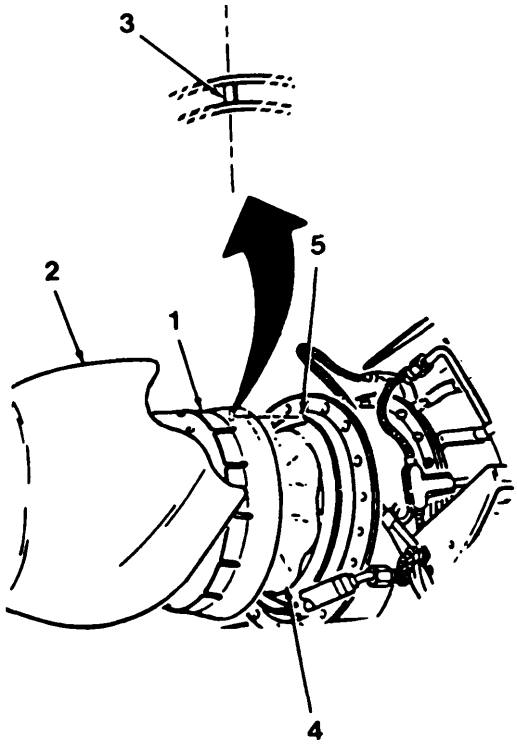
Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector
Helper

References:
TM 55-1520-248-23

Equipment Condition:
Engine cowling removed (TM 55-1520-248-23).
Engine supported by hoist.

1. Install combustion liner (1). inside combustion outercase (2). Position liner (1) so alignment key (3) is visible at twelve o'clock position.

2. Install combustion liner (1) as follows: Place combustion outercase (2) and combustion liner (l), aft of first stage nozzle shield (4). Instruct helper to support combustion outercase (2); then slide combustion liner (1) forward. Insure alignment key (3) fully engages key slot (5), at twelve o'clock position on first stage nozzle shield (4).



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4-1-3. INSTALL COMBUSTION MODULE (ON HELICOPTER (CONT)

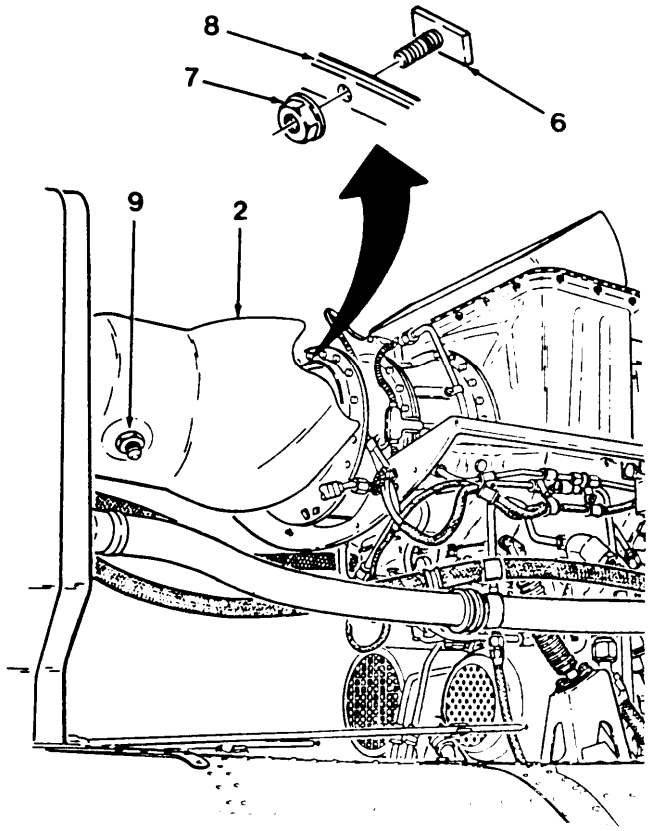
3. Lightly lubricate threads of twenty-four tee head bolts with anti-seize compound (C19).

NOTE

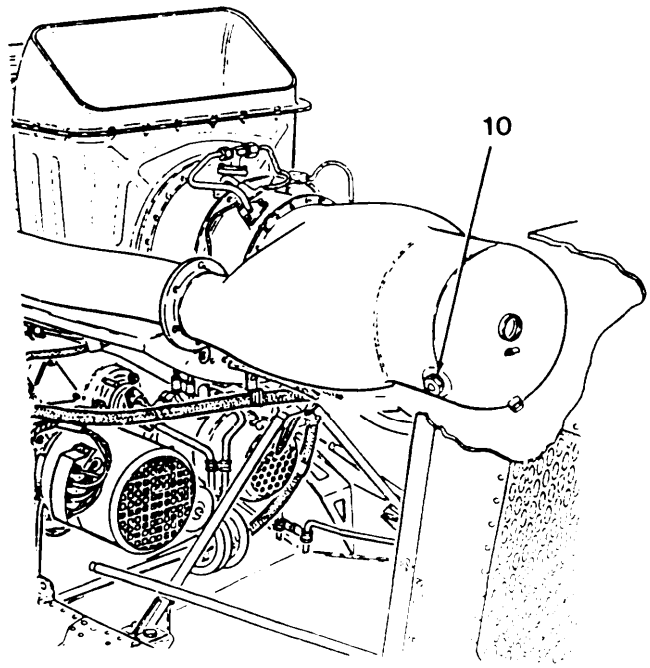
The long tee head bolts are used to secure rear engine mount assembly.

4. Install combustion outercase (2), observing alignment mark on top of outercase made during removal. Secure with one tee head bolt (6) and nut (7) at twelve o'clock position (8) of splitline.

5. Lightly coat threads of spark igniter (9) with anti-seize compound (C19); then install finger tight on right side of engine.



6. Lightly coat threads of dummy spark igniter (10) with anti-seize compound (C19); then install finger tight on left side of engine.



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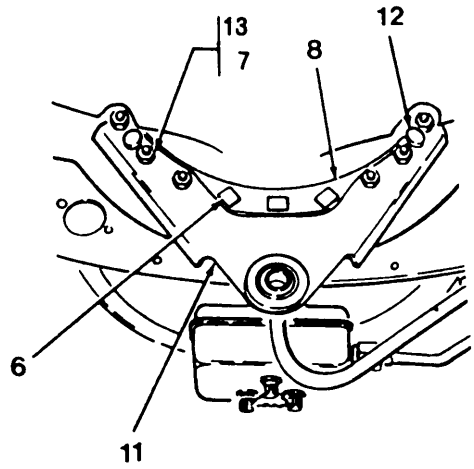
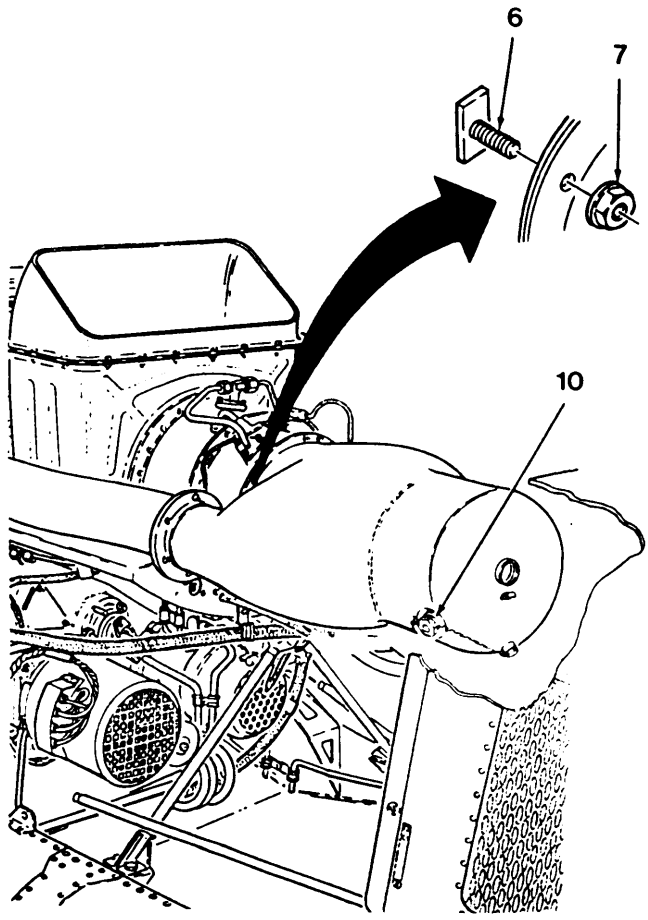
INSTALL COMBUSTION MODULE (ON HELICOPTER) (CONT)

7. Install three tee head bolts (6), with heads facing aft, inside of rear engine mount assembly (11). Secure with three nuts (7) finger tight.

8. Install rear engine mount assembly (11). Insure two dowels (12) engage aligmnent openings in combustion case flange (8); then install six longest tee head bolts (13) and nuts (7). Tighten finger tight.





9. Install remaininq fourteen tee head bolts (6) and nuts (7). Tighten finger tight.

10. Torque al 1 twenty-four nuts (7) to 35-40 in. lbs.

11. Torque dummy igniter plug (10) to 150-200 in. lbs. Lockwire (C4).

12. Install engine legs in accordance with TM 55-1520-248-23, as required.

GO TO NEXT PAGE

4-1-3. INSTALL COMBUSTION MODULE (ON HELICOPTER) (CONT)

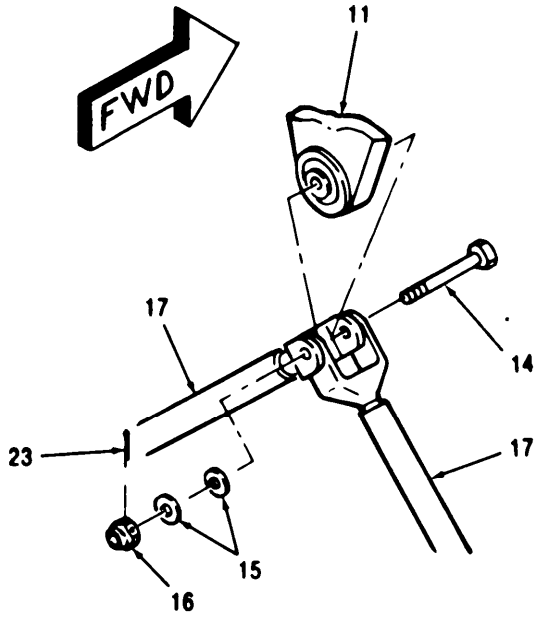
NOTE

Installation procedures for both left and right aft legs are the same.

13. Install bolt (14) with head pointing fwd, two washers (15), and nut (16).

14. Tighten nut (16) to 15-25 in. lbs. Secure nut (16) with cotter pin (23).

15. Install both compressor discharge air tubes (task 4-4-6).



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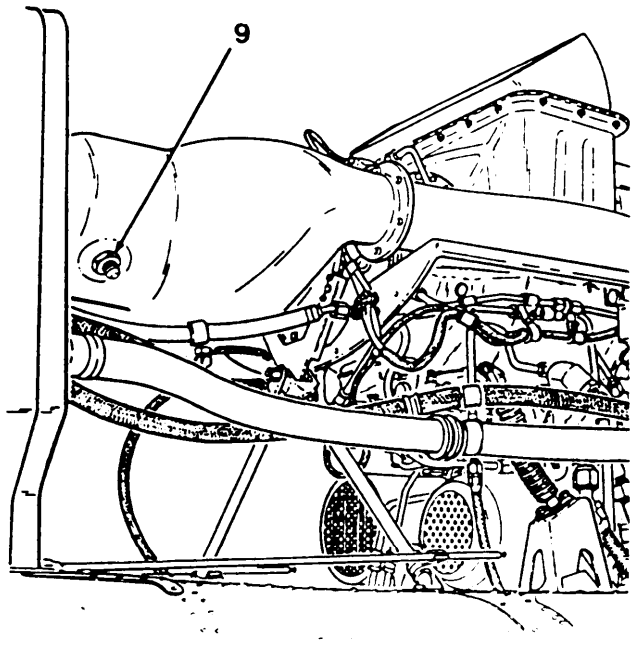
4-1-3. INSTALL COMBUSTION MODULE (ON HELICOPTER) (CONT)

16. Tighten spark igniter (9) to 150-200 in. lbs. Lockwire (C5).



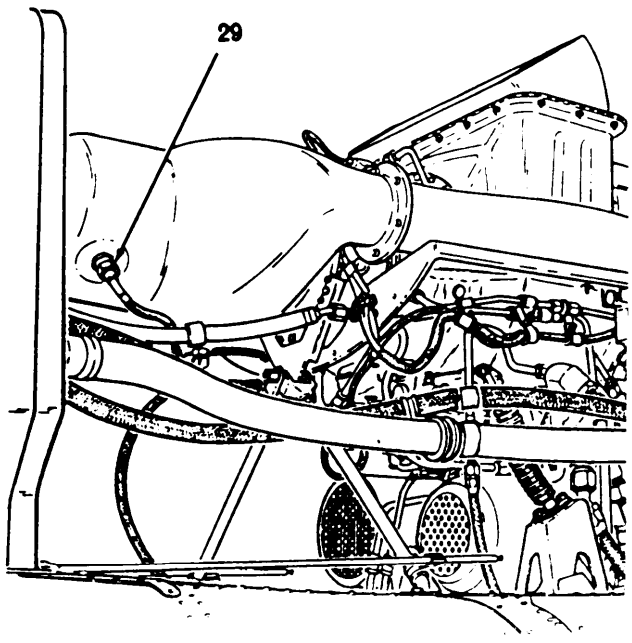
17. Connect spark igniter lead connector plug (29) and tighten to 70-90 in. lbs.

18. Install burner drain valve (task 4-5-3).

19. Install fuel nozzle (task 7-4-5).

INSPECT

FOLLOW ON MAINTENANCE:
Inspect combustion module for air leakage. (task 4-1-1).



END OF TASK

4-1-4. REMOVE COMBUSTION MODULE (OFF HELICOPTER)

This task covers: Off Helicopter Removal

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Materials:
Marking Pencil (C12)

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment Condition:
Engine mounted in engine turnover stand (task 1-5-5), combustion section up.

1. Remove lockwire and dummy igniter plug (l).

2. Remove lockwire and disconnect coupling nut (2).

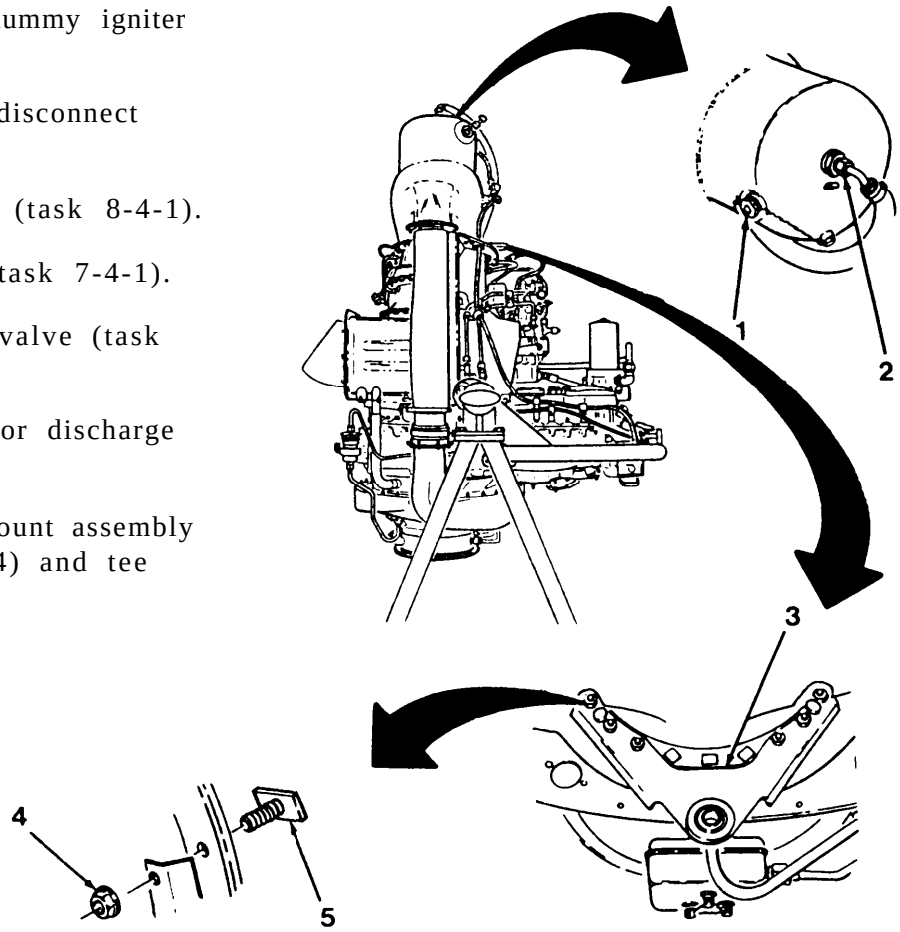
3. Remove spark igniter (task 8-4-1).

4. Remove fuel nozzle (task 7-4-1).

5. Remove burner drain valve (task 4-5-1).

6. Remove both compressor discharge air tubes (task 4-4-1).

7. Remove rear engine mount assembly (3) by removing six nuts (4) and tee head bolts (5).



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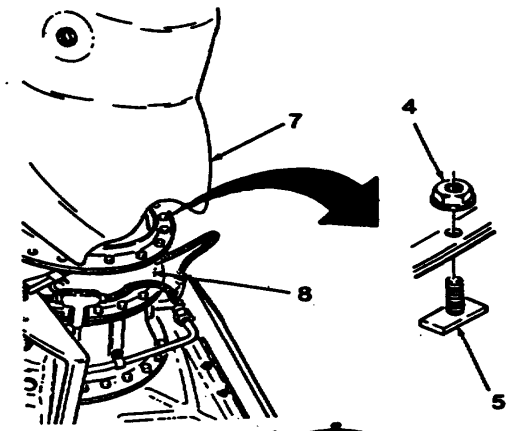
4-1-4. REMOVE COMBUSIION MODULI (C

8. Remove eighteen nuts (4) and tee head bolts (5).

9. Mark an alignment line across top of combustion case (7) and power turbine case (8) with pencil (C12). This will aid in reassembly.



CAUTION

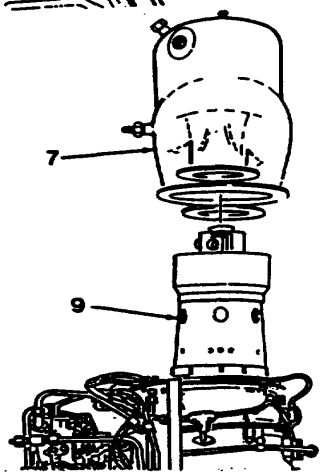
Be prepared to support combustion liner. It may be moved by contact with combustion outer case, as outer case is being removed. Liner may be damaged if dropped.

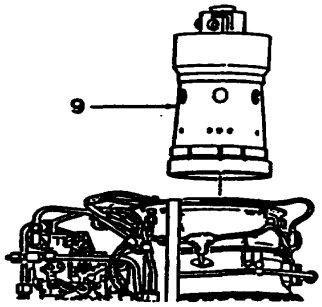
10. Carefully lift combustion outercase (7) from engine. Avoid contact with combustion liner (9).

NOTE

Whenever combustion liner is removed, inspect turbine module first stage nozzle shield, nozzle and turbine wheel (task 5-1-1).

11. Remove combustion liner (9) by carefully lifting it from engine.





END OF TASK

4-1-5. INSTALL COMBUSTION MODULE (OFF HELICOPTER)

This task covers: Off Helicopter Installation

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs

Materials:
Lockwire (C5)
Anti-seize Compound (Cl9)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector
Helper

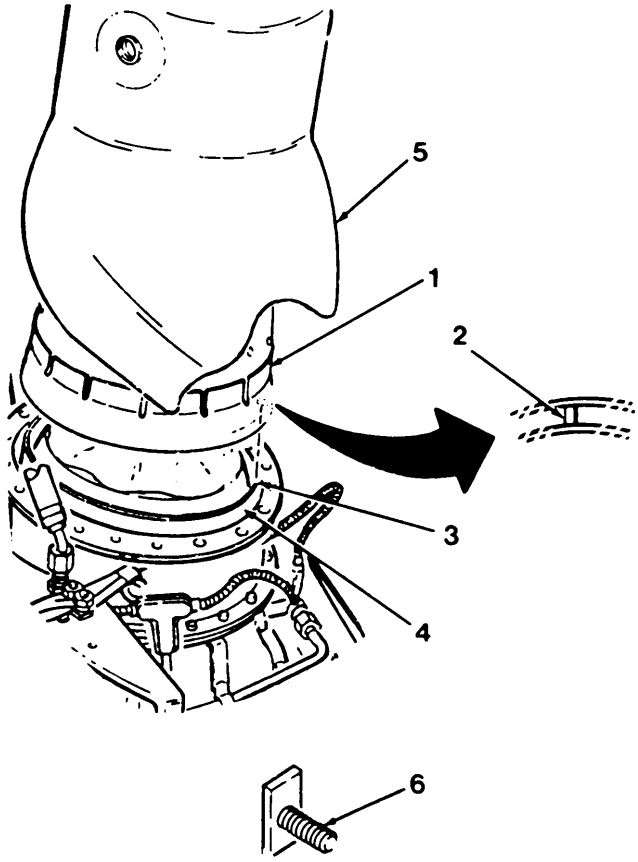
Equipment Condition:
Engine mounted in engine turnover stand (task 1-5-5), combustion section up.

1. Install combustion liner (1) by engaging alignment key (2) into key slot (3) at twelve o'clock position of first stage nozzle shield (4). Insure key (2) fully engages key slot (3); then instruct helper to manually support combustion liner until combustion outer case (5) is installed.

2. Lightly lubricate threads of twenty-four tee head bolts (6) with anti-seize compound (C19).

NOTE

The six longest tee head bolts are used only to secure rear engine mount assembly.



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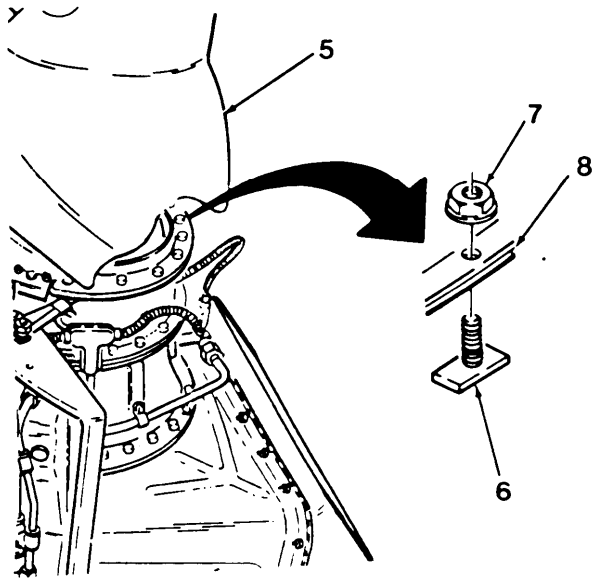
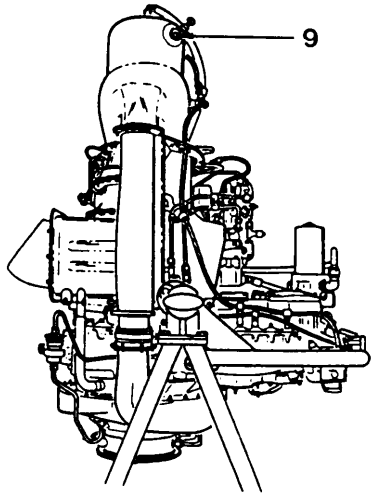
4-1-5. INSTALL COMBUSTION MODULE (OFF HELICOPTER) (CONT)

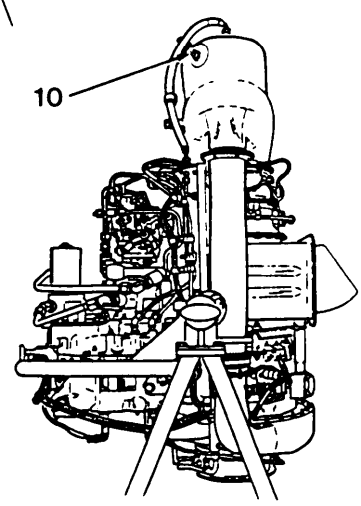
3. Install combustion outercase (5), observing alignment mark on twelve o'clock position of outercase (5) made during removal. Secure with one tee head bolt (6) and nut (7) on splitline (8) at twelve o'clock position of combustion case (5).



4. Lightly lubricate threads of dummy igniter plug (9), left side of engine, with anti-seize compound (C19); then install finger tight.



5. Lightly lubricate threads of spark igniter (10) with anti-seize compound (C19); then install finger tight on right side of engine.



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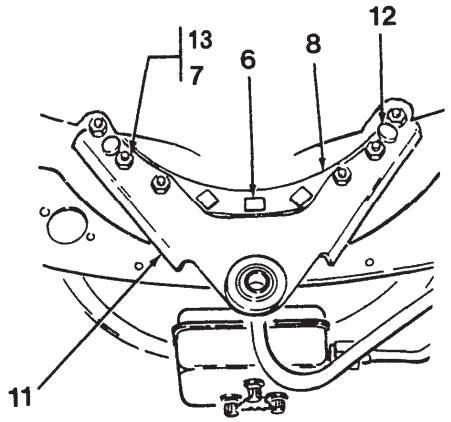
4-1-5. INSTALL COMBUSTION MODULE (OFF HELICOPTER) (CONT)

6. Install three bolts (6), with heads facing aft, inside of engine mount (11). Secure with three nuts (7).

7. Install rear engine mount (11). Insure two dowels (12) engage alignment openings on combustion case flange (8). Install six long tee head bolts (13) and nuts (7).



8. Install remaining fourteen tee head bolts (6) and nuts (7).

9. Tighten all twenty-four nuts (7) to 35-40 in. lbs.

10. Install fuel nozzle (task 7-4-5).

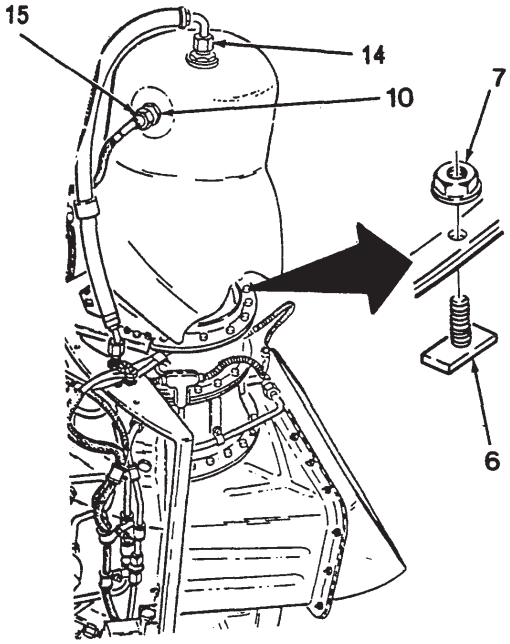
11. Install burner drain valve (task 4-5-3).

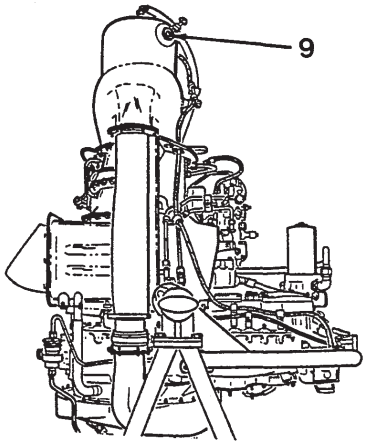
12. Install both compressor discharge air tubes (task 4-4-6).

13. Tighten spark igniter (10) to 150-200 in. lbs. Lockwire (C4).

14. Connect spark igniter lead (15). Torque to 70-90 in. lbs.

15. On left side of engine, torque dummy igniter plug (9) 150-200 in. lbs. Lockwire (C5).





INSPECT

FOLLOW ON MAINTENANCE:
Enter a requirement for an MOC.

END OF TASK

Section II COMBUSTION OUTER CASE

This section includes maintenance procedures for inspecting and repairing com-

LIST OF TASKS

4-2-1. INSPECT COMBUSTION OUTER CASE (AVUM)

This task covers: Off Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Dial Indicating Depth Gage

Materials:
Lockwire (C6)
Marking Pencil (C12)

Personnel Required:
686 Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1500-204-25/1

Equipment Condition:
Combustion module removed (task 4-1-2 or 4-1-4).

CAUTION

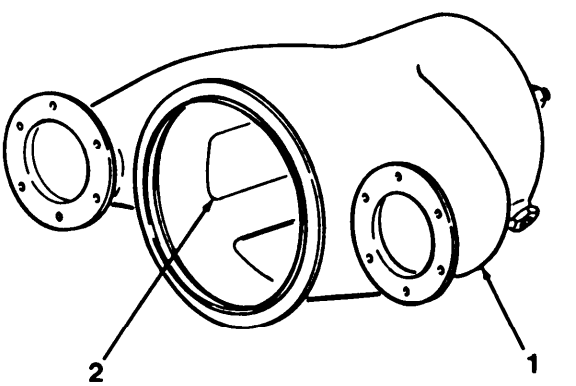
Mark with approved pencil (Cl2) only on combustion outer case or crack will occur.

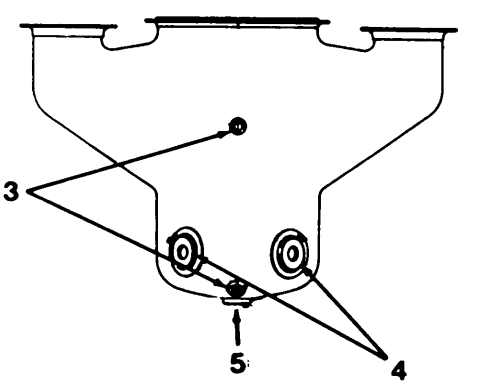
1. Perform visual check for cracks on items a thru e below. Repair as described in task 4-2-2.

a. Outer shell (l).
b. Liner inner basket (2).
c. Two burner drain plug bosses (3).
d. Two igniter plug bosses (4).
e. Fuel nozzle boss (5).

2. Using an inspection mirror, check for trapped foreign material under liner basket (2). Remove all trapped foreign material using wire hook fabricated from lockwire (C6) or other suitable material.

3. Visually inspect outer shell (1) for dents using dial indicating depth gage. Repair only if dents are no more than 0.125-in. deep, l-in. wide, and 3-in. long (task 4-2-3).





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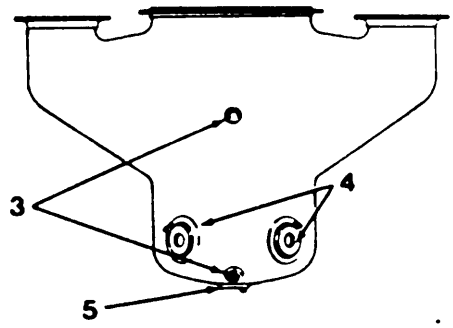
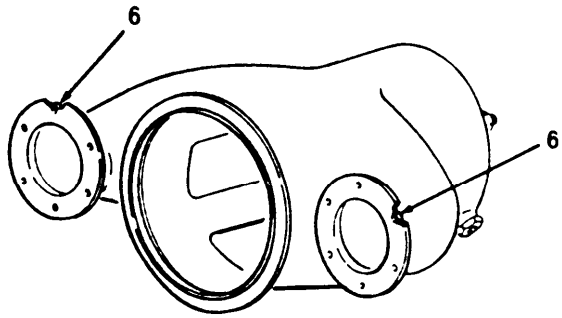
4-2-1. INSPECT COMBUSTION OUTER CASE (AVUM) (CONT)

4. Visually inspect two igniter bosses (4) fuel nozzle boss (5) and two burner drain valve bosses (3) for stripped or cross-threaded condition. Repair threads (TM 55-1500-204-25/1).



5. Visually inspect captive nuts (6) for stripped, damaged or cross-threaded condition. Repair or replace if necessary (TM 55-1500-204-25/1) Run-in torque for captive nuts (6) is 0.7 in. lb., if applicable.



END OF TASK

4-2-2. REPAIR COMBUSTION OUTER CASE CRACKS (AVIM)

This task covers: Off Helicopter Repair

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
AVIM Welding Shop Set
Twist Drill Set

Materials:
Wiping Rags (Cl)
Methylethylketone (C7)
Gloves (C9)
Welding Rod (C41)
Welding Flux (C42)

Personnel Required:
66S Inspector
44E Machinist

References:
TM 55-1500-204-25/1
TM 9-237
TM 43-0103

Equipment Condition:
Combustion module removed (task 4-1-2 or 4-1-4).

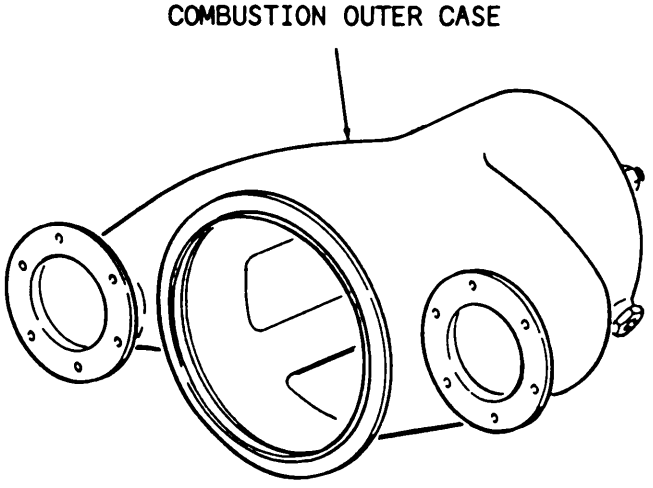
NOTE

Welding general shop rules are described in TM 55-1500-204-25/1. Specific welding techniques and procedures are described in TM 9-237.

1. Remove surface contamination using a scratch wire brush.

WARNING

MEK is flammable and toxic. It can irritate and cause burns. Use only in well ventilated areas, away from heat or open flame. Wear gloves and goggles. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



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4-2-2. REPAIR COMBUSTION OUTER CASE CRACKS (AVIM) (CONT)

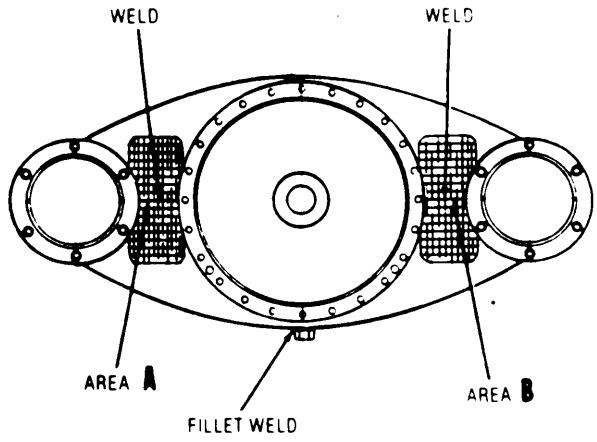
2. Wipe area clean using clean wiping rags (C1) dampened in methylethylketone (C7); then allow to air dry.

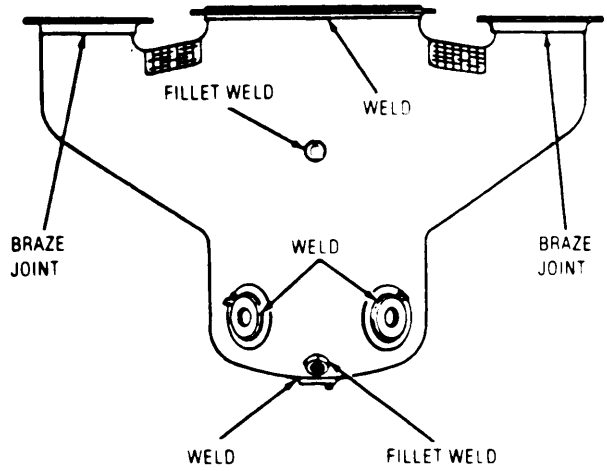
3. Weld cracks using inert gas shielded method and welding rod (C41). Apply 1/8-in. wide stringer bead using medium heat input. Cool each bead with a wet wiping rag (Cl) immediately. Do not apply another bead until cool enough to touch by hand.

4. Inspect welds for undercut, cracking, and discontinuities.

5. Dye check repaired areas (TM 43-0103).

INSPECT





CAUTION

ARC STRIKES WITHIN AREAS DEFINED BY NOTE 1 ARE NOT ACCEPTABLE NOR REPAIRABLE

NOTES
WELD REPAIR ON OVERHAUL PART NOT PERMITTED

1 IF WITHIN 1/4 IN OF WELD IN AREAS A AND B.
2 IF WITHIN ORIGINAL FLANGE WELD AND LARGER THAN REQUIRED TO REPAIR A PIN HOLE LEAK
3 IF IN FLANGE MATERIAL (SEE NOTE 2)

END OF TASK

4-2-3. REPAIR COMBUSTION OUTER CASE DENTS (AVIM)

This task covers: Off Helicopter Repair

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Soft Metal Drift

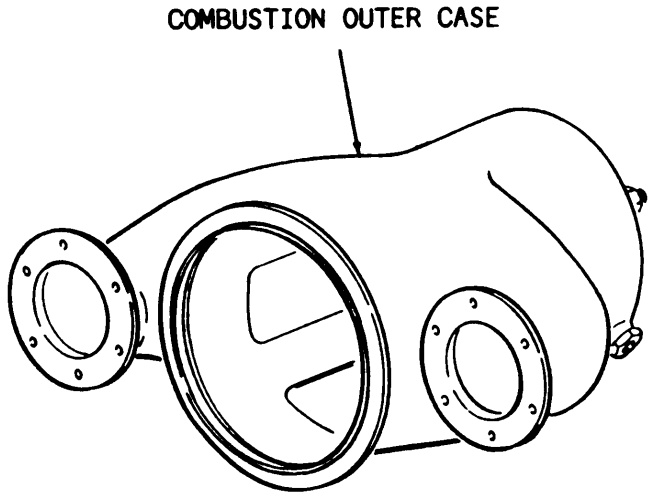
Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 43-0103

Equipment Condition:
Combustion module removed (task 4-1-2 or 4-1-4).

NOTE

Repair is authorized for dents if there are no more than three dents with a maximum depth of 0.125-in. and maximum diameter of 1-in. and 3-in. long.



1. Straighten and reform all dents on surface of combustion outer case using a soft metal drift.

2. Inspect all repaired dents for cracks using dye penetrant (TM 43-0103). If cracks are found refer to task 4-2-2.

3. Inspect for normal contour of surface after repair.

INSPECT

END OF TASK

Section III COMBUSTION LINER

This section includes maintenance procedures for inspecting and repairing combustion liner.

LIST OF TASKS

4-3-1. INSPECT COMBUSTION LINER (AVUM)

This task covers: Off Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Telescoping gage Set
Outside Micrometer Caliper Set
Vernier Caliper
Dial Indicating Depth Gage

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 43-0103

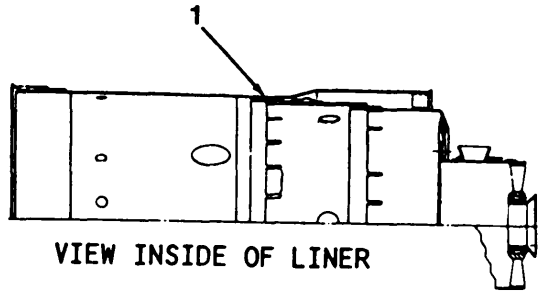
Equipment Condition:
Combustion module removed (Task 4-1-2 or 4-1-4).

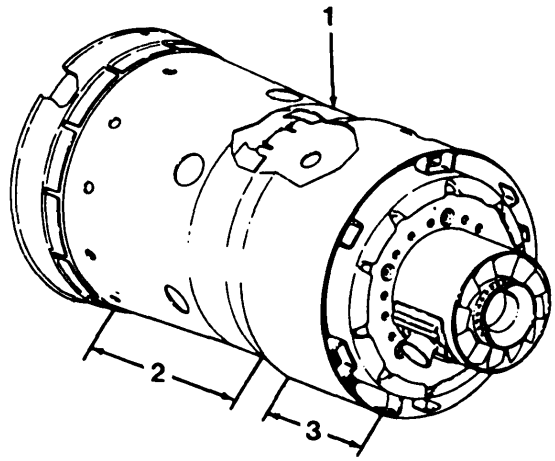
1. Visually inspect for broken spotwelds in liner step (l). Repair (task 4-3-2) if there are fewer than five adjacent broken welds or ten total broken welds.

2. Visually inspect for dents. Repair (task 4-3-3) only if dents are located in areas (2) and (3).

3. Using vernier caliper and dial indicating depth gage inspect for warped condition in areas (2) on liner surface. Condition is usually caused by localized high temperature distortion and area will be discolored. Liner is serviceable if warping in localized areas does not exceed l-in. diameter with maximum depth of 0.187-in.

4. Using vernier caliper and dial indicating depth gage inspect for warped condition on liner surface in area 3). Area will usually be discolored. Liner is serviceable if warping in localized areas does not exceed l-in. diameter with depth of 0.100-in.





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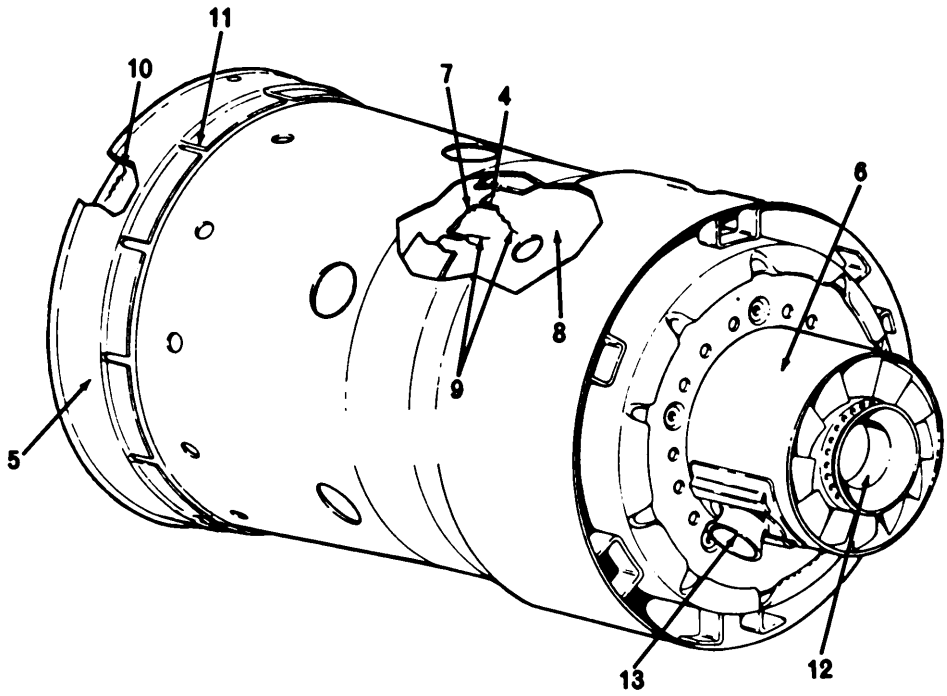
4-3-1. INSPECT COMBUSTION LINER (AVUM) (CONT)

5. Visually inspect for burning inside relief slot areas (4). Measure burned areas using machinist steel rule. Liner is serviceable if burned area does not exceed maximum of 1/16-in. on rear edge, or both corners burned maximum of 1/4-in. along relief slot.

6. Visually inspect for distortion in exit end (5) or dome (6). Liner is not serviceable if distorted in these areas.



7. Perform dye penetrant check (TM 43-0103) for cracks in the following areas. Repair (task 4-3-4) if noted repair limits are not exceeded.

a. Complete outside surface of liner.

b. Tab end (7) of inside liner (8). Repair limit: three or more cracks, or any one crack greater than 1/4-in. long.

c. Relief slots (4). Repair limit: cracks (9) more than 3/16-in. long when any other crack extends 3/8-in. toward the same air hole.

d. Double lip area (10).

e. Expansion slots (11).

f. Attaching welds for fuel nozzle ferrule (12) and igniter ferrule (13).

GO TO NEXT PAGE

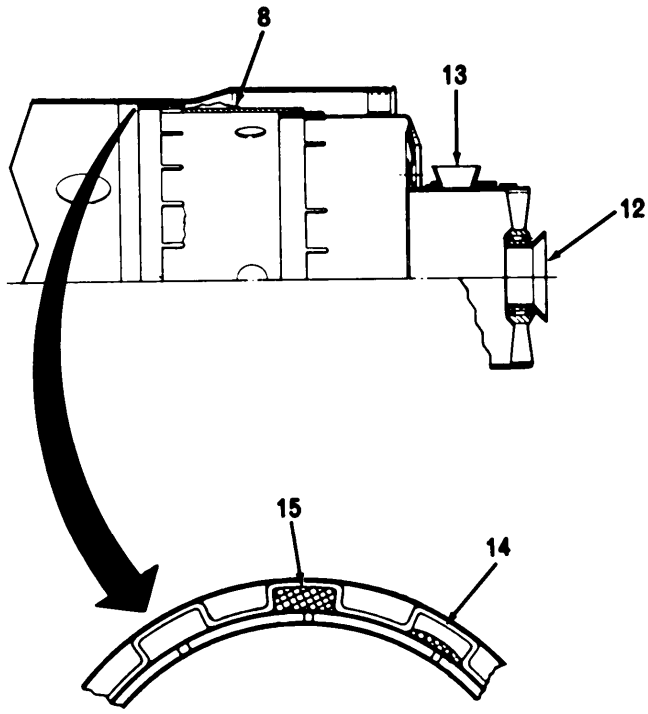
4-3-1. INSPECT COMBUSTION LINER (AVUM) (CONT)

8. Using a flashlight, visually inspect exit louvers around interior of combustion liner. Warpage of inside liner (8) can block these louvers. Partial blockage (14) is acceptable. Complete blockage (15) of any louver is not acceptable.

9. Visually inspect inside diameter of igniter ferrule (13) and fuel nozzle ferrule (12) for roughened condition. Repair as described in task 4-3-5.

10. Using telescoping gage inspect fuel nozzle ferrule (12) for worn or distorted (out-of-round) condition. Liner is serviceable if inside diameter of ferrule does not exceed 0.965-in.

11. Using telescoping gage inspect igniter ferrule (13) for worn or distorted (out-of-round) condition. Using outside micrometer caliper measure wall thickness of igniter ferrule (13). Liner is acceptable if inside diameter of ferrule does not exceed 0.560-in. and wall thickness is not less than 0.020-in.



END VIEW
EXIT LOUVERS

END OF TASK

4-3-2. REPAIR COMBUSTION LINER BROKEN SPOTWELDS (AVIM)

This task covers: Off Helicopter Repair

INITIAL SETUP

Applicable Configurations:
All

Tools:
AVIM Welding Shop Set
Twist Drill Set
Portable Electric Drill
Welders Tool Set

Materials:
Wiping Rags (Cl)
Methylethylketone (C7)
Gloves (C9)
Welding Rod (C41)
Welding Flux (C42)

Personnel Required:
66S Inspector
44E Welder

References:
TM 55-1500-204-25/1
TM 9-237

Equipment Condition:
Combustion module removed (task 4-1-2 or 4-1-4).

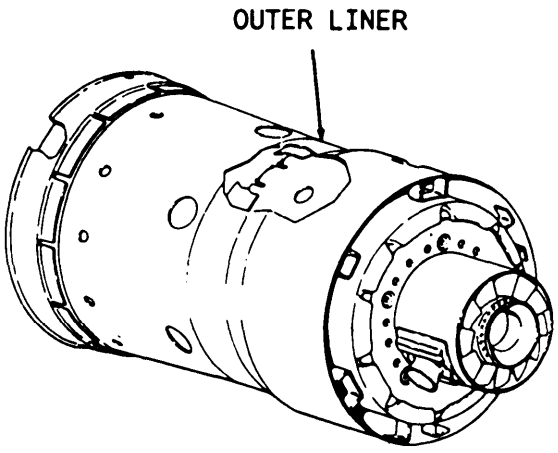
NOTE

Repair is authorized only if there are fewer than five adjacent broken welds or ten total broken welds.

Welding general shop rules are described in TM 55-1500-204-25/1. Specific welding techniques and procedures are described in TM 9-237.

1. Drill 3/16-in. diameter hole through defective spotweld in outer liner only.

2. Remove surface contamination using a wire scratch brush.



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4-3-2. REPAIR COMBUSTION LINER BROKEN SPOTWELDS (AVIM) (CONT)

WARNING

MEK is flammable and toxic. It can irritate and cause burns. Use only in well ventilated areas, away from heat or open flame. Wear gloves and goggles. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

3. Wipe area clean using clean wiping rags (Cl) dampened in methylethylketone (C7).

NOTE

Weld material must not extend into air openings. Do not grind welds unless weld material blocks air entry.

4. Weld defective spotwelds using inert gas shielded arc method with welding rods (C41).

INSPECT

END OF TASK

4-3-3. REPAIR COMBUSTION LINER DENTS (AVIM)

This task covers: Off Helicopter Repair

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Soft Metal Drift

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 43-0103

Equipment Condition:
Combustion module removed (task 4-1-2 or 4-1-4).

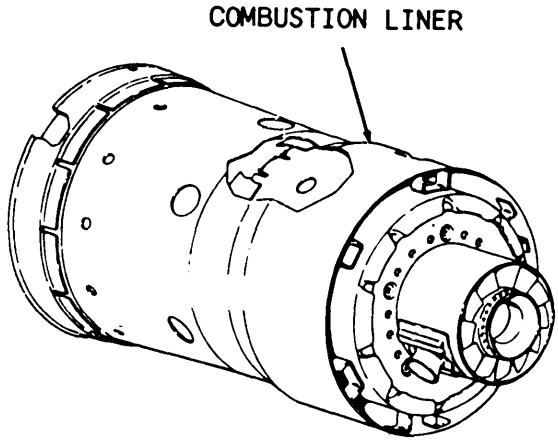
NOTE

Repair is authorized only when limitation for dents are not exceeded, as described in task 4-3-1.

1. Straighten all dents on surface of liner.

2. Inspect for normal contour of surface after all repairs.

3. Inspect all repaired dents for cracks using dye penetrant (TM 43-0103).



INSPECT

END OF TASK

4-3-4 l REPAIR COMBUSTION LINER CRACKS (AVIM)

This task covers: Off Helicopter Repair

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
AVIM Welding Shop Set
Twist Drill Set
Portable Electric Drill

Materials:
Wiping Rags (Cl)
Methylethylketone (C7)
Gloves (C9)
Welding Rod (C41)
Welding Rod (C43)

Personnel Required:
66S Inspector
44E Welder

References:
TM 55-1500-204-25/1
TM 9-237

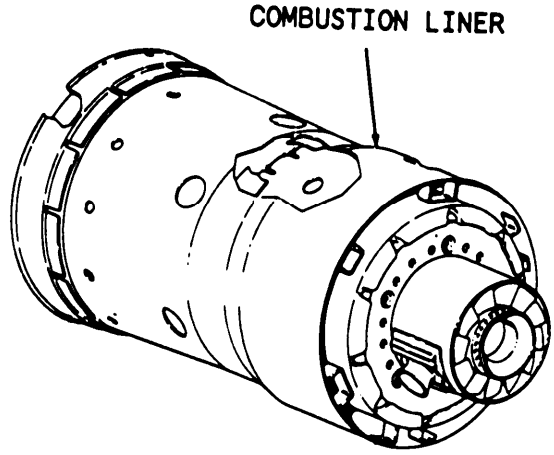
Equipment Condition:
Combustion module removed (task 4-1-2 or 4-1-4).

NOTE

Repair is authorized only when limitations for cracks are not exceeded, as described in task 4-3-1.

Welding general shop rules are described in TM 55-1500-204-25/1. Specific welding techniques and procedures are described in TM 9-237.

1. Remove surface contamination using wire scratch brush.



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4-3-4. REPAIR COMBUSTION LINER CRACKS (AVIM) (CONT)

WARNING

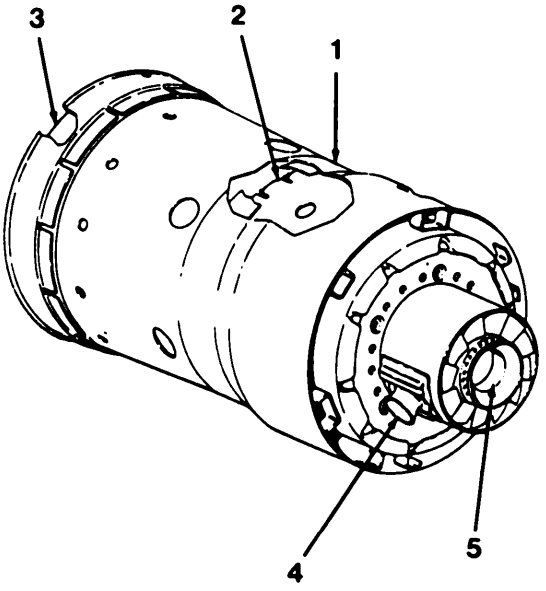
MEK (C7) is flammable and toxic. It can irritate and cause burns. Use only in well ventilated areas, away from heat or open flame. Wear gloves and goggles. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

2. Wipe area clean using clean wiping rags (Cl) dampened in methylethylketone (C7).

3. Weld cracks using inert gas shielded arc method.

a. For cracks in liner surface (l), relief slots (2), double lip area (3), and igniter ferrule (4), using welding rod (C41). Maximum width of weld on ferrule, 0.080-in. Do not grind weld unless weld material obstructs air passage.

b. For cracks in fuel nozzle ferrule (5), use welding rod (C43). Maximum width of weld, 0.080-in.



INSPECT

END OF TASK

4-3-5. REPAIR COMBUSTION LINER FERRULES (AVIM)

This task covers: Off Helicopter Repair

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit,
Telescoping Gage Set
Outside Micrometer 0-1 in.

Materials:
Emery Cloth (C17)

Personnel Required:
686 Aircraft Powerplant Repairer
66S Inspector

Equipment Condition:
Combustion module removed (task 4-1-2 or 4-1-4).

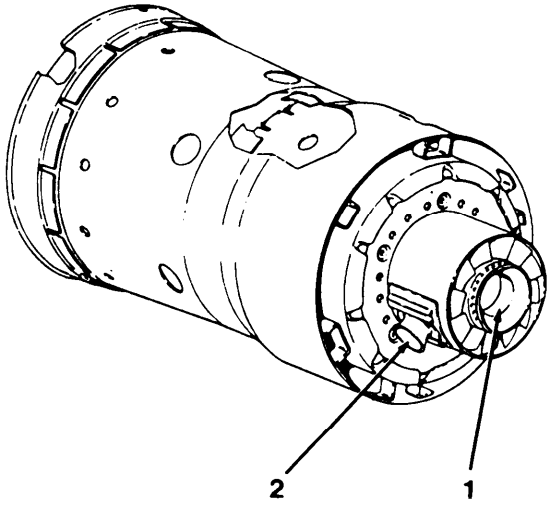
1. Polish roughened or galled surfaces on inside diameter of fuel nozzle ferrule (1) and igniter ferrule (2) using emery cloth (C17).

2. Polish until all surface roughness is removed.

3. Using a telescoping gage, inspect after repair as follows:

a. Fuel nozzle ferrule (1) ID does not exceed 0.965-in.

b. Igniter nozzle ferrule (2) ID does not exceed 0.560-in.



INSPECT

END OF TASK

Section IV COMPRESSOR DISCHARGE AIR TUBES

This section includes maintenance procedures for inspecting, repairing, removing and installing compressor discharge air tubes.

LIST OF TASKS

4-4-1. REMOVE COMPRESSOR DISCHARGE AIR TUBES

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (1-5-5).

CAUTION

Bolt (4) and nut (5) must be removed before bolt (3) to avoid damaging helical insert or shearing head of bolt (3).

1. Remove lockwire; then remove bracket halves (1) and (2) by removing bolt (4) and nut (5); then remove bolt (3).

2. Remove six bolts (6) and nuts (7) from compressor scroll.

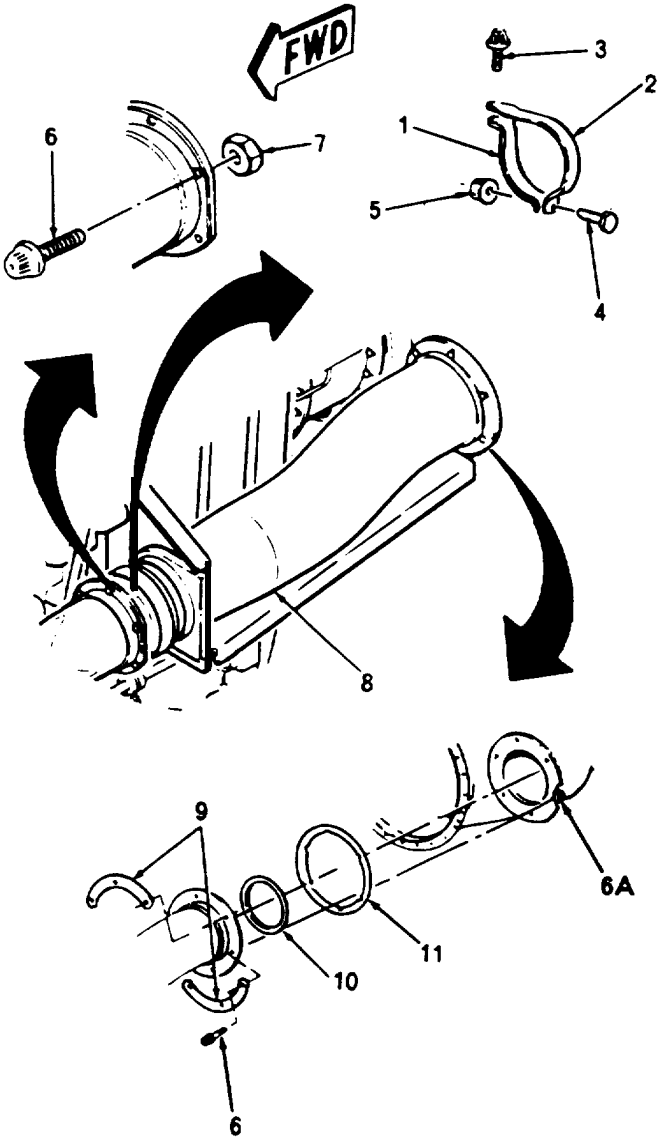
3. Remove six bolts (6) and nuts (6A), if applicable, from aft end of compressor discharge air tube (8).

NOTE

Alignment washer (11) may be reused. Ring seal (10) must be discarded and replaced.

4. Remove two doubler plates (9); then remove compressor discharge air tube (8), ring seal (10), and alignment washer (11).

5. Repeat steps 1 thru 4 to remove right side compressor discharge air tube.



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4-4-1. REMOVE COMPRESSOR DISCHARGE AIR TUBES (CONT)

NOTE

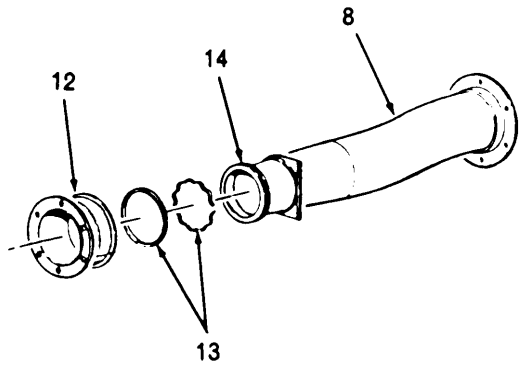
If disassembly is required by maintenance action, perform steps 6 and 7. If not, task is complete.

6. Remove flange adapter (12) by sliding it off of compressor discharge air tube (8).

NOTE

Keep split seal piston ring assembly with compressor discharge air tube it was removed from.

7. Remove split seal piston ring assembly (13) from groove (14) in compressor discharge air tube (8).



FOLLOW ON MAINTENANCE:
Inspect (task 3-3-2)

END OF TASK

4-4-2. INSPECT COMPRESSOR DISCHARGE AIR TUBES

This task covers: Off Helicopter Inspection:

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Dial Indicating Depth Gage
2-3 in. Outside Caliper
Micrometer

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

Equipment Condition:
Compressor discharge air tubes removed (task 4-4-1).

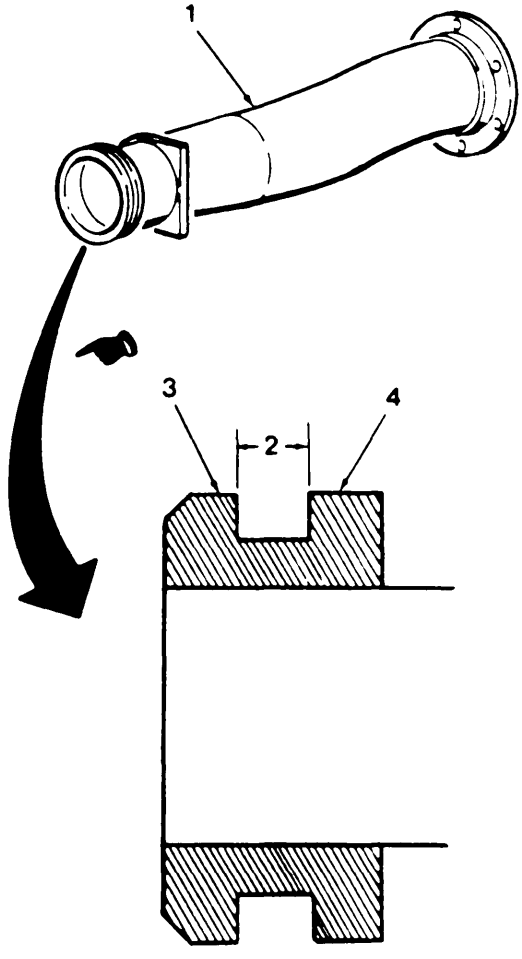
1. Visually inspect compressor discharge air tube (1) for cracks. Repair all cracks that are 3-in. or less in length and do not extend into brazed joints at end flanges (task 4-4-3).

2. Visually inspect compressor discharge tube (1) for dents, using dial indicating depth gage. Repair if there are no more than three dents per tube with a maximum depth of 0.125-in. and maximum diameter of 0.500-in. (task 4-4-4).

3. Inspect seal ring groove (2) for wear using feeler gage. Maximum width of seal ring groove is 0.195-in.

4. Inspect land surface diameters (3) and (4) using outside caliper micrometer. Replace tube if outside diameter of either surface is less than 2.750-in. (task 4-4-6).

5. Repeat steps 1 thru 4 on second compressor discharge air tube.



INSPECT

END OF TASK

4-4-3. REPAIR COMPRESSOR DISCHARGE AIR TUBE CRACKS (AVIM)

This task covers: Off Helicopter Repair

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Avim Welding Shop Set

Materials:
Wiping Rags (Cl)
Methylethylketone (C7)
Gloves (C9)
Welding Rod (C41)

Personnel Required:
66S Inspector
44E Welder

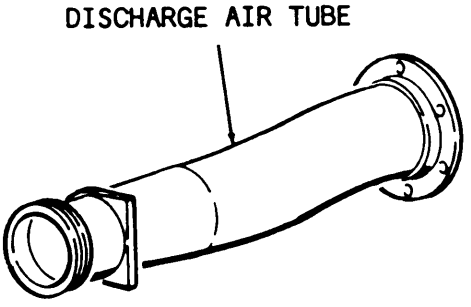
References:
TM 9-237
TM 55-1500-204-25/1
TM 43-0103

Equipment Condition:
Compressor discharge air tubes removed (task 4-4-1).

NOTE

Repair is authorized only on cracks that are 3-in. or less in length.

Welding general shop rules are described in TM 55-1500-204-25/1. Specific welding techniques and procedures are described in TM 9-237.



1. Remove surface contamination using a wire scratch brush.

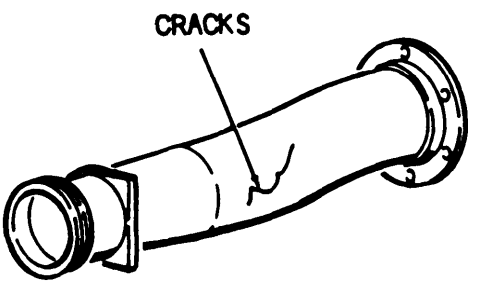
GO TO NEXT PAGE

4-4-3. REPAIR COMPRESSOR DISCHARGE AIR TUBE CRACKS (AVIM) (CONT)

WARNING

MEK (C7) Is flammable and toxic. It can irritate and cause burns. Use only in well ventilated areas, away from heat or open flame. Wear gloves and goggles. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

2. Clean cracks and surrounding area using wiping rags (Cl) and methylethyl-ketone (C7); then allow surface to air dry.



NOTE

Weld materials must not extend into air openings. Do not grind welds unless weld materials block air entry.

3. Weld cracks using inert gas shielded arc method and welding rods (C41).

4. Inspect all welded cracks using dye penetrant check (TM 43-0103).

INSPECT

END OF TASK

4-4-4. REPAIR COMPRESSOR DISCHARGE AIR TUBE DENTS (AVIM)

This task covers: Off Helicopter Repair

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Soft Metal Drift

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 43-0103

Equipment Condition:
Compressor discharge air tubes removed (task 4-4-1).

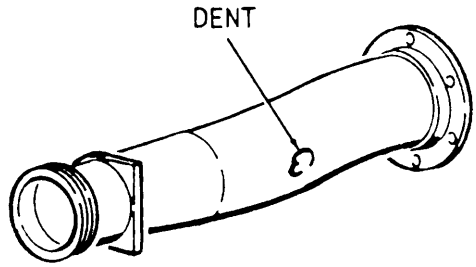
NOTE

Repair is authorized if there are no more than three dents with maximum depth of 0.125 in. and maximum diameter of 0.5 in.

1. Straighten and reform dents using a soft metal drift.

2. Inspect all repaired dents for cracks using dye penetrant (TM 43-0103). If cracks are found, refer to task 4-4-3.

3. Inspect for normal contour of surface after repair.



INSPECT

END OF TASK

4-4-5. INSPECT COMPRESSOR DISCHARGE AIR TUBE SPLIT SEAL PISTON RINGS

This task covers: Off Helicopter Inspection

INITIAL SETUP

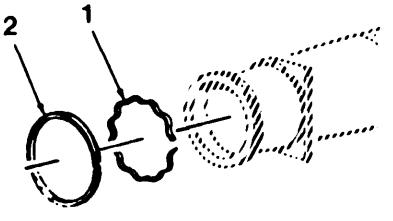
Applicable Configurations:
Al1

Tools:
Vernier Caliper

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

Equipment Condition:
Compressor discharge air tubes removed and disassembled (task 4-4-1).

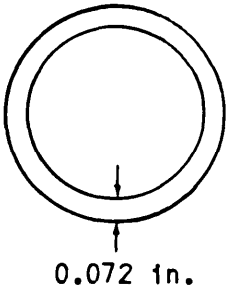
1. Inspect expander ring (1) and piston ring (2) for cracks. There must be no cracks.



NOTE

Use vernier caliper with knife-edged jaws to measure piston ring thickness. Calipers with square jaws will not work.

2. Using a vernier caliper, measure radial thickness of piston ring (2). Minimum acceptable radial thickness is 0.072-in.



FOLLOW ON MAINTENANCE:

Complete task 3-3-2, Inspect Compressor Scroll-Discharge Air Tube Flange Adapters

END OF TASK

4-4-6. INSTALL COMPRESSOR DISCHARGE AIR TUBES

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 0-30 in. lbs
Torque Wrench 30-150 in. lbs

Materials:
Anti-seize compound (C19)
Lockwire (C4)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

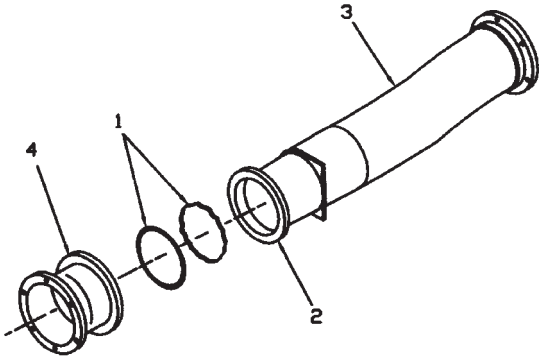
Equipment Condition:
Compressor scroll-to-discharge air tube flange adapters inspected (task 3-3-2).
Compressor discharge tube split seal piston rings inspected (task 4-4-5).
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

NOTE

If compressor discharge air tube was disassembled perform steps 1 and 2. If not disassembled begin with step 3.

Compressor discharge air tubes are interchangeable between left and right side of engine.

1. Install split seal piston ring assembly (1), into groove (2) of compressor discharge air tube (3). Make sure splits on ring assembly are not on top of each other.



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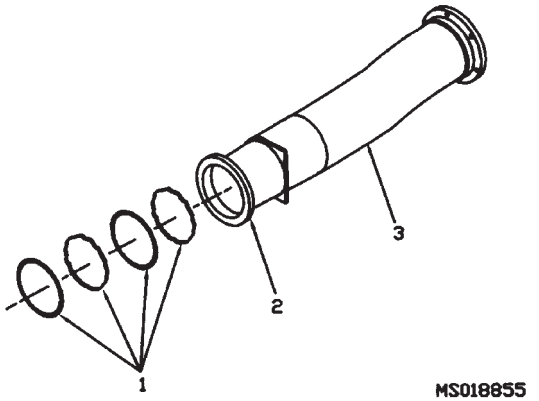
NOTE

For single piston ring tube, install piston ring with end gap outboard of horizontal centerline of engine. For the double piston ring tube, install piston rings with end gaps 180 degrees apart at horizontal centerline of engine.

2. Use anti-seize compound (C19) to coat flange adaptor (4) spline bore that seals with the piston ring and install flange adapter (4) over end of compressor discharge air tube (3). Slide flange adapter (4) onto discharge air tube (3) as far as possible.



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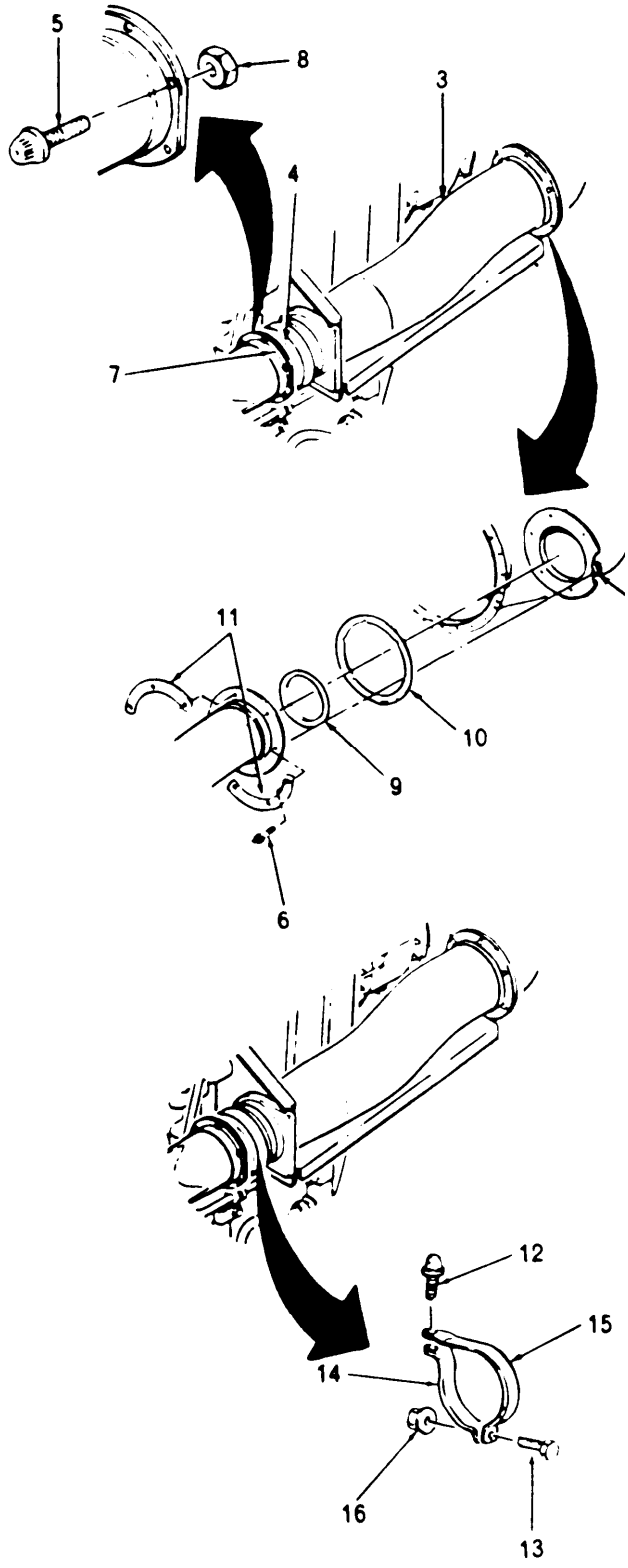
4-4-6. INSTALL COMPRESSOR DISCHARGE AIR TUBES (CONT)

3. Lightly coat threads of twelve bolts (5) and (6) with anti-seize compound (C19).

4. Install compressor discharge air tube (3) and slide flange adapter (4) forward to contact attachment ring of compressor scroll (7). Secure with the six shortest bolts (5) and nuts (8). Tighten to 10-12 in. lbs above drag torque.

5. Install compressor discharge air tube (3), new ring seal (9) and alignment washer (10). Secure with two doubler plates (11), and the six longest bolts (6) and tighten to 10-12 in. lbs. above drag torque, or install self-locking nuts (6A) and tighten to 10-12 in. lb., if applicable.



CAUTION

Do not over-torque bolts (12) and (13). Excessive torque can cause gearbox lugs to crack.

6. Install two bracket halves (14) and (15) and secure with bolts (12) and (13), and nut (16). Tighten bolt (12) 35-40 in. lbs; then tighten bolt (13) 10-15 in. lbs above drag torque. Lockwire (C4).

7. Repeat steps 1 thru 6 to install right side compressor discharge air tube.

INSPECT

END OF TASK

Section V BURNER DRAIN VALVE

This section includes maintenance procedures for service, removal, and installation of burner drain valve.

LIST OF TASKS

4-5-1. REMOVE BURNER DRAIN VALVE

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

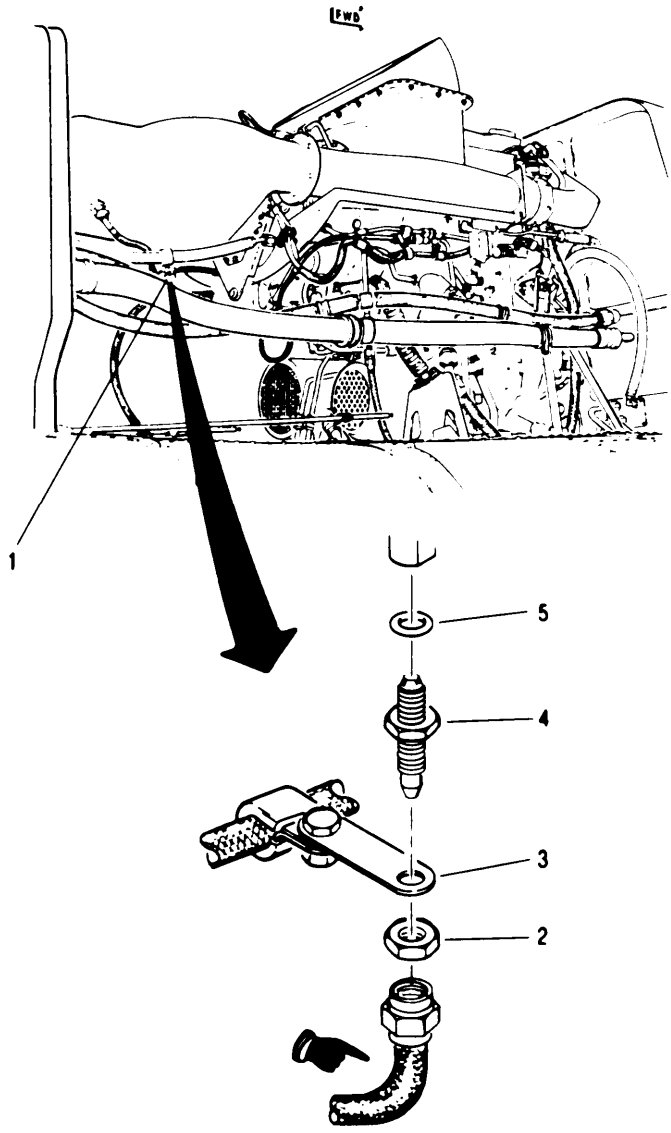
References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Disconnect coupling nut (1).

2. Remove nut (2) and disconnect igniter lead mounting bracket (3).

3. Remove burner drain valve (4); then remove and discard packing (5).



END OF TASK

4-5-2. SERVICE BURNER DRAIN VALVE

This task covers: Off Helicopter Servicing

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Air Compressor Unit
Air Blow Gun

Materials:
Dry Cleaning Solvent (C8)
Gloves (C9)
Carbon Removal Compound (C33)

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment Condition:
Burner drain valve removed (task 4-5-1).

WARNING

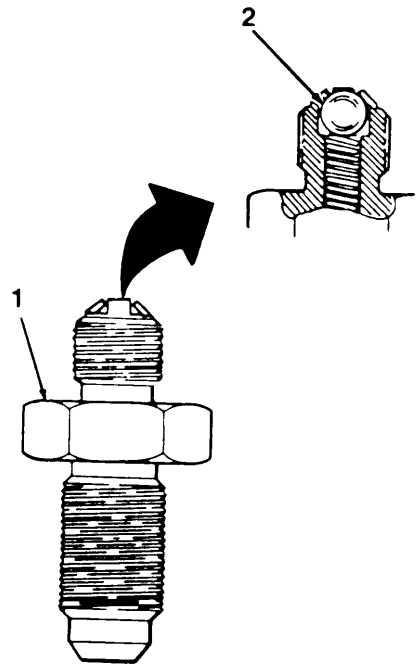
Dry cleaning solvent (C8) is flammable and toxic. It can irritate skin and cause burns. Use only in well ventilated area away from heat and open flame. Wear gloves. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Clean burner drain valve (1) with dry cleaning solvent (C8). Make sure solvent passes through burner drain valve.

2. Repeat cleaning with carbon removal compound (C33).

WARNING

Use goggles to protect eyes and face when using compressed air. Do not exceed 30 psig. Do not direct airstream towards yourself or another person. Failure to comply may result in injury to personnel.



3. Dry burner drain valve with compressed air and air blow gun.

4. Check to make sure that ball (2) moves freely when pressed.

END OF TASK

4-5-3. INSTALL BURNER DRAINER VALVE

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Anti-seize Compound (C19)
Petrolatum (C34)

Parts:
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Lubricate packing (1) with petrolatum (C34) and install on ball bearing end of burner drain valve (2); then lightly lubricate threads with anti-seize compound (C19).

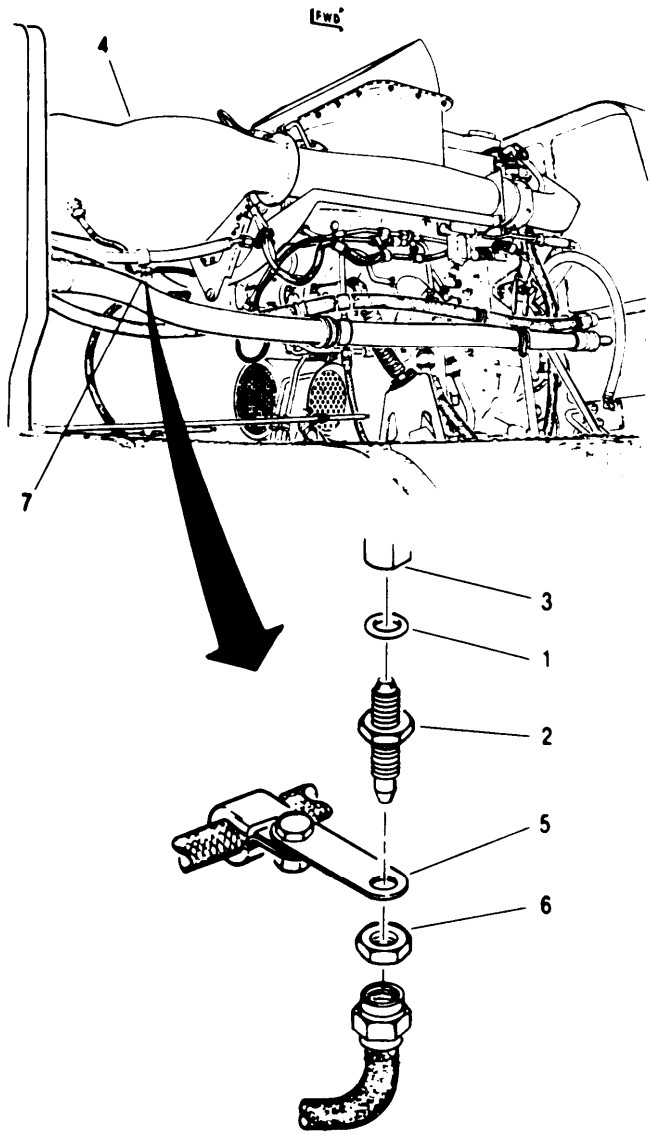
2. Install burner drain valve (2) with ball bearing end inserted in combustion outer case (4); then using a wrench on boss (3) to offset torque, torque to 120-140 in. lbs.

3. Install igniter lead mountin bracket (5) on burner drain valve (2) and secure with nut (6).

4. Start the engine and check that the burner drain valve is closed to the passage of air. Replace valve if it does not close when the engine is operating.

5. Connect coupling nut (7). Tighten nut (7) to 80-120 in. lb.

6. Deleted.



INSPECT

END OF TASK

Section VI ENGINE REAR MOUNT

This section includes maintenance procedures for inspection, removal, and installation of engine rear mount.

LIST OF TASKS

4-6-1. INSPECT ENGINE REAR MOUNT BEARING

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Dial Indicator

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).
Rear engine mount helicopter support struts disconnected/removed.

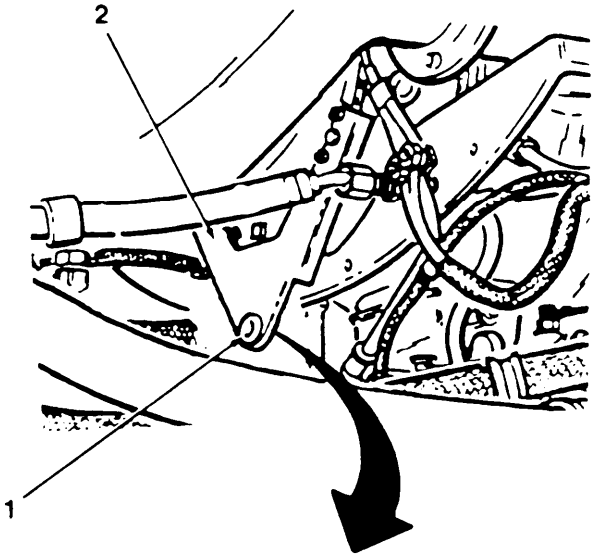
NOTE

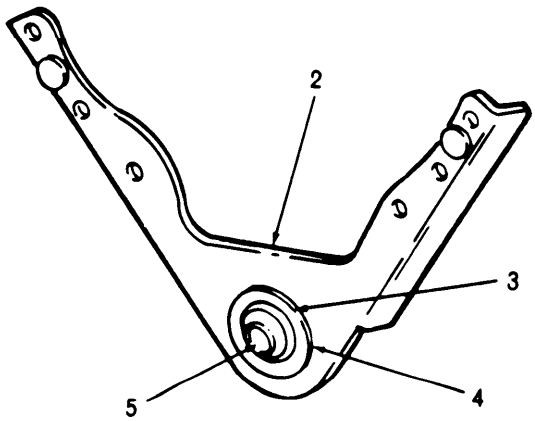
Do not remove bearing for inspection.

