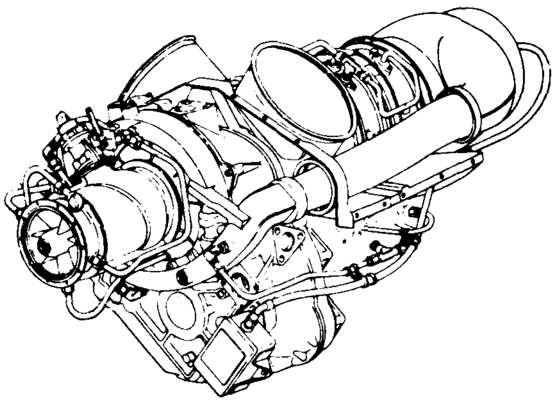
TM 55-2840-231-23

TECHNICAL MANUAL

AVIATION UNIT
AND
AVIATION INTERMEDIATE
MAINTENANCE MANUAL

ENGINE ASSEMBLY



MODE L T63-A-5A
NSN 2840-00-923-6023
MODEL T63-A-700
NSN 2840-00-179-5536

HEADQUARTERS
DEPARTMENT OF THE ARMY
27 FEBRUARY 1981

This copy is a reprint which includes current pages from Change 1 through 6,7,8,9,10,11

CHANGE NO. 13

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 31 July 1995

Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE ASSEMBLY

MODEL T63-A-700
NSN 2840-00-179-5536

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i and ii	i and ii
1-49 and 1-50	1-49 and 1-50
1-57 and 1-58	1-57 and 1-58
1-61 and 1-62	1-61 and 1-62
- - -	1-62.1/1-62.2 blank)
1-63 through 1-66	1-63 through 1-66
- - -	1-66.1/(1-66.2 blank)
1-93 and 1-94	1-93 and 1-94
1-129 and 1-130	1-129 and 1-130
- - -	1-130.1 and 1-130.2
1-131 and 1-132	1-131/(1-132 blank)
1-137 and 1-138	1-137 and 1-138
- - -	1-138.1 and 1-138.2
1-139 and 1-140	1-139 and 1-140
1-148.1/(1-148.2 blank)	1-148.1/(1-148.2 blank)
1-149 and 1-150	1-149 and 1-150
1-157 and 1-158	1-157 and 1-158
1-159 and 1-160	1-159 and 1-160
1-161 and 1-162	- - -
2-13 and 2-14	2-13 and 2-14
2-23 through 2-26	2-23 through 2-26

Remove pages	Insert pages
2-33 through 2-36	2-33 through 2-36
2-63 and 2-64	2-63 and 2-64
2-64.3/(2-64.4 blank)	2-64.3 and 2-64.4
3-1 and 3-2	3-1 and 3-2
3-7 through 3-12	3-7 through 3-12
3-21 and 3-22	3-21 and 3-22
4-1 and 4-2	4-1 and 4-2
5-7 through 5-10	5-7 through 5-10
6-1 and 6-2	6-1 and 6-2
6-53 through 6-60	6-53 through 6-60
6-68.1 through 6-68.4	6-68.1 through 6-68.4
6-68.5/(6-68.6 blank)	6-68.5 and 6-68.6
- - -	6-68.7 through 6-68.9/(6-68.10 blank)
6-69 and 6-70	6-69 and 6-70
7-9 and 7-10	7-9 and 7-10
8-15/(8-16 blank)	8-15 and 8-16
- - -	8-16.1 and 8-16.2
- - -	8-17 and 8-18
9-5 and 9-6	9-5 and 9-6
9-7 through 9-10	9-7 through 9-10
B-7 and B-8	B-7 and B-8
B-11 and B-12	B-11 and B-12
G-25 through G-28	G-25 through G-28
H-5 and H-6	H-5 and H-6
Glossary-1 and Glossary-2	Glossary-1 and Glossary-2
Index-11 and Index-12	Index-11 and Index-12

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Chief of Staff

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TM 55-2840-231-23
C12

CHANGE

NO. 12

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 18 November 1994

Aviation Unit and Aviation Intermediate Maintenance Manual

Engine, Assembly
Model T63-A-700
NSN 2840-00-179-5536

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2-8.1/(2-8.2 blank)	2-8.1/(2-8.2 blank)
2-9 and 2-10	2-9 and 2-10
2-48	2-48
---	2-48.1/(2-48.2 blank)
D-5/(D-6 blank)	D-5/(D-6 blank)

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Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE ASSEMBLY

Model T63-A-700 (NSN 2840-00-179-5536)

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Remove pages	Insert pages
a and b	a through e/f
i and ii	i and ii
1-1 through 1-6	1-1 through 1-6
1-21 and 1-22	1-21 and 1-22
1-67 through 1-70	1-67 through 1-70
1-75 through 1-88	1-75 through 1-88
1-89 and 1-90	1-89 blank/1-90
1-91 and 1-92	1-91 and 1-92
1-97 and 1-98	1-97 and 1-98
1-103 through 1-110	1-103 through 1-110
1-115 and 1-116	1-115 and 1-116
1-119 and 1-120	1-119 and 1-120
1-125 and 1-126	1-125 and 1-126
1-129 through 1-132	1-129 through 1-132
1-143 and 1-144	1-143 and 1-144
-----	1-148.1/1-148.2
1-149 through 1-158	1-149 through 1-158
-----	1-158.1 through 1-158.3/1-158.4
1-159 through 1-162	1-159 through 1-160
2-1 through 2-8	2-1 through 2-6
2-8.1/2-8.2	2-8.1/2-8.2
2-11 through 2-14	2-11 through 2-14
-----	2-14.1 through 2-14.4
2-15 and 2-16	2-15 and 2-16
2-19 and 2-20	2-19 and 2-20
-----	2-20.1/2-20.2
2-23 and 2-24	2-23 and 2-24
2-33 through 2-36	2-33 through 2-36
-----	2-36.1 through 2-36.6
2-37 and 2-38	2-37 and 2-38
2-39 and 2-40	2-39 and 2-40

Remove pages	Insert pages
2-41 through 2-44	2-41 through 2-44
2-45 through 2-48	2-48
2-49 through 2-64	2-49 through 2-64
-----	2-64.1 through 2-64.3/2-64.4
2-65 and 2-66	2-65 and 2-66
-----	2-66.1/2-66.2
2-69 and 2-70	2-69 and 2-70
2-71 through 2-74	2-73 blank/2-74
3-1 and 3-2	3-1 and 3-2
3-13 and 3-14	3-13 and 3-14
3-17 through 3-22	3-17 through 3-22
3-25 through 3-28	3-25 through 3-28
4-1 through 4-4	4-1 through 4-4
5-7 through 5-10	5-7 through 5-10
6-1 through 6-4	6-1 through 6-4
-----	6-4.1/6-4.2
6-5 through 6-8	6-5 through 6-8
6-8.1 and 6-8.2	6-8.1 and 6-8.2
6-9 and 6-10	6-9 and 6-10
6-13 and 6-14	6-13 blank/6-14
6-15 and 6-16	6-15 and 6-16
6-21 and 6-22	6-21 and 6-22
6-25 through 6-28	6-25 through 6-28
6-28.1/6-28.2	6-28.1/6-28.2
6-29 and 6-30	6-29 and 6-30
6-33 and 6-34	6-33 and 6-34
6-37 and 6-38	6-37 and 6-38
6-47 and 6-48	6-47 and 6-48
6-53 and 6-54	6-53 and 6-54
6-68.1 through 6-68.5/6-68.6	6-68.1 through 6-68.5/6-68.6
6-69 and 6-70	6-69 and 6-70
7-4.1 and 7-4.2	7-4.1/7-4.2
7-5 through 7-10	7-5 through 7-10
7-13 and 7-14	7-13 and 7-14
8-1 through 8-4	8-1 through 8-4
8-11 through 8-14	8-11 through 8-14
9-1 and 9-2	9-1 and 9-2
9-5 and 9-6	9-5 and 9-6
-----	9-6.1/9-6.2
9-7 through 9-11	9-7 through 9-11
A-1/A-2	A-1/A-2
B-3 through B-14	B-3 through B-14
C-1 and C-2	C-1 and C-2
D-1 through D-4	D-1 through D-5/D-6
G-3 and G-4	G-3 and G-4
G-25 through G-27/G-28	G-25 through G-28
Index 1 through Index 15/Index 16	Index 1 through Index 15/Index 16

URGENT

CHANGE NO. 10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 27 April 1987

Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE ASSEMBLY

Model T63-A-5A (NSN 2840-00-923-6023)
Model T63-A-700 (NSN 2840-00-179-5536)

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2-7 and 2-8	2-7 and 2-8
- - -	2-8.1/(2-8.2)
2-33 and 2-34	2-33 and 2-34

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CHANGE
NO. 9

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Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE ASSEMBLY

Model T63-A-5A (NSN 2840-00-923-6023)
Model T63-A-700 (NSN 2840-00-179-5536)

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Remove pages	Insert pages
6-1 and 6-2	6-1 and 6-2
6-5 through 6-8	6-5 through 6-8
- - -	6-8.1 and 6-8.2
6-9 and 6-10	6-9 and 6-10
6-21 through 6-24	6-21 through 6-24
- - -	6-24.1 through 6-24.6

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WASHINGTON, D.C., 10 June 1986

Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE ASSEMBLY

Model T63-A-5A (NSN 2840-00-923-6023)
Model T63-A-700 (NSN 2840-00-179-5536)

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Remove pages	Insert pages
1-13 and 1-14	1-13 and 1-14
1-23 and 1-24	1-23 and 1-24
1-43 through 1-46	1-43 through 1-46
1-55 through 1-58	1-55 through 1-58
1-69 and 1-70	1-69 and 1-70
1-79 through 1-84	1-79 through 1-84
1-91 and 1-92	1-91 and 1-92
1-131 and 1-132	1-131 and 1-132
1-132A/1-132B	1-132.1 and 1-132.2
1-141 and 1-142	1-141 and 1-142
1-155 through 1-160	1-155 through 1-160
2-11 and 2-12	2-11 and 2-12
2-17 through 2-20	2-17 through 2-20
2-47 and 2-48	2-47 and 2-48
2-69 and 2-70	2-69 and 2-70
3-13 through 3-18	3-13 through 3-18
3-21 and 3-22	3-21 and 3-22
3-27 and 3-28	3-27 and 3-28
4-1 through 4-3/4-4	4-1 through 4-5/4-6
5-5 and 5-6	5-5 and 5-6
6-1 and 6-2	6-1 and 6-2
6-7 through 6-12	6-7 through 6-12
6-15 through 6-24	6-15 through 6-24
6-69 and 6-70	6-69 and 6-70
7-4.1 and 7-4.2	---
8-5 through 8-10	8-5 through 8-10
8-13 and 8-14	8-13 and 8-14
9-7 through 9-11	9-7 through 9-11

Remove pages	Insert pages
B-11 and B-12	B-11 and B-12
G-3 and G-4	G-3 and G-4
G-15 and G-16	G-15 and G-16
Index 5 through Index 8	Index 5 through Index 8

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Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE ASSEMBLY

Model T63-A-5A (NSN 2840-00-923-6023)
Model T63-A-700 (NSN 2840-00-179-5536)

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Remove pages	Insert pages
1-5 through 1-8	1-5 through 1-8
1-15 and 1-16	1-15 and 1-16
6-1 and 6-2	6-1 and 6-2
6-67 and 6-68	6-67 and 6-68
---	6-68.1 through 6-68.5/6-68.6
B-9 and B-10	B-9 and B-10
D-1 through D-4	D-1 through D-4
Index 13 and Index 14	Index 13 and Index 14

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Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE ASSEMBLY

Model T63-A-5A (NSN 2840-00-923-6023)
Model T63-A-700 (NSN 2840-00-179-5536)

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1. Remove and insert pages as indicated below.

	Remove pages	Insert pages
Chapter 1	1-3 and 1-4	1-3 and 1-4
	1-19 and 1-20	1-19 and 1-20
	1-43 and 1-44	1-43 and 1-44
	1-79 thru 1-82	1-79 thru 1-82
	1-85 thru 1-88	1-85 thru 1-88
	1-97 and 1-98	1-97 and 1-98
	1-141 and 1-142	1-141 and 1-142
	1-149 and 1-150	1-149 and 1-150
	1-155 thru 1-158	1-155 thru 1-158
	1-161 and 1-162	1-161 thru 1-162.1/1-162.2
Chapter 2	2-3 and 2-4	2-3 and 2-4
	2-9 and 2-10	2-9 and 2-10
	2-15 thru 2-24	2-15 thru 2-24
Chapter 3	3-1 and 3-2	3-1 and 3-2
	3-13 thru 3-22	3-13 thru 3-22
	3-25 thru 3-28	3-25 thru 3-28
Chapter 4	4-1 and 4-2	4-1 and 4-2
Chapter 6	6-5 and 6-6	6-5 and 6-6
	6-11 and 6-12	6-11 and 6-12
	6-15 and 6-16	6-15 and 6-16
	6-19 thru 6-22	6-19 thru 6-22
	6-27 and 6-28	6-27 and 6-28.1/6-28.2
	6-29 and 6-30	6-29 and 6-30
Chapter 7	7-4.1 and 7-4.2	7-4.1 and 7-4.2
	7-7 thru 7-10	7-7 thru 7-10
Chapter 9	9-1 thru 9-4	9-1 thru 9-4
	9-9 thru 9-15/9-16	9-9 thru 9-11
Appendix B	B-9 thru B-14	B-9 thru B-14
	Index 1 and Index 2	Index 1 and Index 2

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Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE ASSEMBLY

Model T63-A-5A (NSN 2840-00-923-6023)
Model T63-A-700 (NSN 2840-00-179-5536)

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1. Remove and insert pages as indicated below.

	Remove pages	Insert pages
Chapter 1	1-157 thru 1-162	1-157 thru 1-162
Chapter 2	2-13 and 2-14	2-13 and 2-14
	2-65 thru 2-68	2-65 thru 2-68
Appendix D	D-3 and D-4	D-3 and D-4

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *17 September 1982*

Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE ASSEMBLY

Model T63-A-5A (NSN 2840-00-923-6023)
Model T63-A-700 (NSN 2840-00-179-5536)

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1. Remove and insert pages as indicated below.

	Remove pages	Insert pages
Chapter 1	1-67 and 1-68	1-67 and 1-68
	1-129 thru 1-132	1-129 thru 1-132
Appendix H	H-5/H-6	H-5 and H-6

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Aviation Unit and Aviation Intermediate Maintenance Manual

ENGINE ASSEMBLY
Model T63-A-5A NSN 2840-00-923-6023
Model T63-A-700 NSN 2840-00-179-5536

TM 55-2840-231-23, 27 February 1981, is changed as follows:

1. Remove and insert pages as indicated below:

	Remove pages	Insert pages
Chapter 1	1-55 and 1-56	1-55 and 1-56
	1-69 and 1-70	1-69 and 1-70
	1-83 and 1-84	1-83 and 1-84
	1-87 and 1-88	1-87 and 1-88
	1-129 thru 1-132	1-129 thru 1-132A/1-132B
	1-137 and 1-138	1-137 and 1-138
	1-141 thru 1-148	1-141 thru 1-148
	1-151 and 1-152	1-151 and 1-152
	1-155 thru 1-162	1-155 thru 1-162
Chapter 2	2-9 and 2-10	2-9 and 2-10
Chapter 5	5-3 and 5-4	5-3 and 5-4
Chapter 6	6-1 and 6-2	6-1 and 6-2
	6-7 thru 6-12	6-7 thru 6-12
	6-15 and 6-16	6-15 and 6-16
	6-43 and 6-44	6-43 and 6-44
	6-65 and 6-66	6-65 and 6-66
		7-4.1/7-4.2
Chapter 8	8-3 and 8-4	8-3 and 8-4
Chapter 9	9-7 and 9-8	9-7 and 9-8
Appendix	A-1/A-2	A-1/A-2
Appendix	D-1 thru D-4	D-1 thru D-4
Appendix	G-27/G-28	G-27/G-28

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CHANGE No. 2

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DEPARTMENT OF THE ARMY
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Aviation Unit and Aviation Intermediate
Maintenance Manual

ENGINE ASSEMBLY
Model T63-A-5A NSN 2840-00-923-6023
Model T63-A-700 NSN 2840-00-179-5536

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1. Remove and insert pages as indicated below.

	Remove pages	Insert pages
Chapter 9	9-13 and 9-14	9-13 and 9-14

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Aviation Unit and Aviation Intermediate Maintenance Manual

ENGINE ASSEMBLY

Model T63-A-5A NSN(2840-00-923-6023)
Model T63-A-700 NSN(2840-00-179-5536)

TM 55-2840-231-23, 27 February 1981, is changed as follows:

1. Remove and insert pages as indicated below.

	Remove pages	Insert pages
Chapter 1	1-43 and 1-44	1-43 and 1-44
	1-129 and 1-130	1-129 and 1-130
	1-155 and 1-156	1-155 and 1-156
Chapter 6	6-7 and 6-8	6-7 and 6-8
	6-47 thru 6-50	6-47 and 6-48
	6-51 and 6-52	6-52
Appendix D	D-1 and D-2	D-1 and D-2

2. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

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

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

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Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31, Organizational Maintenance Requirements for OH-6 and OH-58 aircraft.

WARNING AND FIRST AID DATA PAGE

For artificial respiration and other first aid data, refer to FM21-11.

Personnel performing instructions involving operations, procedures, and practices which are included or implied in this technical manual shall observe the following instructions. Disregard of these warnings and precautionary information can cause serious injury, illness, death or an aborted mission.

WARNING

An operating procedure, practice, etc., which if not correctly followed, could result in 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 it is essential to highlight.

WARNING

Compressed Air

- Compressed air used for cleaning purposes will not exceed 30 psi.
- Use only with effective chipguarding and personal-protective equipment (goggles, shields, gloves, etc.).
- Personnel should stand clear of air valve when loosening to prevent personal injury.

WARNING AND FIRST AID DATA PAGE — Continued

WARNING

Calibrating Fluid
MIL-C-7024

- Combustible — do not use near open flames, near welding areas, or on hot surfaces.
- Prolonged contact with skin may cause irritation. Prolonged inhalation of vapor can cause dizziness, headache, and intoxication.
- If there is any prolonged contact with skin, wash affected area with soap and water. If liquid contacts eyes, flush eyes thoroughly with water. Remove solvent-saturated clothing. If vapors cause light-headedness, go to fresh air. If liquid is swallowed, do not try to vomit. Get medical attention.
- When handling or when applying liquid at an air-exhausted workbench, wear approved gloves.
- When handling or when applying liquid at an unexhausted workbench, wear approved gloves and goggles.
- Dispose of liquid-soaked rags in approved metal container.

WARNING

Radioactive Material

The Scroll assembly, NSN 2840-00-244-1774, contains thorium, a radioactive material. Maintenance of this engine part is limited to replacement unless other maintenance is specifically authorized and is covered by a valid US Nuclear Regulatory Commission license. Nonrepairable Scroll assemblies must be disposed of as radioactive waste in accordance with AR 385-11.

WARNING AND FIRST AID DATA PAGE — Continued

WARNING

DRY CLEANING SOLVENT, P-D-680

used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C-59°C).

WARNING

CLEANING SOLVENTS

Cleaning solvents may be toxic. 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.

WARNING

DANGEROUS CHEMiCALS

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

WARNING

HIGH VOLTAGE

may be present in the igniter lead. Insure that the ignition system has been off for at least five minutes before disconnecting the lead. Ground the lead to the engine using an insulated screwdriver to dissipate any energy stored in the exciter.

WARNING AND FIRST AID DATA PAGE — Continued

WARNING

Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

WARNING

SEVERE BURNS

may result from contact with the engine hot section. Insure that the engine has had sufficient time to cool before attempting to perform maintenance on the hot section.

If a magnetic plug warning light comes on during flight, land and inspect the magnetic plugs as soon as possible. This light is an indication of conditions which could cause engine failure.

Prolonged contact with lubricating oil may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

Methanol is flammable; it should not be used if the ambient temperature is above 4°C (40°F), its vapor is harmful; it could be fatal or cause blindness if swallowed. Keep it away from open flame and avoid prolonged breathing of the vapor.

To prevent injury to personnel, the fuel system of all engines that are to be placed in containers (less accident-involved engines) will be thoroughly drained, purged, and preserved. All disconnected lines will be capped or plugged. Tape will not be used in place of caps or plugs.

Make certain that all air pressure has been released before loosening nuts and bolts. If nuts are removed before pressure is released, internal pressure could blow off cover. Injury to personnel could occur.

WARNING AND FIRST AID DATA PAGE - Continued

When handling combustion chamber internal parts that have been exposed to fuels containing tetraethyl lead, insure that the byproduct (poisonous lead oxide) 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 clean water and obtain immediate medical attention.

Prior to removing engine from container, make sure both sections are grounded and the container is opened in a well ventilated area. Explosion could cause injury to personnel.

To avoid electrical shock, insure ignition system has been off for at least five minutes before disconnecting any leads. Ground leads to engine using an insulated screwdriver.

Personnel should stand clear of air valve when loosening to prevent personal injury.

Failure to properly install, align and torque fuel, oil, and air fittings and tubes could result in an engine failure.

TECHNICAL MANUAL

NO. 55-2840-231-23

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 27 February 1981

Aviation Unit and Intermediate *Maintenance* Manual
Engine Assembly
Model T63-A-700
NSN 2840-00-179-5536

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter 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. A reply will be furnished directly to you.

Distribution Statement A: Approved for public release, distribution is unlimited.

*This manual supersedes TM 55-2840-231-24, 3 March 1972, including all changes.

List of Illustrations

List of Tables

CHAPTER 1

ENGINE - GENERAL

OVERVIEW

This chapter contains information and descriptions pertaining to the T63-A-700 engine system, system components, major assemblies, leading particulars and operation. General maintenance and support information is also provided for inspection, servicing, maintenance, troubleshooting and testing of the complete engine.

Section I. GENERAL INFORMATION

1.1. SCOPE.

Type of Manual: Aviation Unit Maintenance (AVUM) and Aviation Intermediate Maintenance (AVIM)

Model Number and Equipment Name: T63-A-700 Turboshaft Engine (See figure 1-1.)

Purpose of Equipment: To supply engine power requirements for various helicopter aircraft which have been designed to accept the turboshaft engine contained in this manual. External view of the engine is given below.

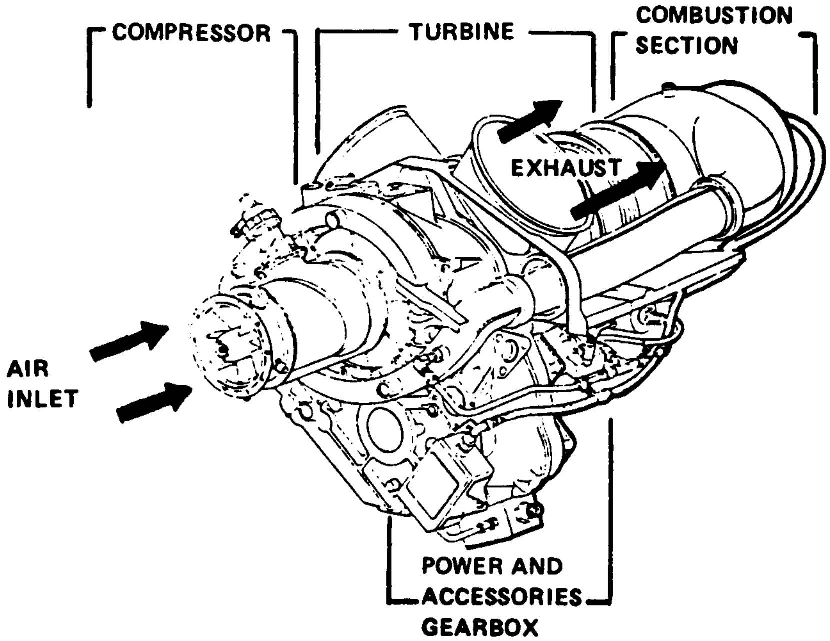


Figure 1-1. T63-A-700 Turboshaft Engine

a. GENERAL DESCRIPTION. Consists of:

(1) Engine

(2) Systems

(3) Components

(4) Accessories

b. MAINTENANCE PROCEDURES. Consists of:

(1) Removal

(2) Disassembly

(3) Cleaning

(4) Repair and Replacement

(5) Assembly

(6) Installation

(7) Preservation

(8) Storage

(9) Activation of Uninstalled Engine

c. PROCEDURES. Contained in the airframe Organizational Maintenance Manual consist of:

(1) Preservation

(2) Storage

(3) Activation of installed engines

Applicable Airframe Organizational Manuals

Airframe Manual	Title
TM 55-1520-214-23	AVUM and AVIM Maintenance Manual Helicopter, Observation OH-6A (Hughes)
TM 55-1520-228-23	AVUM and AVIM Maintenance Manual Army Model OH-58A Helicopter

1.2 MODIFICATIONS: The following modification directives (table 1-1) have been incorporated in the manual. If the time compliance period for the modification directive has not been reached, both configurations are included in the manual. If the time compliance period has expired, only the current configuration is shown.

Table 1-1. Modification Directives

*MWO 55-2840-231-30/2	Modification to Install a P_c Air Filter Kit (T63-A-700)
MWO 55-2840-231-3014	Modification to Install a Compressor Bleed Valve Orifice Engine to be modified at next overhaul.

* Cancelled.

1-3. MAINTENANCE FORMS, RECORDS AND REPORTS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pamphlet 738-751, Functional Users/ Manual for the Army Maintenance Management System - Aviation (TAMMS-A).

1-4. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE. Destroy engine when evacuation to safety is not possible to prevent use by enemy. Refer to TM 750-244-1-5.

a. Demolition of Engine by Explosives. Use explosives to destroy engine. Place explosives, whenever possible in inlet and exhaust opening of engine. Detonate when personnel have withdrawn to a safe distance or cover. Explosives may also be detonated under an engine stored in a shipping container.

b. Demolition of Engine Using Mechanical Means. Smash all cast parts to destroy engine mechanically. A smashed compressor housing will cause engine to become inoperable. Other parts and accessories may be smashed or crushed as time permits. When more than one engine is to be destroyed mechanically, insure similiar parts on each engine are destroyed.

c. Demolition of Engine by Fire. An incendiary grenade or any other source of intense and sustained combustion may be used to destroy the engine by fire.

1.5. ADMINISTRATIVE STORAGE. Requirements are part of maintenance instructions. Refer to Section VII.

1.6. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC). Refer to TM 55-0411 for information about Quality Assurance/Quality Control (QA/QC).

Section II. EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT PURPOSE, CAPABILITIES AND FEATURES.

a. Purpose of Engine, Shaft Turbine. The T63 Series engines are designed for use on the OH-6A and OH-58A helicopters.

b. Capabilities and Features.

Ž Major Sections:

1. Combustion Section
2. Turbine Section
3. Compressor Section
4. Power and Accessories Gearbox

Ž Major Engine Systems:

1. Fuel and Control
2. Lubrication
3. Ignition
4. Anti-icing air
5. Temperature Measurement
6. Compressor acceleration bleed air

- All components are covered separately in this manual.

1-8. Deleted.

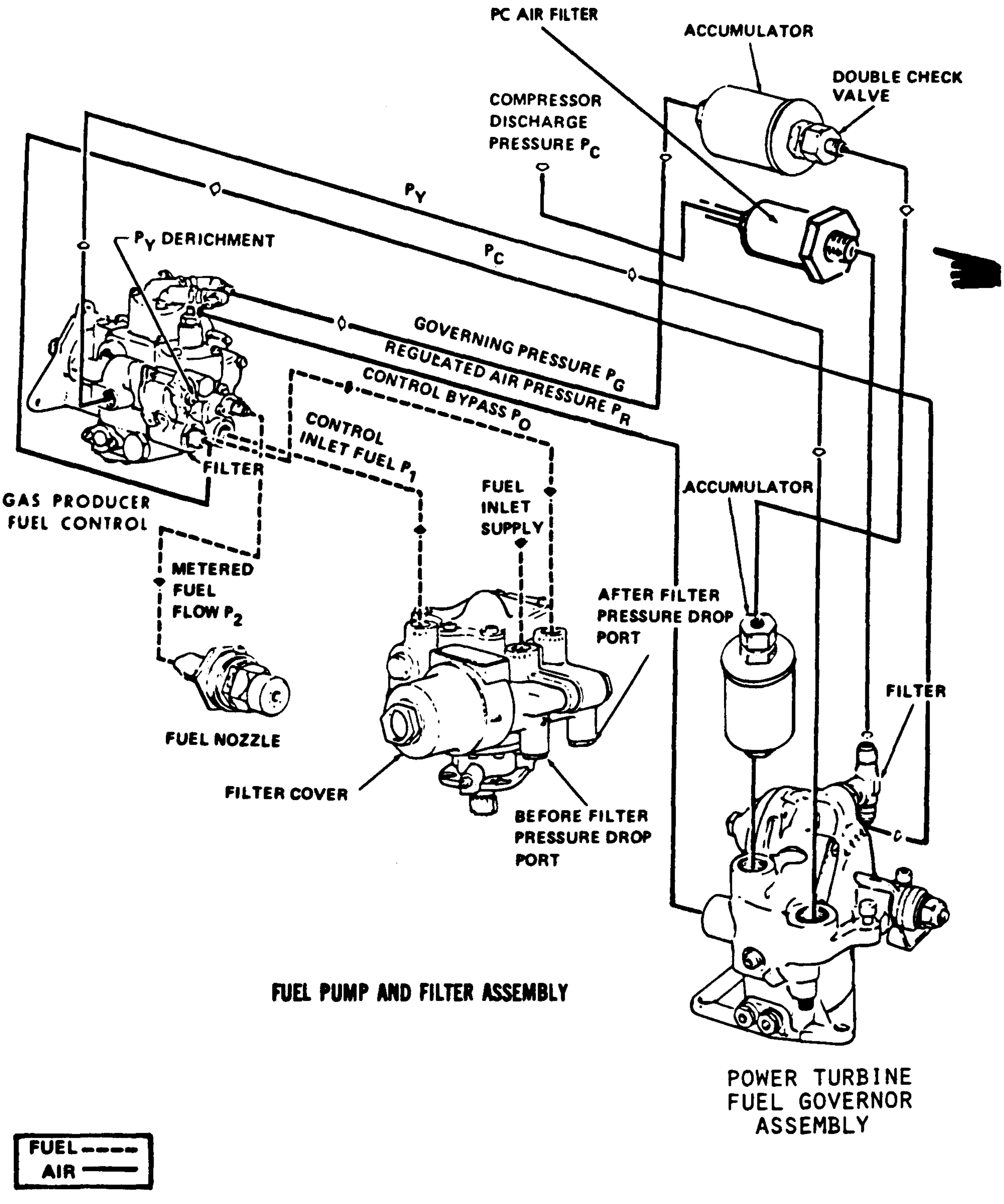


Figure 1-2. Engine Fuel and Control System

1-9. DESCRIPTION OF ENGINE OPERATION. The engine is a free turbine engine (no mechanical connection between the gas producer turbine and the power turbine). The power turbine is gas coupled to the gas producer turbine by the combustion gases.

The helicopter uses a conventional control system. The collective pitch of the helicopter rotor establishes the power output demand on the engine. For all practical purposes, helicopter rotor speed is held constant by the engine and its control system.

The fuel control is connected to the twist grip on the pilot's and copilot's collective pitch sticks. The power turbine governor is interconnected to the collective-pitch sticks through a coordinated system of bellcranks and linkages. Any change in collective pitch resets the-governor to a new power demand. This demand is transmitted to the gas producer fuel control, which resets and varies the N1 speed of the gas producer turbine accordingly.

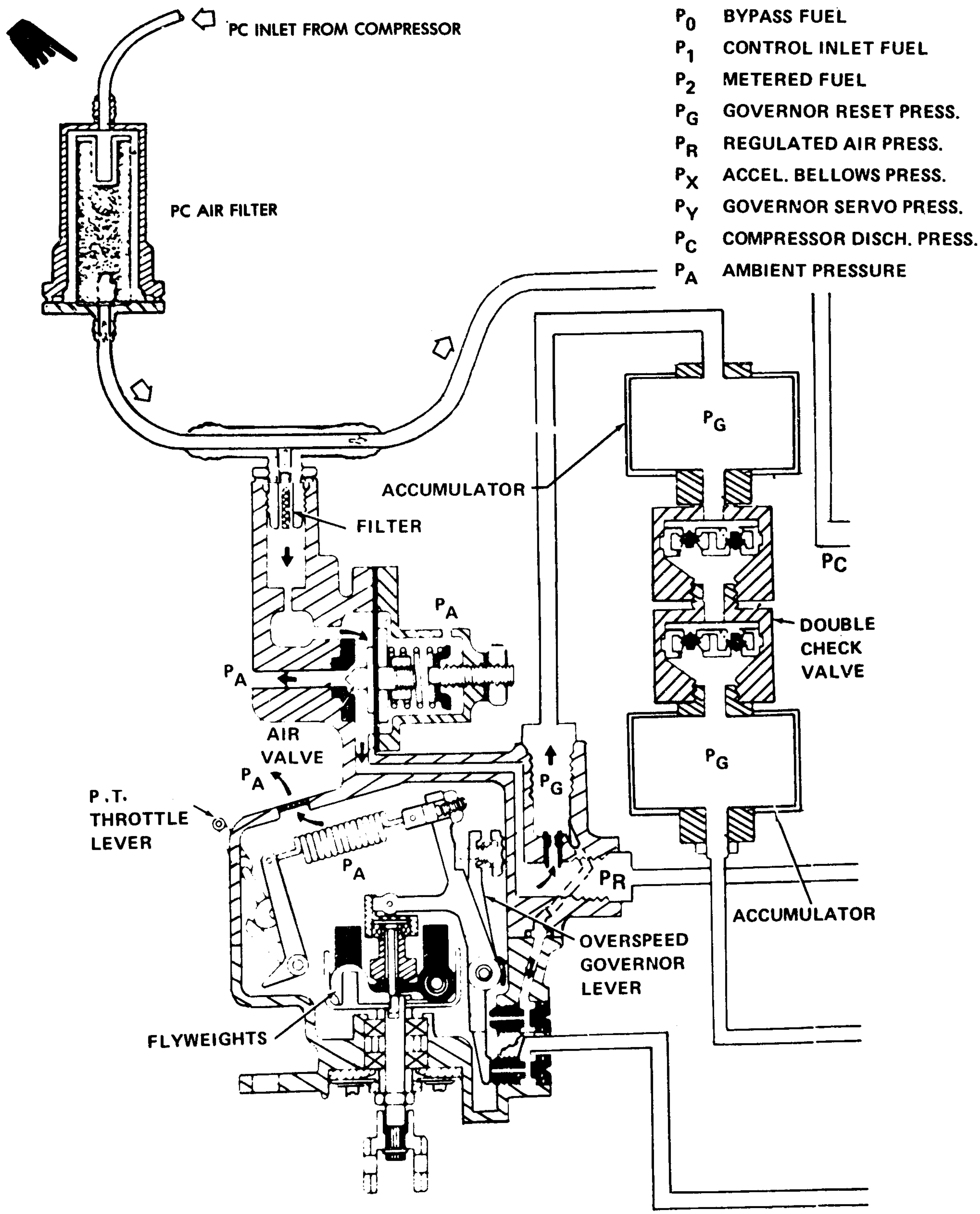
A motor-actuated speed trimming device is installed in the linkage between the collective pitch sticks and the power turbine governor lever. It is operated by a trim switch on each collective pitch stick, and allows engine output speed to be varied over a normal range of approximately 98 to 103 percent (5880 to 6180 rpm).

1-10. Fuel and Control System. The gas producer fuel control (figs. 1-2 and 1-3) is located schematically in the fuel system between the fuel pump assembly and the fuel nozzle. A power turbine governor, also apart of the control system, provides control intelligence to the gas producer fuel system.

The system controls engine power output by controlling gas producer speed. Gas producer speed levels are established by the action of the power turbine governor which senses power turbine speed. Power turbine speed is selected by the operator. The power required to maintain this speed is automatically maintained by power turbine governor action on the gas fuel control.

The power turbine governor lever schedules the governor requirements. The power turbine governor in turn, schedules the gas producer speed to a changed power output to maintain output shaft speed.

Fuel flow for engine control depends on compressor discharge pressure (P_c), engine speed (gas producer - N1 and/or power turbine - N2), and lever angle. Fuel flow is a function of P_c as sensed in the fuel control. Variations of fuel flow schedules are obtained by modulating the P_c to P_x and P_y pressures in the control through the action of a bleeddown circuit actuated by the governors.



POWER TURBINE, GOVERNOR ASSEMBLY

Figure 1-3. Fuel Control System Schematic (Sheet 1 of 2)

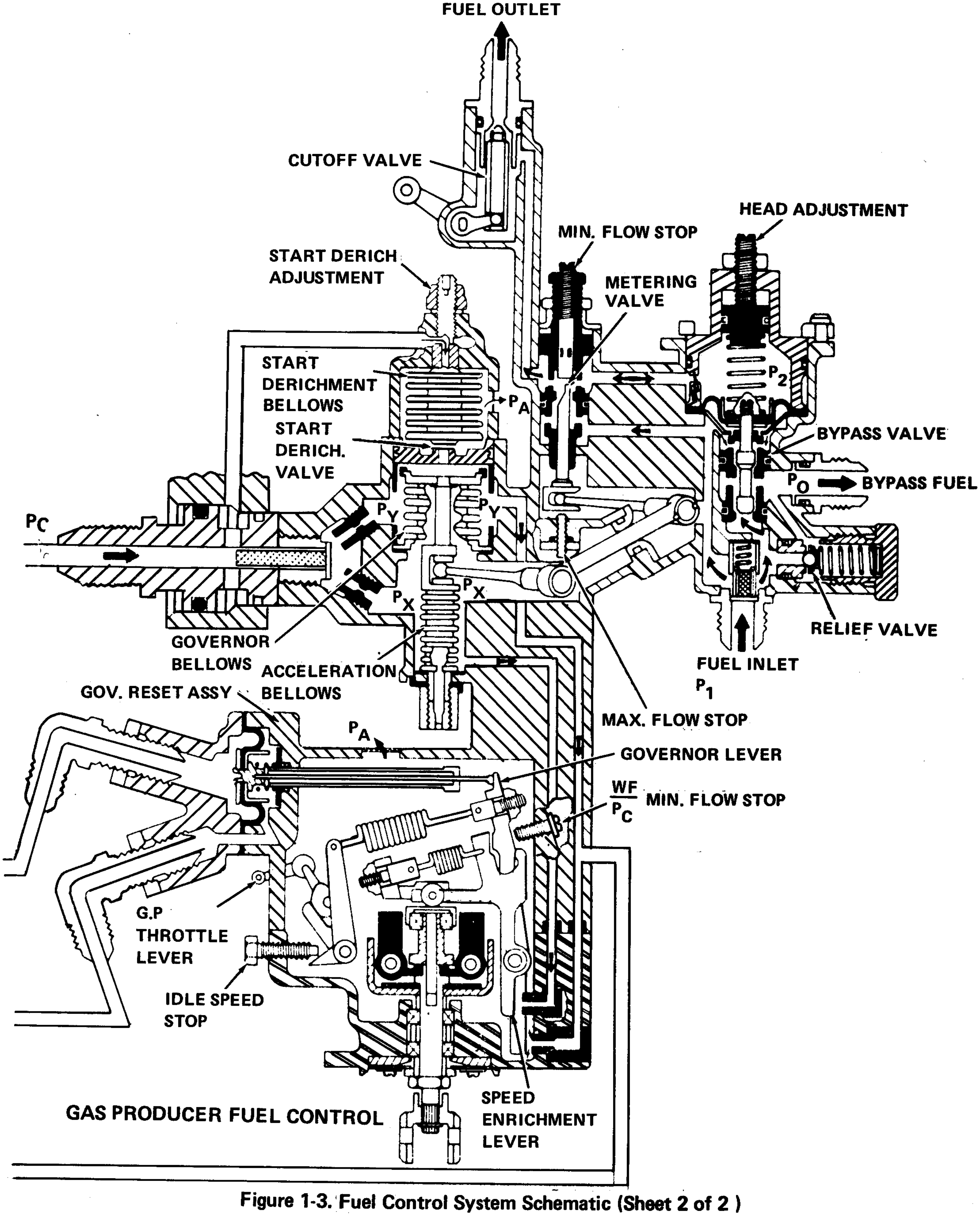


Figure 1-3. Fuel Control System Schematic (Sheet 2 of 2)

1-11. Compressor. The compressor assembly (fig. 1-4) consists of a compressor front support, case assembly with stator vanes, rotor assembly with blades, centrifugal impeller, front diffuser assembly, rear diffuser assembly, and diffuser scroll. Air enters the compressor through the front support. Struts in the support guide the air and direct it in the proper direction into the first stage of the compressor rotor. The air is then compressed by the six axial compressor stages and one centrifugal stage. As the air passes through the axial stages, it is alternately accelerated by the rotor blade and decelerated by the stator vanes. At the same time, it is compressed into an ever decreasing space. This results in an increase of both air pressure and temperature. The sixth-stage compressor vanes direct the compressed air into the impeller. The impeller vanes centrifugally accelerate the air through an ever decreasing space to further increase the air pressure and temperature. It is then discharged across the diffuser vanes and directed into the diffuser scroll. The diffuser scroll collects the compressor discharge flow at a constant velocity and directs it rearward through two ports to the combustion section.

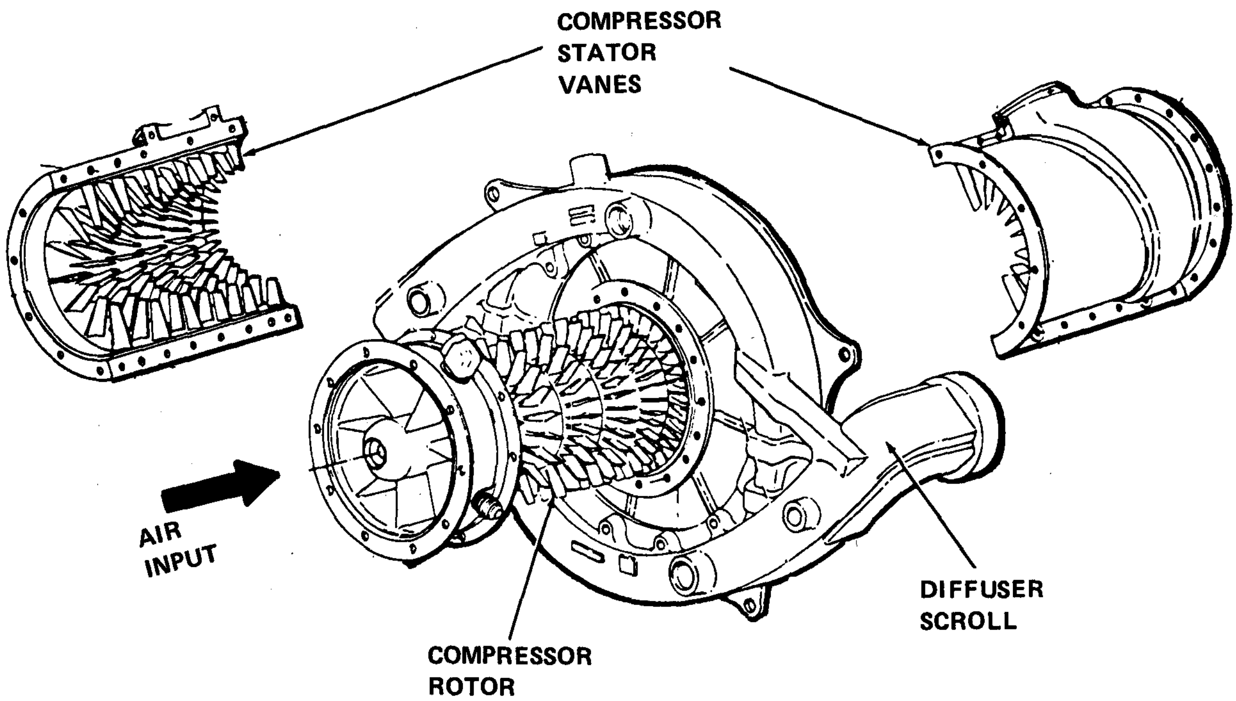


Figure 1-4. Compressor Assembly

1-12. Turbine. The turbine (fig. 1-5) consists of a gas producer turbine, a power turbine support, a turbine and exhaust collector support, a two-stage gas producer turbine, and a two-stage power turbine. The turbine is mounted between the combustion section and the power and accessory gearbox. The two-stage gas producer turbine drives the compressor and accessory gear train. The two-stage power turbine furnishes the output power of the engine.

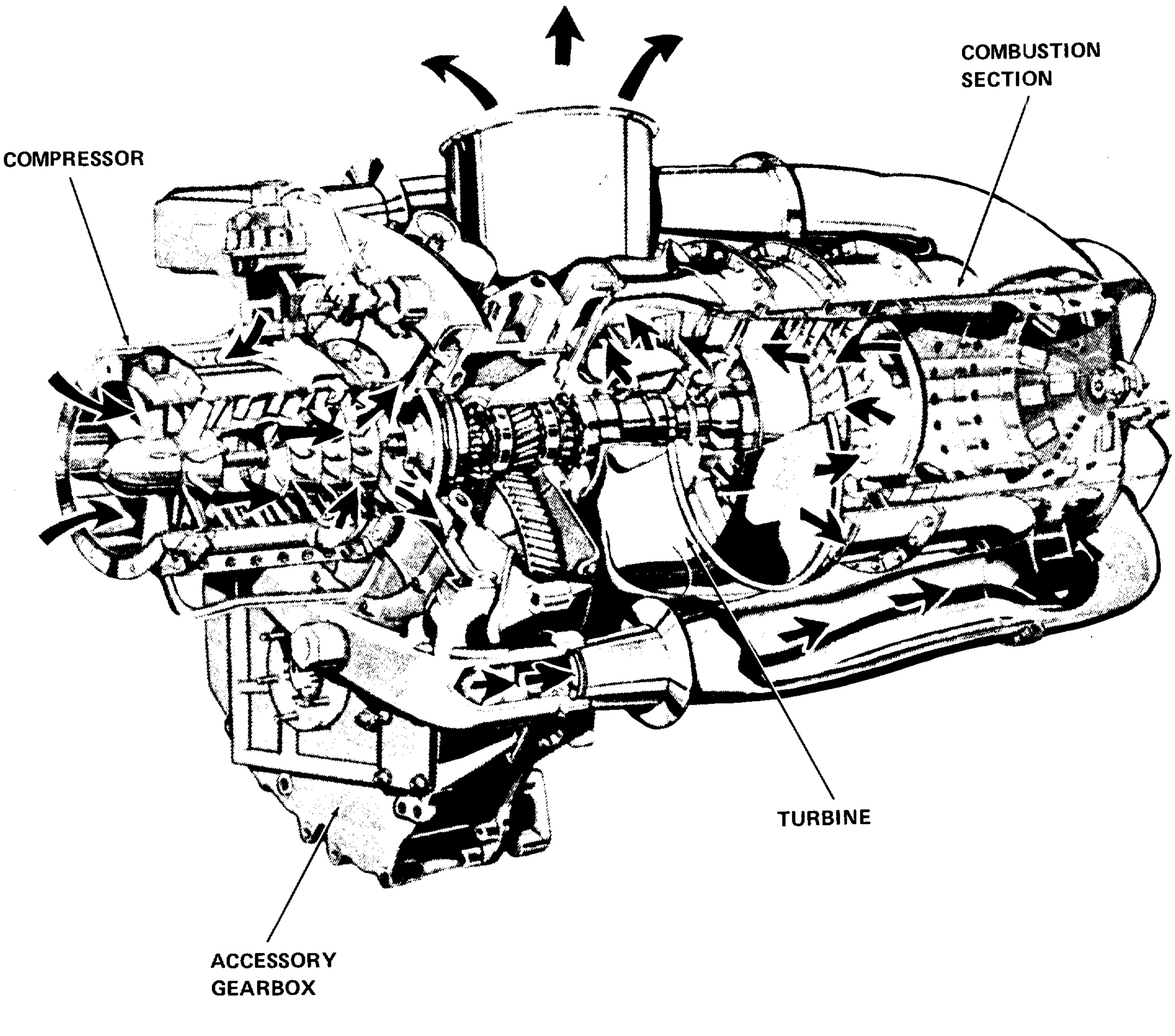


Figure 1-5. Power Turbine Section

1-13. Combustion Section. combustion section (fig. 1-6) consists of two compressor discharge air tubes (one on each side of engine), a combustion outer case, and a combustion liner. A spark igniter and fuel nozzle are installed in the rear of the outer combustion case. Compressor discharge air is ducted from the diffuser scroll to the combustion outer case by the two compressor discharge air tubes. Air enters the single combustion liner at the rear through holes in the liner. The air is mixed with fuel sprayed from the fuel nozzle and combustion gases move forward out of the combustion liner to the turbine.

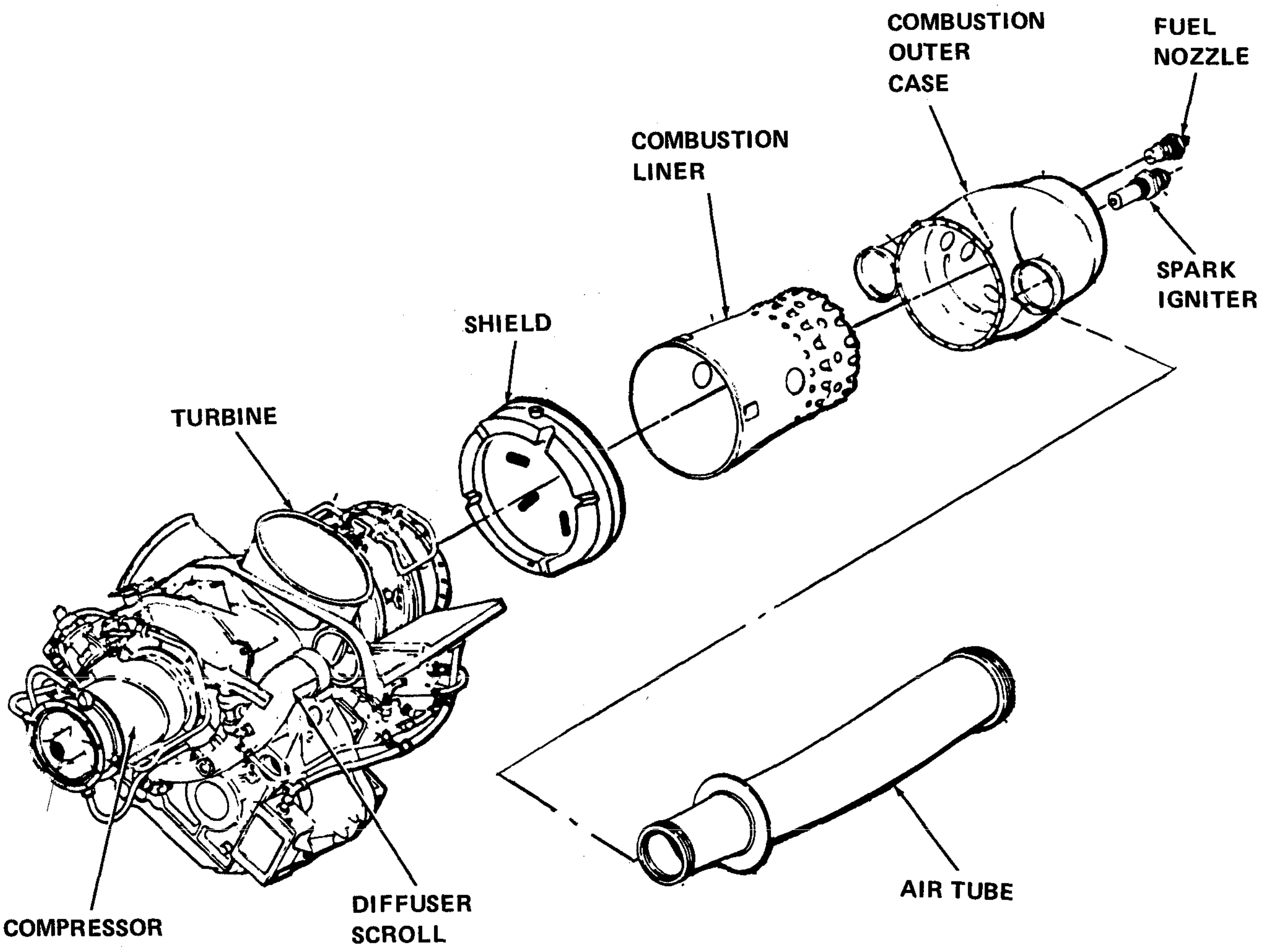
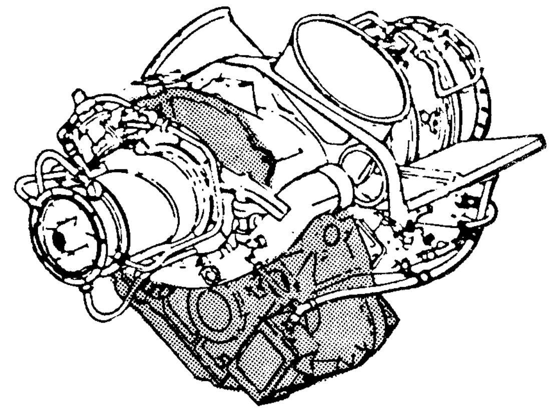
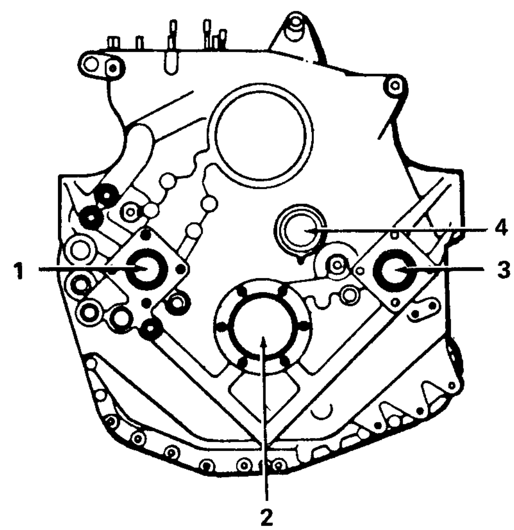


Figure 1-6. Combustion Section

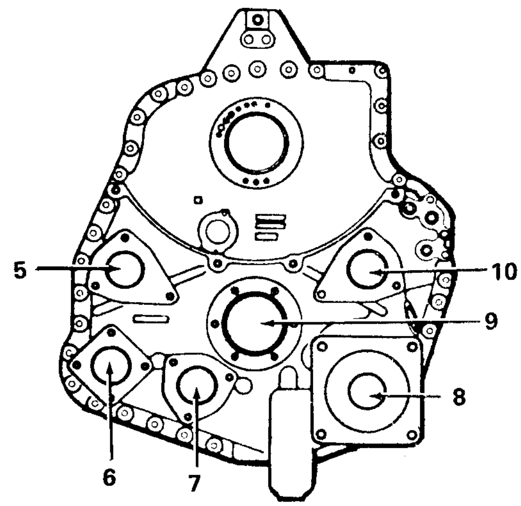
1-14. Power and Accessory Gearbox. The main power and accessory drive gear trains (fig. 1-7) are enclosed in a single gear case. The gear case serves as the structural support of the engine. All engine components, including the engine-mounted accessories, are attached to the case. The reduction gearing reduces power turbine speed from 35,000 to 6000 rpm at the output drive pads.

1. Gas Producer Tachometer-Generator
2. Power Takeoff
3. Power Turbine Tachometer Generator
4. Torquemeter Spanner Nut
5. Power Turbine Fuel Governor
6. Spare (not used)
7. Fuel Pump
8. Starter-Generator
9. Power Takeoff
10. Gas Producer Fuel Control





FRONT



REAR

Figure 1-7. Power and Accessory Gearbox

1-15. Gas Producer Fuel Control. The gas producer fuel control has a bypass valve, metering valve, acceleration bellows, governing and enrichment bellows, manually operated cutoff valve, maximum pressure relief valve, torque tube seal and lever assembly, and a start derichment valve. The maximum pressure relief valve protects the system from excessive fuel pressure.

Fuel enters the control from the engine fuel pump and filter assembly and is delivered to the metering valve. The bypass valve maintains a constant pressure differential across the metering valve. Also, excess fuel is bypassed to the fuel pump and filter assembly through an external line connecting the pump bypass inlet to the bypass outlet port of the gas producer fuel control.

The metering valve is operated by lever action through movement of the governor and acceleration bellows. Metering valve area depends on valve travel. Before light-off and acceleration, the metering valve is set at a predetermined open position by the acceleration bellows under the influence of ambient pressure (P_c at zero rpm).

The start derichment valve is open during light-off and acceleration to a set P_c. The open derichment valve vents P_y pressure to atmosphere. Venting P_y allows the governor bellows to move the metering valve against the minimum flow stop. At minimum flow the metering valve provides the required lean fuel schedule after light-off. As compressor rpm increases, the derich-ment valve is closed by P_c acting on the derichment bellows. When the derichment valve is closed, control of the metering valve is returned to the normal operating schedule.

During acceleration, the P_x and P_y pressures are equal to the modified compressor discharge pressure (P_c) up to the point where the speed enrichment orifice is opened by flyweight action. Opening the speed enrichment orifice bleeds P_x pressure while P_y remains at a value equal to P_c. Under the influence of the P_y minus P_x pressure drop across the governor bellows, the metering valve moves toward the maximum flow stop where it increases fuel flow.

Gas producer speed is controlled by the gas producer fuel control governor. A set of flyweights operate the governor lever which controls the governor bellows (P_y) bleed at the governing orifice. Flyweight operation of the governor lever is opposed by a variable spring load. The spring force is established by the throttle lever acting on a spring scheduling cam. Opening the governing orifice bleeds P_y pressure and allows P_x pressure to control the governor bellows. The P_x influence on the bellows moves the metering valve toward minimum flow and at a position where metered flow is at steady state requirements.

The governor reset assembly in the gas producer fuel control limits or governs power turbine speed. Control of the reset assembly is derived from the power turbine governor. The power turbine governor also provides quick responding overspeed protection by bleeding governor servo (P_y) pressure from the gas producer fuel control.

1-16. Power Turbine Governor. Power turbine speed is scheduled by the power turbine governor lever and the power turbine speed scheduling cam. The cam sets a governor spring load which opposes a fly-weight output. As the desired speed is approached, the flyweights operating against the governor spring move a link to open the power turbine governor orifice. The flyweights also open the overspeed bleed (P_y) orifice but at a higher speed than the regular governor (P_g) orifice.

The governor orifice is downstream of a bleed supplied by a regulated air pressure (P_r). Opening the orifice results in a reduced pressure downstream of the bleed (P_g) as an inverse function of increasing speed. Regulated pressure (P_r) and governing pressure (P_g) are applied to opposite sides of a diaphragm in the governor reset section of the gas producer fuel control. The force generated by P_r minus P_g across the diaphragm acts on the gas producer power output link through the governor reset rod. This force supplements the weight force in the gas producer fuel governor to reset (reduce) the gas producer speed.

Gas producer speed cannot exceed the gas producer fuel governor setting. The P_r minus P_g diaphragm is preloaded for establishing the active P_r minus P_g range. P_r pressure is supplied from engine P_c pressure by an air regulator valve.

The overspeed orifice bleeds P_y pressure from the governing system of the gas producer fuel control. Bleeding P_y pressure at the power turbine governor gives the fuel control system a rapid response to overspeed conditions.

1-17. Fuel Pump and Filter Assembly. The fuel pump and filter assembly (fig. 1-8) has two gear-type pumping elements arranged in tandem and driven by a common drive shaft. Fuel enters the engine fuel system at the inlet port of the pump and passes through a low pressure filter before entering the gear elements. The gear elements are in parallel. Each pumping element has sufficient capacity to permit takeoff power operation if the other pumping element fails. Two discharge check valves are in the assem-bly to prevent reverse flow if one gear pumping element fails. A bypass valve in the pump assembly by-passes fuel if the filter element becomes clogged.

The bypass return flow from the fuel control is passed back to the inlet of the gear elements through a pressure regulating valve which maintains the bypass flow pressure above inlet pressure. By means of passages, leading to auxiliary filling ports on the periphery of the gear elements, a portion of the bypass flow is used to fill the gear teeth when vapor-liquid conditions exist at the inlet to the gear elements.

A 5-micron paper filter is located inside the fuel pump assembly upstream of the gear elements. It is retained by a threaded cover, distinguished by a hex, which can be found on the lower side of the pump assembly. A container should be used to catch undrained fuel when the filter cover is removed.

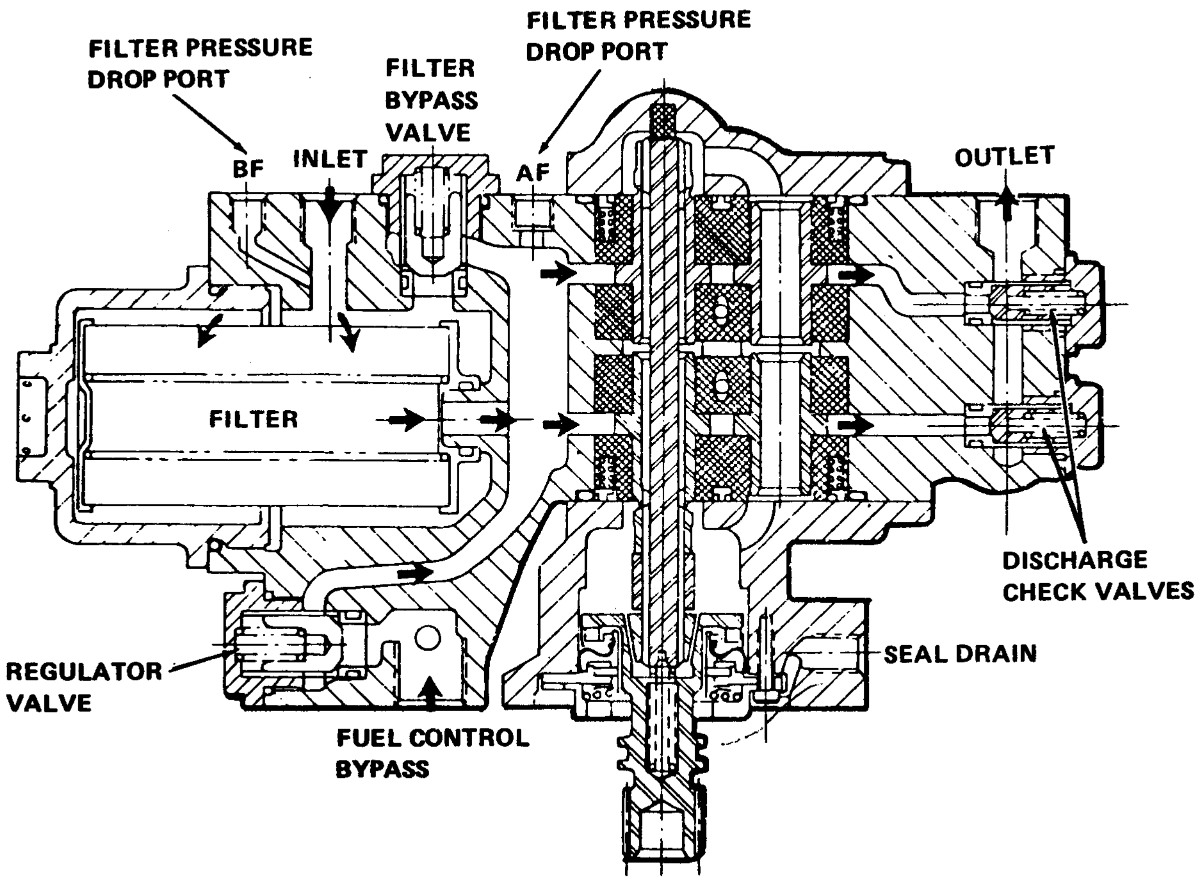


Figure 1-8. Fuel Pump and Filter Assembly

1-17.1 Pc Air Filter. The Pc air filter is a 10 micron filter located in the Pc air supply line leading from the diffuser scroll to the power turbine governor. It incorporates a permanent type, wire mesh, cleanable element and prevents the governor and fuel control pneumatic components from being contaminated with foreign particles by filtering Pc air flow to the governor and control.

1-18. Lubrication System. The lubrication system (fig. 1-9) is a dry sump type with an external reservoir and heat exchanger. A gear type pressure and scavenge pump assembly is mounted within the Power and accessory gearbox. oil fiter, bypass valve (fig. 1.9), and pressure regulating valve are in a unit which is located in the upper right-hand side of the power and accessory gearbox housing and are accessible from the top of the engine. A check valve is located between the housing and the filter unit. Indicating type magnetic chip detectors are installed at the bottom of the power and accessory gearbox, snd at the engine oil outlet connection. All engine oil system lines and connections are internal with the exception of pressure and scavenge lines to the front compressor support, the gas producer turbine support, and the power turbine support.

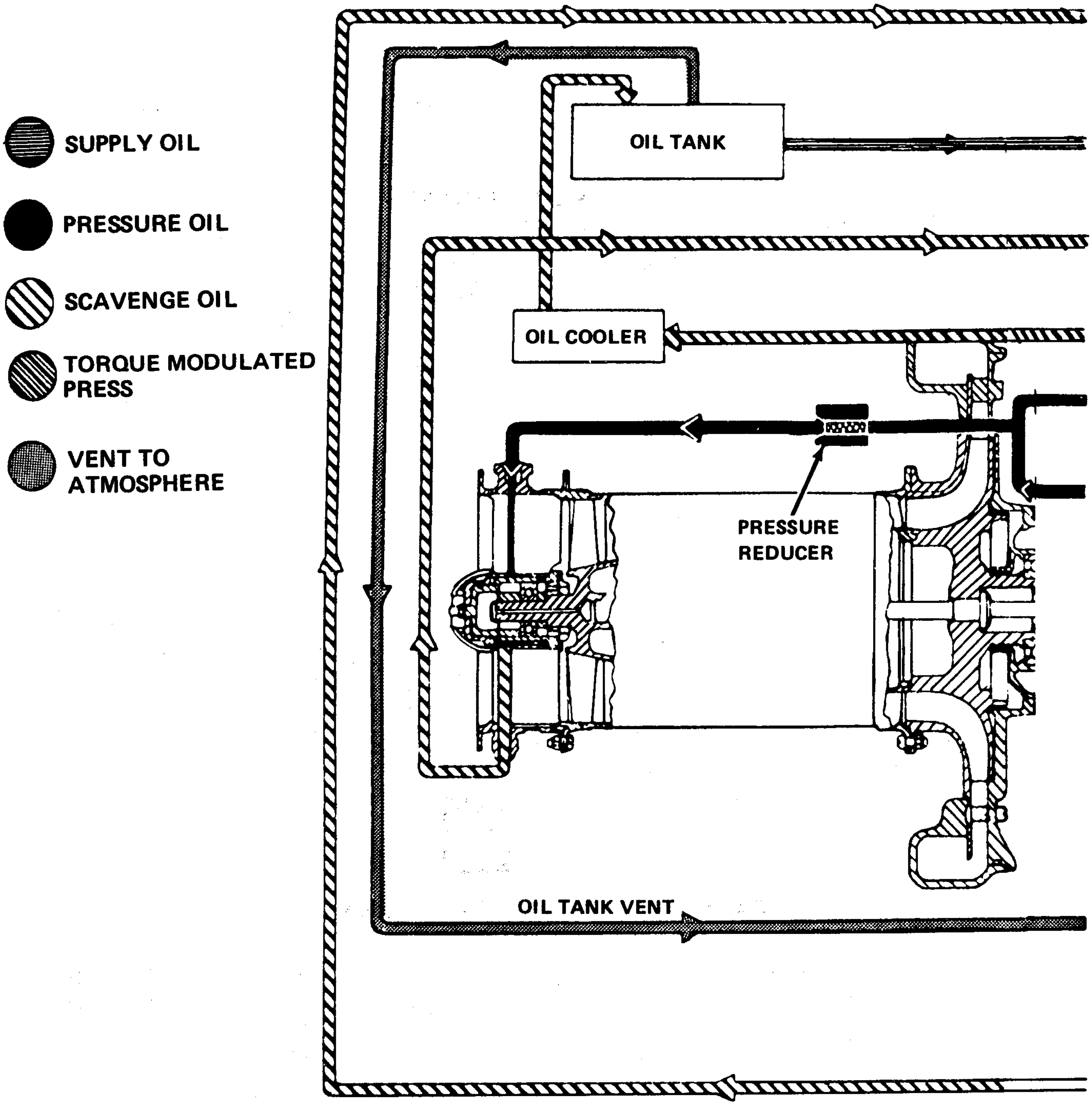


Figure 1-9. Engine Lubrication Schematic (Sheet 1 of 2)

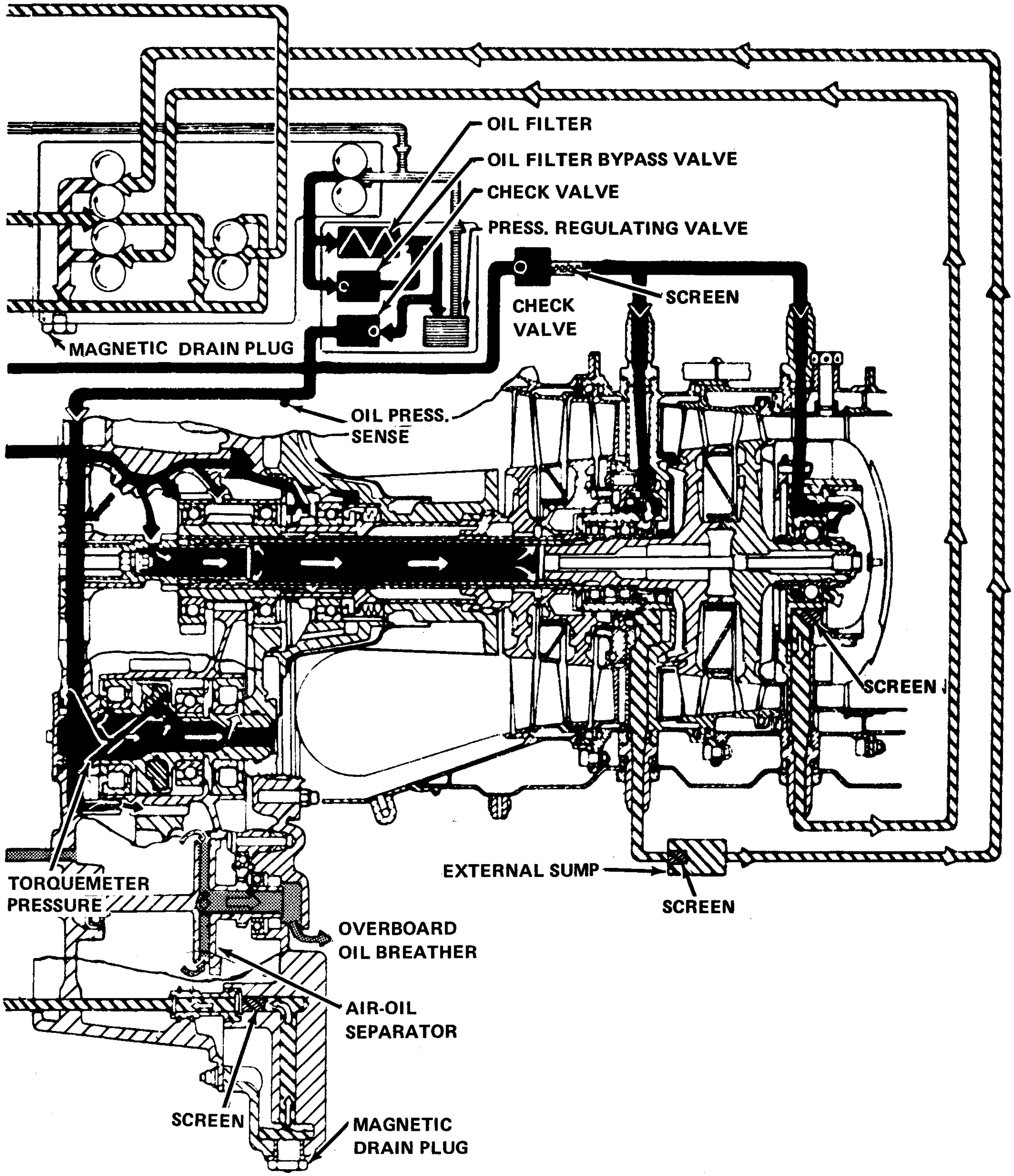


Figure 1-9. Engine Lubrication Schematic (Sheet 2 of 2)

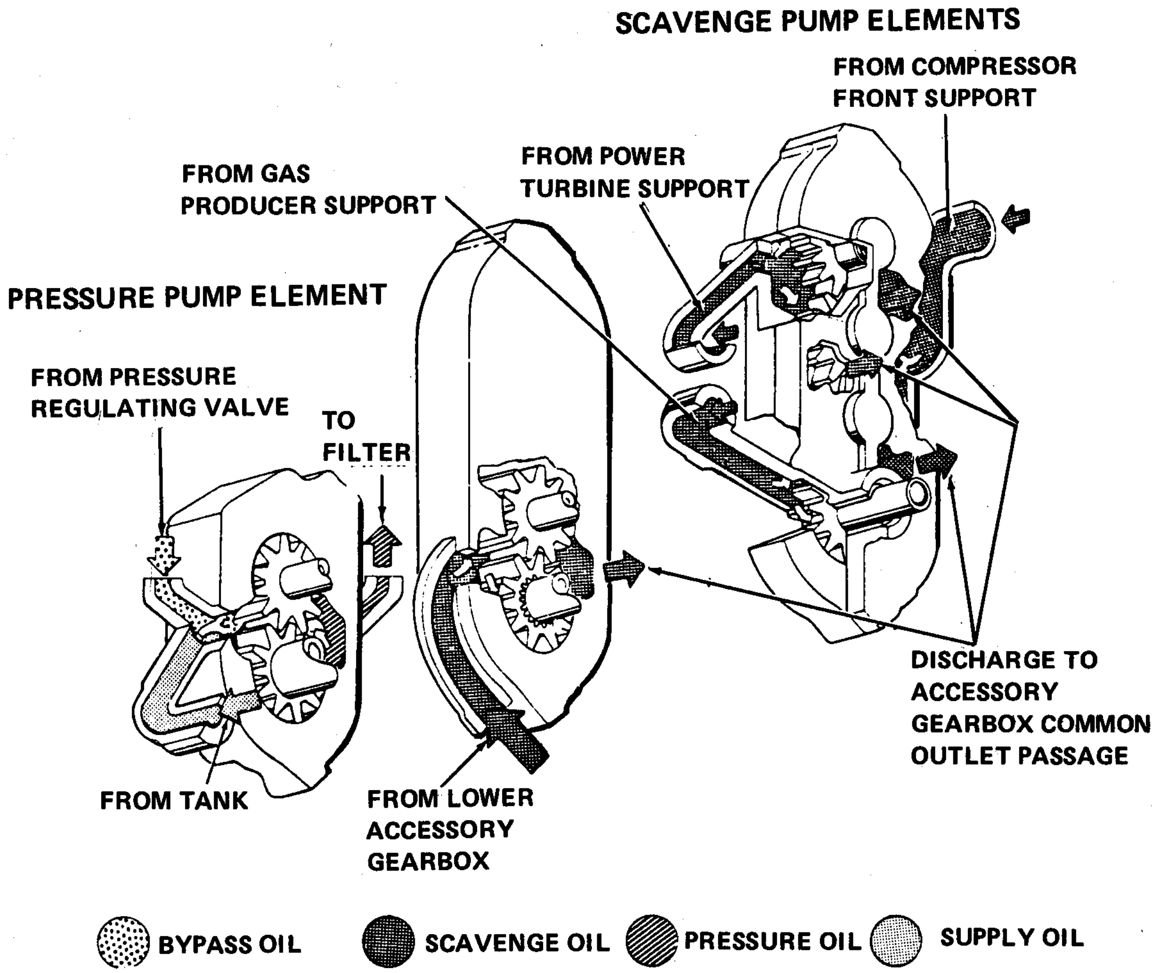


Figure 1-10. Oil Pump Schematic

1-19. Fuel Nozzle. Fuel nozzle (fig. 1-11) is a single-entry, duual-otifice type unit. It contains an integral valve for dividing primary and secondary flow. This same valve acts as a fuel shutoff valve when fuel manifold pressure falls below a predetermined pressure, and keeps fuel out of the combustion chamber at shutdown.

1-20. Ignition System. The engine ignition system (fig. 1-12) consists of a low tension capacitor discharge ignition exciter, a spark igniter lead, and a shunted-surface gap spark igniter. The system receives its input power from a 14- to 29-volt dc power source.

Some T63-A-700 engines have an auto reignition system installed to automatically relight the engine in the event of an inflight flame-out. The system senses compressor discharge pressure and automatically turns on the ignition system when the rate of decay of compressor discharge pressure exceeds a predetermined rate. When an automatic reignition is initiated, the auto reignition light illuminates and the ignition system is energized. After approximately 2.8 seconds, the ignition system deenergizes; however, the auto reignition light remains illuminated until it is manually turned off (reset).

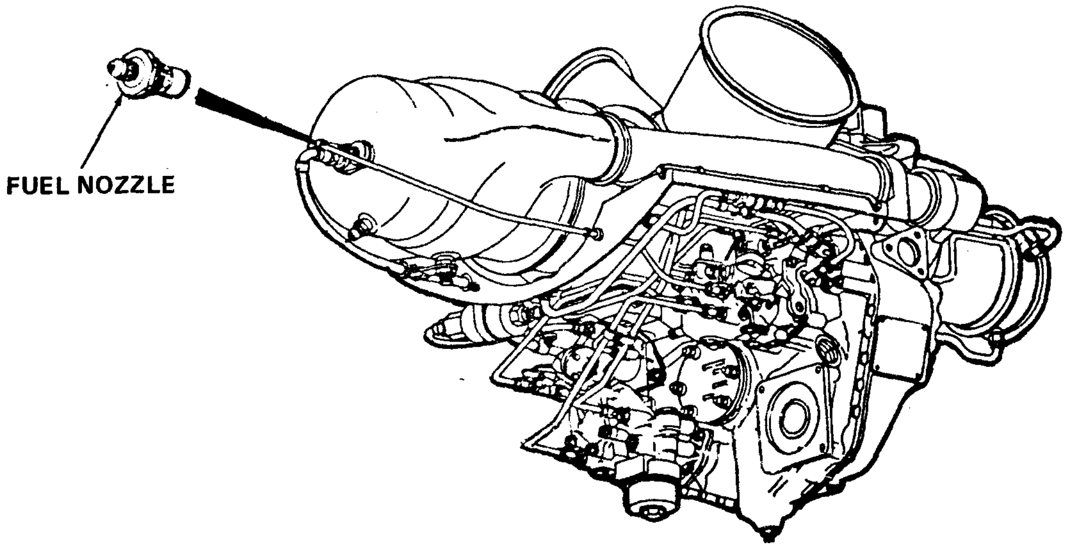


Figure 1-11. Fuel Nozzle

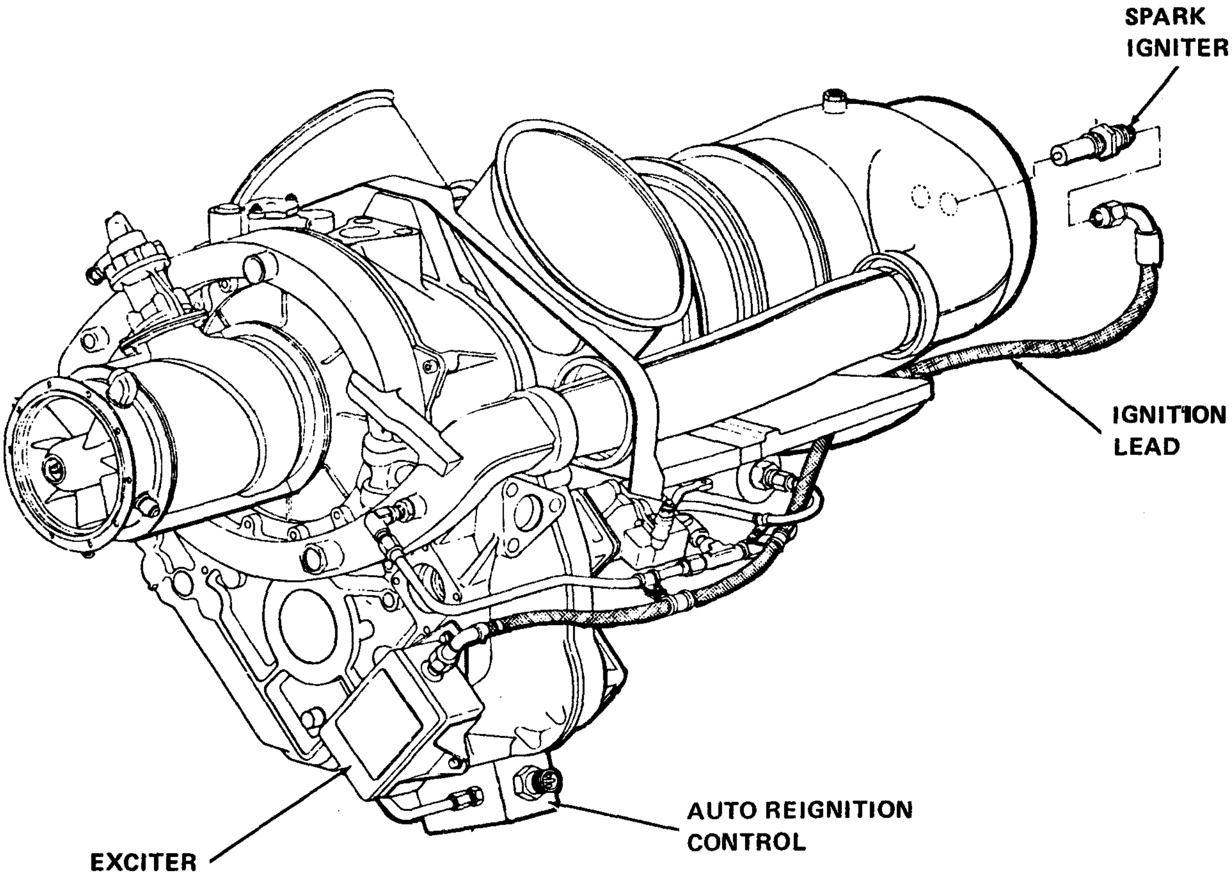


Figure 1-12. Ignition System

1-21. Temperature Measurement System. The temperature measurement system has four chromel-alumel single junction thermocouples in the gas producer turbine outlet (TOT) and an associated integral harness. The voltages of the four thermocouples are electrically averaged in the assembly and delivered by the assembly lead to an engine terminal block for attachment to the airframe temperature indicating system.

1-22. Anti-Icing System. Anti-icing (fig. 1-13) is provided for the compressor inlet guide vanes and front support hub by the use of compressor discharge air. The air is taken from a port at the twelve o'clock position on the front face of the diffuser scroll. An anti-icing air shutoff valve is installed in the port and is manually operated from the flight deck to control anti-icing air flow. Anti-icing air tubes direct the flow of air from the valve to fittings on each side of the compressor front support. The air is then routed through an annuris around the OD of the front support and through the inlet guide vanes and is discharged into the inlet air stream.

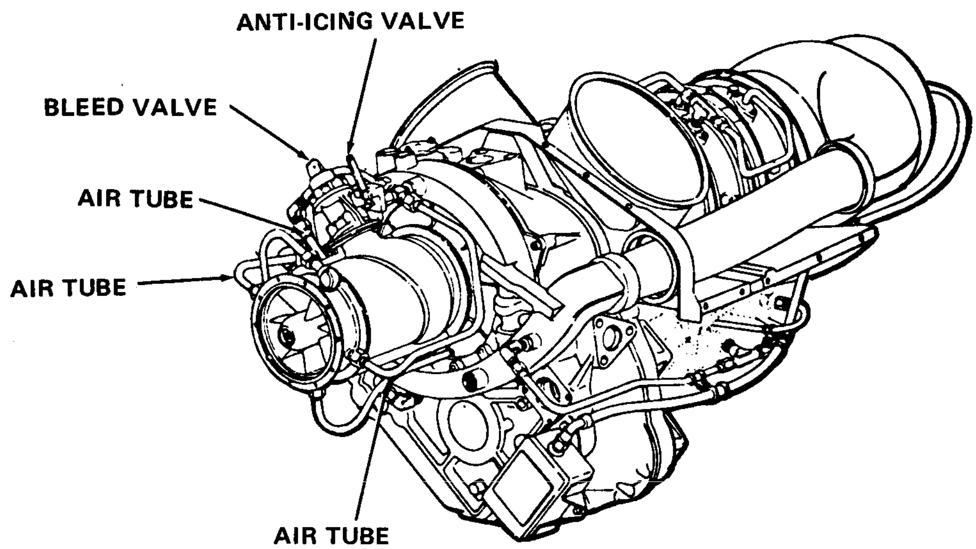


Figure 1-13. Anti-Icing System

1-23. Acceleration Bleed Air System. The compressor bleed air system permits rapid engine response. The system has a compressor discharge pressure sensing port on the scroll, tubing from the sensing port to the bleed valve, a compressor bleed control valve (fig. 1-14) and a bleed air manifold on the compressor case.

Elongated slots between every other vane at the compressor fifth stage bleeds compressor air into a manifold, which is an integral part of the compressor case. The manifold forms the mounting flange for the compressor bleed control valve when the compressor case halves are assembled.

Compressor discharge air pressure sensing, for bleed control valve operation, is obtained at a sensing port on the compressor scroll. The bleed control valve is normally open; it is closed by compressor discharge pressure.

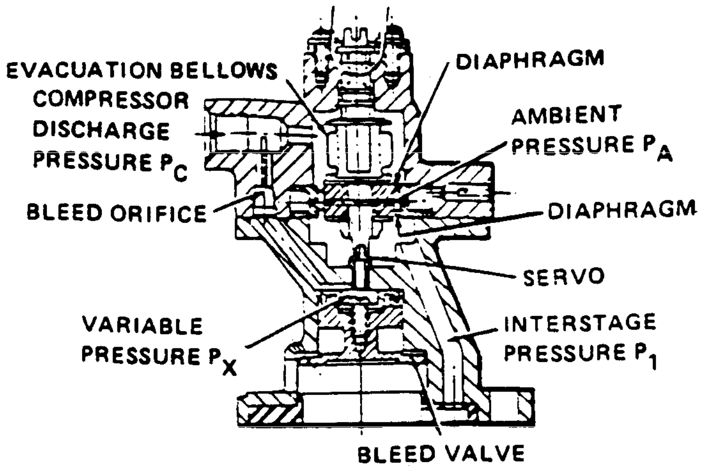


Figure 1-14. Compressor Bleed Control Valve

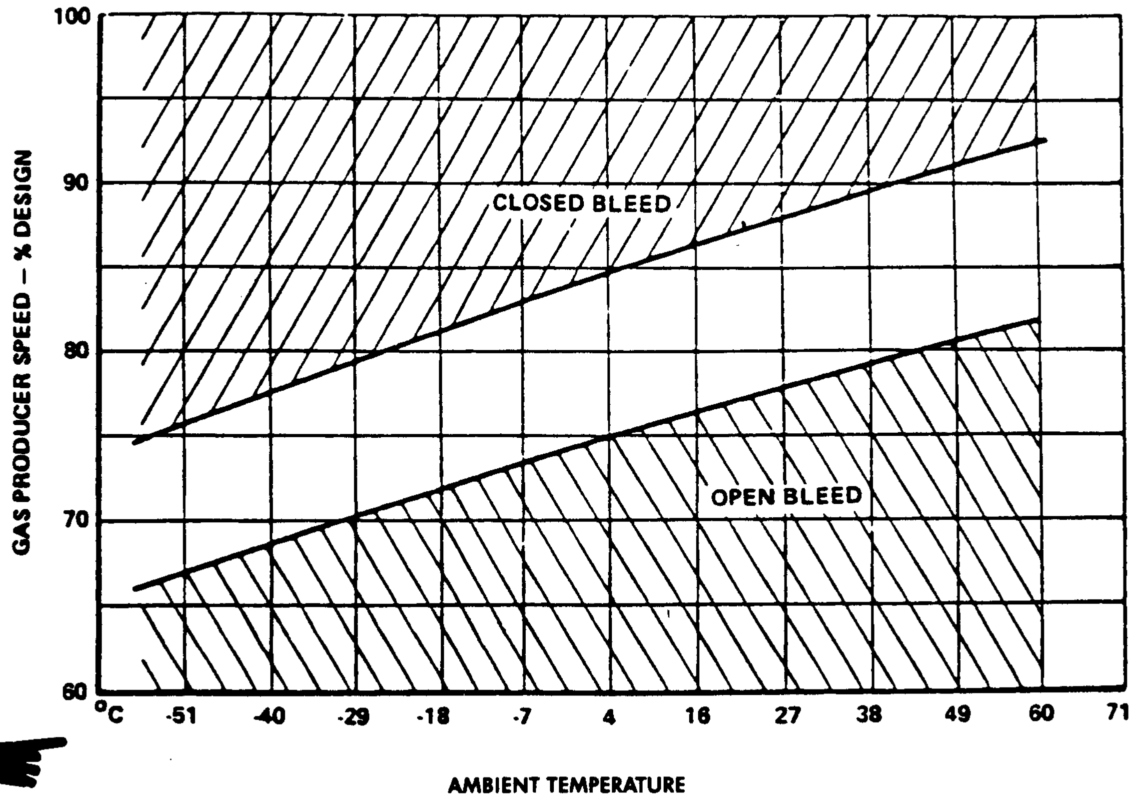


Figure 1-15. Compressor Bleed Control Valve Operation

1-24. Air Bleed Extraction. Two parts are provided on the diffuser scroll to supply compressor bleed air for aircraft systems. Bleed airflow is limited to four percent of total engine airflow.

1-25. ENGINE LEADING PARTICULARS. Engine leading particulars and performance rating are as given in tables 1-3 and 1-4.

Table 1-3. Leading Particulars

Dimensions	
Length	40.4 inches (1.03 m)
Height	22.5 inches (0.57 m)
Width	19.0 inches (0.48 m)
Engine weight (dry):	
T63-A-700	138.5 pounds (62.82 kgr.)
Maximum oil consumption	0.05 gal/hr (6.5 oz/hr)
Lubricating oil specifications	MIL-L-23699 or MIL-L-7808
Fuel specifications:	
Primary	MIL-T-5624 (JP-4)
Alternate	MIL-T-5624 (JP-5) (JP-8) (JET-A) (JETA-1)
Emergency	MIL-G-5572
Design power output	317 shp
Ram power rating	335 shp
Design speeds:	
Gas producer (Nl)	100% (51,120 rpm)
Power turbine (N2)	100% (35,000 rpm)
Power output shaft	100% (6,000 rpm)

Table 1-4. Performance Ratings (Standard Sea Level Static Conditions)

Rating	Shaft HP (rnin)	Net jet thrust lb (rein)	Gas producer speed rpm (%) (est)	output shaft rpm	Specific fuel consumption lb/SHP-hr (max)	Ram power rating torque at output shaft ft-lb (max)	Measured rated gas temp /260F (°C) (max)
Takeoff	317	33	51600 (100.9)	6000	0.697	293	1380 (749}
Normal	270	28	49760 (97.3)	6000	0.706	249	1280 (693)
90% normal	243	26	48650 (95.2)	6000	0.725	249	1226 (663)
75% normal	203	21	46950 (91.8)	6000	0.762	249	1148 (620)
Start and idle	35 max	10 max	32000 (62.6)	4500-6300	61 lb/hr	—	750±100 (399± 56)
Flight auto-ration	0 max	10 max	32000 (62.6)	5900-6480	61 lb/hr	—	725±100 (385±56)

NOTE: Specific fuel consumption = fuel flow/SHP.

Section III. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

1-26. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

Refer to Appendix C for special tools, support equipment, and test, measurement and diagnostic equipment (TMDE).

Section IV. SERVICE UPON RECEIPT

1-27. SERVICE UPON RECEIPT.

This section provides complete instructions and procedures for the inspection, preservation, storage, and activation of a complete engine assembly. Procedures for installing and removing the engine from metal shipping and storage and marking of containers are also included in this section.

1-28. Shipping Container Dimensions and Weight. The following lists the size, weight, and cubic displacement of the engine, compressor, fuel pump, gas producer fuel control, and the power turbine governor shipping and storage containers.

a. Engine Container

Length	57 in. (1.45 m)
Width	34 in. (0.86 m)
Height	39 in. (0.99 m)
Weight (with engine)	600 lb (272 kgr)
Cubic Displacement	45 cu ft (1.27 cu/m)

b. Compressor Container (Metal)

Height	24 in. (0.61 m)
Diameter	23 in. (0.58 m)
Weight (with compressor)	85 lb. (38.6 kgr)
Cubic Displacement	5.7 cu ft (0.16 cu/m)

c. Fuel Pump and Filter Assembly Container

Height	15 in. (0.38 m)
Diameter	14 in. (0.36 m)
Weight (with fuel pump)	24 lb (10.9 kgr)
Cubic Displacement	1.15 cu ft (0.03 cu/m)

d. Gas Producer Fuel Control Container

Height	12¾ in. (0.32 m)
Diameter	10½ in. (0.27 m)
Weight (with fuel control)	16 lb (7.26 kgr)
Cubic Displacement	0.99 cu ft (0.028 cu/m)

e. Power Turbine Governor Container

Height	12¾ in. (0.32 m)
Diameter	10½ in. (0.27 m)
Weight (with governor)	13 lb (5.9 kgr)
Cubic Displacement	0.6 cu ft (0.007 cu/m)

1-29. ENGINE - REMOVAL FROM SHIPPING CONTAINER.

INTIAL SETUP

Applicable Configuration
All

Special Tools
Engine Assembly Lift, Tool No. 6796963
Engine Turnover Stand, Tool No. 6795579

Consumable Materials
Corrosion Preventive Compound (item 9, Appendix D)

LOCATION/ITEM	REMARKS	ACTION

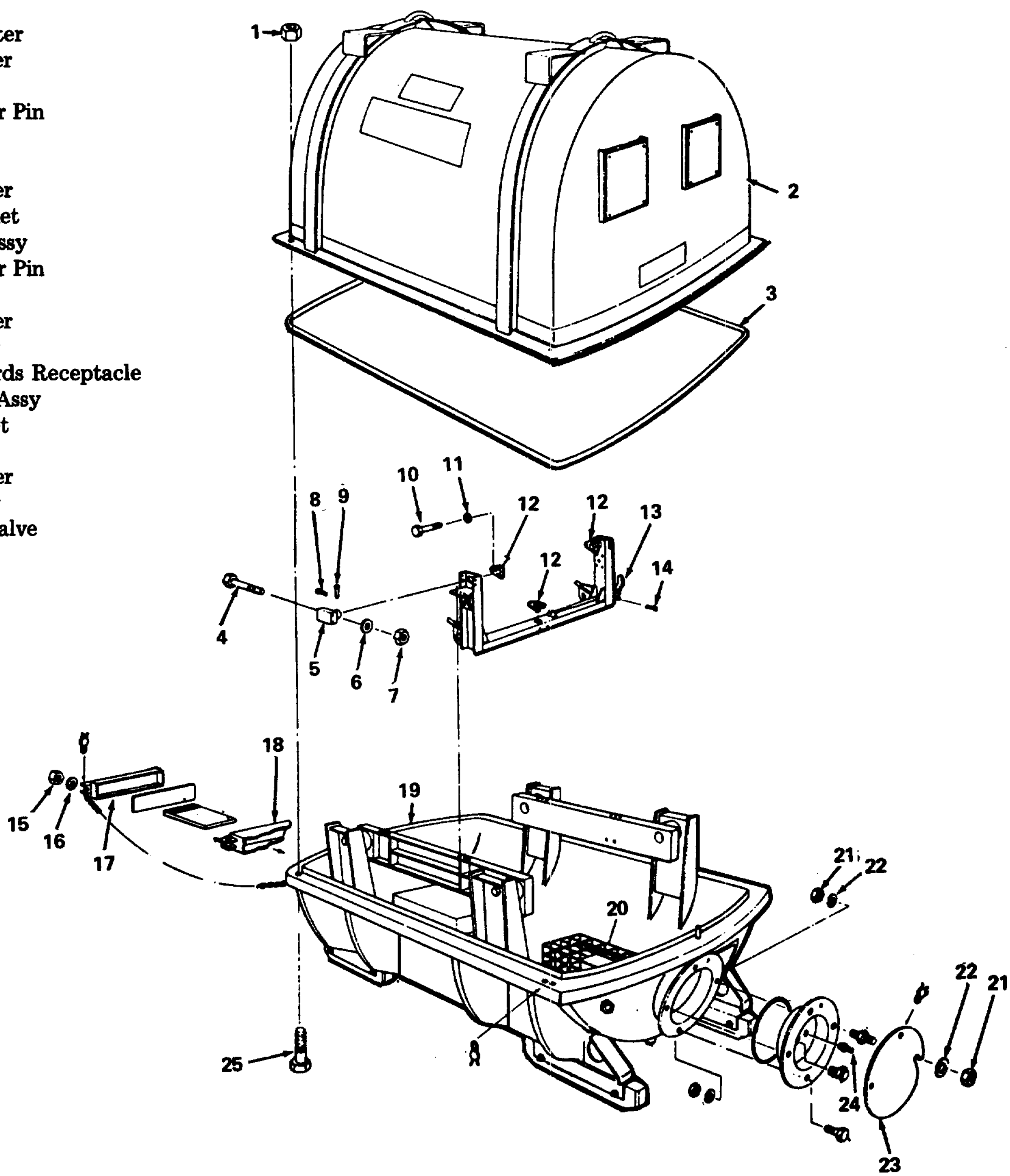
WARNING

Prior to removing engine from container, make sure both sections of container are grounded and the container is opened in a well ventilated area. Explosion could cause injury to personnel.

1-29. Engine - Removal From Shipping Container - Continued

LOCATION/ITEM	REMARKS	ACTION
	NOTE Before removing the engine from the shipping container, inspect for evidence of rough handling or tampering.	

1. Nut
2. Cover Assy
3. Gasket
4. Bolt
5. Adapter
6. Washer
7. Nut
8. Cotter Pin
9. Pin
10. Bolt
11. Washer
12. Bracket
13. Pin Assy
14. Cotter Pin
15. Nut
16. Washer
17. Cover
18. Records Receptacle
19. Base Assy
20. Basket
21. Nut
22. Washer
23. Cover
24. Air Valve
25. Bolt



1-29. Engine - Removal From Shipping Container - Continued

LOCATION/ITEM	REMARKS	ACTION
1. Engine Shipping Container		Loosen nut (15) and washer (16). Remove engine records from record receptacle (18).
2. Engine Shipping Container		Loosen nuts (21) and washers (22). Open cover (23).
3. Engine Shipping Container		Loosen air valve (24). Allow container to depressurize.
	WARNING Make certain that all air pressure has been released before loosening nuts and bolts (1 and 25). If nuts are removed before pressure is released, internal pressure could blow off cover. Injury to personnel could occur.	
4. Engine Shipping Container		Remove nuts (1) and bolts (25). Remove cover (2).
	CAUTION Insure upper half of shipping container does not strike engine when removing cover. Damage to engine could occur.	
5. Engine	Use Engine Assembly Lift, Tool No. 6796963.	Install engine assembly lift on gearbox mounting pad. Attach hoist. Raise engine only enough to take the strain off the mounts.
6. Engine Side Mounts		Remove four nuts (7), washers (6), and bolts (4).
7. Engine Side Mounts		Remove two cotter pins (8), pins (9), and adapters (5).

1-29. Engine - Removal From Shipping Container - Continued

LOCATION/ITEM	REMARKS	ACTION
8. Engine Shipping Container		Remove cotter pin (14) and pull out on pin assembly (13) until it disengages from the engine bottom mount.
9. Engine Shipping Container		Remove bolt (10) and washer (11).
10. Engine Assembly		Lift out of shipping container.
11. Engine	Brackets removed during this action are to remain with the shipping container.	Remove three engine mounting brackets (12).
12. Engine	Mounting brackets installed in this action are supplied with Engine Turnover Stand, Tool No. 6795579.	Install three mounting brackets on engine. Install engine in turnover stand.
	CAUTION Do not use the shipping container mounting brackets in lieu of the turnover stand mounting brackets. Damage to engine could occur.	
13. Engine Shipping Container		Place all loose shipping container hardware in cloth bag supplied with container. Place bag in bottom of container.
14. Desiccant		Remove from desiccant basket (20).
15. Container Base Assembly (19)		Install gasket (3) on container base assembly (19).
16. Cover Assembly (2)		Lower into place.
17. Cover Assembly (2)		Engage forward end of cover with guide pin in closure flange of base assembly (19) then lower aft end. Insure gasket (3) is properly seated.

1-29. Engine - Removal From Shipping Container - Continued

LOCATION/ITEM	REMARKS	ACTION
18. Closure flange	Bolts (25) shall be inserted from the bottom side of the closure flange. Use corrosion preventive compound (item 9, Appendix D).	Install bolts (25) and nuts (1). Tighten nuts (1) finger tight. Apply preservative to bolt threads.

1-30. Engine - Installation Into Reusable Metal Shipping and Storage Container.

INITIAL SETUP

Applicable Configuration
All

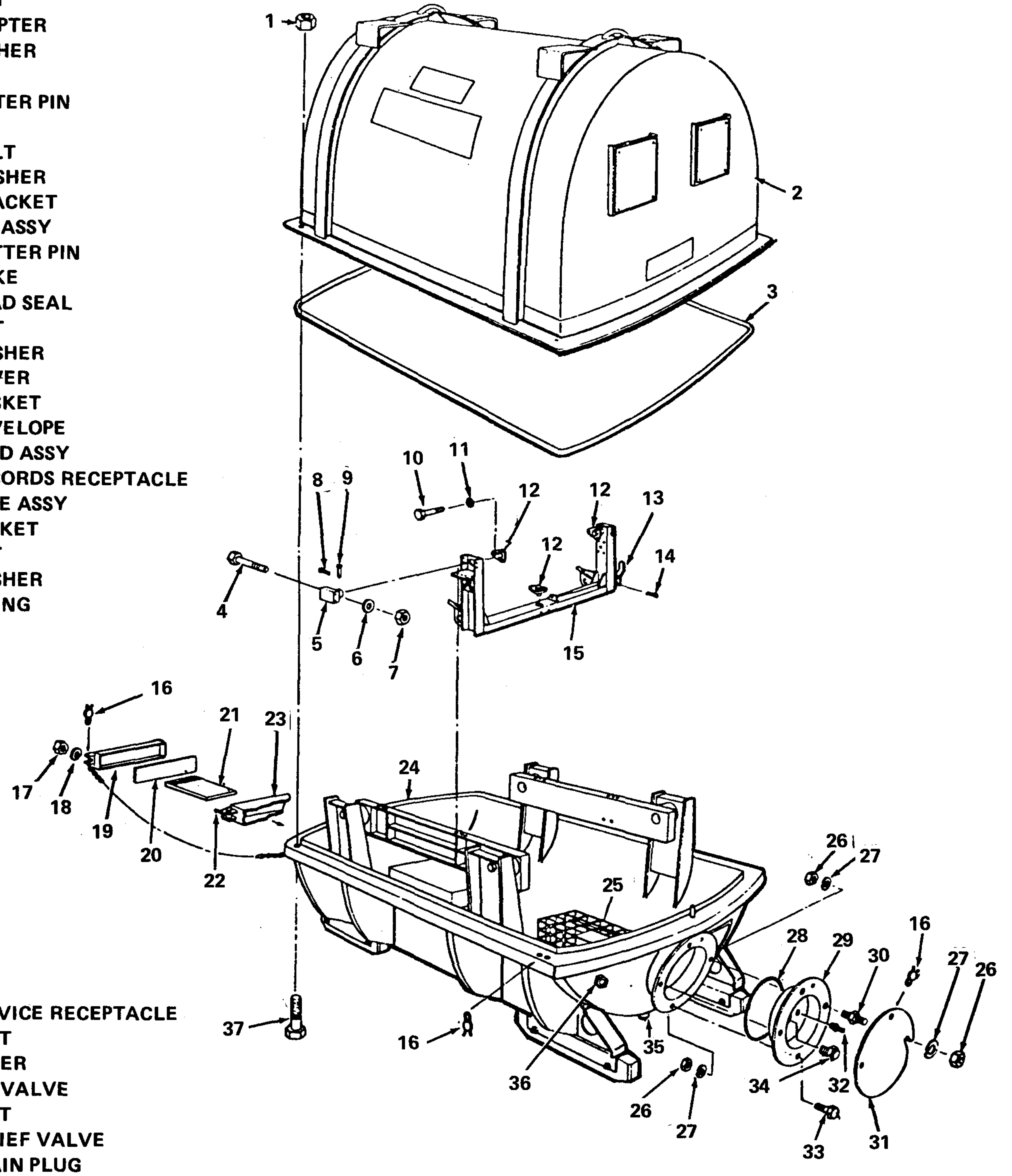
Special Tools
Engine Assembly Lift, Tool No. 6796963

Consumable Materials
Lockwire (item 7, Appendix D)
Desiccant (item 8, Appendix D)
Liquid Soap (item 45, Appendix D)
Corrosion Preventive Compound (item 9, Appendix D)

References
Para 1-39

LOCATION/ITEM	REMARKS	ACTION
SHIPPING OR STORAGE CONTAINER/ Engine	All engines which are prepared for storage or shipment will be preserved and packed in a metal reusable shipping and storage container, PN 8145-CON-001, NSN 8145-00-034-1063, in accordance with the following procedure.	
1. Preparation of Container		a. Loosen two nuts (26) and pivot cover (31) around to expose air valve (32).
	WARNING Personnel should stand clear of air valve when loosening to prevent personal injury	
		b. Slowly loosen air valve (32) to relieve pressure in the container.

1. NUT
2. COVER ASSY
3. GASKET
4. BOLT
5. ADAPTER
6. WASHER
7. NUT
8. COTTER PIN
9. PIN
10. BOLT
11. WASHER
12. BRACKET
13. PIN ASSY
14. COTTER PIN
15. YOKE
16. LEAD SEAL
17. NUT
18. WASHER
19. COVER
20. GASKET
21. ENVELOPE
22. STUD ASSY
23. RECORDS RECEPTACLE
24. BASE ASSY
25. BASKET
26. NUT
27. WASHER
28. O-RING



29. SERVICE RECEPTACLE
30. BOLT
31. COVER
32. AIR VALVE
33. BOLT
34. RELIEF VALVE
35. DRAIN PLUG
36. HUMIDITY INDICATOR
37. BOLT

1-30. Engine - Installation Into Reusable Metal Shipping and Storage Container - Continued

LOCATION/ITEM	REMARKS	ACTION
SHIPPING OR STORAGE CONTAINER/ - Continued		c. Remove thirty-two nuts (1) and bolts (37) from the closure flange and remove cover as-SEMBLY (2).
		d. Remove two cotter pins (8) and pins (9) and remove engine side mounting brackets (12).
		e. Remove cotter pin (14) and pull out pin assembly (13) until it disengages from the engine lower mounting bracket (12). Remove the mounting bracket.
		f. Remove four nuts (7), washers (6), and bolts (4) and remove engine side mounting adapter (5).
		g. Inspect container to determine that it is complete and service-able. Particular atten-tion should be given to mounting brackets, bolts, nuts, pins and cotter pins in engine suspension system. Replace parts which show signs of wear and/or darnage.
2. Installation of Engine in Container		
	WARNING To prevent injury to personnel, the fuel system of all engines that are to be placed in containers (less accident-involved engines) will be thoroughly drained, purged, and preserved. All disconnected lines will be capped or plugged. Tape will not be used in place of caps or plugs.	

1-30. Engine - Installation Into Reusable Metal Shipping and Storage Container - Continued

LOCATION/ITEM	REMARKS	ACTION
SHIPPING OR STORAGE CONTAINER/-Continued	Engine Assembly Lift, Tool No. 6796963	a. Suspend engine from a hoist in upright position (exhaust ducts up) using engine assembly lift.
	Lockwire (item 7, Appendix D)	b. Remove three turnover stand mounting brackets and assemble three engine mounting brackets (12) on the engine using nine bolts (10) and washers (11). Tighten bolts to 85-110 in. lb (1.0-1.3 kg/m) and lockwire.
	CAUTION Do not use the engine turnover stand mounting brackets in lieu of engine mounting brackets (12). Damage to engine could occur.	
		c. Lower engine into container until the bottom mounting bracket (12) engages with bottom mounting adapter.
		d. Aline pin holes and engage pin assembly (13). Secure with one cotter pin (14).
		e. Insert two side mounting adapters (5) through the locating holes in yoke assembly (15) and engage with two side mounting brackets (12). Secure with two pins (9) and cotter pins (8).
		f. Secure two side mounting adapters (5) to yoke assembly (15) with four bolts (4), washers (6) and nuts (7). Tighten nuts (7) firmly then loosen one complete turn.

1-30. Engine - Installation Into Reusable Metal Shipping and Storage Container - Continued

LOCATION/ITEM	REMARKS	ACTION
SHIPPING OR STORAGE CONTAINER/ - Continued	Engine Assembly Lift, Tool No. 6796963	g. Release engine weight from the hoist and remove engine assembly lift from engine.
		h. Tighten four nuts (7) at engine side mounts to 40-50 in. lb (0.5-0.6 kg/m).
		i. Tie the cloth bag, used to store engine mounting bolts (10) and washers (11), to desiccant basket (25) for future use.
	Desiccant (item 8, Appendix D)	j. Place two bags of desiccant into desiccant basket (25).
		k. Install gasket (3) on container base assembly (24).
		1. Lower cover assembly (2) into place over engine. Engage the forward end of cover with guide pin in closure flange of base assembly (24); then lower the aft end. Insure that gasket (3) is properly seated.
		m. Install thirty-two bolts (37) and nuts (1) in closure flange. Bolts (37) shall be inserted from bottom side of closure flange. Tighten nuts (1) finger tight.
		n. Tighten one nut (1) on each side of container at center and at each of four corners to approximately 75 in. lb (0.9 kg/m).

1-30. Engine - Installation Into Reusable Metal Shipping and Storage Container - Continued

LOCATION/ITEM	REMARKS	ACTION
SHIPPING OR STORAGE CONTAINER/ - Continued		o. Starting at guide pin in forward end of the closure flange and moving in a clockwise direction, fina1-tighten nuts (1) to 150-165 in. lb (1.7-1.9 kg/m).
3. Container Pressurization		a. Tighten air valve (32).
		b. Using a source of filtered, dry, compressed air, pressurize the container to the value shown in the following tabular listing.

Container Air Pressure vs Ambient Temperature

Temperature (°C)	Temperature (°F)	Pressure (psig)	Temperature (°C)	Temperature (°F)	Pressure (psig)
60	140	7.6	4	40	3.9
54	130	7.3	-1	30	3.5
49	120	6.9	-7	20	3.2
43	110	6.5	-12	10	2.8
38	100	6.1	-18	0	2.4
32	90	5.8	-23	-10	2.0
27	80	5.4	-29	-20	1.7
21	70	5.0	-34	-30	1.3
16	60	4.6	-40	-40	0.9
10	50	4.3			

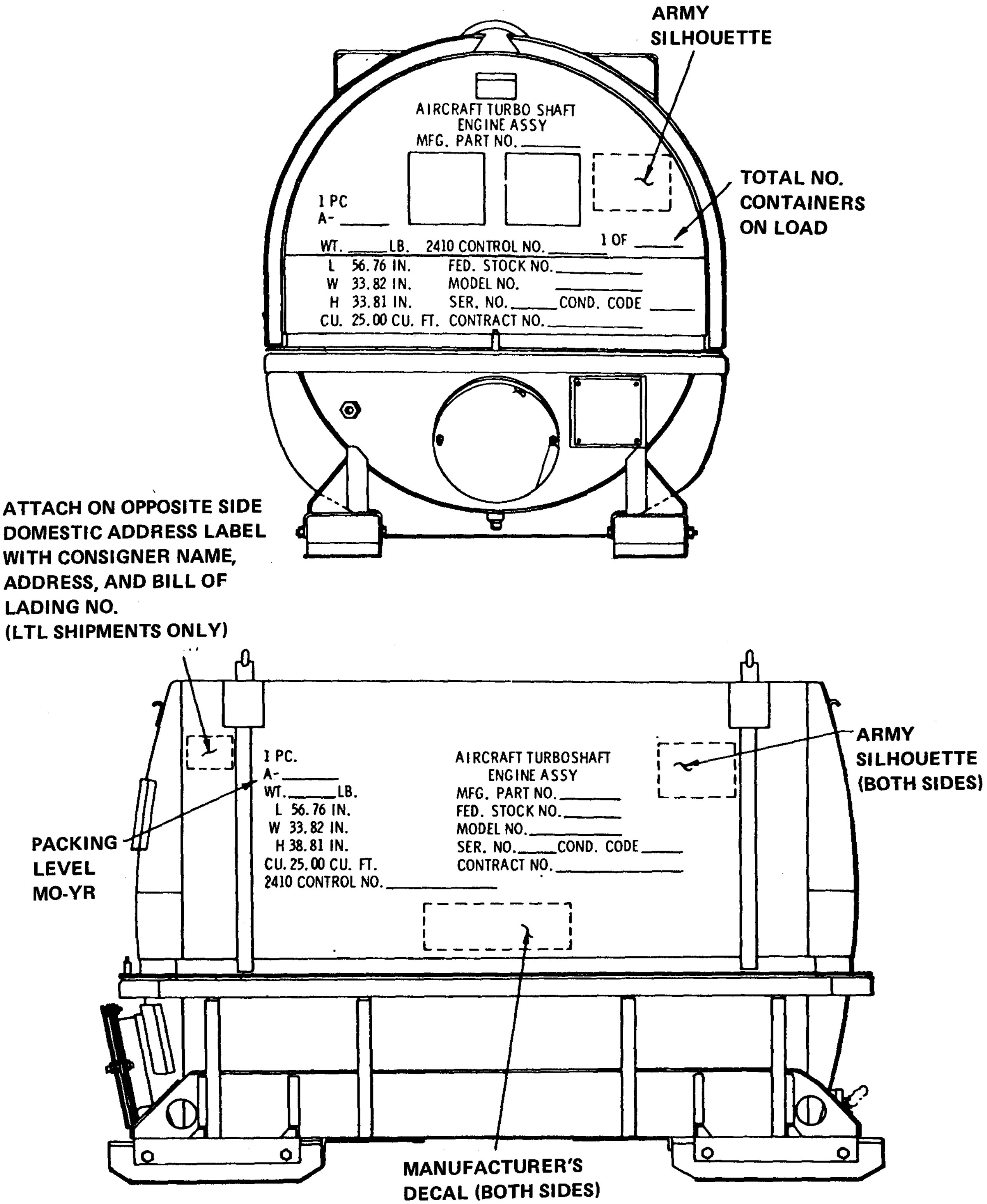
LOCATION/ITEM	REMARKS	ACTION
	Liquid Soap Solution (item 45, Appendix D)	c. Check gasket (3), humidity indicator (36), preformed packing (28), drain plug (35), air valve (32), and relief valve (34) for leaks by brushing a liquid soap solution on all seams and closure points.
		d. If leaks are found, check torque on nuts (1) and (26). gasket (3) and packing (28) if necessary.

1-30. Engine - Installation Into Reusable Metal Shipping and Storage Container - Continued

LOCATION/ITEM	REMARKS	ACTION
SHIPPING OR STORAGE CONTAINER/ - Continued		Preformed packing (28) is removed by removing four nuts (26), washers (27), three bolts (33) and bolt (30).
	CAUTION Do not attempt to stop leaks by overtorquing nuts. Damage to container could occur.	
		e. **Repeat** steps b and c as required.
		f. **Wipe off** or **flush** away soap solution.
		g. **Install** cover (31) on bolts (30) and **tighten** nuts (26) to 15-25 in. lb (0.2-0.3 kg/m).
4. Engine Records Receptacle		a. **Loosen** two nuts (17) and **swing** stud assembly (22) out of the slot in cover (19). **Pivot** the cover out of the way.
		b. **Insert** applicable engine records in envelope (21) and **place** in the engine records receptacle.
		c. **Pivot** cover (19) with gasket (20) into place over the receptacle opening and **swing** stud assembly (22) into the cover (19) slot.
		d. **Secure** the cover in place by" **tightening** two nuts (17) to 30-45 in. lb (0.3-0.5 kg/m).

1-30. Engine - Installation Into Reusable Metal Shipping and Storage Container - Continued

LOCATION/ITEM	REMARKS	ACTION
SHIPPING OR STORAGE CONTAINER/ - Continued		
5. Tamper-Roof security	Container tamper-proof security is provided by five lead seals; two in the container closure flange, two in the records receptacle cover, and one in the service receptacle cover.	
		a. Thread seal (16) wire through sealing holes in cover (31) and service receptacle (29). Seal ends of wire together with attached lead seal.
		b. Seal both ends of records receptacle cover (19) by threading seal wire (16) through sealing holes in cover (19) and receptacle (23). Seal ends of wires together with attached lead seals.
		c. Thread seal wire (16) through each set of sealing holes in closure flange of base assembly (24) and cover assembly (2). Thread wire down through one hole and up through the other hole. Secure ends of wires together with attached lead seals. Sealing holes are located at left front and right rear of container closure flange.
	Corrosion Preventive Compound (item 9, Appendix D).	d. Coat exposed threads of bolts (30 and 37) and stud assembly (22) with corrosion preventive compound.
6. Container Stenciling	Stenciling of the engine shipping container will be in accordance with paragraph 1-39 and the following figure.	


ARMY SILHOUETTE
AIRCRAFT TURBO SHAFT ENGINE ASSY
MFG. PART NO.
1 PC
A-
WT. LB. 2410 CONTROL NO. 1 OF
TOTAL NO. CONTAINERS ON LOAD
L 56.76 IN. FED. STOCK NO.
W 33.82 IN. MODEL NO.
H 33.81 IN. SER. NO. COND. CODE
CU. 25.00 CU. FT. CONTRACT NO.
ATTACH ON OPPOSITE SIDE DOMESTIC ADDRESS LABEL WITH CONSIGNER NAME, ADDRESS, AND BILL OF LADING NO. (LTL SHIPMENTS ONLY)
1 PC.
A-
WT. LB.
L 56.76 IN.
W 33.82 IN.
H 38.81 IN.
CU. 25.00 CU. FT.
2410 CONTROL NO.
AIRCRAFT TURBOSHAFT ENGINE ASSY
MFG. PART NO.
FED. STOCK NO.
MODEL NO.
SER. NO. COND. CODE
CONTRACT NO.
ARMY SILHOUETTE (BOTH SIDES)
PACKING LEVEL MO-YR
MANUFACTURER'S DECAL (BOTH SIDES)

1-31. Inspection of Engine Dropped During Handling

INITIAL SETUP

Applicable Configuration
All

References
Para 1-30,1-38,1-39 and 1-63 thru 1-71

LOCATION/ITEM	REMARKS	ACTION
	NOTE If engine is dropped during handling, perform inspection and tests contained within this paragraph.	
1. Accessory Drive Gearbox		Inspect for cracked flanges.
2. Governor and Tachometer Drive		Inspect for cracks, distortion, and bent shafts.
3. Oil Filter		Inspect for damage.
4. Fuel Control Assembly		Inspect for cracked flanges.
5. Engine Mounting Pads		Inspect for cracks.
6. Air, Oil, and Fuel Hose Connections		Check to insure they are secure.
7. Accessories		Check for loose bolts, nuts, and connections.
8. Engine	If no visual damage is apparent, engine may be operationally checked either in airframe or in mobile engine test unit. (Refer to paragraphs 1-63 thru 1-71.) Minimum test time is 30 minutes and shall include vibration check, coastdown noise check, and post-test inspection of oil filter and chip detectors for metal, lint, or other foreign material. Vibration levels must be within established limits. If no defects are noted, engine is considered serviceable.	Perform operational checks.

1-31. Inspection of Engine Dropped During Handling - Continued

LOCATION/ITEM	REMARKS	ACTION

NOTE

Action for items 9 thru 11 are to be performed if engine is unserviceable.

LOCATION/ITEM	REMARKS	ACTION
9. Engine	Refer to paragraph 1-38 and 1-30.	**Preserve** if unserviceable. **Pack** in a metal reusable shipping and storage container.
10. Engine		**Return** to Depot facility.
11. Engine	Refer to paragraph 1-39.	**Complete** and **attach** necessary tags. **Prepare** necessary forms and records. **Place** records in receptacle.

1-32. Installing Engine In Turnover Stand.

INITIAL SETUP

Applicable Configuration
All

Special Tools
Engine Assembly Lift, Tool No. 6796963
Turnover Stand Mounting Brackets, Tool No. 6795579

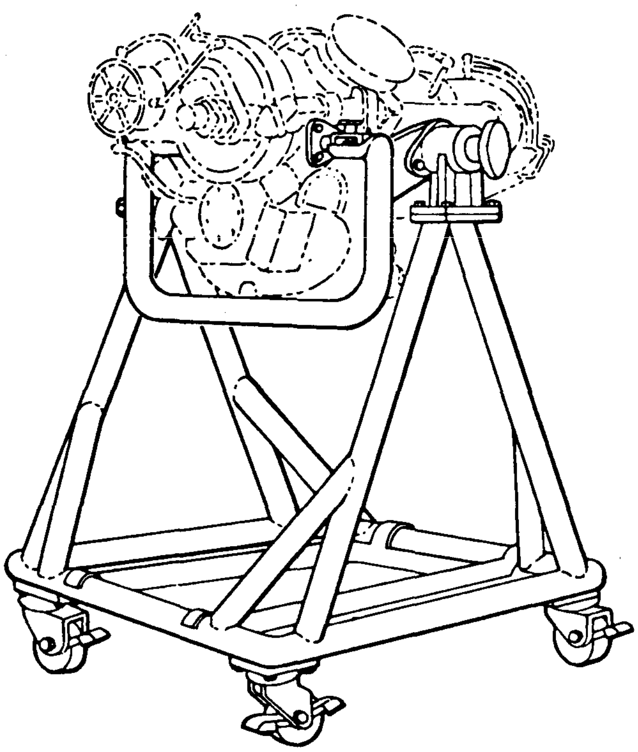
LOCATION/ITEM	REMARKS	ACTION
TEST STAND/		
1. Engine	Engine Assembly Lift, Tool No. 6796963	a. **Install** engine assembly lift on the gearbox top mounting pad and **suspend** the engine from the hoist.

NOTE

Do not use the shipping container or airframe mounting brackets in lieu of the turnover stand mounting brackets.

1-32. Installing Engine In Turnover Stand - Continued

LOCATION/ITEM	REMARKS	ACTION
TEST STAND/ - Continued	Turnover Stand Mounting Brackets, Tool No. 6795579	b. Install three turnover stand mounting brackets on the gearbox side and bottom pads.



c. Lower engine into the turnover stand. Insure that the three mounting brackets installed on the gearbox engage the mounting bosses on the turnover stand.

d. Slide two clamps at the gearbox side mounts in to engage the mounting brackets and tighten the hand knobs.

e. Remove hoist and lifting tool.

1-33. Dismantling Engine Into Major Functional Assemblies.

a. During dismantling, examine all major functional assemblies for serviceability. The condition of an assembly can often be better determined by examination during dismantling. Signs of scoring, burning, and excessive wear or the presence of metal particles are danger signals. Thorough inspection should be made immediately. Look for any indications of work incorrectly performed during previous maintenance or overhaul. Report any such indications to the local maintenance officer.

b. Care must be exercised to prevent the entrance of dirt and other foreign material into the engine. Whenever practical, temporary covers should be used to seal all openings in the dismantled engine. All threads, splines, and pilot diameters should be protected against damage. Protective covers should be of a shape that prohibits assembly with mating parts without removing the covers.

c. Unless parts of a particular engine are to be held for a special inspection, discard all gaskets, lockwashers, preformed packings, O-rings, diaphragms, and cotter pins as they are removed. These parts must not be mixed with new parts of similar type and must not be used again. Arrangement of self-locking nuts shall be determined in accordance with minimum prevailing torque at reassembly. Self-locking nuts shall be tested for reuse in accordance with TM 55-1500-204-25/1.

WARNING

Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

CAUTION

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

d. Remove the magnetic drain plug from the bottom of the gearbox and allow oil to drain before the engine is rotated in the turnover stand.

1-34. Preservation Maintenance. Preservation maintenance is not representation, but is the regular inspection and replacement of the dehydrating agent. Allow engine awaiting installation to remain in the dehumidified shipping container as long as possible.

1-35. Engine - Depreservation.

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning Solvent P-D-680 (item 1, Appendix D)

References
Para 2-11, 2-17 and 5-6

LOCATION/ITEM	REMARKS	ACTION
1. Engine		Remove all shipping caps, plugs, and covers from engine as required.
2. Engine		Remove lockwire from fuel control and governor stops and anti-icing air valve lever.

WARNING

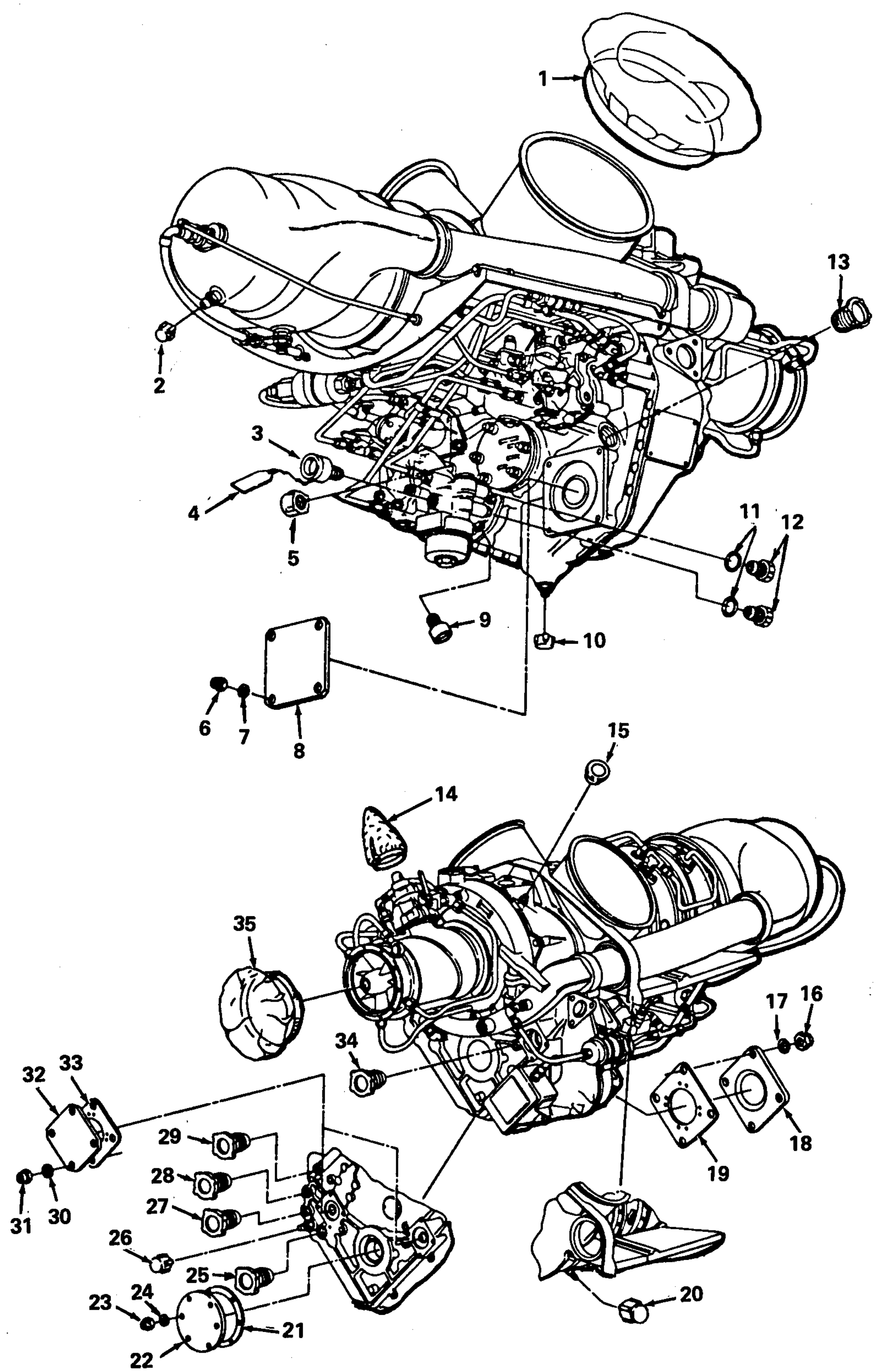
Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100° F - 138°F (38°C - 59°C).

LOCATION/ITEM	REMARKS	ACTION
3. Engine	Use drycleaning solvent P-D-680 (item 1, Appendix D).	Remove all barrier material and tape. Remove tape residue with solvent.
4. Engine	Refer to paragraphs 2-11, 2-17 and 5-6.	Remove any corrosion from the exterior surfaces. Touch up paint as required.

NOTE

Flushing of engine with fuel is not required.

1. Exhaust Cover
2. Cap
3. Plug
4. Tag
5. Cap
6. Nut
7. Washer
8. Generator Pad Cover
9. Plug
10. Cap
11. Preformed Packing
12. Plug
13. Plug
14. Bleed Valve Cover
15. Plug
16. Nut
17. Washer
18. Accessory Pad Cover
19. Gasket
20. Cap
21. Gasket
22. Output Pad Cover
23. Nut
24. Washer
25. Plug
26. Cap
27. Plug
28. Plug
29. Plug
30. Washer
31. Nut
32. Tach Pad Cover
33. Gasket
34. Plug
35. Inlet Cover



1-36. Engine - Preservation.

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning Solvent (item 1, Appendix D)
Lubricating Oil (item 5, Appendix D)
Lubricating Oil (item 4, Appendix D)
Barrier Material (item 2, Appendix D)
Tape (item 3, Appendix D)
Methylethylketone (item 32, Appendix D)
LockWire (item 7, Appendix D)

References
TM 55-1500-333-24
TM 55-1520-214-23
TM 55-1520-228-23
Para 2-11, 2-17 and 5-6

LOCATION/ITEM	REMARKS	ACTION

NOTE

A serviceable engine that is being removed from an aircraft for the purpose of storage or return to the overhaul facility will be preserved prior to removal from the aircraft.

WARNING

Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C - 59°C).

LOCATION/ITEM	REMARKS	ACTION
1. Engine, Accessories, Inlet Duct, Plenum Chamber, and Inlet Screens	When external cleaning is necessary, clean with solvent (item 1, Appendix D). Refer to TM 55-1500-333-24.	Insure these items are clean and free from corrosion and foreign material.

CAUTION

Do not use contact preservatives of any kind either internally or externally on the compressor section. Damage to compressor could occur.

1-36. ENGINE - PERSERVATION - Cont.

LOCATION/ITEM	REMARKS	ACTION
	WARNING Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.	
2. Engine Oil Tank	Use lubricating oil (item 5, Appendix D). If available, use external auxiliary power unit (APU).	Fill as necessary to normal operating level with lubricating oil. Start engine.
3. Engine		Run at idle to insure satisfactory operation. Operate engine for five minutes or until oil temperature reaches 191°F (88°C), whichever comes first.
4. Engine		Idle for two minutes, prior to shutting down engine.
5. Engine	**CAUTION** Cranking engine with fuel pump circuit breaker on may cause fuel to spray past the cap on disconnected fuel line.	Allow to cool sufficiently to prevent auto ignition. Pull fuel pump circuit breaker to OFF before cranking engine.
	NOTE Perform action for items 6 thru 11 to preserve engine fuel system.	
6. Power Input Lead		Disconnect at ignition exciter or pull IGN ENG circuit breaker.

1-36. ENGINE – PRESERVATION – Cont.

LOCATION/ITEM	REMARKS	ACTION
	WARNING Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.	
7. Fuel Line	Use lubricating oil (item 4, Appendix D).	Disconnect at the fuel pump inlet port. Connect a source of lubricating oil Cap disconnected fuel line.
8. Engine	**CAUTION** Observe starter time restriction– 35 seconds maximum when temperature is 90°F (32°C) or above. Damage to starter could occur.	Move the twist grip to IDLE detent and motor engine with the starter (use APU, if available).
9. Engine		Discontinue motoring when fuel-free oil flows from the combustion burner drain valve hose.
10. Engine		Disconnect source of lubricating oil. Cap inlet port of fuel pump.
11. Power Lead		Reconnect power lead to ignition exciter or reset IGN ENG circuit breaker. Reset boost pump circuit breaker.

1-36. Engine - Preservation - Continued

LOCATION/ITEM	REMARKS	ACTION
12. Engine Inlet and Exhaust Protective Covers	If covers are not available, seal openings with barrier material (item 2, Appendix D) and secure with tape (item 3, Appendix D).	Install.
13. Engine	Use DA Form 2408-13.	Make all necessary entries to include date and extent of engine preservation on engine historical form.
14. Engine Accessories	Refer to TM 55-1520-214-23 or TM 55-1520-228-23.	Remove.
15. Starter-Generator Drive	Use methylethylketone (item 32, Appendix D) as cleaning agent.	Clean splines when necessary to remove previously applied lubricant.

WARNING

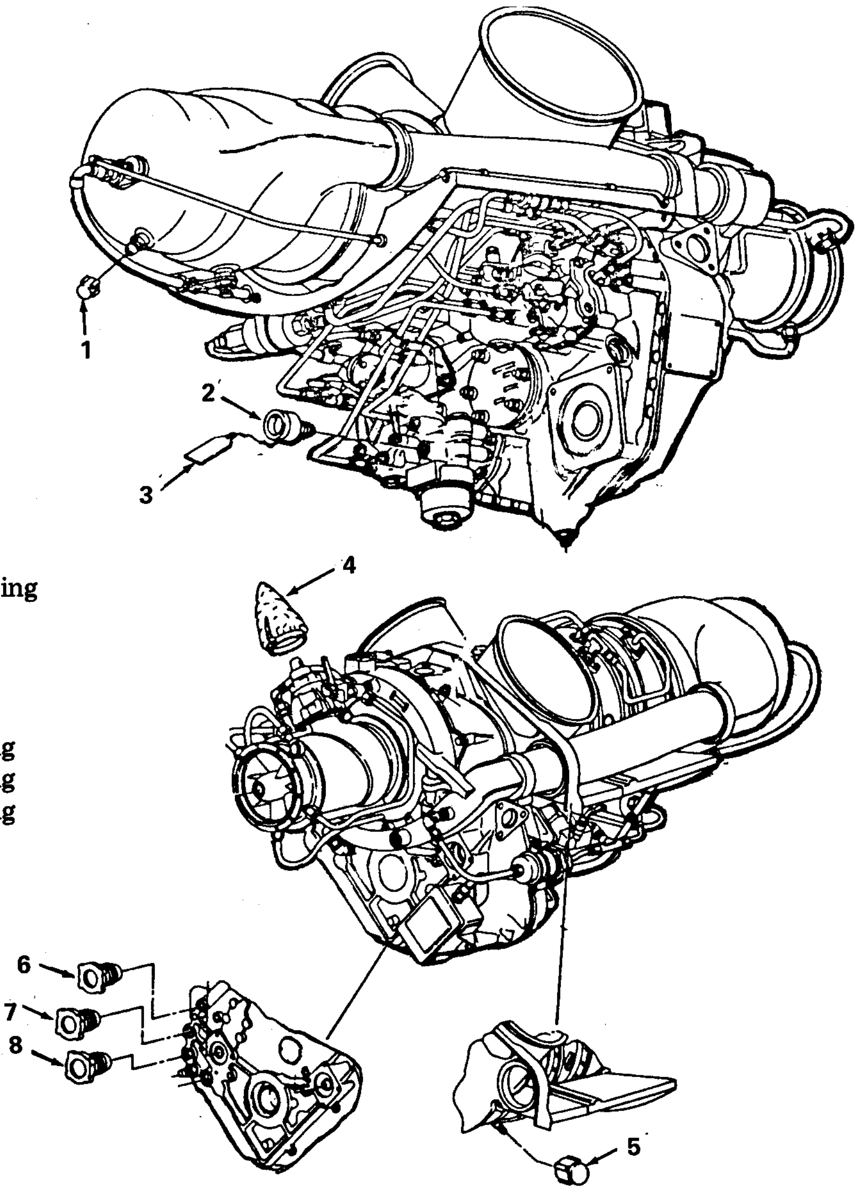
Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

LOCATION/ITEM	REMARKS	ACTION
16. Engine	Use lubricating oil (item 5, Appendix D).	Coat all accessory, drive splines and pads which do not have accessories installed on them and engine oil shipping plugs (6, 7, and 8) with lubricating oil.

WARNING

Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately, Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

1-36. Engine - Preservation - Continued



1. Cap
2. Fuel Inlet Shipping Plug
3. Tag
4. Cover
5. Cap
6. Oil Shipping Plug
7. Oil Shipping Plug
8. Oil Shipping Plug

LOCATION/ITEM	REMARKS	ACTION
17. Fuel Inlet Shipping Plug (2)	Use lubricating oil (item 5, Appendix D).	Coat with lubricating oil.
18. Engine Shipping Container		Install shipping plugs, covers, gaskets, washers, and nuts.

1-36. Engine - Preservation - Continued

LOCATION/ITEM	REMARKS	ACTION
19. Gas Producer Fuel Control Stop		Secure in cut-off position.
20. Power Turbine Governor Stop and Anti-Icing Valve Lever	Lockwire (item 7, Appendix D) shall be used to secure stops and lever.	Secure tight enough to prevent movement.
21. Engine	The following information shall appear on tag attached to fuel inlet shipping plug: THIS FUEL SYSTEM HAS BEEN PREPARED FOR STORAGE BY FLUSHING WITH OIL CONFORMING TO SPECIFICATION MIL-L-6081, GRADE 1010.	Attach tag (3) to fuel inlet shipping plug (2).
22. Engine	Refer to paragraphs 2-11, 2-17, and 5-6. Do not expose touchup areas to engine fluids or cleaning solvents for a minimum period of 72 hours after application.	Touch up paint where damaged.
23. Engine	This action does not apply to caps (1 and 5) on the combustor drain valve and exhaust collector drain. Caps (1 and 5) are to be tightened to bottom of cap, then twisted an additional 90-120 degrees.	Tighten aluminum and plastic shipping caps and plugs finger tight.
24. All Threaded Parts		Tighten to standard torques.
25. Engine		Tighten nuts which secure plastic accessory covers as required to obtain a snug fit without excessive cover indentation. Cover the compressor bleed valve with cover (4).

1-37. Accident Engine - Preservation

INITIAL SETUP

Applicable Configuration

All

Consumable Materials

Barrier Material (item 2, Appendix D)
Tape (item 3, Appendix D)

References

Para 1-30

LOCATION/ITEM	REMARKS	ACTION

NOTE

Do not treat an engine for corrosion that has been involved in an accident where engine failure or malfunction is known or suspected to have been a factor. This engine must be held for shipment to an overhaul depot or designated investigation area and should not be treated for corrosion prevention.

LOCATION/ITEM	REMARKS	ACTION
1. Engine	Perform this action without disconnecting lines or fittings.	**Prevent** remaining fuel and oil in engine from leaking out.
2. Engine	If covers are not available, seal with barrier material (item 2, Appendix D) and secure with tape (item 3, Appendix **D).**	**Seal** all openings with covers.
3. Engine		**Plug** all ports and cap all fittings.
4. Engine	Refer to paragraph 1-30.	**Install** in bottom half of metal reusable shipping and storage container.

WARNING

Ground engine to container to prevent a possible explosion of dangerous vapors which may be ignited by static electricity or a spark. Secure all loose metal components to container with tape PPP-T-60 to prevent possible spark during shipment.

1-38. Damaged, Cannibalized, or Failed Engine Preservation. Inoperable engines that are idle because they require parts or maintenance shall be preserved in accordance with paragraph 1-37 and stored in a shipping container or in a clean, dry, area where the engine will be adequately protected from dirt, corrosion, and physical damage.

CAUTION

Do not use contact preservatives of any kind, either internally or externally, on the compressor section. Damage to compressor could occur.

1-39. Forms, Records, Tags and Stenciling.

a. 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 listed in and prescribed by DA Pamphlet 738-751.

b. Authorized tags and published procedure for their completion is prescribed in TB 750-126. Additional pressurization tags may be applied to assist the maintenance officer in depreservation.

c. Stenciling, labeling and marking of containers for storage and shipment are shown in figures 1-16 and 1-17. Obliterate old markings that do not apply. Letters and numerals of stencils shall be in block letters 1/2 inch high. Use white stencil ink (item 10, Appendix D). For additional information on marking and stenciling refer to MIL-STD- 129.

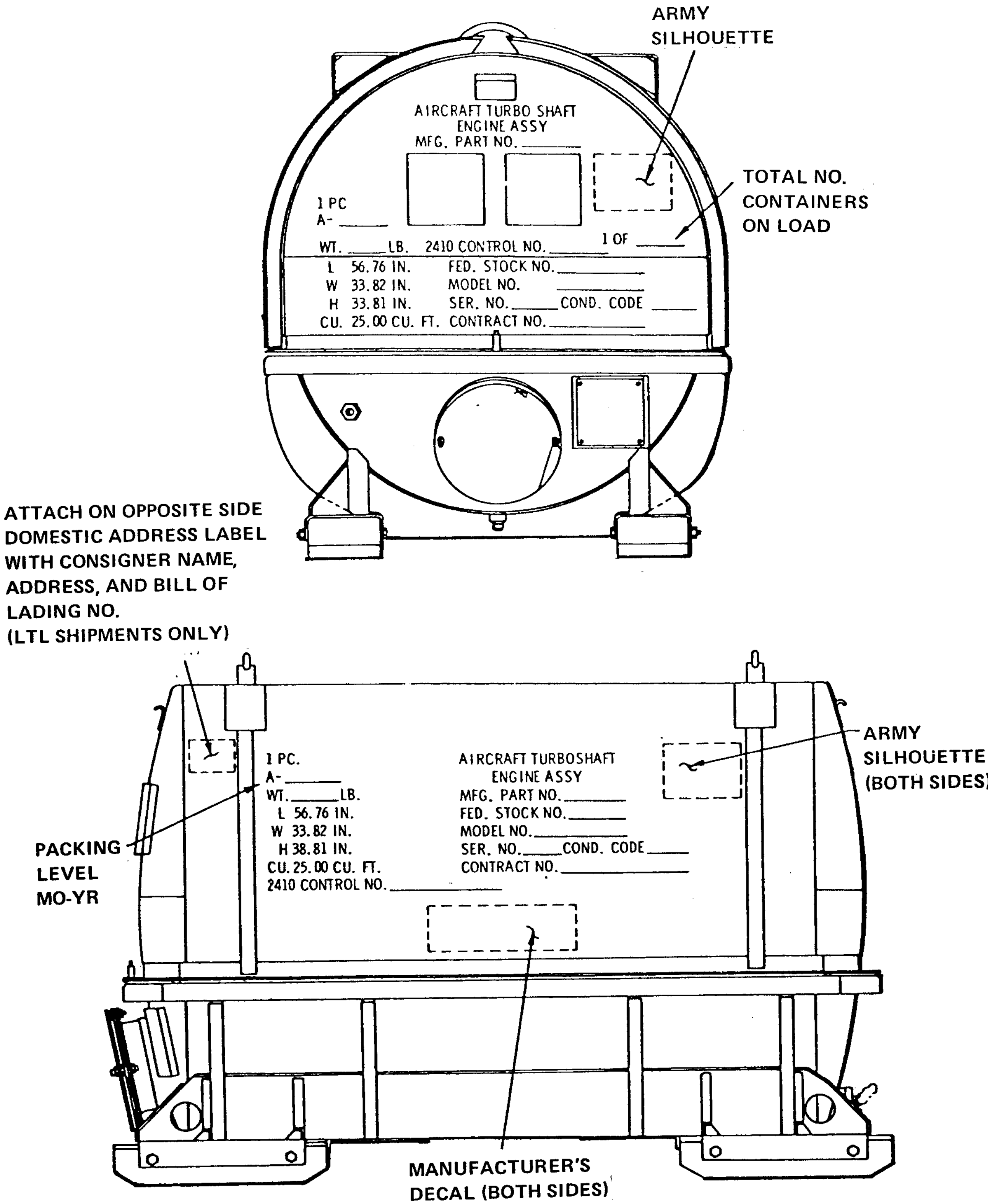


Figure 1-16. Engine Shipping Container Stenciling and Labeling

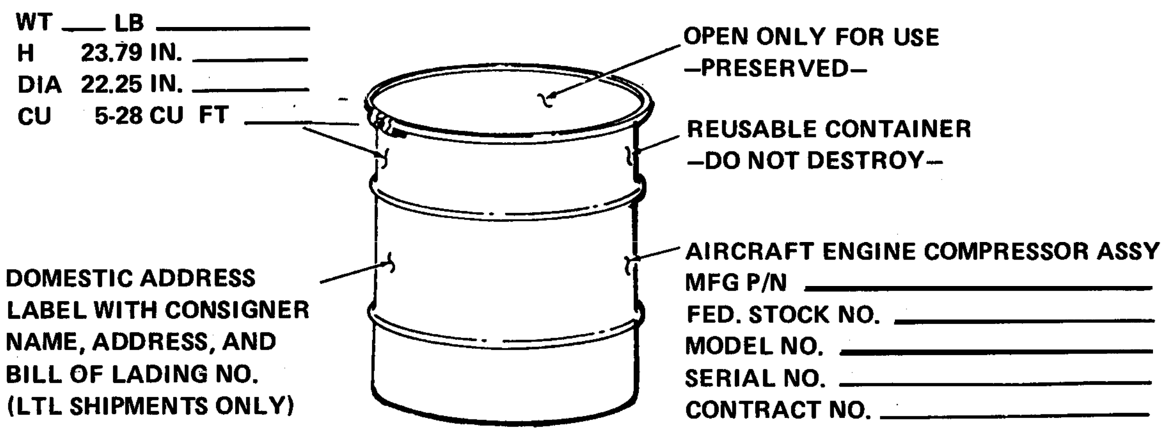


Figure 1-17. Compressor Shipping Container Stenciling

Section V. PREVENTIVE MAINTENANCE INSPECTIONS

1-40. Pressurized Container - Inspection

INITIAL SETUP

Applicable Configuration
All

References
TB 55-8100-200-25
Para 1-36
Table 1-5

LOCATION/ITEM	REMARKS	ACTION
ENGINE CONTAINER/	Immediately upon receipt of an engine at an activity and every 90 days (or more frequently) thereafter, check the relative humidity indicator and the internal pressure of the container in accordance with table 1-5.	

1-40. Pressurized Container - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE CONTAINER/ - Continued	**NOTE** An all blue in the humidity indicator indicates a safe condition. As moisture content inside the container increases, the indicator color will change from blue to pink. An all pink condition is considered unsafe and indicates that the desiccant must be changed and the container repressurized.	
1. Humidity Indicator	If the humidity indicator indicates that the relative humidity is less than 40 percent and the internal pressure is more than 1 psig, no maintenance is necessary until the next regular inspection.	
2. Humidity Indicator	If the humidity indicator indicates that the relative humidity is less than 40 percent but the internal pressure is less than 1 psig, the container shall be checked for leakage, using a soap solution at all closures. (Refer to TB 55-8100-200-25.) When leakage has been corrected, the container shall be repressurized to the value stated in table 1-5. Use clean dry compressed air. Record date of repressurization and name of activity in appropriate section of engine historical record.	
3. Humidity Indicator	If the humidity indicator indicates the relative humidity to be 40 percent or more, an unsafe or corrosive condition exists. Correct as follows:	
		a. **Depressurize** shipping container by **opening** air filling valve at front of container.

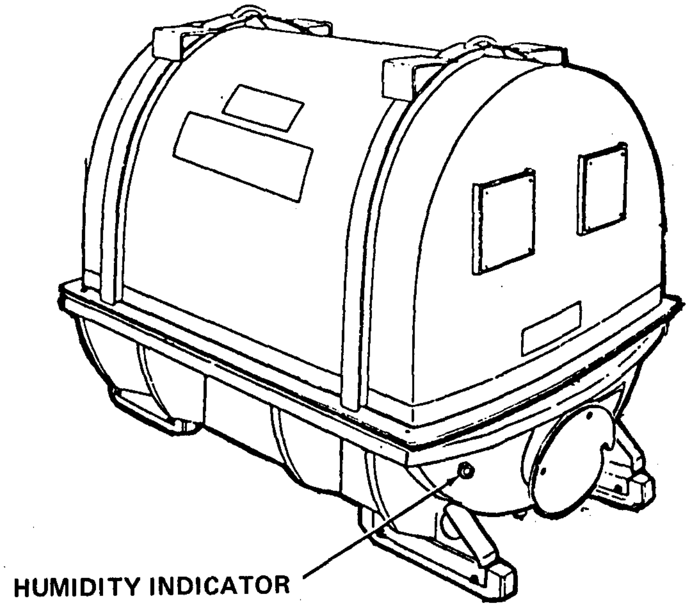
1-40. Pressurized Container - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION

ENGINE CONTAINER/ - Continued

CAUTION

Do not disturb relief valve. Valve could be damaged.



b. **Allow** air pressure to return to zero.

c. **Remove** capscrews and nuts that secure container halves together,

d. **Remove** cover from container and **inspect** engine to determine its serviceability. Any presense of corrosion on the inlet, or compressor housing, or on other visible exterior surfaces, or on the compressor or turbine blades or vanes is cause to render the engine as unserviceable.

Table 1-5. Container Air Pressure vs. Ambient Temperature

Temperature (°C)	(°F)	Pressure (psig)	Temperature (°C)	(°F)	Pressure (psig)
60	140	7.6	4	40	3.9
54	130	7.3	-1	30	3.5
49	120	6.9	-7	20	3.2
43	110	6.5	-12	10	2.8
38	100	6.1	-18	0	2.4
32	90	5.8	-23	-10	2.0
27	80	5.4	-29	-20	1.7
21	70	5.0	-34	-30	1.3
16	60	4.6	-40	-40	0.9
10	50	4.3			

If the engine is found to be serviceable, remove it from container and preserve it as outlined in paragraph 1-36 or place it in service.

If unserviceable, inspect and repair to a like-new corrosion-free condition per applicable paragraphs within this manual as authorized by Maintenance Allocation Chart. If not repairable, ship engine to Depot.

1-41. Engine Container - Internal Pressure and Humidity Check

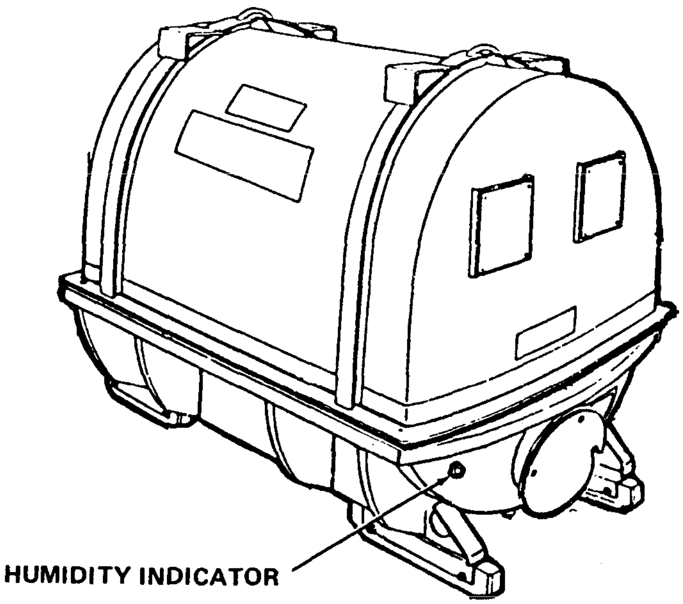
INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Desiccant (item 8, Appendix D)

References
Para 1-30,1-43
Table 1-5
Procedure 7, Troubleshooting Chart

LOCATION/ITEM	REMARKS	ACTION
ENGINE CONTAINER/	Check the internal pressure and humidity within 24 hours after the container is pressurized. Check the pressure and humidity immediately prior to shipment if the engine is to be shipped.	
1. Internal Pressure Check	If the internal pressure is not within 0.5 psig of the value shown in table 1-5, repeat procedures in paragraph 1-30, item 3, steps b and c.	
2. Humidity Indicator Check	The humidity indicator (see figure) is normally light blue in color. At 40 + or -3 percent relative humidity; the color will change to light lavender or lavender pink.	a. The humidity indicator may be light lavender or lavender pink when the container is pressurized and should change to light blue within one to two hours. If it does not change to light blue, replace the indicator.



1-41. ENGINE CONTAINER – INTERNAL PRESSURE AND HUMIDITY CHECK – Cont.

		ACTION
ENGINE CONTAINER/- Continued	NOTE The humidity indicator should change to light blue in an atmosphere of less than 37 percent relative humidity unless it has absorbed sufficient moisture to wash away or destroy its chemical properties.	
	Refer to paragraph 1-40 (item 3).	b. If humidity indicator changes to light lavender or lavender pink after container has been pressurized, open the container and inspect the engine for corrosion. Replace the desiccant (item 8, Appendix D).

1-42. SPECIAL INSPECTIONS.

This section provides special inspections to be performed on the turbine when the engine has experienced operation beyond allowable temperature limits. Tables 1-6 and 1-7 list the various overtemperature conditions for starting and power transients and the maintenance action required for each.

Table 1-6. Overtemperature During Start

Temperature Range	Time	Maintenance Action
1380°F-1700°F (749°C-927°C)	Over 10 seconds	Inspect turbine. *
1700°F-1830°F (928°C-999°C)	Anytime	Inspect turbine. *
Over 1830°F (999°C)	Anytime	Remove engine for depot maintenance or overhaul.

NOTE

1. Refer to Procedure 7, Troubleshooting Chart when temperature consistently exceeds 1550°F (843°C).

2. The time-at-temperature limits are not additive and may be repeated without restrictions.

*Refer to Turbine Overtemperature Inspection paragraph 1-43.

Table 1-7. Overtemperature During Power Transients

Temperature Range	Time	Maintenance Action
1380° F- 1550° F (749° C- 843° C)	Over 6 Seconds	**Inspect** turbine.*
1550° F- 1700° F (843° C- 927° C)	Anytime	**Inspect** turbine.*
over 1700° F (927° C)	Anytime	**Remove** engine for depot maintenance or overhaul.

Note

The time-at-temperature limits are not additive and may be repeated without restrictions.

*Refer to turbine overtemperature inspection paragraph 1-43.

143. TURBINE OVERTEMPERATURE - INSPECTION.

INITIAL SETUP

Applicable Configuration
All

References
Para 3-2, 3-4, 3-6, 3-8 and 3-10

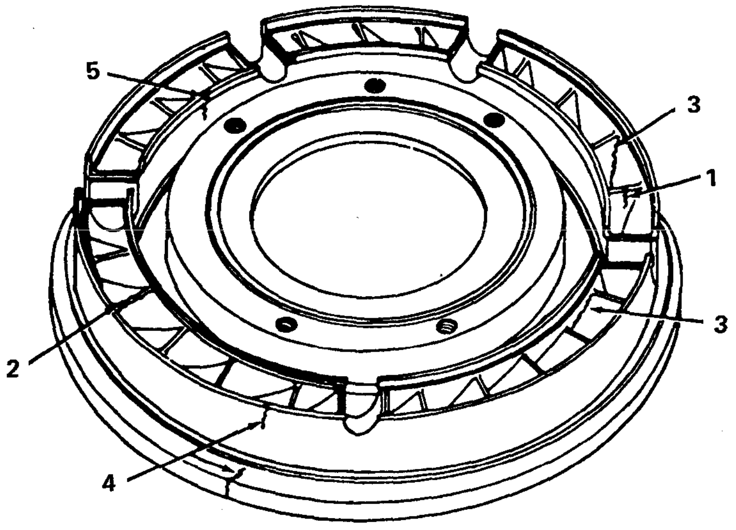
LOCATION/ITEM	REMARKS	ACTION
ENGINE/	NOTE The following inspection may be performed with the engine installed in the airframe.	
1. Combustion Section	Refer to paragraph 3-6.	**Remove** the combustion section.
	NOTE Removal of the first-stage nozzle from the turbine is not authorized.	
2. First Stage Turbine Nozzle and Shield	First stage turbine nozzle and shield. Replace engine if serviceable limits are exceeded on the first stage turbine nozzle, Replace shield if serviceable limits are exceeded on the shield.	**Inspect** the first stage turbine nozzle and shield as outlined in the following tabular listing and figure. Visually **inspect** blades of first-stage N1 turbine for possible damage.

First-Stage Turbine Nozzle and Shield Inspection

Item	condition	Serviceable Limits
First Stage Nozzle		
1	Axial cracks in vane airfoil.	Leading edge 1/4 in. (6.4 mm) maximum; trailing edge 5/16 in. (7.9 mm) maximum. a. No two cracks in same plane. b. Adjacent cracks 1/4 in. (6.4 mm) apart. c. Adjacent cracks not progressing toward each other.
2	Nicked or dented leading and trailing edge. Warped or burned trailing edge only.	Leading edge 1/16 in. (1.6 mm) maximum; trailing edge 1/8 in. (3.2 mm) maximum.
3	Fillet cracks-inner and outer band.	Leading edge 1/4 in. (6.4 mm) maximum; trailing edge 1/8 in. (3.2 mm) maximum.
4	Outer band cracks-leading and trailing edges.	Leading edge-visible portion of crack extends 3/8 in. (9.5 mm) maximum axially into the band. Trailing edge-crack extends 1/2 in. maximum axially into the band. Cracks on leading edge must not be in line with cracks on trailing edge.
5	Inner band cracks-leading and trailing edges.	Leading edge-visible portions of crack extends 1/16 in. (1.6 mm) maximum axially into the band. Trailing edge-none permitted.
First Stage Nozzle Shield		
6	Cracks around spotwelds on heat shield.	Cracks are acceptable provided the length of the crack is not greater than 50 percent of the distance around the weld.
Combustion Section Components		
7	(Refer to paragraphs 3-2, 3-4, 3-8 and 3-10.)	

1-43. Turbine Overtemperature - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		



1-44. Compressor - Special Inspection. This paragraph presents special inspections to be performed on the engine when damage has been sustained due to operation under abnormal conditions or operation in severe climatic conditions.

INITIAL SETUP

Applicable Configuration
All

Special Tools
Vibration Mounting Kit, Tool No. 171170-0104

References
Para 2-9, 2-10, 2-14, 2-21, 2-19, and 3-6
TM 55-4920-243-15

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	This inspection must be performed following an in-flight flameout in ice-producing weather or anytime snow and ice ingestion is suspected. Inspect the compressor for snow, ice, or water damage as follows:	
1. Compressor Snow and Ice Ingestion Inspection		a. **Obtain** access to the compressor inlet but **do not disassemble** any engine parts.

1-44. Compressor - Special Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		b. **Inspect** compressor front support vanes and first-stage rotor blades. **Replace** compressor if any damage, bending or distortion is detected.
2. Compressor Inlet Blockage Inspection		a. **Replace** compressor assembly if engine has been operated with inlet air restricted due to foreign objects or materials which have become lodged in the compressor inlet. b. **Tag** the replaced compressor to **show** that the cause of removal was inlet air blockage.
	Conditions which constitute blockage are as follows: a. Foreign objects or materials found in the inlet during inspection of the aircraft when not in operation. If it can be determined that the blockage was not there during the last operation of the engine, remove the foreign object or material and leave the compressor in service. b. Power loss encountered following a restriction at the compressor inlet area while the engine is in operation. Blockage in flight can usually be verified by inspection after landing (blockage still exists). However, some blockage may be followed by ingestion before inspection can take place. Objects or materials which were large enough to have stopped at the inlet guide vanes before ingestion should be considered to have caused compressor inlet blockage.	
3. Compressor Foreign Object Damage (FOD) Inspection	Power loss associated with an increase in engine vibration can often be attributed to foreign object damage. Inspect for foreign object damage as follows:	s. Obtain access to compressor inlet but do not disassemble any engine parts.

1-44 Compressor - Special Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
	If this inspection is inconclusive, remove one compressor case half and check for FOD (refer to paragraph 2-9).	b. **Inspect** compressor front support vanes and first-stage rotor blades and vanes for FOD.
		c. If compressor FOD is detected, **remove** the combustion section **(refer** to paragraph 3-6) end **check** the turbine first-stage vanes and blades for FOD.
	If turbine FOD is detected, replace the engine. If only the compressor has sustained FOD, replace the compressor.	
4. Compressor Erosion Inspection	If the engine is frequently subjected to sand and dust, ingestion causing reduced engine performance (evidenced by high TOT and low torque), compressor erosion inspection is recommended. (Refer to paragraphs 2-14 end 2-19).	
5. Compressor Vibration Inspection	If engine vibration is encountered or compressor replacement was made, perform vibration test as follows and repair or replace the engine as applicable.	
	Vibration Monitoring Kit, Tool No. 171170-0104	a. **Install** vibration monitoring kit in accordance with TM 55-4920-243-15.
		b. **Run** engine and **check** for vibration in excess of the limits specified in the following tabular listing. **Note** the origin of the vibration.

144. Compressor - Special Inspection - Continued

LOCATION /ITEM	REMARKS	ACTION

ENGINE/ - Continued

Vibration Limits

Item	Limit		Remarks
Maximum vibration (200 cps filter)	Test Stand	Airframe	
Transient Power			
Compressor	1.2 inch/second	2.0 inch/second	If limits are **exceeded** shut down immediately. **Investigate** to determine cause.
Turbine	1.8 inch/second	3.0 inch/second	
Gearbox	1.0 inch/second	1.7 inch/second	
Steady state 100% with Collective at Flat Pitch			
Compressor	0.6 inch/second	0.9 inch/second	
Turbine	0.9 inch/second	1.5 inch/ second	
Gearbox	0.5 inch/second		

LOCATION /ITEM	REMARKS	ACTION
	NOTE Perform engine vibration test after initial installation of engine in aircraft, after removal of combustion case, when excessive engine vibration is suspected; or when any maintenance has been performed that may affect engine to transmission alignment. The engine vibration test requirement shall apply to all engines installed, reinstalled, new, overhauled, same or different.	c. If turbine or gearbox vibration limits are exceeded, **replace** the engine. d. If compressor vibration limits are exceeded, **perform** the following inspections shown in items 6 through 10.
6. Compressor Case	Refer to paragraph 2-9.	**Remove** the top half of the compressor case.
7. Blades and Vanes	If blade and vane conditions are not within the limits of paragraph 2-14 and 2-19, replace the compressor assembly.	**Inspect** blades and vanes for foreign object damage and/or bent or distorted vanes.
8. Adapter Spur Gearshaft	Refer to paragraph 2-21.	**Remove** the compressor from the engine. **Check** the adapter spur gearshaft for excessive wear on the 17-tooth gear and splines. **Replace** the compressor if wear is detected.
9. Scroll	Damage is indicative of impeller vane tip or shroud failure; replace the compressor assembly.	**Check** the scroll outlet ports (turning vanes) for damage.
10. Adapter Spur Gearshaft Spline	Refer to paragraph 2-21.	**Check** adapter spur gearshaft spline runout and **correct** as required.

1-44.1 Time and Calendar Inspection.

LOCATION/ITEM	REMARKS	ACTION
ENGINE		
Compressor Case	Remove and inspect in accordance with paragraph 2-43, 2-9, 2-10.1, 2-10.2, and 2-14. Inspection shall be accomplished every 24 months **or** 300 hours after installation, whichever occurs first.	Remove the compressor case.

1-45. Abnormal Flight Maneuver Inspection.

INITIAL SETUP

Applicable Configuration

AU

References

TM 55-4920-243-15
Para 1-42

References

Vibration Mounting Kit, Tool No.
171170-0104

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Hard Landing Inspection	Replace the engine if landing forces exceeded 10g. Use the airframe condition to determine if the 10g force limit has been exceeded as follows:	
2. OH-6A HELICOPTER/		Pilot and co-pilot seat metal box frames buckled, dishpanned, and/or wrinkled.
3. OH-6A HELICOPTER/		Airframe landing skids and cross tubes deformed to a degree that the fuselage touches (or shows evidence of having touched) the ground.
	If the above items do not apply make an inspection of the engine for damage as follows:	
4. Gearbox Housing and Flanges		Check gearbox housing and flanges for cracks.
5. Magnetic Chip Detector		Inspect magnetic chip detector for metal particle acumulation.
6. Engine Mounting Pads		Check engine mounting pads for cracks.
7. Air, Oil, and Fuel Tube Connections		Check air, oil, and fuel tube connections for tightness and leaks.

1-45. Abnormal Flight Maneuver Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
8. Engine Accessories		**Check all engine accessories for cracked flanges, loose bolts and nuts, connections, and general condition.**
9. Vibration Test	Vibration monitoring kit, tool no. 171170-0104	**Install** vibration monitoring kit in accordance with TM 55-4920-243-15 and operate the engine on the ground for 30 minutes. Check for vibration in excess of the limits specified in para 1-44. action item 5 (Vibration Limits).
9.1. Magnetic chip Detector		**Inspect** magnetic chip detector for metal particle accumulation.
10. Sudden Stoppage Inspection	The following inspections must be accomplished whenever the main rotor or tail rotor strikes a stationary object.	
11. Engine Mounts		**Inspect** the engine mounts for cracks and security. If stoppage was severe enough to fracture an engine mount, send the engine to overhaul.
12. Magnetic Chip Detectors		**Check** the magnetic chip detectors for metal particles.
13. Engine Inlet		**Inspect** the engine inlet for foreign objects.
14. ENGINE/		**Motor** the engine and check for unusual noise.
15. Vibration Test		**Install** vibration monitoring kit in accordance with TM 55-4920-243-15 and **operate** the engine on the ground for 30 minutes. **Check** that vibration is within limits specified in para 1-44, action item 5 (Vibration Limits).

1-45. Abnormal Flight Maneuver Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
16. Magnetic Chip Detectors		a. **Shut down** and **check** the magnetic chip detectors for metal particles. b. **Recheck** the magnetic chip detectors after eight hours of engine operation.

1-46. Inspection After lnflight Auto Reignition Operation.

INITIAL SETUP

Applicable Configuration	References
All	Para 1-44

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	Perform inspections specified in paragraph 1-44 and location/Items 1, 2 and 3.	a. **Check** for water or other contaminants in fueld. b. **Check** for loose connections in fuel lines and Pc air lines. c. **Check** for contaminated fuel filter.

1-46.1. Inspections For Engines Operated In Volcanic Ash

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ – Continued		
1. Inspections for Engines operated in Volcanic Ash	**If aircraft is parked in areas where ash fall out has occurred. A compressor wash is required prior to next flight.**	Compressor wash in accordance with paragraph 2-4.
	If aircraft is flown near but not in volcanic ash cloud the following inspections should be complied with every 25 hours. If the aircraft is flown or hovered in the volcanic ash cloud then the inspections should be complied with following each flight.	a. **Wash** compressor in accordance with paragraph 2-4.
	NOTE **Any signs of deterioration in the deceleration time is cause for fuel control removal/replacement.**	b. **Flush** the engine oil system in accordance with TM 55-1520-228-23, paragraph 1-8.
	If contamination of the fuel control system is suspected, the fuel control and/or governor should be removed/replaced.	c. **Clean/replace** egine oil filter in accordance with paragraph 8-3 through 8-5.
		d. **Clean/replace** engine oil falter in accordance with paragraphs 6-27.1 through 6-27.3.
		e. **Clean** the bleed valve air system and poppet seat area of ash deposits in accordance with paragraph 2-4.1.
		f. **Perform** compressor erosion inspection in accordance with paragraph 2-14.
		g. **Replace** engine low pressure fuel falter in accordance with paragraph 6-27.

Section VI. TROUBLESHOOTING

1-47. **GENERAL.**

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;(1) the correct operating procedures have been followed and (2) the problem is caused by a single failure or malfunction.

The trouble as reported by the flight crew is the main point of the problem. Obtain as much information as possible from the flight 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 occuring.

The probable cause lists the components which might cause the malfunction. The cockpit indications can often give a clue as to which of these components is causing the problem.

Caution must be exercised to avoid troubleshooting difficulties caused by false cockpit indications. In most cases, a false indication can be detected by checking it against other indications. For example, a TOT indication system malfunction should be suspected if TOT is high, low, or fluctuating with no change in fuel flow or torque.

It is not possible to list troubleshooting difficulties caused by false cockpit indications. In most cases, a false indication can be detected by checking it against other indications. For example, a TOT indication system malfunction should be suspected if TOT is high, low, or fluctuating with no change in fuel flow or torque.

The troubleshooting procedures are given in logic diagrams. The logic diagrams are organized by specific symptoms and contain the steps required to locate the fault.

The logic diagram lists the action to be taken to correct the fault.

Preserve the engine before removing it from aircraft.

The following is an outline of procedures to follow when troubleshooting.

If possible, confirm the reported fault with a ground test run.

Troubleshoot according to the symptoms listed in the Symptom Index. Table 1-8.

Confirm fault has been fixed with a maintenance operation check.

Table 1-8. Sympton Index (METS)

	Troubleshooting Procedure
ANTI-ICING SYSTEM	
Lack of Anti-Icing Air	39
ENGINE	
Afterfire	47
Acceleration Temperature Too High During Start	7
Acceleration Temperature Too Low During Starting	8
Compressor Rear Bearing Labyrinth Seal Vent Smoking	41
Continuous Exhaust Smoking	40
Engine Fails to Light Off - Fuel Vapor Coming Out of Exhaust and No Audible Ignition Operation	2
Engine Fails To Light Off - No Fuel Vapor Coming Out Of Exhaust	4
Engine Fails to Light Off - Vapor Coming Out of Exhaust and Ignition Operation Audible	3
Engine Fails to Reach Light Off Cranking Speed	1
Engine Lights Off But Will Not Accelerate to Ground Idle Speed Due to Lack of Secondary Fuel	5
Engine Lights Off But Will Not Accelerate to Idle Speed in 45 Seconds	6
Engine N1 Overspeed Above Maximum Limits	27
Engine N2 Overspeeds	28
Engine Power Reset to the Takeoff Setting	33
Engine Tubing Cracked or Broken At the Flare	56
Excessive Exhaust Torching During Start and Transients	29
Excessive Fuel Leaking From Drains or Weep Holes	37
Exhaust Duct Emitting Sparks	44
Exhaust Smoking on Shutdown or Engine Start	42
Faulty Torquemeter Indication	38
High Health Indicator Test (HIT) Check	59

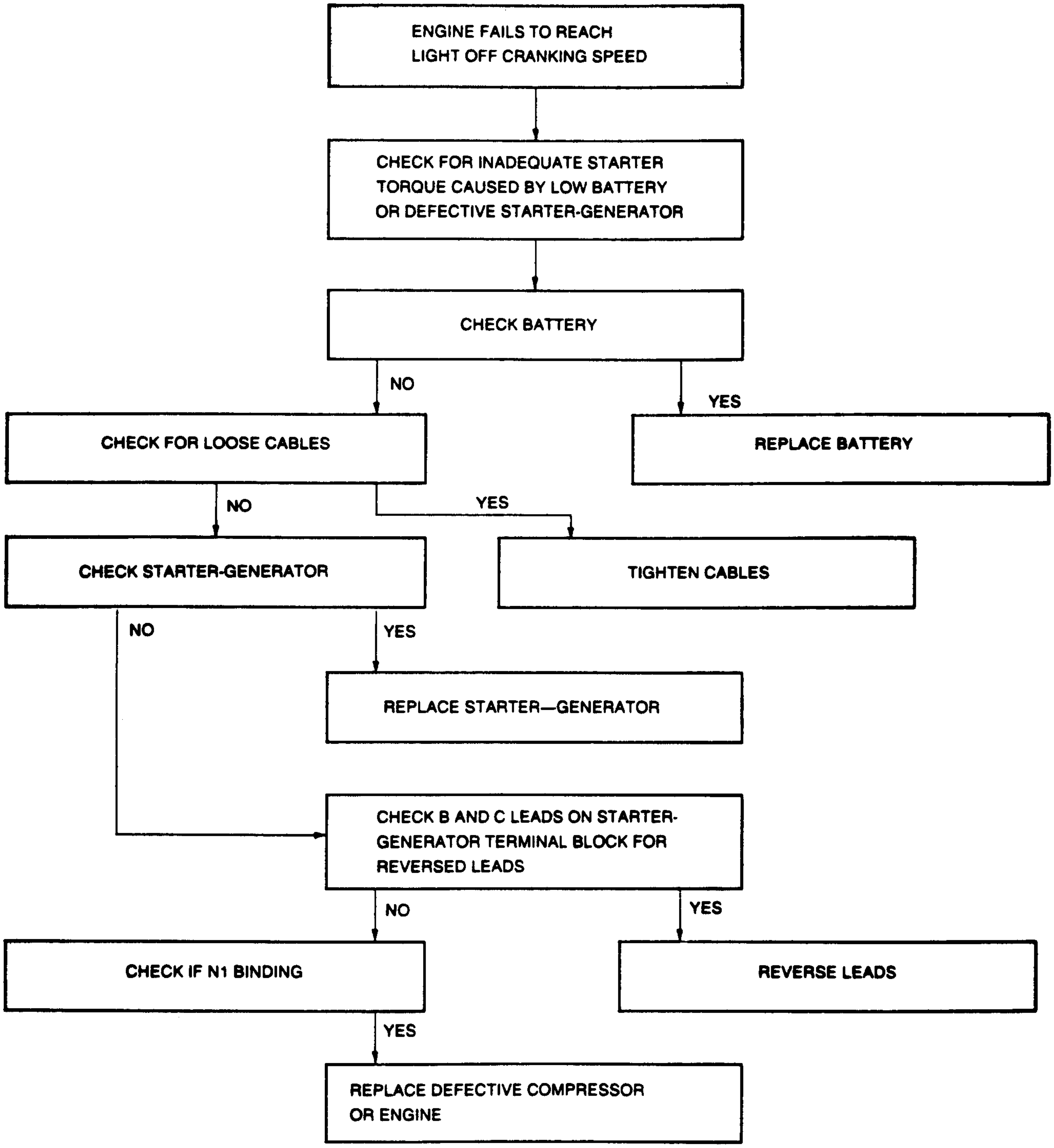
Table 1-8. Symptom Index (METS) - Continued

	Troubleshooting Procedure
High Temperature During Shutdown (Indicatd By Sudden and Considerable Rise in TOT During N1 Deceleration)	48
Low Measured TOT at Normal or High Power	26
Low Power With High TOT	24
Low Power With TOT Below Maximum Limit	25
Main Rotor Does Not Rotate By 30% N1 Speed During Start	54
Engine Power Loss, N2 Droop or Flameout	58
OIL SYSTEM	
Engine Oil Temperature Exceeds 225°F (107°C) But Remains Less Than 248°F (120°C) For a Period Not Exceeding Ten Minutes Without Any Change in Normal Oil Pressure	18
Engine Oil Temperature Exceeds 225°F(107°C) But Remains Less Than 248°F (120°C) For a Period Not Exceeding 10 Minutes With a Change in Normal Oil Pressure	19
Excessive Oil Pressure Fluctuation	15
High Oil Pressure	17
Low Oil Pressure	16
No Response to Oil pressure Adjustment	21
Oil Consumption Exceeds 0.05 Gallons (6.5 Ounces) Per Hour	22
Oil Leakage at Compressor Attachment Insert in the Gearbox Housing (At Insert Adjacent to Compressor Oil Supply Fitting)	50
Oil Leakage During Shutdown Periods (Smoking on Shutdown)	49
Oil Leaking From Weep Holes at Ges Producer Fuel Control and/or Power Turbine Fuel Governor	52
Oil Pressure Drops Off Severely	14
Oil Spewing From Diffuser Vent Orifice	23
Oil Temperature Exceeds 248°F(120°C) Momentarily on 225°F(107°C) For a Period Exceeding 10 Minutes	20
Static Oil Leakage From Burner Drain Valve	43
Static Oil Leakage From Power and Accessory Gearbox Breather	51

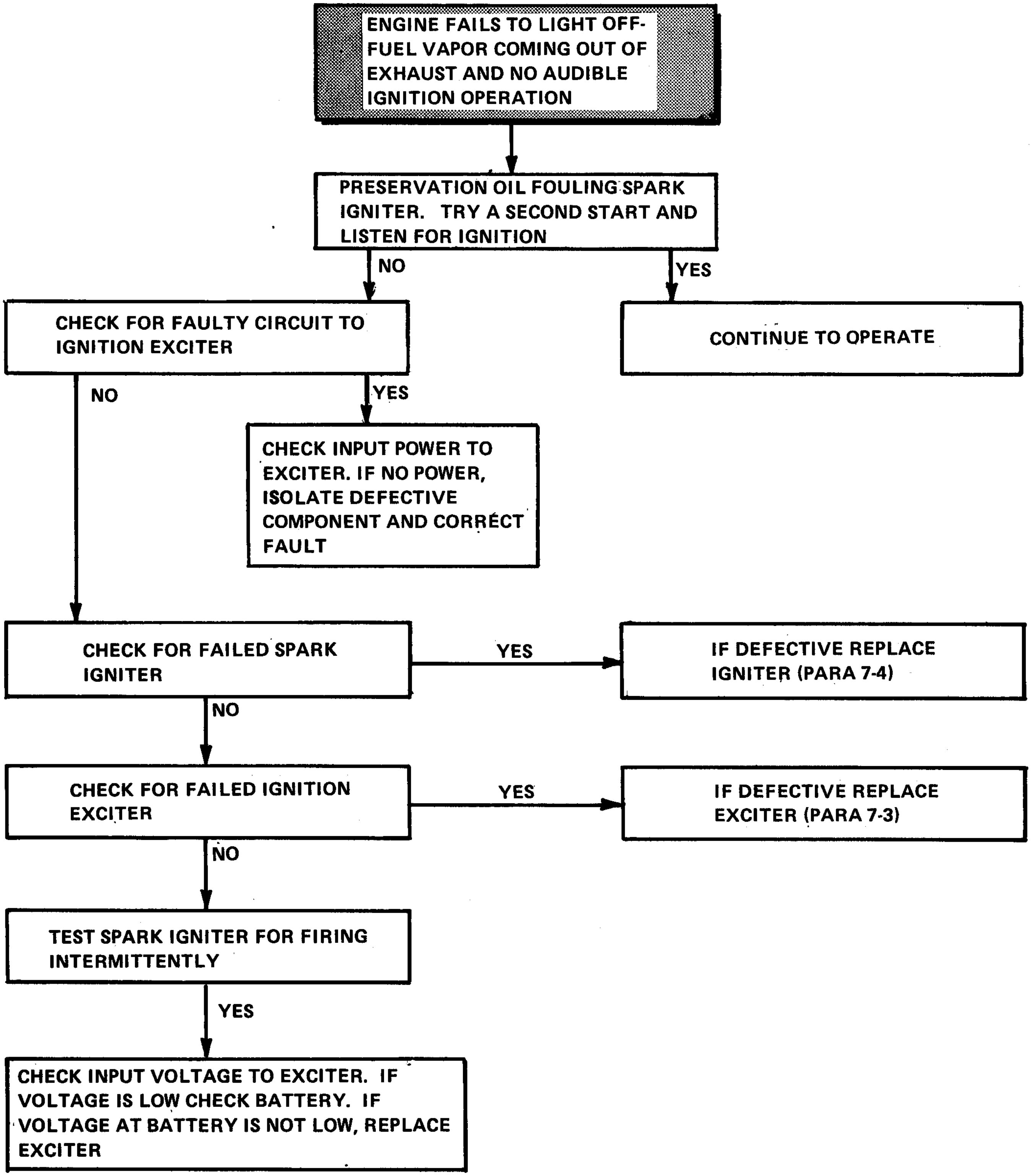
Table 1-8. Sympton Index (METS) - Continued

	Troubleshooting Procedure
Starting	
Starter Unable to Rotate Engine Immediately After Shutdown	53
Slow Engine Response While in Flight	31
Slow to Accelerate From Idle to Power Speed	30
Speed	
Engine Instability Above Idle Speed	11
Engine Speed Cycles at Idle	10
Idle Speed Too High	13
Idle Speed too Low	12
Stalls	
Compressor Stall During Acceleration	35
Compressor Stall During Low Power Operation	36
Compressor Stall During Starting or Near Idle Speed (Refer to TM 55-1520-214-10 or TM 55-1520-228-10 For Stall Definition)	34
TOT Approximately 30°C Lower Than Normal at Idle	32
Unable to Stop Engine	46
Unable to Obtain Maximum N2 RPM	55
Uncontrollable Acceleration Above Idle Speed During or Immediately Following a Cold Engine Start - Ambient Temperature Below 41°F(5°C).	9
VIBRATION	
Excessive Vibration	45
Powerturbine Governor and Gas Producer Fuel Control Throttle Shaft Binding.	57

Troubleshooting Procedure 1. Engine Fails to Reach Light Off Cranking Speed



Troubleshooting Procedure 2. Engine Fails to Light Off - Fuel Vapor Coming Out of Exhaust and No Audible Ignition Operation



Troubleshooting Procedure 3. Engine Fails to Light Off - Vapor Coming Out of Exhaust and Ignition Operation Audible

ENGINE FAILS TO LIGHT OFF - VAPOR COMING OUT OF EXHAUST AND IGNITION OPERATION AUDIBLE

CHECK IF WATER OR OTHER CONTAMINANTS IN FUEL.

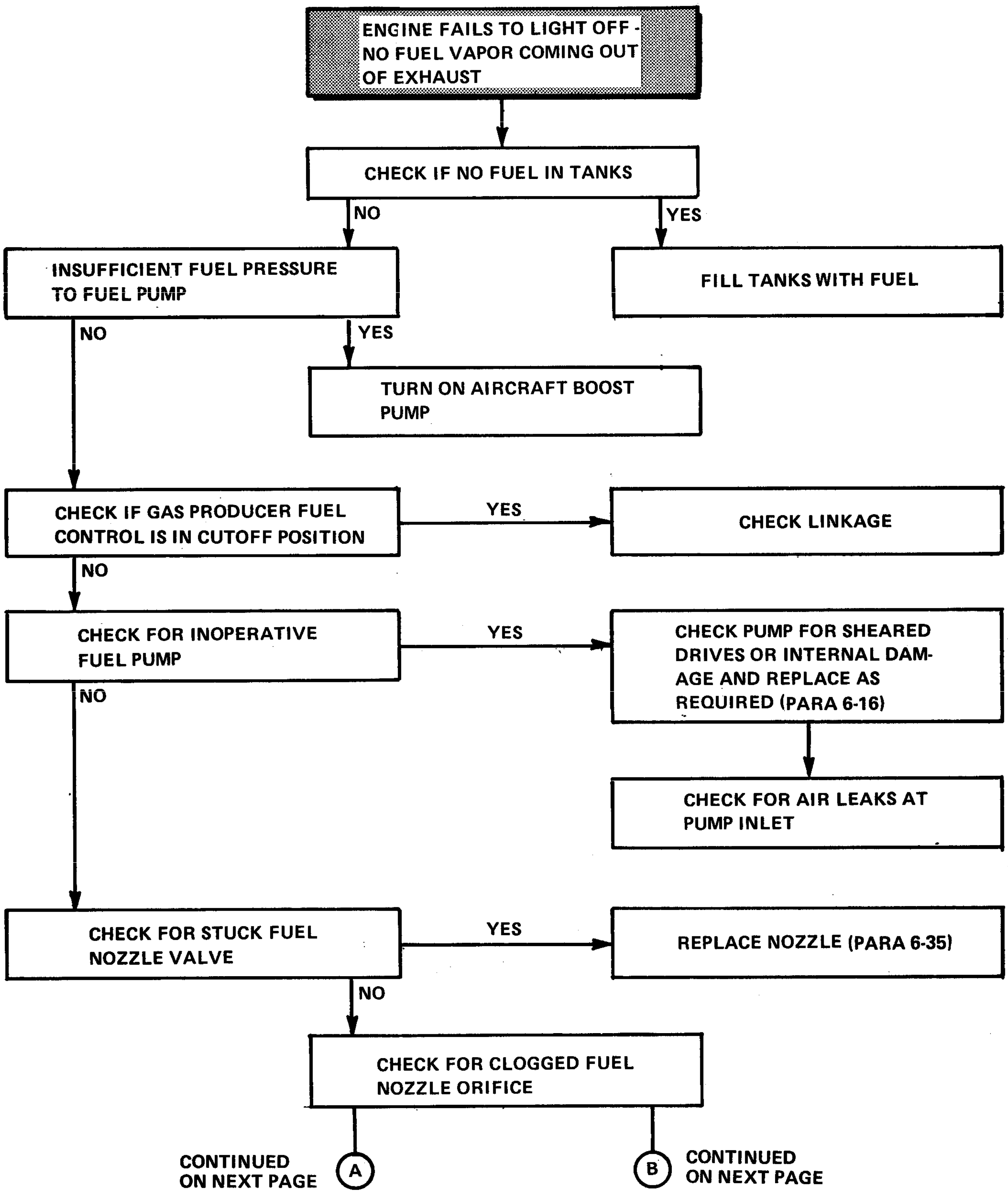
CHECK A SAMPLE OF FUEL FROM THE BOTTOM OF THE TANK. IF CONTAMINATED, DISCONNECT FUEL LINE AT FUEL NOZZLE, DRAIN FUEL, THEN FLUSH SYSTEM WITH CLEAN FUEL. INSTALL NEW FUEL PUMP AND FUEL CONTROL FILTERS.

CHECK INNER COMBUSTION LINER FOR MISALINEMENT ON FIRST STAGE NOZZLE SHIELD

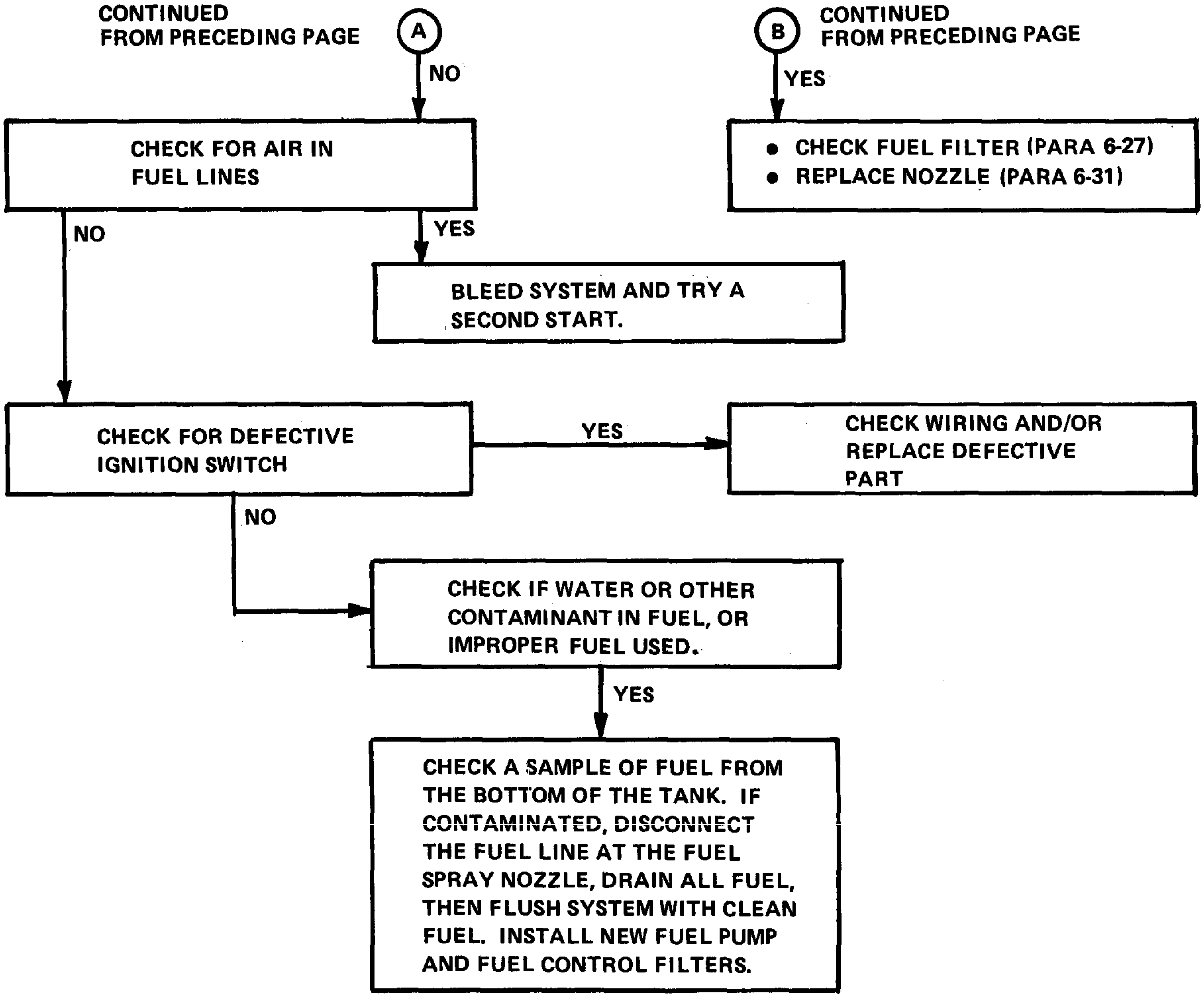
YES

ALINE COMBUSTION LINER WITH FIRST STAGE NOZZLE SHIELD (PARA 3-7).