1. Check bearing (1) by hand for looseness in engine mount (2). Bearing outer ring (3) must be tight in engine mount bore (4).

2. Using dial indicator, check bearing inner race (5) for axial movement (forward-to-rear). Maximum allowable movement: 0.030-in.

3. Check bearing inner race (5) for diametrical movement (up/down and sideways) in engine mount (2). Maximum allowable movement in any plane: 0.012-in.





END OF TASK

4-6-2. REMOVE ENGINE REAR MOUNT

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Engine Assembly Lift (T9)
Hoist

Personnel Required:
68B Aircraft Powerplant Repairer

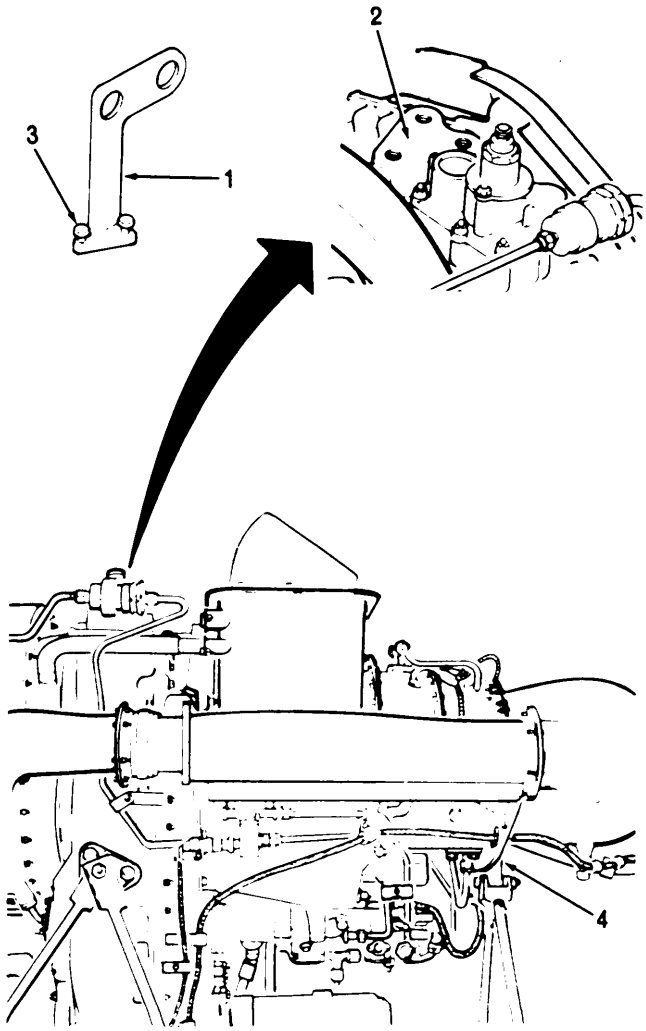
References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Install engine assembly lift (1) on gearbox top mounting pad (2) and tighten three bolts (3).

2. Attach hoist to engine assembly lift (1).

3. Hoist engine only enough to relieve weight from engine mount (4).



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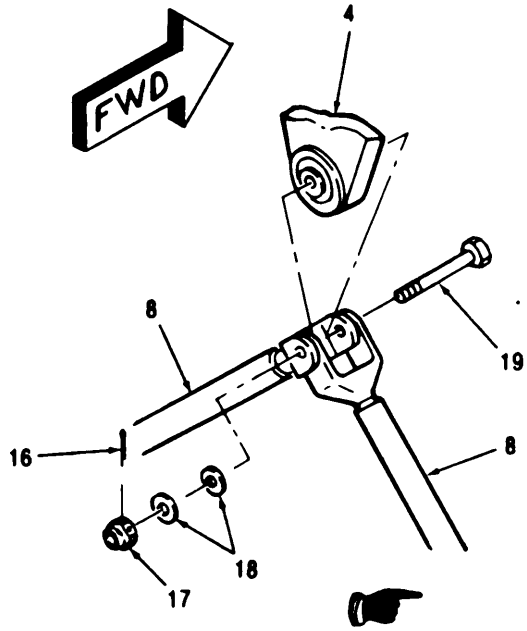
4-6-2. REMOVE ENGINE REAR MOUNT (C0NT)

CAUTION

Shims between legs and trunnions are for engine-to-transmission alignment. Loose shims are to be rebonded in place immediately. If removal is required, identify shims to insure reinstallation to original positions for proper alignment. Loss or intermixing of shims will require realignment of engine-to-transmission (TM 55-2840-248-23).

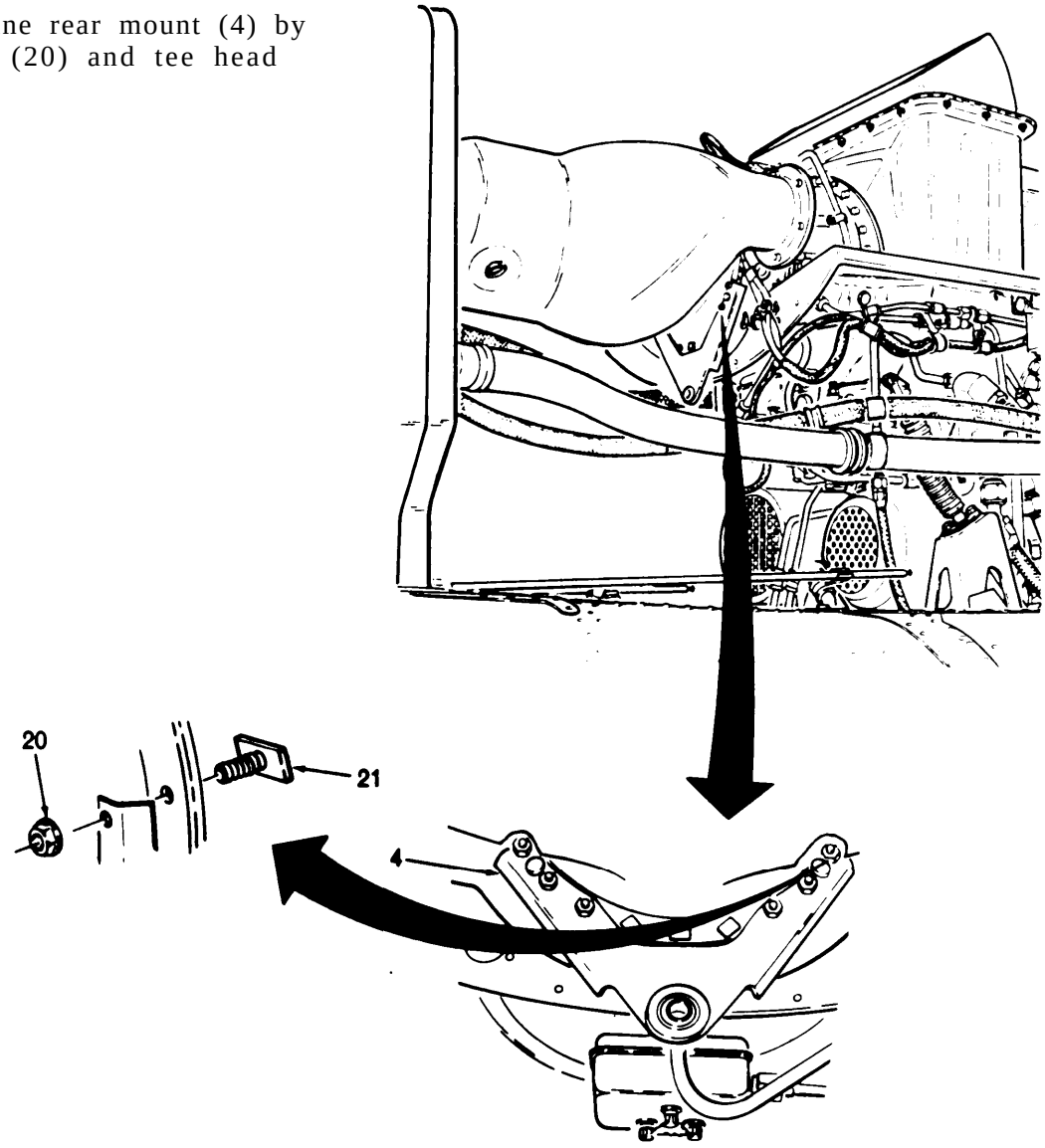


4. Remove cotter pin (16), nut (17), two washers (18) and bolt (19) from rear engine mount (4). Remove aft leg (8). Discard cotter pin (16).

GO TO NEXT PAGE

4-6-2. REMOVE ENGINE REAR MOUNT (CONT)

5. Remove engine rear mount (4) by removing six nuts (20) and tee head bolts (21).



END OF TASK

4-6-3. INSTALL ENGINE REAR MOUNT

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Anti-seize Compound (C19)

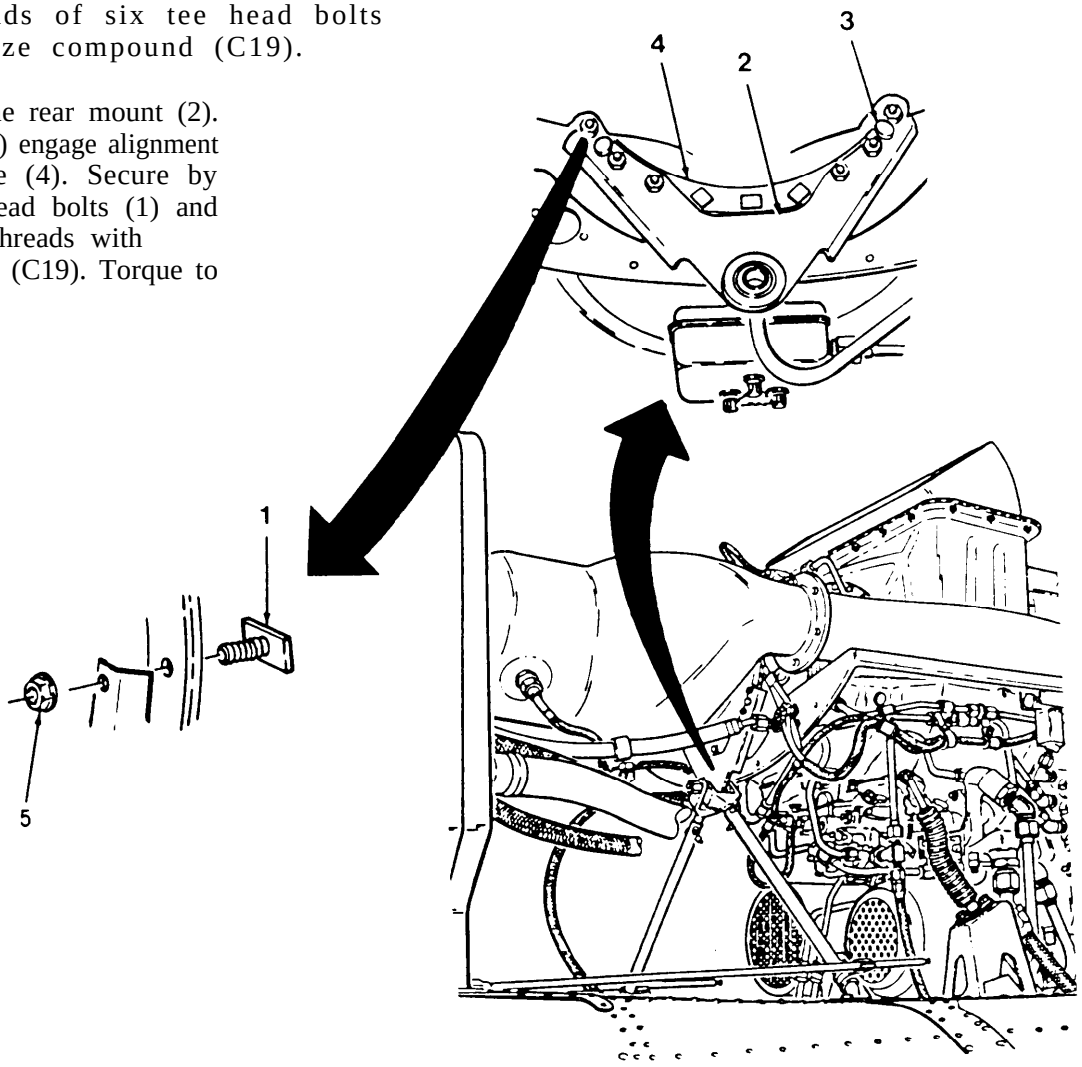
Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine cowling removed. (TM 55-2840-248-23).
Engine supported by hoist.
Off Helicopter: Engine mounted in engine turnover stand (Task 1-5-5).

1. Coat threads of six tee head bolts (1) with anti-seize compound (C19).

2. Install engine rear mount (2). Insure two dowels (3) engage alignment holes on split 1ine (4). Secure by installing six tee head bolts (1) and nuts (5) and coat threads with anti-seize compound (C19). Torque to 35-40 in. lbs.



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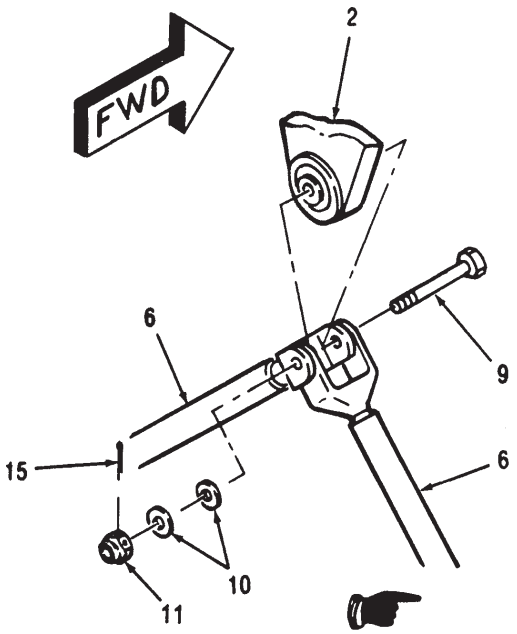
4-6-3. INSTALL ENGINE REAR MOUNT (CONT)

3. Install bolt (9) with head pointing forward, two washers (10) and nut (11).

4. Tighten nut (11) to 10-15 in. lbs. Secure nut (11) with cotter pin (15).



INSPECT

END OF TASK

CHAPTER 5
TURBINE MODULE MAINTENANCE

Section I GENERAL INSTRUCTIONS

This section includes maintenance procedures for inspection of first stage nozzle shield, nozzle, and turbine wheel and removal and installation of turbine module.

LIST OF TASKS

5-1-1. INSPECT FIRST STAGE NOZZLE SHIELD. NOZZLE. AND TURBINE WHEEL

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Lockwire (C4)
Anti-Seize Compound (C19)

Personnel Required:
68B Aircraft Powerplant Repairer
67S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
Combustion module removed (task 4-1-2 or 4-1-4).
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

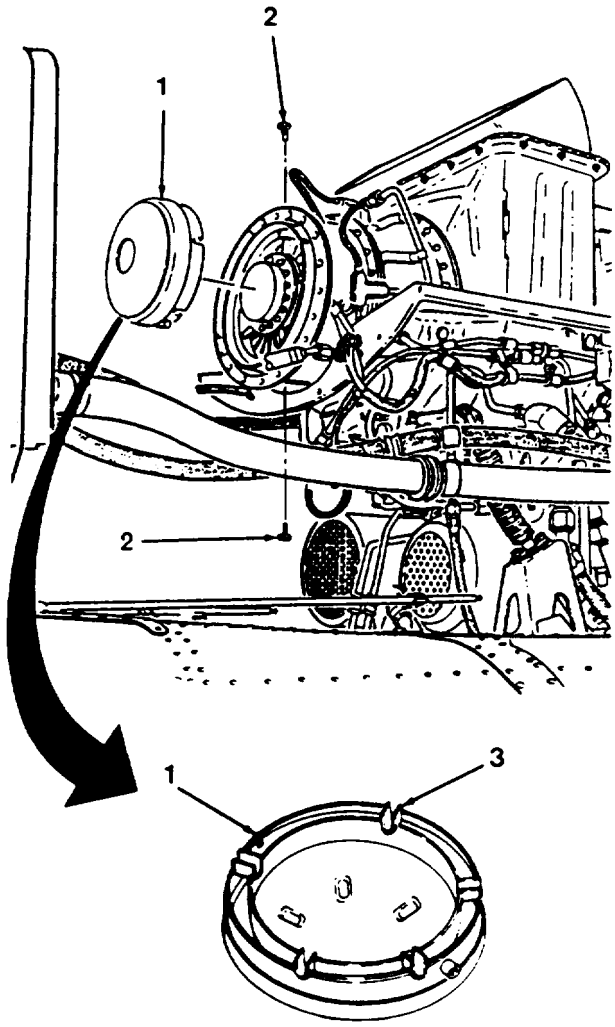
INSPECT NOZZLE SHIELD

NOTE

With exception of nozzle shield, all Inspections will be performed with components installed on engine. Illustrations showing components removed are only for clarity. Flashlight and inspection mirror are needed to perform Inspections.

1. Remove first stage nozzle shield (1) by removing lockwire and two positioning plugs (2).

2. Inspect five brazes (3) for cracks. Cracks amounting to 25% or less of total distance around each braze are acceptable. If cracks exceed this limitation, or any other type of damage Is found, replace first stage nozzle shield.



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5-1-1. INSPECT FIRST STAGE NOZZLE SHIELD, NOZZLE, AND TURBINE WHEEL (CONT)

INSPECT FIRST STAGE NOZZLE

3. Inspect first stage nozzle vanes (4) for axial cracks (5). Nozzle is serviceable if cracks do not exceed following limitations:

a. Leading edge: 1/4-in.

b. Trailing edge: 1/2-in.

c. No two cracks in same plane.

d. Adjacent cracks at least 1/4-in. apart and not progressing toward each other.

e. Any vane with a 1/2-in. crack must be connected to at least two other vanes with no cracks longer than 1/4-in. through a section of outer band having no cracks longer than 1/4-in.

4. Inspect first stage nozzle vanes (4) for nicks or dents on leading and trailing edges (6). Also inspect for warps or burns on trailing edge. Nozzle is serviceable if damage does not exceed following limitations:

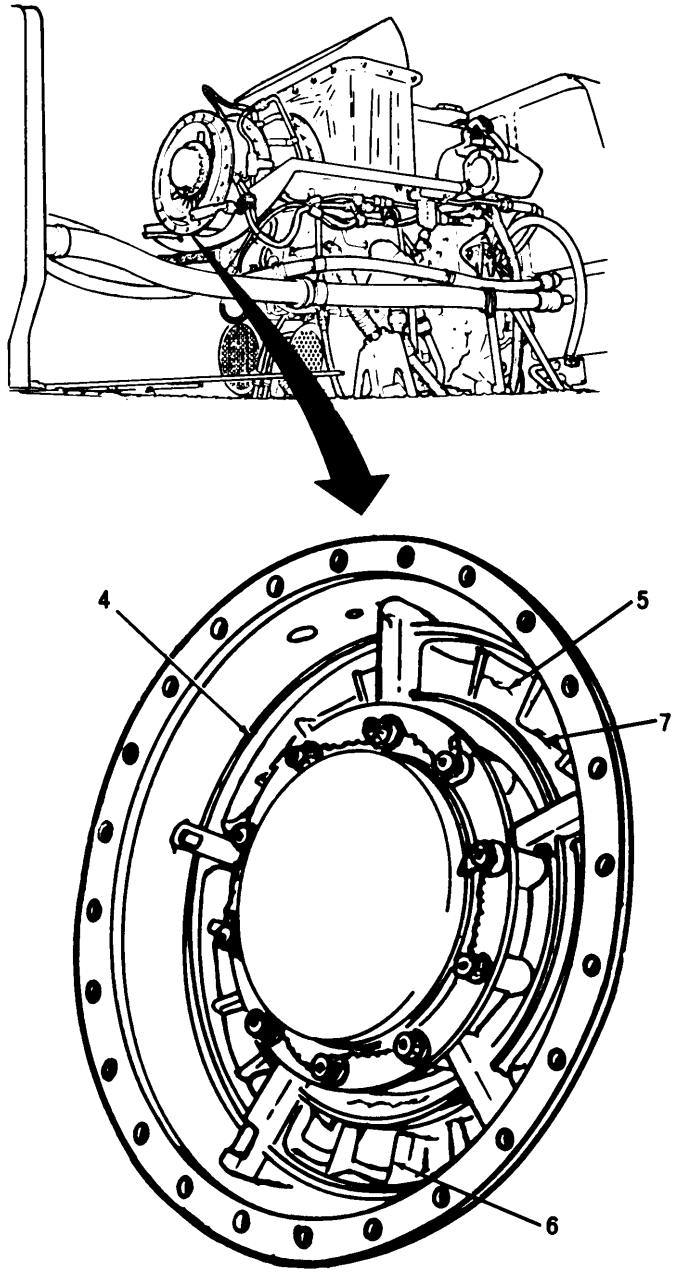
a. Leading edge: 1/16-in.

b. Trailing edge 1/8-in.

5. Inspect first stage nozzle (4) for fillet cracks (inner and outer band) (7). Nozzle is serviceable if cracks do not exceed following limitations:

a. Leading edge: 1/4-in.

b. Trailing edge: 1/8-in.



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5-1-1. INSPECT FIRST STAGE NOZZLE SHIELD, NOZZLE, AND TURBINE WHEEL (CONT)

6. Inspect first stage nozzle (4) for cracks in leading and trailing edges of inner band (8). Nozzle is serviceable if cracks do not exceed following limitations.

Leading edge: 3/16-in. axially into band and not in line with trailing edge cracks.

b. Trailing edge extending through inner band to sheet metal detail.

7. Inspect first stage nozzle (4) for cracks in leading and trailing edges of outerband (9).

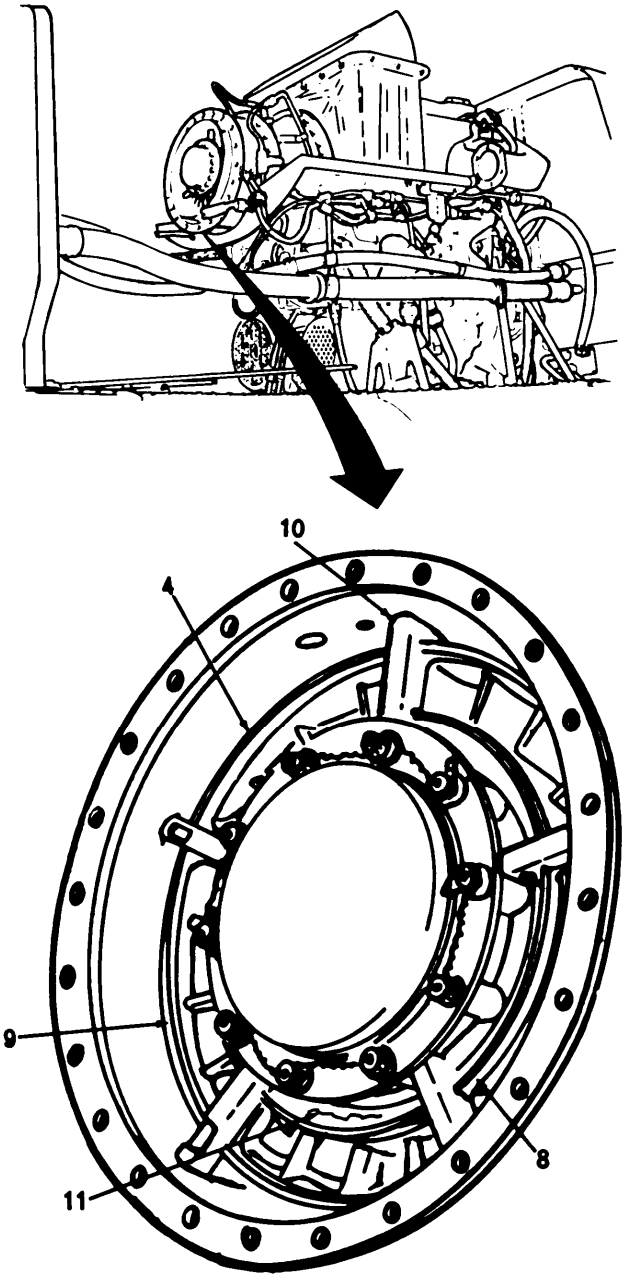
a. Nozzle is serviceable if cracks do not exceed 3/16-in. axially on leading or trailing edges into band, and not in line with opposite edge.

b. No more than two cracks extending axially through outer band.

(1) Cracks at least 90 degrees apart.

(2) Each outer band segment is attached to inner band by at least two vanes having no cracks longer than 1/4-in.

(3) Cracks in the “saddle” (10) area shall not extend more than 1/4-in. radially into saddle vane.



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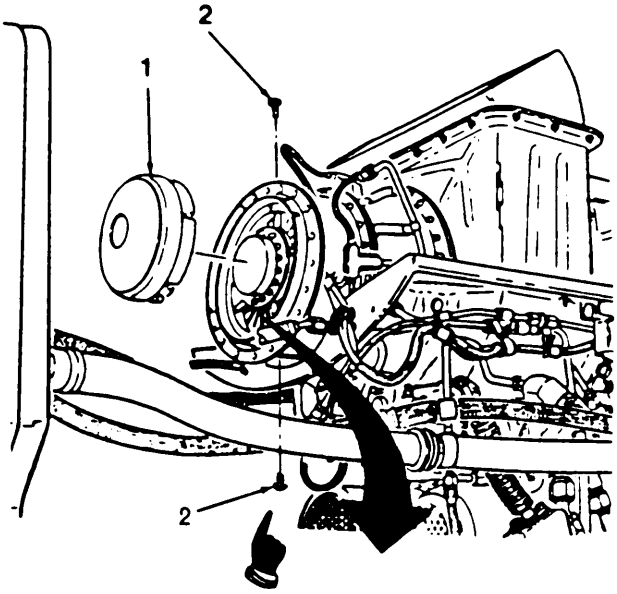
5-1-1. INSPECT FIRST STAGE NOZZLE SHIELD, NOZZLE, AND TURBINE WHEEL (CONT)

8. Inspect first stage nozzle (4) for cracks in sheet metal area (11). Nozzle is serviceable if cracks do not exceed 1/2-in. circumferentially, and no more than two cracks at least 2-in. apart.

NOTE

If damage exceeds preceding limitations, or any other type of damage is found, replace turbine module (tasks 5-1-2 and 5-1-3).



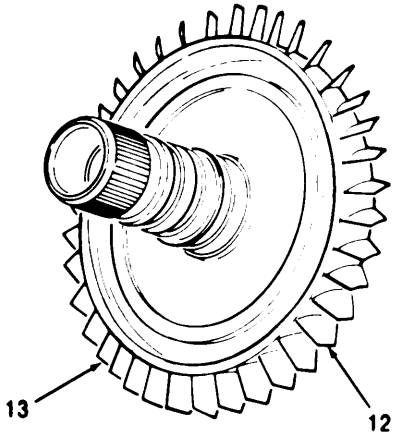
INSPECT TURBINE WHEEL

9. Using flashlight and inspection mirror, inspect first stage turbine wheel (12) for following conditions. Replace turbine module if any of the conditions are found (tasks 5-1-2 and 5-1-3).

a. Broken, cracked, or melted blades (13).

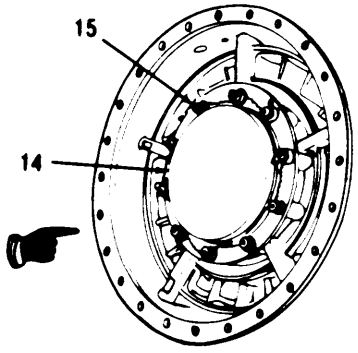
b. Any dents (FOD) to inner-two-thirds of any one blade (12).

c. Wheel rub, binding, or other unusual noises observed when turbine wheel is rotated by hand.



10. Inspect support cover (14) for oil leakage. None allowed.

11. Inspect support cover bolts (15). No broken or missing bolt heads, lockwire secure and intact.



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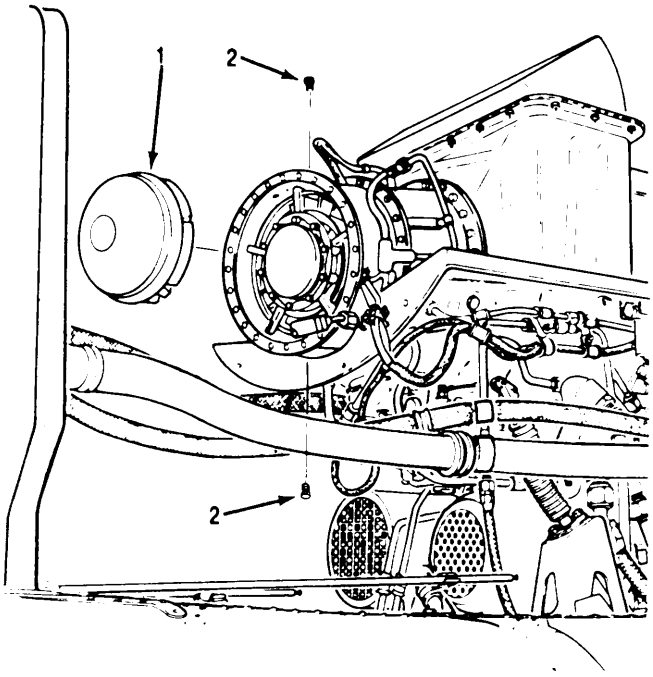
5-1-1. INSPECT FIRST STAGE NOZZLE SHIELD. NOZZLE. AND TURBINE WHEEL (CONT)

INSPECT BEARING SUPPORT COVER

12. Install nozzle shield (l); then coat threads of two positioning plugs (2) with anti-seize compound (C19) and install. Tighten to 100-120 in. lbs and lockwire (C4).



INSPECT

END OF TASK

5-1-2. REMOVE TURBINE MODULE (AVIM)

This task covers: Off Helicopter Removal

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Holding Fixture (T36)

Personnel Required:
68B Aircraft Powerplant Repairer
Helper

Equipment Condition:
Engine mounted in engine turnover stand. (task 1-5-5).

NOTE

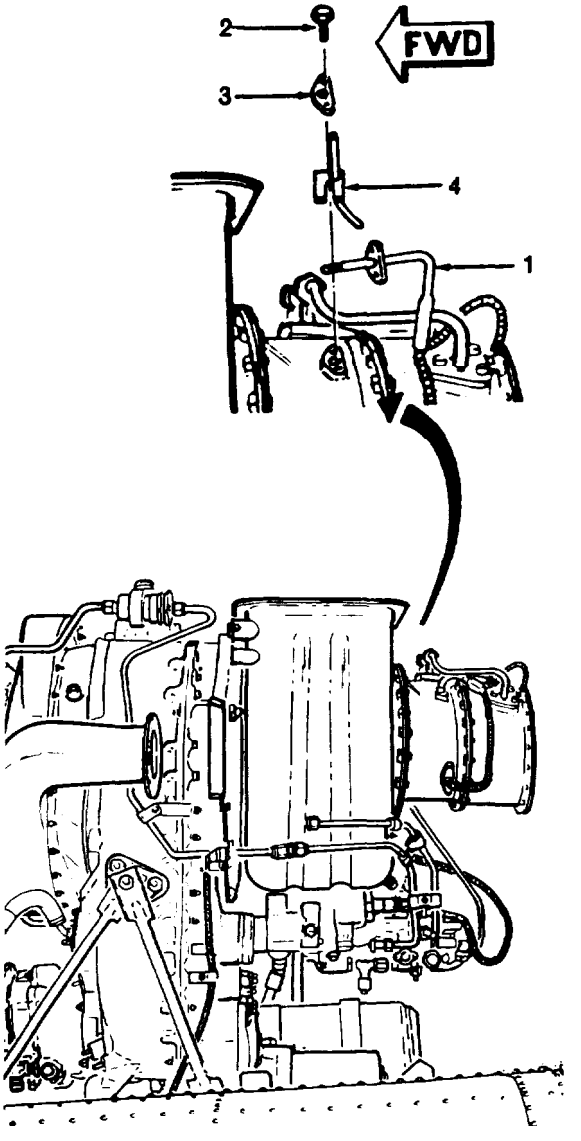
If turbine is being removed for access only, it is not necessary to remove combustion outer case or engine rear mount when performing task 5-1-2.

1. Remove thermocouple (1) by removing lockwire; and two bolts (2). Remove and discard gasket (3).

2. Lock turbine in this position by carefully installing holding fixture (T36) (4) into thermocouple mounting hole and secure with one bolt (2).

3. Remove combustion module (task 4-1-4).

4. Remove horizontal firewall shield (task 5-2-2).



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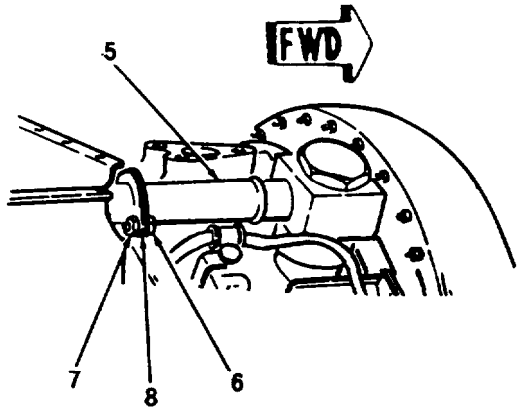
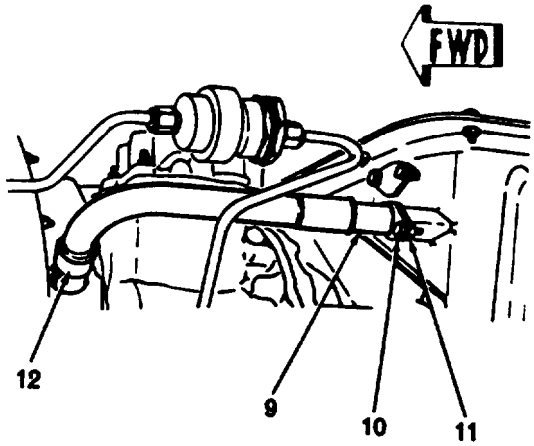
5-1-2. REMOVE TURBINE MODULE (AVIM) (CONT)

NOTE

Vent adapter tube (5) may stick to collector flange. If it does, leave in place until turbine is removed (step 8). Tube can then be removed by tapping gently with a soft hammer.

5. Disconnect vent adapter tube (5) by removing two bolts (6), nuts (7), and gasket (8). Discard gasket (8).





6. From left side of engine, disconnect diffuser vent orifice tube (9) by removing bolts (10), nuts (11), and loosening clamp (12).

GO TO NEXT PAGE

5-1-2. REMOVE TURBINE MODULE (AVIM) (CONT)

CAUTION

If engine is in horizontal position, all weight of turbine assembly must be supported by hand prior to removing retaining nuts.

7. Instruct helper to support weight of turbine assembly (13) until it is removed.

8. Remove turbine assembly (13) by removing and discarding six nuts (14). Record location of all installed shims (15); then remove shims (15).

9. Remove vertical firewall (16).

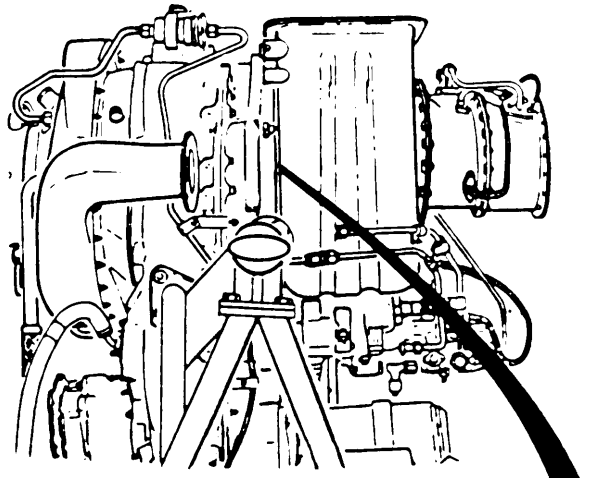
10. Remove and discard packing (17). Remove turbine shaft to pinion gear coupling (18) and remove and discard two seals (19).

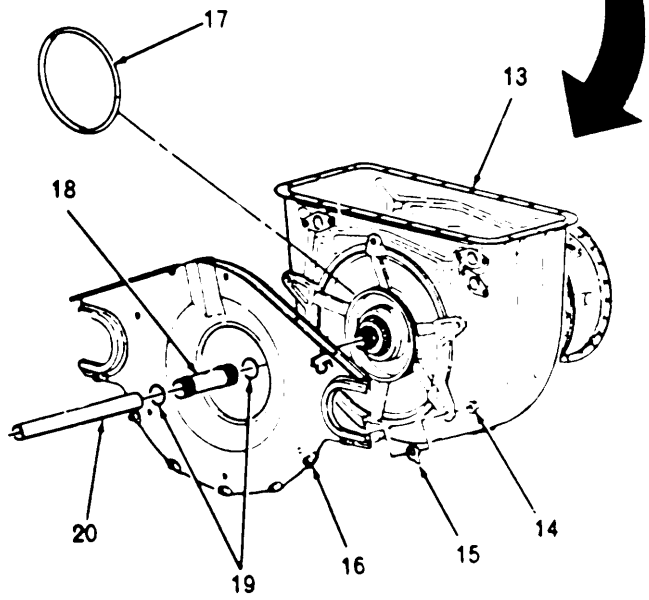
NOTE

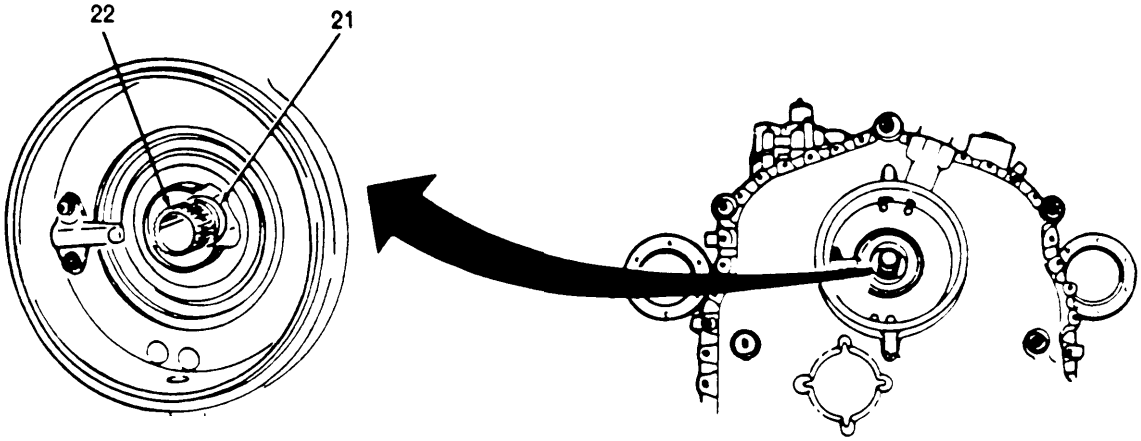
Ensure that turbine to compressor coupling (20) and splined adapter gearshaft (22) are match marked before removal.

11. Remove turbine to compressor coupling (20).

12. Remove and discard two spur adapter gearshaft packings (21).







END OF TASK

5-1-3. INSTALL TURBINE MODULE (AVIM)

This task covers: Off Helicopter Installation

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Thermometer capable of indicating up to 250 degrees F.
Engine Turning Adapter (T8)
Turbine to Compressor Coupling Installation Guide (T27)
Spur Adapter Gearshaft O-ring (Packing) Installation Tool (T28)
Turbine Lower Attaching Nut Torque Adapter (T29)
Turbine Upper Attaching Nut Torque Adapter (T30)
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs
Power Plant Tool Kit
Gas Producer Turbine Rotor Holding Fixture (T36)
Gun Type Electric Heater
Air Compressor Unit
Air Blow Gun Generator Set
Suitable Container 1 qt capacity
Acid Swabbing Brush

Materials:
Lockwire (C4)
Emery Cloth (Cl7)
Anti-seize Compound (C19)
Engine Oil (C30 or C31) presently used in engine
Petrolatum (C34)

Parts:
Packings
Gaskets
Seal Rings
Nuts

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector
2 Helpers to set turbine in place

References:
TM 55-1520-248-23

Equipment Condition:
Engine mounted in engine turnover stand (task 1-5-5).
Starter-generator removed (TM 55-1520-248-23).
Compressor module installed (task 3-1-2).

General Safety Instructions:

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

GO TO NEXT PAGE

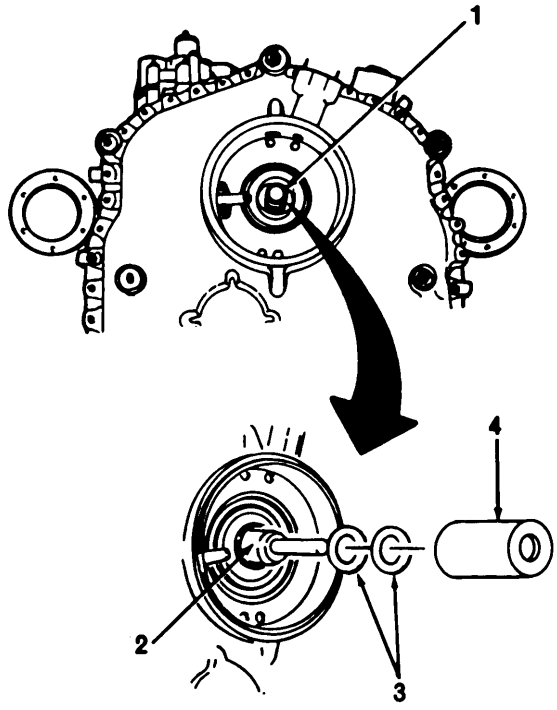
5-1-3. INSTALL TURBINE MODULE (AVIM) (CONT)

1. Inspect ID of spur adapter gearshaft (1) for cleanliness. Remove any accumulations of dirt etc. using an acid swabbing brush; then flush with engine oil (C30 or C31).

2. Install packins installation tool guide (2) on gearshaft (l).

3. Lubricate packings (3), guide (2) and gearshaft (1) with engine oil (C30 or C31), then install packing (2) onto gearshaft (1) using installation tool pusher (4).

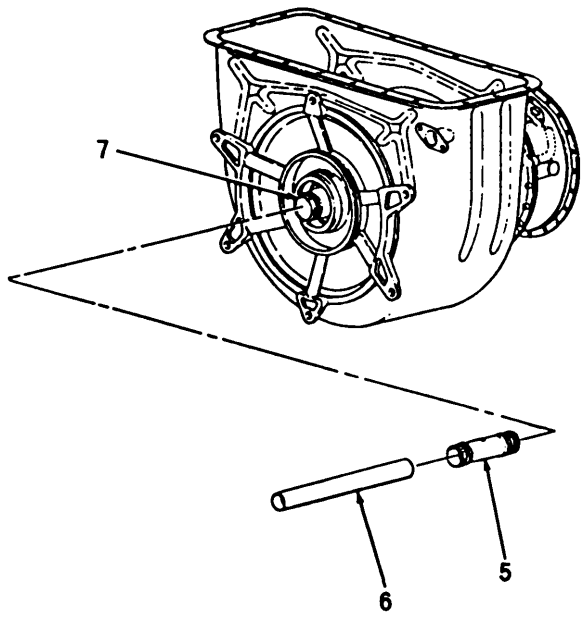
4. Inspect ID of turbine shaft to pinion gear coupling (5), OD of turbine to compressor coupling (6) and power turbine inner shaft ID (7) for carbon accumulation, evidence of circumferential rubbing, and corrosion pitting.



WARNING

Use goggles to protect eyes and face when using compressed air. Do not exceed 30 psig. Do not direct airstream towards yourself or another person. Failure to comply may result in injury to personnel.

Dry cleaning solvent (C8) is flammable and toxic. It can irritate skin and cause burns. Use only in well ventilated area away from heat and open flame. Wear gloves. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



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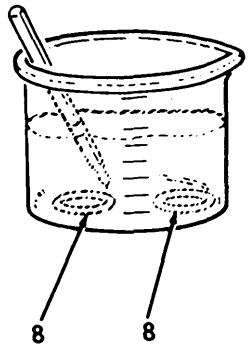
5-1-3. INSTALL TURBINE MODULE (AVIM) (CONT)

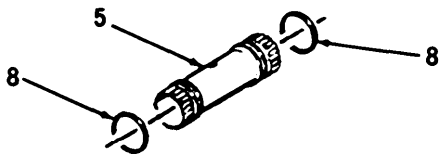
5. Clean turbine shaft to pinion gear coupling (5) and turbine to compressor coupling (6) using acid swabbing brush and dry cleanlng solvent (C8). Dry using compressed air and air blow gun.



6. Prepare two new turbine shaft-to-pinion gear coupling piston seal rings (8) as follows:

a. Place two new piston seal rings (8) and thermometer in suitable container and cover with engine oil (C30 or C31).

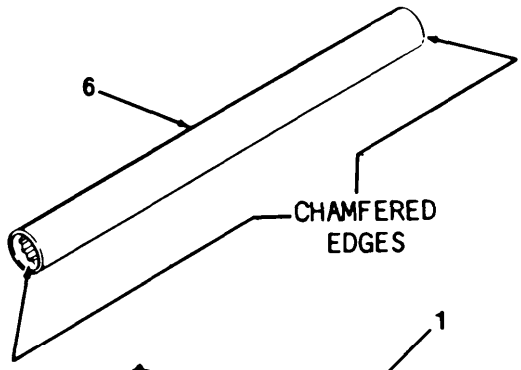
b. Using gun-type electric heater, heat oil to 250 degrees F until rings (8) are expanded; then remove rings.



CAUTION

Do not force seal rings (8). Damage to seal rings will occur.

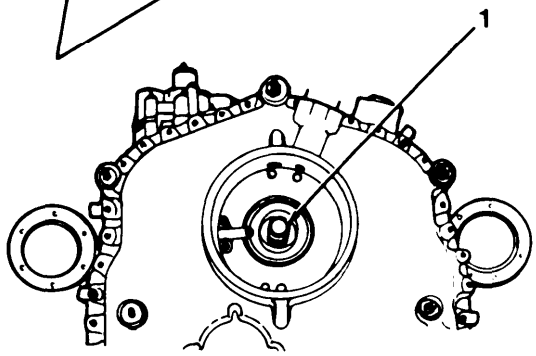
1. Install both piston seal rings (8) on turbine shaft-to-pinion gear coupling (5) and allow to cool to room temperature.

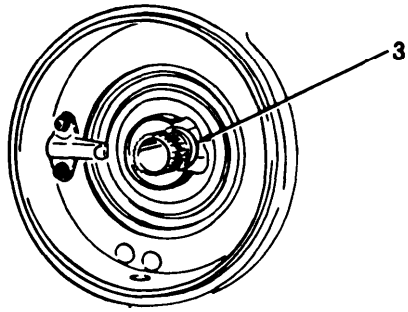


CAUTION

Do not remove more material than absolutely necessary to smooth irregularities or sharp edges on chamfer.

8. Inspect chamfered edges of compressor to turbine coupling (6) for damage (such as nicks, scratches, or gouges etc.) which could cut packing (3) on spur adapter gearshaft (1) during installation of coupling. Burnish out any damage found with emery cloth (C17).





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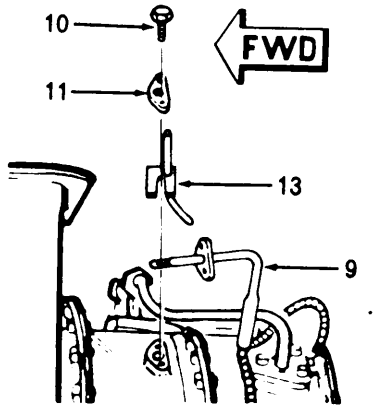
5-1-3. INSTALL TURBINE MODULE (AVIM) (CONT)

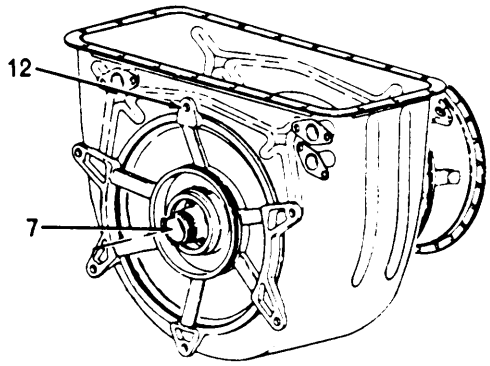
NOTE

If turbine module is replaced, perform steps (9) and (10), otherwise precede to step (11).

9. Remove thermocouple (9) by removing lockwire; and two bolts (10). Remove and discard gasket (11).



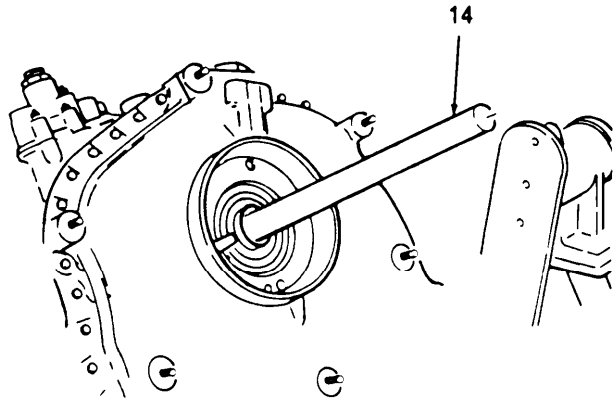
10. Using a flashlight, locate spline lock nut alignment mark inside power turbine inner shaft (7). Align mark with top support mounting foot (12)$_0$ Lock turbine in this position by carefully installing holding fixture (T36) (13) into thermocouple mounting hole and secure with one bolt (10).



NOTE

Turbine to compressor coupling can be used to align turbine and mounting foot.

11. Liberally lubricate turbine-to-compressor coupling installation guide (T27) (14) with engine oil (C30 or C31); then install in ID of spur adapter gearshaft.



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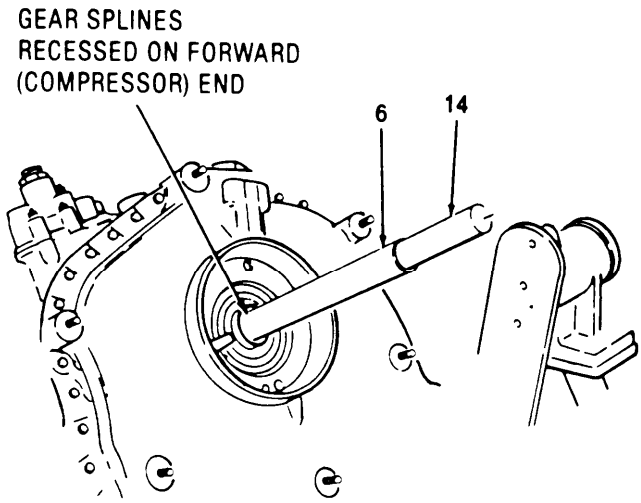
5-1-3. INSTALL TURBINE MODULE (AVIM) (CONT)

CAUTION

Do not use hammer or force by impact to install turbine to compressor coupling. Failure to comply may result in damage to coupling, spur adapter gear shaft and packing, and/or compressor or accessory gearbox module internal components.

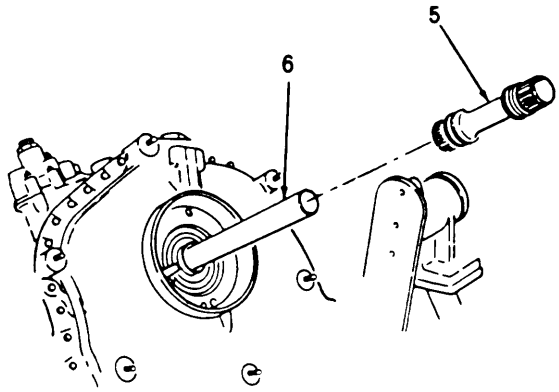
NOTE

Recessed splined end of coupling (6) mates to gearbox.



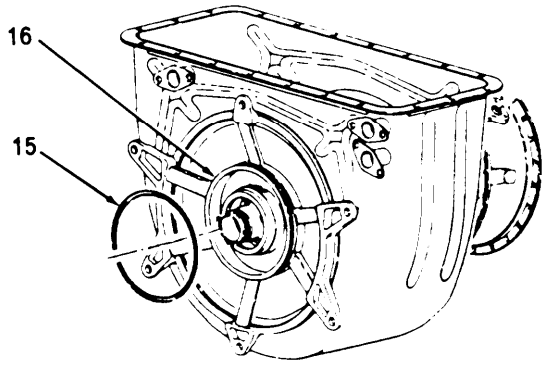
12. Liberally lubricate coupling (6) with engine oil (C30 or C31). Align "00" mark at front of coupling with alignment mark on spur adapter gearshaft.

13. Insert coupling (6) using steady hand pressure; then hold coupling in place and carefully remove guide (14).



14. Liberally lubricate turbine shaft to pinion gear coupling (5) with engine oil (C30 or C31) and install (either end) over turbine-to-compressor coupling (6). Insure splines on coupling engage splines in accessory gearbox.

15. Lubricate new packing (15) with petrolatum (C34) and install on exhaust collector support pilot (16).



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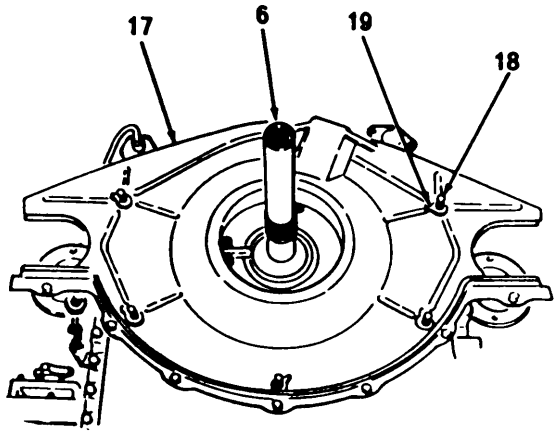
5-1-3. INSTALL TURBINE MODULE (AVIM) (CONT)

NOTE

Make sure all mating surfaces are clean.

16. Install vertical fireshield (17) on SIX mounting studs (18).

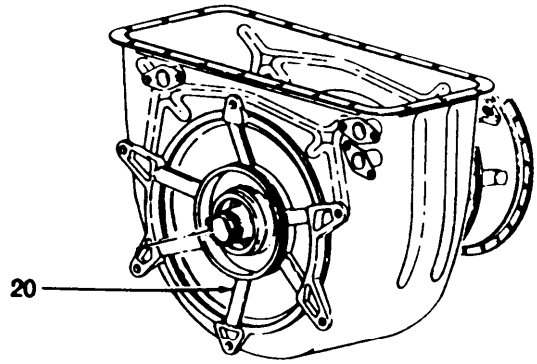


17. If installing the same turbine module that was removed, install shims (19) in locations recorded during turbine module removal (task 5-1-2). If shim location is unknown or if a new turbine module Is being installed, install shims in accordance with total thickness marked on support leg (20) or mounting flange.

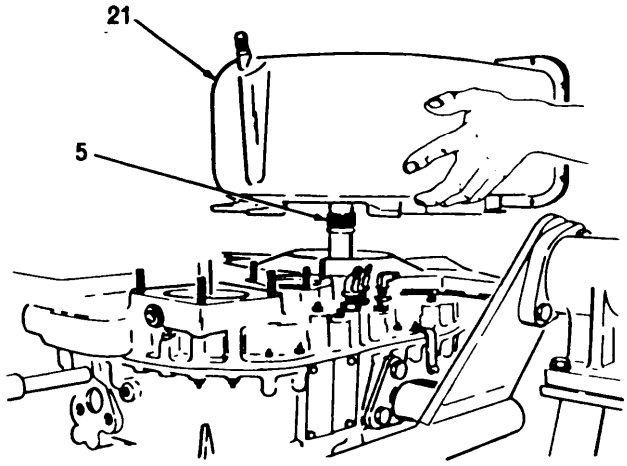
18. Coat threads of six mounting studs (18) with antiseize compound (C19).

CAUTION

All weight of turbine module must be supported by hand until all retaining nuts are installed and torqued. Failure to comply may result in damage to compressor coupling and/or adapter gearshaft.



Make sure seal rings on pinion gear coupling (5) are not stretched and will fit freely into turbine module and gearbox assembly. If not, damage will occur to seal rings during installation.



19. With assistance from two helpers, install turbine module (21) as follows:

a. Align “00” mark at rear of turbine to compressor coupling (6) with top mounting stud.

GO TO NEXT PAGE

5-1-3. INSTALL TURBINE MODULE (AVIM) (CONT)

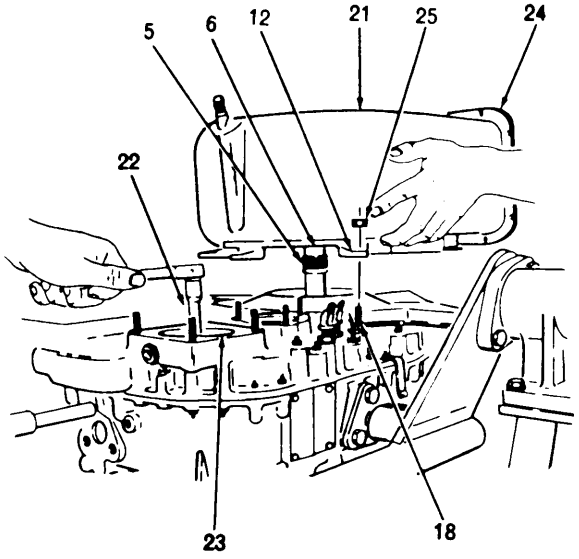
b. Carefully guide turbine module (21) over turbine to compressor coupling (6). If coupling splines do not fully engage second stage turbine rotor splines inside turbine module, perform steps (1) and (2).

(1) Instruct helpers to support weight of turbine module (21).

(2) Install engine turning adapter (T8) (22) in right side starter-generator drive gear (23) and slowly rotate adapter in small clockwise or counterclockwise increments (DO NOT FORCE) until splines engage.

c. Engage turbine shaft to pinion gear coupling (5) by gently rotating power turbine by hand through exhaust collector (24).

d. Move turbine module (21) to engage six mounting studs (18) with six turbine support feet (12).



WARNING

Firewall lip areas are sharp. Serious cuts and injuries may result if extreme caution is not exercised.

e. Install six new nuts (25) and secure as follows:

(1) Using turbine attaching nut torque adapter (T30), tighten upper nut (at 12 o'clock position) to 120-150 in. lbs.

(2) Using turbine attaching nut torque adapter (T29), tighten five remaining nuts to 120-150 in. lbs.

20. Remove holding fixture from thermocouple hole.

GO TO NEXT PAGE

5-1-3. INSTALL TURBINE MODULE (AVIM)

21. Install new gasket (11), thermocouple (9) and two bolts (10). Torque to 30-40 in. lbs. Lockwire (C4).

22. Install horizontal firewall shield (task 5-2-3).

23. Position vent adapter tube (26) into place.

24. Coat bolts (27) with anti-seize compound (C19).

25. Attach vent adapter tube (26) to turbine with two bolts (27), nuts (28) and new gasket (29). Tighten to 35-40 in. lbs.

26. Check torque of breather vent bolt (30) to ensure it is 200-250 in. lbs.

27. Coat bolts (31) with anti-seize compound (C19).

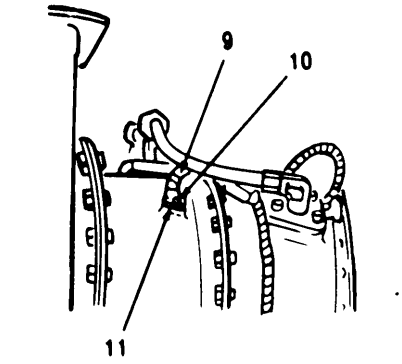
28. On left side of engine, attach diffuser vent orifice tube (32) to turbine with two bolts (31) and nuts (33). Tighten to 35-40 in. lbs.

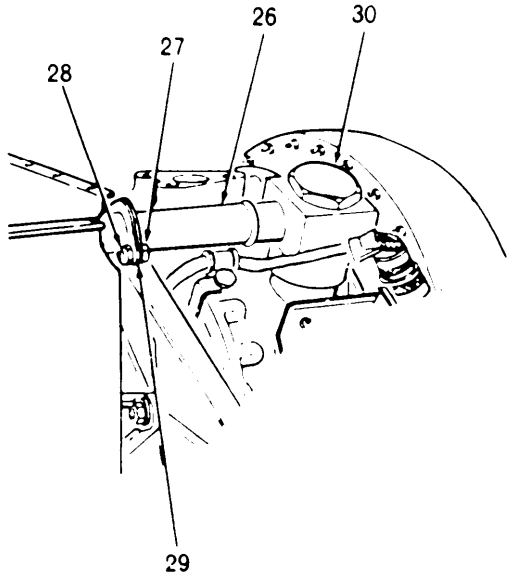
29. Install clamp (34) with nut and bolt. Tighten to 35-40 in. lbs.

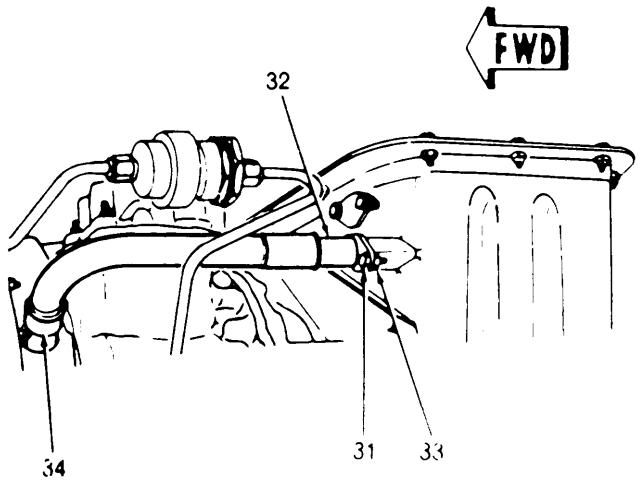
30. Install exhaust shroud and exhaust nozzle assemblies (TM 55-1520-248-23).

31. If removed install combustion module (task 4-1-5).

32. Set both compressor discharge air tubes in place into compressor module.







INSPECT

FOLLOW ON MAINTENANCE:

Verify accuracy of helicopter TGT monitoring system (TM 55-1520-248-23).

END OF TASK

Section II HORIZONTAL FIRE SHIELD

This section includes maintenance procedures for inspection, removal, and installation of horizontal firewall shield.

LIST OF TASKS

5-2-1. INSPECT HORIZONTAL FIREWALL SHIELD FOR CRACKS

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
0.125-in. Twist Drill
Hand Drill

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Visually inspect horizontal firewall shield for cracks.

2. If cracks exceed 2-in. in length replace horizontal firewall shield (tasks 5-2-2 and 5-2-3), if 2-in. or less, weld repair using 29-9 weld rod (AMS 5794).

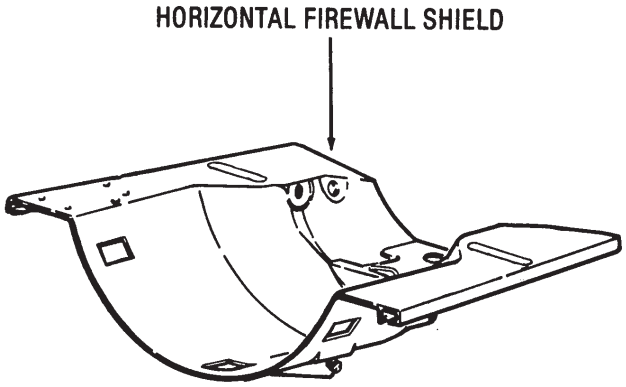
NOTE

If cracks are not accessible for repair on helicopter, remove horizontal firewall shield (task 5-2-2), repair cracks (step 3); then reinstall firewall shield (task 5-2-3).

3. If cracks are 2-in. or less, stop drill each end of crack using a 0.125-in. diameter twist drill.

INSPECT

4. Replace firewall shield (tasks 5-2-2 and 5-2-3) should repaired cracks continue beyond stop drill.



END OF TASK

5-2-2. REMOVE HORIZONTAL FIREWALL SHIELD

INITIAL SETUP

Applicable Configurations:
All

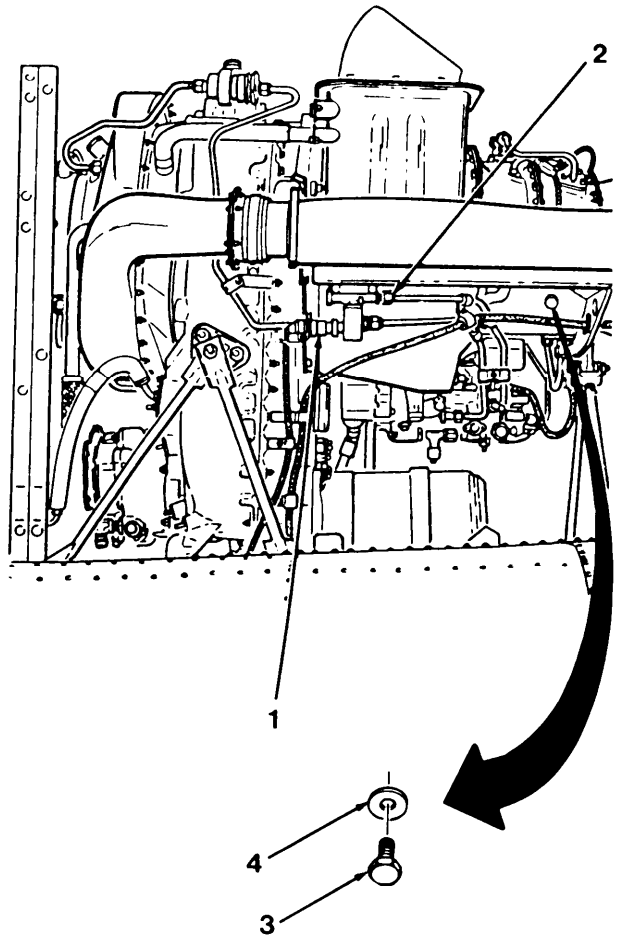
Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References
TM 55-1520-248-23

Equipment Condition:
Right side compressor discharge tube removed (task 4-4-1).
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Remove igniter lead (task 8-5-1).
2. Disconnect burner drain valve drain line (TM 55-1520-248-23).
3. Remove two firewall shield drain lines (TM 55-1520-248-23).
4. Disconnect Np overspeed solenoid connector plug (l).
5. Disconnect coupling nut (2).
6. Remove bolt (3) and washer (4).



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5-2-2. REMOVE HORIZONTAL FIREWALL SHIELD (CONT)

7. Remove fuel supply hose (5) by disconnecting coupling nuts (6) and (7).

8. Disconnect coupling nut (8).

9. Disconnect six thermocouple terminal lugs (9) by removing two nuts (10).

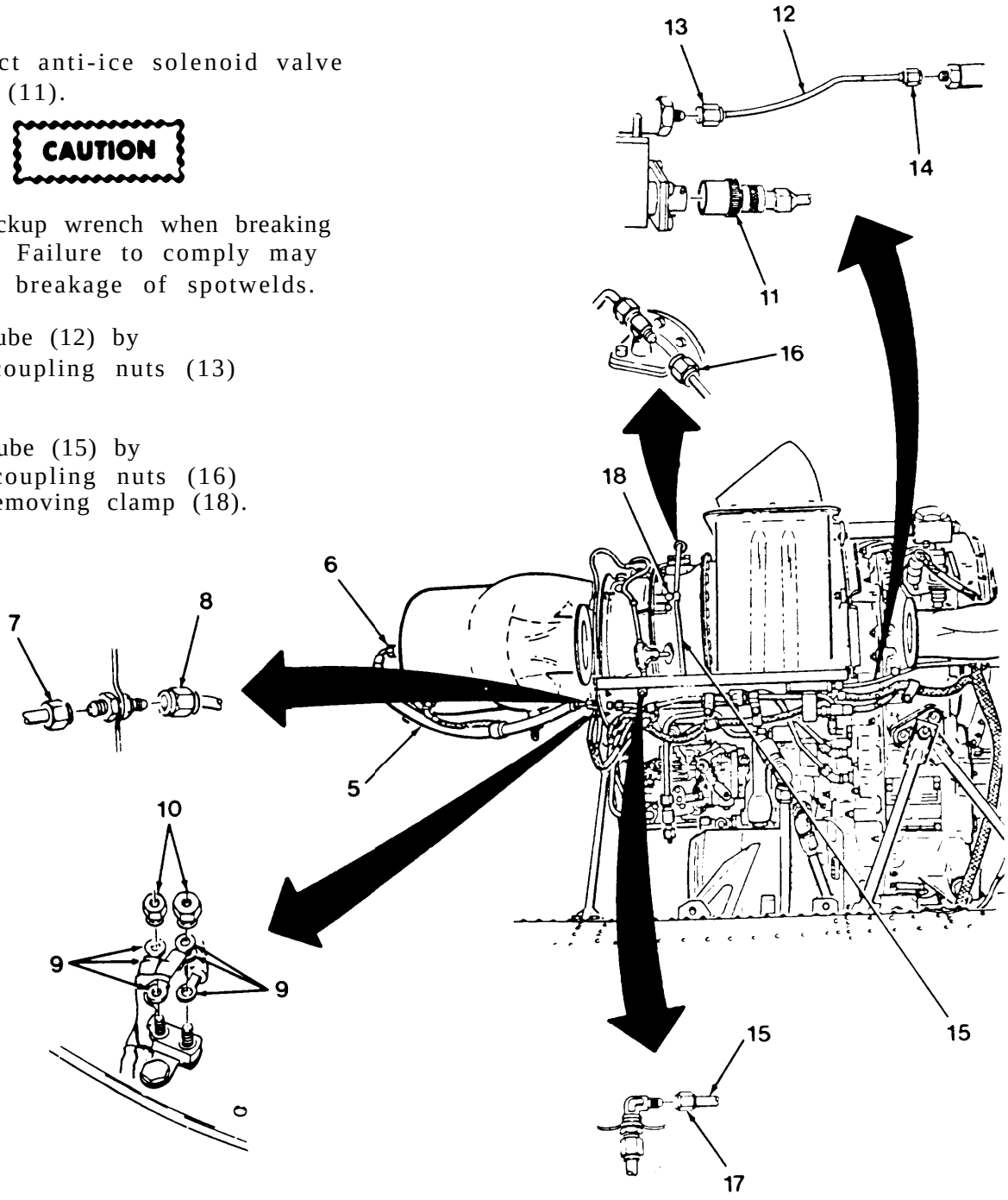
10. Disconnect anti-ice solenoid valve connector plug (11).

CAUTION

Use a backup wrench when breaking nut (13). Failure to comply may result in breakage of spotwelds.

11. Remove tube (12) by disconnecting coupling nuts (13) and (14).

12. Remove tube (15) by disconnecting coupling nuts (16) and (17) and removing clamp (18).



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5-2-2. REMOVE HORIZONTAL FIREWALL SHIELD (CONT)

13. Remove tube (19) as follows.

a. Disconnect clamps (20) and (21) by removing bolts (22) and nuts (23).

b. Disconnect coupling nuts (24) and (25). Remove tube (19) with attaching clamps (20) and (21).

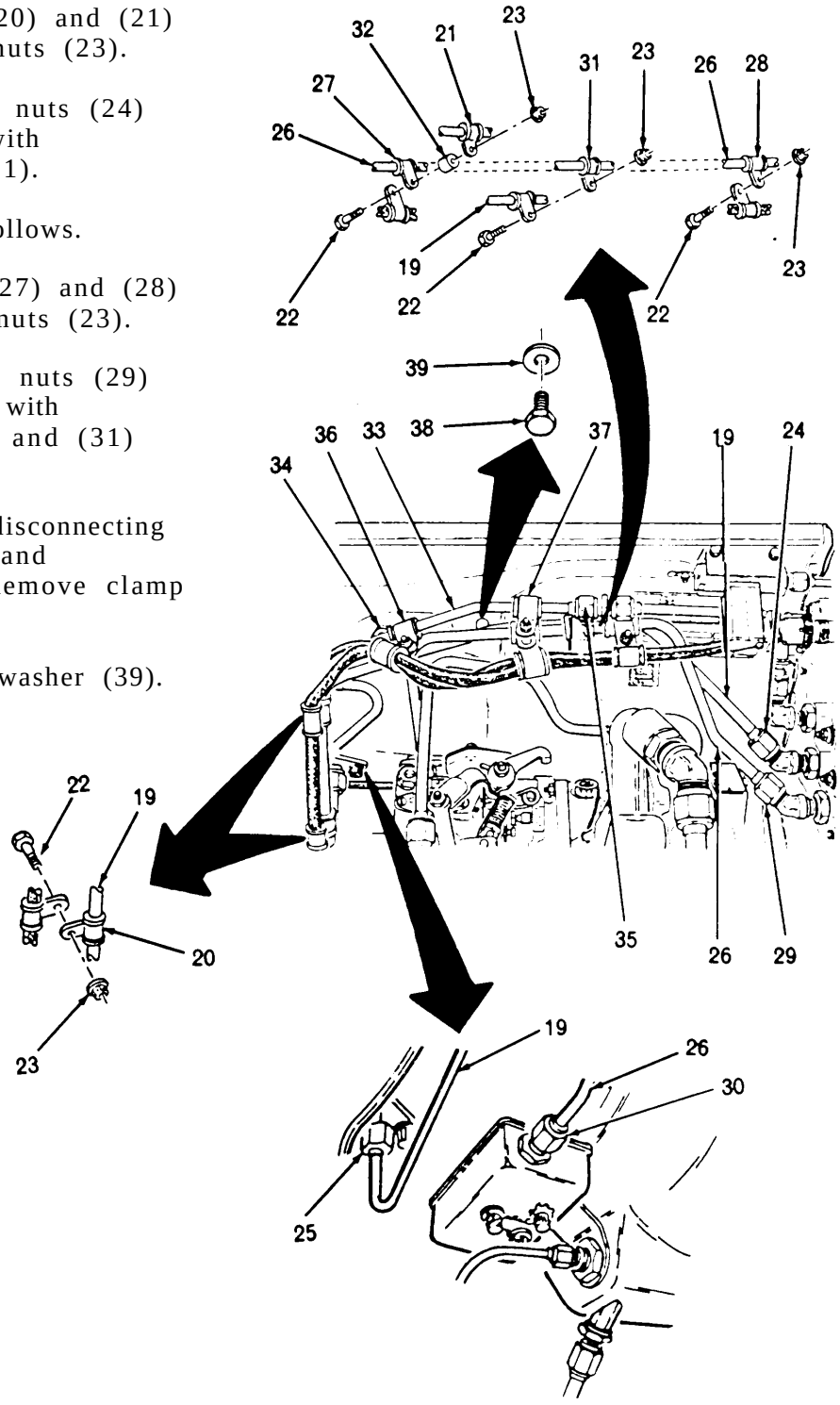
14. Remove tube (26) as follows.

a. Disconnect clamps (27) and (28) by removing bolts (22) and nuts (23).

b. Disconnect coupling nuts (29) and (30). Remove tube (26) with attaching clamps (27), (28), and (31) and spacer (32).

15. Remove tube (33) by disconnecting coupling nuts (34) and (35) and disconnecting clamps (36). Remove clamp (37) with tube (33).

16. Remove bolt (38) and washer (39).



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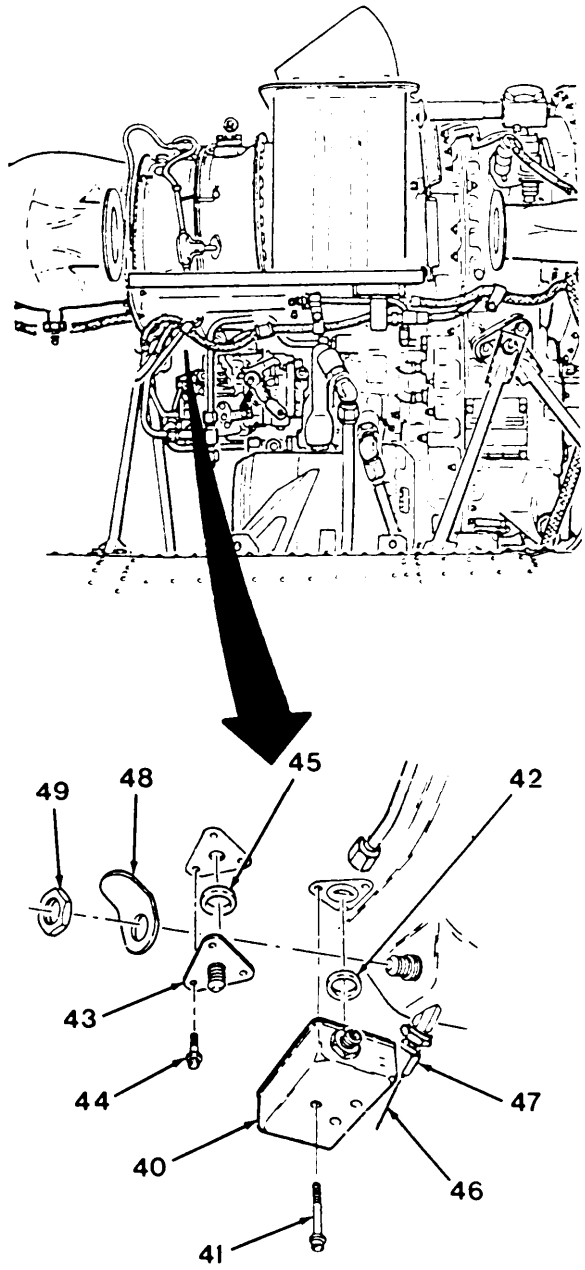
5-2-2. REMOVE HORIZONTAL FIREWALL SHIELD (CONT)

17. Remove scavenge oil sump (40) by removing lockwire and three bolts (41). Discard metal seals (42).

18. Remove scavenge oil fitting (43) by removing lockwire and three bolts (44). Discard metal seals (45).

19. Disconnect helicopter line (46) by disconnecting coupling nut (47).

20. Remove fireshield collector drain cover (48) by removing nut (49).



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5-2-2. REMOVE HORIZONTAL FIREWALL SHIELD (CONT)

21. Deleted

22. Remove rear engine mount assembly (task 4-6-2).

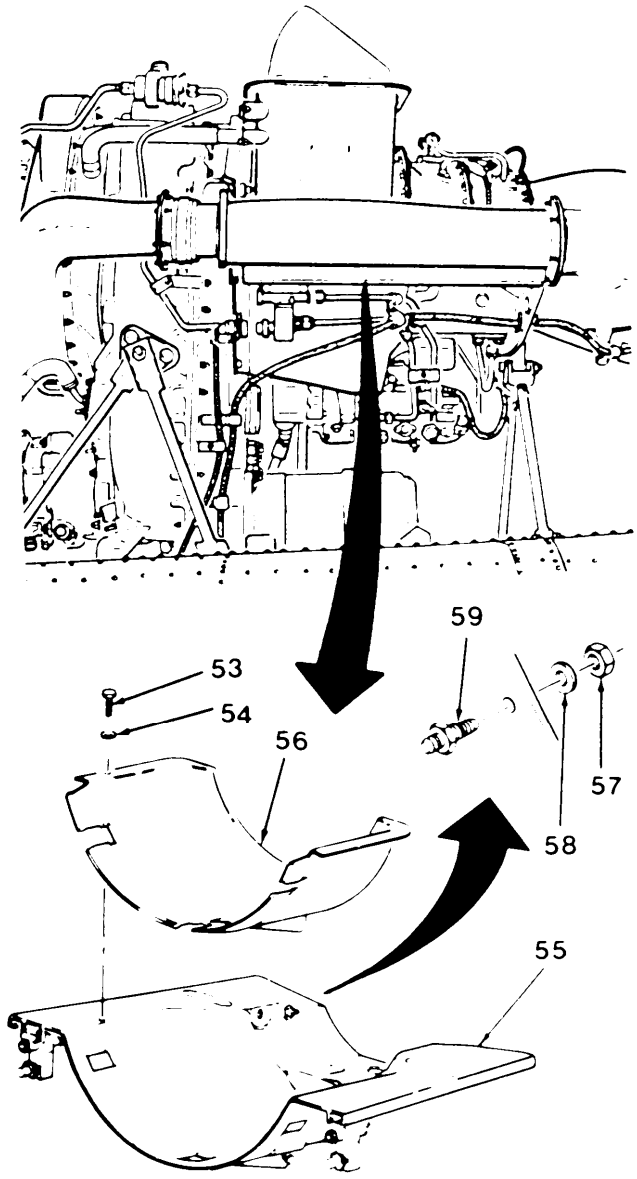
23. Remove two bolts (53) and washers (54) that secure horizontal firewall shield (55) to blanket (56).

24. Pull firewall shield (55) and blanket (56) aft to remove.

NOTE

Horizontal firewall shield is a component of turbine module and turbine module ID plate is mounted on firewall shield. ID plate must be kept with turbine module at all times. When replacing turbine module insure correct ID plate is installed.

25. Remove nut (57), washer (58), and union (59).



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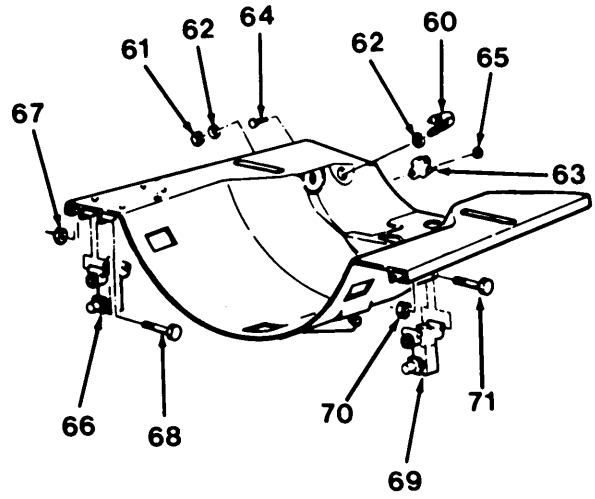
5-2-2. REMOVE HORIZONTAL FIREWALL SHIELD (CONT)

26. Remove elbow (60) by removing nut (61) and two washers (62).

27. Remove thermocouple terminal assembly (63) by removing two bolts (64) and nuts (65).

28. Remove anti-ice solenoid valve (66) by removing two nuts (67) and bolts (68).

29. Remove Np overspeed solenoid (69) by removing two nuts (70) and bolts (71).



END OF TASK

5-2-3. INSTALL HORIZONTAL FIREWALL SHIELD

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs

Materials:
Lockwire (C4)
Anti-Seize Compound (C19)
Soap Solution (C22)
Petrolatum (C34)

Parts:
Metal Seals

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).
Right side compressor discharge tube removed (task 4-4-1).

NOTE

Lightly coat threads of all bolts described in this procedure with anti-seize compound (C19).