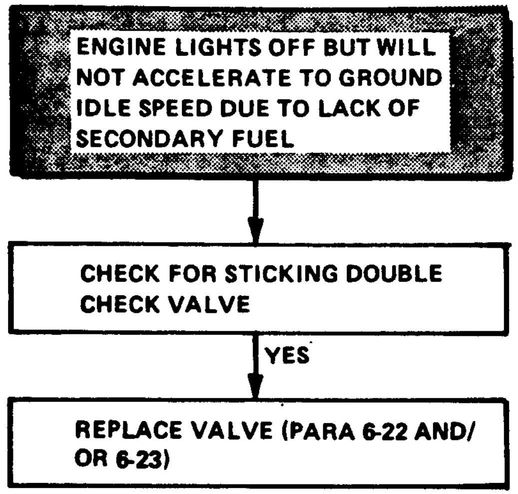
Troubleshooting Procedure 4. Engine Fails to Light Off - No Fuel Vapor Coming Out of Exhaust



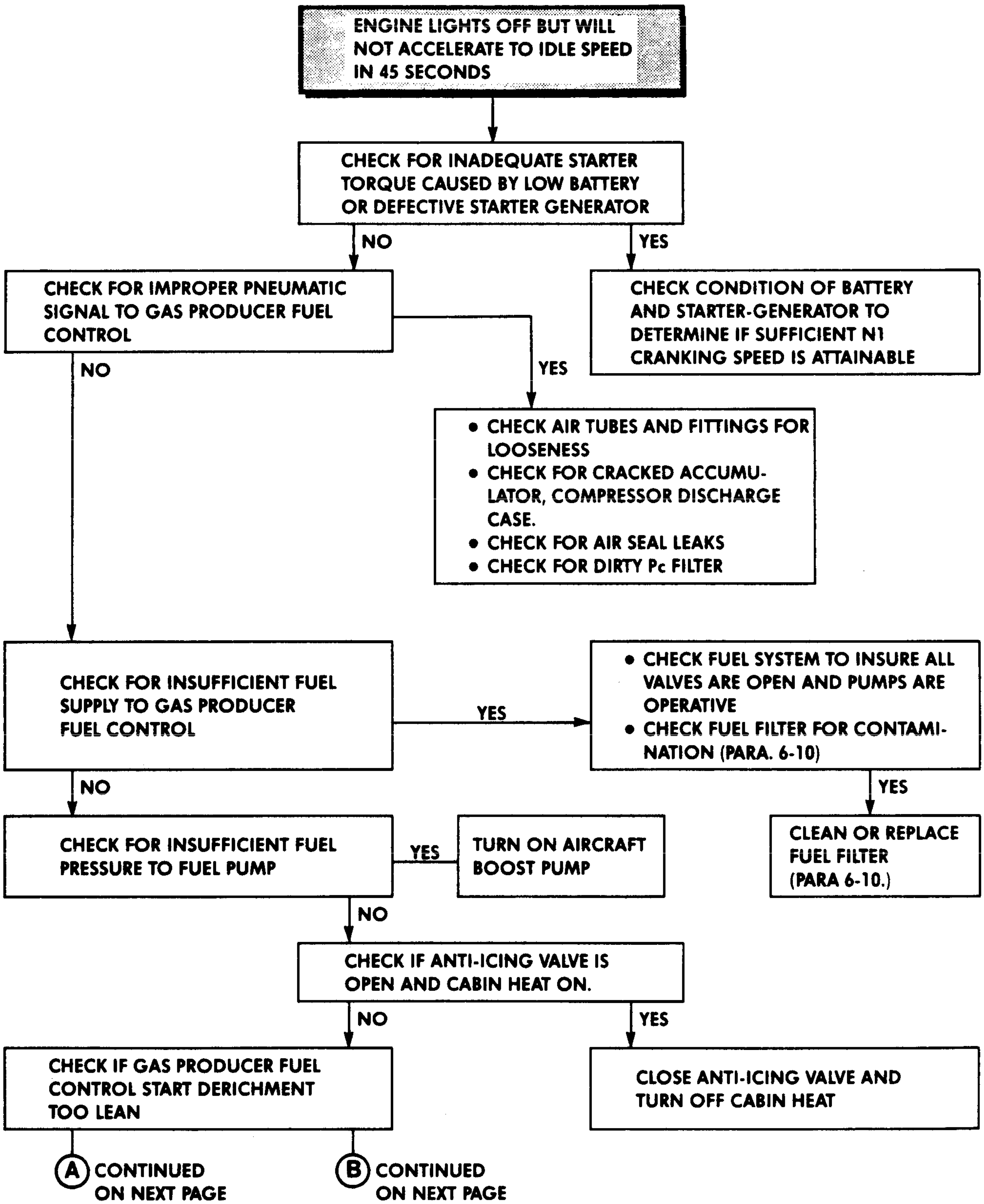
Troubleshooting Procedure 4. Engine Fails to Light Off - No Fuel Vapor Coming out of Exhaust (Cont)



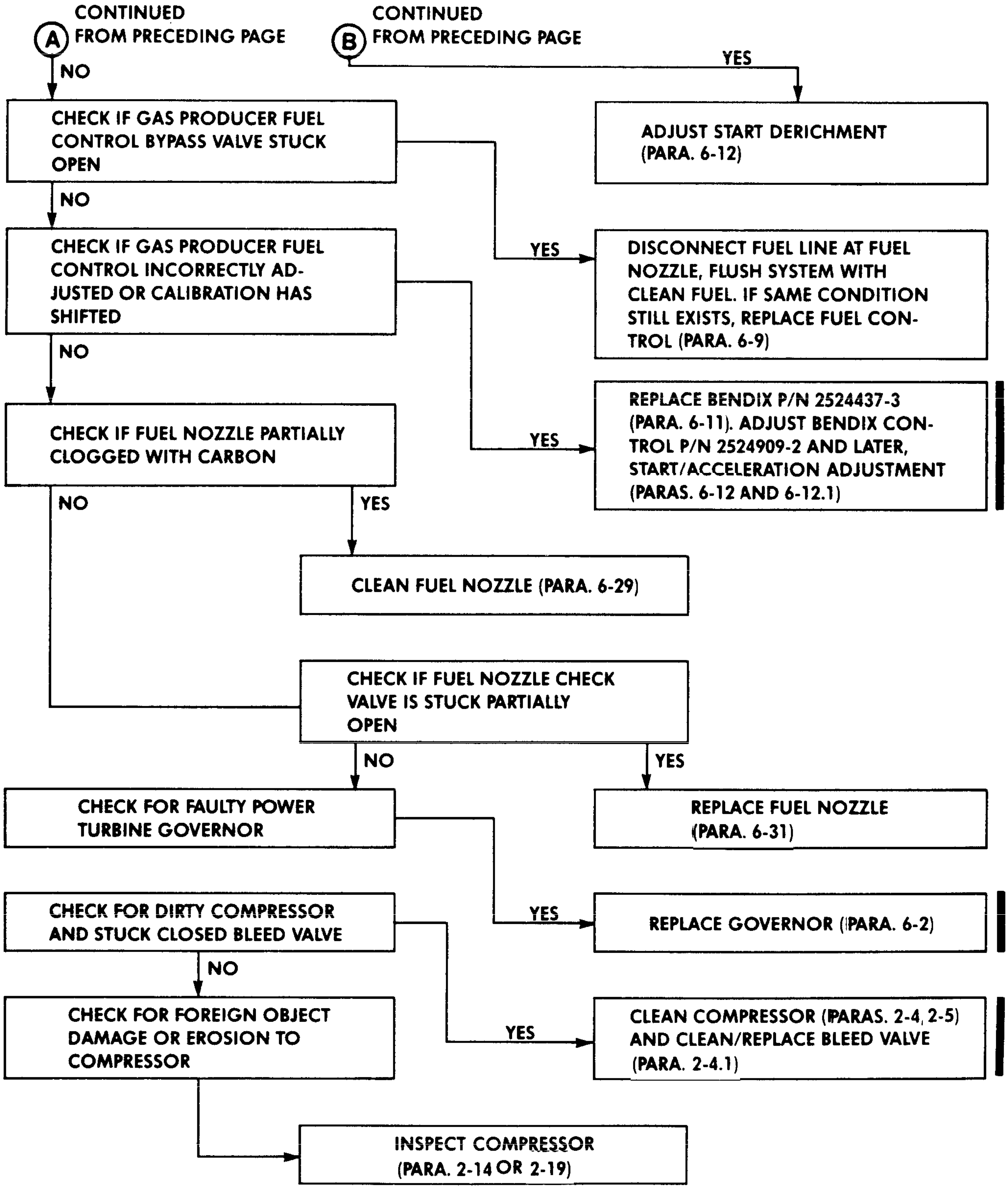
Troubleshooting Procedure 5. Engine Lights Off But Will Not Accelerate To Ground Idle Speed Due to Lack of Secondary Fuel



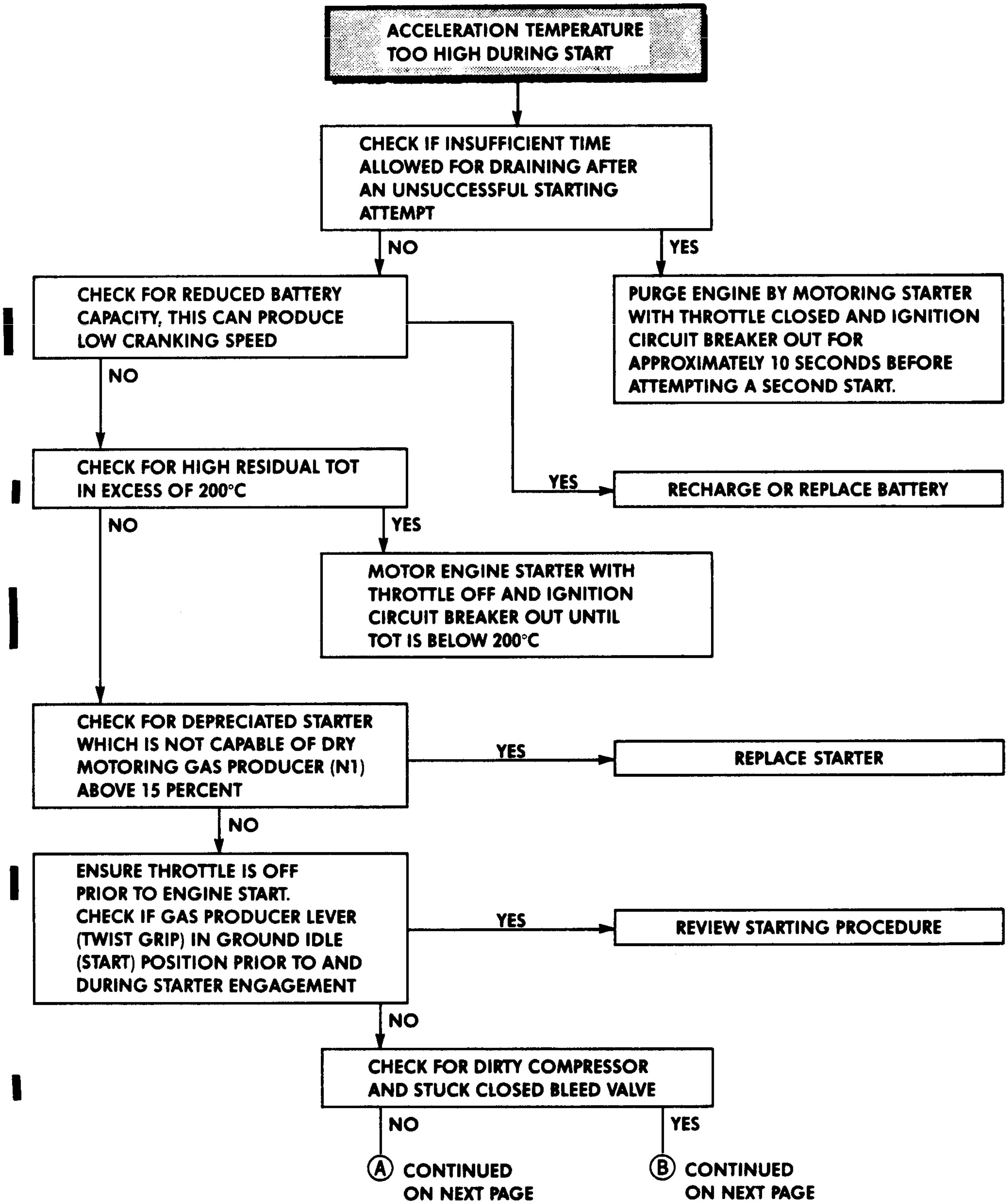
Troubleshooting Procedure 6. Engine Lights Off But Will Not Accelerate to Idle Speed in 45 Seconds



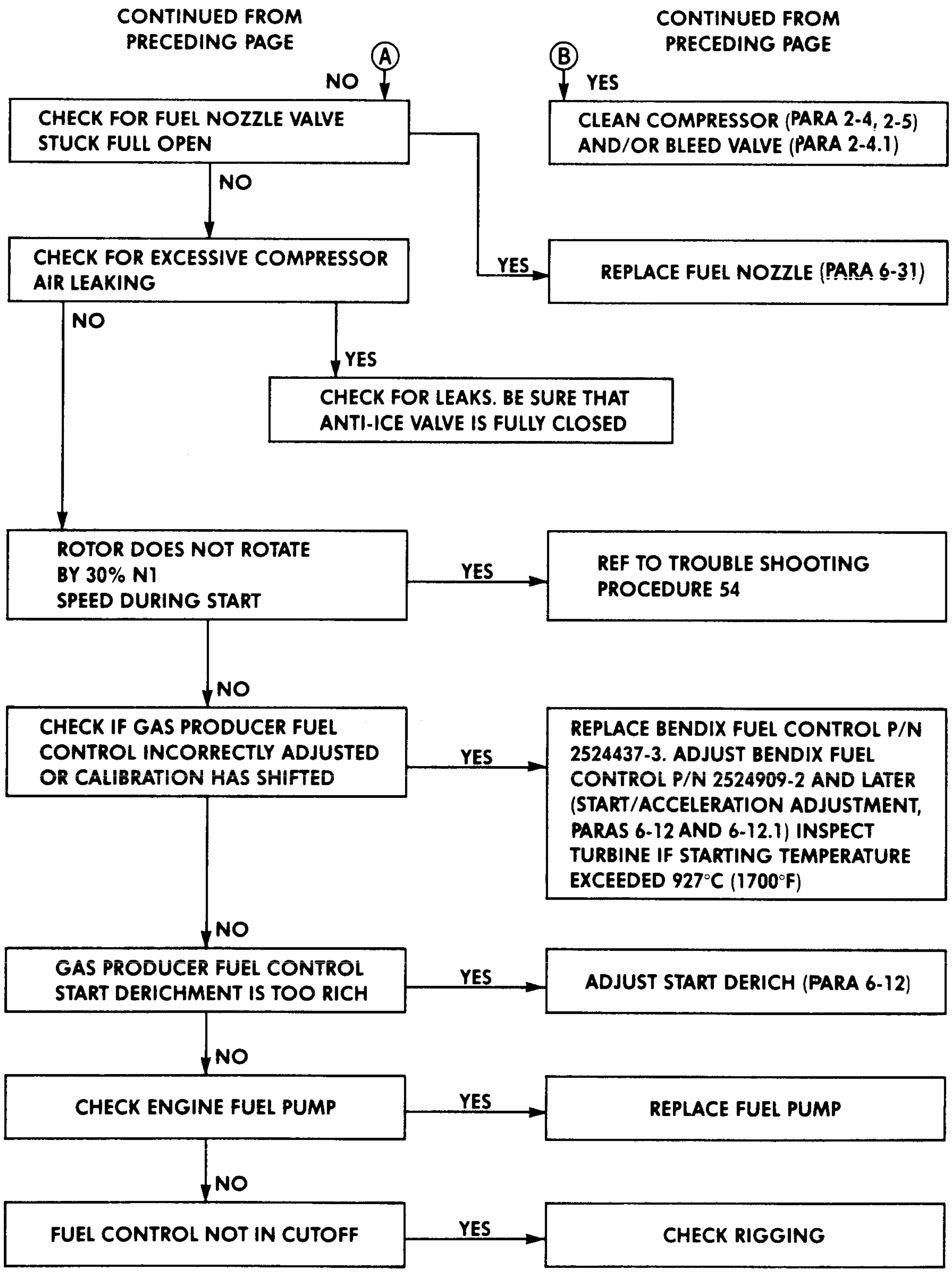
Troubleshooting Procedure 6. Engine Lights Off But Will Not Accelerate
To Idle Speed in 45 Seconds (Cont)



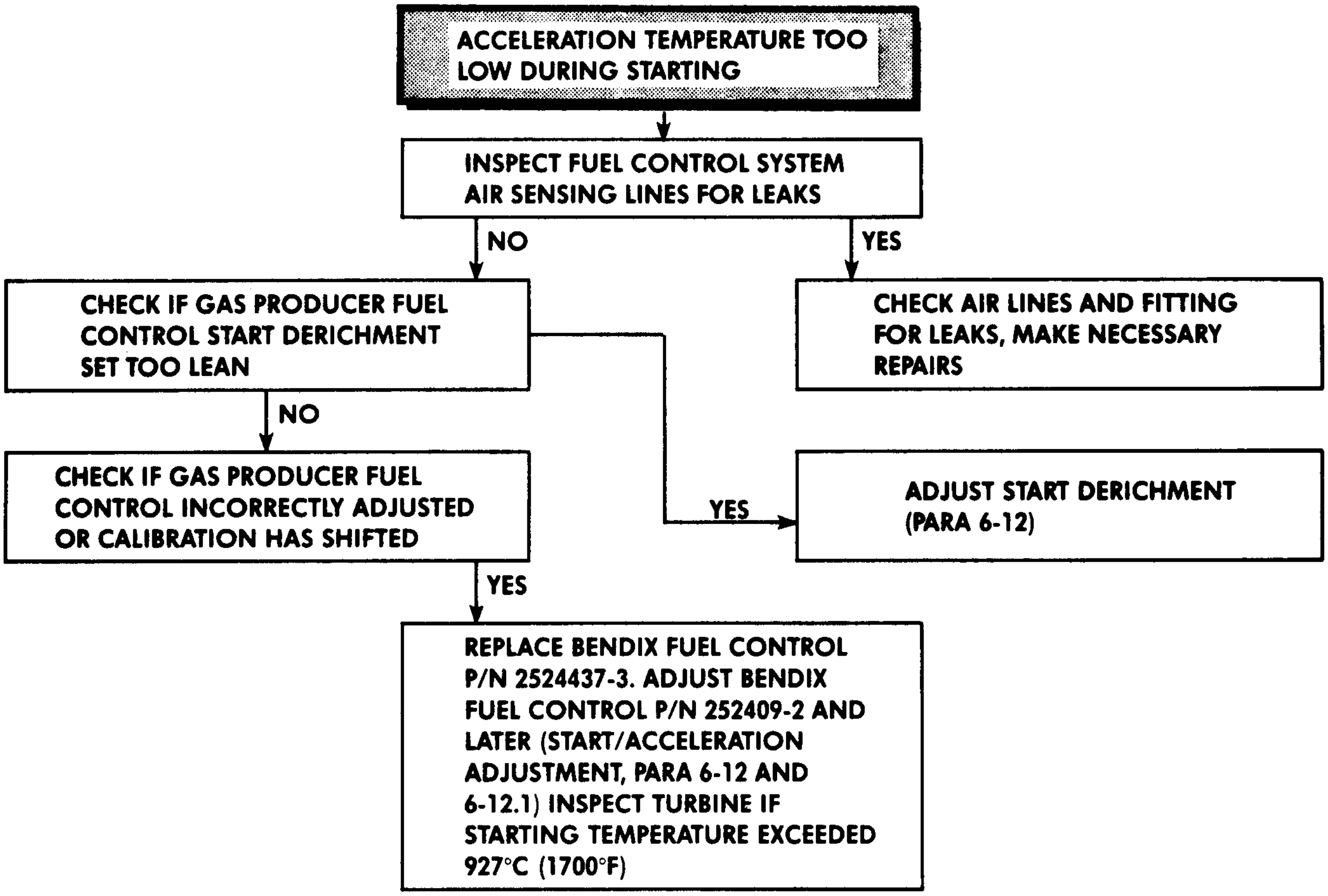
Troubleshooting Procedure 7. Acceleration Temperature Too High During Start



Troubleshooting Procedure 7. Acceleration Temperature Too High During Start (Cont)



Troubleshooting Procedure 8. Acceleration Temperature Too Low During Starting



Troubleshooting Procedure 9. Uncontrollable Acceleration Above Idle Speed During or Immediately Following a Cold Engine Start-Ambient Temperature Below 41°F (5°C)

UNCONTROLLABLE ACCELERATION ABOVE IDLE SPEED DURING OR IMMEDIATELY FOLLOWING A COLD ENGINE START-AMBIENT TEMPERATURE BELOW 41°F (5°C)

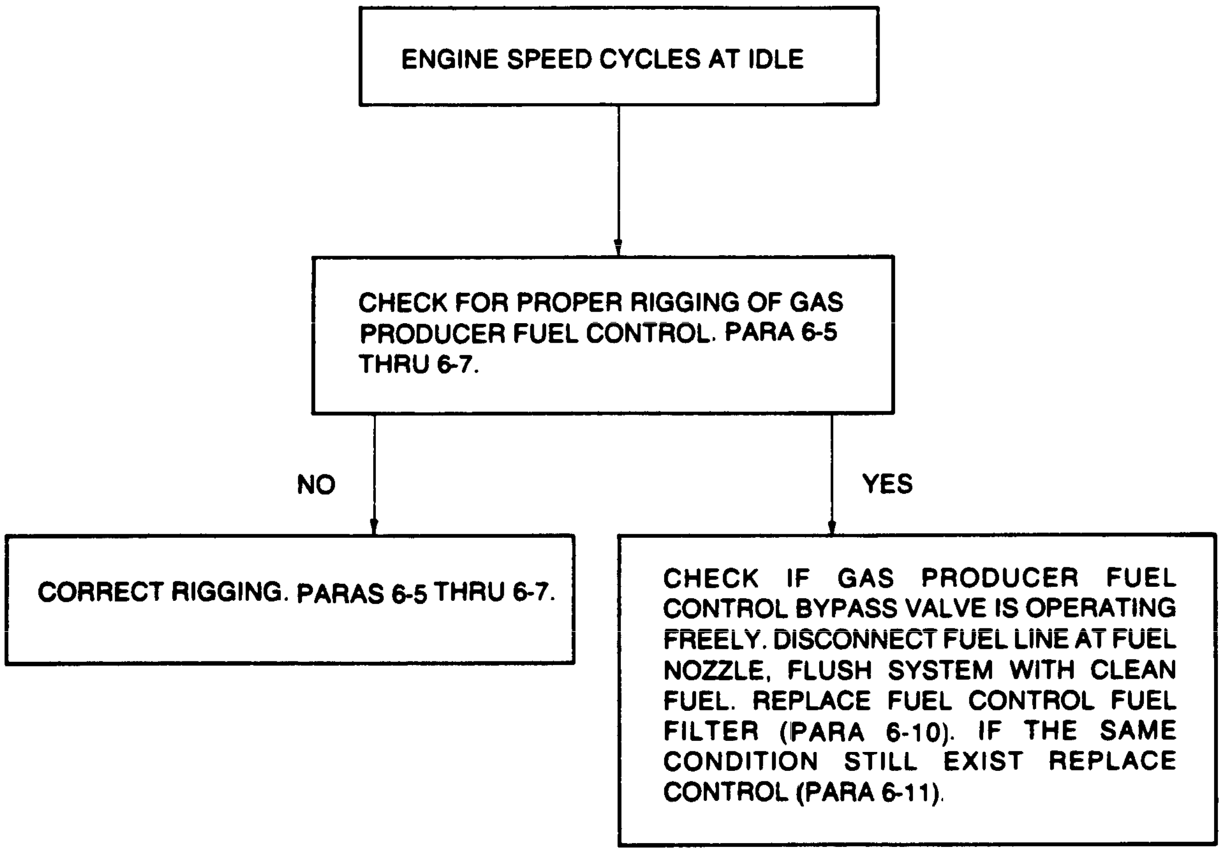
↓

CHECK FOR FROST FORMATION IN BLEED PORTS AT BOTTOM OF FUEL CONTROL

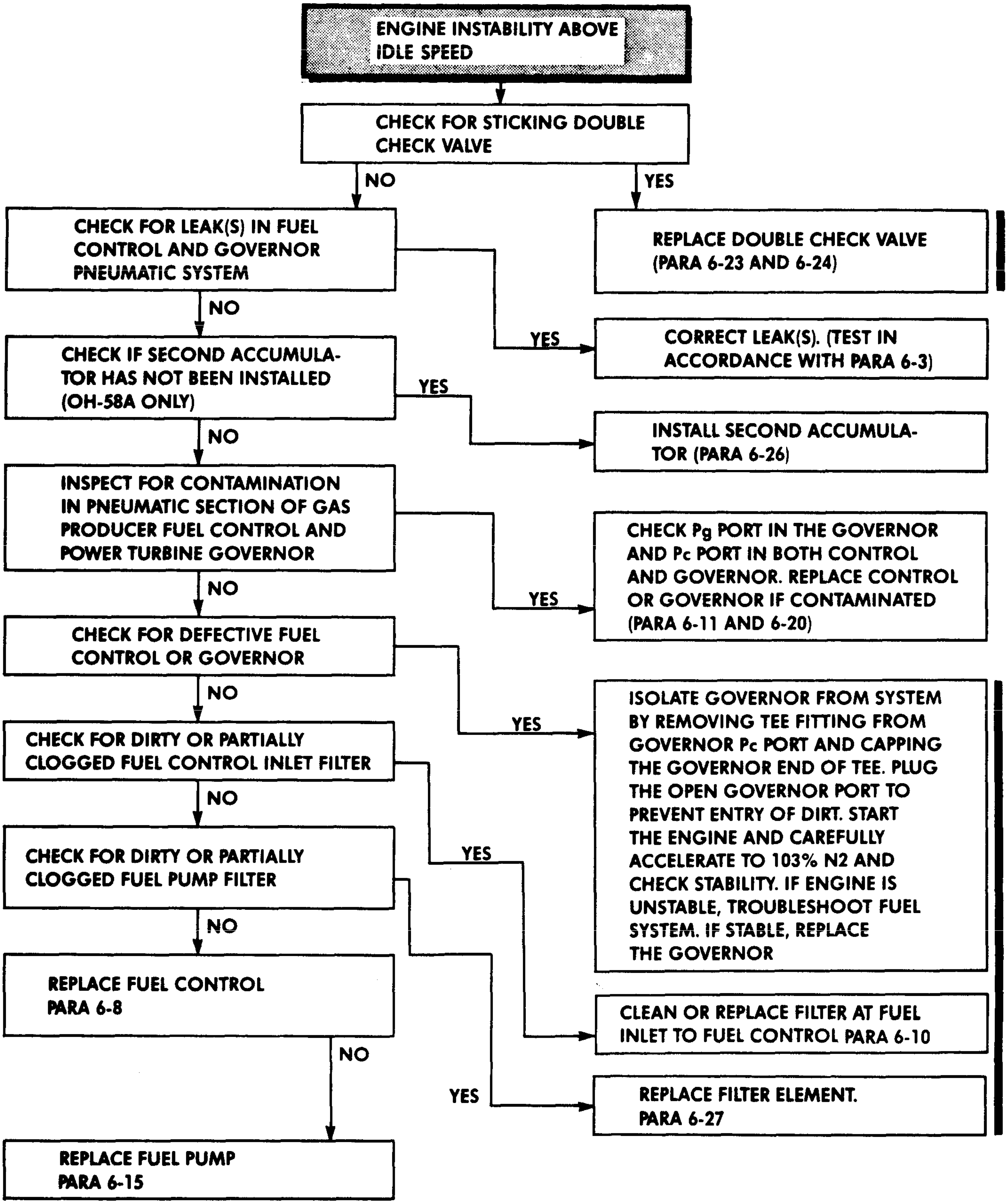
YES →

- OPEN FUEL CONTROL HEATER AIR SHUTOFF VALVE (IF SO EQUIPPED)
- IF NOT EQUIPPED WITH FUEL CONTROL HEATER, CONTINUE START ATTEMPTS, SHUTTING DOWN ENGINE BETWEEN ATTEMPTS.
- IF ENGINE DOES NOT START ON THIRD ATTEMPT, PREHEAT FUEL CONTROL BY BLOWING HEATED AIR ON ENGINE.

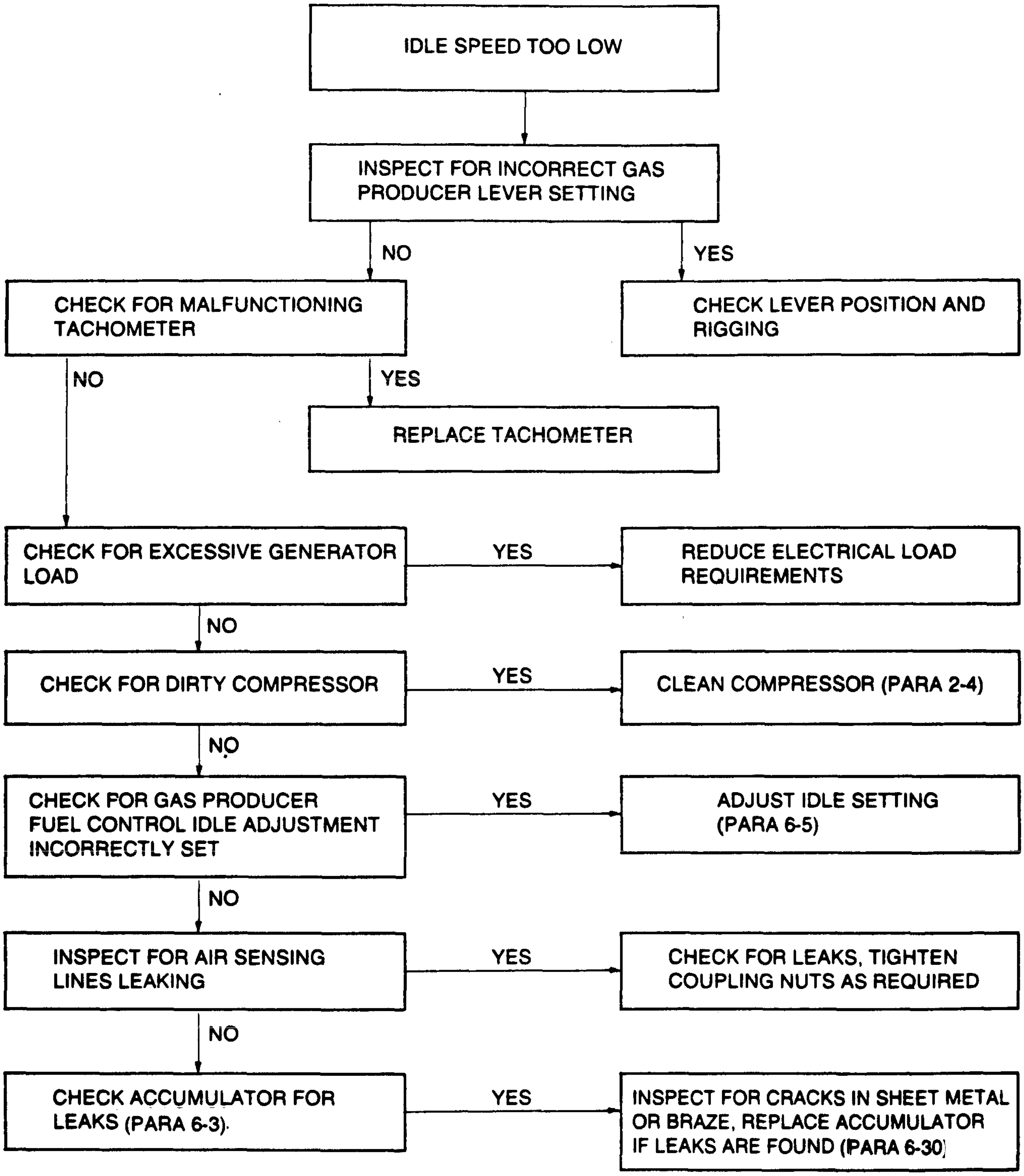
Troubleshooting Procedure 10. Engine Speed Cycles At Idle



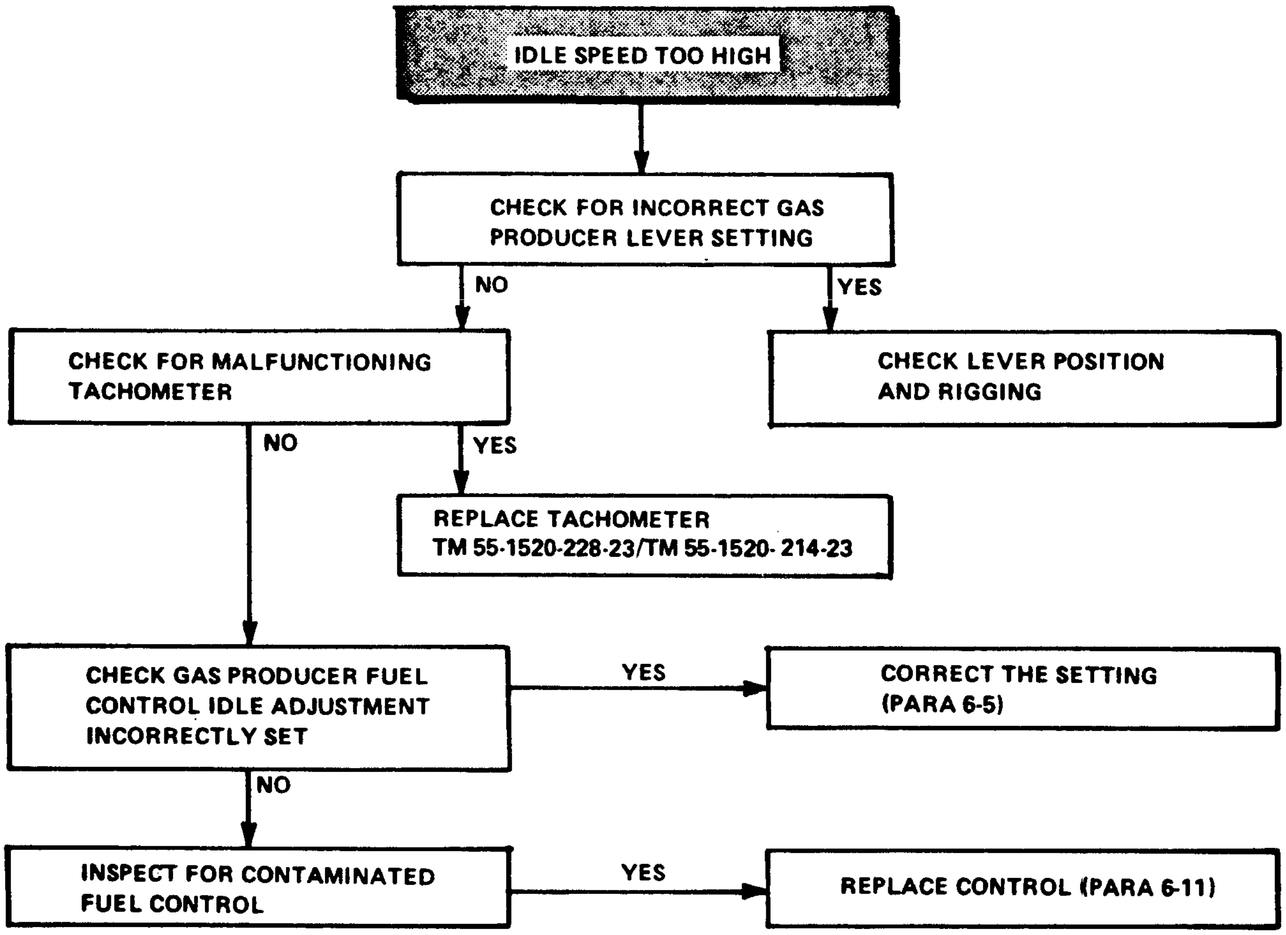
Troubleshooting Procedure 11. Engine Instability Above Idle Speed



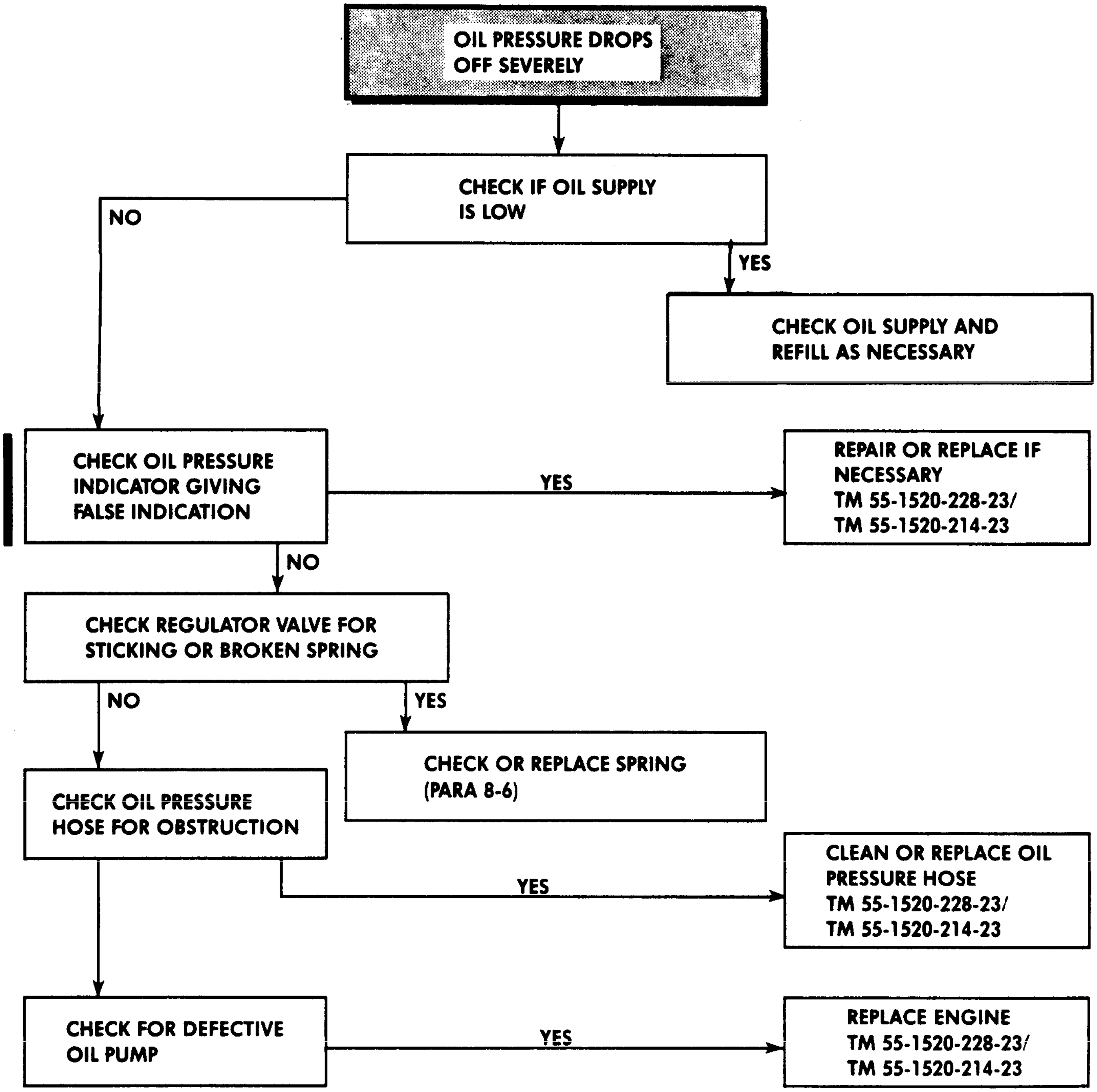
Troubleshooting Procedure 12. Idle Speed Too Low



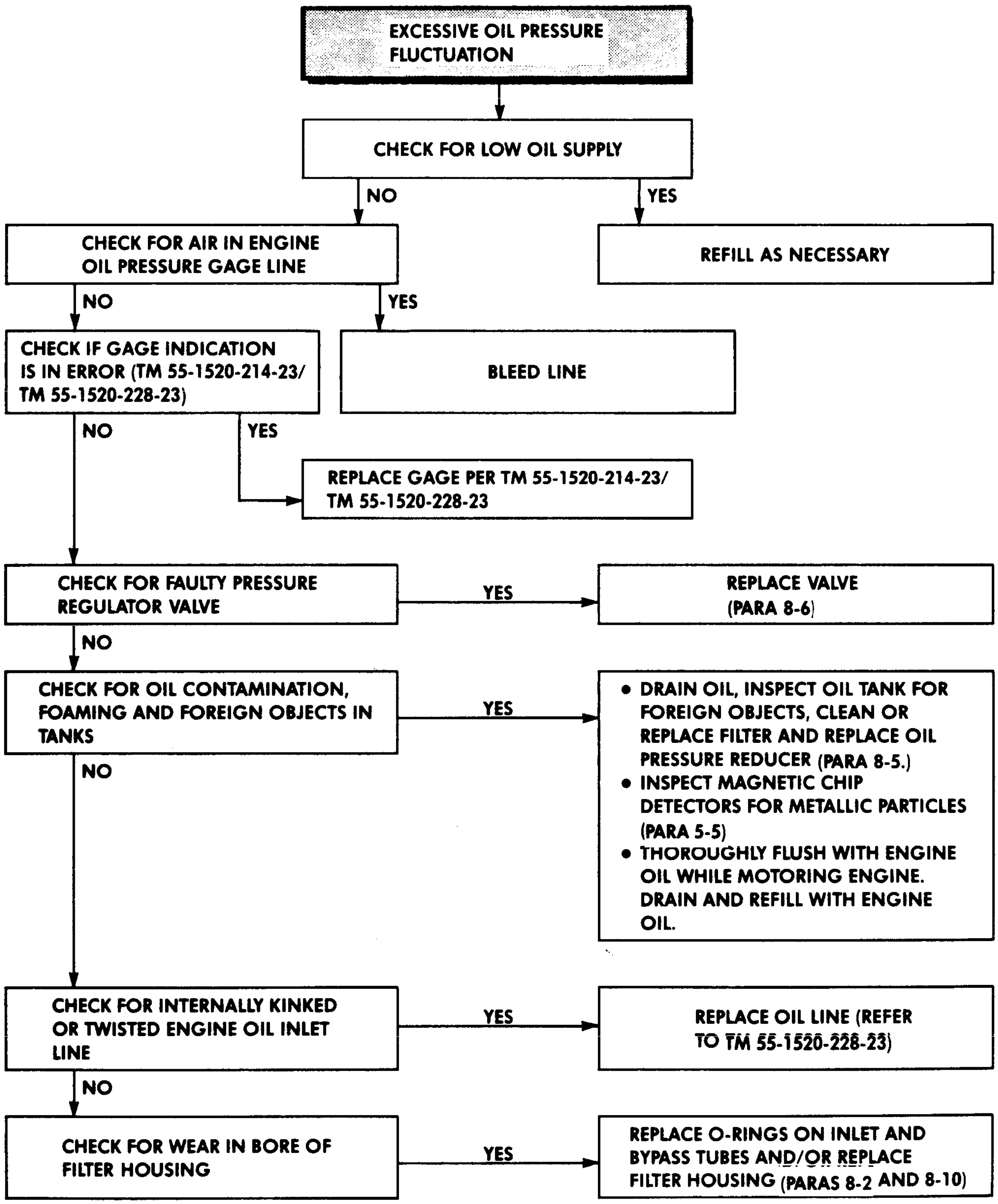
Troubleshooting Procedure 13. Idle Speed Too High



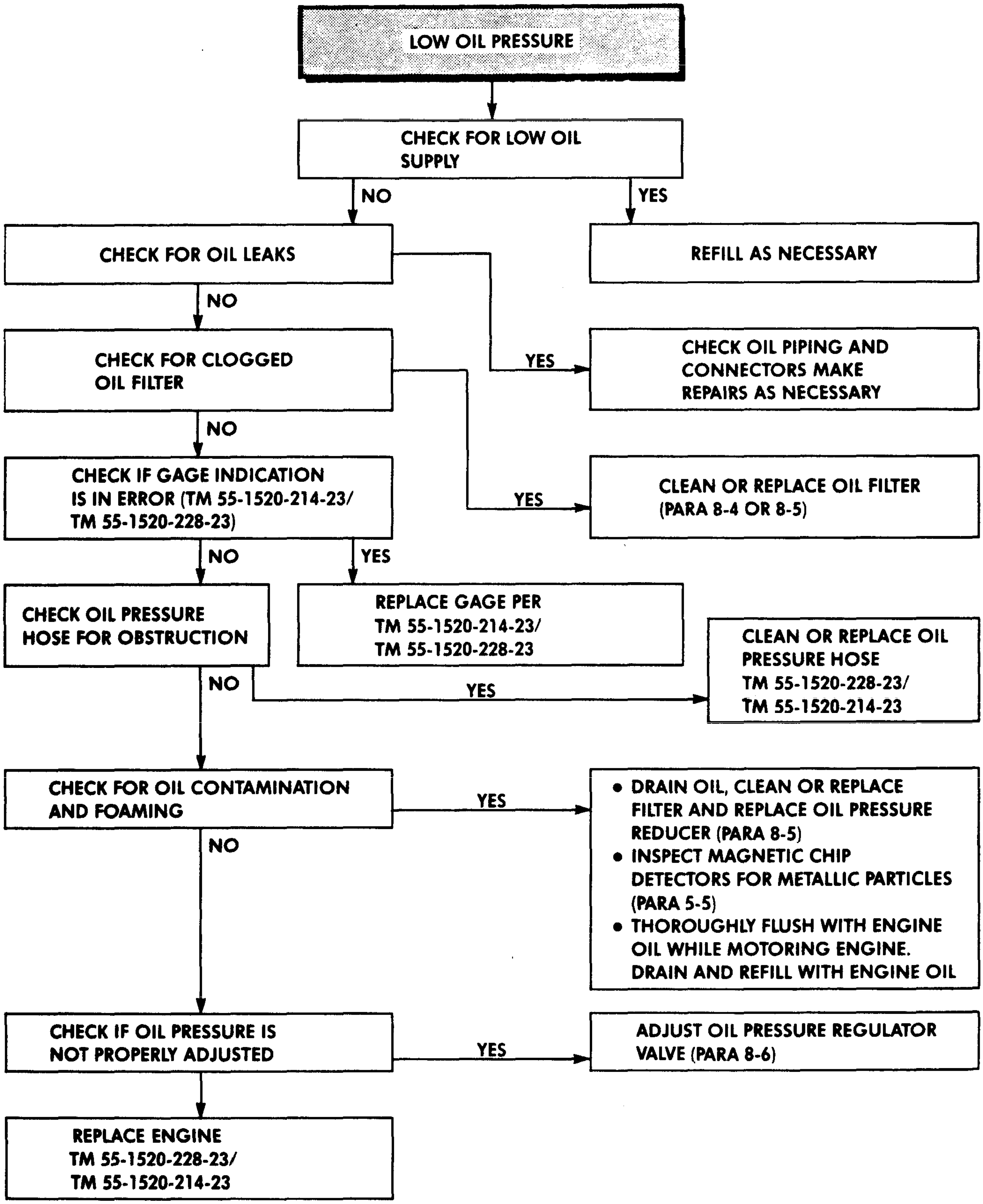
Troubleshooting Procedure 14. Oil Pressure Drops Off Severely



Troubleshooting Procedure 15. Excessive Oil Pressure Fluctuation



Troubleshooting Procedure 16. Low Oil Pressure



Troubleshooting Procedure 17. High Oil Pressure

HIGH OIL PRESSURE

↓

CHECK IF OIL PRESSURE GAGE TRANSMITTER IS ACCURATE

NO ↓

CHECK IF GAGE INDICATION IS IN ERROR.
TM 55-1520-228-23/TM 55-1520-214-23

YES ↓

REPLACE GAGE.
TM 55-1520-228-23/
TM 55-1520-214-23

YES ↓

CAUTION

Except for initial adjustment 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 step change in oil pressure. These conditions are cause to suspect other oil system problems have developed.

READJUST OIL PRESSURE REGULATING VALVE
(PARA 8-6)

All data on page 1-89 deleted.

Troubleshooting Procedure 18. Engine Oil Temperature, Excessive 225°F (107°C) But Remains Less Than 248°F (120°C) For a Period Not Exceeding Ten Minutes Without Any Change In Normal Oil Pressure

ENGINE OIL TEMPERATURE EXCEEDS 225°F (107°C) BUT REMAINS LESS THAN 248°F (120°C) FOR A PERIOD NOT EXCEEDING TEN MINUTES WITHOUT ANY CHANGE IN NORMAL OIL PRESSURE

↓

CHECK FOR CONTAMINATED OIL OR OIL COOLER MALFUNCTION

↓ YES

- DRAIN AND REFILL ENGINE OIL SYSTEM
- INSPECT MAGNETIC DRAIN PLUGS
- INSPECT OIL FILTER AND CLEAN OR REPLACE AS REQUIRED (PARA 8-3, 8-4 AND 8-5)
- REPLACE OIL PRESSURE REDUCER (PARA 8-9)
- GROUND RUN AIRCRAFT FOR TEN MINUTES. OBTAIN AS HIGH A POWER LEVEL AS POSSIBLE WITHOUT LIFT OFF (WITHOUT EXCEEDING MAXIMUM CONTINUOUS RATING)
- REINSPECT MAGNETIC DRAIN PLUGS. IF THE MAGNETIC DRAIN PLUGS ARE FREE OF PARTICLES, REINSPECT AFTER FIVE HOURS OF OPERATION
- IF CARBON PARTICLES ARE FOUND, REPEAT THE MAINTENANCE PROCEDURE

Troubleshooting Procedure 19. Engine Oil Temperature Exceeds 225°F (107°C) But Remains Less Than 248°F (120°C) For A Period Not Exceeding 10 Minutes With A Change In Normal Oil Pressure

ENGINE OIL TEMPERATURE EXCEEDS
225°F (107°C) BUT REMAINS
LESS THAN 248°F (120°C)
FOR A PERIOD NOT EXCEEDING
10 MINUTES WITH A CHANGE
IN NORMAL OIL PRESSURE

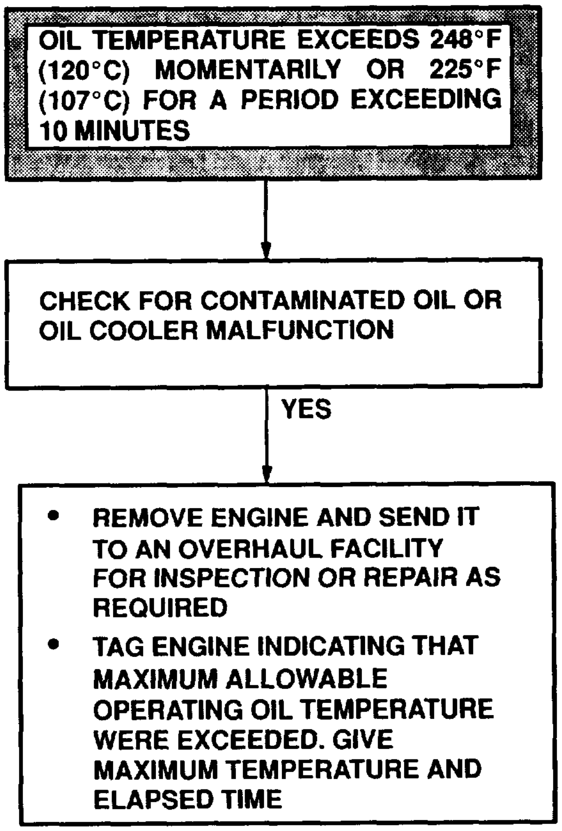
↓

CHECK FOR CONTAMINATED OIL OR
OIL COOLER MALFUNCTION

↓ YES

- DO NOT ATTEMPT TO ADJUST THE OIL PRESSURE REGULATOR VALVE SETTING, REPLACE OIL FILTER HOUSING ASSEMBLY (PARA 8-2).
- INSPECT AND CLEAN OR REPLACE OIL FILTER (PARA 8-3, 8-4 AND 8-5)
- REPLACE OIL PRESSURE REDUCER (PARA 8-9)
- DRAIN AND REFILL ENGINE OIL SYSTEM
- INSPECT MAGNETIC DRAIN PLUGS
- START ENGINE AND CHECK OIL PRESSURE AT 78.2% N1 SPEED OR ABOVE; IF PRESSURE IS NOT WITHIN 90 TO 130 PSIG, ADJUST OIL PRESSURE REGULATOR VALVE AS REQUIRED
- IF CORRECT OIL PRESSURE IS OBTAINED,PERFORM GROUND RUN AIRCRAFT CHECK IN TROUBLESHOOTING PROCEDURE NO. 18
- IF CORRECT OIL PRESSURE CANNOT BE OBTAINED BY REGULATOR VALVE ADJUSTMENT, REPLACE ENGINE TM 55-1520-228-23/TM 55-1520-214-23

Troubleshooting Procedure No. 20. Oil Temperature Exceeds 248°F (120°C) Momentarily or 225°F (107°C) For A Period Exceeding 10 Minutes



Troubleshooting Procedure No. 21. No Response To Oil Pressure Adjustment

NO RESPONSE TO OIL PRESSURE ADJUSTMENT

↓

CHECK FOR DEFECTIVE PRESSURE REGULATING VALVE

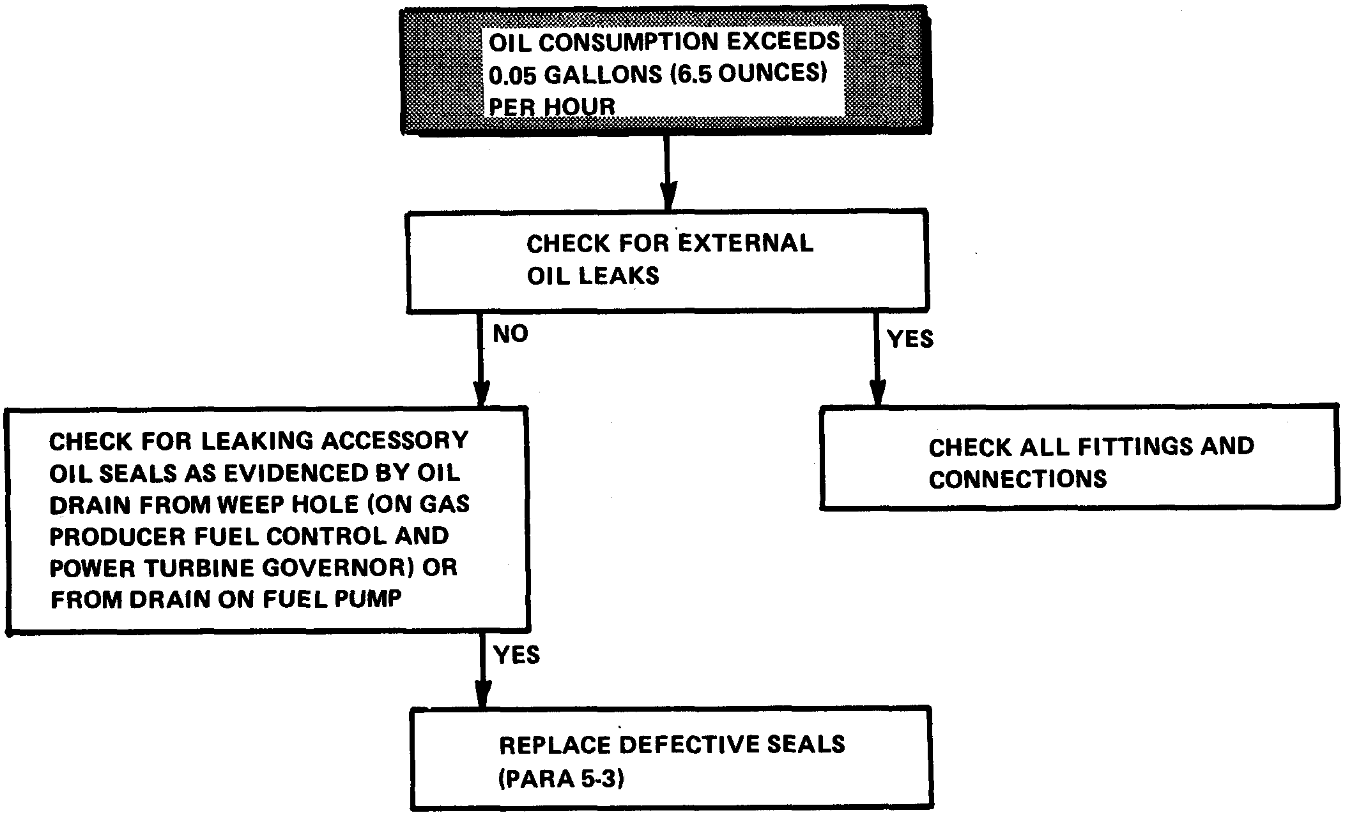
↓ **YES**

REPLACE OIL FILTER HOUSING ASSEMBLY (PARA 8-2)

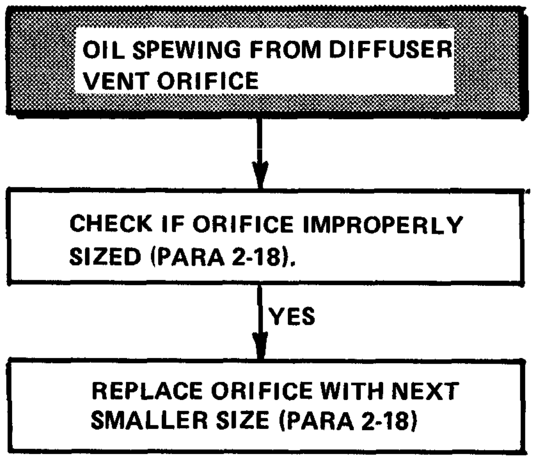
NOTE

A FLOW OF LESS THAN 90CC (3 COUNCES) INDICATES A SIGNIFICANT RESTRICTION OF THE OIL NOZZLE AND/OR PASSAGES. INSPECT EXTERNAL CHECK VALVE FOR PROPER OPERATION IN ACCORDANCE WITH PARA 8-8, STEP 3. INSPECTION PRIOR TO ENGINE REMOVAL.

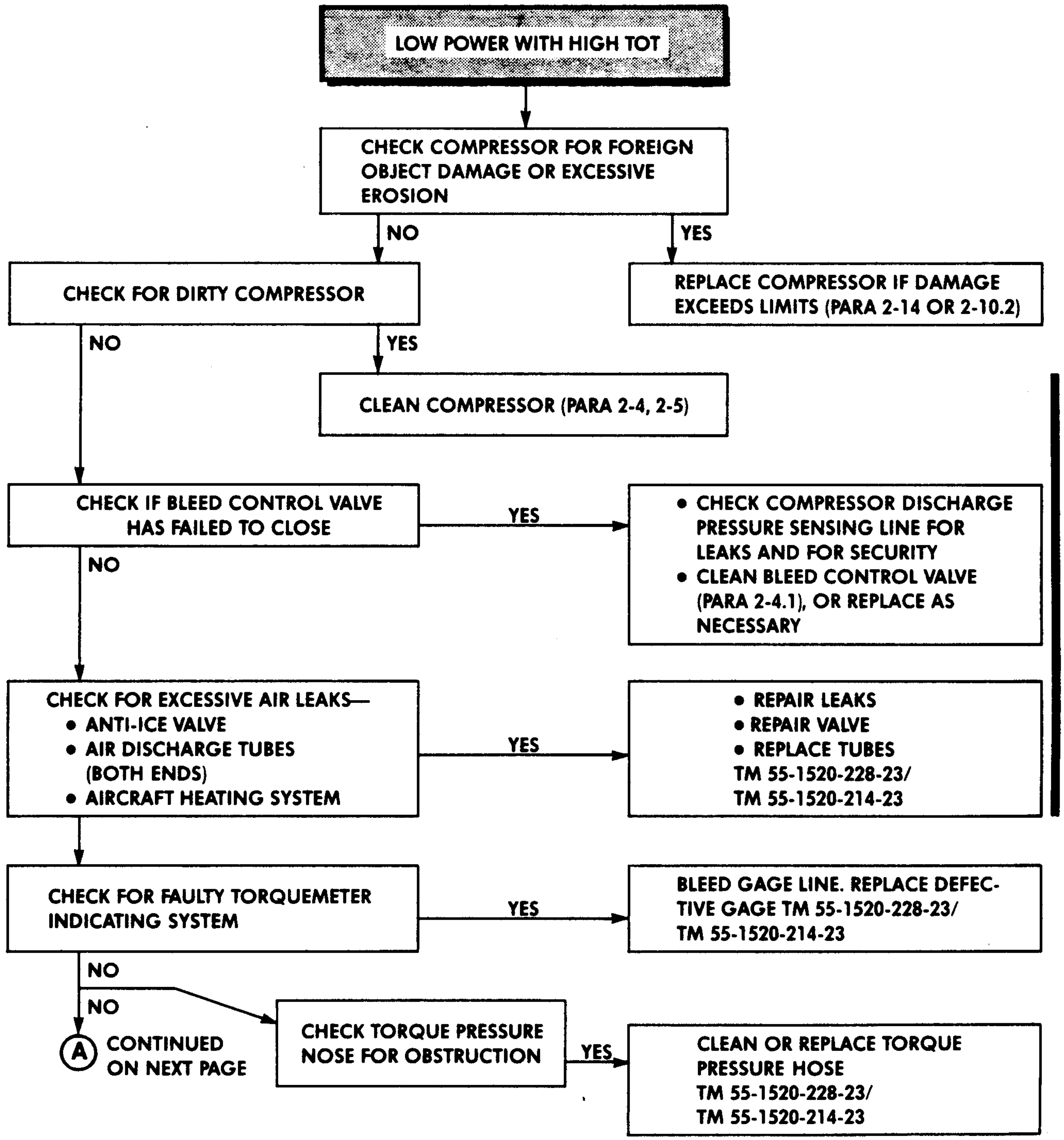
Troubleshooting Procedure 22. Oil Consumption Exceeds 0.05 Gallons (6.5 Ounces) Per Hour



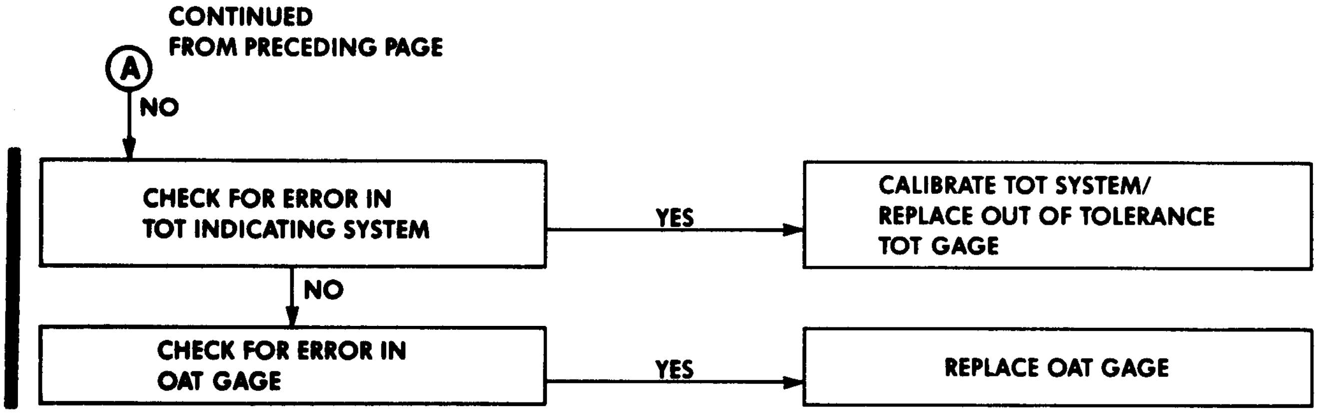
Troubleshooting Procedure 23. Oil Spewing From Diffuser Vent Orifice



Troubleshooting Procedure 24. Low Power With High TOT



Troubleshooting Procedure 24. Low Power With High TOT - Continued



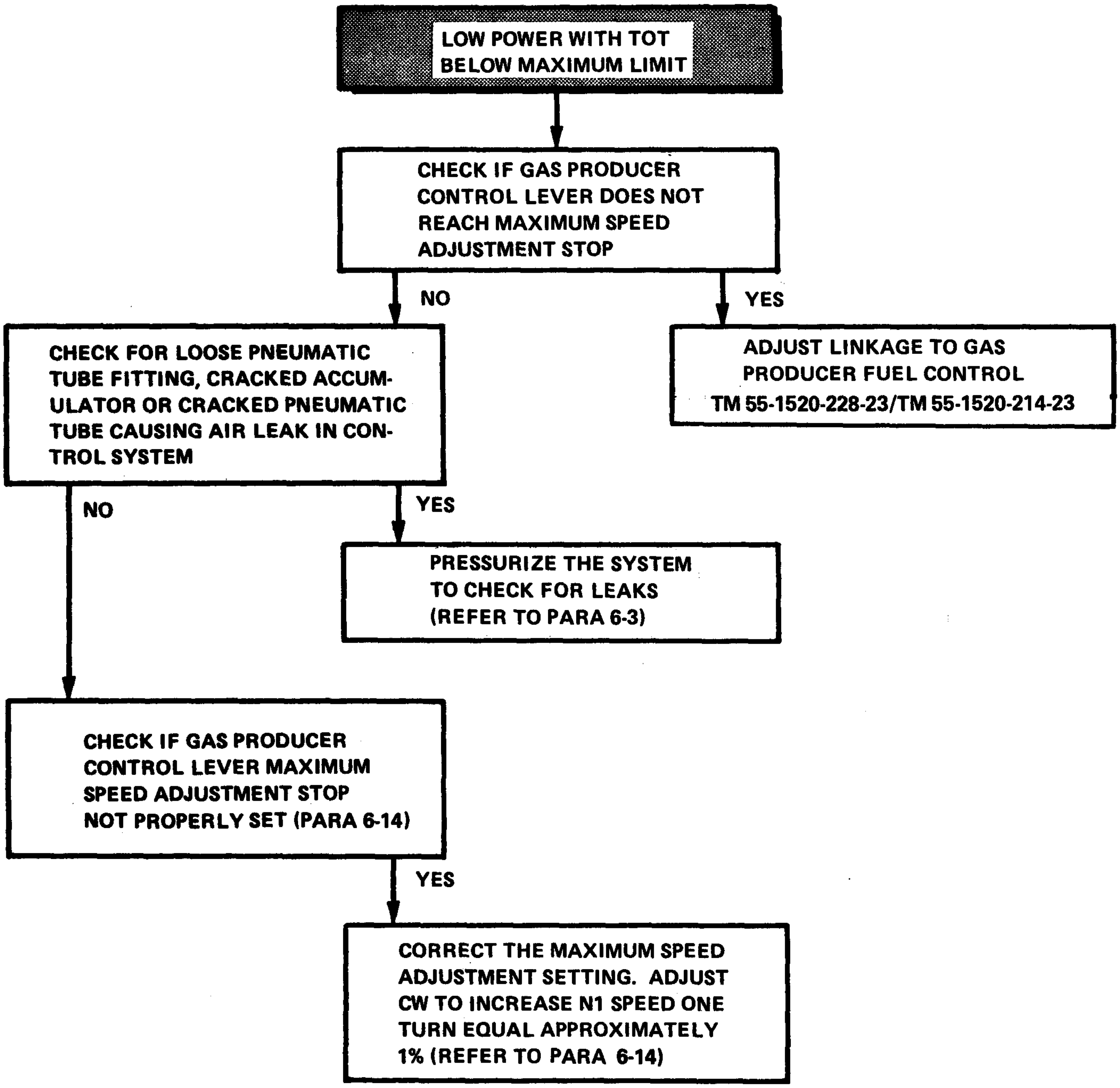
NOTE

The effect of anti-icing air flow on engine performance is as follows:

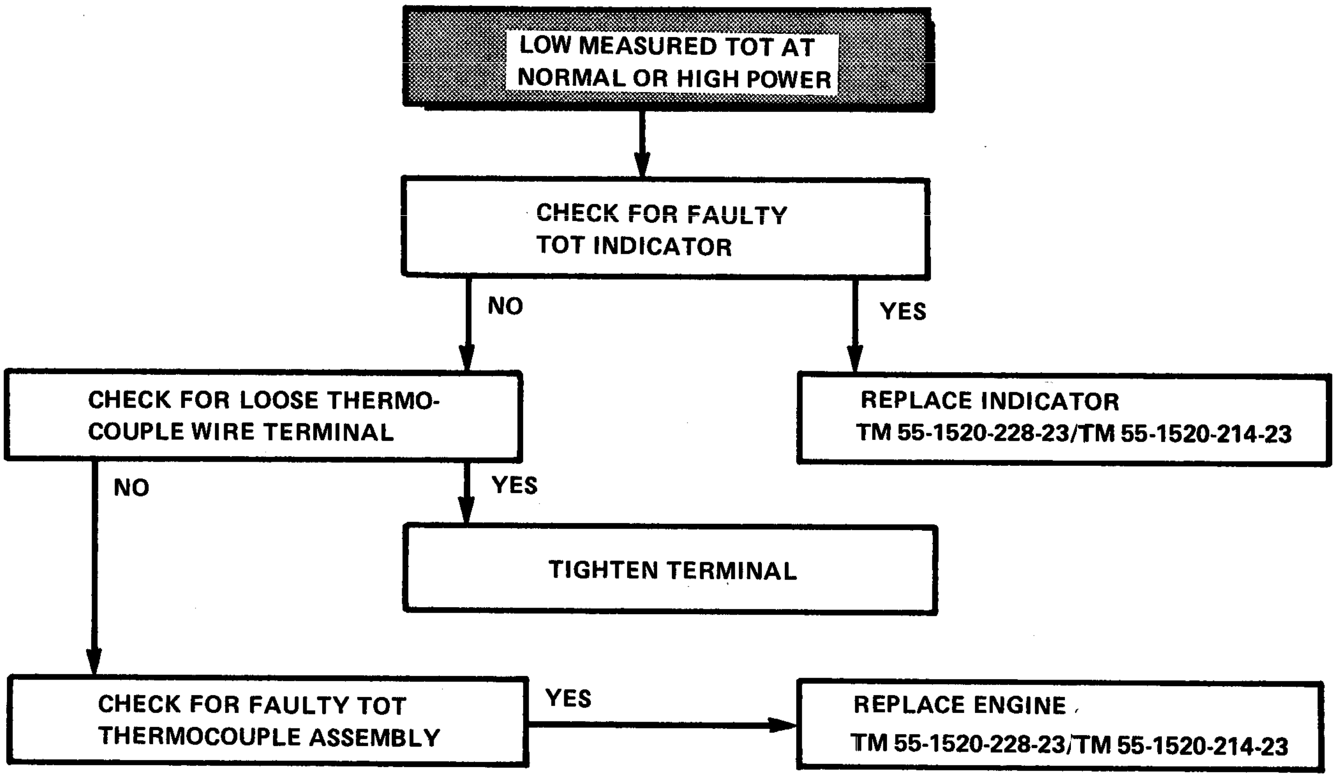
Type of Operation	Approximate Effect on Performance Available at Power Levels Above 79% N1 Speed*
Constant TOT.	A 30 hp decrease and a 100 rpm (1.95%) decrease in N1 (gas producer) speed.
Constant N1 Speed	A 7 hp decrease and a 45°F (25°C) increase in TOT.
Constant hp and constant collective pitch (load) operation.	A 300 rpm (0.59%) increase in N1 speed and a 60°F (33°C) increase in TOT.

* The effects at lower powers and speeds will be only slightly different but still immediate and definite.

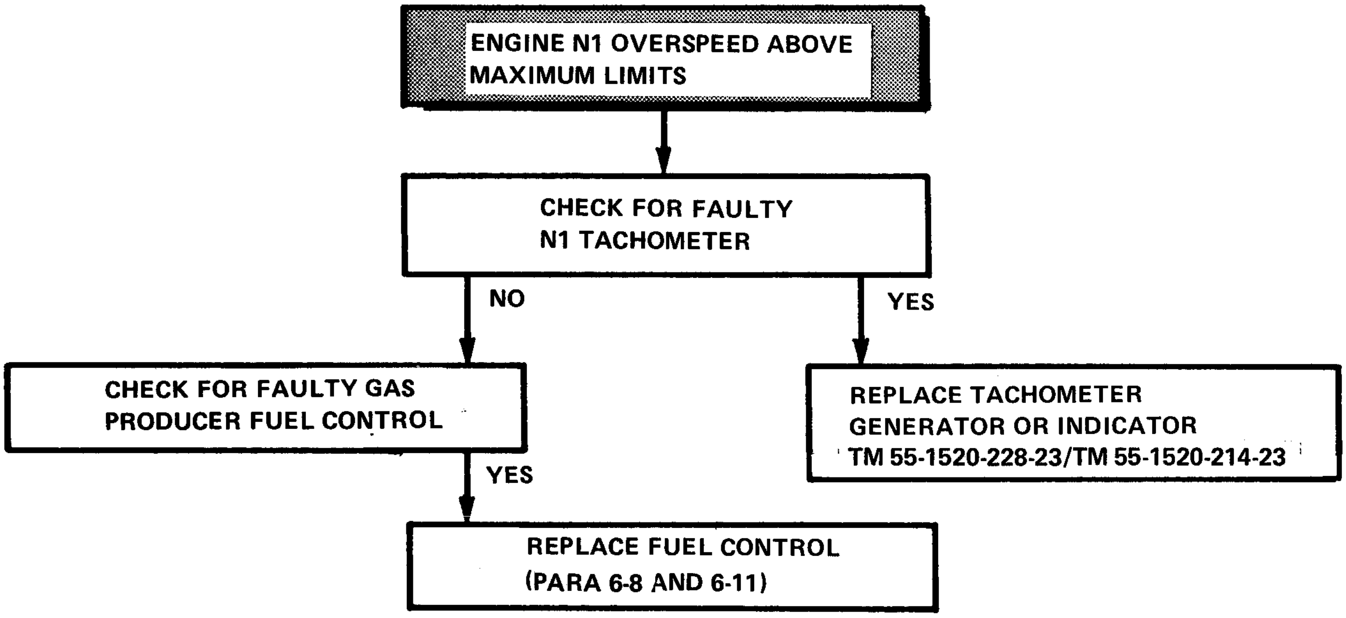
Troubleshooting Procedure 25. Low Power With TOT Below Maximum Limit



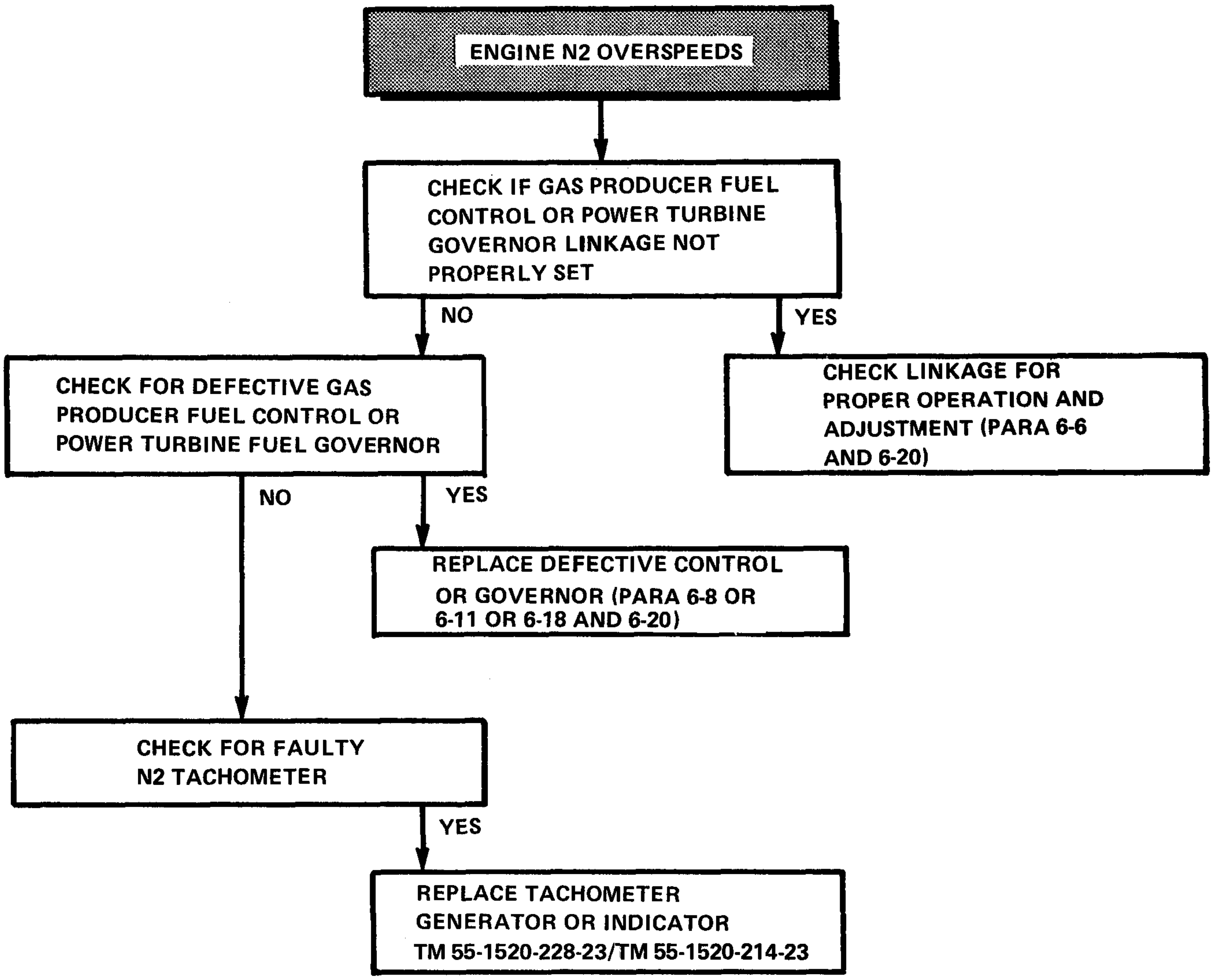
Troubleshooting Procedure 26. Low Measured TOT At Normal Or High Power



Troubleshooting Procedure 27. Engine N1 Overspeed Above Maximum Limits



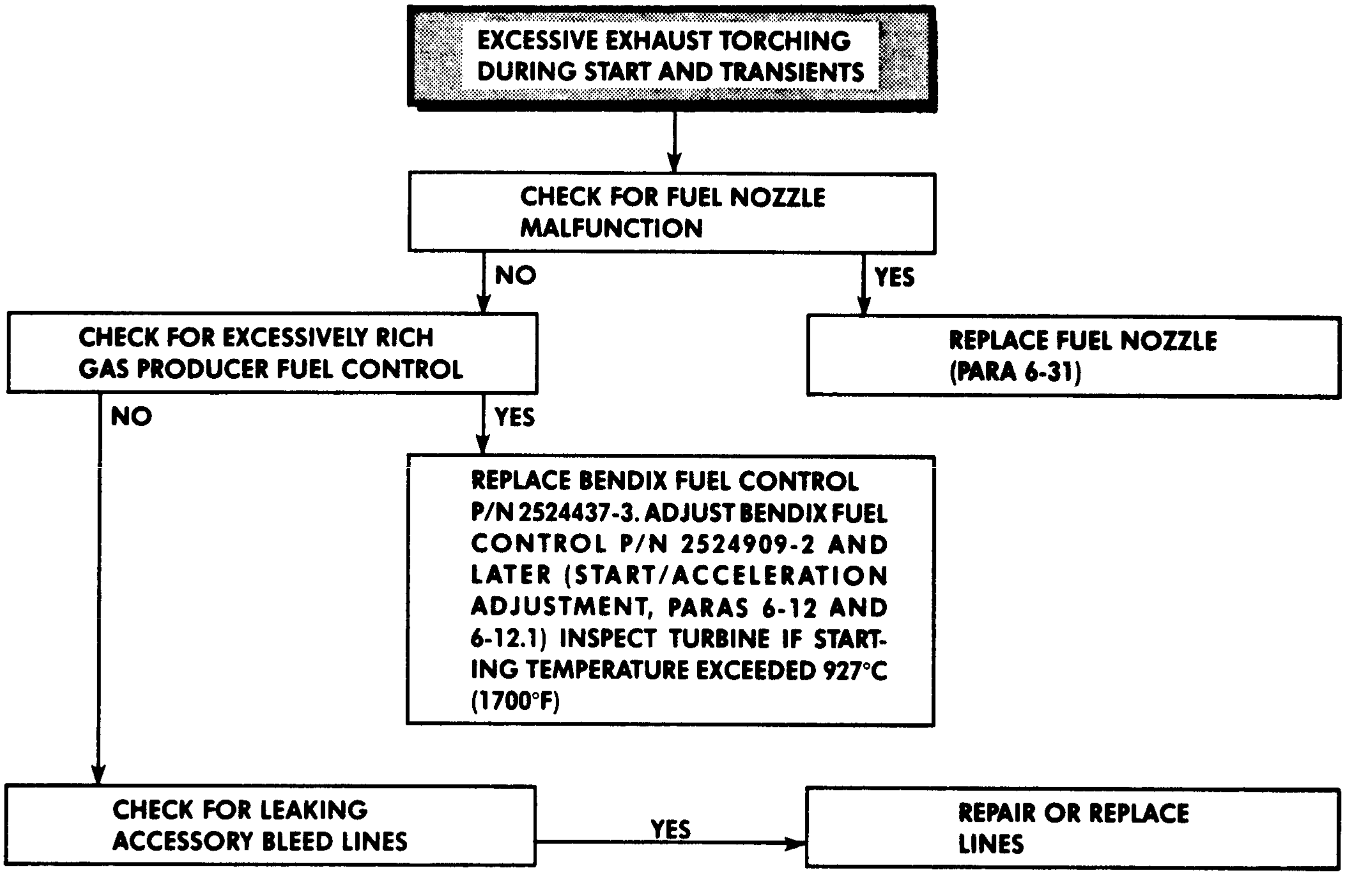
Troubleshooting Procedure 28. Engine N2 Overspeeds



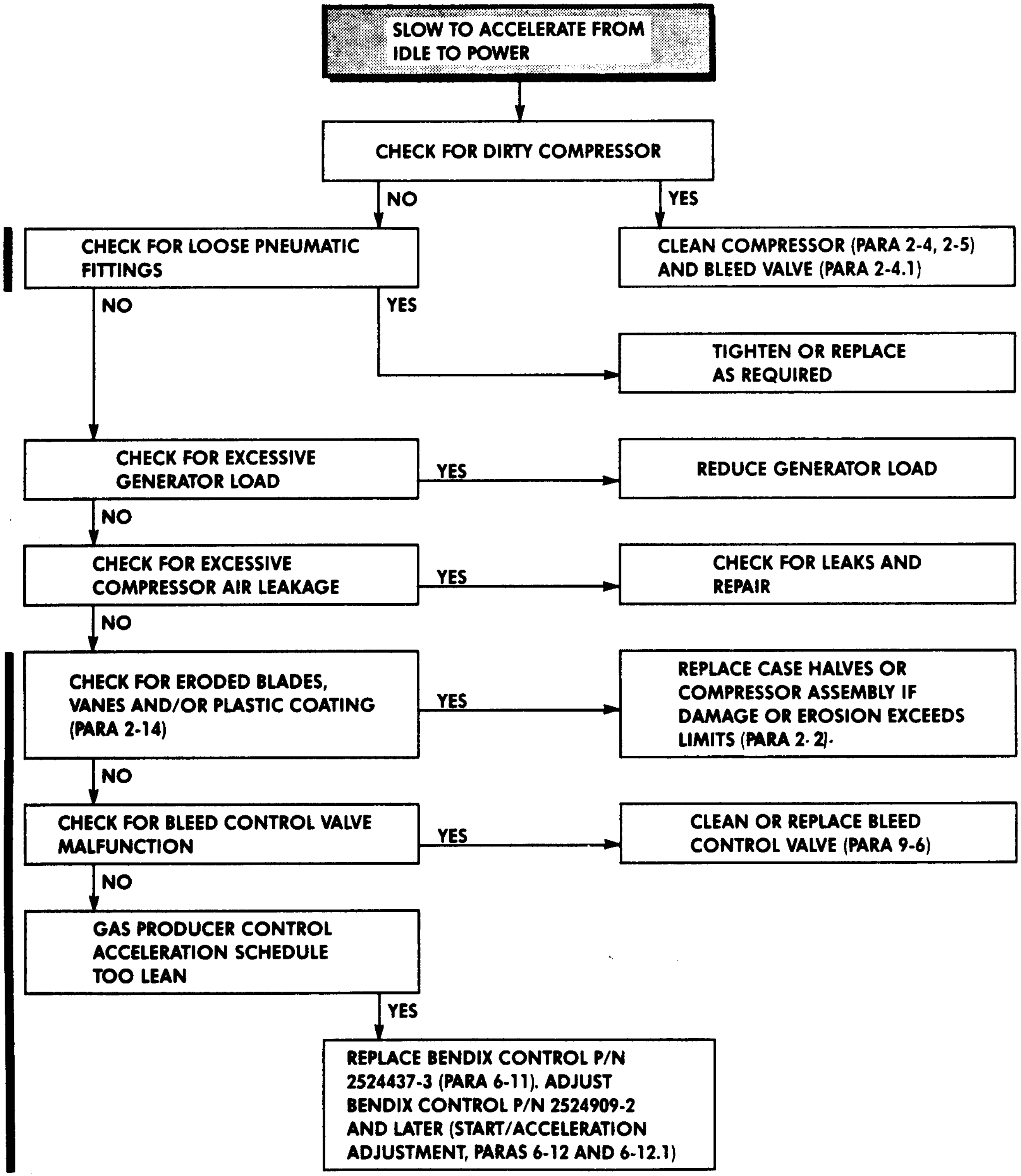
NOTE

DURING MAINTENANCE OPERATIONAL CHECK AFTER OVERSPEED INCIDENT, NOTE THE IDLE SPEED WITH THE TWIST GRIP AT 30-DEGREE POSITION IF IDLE SPEED IS NORMAL, SUSPECT THE GOVERNOR AS FAULTY COMPONENT. IF IDLE SPEED IS HIGH, SUSPECT THE GAS PRODUCER FUEL CONTROL AS THE FAULTY COMPONENT.

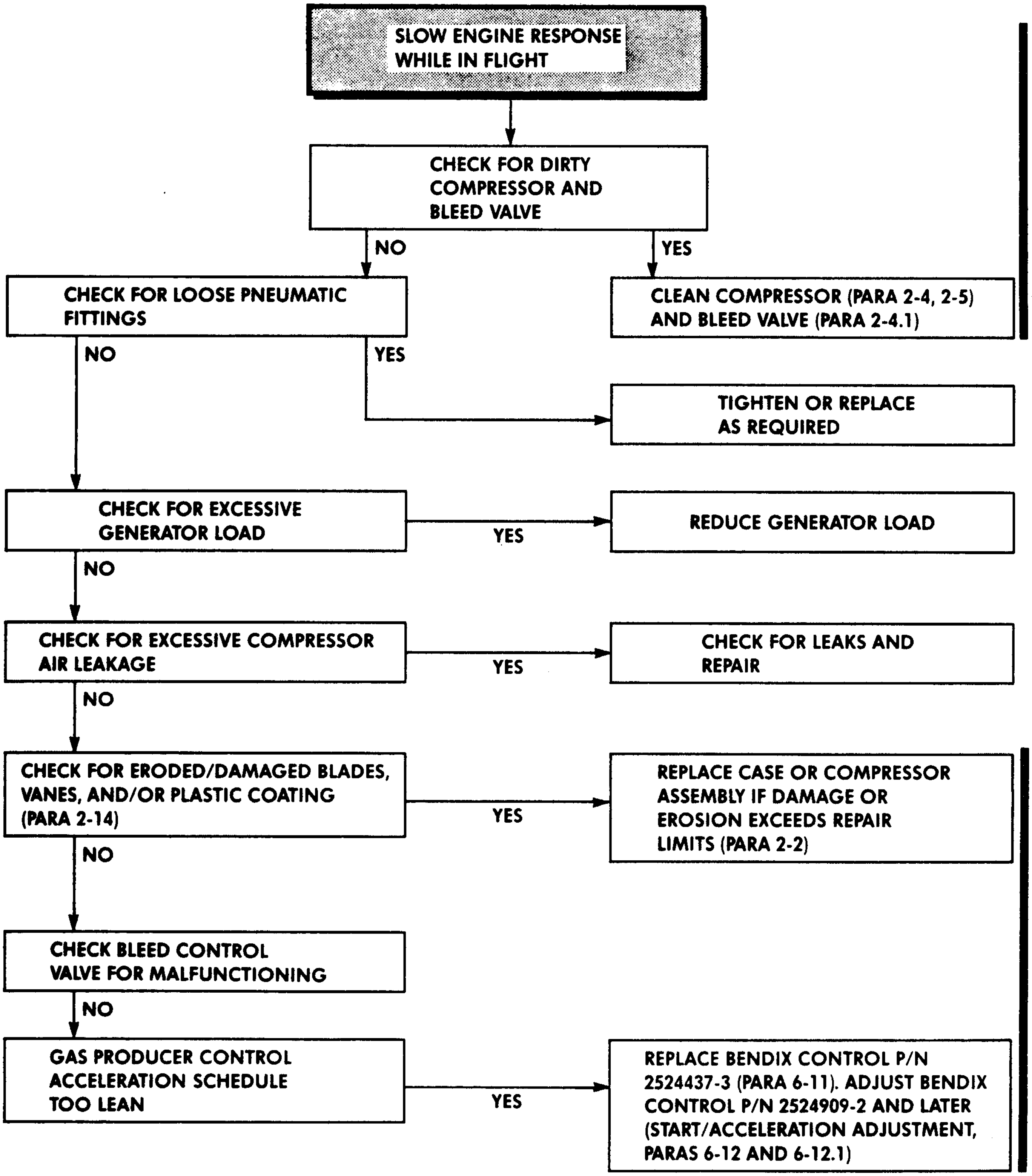
Troubleshooting Procedure 29. Excessive Exhaust Torching During Start and Transients



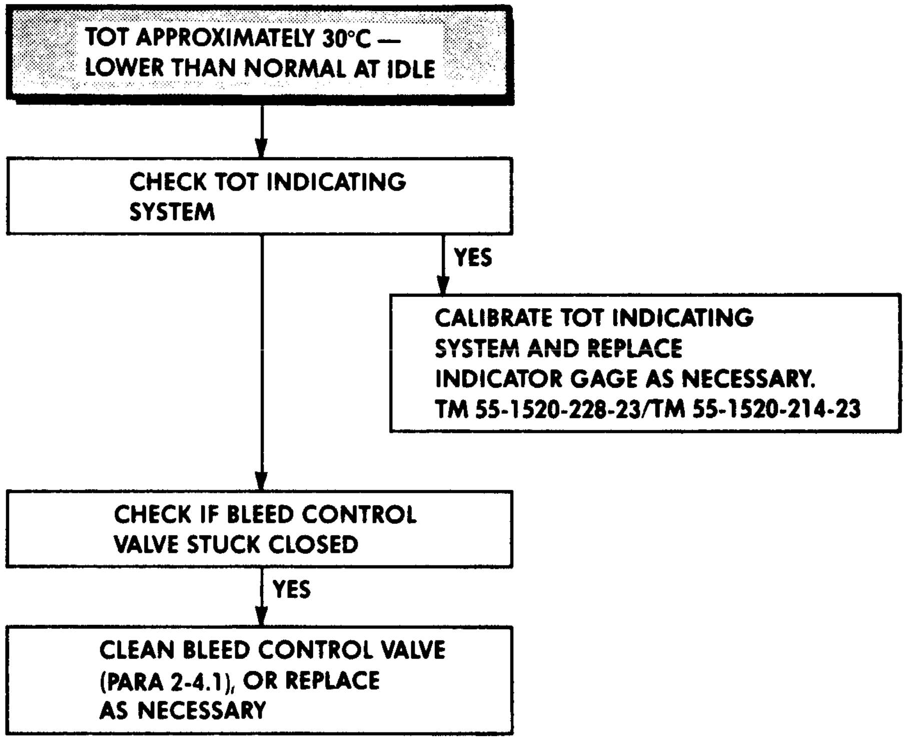
Troubleshooting Procedure 30. Slow To Accelerate From Idle To Power



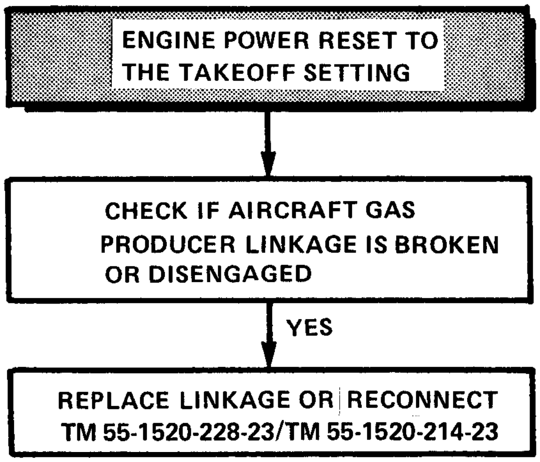
Troubleshooting Procedure 31. Slow Engine Response While In Flight



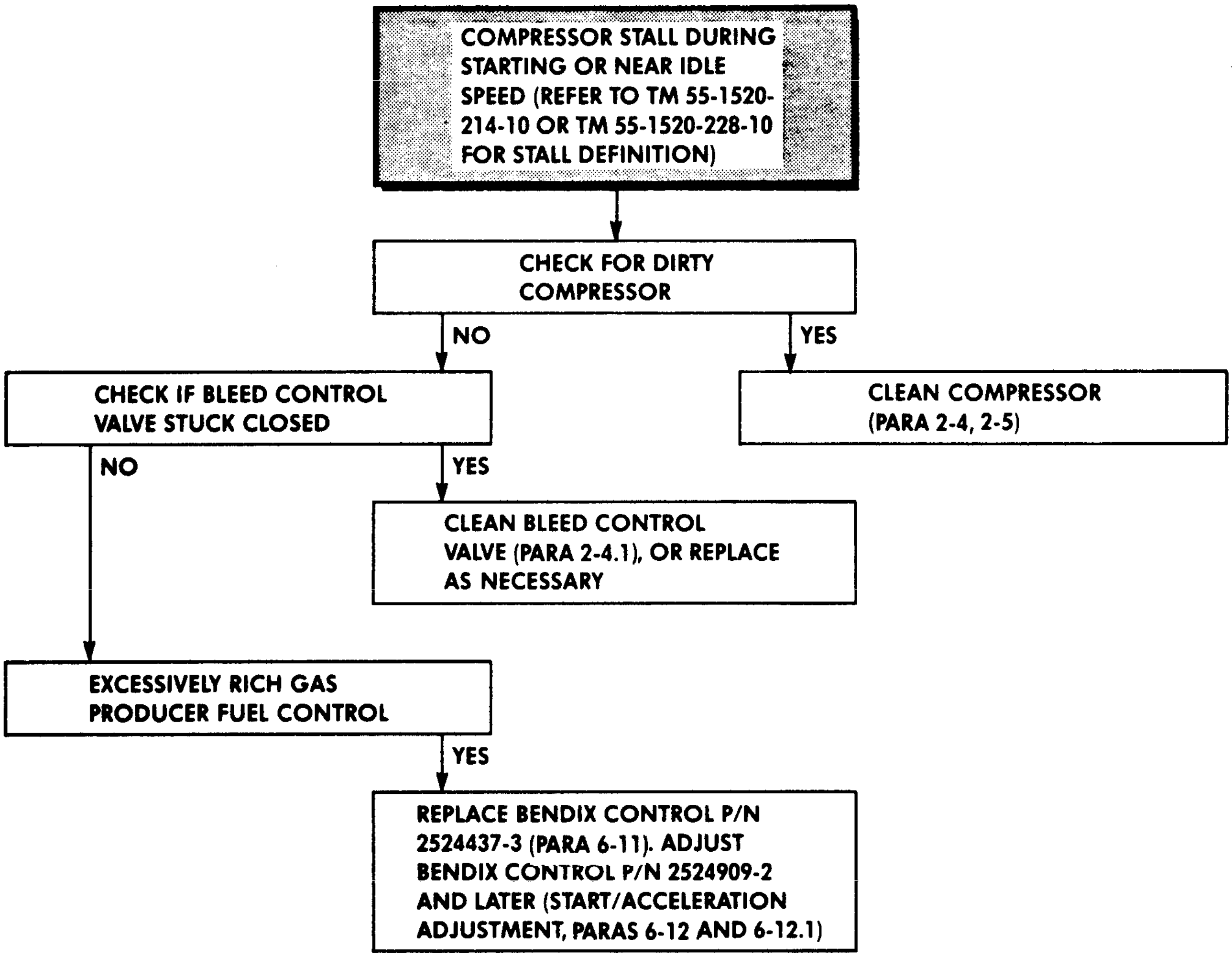
Troubleshooting Procedure 32. TOT Approximately 30°C Lower Than Normal At Idle



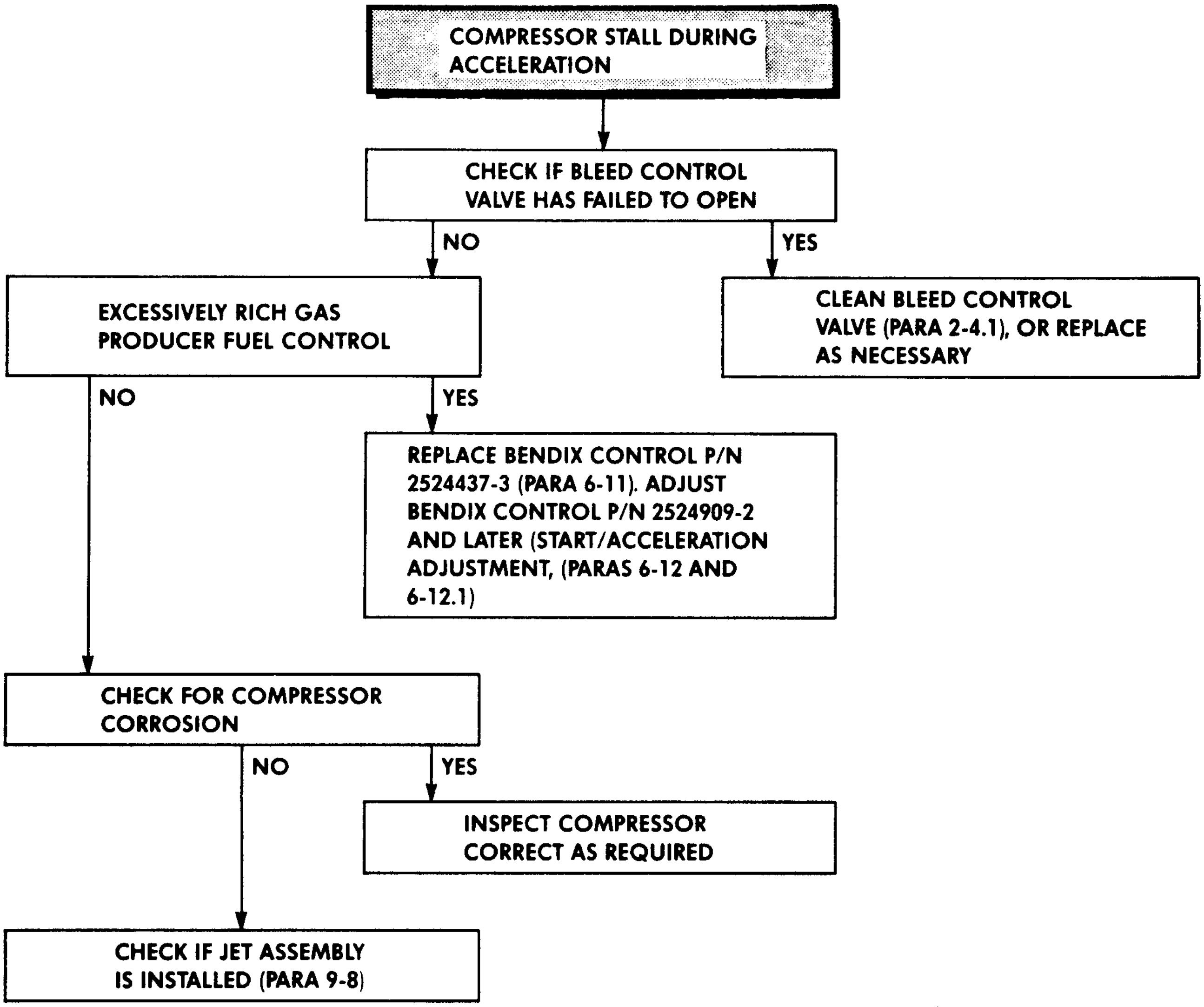
Troubleshooting Procedure 33. Engine Power Reset To The Takeoff Setting



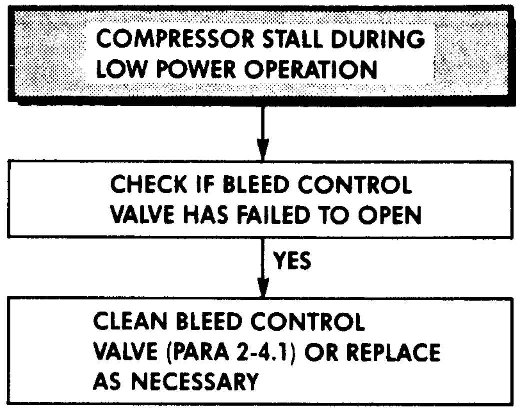
Troubleshooting Procedure 34. Compressor Stall During Starting or Near Idle Speed (Refer to TM 55-1520-214-10 or TM 55-1520-228-10)



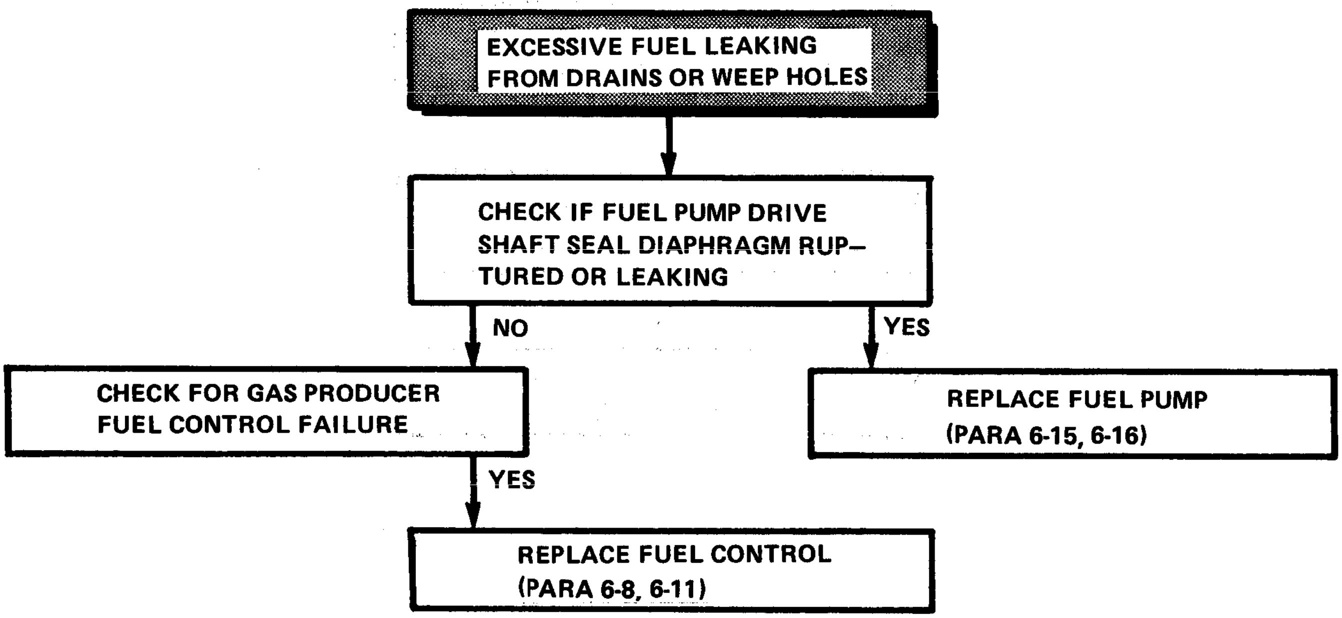
Troubleshooting Procedure 35. Compressor Stall During Acceleration



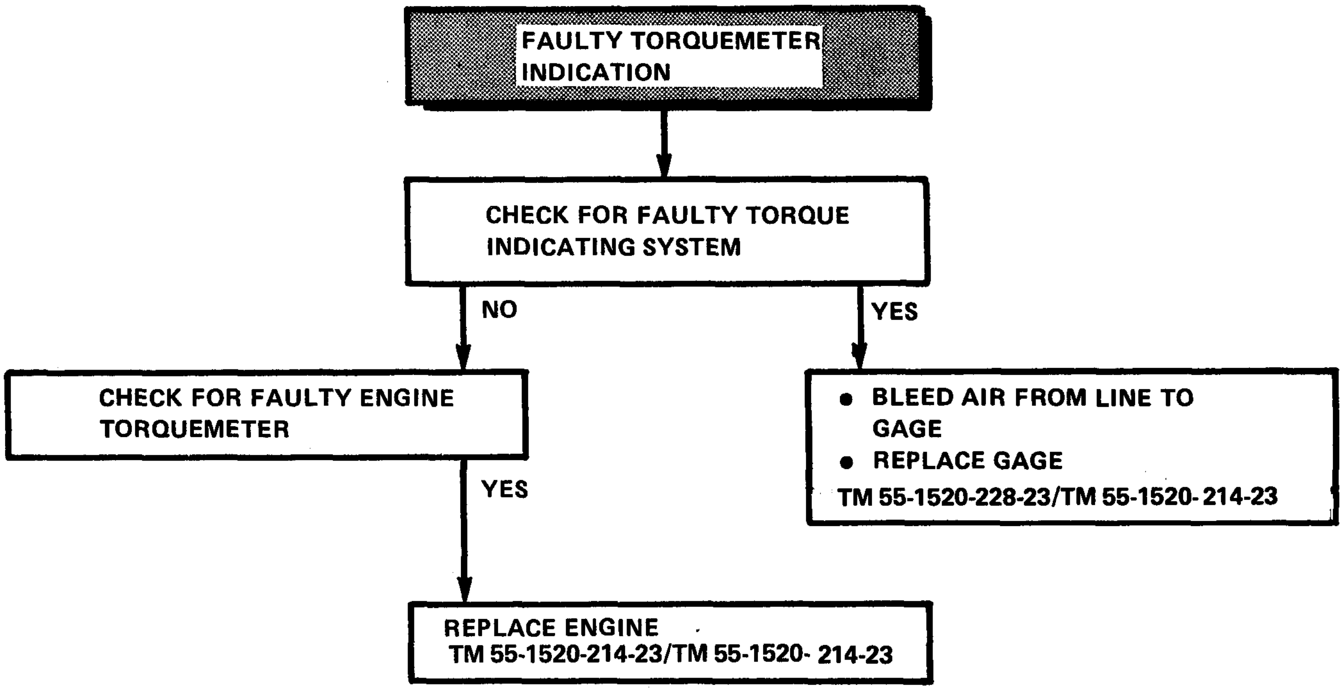
Troubleshooting Procedure 36. Compressor Stall During Low Power Operation



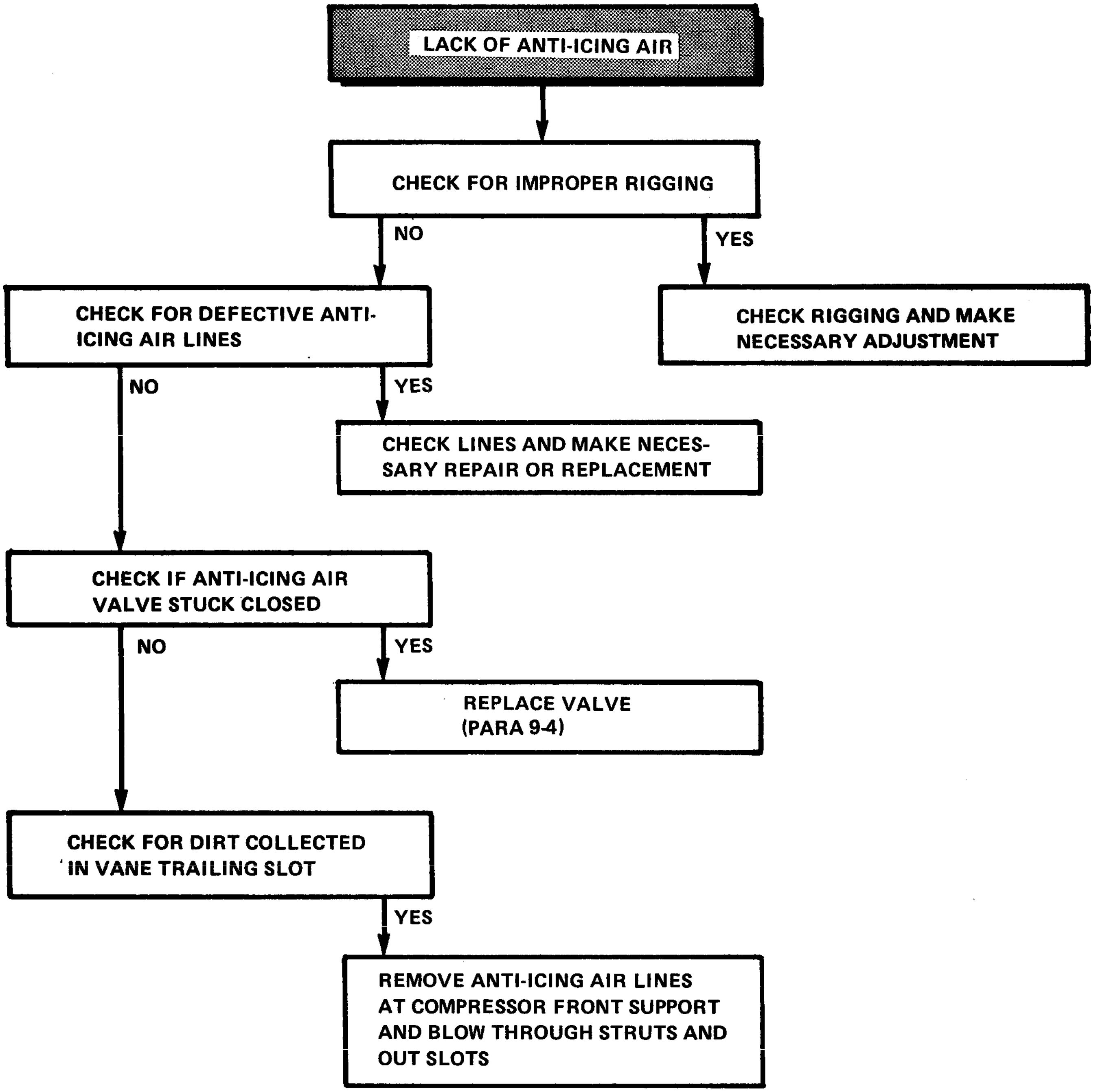
Troubleshooting Procedure 37. Excessive Fuel Leaking From Drains or Weep Holes