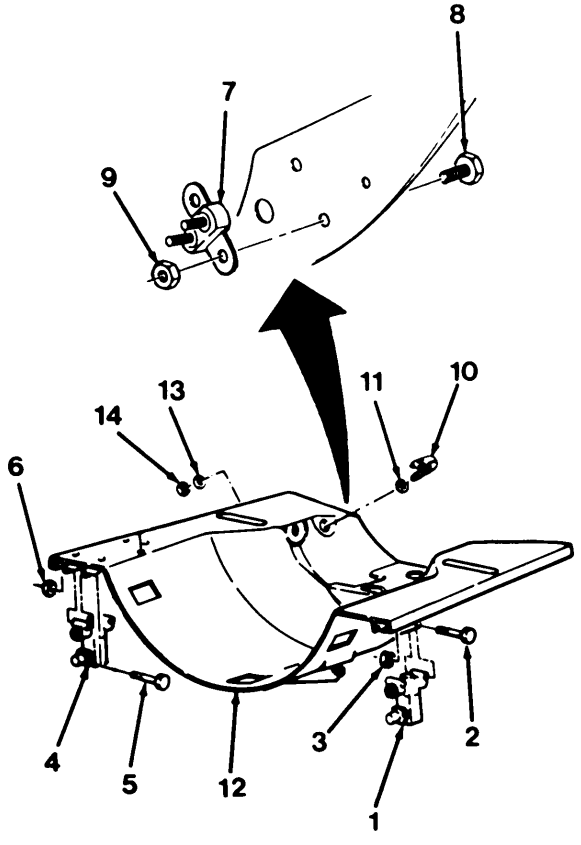
1. Install Np overspend solenoid (1) and secure with two bolts (2) and nuts (3). Torque to 35-40 in. lbs.

2. Install anti-ice solenoid valve (4) and secure with two bolts (5) and nuts (6). Torque to 35-40 in. lbs.

3. Install thermocouple terminal assembly (7) and secure with two bolts (8) and nuts (9).

4. Place washer (11) on elbow (10).

5. Install elbow (10) through firewall shield (12) and secure with washer (13) and nut (14).



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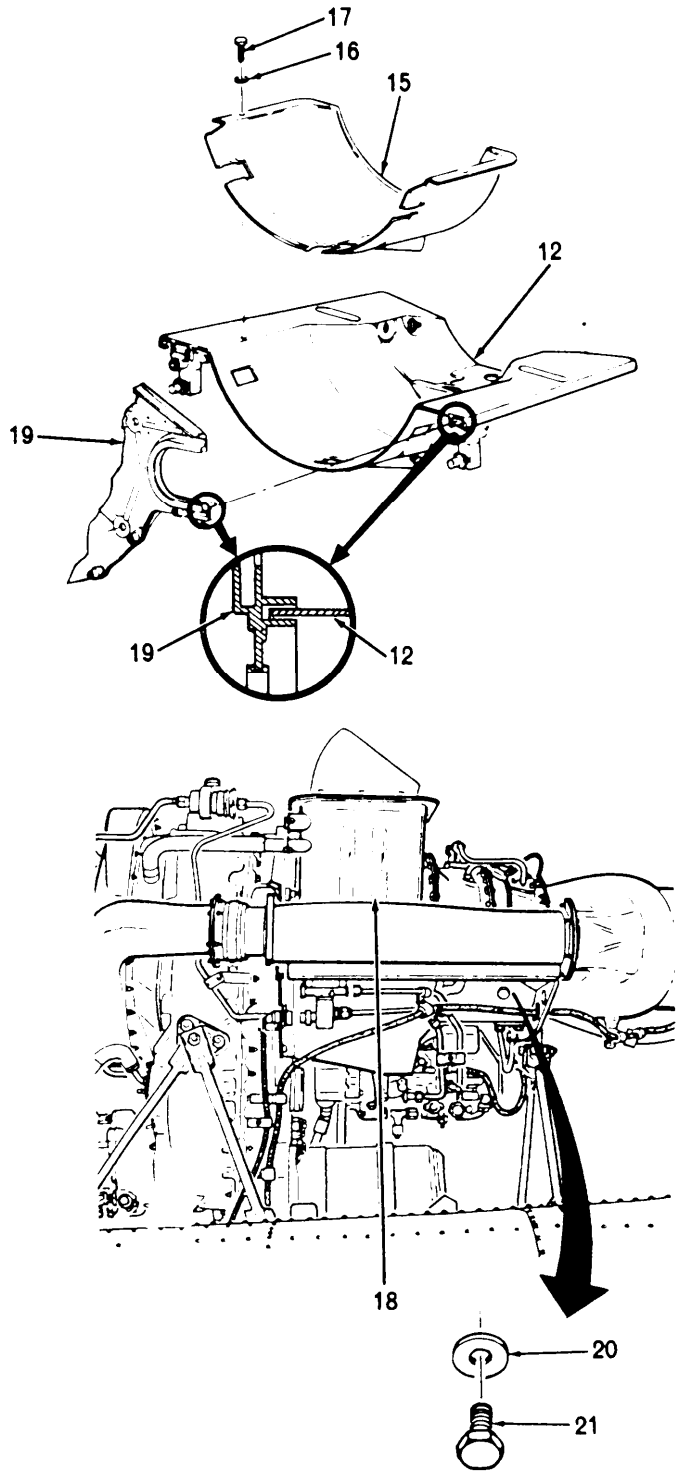
5-2-3. INSTALL HORIZONTAL FIREWALL SHIELD (CONT)

6. Install fireshield insulation blanket (15) on firewall shield (12) and secure with two washers (16) and bolts (17).

7. Slide firewall shield (12) turbine module (18). Insure leading edge engages vertical firewall slip joint (19).

8. Install, but do not tighten, one washer (20) and bolt (21) on each side of engine.



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5-2-3. INSTALL HORIZONTAL FIREWALL SHIELD (CONT)

9. Install rear engine mount assembly (task 4-6-3).

10. Deleted,

11. Install helicopter line (27) by connecting coupling nut (28).

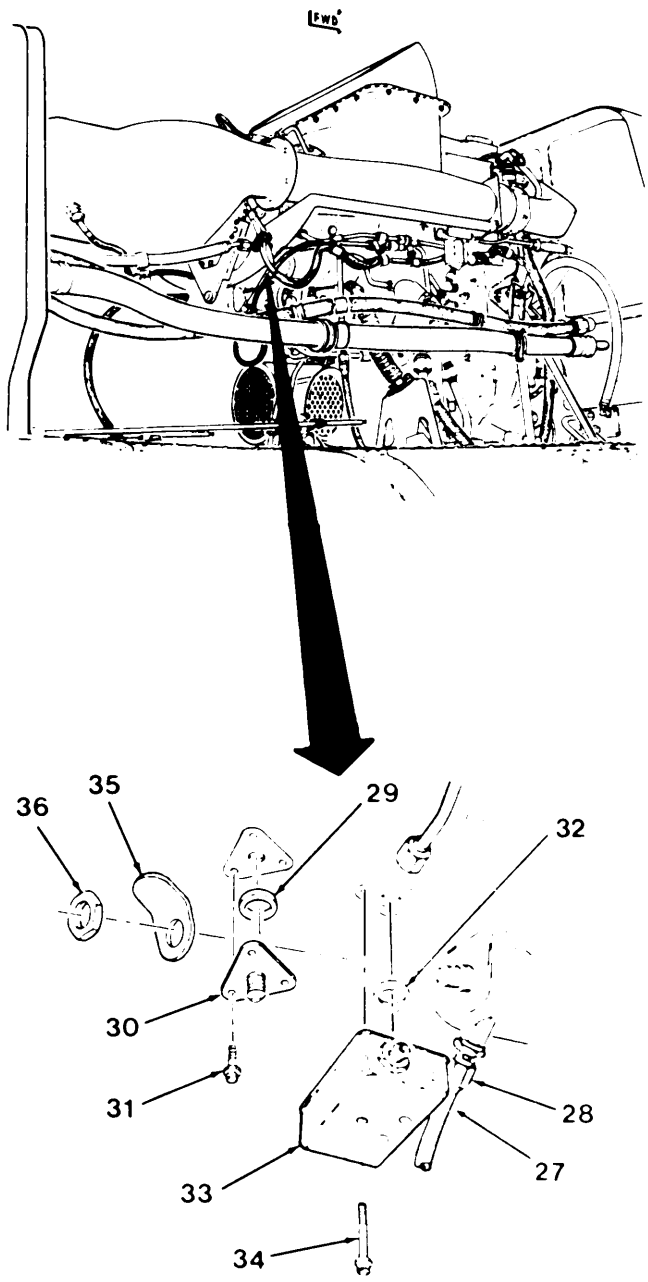
12. Lightly coat new metal seal (29) with petrolatum (C34); then install on scavenge oil fitting (30).

13. Install scavenge oil fitting (30) and secure with three bolts (31). Torque to 70-85 in. lbs. Lockwire (C4).

14. Lightly coat new metal seal (32) with petrolatum (C34); then install on scavenge oil sump (33).

15. Install external sump (33) and secure with three bolts (34). Torque to 70-85 in. lbs. Lockwire (C4).

16. Install fireshield collector drain cover (35) and secure with nut (36). Torque to 65-70 in. lbs.



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5-2-3. INSTALL HORIZONTAL FIREWALL SHIELD (CONT)

28. Install tube (68) and connect coupling nuts (69) and (70). Torque to 65-100 in. lbs.

29. Secure clamp (71), on tube (68), to bracket (72) with bolt (73) and nut (74).

30. Install tube (75) and connect coupling nuts (76) and (77). Torque to 65-100 in. lbs.

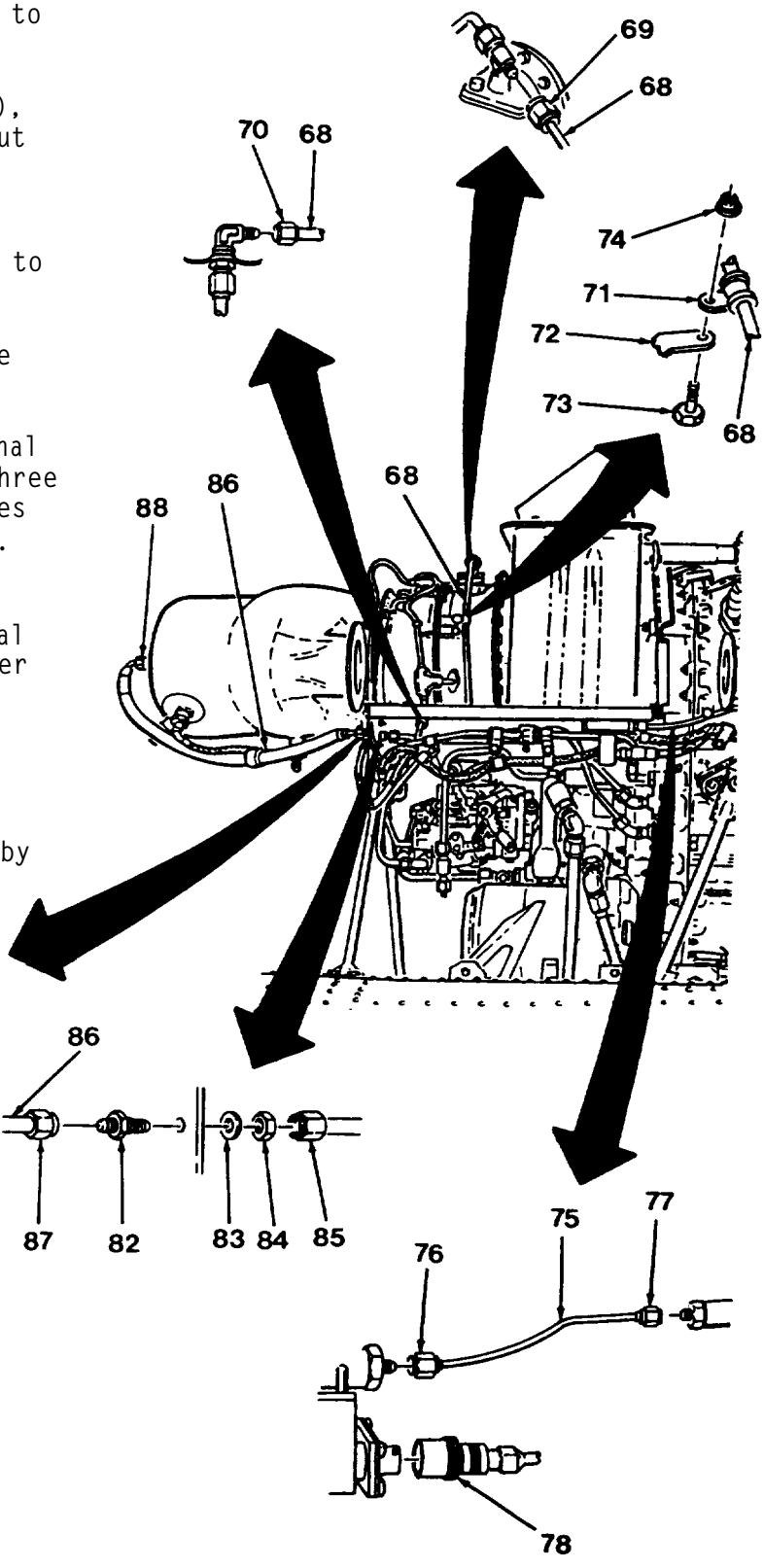
31. Connect anti-ice solenoid valve connector plug (78).

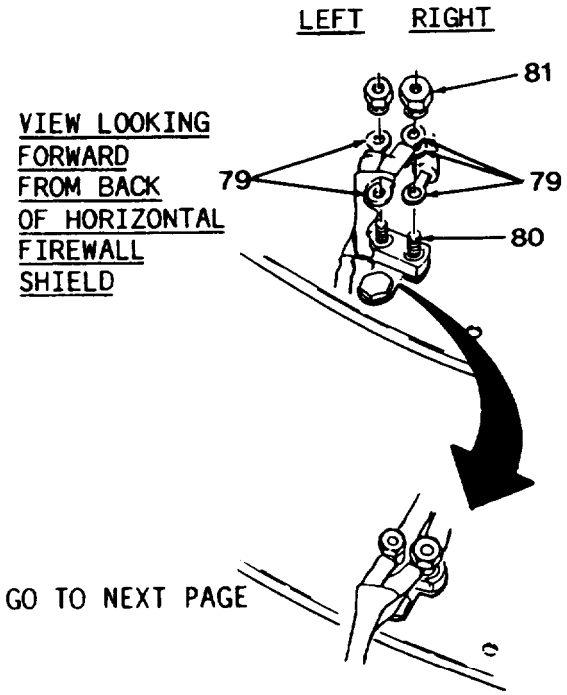
32. Install six thermocouple terminal lugs (79) on terminal posts (80). Three white wires on left; three green wires on right. Secure with two nuts (81). Torque to 18-24 in. lbs.

33. Install union (82) on horizontal firewall shield and secure with washer (83) and nut (84).

34. Connect coupling nut (85) and torque to 150-200 in. lbs.

35. Install fuel supply hose (86) by connecting coupling nut (87) and (88); then torque to 150-200 in. lbs. Lockwire (C4) coupling nut (88).





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5-2-3. INSTALL HORIZONTAL FIREWALL SHIELD (CONT)

36. On left side of engine, tighten bolt (21).

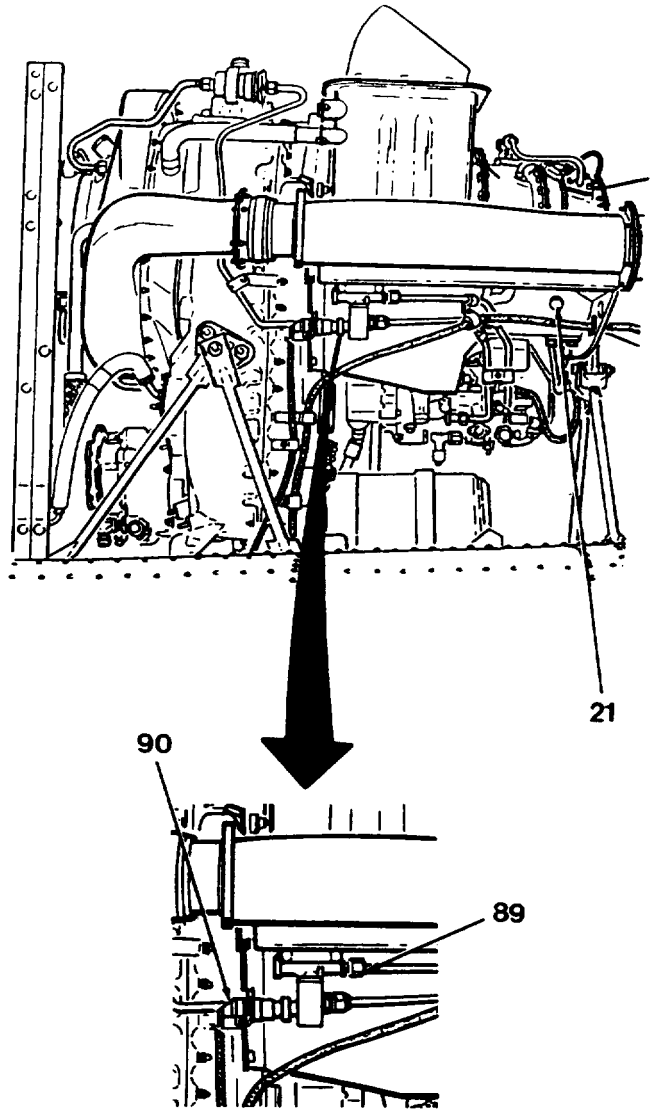
37. Connect coupling nut (89) and torque to 80-120 in. lbs.

38. Connect Np overspeed solenoid connector plug (90).

39. Connect burner drain valve drain line (TM 55-1520-248-23).

40. Install igniter lead (task 8-5-3).

41. Install right side compressor discharge air tube (task 4-4-6).



INSPECT

FOLLOW ON MAINTENANCE:
Purge engine fuel system (task 7-1-1).

END OF TASK

Section III THERMOCOUPLE ASSEMBLY

This section Includes maintenance procedures for testing, removal, inspection, and installation of thermocouple.

LIST OF TASKS

5-3-1. TEST THERMOCOUPLE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Multimeter
Torque Wrench 0-30 in. lbs

Personnel Required:
68B Aircraft Powerplant Repairer
68F Aircraft Electrician

References:
TM 55-1520-248-23

Equipment Conditions
On Helicopter: Engine cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Disconnect thermocouple terminal lugs (1) and (2) by removing two nuts (3).

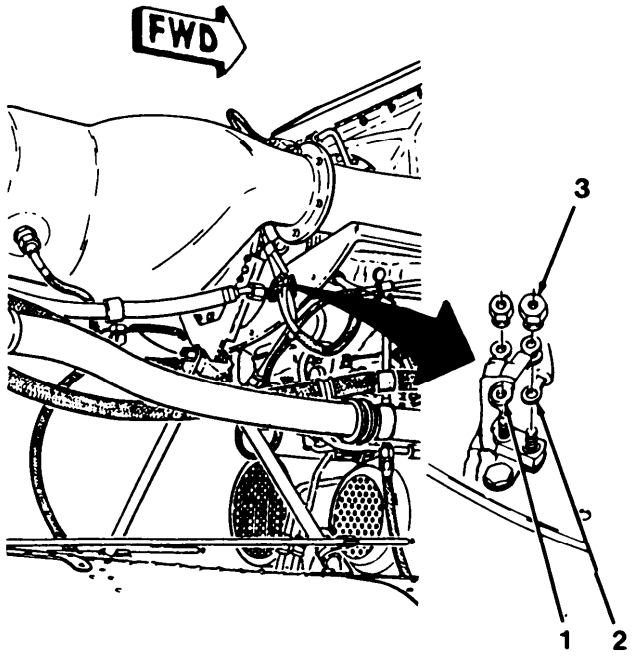
2. Test continuity by connecting one lead from multimeter to each terminal lug (1) and (2). If continuity is not present replace thermocouple assembly (tasks 5-3-2 and 5-3-4).

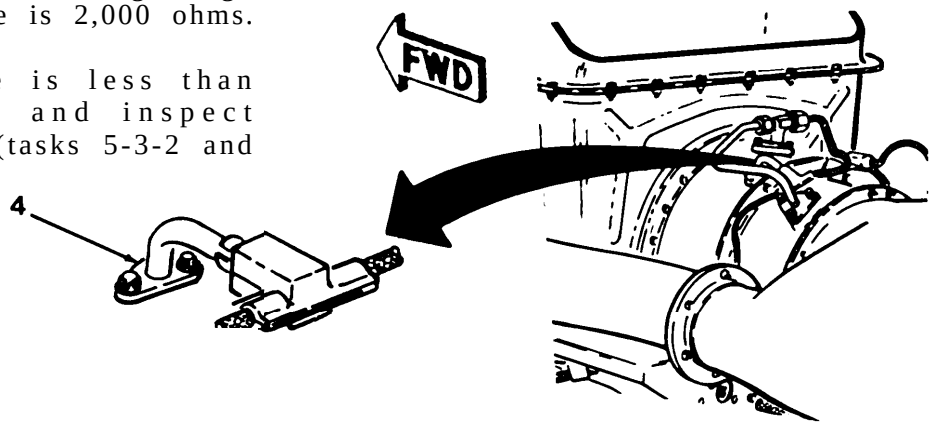
NOTE

The internal resistance of an acceptable thermocouple assembly measured across terminal lugs is 0.27-0.37 ohms at room temperature.

3. Test insulation resistance by connecting one lead from multimeter to either terminal lug (1) or (2) and second lead to any probe mounting flange (4). Minimum resistance is 2,000 ohms.

a. If resistance is less than 2,000 ohms remove and inspect thermocouple assembly (tasks 5-3-2 and 5-3-3).





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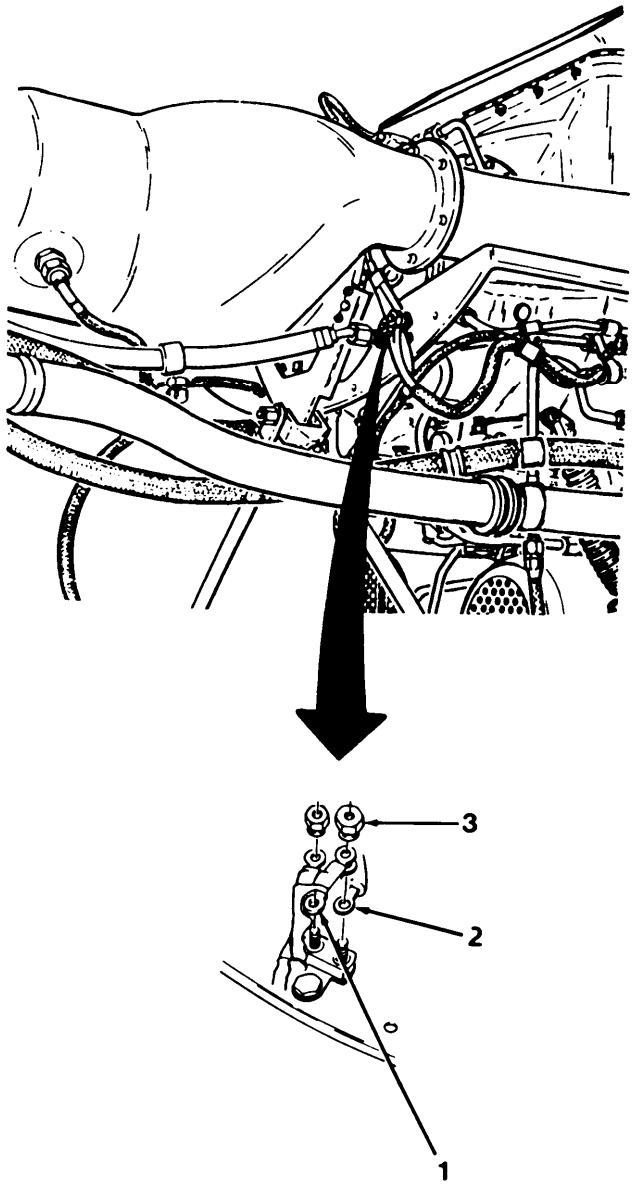
5-3-1. TEST THERMOCOUPLE ASSEMBLY (CONT)

NOTE

If insulation resistance test is performed with thermocouple assembly removed, test from either terminal lug to each of four probe flanges.

b. Repeat test procedure. If minimum resistance is less than 2,000 ohms install serviceable thermocouple assembly (task 5-3-4).

4. Install terminal lugs (1) and (2) and secure with two nuts (3). Torque to 18-24 in. lbs.



END OF TASK

5-3-2. REMOVE THERMOCOUPLE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On helicopter: Engine cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Remove horizontal firewall shield (task 5-2-2).

2. Remove clamp (1) by removing nut (2) and bolt (3).

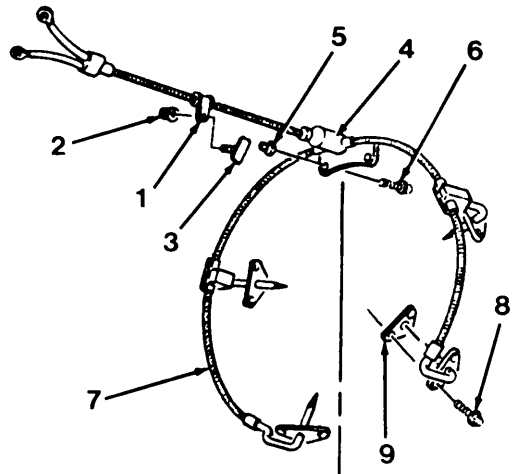
3. Disconnect mounting bracket (4) by removing two nuts (5) and bolts (6).

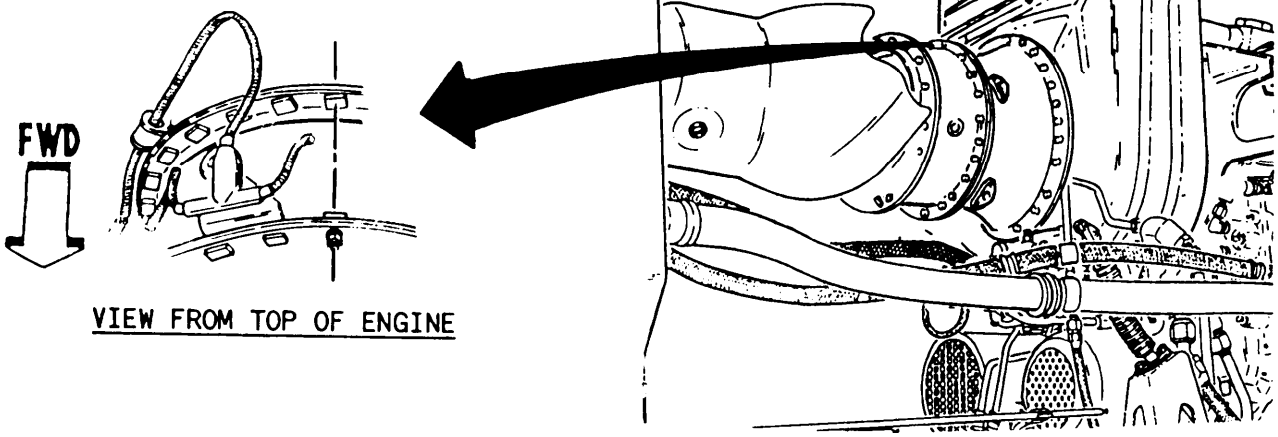
NOTE

When removing thermocouple assembly start at one end and work through to opposite end.

4. Remove thermocouple assembly (7) by removing lockwire and eight bolts (8).

5. Remove and discard four gaskets (9).





END OF TASK

5-3-3. INSPECT THERMOCOUPLE ASSEMBLY

This task covers: Off Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Materials:
Wiping Rag (Cl)

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment Condition:
Thermocouple assembly removed. (task 5-3-2).

1. Inspect thermocouple assembly (1) using flashlight and magnifier. Replace thermocouple assembly (1) if any of following conditions exist:

a. Broken or frayed leads (2).

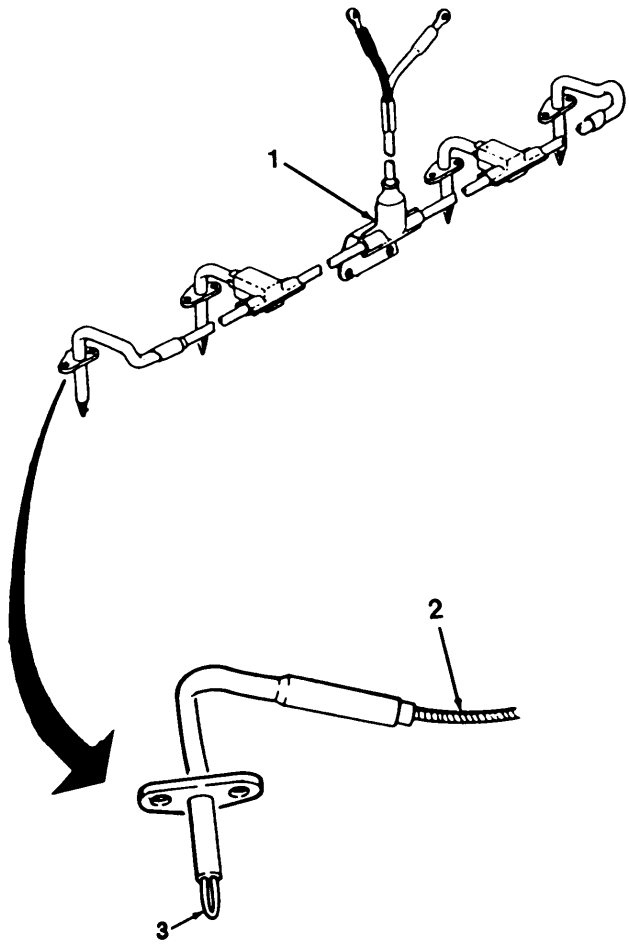
b. Broken, melted, or cracked tips (3).

c. Tips (3) having erosion of more than 25% of either wire.

CAUTION

Engine thermocouples should never be immersed or sprayed with cleaning solvents. Liquid cleaning solvents will penetrate the porous magnesium oxide insulation. Engine heat will vaporize the solvents leaving a residue containing carbon which causes a low resistance to ground.

2. Clean carbon deposits from tips (3) using a clean wiping rag (Cl).



END OF TASK

5-3-4. INSTALL THERMOCOUPLE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 0-30 in. lbs
Torque Wrench 30-150 in. lbs

Materials:
Lockwire (C4)
Anti-seize Compound (C19)

Parts:
Gaskets

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand.
Horizontal firewall shield removed.

1. Lightly coat threads of all attaching bolts with anti-seize compound (C19).

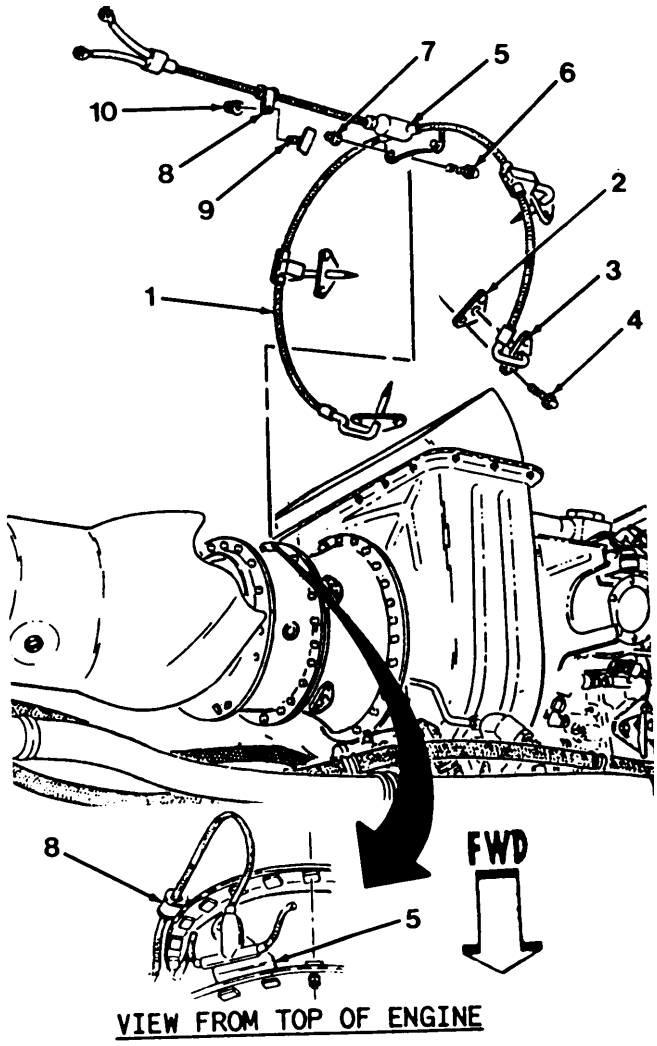
NOTE

When installing thermocouple assembly start in middle and work through to each end.

2. Install thermocouple assembly (1) by installing four gaskets (2), and probe flanges (3). Secure with eight bolts (4). Torque to 30-40 in. lbs. Lockwire (C4).

3. Install mounting bracket (5) and secure with two bolts (6) and nuts (7). Torque to 20-30 in. lbs.

4. Install clamp (8) and secure with bolt (9) and nut (10). Torque to 20-30 in. lbs.



INSPECT

FOLLOW ON MAINTENANCE:
Verify accuracy of helicopter TGT indicating system (TM 55-1520-248-23).

END OF TASK

section IV VERTICAL FIRE SHIELD

This section includes maintenance procedures for inspection of vertical fire-wall shield.

LIST OF TASKS

5-4-1. INSPECT VERTICAL FIREWALL SHIELD

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
0.125-in. Twist Drill
Hand Drill

References:
TM 55-1520-248-23
TM 55-1500-204-25/1

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

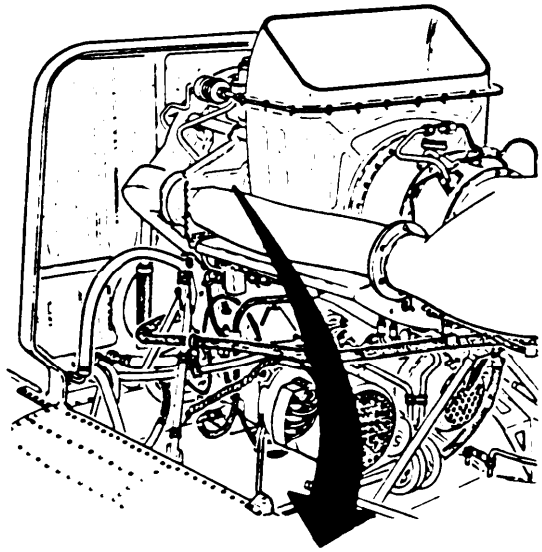
1. Visually inspect vertical firewall shield for cracks as follows:

a. If cracks exceed 2 in. in length remove turbine module (task 5-1-2), install serviceable vertical firewall shield; then install turbine module (task 5-1-3).

b. If cracks are not accessible for repair, remove turbine module (task 5-1-2), repair cracks (step c); then install turbine module (task 5-1-3).

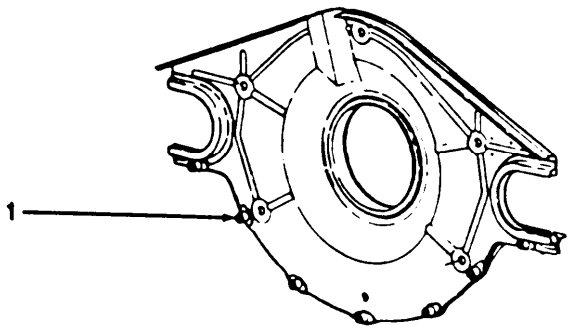
c. If cracks are 2 in. or less, stop drill each end of crack using a 0.125-in. diameter twist drill.

2. Inspect nutplates (1) and replace if damaged (TM 55-1500-204-25/1).



INSPECT

3. Replace vertical firewall shield (tasks 5-1-2 and 5-1-3) should any crack continue beyond stop drill.



END OF TASK

CHAPTER 6
ACCESSORY GEARBOX MODULE MAINTENANCE

Section I GENERAL INSTRUCTIONS

This section includes maintenance procedures for replacement of accessory gearbox module. Additional maintenance procedures include inspection of accessory gearbox attaching nuts, replacement of accessory and drive seals, replacement of studs and priming engine oil pump.

LIST OF TASKS

6-1-1. INSPECT ACCESSORY GEARBOX ATTACHING NUTS

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs
Turbine Attaching Nut Torque Adapter (T29)
Turbine Attaching Nut Torque Adapter (T30)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23
TM 55-1500-204-25/1

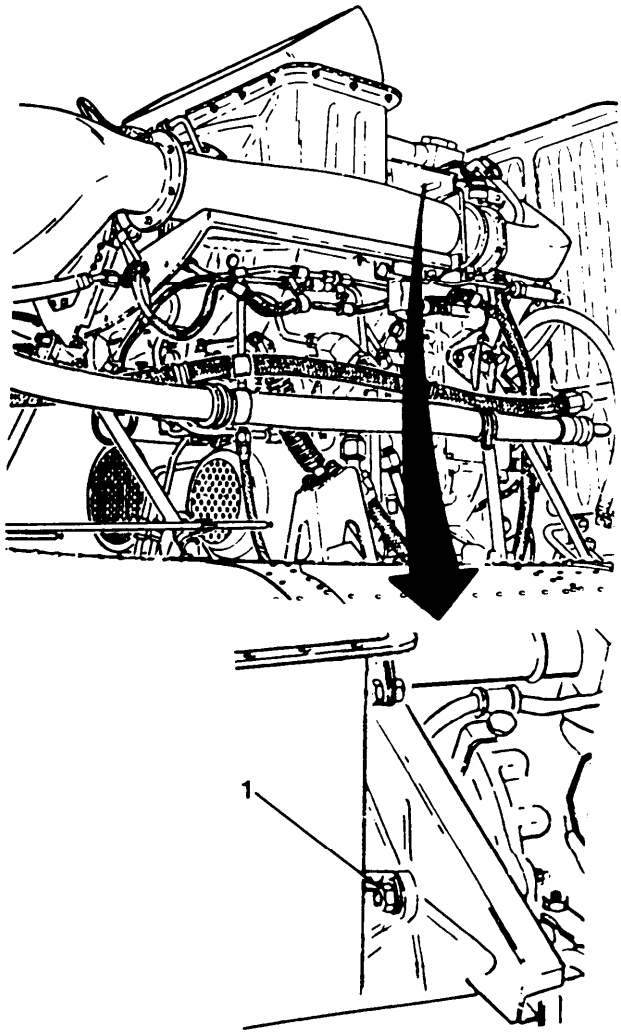
Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (1-5-5).

NOTE

To obtain proper torque using turbine attaching nut torque adapters, refer to TM 55-1500-204-25/1.

1. Check torque of top three upper attaching nuts (1) using torque wrench and turbine attaching nut torque adapter (T30) Replace nuts that are less than l20 in. lbs.

2. Torque nuts (1) to 150 in. lbs.



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6-1-1. INSPECT ACCESSORY GEARBOX ATTACHING NUTS (CONT)

3. Remove the three nuts (2) and three access plates (3).

NOTE

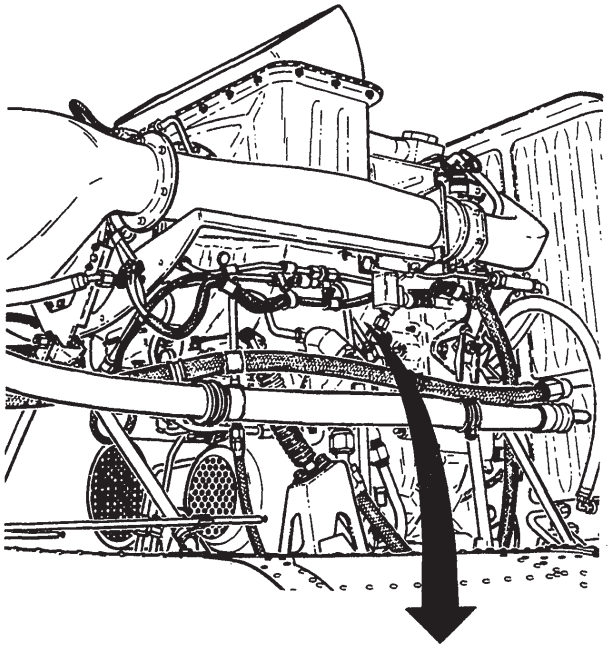
If difficulties persist when using the adapter (T29), it may aid accomplishment of the task by removing the engine components (TM 55-2840-256-23) that hinder the handle, extension and/or adapter onto the attaching nuts.

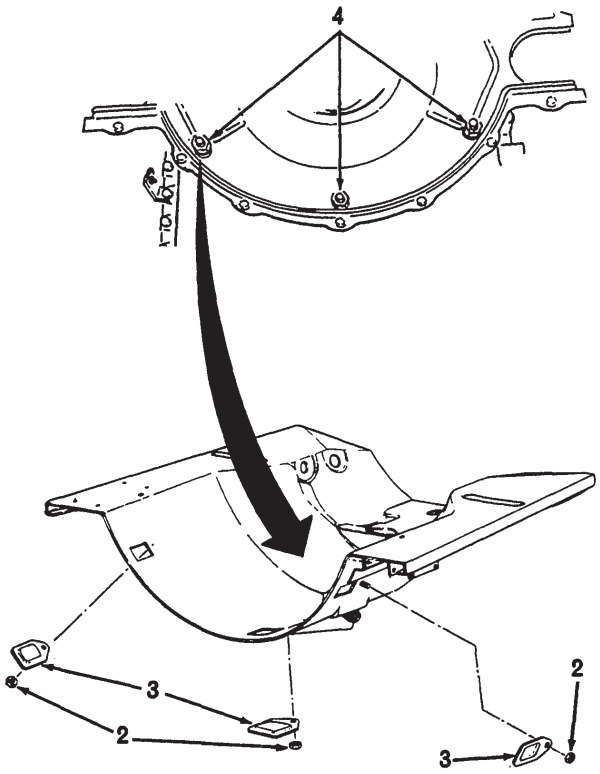
4. Check torque of lower three attaching nuts (4) using torque wrench and turbine attaching nut torque adapter (T29). Replace all nuts that are less than 120 in. lbs.

5. Torque nuts (4) to 150 in. lbs.

6. Install the three access plates (3) and nuts (2).

INSPECT





END OF TASK

6-1-2. REMOVE ACCESSORY GEARBOX MODULE (AVIM)

This task covers: Off Helicopter Removal

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
Engine mounted In engine turnover stand (task 1-5-5).
All helicopter gearbox interface compo-ments removed (TM 55-1520-248-23).

1. Remove electrical harness (task 8-1-2).

2. Remove ignition exciter (task 8-2-2) .

3. Remove start counter (task 8-8-2).

4. Remove igniter lead (task 8-5-1).

5. (T703-AD-700 ONLY) Remove Pc inlet filter (1) and line (2) as follows:

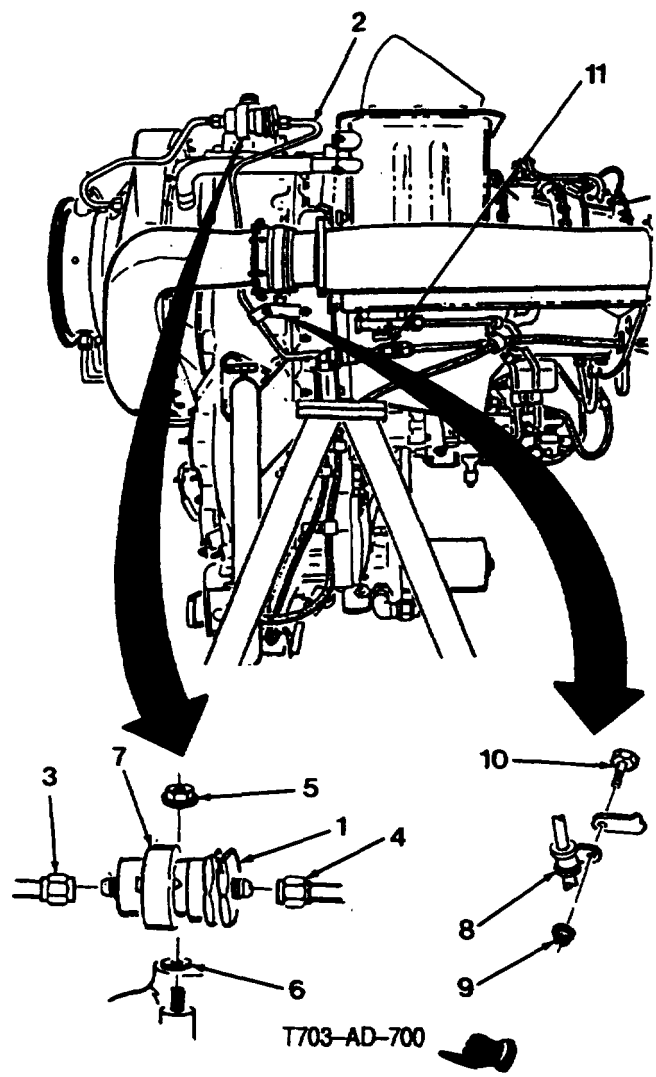
a. Hold Pc inlet air filter assembly (1) from rotating and disconnect coupling nuts (3) and (4).

b. Remove nut (5), Pc inlet air filter assembly (1), and washer (6).

c. Remove clamp (7) from Pc inlet air filter assembly (1).

d. Remove clamp (8) by removing nut (9) and bolt (10).

e. Disconnect coupling nut (11) and remove line (2).



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5A. (T703-AD-700B ONLY) Remove Pc inlet filter (11A) and line (11B) as follows:

a. Hold Pc inlet air filter assembly (11A) from rotating and disconnect coupling nuts (11C) and (11D).

b. Remove bolt (11E) and nut (11F) and remove filter (11A).

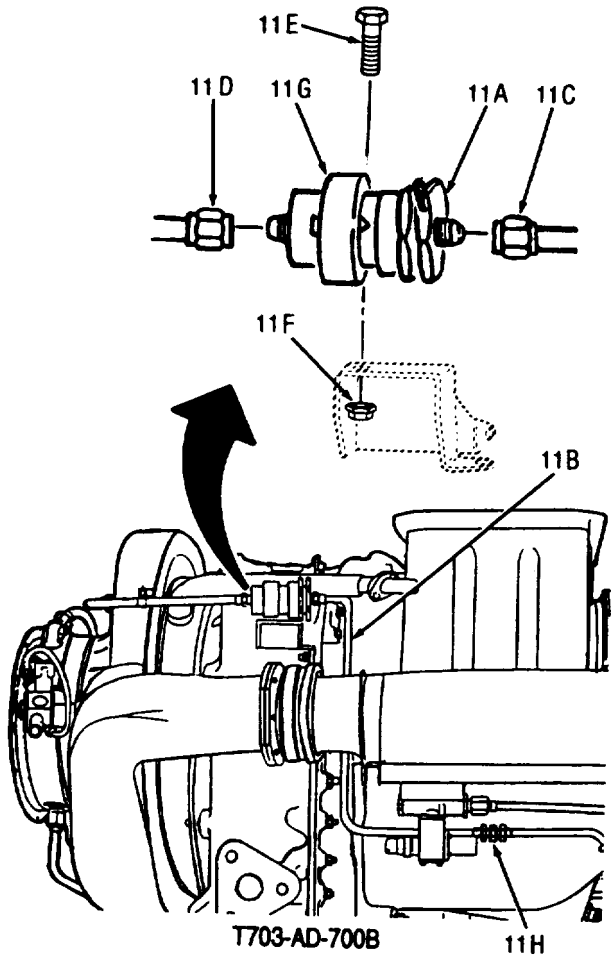
c. Remove clamp (11G) from filter (11A).

d. Disconnect coupling nut (11H) and remove line (11B).

6. Remove fuel control (task 7-2-11).

7. Remove fuel pump (task 7-3-1).

8. Remove fuel filter assembly (task 7-5-2) .



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6-1-2. REMOVE ACCESSORY GEARBOX MODULE (AVIM) (CONT)

9. Remove tube (12) by disconnecting coupling nuts (13) and (14).

10. Remove tube (15) by disconnecting coupling nuts (16) and (17).

11. Remove both compressor discharge air tubes (task 4-4-1).

NOTE

When removing the turbine module, it is not necessary to remove the combustion outer case or the engine rear mount.

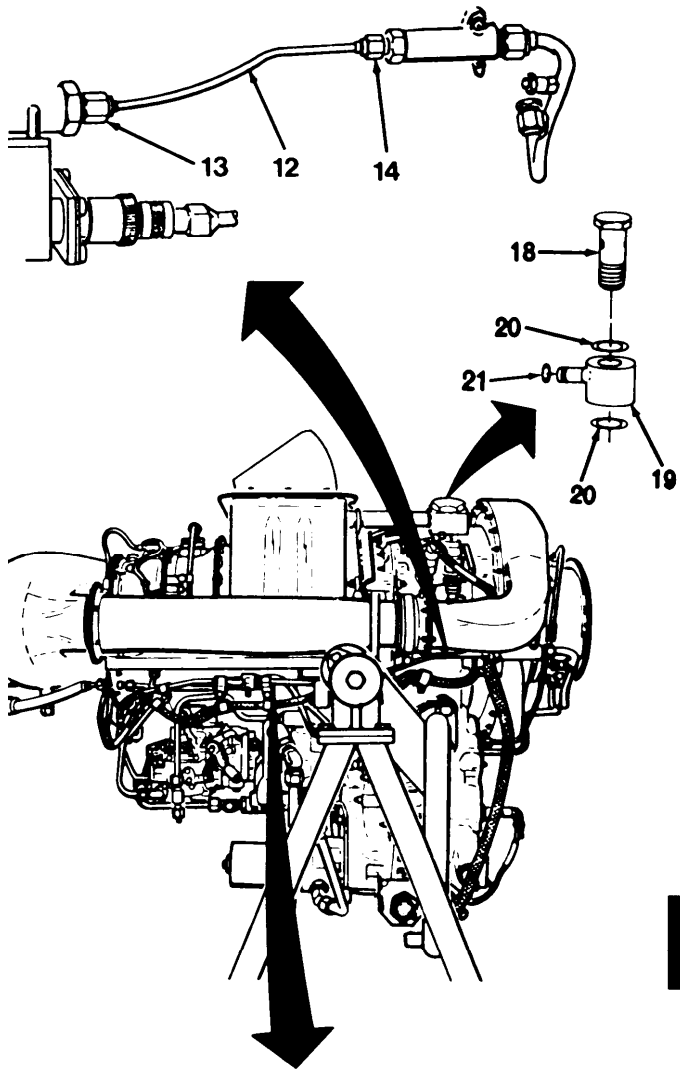
12. Remove turbine module with combustion outer case and engine rear mount still attached (task 5-1-2).

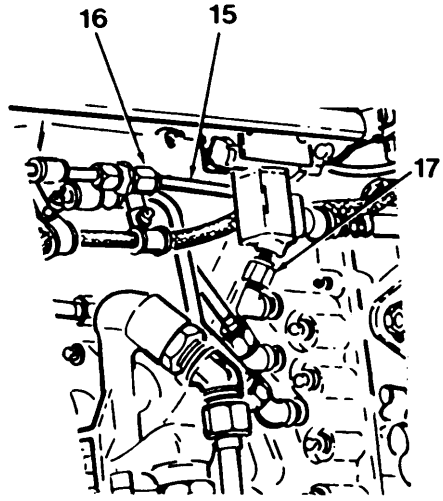
13. Remove compressor module (task 3-1-1).

NOTE

If gearbox is to be replaced, complete step 14 and retain bolt and elbow for installation on replacement gearbox.

14. Remove bolt (18), breather elbow (19), and two gaskets (20). Discard gaskets (20) and packings (21).





END OF TASK

6-1-3. INSTALL ACCESSORY GEARBOX MODULE (AVIM)

This task covers: Off Helicopter Installation

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs
1-15/16 in. Box End Wrench

Materials:
Engine oil (C30 or C31) currently used in engine.

Parts:
Packing
Gaskets

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

Equipment Condition:
Accessory gearbox module mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or f1ames. Use only with adequate ventilation.

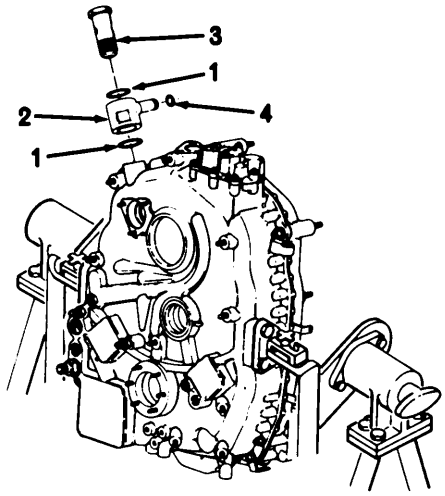
NOTE

If bolt and elbow have been removed complete step 1, if not go to step 2.

1. Install two gaskets (l), elbow (2) and bolt (3). Torque to 200-250 in. lbs.

2. Lightly lubricate new packing (4) with engine oil (C30 or C31) and install on elbow (2).

3. Install compressor module (task 3-1-2).



NOTE

Turbine module may be installed with combustion outer case and engine rear mount still attached to it.

GO TO NEXT PAGE

6-1-3. INSTALL ACCESSORY GEARBOX MODULE (AVIM) (CONT)

4. Install turbine module with combustion outercase and engine rear mount attached (task 5-1-3).

5. Install both compressor discharge air tubes (task 4-4-6).

6. Install fuel pump (task 7-3-3).

7. Install fuel control (task 7-2-12).

8. Install fuel filter assembly (task 7-5-5) .

9. Install start counter (task 8-8-3).

10. Install ignition exciter (task 8-2-3) .

11. Install igniter lead (task 8-5-3).

11A. Install electrical harness (task 8-1-3).

12. (T703-AD-700 ONLY) Install Pc inlet air filter assembly (5) and line (6) as follows:

a. Install washer (7) on mounting stud (8).

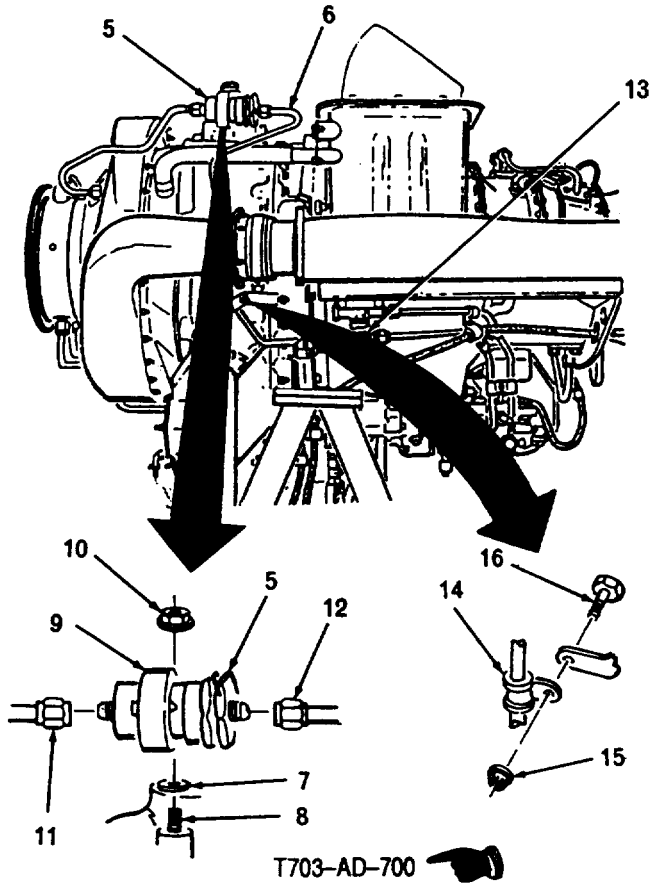
NOTE

Make sure arrow on valve is pointing aft.

b. Install Pc inlet air filter assembly (5) with attached clamp (9) on mounting stud (8); then install nut (10).

c. Connect coupling nuts (11), (12), and (13). Torque to 80-120 in. lbs.

d. Install clamp (14) and secure with nut (15) and bolt (16). Torque to 80-120 in. lbs.



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6-1-3. INSTALL ACCESSORY GEARBOX MODULE (AVIM) (CONT)

12A. (T703-AD-700B ONLY) Install Pc inlet filter (16A) and line (16B) as follows:

NOTE

Make sure arrow on valve is pointing aft.

a. Install Pc inlet air filter (16A) with attached clamp (16C) on bracket (16D); secure with bolt (16E) and nut (16F).

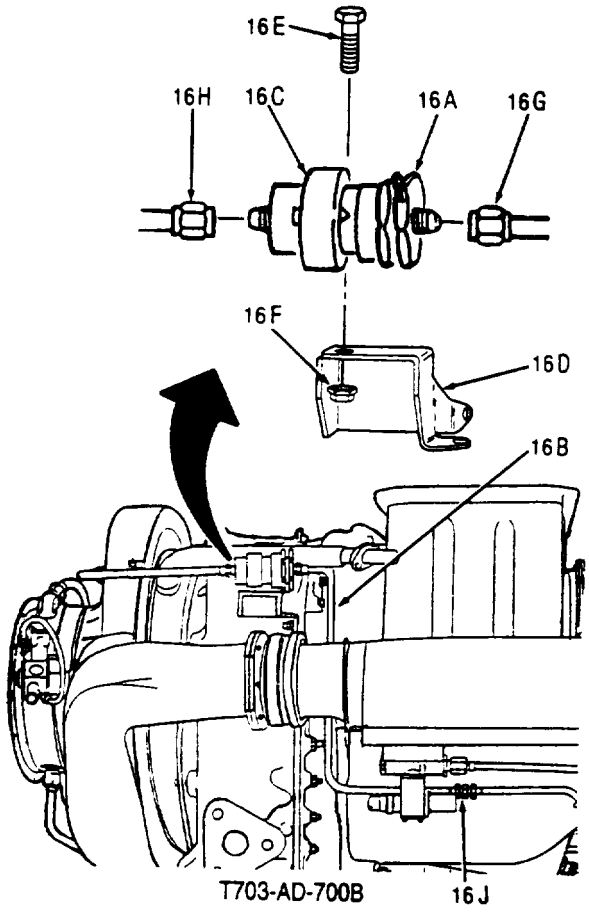
b. Connect coupling nuts (16G), (16H), and (16I). Torque to 80-120 in. lbs.

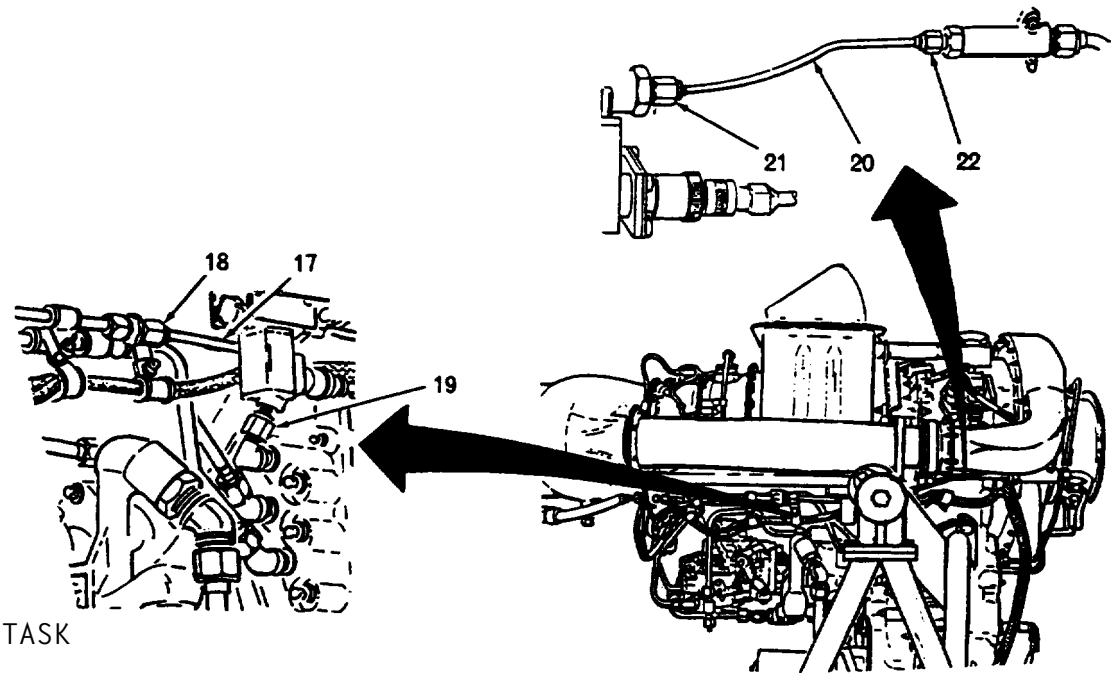
13. Install tube (17) and connect coupling nuts (18) and (19). Torque to 150-200 in. lbs.

14. Install tube (20) and connect coupling nuts (21) and (22). Torque to 65-100 in. lbs.

INSPECT

FOLLOW ON MAINTENANCE:
Prime engine 011 pump (task 6-1-5).





END OF TASK

6-1-4. REPLACE ACCESSORY GEARBOX MODULE ACCESSORY AND DRIVE SEALS (AVIM)

INITIAL SETUP

Applicable Configurations:
Al1

Tool S :
Power Plant Tool Kit
PTO Shaft Seal, Seal Installation Pusher (T10)
Tach Drive Seal, Installation Pusher (T11)
Power Turbine Governor Seal Pad, Installation Pusher (T12)
Fuel Pump Seal, Installation Pusher (T13)
Starter Seal, Installation Pusher (T14)
Mechanical Seals, Puller Kit (T18)
Front Spare Seal Installation Pusher (T22)
Seal Pusher Extension (T23)
Centrifugal Breather Seal Puller (T24)
Support Seal Installation Pusher (T25)

Materials:
Grease (C35)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

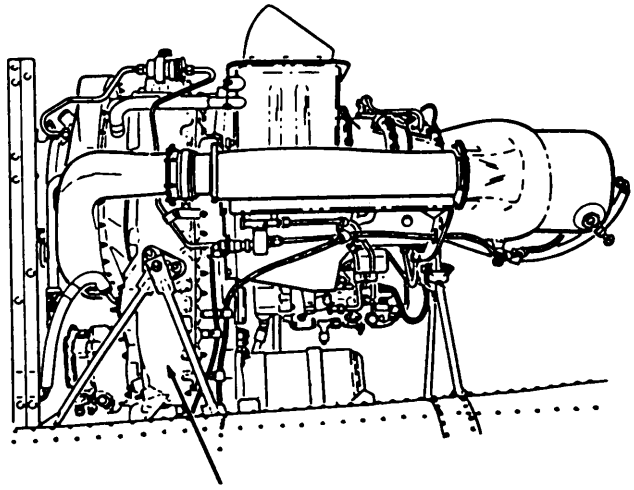
References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

REMOVE

1. Remove accessory or drive component from leaking pad of accessory gearbox.

2. Remove leaking seal using appropriate special tools. (See chart on page 6-11 and illustration of typical removal on page 6-10.) Use caution not to damage any shaft bearings or gearshaft. Discard removal seal.



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6-1-4. REPLACE ACCESSORY GEARBOX MODULE ACCESSORY AND DRIVE SEALS (AVIM) (CONT)

INSTALL

3. Apply grease (C35) to ID and OD of new seal.

CAUTION

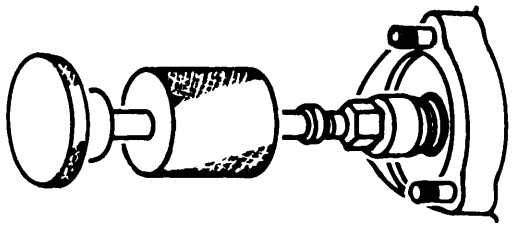
Keep seals straight while installing; if not straight, damage can occur to gearbox. When seals are installed with engine on helicopter, seal pusher extension (T23) may be required with installation tools listed in chart.

4. Install new seal using appropriate special tools. (See chart on page 6-11 and illustration of typical installation.)

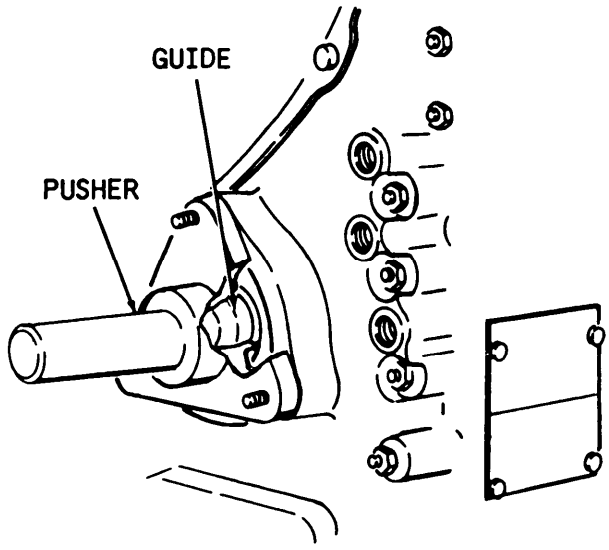
5. Install removed accessory or drive component on accessory gearbox pad.

INSPECT

TYPICAL SEAL REMOVAL



TYPICAL SEAL INSTALLATION



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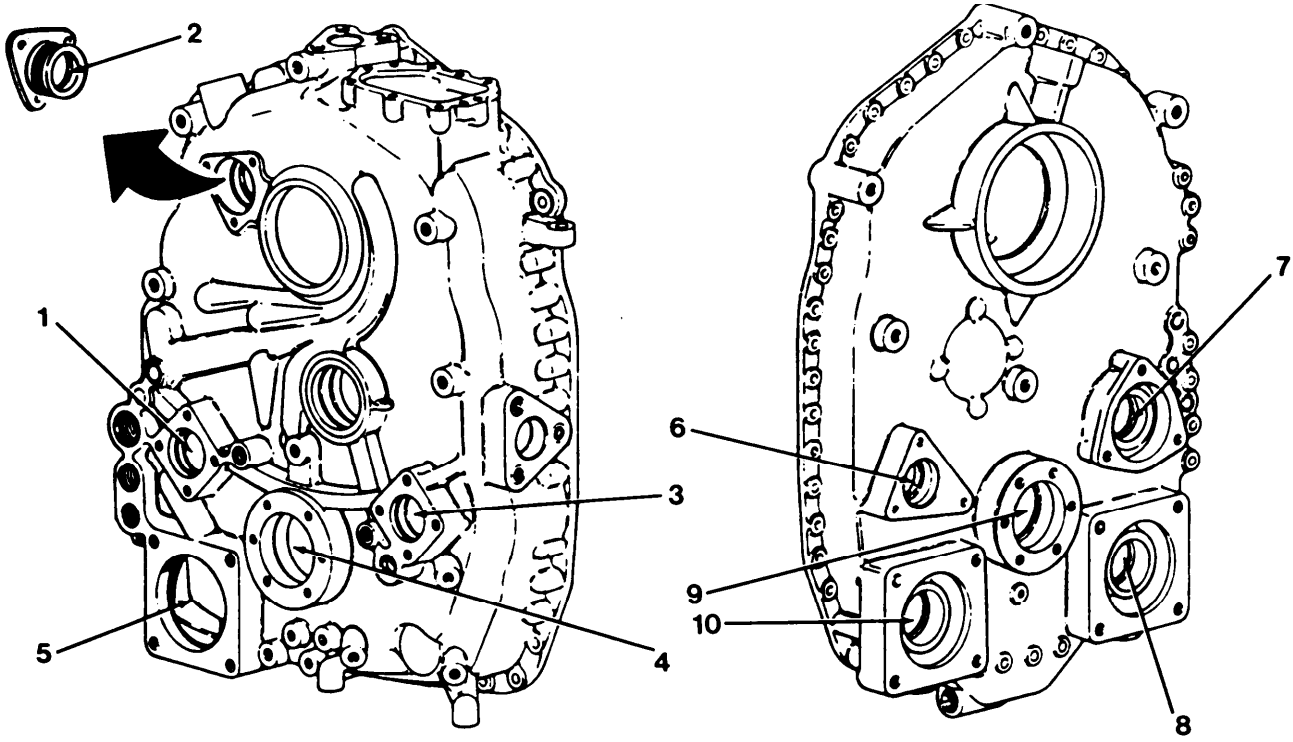
6-1-4. REPLACE ACCESSORY GEARBOX MODULE ACCESSORY AND DRIVE SEALS (AVIM) (CONT)



	REMOVAL TOOLS			INSTALLATION TOOLS	
SEAL	FROM KIT T-18 (T63)	ADDITIONAL TOOL (T703)	SEAL	FROM KIT T-18 (T63)	ADDITIONAL TOOL (T703)
1*	-200, -203	None	1	-13	T-11
2*	-203	T-24	2	None	T-25
3*	-200, -203	None	3	-13	T-11
4	-202, -203	None	4	-15	T-10
5	-201, -203	None	5	-14	T-22
6	-201, -203	None	6	-14	T-12
7	-201, -203	None	7	-14	T-13
8	-201, -203	None	8	-14	T-14
9	-202, -203	None	9	-15	T-10
10	-201, -203	None	10	-14	T-14

* For replacement of these seals, engine removal may be necesary.

END OF TASK

6-1-5. PRIME ENGINE OIL PUMP

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Engine Oil (C30 and C31) presently used in engine

Parts:
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

GO TO NEXT PAGE

6-1-5. PRIME ENGINE OIL PUMP (CONT)

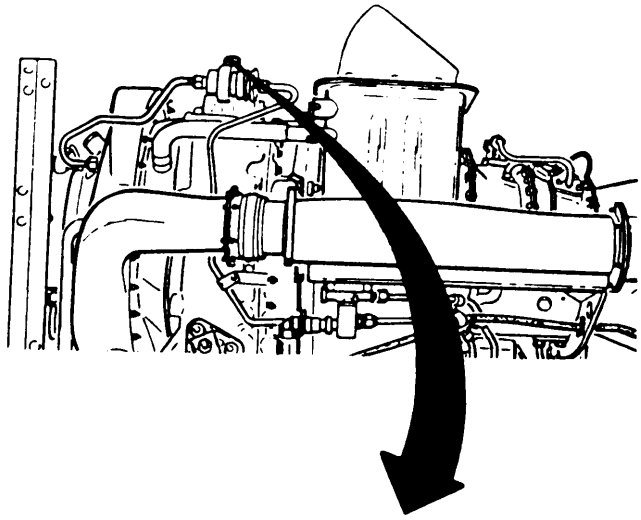
1. Remove cap (1) by removing two nuts (2) and washers (3).

2. Remove and discard packing (4).

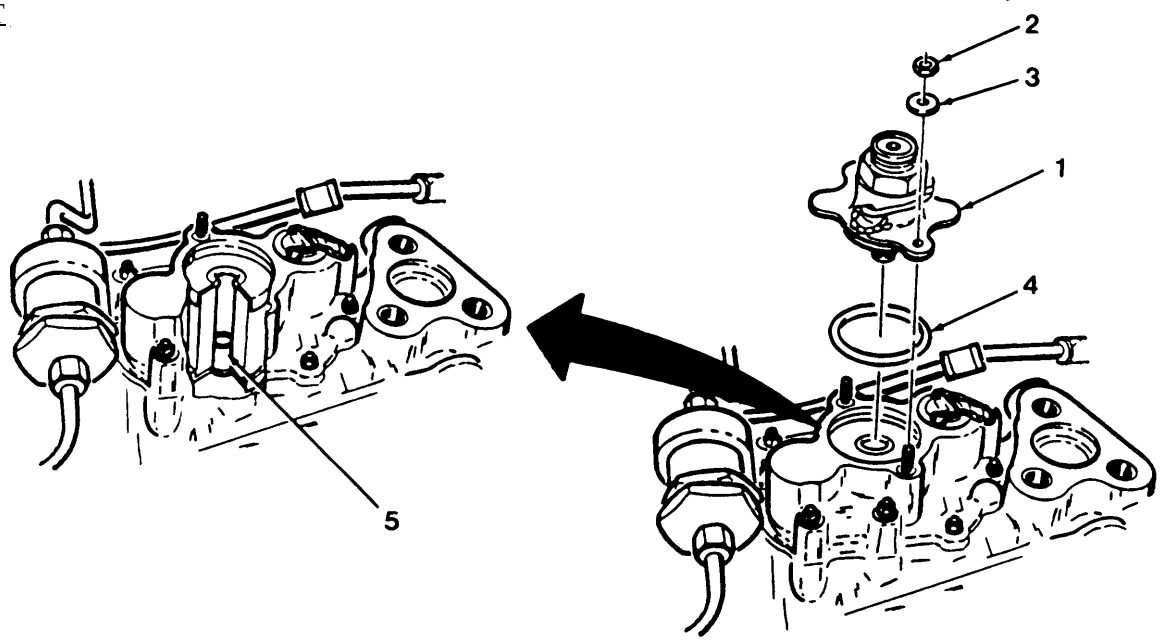
3. Pour engine oil (C30 or C31) into filter cavity until it is level with top of stand pipe (5).

4. Lightly lubricate new packing (4) with engine oil (C30 or C31) and Install on cap (l).

5. Install cap (1) and secure with two washers (3) and nuts (2). Torque to 35-40 in. lbs.



INSPECT



END OF TASK

6-1-6. REPLACE ACCESSORY GEARBOX MODULE STUDS (AVIM)

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Stud Puller (T37)

Materials:
Anti-seize Compound (C19)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23
TM 55-1500-204-25/1

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

NOTE

Refer to TM 55-1500-204-25/1 for stud replacement.

REMOVE

1. Using puller (T37) remove and discard damaged stud.

2. Clean and retap stud hole threads only when condition of hole threads restrains stud installation. Use the same size tap.

INSTALL

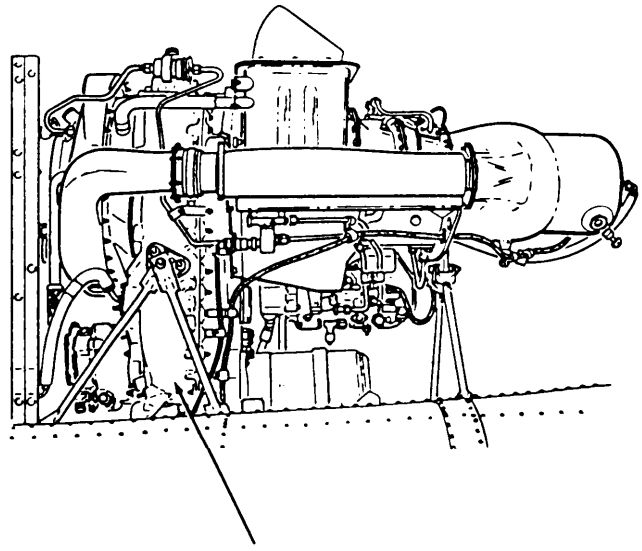
3. Apply anti-seize compound (C19) to the stud threads and to the stud hole threads.

NOTE

Oversize replacement studs may be used when necessary.

4. Install the stud and tighten to obtain torque specified on the following page.

INSPECT



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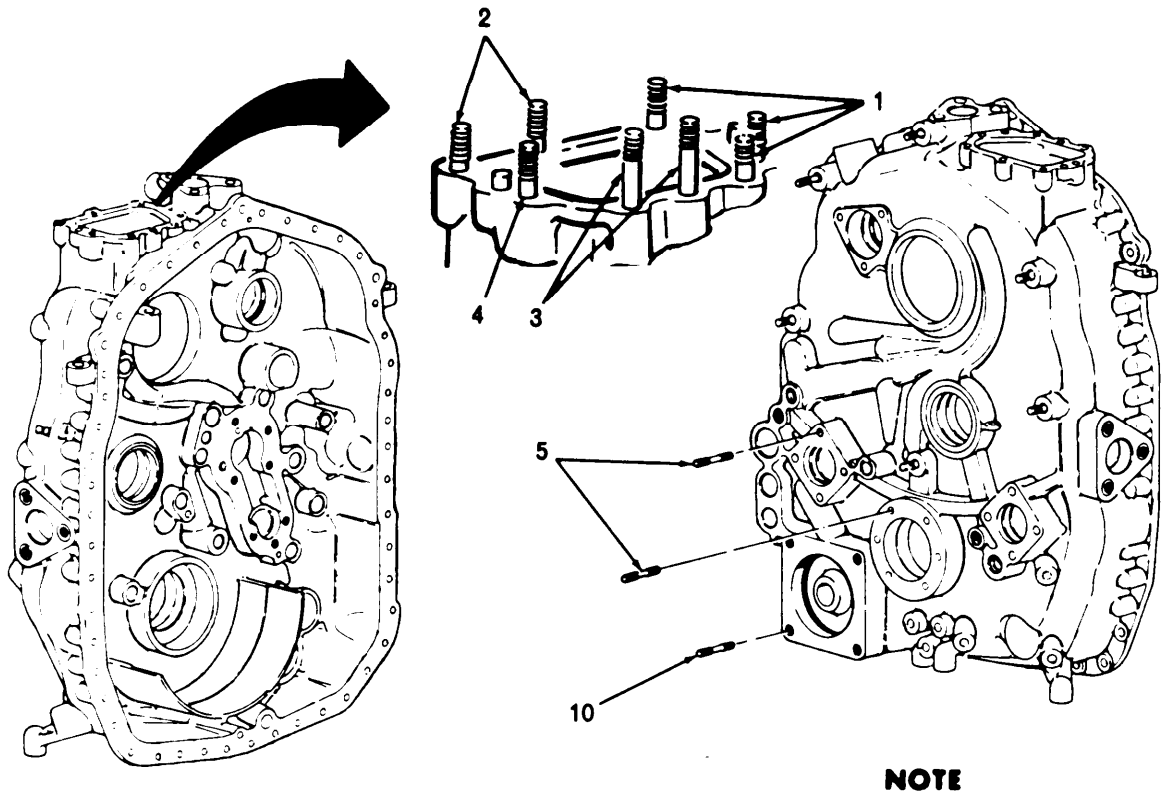
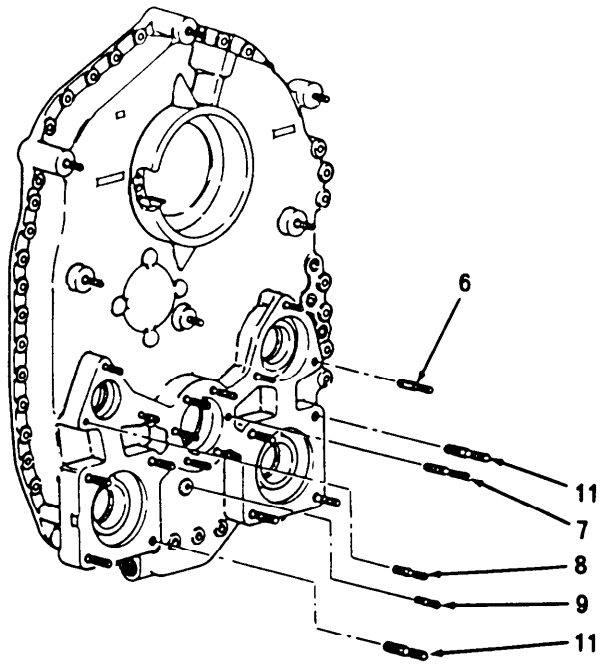
6-1-6. REPLACE ACCESSORY GEARBOX MODULE STUDS (AVIM) (CONT)





NOTE

STUDS SHALL HAVE A INTERFERENCE FIT AFTER APPROXIMATELY TWO TURNS OF ENGAGEMENT. DRIVING TORQUE SHOULD GRADUALLY INCREASE TO THE SPECIFIED LIMIT UPON REACHING THE STUD SETTING HEIGHT. THIS PROVIDES INTERFERENCE FIT FOR THE FULL LENGTH OF THE THREADS.

	THREAD SIZE	STUD HEIGHT	SETTING TORQUE
1.	1/4-20	0.642-0.602	35-70 in. lb.
2.	1/4-20	0.768-0.728	35-70 in. lb.
3.	1/4-20	1.210-1.170	35-70 in. lb.
4.	1/4-20	1.018-0.978	35-70 in. lb.
5.	5/16-18	0.660-0.620	85-170 in. lb.
6.	5/16-18	0.815-0.775	85-170 in. lb.
7.	5/16-18	0.930-0.890	85-170 in. lb.
8.	5/16-18	0.640-0.600	85-170 in. lb.
9.	5/16-18	0.520-0.480	85-170 in. lb.
10.	3/8-16	0.871-0.831	150-300 in. lb.
11.	3/8-16	0.861-0.821	150-300 in. lb.

NOTE

The shouldered compressor and turbine mounting studs are replaced at depot.

END OF TASK

Section II OIL FILTER HOUSING ASSEMBLY

This section includes maintenance procedures for inspection and replacement of oil filter impending bypass indicator and servicing of oil filter housing assembly. Additional maintenance procedures include replacement of housing and check valve assemblies; adjustment of oil pressure regulator valve; replacement, inspection, and repairing of regulator valve assembly; and replacement, inspection, and servicing of oil filter element.

LIST OF TASKS

6-2-1. INSPECT ENGINE OIL FILTER IMPENDING BYPASS INDICATOR

This task covers: On Helicopter Inspection

INITIAL SETUP

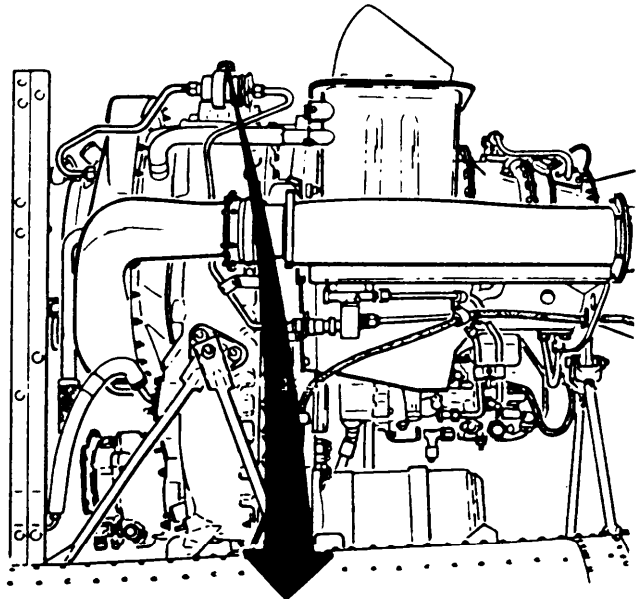
Applicable Configurations:
All

Personnel Required:
68B Aircraft Powerplant Repairer

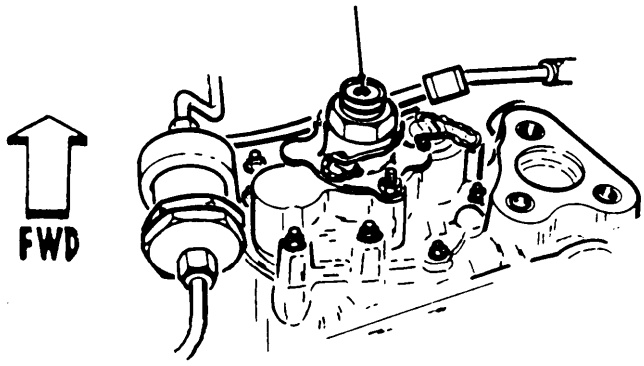
References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23.)

lnspect engine oil filter impending by-pass indicator. It must not be extended. If extended, perform troubleshooting (para 1-24, procedure 50).



ENGINE OIL FILTER IMPENDING BYPASS INDICATOR



END OF TASK

6-2-2. SERVICE ENGINE OIL FILTER HOUSING ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Suction bubble (T38)

Personnel Required:
688 Aircraft Powerplant Repairer

Materials:
Wiping rags (C-1)

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).
Engine oil filter element removed (task 6-2-10).

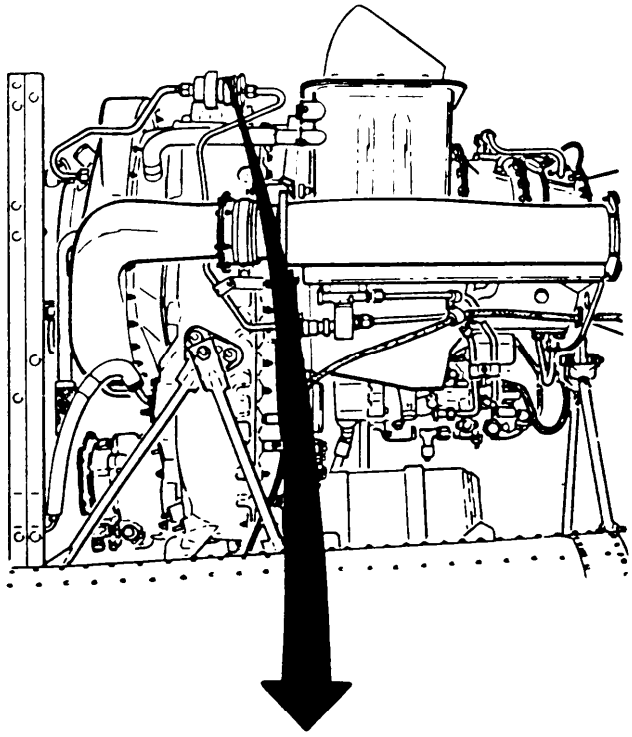
WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

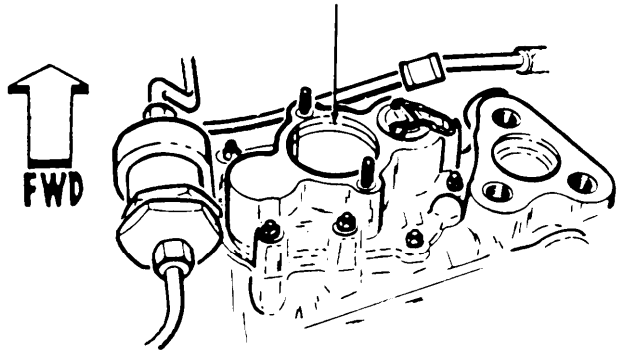
CAUTION

Do not use solvent to clean the oil filter cavity. Solvent spilled into the lube system will contaminate the oil.

Using suction bubble (T38) and wiping rags (C-l), remove all oil, sludge, and contaminants from oil filter element cavity.



OIL FILTER ELEMENT CAVITY



END OF TASK

6-2-3. REMOVE OIL FILTER HOUSING AND CHECK VALVE ASSEMBLIES

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Materials:
Wiping Rags (Cl)

Personnel Required:
686 Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine cowling removed (TM 55-1 520-248 -23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

WARNING

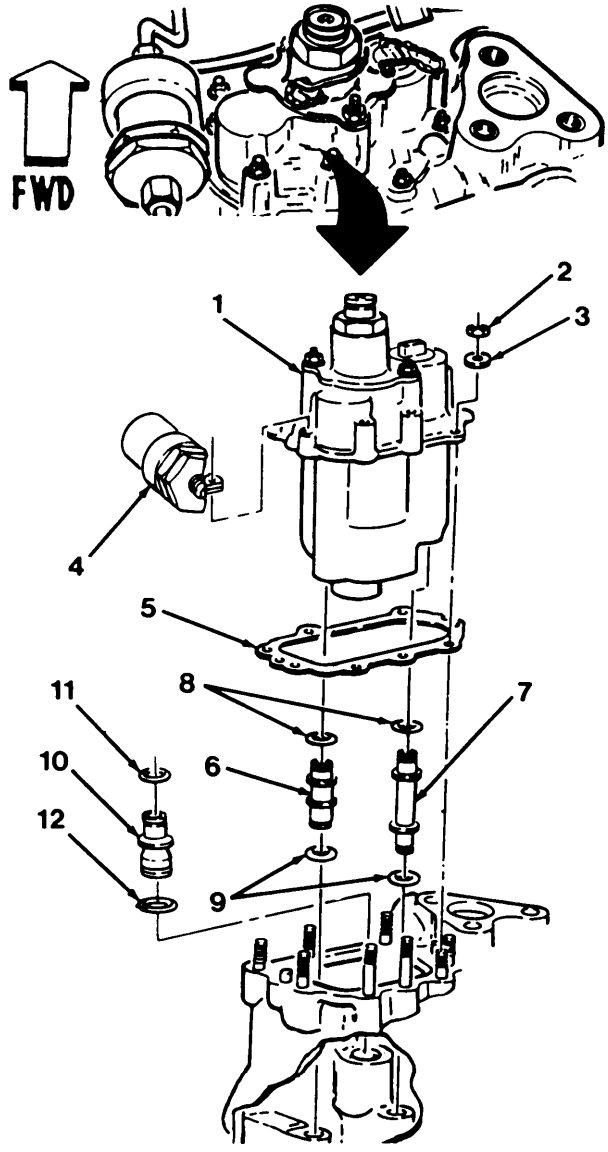
Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

1. Remove oil filter housing assembly (1) by removing eight nuts (2) and washers (3) and disconnecting clamp (4). Lift off oil filter housing assembly (l).

2. Remove and discard gasket (5).

3. Remove oil transfer tubes (6) and (7). Remove and discard four packings (8) and (9).

4. Lift out check valve assembly (10). Remove and discard packings (11) and (12).



END OF TASK

6-2-4. INSTALL OIL FILTER HOUSING AND CHECK VALVE ASSEMBLIES

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Engine Oil (C30 or C31) currently used in engine

Parts:
Packings
Gasket

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

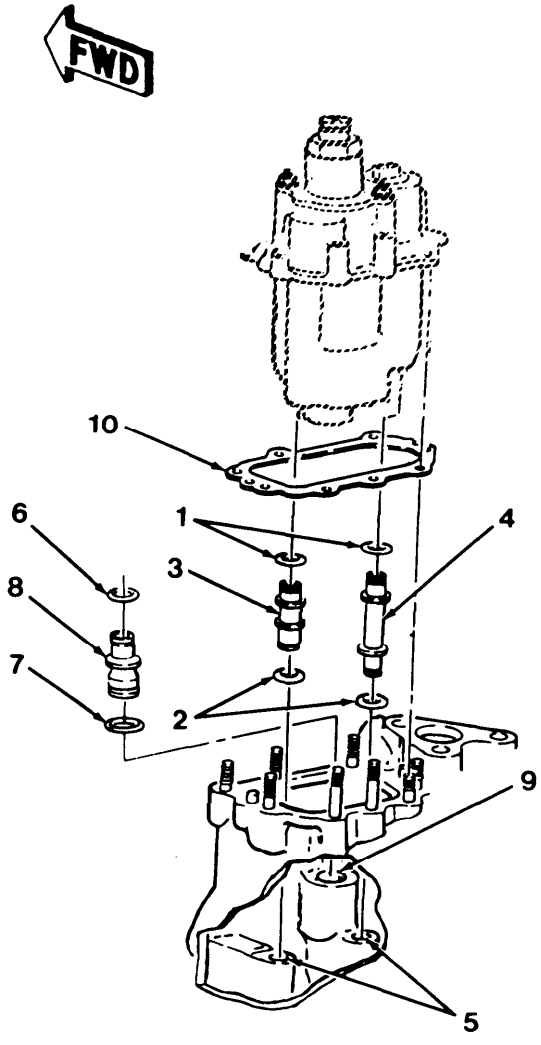
1. Lightly lubricate four new packings (1) and (2) with engine oil (C30 or C31); then install on two oil transfer tubes (3) and (4).

2. Install two oil transfer tubes (3) and (4) into two receptacles (5).

3. Lightly lubricate new packings (6) and (7) with engine oil (C30 or C31) and install on check valve (8).

4. Install check valve (8) in receptacle (9).

5. Install new gasket (10).



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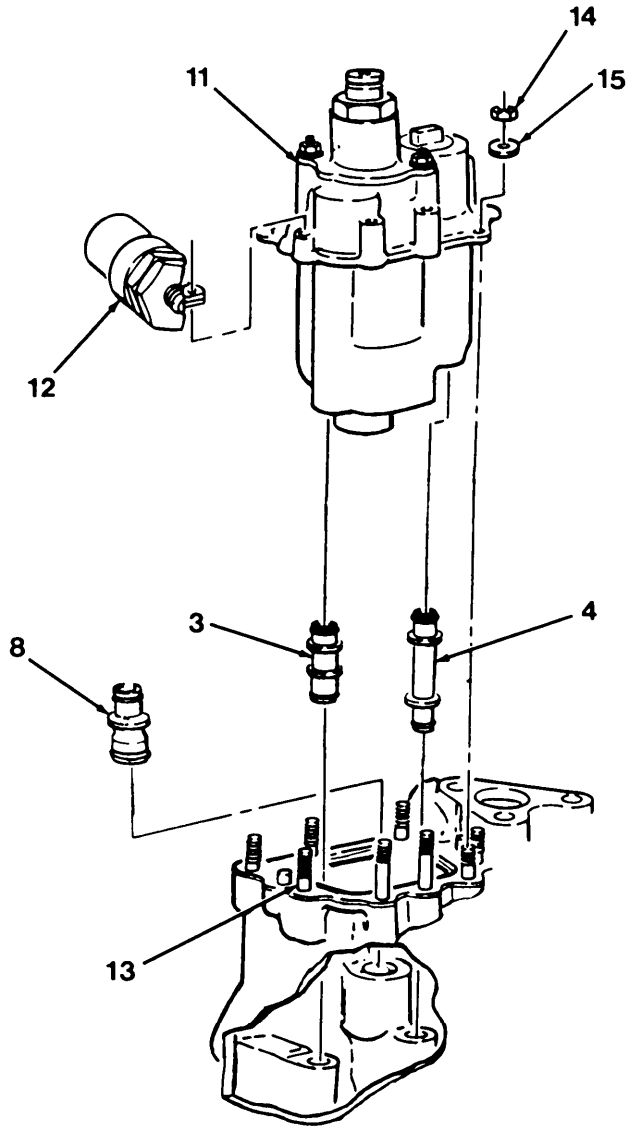
6-2-4. INSTALL OIL FILTER HOUSING AND CHECK VALVE ASSEMBLIES (C0NT)

6. Install oil filter housing assembly (11) insure openings in bottom of housing (11) mate with oil transfer tubes (3) and (4) and check valve (8); then attach Pc filter clamp (12) to mounting stud (13). Secure with 8 washers (15) and nuts (14). Torque to 35-40 in. lbs.

INSPECT



END OF TASK

6-2-5. REMOVE OIL PRESSURE REGULATOR VALVE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

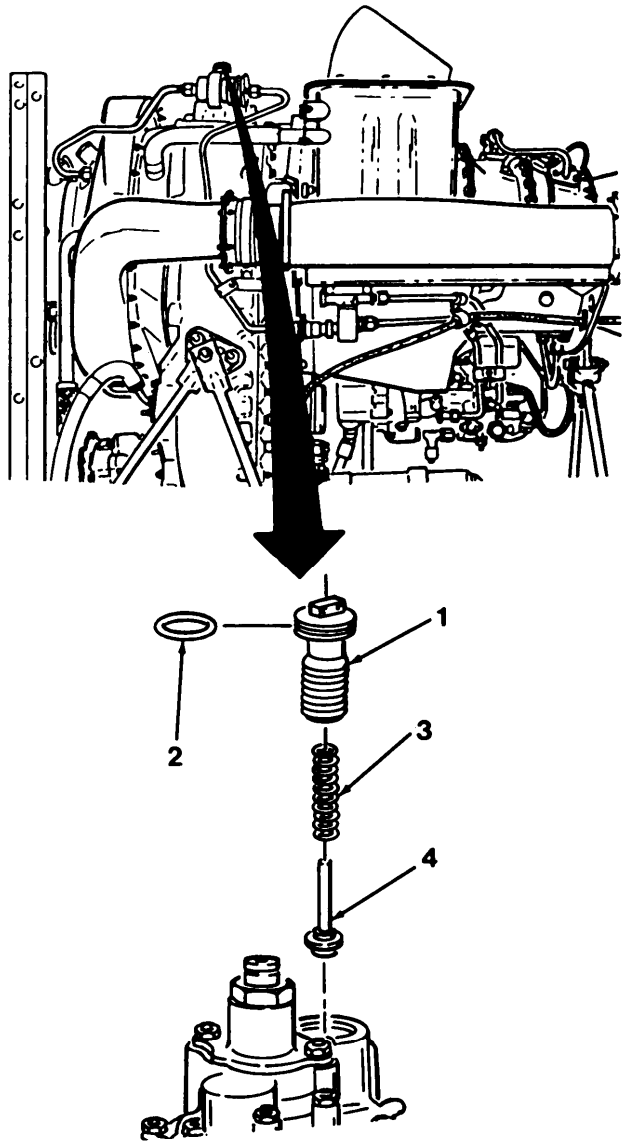
WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

1. Remove lockwire, poppet guide assembly (l), and packing (2). Discard packing (2).

2. Remove compression spring (3).

3. Remove poppet valve (4).



END OF TASK

6-2-6. INSPECT OIL PRESSSURE REGULATOR VALVE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Equipment Condition:
Oil pressure regulator valve assembly removed (task 6-2-5)

Personnel Required:
686 Aircraft Powerplant Repairer
66S Inspector

1. Visually inspect poppet seat (1) and poppet valve (2) for burrs.

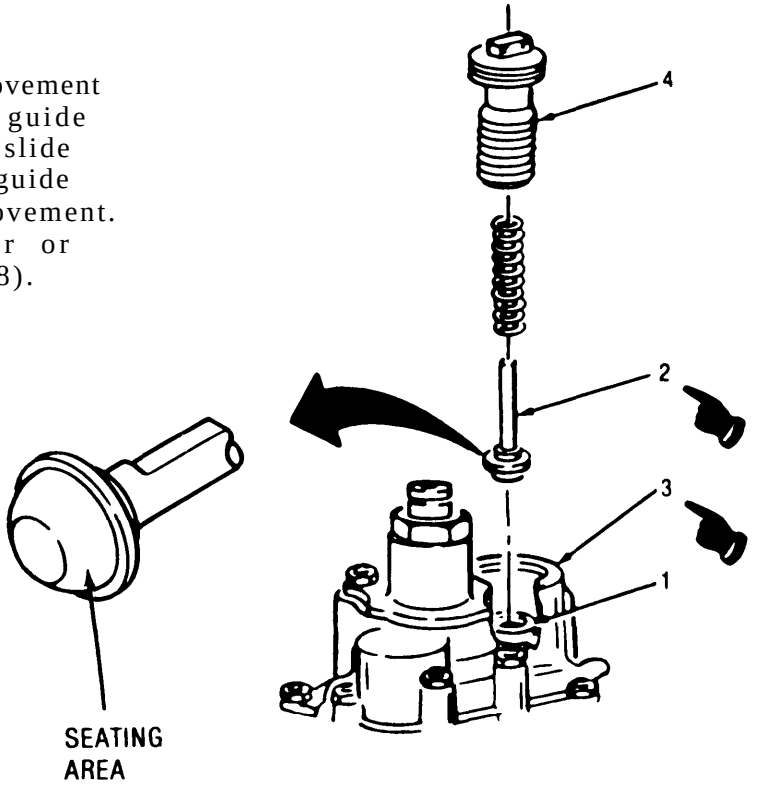
NOTE

Replace poppet valve (2) if there is any visible damage to the seating area.

2. Check seat (1) for looseness. Replace housing (3) if seat is loose (tasks 6-2-3 and 6-2-4).

3. Manually check freedom of movement of poppet valve (2) inside pocket guide assembly (4). Poppet valve must slide freely up and down inside pocket guide assembly with no restriction of movement. If restrictions are present, repair or replace valve (task 6-2-7 or 6-2-8).

INSPECT



END OF TASK

6-2-7. REPAIR OIL PRESSURE REGULATOR VALVE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Materials:
Wiping Rags (Cl)
Dry Cleaning Solvent (C8)
Gloves (C9)
Emery Cloth (C17)

Personnel Required:
67S Helicopter Powerplant Repairer

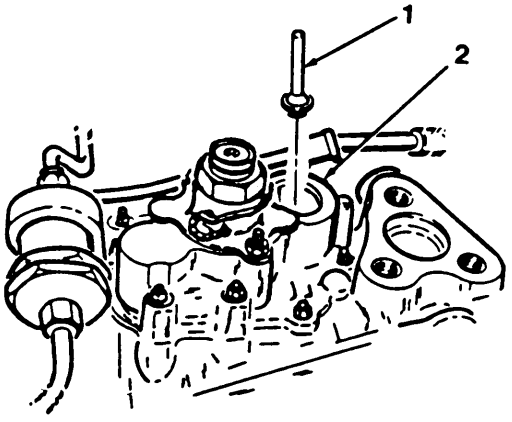
Equipment Condition:
Oil pressure regulator valve assembly removed (task 6-2-5)

1. Remove all burrs from stem of poppet (1) using emery cloth (Cl7).

WARNING

Dry cleaning solvent (C8) is flammable and toxic. It can irritate skin and cause burns. Use only in well ventilated area away from heat and open flame. Wear gloves. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

2. Clean poppet (1) and housing (2) with dry cleaning solvent (C8) and dry with clean wiping rags (Cl).



INSPECT

END OF TASK

6-2-8. INSTALL OIL PRESSURE REGULATOR VALVE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Materials:
Engine Oil (C30 or C31) currently used in engine

Parts:
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

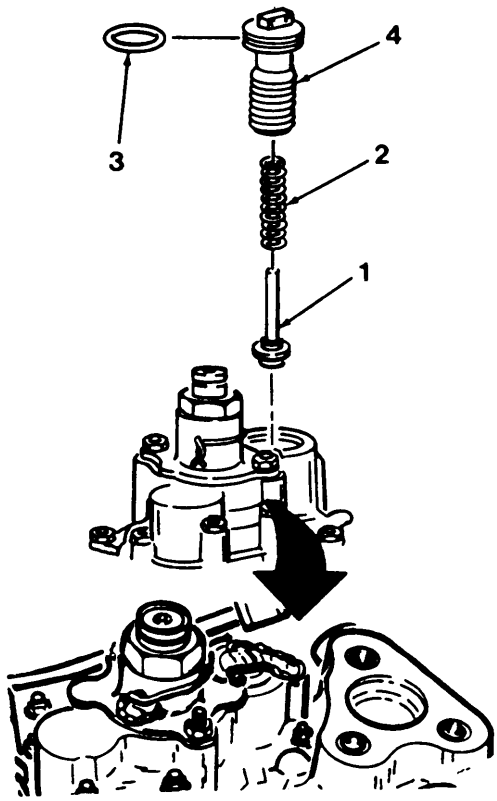
Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thorouqhly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

1. Install poppet valve (1) and insure it seats properly.

2. Install compression spring (2) over poppet valve (1).

3. Lightly lubricate new packing (3) with engine oil (C30 or C31); then install on poppet guide assembly (4).

4. Install poppet guide assembly (4) over compression spring (2). Tighten poppet guide assembly (4) until it bottoms out; then back it out five and one-half turns.



INSPECT

FOLLOW ON MAINTENANCE:
Adjust oil pressure regulator valve (task 6-2-9).

END OF TASK

6-2-9. ADJUST OIL PRESSURE REGULATOR

This task covers: On Helicopter Adjustment

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Materials:
Lockwire (C5)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector
Pilot

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23.)
Measure engine oil pressure (task 1-8-12)

1. Deleted.

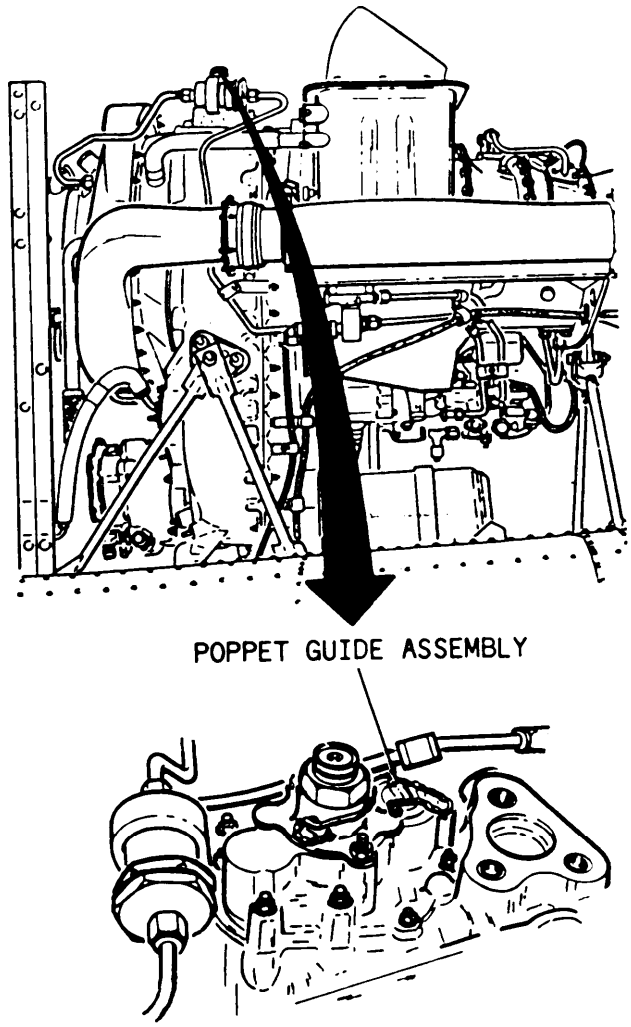
WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engine in operation

CAUTION

Shut engine down if positive oil pressure indication has not been obtained by 59% Ng.

2. Pilot: Operate engine at 100% Np and allow engine oil temperature to stabilize at 107 degrees C.



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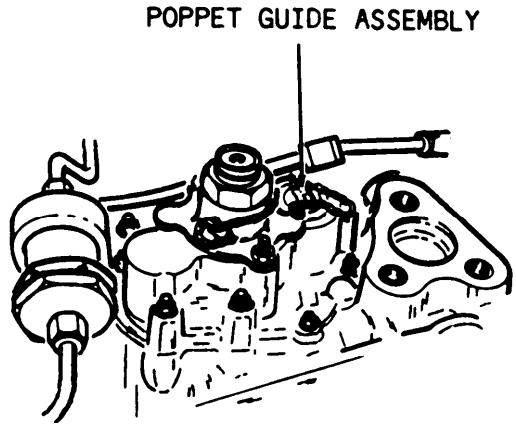
6-2-9. ADJUST OIL PRESSURE REGULATOR VALVE (CONT)

CAUTION

Except for initial adjustments on newly installed engines, do not adjust the pressure regulating valve to correct for high oil pressure. Do not make a pressure regulating valve adjustment to correct for a sudden increase or rapid change in oil pressure. These conditions are cause to suspect that other oil system problems have developed.



NOTE

One full turn of adjustment will change oil pressure approximately 13 psig.

3. Rotate poppet guide assembly clockwise to increase oil pressure and counterclockwise to decrease oil pressure.

4. Adjust oil pressure until helicopter oil pressure indicates 115-130 psig at 94%, or higher, Ng.

5. Lockwire (C5) poppet guide assembly.

6. Insure oil pressure remains as adjusted.

7. Pilot: Shut down engine.

INSPECT

END OF TASK

6-2-10. REMOVE OIL FILTER ELEMENT

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Materials:
Wiping Rags (C1)

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

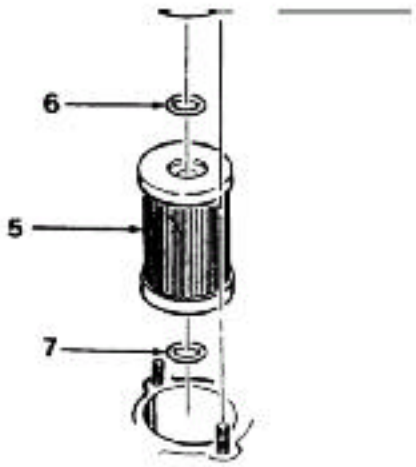
1. Pack wiping rags (C1) around cap (1) to absorb escaping oil.

2. Remove cap (1) by removing two nuts (2) and washers (3).

3. Remove and discard packing (4).

4. Remove filter element (5).

5. Remove and discard packings (6) and (7).



FOLLOW ON MAINTENANCE:
Service oil filter housing assembly (task 6-2-2).

END OF TASK

6-2-11. INSPECT OIL FILTER ELEMENT

This task covers: Off Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

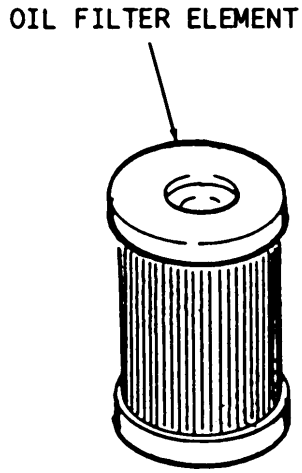
References:
TM 55-1520-248-23

Equipment Condition:
Oil filter element removed (task 6-2-10) and serviced (task 6-2-12).

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

Using magnifying glass, Inspect filter element for punctures or tears. None allowed.



END OF TASK

6-2-12. SERVICE OIL FILTER ELEMENT

This task covers: Off Helicopter Servicing

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Suitable Container

Materials:
Mineral Spirits (C32)

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment condition:
Oil filter element removed (task 6-2-10).

WARNING

Mineral spirits is toxic. Provide adequate ventilation for personnel using it.

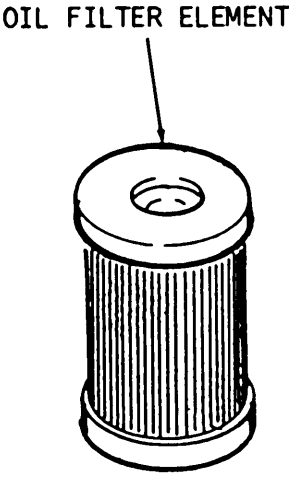
1. Agitate oil filter element using mineral spirits (C32) in a suitable container.

2. Inspect oil filter element (task 6-2-11) and repeat cleaning if necessary.

3. Allow to air dry.

NOTE

Plug filter ends if not immediately reinstalled.



END OF TASK

6-2-13. INSTALL OIL FILTER ELEMENT

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Engine oil (C30 or C31) currently used in engine.

Parts:
Packings

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).
Engine oil filter housing assembly serviced (task 6-2-2).
Oil filter element serviced (task 6-2-12).

WARNING

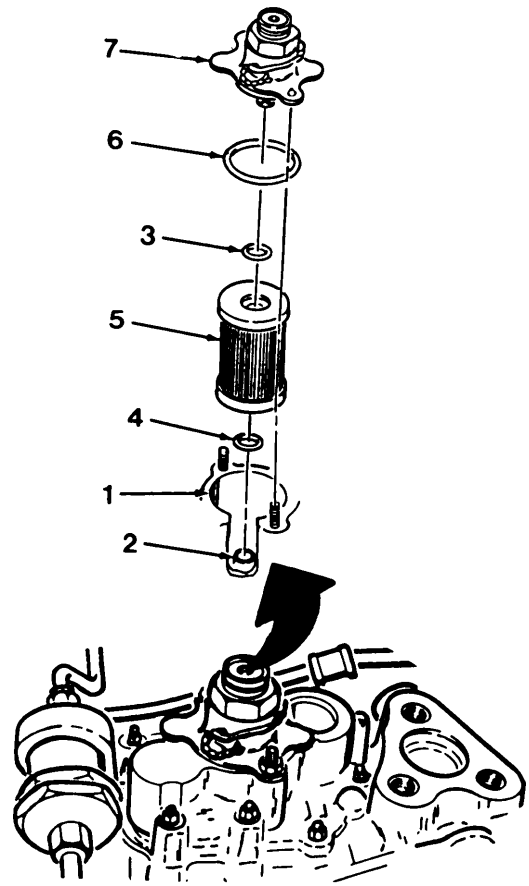
Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

1. Pour engine oil (C30 or C31) into filter cavity (1) until il is level with top of stand pipe (2).

2. Lightly lubricate new packings (3) and (4) with engine oil (C30 or C31) and install in filter element (5).

3. Install filter element (5) on stand pipe (2).

4. Lightly lubricate new packing (6) with engine oil (C30 or C31) and install on cap (7).



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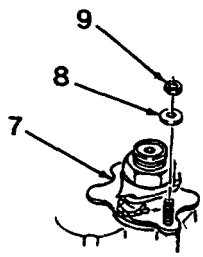
6-2-13. INSTALL OIL FILTER ELEMENT (CONT)

5. Install cap (7) and secure with two washers (8) and nuts (9). Torque to 30-40 in. lbs.



INSPECT

END OF TASK

6-2-14. REMOVE OIL FILTER IMPENDING BYPASS INDICATOR

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
l-in. socket, 1/2-in. drive

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

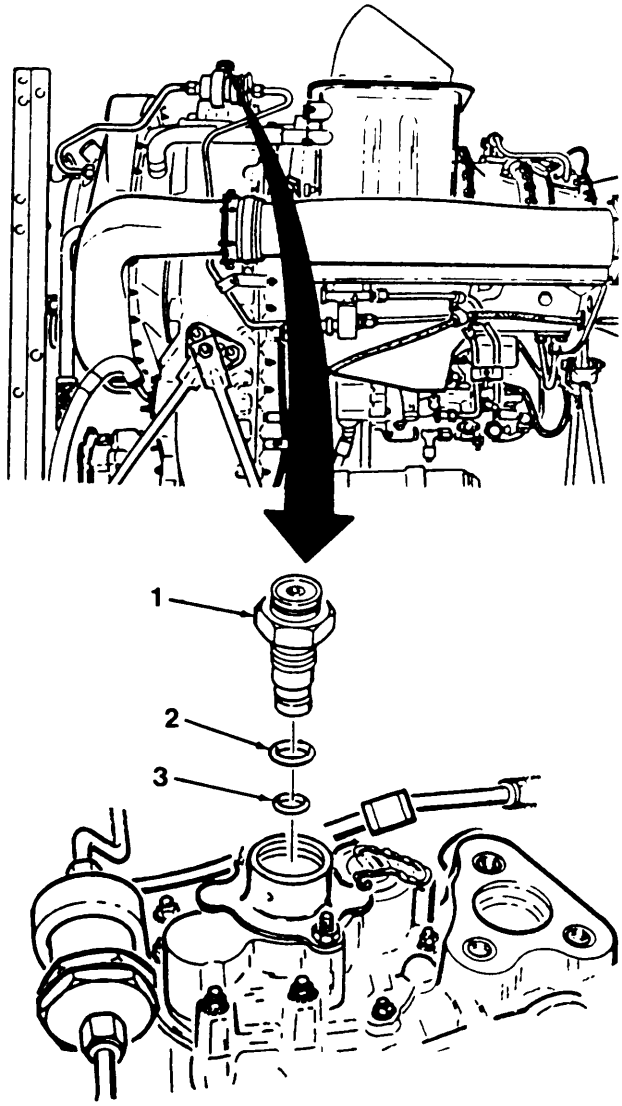
Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation

1. Remove lockwire and differential pressure indicator assembly (1) using l-in. socket.

2. Remove and discard packings (2) and (3).



END OF TASK

6-2-15. INSTALL OIL FILTER IMPENDING BYPASS INDICATOR

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs
1-in. socket, 1/2-in. drive

Materials:
Lockwire (C4)
Engine Oil (C30 or C31) currently used in engine.

Parts:
Packings

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

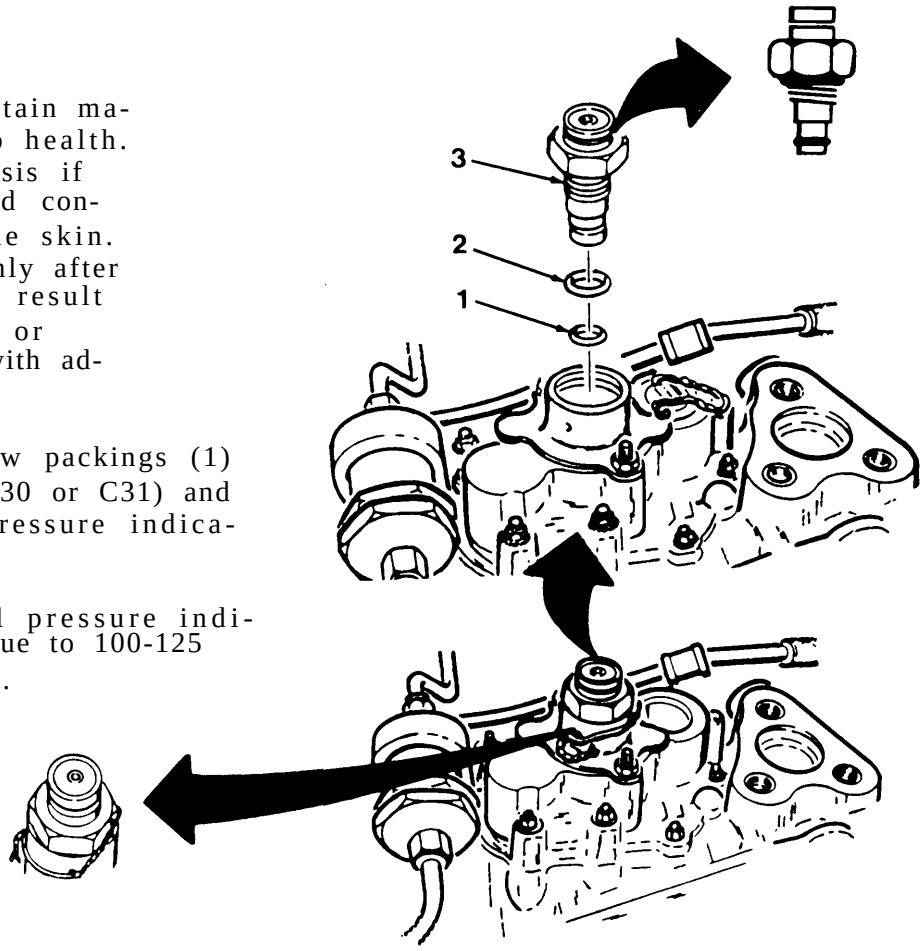
Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

1. Lightly lubricate new packings (1) and (2) with engine oil (C30 or C31) and install on differential pressure indicator assembly (3).

2. Install differential pressure indicator assembly (3). Torque to 100-125 in. lbs and lockwire (C4).



INSPECT

END OF TASK

Section III MAGNETIC CHIP DETECTOR

This section Includes maintenance procedures for removal, installation, and inspection of side and bottom magnetic chip detectors.

LIST OF TASKS

6-3-1. REMOVE SIDE MAGNETIC CHIP DETECTOR

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Materials:
Wiping Rags (Cl)

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Place wiping rag (Cl) below side magnetic chip detector.

2. Disconnect electrical connector (2).

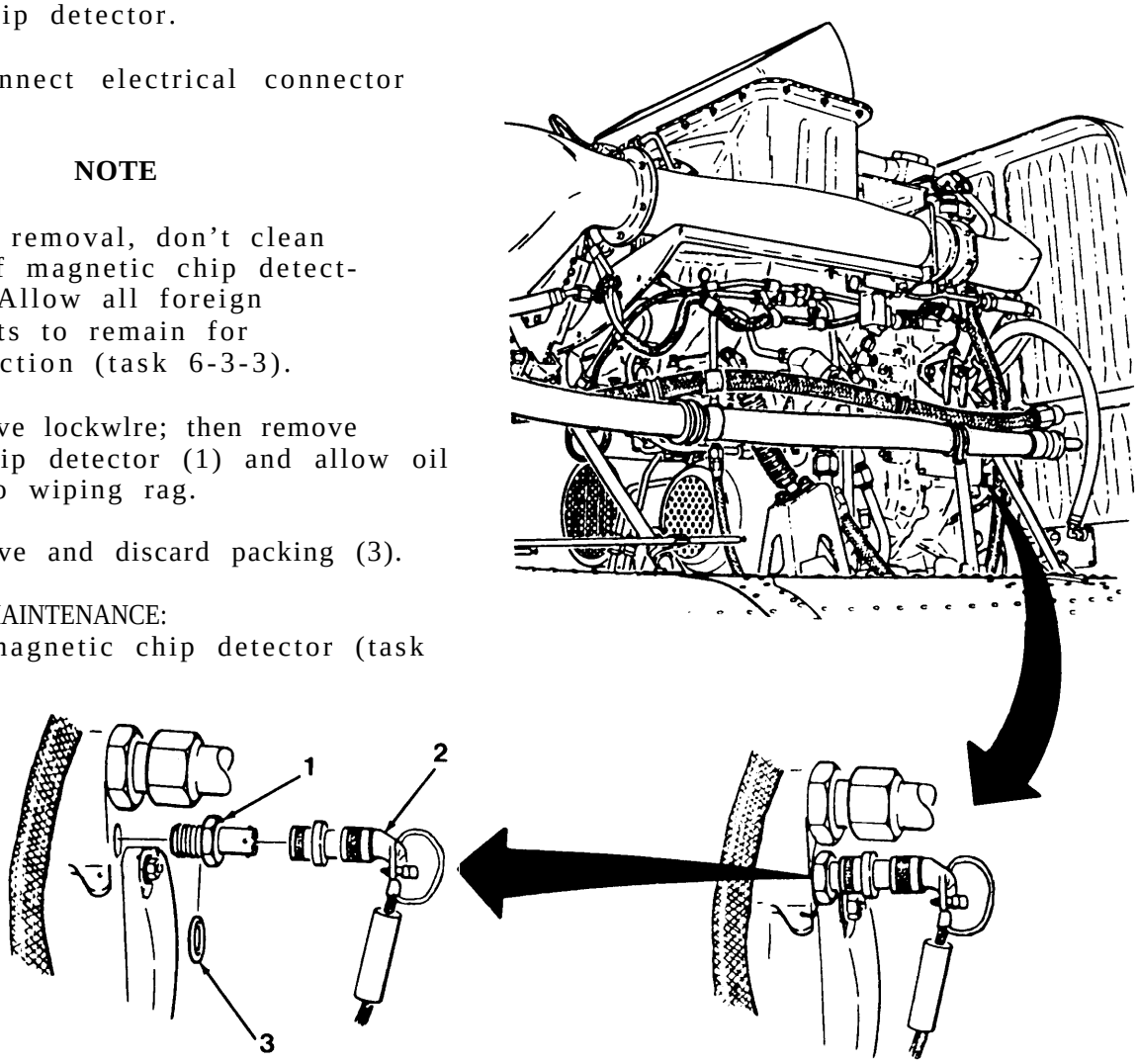
NOTE

After removal, don't clean tip of magnetic chip detector. Allow all foreign objects to remain for inspection (task 6-3-3).

3. Remove lockwlre; then remove magnetic chip detector (1) and allow oil to drip onto wiping rag.

4. Remove and discard packing (3).

FOLLOW ON MAINTENANCE:
Inspect magnetic chip detector (task 6-3-3).



END OF TASK

6-3-2. REMOVE BOTTOM MAGNETIC CHIP DETECTOR

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Suitable Container 1 qt Capacity

Personnel Required:
688 Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Place suitable container below bottom magnetic chip detector.

2. Disconnect electrical connector (2).

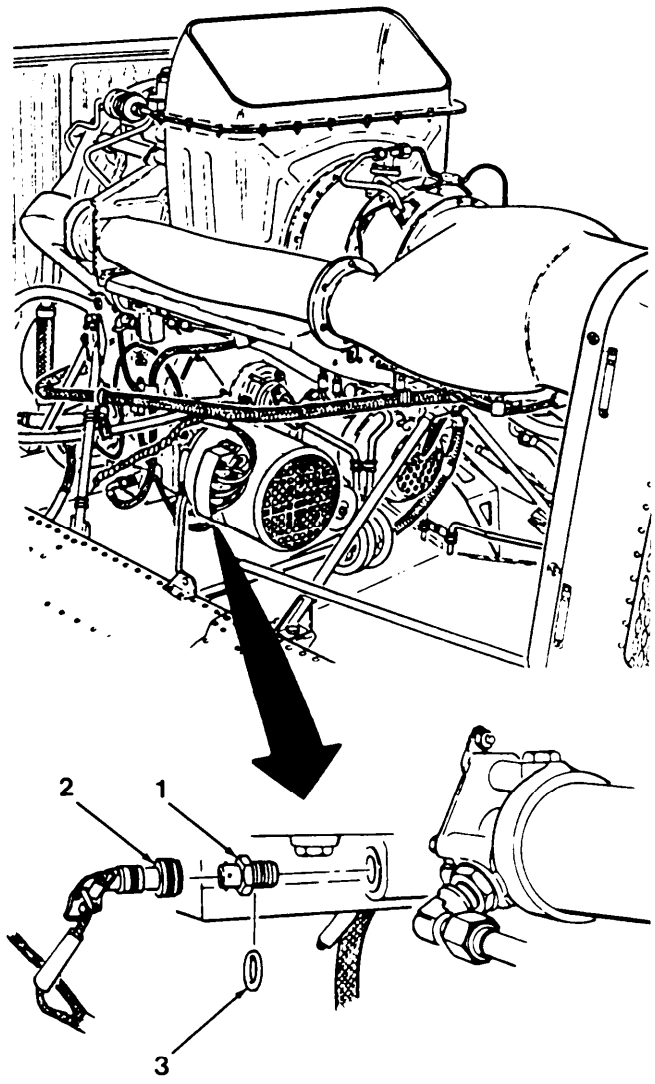
NOTE

After removal, don't clean tip of magnetic chip detector. Allow all foreign objects to remain for inspection (task 6-3-3).

3. Remove lockwire; then remove magnetic chip detector (1) and allow oil to drain into suitable container.

4. Remove and discard packing (3).

FOLLOW ON MAINTENANCE:
Inspect magnetic chip detector (task 6-3-3) .



END OF TASK

6-3-3. INSPECT MAGNETIC CHIP DETECTORS

INITIAL SETUP

Applicable Configurations:
All

Personnel Required:
68B Aircraft Powerplant Repairer
67S Inspector
Pilot

References:
TM 55-1520-248-23

Equipment Condition:
Magnetic chip detectors removed (task 6-3-1 and 6-3-2).

General Safety Instructions:

WARNING

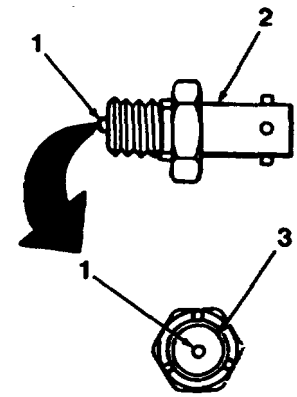
Lubricating oils contain materials hazardous to health. They produce paralysis If swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

NOTE

If magnetic chip detector is being Inspected as a result of a magnetic chip detector warning light illumination, complete entire procedure. If it is being inspected as part of scheduled maintenance, complete steps 1 thru 4 only.

1. Inspect magnetic tip (1) of magnetic chip detector (2) for following conditions:

a. Paste - result of fine, soft particles which come from normal wear due to gear mesh, bearing rotation, and/or spline engagement. These particles mix with oil or soft carbon to form paste. This condition is normal except if paste bridges the gap between tip (1) and wall (3). If paste accumulation is heavy, it will prevent magnetic chip detector from being activated by metal particles. If this is found, enter a requirement in aircraft log book to inspect chip



detector every 25 hours of operation until next scheduled Inspection. Paste generally does not cause a warning light; however, if a light is encountered, perform magnetic chip detector check per step 5.

NOTE

Heavy accumulations of paste require Inspection and cleaning of the magnetic chip detectors at intervals of 25 hours to the 100 hour inspection. Cleaning paste from, chip detectors is necessary to ensure that small chips, flakes, and/or slivers can be detected.

GO TO NEXT PAGE

b. Magnetic particles, debris, chips, flakes, and slivers - possible indications of bearing or gear failure and/or abnormal wear within the engine. Refer to steps c and d for acceptable and not acceptable limits.

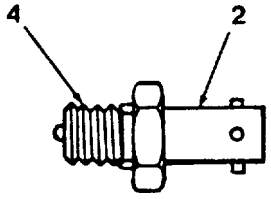
c. Metal chips or flakes less than 1/32 in. diameter or three slivers or less are acceptable. Service engine oil system (task 1-8-1). If a warning light is encountered, refer to step 5. Reinstall the magnetic chip detector and tighten to 60-80 in. lbs.

d. Metal chips or flakes exceeding 1/32 in. diameter or four or more slivers are not acceptable. Replace the engine and perform the following prior to operation.

(1) If a scavenge oil filter is Installed and the filter bypass has not extended, clean airframe provided engine oil lines and replace scavenge oil filter (TM 55-1520-248-23). Proceed to step 5.

(2) If the scavenge oil filter has bypassed or if no scavenge oil filter is installed, clean or replace scavenge oil filter, oil cooler, oil tank, and lubrication system oil lines (TM 55-1520-248-23). Drain and replace engine oil. Proceed to step 5.

2. Service magnetic chip detectors (task 6-3-4).



3. Inspect detector end (4) of magnetic chip detector (2) for cracks; cracks are not acceptable.

4. Install magnetic chip detector (tasks 6-3-5 and 6-3-6).

WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engine in operation.

5. Perform the following procedures as a result of magnetic chip detector warning light illumination:

GO TO NEXT PAGE

6-3-3. INSPECT MAGNETIC CHIP DETECTORS (CONT)

a. Clean both chip detectors. Perform a 30-minute ground run at power with the rotor turning. Observe engine operation limits and chip detector warning lights

(1) If operation is normal, remove, inspect, clean, and reinstall both chip detectors. Return engine to service.

(2) If chips or flakes greater than 1/32 in. diameter or four or more slivers are encountered, proceed to step 1.d.

(3) If chips or flakes less than 1/32 In. diameter or three slivers or less are encountered during the 30-minute ground run, proceed to step b.

b. If a chip light is encountered during the first 30-minute ground run, the following steps must be taken before the second 30-minute ground run:

(1) Drain oil.

(2) Clean engine oil filter.

(3) Flush aircraft oil system.

(4) Clean magnetic chip detectors.

(5) Service engine oil system with fresh, clean oil.

c. Perform a 30-minute ground at power with rotor turning. Observe engine operating limits and chip detector warning lights.

(1) If operation is normal, remove, inspect, clean, and reinstall both chip detectors (tasks 6-3-1 and 6-3-2) . Return engine to service.

(2) If a chip detector warning light is encountered, remove the engine from service. Clean the aircraft engi ne oil system per step 1.d (1) or 1.d (2).

NOTE

If a warning light **lluminates** within the next-eight operating hours following a 30-minute ground run, and the cause is determined to be an accumulation of magnetic particles and debris (chips, flakes, or slivers), remove the engine. Tag engine noting cause for rejection.

d. A maximum of four occurrences of chip detector warning light illuminations within any 50 hours of engine operation requires removal of the engine.

INSPECT

END OF TASK

6-3-4. SERVICE MAGNETIC CHIP DETECTORS

This task covers: Off Helicopter Servicing

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

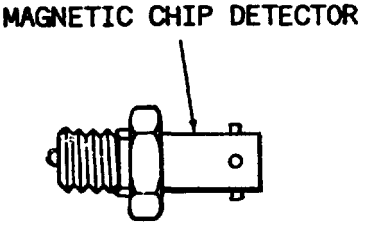
Materials:
Wiping Rag (C1)
Dry Cleaning Solvent (C8)
Gloves (C9)

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment Condition:
Magnetic chip detectors removed (tasks 6-3-1 and 6-3-2)

WARNING

Dry cleaning solvent (C8) is flammable and toxic. It can irritate skin and cause burns. Use only in well ventilated area away from heat and open flame. Wear gloves. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.



Remove all oil, paste, and other contaminants from magnetic chip detector using paint brush and dry cleaning solvent (C8); then dry with clean wiping rags (C1).

END OF TASK

6-3-5. INSTALL SIDE MAGNETIC CHIP DETECTOR

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Lockwire (C4)
Engine Oil (C30 or C31) currently used in engine

Parts:
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

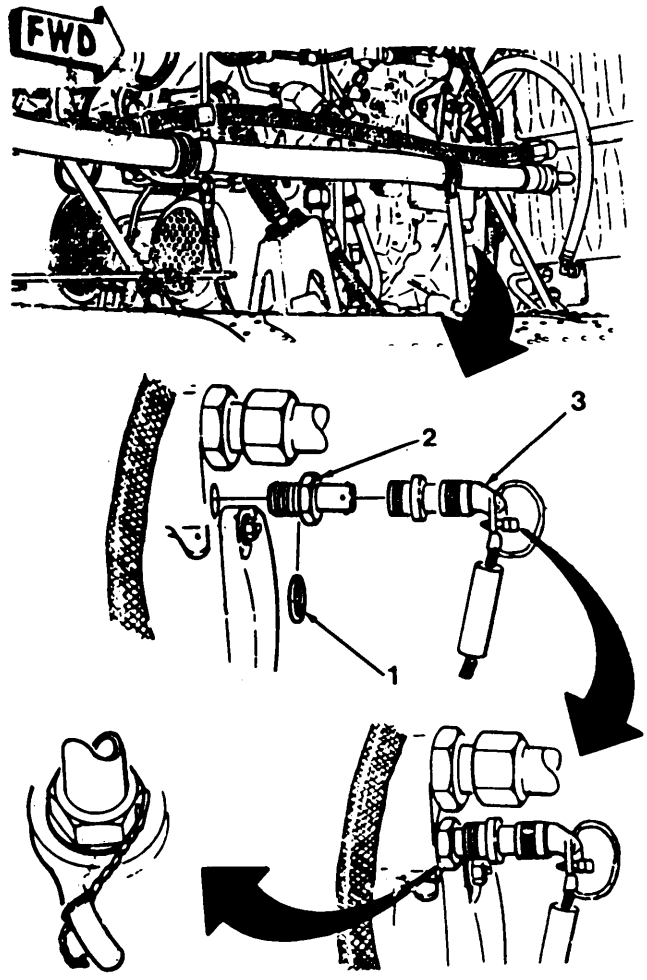
WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

1. Lightly lubricate new packing (1) with engine oil (C30 or C31) and instill on side magnetic chip detector (2).

2. Install side magnetic chip detector (2) and tighten to 60-80 in. lbs. Lockwire (C4) .

3. Connect electrical connector plug (3). Lockwire (C4).



INSPECT

FOLLOW ON MAINTENANCE:
Off Helicopter: Enter a requirement for MOC in aircraft logbook.

END OF TASK

6-3-6. INSTALL BOTTOM MAGNETIC CHIP DETECTOR

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Lockwire (C4)
Engine Oil (C30 or C31) currently used in engine

Parts:
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23,

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23.)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

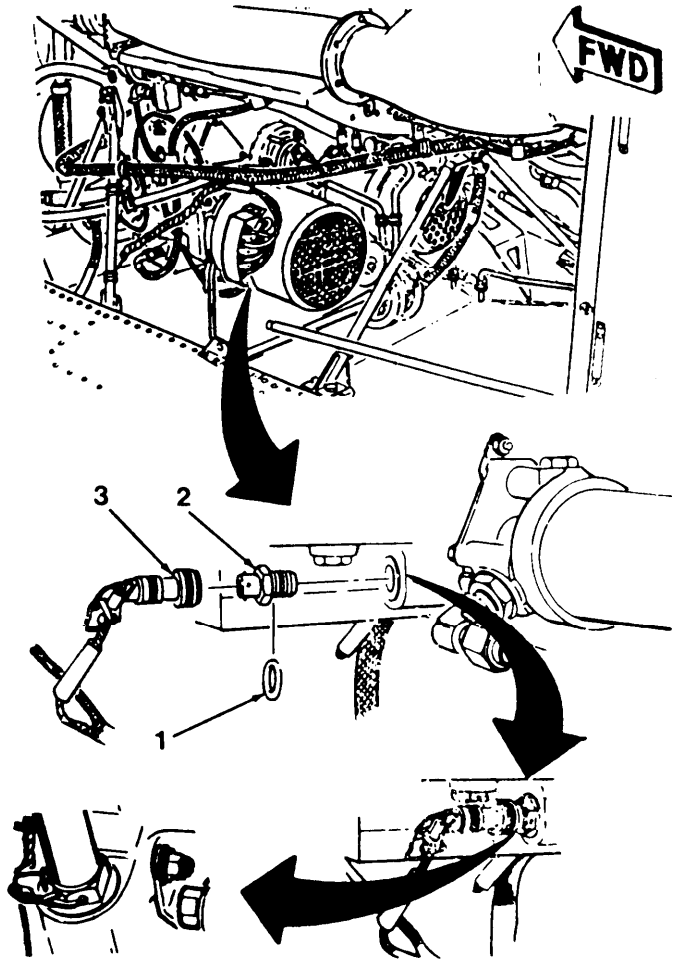
WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

1. Lightly lubricate new packing (1) with engine oil (C30 or C31) and install on bottom magnetic chip detector (2).

2. Install bottom magnetic chip detector (2) and tighten to 60-80 in. lbs. Lockwire (C4).

3. Connect electrical connector plug (3). Lockwire (C4).



INSPECT

FOLLOW ON MAINTENANCE:
Perform MOC.

END OF TASK

CHAPTER 7

FUEL SYSTEM MAINTENANCE

Section I GENERAL INSTRUCTIONS

This section includes maintenance procedures for purging and draining the engine fuel system.

NOTE

Refer to fuel system preservation (task 1-12-2).

LIST OF TASKS

TASK	TASK NO.	PAGE NO.
Purge Engine Fuel System	7-1-1	7-2
Drain Engine Fuel	7-1-2	7-4
Remove Contaminated Fuel-Water or Other Contaminant	7-1-3	7-4.1
Engine Fuel System Flush	7-1-4	7-4.3

7-1-1. PURGE ENGINE FUEL SYSTEM

This task covers: On Helicopter Purging

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Suitable Container 1 gal. capacity
Torque Wrench 30-150 in. lbs

Materials:
Lockwire (C4)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

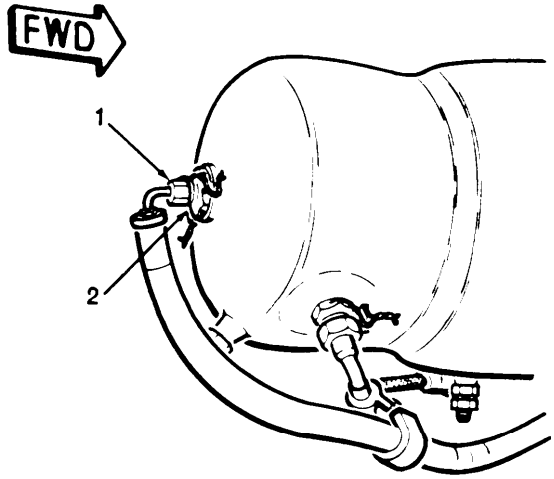
General Safety Instructions:

WARNING

Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

Fuel/air discharge during purging is irritating and highly flammable. Take suitable measures to protect eyes and prevent fire.

1. Remove lockwire and disconnect coupling nut (1) from fuel nozzle (2).



GO TO NEXT PAGE

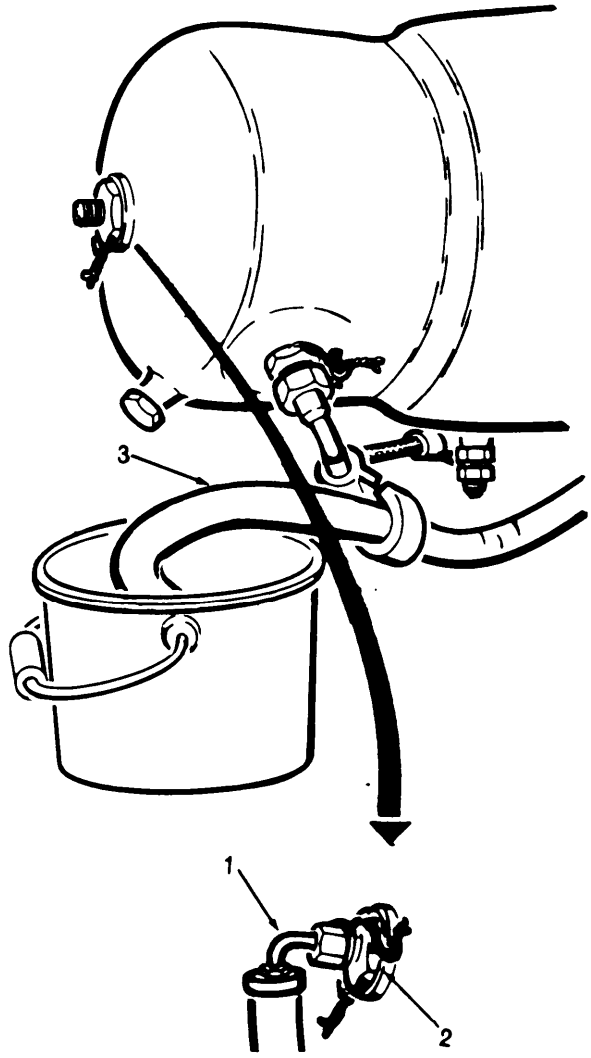
7-1-1. PURGE ENGINE FUEL SYSTEM (CONT)

2. Place end of fuel supply hose (3) in suitable container.

3. Verify that ignition system circuit breakers are open.

4. Open throttle to idle position.

5. Observe flow of fuel during motoring and signal pilot when there is a constant flow of fuel.



WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

6. Motor engine approximately 15 seconds or until repairer signals there is a constant flow of fuel.

7. Close throttle and turn all electrical power off; then close ignition system circuit breakers.

8. Connect coupling nut (1) to fuel nozzle (2). Torque to 80-120 in. lbs. Lockwire (C4).

INSPECT

FOLLOW ON MAINTENANCE:
Perform MOC.

END OF TASK

7-1-2. DRAIN ENGINE FUEL

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs.

Materials:
Wiping Rags (Cl)
Engine Fuel (C10)
Gloves (C29)
Suitable Container 1 qt min capacity
Lockwire (C4)

Parts:
Packing

References:
TM 55-1520-248-23

Equipment Conditions:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

Personnel Required:
68B Aircraft Powerplant Repairer

General Safety Instruction:

WARNING

Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Place container below drain plug

2. Remove lockwire. Remove drain plug (1) and packing (2). Discard packing (2).

3. After fuel is completely drained, coat new packing (2) with engine fuel (C10) and install on plug (l).

4. Install plug (1) and tighten to 60-80 in. lbs. Lockwire (C4).

INSPECT

END OF TASK

7-1-3. REMOVE CONTAMINATED FUEL-WATER OR OTHER CONTAMINANT

This task covers: On Helicopter Removal of Contaminated Fuel

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Suitable Container 1 gal. capacity

Materials:
Lockwire (C4)

Personnel Required:
68B Aircraft Powerplant Repairer
67S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

General Safety Instructions:

WARNING

Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Hash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

Fuel/air discharge during purging is irritating and highly flammable. Take suitable measures to protect eyes and prevent fire.

CAUTION

If any fuel system component is suspected of having ingested fuel contaminated with a corrosive agent, (e.g. water, salt water, pesticide, etc.), replace the fuel control (task 7-2-11 and 7-2-12), fuel pump (task 7-3-1 and 7-3-3), fuel filter element (task 7-5-6 and 7-5-7), and fuel nozzle (task 7-4-1 and 7-4-5).

NOTE

Flush aircraft fuel system and engine fuel system plumbing with clean fuel before replacing fuel control, fuel pump, fuel filter element, and fuel nozzle.

GO TO NEXT PAGE

7-1-3. REMOVE CONTAMINATED FUEL-HATER OR OTHER CONTAMINANT (CONT)

1. Inspect the (engine) fuel filter impending bypass indicator (task 7-5-1) . If the bypass indicator is "popped". (indicating bypass is about to or has occurred), perform the following.

NOTE

If the fuel filter impending bypass has not "popped" proceed to item 5.

2. Remove the fuel filter element (task 7-5-6), and remove the fuel control fuel filter (task 7-2-13).

3. Inspect fuel control inlet screen, if screen is 50% or more contaminated perform the following.

NOTE

If fuel control inlet screen is less than 502 contaminated. service fuel control fuel filter (task 7-2-14), and install fuel control fuel filter (task 7-2-15).

a. Flush aircraft fuel system and engine fuel system plumbing with clean fuel.

b. Remove fuel control (task 7-2-11), fuel pump (task 7-3-1), and fuel nozzle (task 7-4-1).

c. Install replacement fuel control (task 7-2-12), fuel pump (task 7-3-3), and fuel nozzle (task 7-4-5) .

4. Install new fuel filter (task 7-5-7), and reset the bypass indicator if required.

5. Perform engine fuel system flush (task 7-1-4).

INSPECT

FOLLOW ON MAINTENANCE:

Perform MOC.

END OF TASK

7-1-4. ENGINE FUEL SYSTEM FLUSH

INITIAL SETUP

Applicable Configurations:
All

Tool S :
Power Plant Tool Kit
2 Clean Suitable Container
1 gal. capacity

Materials:
Wiping Rags (C1)
Gloves (C29)

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine-turnover stand (task 1-5-5).

General Safety Instruction:

WARNING

Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

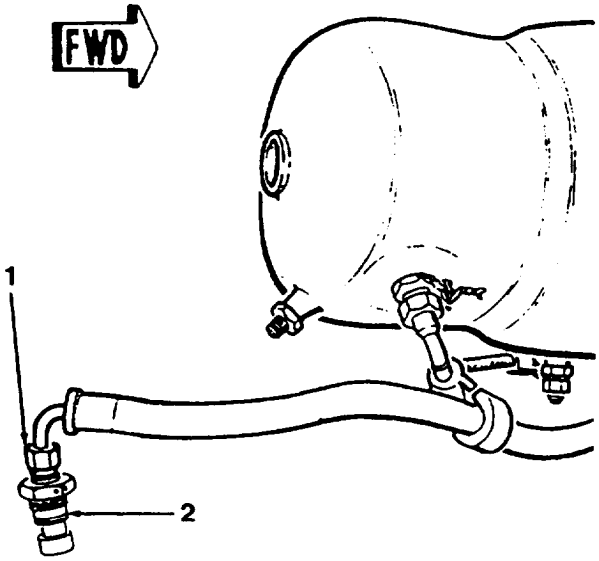
Fuel/air discharge during flushing is irritating and highly flammable. Take suitable measures to protect eyes and prevent fire.

1. Remove fuel nozzle (task 7-4-1).

CAUTION

Take extra care not to damage mirror finish on fuel nozzle spray tip. If it is dropped, replace.

2. Connect coupling nut (1) to fuel nozzle (2) and tighten hand tight.



WARNING

Hear goggles to protect eyes from accidental fuel splash.

GO TO NEXT PAGE

7-1-4. ENGINE FUEL SYSTEM FLUSH (CONT)

3. Hold supply hose (3) with attached nozzle (2) and direct spray tip (4) towards container.

4. Disconnect the engine fuel pump inlet line (5) from the aircraft.

5. Mix 80 oz of clean engine fuel with 4 oz of clean oil (C21), put mixture in clean container with fuel pump inlet line submerged in mixture.

6. Verify that ignition system circuit breakers are open.

7. Open throttle to idle position.

8. Motor engine until the fuel/oil mixture has been ingested by the engine fuel pump.

NOTE

Obey the starter duty cycle limitations.

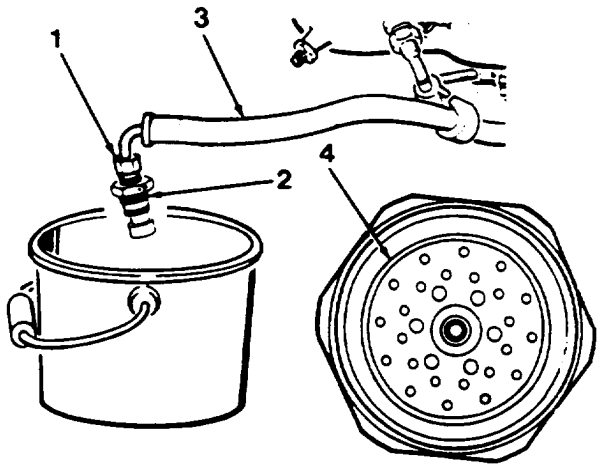
9. Close throttle and turn all electrical power off.

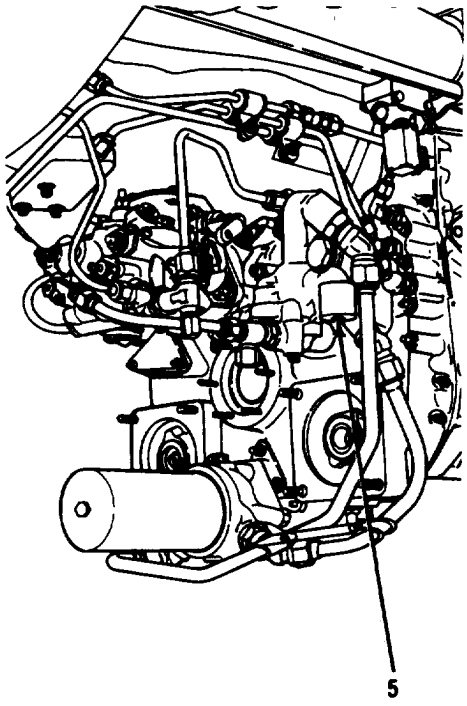
10. Install fuel nozzle (2) (task 7-4-5).

11. Install fuel pump inlet line (5) to the aircraft.

12. Remove fuel filter element (task 7-5-6), inspect element and replace if necessary. Install fuel filter element (task 7-5-7).

13. Perform purge engine fuel system (task 7-1-1).





INSPECT

FOLLOW ON MAINTENANCE:

Perform MOC.

END OF TASK

Section II FUEL CONTROL

This section Includes maintenance procedures for inspection, servicing, adjusting, and replacement of the fuel control.

LIST OF TASKS

7-2-1. INSPECT FUEL CONTROL RIGGING

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Personnel Required:
688 Aircraft Powerplant Repairer
helper

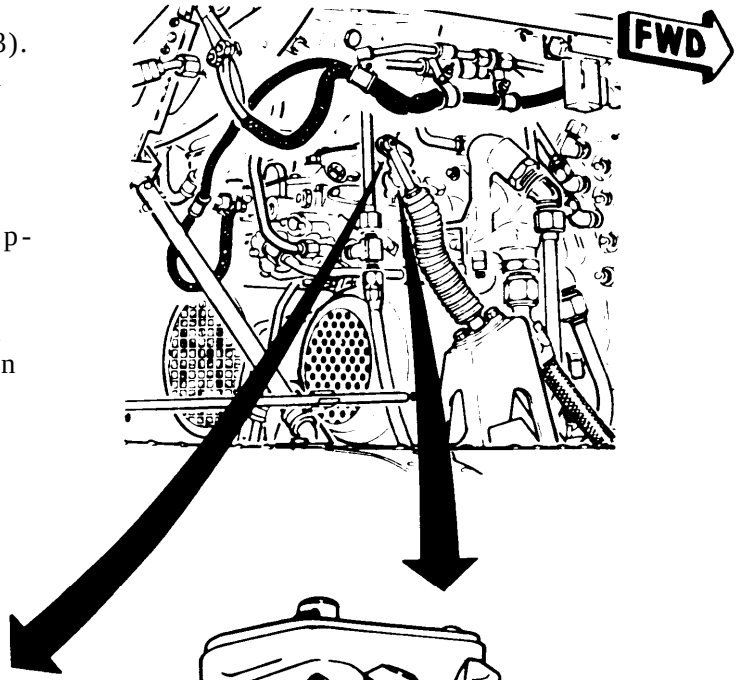
References:
TM 55-1520-248-23

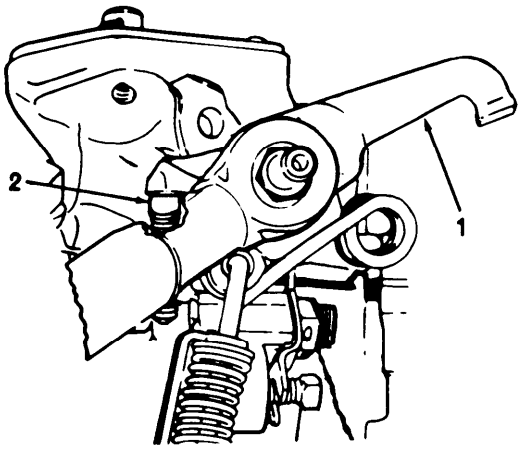
Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

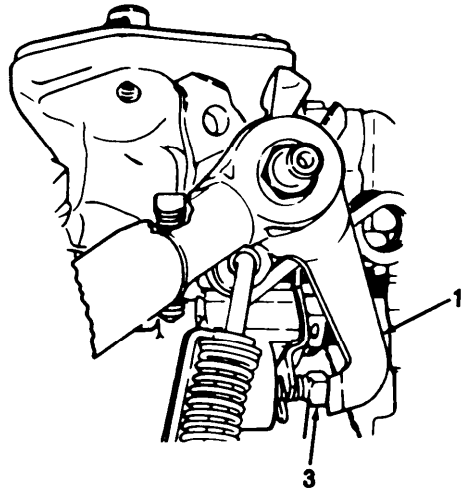
1. Observe throttle lever (1) as helper turns pilot throttle twist grip to full closed position (TM 55-1 520-248-23). Throttle lever (1) must contact minimum stop (2) at or before full closed position is reached on pilot's throttle twist grip.

2. Observe throttle lever (1) as helper turns pilot's throttle twist grip to full open position (TM 55-1520-248-23). Throttle lever (1) must contact maximum stop (3) at or before full open position is reached on pilot's throttle twist grip.

3. Repeat steps 2 and 3 using cp/o throttle twist grip (TM 55-1520-248-23).







GO TO NEXT PAGE

7-2-1. INSPECT FUEL CONTROL RIGGING (CONT)

4. Mark quadrant (4) with a pencil at position (5), 5/64-in. below 40 degrees.

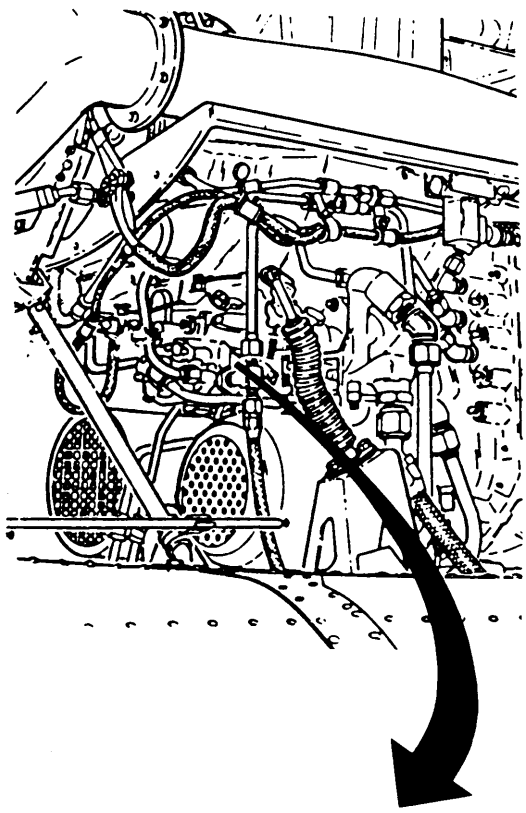
NOTE

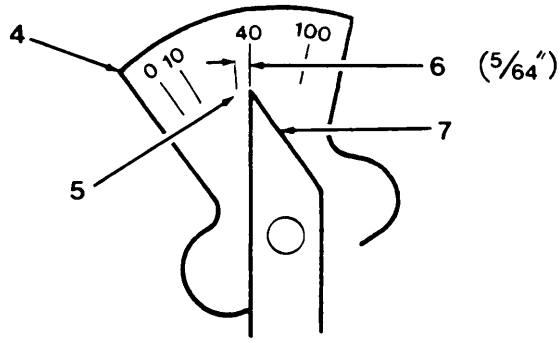
Play found in fuel control or helicopter throttle linkage must be removed by finding and replacing worn parts (TM 55-1520-248-23). Play that cannot be removed must be within limits of dimension (6), 5/64 in.

5. Set pilot throttle twist grip at full open position then rotate grip to IDLE position (TM 55-1520-248-23). Pointer (7) must be within dimension (6).

6. Set pilot throttle twist grip at full closed position then rotate grip to ground idle position (TM 55-1520-248-23). Pointer (7) must be within dimension (6), 5/64-in.

7. Repeat steps 6 and 7 using cp/o throttle twist grip (TM 55-1520-248-23).





END OF TASK

7-2-2. INSPECT FUEL CONTROL IDLE SPEED SETTING

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
688 Aircraft Powerplant Repairer
Pilot

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

General Safety Instructions:

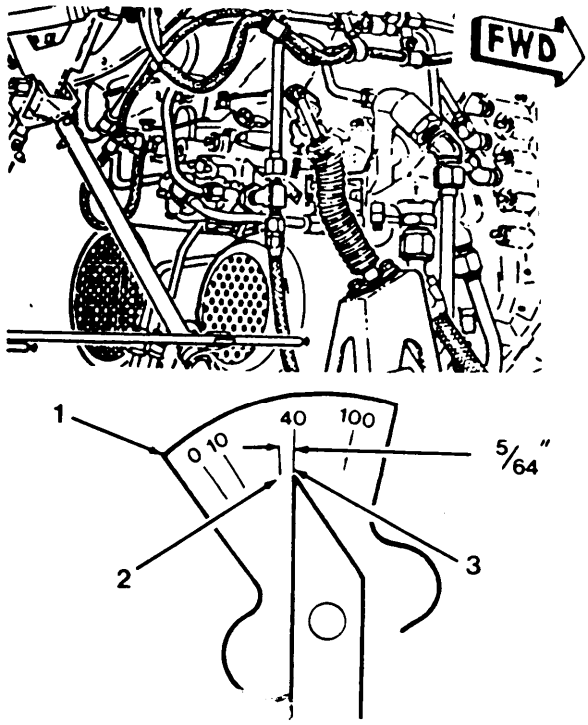
WARNING

Noise levels reached during. ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

1. Mark quadrant (1) with a pencil at position (2), 5/64-in. below 40 degree mark (3).

2. Pilot: Operate engine until all temperatures and pressures are within normal operating range; then set throttle at ground idle.

3. Pilot: Note stabilized Ng ground idle speed, then open throttle full open and close it back to ground idle again. Stabilized Ng ground idle speed should be the same as-before opening throttle. If stabilized Ng ground idle speed is not the same as before, complete steps 4 thru 7. If Ng ground idle speed is the same before and after throttle full open, proceed to step 8.



GO TO NEXT PAGE

7-2-2. INSPECT FUEL CONTROL IDLE SPEED SETTING (CONT)

4. Pilot: Shutdown engine.

5. Rig aircraft throttle linkage (TM 55-1520-248-23) .

6. Pilot: Start engine.

7. Repeat steps 2 and 3.

8. Observe quadrant (1) while pilot slowly moves throttle below ground idle detent just until there is noticeable movement of pointer (4). There should be no change in Ng idle speed.

9. Observe pointer. If pointer (4) is outside of dimension (5) (5/64 in. below 40 degrees mark), complete steps 10 thru 13. Otherwise, proceed to step 14.

10. Pilot: Shutdown engine.

11. Rig aircraft throttle linkage (TM 55-1520-248-23) to move pointer (4) to a point just below 40 degrees mark (3) within dimension (5).

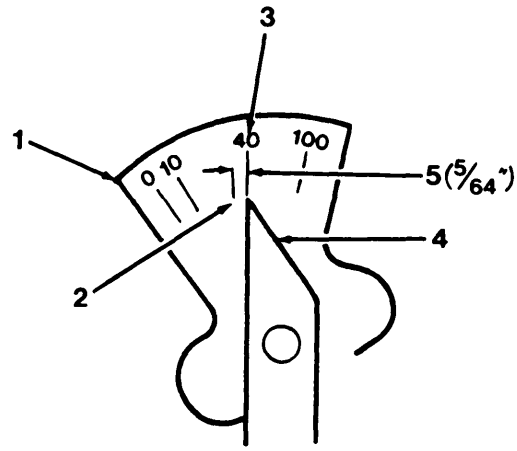
12. Pilot: Start engine.

13. Repeat steps 8 and 9.

14. Observe quadrant (1) while pilot slowly moves throttle toward open until there is noticeable movement of pointer (4). No increase in Ng speed is permitted before pointer (4) goes above 40 degrees mark (3).

15. Observe engine speed. If there is an Ng speed increase with pointer (4) below 40 degrees mark (3), replace fuel control (tasks 7-2-11 and 7-2-12).

16. Pilot: Shutdown engine.



END OF TASK

7-2-3. INSPECT FUEL CONTROL FUEL FLOW SCHEDULE

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Calibrated Beaker (T39)
Utility Pail
Torque Wrench 30-150 in. lbs
Fuel Control Rigging Pin (T31)

Materials:
Lockwire (C4)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

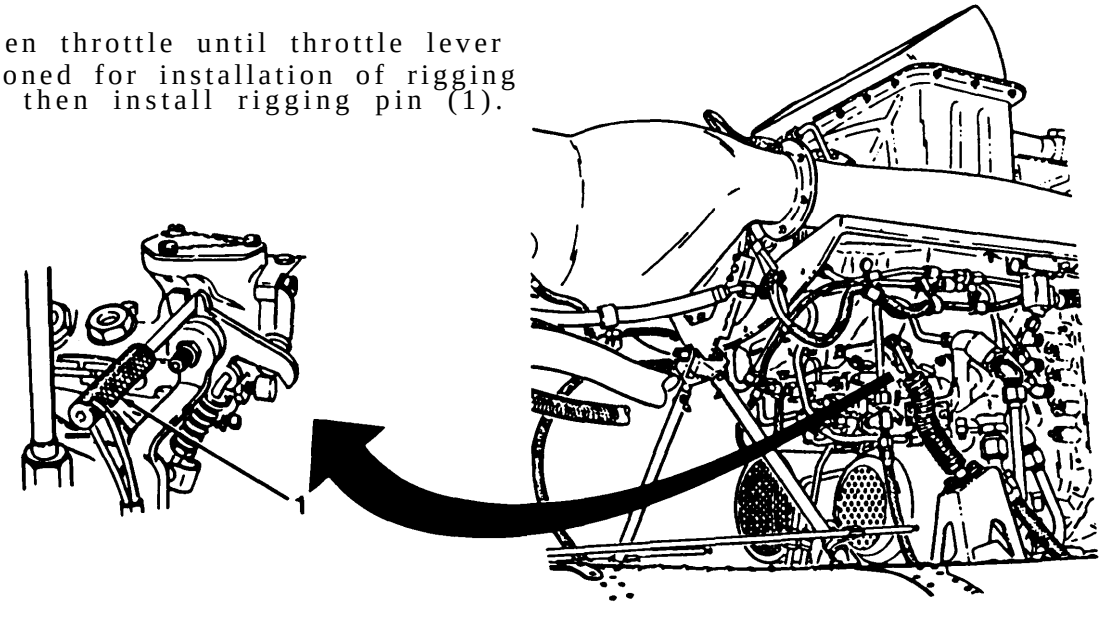
Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

General Safety Instructions:

WARNING

Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Open throttle until throttle lever is positioned for installation of rigging pin (1): then install rigging pin (1).



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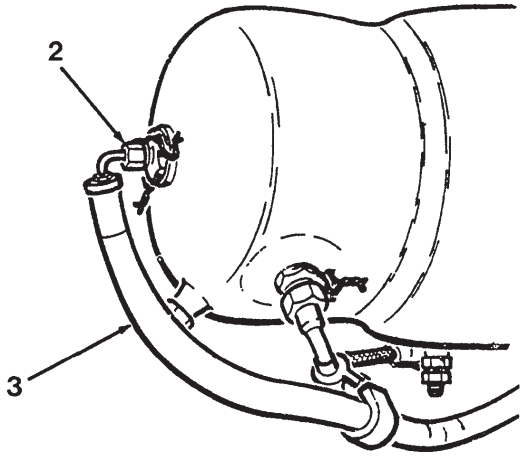
7-2-3. INSPECT FUEL CONTROL FUEL FLOW SCHEDULE (CONT)

2. Place utility pail directly below coupling nut (2). Remove lockwire and disconnect coupling nut (2). Allow all fuel to drain into utility pail.



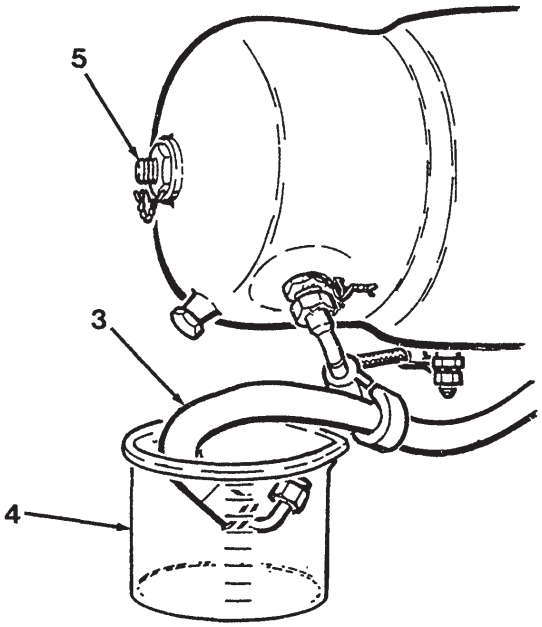
3. Place hose (3) in calibrated beaker (4).

4. Remove rigging pin (1).

NOTE

It is very important that throttle be closed exactly 15 seconds after start of engine motoring.

5. Open all ignition system circuit breakers and motor engine to 15% Ng, open the throttle to the 40˚ (ground idle) position for exactly 15 seconds and close the throttle.

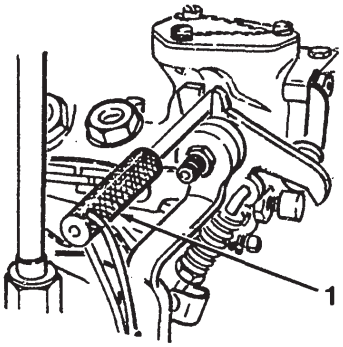


6. Allow all fuel to drain into calibrated beaker (4). Measure amount of fuel in beaker and record it, then empty beaker.