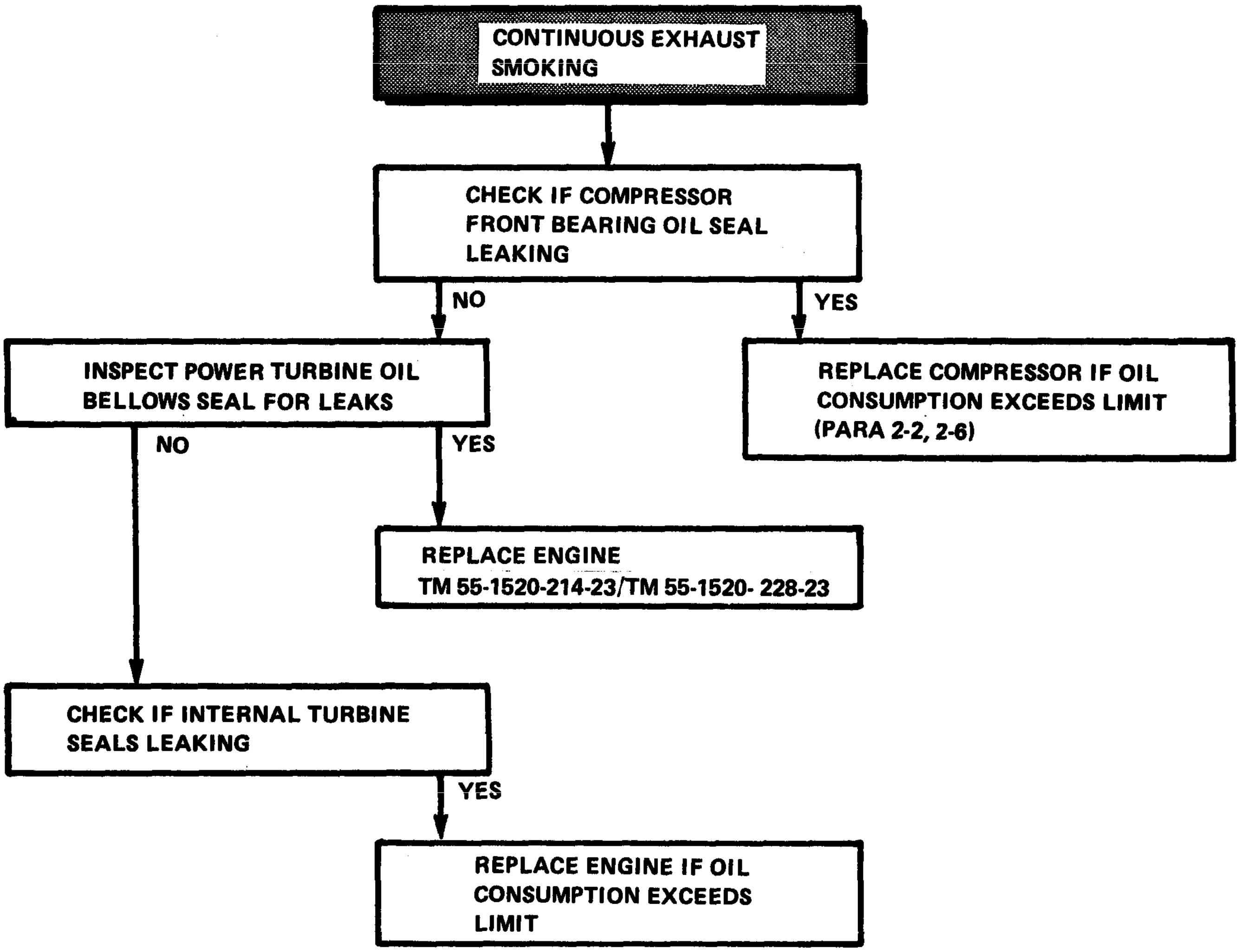
Troubleshooting Procedure 38. Faulty Torquemeter Indication



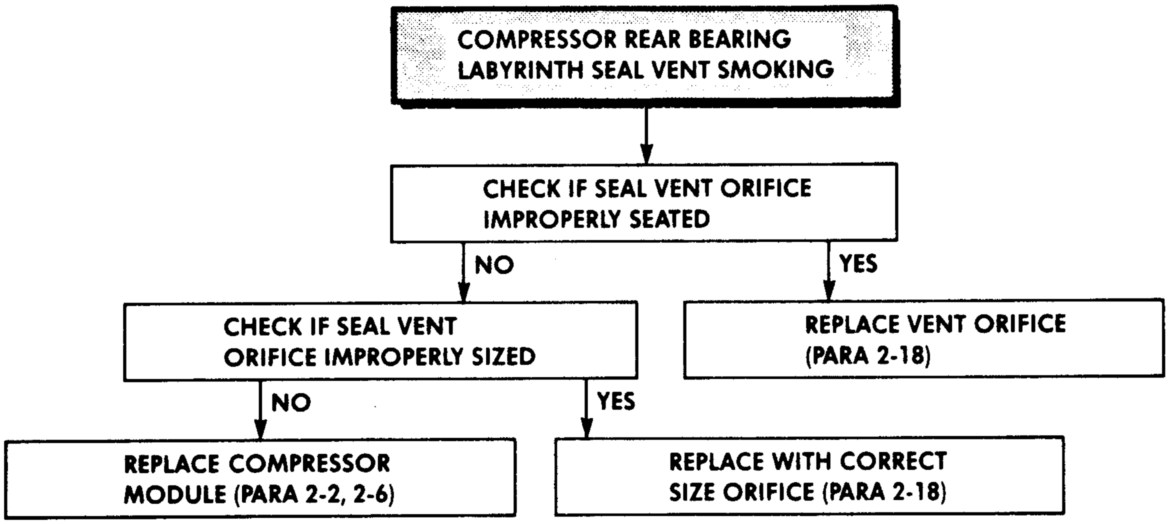
Troubleshooting Procedure 39. Lack of Anti-Icing Air



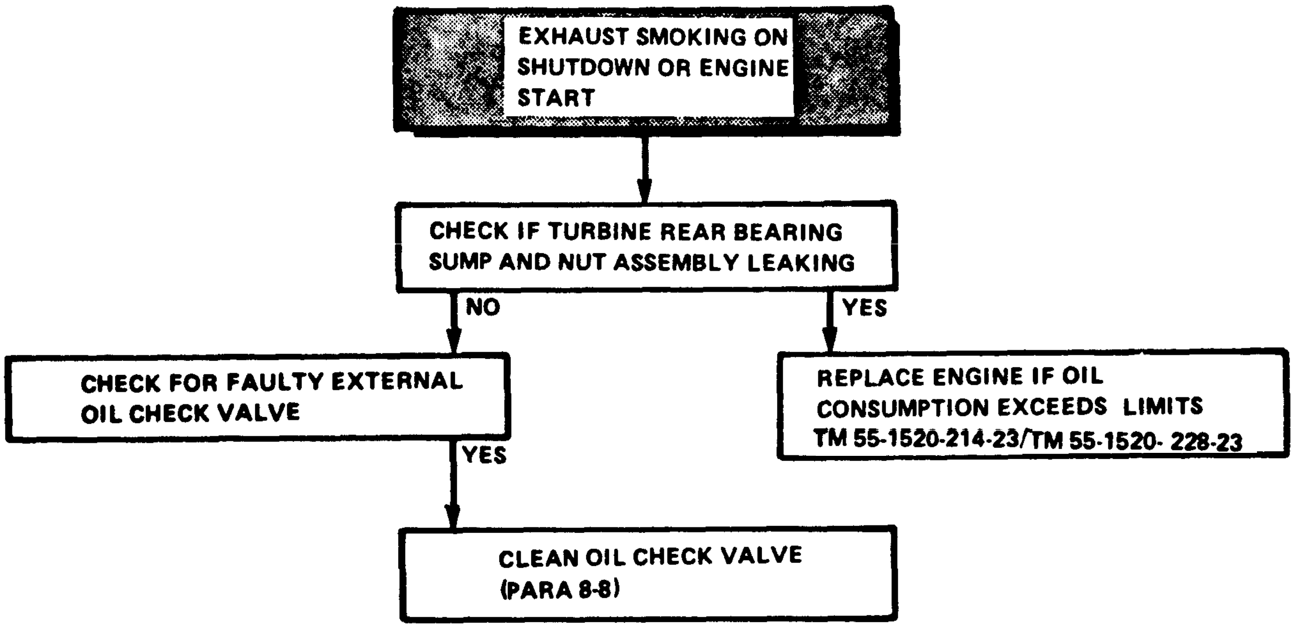
Troubleshooting Procedure 40. Continuous Exhaust Smoking



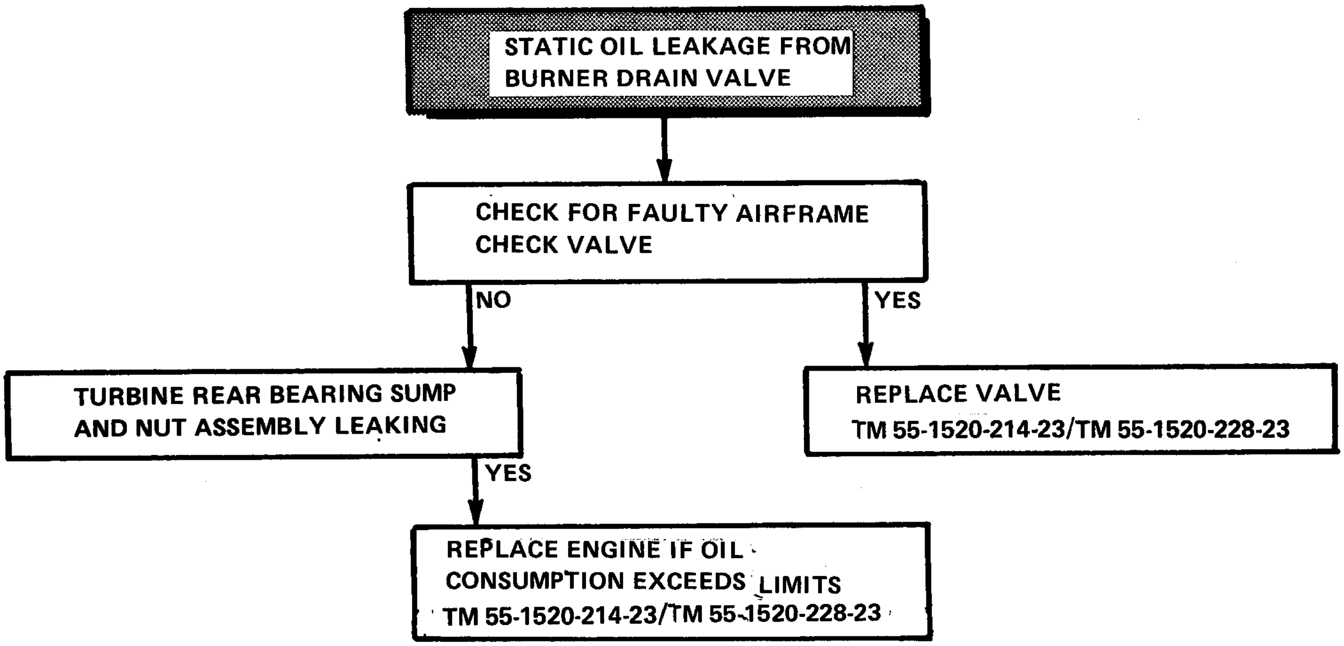
Troubleshooting Procedure 41. Compressor Rear Bearing Labyrinth Seal Vent Smoking



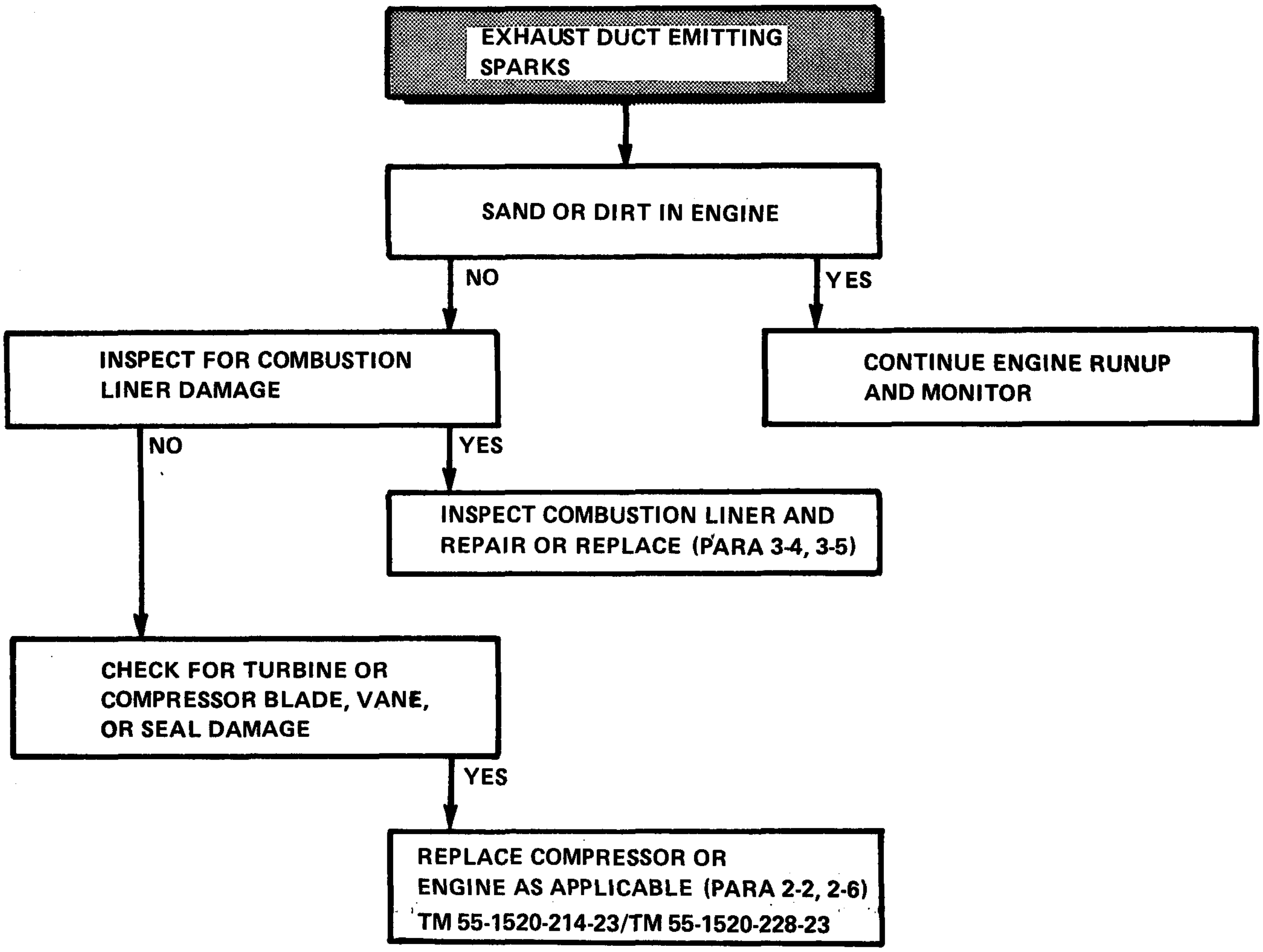
Troubleshooting Procedure 42. Exhaust Smoking on Shutdown or Engine Start



Troubleshooting Procedure 43. Static Oil Leakage From Burner Drain Valve



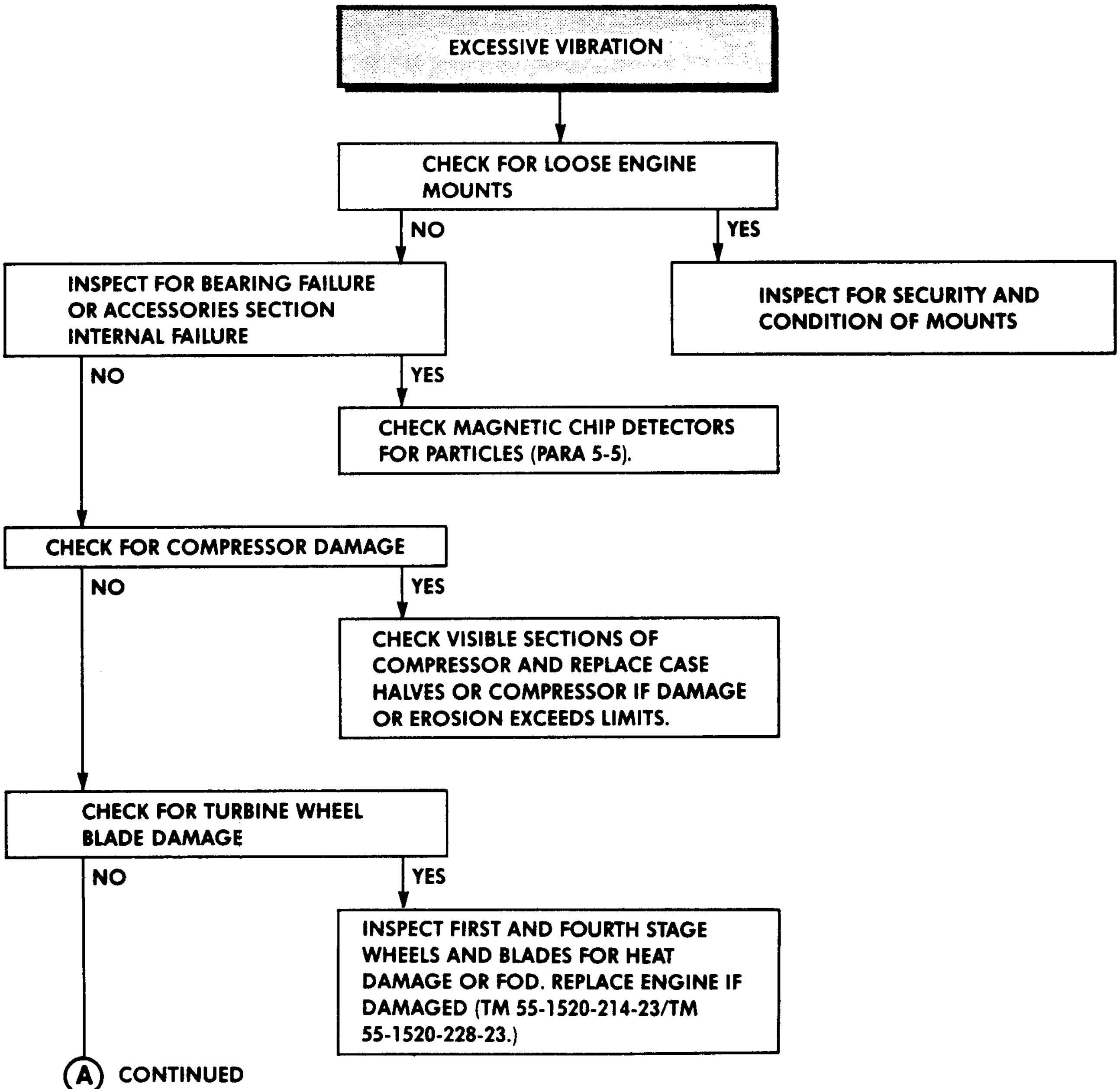
Troubleshooting Procedure 44. Exhaust Duct Emitting Sparks



Troubleshooting Procedure 45. Excessive Vibration

NOTE

Perform engine vibration test (para 1-45). Engine vibration test is required after initial installation of engine in aircraft, after removal of compressor case or assembly when excessive engine vibration is suspected; or when any maintenance has been performed that may affect engine-to-transmission alignment. This requirement shall apply to all engines, new or overhauled, whether being installed or reinstalled.



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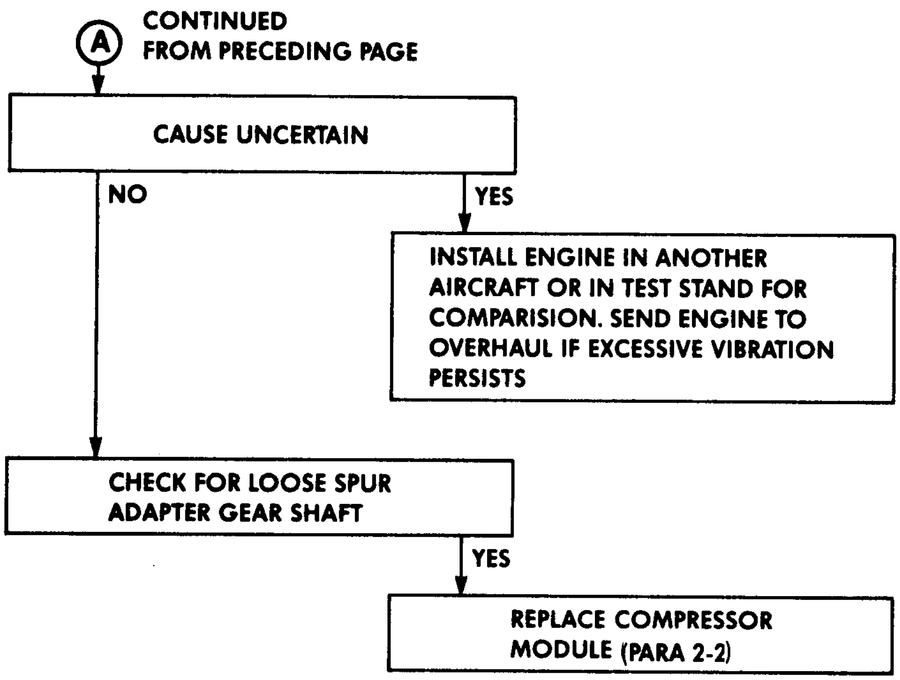
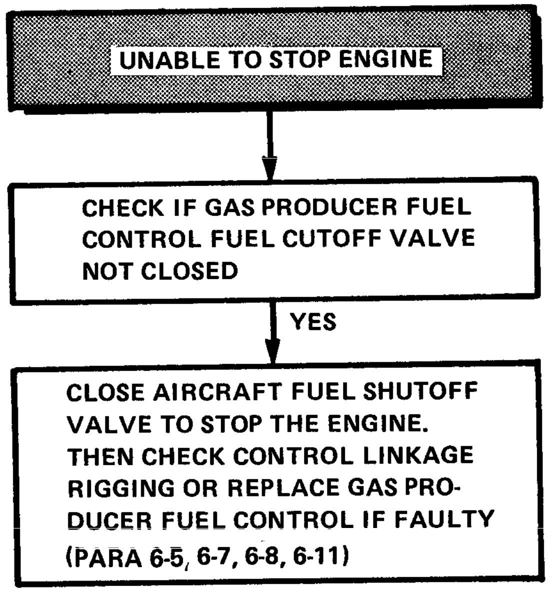
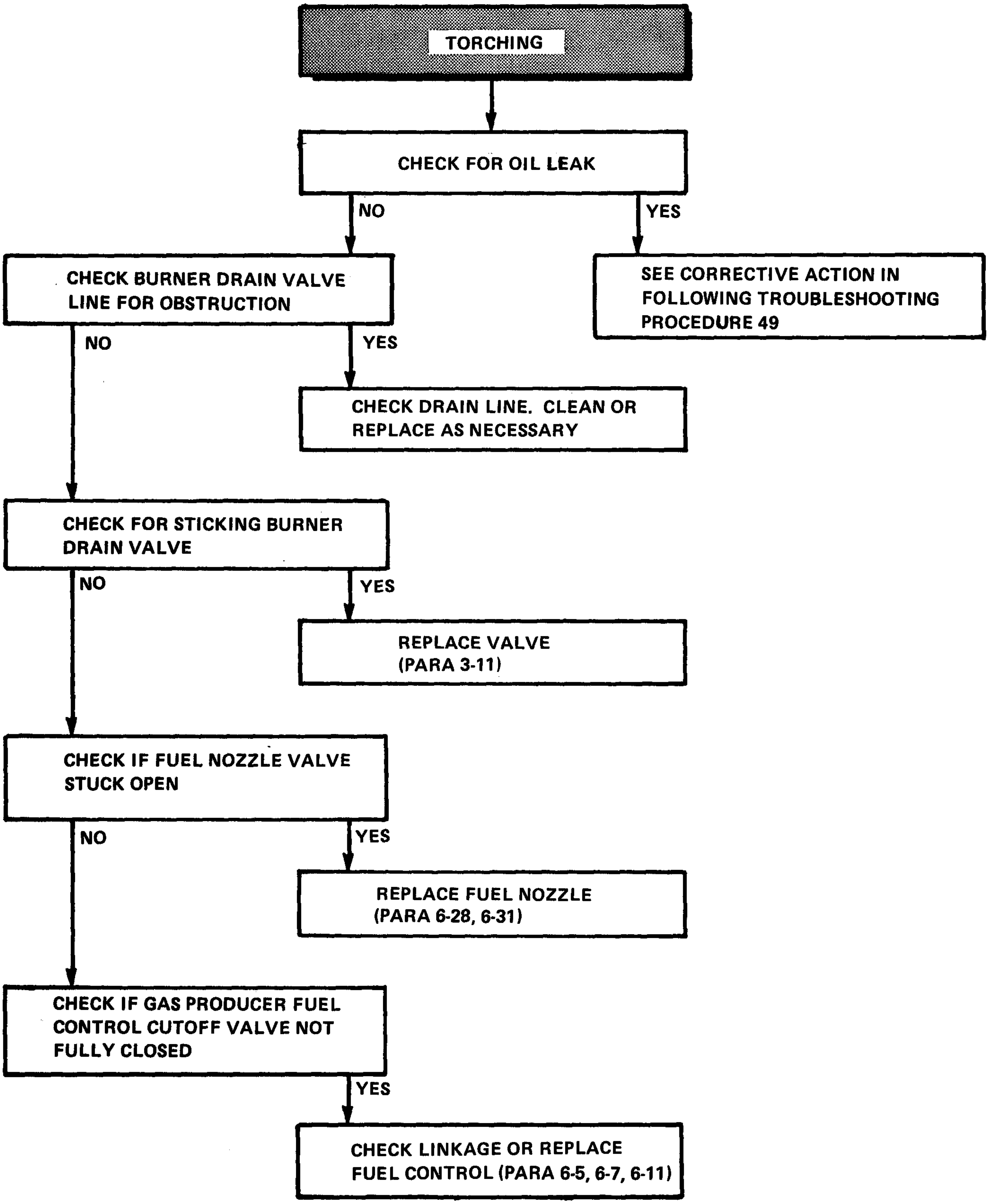
Troubleshooting Procedure 45. Excessive Vibration - Continued



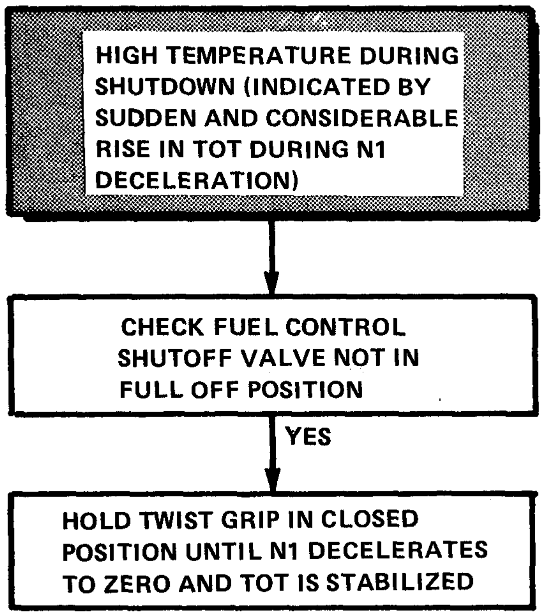
Troubleshooting Procedure 46. Unable to Stop Engine



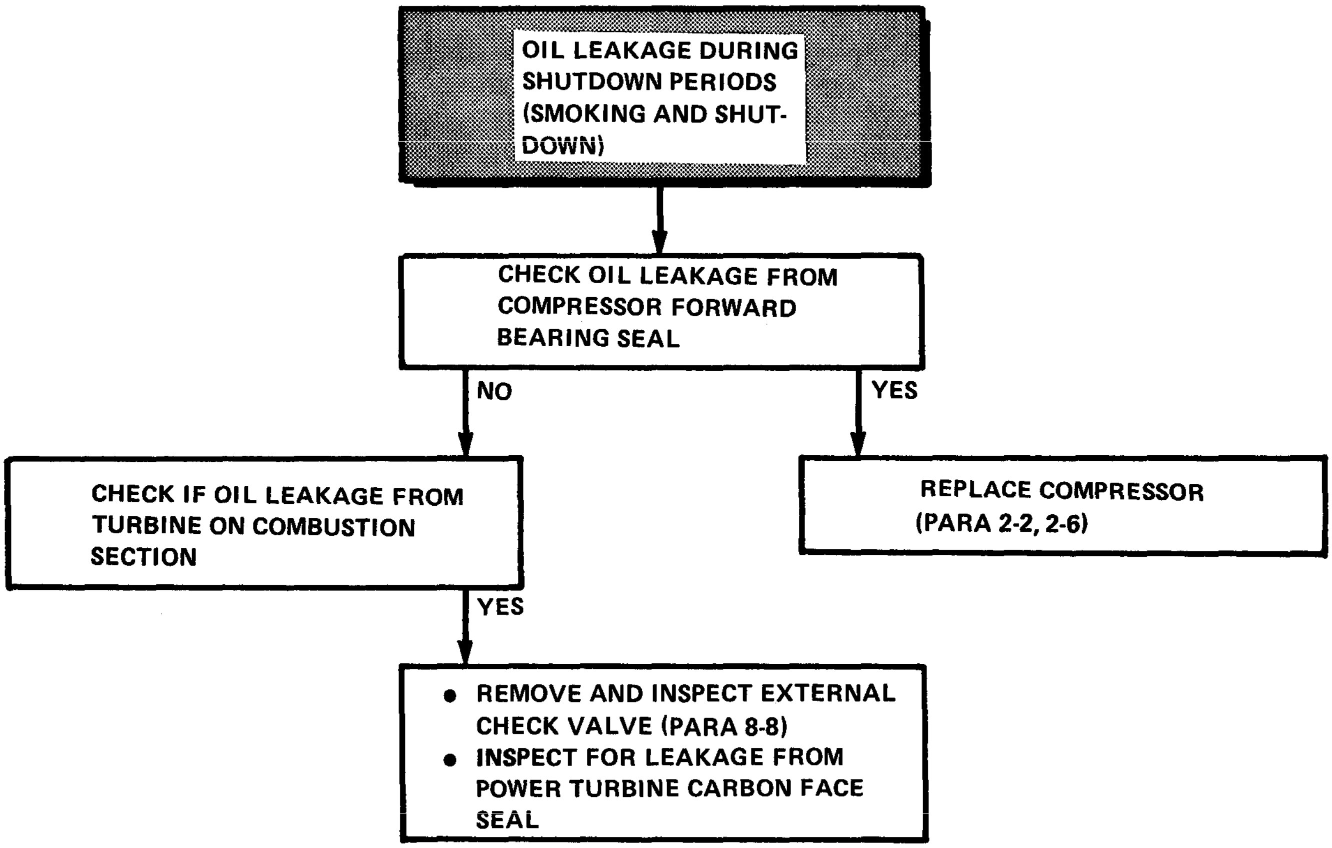
Troubleshooting Procedure 47. Afterfire



Troubleshooting Procedure 48. High Temperature During Shutdown (Indicated By Sudden And Considerable Rise In TOT During N1 Deceleration)



Troubleshooting Procedure 49. Oil Leakage During Shutdown Periods (Smoking On Shutdown)



Troubleshooting Procedure 50. Oil Leakage At Compressor Attachment Insert In The Gearbox Housing (At Insert Adjacent To Compressor Oil Supply Fitting)

OIL LEAKAGE AT COMPRESSOR ATTACHMENT INSERT IN THE GEARBOX HOUSING (AT INSERT ADJACENT TO COMPRESSOR OIL SUPPLY FITTING)

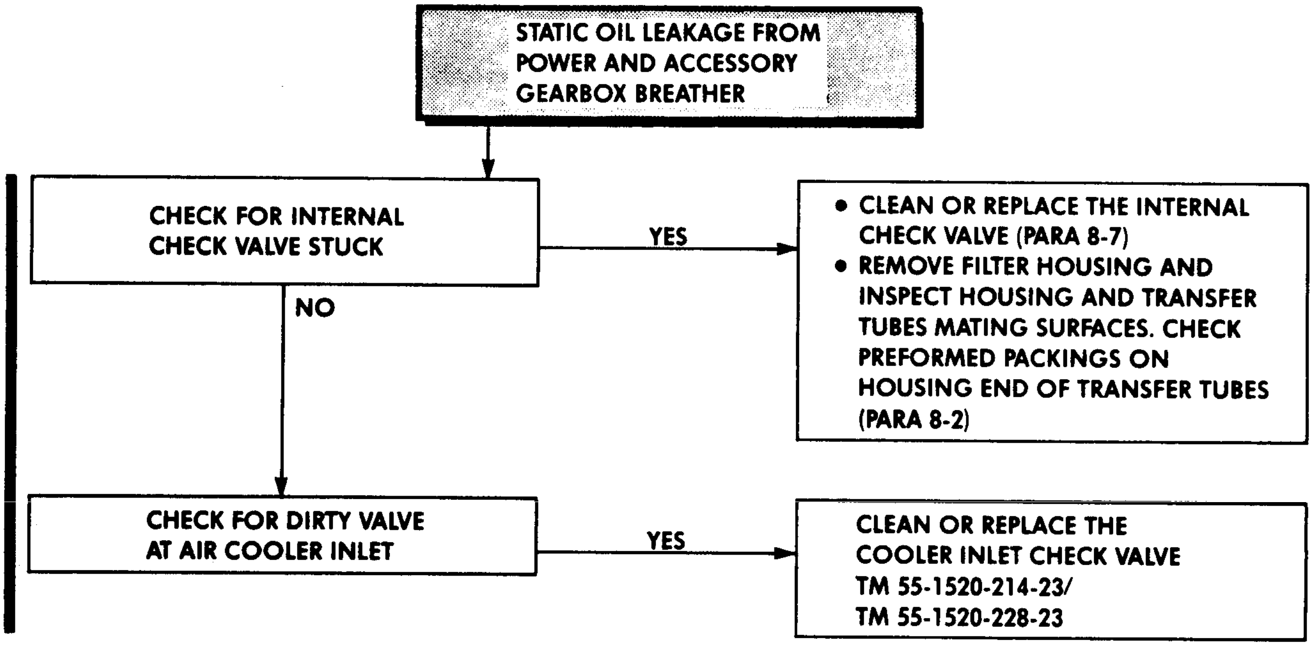
↓

CHECK FOR LOOSE INSERT

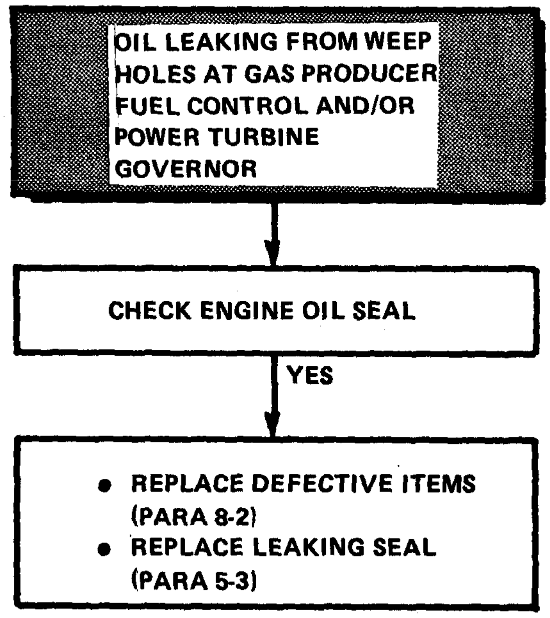
↓ YES

REPLACE ENGINE
TM 55-1520-214-23/TM 55-1520-228-23

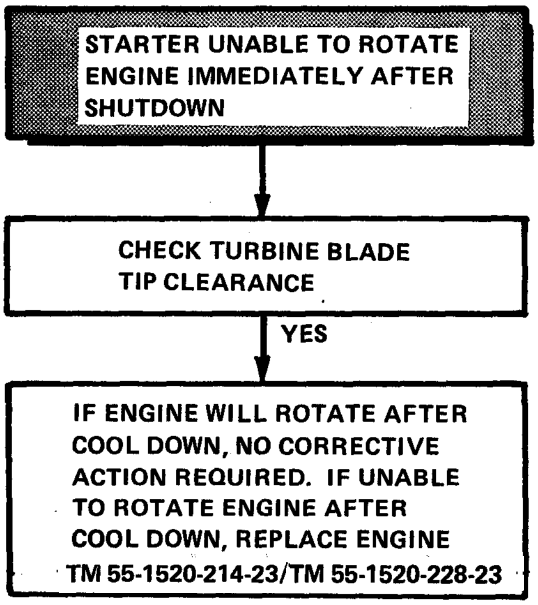
Troubleshooting Procedure 51. Static Oil Leakage From Power And Accessory Gearbox Breather



Troubleshooting Procedure 52. Oil Leaking From Weep Holes At Gas Producer Fuel Control And/Or Power Turbine Governor



Troubleshooting Procedure 53. Starter Unable To Rotate Engine Immediately After Shutdown



Troubleshooting Procedure No. 54. Main Rotor Does Not Rotate by 30% N1 Speed During Start

MAIN ROTOR DOES NOT ROTATE BY 30% N1 SPEED DURING START

SHUT DOWN, ENSURE THAT THE OIL BEING USED IS MIL-L-7808F OR G, OR MIL-L-12699. REPEAT START PROCEDURE. IF NOT ROTATING AFTER SECOND ATTEMPT, SUSPECT DIRT OR SAND BETWEEN FOURTH STAGE TURBINE WHEEL AND SHROUD.

YES

BLOW OUT THROUGH EXHAUST STACK WITH COMPRESSED AIR. MAKE THIRD START ATTEMPT TO VERIFY CORRECTIVE ACTION.

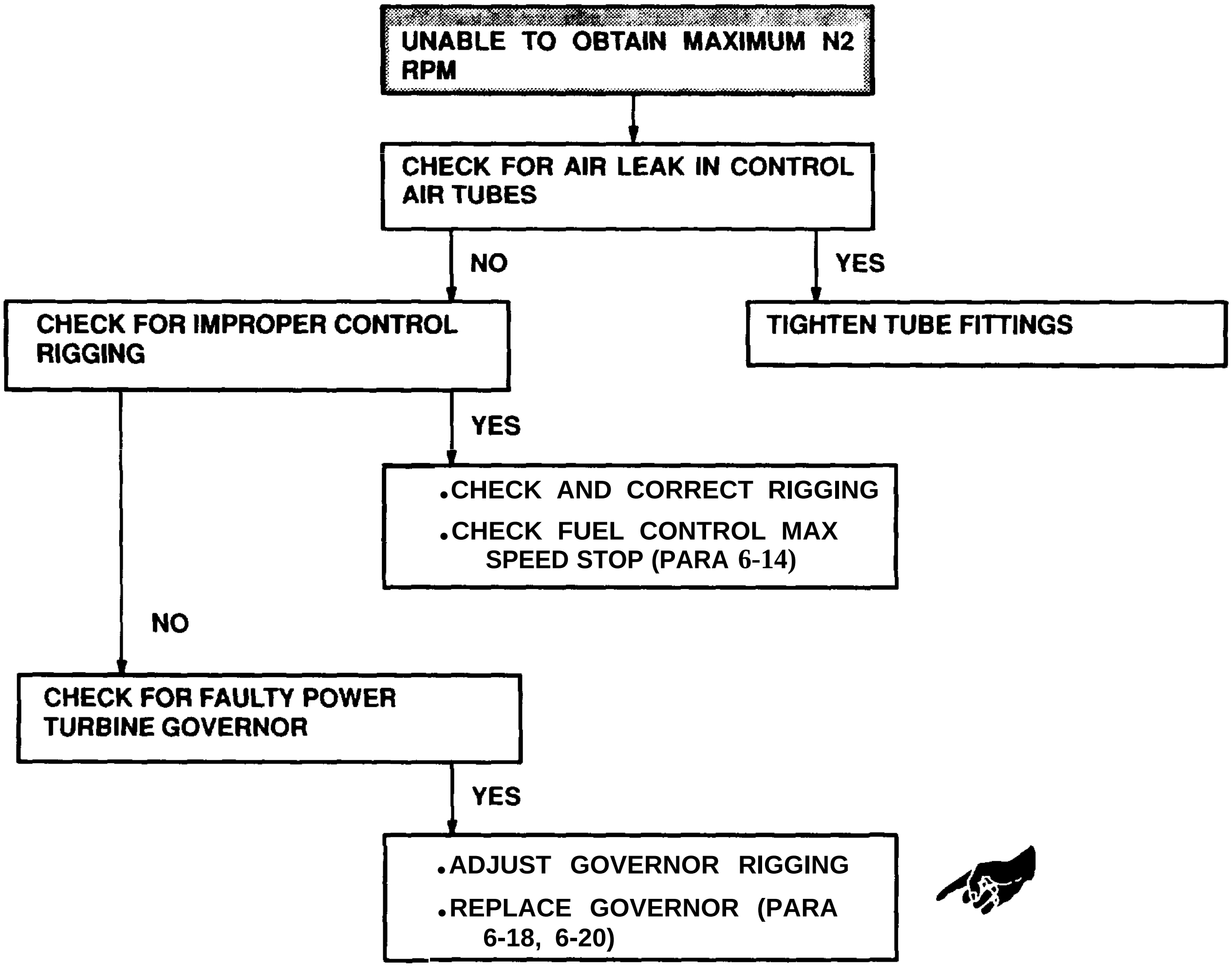
NO

AIRCRAFT POWER TRAIN SEIZURE
TM 55-1520-228-23

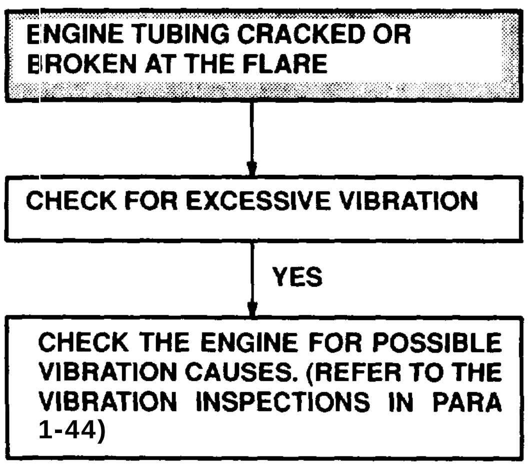
NO

REPLACE ENGINE
TM 55-1520-214-23/
TM 55-1520-228-23

Troubleshooting Procedure No. 55. Unable to Obtain Maximum N2 RPM



Troubleshooting Procedure No. 56. Engine Tubing Cracked Or Broken At The Flare



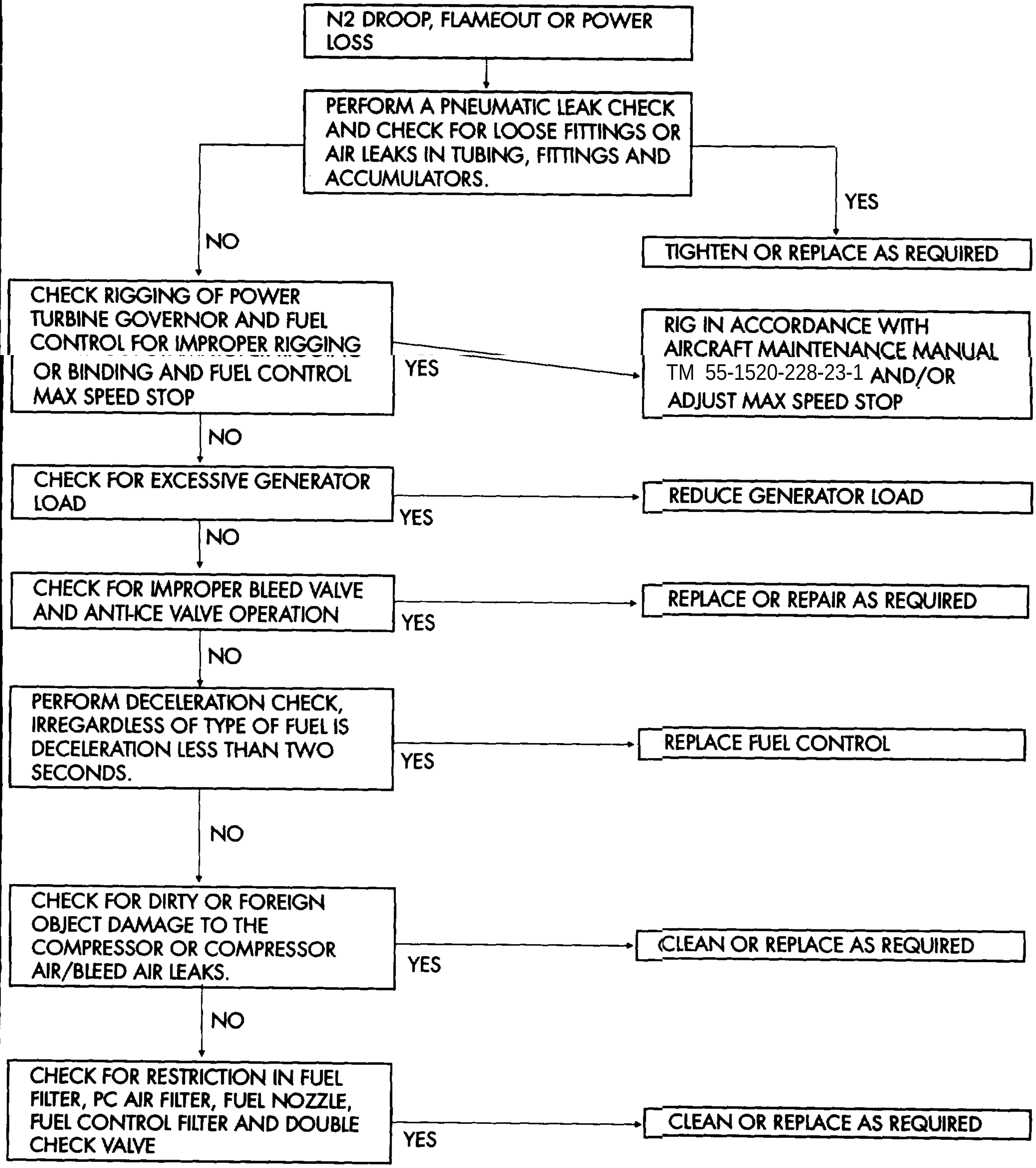
Troubleshooting Procedure No. 57. Powerturbine Governor and Gas Producer Fuel Control Throttle Shaft Binding

POWER TURBINE GOVERNOR AND GAS PRODUCER FUEL CONTROL THROTTLE SHAFT BINDING

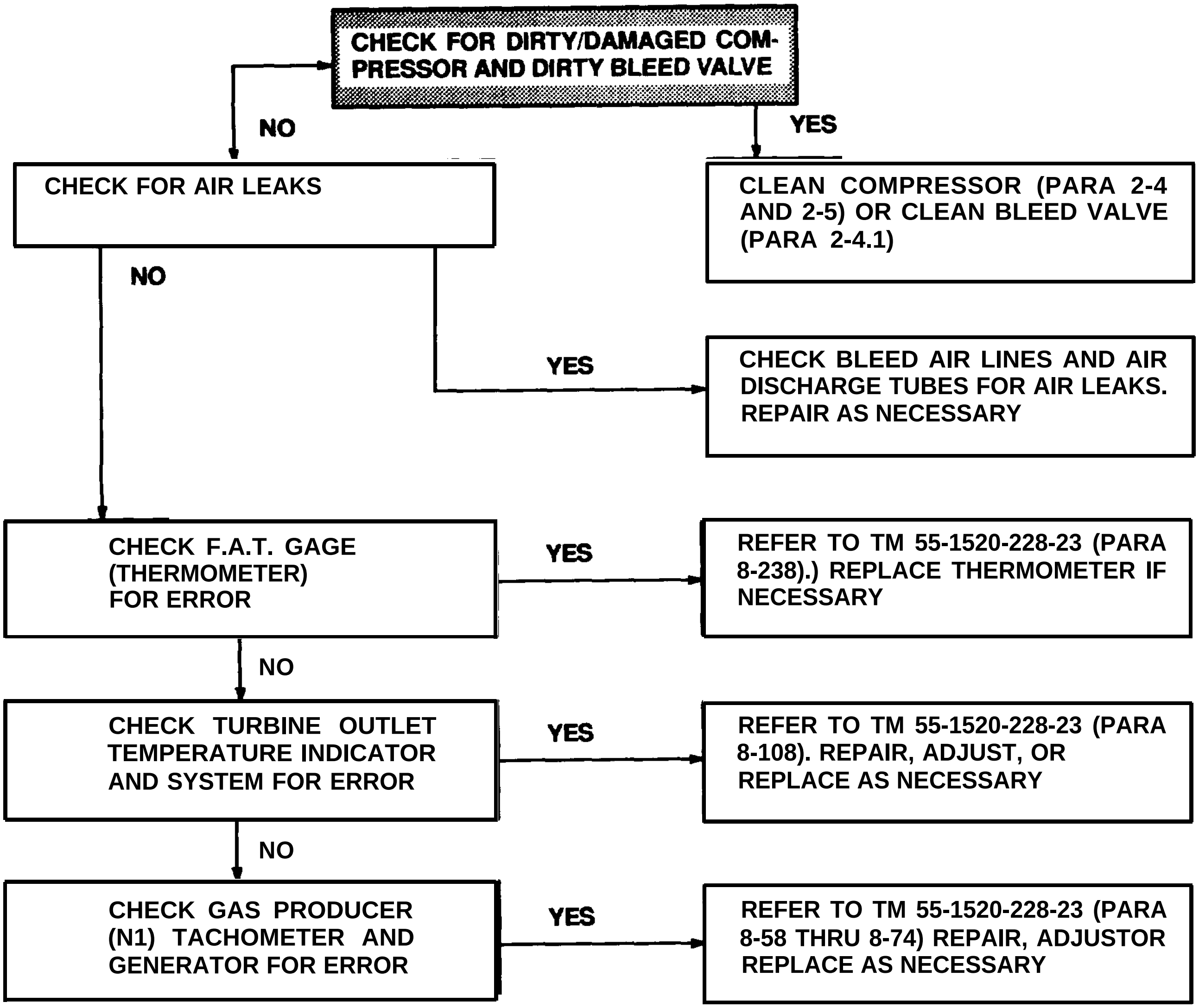
CORROSION BUILD–UP ON SHAFT CAUSING A TIGHT FIT IN THE THROTTLE SHAFT BUSHING

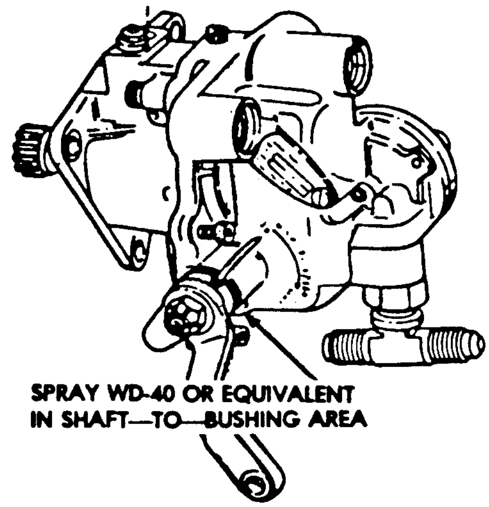
APPLY ITEM 49 APPENDIX D TO THE AREA SHOWN IN ILLUSTRATION. A ONE SECOND SPRAY SHOULD BE SUFFICIENT. ROTATE SHAFT BACK AND FORTH FOLLOWING SPRAY TO ASSURE PENETRATION. REPEAT SPRAY IF NECESSARY.

Troubleshooting Procedure 58. Engine Power Loss, N2 Droop or Flameout

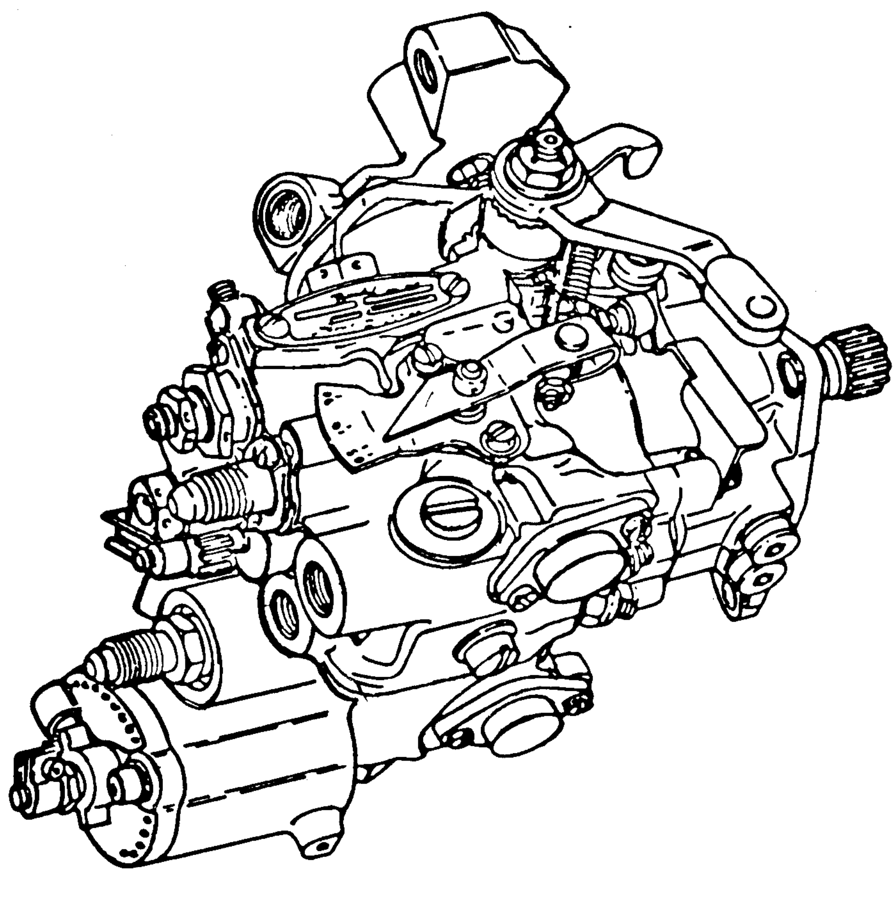


Troubleshooting Procedure No. 59. High Health Indicator Test (HIT) Check





Bendix Governor



Bendix Fuel Control

Section VII. GENERAL MAINTENANCE PROCEDURES

1-48. GENERAL MAINTENANCE INFORMATION.

This section contains general information and practices that maintenance personnel will become familiar with before attempting work on the engine. Refer to Appendix G for torque values for bolts, nuts, and connectors used on the engine.

1-49. General Maintenance Practices.

Engines removed for unscheduled repair, require only that work necessary to return the engine to service.

During disassembly, examine all parts and assemblies for serviceability. Look for indications of work done incorrectly during previous maintenance or overhaul. Report any such indications.

WARNING

Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Areas in which lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

CAUTION

Never allow fuel or oil to contact electrical connectors. Do not use pliers to tighten connectors. Use only specified solvent to clean connectors. Other solvents might damage connectors.

NOTE

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

Protect engine from dust and inclement weather, When possible, perform maintenance in a sheltered area.

On removal of engine components, exercise care to prevent dirt and other foreign matter from entering the engine. Caps, plugs, or temporary covers shall be used to close all openings. Do not use tape to cover fuel and oil openings. Tape adhesive is soluble in fuel or oil and can cause contamination.

When the gas producer fuel control, power turbine governor, check valve, or accumulator are removed from the engine, use extreme care to prevent foreign materials from entering the pneumatic lines or the ports of the component.

Always use a backup wrench on fittings when removing or installing tubing.

Before removing ignition components, disconnect the input power lead at the ignition exciter.

Carefully inspect the condition of all replacement parts before installation.

Never attempt to rotate the gear trains and rotors using a speed wrench at the tachometer drive pads. Side loads on the speed wrench could crack the tachometer drive shaft. Rotate the gas producer gear train and rotor using the 6799790 turning adapter at the fuel control, fuel pump, starter-generator, or spare accessory drive pad. Rotate the power turbine gear train and rotor using the 6799790 turning adapter at the power turbine governor drive pad.

Before disconnecting tubes and hoses, remove locknuts and bolts from cushion clamps. This prevents damage to fittings. If the same lines are going to be reinstalled, reassembly will be easier if clamps are not removed from lines. Remove locknut and bolt that secure the clamp, free the clamp, then reinstall bolt and locknut loosely in the clamp.

When connecting or disconnecting tubes and hoses, use caution to prevent damage and twisting action. When possible, use a backup wrench on fitting. As tubes and hoses are disconnected, cap or cover openings to prevent entrance of foreign material.

To aid in reassembly, keep bolts together as they are removed from each bolt circle.

Dispose of unserviceable parts in accordance with current regulations. Discard all preformed packings and gaskets that are removed during disassembly. Do not discard adapter gasket (sheet metal plate with integral seals) used on sequence valve, on oil cooler, or on oil manifold unless sealing material is damaged.

Keywashers are not reusable. Once used, they must be replaced by new keywashers in all applications.

All used locknuts will be tried for self-locking capabilities before being reused. Manually thread used locknut onto bolt or stud until it stops turning. Replace locknut if bolt or stud threads go past end of locknut.

Use care when assembling bolts to shank-type locknuts. Aline the bolts and engage the first few threads manually to avoid dislodging the locknut from its seat.

During assembly, be careful not to drop nuts, washers, or other objects into the subassembly. If an object is dropped, do not proceed further until it is removed,

Do not use excessive force to assemble mating parts. If excessive force appears necessary, inspect mating surfaces for burrs or pickups. Remove any such defects and repair or replace defective parts.

The special tools identified in this manual are designed specifically for use on this engine. Avoid the use of makeshift tools.

CAUTION

Do not use brass or lead tools when installing or disassembling hot section parts. Brass and lead contaminants can ultimately lead to part failure.

Before using tools, be sure that they are clean and free from nicks, dents, or burrs that could damage engine parts.

CAUTION

Do not use cadmium-plated tools on titanium parts. Doing so may cause parts to fail during subsequent use.

Titanium parts require special care. When cadmium-plated tools are used on titanium parts, it is possible for particles of cadmium to become embedded in the titanium. At temperatures above 600°F (316°C), the cadmium can cause the titanium to become brittle, resulting in overstressed areas and possible cracking. Therefore, cadmium-plated tools will not be used on titanium parts.

Do not use screwdrivers or sharp metal rods to separate engine parts. If engine parts are bound or seized, use wooden wedges to separate them.

Do not use hammers with metal heads to drive any tool on any part of the engine; instead use hammers with plastic, nylon, or rawhide heads when driving is required.

Do not leave tools or parts on any part of the engine, particularly near inlet, during maintenance. Return each tool to its proper place immediately after use.

Use approved thermally insulated gloves.

Lift all heavy parts with proper lifting devices to prevent damage to the part or injury to personnel. Do not use engine components as handles when moving the engine.

CAUTION

Never mark engine parts with a lead pencil. Such deposits can cause corrosion and burn-out of parts. Do not use either the electrolytic-etch or electric-arc scribe methods to mark engine parts.

Use dye or equivalent to temporarily mark engine parts (item 48, Appendix D).

1-50. Cleanliness.

Keep dirt and other foreign material out of the engine. Use the recommended covers to seal openings in the dismantled engine and in disassembled parts.

Place each engine part on a clean surface as it is removed from the engine. Wrap small parts in barrier material (item 15, Appendix D), seal with tape (item 3, Appendix D) and tag (or otherwise identify) the package with engine and module serial number, part nomenclature, and part number.

Do not remove wrappings, protectors or covers until the part is ready to be installed.

1-51. Hardware.

Use 0.020 in. diameter stainless steel lockwire (item 7, Appendix D) where lockwire size is not specified. Double strand lockwire all drilled bolts, plugs, and screws, except those locked with self-locking nuts or lockwashers. Lockwire bolts in pairs where possible. When reassembling, be sure to safety wherever lockwire was removed. Do not use zinc lockwire. Do not reuse lockwire, cotter pins, ring seals, lip seals, composition gaskets, and split or tabwashers.

1-52. Universal Fittings.

a. Use this procedure to install universal fittings with backup rings. (See figure 1-18.)

(1) Install the nut on the fitting and run it back until the counterbore of the nut alines with the upper inner. corner of the seal groove.

(2) Lubricate seals used on oil, anti-icing, and bleed air tube fittings with lubricating oil (item 5, Appendix D). Lubricate seals used on fuel tube fittings with lubricating oil (item 4, Appendix D). DO NOT lubricate seals used on fuel system control air tube fittings. Install the seal on the fitting.

(3) Work the backup ring into the counterbore of the nut,

(4) Turn the nut down until the seal is pushed firmly against the lower threaded section of the fitting.

(5) Install the fitting into the boss, making certain the nut turns with the fitting, until the seal touches the boss. Then tighten the fitting one and one-half turns more.

(6) Put a wrench on the nut to prevent its turning, and position the fitting by turning it not more than one turn.

(7) Hold the fitting in its position and tighten the nut against the boss.

b. Use this procedure to install universal fittings without backup rings. (See figure 1-17.)

(1) Run the nut on the fitting end back until the washer face is alined with the upper inner corner of the seal groove.

(2) Lubricate seals used on oil, anti-icing, and bleed air tube fittings with lubricating oil (item 5, Appendix D). Lubricate seals used on fuel tube fittings with lubricating oil (item 4, Appendix D). DO NOT lubricate seals used on fuel system control air tube fittings. Place the seal in the seal groove.

(3) Screw the fitting into the boss until the seal barely touches the boss.

(4) Turn the fitting and nut together until the nut touches the boss.

(5) Put a wrench on the nut to prevent its turning, and position the fitting by turning it in up to 270 degrees or unscrewing it up to 90 degrees.

(6) Hold the fitting in its proper position and tighten the nut against the boss.

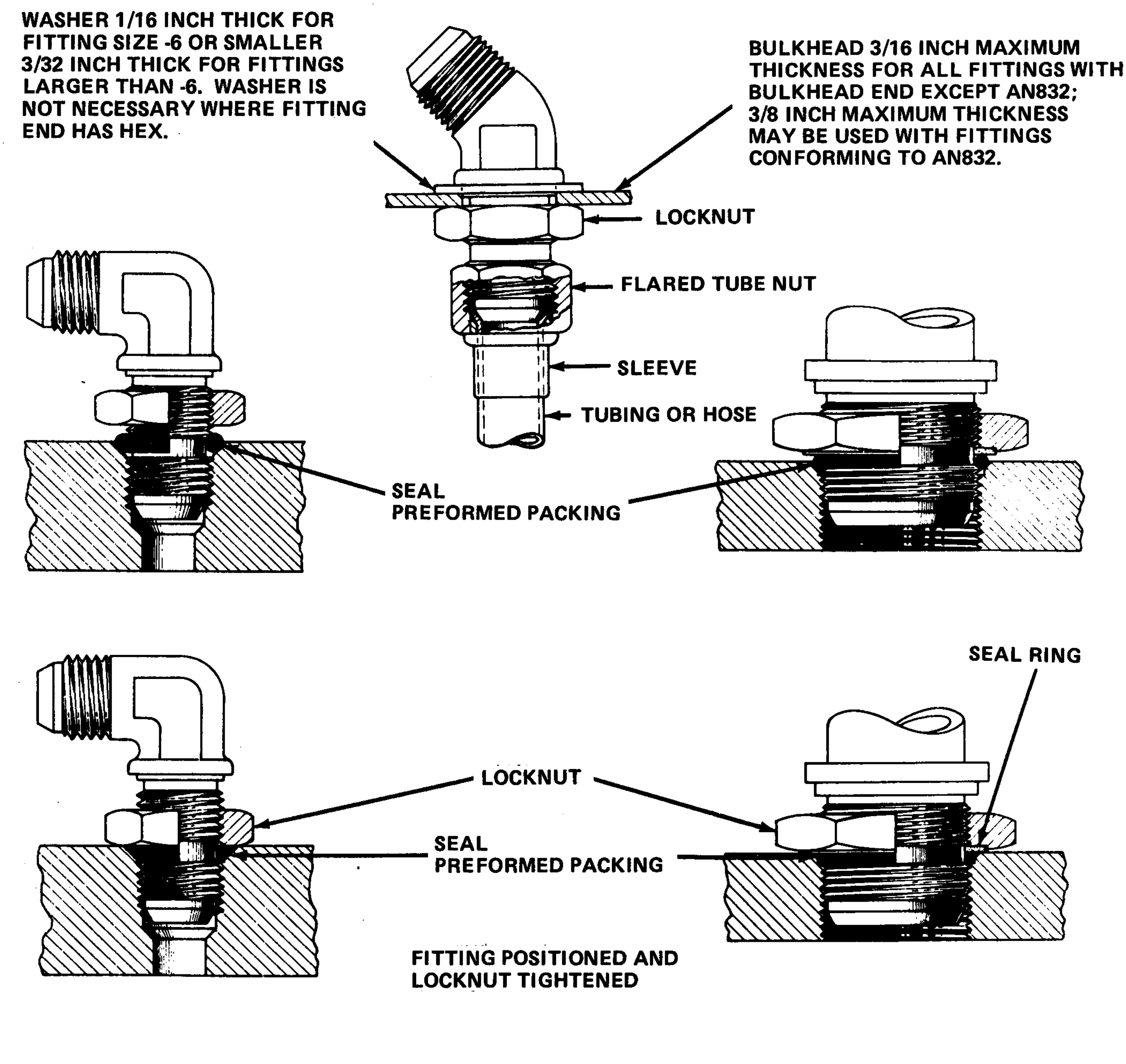


Figure 1-18. Universal Fittings

1-53. Rigid Tube Installation.

a. Tube assemblies must fit and align with the mating flare tube fittings to the degree that both ends of the assembly flares shall uniformly seat in a free state on the cones of The mating fittings. The fit shall be without distortion or stretching of the tube assembly and to the degree that the nuts can be fully engaged up to the final one-half turn with light finger pressure.

b. If proper alignment cannot be attained by repositioning mating flare tube fittings, bend the tube enough to provide alignment in the free-state as specified. Accomplish all bending with the tube removed from the engine. Adjustment of the fit may be accomplished by bending by hand at principal bends. In the event the tube cannot be bent by hand, use a proper tube bending device. The flattened effect of the cross section of the tube as a result of the reforming operation must not exceed 15 percent of the tube OD.

c. When proper free-state alignment is attained complete the tubing installation by securing both the coupling nuts and tightening them to proper torque. Always use a backup wrench on the tube fittings when tightening the tube coupling nuts.

d. When a component to which rigid tube assemblies are attached is replaced, remove all interfering tube assemblies to permit easy removal and reinstallation of the component. This precaution will prevent later damage to the tube assemblies.

1-54. Fuel Requirements. The fuel used for testing shall conform to item 43, Appendix D. The fuel supply system shall be capable of supplying 250 pounds per hour (113.50 kg) flow over the range of 5 to 45 psig inlet pressure. A sufficient number of 10 micron (No. 200 mesh screen) filter elements shall be provided to adequately filter the fuel and allow the required flow rate.

1-55. Lubricating Oil Requirements. The engine lubricating oil used for testing shall conform to item 5, Appendix D. The oil supply system shall be capable of maintaining oil inlet pressure within 0 to 1.8 psig and oil inlet temperature within the range of 180° F to 225° F (82.2° C to 107.2° C). A sufficient number of 25 micron filters shall be provided to adequately filter the scavenge oil.

1-56. Electrical Supply Requirements.

a. The ignition exciter requires a dc power supply of 28 volts (4 amps minimum).

b. The starter requires a source of external power capable of 350 to 400 amperes, and 28 volts is recommended for starting the engine; however, limits of 300 to 750 amperes and 28 volts are allowable for starting the engine.

1-57. Drainage Requirements. When the engine is to be tested on the test stand, drain bottles shall be provided to collect drainage from the burner drain valve, fuel pump seal drain, firewall shield drain and exhaust collector drain. Combined drainage shall not exceed 2 cc/minute, except fuel pump seal drainage shall not exceed 0.5 cc/minute, of this total.

1-58. Preservation Requirements. Engines which are not scheduled for immediate installation into the airframe shall be preserved as outlined in paragraphs 1-35 thru 1-38.

1-59. Use of Oils.

NOTE

It is not advisable to mix MIL-L-7808 and ML-L-23699 oils except in cases of emergency. If it becomes necessary, the system must be flushed after 6 hours of operation. (Refer to paragraph 1-61.)

NOTE

Nearly all present day lube oils contain anti-foam additives which can settle to the bottom of the container. Thoroughly shake (agitate) the container prior to adding oil to the system either at an oil change or during routine servicing.

a. Use of ML-L-23699 oil is authorized and directed for ambient temperatures above minus 25°F (-31.7°C). This oil may also be used when MIL-L-7808 oil is not available.

b. Use of MIL-L-7808 oil is specified for operation in ambient temperatures below minus 25°F (-31.7°C). This oil may also be used when MIL–L-23699 oil is not available.

1-60. Oil Change Procedure.

INITIAL SETUP

Applicable Configuration

All

Consumable Materials

Lubricating Oil (item 5, Appendix D)

References

Paras 5-5, 8-3, 8-4 and 8-5

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	**WARNING** **Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.** Drain and refill the lubrication system after each 150 hours of engine operations as follows:	
		a. **Drain** the oil system.
	Refer to paragraph 5-5.	b. **Remove, inspect and clean** the magnetic chip detectors.

1-60. Oil Change Procedure - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		c. Loosen the fittings and remove the line going to the "T" fittings that feeds oil to the number six and seven bearing, pressure oil tube, P6871470. Remove the small oil screen, P6840476 (Pressure Oil Fitting Screen Assembly). Motor the engine with the starter and permit a small amount of oil (1 or 2 ounces) to come out the end of the oil tube. Clean and reinstall the screen and tube assembly. Tighten pressure oil tube coupling nuts to 80-120 in-lb (9.0-13.6 Kg/m). Tighten clamp nuts to 35-40 in. lb (3.9-4.5 Kg/m). Refer to Figure 1-18.1. d. **Remove** and **clean** or **replace** the oil filter.

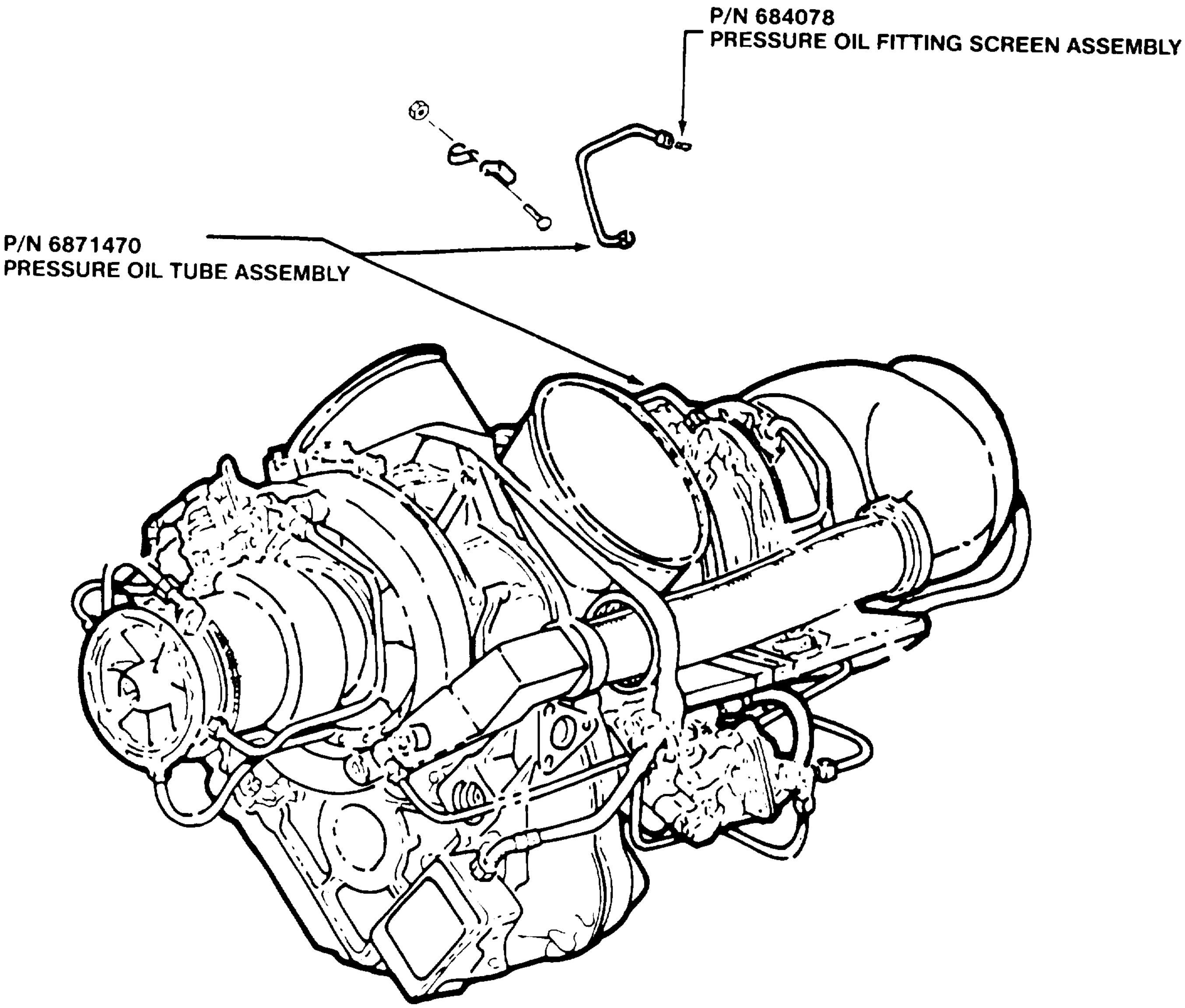


Figure 1-18.1 Pressure Oil Tube and Pressure Oil Filter Screen

1-60. Oil Change Procedure - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
	Lubricating Oil (item 5, Appendix D).	e. **Refill** oil tank with lubricating oil,
		f. **Motor** engine with the starter until positive oil pressure indication is obtained. **Do not exceed** starter limitations. (TM 55-1520-228-23/TM 55-1520-214-23)
		g. closely **monitor** indicated oil pressure for the first live minutes of engine operation.

1-61. Oil Changeover Procedure

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Lubricating Oil (item 5, Appendix D)

References
Paras 8-3 thru 8-5

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	**WARNING** Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.	
Oil System	When changing over from MIL-L-7808 oil to MIL-L-23599 oil or vice-versa, proceed as follows:	

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		a. **Drain** the oil tank, system components and piping, and engine gearbox as completely as possible.
	Refer to paragraphs 8-3 thru 8-5.	b. **Remove** and **clean** or re**place** the oil filter.
		c. Remove, inspect and **clean** the magnetic chip detectors.
	Lubricating oil (item 5, Appendix D)	d. **Fill** oil tank with desired lubricating oil.
		e. Motor engine to pump oil through the system. **Check** tank oil level and **add** oil as required. **Repeat** the motoring cycle until the tank oil level does not change.
		f. **Run** engine for 30 minutes to one hour and **shut down.**
		g. **Inspect** and **clean** or re**place** the oil filter.
		(1) If filter was heavily contaminated, **accomplish** action items h. through 1.
		(2) If filter was not heavily contaminated, **accomplish** action items j. through 1.
	Refer to paragraph 1-60.	h. **Drain** oil from the engine oil system
		i. **Fill** oil tank with the desired oil and **release** the engine for service.

1-61. OIL CHANGEOVER PROCEDURE - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		j. After five hours operation, inspect and clean or replace the oil filter.
		k. After 15 hours operation, inspect and clean or replace the oil filter.
		l. **Revert** to normal schedule of inspection of oil filter.

1-62. ENGINE EXTERIOR SURFACE – CLEANING

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning Solvent (item 1, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
	WARNING Drycleaning solvent, P-D-680, type II used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 138°F (59°C).	
Engine Exterior Surface	Flush or spray wash external surfaces with petroleum solvent (item 1, Appendix D) to remove grease, oil, and dirt. Insure that all openings are plugged or covered before cleaning.	

Section VIII. ENGINE TESTING IN MOBILE OR FIXED FACILITIES

1-63. **GENERAL.**

This section provides instructions for conducting functional tests following repair or replacement of parts.

1-64. **PREPARATION FOR TEST.** Engine testing may be accomplished with the engine installed in the airframe AVUM or on a mobile engine test stand AVIM.

Engine Installation in Airframe. Install the engine in the airframe as outlined in the applicable aircraft maintenance manual TM 55-1520-214-23 or TM 55-1520-228-23.

Engine Installation on Test Stand. Install the engine on the mobile engine test stand, part No. LTCT 10465-02 (NSN 4920-00-167-9178), as outlined in TM55-4920-328-13.

1-65. **INSTRUMENTATION REQUIREMENTS.** Engine testing may be accomplished using no more than standard aircraft instrumentation to monitor the following parameters.

a. Turbine Outlet Temperature 0°C-1000°C)

b. Output Shaft Torque (0-110 psi).

c. Oil Pressure (0-150 psi).

d. Gas Producer (Nl) Speed (0-110%).

e. Power Turbine (N2) Speed (0-120%).

1-66. ENGINE TESTING.

1-67. ENGINE MOTORING PROCEDURE.

a. Engine installed in airframe.

(1) Disconnect the power input lead from the ignition exciter or pull the IGN ENG circuit braker (refer to TM 55-1520-235-10).

(2) Insure that the throttle (twist grip) is in the FUEL CUTOFF position.

(3) Insure that the collective pitch control is at the minimum **position.**

(4) Press and hold the starter - ignition button to motor the engine. **Release the button to stop** motoring

b. Engine Installed on Test Stand.

(1) Prepare the test stand for operation as outlined in **TM 55-4920-328-13.**

(2) Place the N1 throttle lever to the zero degree position **as indicated on the throttle position indicator.**

(3) Place the governor lever to the minimum position.

NOTE

Do not press the ignition switch.

CAUTION

Insure that lubrication oil is available at the engine oil inlet port

(4) TO motor engine, press and hold start switch. To stop motoring engine, release start switch.

1-68. Engine Operating Procedures

INITIAL SETUP

Applicable Configuration
All

Teat Equipment
Test Stand

References
TM 55-4920-328- 13
TM 55-1520-214-10
TM 56-1520-228-10

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/		
1. Engine Operation	**NOTE** Refer to the applicable TM 55-1520-214-10 or TM 55-1520-228-10 for starting, operating, and shutdown procedures where the engine is to be tested in the airframe.	

1-68. Engine Operating Procedure - Continued

LOCATION/ITEM	REMARKS	ACTION
2. TEST STAND/ STARTING		
	The following operating procedures apply when the engine is installed on the test stand.	
		Prepare the test stand for operation as outlined in TM 55-4920-328-13.
	CAUTION **Insure that fuel and lubricating oil are available at the engine fuel and oil inlet ports.**	
		Place N1 throttle lever to zero degree position as indicated on the throttle position indicator. **Place** governor lever to minimum position.
	CAUTION **Abort the start if any of the following conditions occur:** **• Time from starter ON to idle speed exceeds one minute. Investigate and correct cause before attempting another start.** **• Engine oil pressure does not start to increase by the time gas producer speed (NI) reaches 20%. speed. Investigate and correct cause before attempting another start.** **• No indication of power turbine rotor speed (N2) by the time gas producer speed (N1) reaches 30% speed. Investigate and correct cause if malfunction was of test stand origin. Reject engine if malfunction was of engine origin,**	

1-68. Engine Operating Procedures - Continued

LOCATION/ITEM	REMARKS	ACTION
TEST STAND/- Continued	**CAUTION -Continued** **● Indicated TOT exceeds 1380°F (749°C) for more than 10 seconds with a momentary peak of one second at 1700°F (927°C).** **● Indicated TOT exceeds 1700°F (927°C) or remains at 1700°F (927°C) for more than one second.**	
		Simultaneously **press** the start switch, ignition switch, timer start switch.
	CAUTION **Do not advance the N1 throttle lever above the 0° position (fuel cutoff) until the proper cranking speed is attained. An overtemperature start or an explosive lightoff may occur.**	
		When N1 speed reaches value listed below **advance the** N1 throttle lever to 30-degree position (idle). If there is no immediate TOT indication, **retard** throttle lever to O-degree position (fuel cutoff). **Investigate** to determine the cause for no lightoff.

Ambient Temperature	N1 Speed
45°F to 130°F (7°C to 54°C)	15%
0°F to 44°F (-18°C to 7°C)	13%
-65°F to -1°F (-54°C to -18°C)	12%

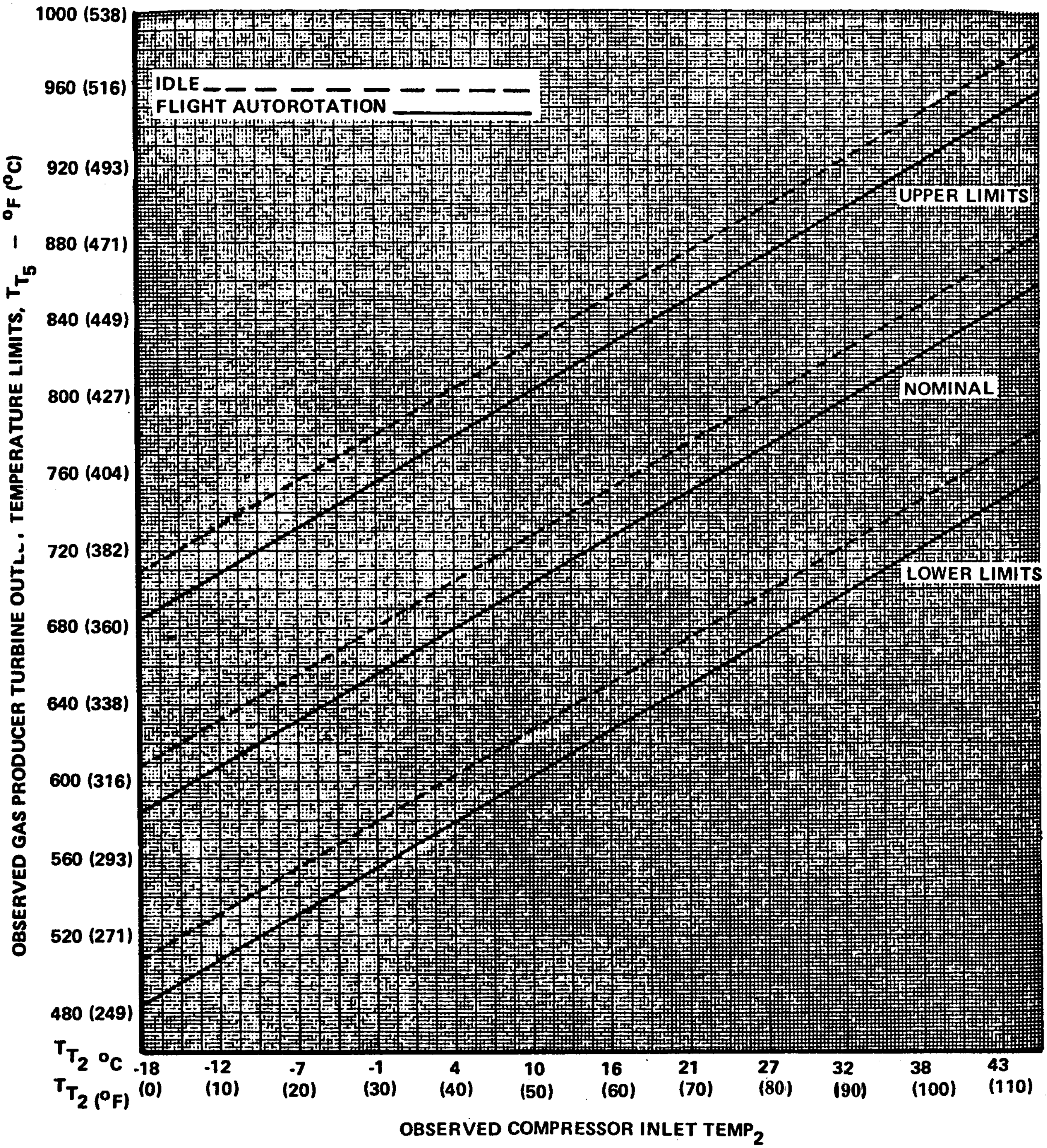
At 58% N1 speed, **release** start switch, and ignition switch to cut off starter and ignition.

1-68. Engine Operating Procedures - Continued

LOCATION/ITEM	REMARKS	ACTION
TEST STAND/ - Continued		
	The engine should continue to accelerate and stabilize at 62-65% N1 speed (idle). Oil pressure should beat least 50 psi (3.51 kg/sq cm). **NOTE** During cold weather, oil pressure up to 150 psi (10.55 kg/sq cm) is permissible. Operate at idle until normal pressure limits can be maintained.	
3. TEST STAND/ Operating Idle	Idle is the same setting as for starting and is established with the governor lever at the minimum position and the N1 throttle lever at the idle (30°) position. Other determining factors are: N1 speed =62 to 65% N2 speed = 75 to 105% GPTOT = Determine from the following figure Torque pressure = O to 11 psi (O to 0.77 kg/sq cm)	
4. TEST STAND/ Flight Autorotation	Flight autorotation is established with the governor lever in the minimum position and the N1 throttle lever at any position between idle (30°) and maximum (90°). Other determining factors are: N1 speed= 63% (estimated) N2 speed =98 to 108% (normal, see table 1-9 for exception) GPTOT = Determine from the preceding figure. Torque pressure = O to 5 psi (O to 0.35 kg/sq cm)	

1-68. Engine Operating Procedures - Continued

LOCATION/ITEM	REMARKS	ACTION



1-68. Engine Operating Procedures . Continued

LOCATION/ITEM	REMARKS	ACTION
5. TEST STAND/ Take off	Takeoff is established with the N1 throttle lever at maximum (90°), the governor lever positioned to produce 100% N2 and the engine loaded to produce 1380°F (749°C) GPTOT. Other determining factors are: N1 speed = 104% max Torque pressure = 100 psi (7.03 kg/sq cm) max	
6. TEST STAND/ Normal Shutdown		**Place** N1 throttle lever to ground idle (30°) **position the** governor lever to the minimum position. **Stabilize** at idle for two minutes. **Move** N1 throttle lever to fuel cutoff (0°) position. **Shut down** the test stand as outlined in TM 55-4920-328-14.
7. TEST STAND/ Emergency Shutdown	If time permits, position the test set switches and controls as outlined in TM 55-4920-328-13.	**Press** instrument power off switch and move N1 throttle lever to the fuel cutoff (0°) position.

1-69. Operating Limits - Continued. Observe engine operating limits during all phases of engine testing. (Refer to table 1-9.)

Table 1-9. Operating limits

Item	Limit	Remarks
N1 speed		
Rated	100%	
Maximum continuous	*104%	
Maximum transient	*105%	Permitted for 15 seconds maximum.
N2 speed		
Rated	100%	See note.
Maximum continuous		
Takeoff	*103%	
Flight autorotation	*108%	
Maximum transient		See note.
Takeoff	*105%	Permitted for 15 seconds maximum.
Flight autorotation	*110%	Permitted for 15 seconds maximum.

NOTE

Refer to figure 1-18.2.

*Send the engine to repair/overhaul if limits exceeded.

GPTOT		
Maximum takeoff	1380°F (749°C)	Permitted for 30 minutes maximum.
Maximum continuous	1280°F (693°C)	Permitted for continuous operation.
Maximum transient	1380°F-1550°F (749°C-843°C)	Permitted for 6 seconds maximum.
Maximum starting	1380°F-1700°F (749°C-927°C)	Permitted for 10 seconds.

NOTE

If temperature limits are exceeded, inspect the turbine as outlined in paragraph 1-43.

Maximum vibration (200 cps filter)	Test Stand	Airframe	
Transient Power			
Compressor	1.2 inch/second	2.0 inch/second	If limits are exceeded, shut down immediately. Investigate to determine cause.
Turbine	1.8 inch/second	3.0 inch/second	
Gearbox	1.0 inch/second	1.7 inch/second	

1-69. Operating Limits.

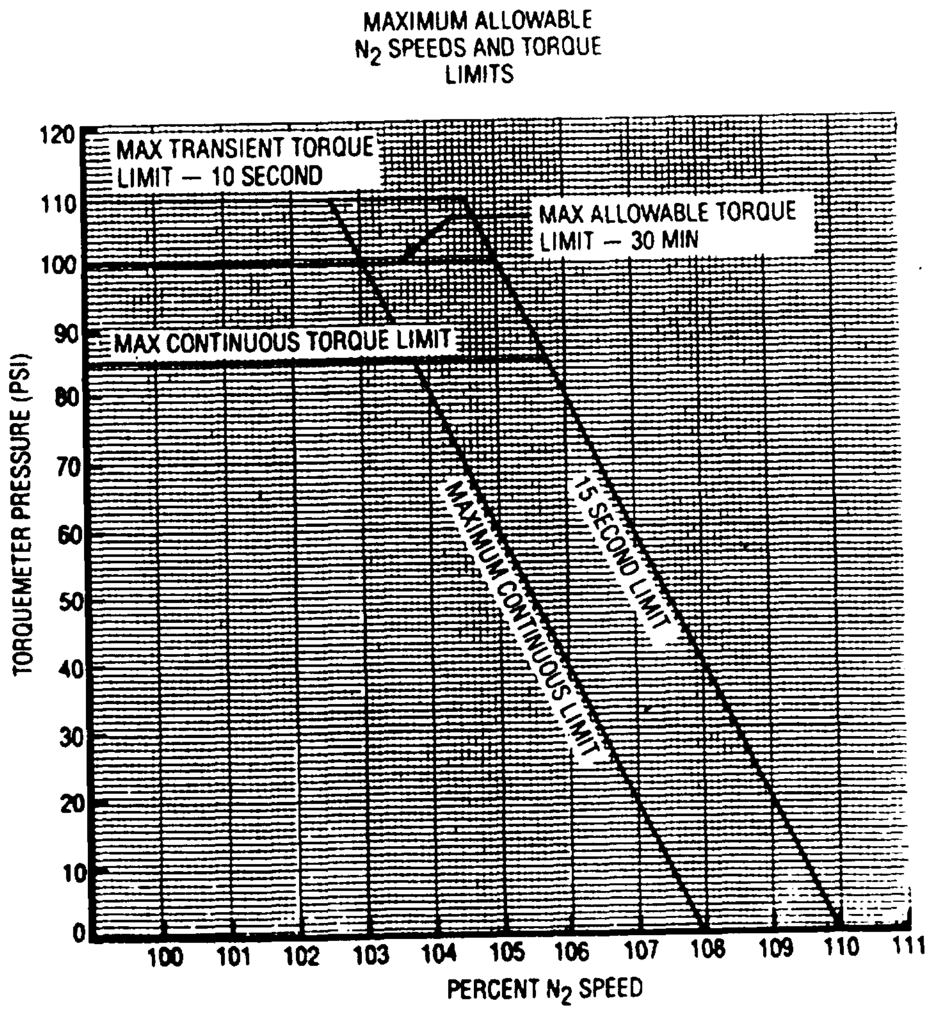


Figure 1-18.2. Maximum Allowable N2 Speed

Table 1-9. Operating Limits - Continued

Item	Limits		Remarks
Steady state 100% N2 with Collective at flat pitch			
Compressor	0.6 inch/second	0.9 inch/second	
Turbine	0.9 inch/second	1.5 inch/second	
Gearbox	0.5 inch/second		

NOTE

Vibration test required after initial installation of engine in aircraft or when excessive vibration is suspected. (Refer to para 1-44.)

Oil pressure		
During start	Increasing pressure by the time 20% N1 is reached	Abort start if pressure does not start increasing.
Idle to 78% N1	50 psig minimum	
78-89% N1	90-130 psig	
90% N1 and above	115-130 psig	

NOTE

Oil pressure limits are based on an oil inlet temperature of 180°F-225°F (82°C-107°C).

Oil temperature		
For starting	-65°F (-54°C) minimum	
*For operation above idle	35°F (1.7°C) minimum	Operate at idle until within limit.
Normal range	180°F-200°F (82°C-93°C)	
Maximum	225°F (107°C) maximum	Reducer power to maintain limit.

*For test cell only.

NOTE

During cold weather operation, 150 psig engine oil pressure is permitted following engine start. When the 130 psig limit is exceeded, operate engine at idle RPM until normal engine oil pressure is obtained. When engine oil pressure is within normal limits, engine may be operated within full range of temperature limits – 54°C to 107°C (– 65°F to 224°F) without regard to engine oil temperature markings.

1-70. Test Requirements.

a. Table 1-10 lists the test requirements following repair or replacement of an engine component or accessory. Parts removed to gain access to other parts or areas shall invoke the same test requirements in accordance with the table of test requirements, as parts repaired or replaced to correct deficiencies or malfunctions. In the event that more than one test requirement is invoked, the most severe shall apply.

b. Setting numbers listed in the functional test column of table 1-10 refer to the setting numbers in the functional test schedule (Table 1-11).

c. The following test points should be utilized for vibration testing of an engine when installed in an aircraft.

(1) Steady state data points:

(a) Throttle full open, 103 percent N2, flat pitch, stabilize for 30 seconds, record reading,

(b) Throttle full open, 103 percent N2, 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 (103 percent N2) record the peak reading.

(b) Throttle full open, 103 percent N2, flat pitch, increase collective until skids are light, record the peak reading.

Table 1-10. Test Requirements

Item	Parts Replaced or Repaired	Functional Test	Remarks
1	Gearbox seals	Settings 3 thru 6	Check for leaks.
2	Oil pressure reducer	Settings 1 thru 6	Insure oil pressure is within limits of table 1-9.
3	Lube oil check valve	Settings 1 thru 6	Insure oil pressure is within limits of table 1-9.

Table 1-10. Test Requirements - Continued

Item	Parts Replaced or Repaired	Functional Test	Remarks
4	Oil filter housing and associated valves	Settings 3 thru 6	Adjust oil pressure regulating valve. (Refer to paragraph 8-6.) Insure oil pressure is within limits of table 1-8.
5	Spark igniter	Settings 1 and 2	Insure satisfactory start.
6	Ignition exciter	Settings 1 and 2	Insure satisfactory start.
7	Bleed valve	Settings 3 thru 6	Insure valve operates within limits of figure 1-19 with a non-restricted fitting installed on Bleed Valve Compressor discharge part.
8	Fuel control	Settings 1 thru 6	Make fuel control adjustments as required. (Refer to paragraphs 6-5 thru 6-14.) Insure engine operates within limits of table 1-8.
9	Governor	Settings 1 thru 6	Insure engine operates within limits of table 1-9.
10	Fuel pump	Settings 1 thru 6	Insure engine operates within limits of table 1-9.
11	Compressor	Settings 1 thru 10	Insure engine operates within limits of table 1-9.
12	Compressor case	Settings 1 thru 6	Insure engine operates within limits of table 1-9.
13	Combustion liner	Settings 3 thru 6	Insure engine operates within limits of table 1-9.
14	Combustion outer case	Settings 3 thru 6	Insure engine operates within limits of table 1-9.
15	Compressor discharge air tube(s)	Settings 3 thru 6	Insure engine operates within limits of table 1-9.
16	Double check valve	Settings 3 thru 6	Check for leaks.
17	Fuel filter element	Settings 1 and 2	Check for leaks.
18	Oil filter element	Settings 1 and 2	Check for leaks.
19	Fuel, oil, and air piping	Settings 1 and 2	Check for leaks.

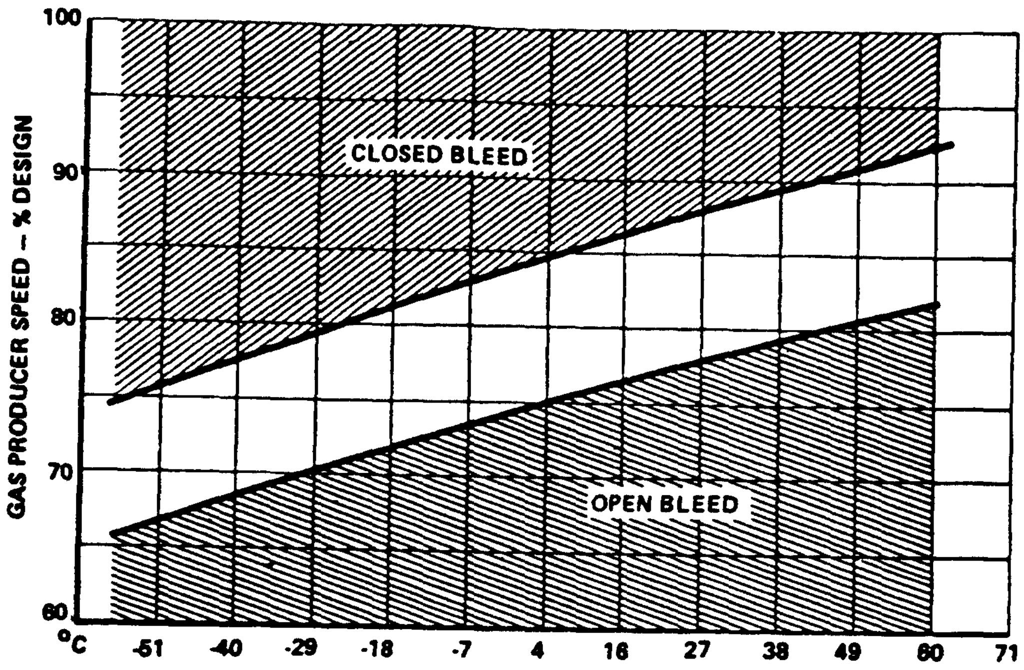


Figure 1-19. Bleed Valve Operation

1-71. FUNCTIONAL TEST SCHEDULE.

Table 1-11 lists the power settings and sequence of events for performing an engine functional test run. Perform the applicable portions of the test as outlined in table 1-10. The engine must operate within the limits specified in table 1-9.