7. Perform steps 1 and 3 thru 5, two additional times.

8. Total all amounts of fuel recorded and divide by three. Average must be within limits of figure on page 7-12.

9. If average exceeds limits, adjust fuel control start acceleration schedule (task 7-2-9).



10. Remove hose (3) from calibrated beaker (4).

11. Connect coupling nut (2) to fuel nozzle (5). Torque to 80-120 in. lbs and lockwire (C4).

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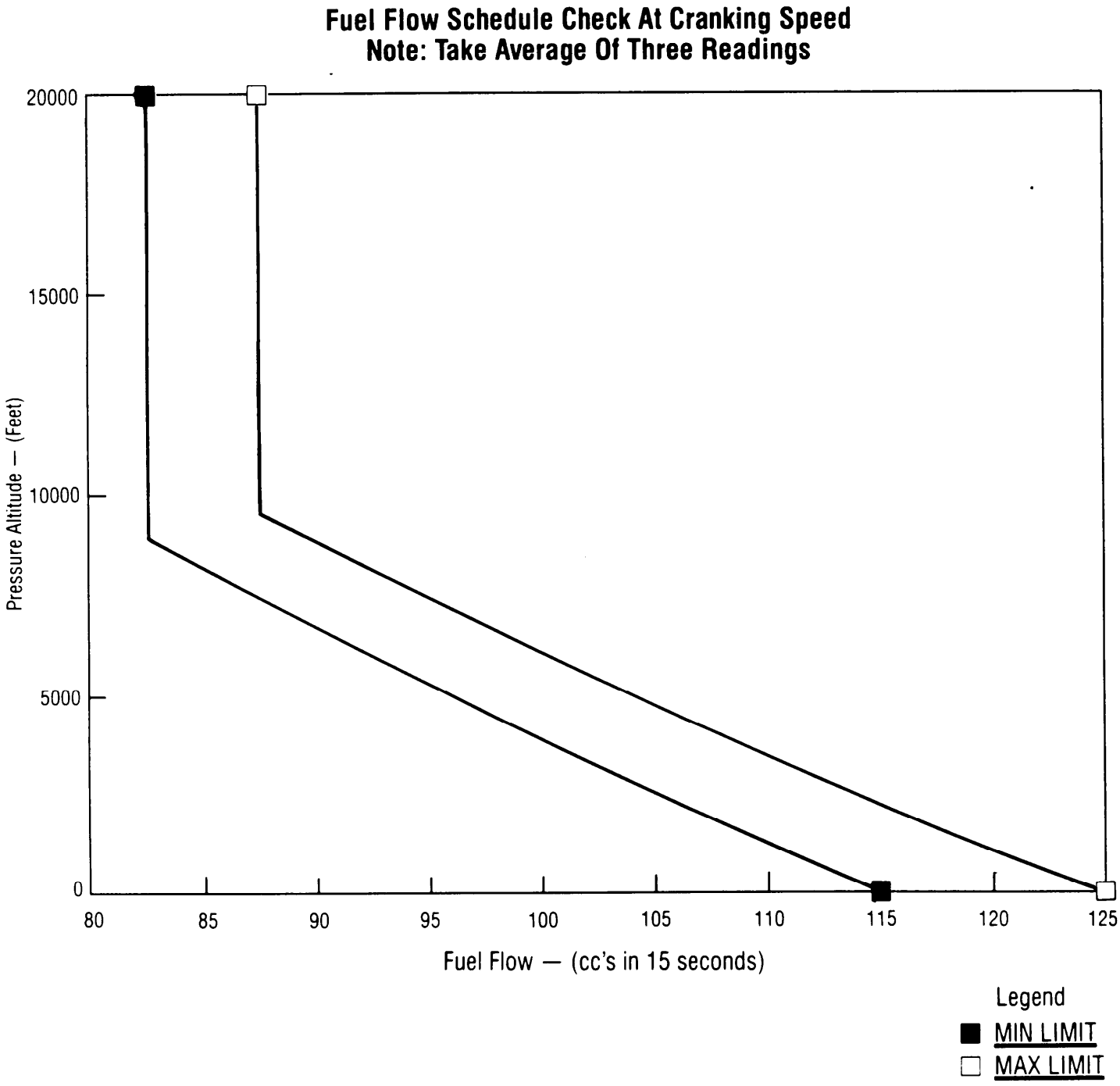
7-2-3. INSPECT FUEL CONTROL FUEL FLOW SCHEDULE (CONT)



INSPECT

END OF TASK

7-2-4. INSPECT FUEL CONTROL AIR SENSING TUBES

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Air and Water Separator
Torque Wrench 30-150 in. lbs

Materials:
Wiping Rags (Cl)
Leak Detector (C2)
Soap Solution (C22)

Personnel Required:
68B Aircraft Powerplant Repairer
Pilot

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

General Safety Instructions:

WARNING

Air leaks in the fuel system pneumatic sensing system can cause flameouts, power loss, or overspeed.

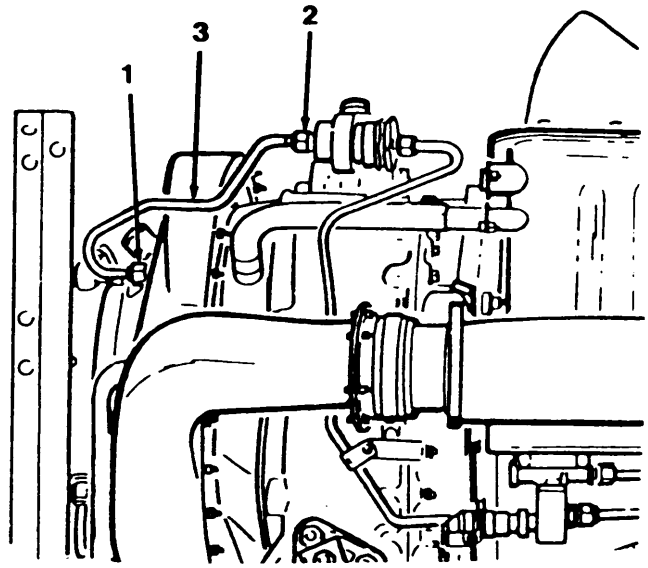
1. Disconnect coupling nut (l).

2. Loosen coupling nut (2).

3. Rotate tube (3) to position where air compressor line may be connected to coupling nut (l).

4. Tighten coupling nut (2) and torque to 80-120 in. lbs.

5. Install oil and water separator on air compressor unit.



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7-2-4. INSPECT FUEL CONTROL AIR SENSING TUBES (CONT)

6. Connect air compressor line or nitrogen line to coupling nut (l); then apply 80 psig compressed air or nitrogen.

7. Spray leak detector (C2) or soap solution (C22) on the following components and check for air leakage. No air leakage Is allowed.

a. Fittings (1) and (2), and tube (3).

b. Pc filter (4).

c. Coupling nuts (5) and (7), and tube (6).

d. Fitting (8).

e. Coupling nuts (9) and (10), and tube (11).

f. Coupling nut (12) and (13), and tube (14).

g. Fitting (15).

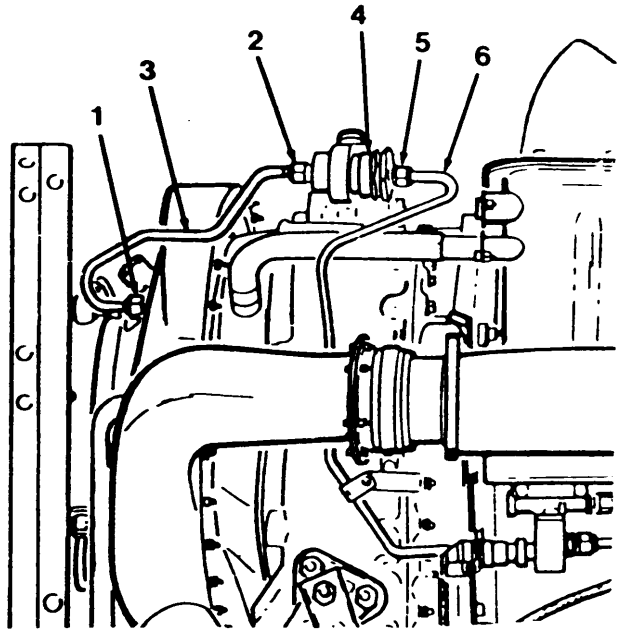
8. Stop air compressor unit and disconnect It from coupling nut (l).

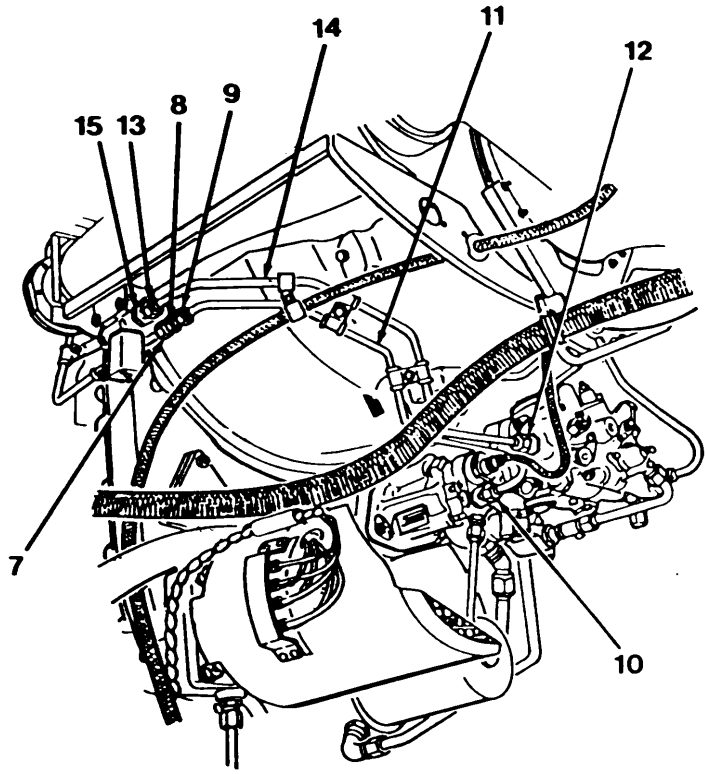
9. Loosen coupling nut (2); then connect coupling nut (l). Tighten coupling nuts (1) and (2) to 80-120 in. lbs.

10. Pilot: Operate engine at ground idle in accordance with operator's manual. Have mechanic spray leak detector (C2) or soap solution (C22) on coupling nuts (1 and 2). No air leakage is allowed.

11. Pilot: Shutdown engine.

12. Remove leak detector (C2) or soap solution (C22) with wiping rags (Cl).





INSPECT

END OF TASK

7-2-5. INSPECT FUEL CONTROL WEEP HOLES

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

General Safety Instructions:

CAUTION

Leakage from fuel control weep holes is an indication of serious malfunctions. Engine failure will result unless proper corrective actions are taken.

1. Inspect two weep holes for evidence of fuel and/or oil leakage. No fuel or 011 leakage is allowed.

2. If fuel leakage is found:

   a. Remove fuel control (task 7-2-11).

   b. Remove fuel pump (task 7-3-1).

   c. Install serviceable fuel pump (task 7-3-3).

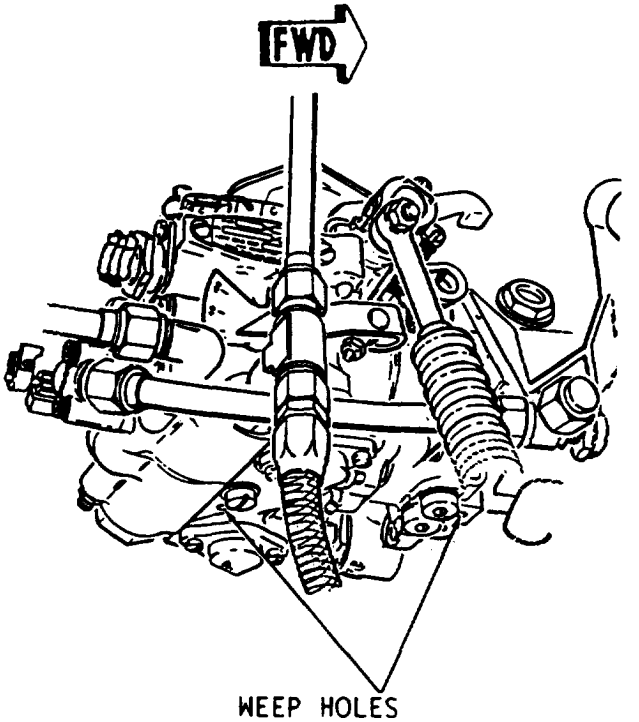
   d. Install serviceable fuel control (task 7-2-12).

3. If 011 leakage is found:

   a. Remove fuel control (task 7-2-11).

   b. Remove fuel pump (task 7-3-1).

   c. Replace fuel pump accessory drive seal (task 6-1-4).



WEEP HOLES
VIEW FROM BELOW

   d. Install serviceable fuel pump (task 7-3-3).

   e. Install serviceable fuel control (task 7-2-12).

END OF TASK

7-2-6. INSPECT FUEL CONTROL CUTOFF VALVE

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Utility Pail
Torque Wrench 30-150 in. lbs

Materials:
Lockwire (C4)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

Reference:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

General Safety Instructions:

WARNING

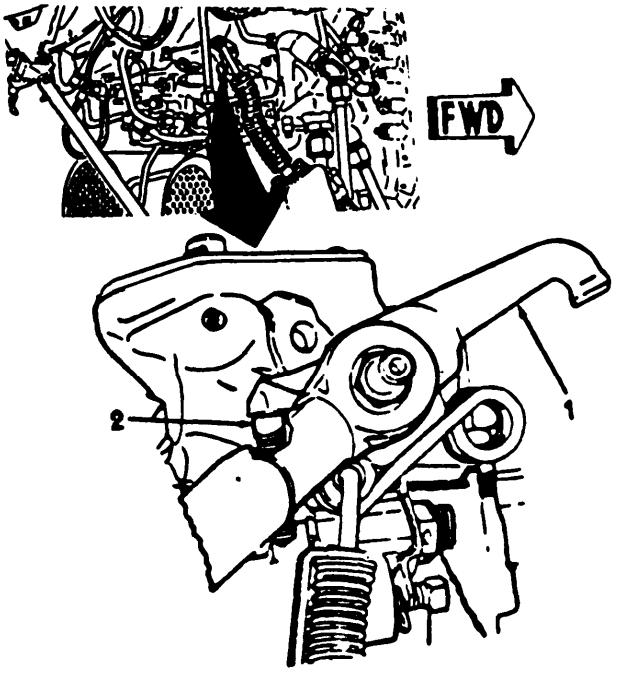
Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Turn battery on.

2. Verify that all ignition system circuit breakers are open (TM 55-1520-248-23).

3. Turn pilot's throttle twist grip to full close position (TM 55-1520-248-23) .

4. Insure throttle lever (1) is contacting minimum stop (2).



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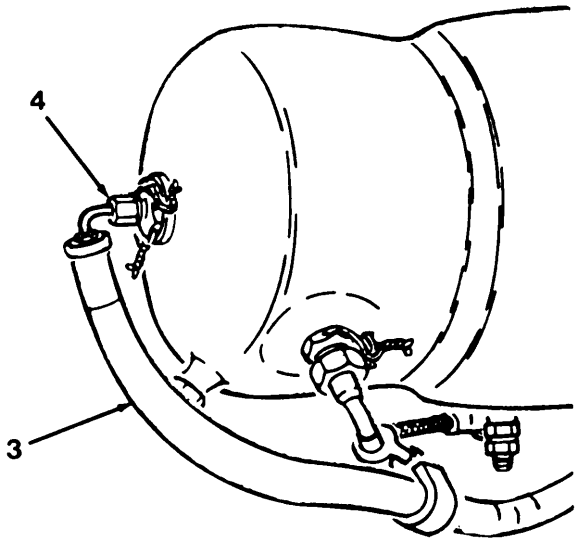
7-2-6. INSPECT FUEL CONTROL CUTOFF VALVE (CONT)

5. Disconnect fuel supply hose (3) at coupling nut (4); then place end of hose (3) in utility pail and allow all fuel to drain from hose.

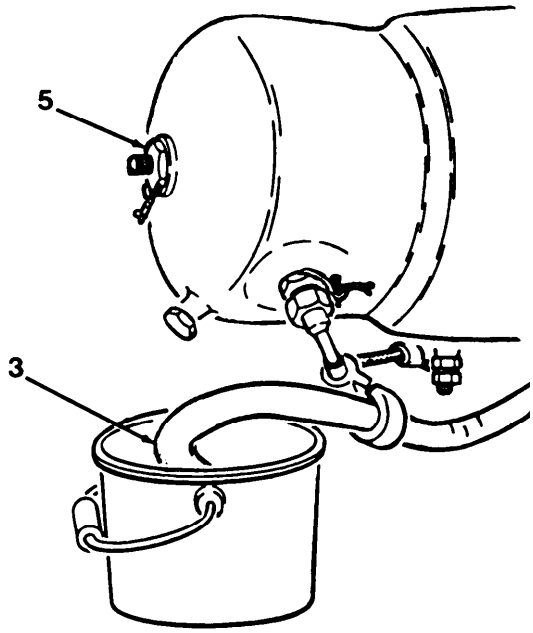


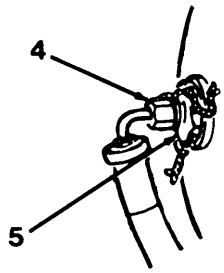
6. Observe open end of fuel supply hose (3) in pail as engine is motored for approximately 15 seconds. There should not be any fuel flowing out of hose. If Fuel is flowing. replace fuel control (tasks 7-2-11 and 7-2-12).

7. Turn battery off.

8. Connect coupling nut (4) to fuel nozzle (5). Torque to 80-120 in. lbs and lockwire (C4).

INSPECT





END OF TASK

7-2-7. SERVICE FUEL CONTROL Pc INLET AIR FILTER ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Machinist Vise
Vise Jaw Caps
Oil and Hater Separator
Air Compressor Unit
Torque Wrench 30-150 in. lbs
Torque Wrench 700-1600 in. lbs
1-1/2 in. Crow's-foot Adapter Wrench
10X Magnifying Glass

Materials:
Lockwire (C5)
Dry Cleaning Solvent (C8)
Antiseize Compound (C19)
Gloves (C29)

Parts:
Packing

Personnel Required:
67S Helicopter Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed. (TM 55-1520-248-23.
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

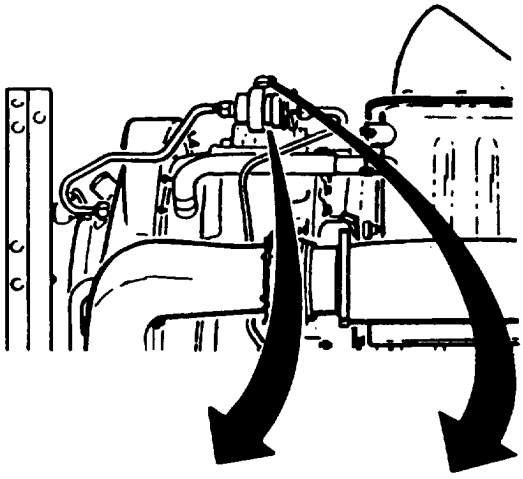
1. Hold Pc Inlet air filter assembly (1) from rotating and disconnect coupling nuts (2) and (3).

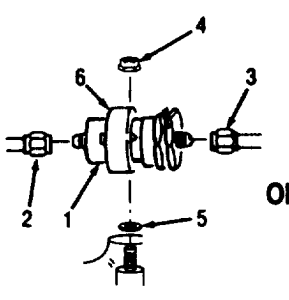
2. (T703-AD-700 ONLY) Remove nut (4), Pc inlet air filter assembly (1), and washer (5).

2A. (T703-AD-700B ONLY) Remove bolt (4A), nut (5A), and Pc inlet air filter (1).

3. Remove lamp (6) from Pc inlet air filter assembly (1).

4. Remove lockwire from Pc inlet air filter assembly (1).





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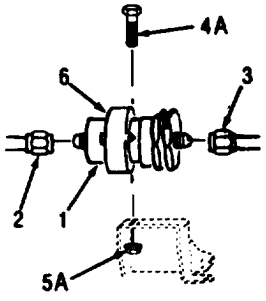


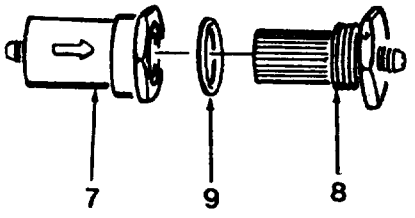
T703-AD-700 T703-AD-700B

GO TO NEXT PAGE

7-2-7. SERVICE FUEL CONTROL Pc INLET AIR FILTER ASSEMBLY (CONT)

CAUTION

Use only enough force to retain assembly in vise. Forces exceeding this amount may crack or warp filter element.



5. Place hexagon portion of filter element (8) in a machinist's vise with vise jaw caps installed.

6. Remove housing (7) from filter element (8) by using 1-1/2 in. crow's-foot adapter wrench on hexagon portion of housing (7).

7. Remove and discard packing (9).

WARNING

Dry-cleaning solvent (C8) is flammable and toxic. It can irritate skin and cause burns. Use only in well ventilated area away from heat and open flame. Hear gloves. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

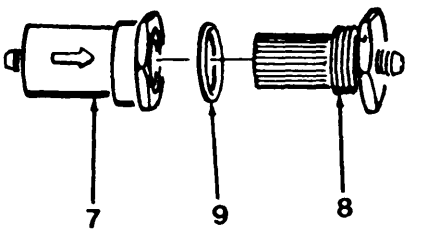
8. Clean filter element (8) by agitating in dry clean solvent (C8).

GO TO NEXT PAGE

7-2-7. SERVICE FUEL CONTROL Pc INLET AIR FILTER ASSEMBLY (CONT)

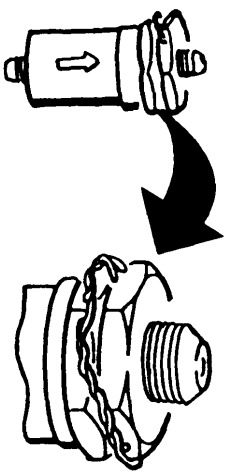
WARNING

Use goggles to protect eyes and face when using compressed air. Do not exceed 30 psig. Do not direct airstream towards yourself or another person. Failure to comply may result in Injury to personnel.



9. Dry filter element (8) with filtered air from air compressor with oil and water separator installed.

10. Inspect filter element (8) for cracks using 10X magnifying glass and flashlight. No cracks allowed. If found, replace filter element (8).



11. Lubricate new packing (9) with engine oil (C30 or C31) and Install on filter element (8).

12. Lubricate threads on filter element (8) and housing (7) with antiseize compound (C19).

CAUTION

Use only enough force to retain filter assembly in vise. Forces exceeding this amount may crack or warp filter element.

13. Place hexagon nut portion of filter element (8) in machinist's vise with jaw caps installed.

14. Install housing (7) on filter element (8); then tighten using 1-1/2 in. crow's-foot adapter wrench on hexagon nut part of housing (7).

GO TO NEXT PAGE

7-2-7. SERVICE FUEL CONTROL Pc INLET AIR FILTER ASSEMBLY (CONT)

NOTE

If a metallic seal is used, tighten housing (7) to 720-780 in. lbs. If a rubber packing is used, tighten housing to 60-65 in. lbs.

15. Tighten housing (7) and lockwire (C5).

16. Install clamp (6).

17. (T703-AD-700 ONLY) Install washer (5) on mounting stud (10).

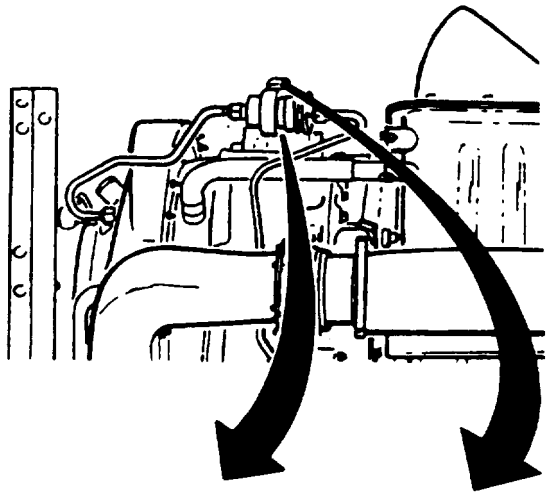
NOTE

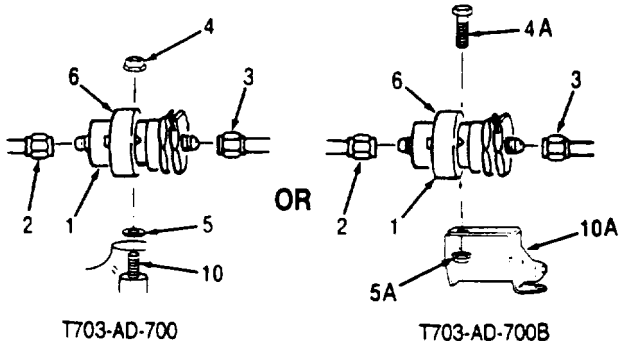
Make sure arrow on filter assembly (1) is pointing aft.

18. (T703-AD-700 ONLY) Install Pc inlet air filter assembly (1) with attached clamp (6) on mounting stud (10); then install nut (4).

18A. (T703-AD-700B ONLY) Install Pc inlet air filter assembly (1) with attached clamp (6) to bracket (10A); then install bolt (4A) and nut (5A).

19. Connect coupling nuts (2) and (3). Torque to 80-120 in. lbs.





T703-AD-700 T703-AD-700B

INSPECT

FOLLOW ON MAINTENANCE:
Inspect air sensing tubes (task 7-2-4).

END OF TASK

Task 7-2-8 deleted.
Pages 7-21 and 7-22 deleted.

7-2-9. ADJUST FUEL CONTROL START/ACCELERATION SCHEDULE

This task covers: On Helicopter Adjustment

INITIAL SETUP

Applicable Configurations:
Al1

Tools
Power Plant Tool Kit

Materials:
Lockwire (C4)

Personnel Required:
686 Aircraft Powerplant Repairer

References:
TM 55-1520-248-23
TM 55-1520-248-MTF

Equipment Condition:
Engine access panels open/cowling removed. (TM 55-1520-248-23).

General Safety Instructions:

CAUTION

Do not use start/acceleration adjustment to correct for normal maintenance items such as misrigging air leaks, fuel leaks, faulty fuel nozzle, ignition problems, starter-generator system problems, etc. A required adjustment of more than two clicks clockwise (CW) is an Indication fuel control is not cause of problem.

CAUTION

Do not use start/acceleration adjustment only to improve engine starting. Too many CW settings before encountering TGT overtemperature causes a high TGT for a large part of the starting time. High TGT starts over a long period of time may cause Internal damage of turbine module.

An overadjustment of start/acceleration setting clockwise (CW) can cause TGT overtemperature starts or compressor surge.

An overadjustment of start/acceleration setting counterclockwise (CCW) can cause a hung start or too long of a start.

NOTE

To accurately determine the proper adjustment, conditions under which adjustments are made should be consistent; i.e., a fully charged aircraft battery, same residual TGT, and same lightoff speed.

Make all adjustments in changes of one detent (click) at a time.

GO TO NEXT PAGE

7-2-9. ADJUST FUEL CONTROL START/ACCELERATION SCHEDULE (CONT)

CAUTION

Don't cut lockwire or seal for adjustment screw (2). This adjustment is factory set, and if disturbed, the fuel control must be replaced.

NOTE

There are eight positions for adjuster (l). Neutral position is three clicks from CCW stop. Detent grooves hold adjuster (1) in selected position without need of a jam nut.

1. Remove lockwire from adjuster (1).

2. Make start/acceleration adjustment as required by any of the following conditions.

a. Condition: Excessive lightoff TGT - Ng speed below 20%, TGT over 810 degrees C with a momentary peak of one second maximum at 927 degrees C for a period not to exceed 10 seconds.

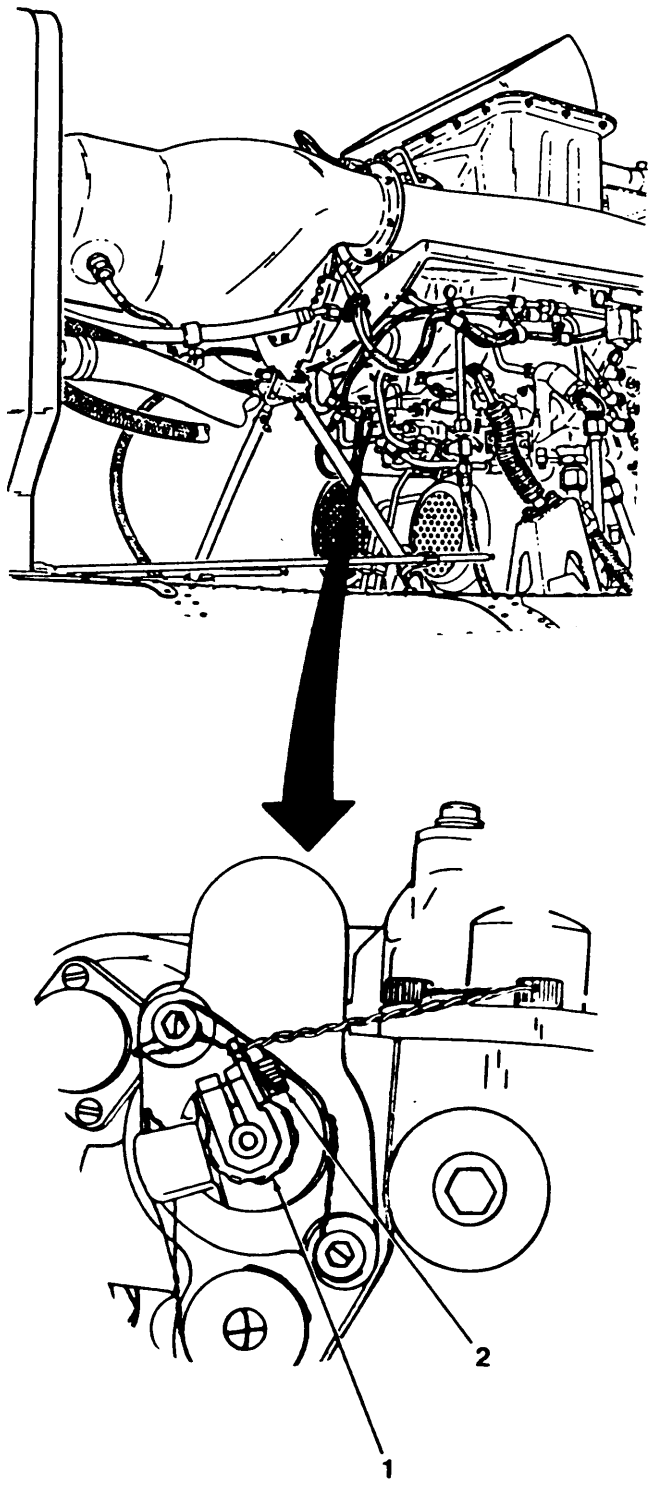
Adjustment: Move adjuster (1) CCW one detent.

b. Condition: High lightoff TGT, Ng speed at 35-55%. TGT over 810 degrees C, with a momentary peak of one second maximum at 927 degrees C, for a period not to exceed 10 seconds,

Adjustment: Move adjuster (1) CCW one detent.

c. Condition: Low lightoff TGT, with Ng speed below 20%. Lightoff TGT below approximately 550 degrees C with slow acceleration.

Adjustment: Move adjuster (1) CW one detent.



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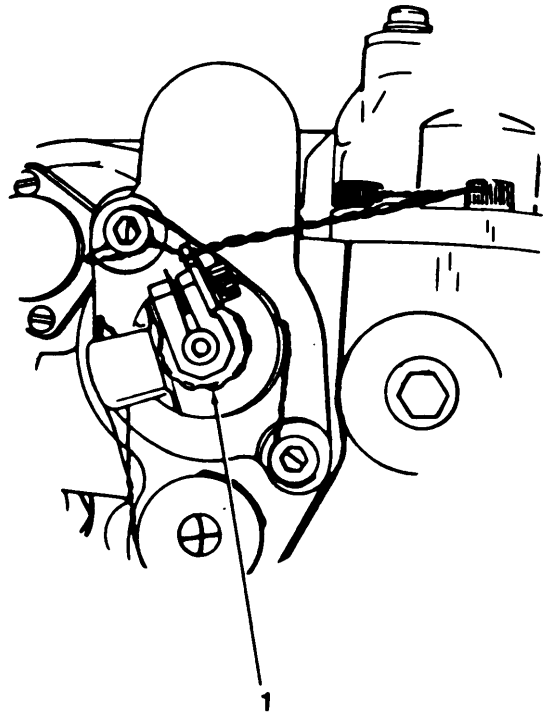
7-2-9. ADJUST FUEL CONTROL START/ACCELERATION SCHEDULE (CONT)

d. Condition: Low lightoff TGT, with slow start - lightoff TGT below approximately 550 degrees C. with start time approaching 60 seconds (or more), and Ng speed hesitation at 20-33%

Adjustment: Move adjuster (1) CW one detent.

e. Condition: LOW lightoff TGT, with slow to hung start - lightoff TGT below approximately 550 degrees C, with starting time near 60 seconds (or more), and Ng speed hesitation at 35-55%.

Adjustment: Move adjuster (1) CW one detent.



CAUTION

To accurately determine proper adjustment, conditions under which adjustments are made should be consistent; i.e., a fully charged aircraft battery, same residual TGT, and same lightoff speed.

3. After completion of adjustment, insure conditions in caution above are correct.

4. Lockwire (C4) adjuster (l).

INSPECT

FOLLOW ON MAINTENANCE:

Pilot: Perform MOC over full power range with electronic supervisory control both ON and OFF (TM 55-1520-248-MTF).

END OF TASK

7-2-10. ADJUST FUEL CONTROL IDLE SPEED

This task covers: On Helicopter Adjustment

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Ground Idle Wrench (T16)

Personnel Required:
68B Aircraft Powerplant Repairer
Pilot

References:
TM 55-1520-248-23
TM 55-1520-248-MTF

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

1. Pilot: Start engine, set throttle at idle, and generator switch OFF.

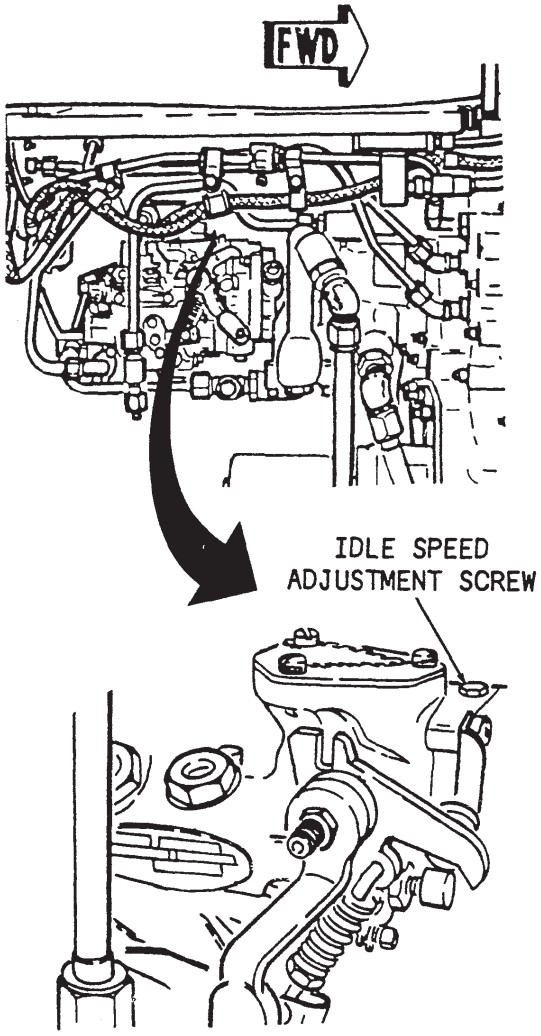
NOTE

Turning adjustment screw clockwise (CW) increases Ng rpm; counterclockwise (CCW) decreases rpm.

A 1/8- turn of idle adjustment screw will change Ng rpm approximately 5%.

2. Adjust idle speed adjustment screw with ground idle wrench (T16) to obtain a 62-65% Ng speed indication.

3. Pilot: Shutdown engine.



END OF TASK

7-2-11. REMOVE FUEL CONTROL

INITIAL SETUP

Applicable Configurations:
All

Tools
Power Plant Tool Kit

Materials:
Wiping Rags (Cl)
Gloves (C29)

Personnel Required:
688 Aircraft Powerplant Repairer

References
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

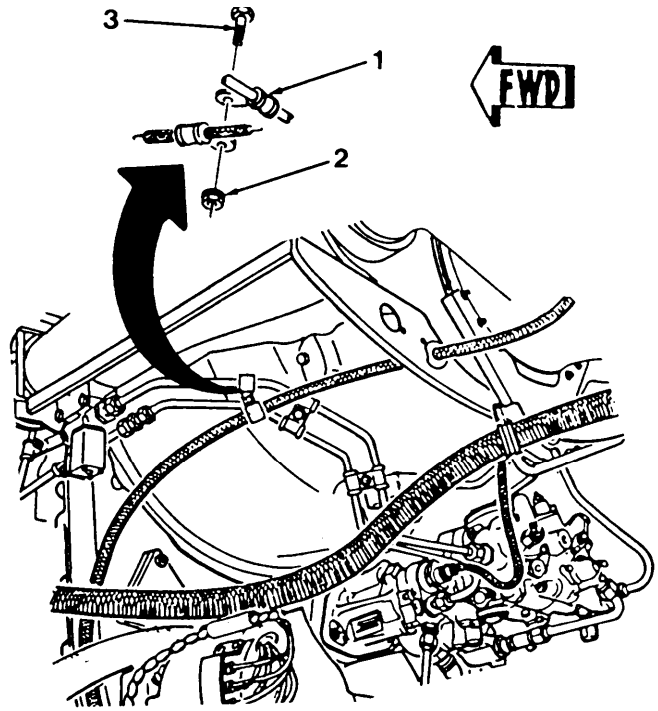
Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

CAUTION

When removing or installing fittings on fuel control, do not apply force that will cause a load on fuel control drive shaft. Failure to comply may result in damage to fuel control.

1. Disconnect helicopter throttle linkage from fuel control (TM 55-1520-248-23).

2. Remove clamp (1) by removing nut (2) and bolt (3).



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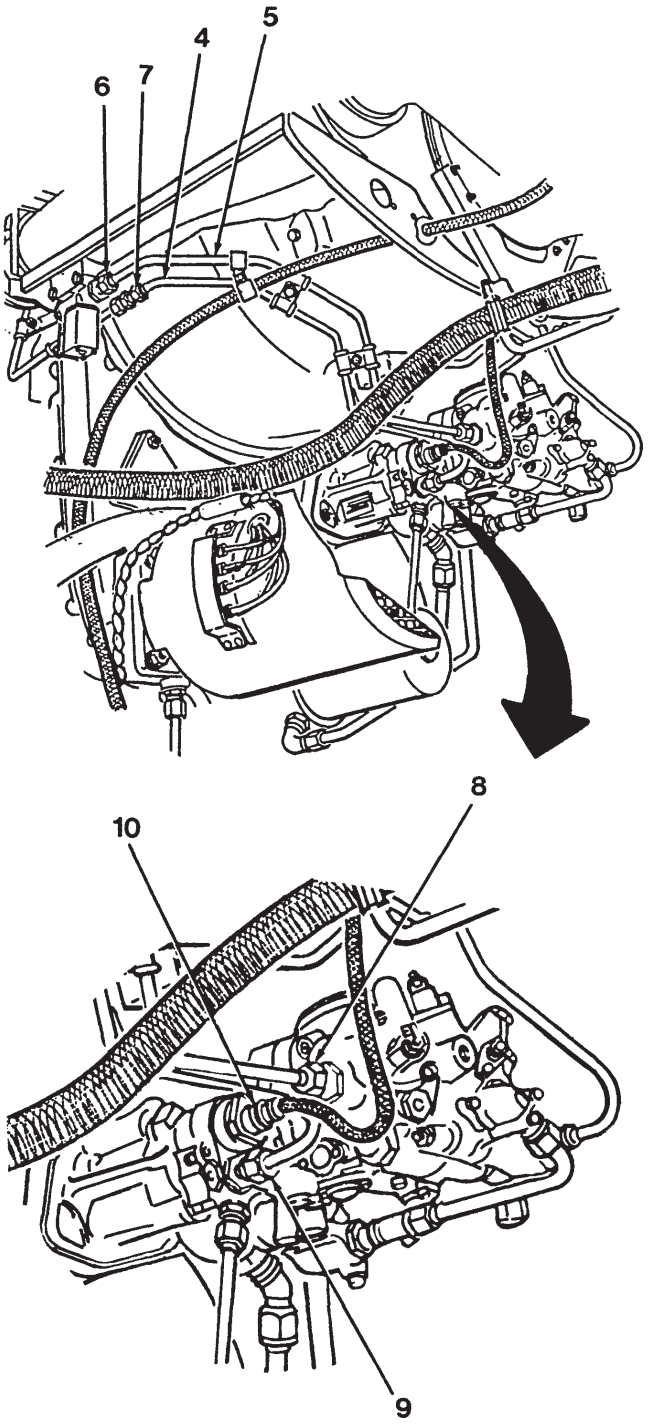
7-2-11. REMOVE FUEL CONTROL (CONT)

3. Remove tubes (4) and (5) by disconnecting coupling nuts (6), (7), (8) and (9).

4. Disconnect torque-motor servo valve connector plug (10).



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7-2-11. REMOVE FUEL CONTROL (CONT)

5. From right side of engine, remove tube (11) by disconnecting coupling nuts (12) and (13).

6. Remove tube (14) by disconnecting coupling nuts (15) and (16).

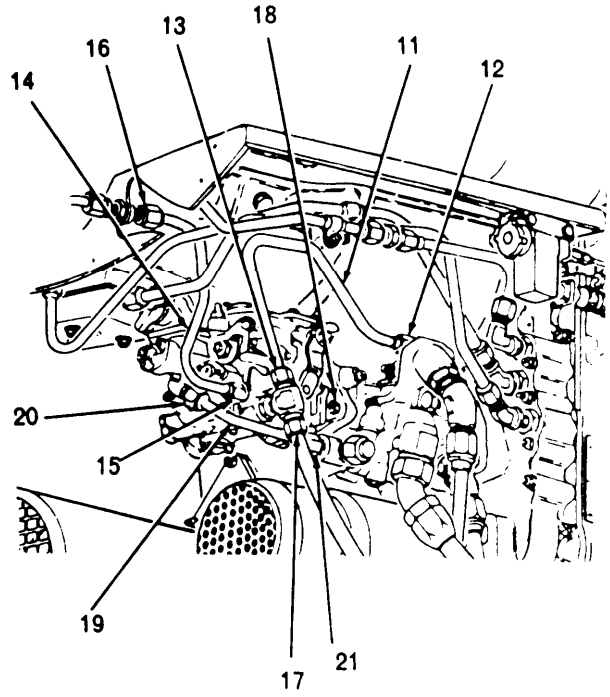
7. Disconnect fuel supply tube coupling nut (17).

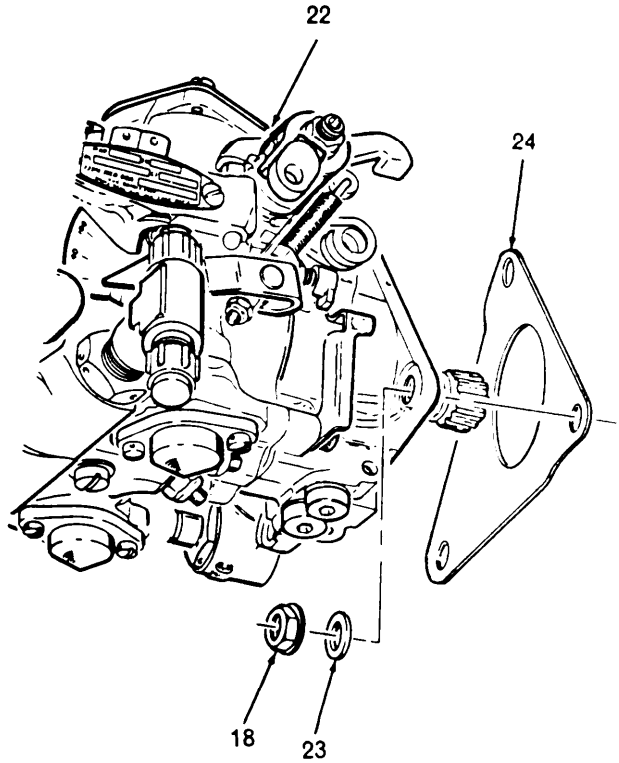
8. Loosen, but do not remove, three fuel control retaining nuts (18).

9. Remove tube (19) by removing coupling nuts (20) and (21).

10. Remove fuel control (22) by removing three retaining nuts (18) and washers (23).

11. Remove and discard gasket (24).





END OF TASK

7-2-12. INSTALL FUEL CONTROL

INITIAL SETUP

Applicable Configurations:
Al1

Tools
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs

Materials:
Anti-seize Compound (C19)
Lubriplate (C20)
Lockwire (C4)

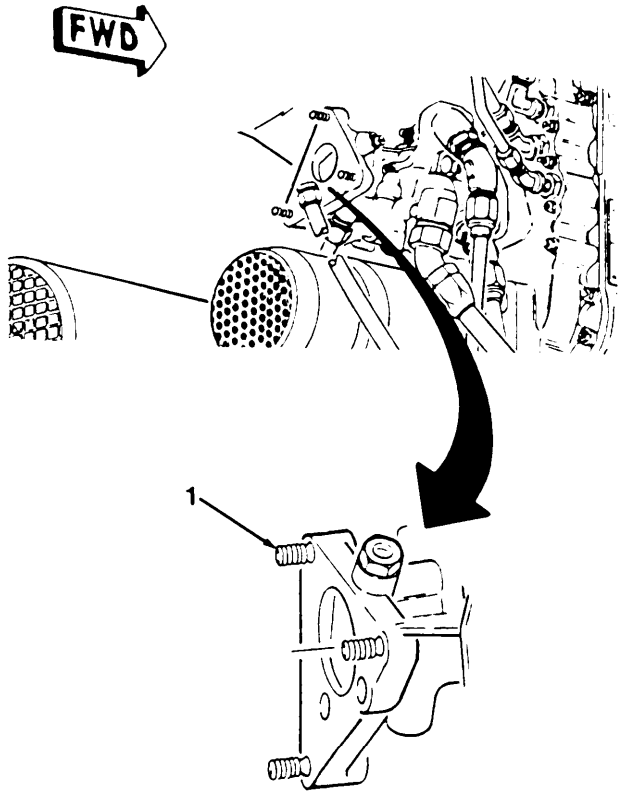
Parts:
Packings
Gasket

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Coat three mounting studs (1) with anti-seize compound (C19).



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7-2-12. INSTALL FUEL CONTROL (CONT)

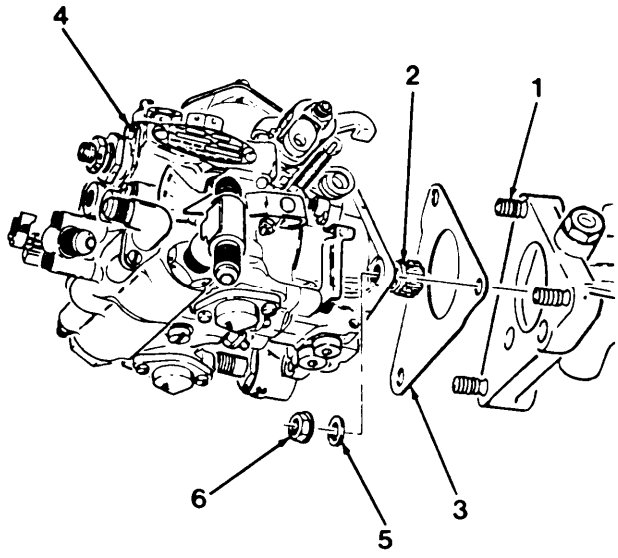
2. Coat fuel control drive shaft splines (2) lightly with lubriplate (C20).

3. Install new gasket (3) on three mounting studs (l).

CAUTION

Insure fuel control drive shaft splines mate smoothly with fuel pump gear splines. Do not force drive shaft in or damage to fuel control and fuel pump may result.

4. Install fuel control (4) and three washers (5); then loosely install three retaining nuts (6).



CAUTION

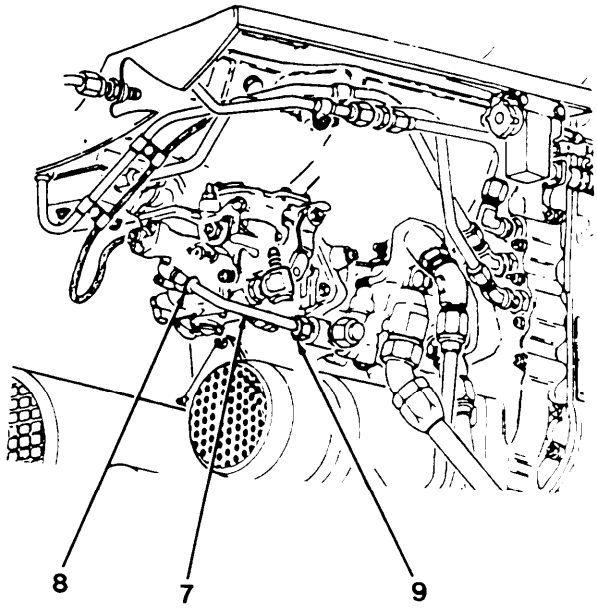
Keep work area clean at all times to insure contaminants do not get into fuel control or connecting components.

Keep retaining nuts loose and fuel control moveable while installing tube (9) to prevent damage to fittings.

5. Install tube (7) and loosely connect coupling nuts (8) and (9).

6. Torque three retaining nuts (6) to 70-85 in. lbs.

7. Torque coupling nuts (8) and (9) to 150-200 in. lbs.



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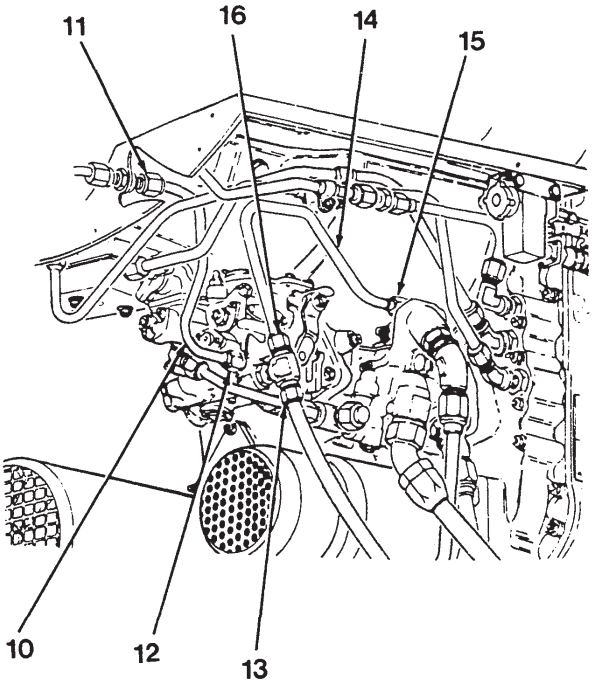
7-2-12. INSTALL FUEL CONTROL (CONT)

8. Install tube (10) and connect coupling nuts (11) and (12). Tighten to 150-200 in. lbs.

9. Connect fuel supply tube coupling nut (13) and tighten to 150-200 in. lbs.

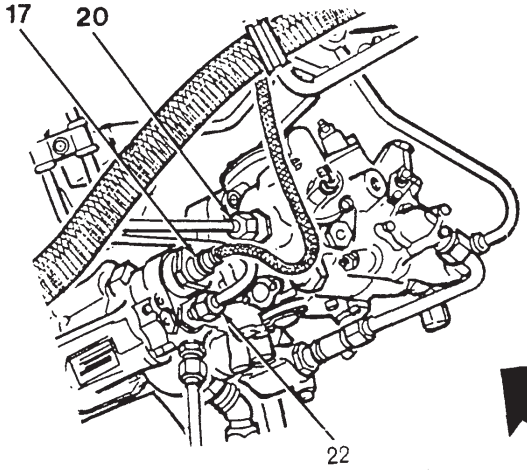
10. Install tube (14) and connect coupling nuts (15) and (16). Tighten to 80-120 in. lbs.

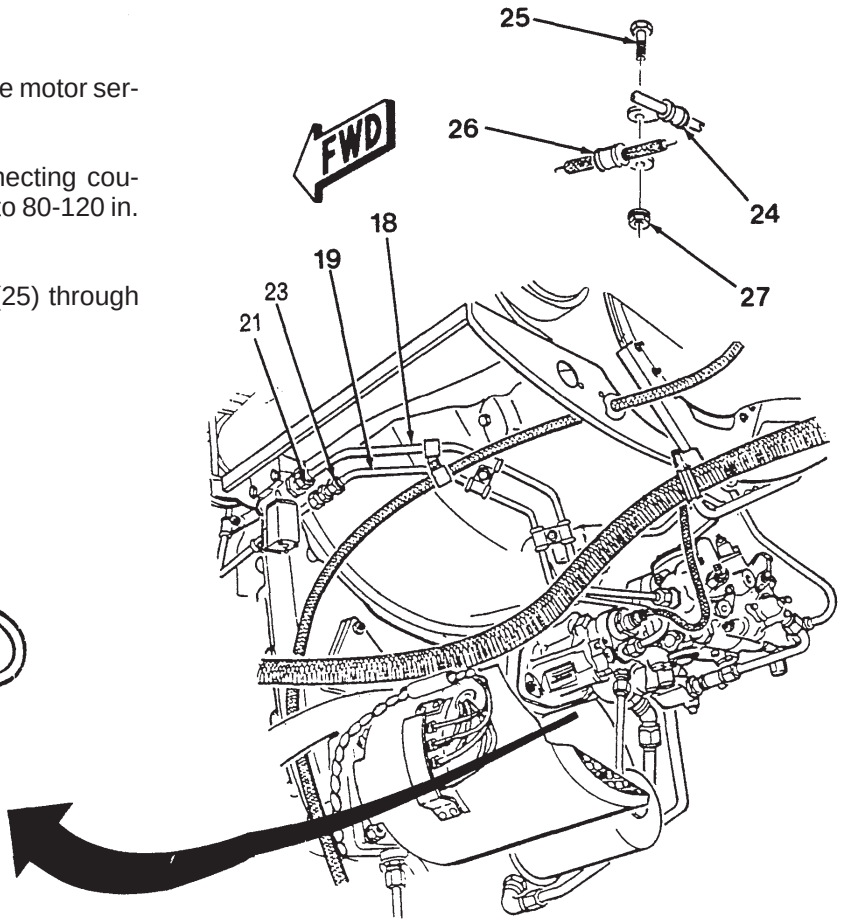


11. On left side of engine, connect torque motor servo valve connector plug (17).

12. Install tubes (18) and (19) by connecting coupling nuts (20), (21), (22), and (23). Tighten to 80-120 in. lbs.

13. Install clamp (24); then install bolt (25) through clamps (24) and (26). Secure with nut (27).





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7-2-12. INSTALL FUEL CONTROL (CONT)

CAUTION

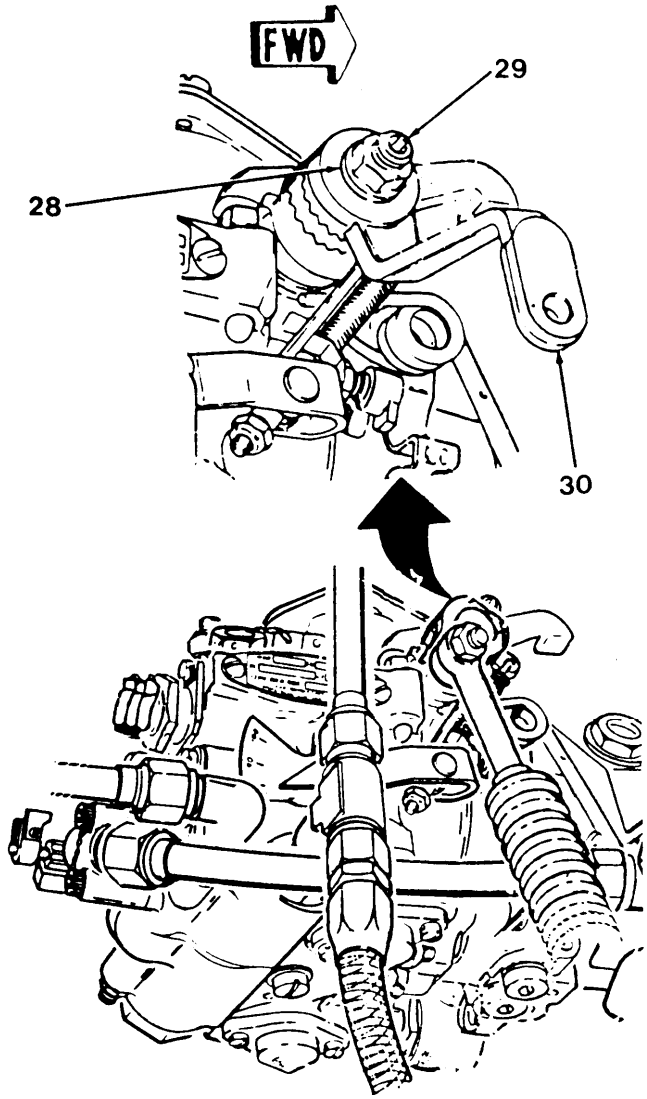
Overtorquing nut (28) causes binding of fuel control levershaft (29) and may result in internal damage to fuel control.

NOTE

If fuel control lever needs repositioning, complete step 14.

14. On right side of engine, loosen retaining nut (28) while holding levershaft (29) with lever (30). Reposition lever (30); then torque nut (28) to 40-45 in. lbs while holding levershaft (29).

15. Connect throttle linkage (TM 55-1520-248-23).



INSPECT

FOLLOW ON MAINTENANCE:

Inspect fuel control rigging (task 7-2-1).

Purge engine fuel system (task 7-1-1).

Inspect fuel control air sensing tubes for leaks (task 7-2-4).

Maintenance test pilot: Perform maintenance test flight.

END OF TASK

7-2-13. REMOVE FUEL CONTROL FUEL FILTER

INITIAL SETUP

Applicable Configurations:
Al1

Tools
Power Plant Tool Kit
13/16-in. Crow Foot Adapter Wrench, 3/8-in. drive Snap On No. FC 26

Materials:
Wiping Rag (C1)
Dry Cleaning Fluid (C8)
Gloves (C29)

Personnel Required:
688 Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

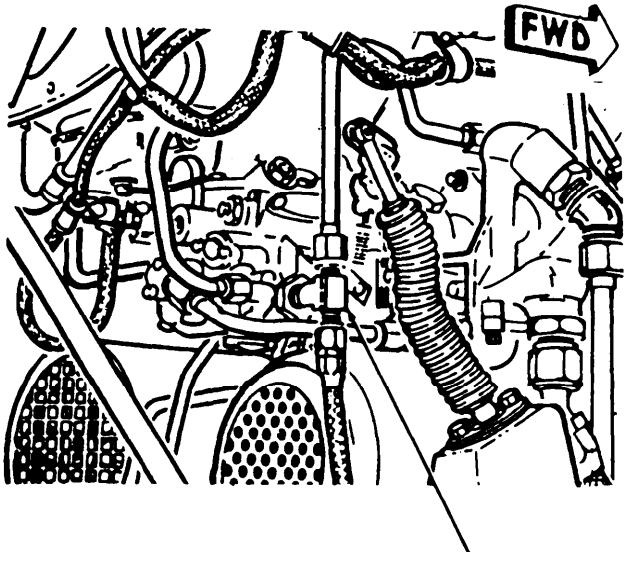
WARNING

Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

WARNING

Dry-cleaning solvent (C8) is flammable and toxic. It can irritate skin and cause burns. Use only in well ventilated area away from heat and open flame. Wear gloves. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

1. Clean exterior of tee fitting (1) and surrounding area of fuel control with dry cleaning solvent (C8).



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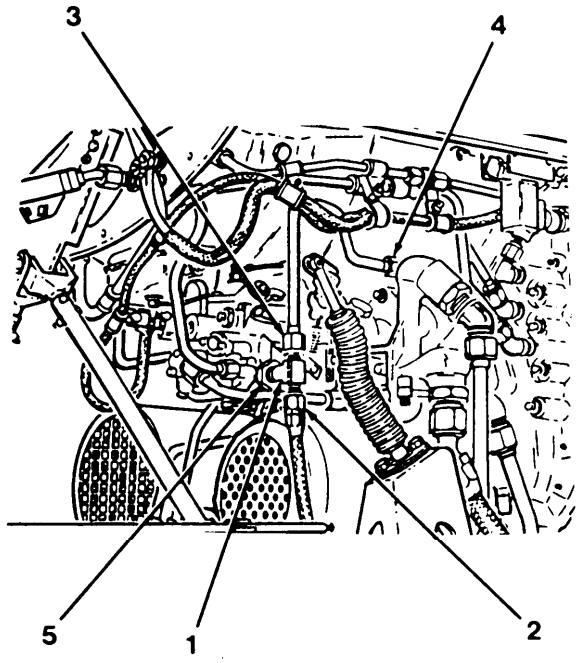
7-2-13. REMOVE FUEL CONTROL FUEL FILTER (CONT)

2. Disconnect coupling nuts (2) and (3) from tee fitting (l).

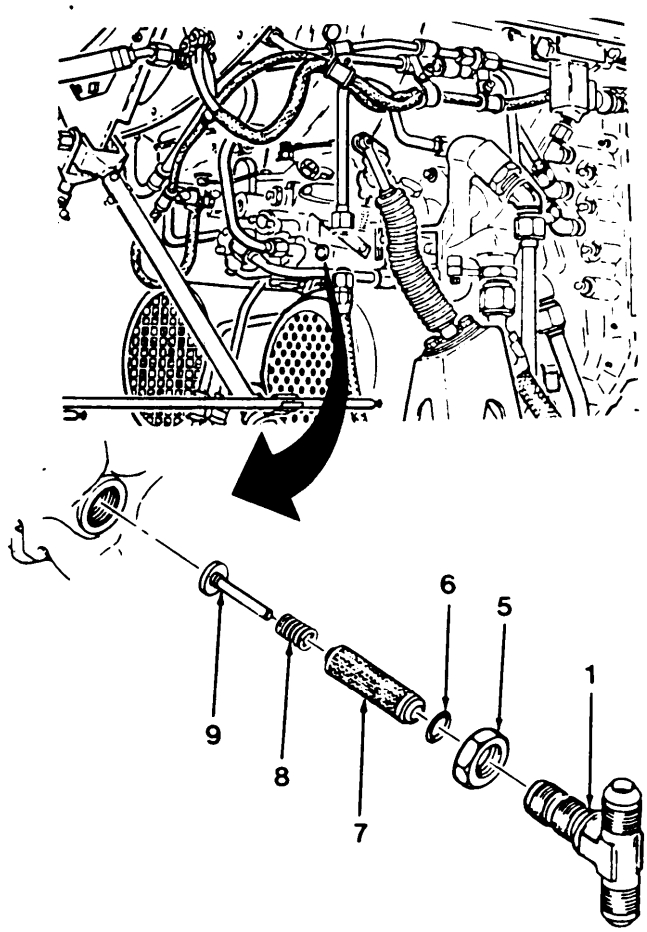
3. Loosen coupling nut (4).

4. Remove lockwire and loosen jam nut (5) using 13/16-in. crow foot adapter wrench.



5. Remove tee fitting (l), nut (5), packing (6), filter (7), spring (8) and guide (9).

6. Separate guide (9), spring (8), filter (7) and packing (6). Discard packing (6).



END OF TASK

7-2-14. SERVICE FUEL CONTROL FUEL FILTER

INITIAL SETUP

Applicable Configurations:
All

Tools
Power Plant Tool Kit
Air compressor unit
Air blow gun
Utility pail one gallon capacity

Materials:
Wiping Rag (C1)
Mineral Spirits (C32)
Gloves (C29)
Sulfuric acid (C44)
Sodium bichromate (C45)

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Clean fuel control fuel filter as follows:

CAUTION

Do not attempt to open a clogged screen with a sharp instrument.

a. Clean filter ultrasonically if equipment is available.

b. If equipment is not available agitate filter in mineral spirits (C32).

GO TO NEXT PAGE

7-2-14. SERVICE FUEL CONTROL FUEL FILTER (CONT)

c. Dry filter with clean shop air (15 psig) applied to the exterior of the filter.

d. Repeat the procedure if visual inspection with a bright light shows that the interior is not entirely free of contaminants.

2. If filter does not clean satisfactorily, go to alternate cleaning method in step 3.

3. Clean fuel control fuel filter as follows:

WARNING

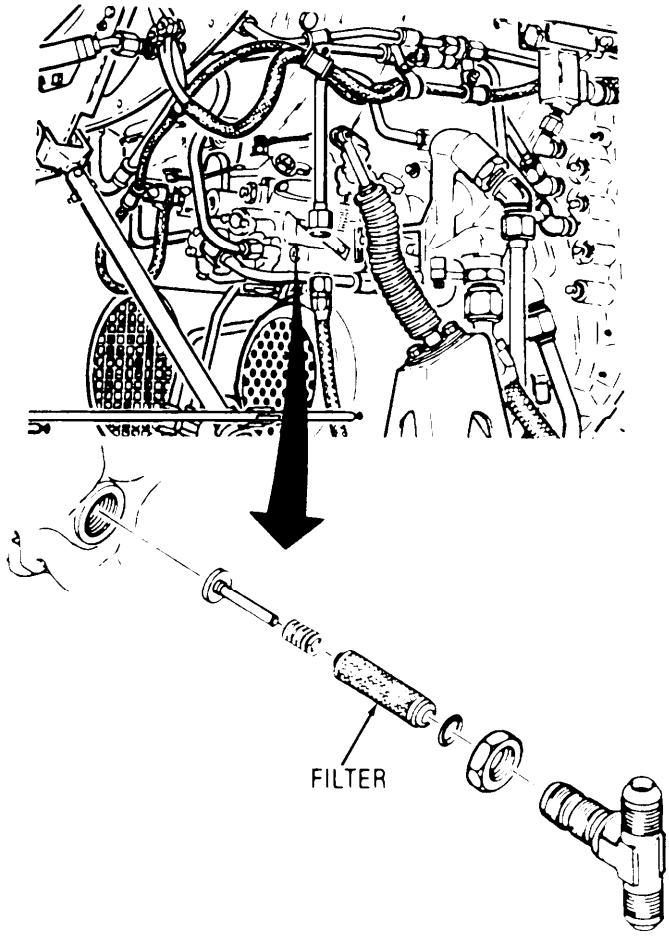
Sulfuric acid causes severe burns. Do not get in eyes, on skin, or on clothing. Do not add water to acid while in a container because of violent reaction. In the event of contact with sulfuric acid, immediately flood exposed skin or clothing with water. For eyes, flush heavily with water and obtain immediate medical attention.

a. Immerse strainer assembly in sulfuric acid (C44) containing approximately 20 grams of sodium bichromate (C45) per liter (0.2642 gallon) for a period of two to five minutes at room temperature.

b. Rinse filter in hot running water.

c. Dry filter with clean shop air (15 psig).

4. If filter does not clean satisfactorily, replace filter.



END OF TASK

7-2-15. INSTALL FUEL CONTROL FUEL FILTER

INITIAL SETUP

Applicable Configurations:
Al1

Too1s
Power Plant Tool Kit
Torque Wrench 150-750 in. lbs
3/16-in. Crow Foot Adapter Wrench, 3/8-in. drive, Snap on No. FC 26

Materials:
Lockwire (C4)
Engine Fuel (C10)

Parts:
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).

Equipment Condition: (Cont)
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

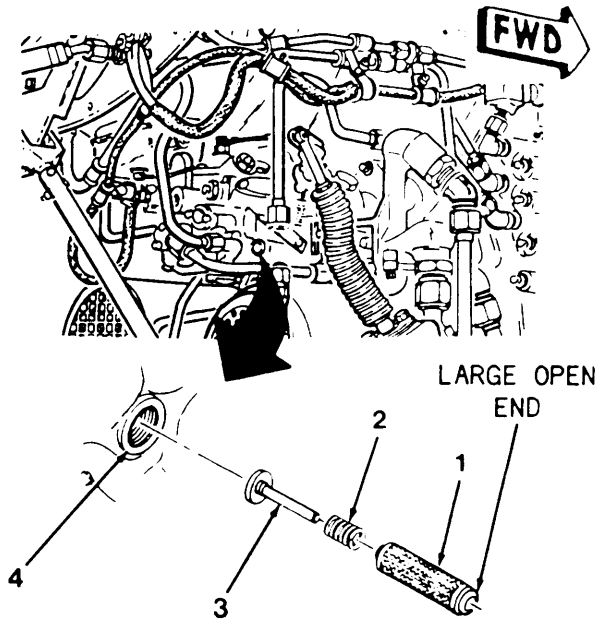
Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

CAUTION

Insure filter (1) is installed with large open end toward outside of fuel control. Do not install filter backwards as it will allow contaminants into fuel control.

1. Assemble spring (2), guide (3) and filter (l).

2. Install assembled filter (1) into fuel control (4).



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7-2-15. INSTALL FUEL CONTROL FUEL FILTER (CONT)

3. Install jam nut (5) onto tee fitting (6). Thread on as far as it will go without tightening it.

4. Lubricate new packing (7) with engine fuel (C10) and Install into tee fitting (6). Insure packing (7) is positioned properly into seat on tee fitting (6).

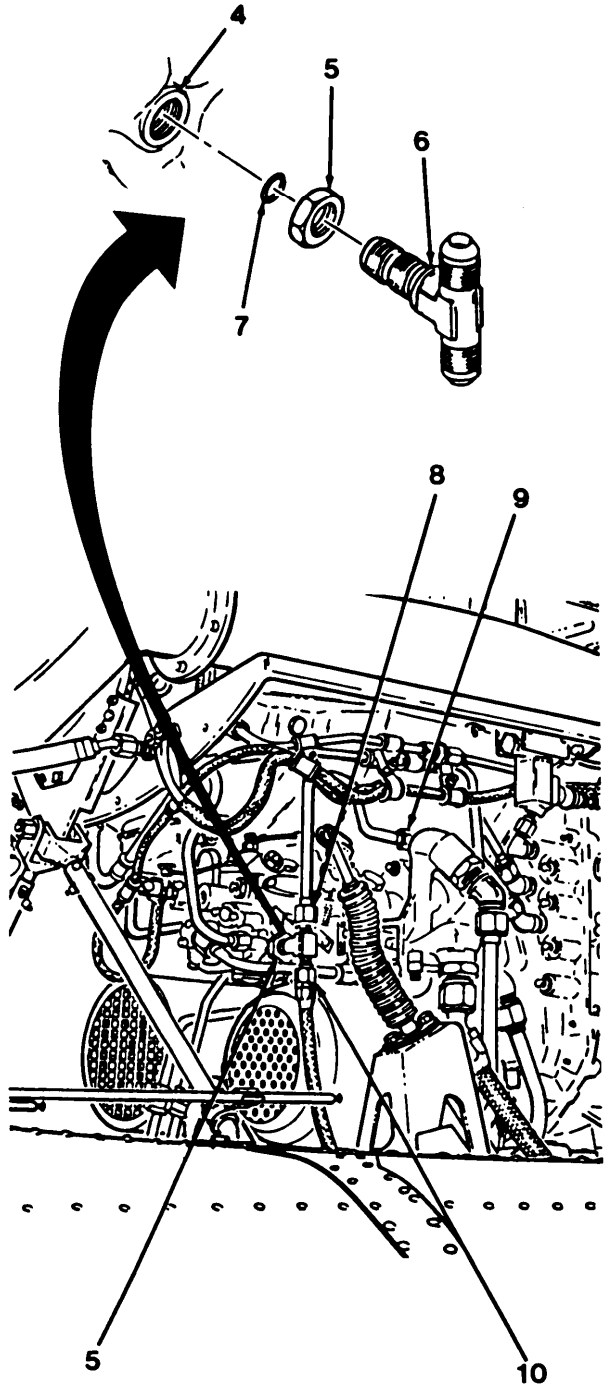
5. Install tee fitting (6) in fuel control (4).

6. Tighten jam nut (5) using 13/16-in. crow foot adapter wrench. Lockwire (C4).

7. Connect coupling nuts (8), (9), and (10). Torque to 150-200 in. lbs.

INSPECT

FOLLOW ON MAINTENANCE:
Purge engine fuel system (task 7-1-1).



END OF TASK

Section III FUEL PUMP

This section Includes maintenance procedures for purging and draining the of the fuel pump.

LIST OF TASKS

7-3-1. REMOVE FUEL PUMP

INITIAL SETUP

Applicable Configurations:
All

Tools
Power Plant Tool Kit

Materials:
Suitable Container 1 qt min capacity
Wiping Rags (Cl)

Personnel Required:
688 Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).
Engine fuel system drained (task 7-1-2).
Fuel control removed (task 7-2-11).

General Safety Instructions:

WARNING

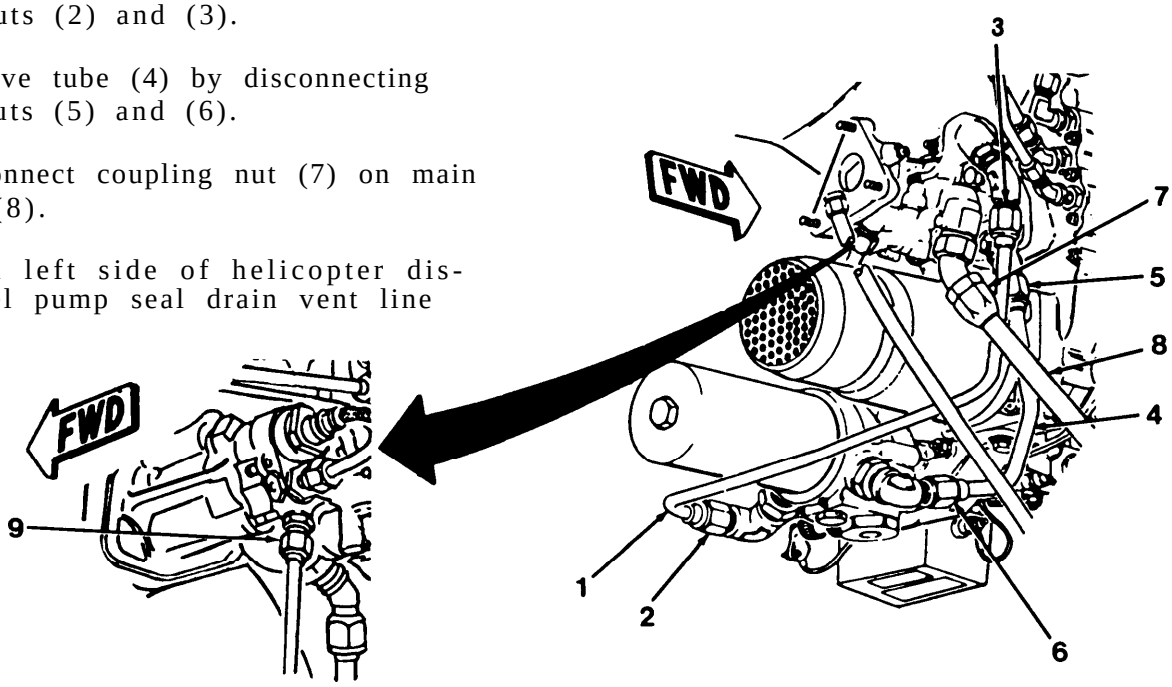
Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Remove tube (1) by disconnecting coupling nuts (2) and (3).

2. Remove tube (4) by disconnecting coupling nuts (5) and (6).

3. Disconnect coupling nut (7) on main fuel line (8).

4. From left side of helicopter disconnect fuel pump seal drain vent line (9)



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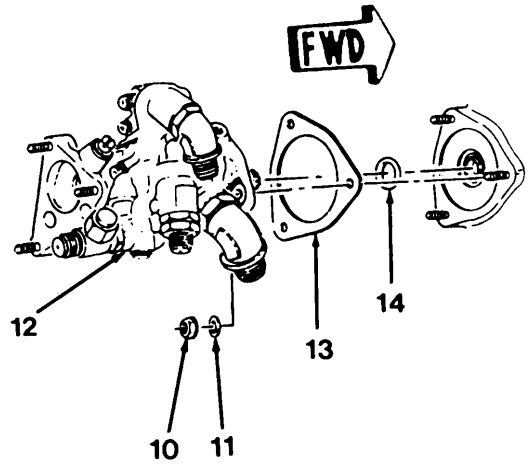
7-3-1. REMOVE FUEL PUMP (CONT)

5. Remove three nuts (10) and washers (11); then remove fuel pump (12).

6. Remove and discard gasket (13) and packing (14).



END OF TASK

7-3-2. INSPECT FUEL PUMP

INITIAL SETUP

Applicable Configurations:
All

Tools
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

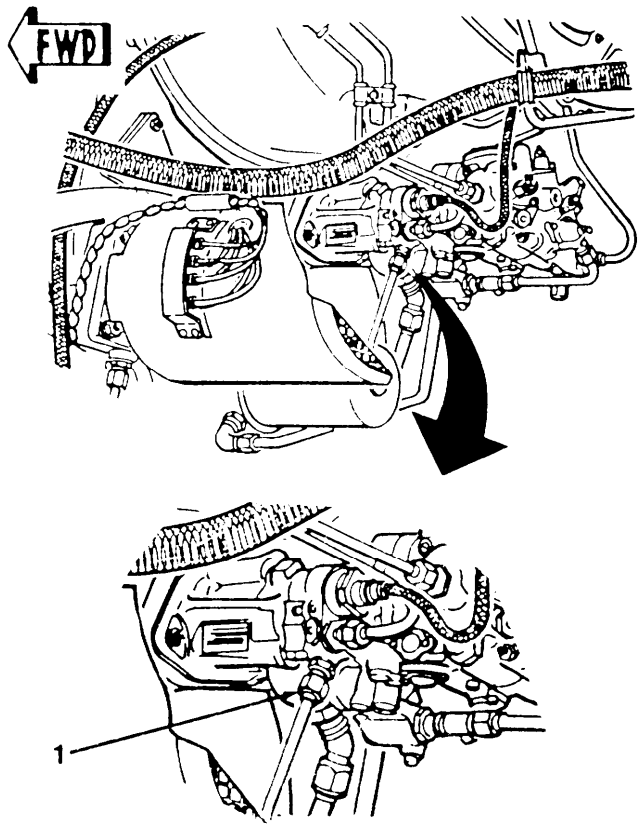
Turbine fuels are flammable They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Inspect fuel pump seal drain vent line (1) on helicopter for evidence of fuel and/or oil leakage and for blockage (TM 55-1520-248-23).

2. Inspect fuel control weep holes (task 7-2-5).

NOTE

If leakage or blockage is not found, no further action is required.



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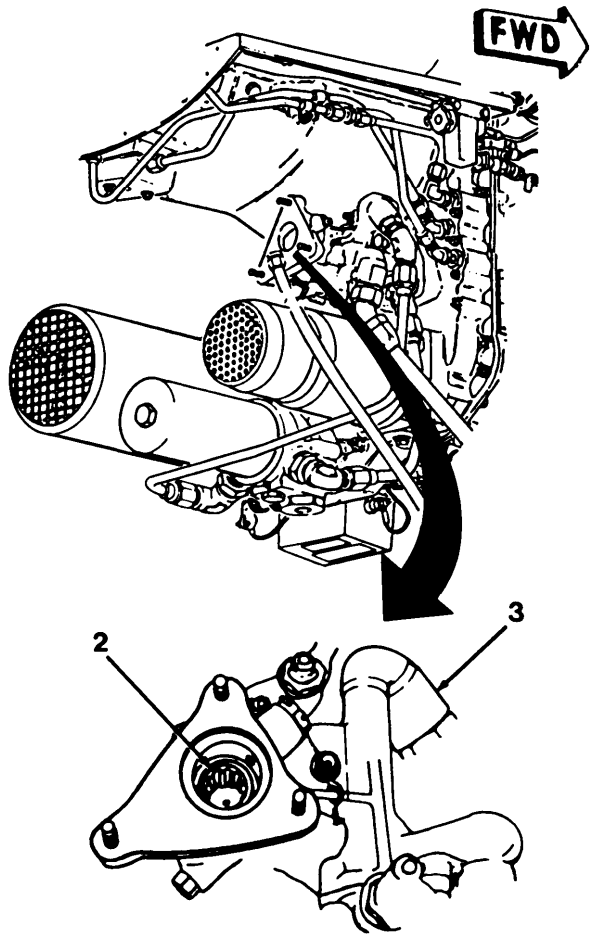
7-3-2. INSPECT FUEL PUMP (CONT)

3. Remove fuel control (task 7-2-11).

4. Inspect cavity (2) in fuel pump (3) for accumulation of oil and/or fuel. If fuel and/or oil leakage is found, replace fuel pump (tasks 7-3-1 and 7-3-3).

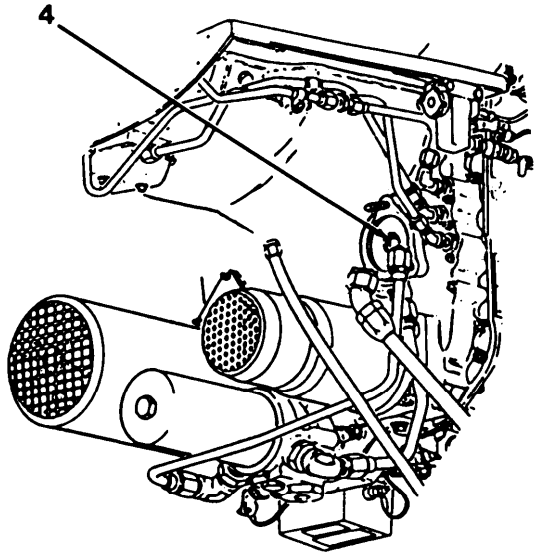
5. Remove fuel pump (task 7-3-1).



6. Inspect fuel pump accessory drive seal (4) for evidence of oil leakage. If oil leakage is found replace seal (task 6-1-4).

7. Install fuel pump (task 7-3-3).

8. Install fuel control (task 7-2-12).



END OF TASK

7-3-3. INSTALL FUEL PUMP

INITIAL SETUP

Applicable Configurations:
All

Tools
Power Plant Tool Kit
Torque Wrench 30-150 in. Ibs
Torque Wrench 150-750 in. Ibs
Engine Turning Adapter (T8)
Fuel Pump Adapter Wrench (T32)

Materials:
Anti-seize Compound (C19)
Oil (C21)
Engine Oil (C30 and C31) currently used in engine.

Parts:
Packings (6)
Gasket

Personnel Required:
686 Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

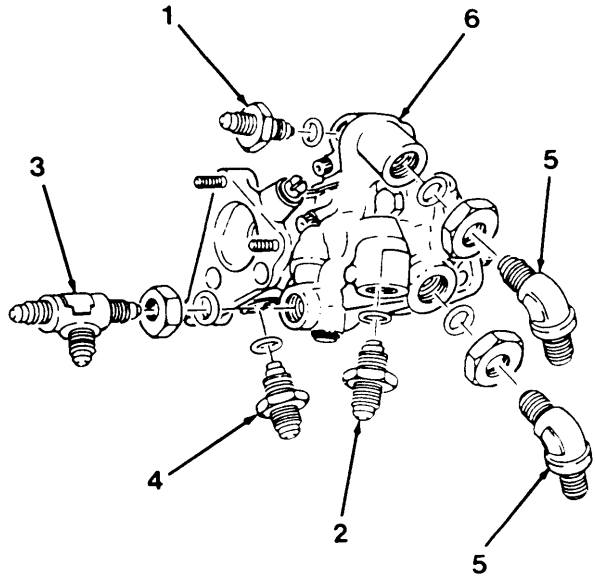
WARNING

Lubricating oils contain materials hazardous to health. They produce paralysis if swallowed. Prolonged contact may irritate the skin. Wash hands thoroughly after handling. Fire can result if exposed to heat or flames. Use only with adequate ventilation.