Table 1-11. Functional Test Schedule

Setting No.	Condition	Time (minutes)	N1 speed (%)	N2 speed (%)	GPTOT °F (°C)	Torque Press (psi)	Note Ref
1	Start engine (accelerate to idle)	5 max	62 to 65	75 to 105	See fig, 1-20	0-11	A
2	Shut down						
3	Start engine (accelerate to idle)		62 to 65	75 to 105	See fig. 1-20	0-11	B
4	Takeoff	2		100	1380 (749)	100	C
5	Idle	2	62 to 65	75 to 105	See fig. 1-20	0-11	D

Table 1-11. Functional Test Schedule - Continued

Setting No.	Condition	Time (minutes)	N1 speed (%)	N2 speed (%)	GPTOT ‘F (°C)	Torque Press (psi)	Note Ref
6	Shut down						E,F
7	Start engine (ac- celerate to idle:		62 to 65	75 to 105	See fig. 1-20	0-11	
8	Takeoff	5		100	1380 (749)	100	G
9	Idle	2	62 to 65	75 to 105	See fig. 1-20	0-11	
10	Shut down						H

NOTES

A Observe engine for abnormal conditions such as vibration, noise, or leakage. Light oil vapor or spewing may occur at the diffuser vent orifice when a new compressor has been installed. Leakage should cease after high power transients have permitted seal to wear in.

B Make idle speed and start derichment adjustments if required. (Refer to paragraph 6-5, 6-12.) Adjust oil pressure regulator if required, (Refer to paragraph 8-6.)

C If the engine is being tested in the airframe, limit collective to just short of lift-off.

D Check operation of the anti-icing valve.

E Give the engine a thorough visual inspection after shutdown. Repeat the check run if any repairs are necessary as a result of the run or the inspection.

F The check run is complete after setting No. 6 unless a new compressor has been installed. To obtain seal wear-in on the new compressor, continue to the completion of the listed check run settings.

G If the engine is being tested in the airframe, make a test flight IAW TM 55-1500-328-25 and observe published operating limits.

H Check the diffuser vent orifice. Repeat settings 7 through 10 until the proper orifice size is determined. (Refer to paragraph 2-18.)

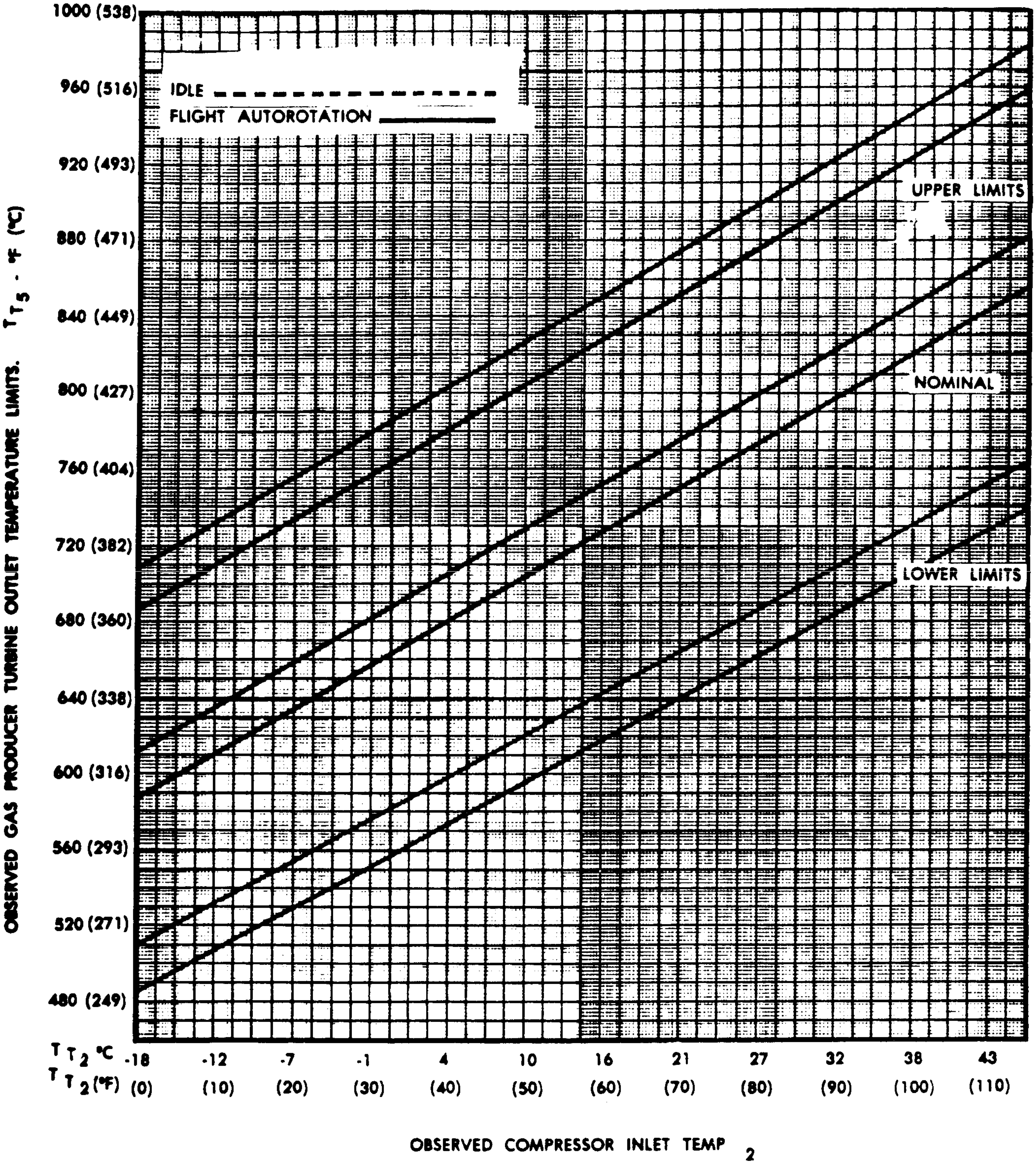


Figure 1-20. Idle and Flight Autorotation GPTOT Limits

1-72. HEALTH INDICATOR TEST (HIT)

INITIAL SETUP

Applicable Configuration	References
All	TM 55-1520-214-10 TM 55-1520-228-10

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/		
1. Health Indicator Test (HIT)	The HIT 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 N1 setting (%) based on the existing outside air temperature (OAT) observed on the aircraft OAT gauge. The TOT indicated at that N1 setting must then relate to the predicted value (Baseline TOT Value) found on the HIT Log. TOT variations from the baseline values are logged by the pilot on the appropriate HIT Log. This log, is then used by maintenance personnel as an aid in monitoring engine health trend data. **CAUTION** **Several readings less than the established baseline value (minus indications) may be an indication of inaccuracies in the TOT, N1, or OAT indicating systems or an erroneous baseline and should be investigated and corrected. (Far example, a HIT indication of – 15 degrees could mean that the indicating systems may be displaying a lower value than the actual present value. Given this example, if the engine is operated at or near an N1 or TOT limit, it may well be operating beyond limitations while indicating to the pilot operations within published limits.)**	

1-72. Health Indicator Test (HIT) - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/ - Continued	When a difference between an indicated TOT and baseline TOT is ± 20°C, the pilot will make an entry on DA FORM 2408-13 to notify the maintenance oficer. A difference of ± 30°C or greater 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 20-29 degrees 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.	
2. Hit Baseline TOT Values	**NOTE** Establish new HIT Baseline TOT Values. New baseline values for HIT will be established when an engine has been replaced or when the airflow of an engine has been affected by any maintenance performed. Examples include: (1) Replacement or repair of the compressor. (2) Discharge tube/seals replacement. (3) Installation of a new particle separator or replacement of swirl tubes. (4) Replacement or repair of components in the combustion section to include liner and fuel nozzle. **NOTE** Prior to establishing new HIT Baseline Values, clean compressor and check the accuracy of the following instrument systems: TOT, OAT, AND N1.	

1-72. Health Indicator Test (HIT) - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/ - Continued	**NOTE** Under no circumstances will a new Baseline HIT be established without first successfully completing an Engine Performance Check and verifiying proper engine operation/health. **NOTE** Perform HIT procedure with a fully charged electrical system. (Generator load less than 20 amps.)	
		Establish the HIT Baseline TOT Values as follows: a. Peform normal engine run-up and cockpit procedures in accordance with the applicable -10 manual. b. Maintain N2 at 103% and stabilize instruments. c. If generator load is greater than 20 amps, turn generator off. d. Turn off all bleed air. Turn aircraft into the wind and read free air temperature on cockpit OAT gage. If utilizing in-flight HIT checks, fly straight and level 60 knots OGE and read free air temperature on cockpit OAT gage. e. Utilizing a blank HIT Baseline TOT Worksheet, locate OAT in first column, nearest the free air temperature read on the cockpit OAT gage. Circle this OAT. f. Set N1% at the value indicated in column two opposite this OAT. Allow TOT to stabilize.

1-72. Health Indicator Test (HIT) - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/ Continued		g. **Read** TOT from indicator. Record TOT beside the circle OAT. h. **Apply** the TOT Correction Factor in column three adjacent to the circled OAT to indicated TOT and **record** the result in the open space in column four. i. **Apply** the TOT_B Correction Factor in column five to the TOT in column four. Records results of calculations for each of the OAT/N 1 combinations shown in column six. j. **Enter** baseline information in the respective columns of the HIT TOT Log. k. The HIT TOT Log should be **placed** in the log book where pilots can utilize it in accordance with applicable – 10 manual directions. The HIT TOT Work Sheet should be **retained** with the engine Historical Records and discarded only after the completion of the next successive HIT TOT Baseline. The current HIT TOT Log and Work Sheet should **accompany** the Historical Records when the engine is removed for any reason.

1-72. Health Indicator Test (HIT) - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/-Continued		
3. Adjust the HIT Baseline TOT value.	Baseline TOT Values will be adjusted, rather than establishing a new baseline, when reverse flow fairings are removed/installed. An engine performance check is not required for a baseline adjustment.	a. Perform three successive Health Indicator Test (HIT) Checks in accordance with HIT TOT Log instructions, immediately prior to and after reverse flow fairing inlet installation/removal. b. **Adiust** the baseline TOT values on the HIT TOT Log to reflect the difference in HIT. **c. Check** readings. For example: (1) The HIT Check after installation of reverse flow fairings is three degrees C TOT higher than before the installation. **Add** three degrees to each of the Baseline TOT values of the original HIT Log and enter the adjusted TOT values on the Reverse Flow Inlet TOT Baseline Work Sheet. (2) **Transcribe** the TOT values from the work sheet to the new HIT TOT Log (Reverse Flow Inlets Installed.) This HIT TOT Log now reflects TOT Values adjusted to compensate for the installation of the fairings. NOTE The pilot will use whichever HIT TOT Log is applicable at the time.

1-72. Health Indicator Test (HIT) - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/Continued		(3) **Install** both HIT TOT Logs in the aircraft logbook, and **retain** the Adjusted HIT TOT Work Sheet with the engine historical records. **Discard** only after the completion of the next successive HIT TOT Baseline.
4. Verify the HIT Baseline TOT values.	Verify Baseline HIT Values when corrective action is taken to bring the HIT TOT Log Value back in tolerance with Baseline TOT Values. [Refer to Troubleshooting Procedure No. 59. High Health Indicator Test (HIT)], verification of the Baseline TOT is required. NOTE If variations between actual TOT and Baseline TOT Values are within acceptable tolerance, then the Baseline TOT Values are verified,	a. **Perform** a normal HIT check in accordance with instructions on the HIT Log. b. **Compare** actual HIT TOT Value with Baseline HIT TOT Value. c. If variations are not acceptable, **perform** an Engine Performance Check to ensure proper engine operationlhealth and **establish** a new HIT TOT Baseline.

OH-58A AND OH-6A HIT TOT WORKSHEET

Instructions to Maintenance Officer:

Aircraft S/N ______________

Engine S/N ______________

Aircraft Hrs ______________

Engine Hrs ______________

NOTE

HIT checks are performed with generator load less than 20 amps.

1. Maintain N2 at 103% and stabilize all instruments.
2. Face aircraft into wind and turn off all bleed air.
3. Deleted.
4. With rotor turning, read free air temperature from cockpit OAT indicator.
5. Enter line 1 at OAT nearest free air temperature.
6. Set N1% at value indicated in line 2.
7. Read TOT from indicator.
8. Apply ΔTOT_A Correction Factor in line 3 to indicated TOT and record result in box in center of line 4.
9. Apply each of the ΔTOT_B Correction Factors in line 5 to the corrected TOT in line 4 and record the result in each of the blank spaces in line 6.
10. Enter Baseline information in the respective columns of the Engine HIT log.
11. Enter aircraft or engine hours and word "Baseline" in log section at bottom of Engine HIT Log.

1	OAT °C	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16
2	N1%	73.9	74.3	74.6	74.9	75.2	75.6	76.0	76.2	76.5	76.8	77.2	77.5	77.8	78.1	78.4	78.7	79.0	79.4
3	ΔTOT_A	+185	+179	+174	+168	+162	+157	+151	+145	+139	+134	+128	+122	+117	+111	+105	+100	+94	+88
4	TOT/θ	(Record Corrected TOT here)																	
5	ΔTOT_B	-185	-179	-174	-168	-162	-157	-151	-145	-139	-134	-128	-122	-117	-111	-105	-100	-94	-88
6	Baseline TOT																		

1	OAT °C	-14	-12	-10	-8	-6	-4	-2	0	2	4	6	8	10	12	14	15	16
2	N1%	79.7	80.0	80.3	80.6	80.9	81.2	81.5	81.8	82.1	82.4	82.6	82.9	83.2	83.5	83.8	84.0	84.2
3	ΔTOT_A	+83	+77	+71	+65	+60	+54	+49	+43	+37	+31	+26	+20	+14	+8	+3	0	-3
4	TOT/θ																	
5	ΔTOT_B	-83	-77	-71	-65	-60	-54	-49	-43	-37	-31	-26	-20	-14	-8	-3	0	+3
6	Baseline TOT																	

1	OAT °C	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
2	N1%	84.5	84.8	85.1	85.4	85.6	85.9	86.2	86.5	86.8	87.0	87.3	87.6	87.9	88.2	88.4	88.7	89.0
3	ΔTOT_A	-8	-14	-20	-26	-31	-37	-43	-49	-54	-60	-65	-71	-77	-83	-88	-94	-100
4	TOT/θ																	
5	ΔTOT_B	+8	+14	+20	+26	+31	+37	+43	+49	+54	+60	+65	+71	+77	+83	+88	+94	+100
6	Baseline TOT																	

OH-58A AND OH-6A HIT TOT WORKSHEET

Aircraft S/N | OH-58A AND OH-6A HIT TOT LOG | Engine S/N

OAT°C	-50	-48	-46	-44	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	- 8	- 6	- 4	- 2	0
N1%	73.9	74.3	74.6	74.9	75.2	75.6	76.0	76.2	76.5	76.8	77.2	77.5	77.8	78.1	78.4	78.7	79.0	79.4	79.7	80.0	80.3	80.6	80.9	81.2	81.5	81.8
Baseline TOT																										

OAT°C	2	4	6	8	10	12	14	15	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
N1%	82.1	82.4	82.6	82.9	83.2	83.5	83.8	84.0	84.2	84.5	84.8	85.1	85.4	85.6	85.9	86.2	86.5	86.8	87.0	87.3	87.6	87.9	88.2	88.4	88.7	89.0
Baseline TOT																										

Instructions to Maintenance Officer:

NOTE

Hit checks are performed with generator load less than 20 amps.

1. Maintain N2 at 103% and stabilize all instruments
2. Face aircraft into wind and turn off all bleed air.
2. Deleted.
4. With rotor turning, read free air temperature from cockpit OAT indicator.
5. Enter OAT line at value nearest to free air temperature from cockpit OAT indicator.
6. Set N1 at value indicated in N1% line. Allow TOT to stabilize.
7. Read TOT from indicator.
8. Compare this TOT with value recorded in line labeled Baseline TOT and N1% utilized.
9. Record aircraft or engine hours and difference (+) between indicated TOT and Baseline TOT in log section below.
10. If difference between indicated TOT and Baseline TOT is A + 20°C or greater - enter on DA Form 2408-13.
    B + 30 °C or greater - Aircraft should not be flown until cause for excessive TOT is determined. Enter on DA 2408-13.

Acft or Eng Hrs (- 13)	Difference from Baseline TOT (+)	Acft or Eng Hrs (- 13)	Difference from Baseline TOT (+)	Acft or Eng Hrs (- 13)	Difference from Baseline TOT (+)	Acft or Eng Hrs (- 13)	Difference from Baseline TOT (+)	Acft or Eng Hrs (- 13)	Difference from Baseline TOT (+)

Pages 1-161 and 1-162 have been deleted.

1-73. ENGINE PERFORMANCE CHECK

See Applicable Aircraft Maintenance Test Flight Manual (MTF)

CHAPTER 2

COMPRESSOR SECTION

OVERVIEW

This chapter contains procedures for the maintenance and preservation of the Compressor Section. Paragraphs following outline disassembly, inspection, repair, and additional requirements needed to maintain the compressor section and related parts. Procedures requiring maintenance on the Aviation Intermediate Maintenance (AVIM) level are specified and must be performed as such. Paragraphs in which the maintenance level is not specified shall be considered Aviation Unit Maintenance (AVUM) and may be performed at this level or a higher level of maintenance.

2-1. COMPRESSOR MAINTENANCE PROCEDURES.

Visually inspect all subassemblies and accessories removed from the engine compressor section. Check for loose or missing parts. Note any damage or excessive wear. Repair damaged parts when possible. Replace damaged parts that cannot be repaired. Disassembly procedures provided enable required cleaning, inspection, repair or replacement of compressor subassemblies and accessories.

During reassembly of the engine subassemblies and accessories discard all of the following parts and replace with new parts:

Seals	Lockpins
Gaskets	Lockwashers
Cotter Pins	Lockwire
Tabwashers	Preformed Packing

2-2. Compressor - Removal.

INITIAL SETUP

Applicable Configuration
Au

References
Para 1-32

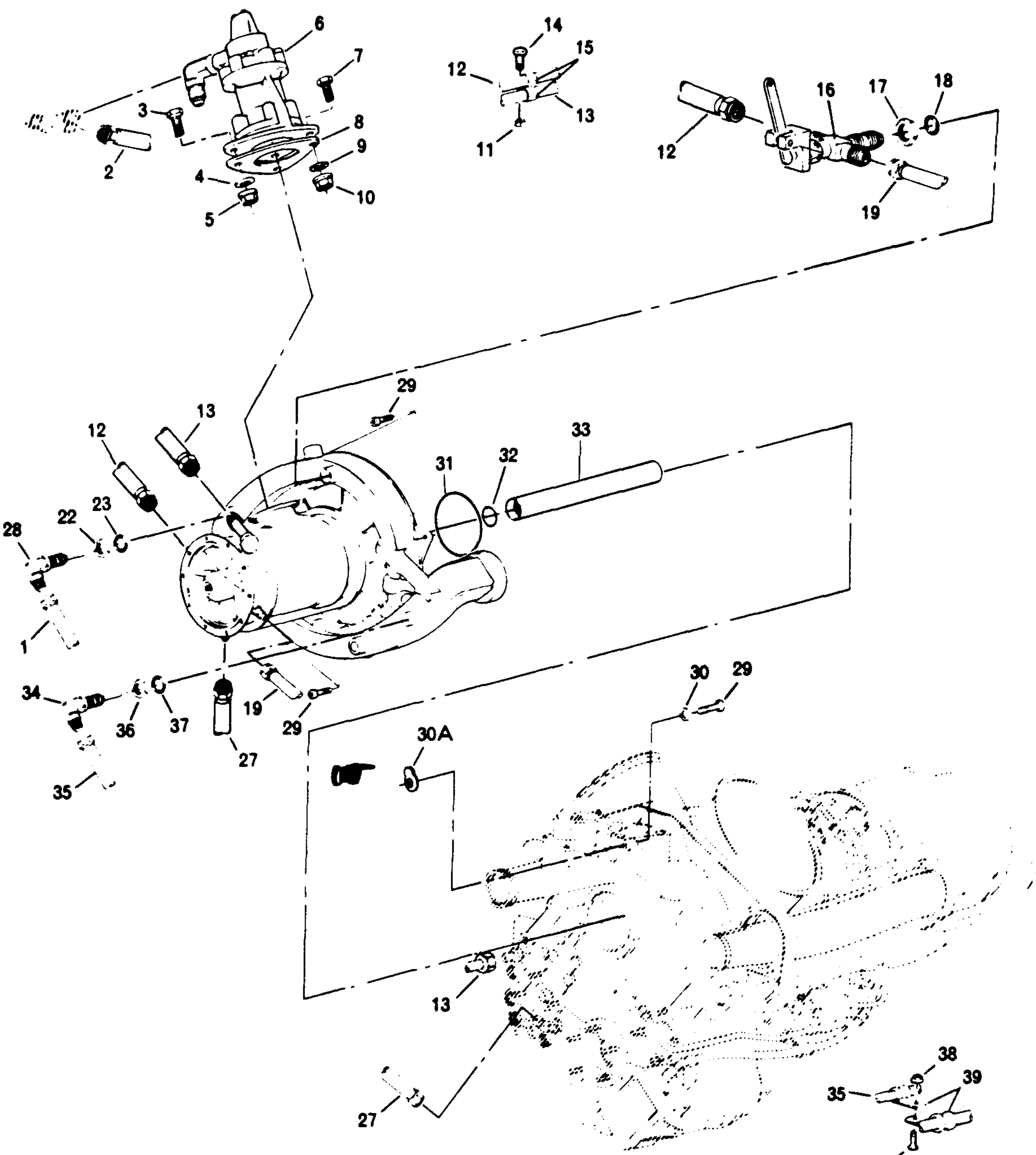
Special Tools
Turnover Stand, Tool No. 6795579

LOCATION/ITEM	REMARKS	ACTION
TURNOVER STAND/		
	Install the engine in the turnover stand, tool no. 6795579. Refer to para 1-32.	Rotate the engine to a vertical position in the stand with the compressor up.
ENGINE/		
1. Oil Supply Tube and Scavenge Tube (13 and 27)		Remove compressor oil supply tube (13) and scavenge tube (27) between the compressor front support and the gearbox.
2. Discharge Pressure Sensing Tube (35)		Remove discharge pressure sensing tube (35) by removing attaching clamp (39), bolt (40) and nut (38), and removing tube between the diffuser scroll and the tee at the power turbine governor.
3. Lockwire on Jam Nut (36)		Remove.
4. Jam Nut (36)		Loosen.
6. Pressure Probe Elbow (34)		Remove from diffuser scroll.

2-2. Compressor - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION

ENGINE/-Continued



2-2.Compressor - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION

ENGINE/-Continued

1. Deleted
2. Auto Reignition Tube
3. Bolt (2)
4. Washers (2)
5. Nut (2)
6. Bleed Valve
7. Bolt
8. Gasket
9. Washer
10. Nut
11. Nut
12. RH Anti-Icing Tube
13. Oil Supply Tube
14. Bolt
15. Clamp (2)
16. Anti-Icing Valve
17. Jam Nut
18. Preformed Packing
19. LH Anti-Icing Tube
20. Deleted
21. Deleted
22. Jam Nut
23. Preformed Packing
24. Deleted
25. Deleted
26. Deleted
27. Scavenge Oil Tube
28. Pressure Probe Elbow
29. Bolt (5)
30. Washer

30A. Shim

31. Preformed Packing
32. Preformed Packing
33. Turbine-to-Compressor Coupling
34. Pressure Probe Elbow
35. Pressure Sensing Tube
36. Jam Nut
37. Preformed Packing
38. Nut
39. Clamp (2)
40. Bolt

LOCATION/ITEM	REMARKS	ACTION
7. Lockwire and Jam Nut (22)		**Remove** and **loosen** jam nut (22).
8. Pressure Probe Elbow (28)		**Remove.**
9. Preformed Packing (23)		**Remove** and **discard.**
ENGINE		
10. Air Tube (2)	This step applies only if engine has an auto reignition system installed.	**Disconnect** air tube (2) at bleed valve (6).
11. Deleted		
12. Deleted		

2-2. Compressor - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
13. Bleed Valve (6)		**Remove** three nuts (5, 10), washers (4, 9), and bolts (3, 7) and **remove** bleed valve (6).
14. Gasket (8)		**Remove** and **discard,**
15. Anti-Icing Air Tubes (12, 19)		**Remove** between the compressor front support and the anti-icing air valve (16). **Remove** clamp (15), bolt (14) and nut (11).
16. Lockwire on Jam Nut (17)		**Remove** and **loosen** jam nut (17).
17. Anti-Icing Valve (16)		**Remove** from diffuser scroll.
18. Preformed Packing (18)		**Remove** and **discard.**
19. Lockwire on Bolts (29)		**Remove.**
20. Bolts (29), Washer (30) and Shim (30A)		**Remove five** bolts and one washer retaining the compressor to the gearbox. **Lift** the compressor off the engine. **Save** shims found at the compressor mounting pads for possible reuse.
21. Turbine-to-Compressor Coupling (33)		**Remove** from the adapter spacer gearshaft.
22. Preformed Packing (31, 32)		**Remove** and **discard.**

2-3. Deleted.

Page 2-7, 2-8 deleted.

2-4. Compressor Cleaning to Restore Lost Performance. This paragraph contain cleaning instructions for the compressor. Use care in separating metals for cleaning. Observe the following general cleaning precautions.

NOTE

B&B 3100 (MIL-C-85704,Type I) is the primary-cleaner for Army turbine engines and remains an approved cleaner for locales where environmental restrictions permit. Egine cleaners that conform to MIL-C-85704, Type II and Type IIA are also acceptable engine cleaners and meet EPA environmental requirements. continue use B&B 3100 where not restricted. Where restrictions apply use MIL-C-85704, Type II and Type IIA cleaners. Approved Type II andType IIA cleaners shall be used in accordance with the existing washing procedure. Type IIA cleaners do not require dilution with water. Both types of cleaners are less effective than Type I cleaners. Therefore more frequent engine washes maybe required to achieve Satisfactory results.

WARNING

Drycleaning solvent/P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F-138°F(38°C-59°C).

Petroleum solvent (item 1, Appendix D) is the cleaning solvent recommended for nonferrous parts.

CAUTION

Cleaners for stel will damage nonferous parts. Do not use rust preventives on magnesium and aluminum parts.

Clean aluminum-coated steel parts with carbon removal compound (item 22, Appendix D). Rinse the part with water and dry with an air blast.

Clean steel parts with cresol base cleaning compound (item 23, Appendix D). Rinse the part thoroughly with hot water. Coat parts with a compound of one part rust preventive (item 24, Appendix D) and three parts oil (item 25, Appendix D).

INITIAL SETUP

Applicable Configuration
All

Special Tools
Compressor Protector Kit, Tool No. 6798861

Consumable Materials
Methanol (item 47, **Appendix** D)
Water Soluble Cleaner (item 26. Appendix D)
Antiseize Compound (item 6, Appendix D)
Lockwire (item 17, Appendix D)
Type II and Type IIA Cleaners (items 55.56.57. 58, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ 1. Compressor	CAUTION **Allow the engine to cool for a minimum of 45 minutes prior to spraying the compressor. Mandatory cooling period is required to prevent warpage to internal engine components.**	

2-4. Compressor Cleaning to Restore Lost Performance - Continued

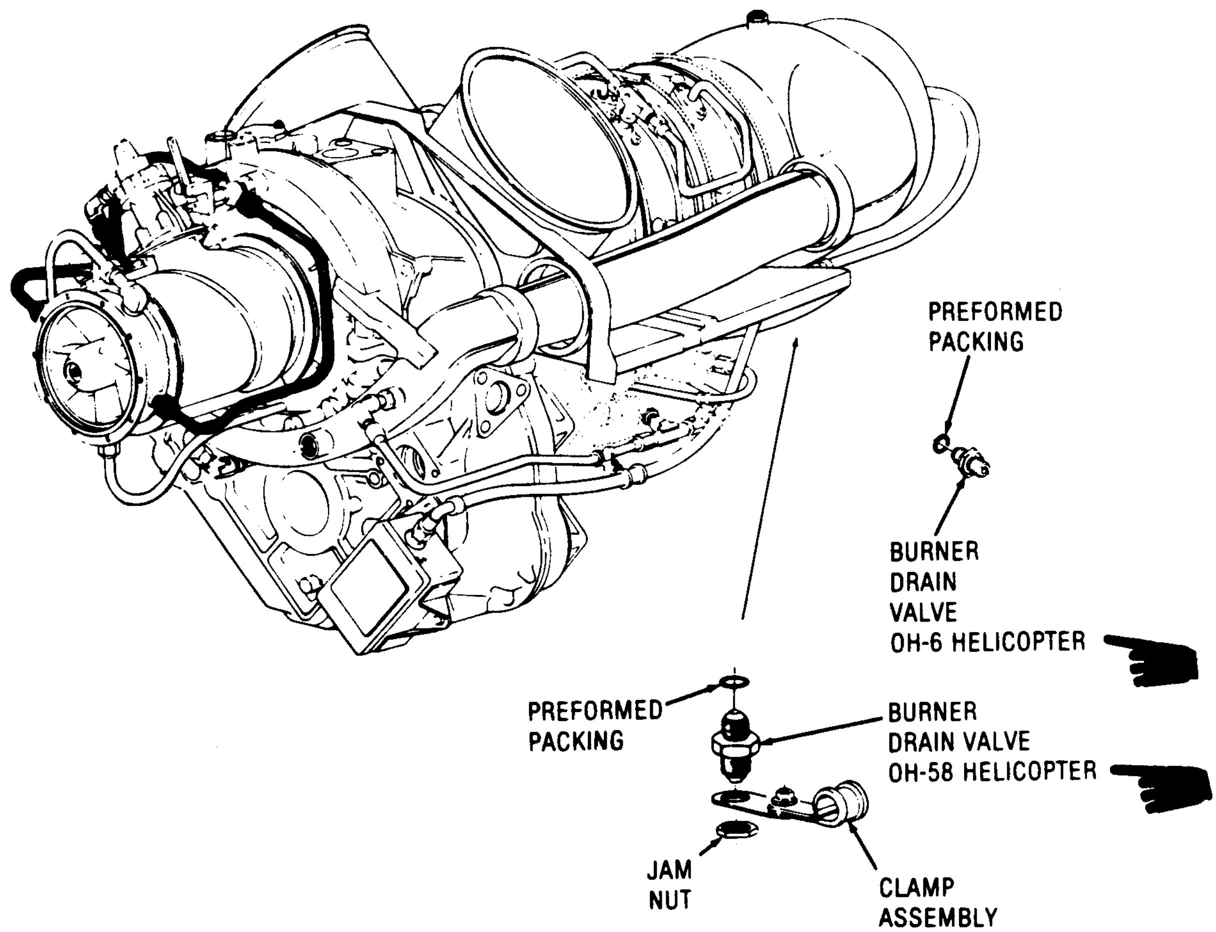
LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
	Buildup of dirt in the compressor can result in a serious loss of engine power and performance Lost performance may be restored by flushing the installed engine with a water/solvent solution as follows	
	WARNING	
	Methanol is flammable; it should not be used if the ambient temperature is above 4°C (40°F), its vapor is harmful; it could be fatal or cause blindness if swallowed. Keep it away from open flame and avoid prolonged breathing of the vapor.	
	NOTE	
	Once the cleaning procedure is started, it must be carried through to completion without delay. At ambient temperatures below 4°C (40°F) and above -29°C (-20°F), use a 40 percent Methanol (item 47, Appendix D), 60 percent water mixture in place of fresh water. The temperature of the wash solution should not be below 4°C (40°F); ideally it should be between 21°C-26°C (70°F-80°F). To avoid spraying concentrated Methanol, which is flammable, mix the solution thoroughly.	
	Water soluble cleaner (item 26, Appendix D). Type II and Type IIA (items 55,56, 57,58, Appendix D).	**Prepare** two to four quarts of cleaning consisting of one part Cleaning compound to four parts of clean water disstilled if available).
	CAUTION	
	Do not substitute petroleum base solvent or jet fuel for recommended cleaning compound. Compressor plastic lining could be damaged.	

2-4. Compressor Cleaning to Restore Lost Performance-Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
2. Anti-Icing Air Valve		**Retain** the anti-icing air valve in the closed position.
3. Control Air and Bleed Valve Pressure Sensing Tubes	Compressor Protector Kit, tool no. 6798861	**Disconnect** control air and bleed valve pressure sensing tubes (1 and 35, fig. on page 2-19) at diffuser scroll pressure probes. Cap both pressure probes and plug all open Sensing lines. close bleed valve by moving plunger down with a piece of safety wire through hole above plunger and seeming inclosed position with block of Compressor Protector Kit, fig. C-7.

2-4. Compressor Cleaning to Restore Lost Performance - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
4. Burner Drain Valve		**Remove** burner drain valve from the drain port on outer combustion case.



2-4. Compressor Cleaning to Restore Lost Performance - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
5. Deleted		
ENGINE/		
6. Ignition System		**Deactivate** the ignition system by disconnecting power lead to ignition exciter or pull the IGN ENG circuit breaker. **(Refer** to TM 55-1520-228-10).
	CAUTION **Do not exceed 10% N1 motoring speed during the cleaning and rinsing cycles to prevent possible blade damage and assure adequate rinse/cleaning at the base of the blades. Do not inject a solid stream of fluid into the compressor. Damage to compressor could occur.**	
7. Compressor		a. **Spray** cleaning solution into compressor inlet **using** a pressure type sprayer equipped with a quick opening valve while **motoring** engine without ignition. **Start** injection 3 seconds prior to starter engagement and **inject** solution at the rate of one quart in 9 to 11 seconds until 2 to 4 quarts (1.9-3.81) have been utilized.

2-4. Compressor Cleaning to Restore Lost Performance - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
		Maintain motoring speed below 10% for duration of injection. Disengage starter if 10% for duration of injection. Disengage starter if 10% N1 speed is attained. Repeat injection cycle as necessary until compressor is clean.
		b. Within 15 minutes after injection of the cleaning solution, spray clean water (distilled preferred) into compressor. Use Methanol water mixture if ambient temperature is below 4°C (40°F). Start injection 3 seconds prior to starter engagement and inject stream of water at the rate of one pint to one quart in 5 to 10 seconds. Disengage starter before N1 speed accelerates above 10%.
	WARNING **Failure to properly install, align and torque fuel, oil and air fittings and tubes could result in an engine failure.**	
		c. Remove compressor protector cleaning kit and reconnect the control and bleed valve sensing tubes. Tighten coupling nuts to 80-120 in. lb. (0.9-1.4 kg m).
		d. Reconnect power lead to the ignition exciter or reset IGN ENG circuit breaker.
8. Deleted		

2-4.Compressor Cleaning to Restore Lost Performance - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
9. Burner Drain Valve	Antiseize Compound (item 6, Appendix D).	**Apply** antiseize compound to threads and install burner drain valve with new preformed packing in the bottom drain port of the outer combustion case. **Tighten** drain valve to 120-140 in. lb. (1.4-1.6 kg/m). **Apply** antiseize compound to threads on outer end of drain valve. **Secure** clamp assembly to drain valve with jam nut.
	Lockwire (item 7, Appendix D).	**Tighten** jam nut to 55-80 in. lb (0.6-0.9 kg/m). Secure nut with lockwire. **Reconnect** the burner drain valve line and torque to 55-80 in. lb (0.6-0.9 kg/m).
10. ENGINE/		**Start** and **operate** engine for a minimum of five minutes. **Operate** engine anti-icing system to purge solution from the compressor from support. Also, **operate** any aircraft systems which use compressor bleed air. **Complete** engine drying run within 15 minutes after cleaning and rinsing.

2-4.1 Bleed Valve Cleaning to Restore Lost Compressor Performance. This paragraph contains cleaning instructions for the bleed valve.

INITIAL SET UP

Applicable Configuration
P/N 6874979 only

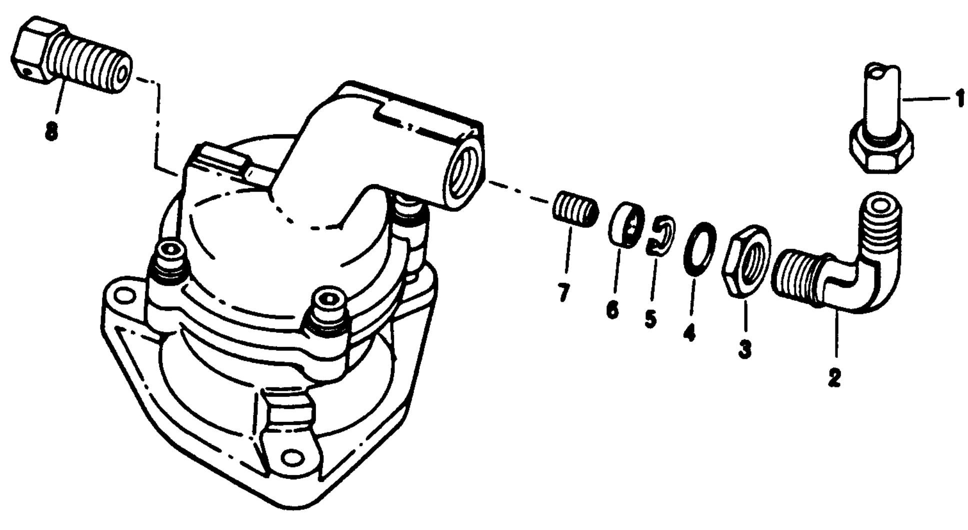
Special Tools
Ultrasonic Cleaning Equipment
(If available)

Consumable Materials
Lockwire (item **17,** Appendix D).
Ultrasonic Cleaner Solvent
(item **52,** Appendix D).
Mineral Spirits (item 53, Appendix D).
Sewing Thread (item 54, Appendix D).
Lubricating Oil (item 5, Appendix D).

LOCATION/ITEM	REMARKS	ACTION

ENGINE/

1. Compressor Bleed Valve



1. Air Sensing Tube
2. Elbow
3. Jam Nut
4. O-ring
5. Internal Retaining Ring
6. Filter
7. Jet
8. Nozzle

2-4.1 Bleed Valve Cleaning to Restore Lost Compressor Performance - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
		Clean the bleed valve nozzle, filter, and jet as follows:
		a. **Remove** the air sensing line (1) from the bleed valve elbow (2).
		b. **Remove** the elbow (2) from the bleed valve. **Discard** the O-ring (4).
		c. Remove the internal retaining ring (5) and separate the filter (6) from the bleed valve. **Replace** the retaining ring before assembly if it is damaged during the removal operation.
		d. **Using** a screwdriver, **remove** the jet (7) from the bleed valve,
		e. **Clip** the lockwire then remove the nozzle (8) from the bleed valve.
	CAUTION Do not blow the jet dry. The small jet can be easily lost or damaged.	
	Mineral Spirits (item 53, Appendix D).	f. **Clean** the nozzle, filter and jet ultrasonically in mineral spirits if equipment is available. If ultrasonic equipment is not available, **agitate** the parts in a clean container of mineral spirits. Use a soft bristle brush to **clean** exposed surfaces.

2-4.1 Bleed Valve Cleaning to Restore Lost Compressor Performance - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued	**Sewing Thread (item 54, Appendix D)**	**Insert a** sewing thread through the jet hole. **Slide** the jet **back** and forth on the thread to remove film. **Clean** the nozzle in the same manner.
	NOTE If the jet must be replaced, return the bleed valve to overhaul for part replacement and recalibration of the valve assembly. CAUTION **Do not use a probe to remove particles lodged in the jet or nozzle.**	
		g. Inspect the jet and the nozzle using a flashlight. **Place** the part on the center of the lens so the light can be seen through the hole. **Reclean** the part if any particles or coating can be seen.
		h. **Install** the jet in the bleed valve. **Tighten** to 8-12 lb in.
		i. **Place** the filter in the bleed valve (skirt end first). **Secure** with an internal retaining ring.
	Lockwire (item 17, Appendix D) .	**j. Install** the nozzle in the bleed valve. **Tghten** to **50-60** lb in. and **secure** with lockwire.

2-4.1 Bleed Valve Cleaning to Restore Lost Compressor Performance - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
	WARNING Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.	
	Lubricating Oil (item 5, Appendix D)	k. **Lubricate** the O-ring and **install** it with the elbow on the bleed valve. Do not tighten the elbow iam nut at this time.
	WARNING Failure to properly install, align and torque fuel, oil and air fittings and tubes could result in an engine failure.	
		1. **Position** the elbow as required and install air sensing line. **Tighten** the coupling nut to 80-120 in. lbs. **Tighten** the jam nut to 55-80 in. lbs.

2-5. Compressor Rinsing to Remove Salt Water Contamination

INITIAL SETUP

Applicable Configuration
All

References
Para 2-4

Special Tools
Compressor Protector Cleaning Kit, Tool No. 6798861

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
	CAUTION **Allow the engine to cool for a minimum of 45 minutes prior to spraying the compressor. Mandatory cooling period is required to prevent warpage to internal engine components.**	
	The compressor shall be rinsed if operated within 200 miles of volcanic activity or operated within ten miles of salt water. Rinsing shall be according to the following procedure as soon as practical after shutdown following the last flight of the day.	
1. Bleed Valve	Compressor Protector Cleaning Kit, Tool No. 6798861.	**Block** bleed valve in closed position using the compressor protector cleaning kit as shown in paragraph 2-4, it is not necessary to remove any lines.
2. Anti-Icing Valve		**Insure** that anti-icing valve is in the closed position.
	CAUTION **Do not exceed 10% N1 motoring speed during the cleaning and rinsing cycles to prevent possible blade damage and assure adequate rinse/cleaning at the base of the blades. Do not inJect a solid stream of fluid into the compressor. Damage to compressor could occur.**	

2-5. Compressor Rinsing to Remove Salt Water Contamination-Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE-Continued 3. Compressor		**Spray** one pint to one quart of clean water (distilled preferred) into compressor inlet while motoring engine without ignition. **Start** injection 3 seconds prior to starter engagement and **disengage** starter at 10% N1 speed. The sprayer used to inject water should have a quick opening valve and a nozzle which flows one quart of water in 9 to 11 seconds. This flow rate should allow the desired quantity of water to be injected by the time 10% N1 speed is attained.
	NOTE A **common garden sprayer can be used provided the spray orifice is sized to give the desired flow.**	
4. Bleed Valve		**Remove** block from bleed valve.
5. AIRFRAME		**Start** and **operate** the engine for a minimum of five minutes. **Operate** engine anti-icing system to **purge** water from the compressor front support. Also. **operate** any aircraft systems which use compressor bleed air. The drying run should be performed within 15 minutes after wash cycle.

2-6. **Compressor - Installation**

INITIAL SETUP

Applicable Configuration
All

Special Tools
Turnover Stand, Tool No. 6795579
Engine Turning Adapter, Tool No. 6799790
Bleed Valve Tube, P/N 6873354

Consumable Materials
Lubricating Oil (item 5, Appendix D)
Antiseize Compound (item 6, Appendix D)
Lockwire (item 7, Appendix D)

References
Para 1-63 thru 1-71

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	**CAUTION** **Use only chrome plated steel or unplated steel tools for the disassembly or reassembly procedures described in this manual. The use of cadmium on zinc plated tools is not permitted since these platings are prone to chipping and flaking. Should these chips enter the engine, they may contaminate the lubrication system, ultimately clogging the filters or produce intergranular attack on nickel or titanium base alloys at elevated temperatures.**	
1. Engine	Turnover Stand 6795579.	a. **Install** engine assembly in the turnover stand. b. **Rotate** engine in stand to a vertical position with combustion section on the bottom.
	NOTE Check to insure that the compressor and gearbox mounting flanges are clean and free of foreign material which could cause misalinement.	

2-6. COMPRESSOR - INSTALLATION - Cont.

LOCATION/ITEM	REMARKS	ACTION
TURNOVER STAND/	**WARNING** Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.	
2. Preformed Packing (31 and 32)		**Lubricate** with oil and **install** new preformed packings (31 and 32) on adapter spur gearshaft and on compressor rear diffuser.

WARNING

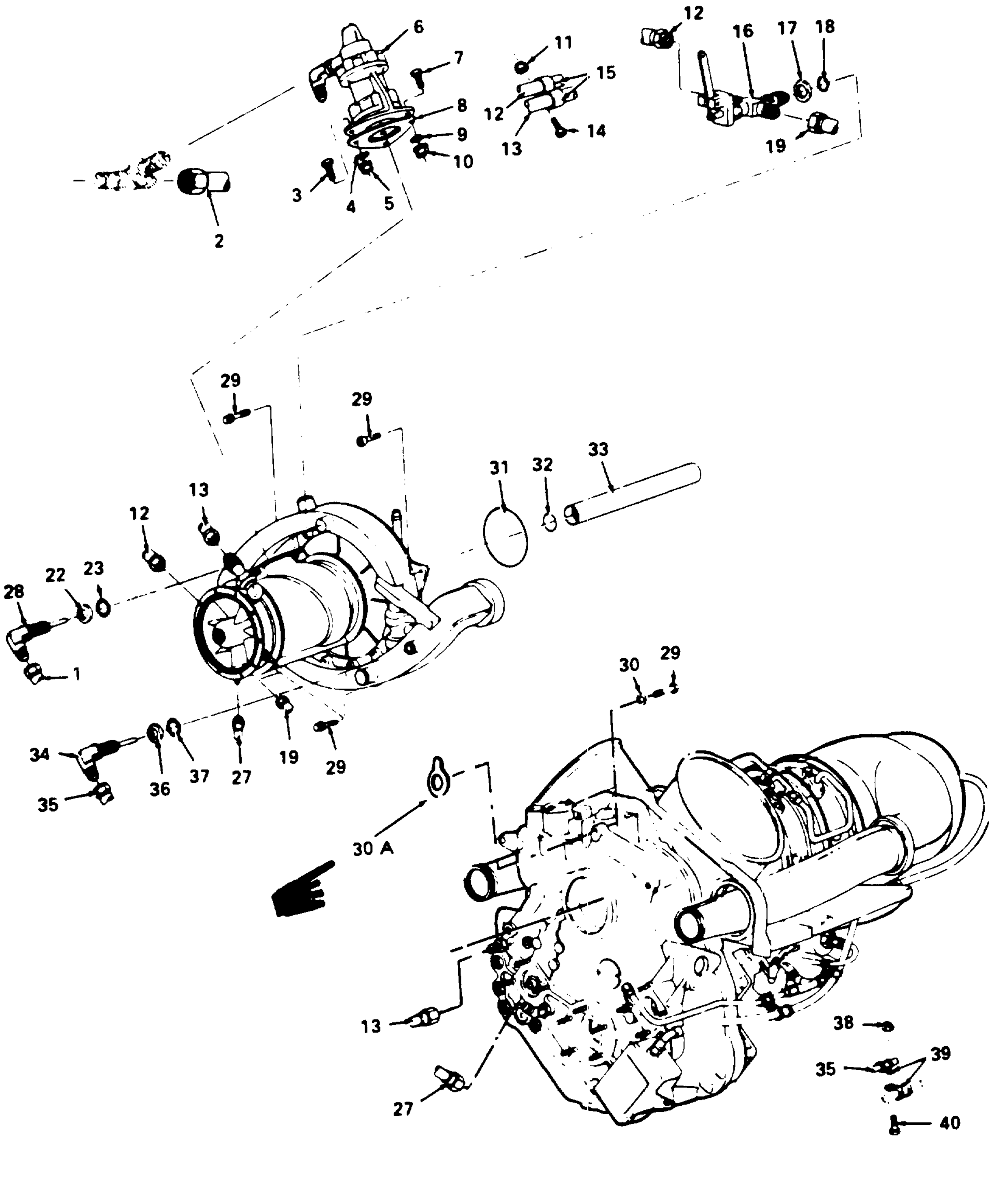
Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

1. Deleted	15. Clamp (2)	29. Bolt (5)
2. Auto Reignition Tube	16. Anti-icing Valve	30. Washer
3. Bolt (2)	17. Jam Nut	30A. Shim
4. Washers (2)	18. Preformed Packing	31. Preformed Packing
5. Nut (2)	19. LH Anti-Icing Tube	32. Preformed Packing
6. Bleed Valve	20. Deleted	33. Turbine-to-Compressor Coupling
7. Bolt	21. Deleted	34. Pressure Probe Elbow
8. Gasket	22. Jam Nut	35. CDP Sensing Tube
9. Washer	23. Preformed Packing	36. Jam Nut
10. Nut	24. Deleted	37. Preformed Packing
11. Nut	25. Deleted	38. Nut
12. RH Anti-Icing Tube	26. Deleted	39. Clamp (2)
13. Oil Supply Tube	27. Scavenge Oil Tube	40. Bolt
14, Bolt	28. Pressure Probe Elbow	

2-6. COMPRESSOR – INSTALLATION – Cont.

LOCATION/ITEM	REMARKS	ACTION

ENGINE/– Continued



2-6. Compressor - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE - Continued		
3. Turbine-to-Compressor Coupling (33)	Lubricating oil (item 5, Appendix D)	**Lubricate** with oil, the adapter spur gearshaft and-splines at-both ends of turbine-to-compressor coupling (33).

CAUTION

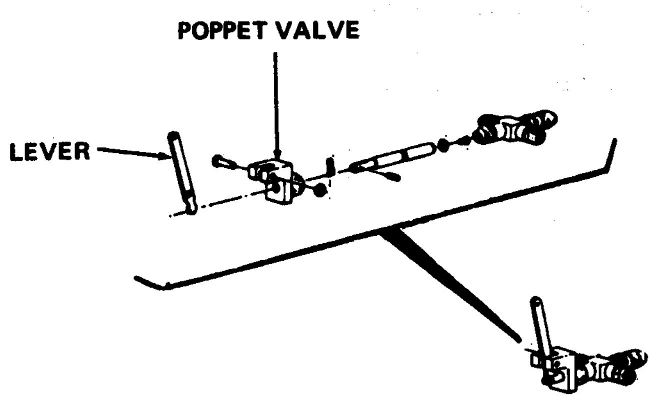
Do not attempt to turn the gas producer gear train using a speed wrench at the tachometer drive pad. Side loads on the speed wrench could crack the tachometer drive shaft.

LOCATION/ITEM	REMARKS	ACTION
4. Compressor, Shims (30A)	Engine Turning Adapter, 6799790.	**Position** turbine-to-compressor coupling (33) on adapter spur gearshaft. **Determine** the number of shims required for compressor installation. The number of .002 inch thick shims required at each bolt hole is marked on the rear diffuser adjacent to the hole (1 requires one .002 inch shim, 2 require two .002 inch shims, etc.) Compressor assemblies without these numbers shall be installed without shims. **Place** the compressor on the gearbox with the required shims in place at the bolt pads. **Use** engine turning adapter at starter-generator pad to turn the gas producer gear train until it meshes with adapter spur gearshaft.

2-6. Compressor - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
	CAUTION **Be sure the adapter spur gearshaft is in mesh with the gearbox mating gear before tightening the compressor retaining bolts.**	
5. Bolts (29), Washer (30)	**Antiseize Compound (item 6, Appendix D)**	**Apply** antiseize compound to five compressor attaching bolts (29). **Attach** compressor to power and accessory gearbox with five bolts (29) and one washer (30). The long bolt (29) and washer (30) are installed from the rear at the top attaching position. **Tighten** bolts.

2-6. Compressor - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
	Lockwire (item 7, Appendix D).	(29) to 70-85 in. lb (0.8 - 1.0 kg/m) and **secure** with lockwire.
6. Anti-Icing Air Valve (16)	Antiseize Compound (item 6, Appendix D). Lubricating Oil (item 5, Appendix D).	**Apply** antiseize compound to threads of anti-icing air valve (16) and lubricating oil to a new preformed packing (18). **Screw** anti-icing air valve (16), with backed-off jam nut (17) and new preformed packing (18) into the diffuser scroll. Do not **tighten** the jam nut (17) at this time.
7. Anti-Icing Air Tubes (12 and 19)	AntiSeize Compound (item 6, Appendix D).	**Apply** antiseize to threads; then **install** anti-icing air tubes (12 and 19) between anti-icing air valve (16) and compressor front support, **Tighten** coupling nuts of tubes (12 and 19) to 150-200 in. lb (1.7 -2.3 kg/m).
	Lockwire (item 7, Appendix D)	**Tighten** anti-icing valve jam nut (17) to 100-150 in. lb (1.2 -1.7 kg/m) and **secure** with lockwire.
8. Anti-Icing Air Valve Poppet Guide		**Loosen** the anti-icing air valve poppet guide and position the anti-icing valve lever as follows with respect to the engine. a. On the OH-6 helicopter, the lever shall extend upright and be parallel to vertical centerline of engine.

2-6. Compressor - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		b. On the OH-58 helicopter, the lever shall extend to the left (when viewed from rear of engine) and shall be parallel to horizontal centerline of engine.
9. Lever	Lockwire (item 7, Appendix D).	When lever is properly positioned, **tighten** poppet guide to 65-75 in. lb (0.7 -0.9 kg/m) and **secure** with lockwire.

WARNING

Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

LOCATION/ITEM	REMARKS	ACTION
10. Pressure Probe Elbows (28 and 34)	Antiseize Compound (item 6, Appendix D). Lubricating Oil (item 5, Appendix D).	**Apply** antiseize compound to threads of pressure probe elbows (28 and 34) and lubricant to preformed packings (23 and 37). Screw pressure probe elbows (28 and 34), with backed-off jam nut (22 and 36) and preformed packings (23 and 37) into diffuser scroll. **Do not tighten** jam nuts (22 and 36) at this time.

2-6. Compressor - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
11. Interstage Bleed Control Valve (6)	**Antiseize compound (item 6, Appendix D)**	**Align** interstage bleed control valve (6) and gasket (8) on mounting flange of compressor case. **Retain** with three each bolts (3, 7), washers (4, 9), and nuts (5, 10). **Apply** antiseize compound to bolts (3, 7). The 1/4-28 bolts (7) goes in the left hole (viewed from the rear). **Tighten** nut (10) to 70-85 in. lb (0.8-1.0 kg/m) and nuts (5) to 35-40 in. lb (0.4-0.5 kg/m).
12. Pressure Sensing Tank	**Antiseize compound (item 6, Appendix D)** **Lockwire (item 7, Appendix D)**	**Apply** antiseize compound to the threads; then install bleed valve tube (1) between pressure probe elbow (28) or tee (20) and elbow or tee on bleed valve (6). **Tighten** coupling nuts 80-120 in. lb (0.9-1.4 kg/m). **Tighten** jam nut (22) and jam nut on bleed valve elbow or tee to 55-80 in. lb (0.6-0.9 kg/m) and **secure** with lockwire.
13. ENGINE/		If engine has an auto reignition system installed, **connect** auto reignition sensing tube (2) to tee on bleed valve. **Tighten** coupling nut to 80-120 in. lb (0.9-1.4 kg/m).

2-6. Compressor - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
14. Deleted		
15. Compressor Discharge Pressure (CDP) Sensing Tube (35)		a. **Install** compressor discharge pressure (CDP) sensing tube (35) between tee at power turbine governor and pressure probe elbow (34) at the scroll. **Tighten** coupling nuts to 80-120 in. lb (0.9-1.4 kg/m).
	Lockwire (item 7, Appendix D)	b. **Tighten** pressure probe elbow jam nut (36) to 55-80 in. lb (0.6-0.9 kg/m) and secure with lockwire. **Clamp** tube (35) to ignition lead using two clamps (39), bolt (40) and nut (38). **Tighten** nut to 35-40 in. lb (0.4-0.5 kg/m).

2-6. Compressor - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
16. Oil Supply Tube (13)		**Install** oil supply tube (13) between oil pressure reducer on compressor front support and the power accessory gearbox. **Secure** tubes (12 and 13) with bolt (14) and clamps (15).
17. Oil Scavenge Tube (27)		a. **Install** oil scavenge tube (27) between compressor front support and power and accessory gearbox. b. **Tighten** coupling nuts to 150-200 in. lb (1.7-2.3 kg/m). **Tighten** jam nut of the elbow in gearbox to 75-110 in. lb (0.9 to 1.3 kg/m).
	Make appropriate entry relative to compressor replacement in the engine log. Test run engine to select proper size diffuser vent orifice in accordance with paragraphs 1-63 thru 1-71. Perform compressor vibration inspection in accordance with paragraph 1-44.	

2-7. Compressor - Preparation for Storage and Shipment

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning Solvent (item 1, Appendix D)
Lubricating Oil (item 5, Appendix D)
Water-Vapor-Proof Bag (item 2, Appendix D)
Desiccant (item 8, Appendix D)
Barrier Material (item 2, Appendix D)
Cushioning Material (item 12, Appendix D)
Cleated Plywood Box (item 46, Appendix D)
Dehydrating Agent (item 8, Appendix D)

References
Para 1-39, 2-11, 2-17, 2-20

LOCATION/ITEM	REMARKS	ACTION
	The compressor assembly will be prepared for storage and shipment in accordance with the following instructions. These instructions are based on the assumption that the assembly will be stored or in transit or both for an indefinite period. Compression assemblies that are to be stored at an AVIM level for short periods of time, and no metal shipping or storage container is available, will be prepared for storage in accordance with action item 1 below. The compressor will then be stored in a clean dry area.	
STORAGE AND SHIPMENT/		
	The procedure prescribed for the removal of the compressor from the container is listed in paragraph 2-20.	
1. Preparation of Compressor		**Prepare** the compressor assembly for **installation in** the metal shipping and storage container, MS 63054-3, as follows:

2-7. Compressor - Preparation for Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
STORAGE AND SHIPMENT/ - Continued		

CAUTION

Do not use any preservatives of any kind internally within the compressor assembly. Compressor plastic liner muld be damaged.

WARNING

Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C - 59°C).

LOCATION/ITEM	REMARKS	ACTION
	Drycleaning solvent (item 1, Appendix D).	a. **Clean** exterior of compressor assembly as necessary with solvent. **Air dry** or **dry** with a clean lint-free cloth. **Blow out** all crevices with dry, filtered, low-pressure compressed air. **Touch up** painted areas when damaged in accordance with paragraphs 2-11 and 2-17. **Do not expose** touchup areas to oil or cleaning solvent for a minimum of 72 hours after application.

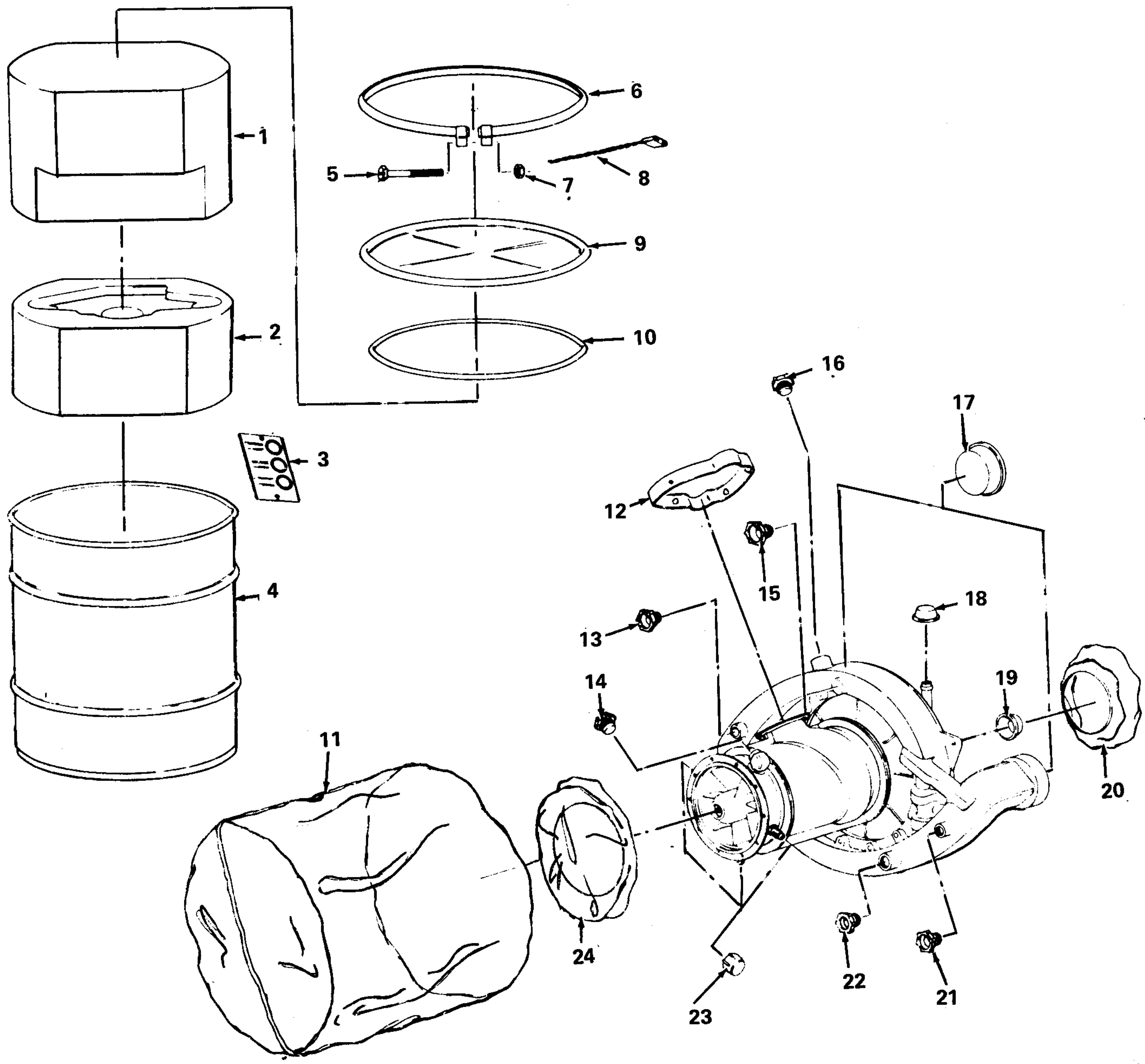
2-7. Compressor - Preparation for Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
STORAGE AND SHIPMENT/ - Continued	**WARNING** **Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.**	
	Lubricating Oil (item 5, Appendix D).	b. Coat splines of adapter spur gearshaft with oil. **Place** cap (19) on the adapter spur gearshaft and **install** cover (20) on rear diffuser pilot diameter.
		c. **Place** plugs (17) in compressor discharge air tube bosses.
		d. **Install** cover (24) on compressor air inlet.
		e. **Install** cover (12) on compressor bleed valve flange.
		f. **Install** shipping caps and plugs at the following locations. **Tighten** threaded caps and plugs fingertight.
		g. Complete and **attach** necessary tags to compressor. **Prepare** necessary forms and records in accordance with paragraph 1-39 and **place** in a greaseproof envelope.

2-7. Compressor - Preparation for Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
STORAGE AND SHIPMENT/ - Continued		

1. Top Cushion
2. Bottom Cushion
3. Humidity Indicator Card
4. Body
5. Bolt
6. Locking Ring
7. Nut
8. Wire Seal
9. Cover
10. Gasket
11. Plastic Bag
12. Cover
13. Plug
14. Cap
15. Plug
16. Plug
17. Plug
18. Plug
19. Cap
20. Cover
21. Plug
22. Plug
23. Cap
24. Cover



2-7. Compressor - Preparation for Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
STORAGE AND SHIPMENT/ - Continued		Index No. / Location Front Support 23 Anti-Icing Air Tube Fittings 23 Scavenge Oil Tube Fitting 14 Oil Pressure Reducer Diffuser Scroll 15 Anti-Icing Air Valve Mounting Boss 13 Bleed Valve Control Air Boss 21 Fuel Control Air Boss 16 & 22 Aircraft Bleed Air Bosses Rear Diffuser 18 Compressor Seal Vent Orifice
		h. **Place** the compressor assembly in plastic bag (11) and **fold** top. **Ventilate** bag to allow for circulation of air.
	Water-vapor-proof bag (item 2, Appendix D). Desiccant (item 8, Appendix D).	i. If a metal shipping container is not available, **place** compressor assembly in a water-vapor-proof bag and **insert** 32 units of fresh dry desiccant. **Insulate** desiccant from assembly by use of barrier material and **heat seal** the bag. **Place** compressor in a cleated plywood box in

2-7. Compressor - Preparation for Storage and Shipment - Continued

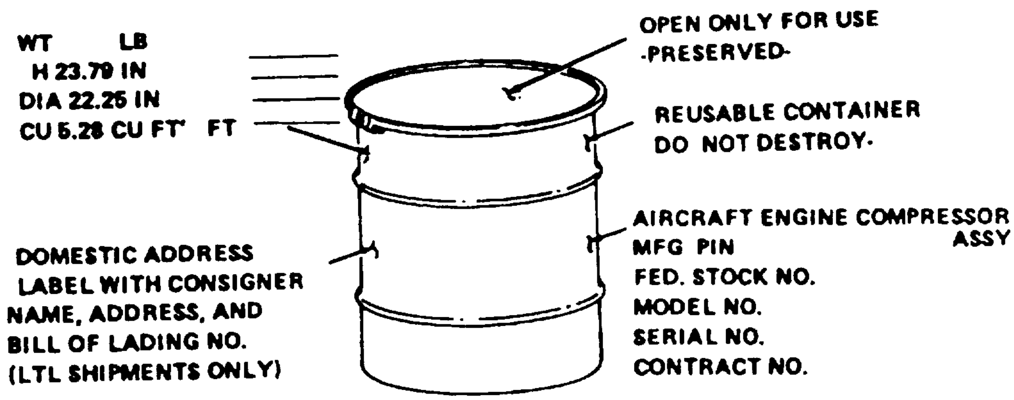
LOCATION/ITEM	REMARKS	ACTION
STORAGE AND SHIPMENT/ - Continued		
		accordance with paragraph 2-7, location/ item 4.
2. Preparation of Metal Shipping Container		a. **Loosen** nut (7) and remove ring (6), cover (9), gasket (10), and top cushion (1) from body (4).
		b. **Check** gasket (10) for damage or deterioration and **replace** if necessary.
		c. **Check** container for cleanliness and general condition.
3. Installation of Compressor Into Metal Shipping Container		a. **Insert** compressor assembly into container, aft end down. **Insure** that it is properly seated in the bottom cushion (2).
		b. **Install** top cushion (1) in container. **Insure** that it is properly seated over the compressor.
	Dehydrating Agent (item 8, Appendix D).	c. **Place** two bags of dehydrating agent in the voids on each side of top cushion (1) -- one bag per side.
		d. **Place** compressor assembly records in one of the voids at the side of the top and bottom cushions. **Tape** the three-spot humidity indicator card (3) on the side of top cushion.

2-7. Compressor - Preparation for Shipping and Storage - Continued

LOCATION/ITEM	REMARKS	ACTION
STORAGE AND SHIPMENT/ - Continued		
		e. **Place** gasket (10) on cover (9). **Install** cover on body (4) and **secure** with ring (6).
		f. Slowly **tighten** nut (7) while tapping on locking ring until 65-75 in. lb (0.7 -0.9 kg/m) torque is obtained. **Secure** nut with wire seal (8).
4. Installation of Compressor Into Cleated Plywood Container	Cushioning Material (item 12, Appendix D). Cleated Plywood Box (item 46, Appendix D).	a. **Insert** two inches of cushioning material into the bottom of a cleated plywood box. **Wrap** compressor with approximately two inches of cushioning material and carefully insert assembly into plywood box, aft end down. Make certain assembly is **held firmly** by the cushioning material and that all voids are filled.
		b. **Install** a minimum of two inches of cushioning material on top of the assembly.
		c. **Insert** the compressor record envelope and **secure** lid of box.
5. Container Stenciling		**Stenciling** of container will be in accordance with paragraph 1-39 and the following figure.

2-7. Compressor - Preparation for Shipping and Storage - Continued

LOCATION/ITEM	REMARKS	ACTION



2-7. Compressor - Preparation for Shipping and Storage - Continued

INITIAL SETUP

Applicable Configuration

All

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/	Visually inspect the compressor front support and replace the compressor assembly if any of the following conditions are found.	
1. Front Support		a. **Inspect** for cracks in the parent metal or braze joint. b. **Inspect** for dents exceeding 1/16 in. (1.6 mm) deep. c. **Inspect** for weld failures at the trailing edge spacers, as viewed from the rear with the compressor case half removed. d. **Inspect** for vane erosion to the extent that reduction of skin thickness is apparent and/or trailing edge slots are restricted.

2-9. Compressor Case Half -Removal

INITIAL SETUP

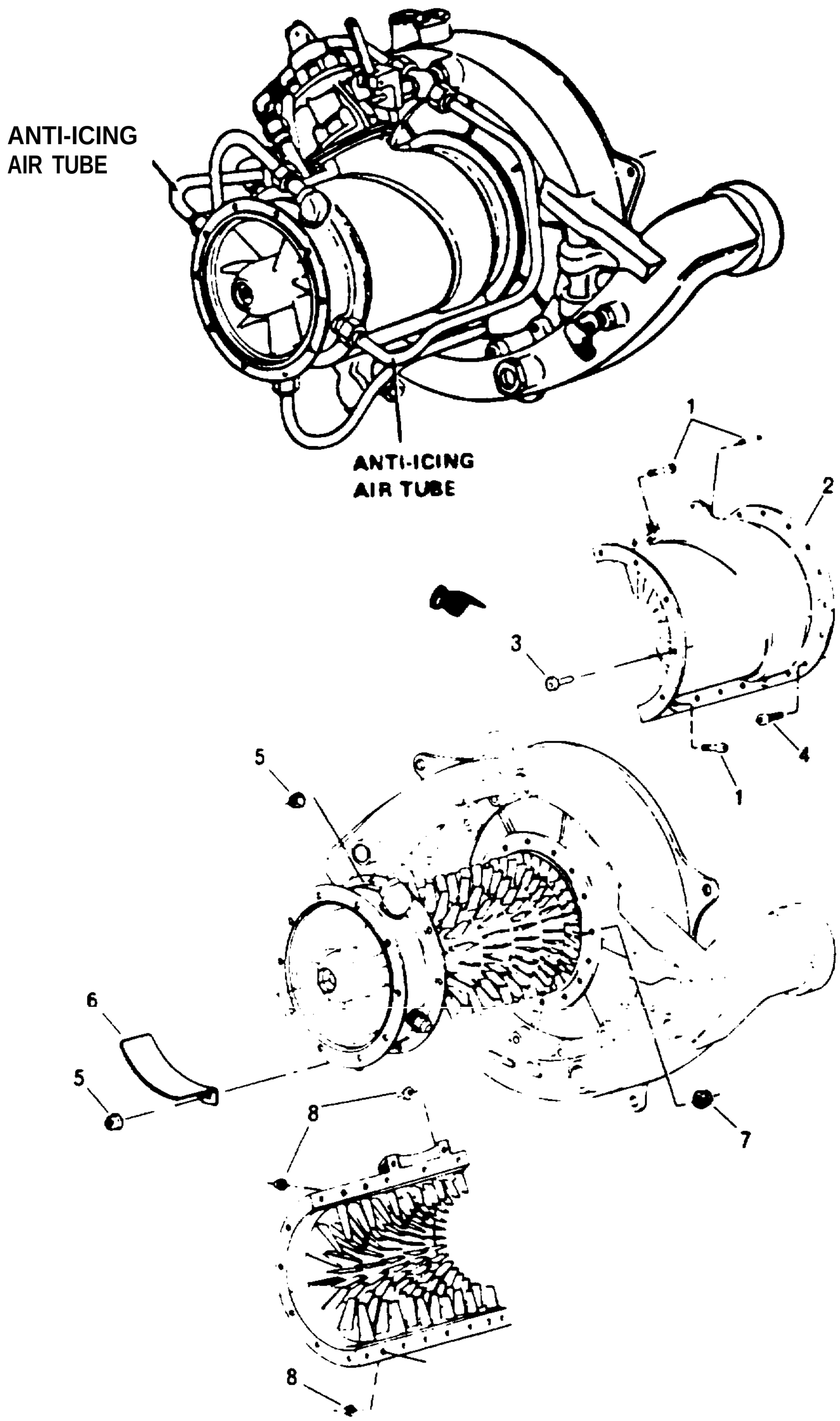
Applicable Configuration
All

References
Para 2-8, 2-9, 2-10.1, 2-10.2, 2-12, 2-14, 9-4 thru 9-8

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	**CAUTION** **Remove only one case half at a time. DO NOT remove both case halves at the same time. Front support could be misaligned. Insure that the removed case half is properly reinstalled and that the bolts are tightened to the required torque values before any of the bolts on the other case half are loosened. (Refer to paragraph 2-12.)**	
1, Compressor Case Half Removal	One compressor case half may be removed to inspect the rotor blades, stator vanes, plastic coating, and front support welds. (Refer to paragraphs 2-8, 2-9, 2-10.1, 2-10.2, and 2-14.) Removal of compressor case half is authorized only as a last resort to determine the cause of low engine performance or when foreign object damage (FOD) is suspected. Before removing the case half insure that low engine performance is not caused by a defective bleed valve or anti-icing valve, leaking scroll-to-rear diffuser seal or compressor discharge air tube seals, or a dirty compressor. Removal of the compressor case and inspection in accordance with paragraphs 2-8, 2-9, 2-10.1, 2-10.2 and 2-14, will be accomplished every 24 months or 300 hours, whichever comes first.	a. **Remove** the compressor bleed valve. **(Refer** to paragraph 9-4 thru 9-8.) b. **Remove** the anti-icing air tubes between the anti-icing air valve and the compressor front support. **(Refer** to para 9-4.) **c. Mark** the location of nameplate (6) when the applicable compressor case half-to-front support bolts (3) are to be removed. This is to insure that the nameplate will be returned to the same location at assembly.

2-9. Compressor Case Half - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		d. Remove one compressor case half (2) by removing 16 horizontal splitline nuts (8) and bolts (1), five case half-to-front support nuts (5) and bolts (3), and eight case half-to-front diffuser nuts (7) and bolts (4). Lift the case half straight out.



1. Bolt (16)
2. Compressor Case Half (2)
3. Bolt (10)
4. Bolt (16)
5. Nut (10)
6. Nameplate
7. Nut (16)
8. Nut (16)

2-9. Compressor Case Half - Cleaning

INITIAL SETUP

Applicable Configuration

All

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/	**WARNING** **Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C - 59°C).** **CAUTION** **Do not immerse the compressor case half in liquid cleaning solvents. Plastic liner could be damaged.**	
1. Compressor Case Half	Drycleaning Solvent (item 1, Appendix D).	Place the compressor case half on end and spray with solvent. Blow dry immediately with clean, compressed air.
	WARNING **Use approved personnel protective equipment to protect eyes and face when using compressed air. Maximum allowable air pressure for cleaning operations is 30 psi. Do not direct air stream towards yourself or toward another person.** If there is any contamination remaining on the vanes, clean with a tooth brush and a solution consisting of one part cleaning compound (item 26, Appendix D) to four parts clean water (distilled if available). Flush with clean water and blow dry immediately with clean compressed air.	

2-10.1 Compressor Plastic Coating - Inspection

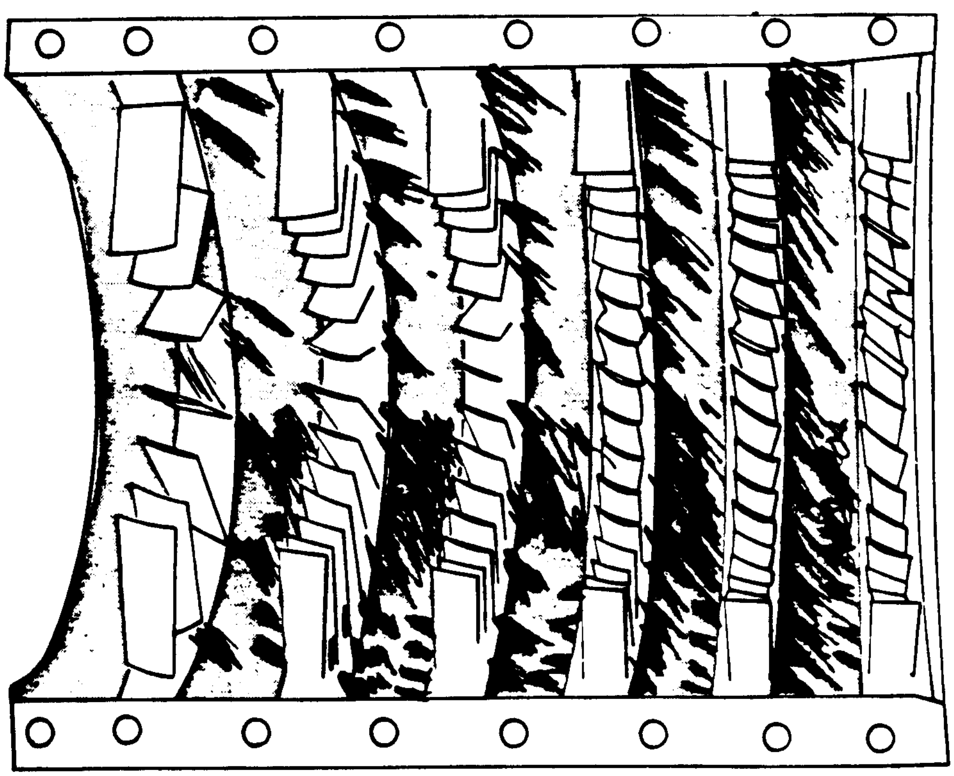
INITIAL SETUP

Applicable Configuration	References
All	Para 2-9, 2-12

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/		
1. Compressor case	**CAUTION** **Remove only one case half at a time. DO NOT remove both case halves at the same time. Front support could be misaligned. Insure that the removed case half is properly reinstalled and that the bolts are tightened to the required torque values before any of the bolts on the other case half are loosened. (Refer to paragraph 2-12.)** NOTE Visually inspect the plastic coating of both compressor case halves for the reasons stated in para 2-9. Visually inspect the compressor case plastic coating for the following conditions. Loss of plastic can have an adverse effect on compressor performance and is a justified reason for replacement of the case on low performance engines.	
		a. If any crack along the horizontal splitline is in excess of 1/2 inch, **replace** compressor halves.
		b. Cracks are acceptable without limitation as to length, quantities, or areas provided the plastic is securely bonded to the case.

2-10.1 Compressor Plastic Coating - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		c. If more than 50 percent of the plastic is missing/ debonded between adjacent vanes in stages five and six, or if 25 percent of the plastic is missing/debonded between adjacent vanes in stages one thru four, **replace** compressor case halves. d. Debonding and/or loss of plastic in the blade path areas is not acceptable. **Replace** compressor case halves. e. Evidence of heat discoloration on any rotor blade tip is not acceptable. **Replace** compressor case assembly. f. Erosion of the plastic coating is acceptable unless any portion of any single half-case vane band (metal) can be seen. **Replace** compressor case halves if any portion of any single half case vane band (metal) can be seen. Erosion patterns are shown in the adjacent figure.



2-10.2 Compressor Stator Vane - Inspection

INITIAL SETUP

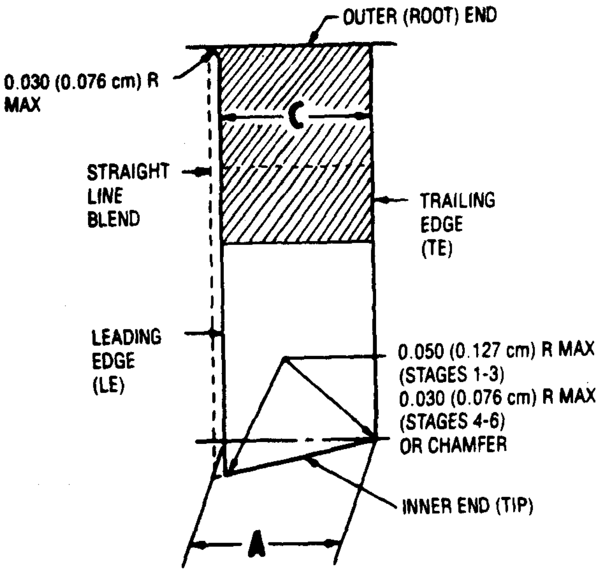
Applicable Configuration
All

References
Para 2-9 and 2-11

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/		
1. Stator Vanes	Visually inspect compressor stator vanes for the following conditions. NOTE This inspection requires removal of a compressor case half and shall be performed only for the reasons stated in paragraph 2-9. NOTE If FOD is detected refer to paragraph 1-44.	**Replace** compressor assembly if any of the stator vanes are missing or if a vane tip has rubbed.
2. Stator Vanes		**Inspect** for cracked or missing stator vanes - none are permitted.
3. Vane Tips	Rub is indicated by smeared metal on the vane tip associated with a burr on the convex side or by heat discoloration on the vane.	**Inspect** vane tips for evidence of rub. None are permitted. **Replace** the compressor if rub is indicated.
4. Vanes	Refer to paragraph 2-11.	**Inspect** for evidence of corrosion on the vanes. There must be no evidence of pitting on outer one-half of the vane. After polishing to remove corrosion, pitting in any area of the vane that forms a definite line is not acceptable.
5. Vanes (stages 3 through 6)		**Inspect** for erosion on the airfoil surface in vane stages 3 through 6. The major thickness of the airfoil must not be less than 0.020 in. (0.051 cm).

2-10.2 Compressor Stator Vane - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		
6. Vane Leading and Trailing Edges	Refer to paragraph 2-11.	Inspect for nicks, dents, and erosion on the vane leading and trailing edges. All damage and imperfections must be blended out. Blended leading and trailing edges must not exceed limits shown in the following figures.



ALL LE AND TE NICKS AND DENTS IN OUTER 1/2 OF VANE MUST BE REMOVED BY STRAIGHT LINE BLENDING WITHIN LIMITS SHOWN. SCALLOP BLENDS ARE NOT PERMITTED IN OUTER 1/2 OF VANE.

TYPICAL STRAIGHT LINE BLEND OF LE IS SHOWN WHICH IS ALSO APPLICABLE TO TE. DO NOT GO BELOW C MIN OR ABOVE MAX NUMBER OF VANES IN PARA 2-10.2. IF SO, REPLACE CASE HALVES

BLEND LE AND TE IN A LONGITUDINAL DIRECTION WITH A FINE STONE.

LE AND TE RADII MUST BE MAINTAINED.

"A" MAXIMUM MUST BE EQUAL TO OR LESS THAN "C"

"A" MINIMUM MUST BE NO LESS THAN "C" MINIMUM WIDTH OF COLUMN 2. PARA 2-10.2.

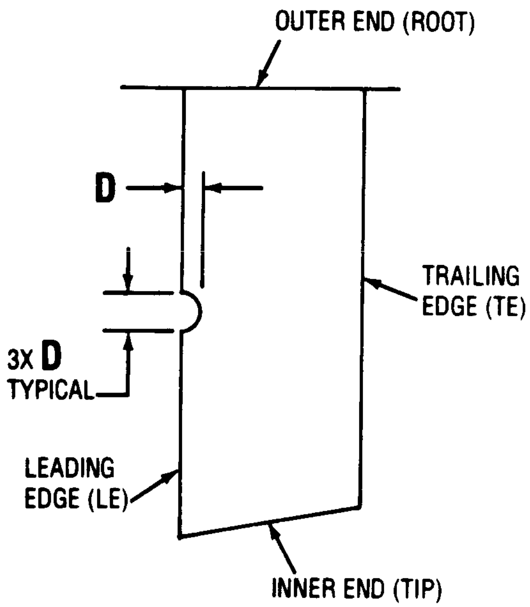
C - CHORDAL WIDTH MEASURED IN OUTER 1/2 OF VANE
A - CHORDAL WIDTH MEASURED IN INNER 3/4 OF VANE

	1		2	
STAGE	MAX NO. REWORKED VANES	DIMENSION C MIN WIDTH	MAX NO. VANES	DIMENSION C MIN WIDTH
1	7	0.415 (1.054 cm)	2	0.395 (1.003 cm)
2	13	0.390 (0.991 cm)	2	0.375 (0.953 cm)
3	14	0.390 (0.991 cm)	2	0.375 (0.953 cm)
4	16	0.390 (0.991 cm)	2	0.375 (0.953 cm)
5	18	0.390 (0.991 cm)	2	0.375 (0.953 cm)
6	15	0.390 (0.991 cm)	2	0.375 (0.953 cm)

NOTE: REDUCE MAX NO. REWORKED VANES IN COLUMN 1 BY THE NO. OF VANES IN COLUMN 2

2-10.2 Compressor Stator Vane - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION



D = MAJOR DEPTH OF SCALLOP BLEND FROM LE AND TE.

IF DIMENSION "D" IS GREATER THAN .030 IN. ON STAGE 1, 0.020 IN. (0.05 CM) ON STAGES 2 THROUGH 5 AND 0.010 IN. (0.03 CM) ON STAGE 6, REPLACE CASE HALVES AND INSPECT ROTOR.

SCALLOP BLENDING ON OUTER 1/2 OF VANE LE AND TE IS NOT PERMITTED, ONLY ONE SCALLOP BLEND PER VANE IS PERMITTED,

TYPICAL SCALLOP BLENDING OF A NICK OR DENT ON THE INNER 1/2 OF THE VANE LEADING EDGE IS SHOWN THIS IS ALSO APPLICABLE TO THE TE, BUT NOT BOTH LE AND TE.

AFTER STRAIGHT LINE BLENDING. SCALLOP BLEND LE AND TE AS SHOWN TO REMOVE MAJOR NICKS AND DENTS. USE A FINE STONE. LE AND TE RADII MUST BE MAINTAINED. FINAL BLENDING AND POLISHING MUST BE IN A LONGITUDINAL DIRECTION.

2-10.2 Compressor Stator Vane - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		

AIRFOIL SURFACE NICKS AND DENTS

OUTER 1/2 OF VANE

MAX DEPTH OF 1/4 AIRFOIL THICKNESS AFTER BLEND. MAINTAIN 3/64 IN. (1.2 MM) MIN BOTTOM RADIUS ON ALL BLENDING. MAX OF TWO BLENDS PER VANE AND BLENDS MUST NOT BE IN LINE PARALLEL WITH CASE CENTER LINE.

INNER 1/2 OF VANE

MAX DEPTH OF 112 AIRFOIL THICKNESS AFTER BLENDING. MAINTAIN 3/64 IN. (1.2 MM) MIN BOTTOM RADIUS ON ALL BLENDING. BLENDS MUST NOT BE IN LINE PARALLEL WITH CASE CENTER LINE.

LOCATION/ITEM	REMARKS	ACTION
7. Vane Airfoil Surface	Refer to paragraph **2-11.**	**Inspect** for nicks and dents on vane airfoil surface. All damage and imperfections must be blended out. Blended area must be within the limits shown in figure above.
8. Vanes		**Inspect** for bent vanes. Bent vanes are not acceptable. **Replace** compressor case halves and inspect rotor.

2-11. Compressor Case - Repair

INITIAL SETUP

Applicable Configuration
All

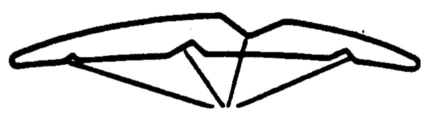
Consumable Materials
Abrasive Paper (item 27, Appendix D)
Emery Cloth (item 28, Appendix D)
Paint Thinner (item 29, Appendix D)
Gray Corrosion Resistant Paint (item 30, Appendix D)
Trichloroethylene (item 13, Appendix D)
Methylethylketone (item 32, Appendix D)
Acetone (item 39, Appendix D)
Sermetal Paint (item 44, Appendix D)

References
Para 2-10.2

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/-		
1. Case	Repair of the compressor case consists of blending and polishing to remove nicks, dents, corrosion, and erosion from the stator vanes. Where blending is recommended, use a medium grit stone. Where polishing is recommended, use a fine grit stone or abrasive paper (item 27, Appendix D). Blend and polish vanes in a longitudinal direction only with the repair forming a smooth blend with the basic airfoil. No sharp edges, burrs, cracks, or tears are acceptable after blending. NOTE It is impossible to fully describe all damage conditions that can be encountered. If damage is within the repair limits of the following figures but there is reasonable doubt about the strength of the blended vanes, replace the compressor case halves. Unlimited light polishing to remove minor damage, where vane dimensions are basically unchanged, is permissible on any part of the vane.	

2-11. Compressor Case - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		
2. Corrosion Removal	Abrasive Paper (item 27, Appendix D)	**Remove** corrosion deposits from the stator vanes by polishing with abrasive paper. **Polish** vanes in a longitudinal direction only. Blending to remove corrosion pitting is not required. Pitting must **not exceed** the limits of paragraph 2-10.2.
3. Vane Surface Blend Repair		**Blend** out nicks, dents, and scratches on the airfoil surface. **Final polish** to remove blending marks. Blended areas must be within the limits shown below. No vane straightening allowed.



AIRFOIL SURFACE NICKS AND DENTS

OUTER 1/2 OF VANE

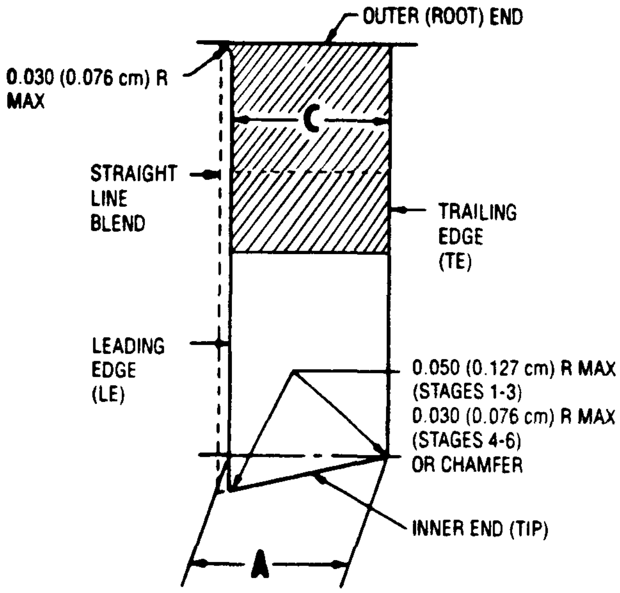
MAX DEPTH OF 1/4 AIRFOIL THICKNESS AFTER BLEND. MAINTAIN 3/64 IN. (1.2 MM) MIN BOTTOM RADIUS ON ALL BLENDING. MAX OF TWO BLENDS PER VANE AND BLENDS MUST NOT BE IN LINE PARALLEL WITH CASE CENTER LINE.

INNER 1/2 OF VANE

MAX DEPTH OF 1/2 AIRFOIL THICKNESS AFTER BLENDING. MAINTAIN 3/64 IN. (1.2 MM) MIN BOTTOM RADIUS ON ALL BLENDING. BLENDS MUST NOT BE IN LINE PARALLEL WITH CASE CENTER LINE.

2-11. Compressor Case - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		
4. Vane Leading and Trailing Edges Blend Repair		a. Straight-line blend the leading and trailing edges to remove minor erosion, nicks, and dents on the outer one-half of the vane. (See the following figure.) b. The chordal width on straight-line blended vanes must be within the limits specified.



ALL LE AND TE NICKS AND DENTS IN OUTER 1/2 OF VANE MUST BE REMOVED BY STRAIGHT LINE BLENDING WITHIN LIMITS SHOWN. SCALLOP BLENDS ARE NOT PERMITTED IN OUTER 1/2 OF VANE.

TYPICAL STRAIGHT LINE BLEND OF LE IS SHOWN WHICH IS ALSO APPLICABLE TO TE. DO NOT GO BELOW C MIN OR ABOVE MAX NUMBER OF VANES IN PARA 2-10.2. IF SO, REPLACE CASE HALVES

BLEND LE AND TE IN A LONGITUDINAL DIRECTION WITH A FINE STONE.

LE AND TE RADII MUST BE MAINTAINED.

"A" MAXIMUM MUST BE EQUAL TO OR LESS THAN "C"

"A" MINIMUM MUST BE NO LESS THAN "C" MINIMUM WIDTH OF COLUMN 2, PARA 2-10.2.

C - CHORDAL WIDTH MEASURED IN OUTER 1/2 OF VANE
A - CHORDAL WIDTH MEASURED IN INNER 3/4 OF VANE

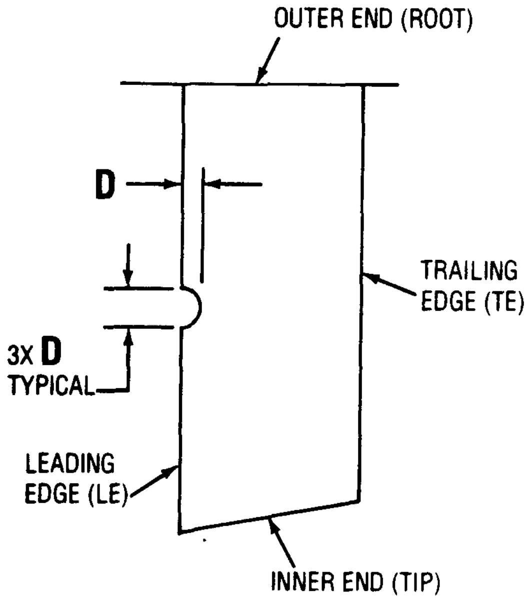
1			2	
STAGE	MAX NO. REWORKED VANES	DIMENSION C MIN WIDTH	MAX NO. VANES	DIMENSION C MIN WIDTH
1	7	0.415 (1.054 cm)	2	0.395 (1.003 cm)
2	13	0.390 (0.991 cm)	2	0.375 (0.953 cm)
3	14	0.390 (0.991 cm)	2	0.375 (0.953 cm)
4	16	0.390 (0.991 cm)	2	0.375 (0.953 cm)
5	18	0.390 (0.991 cm)	2	0.375 (0.953 cm)
6	15	0.390 (0.991 cm)	2	0.375 (0.953 cm)

NOTE: REDUCE MAX NO. REWORKED VANES IN COLUMN 1 BY THE NO. OF VANES IN COLUMN 2

Page 2-40 deleted.

2-11. Compressor Case - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		



D = MAJOR DEPTH OF SCALLOP BLEND FROM LE AND TE.

IF DIMENSION "D" IS GREATER THAN .030 IN. ON STAGE 1, 0.020 IN. (0.05 CM) ON STAGES 2 THROUGH 5 AND 0.010 IN. (0.03 CM) ON STAGE 6, REPLACE CASE HALVES AND INSPECT ROTOR.

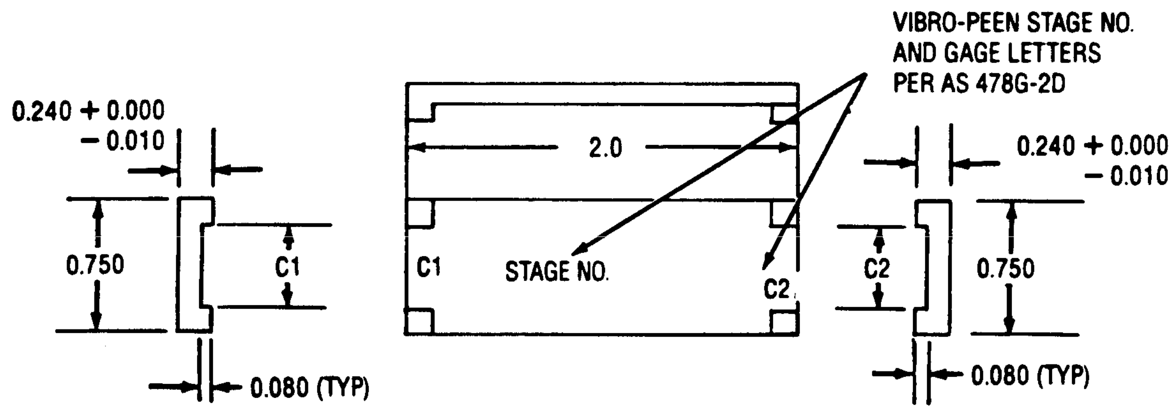
SCALLOP BLENDING ON OUTER 1/2 OF VANE LE AND TE IS NOT PERMITTED. ONLY ONE SCALLOP BLEND PER VANE IS PERMITTED.

TYPICAL SCALLOP BLENDING OF A NICK OR DENT ON THE INNER 1/2 OF THE VANE LEADING EDGE IS SHOWN. THIS ALSO APPLICABLE TO THE TE, BUT NOT BOTH LE AND TE.

AFTER STRAIGHT LINE BLENDING, SCALLOP BLEND LE AND TE AS SHOWN TO REMOVE MAJOR NICKS AND DENTS. USE A FINE STONE. LE AND TE RADII MUST BE MAINTAINED. FINAL BLENDING AND POLISHING MUST BE IN A LONGITUDINAL DIRECTION.

2-11. Compressor Case - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		
5. Vanes		Two chordal width gages necessary to measure chordal width on straight-line blended vanes is shown in the following figure, and may be locally fabricated to facilitate checking chordal width.



MAINTAIN ± 0.0002 IN. (± 0.0005 cm) TOLERANCE ON DIMENSIONS C1 AND C2.
LOCALLY FABRICATE TWO GAGES AS FOLLOWS:

STAGE	DIM C1	DIM C2
1	0.415 in. (1.054 cm)	0.395 in. (1.003 cm)
2-6	0.390 in. (0.991 cm)	0.375 in. (0.953 cm)

USE OF CHORDAL WIDTH GAGE AFTER BLENDING

CHECK VANE CHORDAL WIDTH USING THE CORRECT C1/C2 DIMENSIONAL OPENING(S) ON THE FABRICATED GAGES MAX NO. OF VANES AND MINIMAL C DIMENSION MUST BE WITHIN THE LIMITS SPECIFIED IN THE TABLE ON PAGE 2-36.4. REPLACE COMPRESSOR CASE HALVES IF VANES ARE NOT WITHIN LIMITS.

2-11. **Compressor Case - Repair - Continued**

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/ - Continued		
6. Compressor Case Painting	**Compressor cases which are painted** with gray corrosion resistant paint (item 30, Appendix D) have a glossy, light gray finish. Compressor cases which are painted with Sex'metal paint (item 44, Appendix D) have a dull, gray matte finish and appear to be unpainted.	**a. The** compressor case external surface may be **painted** with either gray, corrosion resistant paint or Sermetal paint. **b. Repair** damaged paint on the external surface of the compressor case as follows:
	Emery Cloth (item 28, Appendix D).	c. Gray, corrosion resistant paint. **(1) Abrade** the damaged area and localized surrounding area with emery cloth.
	Paint Thinner (item 29, Appendix D).	**(2) Wipe** abraded area with paint thinner.
	Gray Corrosion Resistant Paint (item 30, Appendix D).	(3) **Apply** gray corrosion resistant paint to the abraded area. (4) **Air dry** at least one hour before handling.
		d. Sermetal paint.
	Trichloroethylene, Methylethylketone, or Acetone (items 13, 32, or 39, Appendix D).	(1)Thoroughly **clean** the damaged area with a clean cloth saturated with tnchloroethylene, methylethylketone, or acetone, or other suitable solvent. (2) **Air dry** for 5-10 minutes.
	Emery Cloth (item 28, Appendix D),	**(3)** Using emery cloth **abrade** an area slightly larger than the damaged area. **Feather** the edges of the abraded area.

2-11. Compressor Case - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued	**WARNING** **Use approved personnel protective equipment to protect eyes and face when using compressed air. Maximum allowable air pressure for cleaning operations is 30 psi. Do not direct air stream towords yourself or toward another person.**	
		(4) **Clean** the abraded area as in step (1) and dry using a blast of clean, compressed air.
	Sermetal Point (item 44, Appendix D).	(5) **Apply** Sermetal paint to the abraded area and air dry for at least one hour.

2-12. Deleted.

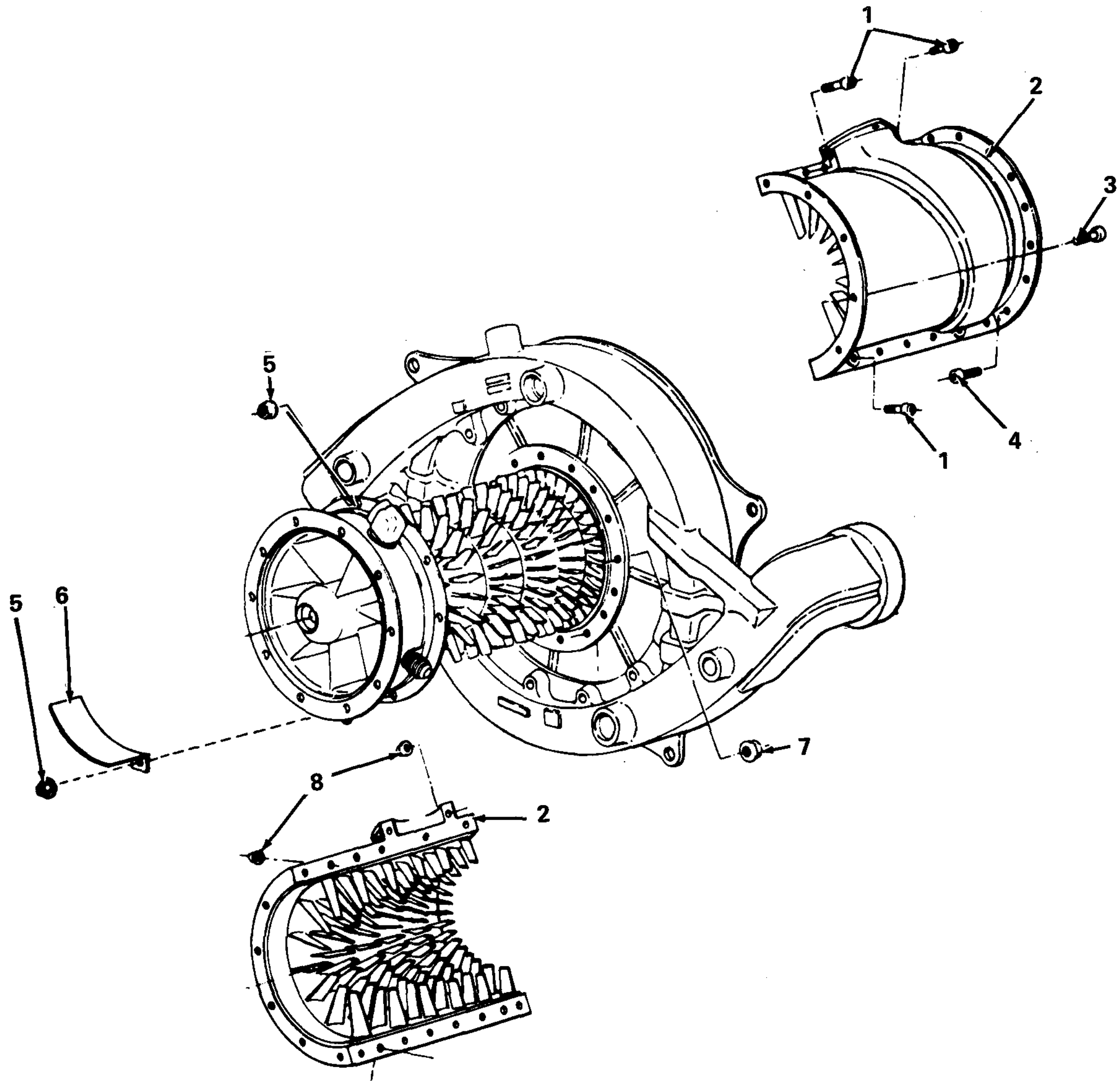
Pages 2-45, 2-46 and 2-47 deleted.

2-12. Compressor Case Half - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/ - Continued		

CAUTION

The compressor case halves are a matched set and shall not be intermixed. If the removed case half cannot be repaired to a serviceable condition, replace the compressor assembly.



2-12. Compressor Case Half - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/ - Continued		
1. Compressor Case Half (2)		a. **Position** compressor case half in place on the compressor.
		b. **Install** eight bolts (l), and nuts (8) in each horizontal splitline. **Bolt** at positions two and seven are pilot bolts. **Tighten** nuts on the pilot bolts to 10-15 in. lb (0.1 - 0.2 kg/m) plus lock-nut drag; then **tighten** the remaining nuts.
	NOTE **To determine locknut drag, run the nut up snug; then back off one-half turn. The torque required to first turn the loosened nut is locknut drag.**	
		c. **Install** eight case-to-front diffuser bolts (4) and nuts (7). **Tighten** the nuts to 10-15 in. lb (0.1 -0.2 kg/m) plus locknut drag.
		d. **Install** nameplate (6) (if applicable) and five case-to-front support bolts (3) and nuts (5). **Tighten** the nuts to 10-15 in. lb (0.1 -0.2 kg/m) plus locknut drag.

2-13. Compressor Rotor Blades - Cleaning.

INITIAL SETUP

Applicable Conjuration
ALL

Consumable Materials
Water Soluble cleaner (item 26, Appendix D)
Type II and Type IIA Cleaners (items 55, 56, 57, 58, AppendixD)

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Rotor Blades	Water Soluble Cleaner (item 26, Appendix D) Type II and Type IIA Cleaners (items 55, 56, 57, 58, App D).	With one compessor case half rernoved, **clean** contamination from the blades **using** a tooth brush and a solution of one part cleaning compound to four parts of clean water (distilled if possible).

NOTE

B&B 3100 (ML-C-85704, Type I) is the primary cleaner for Army turbine engines and remains an approved cleaners for locales where environmental restrictions permit Engine cleaners that conform to MIL-C-85704, Type II and Type IIA are also acceptable engine cleaners and meet EPA environmental requirements. Continue use of B&B 3100 where not restricted Where restrictions apply use MIL-C-85704,Type II and Type IIA cleaners. Approped Type II and type IIA cleaners shall be used in accordance with the existing washing procedure. Type IIA cleaners do not require dilution with water. Both types of cleaners are lease effective than Type I cleaners. Therefore more frequent engine washes may be required to achieve satisfactory results.

2-14. Compressor Rotor and Blades - Inspection

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Paras 2-9 and 2-15

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/		
1. Rotor and Blades	NOTE If FOD is detected refer to paragraph 1-44.	**Visually inspect** the compressor and blades for the following connditions. **Replace** compressor assembly if any of the limits are exceeded
	NOTE This inspection requires removal of a compressor case half and shall be performed only for the reasons stated in paragraph 2-9.	
2. Blades		**Inspect** for cracked or missing compresstor blades -none are permitted

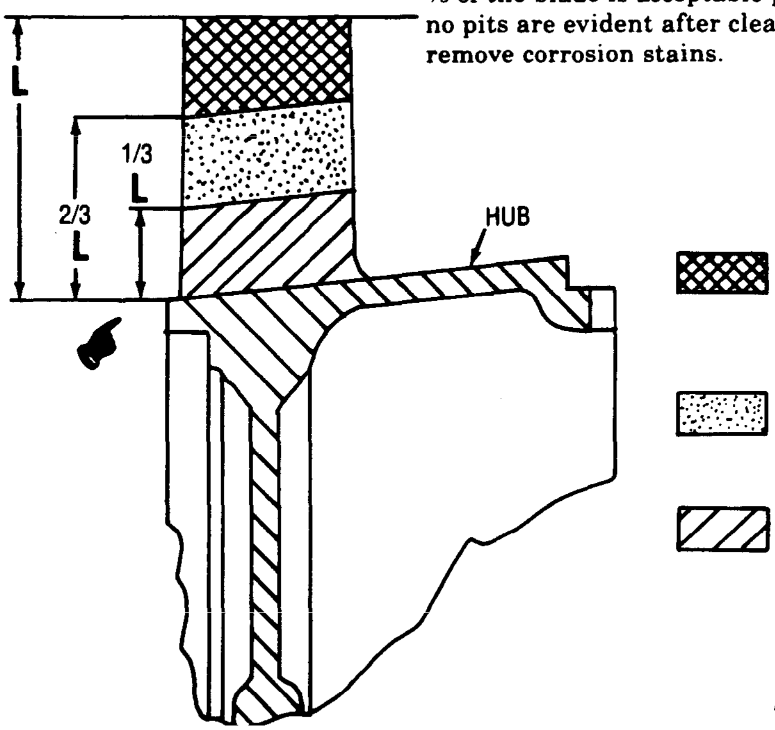
2-14. Compressor Rotor and Blades - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		
3. Rotor Blades and Wheel Hubs		a. Visually **inspect** the compressor rotor and blades. **Replace** compressor assembly if any of the following limits are exceeded.
		b. Inspect for cracked or missing compressor blades. None permitted. **Replace** engine if blade(s) is missing. **Replace** compressor assembly if blade is cracked.
		c. **Inspect** compressor rotor blades and wheel hubs for evidence of corrosion. Corrosion on the outer 2/3 of the blade must be removed by **blending** and **polishing.**

NOTE

Minor surface corrosion on the inner ⅓ of the blade is acceptable provided no pits are evident after cleaning to remove corrosion stains.

d. **Replace** compressor if pitting in any area of blade forms a definite line or pitting exceeds the limits.



NON-CRITICAL AREA-CONCENTRATIONS OF PITTING ARE PERMITTED IF PITS DO NOT FORM A DEFINITE LINE.

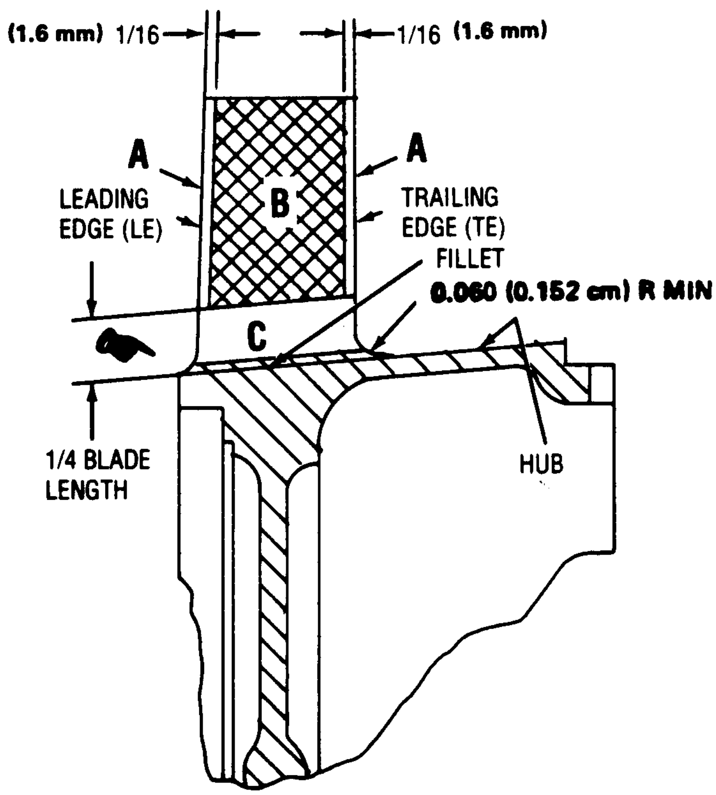
SEMI-CRITICAL AREA-SCATTERED MINOR CORROSION PITS SHALL NOT EXCEED 0.010 IN. (0.025 CM) DEPTH MAX OR 1/3 BLADE THICKNESS; WHICHEVER IS GREATER.

CRITICAL AREA-NO CORROSION PITTING PERMITTED IN THIS AREA.

HUB-PITS SHALL NOT EXCEED 1/16 IN. (1.6 MM) DIA AND 0.020 IN. MAX DEPTH.

2-14. Compressor Rotor and Blades - Inspection - Continued

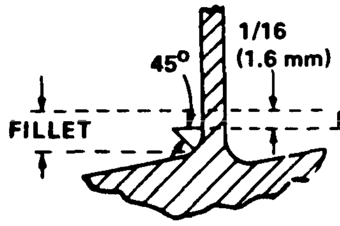
LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued	**NOTE** Obvious heat discoloration is defined as any shade of blueing which can not be rubbed off with a pencil eraser.	
4. Blade Tips		**Inspect** blade tips for heat discoloration on one or more blades. Heat discoloration is caused by severe blade rub on the compressor case plastic lining which occurs when the wheels shift off center due to an unbalance condition. **Replace** compressor assembly if heat discoloration is detected.
5. Rotor Blades and Wheel Hubs	Refer to paragraph 2-15.	**Inspect** compressor rotor blades and wheel hubs for nicks, dents and scratches in areas other than the blade leading and trailing edges. All damages and imperfections must be **blended** out. Blended areas must not exceed the limits shown in the following figure.

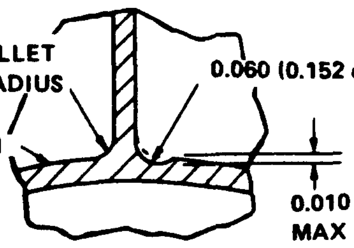


2-14. Compressor Rotor and Blades - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION

COMPRESSOR/ - Continued





3/32 IN. (2.4 mm) MAX DIA OF BLEND. BLEND RADIUS OF 0.060 IN. (0.152 cm) MIN MUST BE MAINTAINED. FAIR OUT TO MAX DEPTH OF 0.010 IN. (0.025 cm) TO PREVENT UNDERCUT OF AIRFOIL.

ALL BLENDING MUST BLEND SMOOTHLY INTO BASIC CONTOUR. MAINTAIN 3/64 IN. (1.2 mm) MINIMUM BOTTOM RADIUS ON ALL BLENDING. BLENDING ON BLADES SHALL BE IN A LONGITUDINAL DIRECTION ONLY.

SURFACE A - SEE LE AND TE BLEND LIMITS.

SURFACE B - 3/32 IN. (2.4 mm) DIA X 1/4 SECTION THICKNESS. 1/3 SECTION THICKNESS IF IN OUTER 1/3 OF BLADE. MAXIMUM OF 4 BLENDED AREAS PER SIDE WITH A MINIMUM SEPARATION OF 3 X LARGER BLEND DIA. BLENDED AREAS ON OPPOSITE SIDES MUST BE SEPARATED BY AT LEAST 2 X SIZE OF LARGER BLEND DIA. NO TWO BLENDED AREAS SHALL BE TRANSVERSELY ORIENTED (WITHIN 15° OF PERPENDICULAR TO LE OR TE).

SURFACE C - (DOES NOT INCLUDE FILLET) NO BLENDING PERMITTED.

FILLET - (SEE ENLARGED VIEW)

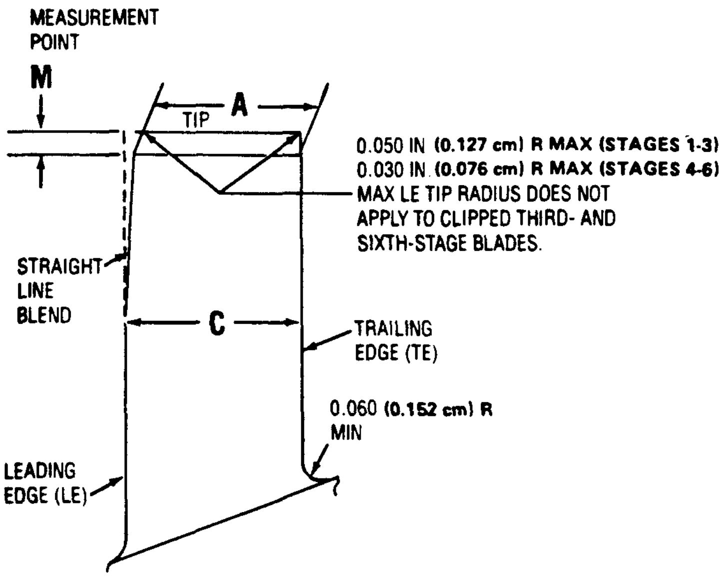
HUB - 1/8 IN. (3.2 mm) DIA X 0.030 IN. (0.076 cm) DEEP

2-14. Compressor Rotor and Blades - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		
6. Blade Leading and Trailing Edges	**Refer to paragraph 2-16.**	**Inspect** for nicks, dents and erosion on the blade leading and trailing edges and at the blade tip. All damage and imperfection must be **blended** out. Blended leading and trailing edges and chamfered blade tips **must not exceed** the limits shown in the following figures.

2-14. Compressor Rotor and Blades - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION



A — CHORDAL WIDTH MEASURED AT M DISTANCE FROM BLADE TIP.
C — CHORDAL WIDTH INBOARD OF MEASUREMENT POINT M. C MINIMUM MUST BE EQUAL TO OR GREATER THAN A EXCEPT AT LOCATION OF A SCALLOP BLEND ON OUTER 1/2 OF BLADE.

ALL LE AND TE NICKS AND DENTS IN THE INNER 1/2 OF THE BLADE MUST BE REMOVED BY STRAIGHT LINE BLENDING WITHIN LIMITS SHOWN. SCALLOP BLENDS ARE NOT PERMITTED IN INNER 1/2 OF BLADE.

TYPICAL STRAIGHT LINE BLENDING OF BLADE LE IS SHOWN WHICH IS ALSO APPLICABLE TO TE AND COMBINED LE AND TE.

BLEND LE AND TE IN A LONGITUDINAL DIRECTION WITH A FINE STONE.

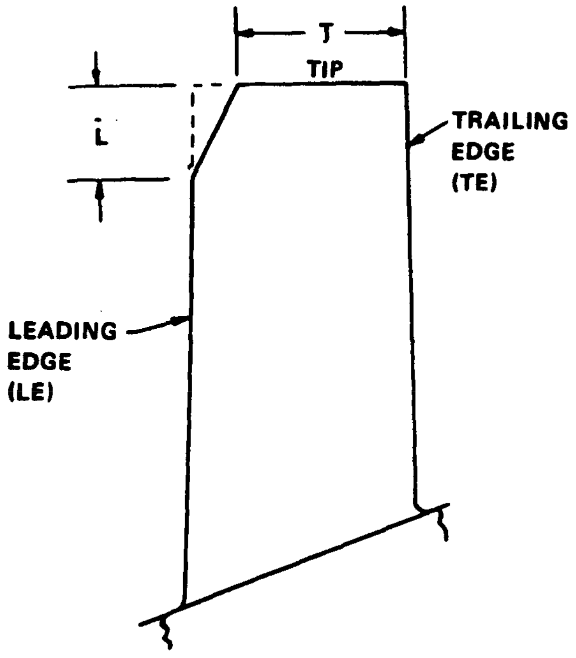
LE AND TE RADII MUST BE MAINTAINED.

LEADING AND TRAILING EDGE STRAIGHT LINE BLEND LIMITS

STAGE	M	A MIN.	MAX. NO. OF REWORKED BLADES
1	0.080	0.569	8
2	0.080	0.517	10
3	0.125	0.504	10
4	0.050	0.484	12
5	0.050	0.457	14
6	0.125	0.443	16

2-14. Compressor Rotor and Blades -Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		



TYPICAL CHAMFER BLENDING OF LE AT BLADE TIP IS SHOWN WHICH IS ALSO APPLICABLE TO TE AND COMBINED LE AND TE. CONVEX CURVE IS PERMITTED.

BLEND LE AND TE IN A LONGITUDINAL DIRECTION WITH A FINE STONE.
LE AND TE RADII MUST BE MAINTAINED.

T = CHORDAL WIDTH AT BLADE TIP.

L = CHAMFER LENGTH INWARD FROM BLADE TIP. MAX L IS 1/5 OF BLADE LENGTH AS MEASURED AT CENTER OF BLADE.

LEADING AND TRAILING EDGE CHAMFER BLEND LIMITS

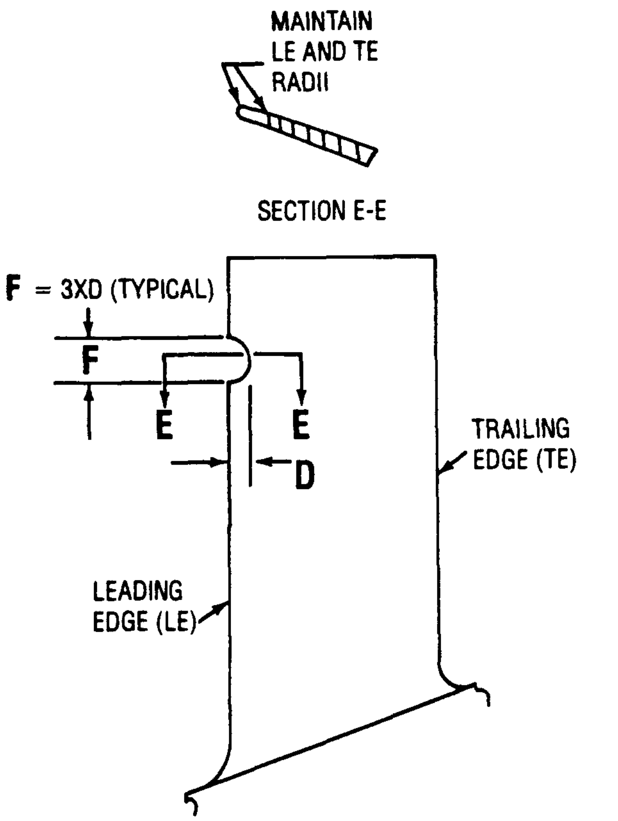
STAGE	MAX NO. BLADE	T (MIN) (IN.)	L (MAX) (IN.)
1	4	0.450 (1.143 cm)	0.263 (0.668 cm)
2	4	0.410 (1.041 cm)	0.213 (0.541 cm)
3	4	0.370* (0.940 cm)	0.177 (0.450 cm)
4	5	0.378 (0.960 cm)	0.149 (0.379 cm)
5	5	0.358 (0.909 cm)	0.128 (0.325 cm)
6	5	0.275** (0.699 cm)	0.145 (0.368 cm)

*REMAINDER OF BLADES MUST BE 0.396 IN. MIN.
**REMAINDER OF BLADES MUST BE 0.300 IN. MIN.

2-14. Compressor Rotor and Blades - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION

COMPRESSOR/-
Continued



D = MAJOR DEPTH OF SCALLOP BLEND FROM LE OR TE.
F = LENGTH OF SCALLOP BLEND.

IF DIMENSION "D" IS GREATER THAN 0.030 IN. FOR STAGE 1, 0.020 IN. FOR STAGES 2 THROUGH 5 AND 0.010 IN. FOR STAGE 6, REPLACE COMPRESSOR. (REFER TO PARAS 2-2 AND 2-6.)

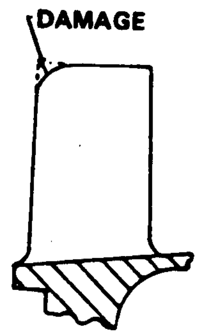
SCALLOP BLENDING ON INNER HALF OF BLADE LE AND TE IS NOT PERMITTED. ONLY ONE SCALLOP BLEND PER BLADE IS PERMITTED.

TYPICAL SCALLOP BLENDING OF A NICK OR DENT IN THE OUTER HALF OF THE BLADE LE IS SHOWN. THIS IS ALSO APPLICABLE TO THE TE, BUT NOT BOTH LE AND TE.

BLEND LE OR TE AS SHOWN TO REMOVE MAJOR NICKS AND DENTS AFTER STRAIGHT LINE BLENDING. USE A FINE STONE. LE AND TE RADII MUST BE MAINTAINED. FINAL BLENDING AND POLISHING MUST BE IN A LONGITUDINAL DIRECTION.

2-14. Compressor Rotor and Blades - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/-Continued		
7. Blade Tips and Leading Edges	Loose plastic rub is a result of the compressor case plastic lining coming loose and displacing inward wearing away portions of all blades in a given stage. Loose plastic rub is evidenced as a chamfer at the leading edge or trailing edge tip, or an undercut of the blade leading edge. See the following figure.	**Inspect** blade tips and leading edges for evidence of loose plastic rub on all blades in a given stage. **Replace** compressor assembly if rub is severe enough to cause obvious heat discoloration.



2-15. Compressor Rotor and Blades - Repair

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Abrasive Paper (item 27, Appendix D)

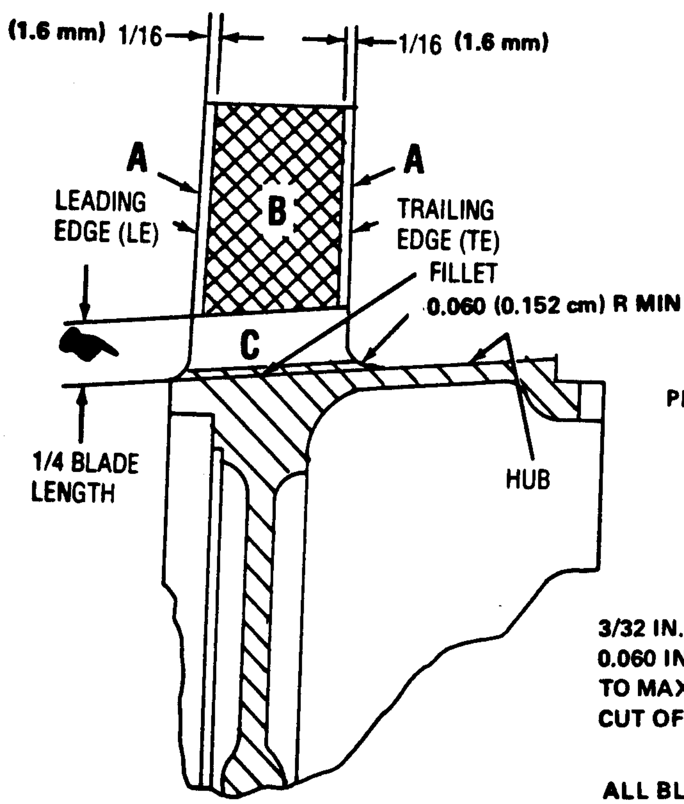
References
Para 2-2, 2-6, 2-13, 2-14

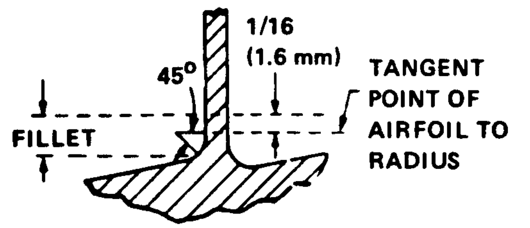
2-15. Compressor Rotor and Blades - Repair - Continued

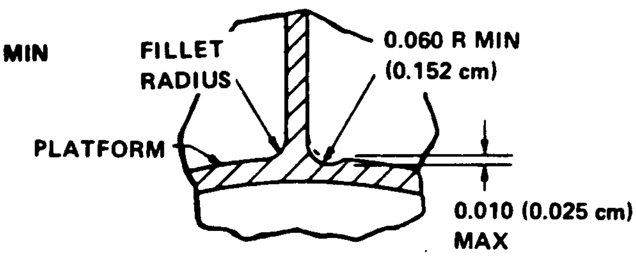
LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/		
1. Rotor and Blades	Repair of compressor rotor and blades consists of blending and polishing to remove nicks, dents, scratches, corrosion, or erosion from blades, blade fillets and wheel hubs. Where blending is recommended, use a No. 0 Swiss pattern file or a medium grit stone. Where polishing is recommended, use a fine grit stone or abrasive paper (item 27, Appendix D). Blend and polish blades in a longitudinal direction only with the repair formi ng a smooth blend with the basic airfoil. No sharp edges, burrs, cracks, or tears are acceptable after blending. **NOTE** It is impossible to fully describe all darnage conditions that can be encountered. If damage is within the repair limits shown in the following figures but there is reasonable doubt about the strength of the blended blade, replace the compressor assembly. Unlimited light polishing to remove minor damage, where blade dimensions are basically unchanged, is permissible on any part of the blade.	
2. Hub and Fillet Blend Repair		**Blend out** nicks, dents and scratches on the compressor wheel hub and blade fillets. **Final polish** to **remove** blending marks. Blended areas must be within the limits shown in the following figures.
3. Blade Surface Blend Repair		**Blend out** nicks, dents, and scratches on the airfoil surface (surface B). **Final polish** to **remove** blending marks. Blended areas must be within the limits shown in the following figure.

2-15. Compressor Rotor and Blades - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		







3/32 IN. (2.4 mm) MAX DIA OF BLEND. BLEND RADIUS OF 0.060 IN. (0.152 cm) MIN MUST BE MAINTAINED. FAIR OUT TO MAX DEPTH OF 0.010 IN. (0.025 cm) TO PREVENT UNDER-CUT OF AIRFOIL.

ALL BLENDING MUST BLEND SMOOTHLY INTO BASIC CONTOUR. MAINTAIN 3/64 IN. (1.2 mm) MINIMUM BOTTOM RADIUS ON ALL BLENDING. BLENDING ON BLADES SHALL BE IN A LONGITUDINAL DIRECTION ONLY.

SURFACE A - SEE LE AND TE BLEND LIMITS.

SURFACE B -
3/32 IN. (2.4 mm) DIA X 1/4 SECTION THICKNESS. 1/3 SECTION THICKNESS IF IN OUTER 1/3 OF BLADE. MAXIMUM OF 4 BLENDED AREAS PER SIDE WITH A MINIMUM SEPARATION OF 3 X LARGER BLEND DIA. BLENDED AREAS ON OPPOSITE SIDES MUST BE SEPARATED BY AT LEAST 2 X SIZE OF LARGER BLEND DIA. NO TWO BLENDED AREAS SHALL BE TRANSVERSELY ORIENTED (WITHIN 15° OF PERPENDICULAR TO LE OR TE).

SURFACE C - (DOES NOT INCLUDE FILLET) NO BLENDING PERMITTED.

FILLET - (SEE ENLARGED VIEW)

HUB - 1/8 IN. (3.2 mm) DIA X 0.030 IN. (0.076 cm) DEEP

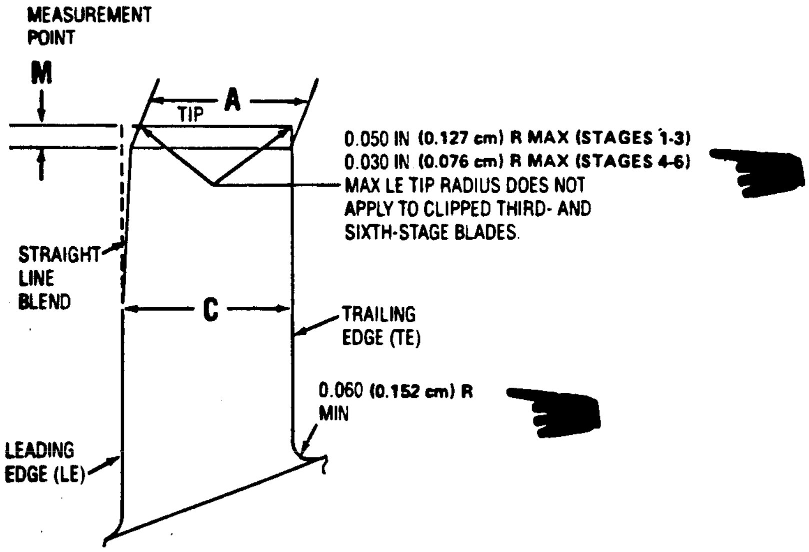
2-15. Compressor Rotor and Blades - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		
4. Blade Leading and Trailing Edges Blend Repair	The chordal width on straight-line and chamfer blended blades must be within the limits specified in the following two figures.	**Blend-repair** as follows: **a. Straight-line blend** the leading and trailing edges to **remove** erosion and minor nicks and dents, **Refer** to the followrng figure for limits. b. **Chamfer blend** to remove any remaining damage at the blade tip. **Refer** to the following figures for limits. **c. Scallop blend** to **remove** any remaining damage on the outer one-half of the blade leading and trailing edges. **Refer** to the following figures for limits.

2-15. Compressor Rotor and Blades - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION

COMPRESSOR/-
Continued



A — CHORDAL WIDTH MEASURED AT M DISTANCE FROM BLADE TIP.
C — CHORDAL WIDTH INBOARD OF MEASUREMENT POINT M. C MINIMUM MUST BE EQUAL TO OR GREATER THAN A EXCEPT AT LOCATION OF A SCALLOP BLEND ON OUTER 1/2 OF BLADE.

ALL LE AND TE NICKS AND DENTS IN THE INNER 1/2 OF THE BLADE MUST BE REMOVED BY STRAIGHT LINE BLENDING WITHIN LIMITS SHOWN. SCALLOP BLENDS ARE NOT PERMITTED IN INNER 1/2 OF BLADE.

TYPICAL STRAIGHT LINE BLENDING OF BLADE LE IS SHOWN WHICH IS ALSO APPLICABLE TO TE AND COMBINED LE AND TE.

BLEND LE AND TE IN A LONGITUDINAL DIRECTION WITH A FINE STONE.

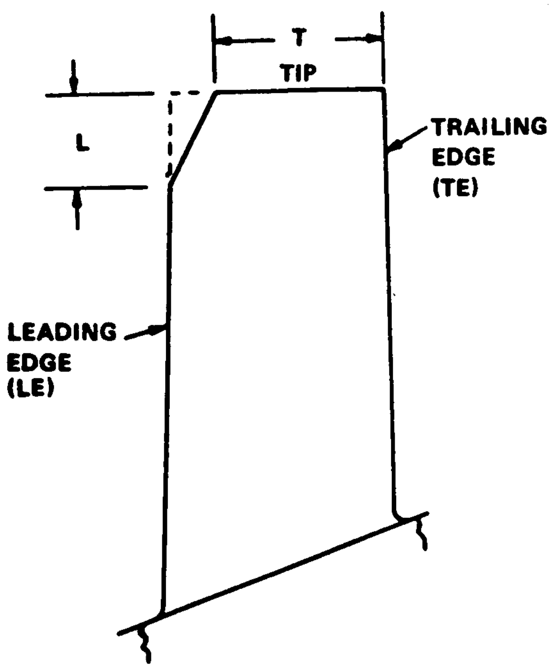
LE AND TE RADII MUST BE MAINTAINED.

LEADING AND TRAILING EDGE STRAIGHT LINE BEND LIMITS

STAGE	M	A MIN.	MAX. NO. OF REWORKED BLADES
1	0.080	0.569	8
2	0.080	0.517	10
3	0.125	0.504	10
4	0.050	0.484	12
5	0.050	0.457	14
6	0.125	0.443	16

2-15. Compressor Rotor and Blades - Repair -Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		



TYPICAL CHAMFER BLENDING OF LE AT BLADE TIP IS SHOWN WHICH IS ALSO APPLICABLE TO TE AND COMBINED LE AND TE. CONVEX CURVE IS PERMITTED.

BLEND LE AND TE IN A LONGITUDINAL DIRECTION WITH A FINE STONE.
LE AND TE RADII MUST BE MAINTAINED.

T = CHORDAL WIDTH AT BLADE TIP.

L = CHAMFER LENGTH INWARD FROM BLADE TIP. MAX L IS 1/5 OF BLADE LENGTH AS MEASURED AT CENTER OF BLADE.

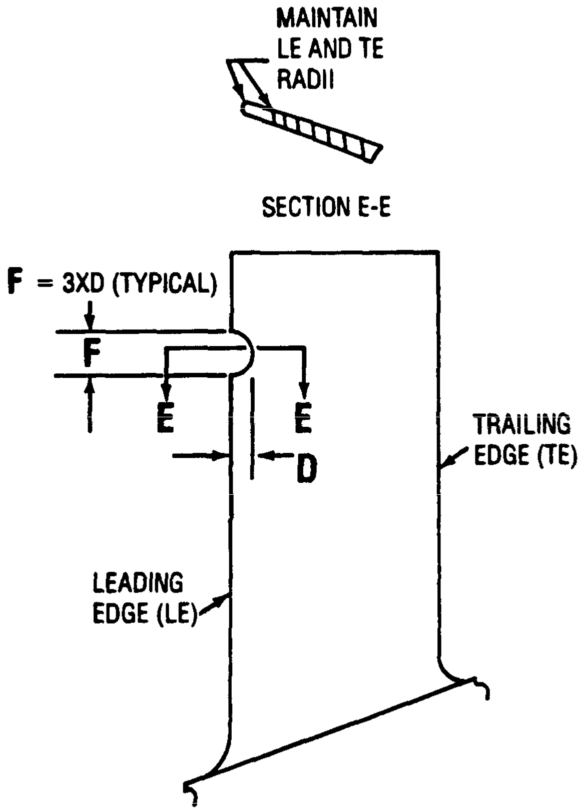
LEADING AND TRAILING EDGE CHAMFER BLEND LIMITS

STAGE	MAX NO. BLADES	T (MIN) (IN.)	L (MAX) (IN.)
1	4	0.450 (1.143 cm)	0.263 (0.668 cm)
2	4	0.410 (1.041 cm)	0.213 (0.541 cm)
3	4	0.370* (0.940 cm)	0.177 (0.450 cm)
4	5	0.378 (0.960 cm)	0.149 (0.379 cm)
5	5	0.358 (0.909 cm)	0.128 (0.325 cm)
6	5	0.275** (0.699 cm)	0.145 (0.368 cm)

*REMAINDER OF BLADES MUST BE 0.396 IN. (1.005 cm) MIN.
**REMAINDER OF BLADES MUST BE 0.300 IN. (0.762 cm) MIN.

2-15. Compressor Rotor and Blades - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/-Continued		



SCALLOP BLENDING ON INNER HALF OF BLADE LE AND TE IS NOT PERMITTED. ONLY ONE SCALLOP BLEND PER BLADE IS PERMITTED.

TYPICAL SCALLOP BLENDING OF A NICK OR DENT IN THE OUTER HALF OF THE BLADE LE IS SHOWN. THIS IS ALSO APPLICABLE TO THE TE, BUT NOT BOTH LE AND TE.

BLEND LE OR TE AS SHOWN TO REMOVE MAJOR NICKS AND DENTS AFTER STRAIGHT LINE BLENDING. USE A FINE STONE. LE AND TE RADII MUST BE MAINTAINED. FINAL BLENDING AND POLISHING MUST BE IN A LONGITUDINAL DIRECTION.

D = MAJOR DEPTH OF SCALLOP BLEND FROM LE OR TE.
F = LENGTH OF SCALLOP BLEND.

IF DIMENSION "D" IS GREATER THAN 0.030 IN. FOR STAGE 1, 0.020 IN. FOR STAGES 2 THROUGH 5 AND 0.010 IN. FOR STAGE 6, REPLACE COMPRESSOR. (REFER TO PARAS 2-2 AND 2-6.)

2-15. Compressor Rotor and Blades - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/ - Continued		
5. Rotor Blades and Wheel Hubs Corrosion Removal	Abrasive Paper (item 27, Appendix D).	a. Remove corrosion deposits or pitting on outer 2/3 of the compressor rotor blades and wheel hubs by blending and polishing with abrasive paper. Blend and polish in a longitudinal direction only.
		b. Remove corrosion stains on the inner 1/3 of the blades by cleaning in accordance with paragraph 2-13. Do not remove or polish metal on the inner 1/3 of the blades. Pitting must not exceed the limits shown in paragraph 2-14, item 3.
6. Hub and Fillet Blend Repair		Blend out nicks, dents, and scratches on compressor wheel hub and plate fillets Final polish to remove blending marks. Blended areas must be within limits shown in item 3 above.
7. Blade Surface Blend Repair		Blend out nicks, dents, and scratches on the airfoil surface(surfsce B, item3 above). Final polish to remove blending marks. Blended areas must be within limits shown in item 3, above.
8. Blade Leading and Trailing Edges Blend Repair		Straight-line blend leading and trailing edges to remove erosion and minor nicks and dents (see figure in item 4 above).

2-15.1 Compressor Case Half - Installation.

INITIAL SETUP

Applicable Configuration

All

Applicable Configuration

All

Consumable Materials

Sealant (item 51, Appendix D)

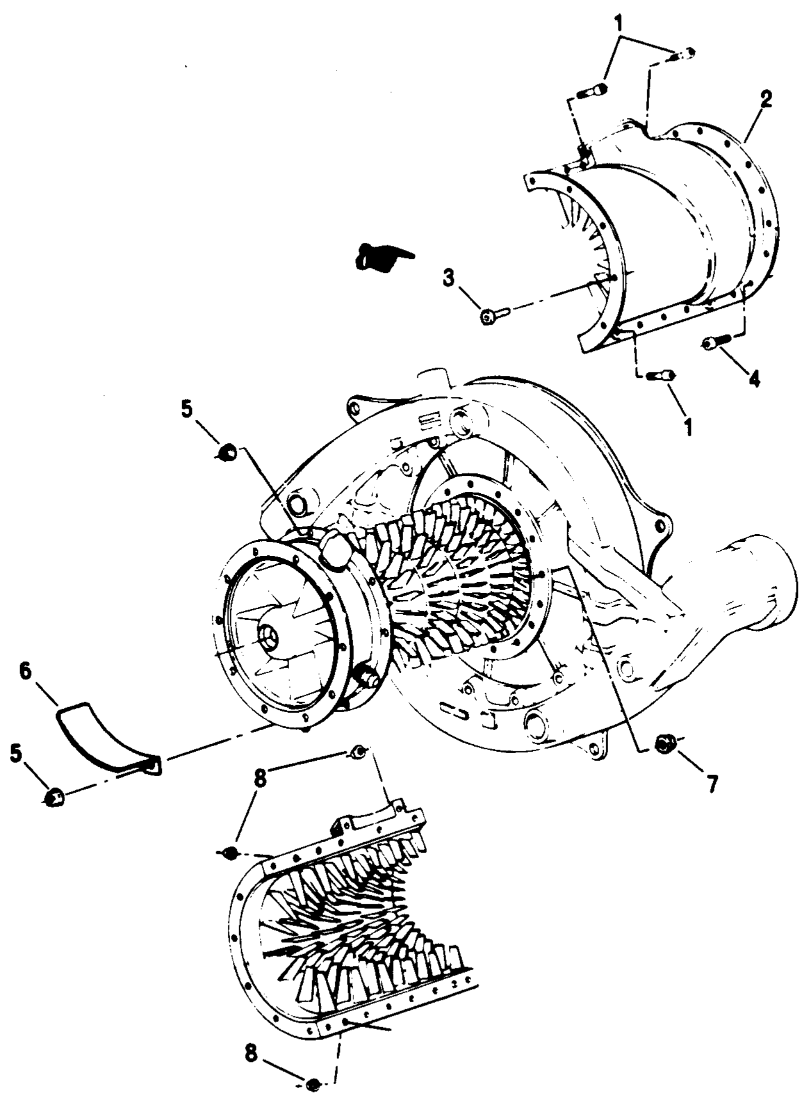
References

Paras 9-6 thru 9-8

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/	**CAUTION** **Use only chrome plated steel or unplated steel tools for the disassembly or reassembly procedures described in this manual. The use of cadmium on zinc plated tools is not permitted since these platings are prone to chipping and flaking. Should these chips enter the engine, they may contaminate the lubrication system, ultimately clogging the filters or produce intergranular attack on nickel or titanium base alloys at elevated temperatures.** Serviceable dent limits are 0.010 inch maximum depth and 0.125 inch maximum diameter. Dents must have a smooth, round bottom. Replace the compressor halves if dents exceed serviceability limits.	

2-15.1 Compresor Case Half - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued	**CAUTION** **The compressor case halves are a matched set and shall not be intermixed, If any removed case half cannot be repaired to a serviceable condition, replace both compressor case halves.**	



2-15.1 CompressorCase Half - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		
1. Compressor Case Half (2)		a. **Position** compressor case half in place on the compressor. b. **Install** eight bolts(l), and nuts (8) in each horizontal splitline. **Bolt** at positions two and seven are pilot bolts. **Tighten** nuts on the pilot bolts to 10-15 in. lb (0.1-0.2 kg/m) plus locknut drag; then tighten the remaining nuts.
	NOTE To determine locknut drag, run the nut up snug; then back off one-half turn. The torque required to first turn the loosened nut is locknut drag. NOTE When installing the first case half, apply a thin coat of sealant (item 51, Appendix D) to the vertical splitlines. When installing the second case half, apply a thin coat of sealant to the vertical and horizontal splitlines and immediately proceed to secure compressor half before sealant cures.	
		c. **Install** eight case-to-front diffuser bolts (4) and nuts (7). **Tighten** the nuts to 10-15 in. lb (O.l-0.2 kg/m) plus locknut drag. d. **Install** nameplate (6) (if applicable) and five case-to-front support bolts (3) and nuts (5). **Tighten** the nuts to 10-15 in. lb (0.1-0.2 kg/m) plus locknut drag.

2-15.1 Compressor Case Half - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/- Continued		

NOTE

To determine locknut drag, run the nut up snug; then back off one-half turn. The torque required to first turn the loosened nut is locknut drag.

NOTE

When installing the first case half, apply a thin coat of sealant (item 51, Appendix D) to the vertical splitlines. When installing the second case half, apply a thin coat of sealant to the vertical and horizontal splitlines and immediately proceed to secure compressor half before sealant cures.

c. Deleted

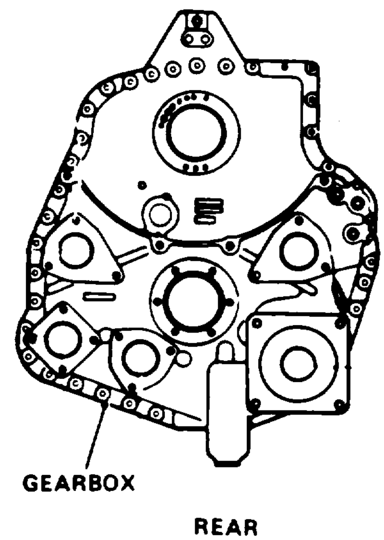
d. Deleted

2-15.1 Compressor Case Half - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/ - Continued		

CAUTION

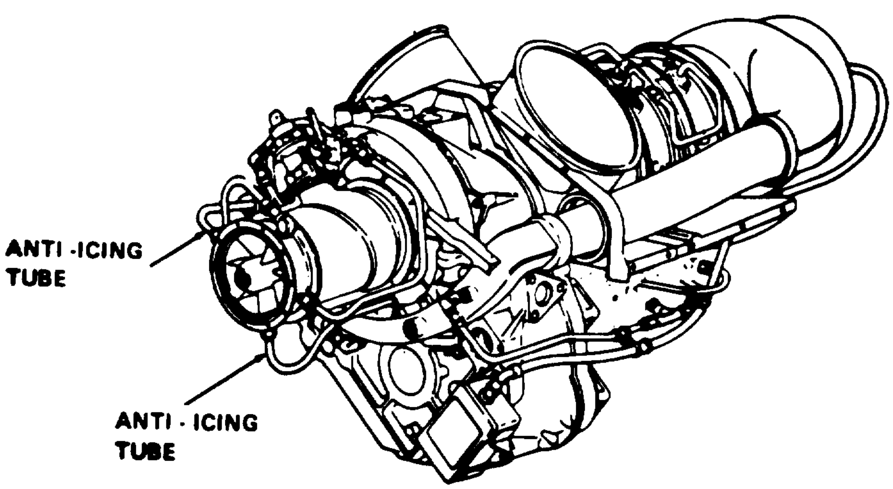
Do not attempt to rotate the compressor using a speed wrench at the tachometer drive pad. Side loads on the speed wrench could crack the tachometer drive shaft.



e. Turn compressor rotor using engine turning adapter at the starter generator pad. The rotor and gear train should turn freely with no evidence of interference or blade tip rub (evidenced by feel or noise).

f. Install compressor bleed valve. Refer to Paragraphs 9-6 thru 9-8.

g. Install anti-icing air tubes. Tighten coupling nuts to 150-200 in. lb (1.7-2.3 kg/m).



2-16. Diffuser Scroll - Inspection

INITIAL SETUP

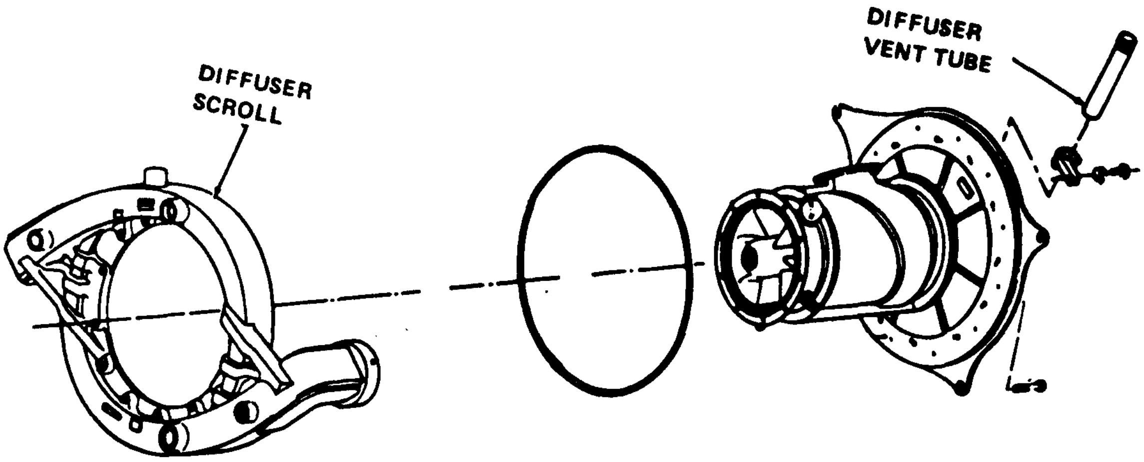
Applicable Configuration
All

References
Para 2-17

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	**WARNING** **The Scroll assembly, NSN 2840-00-244-1774, contains thorium, a radioactive material. Maintenance of this engine part is limited to replacement unless other maintenance is specifically authorized and is covered by a valid US Nuclear Regulatory Commission license. Nonrepairable Scroll assemblies must be disposed of as radioactive waste in accordance with AR 385-11.**	
1. Diffuser Scroll	Visually inspect the installed diffuser scroll for the following conditions. Replace the compressor assembly if the damage cannot be repaired.	a. **Inspect** for visible cracks. **Replace** the compressor if cracks are found. b. **Inspect** for corrosion and paint damage; **repair** in accordance with paragraph 2-17. c. **Check** the turning vanes in the outlet ports for evidence of damage. Damage is indicative of impeller vane tip or shroud failure. **Replace** the compressor.

2-16. Diffuser Scroll - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		



LOCATION/ITEM	REMARKS	ACTION
		d. **Inspect** the diffuser scroll discharge air tube inserts for wear and looseness. If wear in the ID of the insert exceeds 0.010 in. (0.025 cm) depth or there is evidence that the insert has been pulled out of the scroll, **replace** the compressor assembly. If insert wear does not exceed 0.010 in. (0.025 cm) depth, **blend** and polish per paragraph 2-17.
2. Diffuser Vent Tube	If a 3/8 in. diameter rod can be inserted into tube, it is acceptable, A gap not exceeding 0.010 in. (0.025 cm) is acceptable. No cracks are permitted. Remove the tube if replacement is required and replace per paragraph 2-17.	Inspect diffuser vent tube for distortion, 0.010 in. (0.025 cm) gap where tube enters passage, and cracks.

2-17. Diffuser Scroll-Repair

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Emery Cloth (item 31, Appendix D)
Methylethylketone (item 32, Appendix D)
Cres Paint (item 34, Appendix D)
Lacquer Reducer (item 35, Appendix D)
Abrasive Paper (item 36, Appendix D)
Lockwire (item 7, Appendix D)
Aluminum Paint (item 33, Appendix D)

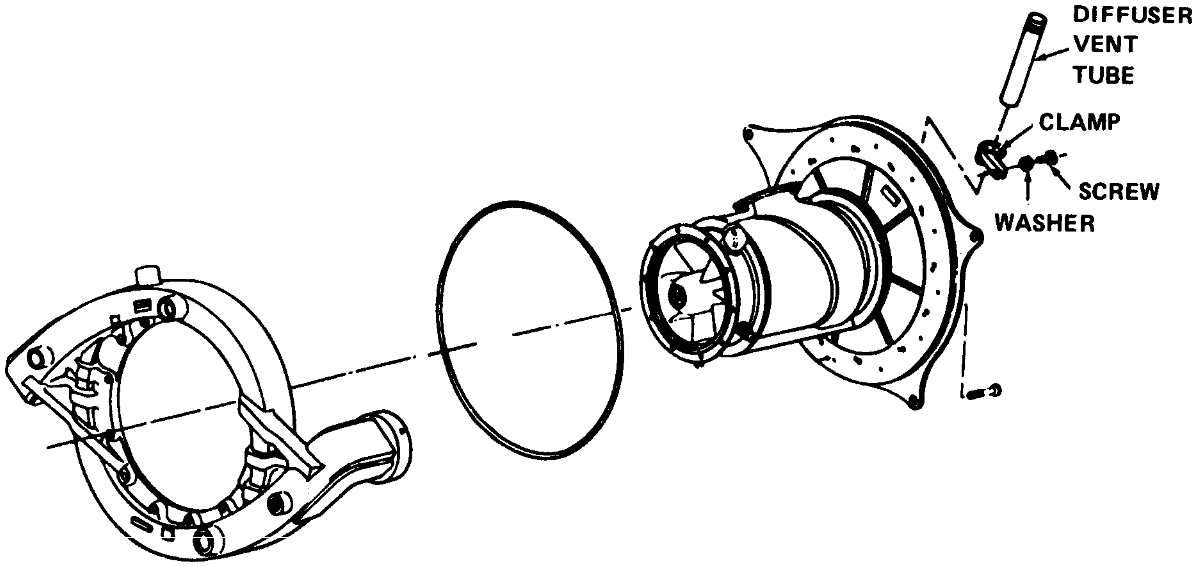
LOCATION/ITEM	REMARKS	ACTION
DIFFUSER SCROLL/	**WARNING** **The Scroll assembly, NSN 2840-00-244-1774, contains thorium, a radioactive material. Maintenance of this engine part is limited to replacement unless other maintenance is specifically authorized and is covered by a valid US Nuclear Regulatory Commission license. Nonrepairable Scroll assemblies must be disposed of as radioactive waste in accordance with AR 385-11.**	
1. Corrosion Removal and Paint Repair	Emery Cloth (item 31, Appendix D)	a. **Remove** corrosion with emery cloth.
		b. **Abrade** damaged areas with emery cloth.

2-17. Diffuser Scroll - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION
DIFFUSER SCROLL/ - Continued		
		c. **Touchup** damaged bichromate coating (abraded areas) by chrome pickle per MIL-M-3171.
	Methylethylketone (item 32, Appendix D).	d. **Clean** surface with methylethylketone and **air dry** 5 to 10 minutes.
	Heat Resistant Aluminum Paint (item 33, Appendix D). Cres Paint (item 34, Appendix D). Lacquer Reducer (item 35, Appendix D).	e. **Touchup** aluminum painted scrolls with heat resistant aluminum paint. **Touchup** spray-painted scrolls with two parts gray Cres paint to one part lacquer reducer by volume.
		f. **Air dry** at least one hour. Localized heat curing is permissible.
2. Air Tube Insert Blend Repair	Abrasive Paper (item 36, Appendix D).	a. Using abrasive paper **blend** and **polish wear** in the OD of the air tube inserts which does not exceed 0.010 in. (0.025 cm) depth. **Blend and polish wear** step as necessary to insure freedom of movement of the air tube seals and to insure that the sealing properties will not be impaired.
	Lockwire (item 7, Appendix D).	b. **Install** a new tube and **secure** with clamp, washer and screw. **Secure** the screw with lockwire.

2-17. Diffuser Scroll - Repair - Continued

LOCATION/ITEM	REMARKS	ACTION



2-18. Diffuser Vent Orifice Selection

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Lockwire (item 17, Appendix D)

References
Table 1-10

LOCATION/ITEM	REMARKS	ACTION

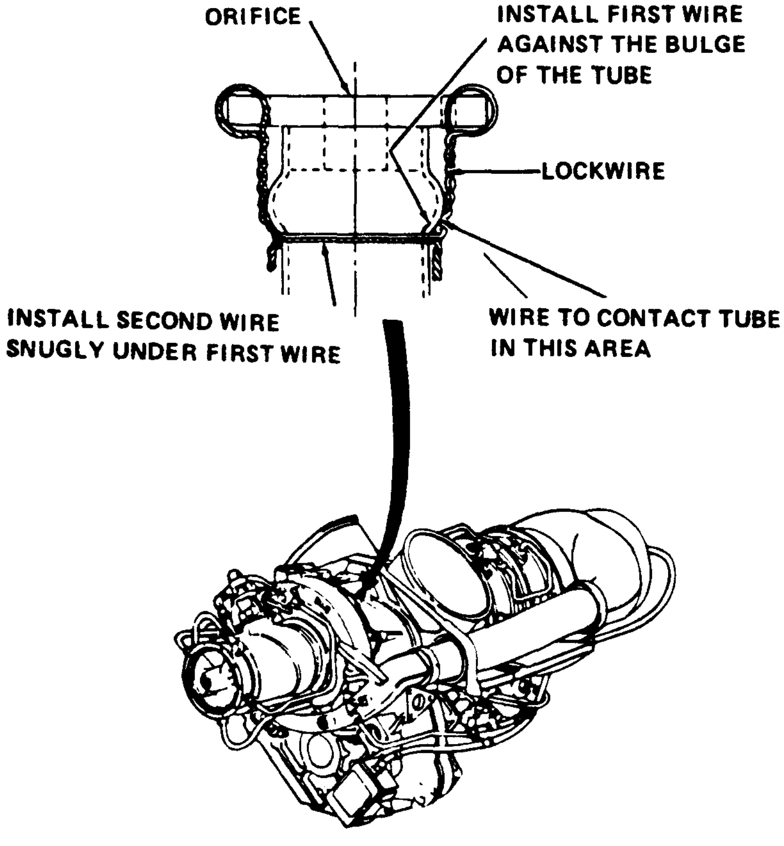
NOTE

Diffuser orifice may be safetied either by starting at the top and ending around the tube and ending at the top.

New compressors should have a -2 size orifice installed on the diffuser vent tube. If the compressor has not been replaced, use the orifice that is presently installed on the vent tube.

2-18. Diffuser Vent Orifice Selection - Continued

LOCATION/ITEM	REMARKS	ACTION
		Clean area around orifice. **Perform** settings 7 through 10 of the test run schedule in table 1-10. After the test run, **inspect** the area around the orifice. If there is any evidence of smoking or spewing from the vent, **reduce** the orifice size by **installing** the next lower dash number orifice. (See figure.) **Secure** the orifice with lockwire (item 17, Appendix D), **Repeat** the run, inspection, and orifice replacement until no evidence of spewing or smoking is present.



2-19. Deleted.

Pages 2-71 through 2-73 deleted.

2-20. Compressor - Removing From Shipping Container

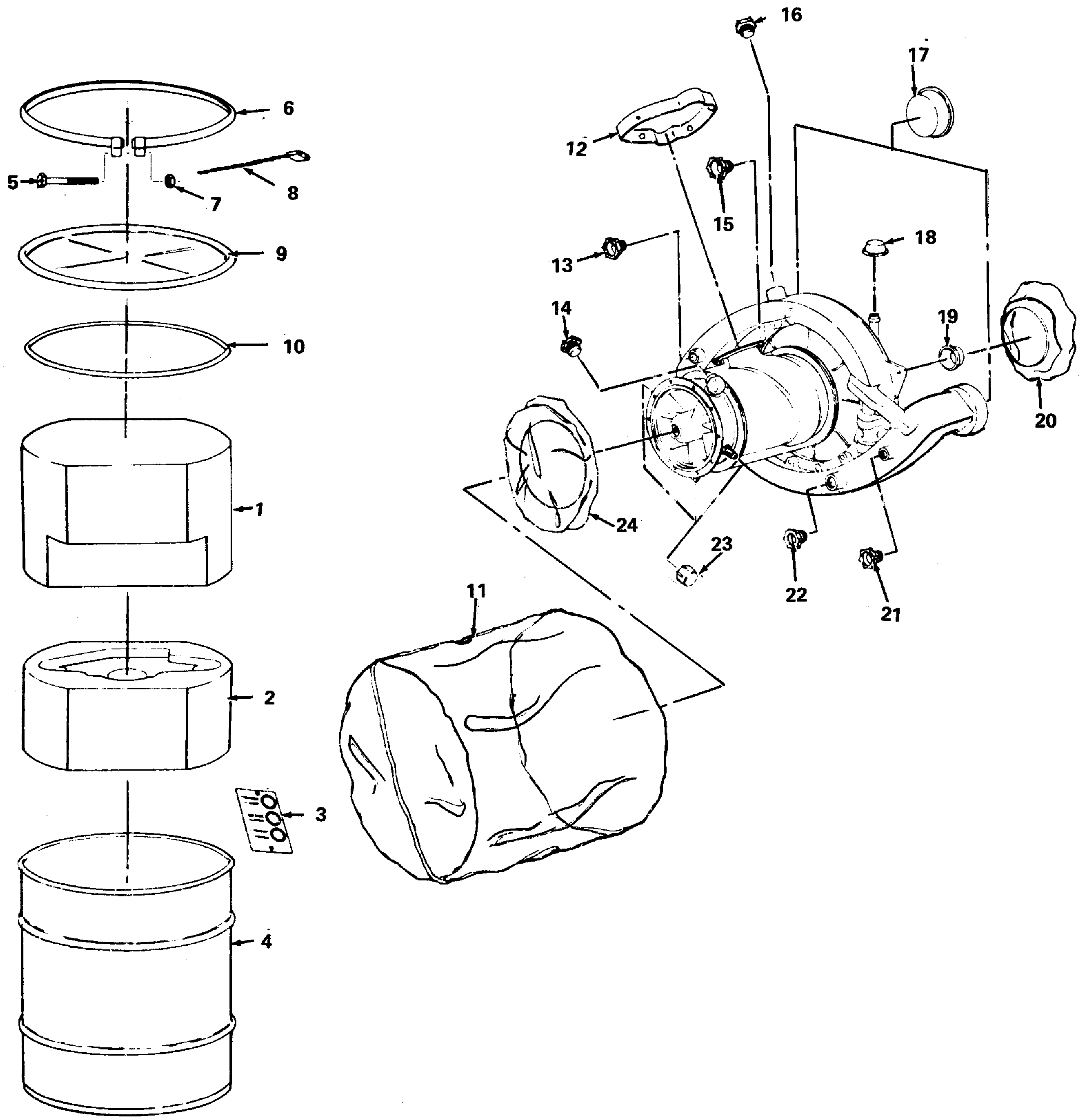
INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR SHIPPING CONTAINER/	NOTE Before removing the compressor from the shipping container, inspect for evidence of rough handling or tampering.	
1. Compressor		a. **Remove** wire seal (8), and **loosen** nut (7) and **remove** ring (6), cover (9), and gasket (10) and bolt (5). b. **Note** the condition of the humidity indicator (3). **c. Remove** compressor assembly records and dehydrating agent from voids on each side of the top cushion (1). d. **Remove** top cushion (1). **e. Remove** compressor from the container body (4) and bottom cushion (2). f. **Remove** the compressor from plastic bag (11). **g. Remove** all shipping caps, plugs, and covers from compressor as required.

2-20. Compressor - Removing From Shipping Container - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR SHIPPING CONTAINER/ - Continued		h. **Place** all shipping parts inside shipping container (less desiccant) and **replace** the cover.



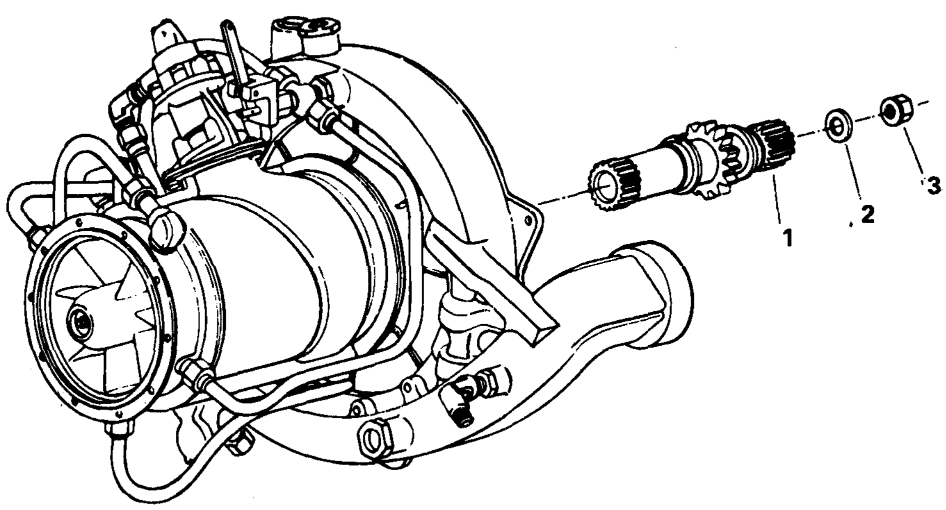
2-21. Adapter Spur Gearshaft - Inspection

INITIAL SETUP

Applicable Configuration
All

Special Tools
Wrench, Tool No. 6795588

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/		
1. Adapter Spur Gearshaft	Visually inspect the adapter spur gearshaft for excessive wear on the 17-tooth gear and splines. Replace the compressor if excessive wear is noted.	
	The runout may be checked using a suitable indicator in a magnetic holder mounted anywhere on the compressor assembly.	**Check** the runout of the adapter spur gearshaft. The gearshaft runout must not exceed 0.003 in. (0.0076 cm) TIR.
2. Nut		**Check** nut (3) for tightness. The nut should be tightened to 50-55 in. lb (0.6 -0.65 kg/m) plus locknut drag, using wrench, tool no. 6795588. **Replace** nut if locknut drag is less than 5 in. lb (0.1 kg/m) in the last two turns. **Recheck** the gearshaft runout. If not within limits, re**place** the compressor assembly.



CHAPTER 3

COMBUSTION SECTION

OVERVIEW

This chapter contains procedures for the maintenance and preservation of the combustion section. Paragraphs following outline disassembly, inspection, repair, and additional requirements needed to maintain the combustion section and related parts. Procedures requiring maintenance on the Aviation Intermediate Maintenance (AVIM) level are specified and must be performed as such. Paragraphs in which the maintenance level is not specified shall be considered Aviation Unit Maintenance (AVUM) and may be performed at this level or a higher level of maintenance.

3-1. COMBUSTION MAINTENANCE PROCEDURES AND FIRST-STAGE NOZZLE SHIELD INSPECTION.

Visually inspect all subassemblies and accessories removed from the engines combustion section. Check for loose or missing parts. Note any damage or excessive wear. Repair damaged parts where possible. Replace damaged parts that cannot be repaired. Disassembly procedures provided enable required cleaning, inspection, repair or replacement.

3-2. Outer Combustion Case - Inspection.

INITIAL SETUP

Applicable Configuration	References
All	Para 3-3

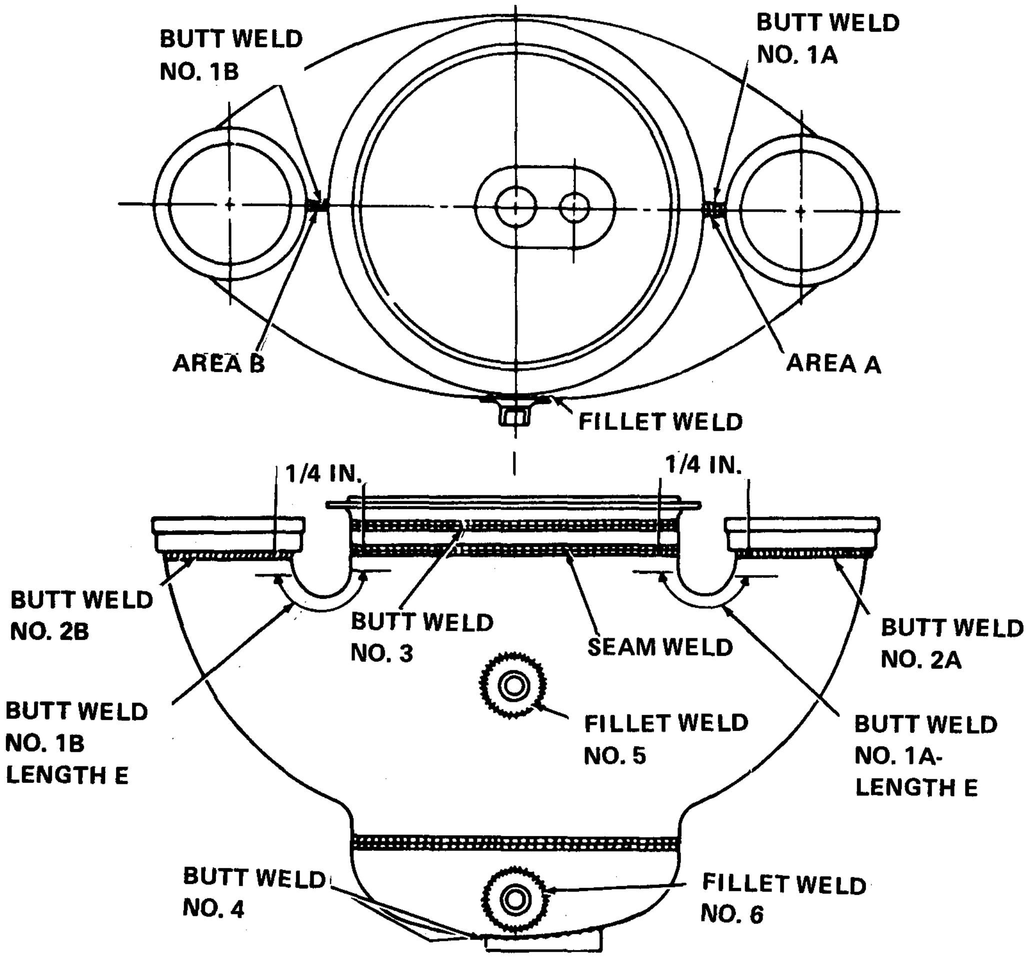
3-2. Outer Combustion Case - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Outer Combustion Case	Visually inspect for cracks and dents in sheet metal surfaces and wear in the air tube bosses. Replace the outer combustion case if the repairable limits are exceeded.	Check for cracks in the outer shell. Replace the outer comubustion case if cracks exceed the limits shown in figure. Weld all repairable cracks. (Refer to paragraph 3-3.)
		Check for cracks in the liner (inner basket). Weld-repair cracks three inches (71.2 mm) or less in length and a minimum of one inch (25.4 mm) apart. (Refer to paragraph 3-3.) Replace the outer combustion case if cracks are greater than three inches (71.2 mm) in length cracks are less than one inch (25.4 mm) apart, or there are more than two cracks.
		Check for dents in outer shell. Replace the outer combustion case if dents are more than 1/8 inch (3.2 mm) deep.
	Wear in air tube bosses.	Check for wear in the air tube bosses. Replace outer combustion case if Step wear is greater than 0.004 inch (0.010 mm) (measured from adjacent unworn area).
	Out of round at air tube bosses.	Maximum of 0.004 in. (0.10 mm) out of round.

3-2. Outer Combustion Case - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION

ENGINE/ - Continued



NOT ACCEPTABLE AND NOT REPAIRABLE

1. ARC STRIKES OR CRACKS IN SHEET METAL AREA WITHIN 2 IN. (50.8 MM) OF BUTT WELDS 1A & 1B IN LENGTH E.
2. CRACKS IN BUTT WELDS NO. 1A& 1B IN LENGTH E.
3. CRACKS IN OR ADJACENT TO BUTT WELD NO. 4.

WELD REPAIR PERMITTED

1. CRACKS UP TO 1/16 IN. (1.6 MM) LENGTH IN BUTT WELDS 1A& 1B OUTSIDE OF LENGTH E.
2. CRACKS UP TO 1 /2 IN. (12,7 MM) LENGTH OR SEPARATED CRACKS FOR AN ACCUMULATED LENGTH OF 14/2 IN. (38.1 MM) TOTAL LENGTH IN BUTT WELDS 3 AND ADJACENT FLANGE.
3. CRACKS UP TO 1/2 IN. (12.7 MM) LENGTH OR SEPARATED CRACKS FOR AN ACCUMULATED LENGTH OF 1/2 IN. (12.7 MM) LENGTH IN BUTT WELDS 2A & 2B AND ADJACENT FLANGE.
4. CRACKS UP TO 1/2 IN. (12.7 MM) LENGTH IN SHEET METAL AREA WITHIN 2 IN. OF BUTT WELDS 2A& 2B IF AT LEAST 2 IN. (50.8 MM) FROM BUTT WELDS 1A& 1B IN LENGTH E.
5. CRACKS UP TO 1/2 IN. (12.7 MM) LENGTH IN SHEET METAL AREA ADJACENT TO BUTT WELD 3.
6. CRACKS UP TO 3/8 IN. (9.5 MM) LENGTH IN FILLET WELDS 5 AND 6
7. CRACKS IN AREAS OTHER THAN ABOVE UP TO 1 IN. (25.4 MM) LENGTH.

3-3. Outer Combustion Case - Weld-Repair (AVIM)

INITIAL SETUP

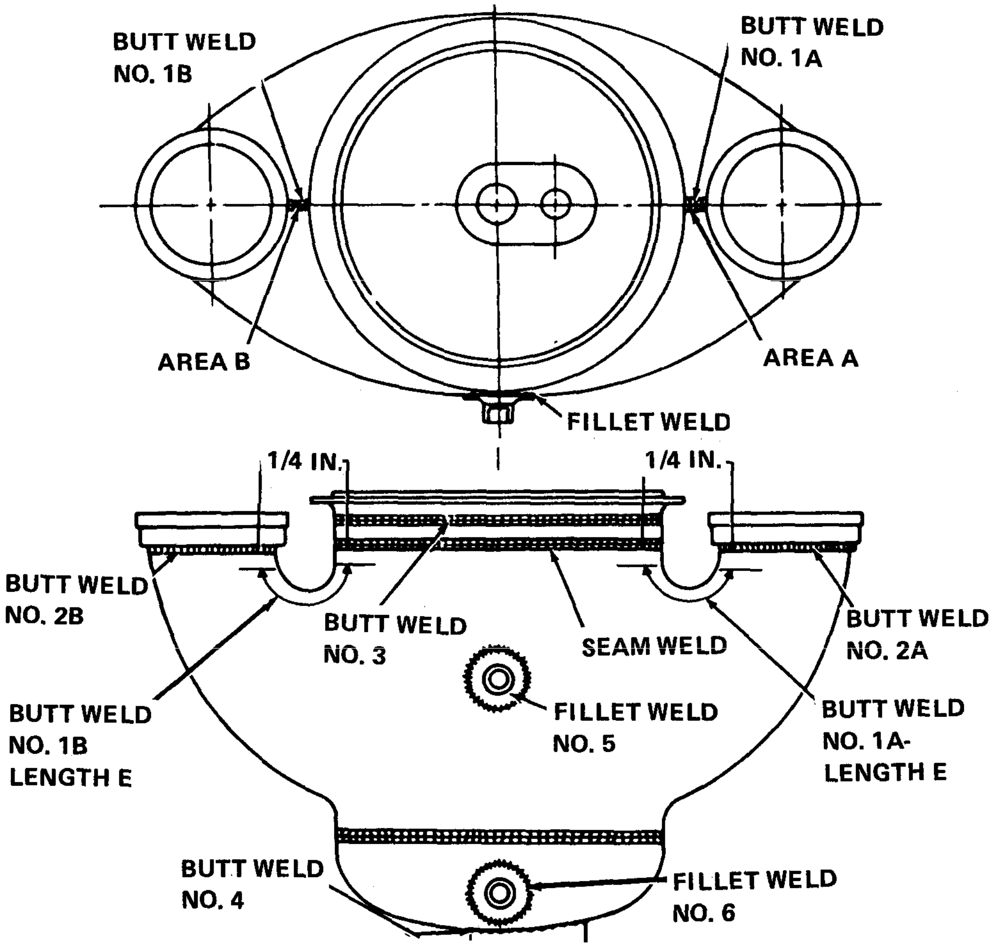
Applicable Configuration
All

Consumable Materials
Acetone (item 39, Appendix D)
Class 6 Weld Rod (item 40, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
COMBUSTION SECTION/		
1. Outer Combustion Case		**Weld-repair** cracks in the outer combustion case as follows. (See the following figure.)
		a. Remove surface contamination using a stainless steel wire brush.
	Acetone (item 39, Appendix D).	b. **Clean** the area with acetone using a clean cloth for the application.
	Class 6 weld rod (item 40, Appendix D).	c. **Weld** cracks using inert gas arc and class 6 weld rod. **Apply** 1/8 inch (3.2 mm) wide stringer bead using medium heat input. Cool each bead with wet cloth immediately. **Do not apply** another bead until cool enough to touch by hand.
		d. To weld cracks in butt weld areas (2A, 2B and 3) **back up the area** with a copper block and argon gas back-up and **build up** the area 1/32 inch (0.8 mm) minimum.
		e. **Inspect** the weld for undercut, cracking and discontinuities. There must be no evidence of undercutting and cracking.

3-3. Outer Combustion Case - Weld-Repair (AVIM) - Continued

LOCATION/ITEM	REMARKS	ACTION
COMBUSTION SECTION/ - Continued		



NOT ACCEPTABLE AND NOT REPAIRABLE

1. ARC STRIKES OR CRACKS IN SHEET METAL AREA WITHIN 2 IN. (50.8 MM) OF BUTT WELDS 1A & 1B IN LENGTH E.
2. CRACKS IN BUTT WELDS NO. 1A&1B IN LENGTH E.
3. CRACKS IN OR ADJACENT TO BUTT WELD NO. 4.

WELD REPAIR PERMITTED

1. CRACKS UP TO 1/16 IN. (1.6 MM) LENGTH IN BUTT WELDS 1A & 1B OUTSIDE OF LENGTH E.
2. CRACKS UP TO 1/2 IN. (12.7 MM) LENGTH OR SEPARATED CRACKS FOR AN ACCUMULATED LENGTH OF 1-1/2 IN. (38.1 MM) TOTAL LENGTH IN BUTT WELDS 3 AND ADJACENT FLANGE.
3. CRACKS UP TO 1/2 IN. (12.7 MM) LENGTH OR SEPARATED CRACKS FOR AN ACCUMULATED LENGTH OF 1/2 IN. (12.7 MM) LENGTH IN BUTT WELDS 2A & 2B AND ADJACENT FLANGE.
4. CRACKS UP TO 1/2 IN. (12.7 MM) LENGTH IN SHEET METAL AREA WITHIN 2 IN. OF BUTT WELDS 2A& 2B IF AT LEAST 2 IN. (50.8 MM) FROM BUTT WELDS 1A & 1B IN LENGTH E.
5. CRACKS UP TO 1/2 IN. (12.7 MM) LENGTH IN SHEET METAL AREA ADJACENT TO BUTT WELD 3.
6. CRACKS UP TO 3/6 IN. (9.5 MM) LENGTH IN FILLET WELDS 5 AND 6.
7. CRACKS IN AREAS OTHER THAN ABOVE UP TO 1 IN. (25.4 MM) LENGTH.

3-4. Combustion Liner - Inspection

INITIAL SETUP

Applicable Configuration
All

References
Para 3-5

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Combustion Liner	Inspect the combustion liner as outlined below.	

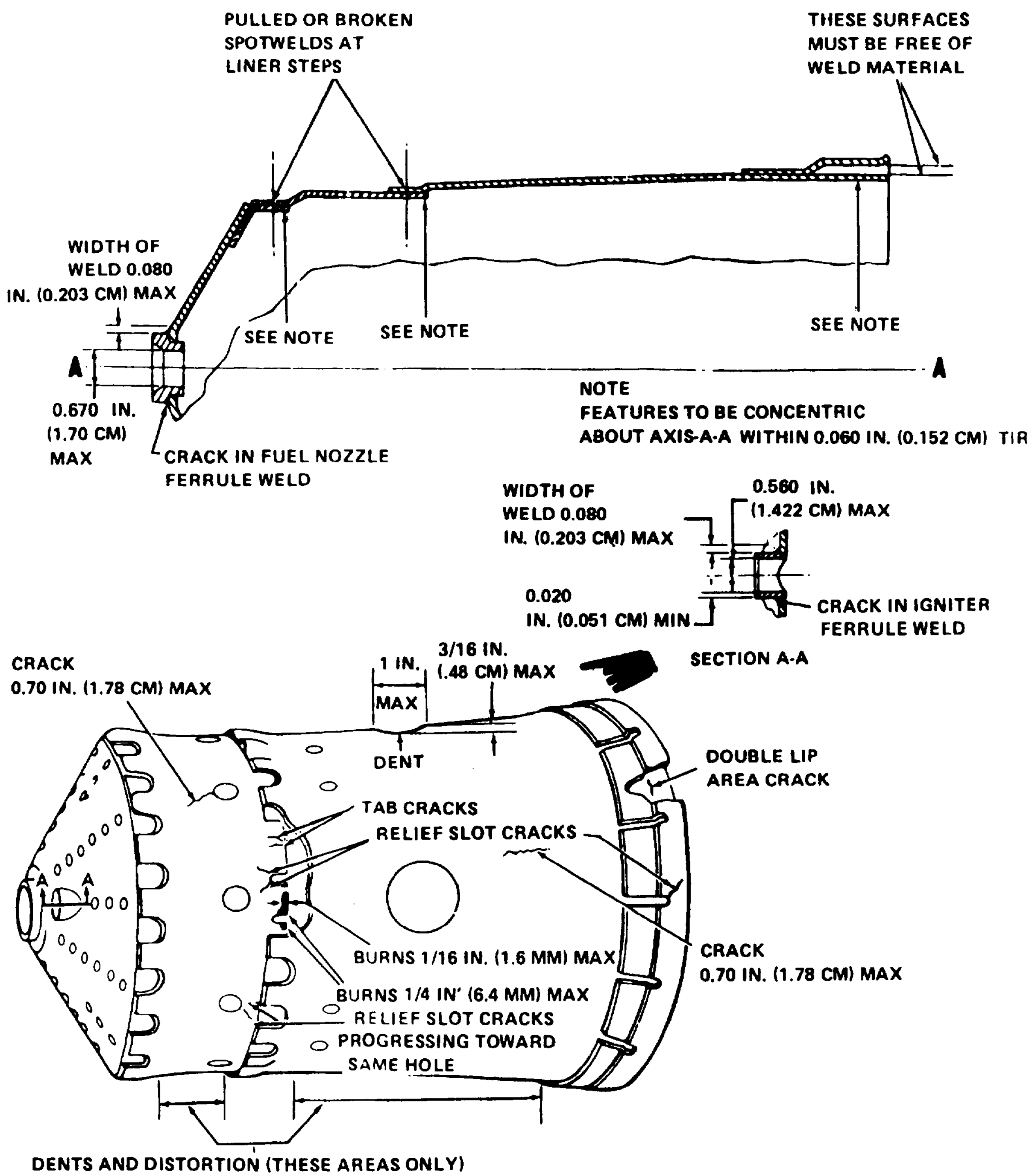
Combustion Liner Inspection

Item	Inspection and Method	Serviceable Limits	Repairable Limits	Corrective Action
1	Pulled or broken spotwelds at liner step. (See preceding figure.) (Visual)	None permitted.	Not more than four adjacent spotwelds or 40 percent of total per step.	**Weld-repair. (Refer** to paragraph 3-5.)
2	Handling damage. **(See** preceding figure.)			
	a. Mashed-out-of-round. (Visual)	None permitted.	Able to straighten to concentricity limits.	**Straighten** and **re-form.**
	b. Dented. (Visual)	None permitted.	Any dent that remains within the area shown on preceding figure and does not cause thin-out of metal. Straightened dents must meet concentricity limits.	**Straighten** and **re-form.**
3	Localized high temperature distortion indicated by warping or rippling of the liner surface and is normally accompanied by discoloring (burning) of the area. (Visual)	Warpage less than 1/16 inch (1.6 mm) deep over an area 1 inch (25.4 mm) in diameter and remaining within the area shown on following figure.	Not repairable.	**Replace** liner.
4	Burning in area of relief slots. (See preceding figure.) (Visual)	Rear edge burned less than 1/16 inch (1.6 mm) or both corners burned less than 1/4 inch (6.4 mm) along relief slot.	Not repairable.	**Replace** liner.

3-4 Combustion Liner - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION

ENGINE/ - Continued



3-4. Combustion Liner - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION

ENGINE - Continued

Combustion Liner Inspection - Continued

Item	Inspection and Method	Serviceable Limits	Repairable Limits	Corrective Action
5	Check on outside of liner. (See preceding figure.)	None permitted.	Any number as long as crack length does not exceed limits shown on preceding figure. Not repairable if crack cannot be completely welded and/or weld obstructs cooling air passage.	Weld-repair. (Refer to paragraph 3-5.)
6	Crack in tab end inside liner. (See preceding figure.) (Visual)	No cracks greater than 1/4 inch (6.44 mm) long and no more than two cracks per tab.	Not repairable.	Replace liner.
7	Cracks at two adjacent relief slots progressing toward same hole. (See preceding figure.) (Visual)	Not permitted.	Not repairable.	Replace liner.
8	Crack in relief slots at combustion liner steps. (See preceding figure.) (Visual)	Any number 3/16 inch (4.8 mm) or less in length.	Any number 1/2 inch (12.7 mm) or less in length.	Weld-repair. (Refer to paragraph 3-5.)
9	Crack in double lip area. (See preceding figure.) (Visual)	None permitted.	Not more than 3 inches (76.2 mm) long.	Weld-repair. (Refer to paragraph 3-5.)
10	Crack in igniter ferrule attaching weld. (See preceding figure.) (Visual)	None permitted.	Crack does not exceed 1/4 inch (6.4 mm) long.	Weld-repair. (Refer to paragraph 3-5.)
11	Roughened igniter ferrule ID. (See preceding figure.) (Visual)	None permitted.	ID does not exceed 0.560 inch (1.422 cm) after polishing.	Polish ID. (Refer to paragraph 3-5.)

3-4. Combustion Liner - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION

Combustion Liner Inspection - Continued

Item	Inspection and Method	Serviceable Limits	Repairable Limits	Corrective Action
12	Worn or distorted (out-of-round) igniter ferrule. (See preceding figure.) (Visual)	Wall thickness is not less than 0.020 inch (0.05 1 cm) and/or ID does not exceed 0.560 inch (1.422 cm).	Not repairable.	Replace liner.
13	Crack in fuel nozzle ferrule attaching weld. (See preceding figure.) (Visual)	None permitted.	Crack does not exteed 1/4 inch (6.4 mm) long.	Weld-repair. (Refer to paragraph 3-5.)
14	Roughened fuel nozzle ferrule ID. (See preceding figure.) (Visual)	None permitted.	ID does not exceed 0.670 inch (1.702 cm) after polishing.	Polish ID. (Refer to pargraph 3-5.)
15	Worn or distorted (out-of-round) fuel nozzle ferrule. (See preceding figure.) (Visual)	ID does not exceed 0.670 inch (1.702 cm).	Not repairable.	Replace liner.
16	Crack around spotwelds on heat shield.	No cracks with a greater length of 50 percent of the distance around the weld.	Not repairable.	Replace shield.

3-5. Combustion Liner - Weld Repair (AVIM)

INITIAL SETUP

Applicable Configuration

All

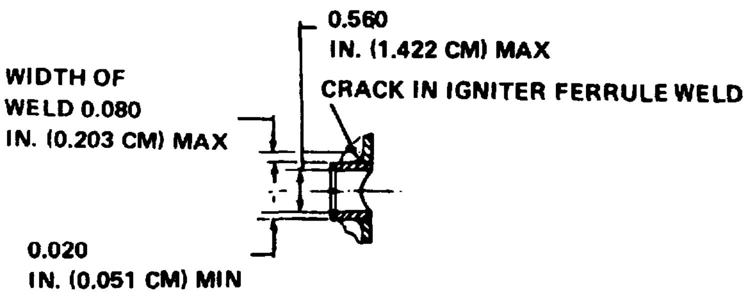
Consumable Materials

Acetone (item 39, Appendix D)
Class 6 Weld Rod (item 40, Appendix D)
Emery Cloth (item 28, Appendix D)
Class 12 Weld Rod (item 40, Appendix D)

References

Para 3-4

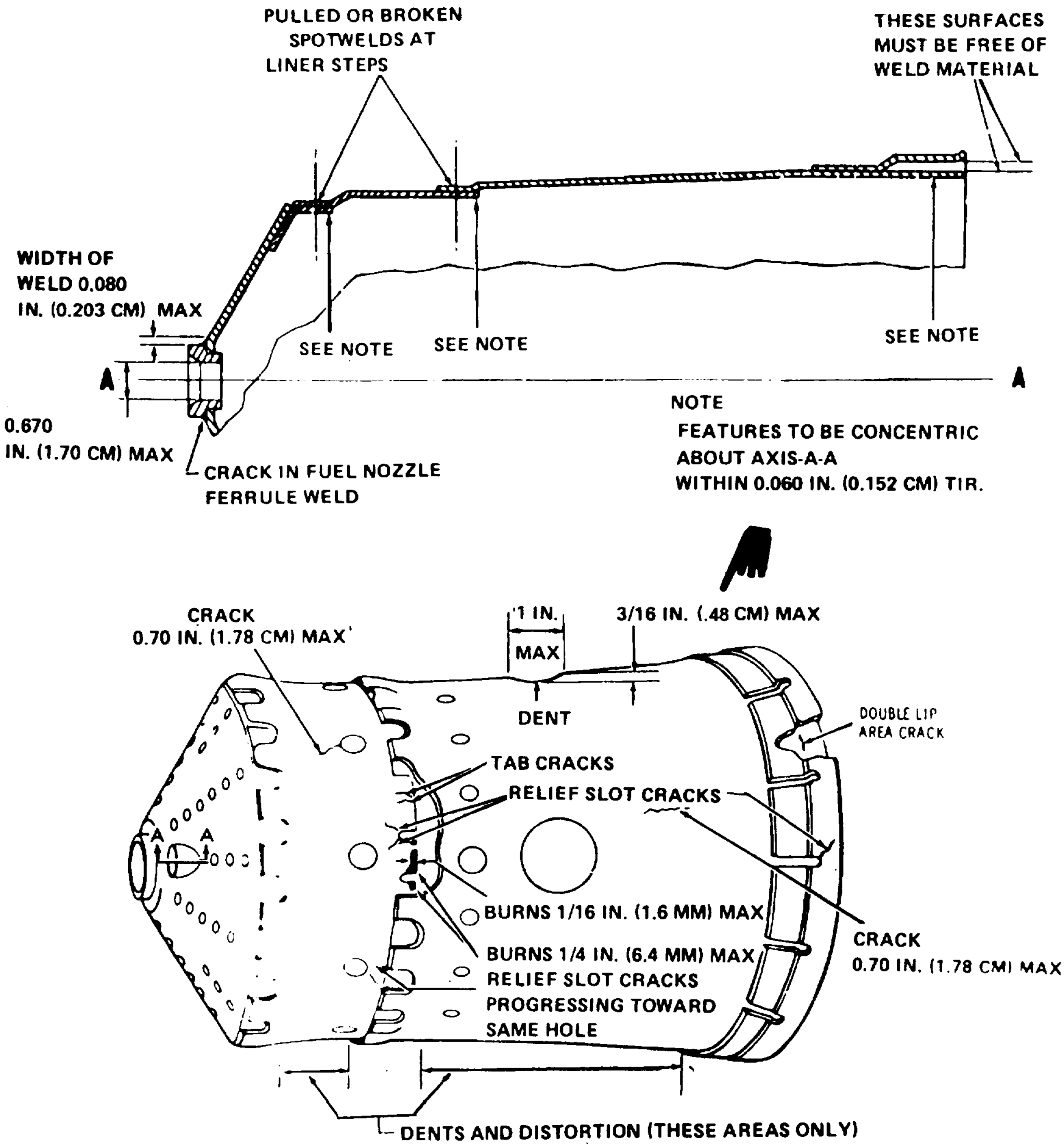
LOCATION/ITEM	REMARKS	ACTION
COMBUSTION SECTION/		
1. Combustion Liner, Pulled or Broken, Spotweld		Weld-repair pulled or broken spotwelds in the lines as follows. (Refer to the following figure.)
		a. Drill a 3/16 inch (4.8 mm) diameter hole through the outer liner section only.
		b. Remove surface contamination using a stainless steel wire brush.
	Acetone (item 39, Appendix D).	c. Clean the area with acetone using a clean cloth for the application.
	Class 6 Weld Rod (item 40, Appendix D).	d. Press the liner sections together and plug weld using inert gas arc with class 6 weld rod. Weld material must not extend into air openings. Do not grind the weld unless weld material blocks air entry.



SECTION A-A

3-5. Combustion Liner - Weld-Repair (AVIM) - Continued

LOCATION/ITEM	REMARKS	ACTION
COMBUSTION SECTION/ - Continued		



3-5. Combustion Liner - Weld Repair (AVIM) - Continued

LOCATION/ITEM	REMARKS	ACTION
COMBUSTION SECTION/ - Continued		
2. Cracks in Liner Surface Relief Slots, and Double Lip Area		**Weld-repair** cracks as follows:
		a. **Remove** surface contamination using a stainless steel brush.
	Acetone (item 39, Appendix D).	b. **Clean** the area with acetone using a clean cloth for the application.
	Class 6 Weld Rod (item 40, Appendix D).	**Weld** Cracks using inert gas arc with class 6 weld rod. Weld material **must not obstruct** cooling air passage. **Do not grind** weld unless weld material obstructs cooling air passage.
3. Cracks in Igniter and Fuel Nozzle Ferrule Attaching Welds		**Repair** cracks in the attaching (fillet) weld as follows:
		a. **Remove** surface contamination using a stainless steel wire brush.
	Acetone (item 39, Appendix D)	b. **Clean** the area with acetone using a clean cloth for the application.
	Class 6 Weld Rod (item 40, Appendix D). Class 12 Weld Rod (item 40, Appendix D).	c. **Weld** cracks using inert gas arc. Use class 6 weld rod on the igniter ferrule. Use class 12 weld rod on the fuel nozzle ferrule.

3-5. COMBUSTION LINER - WELD REPAIR (AVIM) - Cont.

LOCATION/ITEM	REMARKS	ACTION
COMBUSTION SECTION/– Continued		
4. Fuel Nozzle and Igniter Ferrule ID Roughness	Emery Cloth (item 28, Appendix D).	**Remove** roughened or galled surfaced in the ID of the fuel nozzle and igniter ferrules by **polishing** with emery cloth. **Polish** as required to **remove** all surface roughness. **Check** to insure that the ID, after polishing, **does not exceed** the limit specified in paragraph 3-4.

3-6. COMBUSTION SECTION - REMOVAL.

INITIAL SETUP

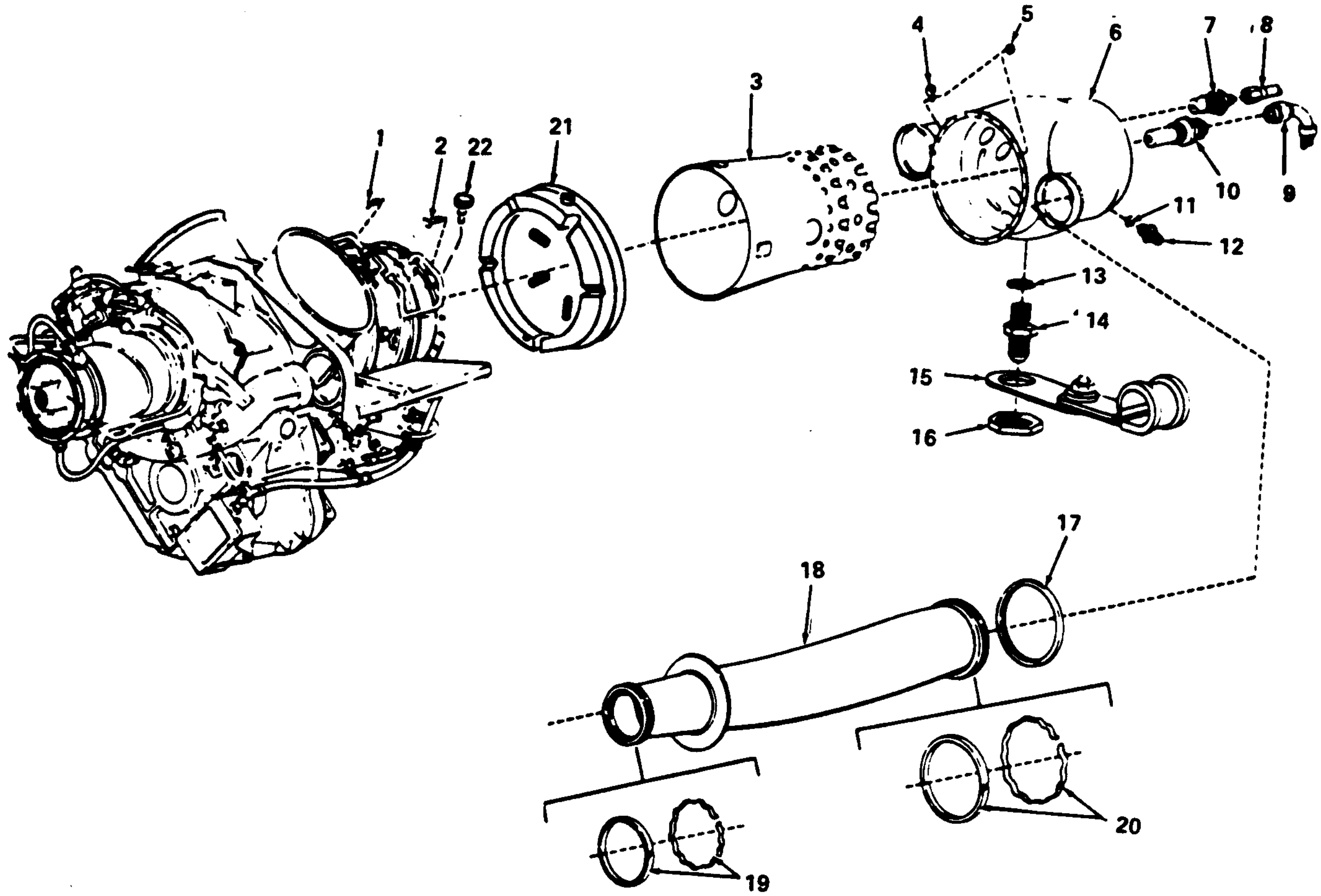
Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
	WARNING Before removing combustion section, check engine historical log to see if engine has used lead based emergency fuels. Handling lead residue coated parts with open cuts or scratches on hands is extremely dangerous. Always wear gloves when checking residue coated turbine or exhaust parts.	
1. Drain Hose		**Disconnect** drain hose from the burner drain valve (12 or 14).
2. Lockwire on Jamnut (16)		**Remove.**
3. Jamnut (16)		**Remove.**
4. Bracket (15)		**Disengage** bracket (15) from engine.

3-6. Combustion Section - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION

ENGINE/-Continued



1. Bolt
2. Bolt (23)
3. Combustion Liner
4. Clamp
5. Nut (24)
6. Outer Combustion Case
7. Fuel Nozzle
8. Fuel Hose
9. Igniter Lead
10. Spark Igniter
11. Preformed Packing
12. Drain Valve (OH-6)
    Plug (OH-58)
13. Preformed Packing
14. Drain Valve (OH-58)
    Plug (OH-6)
15. Bracket
16. Jamnut
17. Retaining Ring
18. Compressor Discharge Air Tube
19. Seal Ring (2 piece)
20. Seal Ring (2 piece)
21. Shield Assembly
22. Plug Machine

3-6. Combustion Section - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued	**WARNING** **Insure ignition system has been off for at least f ive minutes before disconnecting the igniter lead. Electrical shock could occur. Ground the lead to the engine using an insulated screwdriver to dissipate any energy stored in the exciter.**	
5. Igniter Lead (9)		**Disconnect** from spark igniter (10).
6. Fuel Hose (8)		**Remove** fuel hose (8) between the firewall shield and fuel nozzle (7).
	NOTE If a new outer combustion case (6) is to be installed, proceed with the next two items.	
7. Fuel Nozzle (7), and Spark Igniter (10)		**Remove** from outer combustion case (6).
8. Drain Valve and Plugs (12 and 14)		**Remove** from bottom of outer combustion case (6). **Discard** preformed packings (11 and 13).
9. Retaining Rings (17)		**Remove** from outer combustion case (6) and slide them forward on the discharge air tubes (18).
10. Nuts (5), Clamp (4), and Bolts (1 and 2)		**Remove** 24 nuts(5), one clamp (4) and 24 bolts (1 and 2) a.t the combustion case splitline.