NOTE

If fittings (l), (2), (3), (4) and two fittings (5) are not installed on fuel pump, complete steps 1 thru 6. If they are installed, begin with step 7.

Coat threads of all fittings and accompanying packings with oil (C21), prior to installation on fuel pump (6).



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7-3-3. INSTALL FUEL PUMP (CONT)

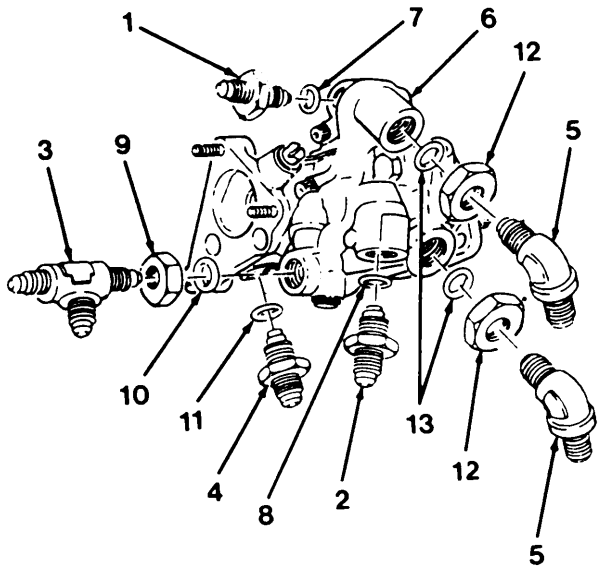
1. Install new packing (7) on fitting (1); then install fitting (1) on fuel pump (6). Tighten fitting (1) to 75-100 in. lb.

2. Install new packing (8) on fitting (2); then install fitting (2). Tighten fitting to 200-300 in. lb.

3. Install jam nut (9) on fitting (3); then install new packing (10) and fitting (3). Tighten jam nut (9). Tighten fitting to 75-100 in. lb.

4. Install new packing (11) on fitting (4); then install fitting (4). Tighten fitting to 50-75 in. lb.

5. Install jam nut (12) on two fittings (5); then install new packing (13) and each fitting (5) on fuel pump (6). Leave both jam nuts (12) loose so that fittings (5) may be repositioned during installation of attaching lines.



CAUTION

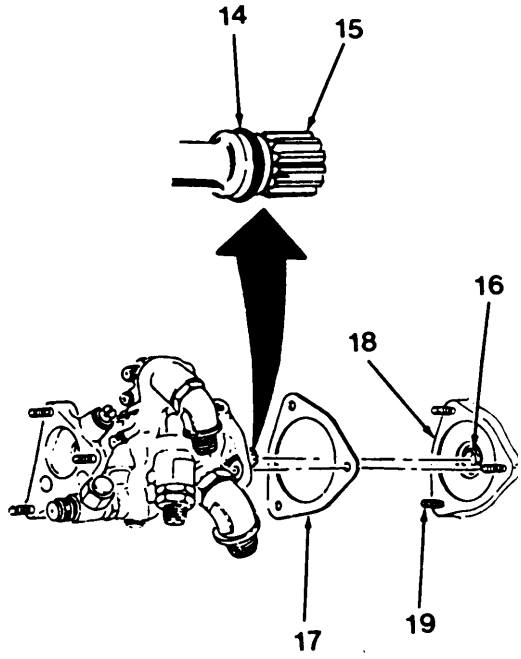
Use care to prevent damage to packing (14) when sliding over splines during installation on drive shaft (15).

6. Lubricate new packing (14) with engine oil (C30 or C31) and install on drive shaft (15).

7. Lubricate drive shaft (15) with engine oil (C30 or C31).

8. Inspect fuel pump drive seal (16) for evidence of oil leakage. If oil leakage is found replace seal (task 6-1-4).

9. Install new gasket (17) on mounting pad (18).



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7-3-3. INSTALL FUEL PUMP (CONT)

10. Lubricate three mounting studs (19) with anti-seize compound (C19).

CAUTION

To prevent oil leakage, do not damage packing (14) when installing fuel pump (6).

NOTE

It may be necessary to use engine turning adapter (T8) to align splines of shaft (15).

11. Install fuel pump (6) on three mounting studs (19); then install three washers (20) and three nuts (21). Tighten to 70-85 in. lbs using fuel pump adapter wrench (T32).

12. Connect main fuel line (22) (TM 55-1520-248-23).

13. Install tube (23) and connect coupling nuts (24) and (25). Tighten to 150-200 in. lbs.

14. Install tube (26) and connect coupling nuts (27) and (28). Tighten to 150-200 in. lbs.

15. Tighten two jam nuts (12) on fuel pump to 200-300 in. lbs.

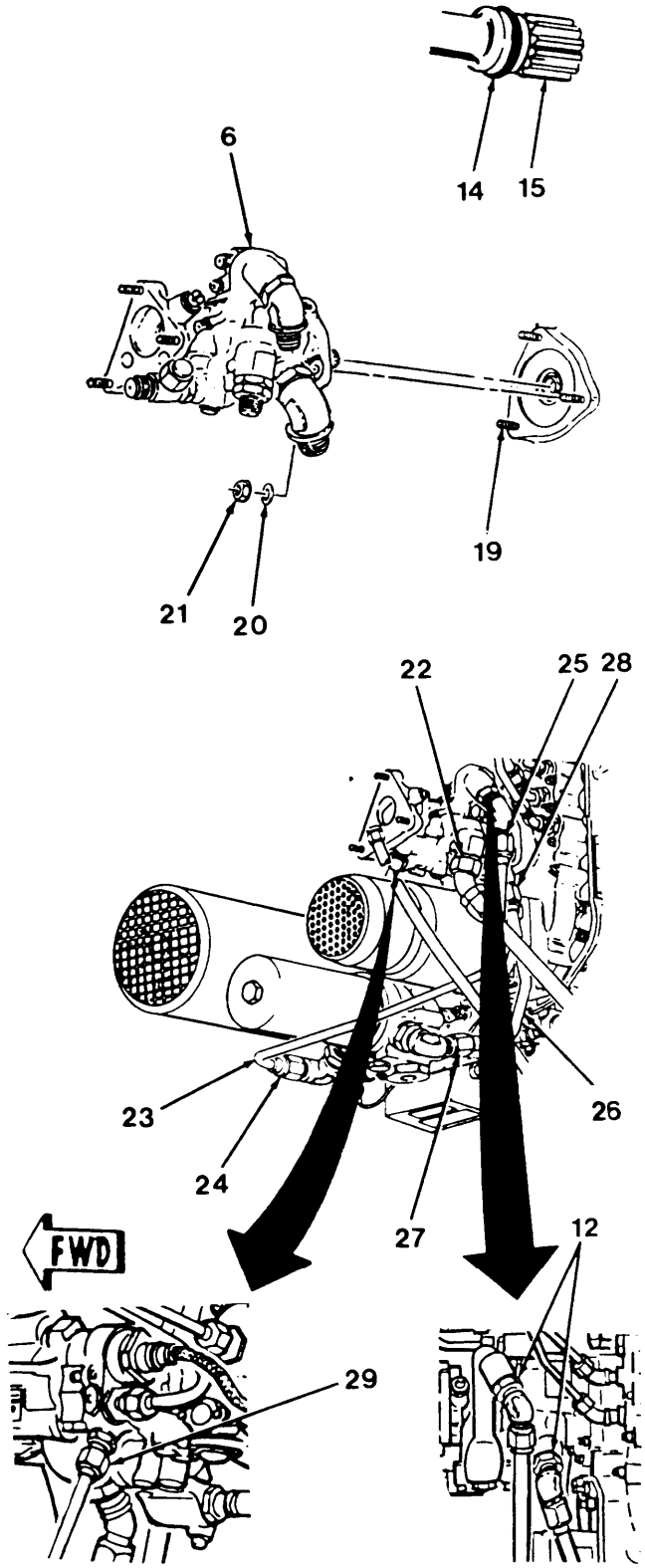
16. From left side of helicopter, inspect fuel pump seal drain vent line (29) and ensure there is no blockage (TM 55-1520-248-23).

17. Connect fuel pump seal drain vent line (29).

INSPECT

FOLLOW ON MAINTENANCE:
Install fuel control (task 7-2-12).

END OF TASK



Section IV FUEL NOZZLE

This section includes maintenance procedures for inspection, service, and replacement of the fuel nozzle.

LIST OF TASKS

7-4-1. REMOVE FUEL NOZZLE

INITIAL SETUP

Applicable Configurations:
All

Tools
Power Plant Tool Kit
Fuel Nozzle Wrench (T21)
Suitable Container 1 qt capacity

Materials:
Wiping Rags (C1)
Gloves (C29)

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

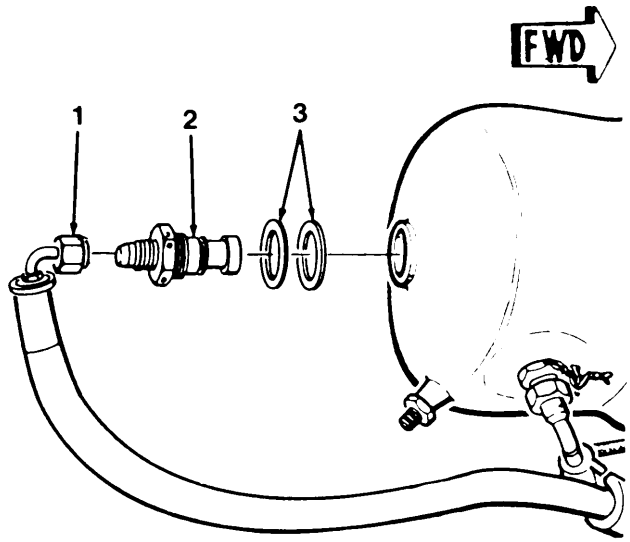
Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Remove lockwire and disconnect coupling nut (1). Allow fuel to drain into suitable container.

CAUTION

Take extra care not to damage mirror finish or edges of spray tip on fuel nozzle. It is not repairable.

2. Remove lockwire from fuel nozzle (2); then using wrench (T21), remove fuel nozzle (2) and spacers (3) (if installed). Leave spacers (3) on nozzle for ease of installation.



END OF TASK

7-4-2. INSPECT FUEL NOZZLE

This task covers: Off Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
Al1

Personnel Required:
68B Aircraft Powerplant Repairer

Tools:
Dial Indicating Depth Gage

Equipment Condition:
Fuel Nozzle Removed (task 7-4-1).

CAUTION

Take extra care not to damage mirror finish on fuel nozzle spray tip. If it is dropped, replace.

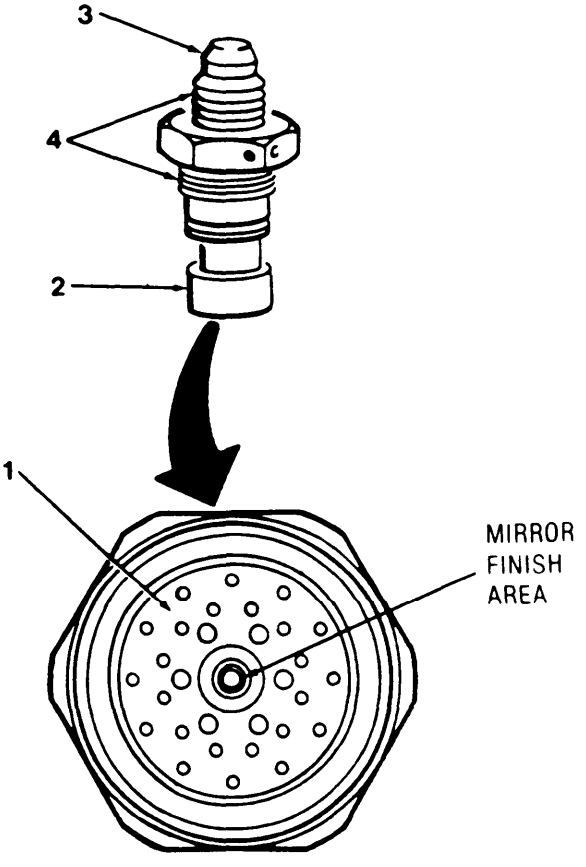
1. Inspect fuel nozzle for damage to spray tip (1) or mirror finish area. No scratches or nicks allowed on spray tip or mirror finish area.

2. Inspect outside diameter of air shroud (2) for wear using depth gage. Maximum allowable depth 0.005 in.

3. Inspect spray tip (1) for carbon build-up. If carbon is found service fuel nozzle (task 7-4-4).

4. Inspect chamfer (3) for nicks or scratches. Replace fuel nozzle (tasks 7-4-1 and 7-4-5) if damage extends over more than one half of surface.

5. Inspect threads (4) for damage. Replace fuel nozzle (tasks 7-4-1 and 7-4-5) if damaged.



END OF TASK

7-4-3. INSPECT FUEL NOZZLE FLOW PATTERN

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Suitable Container 1 gal. capacity

Materials:
Gloves (C29)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/removed (TM 55-1520-248-23).

General Safety Instructions:

WARNING

Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Remove fuel nozzle (task 7-4-1).

CAUTION

Take extra care not to damage mirror finish on fuel nozzle spray tip. If it is dropped, replace.

2. Connect coupling nut (1) to fuel nozzle (2) and tighten hand tight.

GO TO NEXT PAGE

7-4-3. INSPECT FUEL NOZZLE FLOW PATTERN (CONT)

WARNING

Wear goggles to protect eyes from accidental fuel splash.

3. Hold supply hose (3) with attached nozzle (2) and direct spray tip (4) towards container.

4. Verify that all ignition system circuit breakers are open.

WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

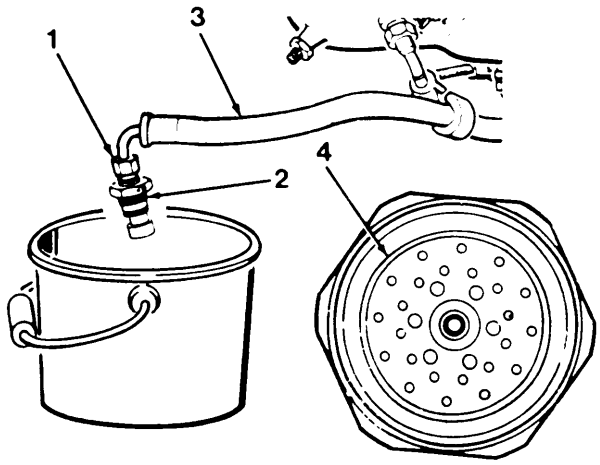
NOTE

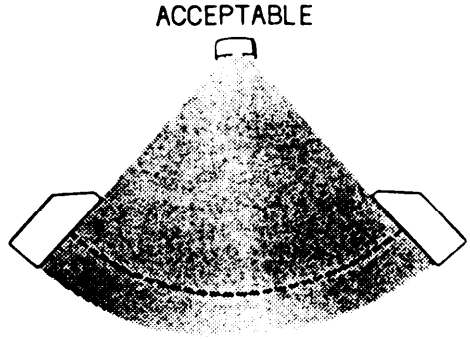
During step 5, fuel boost pump must be on and twist grip at idle detent.

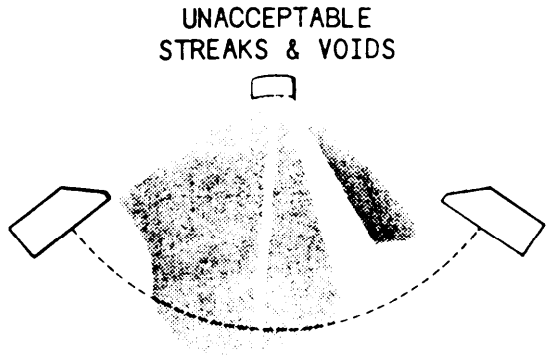
5. Motor engine for fifteen seconds.

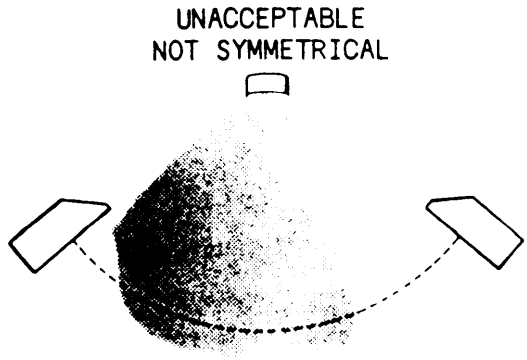
6. Inspect entire circumference of sprayed cone of fuel. Spray pattern must be symmetrical and free of streaks and voids. Correct spray pattern should be as illustrated in example labeled ACCEPTABLE.

INSPECT









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1-4-3. INSPECT FUEL NOZZLE FLOW PATTERN (CONT)

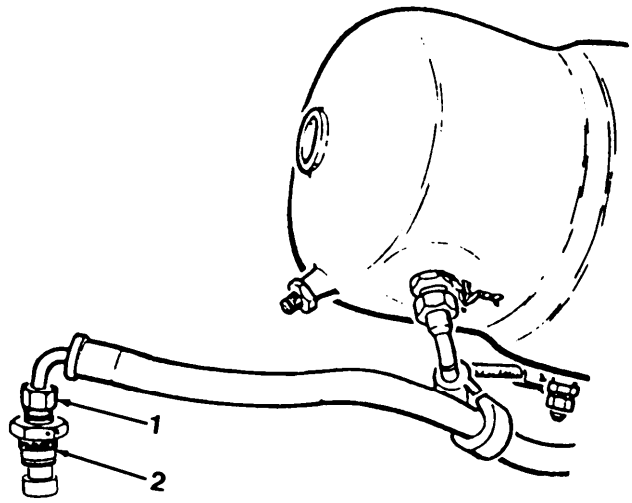
7. If flow pattern is unacceptable, complete the following:

a. Inspect combustion liner (task 4-3-1).

b. Service fuel nozzle (task 7-4-4); then inspect fuel nozzle flow pattern again. If pattern is still unacceptable replace fuel nozzle (tasks 7-4-1 and 7-4-5).

8. Disconnect fuel nozzle (2) from coupling nut (l).

9. Install fuel nozzle (task 7-4-5).



END OF TASK

7-4-4. SERVICE FUEL NOZZLE

This task covers: Off Helicopter Servicing

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Suitable Container

Materials:
Wiping Rags (Cl)
Dry Cleaning Solvent (C8)
Cleaning Solvent (C23)
Gloves (C29)

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment Condition:
Fuel nozzle removed (task 7-4-1).

General Safety Instructions:

WARNING

Dry-cleaning solvent (C8) Is flammable and toxic. It can irritate skin and cause burns. Use only in well ventilated area away from heat and open flame. Wear gloves. In case of contact, immediately flush skin or eyes with water for at least 15 minutes. Get medical attention for eyes.

CAUTION

Take extra care not to damage mirror finish or edges of spray tip on fuel nozzle. It is not repairable. Take extra care not to allow any carbon deposits to enter spray tip. Carbon may cause blockage and faulty fuel flow pattern.

NOTE

Any locally fabricated holder (wire frame for example) may be used to hold fuel nozzle tip to the proper depth in the cleaning solvent.

GO TO NEXT PAGE

7-4-4. SERVICE FUEL NOZZLE (CONT)

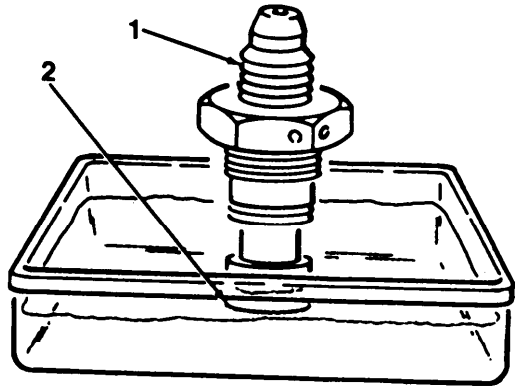
1. Suspend fuel nozzle (1) vertically with spray tip (2) approximately 1/8 in. in cleaning solvent (C23).

2. Soak spray tip (2) approximately one hour; then inspect for removal of all carbon. If necessary, soak longer to remove all carbon.

3. Remove fuel nozzle (1) from cleaning solvent.

4. Flush fuel nozzle (1) internally and externally with dry cleaning solvent (C8). Dry with clean wiping rags (Cl).

5. Inspect nozzle (1) to determine that all air holes are open.



FOLLOW ON MAINTENANCE:
Inspect fuel nozzle flow pattern (task 7-4-3) l

1-4-5. INSTALL FUEL NOZZLE

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Fuel Nozzle Gage (T19)
Fuel Nozzle Wrench (T21)
Combustion Liner Positioning Fixture (T20)
Torque Wrench, 30-150 in. lbs
Torque Wrench, 150-750 in. lbs

Materials:
Lockwire (C4)
Anti-seize Compound (C19)

Parts:
Spacers

Personnel Required:
688 Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23
TM 55-1520-248-MTF

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

CAUTION

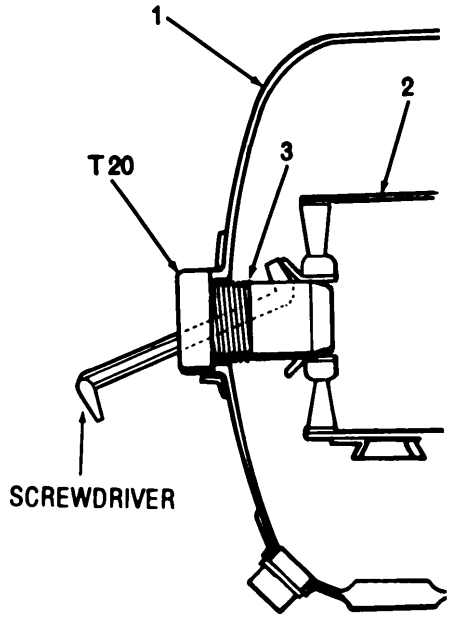
Take extra care not to damage mirror finish on fuel nozzle spray tip. If it is dropped, replace.

1. Install fixture (T20) into combustion outer case (1) to support liner (2).

CAUTION

To obtain correct measurement combustion liner must be fully seated against first stage nozzle shield.

2. Insert screwdriver through slot (3) in fixture (T20) and carefully push liner (2) all the way forward; then remove screwdriver.



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7-4-5. INSTALL FUEL NOZZLE (CONT)

CAUTION

Required thickness of spacers must be determined if dictated by troubleshooting, or when replacing fuel nozzle, combustion case, combustion liner or first stage nozzle shield. Failure to comply may cause irregular burn patterns resulting in damage to internal components of combustion module and engine light off malfunction.

3. Insert gage (T19) through opening in fixture (T20). Measure and record distance between combustion outer case boss (4) and inner surface of combustion liner fuel nozzle holder (5). This is dimension A.

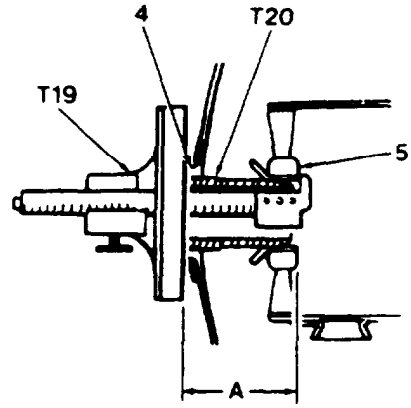
4. Using gage (T19), measure and record distance between underside of hex (6) to end of spray tip (7) on fuel nozzle. This is dimension B.

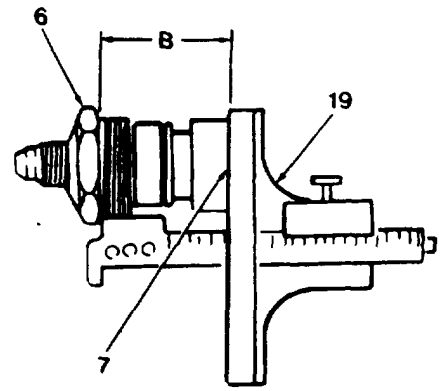
5. Determine required thickness of spacers (dimension C) to be used between fuel nozzle hex (6) and combustion outer case boss (4) as follows:

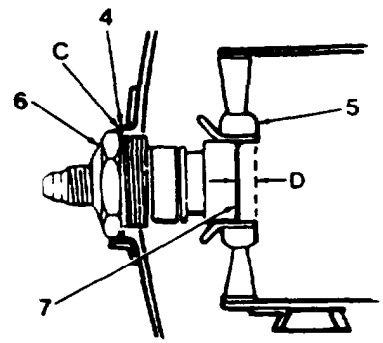
a. Initially establish distance between fuel nozzle tip (7) and end of fuel nozzle holder (5) as 0.080 in. This is dimension D.

b. Subtract dimension D (0.080 in.) from dimension A obtained in step 3. The results are dimension E.

c. Subtract E from dimension B obtained in step 4. Result is thickness of spacers required between fuel nozzle and combustion outer case at C.







d. Select spacers of appropriate thicknesses. If exact C dimension cannot be achieved with available spacers, dimension C can be increased to a maximum of C + 0.30 in. Spacer thickness must not be less than dimension C.

6. Remove gage (T19) and fixture (T20).

GO TO NEXT PAGE

7-4-5. INSTALL FUEL NOZZLE (CONT)

7. Lubricate threads of fuel nozzle (8) with antiseize (C19).

NOTE

Spacers must be kept centered during tightening of fuel nozzle. Failure to do so may affect spray pattern of fuel.

8. Place required spacer(s) on fuel nozzle (8). Inspect to insure that a minimum of three threads show from spacers to end of nozzle. Failure to obtain three full threads will require selection of a different fuel nozzle with greater dimension B, followed by remeasurement, beginning at step 4.

a. Deleted.

b. Deleted.

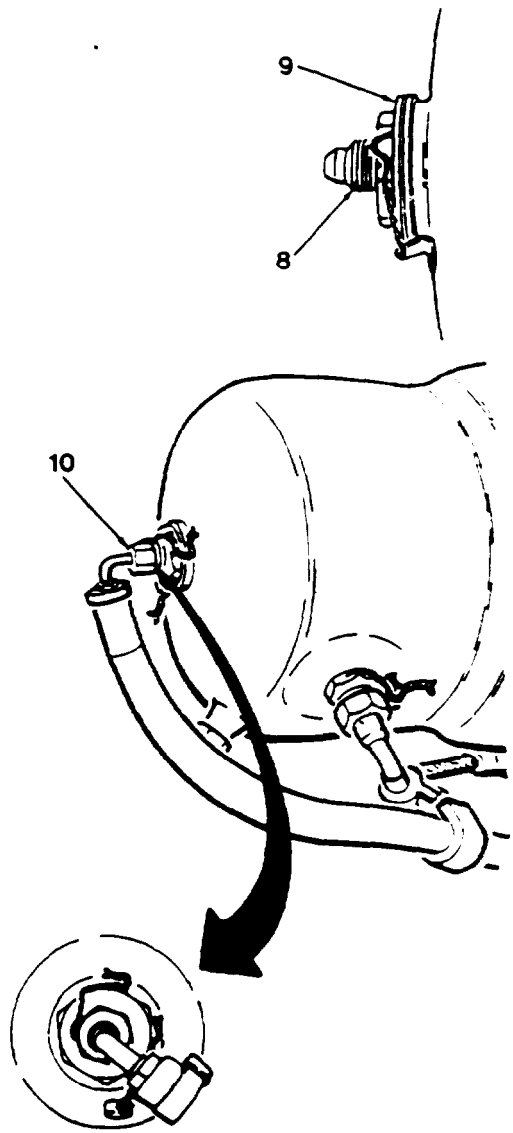
c. Deleted.

d. Deleted.

9. Install fuel nozzle (8) and spacers (9) using fuel nozzle wrench (T21). Torque to 200-300 in. lbs and lockwire (C4).

10. Purge engine fuel system (task 7-1-1).

11. Connect coupling nut (10). Torque to 80-120 in. lbs, and lockwire (C4).



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7-4-5. INSTALL FUEL NOZZLE (CONT)

INSPECT

FOLLOW ON MAINTENANCE:
On Helicopter: Pilot perform MOC (TM 55-1520-248-MTF).
Off Helicopter: Enter a requirement for MOC in engine historical records.

END OF TASK

Section V FUEL FILTER ASSEMBLY

This section includes maintenance procedures for inspection, replacement, disassembly, and assembly of the fuel filter assembly.

LIST OF TASKS

7-5-1. INSPECT FUEL FILTER IMPENDING BYPASS INDICATOR

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
All

References:
TM 55-1520-248-23

Personnel Required:
68B Aircraft Powerplant Repairer
Pilot

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

1. Inspect fuel filter Impending bypass indicator; it must not be extended. If indicator is extended, complete this procedure.

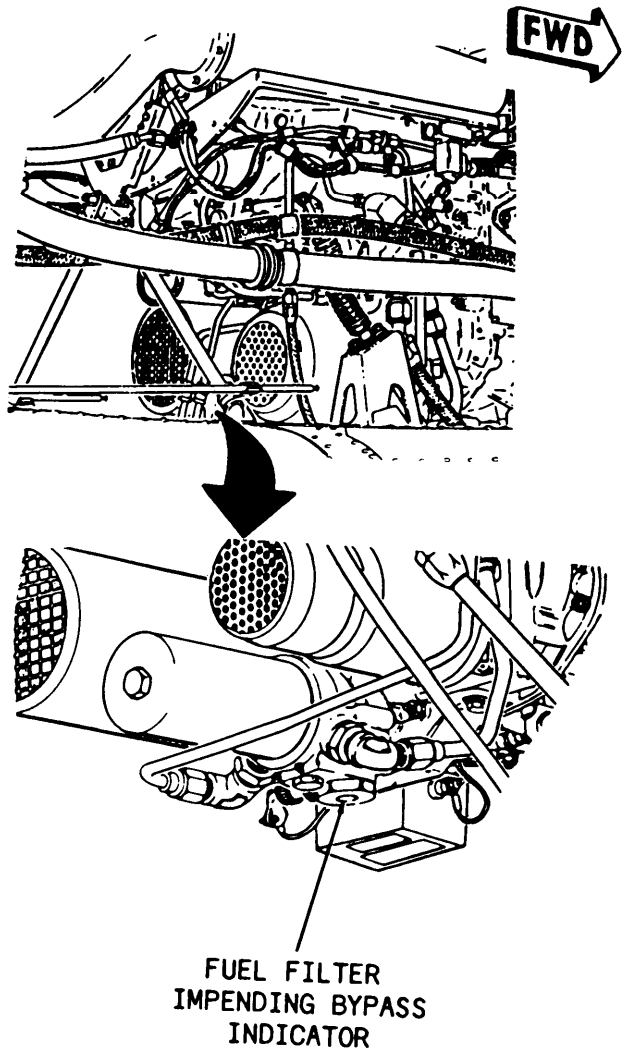
WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

2. Pilot: Operate engine at flight idle.

3. Press in while engine is operating. If indicator remains depressed after engine operation, enter a requirement In helicopter logbook to inspect again after next flight.

4. If indicator extends during engine operation, perform trouble-shooting procedure 51 (para 1-24).



END OF TASK

7-5-2. REMOVE FUEL FILTER ASSEMBLY

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Materials:
Wiping Rags (Cl)
Gloves (C29)

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).
Engine fuel drained (task 7-1-2).

General Safety Instructions:

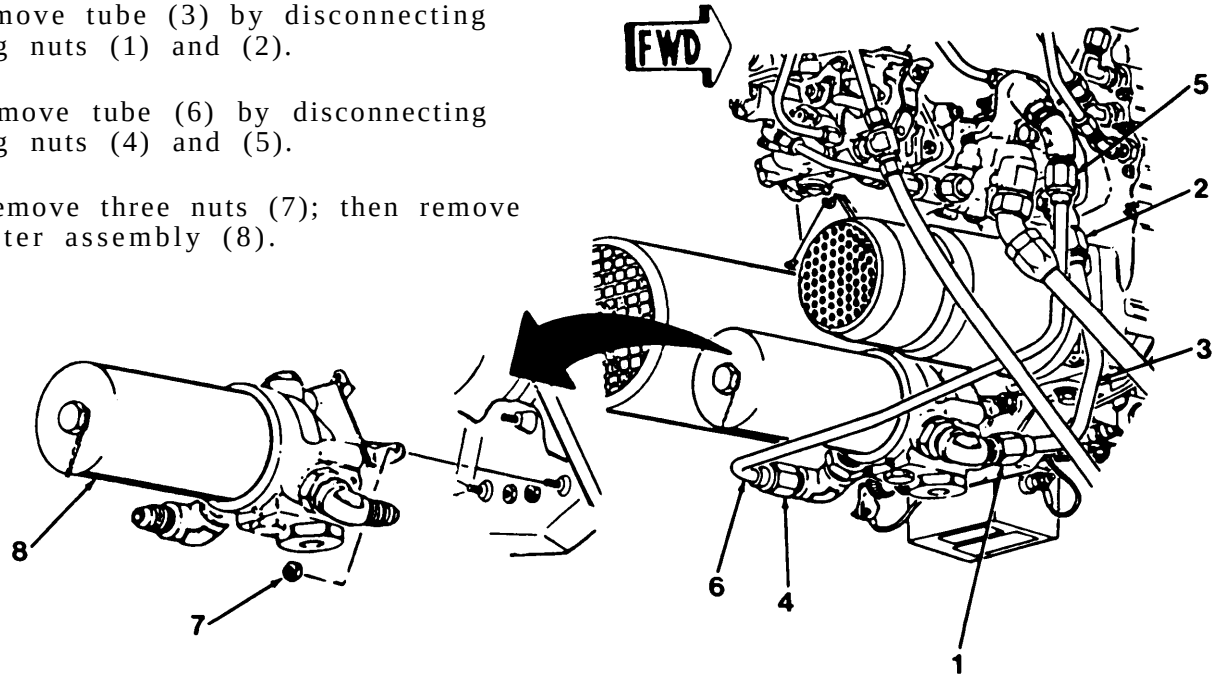
WARNING

Turbine fuels are very flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flame. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of skin results, get medical attention. Get medical attention for eyes.

1. Remove tube (3) by disconnecting coupling nuts (1) and (2).

2. Remove tube (6) by disconnecting coupling nuts (4) and (5).

3. Remove three nuts (7); then remove fuel filter assembly (8).



END OF TASK

7-5-3. DISASSEMBLE FUEL FILTER ASSEMBLY

This task covers: Off Helicopter Disassembly

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Took Kit
1-in. Open End Wrench

Materials:
Wiping Rags (Cl)
Gloves (C29)

Personnel Required:
68B Aircraft Powerplant Repairer

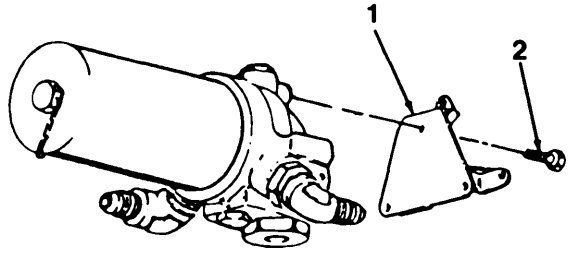
Equipment Condition:
Fuel filter assembly removed (task 7-5-2).

General Safety Instructions:

WARNING

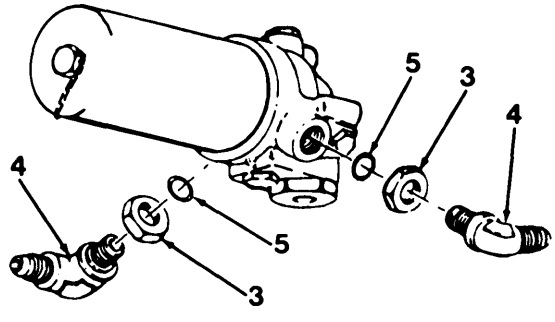
Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Remove bracket (1) by removing lockwire and three bolts (2).



2. Loosen two nuts (3) using l-in. open end wrench.

3. Remove two fittings (4) and packings (5). Discard packings (5).



END OF TASK

7-5-4. ASSEMBLE FUEL FILTER ASSEMBLY

This task covers: Off Helicopter Assembly

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Took Kit
Torque Wrench 0-150 in. lbs

Materials:
Lockwire (C4)
Engine Oil (C30 or C31)

Parts:
Packings

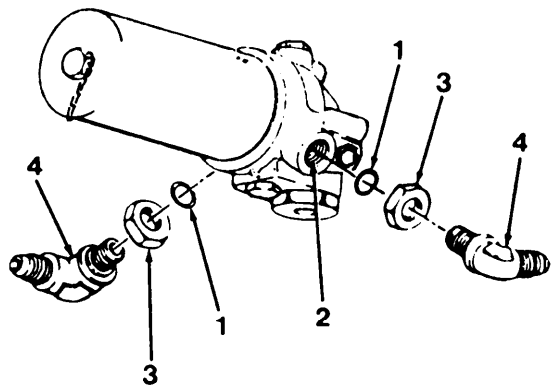
Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

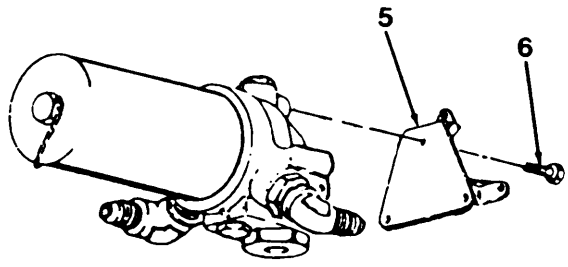
Equipment Condition:
Fuel filter assembly removed (task 7-5-2).

1. Lubricate two new packings (1) with engine oil (C30 or C31); then install in openings (2).

2. Install two nuts (3) on fittings (4).

3. Install two fittings (4) and tighten nuts (3) finger tight. Nuts (3) will be tightened on installation.





4. Install bracket (5) and secure with three bolts (6). Torque to 70-85 in. lbs and lockwire (C4).

INSPECT

END OF TASK

7-5-5. INSTALL FUEL FILTER ASSEMBLY

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Took Kit
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs
l-in. Crow Foot Adapter Wrench
7/8-in. Crow Foot Adapter Wrench

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Install fuel filter assembly (1) on gear box. Insure three studs (2) engage bracket (3); then loosely install three nuts (4).

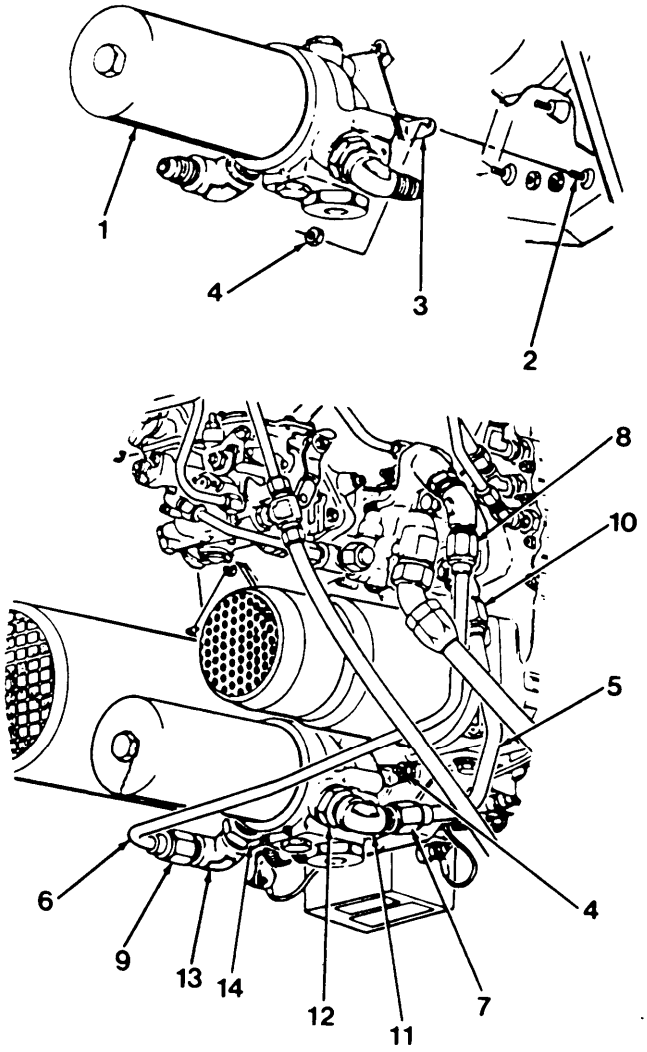
2. Install tubes (5) and (6); then loosely connect coupling nuts (7), (8), (9) and (10).

3. Align fitting (11) with coupling nut (7). Torque nut (12) to 55-80 in. lbs, using l-in. crow foot adapter wrench.

4. Align fitting (13) with coupling nut (7). Torque nut (14) to 55-80 in. lbs, using l-in. crow foot adapter wrench.

5. Torque coupling nuts (7), (8), (9) and (10) to 150-200 in. lbs, using 7/8-in. crow foot adapter wrench.

6. Torque three nuts (4) to 75-85 in. lbs.



INSPECT

FOLLOW ON MAINTENANCE:
Purge engine fuel system (task 7-1-1).

END OF TASK

7-5-6. REMOVE FUEL FILTER ELEMENT

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Took Kit

Materials:
Wiping Rags (C1)

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).
Engine fuel drained (task 7-1-2).

General Safety Instructions:

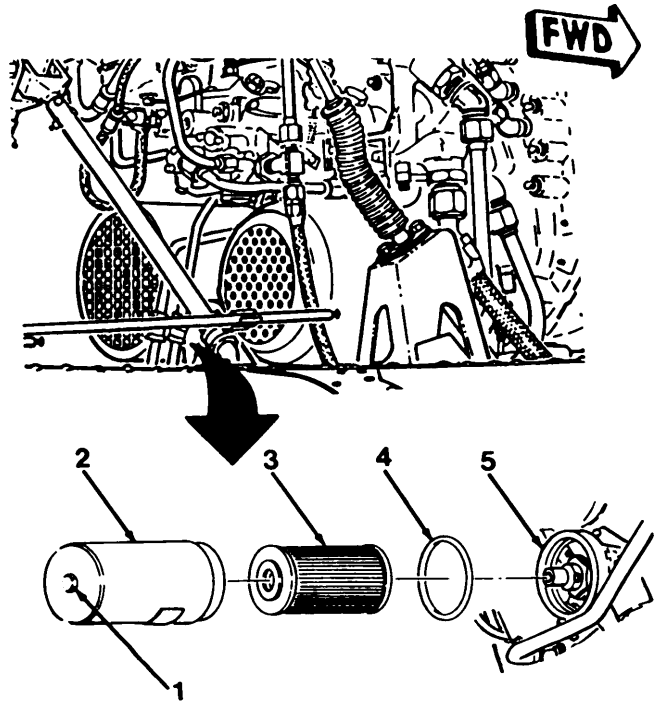
WARNING

Turbine fuels are flammable They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Remove lockwire from hex nut and center post assembly (1); then using wrench on hex nut (1), remove bowl (2) and allow residual fuel to drain on wiping rags (C1).

2. Remove and discard filter element (3) and packing (4).

3. Cover head assembly (5) with wiping rags (C1) to prevent contamination.



END OF TASK

7-5-7. INSTALL FUEL FILTER ELEMENT

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Took Kit
Torque Wrench 0-30 in. lbs
Torque Wrench 30-150 in. lbs

Materials:
Wiping Rags (C1)
Lockwire (C4)
Engine Fuel (Cl0)
Gloves (C29)

Parts:
Fuel Filter Element
Packing

Personnel Required:
688 Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

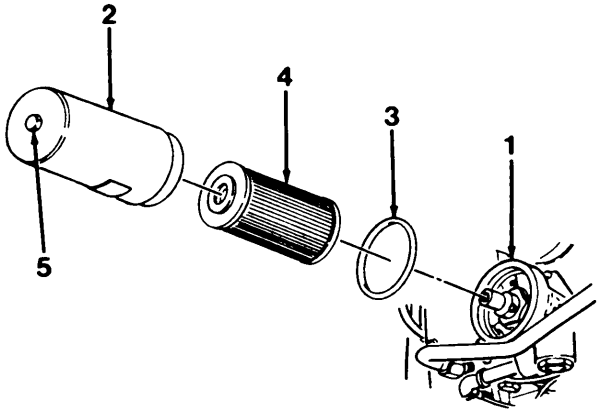
1. Remove wiping rags (Cl) from head assembly (1).

2. Clean head assembly (1) and interior of bowl (2) with wiping rags (C1) moistened with engine fuel.

3. Lubricate new packing (3) with engine fuel (C10) and install in head assembly (l).

4. Install new filter element (4).

5. Install bowl (2) on head assembly (1). Using wrench on center post hex nut (5), torque to 20-40 in. lbs and lockwire (C4).



INSPECT

FOLLOW ON MAINTENANCE:
Purge engine fuel system (task 7-1-1).

END OF TASK

7-5-8. REMOVE FUEL FILTER IMPENDING BYPASS INDICATOR ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Took Kit
l-1/4-in. Open End Wrench

Materials:
Wiping Rags (Cl)
Gloves (C29)

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

References:
TM 55-1520-248-23

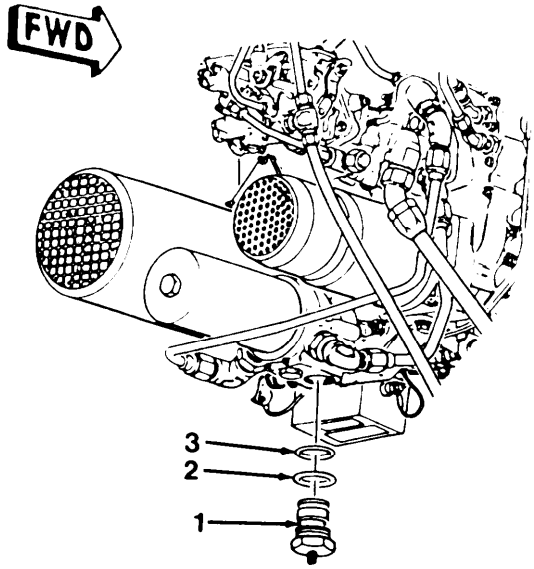
General Safety Instructions:

WARNING

Turbine fuels are flammable. They cause drying and irritation of skin or eyes. Handle only in well ventilated areas away from heat and open flames. Drain and store in approved metal safety containers. Avoid prolonged or repeated contact with skin, and do not take internally. Wash contacted areas of skin thoroughly after handling. If irritation of the skin results, get medical attention. Get medical attention for eyes.

1. Remove lockwire and remove indicator (1) using l-1/4-in. open end wrench.

2. Remove and discard packings (2) and (3).



END OF TASK

7-5-9. INSTALL FUEL FILTER IMPENDING BYPASS INDICATOR ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Took Kit
l-1/4-in. Socket

Materials:
Lockwire (C4)
Engine Fuel (C10)

Parts:
Packings (2)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

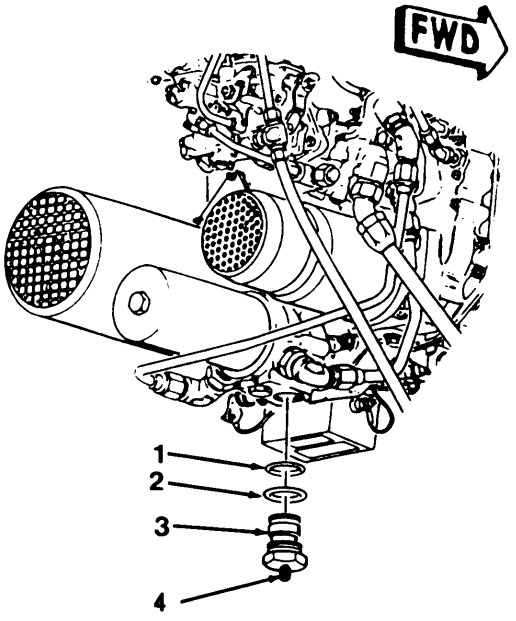
Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Lubricate packings (1) and (2) with engine fuel (C10) and install on bypass indicator assembly (3).

2. Install bypass indicator assembly (3). Torque to 70-80 in. lbs and lockwire (C4).

NOTE

After installation be sure bypass indicator (4) is in the IN position (push in.)



INSPECT

FOLLOW ON MAINTENANCE:
Purge engine fuel system (task 7-l-l).

END OF TASK

CHAPTER 8
ELECTRICAL SYSTEM MAINTENANCE

Section I ELECTRICAL HARNESS

This section includes maintenance procedures for testing, removal, and installation of electrical harness.

LIST OF TASKS

8-1-1. TEST ELECTRICAL HARNESS

INITIAL SETUP

Applicable Configurations:
All

Tools:
Electrical Repairer Tool Kit
Multimeter

Personnel Required:
68F Aircraft Electrician
66S Inspector
Helper

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).

Equipment Condition: (cont)
Battery disconnected.
Helicopter electrical harness disconnected.
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

Allow at least five minutes after operation of ignition system before disconnecting or removing components. Failure to allow high voltage to dissipate can result in injury or death.

SHORT TEST

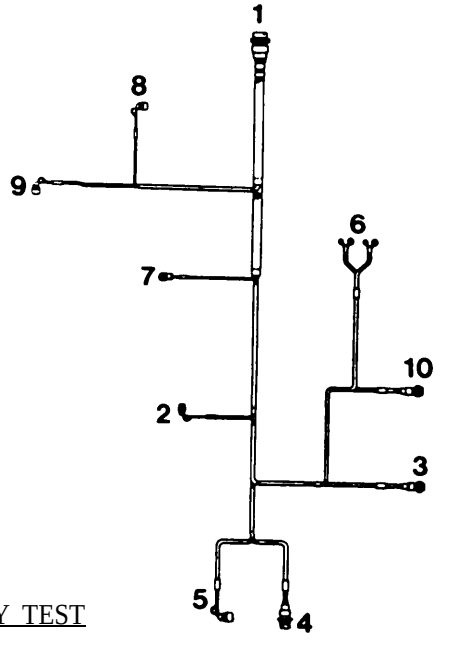
1. Disconnect engine main electrical connector (l).

NOTE

In steps 2 and 3, there must be no continuity in circuits tested, except between pins 1 and 2, 8 and 9; and pins 39 and 40. These three circuits have diodes and continuity is normal.

2. Using multimeter, place positive (+) probe on pin 1 and check to each other pin in connector Individually with negative probe.

3. Repeat step 2, starting with pin 2, to check all other pins in connector (1).



CONTINUITY TEST

4. Disconnect all connector plugs and terminal lugs. (Connector plugs 2 thru 5 and 8, 9, and 10; terminal lugs 6 and 7)

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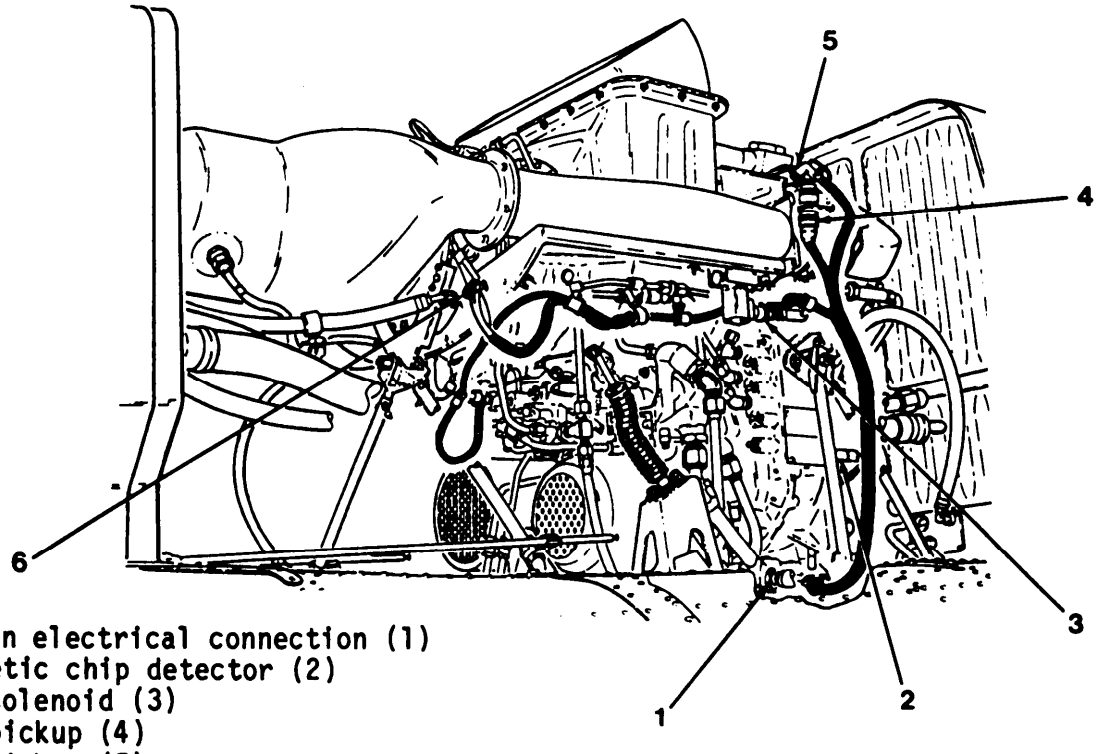
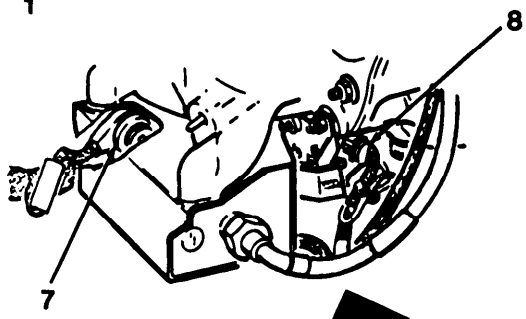
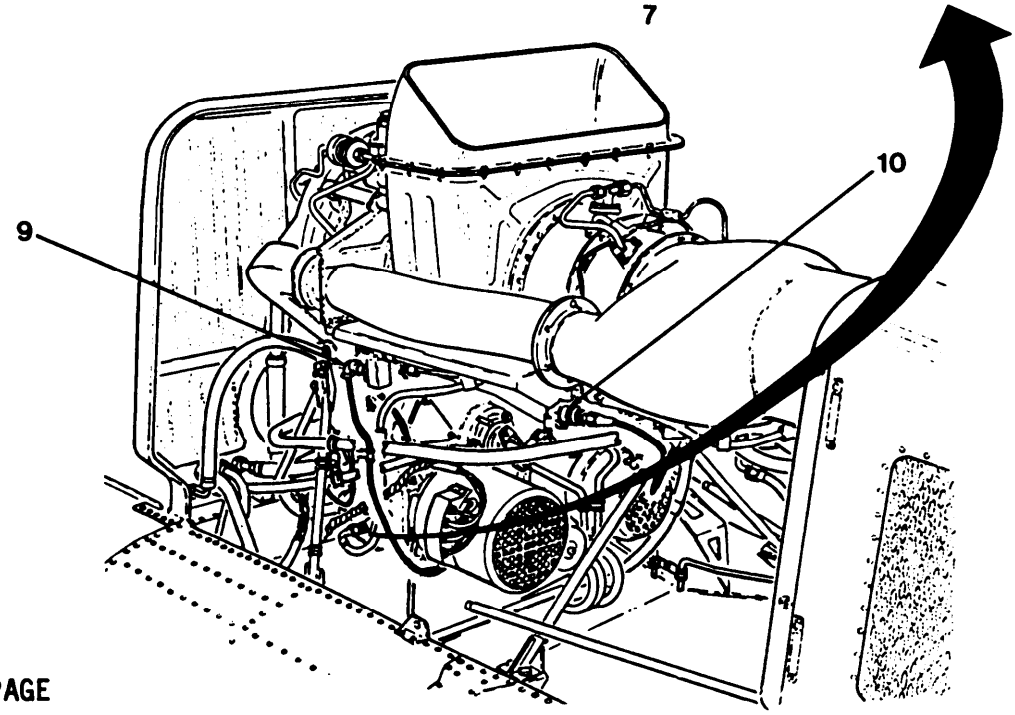
8-1-1. TEST ELECTRICAL HARNESS (CONT)



Engine main electrical connection (1)
Side magnetic chip detector (2)
Anti-ice solenoid (3)
Np speed pickup (4)
Ng speed pickup (5)
Thermocouples (6)
Ignition exciter (7)
Bottom magnetic chip detector (8)
Np overspeed solenoid (9)
torque motor servo valve (10)





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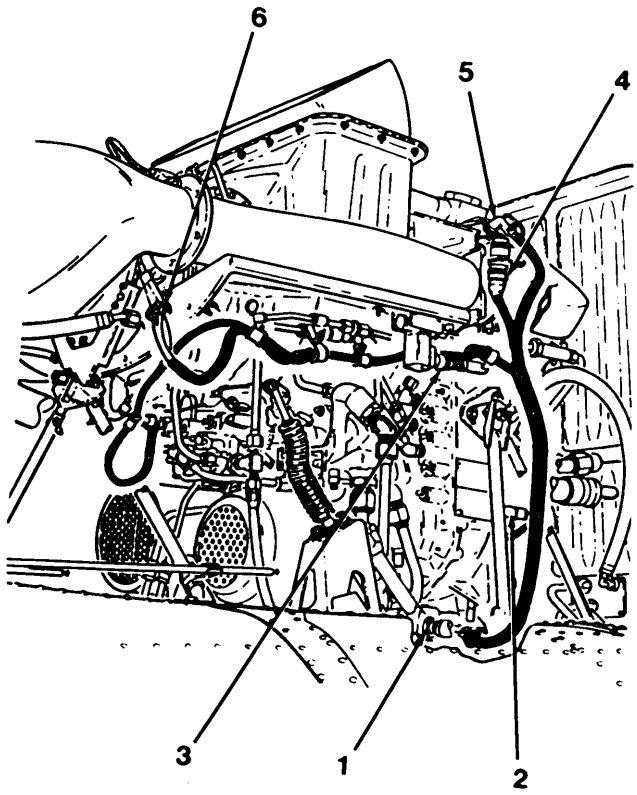
8-1-1. TEST ELECTRICAL HARNESS (CONT)

5. Using multimeter, perform continuity test on all connector plugs, terminal lugs, and pins listed. There must be continuity in all tested circuits.



FROM		TO	
Positive (+) multimeter probe Connector	Pin No.	Negative (-) multimeter probe Connector	Pin No.
1	11	2	NA
1	40	3	1
1	39	3	2
1	17	4	7
1	18	4	8
1	32	4	11
1	33	4	12
1	34	4	11
1	35	4	12
1	3	5	1
1	4	5	2
1	5	5	3
1	6	5	4
1	36	5	3
1	37	5	4
1	30	6	White Wire size 8 lug
1	31	6	Green wire size 10 lug
1	13	6	White wire size 8 lug
1	14	6	Green wire size 10 lug

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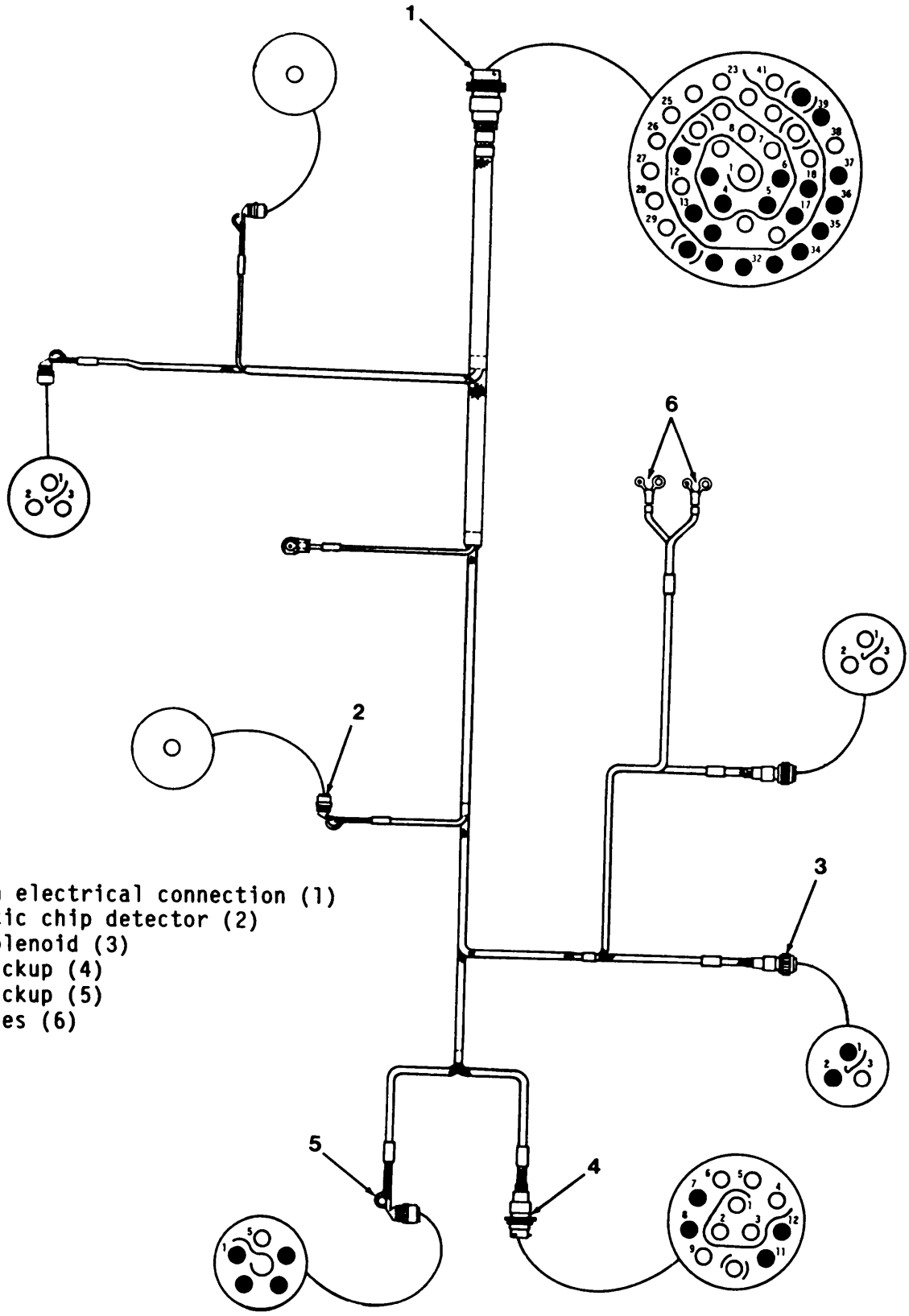
8-1-1. TEST ELECTRICAL HARNESS (CONT)



Engine main electrical connection (1)
Side magnetic chip detector (2)
Anti-ice solenoid (3)
Np speed pickup (4)
Ng speed pickup (5)
Thermocouples (6)

GO TO NEXT PAGE

8-1-1. TEST ELECTRICAL HARNESS (CONT)

FROM		TO	
Positive (+) multimeter probe Connector	Pin No.	Negative (-) multimeter probe Connector	Pin No.
1	41	7	NA
1	10	8	NA
1	9	9	1
1	8	9	2
1	1	10	1
1	2	10	2

DIODE TEST

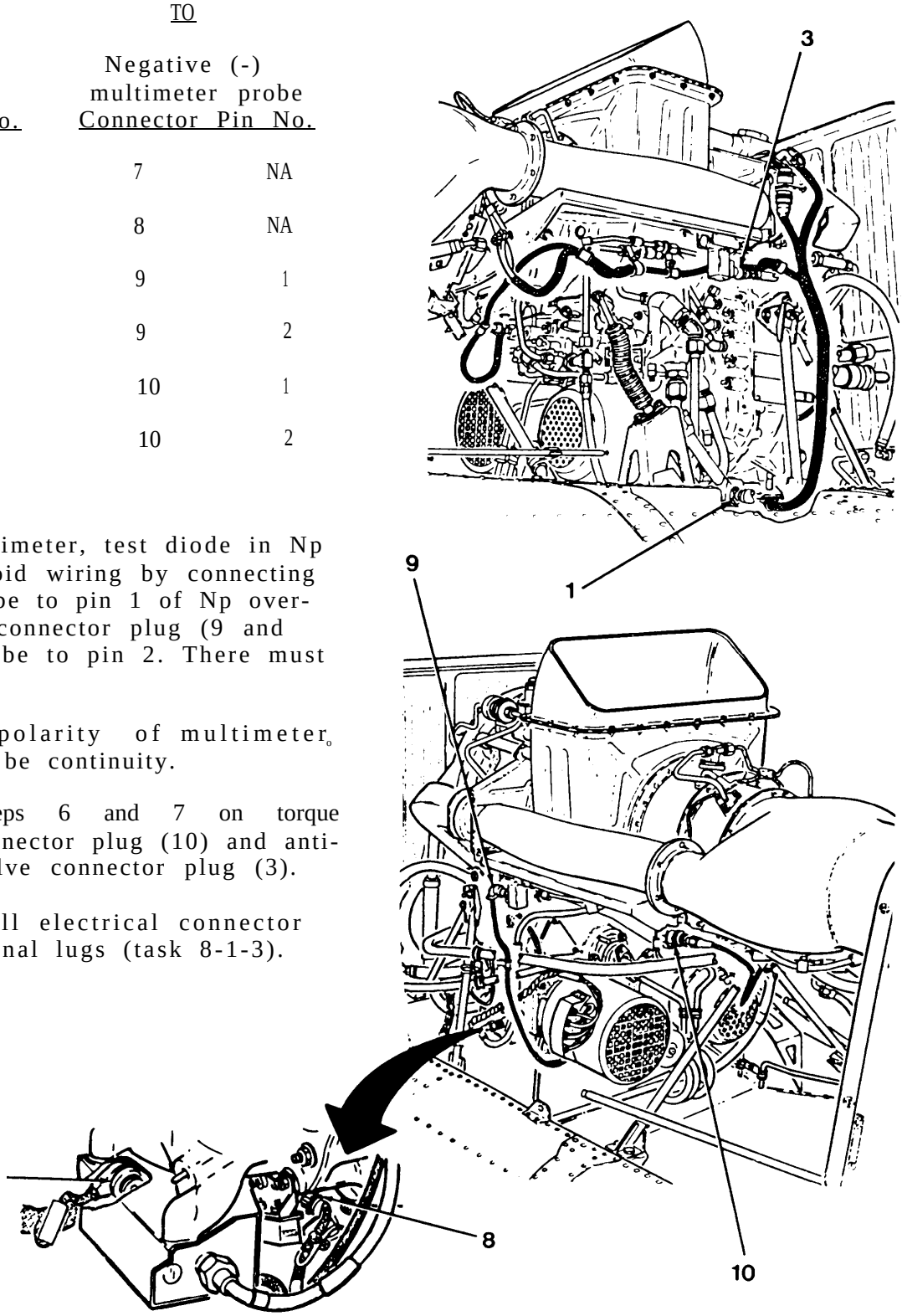
6. Using multimeter, test diode in Np overspeed solenoid wiring by connecting negative (-) probe to pin 1 of Np overspeed solenoid connector plug (9 and positive (+) probe to pin 2. There must be continuity.

7. Reverse polarity of multimeter. There must not be continuity.

8. Repeat steps 6 and 7 on torque motor servo connector plug (10) and anti-ice solenoid valve connector plug (3).

9. Connect all electrical connector plugs and terminal lugs (task 8-1-3).

INSPECT



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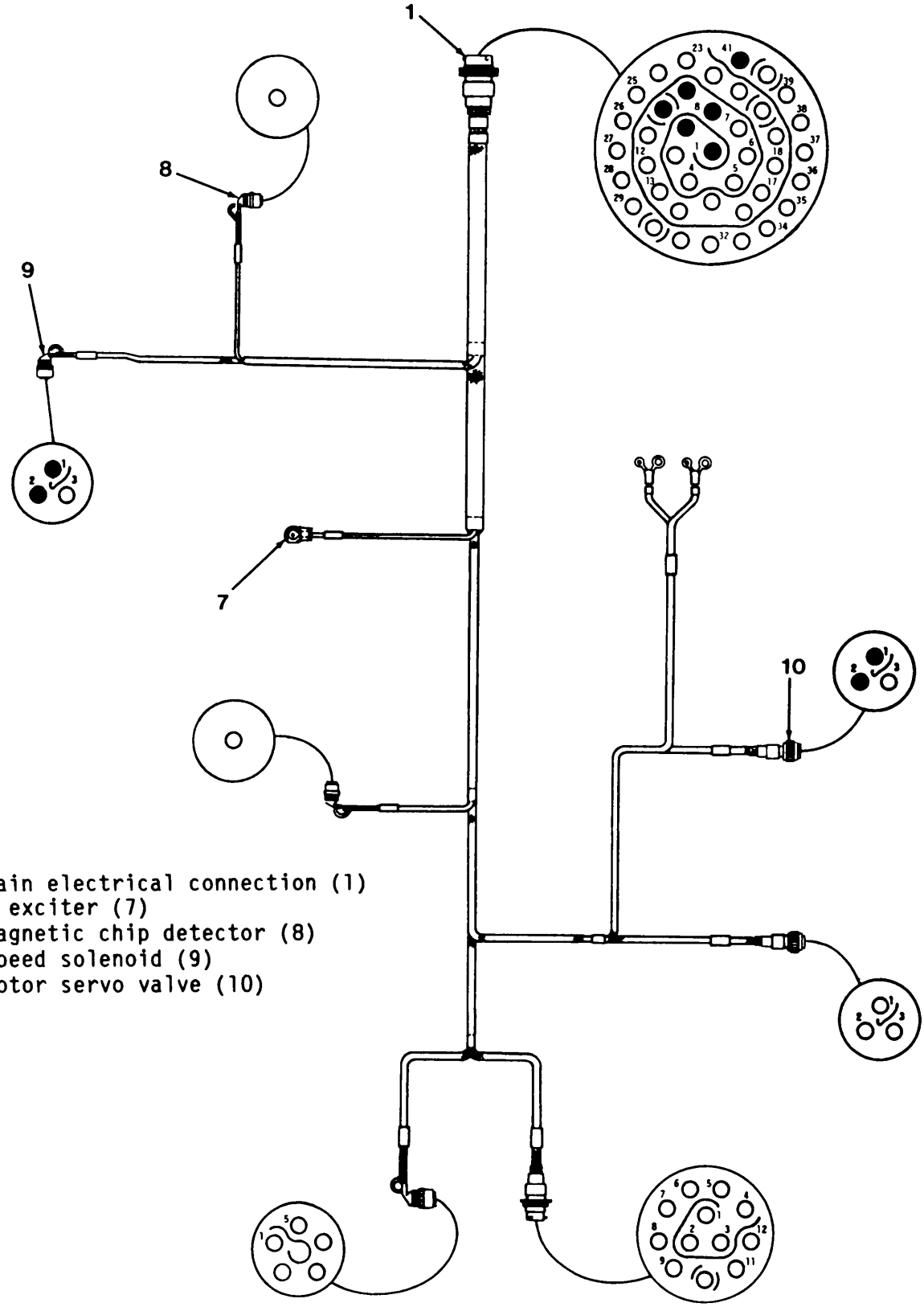
8-1-1. TEST ELECTRICAL HARNESS (CONT)



Engine main electrical connection (1)
Ignition exciter (7)
Bottom magnetic chip detector (8)
Np overspeed solenoid (9)
Torque motor servo valve (10)

END OF TASK

8-1-2. REMOVE ELECTRICAL HARNESS

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
l-1/8-in. Open End Wrench

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Battery disconnected.

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment Condition: (cont)
Helicopter electrical harness disconnected.
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

General Safety Instructions:

WARNING

Allow at least five minutes after operation of ignition system before disconnecting or removing components. Failure to allow high voltage to dissipate can result in injury or death.

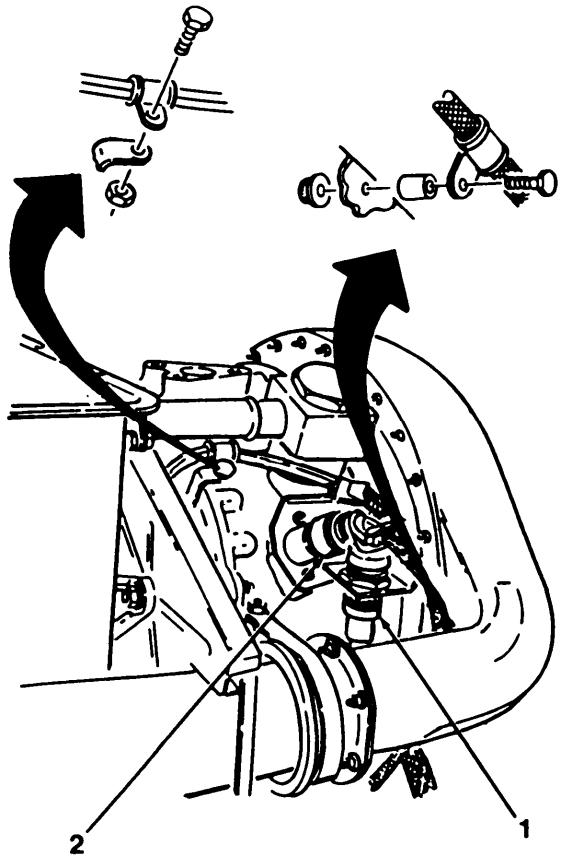
1. Remove anti-ice solenoid valve (task 9-2-l).

2. Disconnect Np speed pickup connector (1) and Ng speed pickup connector (2) using l-1/8-in. open end wrench.

3. Disconnect remaining connector plugs, terminal lugs, and clamps.

NOTE

Pay close attention to harness routing during removal for ease of installation.



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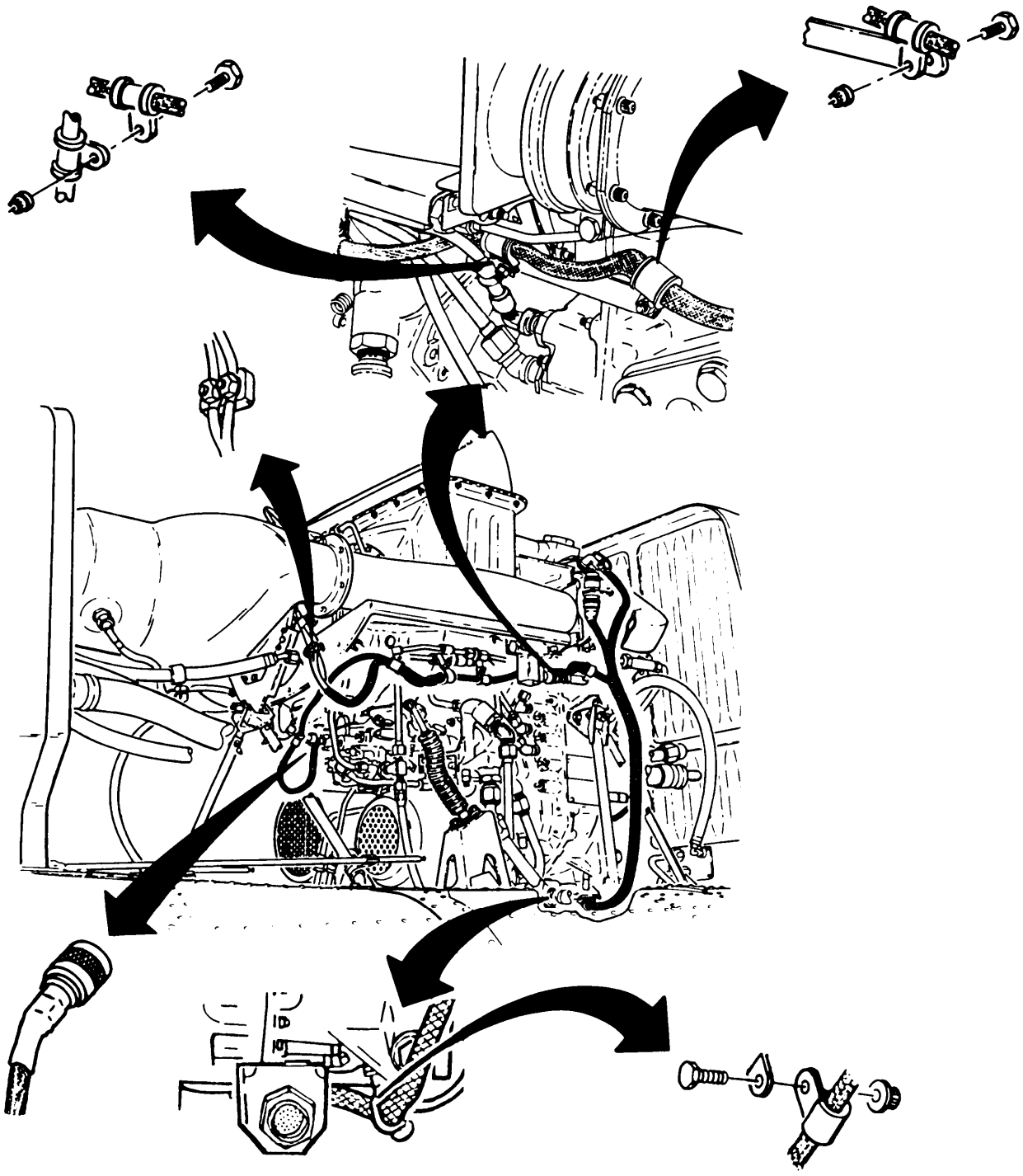
8-1-2. REMOVE ELECTRICAL HARNESS (CONT)

ENGINE RIGHT SIDE
CLAMPING ARRANGEMENT



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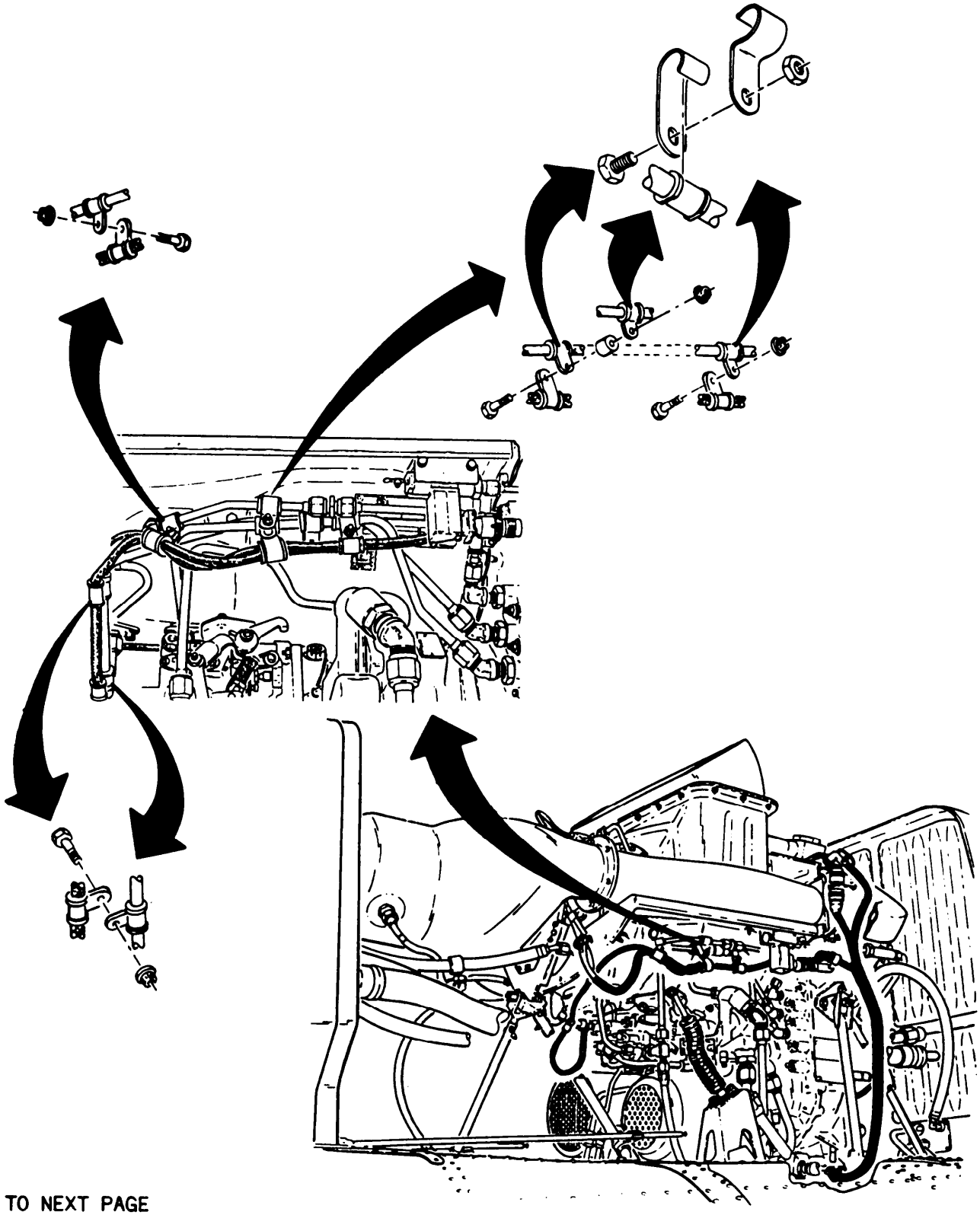
8-1-2. REMOVE ELECTRICAL HARNESS (CONT)

ENGINE RIGHT SIDE
CLAMPING ARRANGEMENT (CONT)



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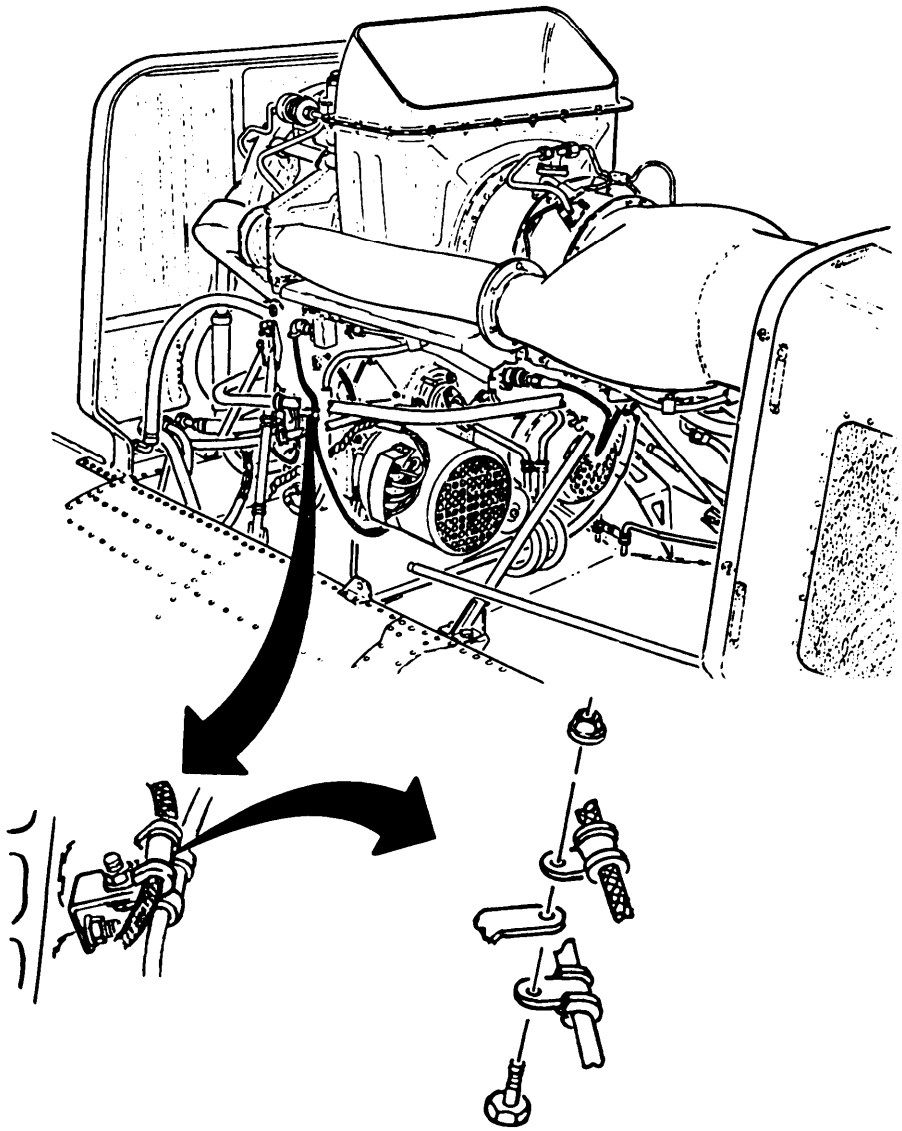
8-1-2. REMOVE ELECTRICAL HARNESS (CONT)

ENGINE LEFT SIDE
CLAMPING ARRANGEMENT



END OF TASK

8-1-3. INSTALL ELECTRICAL HARNESS

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
l-1/8-in. Open End Wrench

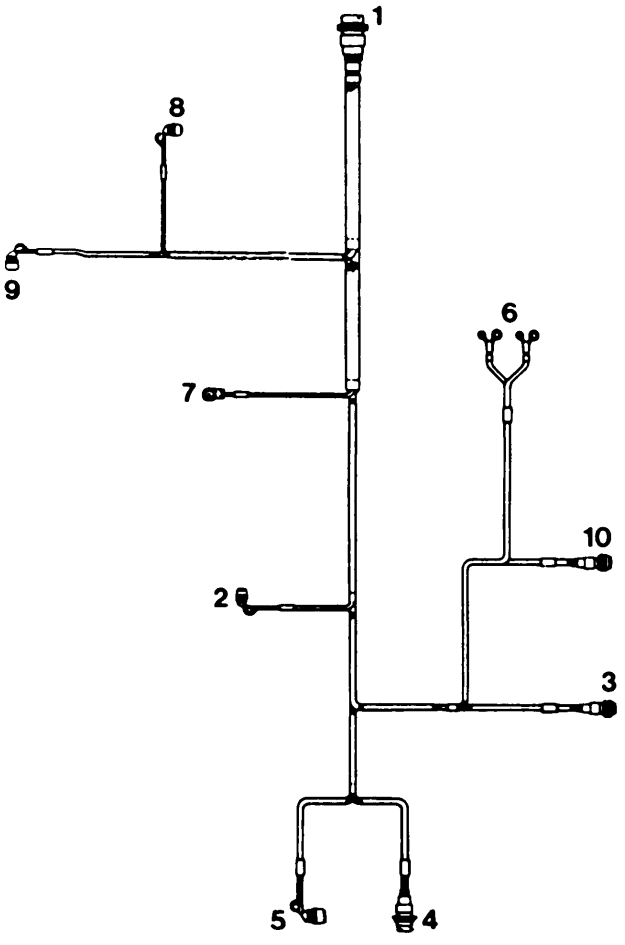
Materials:
Lockwire (C4)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Battery disconnected.
Helicopter electrical harness disconnected.
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Lay electrical harness loosely around engine, with labeled connector plugs (1 thru 10) near their assigned components.