3-6. COMBUSTION SECTION - REMOVAL - Cont.

LOCATION/ITEM	REMARKS	ACTION
ENGINE/–Continued		
11. Combustion Case (6), Air Tubes (18)		**Separate** the air tubes from the outer combustion case.
12. Combustion Liner (3)		Remove from the engine.
13. Seal Rings (19)		**Remove** from the small ends of the air tubes.
14. Retaining Rings (17) and Seal Ring (20)		**Remove** from the large ends of the air tubes.
15. Lockwire and Positioning Plugs (22)		**Remove** and lift off first stage turbine nozzle shield (21).

3-7. COMBUSTION SECTION – INSTALLATION

INITIAL SETUP

Applicable Configuration
All

Special Tools
Turnover Stand, tool no. 6795579
Installation Clamp, tool no. 6799953
Installation Clamp, tool no. 6799952

Consumable Materials
Antiseize Compound (item 6, Appendix D)
Lockwire (item 7, Appendix D)
Molykote (item 41, Appendix D)
Lubricating Oil (item 5, Appendix D)
Lockwire (item 7, Appendix D)

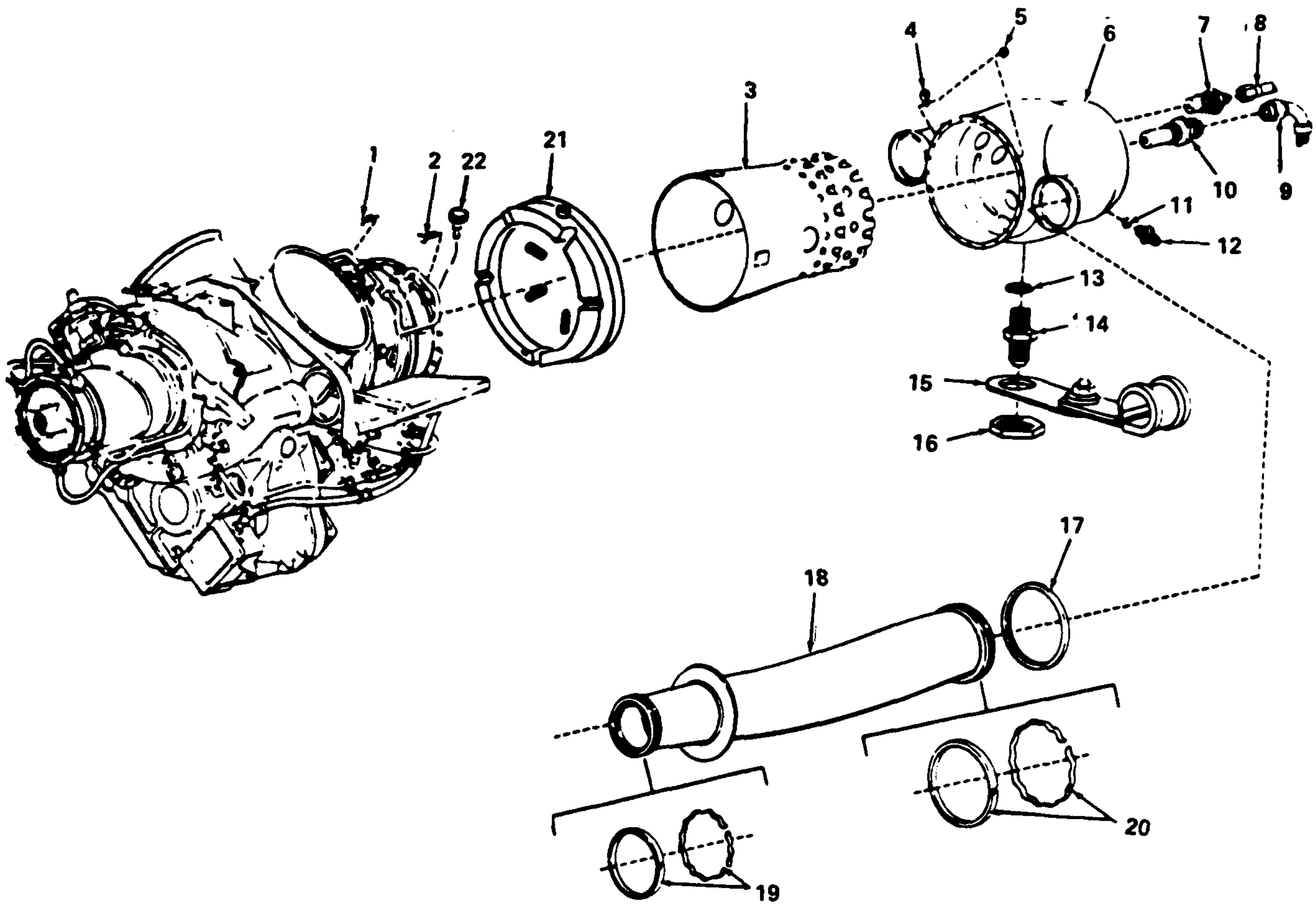
3-7. COMBUSTION SECTION – INSTALI.ATION - **Cont.**

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	NOTE This paragraph provides instruction for installing the combustion section on the engine while the engine is installed in turnover stand (tool no 6795579). If the turnover stand is used, rotate the engine in the stand to a vertical position with the compressor on the bottom.	
1. First Stage Nozzle Shield		**Install** first stage nozzle shield (21), if **removed.**
2. Plugs (22)	Antiseize Compound (item 6, Appendix D). LockWire (item 7, Appendix D).	**Apply** antiseize compound and **install** two positioning plugs (22). **Tighten** to 100 to 150 in.-lb. (1.15 to 1.7 kg/m) **and secure** with lockwire.
3. Combustion Liner (3)		Place combustion liner (3) over first stage turbine nozzle shield with igniter plug opening at the nine o'clock position (as viewed from rear of engine).
4. Retaining Rings (17)		**Slip** retaining rings (17') over the large ends of compressor discharge air tubes (18).

3-7. Combustion Section - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION

ENGINE/-Continued



1. Bolt
2. Bolt (23)
3. Combustion Liner
4. Clamp
5. Nut (24)
6. Outer Combustion Case
7. Fuel Nozzle
8. Fuel Hose
9. Igniter Lead
10. Spark Igniter
11. Preformed Packing
12. Drain Valve (OH-6)
    Plug (OH-58)
13. Preformed Packing
14. Drain Valve (OH-58)
    Plug (OH-6)
15. Bracket
16. Jamnut
17. Retaining Ring
18. Compressor Discharge Air Tube
19. Seal Ring (2 piece)
20. Seal Ring (2 piece)
21. Shield Assembly
22. Plug Machine

3-7. Combustion Section - Installation-Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
5. Seal Ring Assemblies (19 and 20)	Molykote (item 41, Appendix D).	Apply mol ykote to seal ring assemblies (19 and 20) if they do not incorporate a previously applied bonded lubricant. Install the individual components of seal assemblies (19 and 20) and compressor discharge air tubes (18). On the small end of air tubes (18), position ring gaps 180 degrees apart with gap of seal rings to the outboard side of tubes (18). On large end of tubes (18), position ring gaps 180 degrees apart with the gap of seal rings to the inboard side of tubes (18).
6. Left-Hand Compressor Discharge Air Tube (18)	Installation **Clamp No.** 6799953.	**Insert** left-hand compressor discharge air tube (18) through firewall shield, Compress seal ring with the compressor discharge air tube-to-compressor scroll installation clamp. Mate air tube (18) with compressor scroll, then, remove installation clamp .
7. Right Hand Compressor Discharge Air Tube (18)		Install in the same manner used for installing the left-hand tube above.

3-7. Combustion Section - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
8. Seal Rings (20)	Installation Clamp No. 6799952.	**Compress** seal rings at large end of air tube (18) with compressor discharge air tube to outer combustion case installation clamps. Then, **place** outer combustion case (6) over combustion liner (3) while **mating** the case (6) to compressor discharge air tubes (18).

NOTE

The case (6) is properly indexed when drain port is at the bottom of engine. Also check to insure that igniter plug hole in the outer combustion case (6) aligns with the igniter plug hole in combustion liner (3) before inserting attaching bolts.

NOTE

The mating notches on the combustion air tubes and combustion section must be aligned prior to installing retaining rings on the AFT end of the combustion tubes.

LOCATION/ITEM	REMARKS	ACTION
9. Bolts (1 and 2)	**Antiseize Compound (item 6, Appendix D).** The half-inch length bolt is used to secure the thermocouple harness clamp (4) on the rear side of the splitline flange at bolt position 6 (viewed from the rear of the engine with 1 at top center).	**Coat** threads of the 24 outer combustion case attaching bolts (1 and 2) lightly with antiseize compound. **Secure** outer combustion case (6) to the gas producer turbine support with 24 bolts (1 and 2) and nuts (5). **Tighten** nuts (5) to 20 to 30 in.lb (0.2-0.3 kg/m). **Remove** the installation clamps. **Secure** the compressor discharge air tubes (18) to the outer combustion case (6) with retaining rings (17).

3-7. Combustion Section - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
10. Burner Drain Valve (12 or 14)		**If removed, install** the following in the outer combustion case (6):
	Antiseize compound (item 6, Appendix D) Lubricant (item 5, Appendix D).	a. **Apply** antiseize compound to threads, then **install** burner drain valve (14), and plug (12), each with lubricated preformed packing (11 or 13). **Tighten** drain valve and the plug to 120 to 140 in. lb (1.4-1.6 kg/m) **and secure** plug (12) with lockwire.
		b. **Install** fuel nozzle (7). **Do not apply** antiseize compound to fuel nozzle threads. **Tighten** the fuel nozzle to 200 to 300 in. lb (2.3 to 3.5 kg/m).
	Lockwire (item 7, Appendix D)	c. **Install** spark igniter (10). **Do not apply** antiseize compound to spark igniter threads. **Tighten** spark igniter (10) to 150 to 200 in. lb (1.7 to 2.3 kg/m) **and secure** to fuel nozzle (7) with lockwire.
11. Fireshield-to-Fuel Nozzle Hose (8)		**Install** fireshield-to-fuel nozzle hose (8). **Tighten** coupling nuts to 80 to 120 in. lb (0.9 to 1.4 kg/m).
12. Spark Igniter Lead (9)	Antiseize Compound (item 6, Appendix D).	**Attach** spark igniter lead (9) to spark igniter (10). **Tighten** coupling nut 70-90 in. lb (0.8 to 1.0 kg/m).

3-7. Combustion Section - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
13. Spark Igniter Lead (9)	Antiseize Compound (item 6, Appendix D). Lockwire (item 7, Appendix D).	**Apply** antiseize compound lightly to threads of drain valve (14) or plug. **Clamp** igniter lead (9) to drain valve or plug using the bracket (15). **Secure** clamp using a jamnut (16). **Tighten** jamnut (16) to 55 to 80 in. lb (0.6 to 0.9 kg/m). **Secure** nut with lockwire.
14. Drain Hose		**Attach** drain hose to burner drain valve (12, 14) of the airframe installed engine.
	Make appropriate entry relative to combustion section replacement in the engine log.	
	Test run engine after combustion section replacement in accordance with Section VIII, Chapter 1.	

3-8. Compressor Discharge Air Tube - Inspection

INITIAL SETUP

Applicable Configuration
All

References
Para 3-9

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Air Tubes	Visually inspect for cracks or dents in the sheet metal surfaces and wear in the seal ring grooves. Replace the air tube if repairable limits are exceeded.	
	(Refer to paragraph 3-9.)	**Check** for cracks in sheet metal surface. **Weld-repair** cracks which are three inches (7.6 cm) or less in length and do not extend into brazed joints at the end flanges. **Replace** the air tube if cracks are longer than three inches (7,6 cm) or extend into the brazed joint.
	NOTE Dents should be round with no evidence of a sharp bottom. As a rule of thumb, a dent 1/8 in. (3.2 mm) deep should be a minimum of 1/2 inch (12.7 mm) in diameter.	
		Check for dents in sheet metal surfaces. **Replace** air tube if: a. Any dent is greater than 1/8 inch (3.2 mm). b. There are more than two dents up to 1/8 inch (3.2 mm) deep in or affecting the weld joint (P/N 6850398 and 6870748 tubes only).

3-8. Compressor Discharge Air Tube - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		c. There are more than four dents up to 1/8 inch (3.2 mm) deep in areaa not affected by weld joints.
		d. Any dent is greater than 11/2 inches (3.8 cm) in diameter.

3-9. Compressor Discharge Air Tube - Weld-Repair (AVIM)

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Acetone (item 39, Appendix D)
Class 6 Weld Rod (item 40, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/		
1. Compressor Discharge Air Tube		**Weld-repair** cracks in the compressor discharge air tubes as follows:
		a. **Remove** surface contamination using a stainless steel brush.
	Acetone (item 39, Appendix D).	b. **Clean** the area with acetone using a clean cloth for the application.
	Class **6** Weld Rod (item 40, Appendix D).	c. **Weld** cracks using inert gas arc and class 6 weld rod.
		d. **Do not grind weld** unless weld material extends into air path. Thin out of material from welding or grinding is **not permitted.**

3-10. Compressor Discharge Air Tube Seal Ring - inspection

INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	**CAUTION** **Do not substitute standard rubber "O" rings for the Kalrez synthetic rubber. Due to the high temperature restrictions and thermal gradients, only Kalrez synthetic rubber is authorized for use on the compressor discharge tubes,**	
Compressor Discharge Air Tube Seal Ring	Replace compressor discharge air tube seal rings which exhibit fretting, excessive wear, or distortion. Replace two-piece seals when the spherical radius on the OD is worn flat all the way across. Slight leakage around compressor discharge air tube seal ring is allowed, provided it does not affect engine performance. Some compressor discharge tubes utilize a synthetic rubber, trade name Kalrez, and a steel backup ring as the sealing arrangement. Inspect the synthetic rubber seals and reject any seals that exhibit any tears, cuts, or deformation. Use care in removal or installation of synthetic rubber to avoid damage and make certain that the steel backup ring is installed on the atmospheric side of the compressor discharge tube groove.	

3-11. Burner Drain Valve - Removal, Cleaning, Testing and Installation

INITIAL SETUP

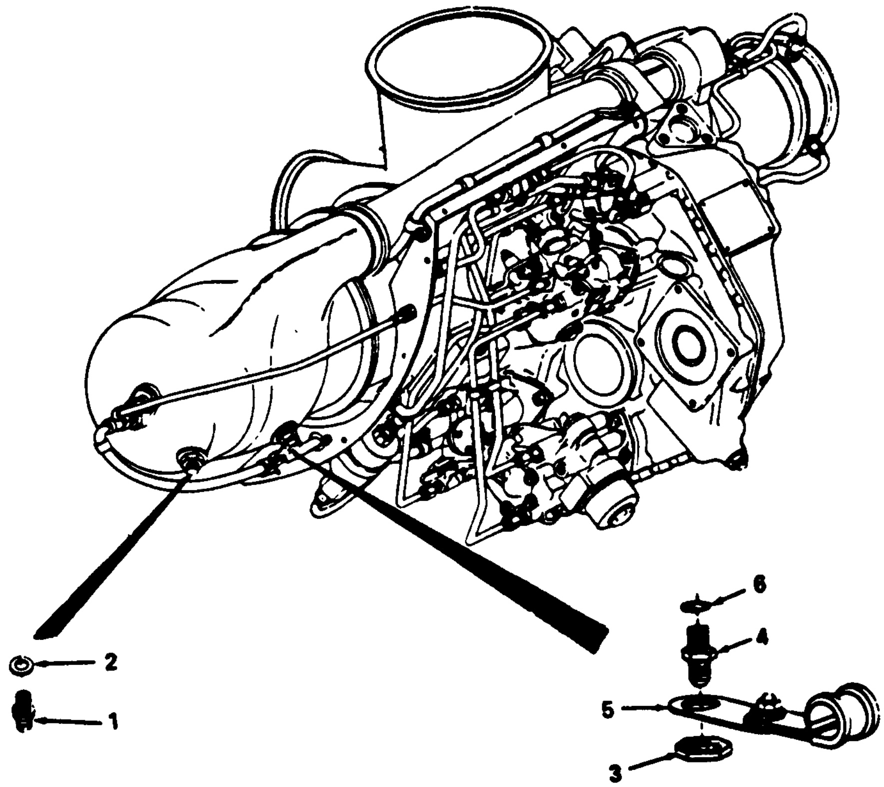
Applicable Configuration
All

Consumable Materials
Carbon Removal Compound (item 22, Appendix D)
Drycleaning Solvent (item 1, Appendix D)
Antiseize Compound (item 6, Appendix D)
Lockwire (item 17, Appendix D)
Lubricating Oil (item 5, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
ENGINE/Burner Drain Valve		
1. Removal		**Remove** drain valve (1) from the outer combustion case and discard preformed packing (2).

3-11. Burner Drain Valve - Removal, Cleaning, Testing and Installation

LOCATION/ITEM	REMARKS	ACTION
ENGINE/Burner Drain Valve - Continued		



LOCATION/ITEM	REMARKS	ACTION
2. Removal		**Remove** lockwire and remove nut (3) from drain valve (4). **Disengage** bracket (5) and remove the drain valve from the outer combustion case. **Discard** preformed packing (6).
3. Cleaning	Solvent (item 22, Appendix D).	**Soak** the valve in solvent.

3-11. Burner Drain Valve - Removal, Testing and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/Burner Drain Valve - Continued	**WARNING** **Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact, Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C-59°C).**	
	Petroleum Solvent (item 1, Appendix D).	**Flush** valve with petroleum solvent. **Pass** solvent through the valve to insure that it is open.
	WARNING **Use approved personnel protective equipment to protect eyes and face when using compressed air. Maximum allowable air pressure for cleaning operations is 30 psi. Do not direct air stream towards yourself or toward another person.**	
		Blow dry with clean compressed air.
4. Testing		**Test** valve to insure that it closes by **applying** air pressure of 8 psig (0.56 kg sq/cm) maximum to the valve.

ENGINE/Burner Drain Valve-Continued

5. Deleted

WARNING

Prolonged contact with lubricating oil (item 5, Appendix D) may cause o skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

6. Installation	Lubricating Oil (item 5, Appendix D). Antiseize Compound (item 6, Appendix D). Lockwire (item 17, Appendix D).	**Lubricate** new preformed packing (6) and place on drain valve (4). **Apply** antiseize compound lightly to threads of drain valve and install in outer combustion case. **Tighten** to 120 to 140 in. lb (1.4 to 1.6 kg/m). **Apply** antiseize compound to threads on the drain valve and install bracket (5) and nut (3). **Tighten** nut to 55 to 80 in. lb (0.6 to 0.9 kg/m) and lockwire drain valve to plug assembly. **Start** engine and check to **insure** that the valve is closed. **Replace** the valve if it fails to close. **Attach** the drain hose to the valve.

CHAPTER 4

POWER TURBINE

OVERVIEW

This chapter contains procedures for the maintenance and preservation of the power turbine. Paragraphs following outline disassembly, inspection, repair, and additional requirements needed to maintain the power turbine and related parts. Procedures requiring maintenance on the Aviation Intermediate Maintenance (AVIM) level are specified and must be performed as such. Paragraphs in which the maintenance level is not specified shall be considered Aviation Unit Maintenance (AVUM) and maybe performed at this level or a higher level of maintenance.

4-1. POWER TURBINE MAINTENANCE PROCEDURES.

Visually inspect all subassemblies and accessories removed from the engines power turbine section. Check for loose or missing parts. Note any damage or excessive wear. Repair damaged parts where possible. Replace dmaaged parts that cannot be repaired. Disassembly procedures provided enable required cleaning, inspection, repair or replacement.

4-2. EXHAUST COLLECTOR SUPPORT - INSPECTION.

3-5. Combustion Liner - Weld Repair (AVIM)

INITIAL SETUP

Applicable Configuration

All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
Exhaust Collector	Visually inspect the exhaust support for cracks. Cracks are not repairable, replace the engine. (Refer to paragraph 1-43 and 7-2.1).	

4-3. Thermocouple Assembly - Inspection

INITIAL SETUP

Applicable Configuration
All

References
TM 55-4920-244-14

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
Themocouple	When erroneous temperature inspections are suspected, insure that the indicating system is functioning properly. Perform a TOT gage calibration check and a total TOT circuit resistance check. (Refer to TM 55-4920-244-14 and applicable airflame manuals.) If no discrepancies are noted, check the thermocouple system as follows. Do not remove the thermocouple assembly from the engine.	
	NOTE A check of these limits can be performed only by using test instruments that offer usable sensitivity in this range (null-type resistance bridge). If such instrumentation is not available, an ohm meter (Simpson meter or equivalent) can be used to detect an open circuit. (An open circuit will cause a high resistance; a short circuit will cause it to be low).	a. Visually inspect thermocouple assembly for broken leads, loose terminals and other visible damage. b. Disconnect plug P12 from receptacle at the engine deck. c. Measure the internal resistance of the thermocouple harness at the terminal block on the right-hand side of the exhaust collector. Resistance shall be 0.55 to 0.65 ohms. d. Reconnect plug P12. Reconnect leads to the terminal assembly. Ensure that the connector is properly mated and secure.

4-4. THERMOCOUPLE TERMINAL ASSEMBLY - REMOVAL AND INSTALLATION.

INITIAL SETUP

Applicable Configuration
All

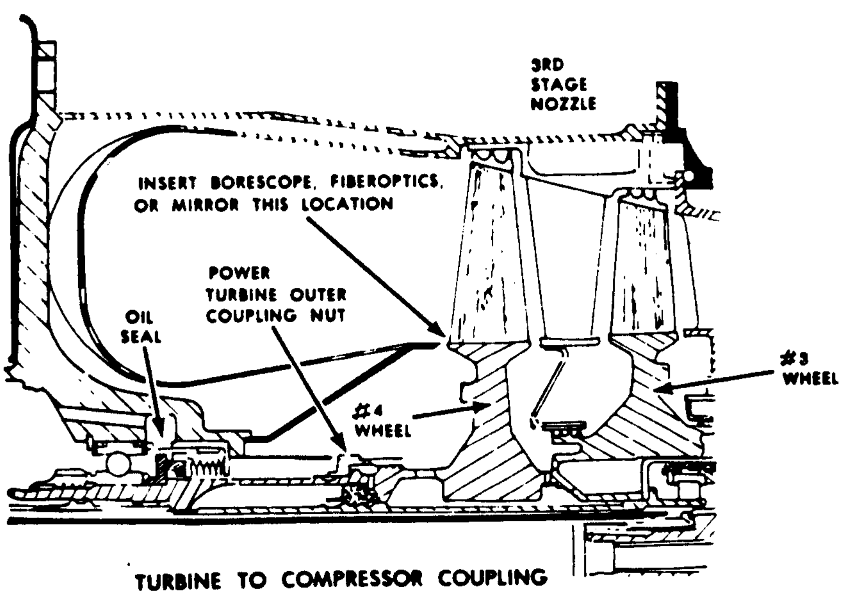
LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Thermcouple Terminal Assembly		
1. Removal		**Remove** two nuts securing the thermocouple leads to the terminal assembly.
		Remove two nuts and bolts securing the terminal assembly to the exhaust collector.
2. Installation		**Position** the terminal assembly on the exhaust collector with the large terminal to the top and **secure** with two bolts and self-locking nuts. **Tighten** the nuts to 35 to 40 in.-lb (0.4 to 0.5 kg/m).
		Attach the alumel leads to the top post on the terminal assembly and **secure** with the no. 10-32 alumel nut. **Tighten** the nut to 17 to 25 in.-lb (0.2 to 0.3 kg/m).
		Attach chromel leads to bottom post on the terminal assembly and **secure** with the no. 8-32 chrome] nut. **Tighten** the nut to 17 to 25 in.-lb (0.2 to 0.3 kg/m).

4-5. Power Turbine Outer Coupling Nut - Inspection

INITIAL SETUP

Applicable Configuration	**Consumable Materials**
All	None

LOCATION/ITEM	REMARKS	ACTION
ENGINE/POWER TURBINE OUTER COUPLING NUT		
1. Inspection	a. Engines identified by the suffix c after the Engine Serial Number do not need inspection. Examples: AE4081OOABC, AE402603BC. These engines will have had the new nut P/N 23001801 installed.	a. The nut is located approximately one and one half inches forward of the fourth stage turbine wheel inside the Center section of the exhaust collector support. **(Refer** to illustration.)
	b. The OH-58A inspection requires removal of the engine cowling and exhaust stacks (Refer to TM 55-1520-228-23/1). The OH-6A inspection requires removal of exhaust tail-pipes (Refer to TM 55-1520-214-23).	b. The condition of the nut can be determined with the use of the mirror or polished metal and a high intensity light source.
		c. Insert the mirror or polished metal halfway inside the exhaust collector, **holding** the light source in a position such that the light falls upon the nut.
		d. **Position** the mirror or polished metal until the nut is in view.
		e. **Insert** the equipment and slowly **rotate** the fourth stage turbine wheel by hand so that the



T63-A-700 TURBINE SECTION

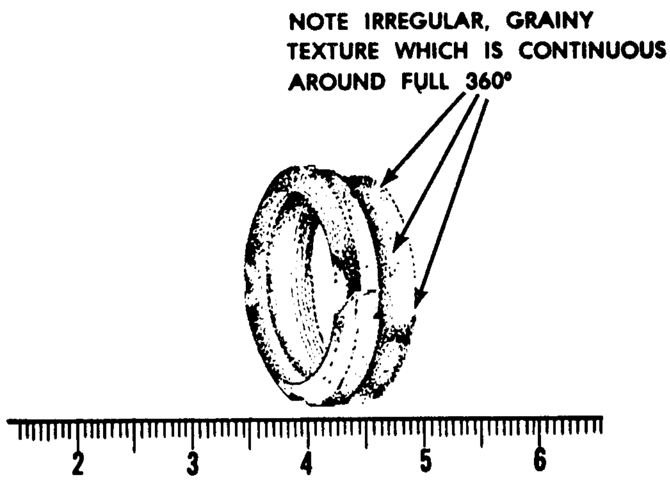
LOCATION/ITEM	REMARKS	ACTION

full 360 degree area of the nut can be viewed. Uncoated or coated nuts will show a grainy textured surface created by the corrosion attack.

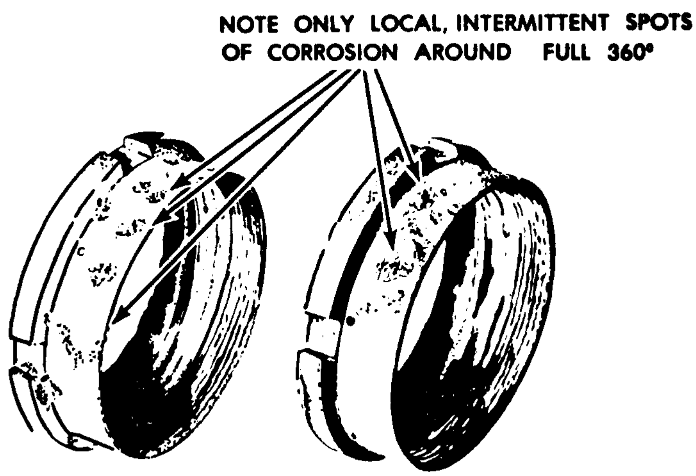
f. Replace nut if the corrosion is continuous around the full 360 degrees of rotation, (Refer to illustration.)

g. If there are only local, intermittent spots of corrosion around the full 360 degrees of rotation, the engine should be continued in service. (Refer to illustration.)

h. Repetitive compliance is required at 90 day intervals for each engine incorporating an acceptable uncoated or coated coupling nut.



TYPICAL UNACCEPTABLE CORRODED NUT



TYPICAL ACCEPTABLE CORRODED NUTS

CHAPTER 5

ACCESSORY GEARBOX

OVERVIEW

This chapter contains procedures for the maintenance and preservation of the accessory gearbox. Paragraphs following outline disassembly, inspection, repair, and additional requirements needed to maintain the accessory gearbox and related parts. Procedures requiring maintenance on the Aviation Intermediate Maintenance (AVIM) level are specified and must be performed as such. Paragraphs in which the maintenance level is not specified shall be considered Aviation Unit Maintenance (AVUM) and may be performed at this level or a higher level of maintenance.

5-1. ACCESSORY GEARBOX MAINTENANCE PROCEDURES.

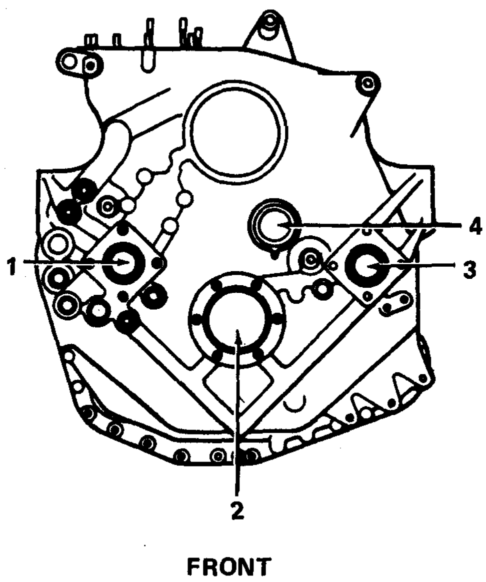
Visually inspect all subassemblies and accessories removed from the engines accessory gearbox. Check for loose or missing parts. Note any damage or excessive wear. Repair damaged parts where possible. Replace damaged parts that cannot be repaired. Disassembly procedures provided enable required cleaning, inspection, repair or replacement.

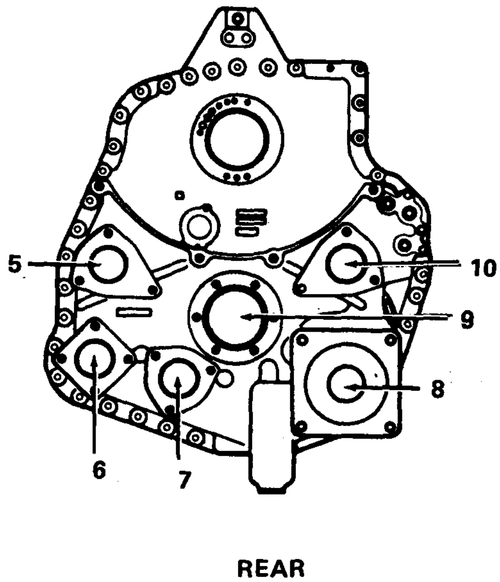
5-2. Gearbox - Inspection

INITIAL SETUP

Applicable Configuration	References
	Paras 5-3, 5-4 and 5-6

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Gearbox Housing and Cover	Visually inspect the exterior of the gearbox for the following conditions.	Check for cracks in the gearbox housing and cover, especially in stress areas, engine mounts, accessory pads, and at the splitline. If cracks are found, replace the engine.





1. Gas Producer Tachometer-Generator
2. Power Takeoff
3. Power Turbine Tachometer Generator
4. Torquemeter Spanner Nut
5. Power Turbine Fuel Governor
6. Spare (not used)
7. Fuel Pump
8. Starter-Generator
9. Power Takeoff
10. Gas Producer Fuel Control

5-2. Gearbox - Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
2. Seals and Power Takeoff Pad		**Check** for oil leaks. If area below seal at any accessory or power take-off pad is dripping, **replace** the seal assembly. **(Refer** to paragraph 5-3.)
3.Gearbox Studs		If any gearbox mounted accessory is **removed,** visually **inspect** the gearbox studs for security, worn areas, and damaged threads. **Replace** loose, damaged or worn studs. **(Refer** to paragraph 5-4.)
4. Painted Surfaces		**Check** for damaged painted surface. **(Refer** to paragraph 5-6.)

5-3. Gearbox External Seals - Replacement (AVIM)

INITIAL SETUP

Applicable Configuration
All

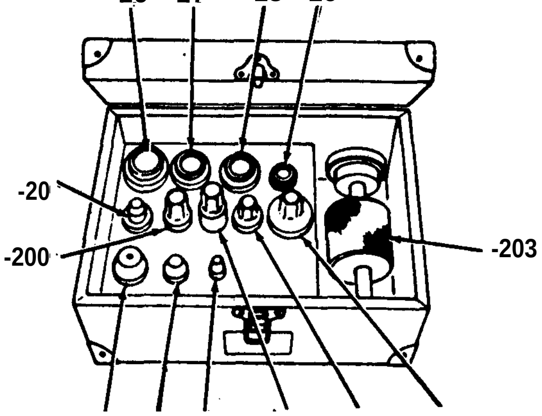
Consumable Materials
Grease (item 37, Appendix D)

Special Tools
Seal Puller Kit, Tool No. 6796941

LOCATION/ITEM	REMARKS	ACTION
GEARBOX/ External seals	**CAUTION** **Do not pry between the seal cavity in the gearbox housing and the seal. Be careful not to contaminate the shaft bearing or damage the gearshaft.**	

5-3. Gearbox External Seals - Replacement (AVIM) - Continued

LOCATION/ITEM	REMARKS	ACTION
GEARBOX/ - Continued	**CAUTION** **Do not use the double lip seal NSN 5330-00-185-0341 on T63-A-700 engines installed on OH-6A Helicopters. Damage to the gearbox could occur.**	**Remove** accessory or drive from the gearbox pad.
	Seal Puller Kit, Tool No. 6796941.	**Remove** defective seals using seal puller kit as follows:
		a. **Use** -201 detail to **remove** seals (1) in the following figures.

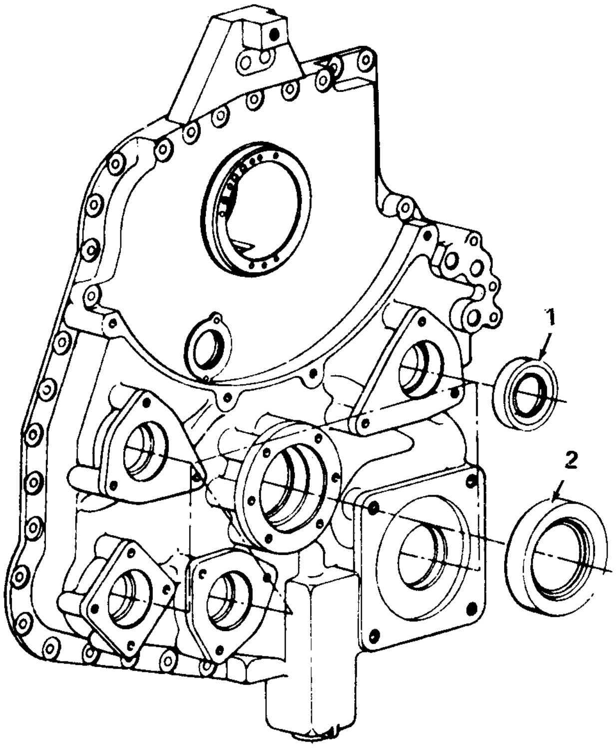


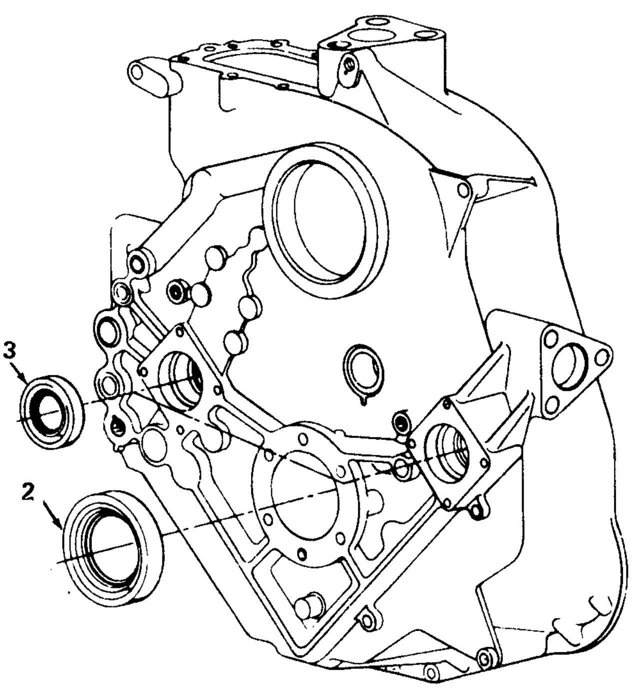
DETAIL	NAME AND APPLICATION
6796941-200	PULLER-TACHOMETER
-201	PULLER-FUEL PUMP ACCESSORY DRIVE, FUEL CONTROL, GOVERNOR, AND STARTER
-202	PULLER-POWER TAKEOFF
-203	HANDLE ASSEMBLY
-12	PULLER-IDLER GEARS
-13	GUIDE-TACHOMETER
-14	GUIDE-FUEL PUMP, ACCESSORY DRIVE; FUEL CONTROL, GOVERNOR, AND STARTER
.15	GUIDE-HELICAL POWER TRAIN DRIVE
-16	INSTALLATION TOOL-TACHOMETER
-17	INSTALLATION TOOL-FUEL PUMP, SPARE: FUEL CONTROL AND GOVERNOR
-18	INSTALLATION TOOL-STARTER
-19	INSTALLATION TOOL-POWER TAKEOFF
-20	INSTALLATION TOOL-GAS PRODUCER GEAR TRAIN IDLER SPUR GEAR

5-3. Gearbox External Seals - Replacement (AVIM) - Continued

LOCATION/ITEM	REMARKS	ACTION

GEARBOX/ - Continued





b. **Use** -202 detail to **remove** seals (2).

c. **Use** -200 detail to **remove** seals (3).

Discard removed seals.

Apply grease (item 37, Appendix D) to the seal lip to aid installation. Carefully **drive** the new seal into place using seal kit as follows:

a. **Use-** 17 and -14 detail to **install** seals (1) at the fuel pump, space accessory, fuel control, and governor pads.

b. **Use-** 18 and -14 detail to **install** seal (1) at the starter-generator pad.

c. **Use-** 19 and -15 detail to **install** seals (2) at the power takeoff pad.

d. Use -16 and -13 detail to **install seals (3)** at the tachometer pad.

Reinstall the accessory or drive on the gearbox pad.

5-4. Gearbox External Stud - Replacement

INITIAL SETUP

Applicable Configuration
All

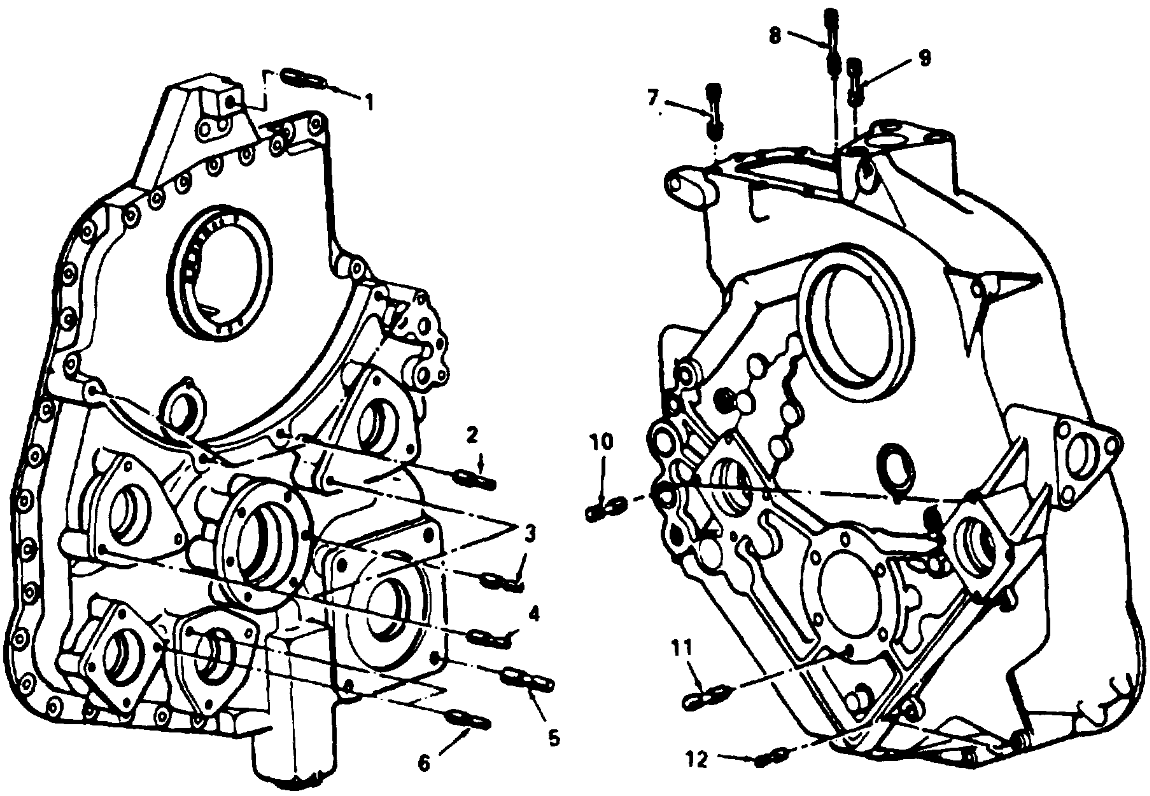
Consumable Materials
Antiseize Compound (item 38, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
GEARBOX/		
1. Stud		**Remove** and **discard** damaged stud.
	See following figures for details of thread size, height and torque.	**Clean** and **retap** stud hole threads only when condition of hole threads restrains stud installation. **Use** the same size tap.
2. Stud	Antiseize Compound (item 38, Appendix D).	**Apply** antiseize compound to the stud threads and to the stud hole threads.
		Install the stud and **tighten** to obtain the torque and setting height specified in preceding figure.
	Oversize replacement studs may be used when necessary.	

5-4. Gearbox External Stud - Replacement - Continued

LOCATION/ITEM	REMARKS	ACTION

GEARBOX/ - Continued



REF NO.	THREAD SIZE	THREAD TYPE	SETTING (LB - IN.)	SETTING HEIGHT (IN.)
1	3/8-16	UNJC-3B	105-210 (1.2-2.4 KG/M)	0.66-0.70 (1.68-2.78 CM)
2	5/16-18	UNJC-3B	50-100 (0.6-1.2 KG/M)	0.60-0.64 (1.52-1.63 CM)
3	5/16-18	UNJC-3B	50-100 (0.6-1.2 KG/M)	0.91-0.95* (2.31-2.41 CM)* 0.48-0.52** (1.22-1.32)**
4	5/16-18	UNJC-3B	50-100 (0.6-1.2 KG/M)	0.60-0.64 (1.52-1.63 CM)
5	3/8-16	UNJC-3B	105-210 (1.2-2.4 KG/M)	0.89-0.93 (2.26-2.36 CM)
6	5/16-18	UNJC-3B	50-100 (0.6-1.2 KG/M)	0.85-0.89 (2.16-2.26 CM)
7	1/4-20	UNC-3B	20-40 (0.2-0.5 KG/M)	0.54-0.58 (1.37-1.47 CM)
8	1/4-20	UNC-3B	20-40 (0.2-0.5 KG/M)	1.17-1.21 (2.97-3.07 CM)
9	1/4-20	UNC-3B	20-40 (0.2-0.5 KG/M)	0.79-0.83 (2.01-2.11 CM)
10	5/16-18	UNC-3B	50-100 (0.6-1.2 KG/M)	0.62-0.66 (1.57-1.68 CM)
11	5/16-18	UNC-3B	50-100 (0.6-1.2 KG/M)	0.62-0.66 (1.57-1.68 CM)
12	1/4-20	UNC-3B	20-40 (0.2-0.5 KG/M)	0.42-0.46 (1.07-1.17 CM)

*P/N 6886945 GEARBOX COVER

5-5. Magnetic Chip Detectors - Removal, Inspection, Cleaning, Installation and Testing

INITIAL SETUP

Applicable Configuration
All

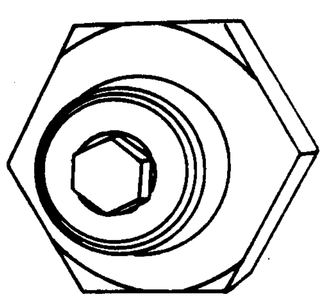
Consumable Materials
Lubricating Oil (item 5, Appendix D)
Lockwire (item 17, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
ENGINE/Magnetic Chip Detectors	Magnetic chip detectors are located at the oil outlet port on the right front and on the bottom of the accessory gearbox. Each chip detector consists of a magnetic plug with a single pin electrical receptacle. The threaded plug portion of the chip detector includes a terminal shaft and pole piece separated from a magnet in the plug body by insulators. When ferrous metal particles are sufficient in size or accumulation to bridge the gap between the pole piece and the magnet, an electrical (ground) circuit between the chip detector and the ENG CHIP DET indicator light is completed.	
1. Removal		**Remove** electrical lead. **Remove** lockwire and **unscrew magnetic** chip detector. Same oil spilling is likely. Remove preformed packing the plug and discard preformed packing

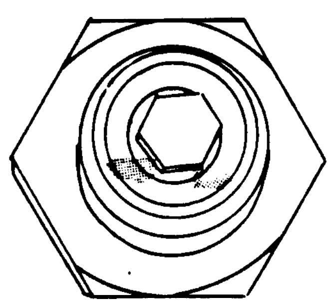
NOTE

When removing chip detector, care should be taken not to contaminate detector.

LOCATION/ITEM	REMARKS	ACTION
2. Inspection		a. Visually **check** each plug for metal accumulation. b. Flakes of magnetic material of 1/16 in. (1.6 mm) or mom diameter are indications of an incipient failure and are cause for engine removal.



ACCEPTABLE



UNACCEPTABLE

5-5. Magnetic Chip Detectors - Removal, Inspection, Cleaning, Installation and Testing - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
	WARNING Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.	
		c. Fuzz or hair-like magnetic particles can normally be found on the magnetic plug and are not cause for engine replacement.
3. Cleaning		Wipe chip detectors with a clean, lint-free cloth.
4. Installation	Lubricating Oil (item 5, Appendix D). Lockwire (item 7, Appendix D).	Install a new preformed packing lubricated with oil on magnetic plug. Install magnetic plug; tighten to 60-80 in. lb (0.7-0.9 kg/m) and lockwire. Connect electrical lead.
5. Testing Chip Detector and Circuitry		a. Place BATT-OFF switch to OFF and apply external power. b. Remove chip detector. c. Connect the electrical lead to the chip detector and ground the case of the chip detector to the engine.

5-5. Magnetic Chip Detectors - Removal, Inspection, Cleaning, Installation and Testing - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		d. Using a screwdriver, short across the gap between the pole piece and the magnet and observe ENG.CHIP DET indicator light. If light is on, circuit and detector test good.
		e. If ENG.CHIP DET indicator light does not illuminate, check that case is grounded to engine. If light is still not observed, remove electrical connector from chip detector and ground connector to engine. ENG.CHIP DET indicator light should illuminate. If light does illuminate, replace chip detector; if light does not illuminate, check components for continuity and replace defective parts.
		f. Reinstall chip detector.
		g. Reinstall electrical connector to chip detector.
		h. With engine running, check the magnetic chip detector light; the light should be out.

5-6. Gearbox Housing and Cover - Painting

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning Solvent (item 1, Appendix D)
Emery Cloth (item 28, Appendix D)
Paint Thinner (item 29, Appendix D)
Medium Gray Corrosion Resistant Paint (item 30, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
GEARBOX/	**WARNING** **Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C-59°C).**	
1. Gearbox Housing and Cover		**Repair** damaged paint on the external surfaces of the gearbox housing and cover as follows:
	Solvent (item 1, Appendix D).	a. **Clean** darnaged area with a clean cloth saturated with solvent.
	Emery Cloth (item 28, Appendix D).	b. Using emery cloth **abrade** an area slightly larger than the damaged **area. Feather** the edges of the abraded area.
		c. **Clean area as in** step a. and **dry** using a blast of clean compressed air.
		d. **Chrome pickle** the cleaned area per MIL-L-3171.
	Paint Thinner (item 29, Appendix D).	e. Wipe the abraded area with paint thinner.

5-6. Gearbox Housing and Cover - Painting - Continued

LOCATION/ITEM	REMARKS	ACTION
GEARBOX/ - Continued	Medium Gray Corrosion Resistant Paint (item 30, Appendix D).	f. **Apply** medium gray corrosion resistant paint to the abraded area.
	Heat may be applied with a heat lamp to speed up curing; however do not exceed 300°F(149°C). Approximately 20 minutes will be required for the heat cure.	g. **Airdry** at least one hour before handling.

CHAPTER 6

FUEL SYSTEM

OVERVIEW

This chapter contains procedures for the maintenance and preservation of the fuel system. Paragraphs following outline disassembly, inspection, repair, and additional requirements needed to maintain the fuel system and related parts. Procedures requiring maintenance on the Aviation Intermediate Maintenance (AVIM) level are specified and must be performed as such. Paragraphs in which the maintenance level is not specified shall be considered Aviation Unit Maintenance (AVUM) and may be performed at this level or a higher level of maintenance.

Fuel system servicing includes removal and installation of the fuel pump, gas producer fuel control, power turbine governor, fuel nozzle, and double check valve. In addition, it includes fuel filter replacement, cleaning the fuel nozzle, and adjusting the gas producer fuel control.

6-1. FUEL SYSTEM MAINTENANCE PROCEDURES

Visually inspect all subassemblies and accessories removed from the engines fuel system, Check for loose or missing parts. Note any damage or excessive wear. Repair damaged parts where possible. Replace damaged parts that cannot be repaired. Disassembly procedures provided enable required cleaning, inspection, repair or replacement.

6-2. Bleeding the Fuel System. Maintenance of the fuel system can result in air entrapment in the fuel lines and subsequent false starts. Following maintenance, purge the air from the fuel system as follows:

a. Disconnect the input lead to the ignition exciter or pull the IGN ENG circuit breaker (refer to TM 55-1520-235-10, TM 55-1520-228-20).

b. Disconnect the fuel hose at the fuel nozzle; place the open end of the hose in a bucket.

c. Move the twist grip to the IDLE detent and motor the engine until a solid stream of fuel flows from the disconnected hose. (Use APU if available.)

d. Reconnect the fuel hose to the fuel nozzle and input lead to the ignition exciter or reset IGN ENG circuit breaker.

6-3. **Fuel System Pneumatic Leak Check**. If any fuel system control air tubing (i.e. P_r, P_g, P_y or P_c from tee fitting on governor to fuel control) is removed or disturbed during maintenance, check the control air tubing for leaks as follows:

a. Disconnect the pressure sensing (PC) line from the pressure probe elbow in the diffuser scroll.

b. Apply 50–80 psi filtered air or nitrogen to the P_c line. Air will immediately escape from the pressure regulating air valve port on the power turbine governor.

c. Use a liquid soap solution (item 1, table 2-1) to check the air tubes for leakage. Cover and parting surfaces on the fuel control and governor which produce a slight bubbling of the soap solution do not represent a leak of sufficient magnitude to warrant concern. These leaks were present during original calibration and were compensated for at that time.

d. Reduce the pressure to 20-22 psi (0.14-1.54 kg/sq cm) and check the governor diaphragm for leakage. No leakage is acceptable. If leakage is noted from the governor diaphragm, remove the safety wire from the screws, back off screws and then torque to 8-11 inch lbs. Let screws rest for 20 minutes and retorque to same valve. If after this is completed, the governor diaphragm still leaks, replace governor.

e. Reconnect the P_c tube. Tighten coupling nuts to 80-120 in. lbs. Hold the P_c filter while tightening the coupling nut. During aircraft run up, use the soap solution to verify no leakage around the reconnected P_c line prior to flight. Rinse water solution from the engine after the check is completed.

6-4. Fuel System Tubes - Removal, Cleaning, and Installation.

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning Solvent (item 1, Appendix D)

Special Tools
Magnifying Glass, 10x (Appendix C)

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
REMOVAL		
Fuel System Tubes	Observe the following precautions when removing fuel system tubes: a. When loosening a coupling nut, always use a backup wrench on the mating fitting to prevent the fitting from turning. b. Always use the proper size wrench to prevent rounding off the hex corners. c. Attach the wrench to the fitting or coupling nut in a manner that will prevent crushing of the fitting or coupling nut. d. Never use a pipe wrench, pliers, or vise grips on a coupling nut or fitting.	**Remove** and **observe** precautions.
CLEANING		

WARNING

Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C - 59°C).

LOCATION/ITEM	REMARKS	ACTION
Fuel System Tubes	Use drycleaning solvent (item 1, Appendix D).	**Flush** tubes with solvent and **blow** dry.

6-4. Fuel System Tubes - Removal, Cleaning, and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
INSPECTION		
Fuel System Tubes	Use the following criteria to determine extent of damage: a. Kinks or dents which could obstruct fuel or air flow. Dents in fuel line are allowable up to 0.015 in. (0.38 mm). Dents in pneumatic air lines are allowable up to 1/8 in. (3 mm), no sharp radius dents allowed. b. Cracked or broken tubes or coupling nuts. c. Cross-threaded, crushed, or otherwise damaged coupling nuts. d. Chafing within clamp areas in excess of 0.010 in. deep (0.25 mm). Chafing is not allowed at or near the flared tubing end. e. Nicks which exceed 0.010 in. (0.25 mm deep.	**Inspect** and **reject** tubes for damage. **Observe** given wear limits.
	f. Inspect tubes for cracks using a 10x magnifying glass (Appendix C). Pay particular attention to the flared ends of the tubes for cracks and to the areas beneath the floating ferrules for excessive fretting damage. 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.**	**Inspect** tubes for cracks **using** a 10x magnifying glass (Appendix C). Tubes found to contain cracks and/or fretting damage are to be **replaced** by new parts of the same part number as removed.
INSTALLATION	**WARNING** **Failure to properly install, align and torque fuel, oil, air fittings and tubes could result in an engine failure.** NOTE Observe precautions listed in REMOVAL when installing fuel tubes.	

6-4. Fuel System Tubes - Removal, Cleaning, and Installation - Continued

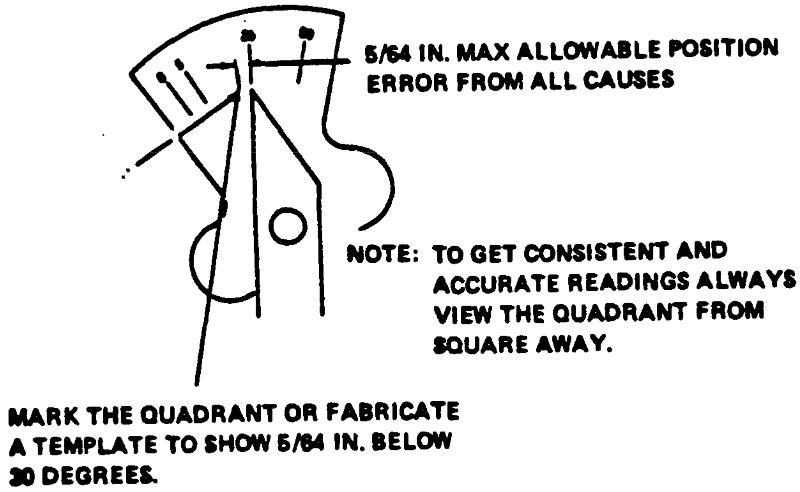
LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
INSTALLATION		
Fuel System Tubes		**Tighten** No. 4 size coupling nut 80 to 120 in. lb (0.9-1.4 kg/m). **Tighten** No. 5 size coupling nuts 150 to 200 in. lb (1.7-7.3 kg/m).
Fuel System Tubes and Air Tubes	Rigid steel tubing must align with its mating fittings in the free state such that both coupling nuts will engage two full threads of their mating fittings with light finger pressure. The tube must not be stretched during final tightening of the coupling nuts. Adjustments may be made by bending the tube at the principal bend or bends. All bending must be accomplished with the tube removed from the engine. Flattening effect as a result of reforming shall not exceed 15 percent of the tube OD.	**Align** rigid steel tubing with its mating fittings.

6-5. Gas Producer Fuel Control - Rigging Check

INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/		
1. Gas Producer Rigging	Check the rigging of the gas producer fuel control after a deceleration check has revealed the deceleration time to be less than the allowable limit. This check is also required after installation of a fuel control or any component of the rigging system. Make the rigging check with the engine shut down using the following procedure: The allowable deceleration time is for an engine which is at normal operating temperature.	
2. AIRFRAME/		Check to insure that sufficient travel is provided to allow physical contact with the gas producer minimum stop, at or before the full closed position of the twist grip. Check the travel to the opposite end. Physical contact must be made with gas producer maximum stop at or before the full open position of the twist grip. Looseness encountered in rigging must be minimized by replacement of worn items and/or accuracy of the rigging. Looseness that cannot be removed must be within limits indicated in the figure. Check the looseness as follows:



6-5. Gas Producer Fuel Control - Rigging Check - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/-Continued		
2. AIRFRAME.		a. **Start** with the twist grip at the full open position then rotate grip slowly to the **IDLE** position, Pointer must be at the 30 degree mark.
		b. **Start** with the twist grip at the full closed position then rotate grip slowly to the **IDLE** position. The pointer must be no more than 5/64 in. below the 30 degree mark. If the pointer is more than 5/64 in. below the 30 degree mark, **rerig** the aircraft linkage to move the pointer closer to the 30 degree mark.
	NOTE Make rigging adjustments using the pilot's twist grip. If the copilot's collective is installed, recheck the linkage movement using the copilot's twist grip. The pointer in IDLE position, using the copilot's twist grip, must be within 5/64 inch of the 30 degree position when rotated from the full open or full closed position and idle speed must be no lower than idle speed obtained using the pilot's twist grip. An engine performance check is required when rigging adjustment has been performed.	

6.6 Gas Producer Fuel Control - Idle Check

INITIAL SETUP

Applicable Configuration
All

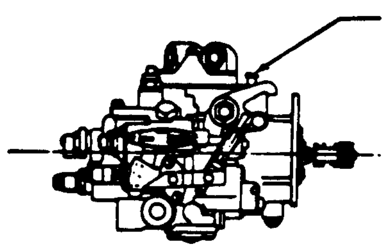
Special Tools
Wrench, Tool No 6798292

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/	NOTE Dual control installation requires an idle speed check from the copilot's side also. Idle speed must repeat every time. Check the repeatability of the idle speed setting by running the engine. Generator current should be less than 20 amperes. The stabilized idle speed should repeat every time, regardless of whether the fuel control throttle shaft is rotated slowly or rapidly from the full throttle to the idle position, and regardless of whether the pilot's or the copilot's twist grip is used. Failure to repeat a stabilized idle speed requires a recheck of the fuel control rigging. Check for proper idle rigging as follows: NOTE Perform the entire idle speed check whenever fuel control rigging or idle speed is adjusted.	
1. Twist Grip.		a. **Roll** twist grip to full open position then to idle detent. **Mark** (pencil) the precise position of pointer tip on the fuel control quandrant with twist grip in **IDLE** position. b. **Release** the idle detent on twist grip. Very slowly roll the twist grip in direction of cutoff just enough to obtain perceptible movement of pointer tip (approximately the width of the pencil mark). Index the twist grip at this position.

6.6 Gas Producer Fuel Control - Idle Check - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/-Continued		Very slowly **roll** the twist grip in the direction of increased power from **IDLE** position just enough to obtain perceptible movement of pointer tip (approximately the width of the pencil mark). **Index** the twist grip at this position. **Move** the pointer to exactly the 30 degree mark. **Index** the twist grip at this position.
		c. **Start** the engine and let N1 stabilize in **IDLE** position. Very slowly **roll** the twist grip to index mark in direction of cut off. If N1 idle speed decreases, take the following corrective action.
		d. If the pointer is at or above the 30 degree mark, rerig aircraft linkage to move pointer tip to a point just below the 30 degree mark.
		e. If pointer is more than 5/64 in. (2.0 mm) below 30 degree mark, rerig aircraft linkage to move closer to 30 degree mark. The pointer must be at or within 5/64 in. below the 30 degree mark.

6-6. Gas Producer Fuel Control - Idle Check - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/-Continued		
	If N1 idle speed did not change, very slowly roll the twist grip to index mark in the direction of increased power. No increase in N1 speed is permitted before fuel control pointer indicates 30 degrees as indicated on twist grip index mark. An increase in speed before the pointer reaches 30 degrees indicates the fuel control internal rigging is incorrect; replace the fuel control. An increase at or above the 30 degree mark is normal.	
	 RIGHT SIDE VIEW (AS INSTALLED)	When the rigging is correct, **change** idle speed adjustment screws to **obtain** a 62-65% N1 speed setting (in the OH-6A helicopter) or 62-64% N1 speed setting (in the OH-58A helicopter) with generator switch off. (See figure for location of fuel control adjustment). **Adjust** to 63% N1 speed setting to allow for seasonal changes.
	Using wrench 6798292, turn screw clockwise to increase or counterclockwise to decrease N 1 speed. A 1/8 turn adjustment changes engine speed approximate y 5%. If N 1 speed does not respond to the idle speed screw adjustment, the rigging is establishing idle speed. Rerig as required. If N 1 speed does respond to the idle speed screw, make the 62-65% (in the OH-6A), or 62-64% (in the OH-58A) N1 speed setting. NOTE Engine performance check is not required for idle speed adjustment if rigging adjustment was not performed. Following any rigging adjustments, perform the idle speed check.	

6-7. Gas Producer Fuel Control - Deceleration Check

INITIAL SETUP

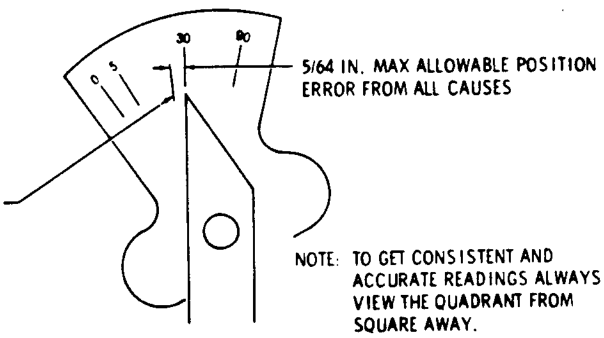
Applicable Configuration
All

References
para 6-5 and 6-7

LOCATION/ITEM	REMARKS	ACTION
	CAUTION **During rapid throttle movements, make appropriate anti-torque pedal corrections to prevent the aircraft from turning on loose or slick surfaces.** NOTE Deceleration check is only required when using alternate fuel. NOTE JP-5/JP-8 fuel is designated as the Army alternate fuel to be used in the T63-A-700. No deceleration time restrictions are imposed on the engine when the Army primary fuel (JP-4) is used. NOTE Deceleration check. Ground check the fuel control system and associated linkage by performing a deceleration check. This check must be performed with the engine at normal operating temperature. NOTE Perform each step in the sequence listed. Recheck the deceleration rate after each step to determine if there is a need for further correction. Replace the fuel control if the deceleration rate is still unsatisfactory after all steps have been completed.	
1. AIRFRAME/		**Turn** generator switch off.
2. AIRFRAME/		**Rotate** twist grip to full open hole collective at flat pitch and stabilize N2 at exactly 103% (trim as required) for approximately fifteen seconds.

6-7. Gas Producer Fuel Control - Deceleration Check - Continued

LOCATION/ITEM	REMARKS	ACTION
3. AIRFRAME/	NOTE Make rigging adjustments using the pilot's twist grip. Recheck the linkage movement using the copilot's twist grip. The limits of the figure shown below are applicable to both sets of controls. The lower stop on the fuel control is set at depot; do not attempt to adjust.	
		Snap twist grip to **IDLE** position. Simultaneously **start** a time count using a stop watch or clock with a sweep second hand. **Stop** the time as N1 needle passes through 65%, The minimum allowable time is two seconds,



If deceleration time is less than the time allowed, **make** two more checks to confirm the time.

If the confirmed deceleration time is less than the allowable minimum, **perform** a rigging check. (Refer to para 6-5.)

Repeat the deceleration check. If the deceleration time is less than time allowable minimum, **perform** an **IDLE** speed check. **(Refer** to para 6-6.)

Repeat the deceleration check. If the deceleration time is less than allowable minimum, **replace** the fuel control. **(Refer** to para 6-1 1.)

NOTE

An EPC is required after a rigging adjustment to the fuel control.

6-8. GAS PRODUCER FUEL CONTROL - REMOVAL

INITIAL SETUP

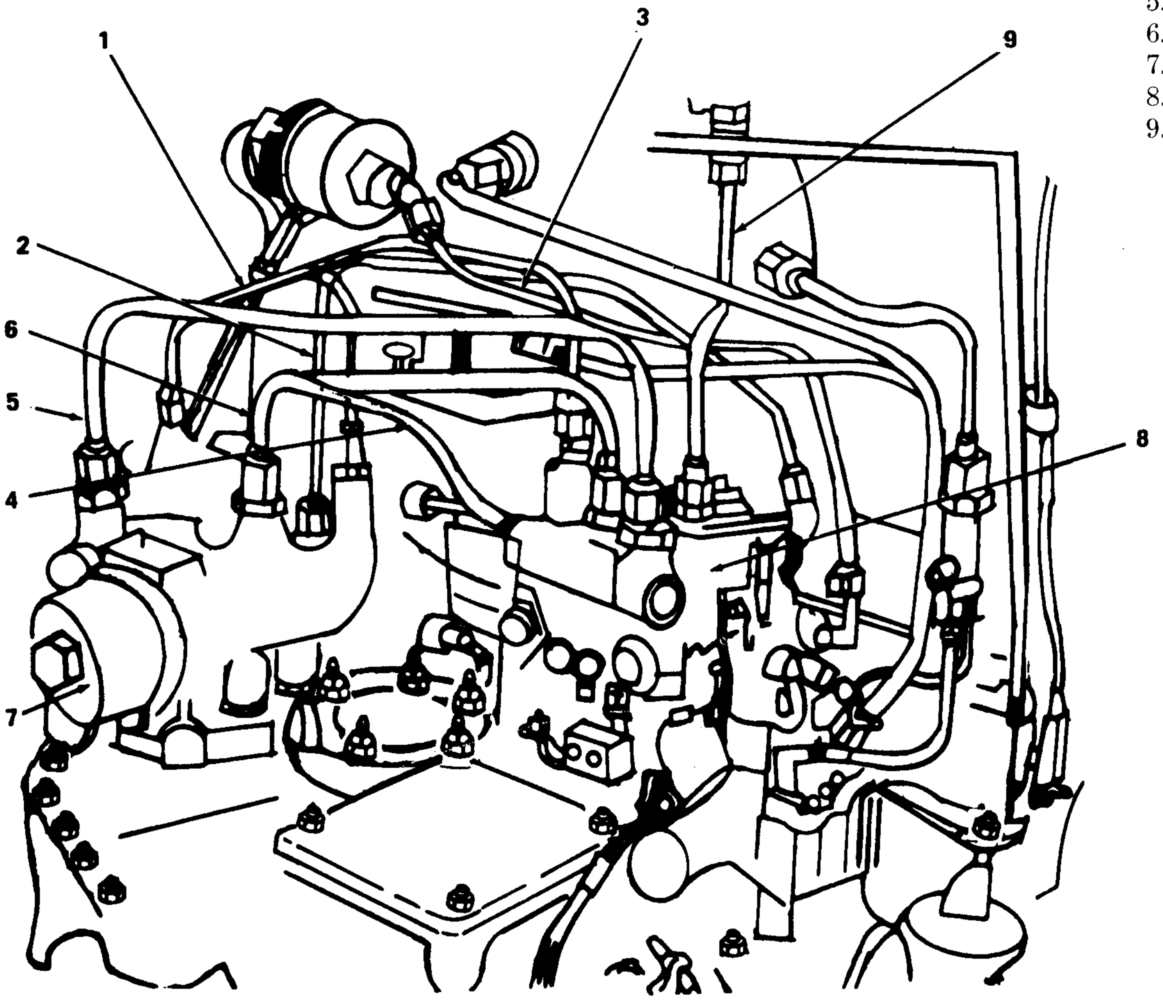
Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	NOTE Before replacing the fuel control to correct an engine malfunction, insure that the pneumatic tubes and fittings are not leaking and that the double check valve is functioning properly. A malfunction which appears to be a fuel control malfunction may be caused by erroneous pressures.	
1. Fuel Control Lever		**Remove** the self-locking nut and **remove** the lever from the fuel control.
2. Fuel Tube (5 and 6)	It will not be necessary to disturb the clamping arrangement between the tubes.	**Remove** tubes between fuel pump (7) and control (8).
3. Fuel tube (9)		**Remove** tube between the control and fireshield.
4. Air Tube (1)		**Remove** tube between the control and governor.
5. Air Tube (2)		**Remove** tube between the control and governor.
6. Air Tube (3)		**Remove** tube between the control and accumulator.

6-8. GAS PRODUCER FUEL CONTROL - REMOVAL - Cont.

LOCATION/ITEM	REMARKS	ACTION

ENGINE/–Continued

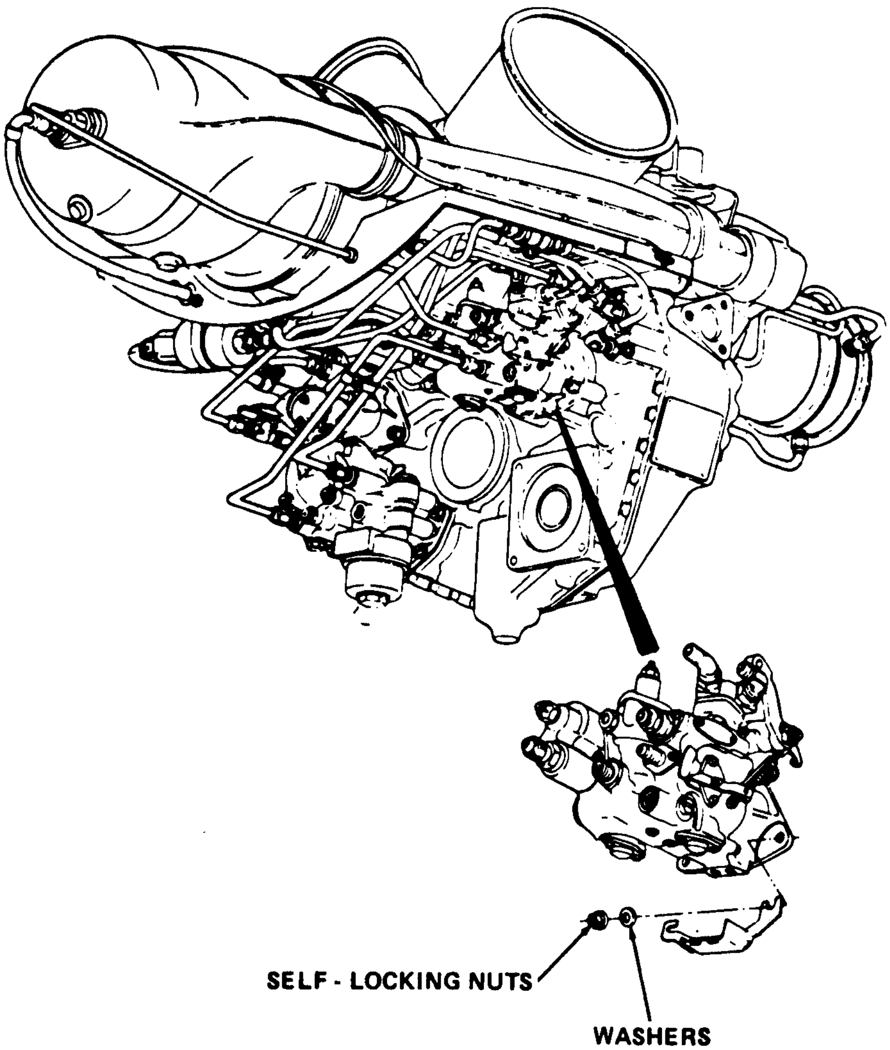


1. Air Tube
2. Air Tube
3. Air Tube
4. Air Tube
5. Fuel Tube
6. Fuel Tube
7. Fuel Pump
8. Control
9. Fuel Tube

LOCATION/ITEM	REMARKS	ACTION
7. Air Tube (4)		Remove tube between the control and governor.

6-8. Gas Producer Fuel Control - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
8. Self- Locking Nuts **and Washers**	Carefully remove control from the mounting studs.	**Remove** three self-locking nuts and washers which secure the control to the gearbox.



6-9. Deleted.

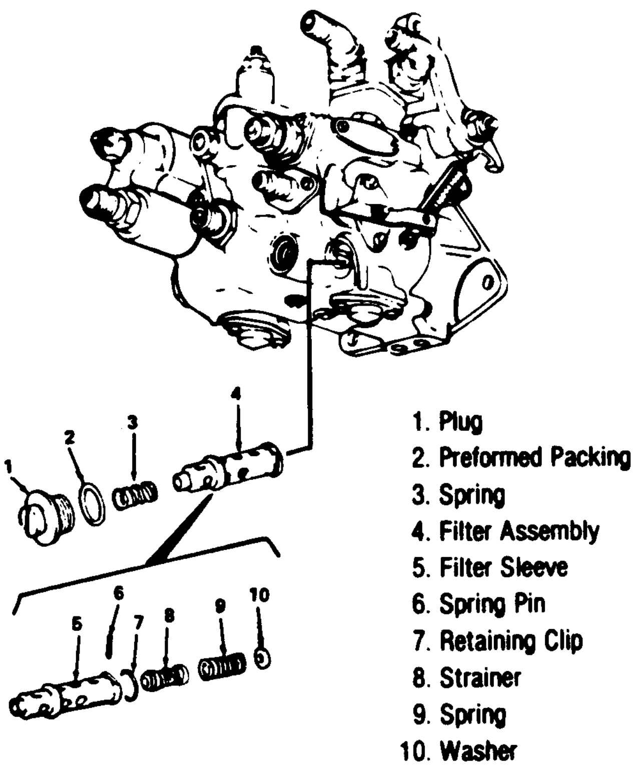
6-10. Gas Producer Fuel Control - Fuel Filter - Cleaning and Replacement

INITIAL SETUP

Applicable Configuration
All

Consumable Material
Lubricating Oil (item 4, Appendix D)
Lockwire (item 17, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
GAS PRODUCER FUEL CONTROL/		

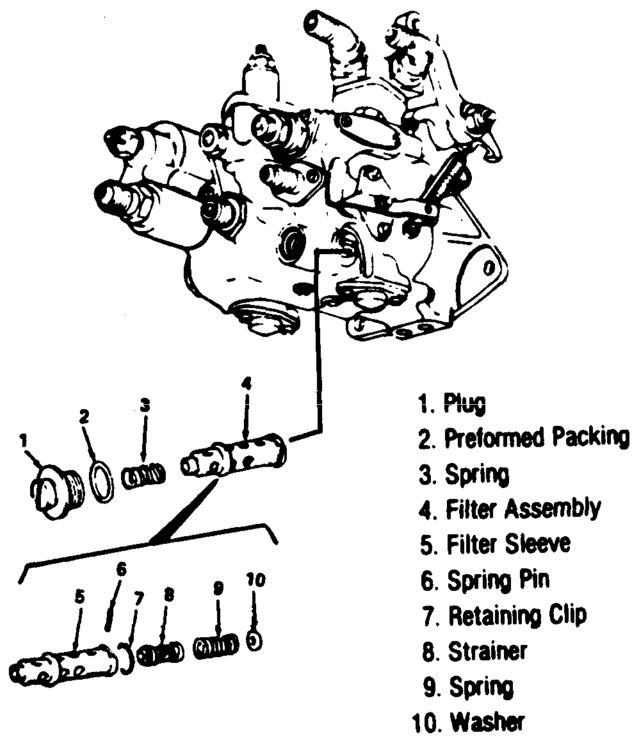


6-10. Gas Producer Fuel Control -Fuel Filter -Cleaning and Replacement. Continued

LOCATION/ITEM	REMARKS	ACTION
GAS PRODUCER FUEL CONTROL/ - Continued		
	CAUTION Do not attempt to open a clogged screen with a sharp instrument.	
1. Cleaning		Thoroughly clean exterior of fuel control in the area of the plug to prevent contaminants from getting into the port after it is opened.
	NOTE Spring (3) and retaining clip (7) are used only with filter assembly PN2539508.	Remove lockwire and remove plug (1), spring (3), and filter assembly (4). Discard preformed packing (2).
	CAUTION Be sure strainer (8) is installed as shown in figure, Open end of strainer toward the outside of the control, away from the spring. Do not install backwards,	
		Remove retaining clip (7), spring pin (6), and separate washer (10), spring (9), and strainer (8) from filter assembly (4).
	CAUTION Use extreme care to insure that the pneumatic lines and fittings are not leaking. Erroneous pressures will cause fuel control malfunction.	

6-10. Gas Producer Fuel Control - Fuel Filter - Cleaning ond Replacement - Continued

LOCATION/ITEM	REMARKS	ACTION
GAS PRODUCER FUEL CONTROL/-Continued		
	Use dry cleaning solvent (item 1, Appendix D)	**Clean** filter assembly parts ultrasonically if equipment is available. If equipment is not available, **agitate** parts in solvent. **Dry** parts using clean shop air regulated to approximately 15 psig. Air pressure should be applied to the exterior of the strainer. **Repeat** the procedure if visual inspection with a bright light shows that the interior of the strainer is not entirely free of contaminants.
		Install strainer (8), spring (9), and washer (10) in filter sleeve (5). **Secure** components in the filter sleeve with spring pin (6) and retaining clip (7).
		Lightly **lubricate** a new preformed packing (2) with engine fuel and place it on plug (1). **Install** filter assembly (4), spring (3) and plug (1) in fuel control. **Tighten** plug to 65-70 in. lb (0.7-0.8 kg/m) and **lockwire. Bleed** the fuel system. (Refer to paragraph 6-2).



6-11. GAS PRODUCER FUEL CONTROL - INSTALLATION

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Lubricating Oil (item 4, Appendix D)
Grease (item 37, Appendix D)
Antiseize Compound (item 6, Appendix D)

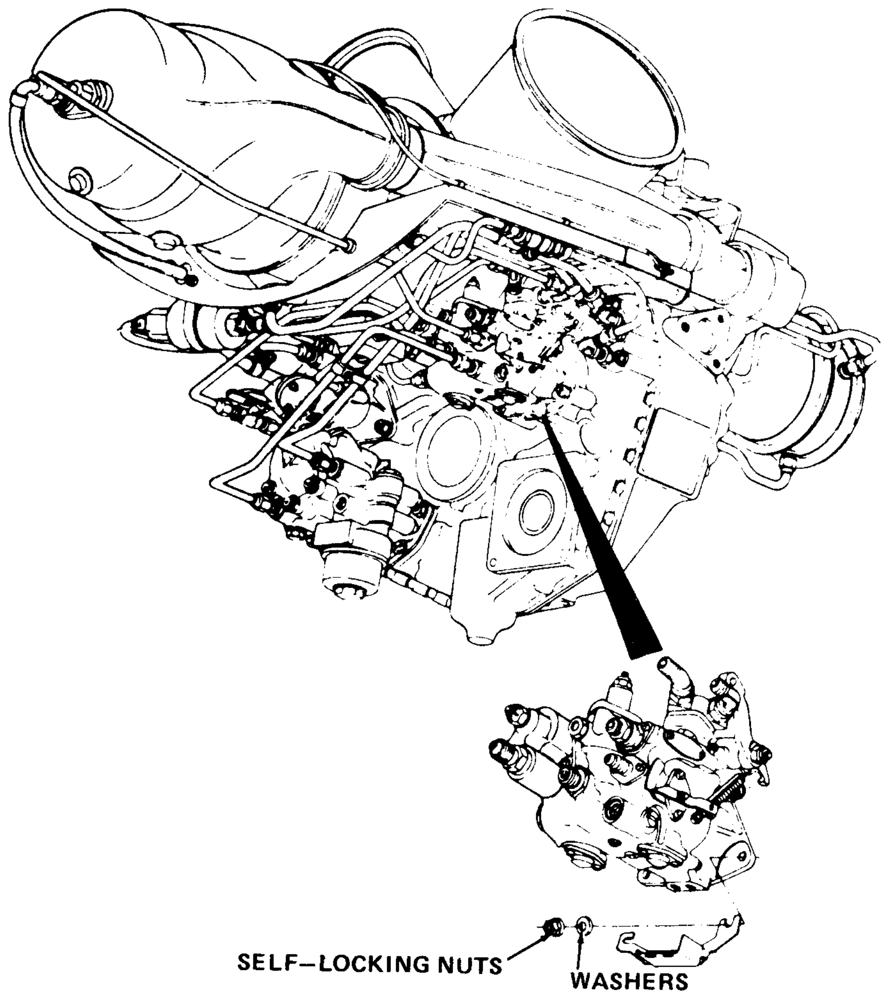
References
Para 1-63 thru 1-71, 6-2, 6-3, 6-5, 6-7, and 6-12

6-11. Gas Producer Fuel Control - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
FUEL CONTROL/	**WARNING** **Prolonged contact with lubricating oil (item 4, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.** **CAUTION** **When removing or installing fittings in the fuel control, be careful not to cause a load on the drive shaft.** **If a new fuel control is to be installed, transfer the tube fittings from the removed control to the new control. Use new preformed packings. Lubricate preformed packings on fuel tube fittings with oil (item 4, Appendix D). Do not lubricate preformed packings on air tube fittings, Tighten unions to 75-110 in. lb (0.9 -1.3 kg/m). Do not tighten jam nuts.**	
1. Drive Shaft Splines, and Studs	Grease (item 37, Appendix D) Antiseize Compound (item 6, Appendix D) Oil (item 4, Appendix D)	**Coat** fuel control drive shaft splines with lubricant, the studs with antiseize compound, and fuel tube fitting with oil.
ENGINE/		
2. Fuel Control	Make certain the fuel control drive splines are properly engaged in the gearbox drive splines; the fuel control must be flush against the gearbox mounting pad.	**Install** fuel control on mounting pad studs.

6-11. Gas Producer Fuel Control - Installation - Continued

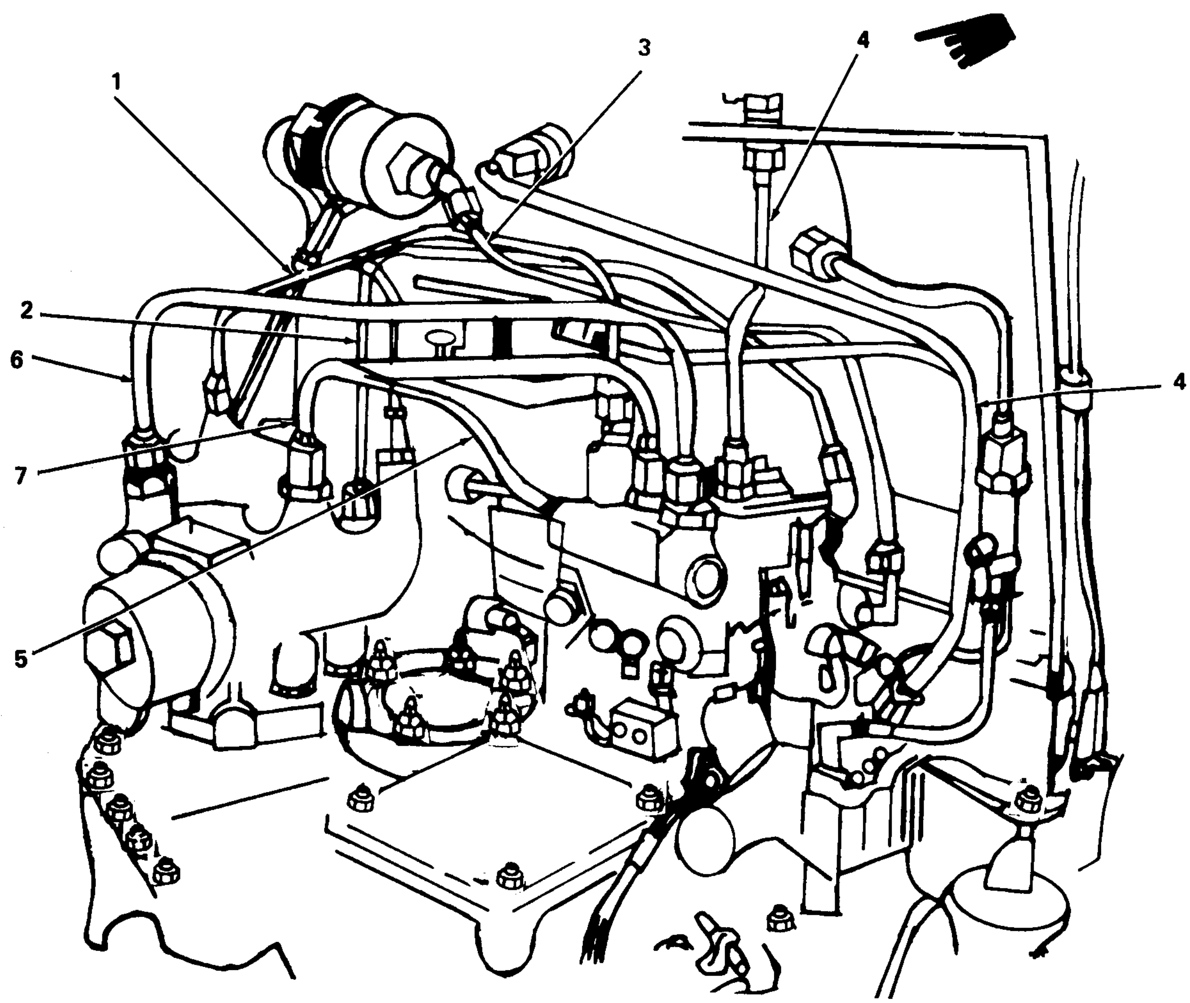
LOCATION/ITEM	REMARKS	ACTION
FUEL CONTROL/ - Continued		
3. Heating Tube		If the engine has a fuel control heating kit installed, **install** heating tube on the two studs at the bottom of the fuel control mounting pad. **Secure** the control with three washers and self-locking nuts. **Tighten** nuts to 70-85 in. lb (0.8 -1.0 kg/m).



LOCATION/ITEM	REMARKS	ACTION
4. Air Tube (5)		**Install** air tube between fuel control and governor. **Tighten** coupling nuts to 80-120 in. lb (0.9 -1.4 kg/m).

6-11. GAS PRODUCER FUEL CONTROL - INSTALLATION - Cont.

LOCATION/ITEM	REMARKS	ACTION
FUEL CONTROL/– Continued		
5. Air Tube (3)		**Install** air tube (3) between control and accumulator. **Tighten** coupling nuts to 8-80-120 in. lb (0.9-1.4 kg/m). **Tighten** jam nut on tube fitting to 55-80 in. lb (0.6-0.9 kg/m).



1. Air Tube
2. Air Tube
3. Air Tube
4. Fuel Tube
5. Air Tube
6. Fuel Tube
7. Fuel Tube

LOCATION/ITEM	REMARKS	ACTION
FUEL CONTROL/ Continued		
6. Air Tube (2)		Install air tube (2) between control and governor. Tighten coupling nuts to 80-120 in. lb (O.9- 1.4 kg/ m). Tighten Jam nut on tube fitting to 55-80 in. lb (0.6 -0.9 kg/m).
7. Fuel Tube (4)		Install fuel tube (4) between control and fireshield. Tighten coupling nuts to 80-120 in. lb (0.9 -1.4 kg/m).
8. Air Tube (l)		Install air tube (1) between control and governor. Tighten coupling nuts to 80-120 in. lb (0.9 -1.4 kg/m). Tighten jam nut to 55-80 in. lb (0.6 -0.9 kg/ m).
9. Fuel Tubes (6 and 7)		Install fuel tubes (6 and 7) between fuel pump and control. Tighten coupling nuts to 150-200 in. lb (1.7 -2.3 kg/m).
10. Lever	(Refer to paragraph 6-7.)	Assemble lever on control and secure with a self-locking nut. Position lever in accordance with rigging instructions contained in applicable aircraft manual.

NOTE

Overtorquing nut causes binding of the lever shaft.

6-11. Gas Producer Fuel Control - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
11. Pneumatic Tubes	(Refer to paragraph 6-3.)	**Check** pneumatic tubes for leaks.
12. Fuel System	(Refer to paragraph 6-2.	**Bleed** the fuel system.
ENGINE/		**Test** the engine as outlined in paragraphs 1-63 thru 1-71 and make the following adjustments if required. a. Idle speed. **(Refer** to paragraph 6-5.) b. **Start** derichment. (Refer to paragraph 6-12.) **c. Start** acceleration (AVIM) (paragraph 6-12.1) d. Max speed stop (paragraph 6-14.)
	CAUTION **Do not adjust minimum stop screw, it is a factory adjustment.**	Make appropriate entry relative to fuel control replacement in the engine log.

6-12. Gas Producer Fuel Control - Start Derichment Adjustment

INITIAL SETUP

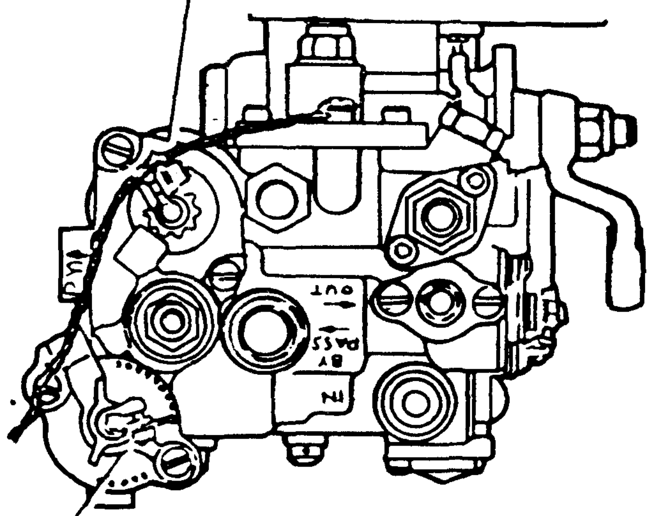
Applicable Configuration
All

Consumable Materials
Lockwire (item 7, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/		
1. Fuel Control	**CAUTION** **Do not disturb the pointer-to-shaft sealed wire at any time. This is an overhaul function only.**	

6-12. Gas Producer Fuel Control - Start Derichment Adjustment - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME /-Continued.		



LOCATION/ITEM	REMARKS	ACTION
2. Lockwire	**CAUTION** During attempted start, TOT must be closely monitored to prevent overtemperature operation. Record overtemperature in the Engine Log.	Remove lockwire securing adjustment locknut to P_c filter fitting.
3. Locknut		Loosen adjustment locknut.
	Turn clockwise to enrich the starting fuel flow to improve stagnated starts, cold weather starts, or high altitude ground starts. Turn counterclockwise for-a leaner fuel flow when starts are too hot. Make the adjustment in 10-degree maximum increments (dots are 10 degrees apart) and tighten locknut 20-25 lb in. (2.3 -2.8 N.m) after each setting. Check the starting peak TOT after each setting until satisfactory starts are made.	Make adjustment using an Allen wrench.

6-12. Gas Producer Fuel Control - Start Derichment Adjustment - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/-Continued		
4. Locknut and Lockwire.	Lockwire (item 7, Appendix D).	When desired adjustment is obtained, secure locknut to P_c filter- fitting with lockwire.

CAUTION

Monitor TOT closely after start derichment adjustment to be sure overtemperature limits are not exceeded.

NOTE

An Engine performance check is not required for this adjustment,

6-12.1. Gas Producer Fuel Control - Start/Acceleration Fuel Flow Adjustment - AVIM.

INITIAL SETUP

Applicable Configuration
Latest Modified Fuel Control

Consumable Materials
Lockwire (item 17, Appendix C)

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME		
1. Fuel Control	The Start/acceleration fuel flow schedule adjustment maintains the gas producer fuel control starting schedule within acceptable limits during normal service life. To optimize engine starting, the start - derichment adjustment should be made in conjunction with the start/acceleration adjustment. (Refer to table and chart.)	

6-12.1. Gas Producer Fuel Control - Start /Acceleration Fuel Flow Adjustment - AVIM - Continued

LOCATION/ITEM	REMARKS	ACTION

AIRFRAME/Continued

Adjustments to Improve Starting.

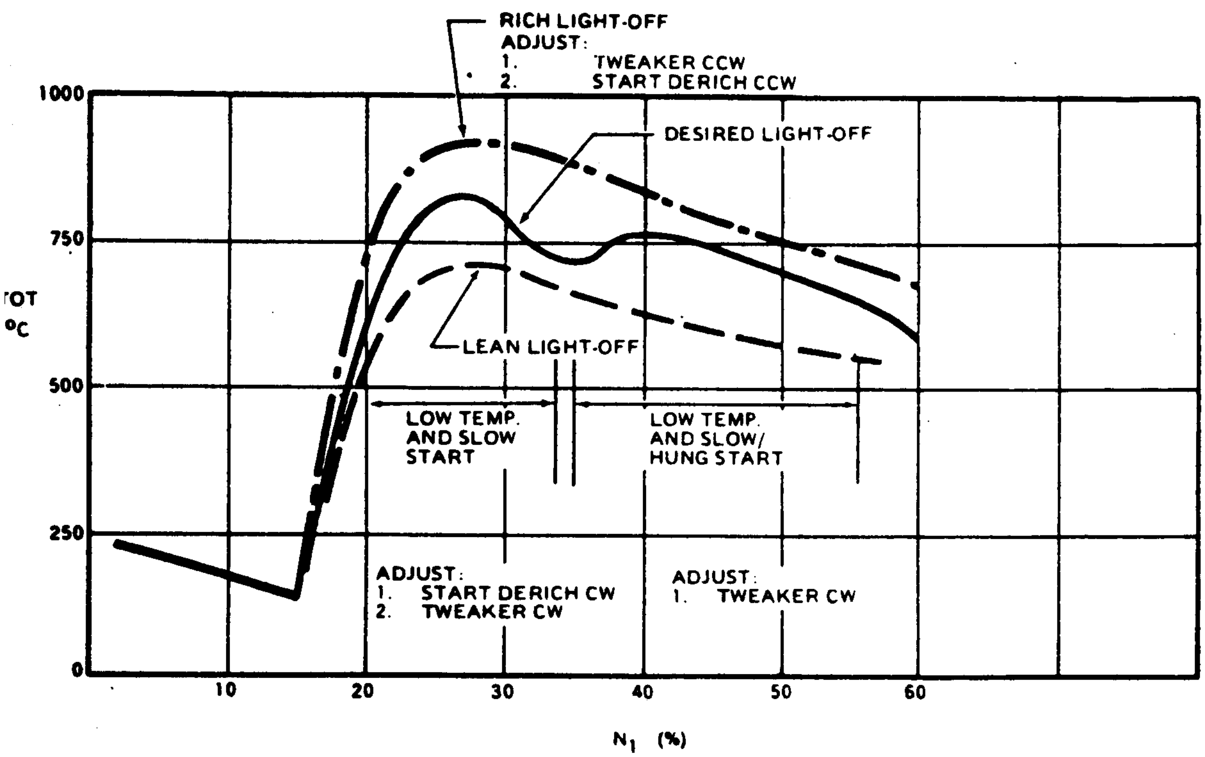
Condition	Recommended Adjustments
Excessive lightoff temperature - over 810° C(1490° F) with momentary peak of one second max at 927° C (1700° F) for a period not to ex-teed 10 seconds. N 1 speed below 20%.	Adjust start /acceleration counterclockwise. If any additional correction is necessary, adjust start-derichment counterclockwise. (Refer to subparagraph 2 and paragraph 6-12 for procedures.)
Low lightoff temperature - lightoff temperature below 550°C(1022 °F) with N1 speed below 20% and slow accelera-tion.	Adjust start/acceleration clockwise. (Refer to subparagraph 2 for procedure.)
High rapid temperature rise with N1 speed at 25.30%.	Adjust start/derichment counterclockwise. If any additional correction is necessary, adjust start/accelerate on counterclockwise. (Refer to subparagraph 2 and paragraph 6-12 for procedures.)
Low lightoff temperature with slow start - lightoff temperature below' approximately 550 °C(1022 °F) with starting time approaching 60 seconds (or more) and N1 speed hesitation at 20-33%.	Adjust start-derichment clockwise. If additional correction is necessary, adjust start acceleration clockwise. (Refer to subparagraph 2 and paragraph 6-12 for procedures.)
High lightoff temperature - over 810°C(1490 °F) with a momen-tary peak of one second max at 927°C (1700°F) for a period not to exceed 10 seconds and N1 speed at 35-55%.	Adjust start/acceleration counterclockwise. (Refer to subparagraph 2 for procedures.)
Low lightoff temperature with slow-to-hung starts - light off temperature below approximate-ly 550°C(1022°F) with starting time approaching 60 seconds (or more) and N1 speed hesitation at 35-55%.	Adjust start/acceleration clockwise. (Refer to subparagraph 2 for procedures.)

6-12.1. Gas Producer Fuel Control - Start/Acceleration Fuel Flow Adjustment - AVIM - Continued

LOCATION/ITEM	REMARKS	ACTION

AIRFRAME/Continued

USE OF START DERICH AND START ACCEL (TWEAKER) ADJUSTMENTS



6-12.1. Gas Producer Fuel Control - Start/Acceleration Fuel Flow Adjustment - AVIM - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/Continued		
2. Lockwire		Remove lockwire and make start/acceleration fuel flow adjustment as follows:
	CAUTION Do not use start/acceleration adjustment to correct normal maintenance items such as misrigging, air leaks, fuel leaks, faulty fuel nozzle, ignition problems, starter-generator systems problems, etc. Do not use the start acceleration adjustment exclusively to improve engine starting. Excessive clockwise settings before encountering over- temperature results in a single high peak TOT over a wide speed range for a large part of the starting time. Use start-derich adjustment with start/acceleration adjustment to optimize engine starting. **NOTE** To accurately determine proper adjustment, conditions under which the adjustments are made should be consistent, i.e., a fully charged aircraft battery, the same residual TOT and the same lightoff speed. There are eight positions for the adjuster (the neutral position is three clicks from the counterclockwise stop). Detent grooves hold the adjuster in the selected one of these positions without the need of a jam nut. A required adjustment of more than two clicks clockwise is an indication that the fuel control is not the cause of the problem.	
	For low lightoff temperature or slow/hung starts, turn the adjuster clockwise. **CAUTION** **An over adjustment of the start/acceleration clockwise setting can cause overtemperature** starts or compressor surge.	Make adjustment in changes of one detent (click) at a time.

6-12.1. Gas Producer Fuel Control - Start/Acceleration Fuel Flow Adjustment. AVIM Continued

LOCATION/ITEM	REMARKS	ACTION

AIRFRAME/Continued

NOTE

If adjuster is positioned to the full clockwise stop and low lightoff temperatures or slow/hung starts are still encountered, ensure there are no pneumatic leaks.

For excessive lightoff temperature starts, turn the adjuster counterclockwise.

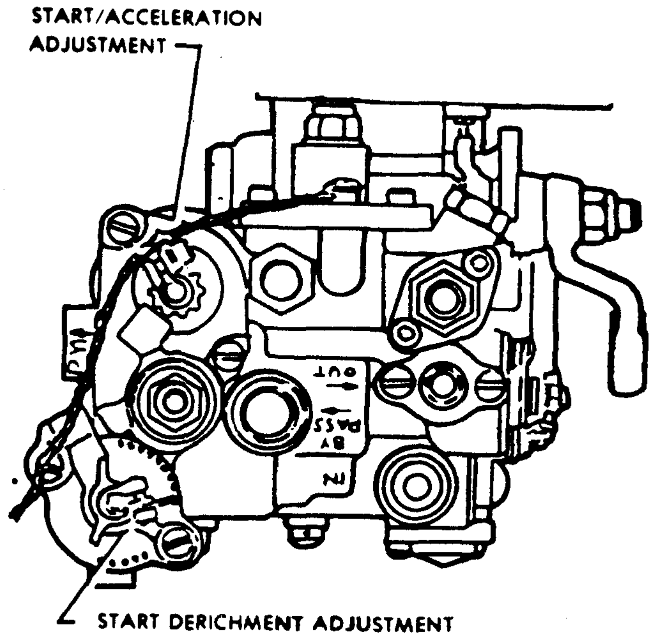
Make the adjustment in changes of one detent (click) at a time.