Engine main electrical connection (1)
Side magnetic chip detector (2)
Anti-ice solenoid (3)
Np magnetic pickup (4)
Ng magnetic pickup (5)
Thermocouples (6)
Ignition exciter (7)
Bottom magnetic chip detector (8)
Np overspeed solenoid (9)
Torque motor servo valve (10)

GO TO NEXT PAGE

8-1-3. INSTALL ELECTRICAL HARNESS (CONT)

2. Connect Ng speed pickup connector (4) and Np speed connector (5) using 1-1/8-in. open end wrench. Lockwire (C4).

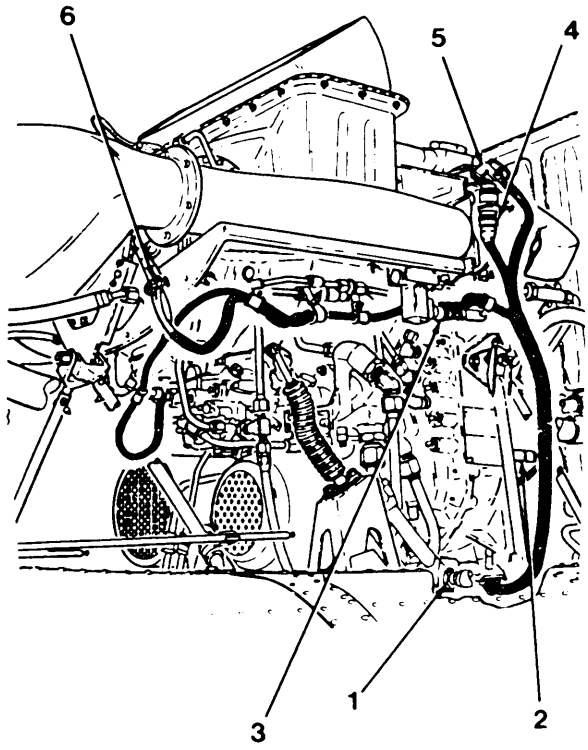
CAUTION

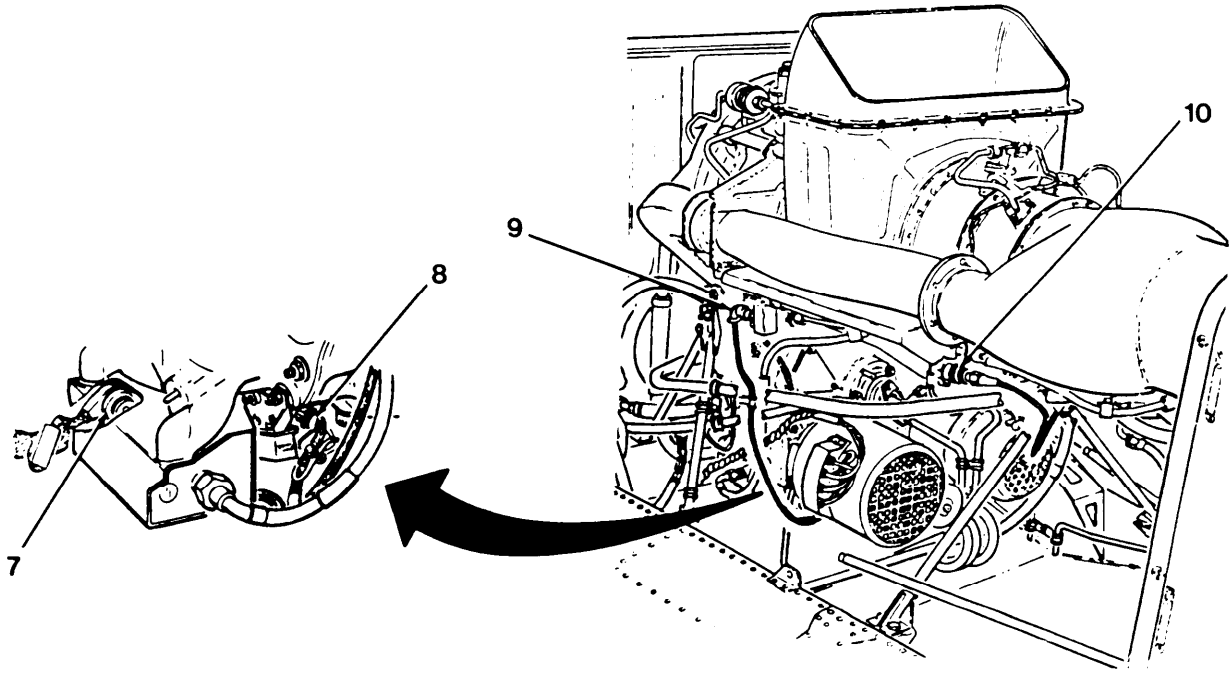
Thermocouple nuts are different sizes. Do not force. Do not substitute steel nuts.

3. Connect remaining electrical connectors (l), (2), (3), (8), (9) and (10), and terminal lugs (6) and (7). Lockwire (C4) connectors (l), (2), (8) and (10).

4. Loosely install clamps and attaching parts until all clamps are installed. (See pages following for clamping arrangements.

5. Tighten clamps securing the electrical harness.





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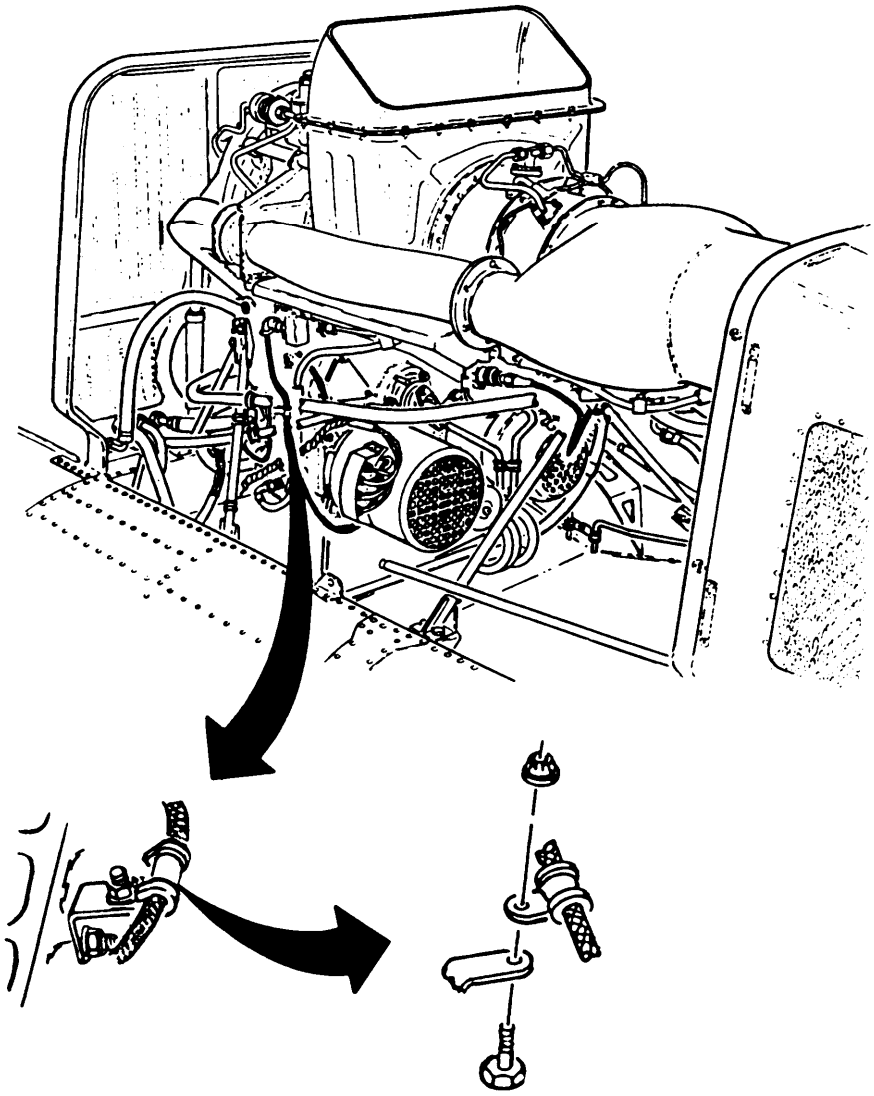
8-1-3. INSTALL ELECTRICAL HARNESS (CONT)

ENGINE LEFT SIDE
CLAMPING ARRANGEMENT



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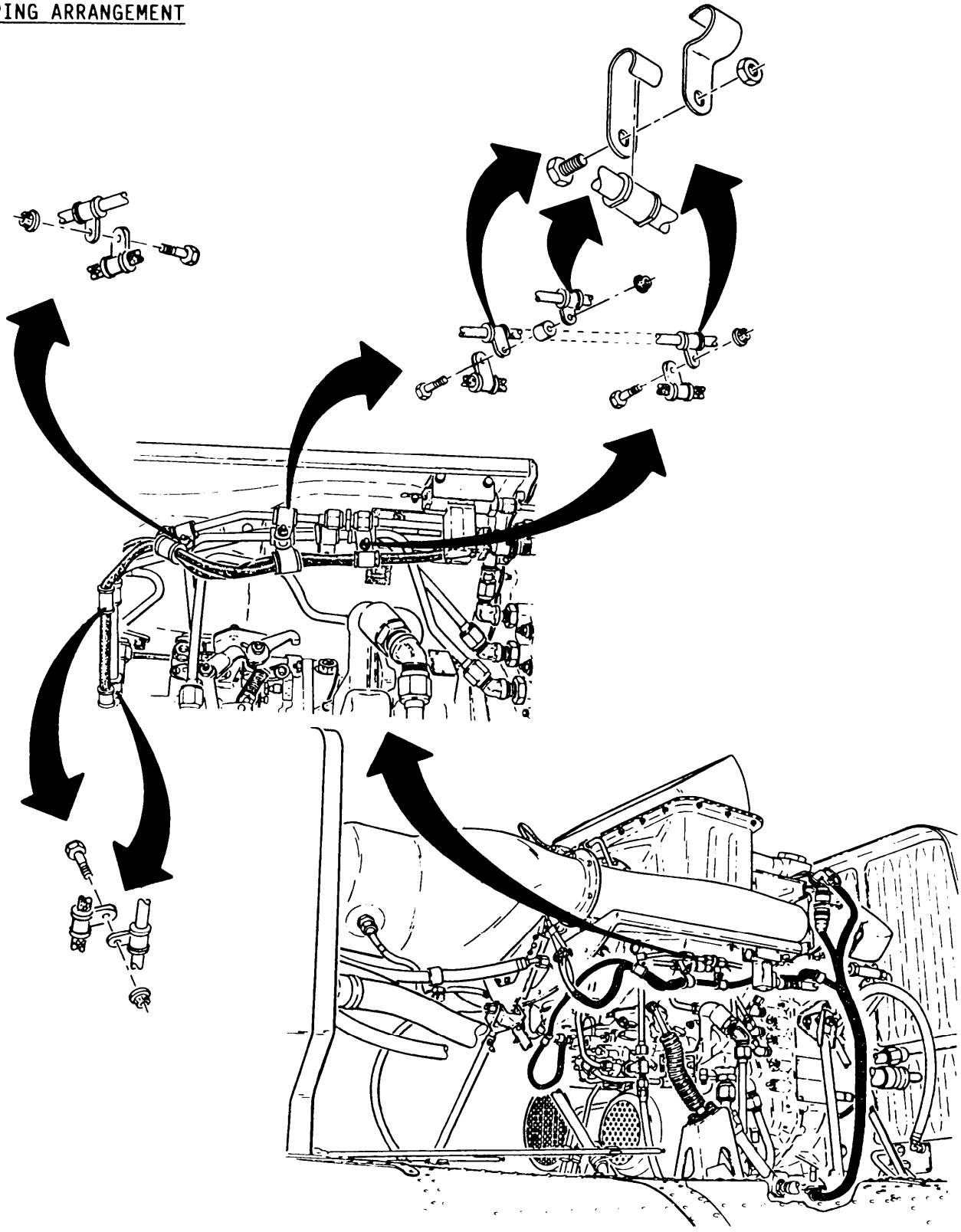
8-1-3. INSTALL ELECTRICAL HARNESS (CONT)

ENGINE RIGHT SIDE
CLAMPING ARRANGEMENT



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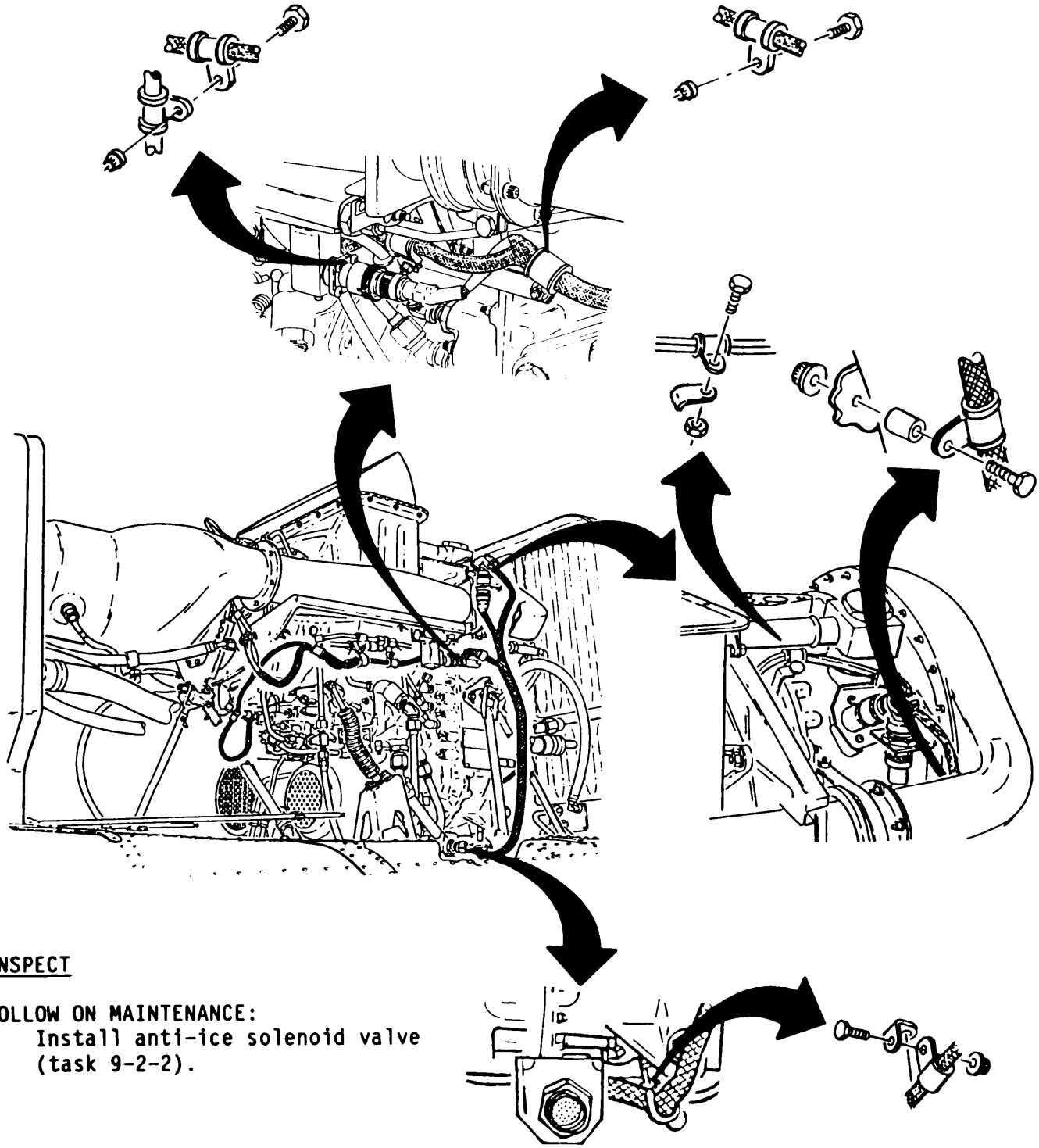
8-1-3. INSTALL ELECTRICAL HARNESS (CONT)

ENGINE RIGHT SIDE
CLAMPING ARRANGEMENT (CONT)



INSPECT

FOLLOW ON MAINTENANCE:
Install anti-ice solenoid valve (task 9-2-2).

END OF TASK

Section II IGNITION EXCITER

This section includes maintenance procedures for testing, removal, and installation of ignition exciter.

LIST OF TASKS

8-2-1. TEST IGNITION EXCITER

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer
Pilot

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).

General Safety Instructions:

WARNING

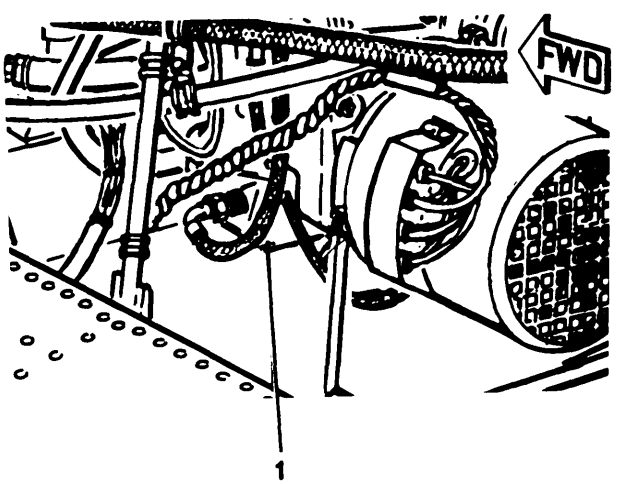
Allow at least five minutes after operation of ignition system before disconnecting or removing components. Failure to allow high voltage to dissipate can result in injury or death.

CAUTION

Do not energize ignition exciter if spark igniter and lead are disconnected. Failure to comply may result in damage to ignition system.

1. Pilot motor engine.

2. Repairer listen for exciter (1) electrical snapping.



END OF TASK

8-2-2. REMOVE IGNITION EXCITER

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Battery disconnected.
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

WARNING

High voltage may be present at the igniter lead. Ensure that the ignition system has been off for at least five minutes before disconnecting the lead.

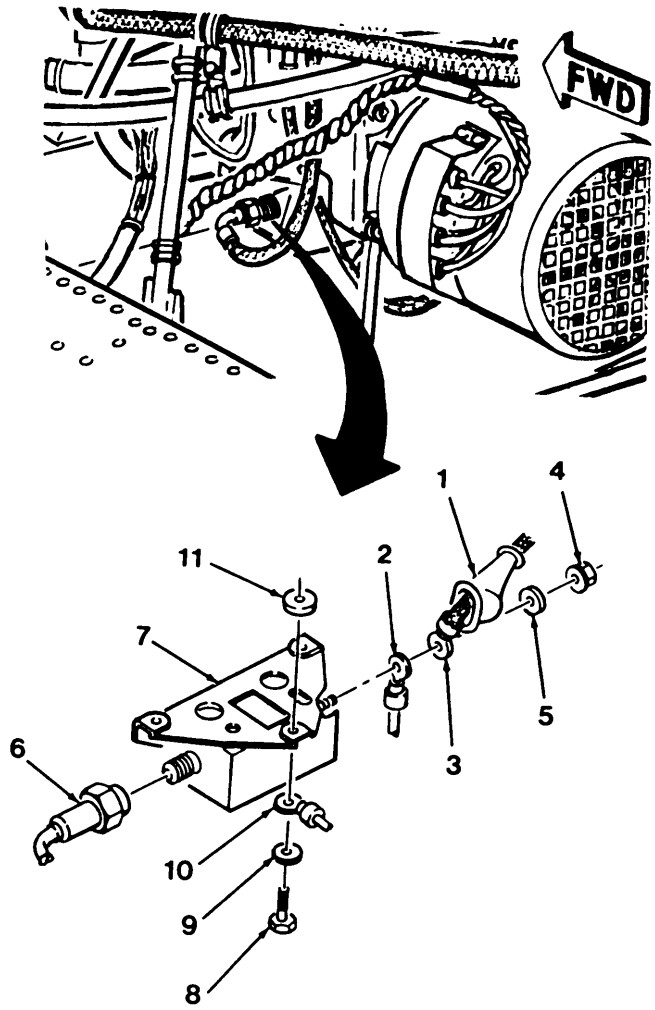
1. Displace rubber nipple (l).

2. Disconnect terminal lugs (2) and (3) by removing nut (4) and washer (5).

3. Disconnect connector plug (6).

4. Remove ignition exciter (7) by removing three bolts (8), washers (9), and start counter wire (10).

5. Remove three spacers (11).



END OF TASK

8-2-3. INSTALL IGNITION EXCITER

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Wiping Rags (C1)

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Battery disconnected.
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Install shortest wire (1) from start counter and washer (2) on aft mount bolt (3).

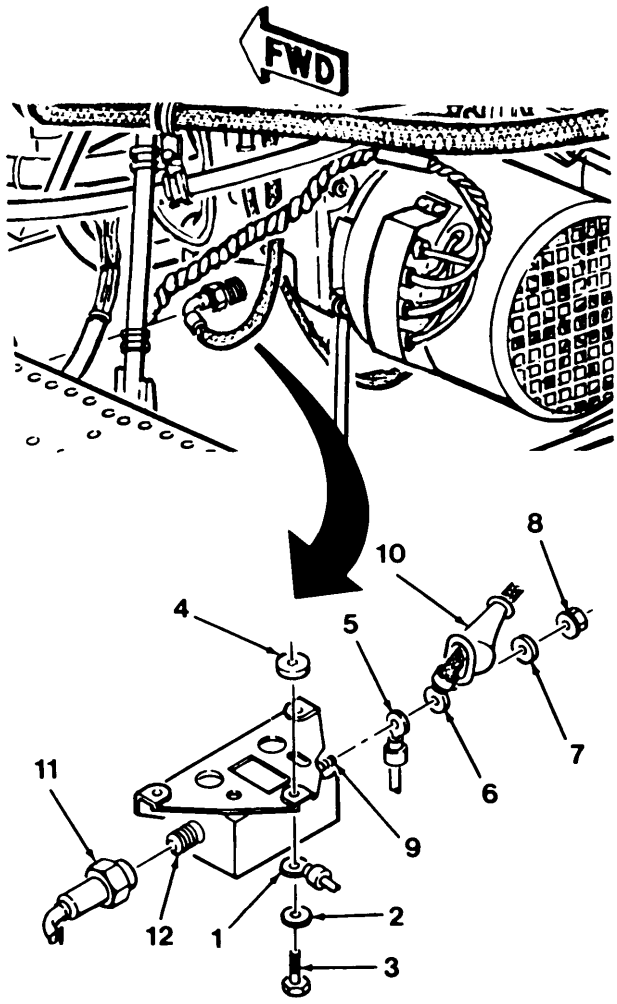
2. Install ignition exciter with one spacer (4) above each mounting, hold and secure with three washers (2) and bolts (3)$_0$ Torque to 30-40 in. lbs.

3. Install terminal lugs (5) and (6), washer (7), and nut (8) on terminal (9)$_0$ Cover with nipple (10).

CAUTION

To prevent shorts and irregular electrical arcs, make sure connector plug (11) and exciter connection (12) are clean and dry. If necessary, clean using clean wiping rag (Cl). Do not wash with solvent.

4. Connect connector plug (11) to exciter connector (12) and torque to 50 to 70 in. lbs.



INSPECT

END OF TASK

Section III Np OVERSPEED SOLENOID

This section includes maintenance procedures for testing, removal, and installation of Np overspeed solenoid.

LIST OF TASKS

8-3-1. TEST Np OVERSPEED SOLENOID

INITIAL SETUP

Applicable Configurations:
All

Tools:
Electrical Repairer Tool Kit
Multimeter

Personnel Required:
68F Aircraft Electrician
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

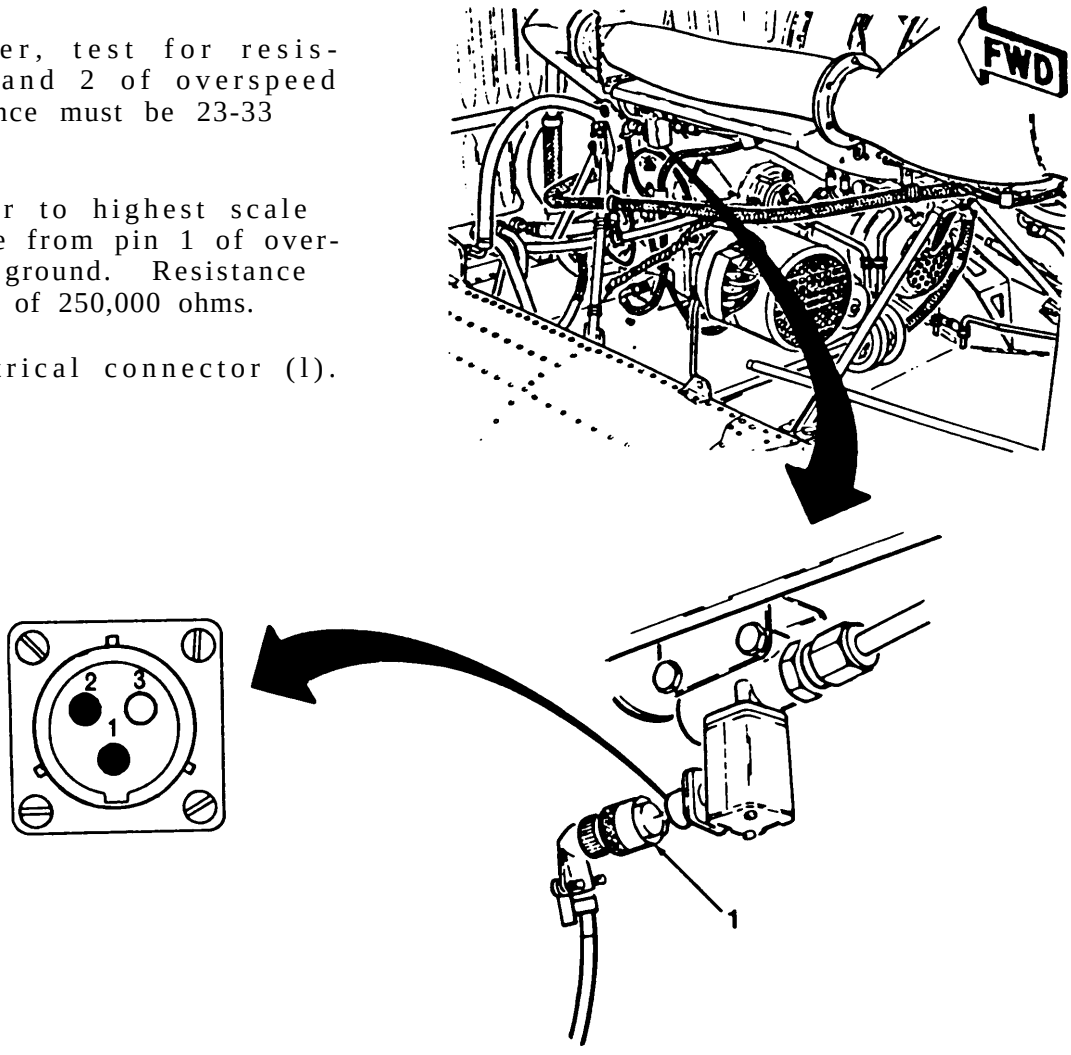
1. Disconnect electrical connector (1).

Using multimeter, test for resis- between pins 1 and 2 of overspeed solenoid. Resistance must be 23-33 ohms.

3. Set multimeter to highest scale and test resistance from pin 1 of over- speed solenoid to ground. Resistance must be a minimum of 250,000 ohms.

4. Connect electrical connector (l).

INSPECT



END OF TASK

8-3-2. REMOVE Np OVERSPEED SOLENOID

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

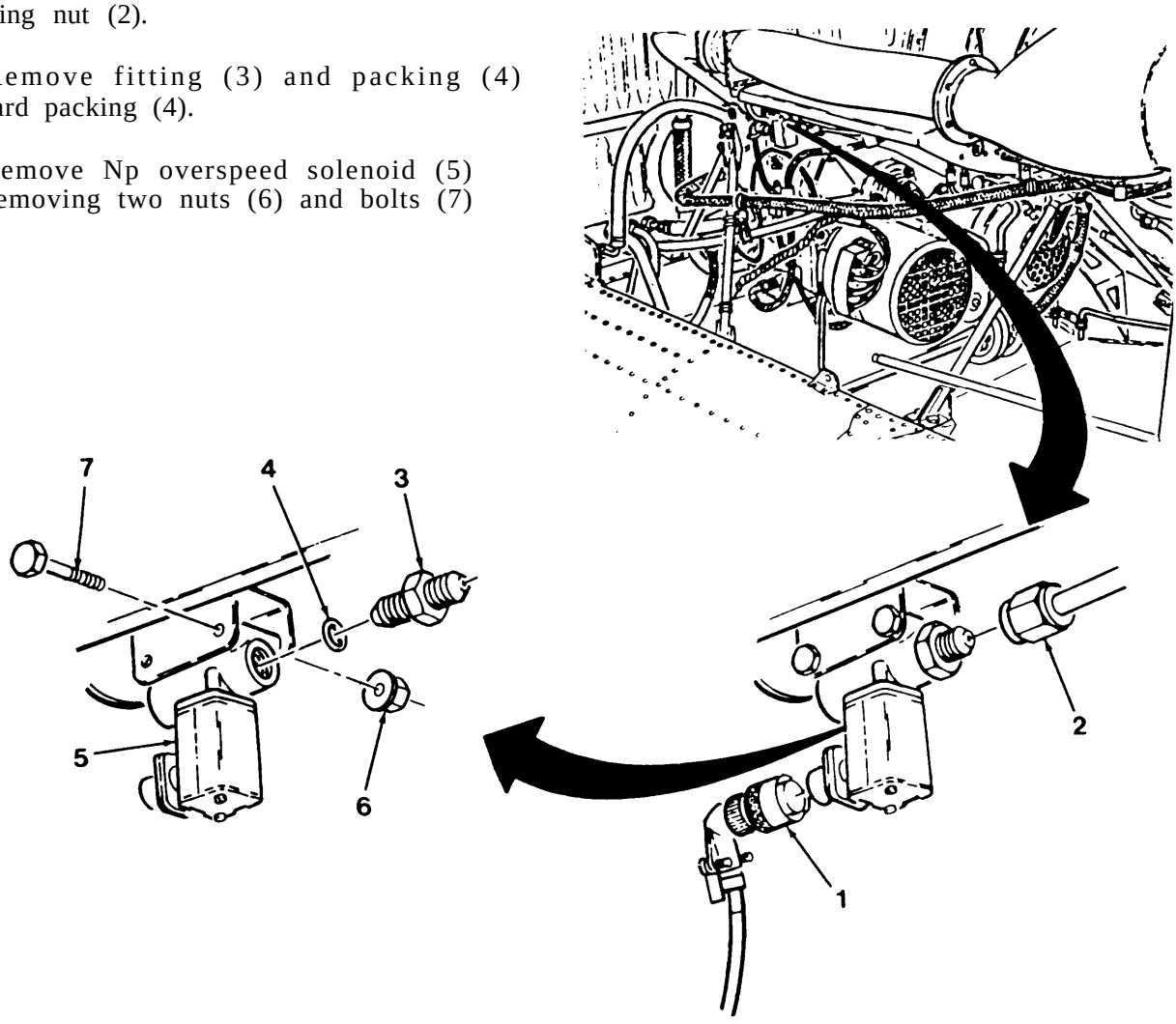
References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Disconnect connector plug (1) and coupling nut (2).

2. Remove fitting (3) and packing (4) Discard packing (4).

3. Remove Np overspeed solenoid (5) by removing two nuts (6) and bolts (7)



END OF TASK

8-3-3. INSTALL Np OVERSPEED SOLENOID

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Petrolatum (C34)

Parts:
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

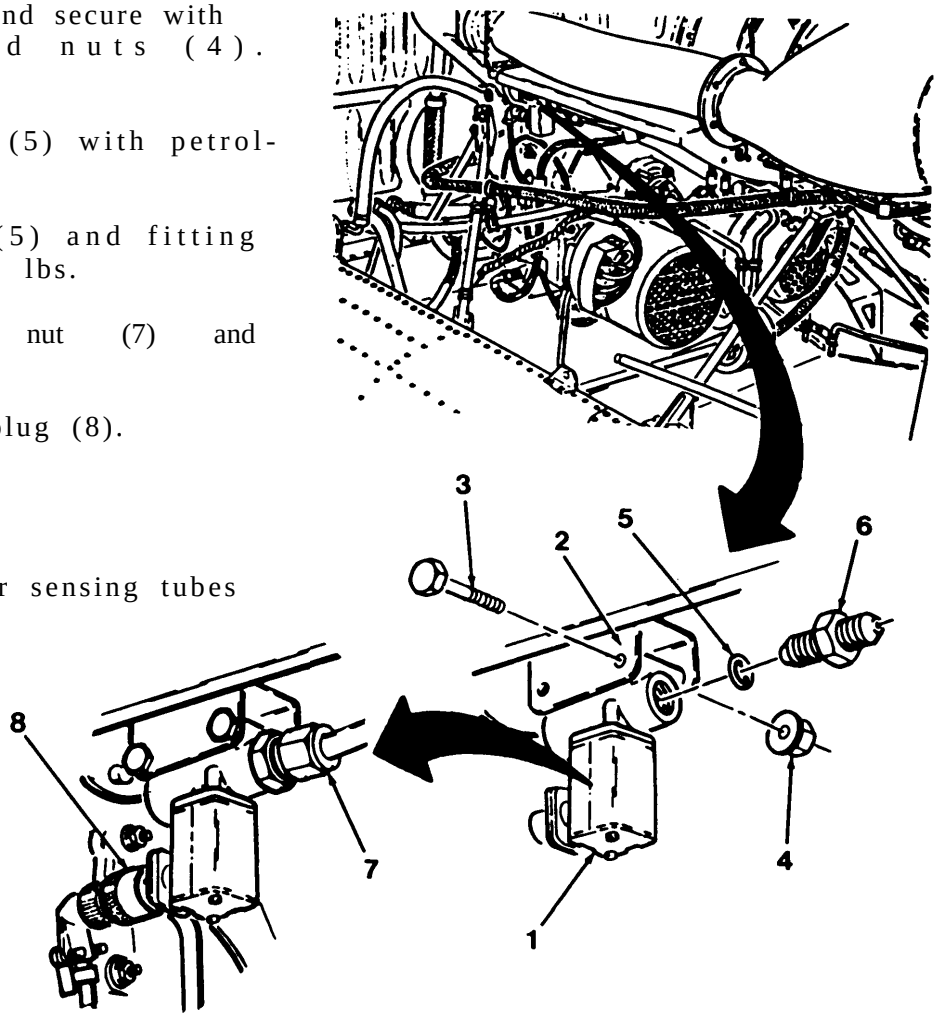
1. Install Np overspeed solenoid (1) in mounting bracket (2) and secure with two bolts (3) and nuts (4). 35-40 in. lbs.

2. Lubricate packing (5) with petrolatum (C34).

3. Install packing (5) and fitting (6). Torque to 55-80 in. lbs.

4. Connect coupling nut (7) and torque to 80-120 in. lbs.

5. Connect connector plug (8).



INSPECT

FOLLOW ON MAINTENANCE:
Inspect fuel control air sensing tubes (task 7-2-4).

END OF TASK

Section IV SPARK IGNITER

This section Includes maintenance procedures for removal, inspection, and installation of spark igniter.

LIST OF TASKS

8-4-1. REMOVE SPARK IGNITER

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Personnel Required:
686 Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

WARNING

High voltage may be present at the igniter lead. Ensure that the ignition system has been off for at least five minutes before disconnecting the lead.

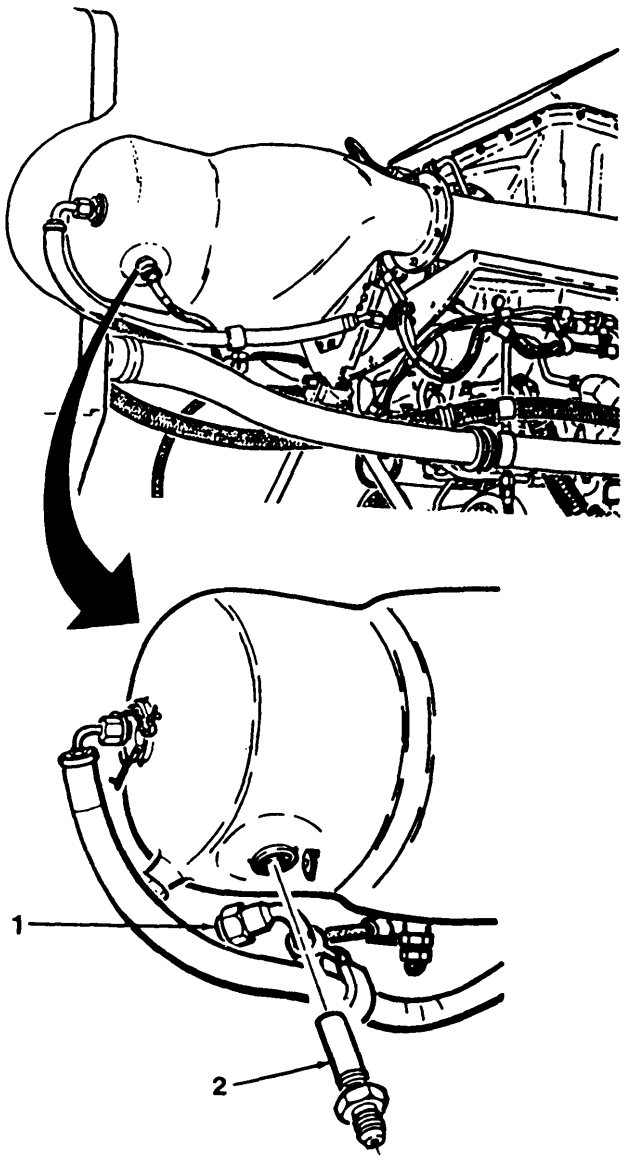
1. Disconnect igniter lead connector plug (l).

2. Ground igniter lead to the engine using an insulated screwdriver to dissipate energy stored in the exciter.

CAUTION

Igniter (2) is fragile. If it is dropped, discard and replace with serviceable igniter on installation.

3. Remove lockwire and igniter (2).



END OF TASK

8-4-2. INSPECT SPARK IGNITER

This task covers: Off Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Dial Indicating Depth Gage
Non-Metallic Blunt Scraper

Materials:
Wiping Rags (Cl)

Personnel Required:
68B Aircraft Powerplant Repairer

Equipment Condition:
Spark igniter removed (task 8-4-1).

General Safety Instructions:

CAUTION

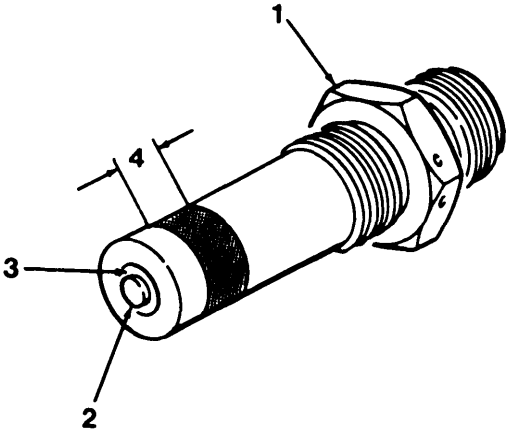
Do not clean spark igniter by wire brushing, sand blasting, vapor blasting or scraping on igniter tip. Any of these practices can damage semiconductor material between the two electrodes and result in shortened spark igniter life or immediate spark igniter failure. Clean only with clean dry wiping rags (C1) and be careful not to damage semi-conductor material.

10 Remove soot and carbon from spark igniter (1) with clean dry wiping rags (c1). Remove any sizeable lumps of carbon with a non-metallic blunt scraper.

2. Inspect center electrode (2) for security. Replace spark igniter (1) if loose.

3. Inspect ceramic areas (3) of spark igniter for erosion. Replace spark igniter (1) if eroded more than 3/16 in. below igniter surface.

4. Using dial indicating depth gage, inspect area (4) for fretting wear. If fretting wear exceeds 0.031 in., replace igniter.



END OF TASK

8-4-3. INSTALL SPARK IGNITER

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench, 30-150 in. lbs
Torque Wrench, 150-750 in. lbs

Materials:
Wiping Rags (Cl)
Lockwire (C4)
Anti-seize Compound (C19)

Personnel Required:
686 Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

CAUTION

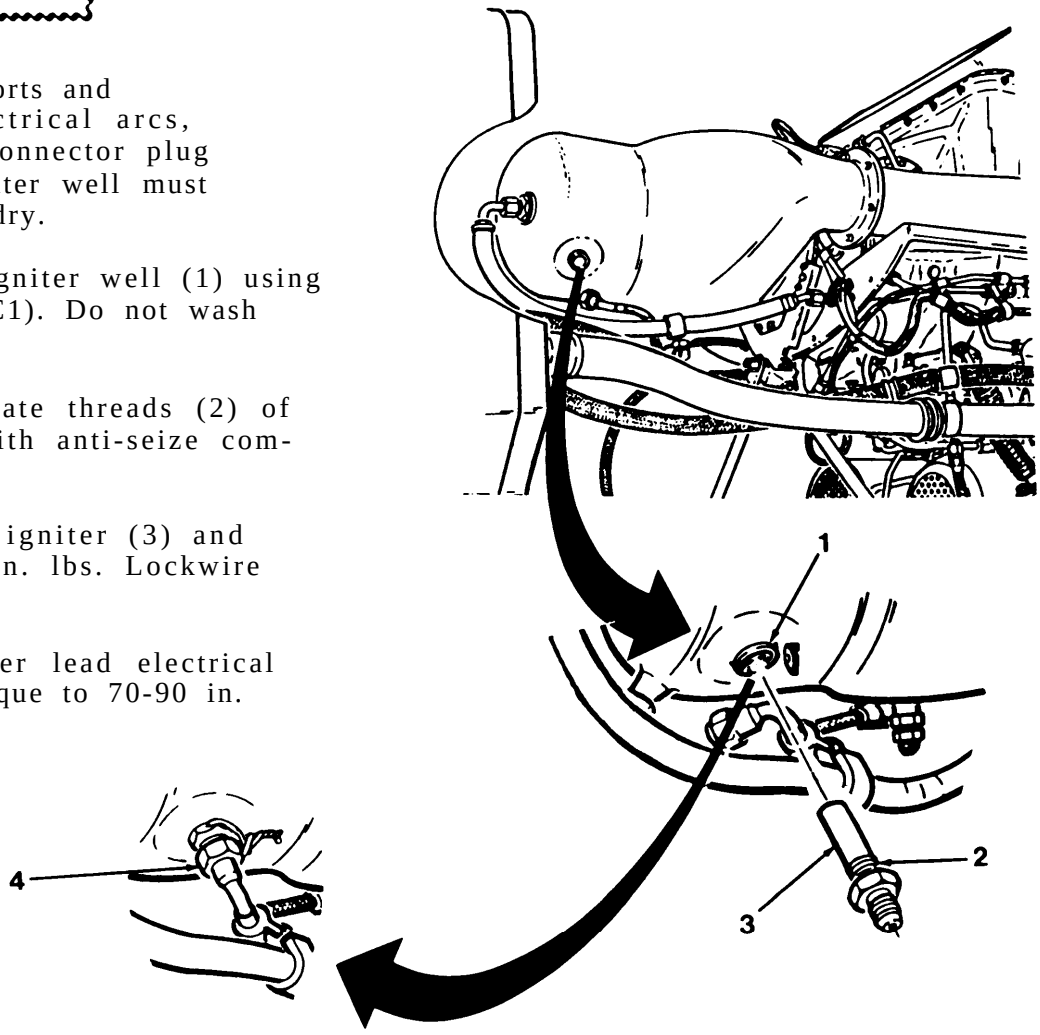
To prevent shorts and irregular electrical arcs, igniter lead connector plug and spark igniter well must be clean and dry.

1. Clean spark igniter well (1) using clean wiping rags (C1). Do not wash with solvent.

2. Lightly lubricate threads (2) of spark igniter (3) with anti-seize compound (C19).

3. Install spark igniter (3) and torque to 150-200 in. lbs. Lockwire (C4).

4. Connect igniter lead electrical connector (4). Torque to 70-90 in. lbs.



INSPECT

END OF TASK

Section V IGNITER LEAD

This section Includes maintenance procedures for removal, testing, and installation of igniter lead.

LIST OF TASKS

8-5-1. REMOVE IGNITER LEAD

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

WARNING

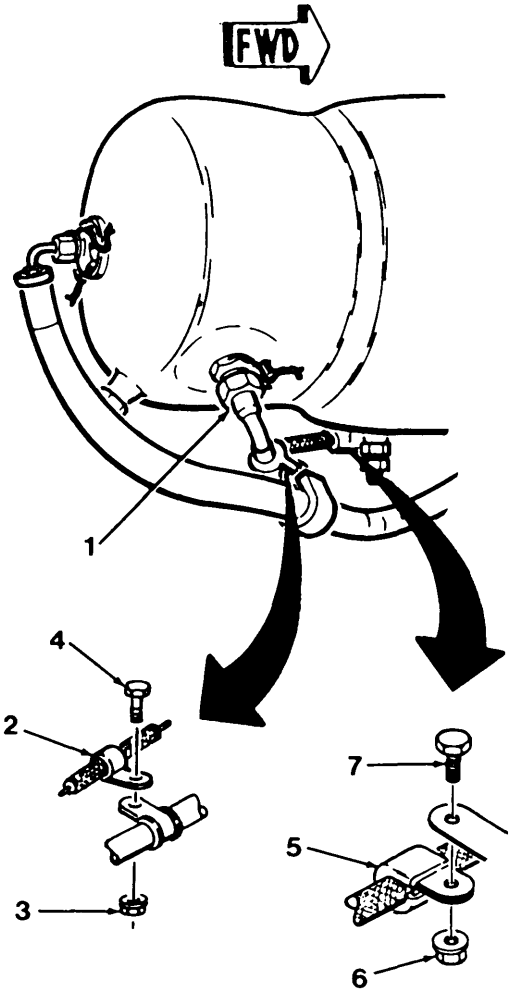
High voltage may be present at the igniter lead. Ensure that the ignition system has been off for at least five minutes before disconnecting the lead.

1. Disconnect connector plug (l).

2. Ground connector plug (1) to the engine using an Insulated screwdriver to dissipate any energy stored in the exciter.

3. Remove clamp (2) by removing nut (3) and bolt (4).

4. Remove clamp (5) by removing nut (6) and bolt (7).



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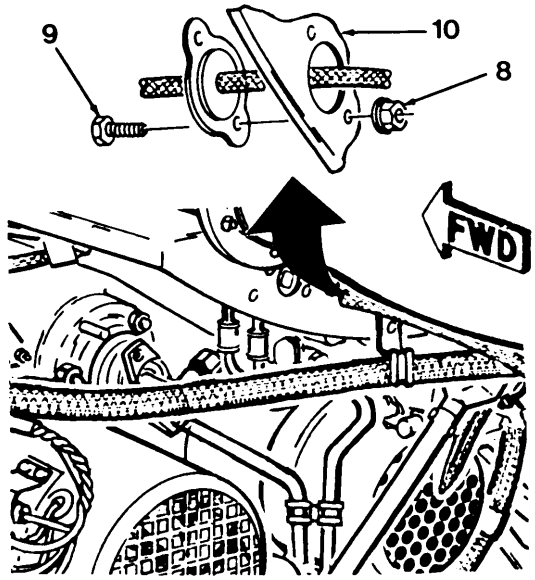
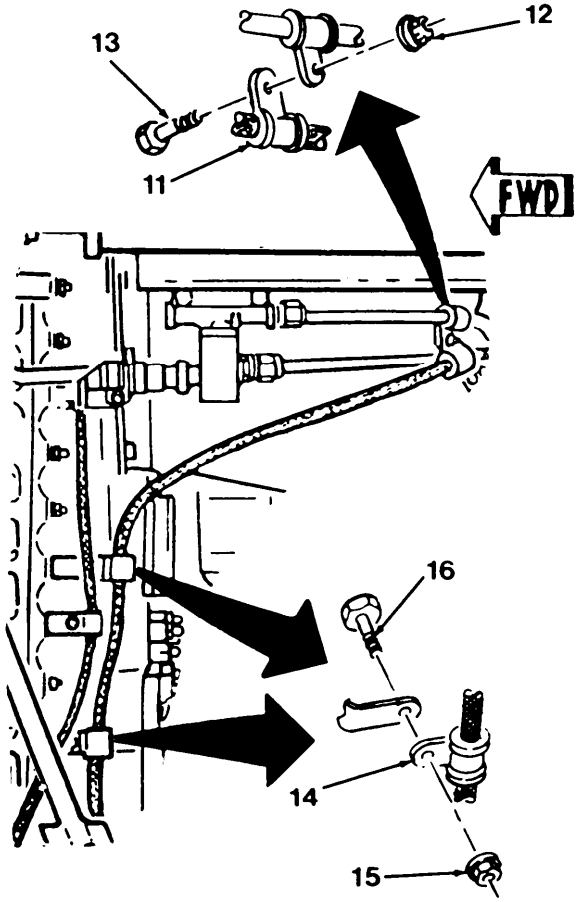
8-5-1. REMOVE IGNITER LEAD (CONT)

5. On left side of engine, remove two nuts (8) and bolts (9) from firewall shield (10).



6 Remove clamp (11) by removing nut (12) and bolt (13).

7. Remove two clamps (14) by removing nuts (15) and bolts (16).



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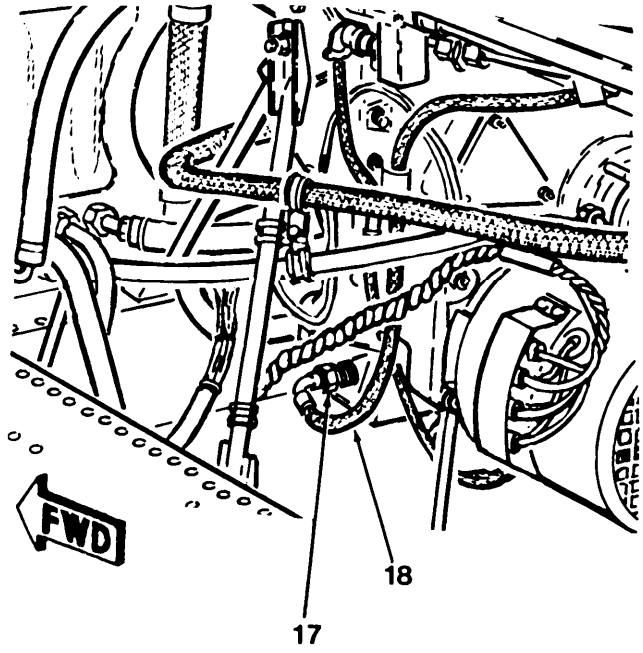
8-5-1. REMOVE IGNITER LEAD (CONT)

8. Disconnect connector plug (17); then remove igniter lead (18).



END OF TASK

8-5-2. TEST IGNITER LEAD

This task covers: Off Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
All

Tools:
Electrical Repairer Tool Kit
Multimeter

Materials:
Wiping Rags (C1)

Personnel Required:
68F Aircraft Electrician

Equipment Condition:
Igniter lead removed (task 8-5-1).

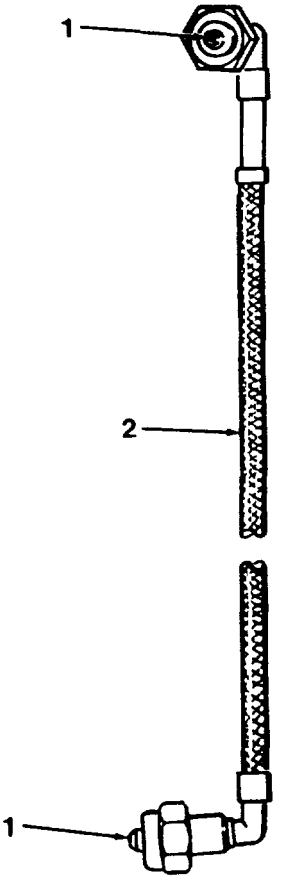
WARNING

Use caution when handling lead as broken wire strands could cause injury.

1. Clean igniter lead with dry wiping rag (C1).

2. Using multimeter, test center conductor (1) for continuity. There must be continuity.

3. Set multimeter to highest scale and test resistance from shielding (2) to conductor (1). Resistance must be a minimum of 2 meg ohms.



INSPECT

END OF TASK

8-5-3 . INSTALL IGNITER LEAD

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Material:
Lockwire (C4)

Personnel Required:
67S Helicopter Powerplant Repairer

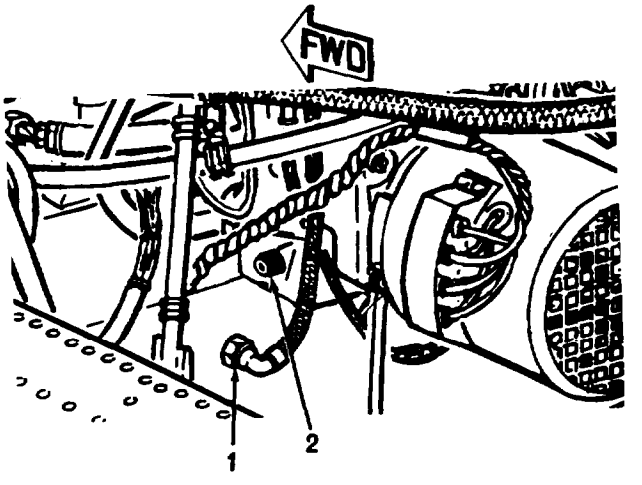
References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Battery disconnected.
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

WARNING

Allow at least five minutes after operation of ignition system before connecting or installing components. Failure to allow high voltage to dissipate can result in injury or death.

1. Connect connector plug (1) to ignition exciter (2) with elbow of connector plug (1) facing aft. Torque to 50-70 in. lbs.



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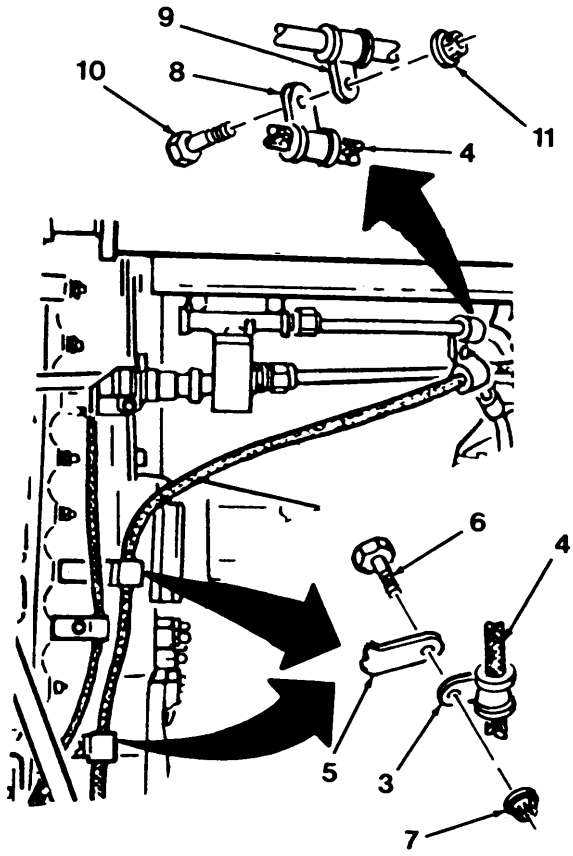
8-5-3. INSTALL IGNITER LEAD (CONT)

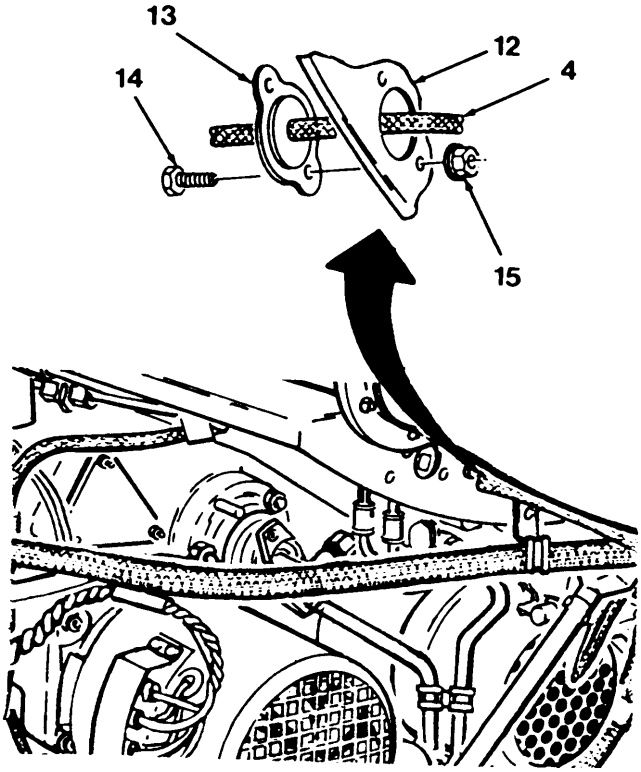
2. Install two clamps (3) on igniter lead (4). Secure to brackets (5) with bolts (6) and nuts (7).

3. Install clamp (8) on igniter lead (4). Secure to clamp (9) with bolt (10) and nut (11).



4. Insert igniter lead (4) through opening in fire wall flange (12).

5. Secure igniter lead mounting bracket (13) to firewall flange (12) with two bolts (14) and nuts (15).



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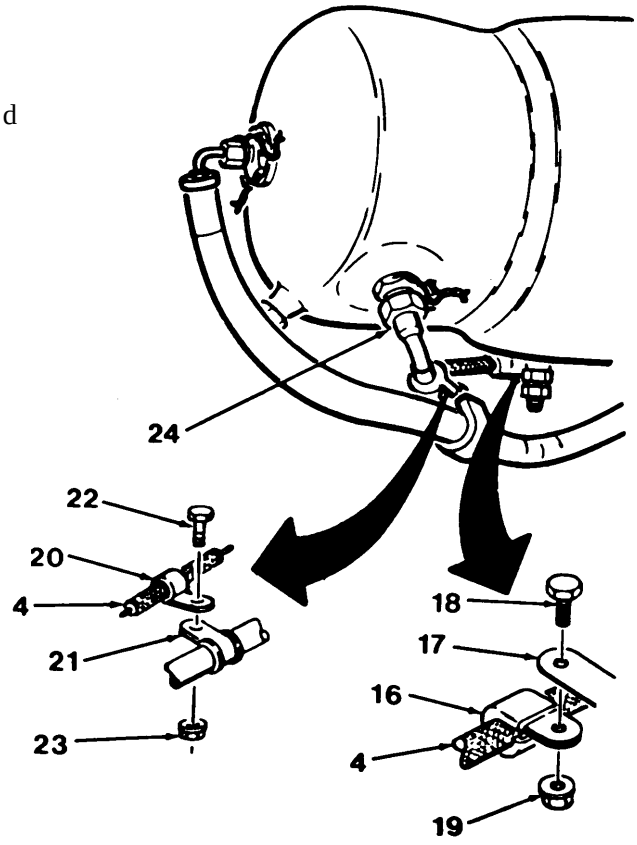
8-5-3. INSTALL IGNITER LEAD (CONT)

6. On right side of engine, Install clamp (16) on igniter lead (4) and secure to bracket (17) with bolt (18) and nut (19).

7. Install clamp (20) on igniter lead (4) and secure to clamp (21) with bolt (22) and nut (23).

8. Install connector plug (24) and torque to 70-90 in. lbs. Lockwire (C4).



INSPECT

END OF TASK

Section VI Ng SPEED PICKUP

This section includes maintenance procedures for testing, removal, and installation of Ng speed pickup.

LIST OF TASKS

8-6-1. TEST Ng SPEED PICKUP

INITIAL SETUP

Applicable Configurations:
All

Tools:
Electrical Repairer Tool Kit
Multimeter

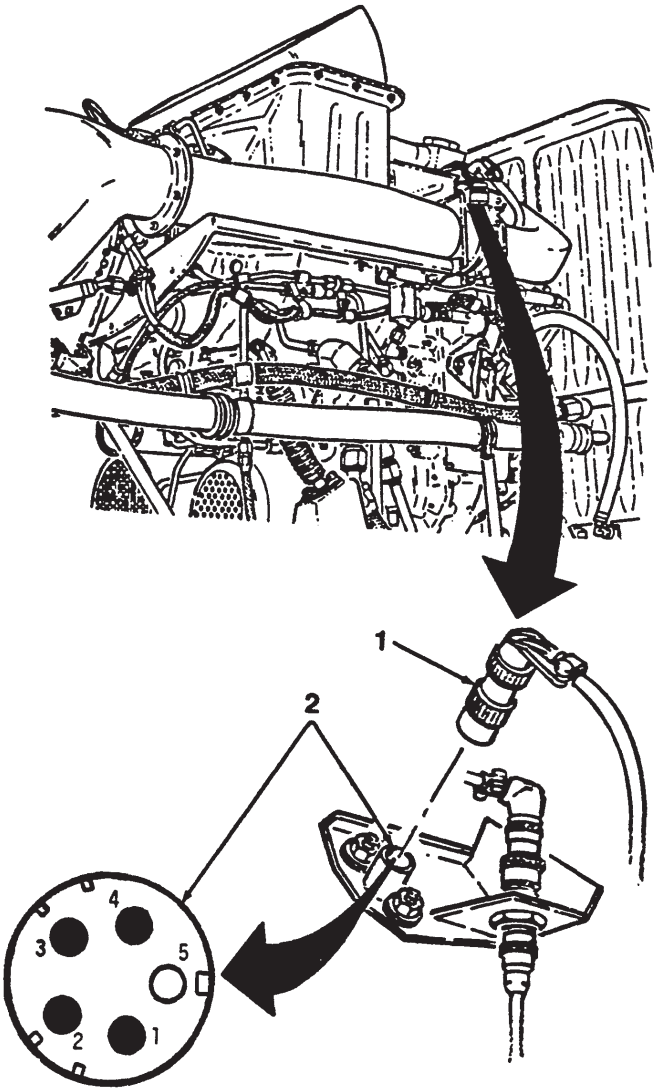
Material:
Lockwire (C4)

Personnel Required:
68F Aircraft Electrician

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Disconnect electrical connector (1).
2. Using multimeter set to applicable scale, test resistance between pins 1 and 2, or pins 3 and 4.
3. P/N 23003100 resistance shall be 2384 ohms maximum. P/N 23037757 resistance shall be 450 ohms maximum.
4. With multimeter set as in step 2, test resistance between pins 3 and 4.
5. P/N 23003100 resistance shall be 2384 ohms maximum. P/N 23037757 resistance shall be 450 ohms maximum.
6. Deleted.
7. Connect electrical connector (1).



INSPECT

END OF TASK

8-6-2. REMOVE Ng SPEED PICKUP

INITIAL SETUP

Applicable Configurations:
All

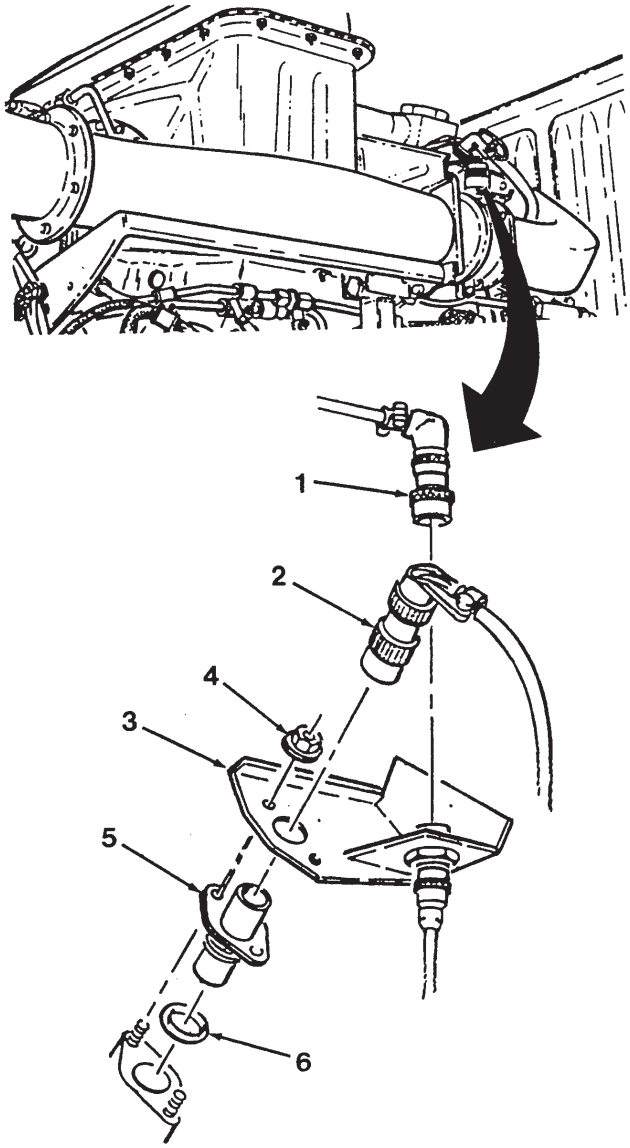
Tools:
Power Plant Tool Kit

Personnel Required:
688 Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Disconnect connector plugs (1) and (2).
2. Remove bracket (3) by removing two nuts (4).
3. Remove Ng speed pickup (5) and packing (6). Discard packing (6).



END OF TASK

8-6-3. INSTALL Ng SPEED PICKUP

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Petrolatum (C34)
Lockwire (C4)

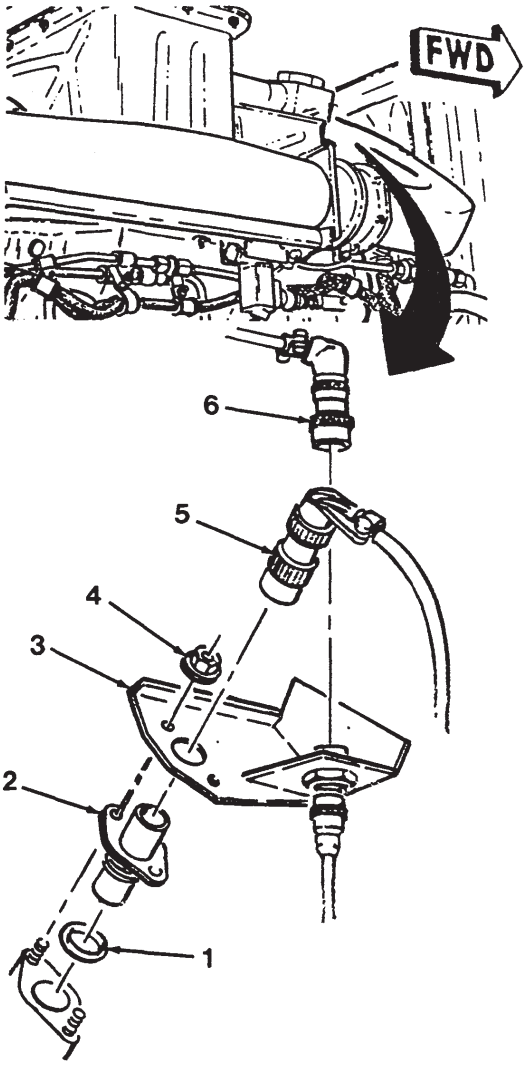
Parts:
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Lightly lubricate packing (1) with petrolatum (C34) and install on Ng speed pickup (2).
2. Install Ng speed pickup (2).
3. Install bracket (3) and secure with two nuts (4). Torque nuts (4) to 30-40 in. lbs.
4. Connect connector plugs (5) and (6).



INSPECT

END OF TASK

Section VII. Np SPEED PICKUP

This section includes maintenance procedures for testing, removal, and installation of Np speed pickup.

LIST OF TASKS

8-7-1. TEST Np SPEED PICKUP

INITIAL SETUP

Applicable Configurations:
All

Tools:
Electrical Repairer Tool Kit
Multimeter

Material:
Lockwire (C4)

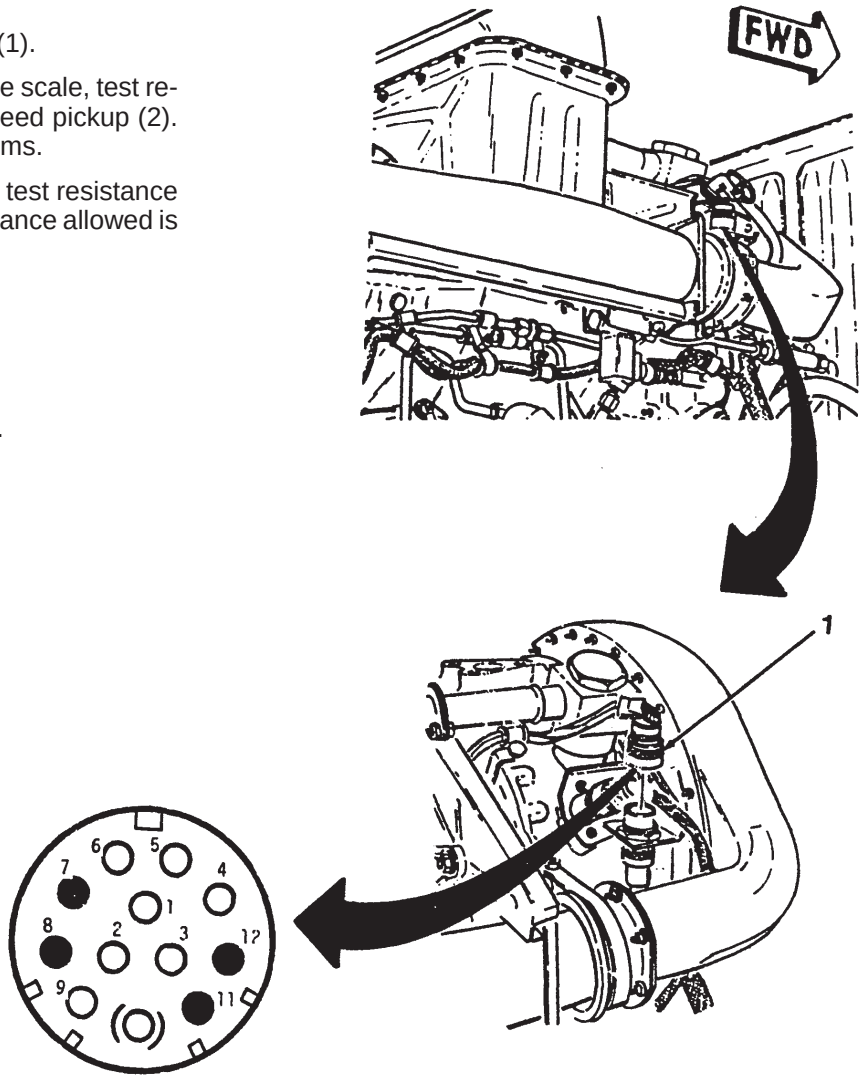
Personnel Required:
68F Aircraft Electrician

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Disconnect electrical connector (1).
2. Using multimeter set to applicable scale, test resistance between pins 7 and 8 of Np speed pickup (2). Maximum resistance allowed is 2090 ohms.
3. With multimeter set as in step 2, test resistance between pins 11 and 12. Maximum resistance allowed is 2090 ohms.
4. Deleted.
5. Deleted.
6. Deleted.
7. Connect electrical connector (1).

INSPECT



END OF TASK

8-7-2. REMOVE Np SPEED PICKUP

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

CAUTION

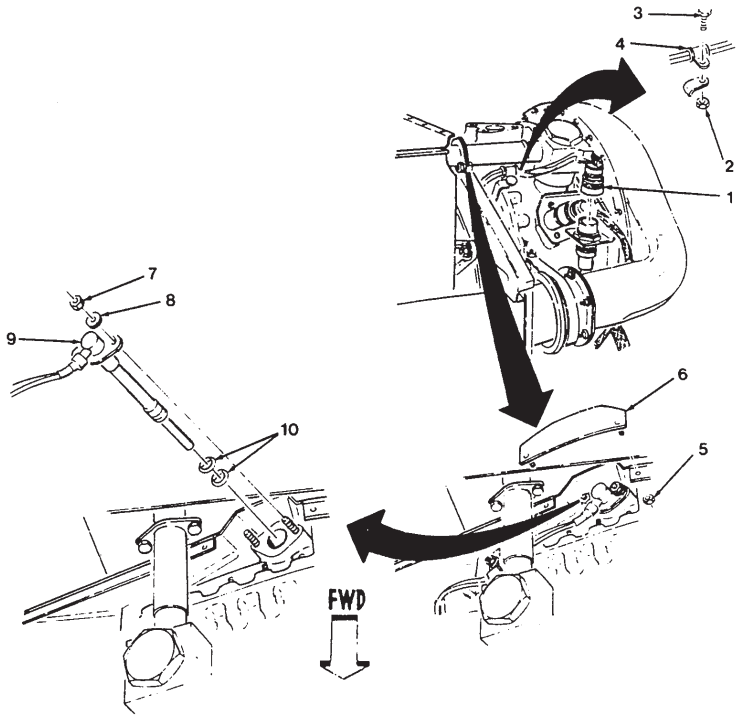
Do not disconnect connector plug with engine running. This could cause engine overspeed.

1. Disconnect connector plug (1).
2. Remove nut (2), bolt (3), and clamp (4).
3. Remove two nuts (5) and protective plate (6).
4. Remove two nuts (7) and washers (8).

CAUTION

Do not apply pressure to wiring attached to pickup. Pressure on wiring may cause pickup failure and lead to overspeed.

5. Remove magnetic Np pickup (9) and two packings (10). Discard packings (10).



END OF TASK

8-7-3. INSTALL Np SPEED PICKUP

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 0-30 in. lbs

Materials:
Petrolatum (C34)
Lockwire (C4)

Parts:
Packings

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Lubricate two packings (1) with petrolatum (C34); then install on magnetic Np pickup (2).

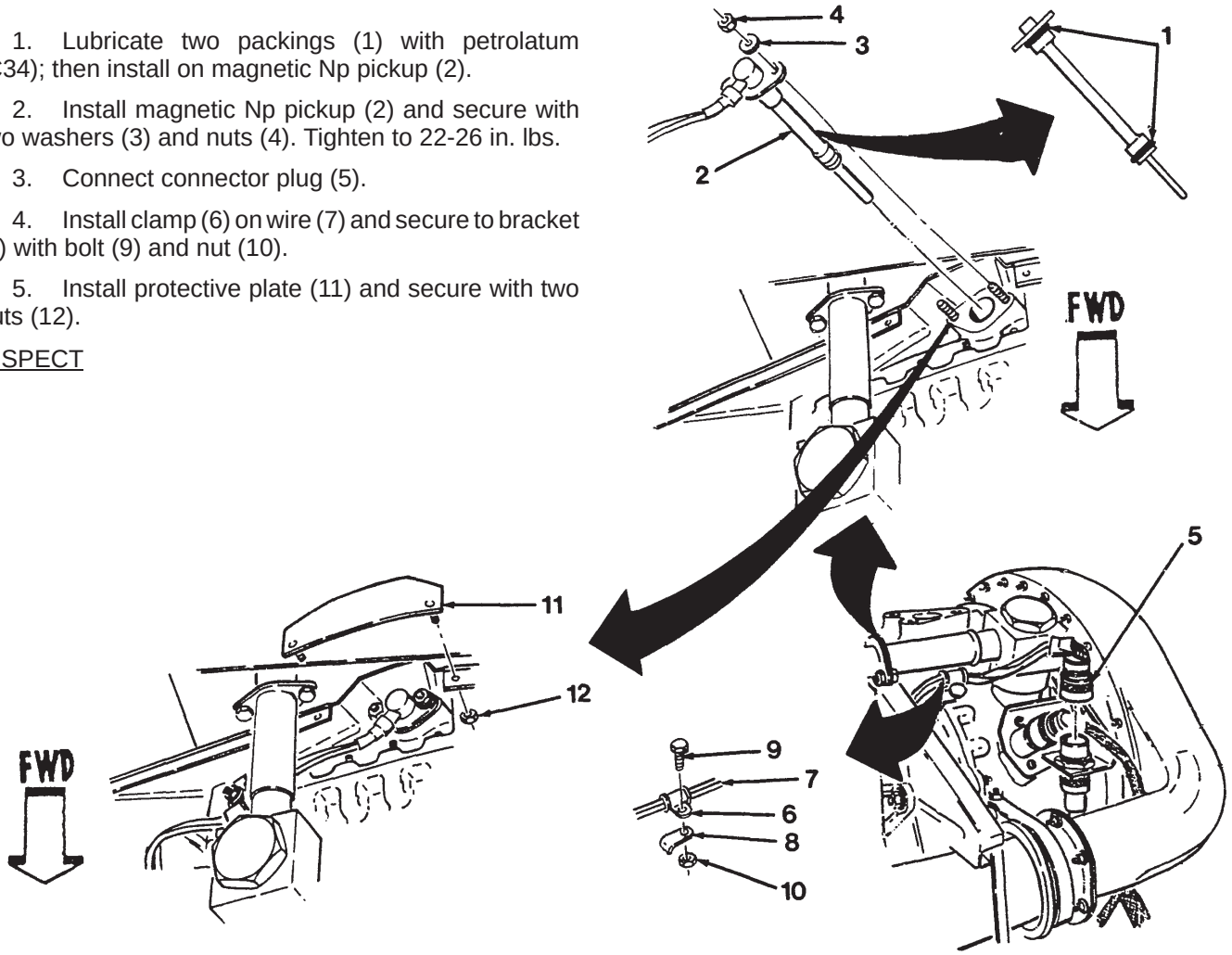
2. Install magnetic Np pickup (2) and secure with two washers (3) and nuts (4). Tighten to 22-26 in. lbs.

3. Connect connector plug (5).

4. Install clamp (6) on wire (7) and secure to bracket (8) with bolt (9) and nut (10).

5. Install protective plate (11) and secure with two nuts (12).

INSPECT



END OF TASK

Section VIII START COUNTER

This section Includes maintenance procedures for inspection, removal, and installation of start counter.

LIST OF TASKS

8-8-1. INSPECT START COUNTER

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
All

References:
TM 55-1520-248-23

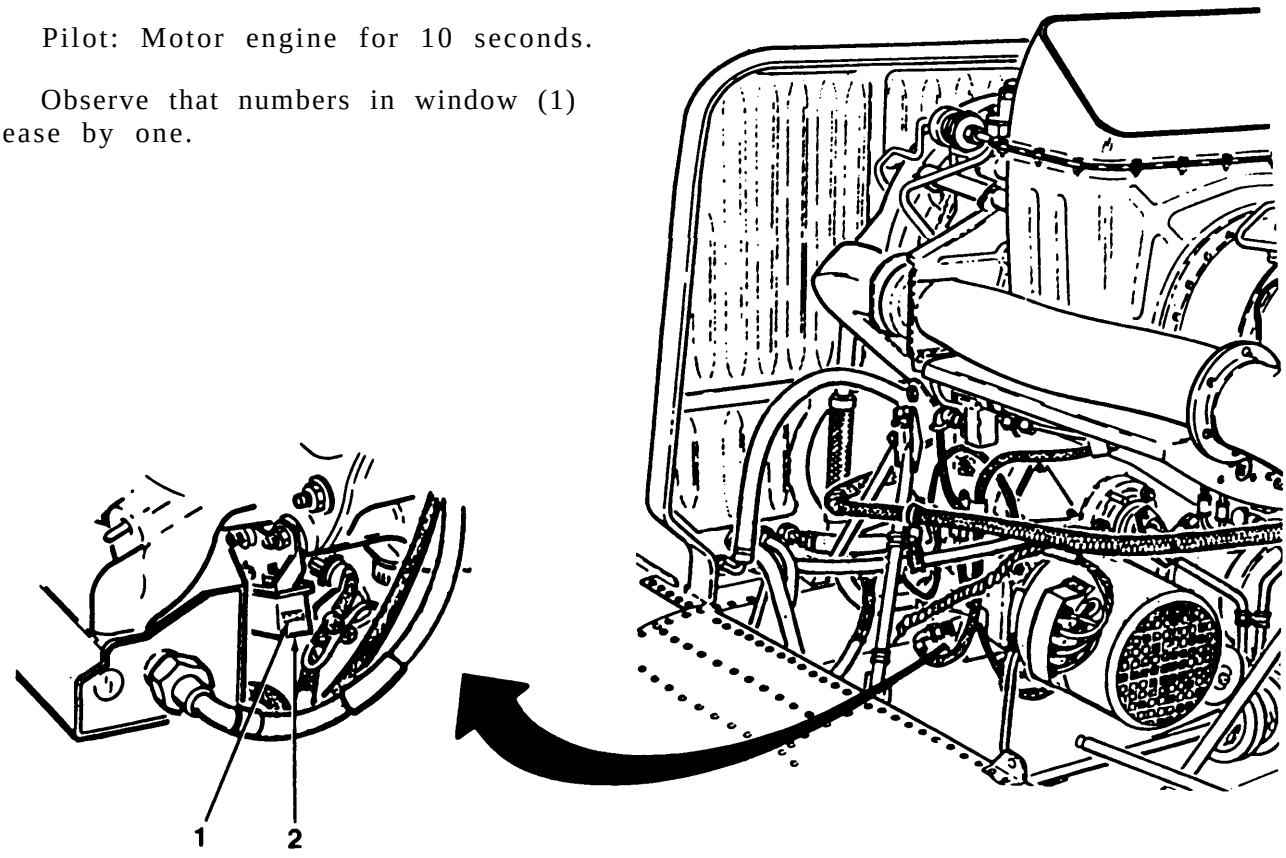
Personnel Required:
688 Aircraft Powerplant Repairer
Pilot

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

1. Observe window (1) on start counter (2).

2. Pilot: Motor engine for 10 seconds.

3. Observe that numbers in window (1) increase by one.



END OF TASK

8-8-2. REMOVE START COUNTER

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Battery disconnected.
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Displace rubber nipple (l); then remove nut (2), washer (3), and terminal lug (4) from ignition exciter (5).

2. Remove bolt (6), washer (7), and terminal lug (8).

3. Remove start counter (9) by removing two nuts (10), two washers (11), and gasket (12). Discard gasket (12).

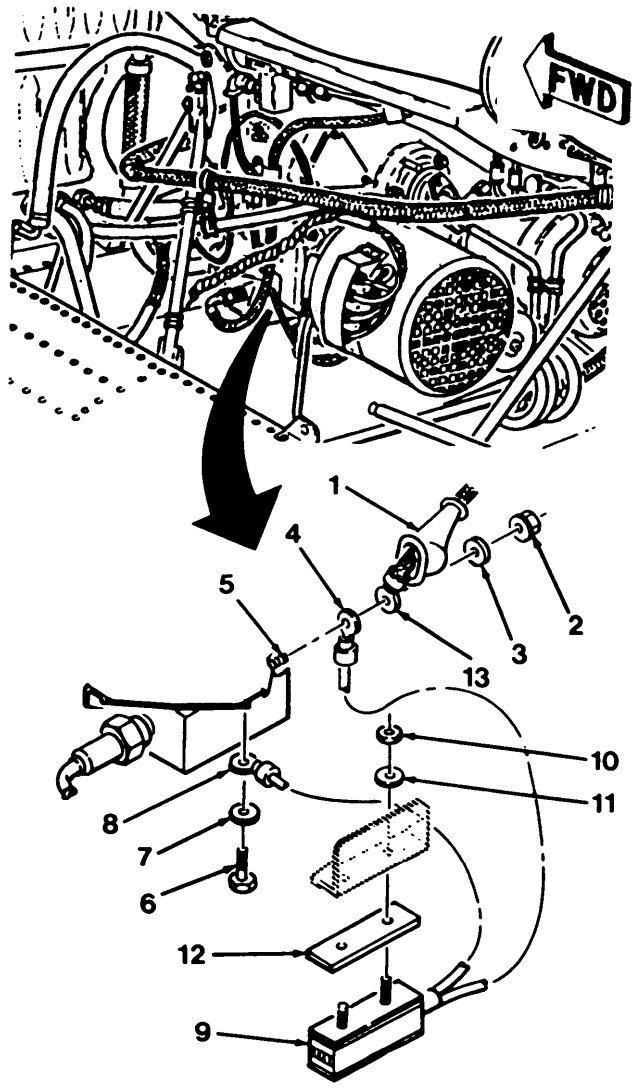
NOTE

Engine may be operated with start counter removed if steps 4 and 5 are completed. If removed, all starts shall be recorded in helicopter log book. Do not complete steps 4 and 5 at this time if start counter will be replaced. Follow procedure in task 8-8-3.

4. Make sure terminal lug (13) is installed; then install washer (3) and nut (2).

5. Install washer (7) and bolt (6). Torque to 30-40 in lbs.

INSPECT



END OF TASK

8-8-3. INSTALL START COUNTER

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 0-30 in. lbs
Torque Wrench 30-150 in. lbs

Parts:
Gasket

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

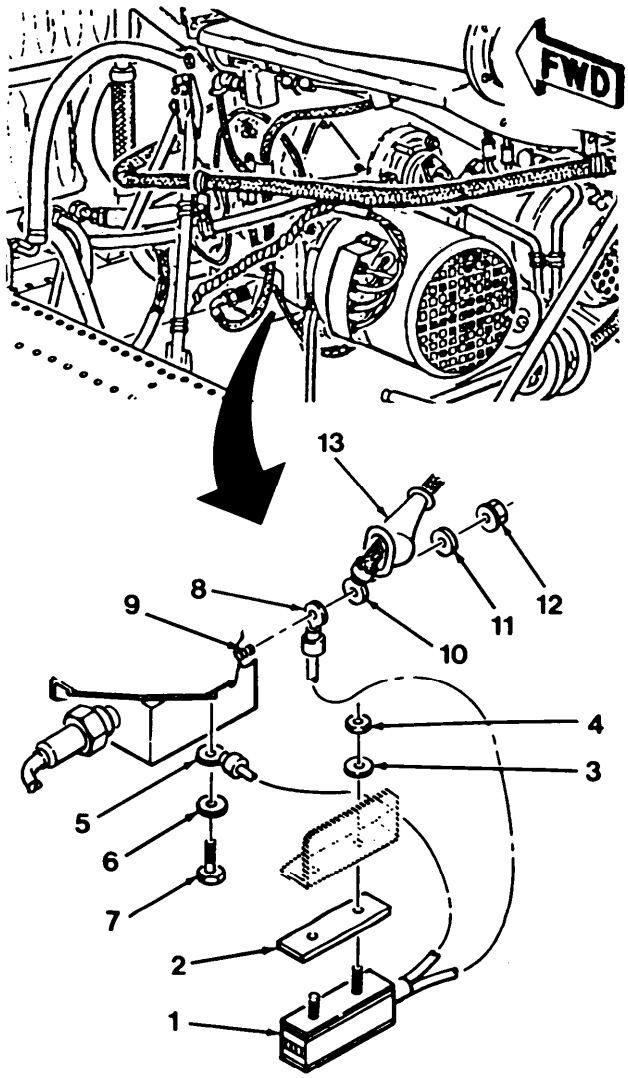
Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Battery disconnected.
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Install start counter (1) new gasket (2). Secure with two washers (3) and nuts (4). Torque to 5-8 in. lbs.

2. If installed, remove bolt (7) and washer (6).

3. Install terminal lug (5) and secure with washer (6) and bolt (7). Torque to 30-40 in. lbs.

4. Instal1 terminal lug (8) on ignition exciter (9); then install terminal lug (10) and secure with washer (11) and nut (12). Cover with rubber nipple (13).



INSPECT

END OF TASK

CHAPTER 9
AIR SYSTEM

Section I GENERAL INSTRUCTIONS

This section includes maintenance procedures for inspection testing of the air system.

LIST OF TASKS

9-1-1. INSPECT ANTI-ICE SYSTEM FOR AIR LEAKAGE

This task covers: On Helicopter Inspection

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Hand Oiler

Materials:
Wiping Rags (Cl)
Liquid Leak Detector (C2)

Personnel Required:
68B Aircraft Powerplant Repairer
Pilot

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

General Safety Instructions:

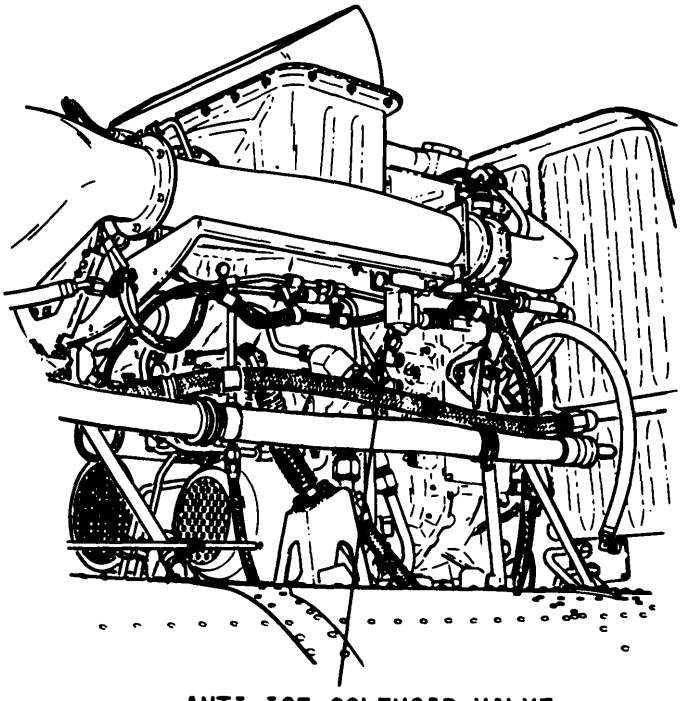
WARNING

Avoid contact with anti-ice air coming from vent of anti-ice solenoid valve. This air is hot enough to cause severe burns.

WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

1. Pilot: Operate engine at ground idle and set anti-ice switch ON.



ANTI-ICE SOLENOID VALVE

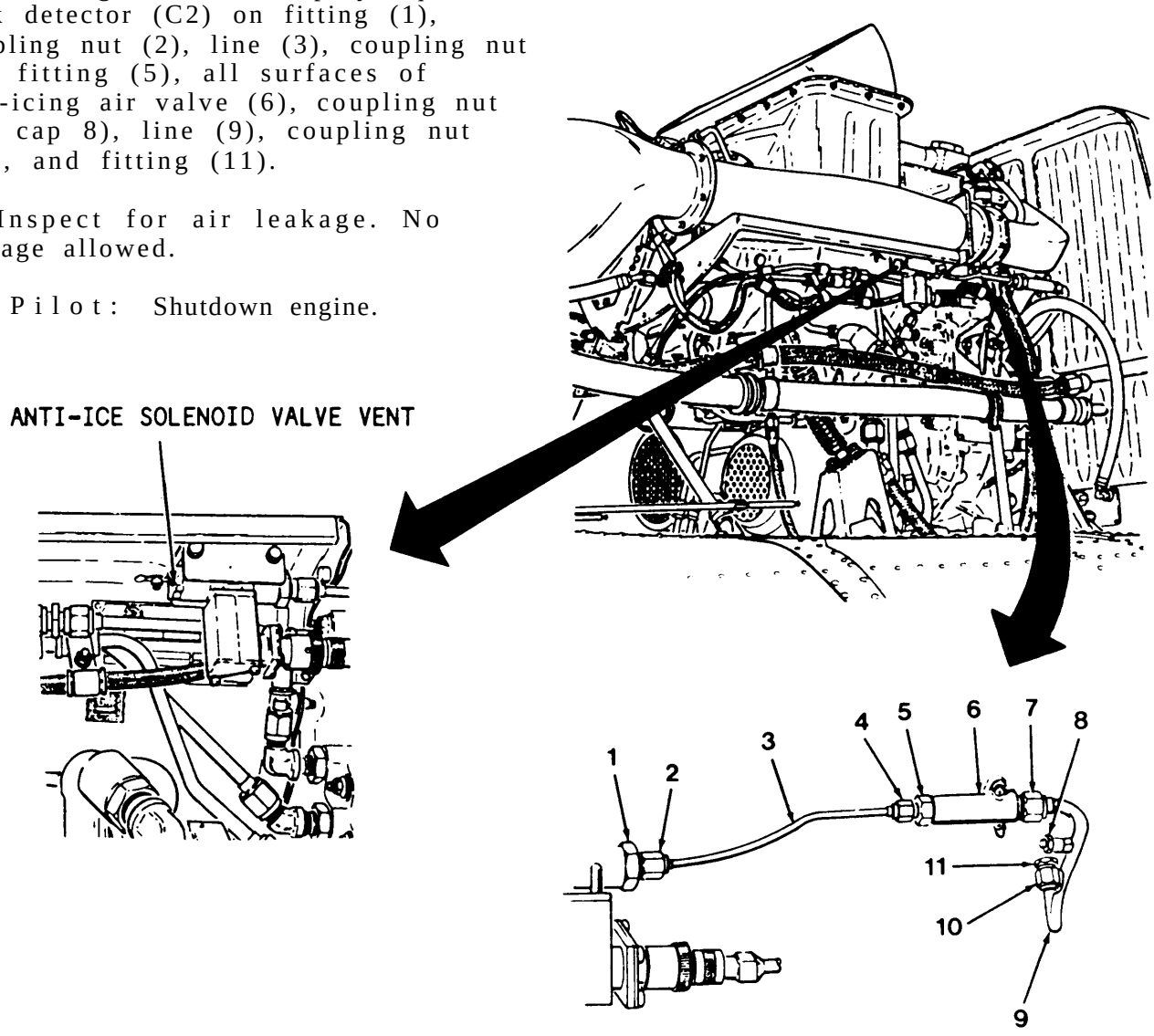
GO TO NEXT PAGE

9-1-1. INSPECT ANTI-ICE SYSTEM FOR AIR LEAKAGE (CONT)

2. Using hand oiler, spray liquid leak detector (C2) on fitting (1), coupling nut (2), line (3), coupling nut (4), fitting (5), all surfaces of anti-icing air valve (6), coupling nut (7), cap 8), line (9), coupling nut (10), and fitting (11).

3. Inspect for air leakage. No leakage allowed.

4. Pilot: Shutdown engine.



END OF TASK

9-1-2. TEST ANTI-ICE SYSTEM

This task covers: On Helicopter Testing

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Multimeter

Personnel Required:
68B Aircraft Powerplant Repairer
68F Aircraft Electrician
Pilot

References:
TM 55-1520-248-23

Equipment Condition:
Engine access panels open/cowling removed (TM 55-1520-248-23).

General Safety Instructions:

WARNING

Noise levels reached during ground runup of Army aircraft are of a level that may cause permanent hearing loss. Maintenance personnel shall wear adequate hearing protection when working on aircraft with engines in operation.

1. Pilot: Operate engine at flight idle.

2. Pilot: Set Np at 100% and collective lever at flat pitch.

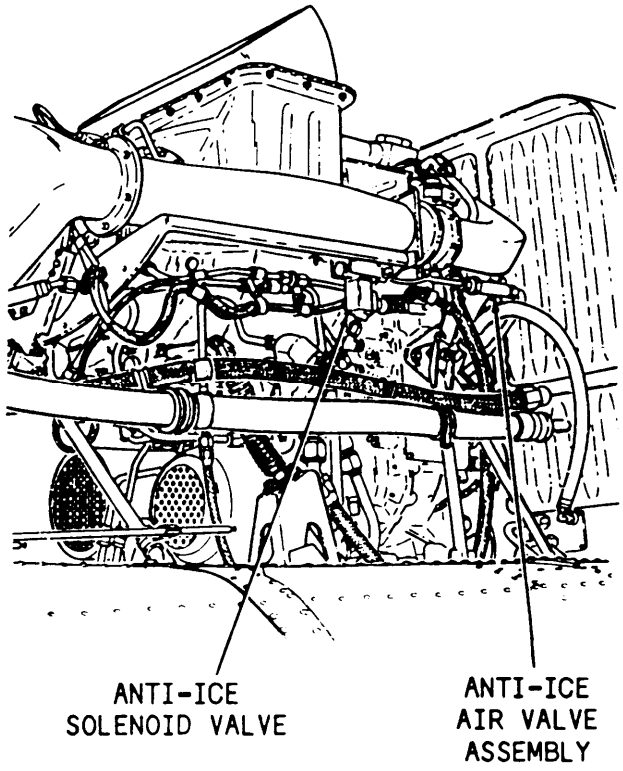
3. Observe TGT indicator.

4. Pilot: Set anti-ice switch ON

NOTE

In step 5, a 10 degree C rise in TGT is based on a standard day and will vary with temperature and altitude changes. TGT increase/decrease will be slightly different, but immediate and definite.

5. Observe that TGT increases 10 degrees C.



GO TO NEXT PAGE

9-1-2. TEST ANTI-ICE SYSTEM (CONT)

6. Pilot: Set anti-ice switch OFF.

7. Observe that TGT decreases 10 degrees C.

8. Pilot: Shutdown engine.

9. If system fails to operate properly, disconnect connector plug (l).

10. Connect multimeter positive (+) probe to pin 1 of connector plug (l), and negative (-) probe to pin 2.

NOTE

System is acceptable if voltage reading in step 11 is 14 to 28 VDC.

11. Test for voltage to connector plug (1) by setting battery switch ON and anti-ice switch OFF (TM 55-1520-248-23). Multimeter must indicate battery voltage.

12. Set anti-ice switch ON. Multimeter shall not indicate any voltage. Set battery switch and anti-ice switches OFF (TM 55-1520-248-23).

13. Remove multimeter probes; then connect connector plug (l).

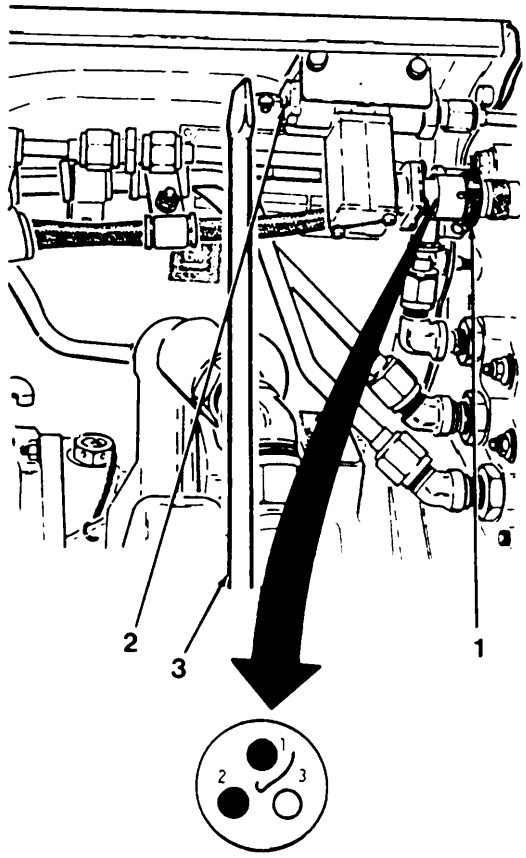
14. Pilot: Operate engine.

15. Pilot: Set anti-ice switch ON.

WARNING

Avoid contact with anti-ice air coming from vent of anti-ice solenoid valve. This air is hot enough to cause severe burns.

16. Using a flat tip screwdriver (3), place tip near vent (2). There shall be a steady stream of air pressure coming from vent (2).



17. Pilot: Set anti-ice switch OFF.

18. Place tip of screwdriver (3) near vent (2). Observe that no air pressure comes from vent (2).

END OF TASK

Section II ANTI-ICE SOLENOID VALVE

This section includes maintenance procedures for removal and installation of anti-ice solenoid valve.

LIST OF TASKS

9-2-1. REMOVE ANTI-ICE SOLENOID VALVE

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

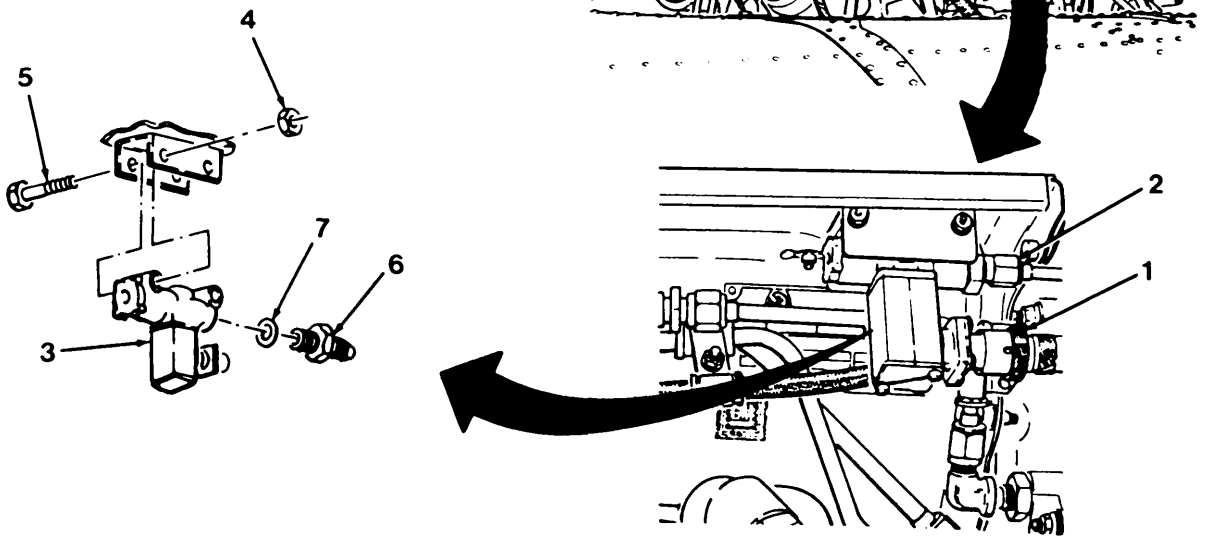
Equipment Condtion:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Disconnect connector plug (l).

2. Disconnect coupling nut (2).

3. Remove anti-ice solenoid valve (3) by removing two nuts (4) and bolts (5).

4. If valve is to be replaced, remove fitting (6) and packing (7). Discard packing (7).



END OF TASK

9-2-2. INSTALL ANTI-ICE SOLENOID VALVE

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Petrolatum (C34)

Parts:
Packing

Personnel Required:
68B Aircraft Powerplant Repairer
66S Inspector

References:
TM 55-1520-248-23

Equipment Condtion:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

NOTE

If required by maintenance action, begin with step 1. If not, begin with step 3.

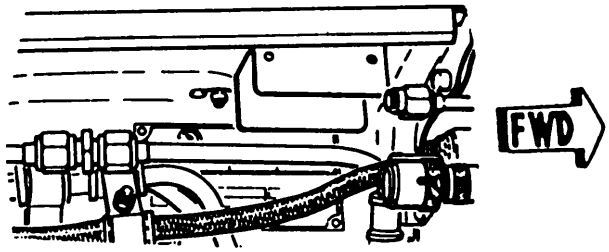
1. Lubricate new packing (1) with petrolatum (C34); then install packing (1) on fitting (2).

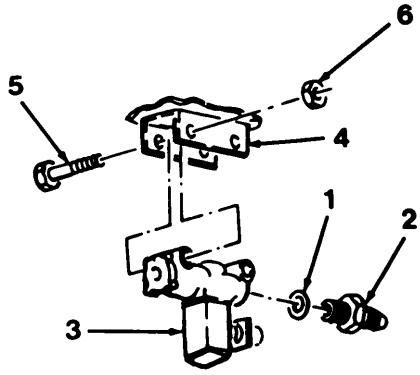
2. Install fitting (2) on anti-ice solenoid valve (3).

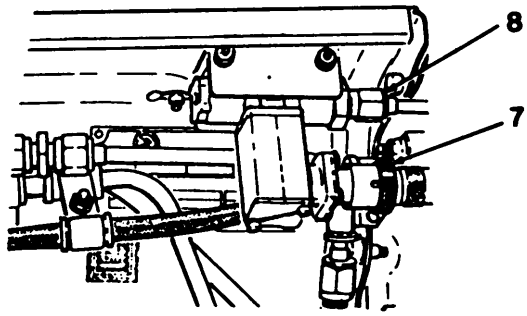
3. Install anti-ice solenoid valve (3) in mounting bracket (4) and secure with two bolts (5) and nuts (6). Torque to 35-40 in. lbs.

4. Connect connector plug (7).

5. Connect coupling nut (8) and torque to 65-100 in. lbs.







INSPECT

FOLLOW ON MAINTENANCE:
Inspect anti-ice system for air leaks (task 9-1-1).

Test anti-ice system (task 9-1-2).

END OF TASK

Section III ANTI-ICING AIR VALVE ASSEMBLY

This section includes maintenance procedures for removal and installation of anti-icing air valve.

LIST OF TASKS

9-3-1. REMOVE ANTI-ICING AIR VALVE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
Al1

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

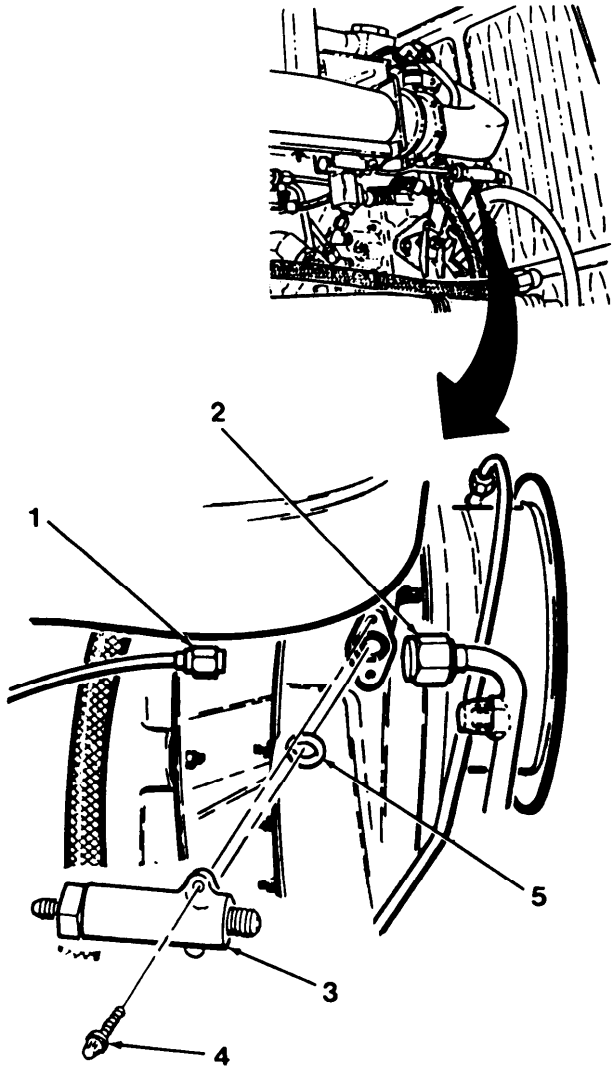
References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

1. Disconnect coupling nuts (1) and (2).

2. Remove anti-icing air valve (3) by removing lockwire and two bolts (4).

3. Remove and discard metal packing (5).



END OF TASK

9-3-2. INSTALL ANTI-ICING AIR VALVE ASSEMBLY

INITIAL SETUP

Applicable Configurations:
All

Tools:
Power Plant Tool Kit
Torque Wrench 0-30 in. lbs
Torque Wrench 30-150 in. lbs
Torque Wrench 150-750 in. lbs
11/16-in. Crow Foot Adapter Wrench

Materials:
Lockwire (C4)
Anti-seize Compound (C19)

Parts:
Metal Packing

Personnel Required:
686 Aircraft Powerplant Repairer
67S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

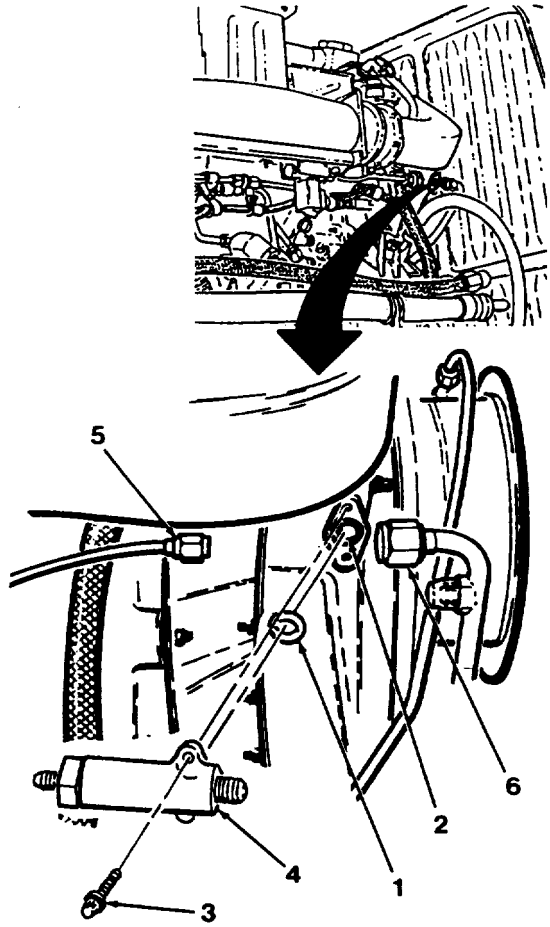
1. Install new metal packing (1) on packing seat around opening (2).

2. Apply anti-seize compound (C19) to threads of two bolts (3).

3. Install anti-icing air valve assembly (4) and secure with two bolts (3). Torque to 17-20 in. lbs and lockwire (C4).

4. Connect coupling nut (5) and torque to 65-100 in. lbs.

5. Connect coupling nut (6) and torque to 150-200 in. lbs using 11/16-in. crow foot adapter wrench.



INSPECT

FOLLOW ON MAINTENANCE:
Inspect anti-ice system for air leaks (task 9-1-1).

Test anti-ice system (task 9-1-2).

END OF TASK

Section IV COMPRESSOR BLEED VALVE ASSEMBLY

This section includes maintenance procedures for removal and installation of compressor bleed valve.

LIST OF TASKS

9-4-1. REMOVE COMPRESSOR BLEED VALVE

INITIAL SETUP

Applicable Configuration:
T703-AD-700B

Tools:
Power Plant Tool Kit

Personnel Required:
68B Aircraft Powerplant Repairer

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted in engine turnover stand (task 1-5-5).

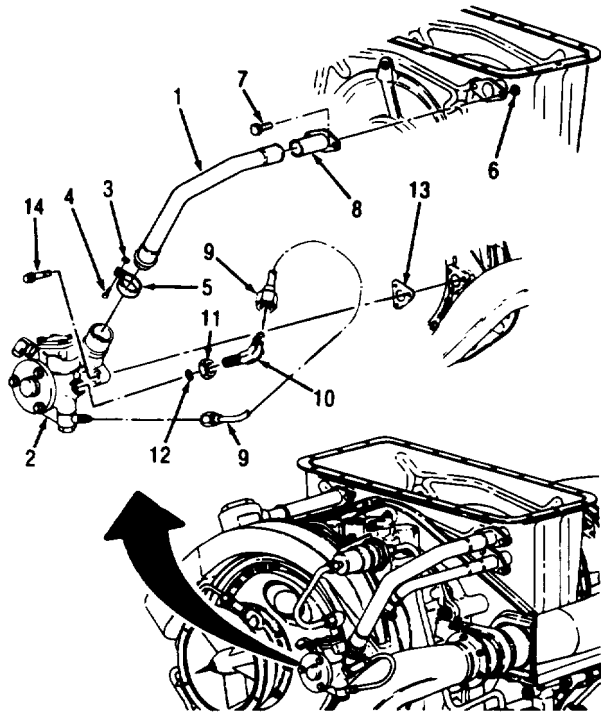
1. Remove bleed valve-to-exhaust collector tube (1) from the bleed valve (2) by removing nut (3), bolt (4), and clamp (5). Remove the tube (1) from the exhaust collector by removing nuts (6), bolts (7), and adapter (8).

2. Remove jumper tube (9), elbow (10), jam nut (11), and packing (12) from bleed valve (2).

3. Remove lockwire, then remove bleed valve (2) and gasket (13) by removing three bolts (14).

NOTE

If bleed valve is being replaced with new valve, transfer the jumper tube and elbow from old valve to replacement valve.



END OF TASK

9-4-2 . INSTALL COMPRESSOR BLEED VALVE

INITIAL SETUP

Applicable Configuration: T703-AD-700B

Tools:
Power Plant Tool Kit
Torque Wrench 30-150 in. lbs

Materials:
Lockwire (C4)
Anti-seize Compound (C19)

Parts: Gasket

Personnel Required:
68B Aircraft Powerplant Repairer
67S Inspector

References:
TM 55-1520-248-23

Equipment Condition:
On Helicopter: Engine access panels open/cowling removed (TM 55-1520-248-23).
Off Helicopter: Engine mounted In engine turnover stand (task 1-5-5).

WARNING

Failure to properly Install, align, and torque air fittings could result in engine failure.

NOTE

If bleed valve is being replaced with new valve, transfer the jumper tube and elbow from old valve to replacement valve.

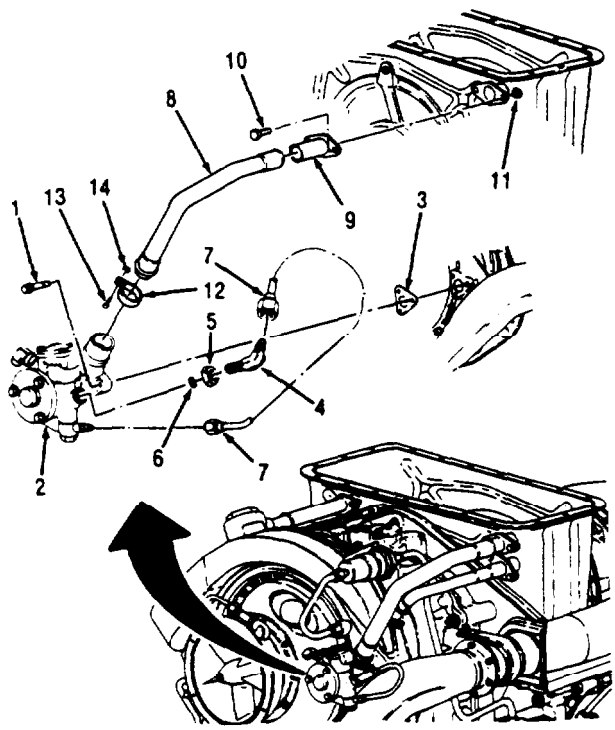
1. Apply anti-seize compound (C19) to threads of three bolts (1).

2. Install bleed valve (2) and gasket (3) to pad on left side of compressor scroll and secure with three bolts (1).. Torque to 35-40 in. lbs and lockwire (C4).

3. Install elbow (4), jam nut (5), and packing (6) to bleed valve (2). Torque jam nut to 50-75 in. lbs. Install jumper tube (7) to bleed valve. Torque tube coupling nuts to 65-100 in lbs.

4. Install bleed valve-to-exhaust collector tube (8) to exhaust collector by securing with adapter (9), bolts (10), and nuts (11). Torque nuts to 35-40 in. lbs.

5. Install tube (8) to bleed valve (2) by securing with clamp (12), bolt (13), and nut (14).



INSPECT

END OF TASK

APPENDIX A

REFERENCES

A-1. FORMS AND PUBLICATIONS

a.	AR 95-1	Aviation General Provisions and Flight Regulations
b.	AS 478	Identification Marking Methods
c.	DA Form 2404	Equipment Inspection and Maintenance Workout
d.	DA Form 2407	Maintenance Request
e.	DA Form 2028-2	Recommended Changes to DA Publications
f.	FM 21-11	Artificial Respiration Manual
g.	FM 55-411	Maintenance, QA, and Technical Inspection Guide for Army A/C
h.	MIL-STD-129	Marking for Shipment and Storage
i.	DA PAM 738-751	Functional Users/Manual for the Army Maintenance Management System - Aviation (TAMMS-A)
j.	SF 368	Quality Deficiency Report
k.	TB-55-1500-300-25	Aircraft Component Replacement and Reuse Procedures
1.	TB 55-1500-301-25	Army Aircraft Preventive Maintenance Inspection System
m.	TB 43-0108	Test Flights and Maintenance Operational Check for Army Aircraft
n.	TB 43-0106	Handling, Storage and Disposal of Army Aircraft Components Containing Radioactive Materials
o.	TB 55-6650-300-15	Spectrometric Oil Analysis
p.	TB 55-8100-200-24	Maintenance of Specialized Reuseable Containers for Aircraft Equipment
q.	TB 55-9150-200-24	Engine and Transmission Oils, Fuels, and Additives for Army Aircraft
r.	TB 750-126	Use of Material Condition Tags and Labels on Army Aeronautical and Air Delivery Equipment
s.	TM 9-237	Welding Techniques
t.	TM 43-0103	Dye Penetrant Inspections

A-1. FORMS AND PUBLICATIONS (CONT)

u.	TM 55-406	Fundamentals of Aircraft Powerplant Maintenance
v.	TM 55-1500-204-25/1	General Aircraft Maintenance Manual
w.	TM 55-4920-243-15	Operator, Organizationl, DS, GS, and Depot Maintenance Manual: Vibration Monitoring Kit
x.	TM 55-4920-401-13&P	Tester, Exhaust Gas Temperature, Model BH 112JB53
y.	TM 55-4920-328-13-1 TM 55-4920-328-13-2	Modular Engine Test Systems Maintenance Modular Engine Test Systems Maintenance
z.	TM 750-244-1-5	Procedures for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command)
aa.	TM 55-1500-333-24	Cleaning Procedures for Army Aircraft
ab.	TM 55-1500-323-25	Installation Practices for Aircraft Electric and Electronic Wiring

A-2. OH-58D PROGRAM PUBLICAT10NS

Helicopter Manuals

a.	TM 55-1520-248-10	Operator's Flight Manual
b.	TM 55-1520-248-CL	Operator/Crewmember's Checklist
c.	TM 55-1520-248-PMD	Preventive Maintenance Dally Manual
d.	TM 55-1520-248-PM	Phased Maintenance Checklist
e.	TM 55-1520-248-MTF	Maintenance Test Flight Manual
f.	TM 55-1520-248-S	Preparation for Shipment of Army Aircraft
g.	TM 55-1520-248-23	AVUM/AVIM Maintenance Manual - Airframe
h.	TM 55-1520-248-23P	Repair Parts and Special Tools List (RPSTL)

Avionics Configuration Manual

i.	TM 11-1520-248-23	AVUM/AVIM Maintenance Manual - Avionics Configuration
j.	TM 11-1520-248-23P	Repair Parts and Special Tools List (RPSTL)

A-2 OH-58D PROGRAM PUBLICATIONS (CONT)

Mast Mounted Sight System (MMSS) Manuals

k.	TM 9-1240-778-20	AVUM Maintenance Manual, MMSS
1.	TM 9-1240-778-30	AVIM Maintenance Manual, MMSS
m.	TM 9-4935-780-13	Operator, AVUM/AVIM Manual, Combined MMS/CDS Equipment (TSS)

Engine Manuals

n.	TM 55-2840-256-23P	AVUM/AVIM Maintenance Repair Parts and Special Tools List (Engine)
o.	TM 55-248-XXX-13&P	Electronic Supervisory Control Test Set, Operator and AVIM Maintenance with RPSTL

APPENDIX B

MAINTENANCE ALLOCATION CHART (MAC)

Section I INTRODUCTION

B-1. MAINTENANCE ALLOCATION CHART

a. This Maintenance Allocation Chart (MAC) assigns maintenance functions in accordance with the Three Levels of Maintenance concept for Army aviation. These maintenance levels (categories) - Aviation Unit Maintenance (AVUM), Aviation Intermediate Maintenance (AVIM), and Depot Maintenance - are depicted on the MAC as:

AVUM, which corresponds to an O Code in the Repair Parts and Special Tools List (RPSTL)

AVIM, which corresponds to an F Code in the Repair Parts and Special Tools List (RPSTL)

DEPOT, which corresponds to a D Code in the Repair Parts and Special Tools List (RPSTL)

b. The maintenance to be performed below depot and in the field is described as follows:

(1) Aviation Unit Maintenance (AVUM) activities will be staffed and equipped to perform high frequency "On-Aircraft" maintenance tasks required to retain or return aircraft systems to a serviceable condition. The maintenance capability of the AVUM will be governed by the Maintenance Allocation Chart (MAC) and limited by the amount and complexity of ground support equipment (GSE), facilities required, authorized manning strength, and critical skills available. The range and quantity of authorized spare modules/components will be consistent with the mobility requirements dictated by the air mobility concept. (Assignments of maintenance tasks to divisional company size aviation units will consider the overall maintenance capability of the division, the requirement to conserve personnel and equipment resources, and air mobility requirements.)

(a) Company Size Aviation Units: Perform those tasks which consist primarily of preventive maintenance and maintenance repair and replacement functions associated with sustaining a high level of aircraft operational readiness. Perform maintenance inspections and servicing to include preflight, daily, intermediate, periodic (or phased), and special inspections as authorized by the MAC or higher headquarters. Identify the cause of equipment/system malfunctions using applicable technical manual troubleshooting instructions, built-in test equipment (BITE), installed aircraft instruments, or test, measurement, and diagnostic equipment (TMDE). Replace worn or damaged modules/components that do not require complex adjustments or system alignment and which can be removed/installed with available skills, tools, and ground support equipment. Perform operational and continuity checks and make minor repairs to the electrical system. Inspect, service and make operational, capacity, and pressure checks to hydraulic systems. Perform servicing, functional adjustments, and minor repair/replacement to the flight control, propulsion, power train, and fuel system.

B-1 . **MAINTENANCE ALLOCATION CHART (CONT)**

Accomplish air frame repair that does not require extensive disassembly, jigging, or alinement. The manufacture of air frame parts will be limited to those Items which can be fabricated with tools and equipment found in current air mobile tool and shop sets. Evacuate unserviceable modules/components and end items beyond the repair capability of AVUM to the supporting AVIM.

(b) Less than Company Size Aviation Units: Aviation elements organic to brigade, group, battalion headquarters, and detachment size units are normally small and have less than ten aircraft assigned. Maintenance tasks performed by these units will be those which can be accomplished by the aircraft crew chief or assigned aircraft repairman and will normally be limited to preventive maintenance, Inspections, servicing, spot painting, stop drilling, application of nonstress patches, minor adjustments, module/component fault diagnosis, and replacement of selected modules/components. Repair functions will normally be accomplished by the supporting AVIM unit.

(2) Aviation Intermediate Maintenance (AVIM) provides mobile, responsive "One-Stop" maintenance support. (Maintenance functions which are not conducive to sustaining air mobility will be assigned to depot maintenance.) AVIM may perform all maintenance functions authorized to be done at AVUM. Repair of equipment for return to user will emphasize support or operational readiness requirements. Authorized maintenance includes replacement and repair of modules/components and end items which can be accomplished efficiently with available skills, tools, and equipment. AVIM establishes the Direct Exchange (DX) program for AVUM units by repairing selected items for return to stock when such repairs cannot be accomplished at the AVUM level. The AVIM level inspects, troubleshoots, performs diagnostic tests, repairs, adjusts, calibrates, and alines aircraft system modules/components. AVIM units will have capability to determine the serviceability of specified modules/components. AVIM units will have capability to determine the serviceability of specified modules/components removed prior to the expiration of the Time Between Overhaul (TBO) or finite life. Module/component disassembly and repair will support the DX program and will normally be limited to tasks requiring cleaning and the replacement of seals, fittings, and items of common hardware. Air frame repair and fabrication of parts will be limited to those maintenance tasks which can be performed with available tools and test equipment. Unserviceable repairable modules/components and end items which are beyond the capability of AVIM to repair will be evacuated to Depot Maintenance. AVIM will perform aircraft weight and balance inspections and other special inspections which exceed AVUM capability. Provides quick response maintenance support, including aircraft recovery and air evacuation, on-the-job training, and technical assistance through the use of mobile maintenance contact teams. Maintains authorized operational readiness float aircraft. Provides collection and classification services for serviceable/unserviceable material. Operates a cannibalization activity in accordance with AR 750-50. (The aircraft maintenance company within the maintenance battalion of a division will perform AVIM functions consistent with air mobility requirements and conservation of personnel and equipment resources. Additional intermediate maintenance support will be provided by the supporting nondivisional AVIM unit.)

8-2. USE OF MAINTENANCE ALLOCATION CHART

a. The maintenance Allocation chart assigns maintenance functions to the lowest category of maintenance based on past experience and the following considerations:

(1) Skills available

(2) Work time required.

(3) Tools and test equipment required and/or available.

b. Only the lowest category of maintenance authorized to perform a maintenance function is indicated. If the lowest maintenance category cannot perform all tasks of any single maintenance function (e.g. test, repair), then the higher maintenance level(s) that can accomplish additional tasks will also be Indicated.

c. A maintenance function assigned to a maintenance category will automatically be authorized to be performed at any higher maintenance category.

d. A maintenance function that cannot be performed at the assigned category of maintenance for any reason may be evacuated to the next higher maintenance category. Higher maintenance categories will perform the maintenance functions of lower maintenance categories when required or directed by the commander that has the authority to direct such tasking.

e. The assignment of a maintenance function will not be construed as authorization to carry the related repair parts or spares in stock. Information to requisition or otherwise secure the necessary repair parts will be as specified in the associated Repair Parts and Special Tools List (RPSTL).

f. Normally there will be no deviation from the assigned level of maintenance. In cases of operational necessity, maintenance functions assigned to a maintenance level may, on a one-time basis and at the request of the lower maintenance level, be specifically authorized by the maintenance officer of the level of maintenance to which the function is assigned. The special tools, equipment, etc. required by the lower level of maintenance to perform this function will be furnished by the maintenance level to which the function is assigned. This transfer of a maintenance function to a lower maintenance level does not relieve the higher maintenance level of the responsibility for the function. The higher level of maintenance will provide technical supervision and inspection of the function being performed at the lower level.

g. Changes to the Maintenance Allocation Chart will be based on continuing evaluation and analysis by responsible technical personnel and on reports received from field activities.

B-3. MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an Item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and Install a serviceable counterpart in its place. “Replace” is authorized by the MAC and is shown as the 3rd position code of the SMR code.

i. Repair. The application of maintenance services (l), including fault location/troubleshooting (2), removal/installation, and disassembly/assembly (3) procedures, and maintenance actions (4) to Identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, sub assembly, module (component or assembly), end Item or system.

(1) Services - inspect, test, service, adjust, align, calibrate, and/or replace.

(2) Fault locate/troubleshoot - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

B-3. MAINTENANCE FUNCTIONS (CONT)

(3) Disassemble/assemble - encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency Identified as maintenance significant (i.e., assign an SMR code) for the category of maintenance under consideration.

(4) Actions - welding, grinding, riveting, straightening, facing, remachining and/or resurfacing.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e. DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

B-4. FUNCTIONAL GROUPS (COLUMNS 1 AND 2)

The functional groupings shown below identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

GROUP NUMBER	DESCRIPTION
0401	ENGINE ASSEMBLY
0402	COMPRESSOR MODULE Rotor, scroll, oil pressure reducer assembly, diffuser vent orifice, and front support.
0403	COMBUSTION MODULE Combustion outer case, combustion liner, burner drain valve, and engine rear mount.
0404	TURBINE MODULE Horizontal firewall shield, vertical fire shield, and thermocouple assembly.
0405	ACCESSORY GEARBOX MODULE Oil filter housing assembly, oil pressure regulator valve, impending oil by-pass indicator and magnetic chip detectors.
0406	FUEL SYSTEM Fuel control, fuel pump, fuel injector, fuel filter, and air filters.
0407	ELECTRICAL SYSTEM Electrical harness, ignition exciter, Ng overspeed solenoid, Np overspeed solenoid, spark igniter, speed pick-ups and start counter.
0410	AIR SYSTEM Anti-ice solenoid valve, anti-ice air valve, and compressor bleed valve.

B-5. h4AINTENANCE FUNCTION (COLUMN 3)

Column 3 lists the functions to be performed on the items listed in column 2.

B-6. MAINTENANCE CATEGORIES AND WORK TIMES (COLUMN 4)

The maintenance categories (levels) AVUM, AVIM, and DEPOT are listed on the Maintenance Allocation Chart with individual columns that include the work times for maintenance functions at each maintenance level. Work time presentations such as "0.1" indicate the average time it requires a maintenance level to perform a specified maintenance function. If a work time has not been established, the columnar presentation shall indicate " --- ". Maintenance levels higher than the level of maintenance indicated are authorized to perform the indicated function.

B-7. TOOLS AND TEST EQUIPMENT (COLUMN 5 AND SECTION III)

Common tool sets (not individual tools), special tools, test, and support equipment required to perform maintenance functions are listed alphabetically in Section III with a reference number to permit cross-referencing to column 5 in the MAC. In addition, the maintenance category authorized to use the device is listed along with the item National Stock Number (NSN) and, if applicable, the tool number to aid in identifying the tool/device.

8-8. REMARKS (COLUMN 6 AND SECTION IV)

Remarks (identified by an alphabetic code in column 6) and other notes (identified by a number in parentheses in the applicable column) are listed in Section IV to provide a ready reference to the definition of the remark/note.

Section II MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS: T703-AD-700 Turboshaft Engine							
(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY			(5) TOOLS AND EQUIPMENT	(6) REMARKS
			AVUM	AVIM	DEPOT		
0401	Engine Assembly	Inspect	-.-			3	
		Service	-.-				C
		Test	-.-			3	A,B
		Replace	-.-			1,3,9,15	
		Repair	-.-			1,3	
		Overhaul			-.-	--	
0402	Compressor Module	Inspect	-.-			3	
		Replace		-.-		3,8,15	
		Repair			-.-	1,3	
		Overhaul			-.-		
040201	Compressor Rotor Assy	Inspect	-.-			3	C
		Service	-.-			3	
		Overhaul			-.-		
040202	Compressor Scroll	Inspect	-.-			3	
		Overhaul			-.-		
040203	Oil Pressure Reducer Assembly	Inspect	-.-			3	
		Replace	-.-			3	
0403	Combustion Module	Inspect	-.-			3	
		Replace	-.-			1,3	
		Overhaul			-.-		
040301	Combustion Outer Case	Inspect	-.-			3	
		Replace	-.-			1,3,19, 20,21	
		Repair		-.-		1,3,7	D
040302	Combustion Liner	Inspect	-.-			3	
		Replace	-.-			1,3,20, 19,21	
		Repair		-.-		3,6,7,5	D

NOMENCLATURE OF END ITEMS

T703-AD-700 Turboshaft Engine

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY			(5) TOOLS AND EQUIPMENT	(6) REMARKS
			AVUM	AVIM	DEPOT		
0404	Turbine Module	Inspect	- . -			3	
		Replace		- . -		3,6,8,15, 28,29,30	
		Repair		- . -		3,34	
		Overhaul			- . -		
040401	Horizontal Fire Shield	Inspect	- . -			3	
		Replace		- . -		1,3	
		Repair		- . -		5,7	
0405	Accessory Gearbox Module	Inspect	- . -			3	
		Replace		- . -		1,3,6,8 15,29,30	
		Repair		- . -		3,4,18, 22,23, 24,25, 26,27, 10,11, 12,13,14	
		Overhaul			- . -		
040502	0il Filter Housing Assembly	Inspect	- . -			3	
		Service	- . -			3	
		Replace	- . -			1,3	
04050-201	Oil Pressure Regulator Valve	Inspect	- . -			3	
		Adjust	- . -			1,3	
		Repair	- . -			1,3	
0406	Fuel System	Inspect	- . -			3	
		Service	- . -				
040601	Fuel Control	Inspect	- . -			3	
		Service	- . -			3,33	
		Adjust	- . -			1,3,16, 31	
		Replace	- . -			1,3	
		Overhaul			- . -		
040602	Fuel Pump	Inspect	- . -			3	
		Replace	- . -			1,3,32	
		Overhaul			- . -		

NOMENCLATURE OF END ITEMS
T703-AD-700 Turboshaft Engine

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY			(5) TOOLS AND EQUIPMENT	(6) REMARKS
			AVUM	AVIM	DEPOT		
040603	Fuel Injector	Inspect	-.-			3	
		Service	-.-			1,3	
		Replace	-.-			1,3,19, 21,20	
		Overhaul			-.-		
040604	LP Fuel Filter Assy	Inspect	-.-			3	
		Replace	-.-			1,3	
		Overhaul			-.-		
0407	Electrical System	Inspect	-.-			3	
040701	Electrical Harness	Inspect	-.-			3	
		Service	-.-				
		Test	-.-			1,2	
		Replace	-.-			1,3	
		Repair			-.-		
040702	Ignition Exciter	Inspect	-.-			3	
		Test	-.-			3	
		Replace	-.-			1,3	
		Overhaul			-.-		
040703	N2 Overspeed Solenoid	Inspect	-.-			3	
		Replace	-.-			1,3	
		Overhaul			-.-		
0410	Air System	Inspect	-.-				
041001	Anti-Ice Solenoid Valve	Inspect	-.-			3	E
		Replace	-.-			1,3	
		Overhaul			-.-		
041002	Anti-Icing Air Valve	Inspect	-.-			3	E
		Test	-.-			3,6	
		Replace	-.-			1,3	
		Overhaul			-.-		
041003	Compressor Bleed Valve	Inspect			-.-	3	
		Test			-.-	3	
		Replace	-.-			3	
		Overhaul			-.-		

Section III TOOL AND TEST EQUIPMENT REQUIREMENTS

NOMENCLATURE OF END ITEMS

T703-AD-700 Turboshaft Engine

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	AVUM	TOOL SET, AVUM SET NO. 2	4900005670476	SC92099CLA92
2	AVUM	TOOL KIT, ELECTRICAL REPAIRMAN ' S	5180003234915	SC518099CLA06
3	AVUM	TOOL KIT, ENGINE REPAIRMAN'S	5180003234944	SC518099CLA07
4	AVIM	SHOP SET, AVIM MACHINE SHOP	4920004059279	SC492099CLA91 MAAM
5	AVIM	SHOP SET, AVIM SHEET METAL	4920001665505	SC492099CLA91 SMAM
6	AVIM	SHOP SET, AVIM TURBINE ENGINE	490002243684	SC492099CLA91 ENTAM
7	AVIM	SHOP SET, AVIM WELDING, AVIM WELDING	490001634093	SC492099CLA91 WEAM
8	AVIM	ADAPTER, ENGINE TURNING	4920009233188	6799790
9	AVUM	LIFT, ENGINE ASSEMBLY	5340012009684	6889888
10	AVIM	PUSHER, SEAL INSTALL-ATION PTO SHAFT SEAL	2840011994000	6893505
11	AVIM	PUSHER, SEAL INSTALL, TACH DRIVE	6680011994002	6893506
12	AVIM	PUSHER, SEAL INSTALL, POWER TURBINE GOVERNOR	2840012009578	6893507
13	AVIM	PUSHER, SEAL INSTALL, FUEL PUMP	2915011991783	6893508
14	AVIM	PUSHER, SEAL INSTALL, STARTER	2925011994001	6893509
15	AVUM	STAND, ENGINE TURNOVER	4920012347293	6891188
16	AVUM	WRENCH, GROUND IDLE	5120007637565	6798292
17	AVIM	TEST SET, ELECTRONIC CONTROL	2840012121222	23006340

NOMENCLATURE OF END ITEMS

T703 - AD - 700 Turboshaft Engine

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
18	AVIM	PULLER KIT, MECHANICAL	5120009450186	6796941
19	AVUM	GAGE, FUEL INJECTOR SETTING	6620011994005	6899957
20	AVUM	FIXTURE, COMBUSTION LINER POSITIONING	2840012009545	6899966
21	AVUM	WRENCH, FUEL INJECTOR	5120011165026	23002215
22	AVIM	PUSHER, SEAL INSTALLATION FRONT SPARE SEAL	2840012009580	6893504
23	AVIM	EXTENSION, SEAL PUSHER	2840012095235	6899985
24	AVIM	PULLER, SEAL, CENTRIFUGAL BREATHER	2840012009579	6893707
25	AVIM	PUSHER, SEAL INSTALLATION, SEAL SUPPORT	2840012009580	6893504
26	AVIM	GUIDE, BEARING, SPUR ADAPTER GEARSHAFT	2840012095234	23005426
27	AVIM	GUIDE, INSTALLATION, COUP-LING, TURBINE TO COMPRESSOR	2840011991815	23006784
28	AVIM	INSTALLATION TOOL, "O" RING, SPUR ADAPTER GEARSHAFT	5120012095246	23006785
29	AVIM	ADAPTER, TORQUE, TURBINE ATTACHING NUT, LOWER	5120012095248	23006782
30	AVIM	ADAPTER, TORQUE, TURBINE ATTACHING NUT, UPPER	5120012095247	23006708
31	AVUM	PIN RIGGING, FUEL CONTROL	5315011994003	23007695
32	AVUM	WRENCH, ADAPTER, FUEL PUMP	5120005110165	1C2518
33		DELETED		
34	AVUM	KIT, CLEANING, PWR TURB SUPT, OIL NOZZLE & SUMP	2840012095233	23007615

NOMENCLATURE OF END ITEMS T703-AD-700 Turboshaft Engine				
TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATAGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
35	AVIM	GAUGE, RETAINING RING	5365012186514	23006764
36	AVIM	FIXTURE, HOLDING GAS PRODUC-ER TURBINE ROTOR	4920012892892	23008710
37	AVIM	PULLER, STUD, 1/4 to 1/2 in.	5120007723470	TMK1
38	AVIM	BUBBLE, SUCTION		T38
39	AVIM	BEAKER, 800 ml	6640002648323	
40	AVIM	SLING LIFT		T40
41	AVIM	SPRAY UNIT	3740006414719	
42	AVIM	CONTAINER 3-5 FL OZ		
43	AVIM	10X MAGNIFYING GLASS	6650001337743	
44	AVIM	ENGINE V/B KIT		

Section IV REMARKS

REFERENCE CODE	REMARKS/NOTES
A	FUNCTIONAL TEST AT AVUM - ENGINE IN AIRFRAME
B	FUNCTIONAL TEST AT AVIM - ENGINE IN AIRFRAME
C	WATER/SOLVENT SOLUTION WASH
D	WELD REPAIR
E	PART OF SYSTEM INSPECTION PROCEDURE
F	BEARING REPLACEMENT AND STORAGE PROCEDURE TM 55-1500-322-24
G	AIRCRAFT ELECTRICAL AND ELECTRONICS WIRING TM 55-1500-323-24

APPENDIX C

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I INTRODUCTION

C-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the engine. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

C-2. EXPLANATION OF COLUMNS

a. Column 1 - Item C Number. This number is assigned to the entry in the listing and is referenced in the maintenance tasks to identify the material (e.g., wiping rag (C-1).

b. Column 2 - National Stock Number. This is the National Stock Number assigned to the item; use it to request or requisition the item.

c. Column 3 - Description. Indicates the item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if there is no NSN in column 2.

d. Column 4 - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

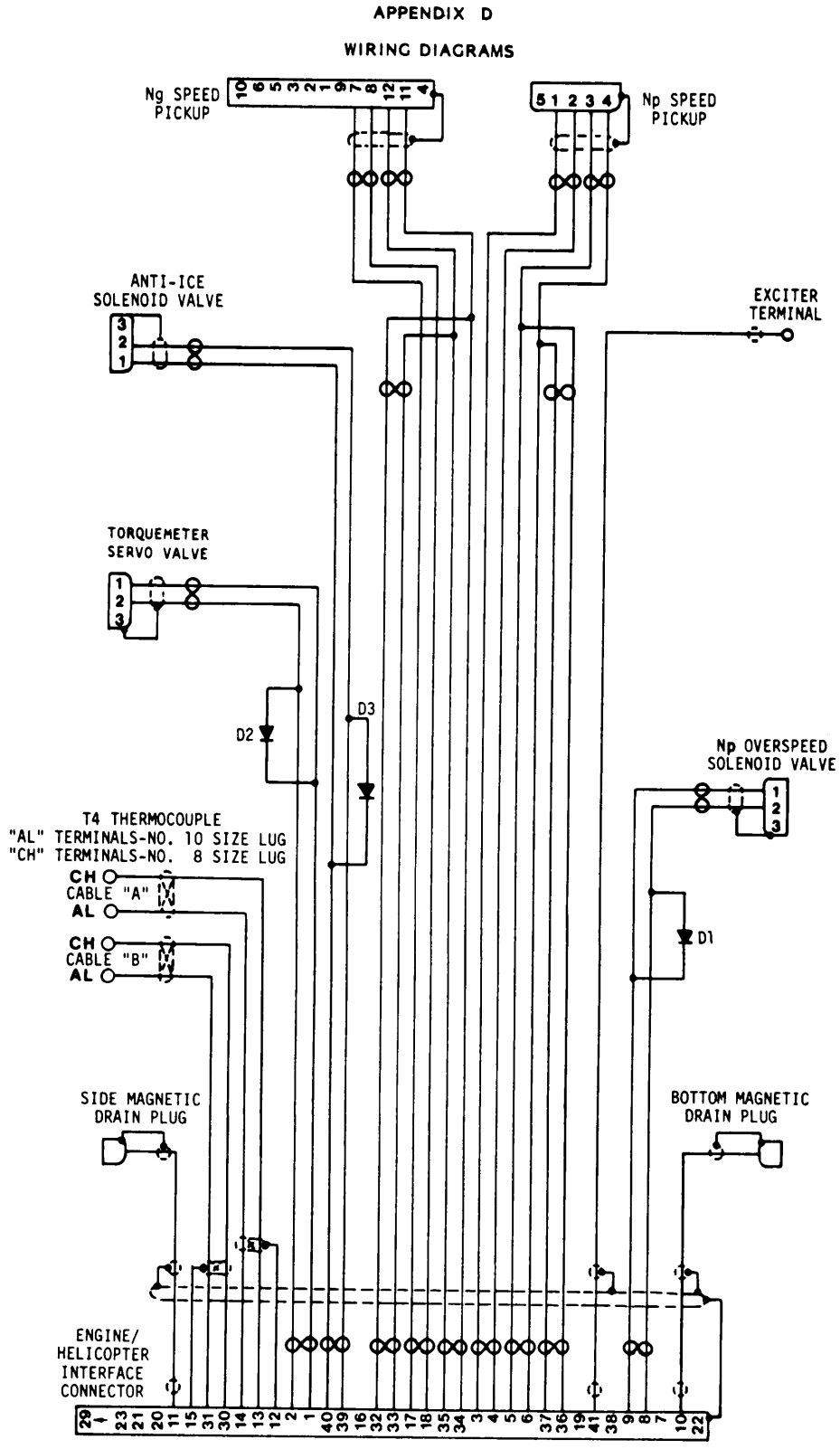
Section II EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item E Number	National Stock Number		(4) U/M
C1	7920-00-205-1711	Wiping rags A-A-531	
C2	6850-00-621-1819	Liquid leak detector (meeting MIL Spec Mil-L-255670) SNOOP mfg by Indiana Valve and Fitting Inc., or equivalent)	
C3	7520-00-223-8000	Stencil Brush H-B-621	
C4	9505-00-221-2650	Lockwire 0.020	ft
C5	9505-00-293-4208	Lockwire 0.032	ft

(1) Item E Number	(2) National Stock Number	(3) Description	(4) U/M
C6	9505-00-331-3275	Lockwire 0.041	ft.
C7	6810-00-281-2785	Methylethylketone (federal specification TM-261)	gal
C8	6850-00-264-9037	Dry cleanlng solvent P-D-680	gal
C9	8415-00-266-8677	MEK handling gloves	pr
C10		Engine fuel (JP-4, JP-5)	
C12	7515-00-465-0994	Marking pencil	ea
C13		Humidity Indicator	
C14		Cotton swabs	
C15		Oil meeting ATSM No. 1	
C16		Any jar or container measuring approx. 1 qt capacity with a vent hole and two 3/8" dia holes in lid. (Mason jar or equivalent)	
C17	5350-00-22407201	Emery cloth number 400 grit	sht
C19	8030-00-105-0270	Anti-seize compound; Never-seez Nickel Special NS 185 (or equivalent)	
C20	9150-00-754-0063	Lubriplate 130A (or equivalent)	
C21	9150-00-231-6676	Oil Mil-L-6081 grad 1010 (Atlantic Refining Co. 3110, or equivalent)	gal
C22	8520-00-141-2519	Liquid soap solution P-S-624 FSC 8520	
C23	7930-01-335-7920	Cleaning solvent (Brulin safety solvent No. 512M, 715N Safety-Solv, 20-20 Plus, B & B 3100, Racason 512M No. 5884 (Turco Products), or equivalent)	
C24		16 gage wire	
C25	6850-00-999-1094	Dehydrating agent Mil-D-3464	pt
C26		Lead seal on wire for sealing shipping container	

(1) Item E Number	(2) National Stock Number	(3) Description	(4) U/M
C27		Corrosive preventative compound (Valvoline Tectyl 891, or equivalent)	
C28		White stencil ink TT-I-1795	
C29	8415-00-266-8675	Fuel handling gloves	
C30	9150-00-985-7099	Engine oil MIL-L-23699	
C31	9150-00-782-2627	Engine oil MIL-L-7808	
C32		Mineral spirits	
C33	6850-00-285-4321	Carbon removal compound MIL-C-25107	gal
C34	9150-00-250-0926	Petrolatum (Vaseline)	lb
C35		Grease (GAA) (MIL-G-23827)	
C36	7510-00-266-6694	Tape, Pressure Sensitive Adhesive, masking, Paper UU1T-106	
C37		Plastic Transparent tubing 1/4 in. ID compatible with synthetic oils	
C38	DELETED		
C39	6810-01-070-1784	Clean water: Demineralized, distilled, air conditioner condensate, or rain water is preferred. City drinking water, well water or river water may be used if other sources are not readily available, but they shall be free of contaminants such as mud, sulpher, sand, salt, etc.	
C40	6810-00-663-9417	Methyl Alcohol, minimum concentration 99.85% methanol (added to water to prevent freezing during compressor rinse).	
C41	3439-00-471-9899	Welding Rod AMS 5784	
C42		Welding Flux	
C43	3439-00-882-7351	Welding Rod AMS 5798	
C44		Sulfuric acid, specific gravity 1.82 to 1.84	
C45	6810-00-262-8566	Sodium dichromate	
C46	9535-00-575-7183	Shim material	
C47	6850-01-372-8303	Cleaner (MIL-C-85704, Type II)	5 gal
C48	6850-01-372-8304	Cleaner (MIL-C-85704, Type II)	55 gal
C49	6850-01-370-5245	Cleaner (MIL-C-85704, Type IIA)	5 gal
C50	6850-01-370-5244	Cleaner (MIL-C-85704, Type IIA)	55 gal

APPENDIX D
WIRING DIAGRAMS



APPENDIX E

ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I INTRODUCTION

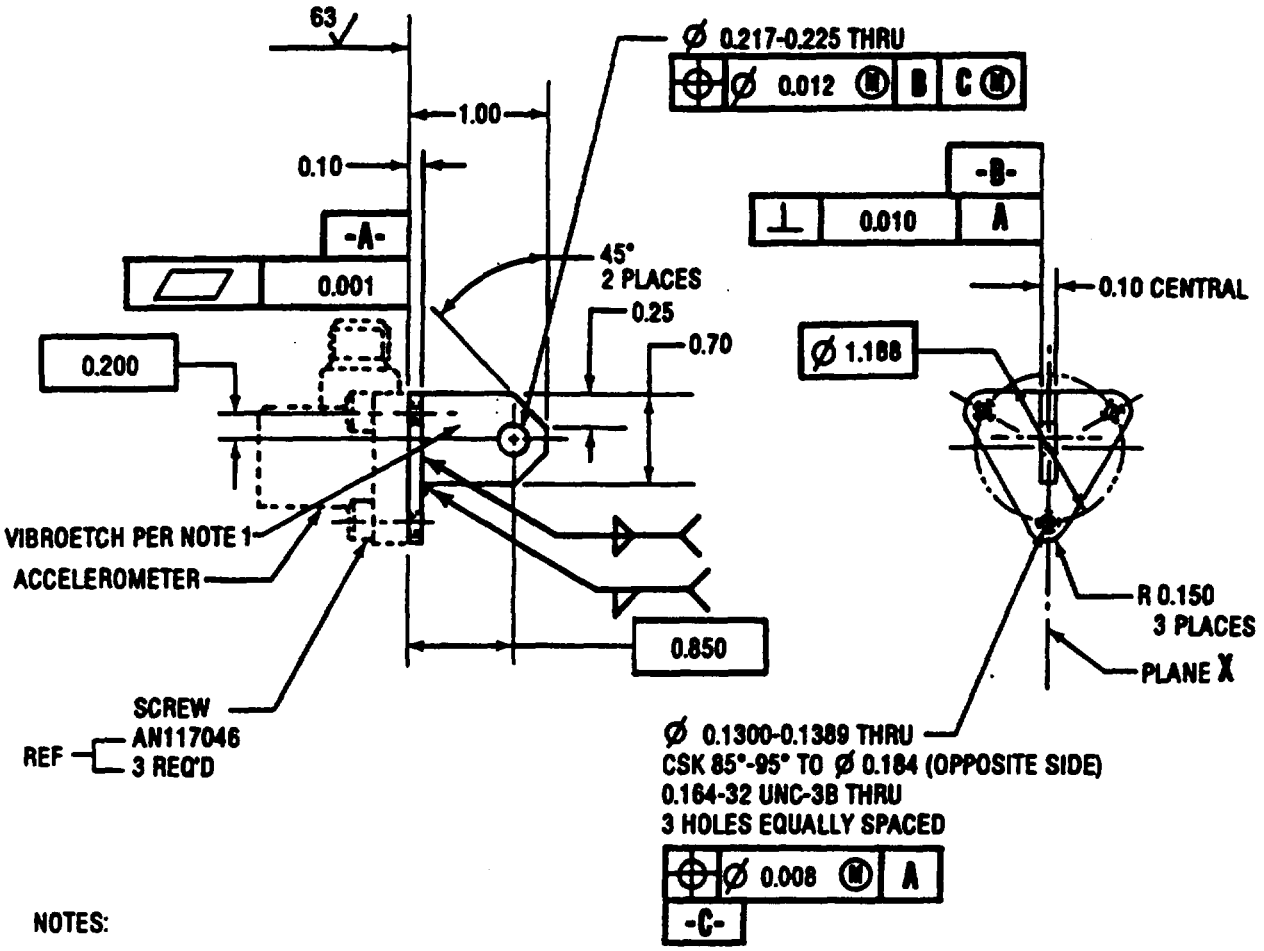
SCOPE

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at organizational maintenance (or aviation unit maintenance, if applicable).

A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

SECTION II INDEX OF MANUFACTURED ITEMS



NOTES:

1. MARK AS SPECIFIED IN LOCATION SHOWN WITH 1/8-3/16 HIGH FIGURES THE FOLLOWING:
   a) THE NAME "ALLISON" FOLLOWED BY THE TOOL NUMBER 23032992
   b) VENDOR NAME OR TRADEMARK
2. BREAK SHARP EDGES 0.020 UOS
3. SURFACE FINISH 125 UOS
4. MATERIAL-300 SERIES STAINLESS STEEL
5. TOL ON 3 PLACE DECIMALS ± 0.010
6. TOL ON 2 PLACE DECIMALS ± 0.02
7. AMS 5510 THRU AMS 5529 (81343) MAY BE USED AS MANUFACTURE MATERIAL (301 SERIES BAR STOCK).

ACCELEROMETER CONNECTOR MUST LIE IN PLANE X

VIBRATION RESONANCE WITH PICKUP MOUNTED IS:	
DIRECTION	FREQ. - HERTZ
NORMAL TO SURFACE B	1120 - 1150
NORMAL TO SURFACE A	ABOVE 2000
PARALLEL TO SURFACES A AND B	245 - 290

Figure 1. Accelerometer Mounting Bracket Part Number 23032992

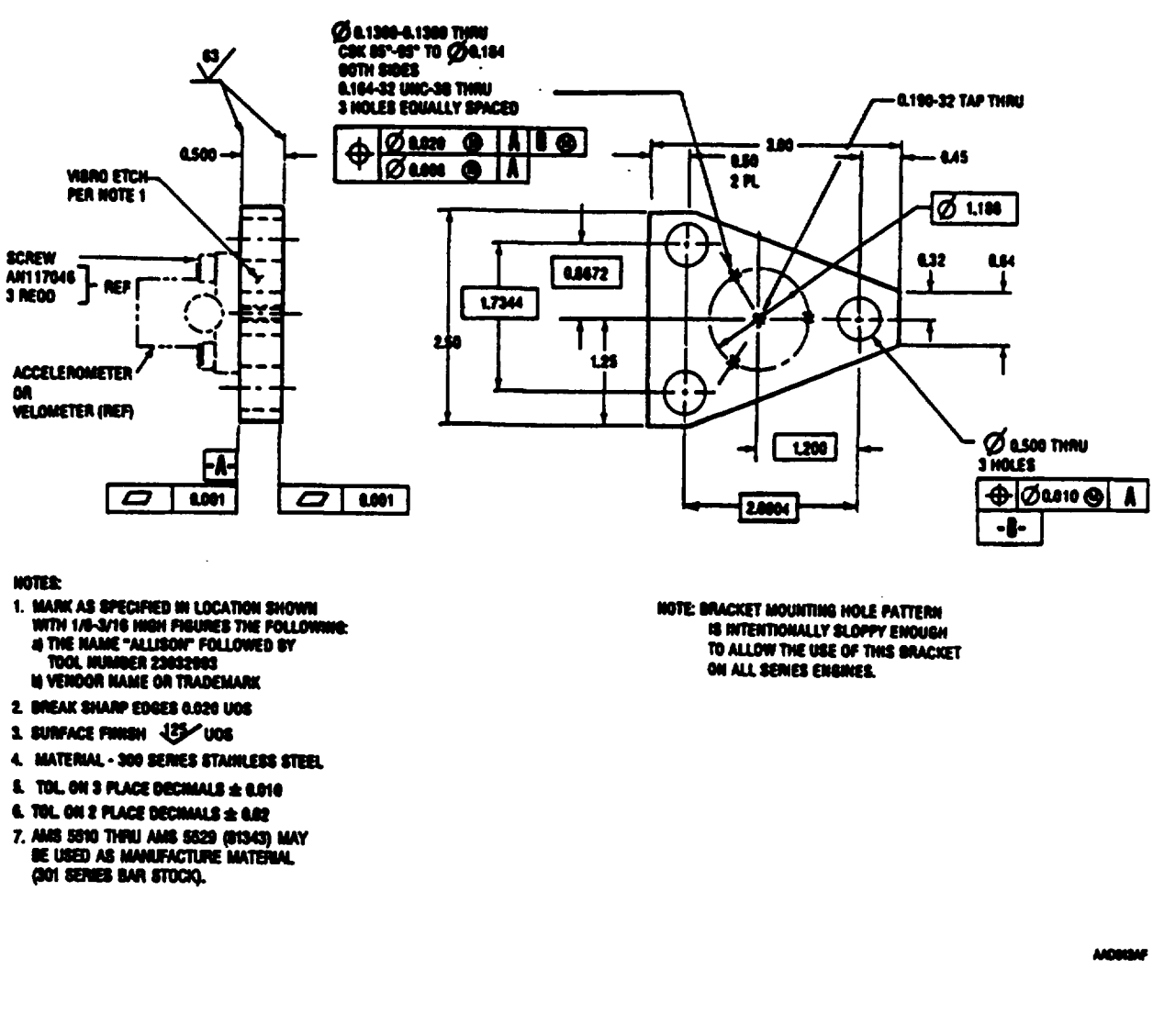
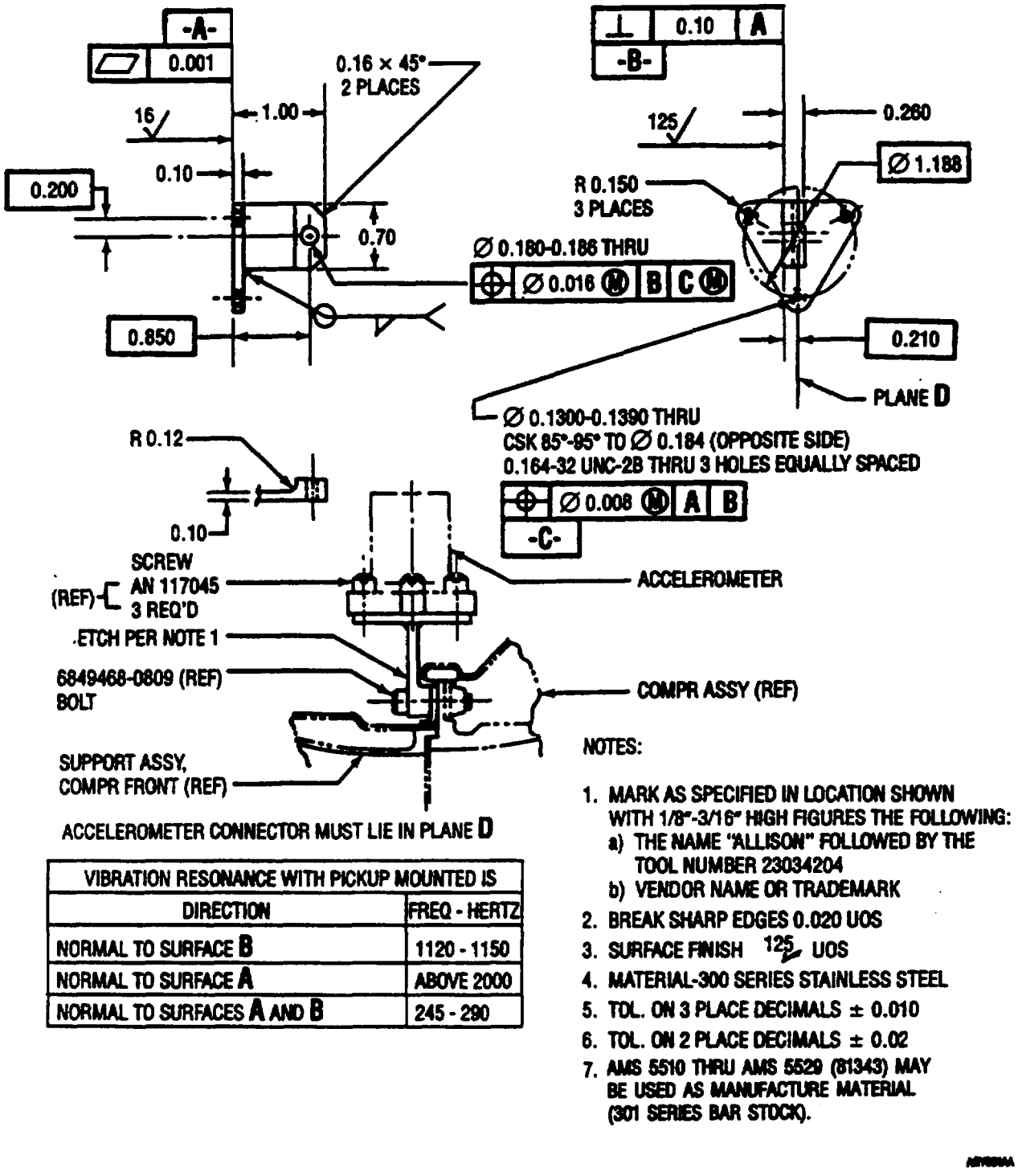


Figure 2. Accessory Gearbox Mounting Pad Part Number 23032993



VIBRATION RESONANCE WITH PICKUP MOUNTED IS	
DIRECTION	FREQ - HERTZ
NORMAL TO SURFACE B	1120 - 1150
NORMAL TO SURFACE A	ABOVE 2000
NORMAL TO SURFACES A AND B	245 - 290

NOTES:

1. MARK AS SPECIFIED IN LOCATION SHOWN WITH 1/8"-3/16" HIGH FIGURES THE FOLLOWING:
   a) THE NAME "ALLISON" FOLLOWED BY THE TOOL NUMBER 23034204
   b) VENDOR NAME OR TRADEMARK
2. BREAK SHARP EDGES 0.020 UOS
3. SURFACE FINISH 125 UOS
4. MATERIAL-300 SERIES STAINLESS STEEL
5. TOL. ON 3 PLACE DECIMALS ± 0.010
6. TOL. ON 2 PLACE DECIMALS ± 0.02
7. AMS 5510 THRU AMS 5529 (81343) MAY BE USED AS MANUFACTURE MATERIAL (301 SERIES BAR STOCK).

Figure 3. Accelerometer Mounting Bracket Part number 23034204

APPENDIX F
TORQUE LIMITS

Not Applicable

GLOSSARY

Section I ABBREVIATIONS

CCW	counterclockwise
CP/O	Co-Pilot/Observer
CW	clockwise
DA	Department of the Army
ea	Each
FM	Field Manual
ft	feet
gal	gallon
in	Inch
in. lbs	Inch Pounds
lb	Pound
max	Maximum
NSN	National Stock Number
oz	Ounce
pt	Pint
psi	Pounds Per Square Inch
qt	Quart
rpm	Revolutions Per Minute
TB	Technical Bulletin
TM	Technical Manual
Ng	Gas Producer Turbine Speed
Np	Power Turbine Speed
TGT	Turbine Gas Temperature
MSL	Mean Seal Level
FOD	Foreign Object Damage
sht	Sheet

Section II DEFINITION OF UNUSUAL TERMS

Warm Engine	As soon after shutdown as possible when the engine is just cool enough to place a bare hand on the combustion module. Engine oil temperature shall be at least 40 degrees C.
Desiccant	A dehydrating agent.
Micron	One thousandth of a millimeter.
Match Mark	Procedure for marking adjacent parts to Insure realignment.
Ground Idle	61 to 65% Ng
Flight Idle	100% Np

ALPHABETICAL INDEX

*U.S. GOVERNMENT PRINTING OFFICE: 1994-555-028/00410

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: daf2028@dmh1.stl.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.

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

To be distributed in accordance with DA Form 12-31A-R (qty rqr block nos., 4 and 8), AVUM and AVIM Maintenance requirements for Engine Free Turbine, T703-AD-700 (TM 55-2840-256 Series).

✪ U.S. GOVERNMENT PRINTING OFFICE: 1989 654-127/87072

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

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 A 3rd Engineer Bn
Ft. Leonardwood, MO 63108

DATE SENT: 22 August 1992

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 1-1520-250-10	15 June 1992	Operator's manual MH60K Helicopter

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

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 on 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

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U.S. ARMY AVIATION AND TROOP COMMAND
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4300 GOODFELLOW BOULEVARD
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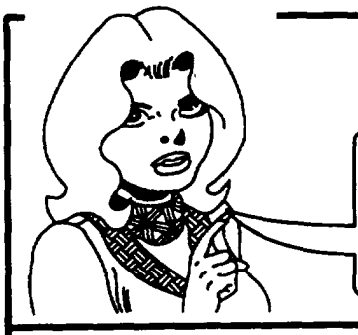

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DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 55-2840-256-23	2 JUNE 1986	Aviation Unit and Aviation Intermediate Maintenance, Engine, Aircraft, Turboshaft

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PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO

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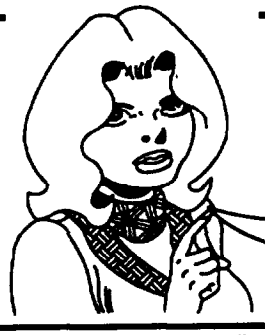

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The Metric System and Equivalents

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 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

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