CAUTION

An over adjustment of the start/acceleration counterclockwise setting can cause an increase in staring time and possibly a hung start.

3. Lockwire

Lockwire (item 7, Appendix D).



When the final start/acceleration adjuster position is established, lockwire the pointer in accordance with referenced figure.

6-12.1. **Gas Producer Fuel Control - Start/Acceleration** Fuel Flow Adjustment - AVIM - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/Continued		
	Check idle speed and deceleration time after the final start setting is determined.	
	NOTE An engine performance check is required for this adjustment.	

8-13. Preparing Gas Producer Fuel Control For Storage and Shipment

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Lubricating Oil (item 4, Appendix D)
Drycleaning Solvent (item 1, Appendix D)
Corrosion Preventive Compound (item 11, Appendix D)

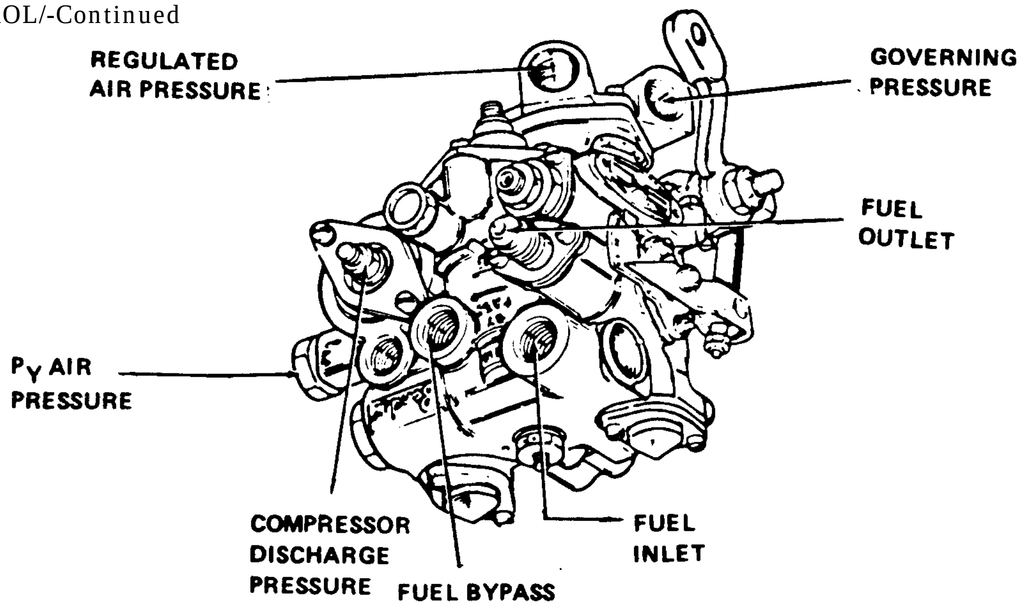
References
Para 1-36, 1-39, 2-7 and 2-20
TM 38-750

LOCATION/ITEM	REMARKS	ACTION
GAS PRODUCER FUEL CONTROL/	**NOTE** The procedure for removing the gas producer fuel control from the metal shipping and storage (container is prescribed in the applicable provisions of paragraph 2-20. Prepare the gas producer fuel control for storage, shipment, and installation in a metal shipping and storage container, MS63048-1, as follows. The fuel control consists of an air section and a fuel section; each section must be treated separately when preparing the unit for storage and shipment. **CAUTION** **Do not permit fuel or oil to enter the drive body cavity or any air pressure ports,**	
		a. Install shipping plugs in the compressor discharge pressure, governing pressure, P_y air pressure, and regulated air pressure ports.

* U.S. Government Printing Office: 1987-754-043/43575

6-13. Preparing Gas Producer Fuel Control For Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
GAS PRODUCER FUEL CONTROL/-Continued		



WARNING

Prolonged contact with lubricating oil (item 4, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

LOCATION/ITEM	REMARKS	ACTION
	Lubricating Oil (item 4, Appendix D)	b. **Drain** residual fuel from fuel control. **Place** throttle lever against the maximum stop. **Pump/pour** lubricating oil into inlet port. When clean oil flows out of bypass and fuel outlet ports, **remove** the source of oil. Plug the inlet, bypass and outlet ports. **Reposition** the throttle lever for shipping.

6-13. Preparing Gas Producer Fuel Control For Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
GAS PRODUCER FUEL CONTROL/-Continnued		
	NOTE If the engine fuel system was preserved in accordance with paragraph 1-36, step b maybe omitted. **WARNING** **Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin oontact. Avoid prolonged or repeated breathing of vapors, Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C - 59°C).**	
	Use drycleaning solvent (item 1, Appendix D).	**c. Clean** exterior of the fuel control with a clean cloth dampened with solvent. **Air dry or wipe** with a clean lint-free cloth. Blow out all crevices with dry, filtered, low-pressure compressed air.
	Use corrosion preventive compound (item 11, Appendix D).	d. **Coat** external bare metal surfaces including the splines with corrosion preventive compound.
		e. Attach a tag to the fuel control stating: FUEL CONTROL PRESERVED WITH LUBRICATING OIL, MIL-L-6081, GRADE 1010.

6-13. Preparing Gas Producer Fuel Control For Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
GAS PRODUCER FUEL CONTROL/ - Continued		
		f. **Attach** a properly filled out DD Form 1577-2 (Unserviceable-Reparable tag). **Refer to** paragraph 1-39 for additional information concerning tags.
		g. **Prepare** DA Form 2410 (Component Removal and Repair/ Overhaul Record) according to TM 38-750 and **place in a grease-**proof envelope. (Refer **to paragraph 1-39.)**
		h. **Wrap** fuel control with barrier material to prevent contact with the cushioning material and to prevent the loss of the corrosion preventive compound. **Secure** barrier material with pressure-sensitive tape.
		i. Prepare the container for use in accordance with paragraph 2-7.
		j. Install the fuel control upright in the container in accordance with paragraph 2-7.
		k. Stencil the container in accordance with paragraph 1-39.

6-14. Fuel Control Max Speed Stop - Check

INITIAL SETUP

Applicable Configuration
All

Special Tools
Fuel Control Max Stop Screw Setting Fixture, Tool No. 6872482

LOCATION/ITEM	REMARKS	ACTION
	Because engines differ on required-to-run fuel flow requirements, it may be necessary to adjust gas producer fuel control maximum stop to maintain N2 speed of 103% rpm at the higher power setting. It may also be necessary to make an N1 adjust during acceptance testing to meet the requirement for takeoff power. The max speed stop setting can be checked during ground operation of the engine by first installing a fixture (spacer) between the throttle lever stop and the max speed stop screw. The spacer (Fuel Control Max Stop Screw Setting Fixture 6872482) is sized to stop the throttle lever at 84% N 1 speed which is 20% below the 104% max continuous limit of the engine. Make the max speed stop setting as follows:	
1. Control Stick		**Attach a** warning note to the pilot's control stick. The note shall read: **WARNING** **Maintenance tool installed on the fuel control.**
ENGINE/		
2. Fuel Control		**Make** a match mark across the serrations of fuel control throttle lever and arm for reference in case the relative index is disturbed during check.
3. Throttle Lever Retaining Nut		**Remove** the throttle lever retaining nut. Do **not remove** the throttle lever.

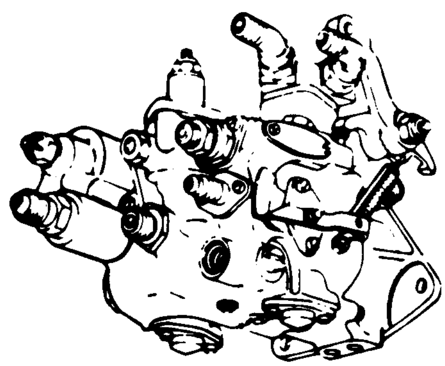
6-14. Fuel Control Max Speed Stop - Check - Continued

INITIAL SETUP

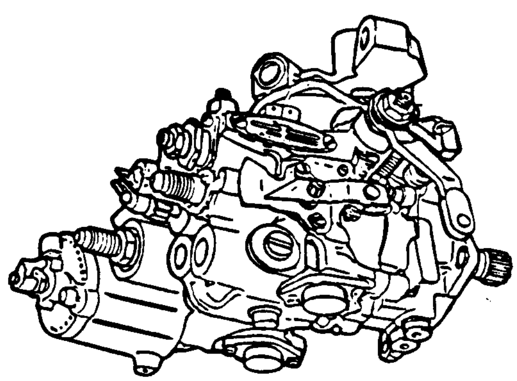
Applicable Configuration
All

Special Tools
Fuel Control Max Stop Screw Setting Fixture, Tool No. 6872482

LOCATION/ITEM	REMARKS	ACTION
4. Throttle Lever Shaft		**Place** the Fuel Control Max Stop Screw Setting Fixture 6872482 (20% N1 Spacer Tool) on the lever shaft,
		Adjust Bendix control P/N 2524909-2 and later, start/acceleration adjustment (paras 6-12 and 6-12.1)



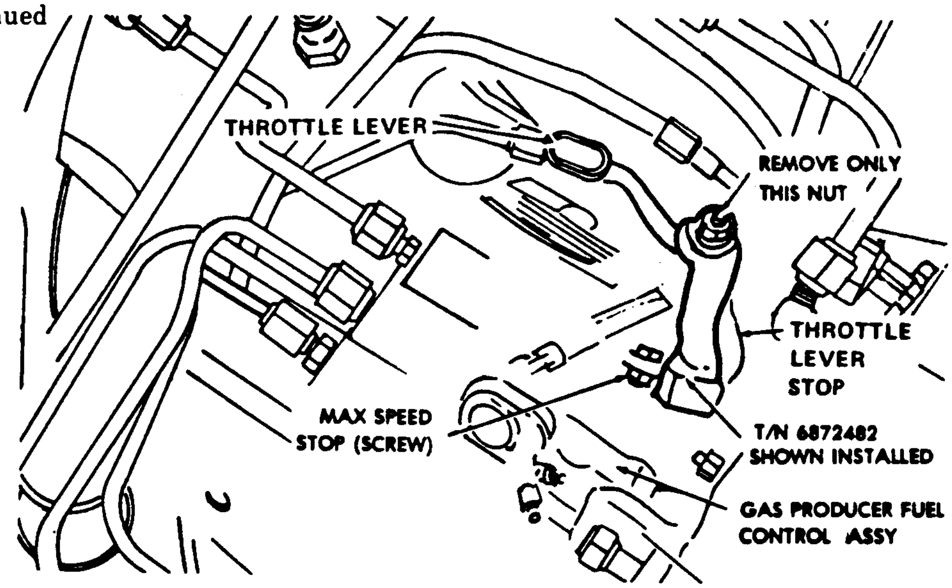
Fuel Control P/N 2524437-3



Fuel Control P/N 2524909-3

6-14. Fuel Control Max Speed Stop - Check - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		



FUEL CONTROL WITH 20% N1 FIXTURE INSTALLED

CAUTION

Ensure aft engine oil cooler cowling is secured to prevent 20% N1 fixture red flag from being blown into oil cooler shaft area during engine operation.

CAUTION

Overtightening the nut can cause binding of the throttle shaft.

AIRFRAME/

Check for max N 1 rpm with tool installed as follows:

WARNING

The helicopter may lift off during this check if it is not sufficiently loaded.

a. **Start** engine and stabilize at idle.

b. **Advance** throttle as far as it will go. **Adjust** beep to maximum position.

6-14. Fuel Control Max Speed Stop - Check - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/ - **Continued**		
		c. **Lift** collective slowly until N2 rpm decays 3 or 4%. At this point N1 is at max rpm. **Record** N1.
		d. **Make** a normal engine shutdown.
6. Fuel Control		**Adjust** max speed stop screw as follows, if required.
	NOTE Assure the accuracy of the TOT and N1 indicating systems prior to adjusting the max speed stop screw.	
	EXAMPLE: 82.4% N1 indicator reading +20.0% tool allowance 102.4% N1 max setting	a. **Add 20%** to N1 reading to account for fixture 6872482. The total should be 104%.
		b. If N1 max setting is above 104%, **make no adjustment.** If setting is less than 104%, as in example, turn max speed atop screw clockwise into casting to increase N1 speed.
	It is recommended that screw be turned in increments of one turn maximum before setting is rechecked. Repeat the setting until 104% is attained. One turn equals approximately 1% speed.	
		Remove fixture 6872482 and **reinstall** throttle lever nut. Tighten nut to 40-60 in. lb (0.5 - 0.6 kg/m). Be **sure** throttle lever match mark is still **alined,**

6-14. Fuel Control Max Speed Stop - Check - Continued

LOCATION/ITEM	REMARKS	ACTION
		Check that throttle lever stop contacts max speed stop screw.
AIRFRAME/		**Remove** warning note from pilot's control stick.

NOTE

This concludes the ground adjustment of the max speed stop screw. However, if the allowable limit of one of the three main indicators (torque, temperature, or N1 speed) cannot be reached in flight, readjust the max speed stop screw. Do not exceed existing torque, temperature or N1 limits.

6-15. Fuel Pump - Removal

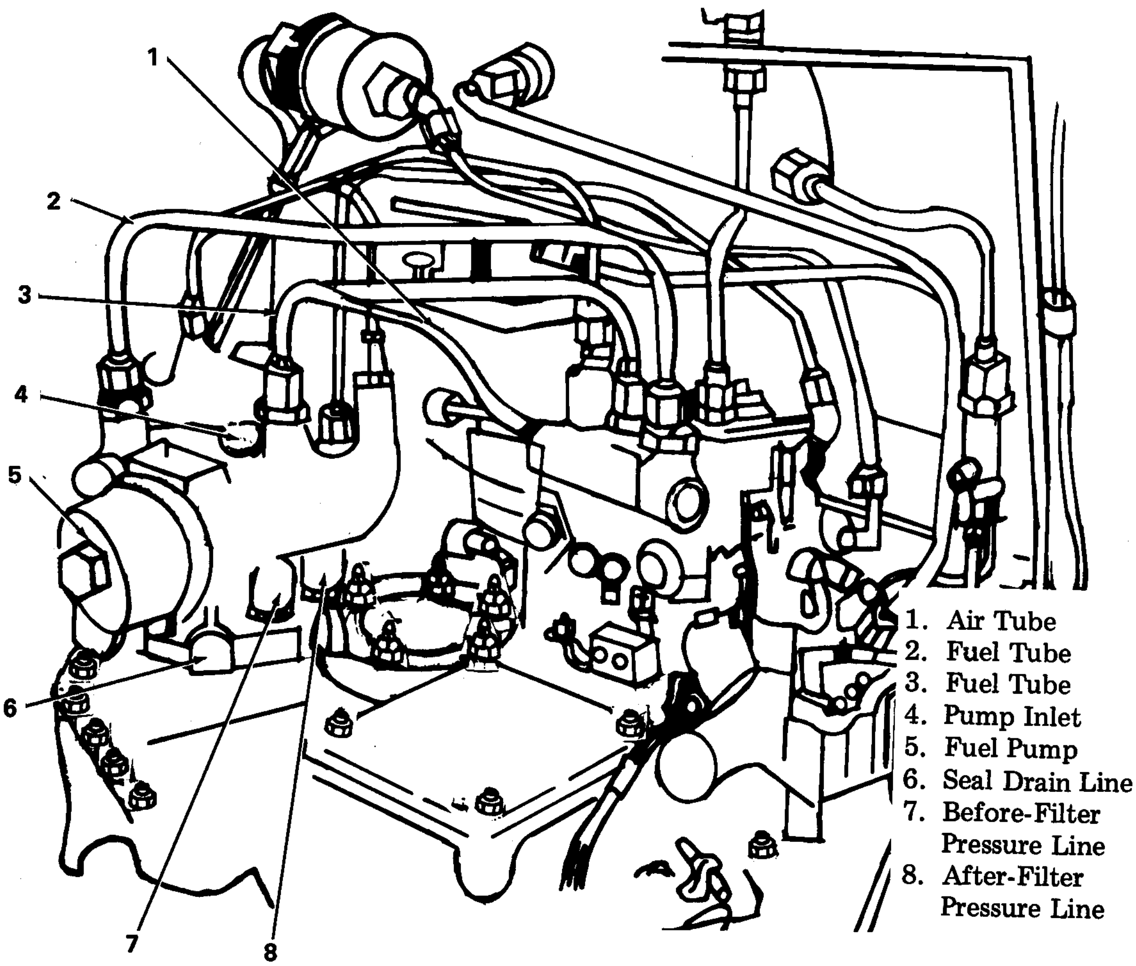
INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Before-Filter and After-Filter Pressure Lines (7 and 8)		**Disconnect** lines.

6-15. Fuel Pump - Removal - Continued

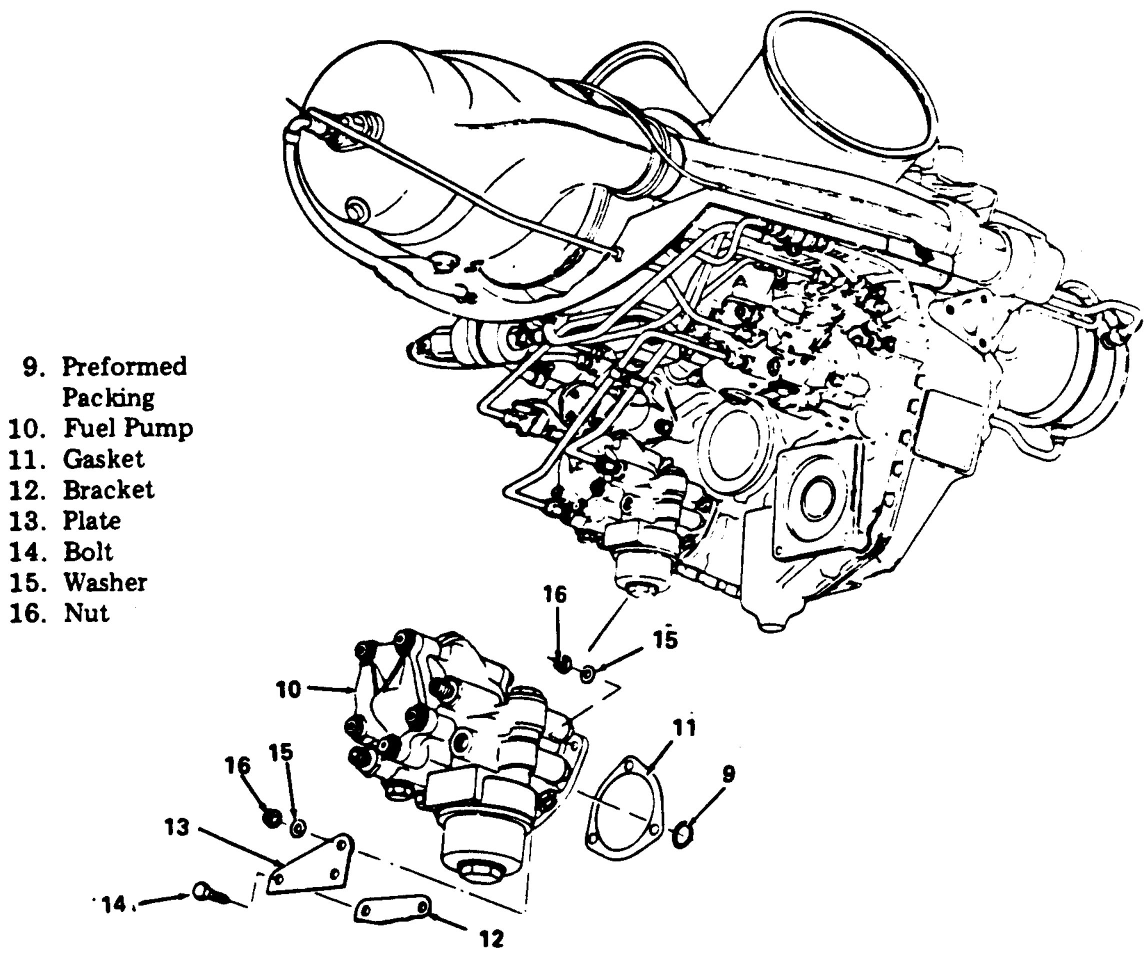
LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		



2. Seal Drain Line (6)		**Disconnect** from fuel pump (5).
3. Fuel Supply Hose		**Disconnect** at pump inlet (4).
4. Fuel Tubes (2 and 3)	It will not be necessary to disturb clamping arrangement between the tubes.	**Remove** fuel tubes between fuel pump and control.

6-15. Fuel Pump - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
5. Bolts (14)		If engine has an auto reignition system installed, remove two bolts (14) securing plate (13) to bracket (12).
6. Nuts (16) and Washers (15)		**Remove** three self-locking nuts (16) and washers (15) which secure fuel pump (10) and plate (13) to gearbox.



6-15. Fuel Pump - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
7. Pump and Plate		**Remove** pump and plate from mounting studs.
8. Gasket (11) and Reformed Pecking (9)		Remove and **discard** mounting flange gasket (11) and preformed packing (9).
	If a new pump is to be installed, remove the tube fittings and keep them for installation in the new pump. Discard the preformed packings.	

6-16. Fuel Pump - Installation

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Lubricating Oil (item 5, Appendix D)
Lubricating Oil (item 4, Appendix D)

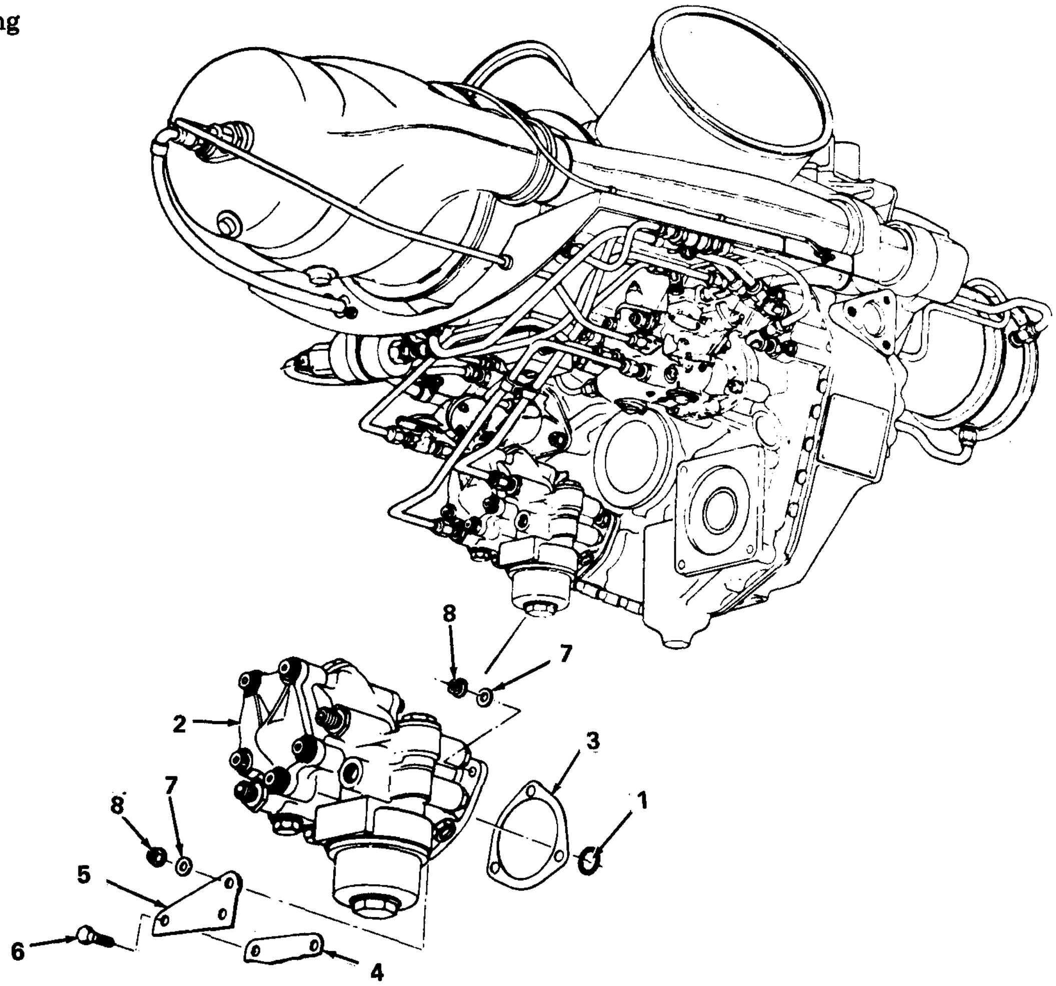
References
Para 1-63 thru 1-71

LOCATION/ITEM	REMARKS	ACTION
	If a new pump is to be installed, transfer tube fittings from removed pump to new pump. Use new preformed packings lubricated with oil (item 4, Appendix D). Tighten fittings in inlet, discharge, and bypass ports to 75-110 in. lb (0.9 -1.3 kg/m). Tighten fittings in the before-filter, after-filter, and seal drain ports to 55-80 in. lb (0.6 -0.9 kg/m).	

6-16. Fuel Pump - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION

1. Preformed Packing
2. Fuel Pump
3. Gasket
4. Plate
5. Bracket
6. Bolt
7. Washer
8. Nut



WARNING

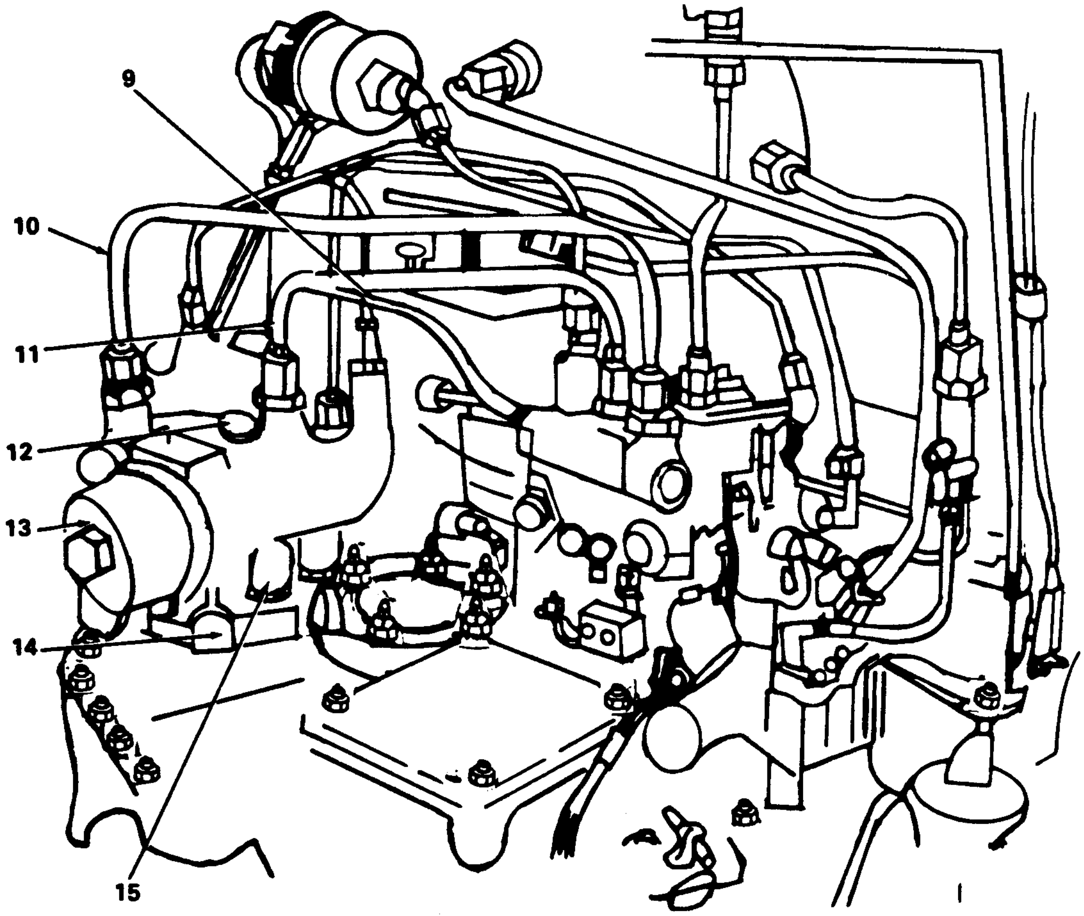
Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.

6-16. Fuel Pump - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
1. Preformed Packing (1)	Lubricating Oil (item 5, Appendix D).	**Lubricate** new preformed packing (1) and **install** on pump drive.
2. Fuel Pump (2)	Lubricating Oil (item 5, Appendix D).	**Coat** fuel pump drive splines with lubricating oil.
T63-A-700 ENGINE/		If the engine has an auto reignition system installed, **install** pump with new gasket (3) on mounting pad studs.
		If the engine has an auto reignition system installed, **install** plate (4) on lower mounting stud. **Secure** plate to bracket (5) with two bolts (6). **Tighten** bolts to 35-40 in. lb (0.4 -0.5 kg/m).
3. Fuel Pump (2)		**secure** pump with three washers (7) and self-locking nuts (8). **Tighten** nuts to 70-85 in. lb (0.8 -1.0 kg/m).

6-16. Fuel Pump - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION



9. Fuel Tube
10. Fuel Tube
11. Fuel Supply Hose
12. Fuel Pump
13. Before-Filter Hose
14. After-Filter Hose
15. Seal Drain Hose

6-16. Fuel Pump - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
4. Fuel Tubes (9 and 10)		**Install** fuel tubes between fuel pump (12) and control. **Tighten** tube coupling nuts to 150-200 in. lb (1.7-2.3 kg/m).
5. Fuel Supply Hose		**Connect** fuel supply hose at pump inlet (11). **Tighten** coupling nut to 150-200 in. lb (1.7-2.3 kg/m).
6. Before-Filter, After-Filter, and Seal Drain Hoses (13. 14 and 15)		**Connect** hoses. **Tighten** coupling nuts to 80-120 in. lb (0.9-1.4 kg/m).
	NOTE On the first start after fuel pump has been changed, return the gas producer lever to fuel cutoff and motor the engine for about 10 seconds if a false start occurs or if a start is not completed within 45 seconds. Following installation of the fuel pump test the engine as outlined in paragraphs 1-63 thru 1-71.	

6-17. Fuel Pump and Filter Assembly - Preparation For Storage and Shipment

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning Solvent (item 1, Appendix D)
Lubricating Oil (item 4, Appendix D)
Corrosion Preventive Compound (item 11, Appendix D)
Tape (item 3, Appendix D)

References
Para 1-36, 1-39, 2-7, 2-20 and 1-6

6-17. Fuel Pump and Filter Assembly - Preparation For Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
	NOTE The procedure for removing the fuel pump and filter assembly from the metal shipping and storage container is prescribed in the applicable provisions of paragraph 2-20. Prepare the fuel pump and filter assembly for storage, shipment, and installation in a metal shipping and storage container, MS63052-1, as follows: **WARNING** **Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of fumes. Do not use near open flame or excessive heat. Flash point of solvent is 100° F - 138°F (38°C - 59°C).**	
1. Fuel Pump and Filter Assembly	Solvent (item 1, Appendix D).	a. **Clean** exterior of fuel pump with a clean cloth dampened with solvent. **Air dry or wipe** with a clean lint-free cloth. **Blow out all** crevices with dry, filtered, low-pressure compressed air.
	WARNING **Prolonged contact with lubricating oil (item 4, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.**	

6-17. Fuel Pump and Filter Assembly - Preparation For Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
	Oil (item 4, Appendix D)	b. **Pump** lubricating oil into fuel inlet port until fuel-free oil flows from the outlet port. **Drain excess oil** from fuel pump.
	NOTE If the engine fuel system was preserved in accordance with paragraph 1-36, step b maybe omitted.	
		c. **Install** shipping plugs in all ports to **prevent** entry of foreign material.
	Corrosion Preventive Compound (item 11, Appendix D).	d. **Coat** external bare metal surfaces including the splines with corrosion preventive compound.
		e. **Attach** a tag to the fuel pump stating: FUEL PUMP PRESERVED WITH LUBRICATING OIL, MIL-L-6081, GRADE 1010.
		f. **Attach** a properly filled" out DD Form 1577-2 (Unserviceable-Reparable tag). **Refer** to paragraph 1-39, for additional information concerning tags.
		g. **Prepare** DA Form 2410 (Component Removal and Repair/Overhaul Record) according to TM 38-750 and **place** in a greaseproof envelope. (Refer **to** paragraph 1-39.)

6-17. Fuel Pump and Filter Assembly - Preparation For Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
	Tape (item 3, Appendix D).	h. **Wrap** fuel pump with barrier material to **prevent** contact with the cushioning material and to **prevent** the loss of the corrosion preventive compound. **Secure** barrier material with tape.
		i. **Prepare** container for use in accordance with paragraph 2-7.
		j. Install fuel pump upright in the container in accordance with paragraph 2-6.
		k. **Stencil** container in accordance with paragraph 1-39.

6-18. Power Turbine Governor - Removal

INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
	NOTE Before replacing the power turbine governor to correct an engine malfunction, insure that the pneumatic tubes and fittings are not leaking and the double check valve is functioning properly. A malfunction which appears to be a governor malfunction may be caused by erroneous pressures.	

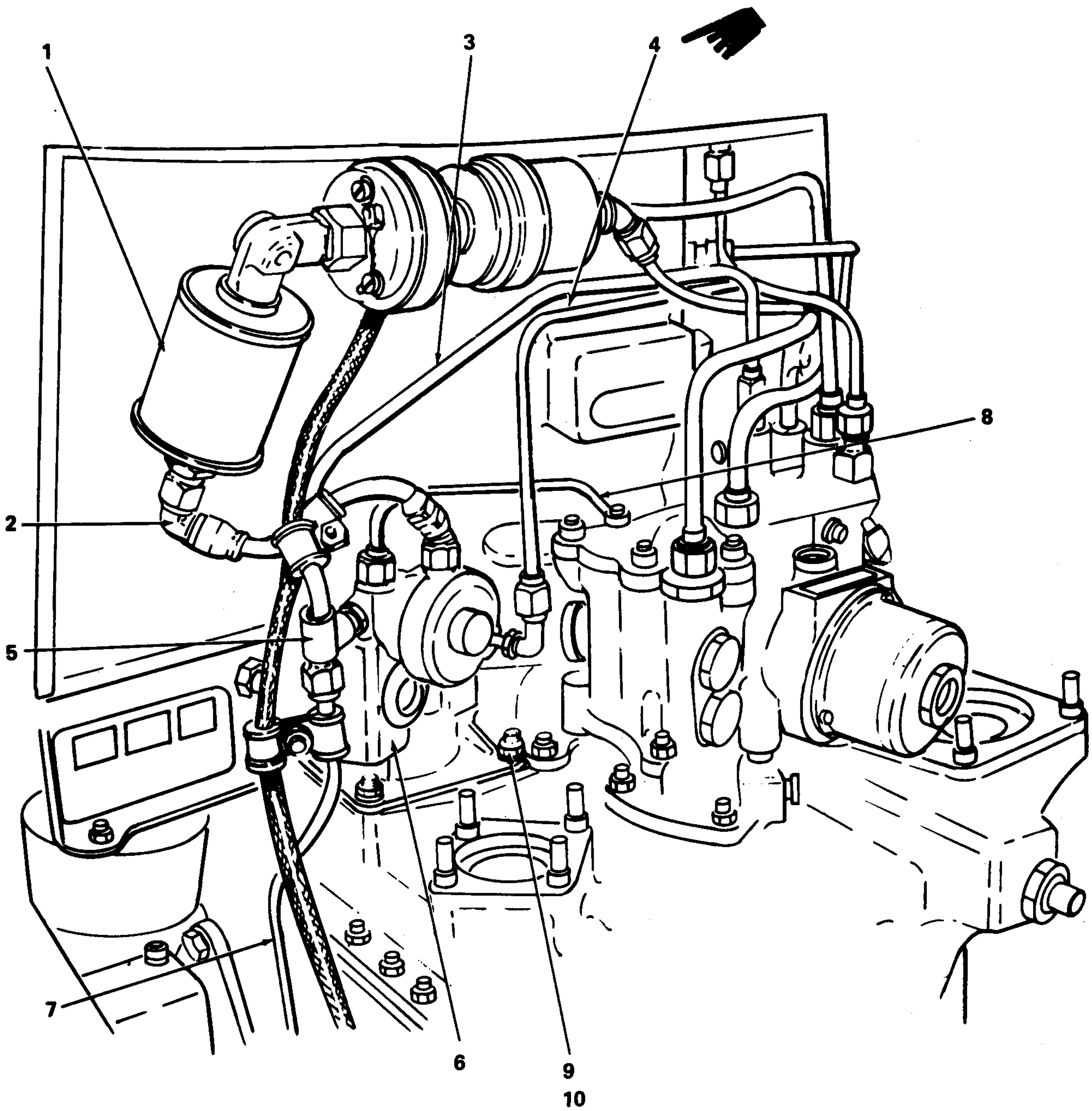
6-18. Power Turbine Governor - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Self-Locking Nuts and Lever		**Remove** self-locking nut and **remove** lever from governor (6).
2. Air Tube (7)		**Remove** air tube (7) between scroll and governor tee.
3. Air Tube (3)		**Remove** air tube (3) between governor tee (5) and fuel control.
4. Air Tube (4)		**Remove air** tube (4) between governor and fuel control.
5. Air Tube (2)		**Remove air** tube (2) between governor and second accumulator (l).
6. Air Tube (8)		**Remove air** tube (8) between governor and control.
GOVERNOR/		
7. Self-Locking Nuts (9), Washers (10)		**Remove** three self-locking nuts (9), and washers (10) securing governor to gearbox. **Remove** governor from mounting studs.

6-18. Power Turbine Governor - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION

ENGINE/ - Continued



6-19. Power Turbine Governor - Drive Gear Replacement

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Grease (item 18, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
POWER TURBINE GOVERNOR/		
1. Retaining Ring		Remove and discard retaining ring securing drive gear on governor drive shaft.
2. Drive Gear, Spring, and Drive Sleeve		Slide drive gear spring and drive sleeve from drive ahaft.
3. Drive Shaft and Drive Gear	Grease (item 18, Appendix D).	Coat splined surfaces of drive shaft and drive gear with grease.
4. Drive Sleeve		Install drive sleeve on drive shaft with the flat side toward governor.
6. spring		Slip spring on drive shaft and engage straight tang on the end of spring in the small hole in drive aleeve.
6. Spring		Engage straight tang on opposite end of spring in small hole in drive gear.
7. Drive Gear		Rotate drive gear 90 degrees clockwise to impose a spring preload and engage drive gear in splines on drive shaft. Slip drive gear onto shaft until drive sleeve and drive gear segments engage; then install a new retaining ring on end of drive shaft.

6-20. Power Turbine Governor - Installation

INITIAL SETUP

Applicable Configuration
All

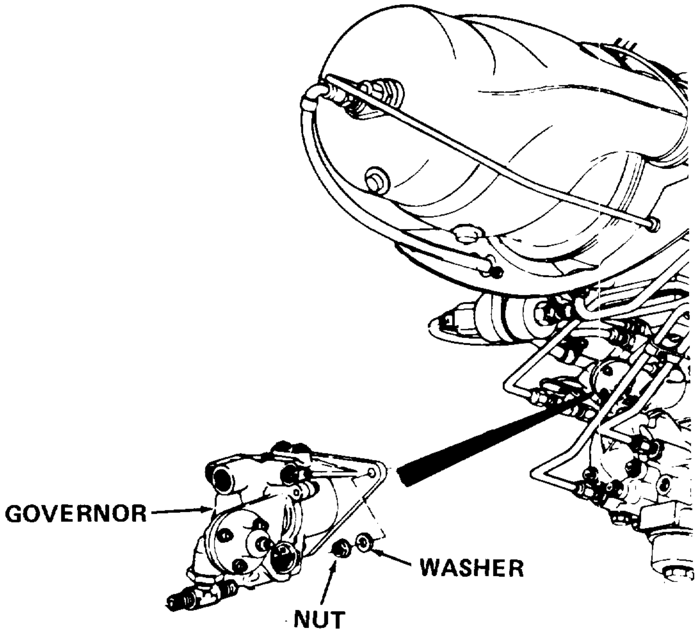
Consumable Materials
Grease (item 37, Appendix D)
Antiseize Compound (item 6, Appendix D)

References
Para 1-63 thru 1-71 and 6-3

LOCATION/ITEM	REMARKS	ACTION
	CAUTION **When removing or installing fittings in the governor, be careful not to cause a load on the drive shaft.** **If a new governor is to be installed, transfer the tube fittings from the removed governor to the new governor. Use new preformed packings; do not lubricate. Do not tighten jam nuts. Tighten nipples to 75-110 in. lb (0.9 -1.3 kg/m).**	
POWER TURBINE GOVERNOR/		
1. Drive Shaft	Grease (item 37, Appendix D) Antiseize Compound (item 6, Appendix D).	**Coat** governor drive shaft splines with lubricant and the studs with antiseize compound. Do **not lubricate** tube fittings.
ENGINE/		**Install governor on** mounting pad studs. Make **certain governor** drive splines are properly engaged in gearbox drive splines, the governor must be flush against gearbox mounting pad.

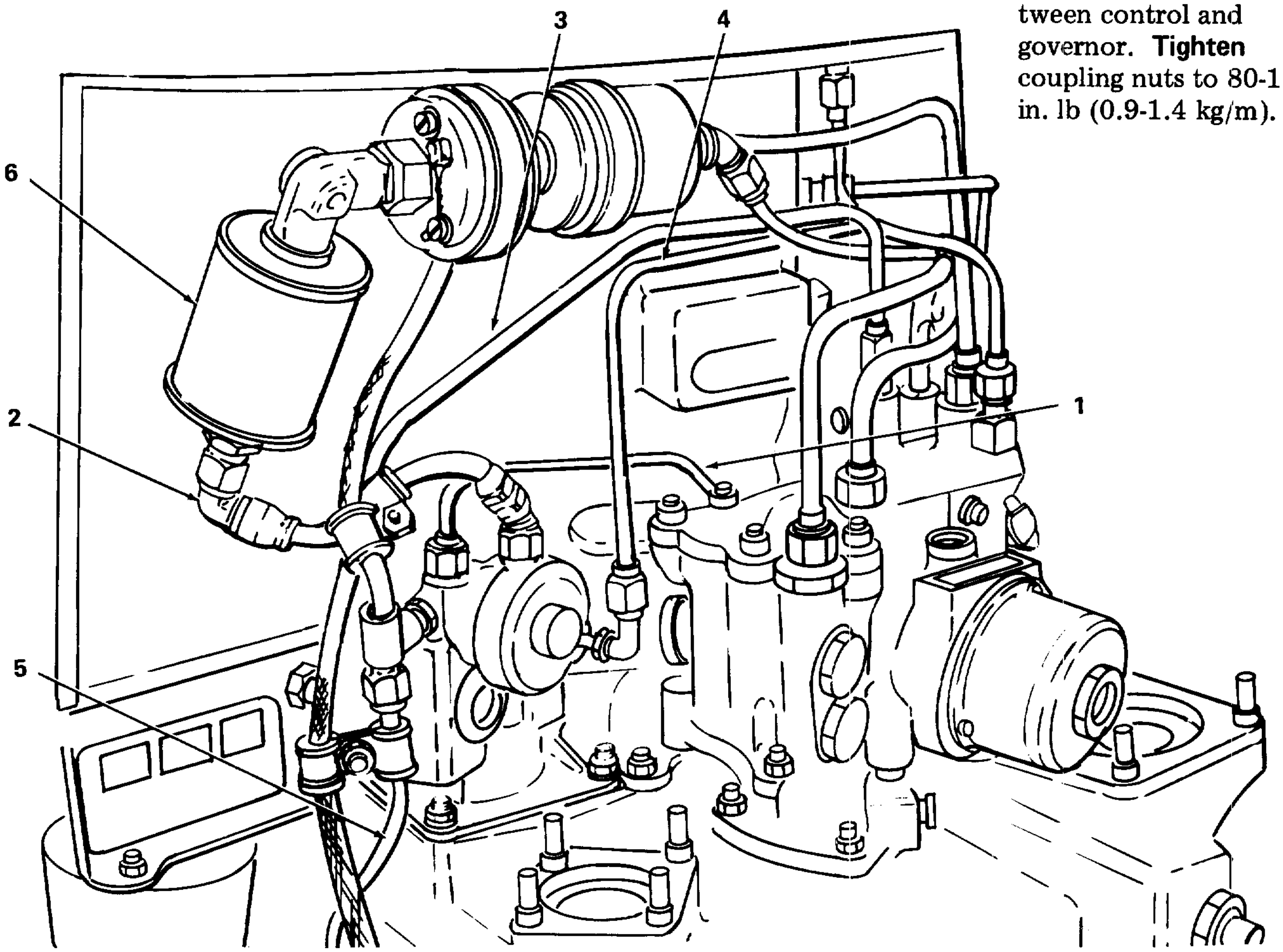
6-20. Power Turbine Governor - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
POWER TURBINE GOVERNOR/ - Continued		**Secure** governor with three washers and self-locking nuts. **Tighten** nuts to 70-85 in. lb (0.8-1.0 kg/m).



ENGINE/

2. Air Tube (1)		**Install** air tube (1) between control and governor. **Tighten** coupling nuts to 80-120 in. lb (0.9-1.4 kg/m).



6-20. Power Tubine Governor- Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
3. Air Tube (2)		**Install** air tube (2) between governor and second accumulator (6). **Tighten** coupling nuts to 80-120 in. lb (0.9-1.4 kg/m).
4. Air Tube (4)		**Install** air tube (4) between governor end control. **Tighten** coupling nuts to 80-120 in. lb (0.9-1.4 kg/m). **Tighten** elbow jam **nut** to 55-80 in, lb (0.6-0.9 kg/m).
5. Air Tube (3)		**Install** air tube (3) be. tween governor tee and control. **Tighten** coupling nuts to 80-120 in. lb (0.9-1.4 kg/m), **Tighten** tee jam nut to 55-80 in. lb (0.6-0.9 Win).
	Perform a fuel system pneumatic leak check, (Refer to para 6.3.)	
6. Air Tube (5)		**Install** air tube (5) be tween **scroll** and governor *tee*. **Tighten** coupling nuts to 80-120 in. lb (0.9-1.4 kg/m).
	CAUTION **Overtorquing** will cause binding **of the lever shaft.**	
7. Governor Lever		**Install** governor lever on governor shaft end **position** approximately 90 degrees to centerline of indicator on stop assembly **Secure** lever with self-locking nut. Tighten nut to 40-50 in. lb (0.5-0.6 kg/m).

6-20. Power Turbine Governor - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		**Adjust** aircraft linkage as outlined in the applicable Aircraft Maintenance Manual. **Test** the engine as outlined in paragraphs 1-63 thru 1-71. **Make** appropriate entry relative to governor replacement in the engine historical records.

6-21. Deleted.

Pages 6-49 through 6-51 deleted.

6-22. Power Turbine Governor - Preparation For Storage and Shipment

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning Solvent (item 1, Appendix D)
Corrosion Preventive Compound (item 11, Appendix D)
Tape (item 3, Appendix D)
Barrier Material (item 2, Appendix D)

References
Para 1-39, 2-7 and 2-20

LOCATION/ITEM	REMARKS	ACTION
	NOTE The procedure for removing the power turbine governor from the metal shipping and storage container is prescribed in the applicable provisions of paragraph 2-20. Prepare the power turbine governor for storage, shipment, and installation in a metal shipping and storage container, MS27684-2, as follows: CAUTION **Use extreme care to prevent foreign material from entering the pneumatic tubes or the governor ports.**	
		a. **Install** shipping plugs in all ports to prevent entry of foreign material.
	WARNING **Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C - 59°C).**	

6-22. Power Turbine Governor - Preparation For Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
	Solvent (item 1, Appendix D)	b. Clean exterior of governor with a clean cloth dampened with solvent. Air dry or wipe with a clean lint-free cloth. Blow out all crevices with dry, filtered, low-pressure compressed air.
	Corrosion Preventive Compound (item 11, Appendix D)	c. Coat external bare metal surfaces including the splines with corrosion preventive compound.
		d. Attach a properly filled out DD Form 1577-2 (Unserviceable-Repairable tag), Refer to paragraph 1-39 for additional information concerning tags.
		e. Prepare DA Form 2410 (Component Removal and Repair/Overhaul Record) according to DA Pamphlet 738-751 and place in a grease-proof envelope. (Refer to paragraph 1-39.)
	Barrier Material (item 2, Appendix D) Tape (item 3, Appendix D)	f. Wrap governor with barrier material to prevent contact with the cushioning material and to prevent the loss of the corrosion preventive compound. Secure barrier material with tape.
		g. Prepare container for use in accordance with paragraph 2-7.

6-22. Power Turbine Governor - Preparation For Storage and Shipment - Continued

LOCATION/ITEM	REMARKS	ACTION
		h. Install governor upright in the container in accordance with paragraph 2-7.
		i. Stencil container in accordance with paragraph 1-39.

6-23. Diaphragm - Type (Cylindrical) Valve - Removal

INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Clamp (1)		**Loosen** clamp. **Loosen** nut (3).
2. Air Hose (2)		**Disconnect** flexible air hose (2) at the union (4). **Hold** union with backup wrench.
3. Accumulator (7)		**Remove** accumulator (7) from elbow (9) by turning on the narrow hexagonal surface on the accumulator using a backup wrench on the elbow. **Discard** o-ring (8).
4. Union (11) and Elbow (9)		**Hold** check valve (13) with backup wrench on hexagonal surface of valve adjacent to union (11). **Remove** union (11) and elbow (9) by turning on union. **Discard** o-ring (12).

6-23. Diaphragm - Type (Cylindrical) Valve - Removal - Continued

ENGINE/ - Continued

LOCATION/ITEM	REMARKS	ACTION
5. Clamp Assembly (6)		Remove clamp assembly (6) from fireshield and check valve (13).
6. Check Valve (13)		Hold accumulate (16) with backup wrench and remove check valve (13) by turning on hexagonal surface on check valve adjacent to union. Discard o-ring.

CAUTION

Do not torque through the double check valve at any time. When the double check valve is removed use extreme care to prevent foreign materials from entering the pneumatic line or the double check valve.

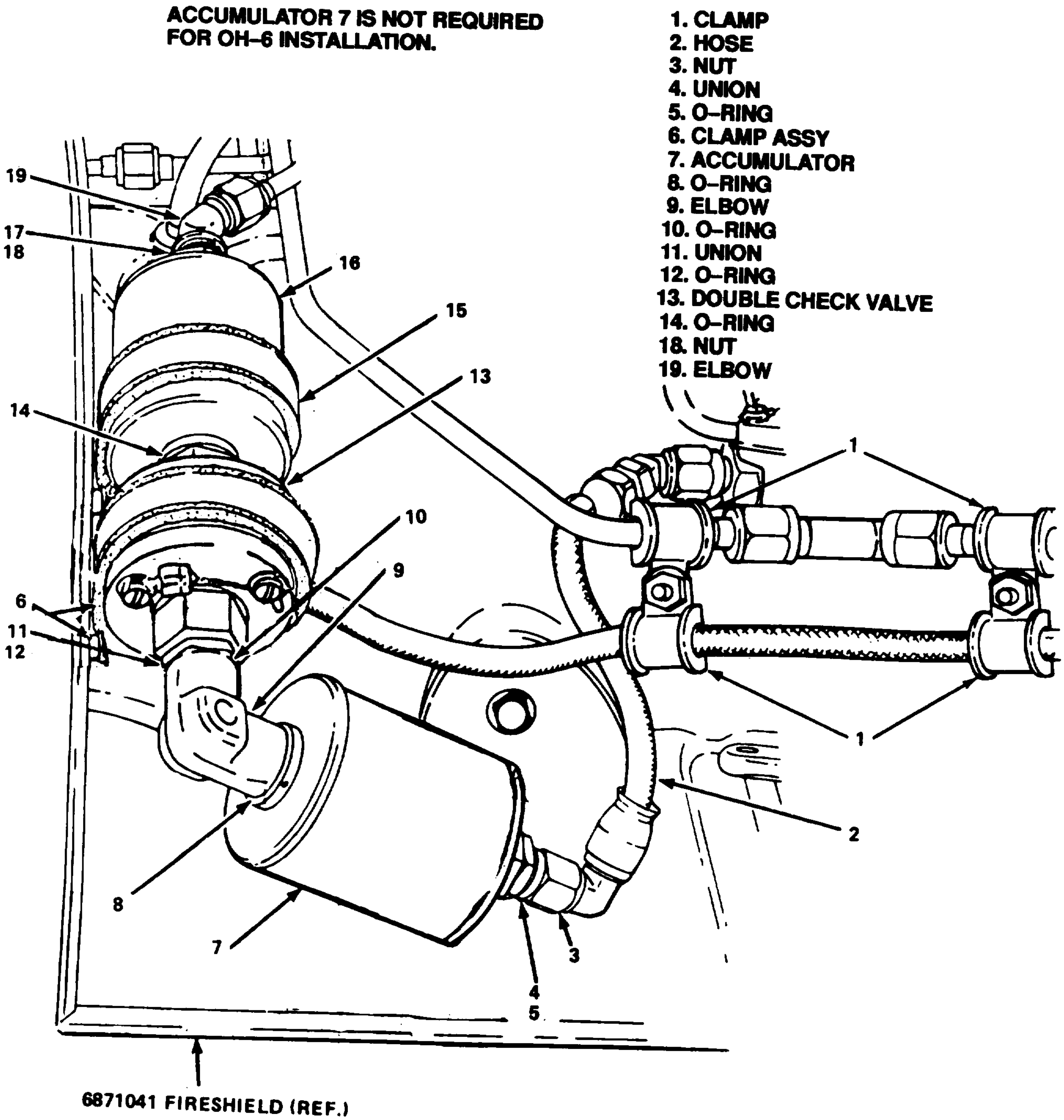
6-23. Diaphragm - Type (Cylindrical) Valve - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION

ENGINE/ - Continued

NOTE

ACCUMULATOR 7 IS NOT REQUIRED FOR OH-6 INSTALLATION.



6-23. Diaphragm - Type (Cylindrical) Valve - Installation

INITIAL SETUP

Applicable Configuration

All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Accumulator (16)		**Place** new o-rings (5) and (14) on accumulator. **Do not lubricate** o-rings.
	CAUTION **Do not torque through the double check valve at any time.**	
2. Check Valve (13)		**Screw** check valve on to accumulator (16). Hold accumulator with backup wrench. **Tighten** check valve 55-80 in. lb (0.6-0.9 kg/m) by turning on hexagonal surface of check valve adjacent to accumulator.
3. Union (11) and Elbow (9)		**Place** new o-rings (10, 12) on union (11). **Do not lubricate** o-rings. Screw union (11) and elbow (9) on check valve (13). **Hold** check valve with backup wrench on hexagonal surface adjacent to union and **tighten** union 55-80 in. lb (0.6-0.9 kg/m).
	At this point it may be necessary to loosen clamp (15) and nut (18) in order to align the assembly as shown. Hold back wrench on elbow (19) and loosen nut (20). Loosen clamp nut so accumulator (16) and assembly may be turned. Leave the assembly loose and continue installation.	

6-24. Diaphragm - Type (Cylindrical) Valve - Installation - Continued

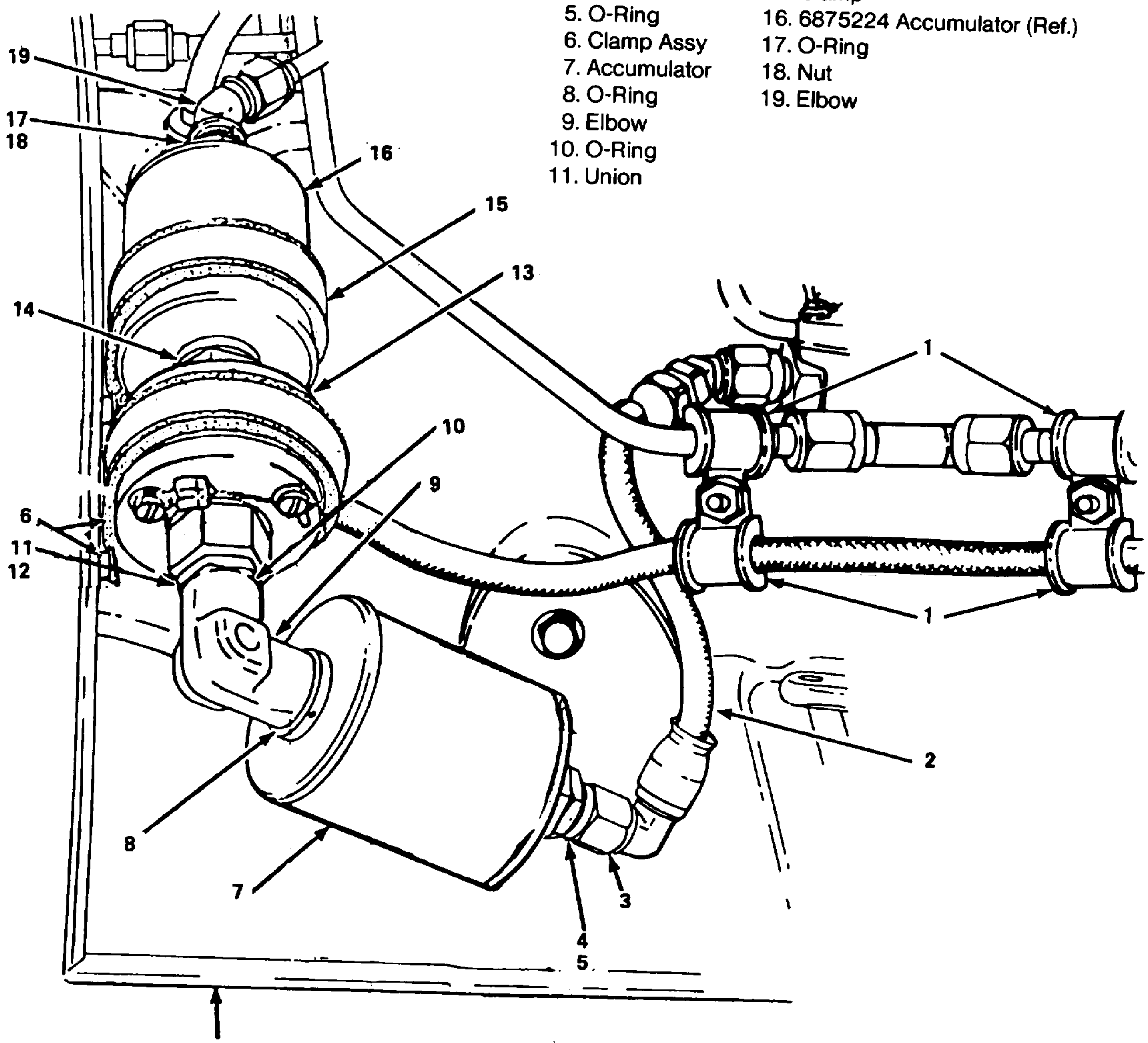
LOCATION/ITEM	REMARKS	ACTION

ENGINE/ - Continued

NOTE

ACCUMULATOR 7 IS NOT REQUIRED FOR OH - 6 INSTALLATION.

1. Clamp
2. Hose
3. Nut
4. Union
5. O-Ring
6. Clamp Assy
7. Accumulator
8. O-Ring
9. Elbow
10. O-Ring
11. Union
12. O-Ring
13. Double Check Valve
14. O-Ring
15. Clamp
16. 6875224 Accumulator (Ref.)
17. O-Ring
18. Nut
19. Elbow



6-24. Diaphragm - Type (Cylindrical) Valve - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
4. Clamp (6)		**Install** clamp (6) on check valve (13). **Attach** clamp to fireshield using bolt, spacer, washer and nut. **Do not tighten.**
5. O-ring		Place new o-ring on accumulator (7). Do not lubricate o-ring.
6. Accumulator (7)		Screw accumulator on elbow (19). Hold backup wrench on elbow and tighten accumulator 55-80 in. lb (0.6-0.9 kg/m) by turning on hexagonal surface on accumulator adjacent to elbow.
7. Nut		Install nut on hose (2) to union (4). Do not tighten.
8. Clamp (1)		Install clamps (1) and tighten clamping nuts to 35-40 in. lb (0.4-0.5 kg/m).
9. Nut		Hold union (4) with backup wrench. Tighten nut on hose (2) to 80-120 in. lb (0.9-1.4 kg/m).
10. Clamp (16)		**Tighten** clamping nut on clamp (15) to 35-40 in. lb (0.4-0.5 kg/m).
11. Nut (18)		**Hold** backup wrench on elbow (19) adjacent to nut (18) and **tighten** nut to 55-80 in. lb (0.6-0.9 kg/m).
12. Clamp Assembly (6)		**Tighten** clamping nut on clamp assembly (6) to 35-40 in. lb (0.4-0.5 kg/m).

6-25. Accumulator - Removal

INITIAL SETUP

Applicable Configuration

All

Consumable Materials

Para 6-30

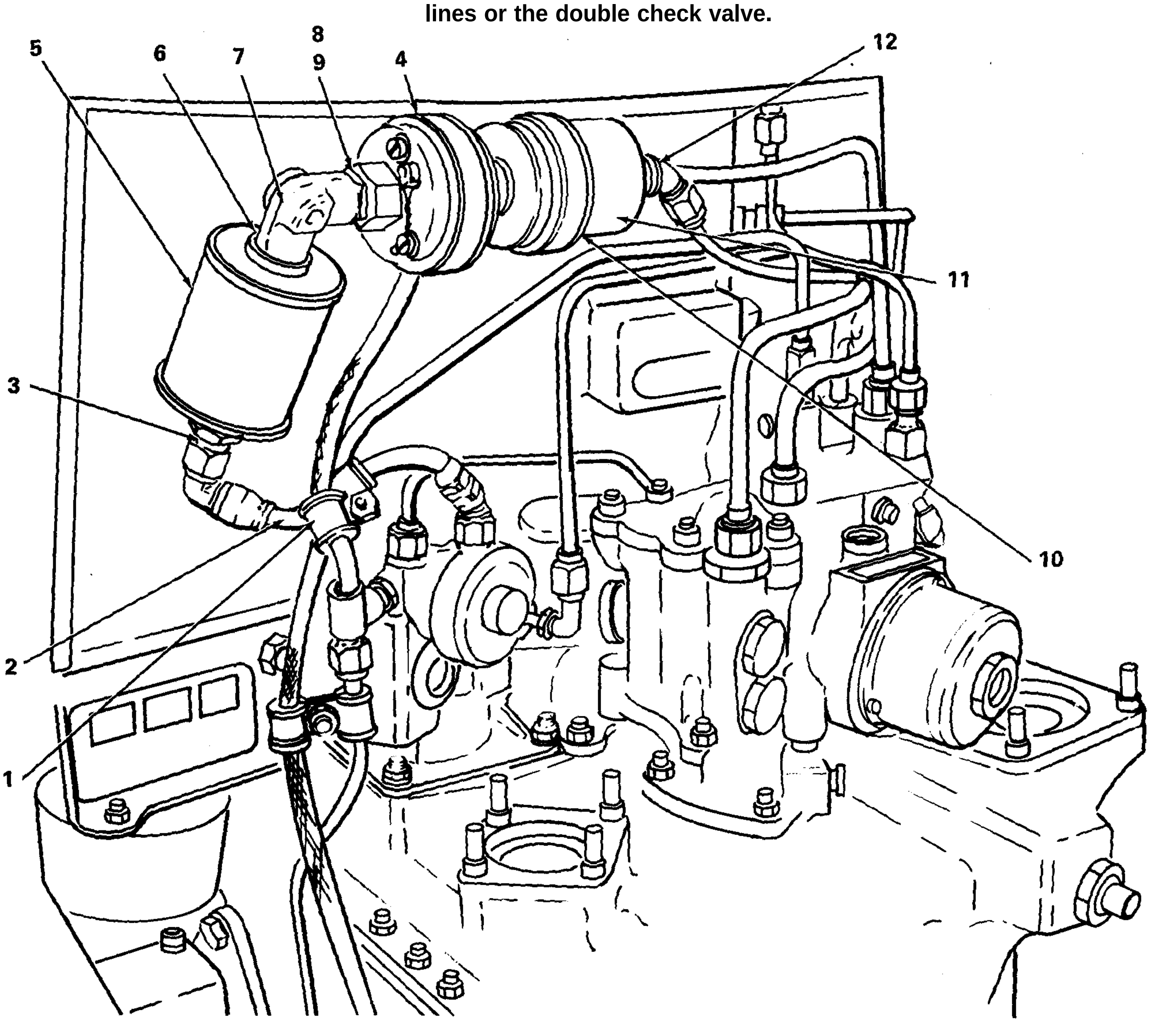
LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Clamp (1)		**Loosen.**
2. Flexible air hose (2)		**Disconnect** at union (3). **Hold** union with backup wrench.
3. Accumulator (5)		**Remove** from elbow (7) by turning on the narrow hexagonal surface on the accumulator using a backup wrench on the elbow.
4. Preformed packing (6)		**Discard.**
5. Double check valve (10)		**Hold** with backup wrench on hexagonal surface of valve adjacent to union (8).
6. Union (8)		**Remove.**
7. Elbow (7)		**Remove** by turning on union (8).
8. Preformed packing (9)		**Discard.**
9. Clamp assembly (4)		**Remove** from fireshield and double check valve (10).
10. Accumulator (11)		**Hold** with backup wrench. **Remove** double check valve (10) by **turning** on hexagonal surface of the check valve adjacent to union.

6-25. Accumulator - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
11. Preformed packing (12)		Discard.

CAUTION

Do not torque through the double check valve at any time. When the double check valve is removed use extreme care to prevent foreign materials from entering the pneumatic lines or the double check valve.



6-26. Accumulator - Installation

INITIAL SETUP

Applicable Configuration
All

References
Para 6-3

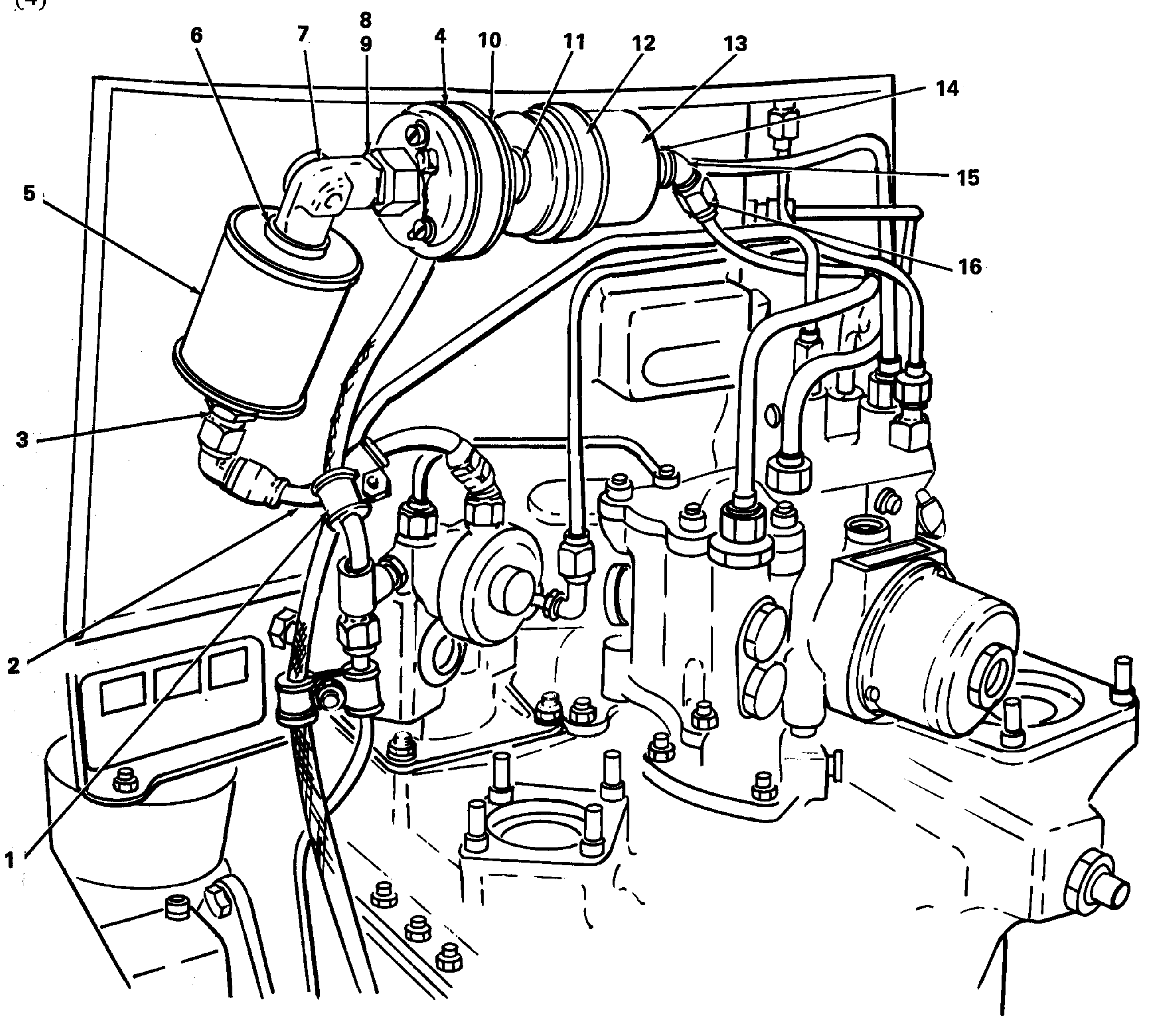
LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. New preformed packing (11)		**Place** on accumulator (13).
	NOTE Do not lubricate preformed packing.	
2. Double check valve (10)		**Screw** on accumulator (13). **Hold** accumulator with backup wrench.
3. Double check valve (10)		**Tighten 55-80** in. lb (0.6-0.9 kg/m) by turning on the hexagonal surface of the check valve adjacent to the accumulator.
4. New preformed packing (9)		**Place** on union (8).
	NOTE Do not lubricate preformed packing.	
5. Union (8) and elbow (7)		Screw on check valve (10).
6. Check valve (10)		**Hold** with backup wrench on hexagonal surface adjacent to union and tighten union 55-80 in. lb (0.6-0.9 kg/m).
7. Clamp (12) and nut (14)		At this point it may be necessary to loosen in order to align assembly.

6-26. Accumulator - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
8. Elbow (15)		**Hold** with backup wrench and **loosen** nut (16). **Loosen** clamp so accumulator (13) and assembly may be turned. **Leave** assembly loose and **continue** installation.
9. clamp (4)		**Install** on check valve (10). **Attach** clamp to fireshield using bolt, spacer, washer and nut. **Do not tighten.**
10. New preformed packing (6)		**Place** on accumulator (5).
	NOTE Do not lubricate preformed packing,	
11. Accumulator (5)		**Screw** on elbow (7). **Hold** backup wrench on elbow and tighten accumulator 55-80 in. lb (0.6-0.9 kg/m) by turning on the hexagonal surface on the accumulator adjacent to the elbow.
12. Nut on base (2)		**Install** to union (3). **Do not tighten.**
13. clamp (1)		**Adjust** and **tighten** clamping nut to 35-40 in. lb (0.4-0.5 kg/m).
14. Union (4)		**Hold** with backup wrench. **Tighten** nut on hose (2) to 80-120 in. lb (0.9-1.4 kg/m).

6-26. Accumulator - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
15. Clamping nut on clamp (12)		**Tighten** to 35-40 in. lb (0.4-0.5 kg/m).
16. Elbow (15)		**Hold** with backup wrench adjacent to nut (14) and **tighten** nut to 55-80 in. lb (0.6-0.9 kg/m).
17. Clamping nut on clamp assembly (4)		**Tighten** to 35-40 in. lb (0.4-0.5 kg/m),



6-27. Fuel Filter - Replacement

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning Solvent (item 1, Appendix D)
Lubricating Oil (item 4, Appendix D)
Lockwire (item 17, Appendix D)

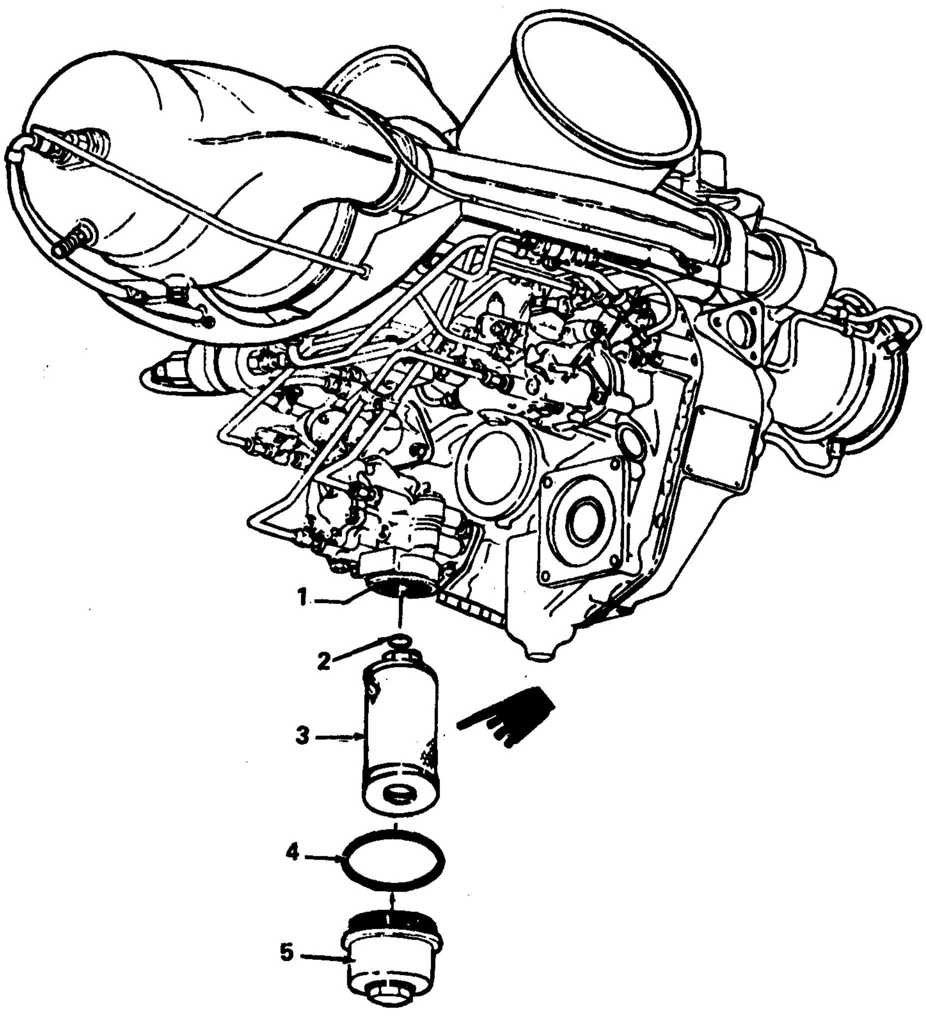
LOCATION/ITEM	REMARKS	ACTION
FUEL PUMP/		
1F.uel Filter	The fuel filter is a 5 or 10-micron paper element located inside the fuel pump. It is retained by a threaded cover and the lower side of the pump. **CAUTION** When there is evidence that the fuel pump filter has been by-passed the Gas Producer Fuel Control Filter Assembly must be replaced.	
2. Cover (5)		Cut the lockwire and loosen the cover by turning the hex. Place a container under the pump assembly as some fuel spillage is likely.
3. Element (3)		Remove the cover and the element.
4. Preformed Packings (2 and 4)		Remove and discard preformed packings. Discard element (3).

WARNING

Drycleaning solvent P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeatad breathing of vapors Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C - 59°C).

6-27. Fuel Filter - Replacement - Continued

LOCATION/ITEM	REMARKS	ACTION
FUEL PUMP/ - Continued		
5. Cover (5)	**Drycleaning Solvent (item 1, Appendix D).**	**Clean** the filter cover with a spray of solvent, or with a fuel soaked cloth.
6. Reformed Packings **(2 and** 4)	Oill **(item** 4, **Appendix D).**	**Lubricate** new preformed packings with oil. **Place** preformed packing (2) on element (3) and preformed packing (4) on cover (5).



6-27. Fuel Filter - Replacement - Continued

LOCATION/ITEM	REMARKS	ACTION
FUEL PUMP/ - Continued	**CAUTION** **Be sure the element is inserted with the open end and shoulder toward the pump and the small preformed packing firmly seated against the housing before installing the cover.**	
7. Element (3)	Lockwire (item 17, Appendix D).	Insert new element (3) into fuel pump (1) and install cover (5). Tighten cover to 180-200 in. lb, (2.1-2.3 kg/m) and secure with Lockwire. Bleed the fuel system. (Refer to paragraph 6-2.)

6-27.1. Pc Air Filter - Removal

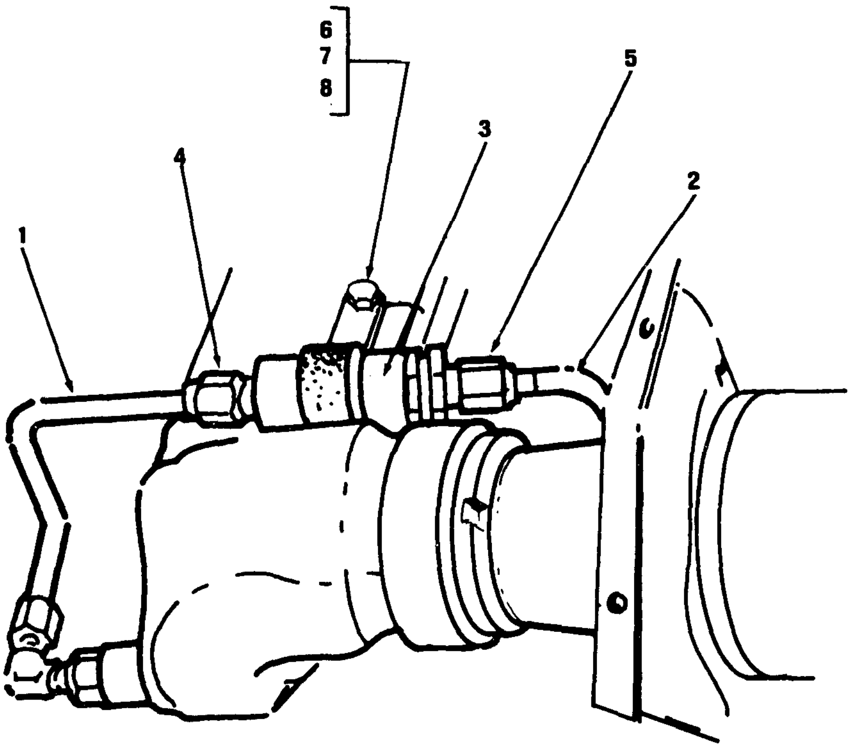
INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Pc Air Filter		Disconnect air tubes (1 and 2) from both ends of filter (3). Hold the filter while loosening coupling nuts (4 and 5). Remove nut (6) and bolt (7) securing filter clamp (8) to filter mounting bracket. Remove filter and separate clamp from the filter.

6-27.1. Pc Air Filter - Removal - Continued

LOCATION/ITEM	REMARKS	ACTION



6-27.2. Pc Air Filter - Cleaning and Inspection

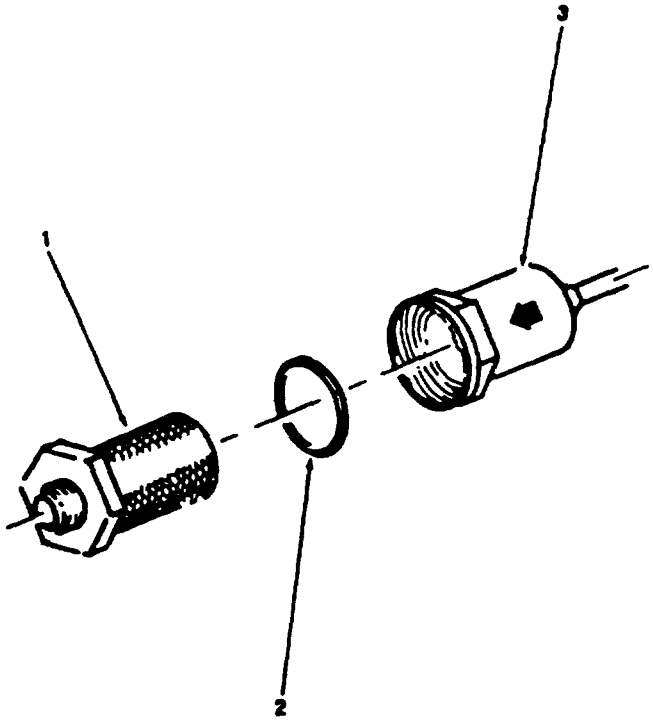
INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning, Solvent (item 1A, Appendix D).
Antiseize Compound (item 50, Appendix D).
Lockwire (item 7, Appendix D).

6-27.2. Pc Air Filter - Cleaning and Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Pc Air Filter - Continued		



LOCATION/ITEM	REMARKS	ACTION
1. Cleaning		Clean the filter assembly ultrasonically if equipment is available. If equipment is not available, cap the outlet fitting of filter element with a clean metal cap (AN 820-4 or equivalent). Remove lockwire and separate filter element (1) and preformed packing (2) from filter housing (3).

6-27.2. Pc Air Filter - Cleaning and Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ PC Air Filter - Continued	WARNING **Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C - 59°C).**	
	Dry cleaning Solvent (item 1A, Appendix D)	**Wash** filter assembly with solvent and a soft bristle brush.
	CAUTION Do not use a cloth to dry the filter element.	
2. Inspection	Antiseize Compound (item 50, Appendix D) Lockwire (item 7, Appendix D)	**Inspect** filter assembly for dirt or damage. **Replace** unserviceable filters. **Apply** high temperature antiseize compound lightly to threads; then assemble preformed packing or metallic crush seal (2) and filter housing (3) over the filter element (1). **Tighten** as follows, then secure with lockwire. P/N 23033400 and P/N 23033422 with preformed packing: 60-65 lb. in. P/N 6874958 with metallic crush seal: 60-65 in. lb.

6-27.3. Pc Air Filter - Installation

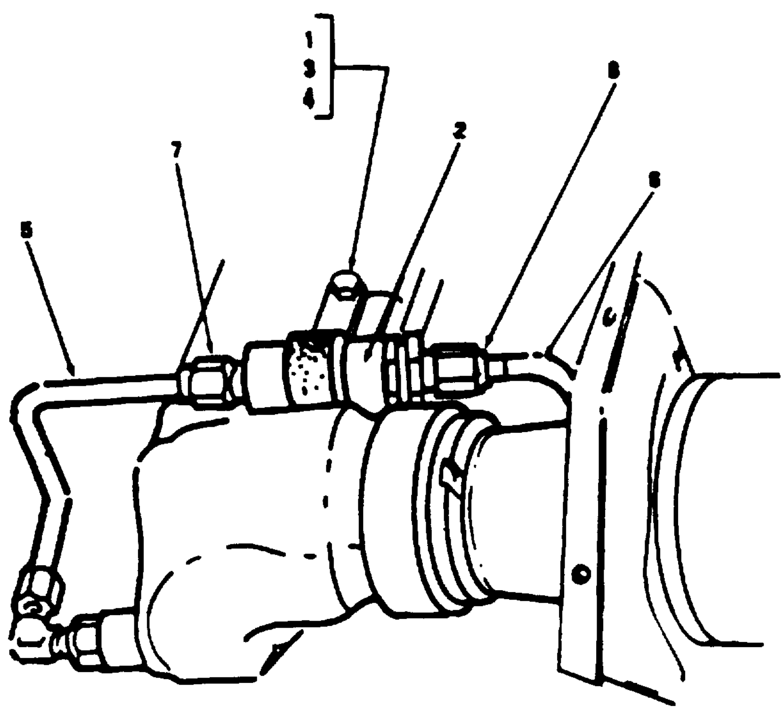
INITIAL SETUP

Applicable Configuration

All

Consumable Materials

LOCATION/ITEM	REMARKS	ACTION
	NOTE Perform fuel system pneumatic leak check in accordance with paragraph 6-3.	Assemble filter clamp (1) on filter (2) and secure it to filter mounting bracket with bolt (3) and nut (4). Attach air tubes (5 and 6) to the filter. Hold the filter while tightening coupling nuts (7 and 8) to 80–120 in. lb (9.0–13.6 kg/m).



6-27.3. Pc Air Filter - Installation

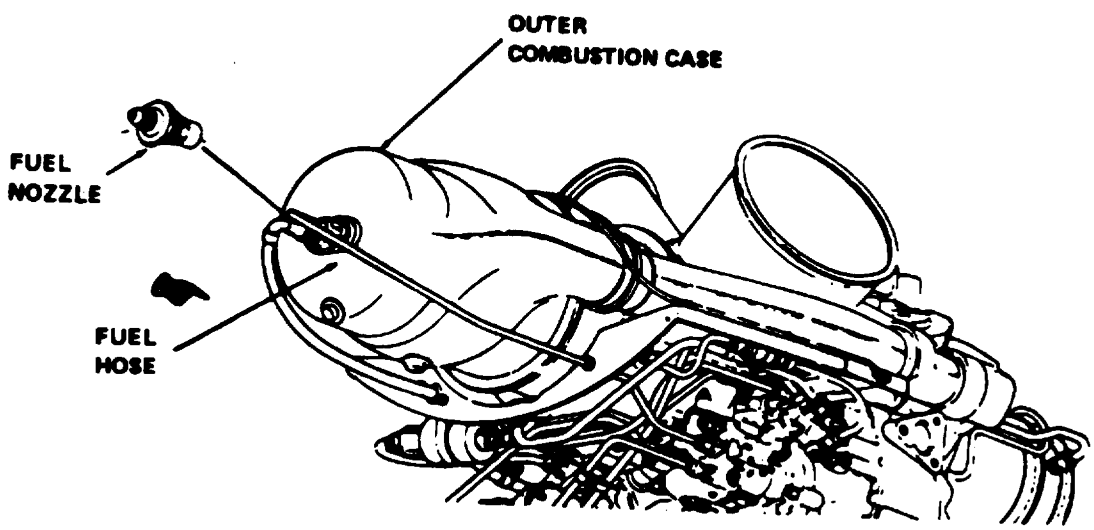
INITIAL SETUP

Applicable Configuration

All

Consumable Materials

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Fuel Hose		Disconnect the fuel hose at the fuel nozzle.



6-27.4. Inspection of Engine Fuel Pump Filter Bypass Valve for Proper Operation

INITIAL SETUP

Applicable Configuration

All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ 1. Fuel Pump Filter Bypass Valve Inspection		a. Test the engine fuel pump filter bypass valve for proper operation as follows: (1) Remove fuel filter in accordance with paragraph 6-27. Inspect fuel filter for signs of clogging or other unsatisfactory conditions. Fuel filter may be reused if determined to be in a satisfactory condition. (2) Install a cap NAS 813-14 or NAS 813-8 on the boss. (3) Remove the after filter sense line from the fuel filter pressure switch and install AN 815-3 fitting in the line. (4) Install approximately 36 inches of 3/8 inch clear plastic tubing, NSN 4720-00-764-0714, on the fitting and install a small funnel in the free end. (5) With the cap installed over the filter boss, install the filter cover, provide a suitable container to catch fuel from the tubing on the after filter port line. Save this fuel for item (7).

6-27.4. Inspection of Engine Fuel Pump Filter Bypass Valve for Proper Operation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Fuel Pump Filter Bypass Valve Inspection - Continued		
		(6) Momentarily actuate the fuel boost pump. The fuel filter caution light should illuminate and fuel should flow from the tubing indicating the pump bypass is working. Refer to paragraph 6-27.5 for corrective action if the bypass is not working.
		(7) Remove the filter cover. Fill the clear tubing with fuel (saved from item (6)) to raise the fuel level 12 to 24 inches above the fuel pump after filter sense line port.
		(8) Observe the filter housing area for leakage. Leakage exceeding 10 drops per minute is not acceptable. Refer to paragraph 6-27.5 for corrective action.
		(9) Remove the cap from the filter boss and remove the fitting and tubing from the after fuel pump filter sense line.
		(10) Reconnect the after fuel pump falter sense line to the fuel filter pressure switch.
		b. Reinstall or replace the fuel filter as required in accordance with paragraph 6-27.

6-27.4. Inspection of Engine Fuel Pump Filter Bypass Valve for Proper Operation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Fuel Pump Filter Bypass Valve Inspection - Continued	**CAUTION** Replace both fuel filter o-rings when reusing same filter.	

6-27.5. Correction Procedures for Engine Fuel Pump Filter Bypass Valve.

LOCATION/ITEM	REMARKS	ACTION
INITIAL SETUP Applicable Configuration All		
ENGINE/ Fuel Pump Filter Bypass Valve Correction Procedures		a. If fuel pump failed bypass test in paragraph 6-27.4, items (6) or (8), then clean as follows: (1) Remove fuel pump in accordance with paragraph 6-15. (2) Remove fuel filter in accordance with paragraph 6-27. (a) Cut and remove lockwire retaining filter bypass plug in the pump housing, reference TM 55-2840-231-23P, figure 13, item 9. (b) Unscrew and remove plug, item 9. (c) Remove spring, item 11, piston, item 13, and sleeve, item 14.

6-27.5. Correction Procedures for Engine Fuel Pump Filter Bypass Valve - Continued.

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Fuel Pump Filter Bypass Valve Correction Procedures - Continued		
		(d) Remove and discard o-ring, item 10, and o-ring, item 15.
		(e) Clean the piston, item 13, and sleeve, item 14, using petroleum solvent, item 1, Appendix 1.
		(f) Clean bypass valve area and filter bow area of the pump housing, item 64, using petroleum solvent.
		(g) Replace o-ring, item 15, NSN 5330-00-248-388, lubricate lightly and sleeve, item 14, using item 4, Appendix D.
		(h) Install sleeve, item 14, in pump housing, item 64.
		(i) Install piston, item 13 and spring, item 11, in sleeve, item 14.
		(j) Replace o-ring, item 10, NSN 5330-00-263-8031. Lubricate and install plug, item 9, with item 14, Appendix D.
		(k) Install cap, item 9, into pump housing, item 64, torque 105-125 in. lb and safety wire.

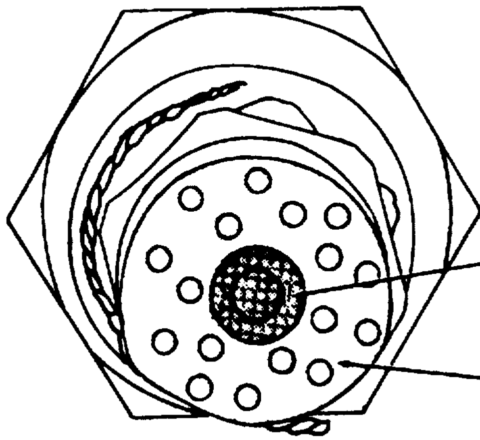
6-27.5. Correction Procedures for Engine Fuel Pump Filter Bypass Valve - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Fuel Pump Filter Bypass Valve Correction Procedures - Continued		
		a. Test bypass per paragraph 6-27-4. items (5) and (6). If bypass malfunction is not corrected by cleaning/ replacing bypass valve, replace fuel pump. b. Reinstall fuel pump in accordance with paragraph 5-16. Prior to installing fuel inlet line to pump, actuate aircraft boost pump to purge any contaminated fuel from the fuel line.

6-29. Fuel Nozzle - Cleaning - Continued

LOCATION/ITEM	REMARKS	ACTION

FUEL NOZZLE/ - Continued



CAUTION

Use extreme care to prevent damaging the mirror finish and edge of the spray tip.

Flow air or fuel through the nozzle throughout the cleaning process to prevent carbon from entering the spray tip.

WARNING

Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F - 138°F (38°C - 59°C).

LOCATION/ITEM	REMARKS	ACTION
2. Spray Tip	Drycleaning Solvent (item 1, Appendix D).	Gently clean the spray tip with a soft cloth dampened with solvent.
3. Air Shroud		Clean the air shroud face with a clean cloth; air holes must be open. Insure that loosened carbon does not enter the spray tip.

6-30. Fuel Nozzle - Inspection

INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
1. FUEL NOZZLE		Visually **inspect** for damaged mirror finish or edge of spray tip. **Replace** damaged nozzles.
2. Spray Tip		Visually **inspect** for carbon lodged in the spray tip. **Flow** fuel through nozzle and **replace** if carbon cannot be flushed out

6-31. Fuel Nozzle - Installation

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Lockwire (item 17, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
	NOTE Do not lubricate the fuel nozzle threads.	
ENGINE/		
1. Nozzle	Lockwire (item 17, Appendix D)	Carefully **install** nozzle in outer combustion case and tighten to 200-300 in. lb (2.9-3.5 kg/m). **Lockwire** the nozzle to the spark igniter. **Connect** fuel hose to nozzle. **Hold** fuel hose to prevent twisting and tighten the coupling nut to 80-120 in. lb (0.9- 1.4 kg/m).

CHAPTER 7

ELECTRICAL SYSTEM

OVERVIEW

This chapter contains procedures for the maintenance and preservation of the electrical system. Paragraphs following outline disassembly, inspection, repair, and additional requirements needed to maintain the electrical system and related parts. Procedures requiring maintenance on the Aviation Intermediate Maintenance (AVIM) level are specified and must be performed as such. Paragraphs in which the maintenance level is not specified shall be considered Aviation Unit Maintenance (AVUM) and may be performed at this level or a higher level of maintenance.

7-1. ELECTRICAL SYSTEM MAINTENANCE PROCEDURES.

Visually inspect all subassemblies and accessories removed from the engines electrical system. Check for loose or missing parts. Note any damage or excessive wear. Repair damaged parts where possible. Replace damaged parts that cannot be repaired. Disassembly procedures provided enable required cleaning, inspections, repair or replacement.

7-2. Auto-Reignition Control - Removal and Installation.

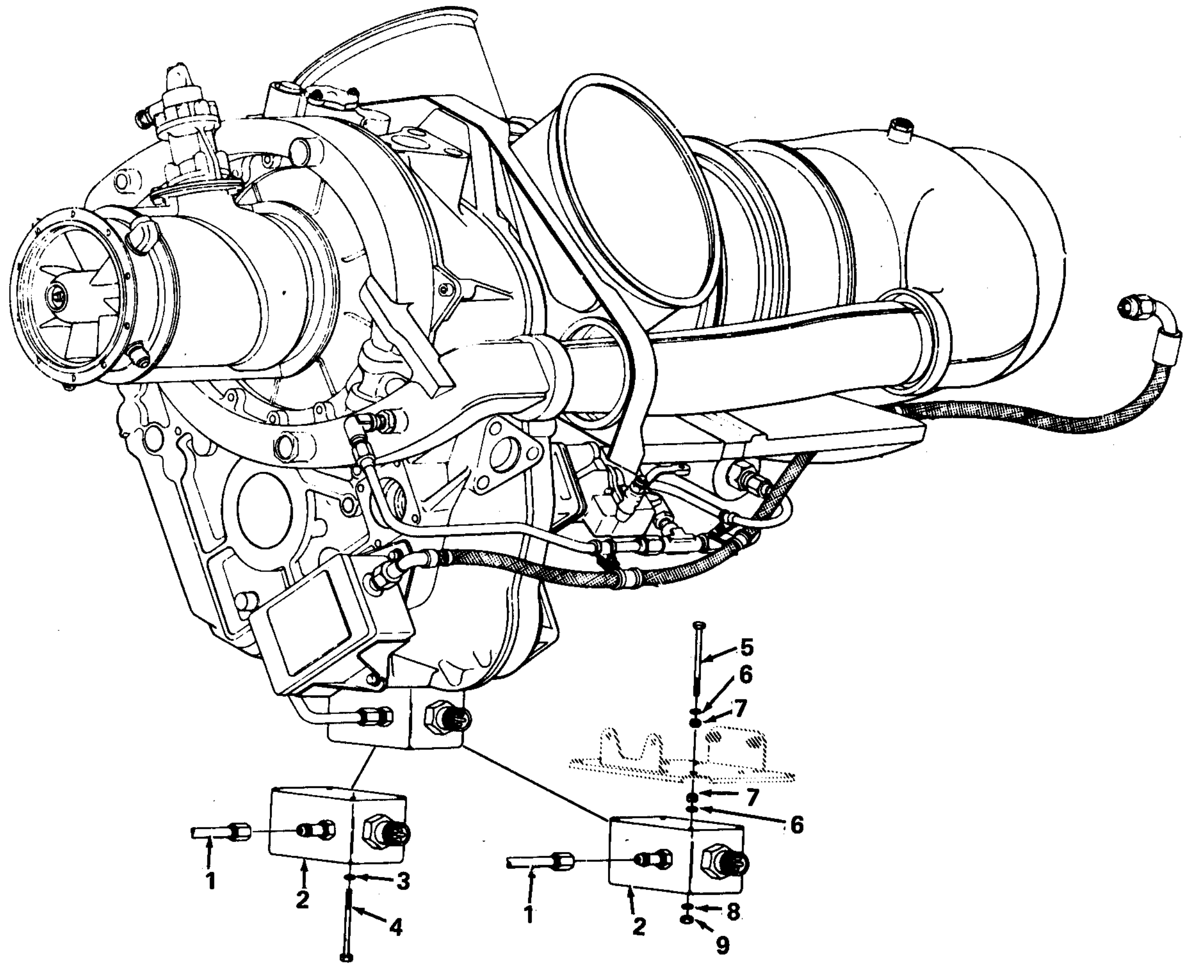
INITIAL SETUP

Applicable Configuration	Consumable Materials
All	None

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Auto-Reignition Control		
1. Removal		**Disconnect** aircraft electrical harness from auto-reignition control (2).

7-2. Auto-Reignition Control - Removal and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/Auto-Reignition Control - Continued		**Disconnect** auto-reignition sensing tube (1) from the control.



CAUTION

When the bolts and nuts are removed from control (2), the cover is not secured to the case of the control. Handle the control carefully to prevent dropping the case out of the cover.

7-2. Auto-Reignition Control - Removal and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/Auto-Reignition Control - Continued		If the control is not mounted on vibration dampers, **remove** four bolts (4) and washers (3) and **remove** control (2) from its mounting bracket. If control is mounted on vibration dampers, **remove** four nuts (9) and washers (8) and **remove** control (2) from its mounting bracket. The four washers (6) and vibration dampers (7) on the bottom of the mounting bracket may come off with the control. If they remain on bolts (5) but are loose, **remove** them.
ENGINE/ 6877187 Auto-Reignition Control		
2. Installation		If a new auto-reignition control (2) is being installed, **remove** the four nuts from the bottom of the control and install them on the bottom of the removed control. **secure** the control to its mounting bracket on the engine with four washers (3) and bolts (4). **Insure** that the P_c pressure port is toward the front of the engine. **Tighten** the bolts to 35-40 in. lb (0.4-0.5 kg/m). **Connect** auto-reignition sensing tube (1) to control (2). **Tighten** the coupling nut to 80-120 in. lb (0.9-1.4 kg/m). **Connect** the aircraft electrical harness to the electrical connector on control (2).

7-2. Auto-Reignition Control - Removal and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ 68770031 Auto-Reignition Control		
3. Installation		If a new auto-reignition control (2) is being installed, **remove** the four nuts (9), washers (8), and bolts (5) from the new control. **Install** the bolts in the removed control and **secure** with the old washers (8) and nuts (9).
		Place four vibration dampers (7) and washers (6) on bolts (5), if removed. **Assemble** control (2) on the four bolts (5) and **secure** with four washers (8) and nuts (9). **Insure** that the P_c pressure port is toward the front of the engine. **Tighten** nuts (26) to 35-40 in. lb (0.4-0.5 kg/m).
		Connect auto-reignition sensing tube (1) to control (2). **Tighten** the coupling nut to 80-120 in. lb (0.9-1.4 kg/m).
		Connect the aircraft electrical harness to the electrical connector on control (2).

7-2.1 Deleted

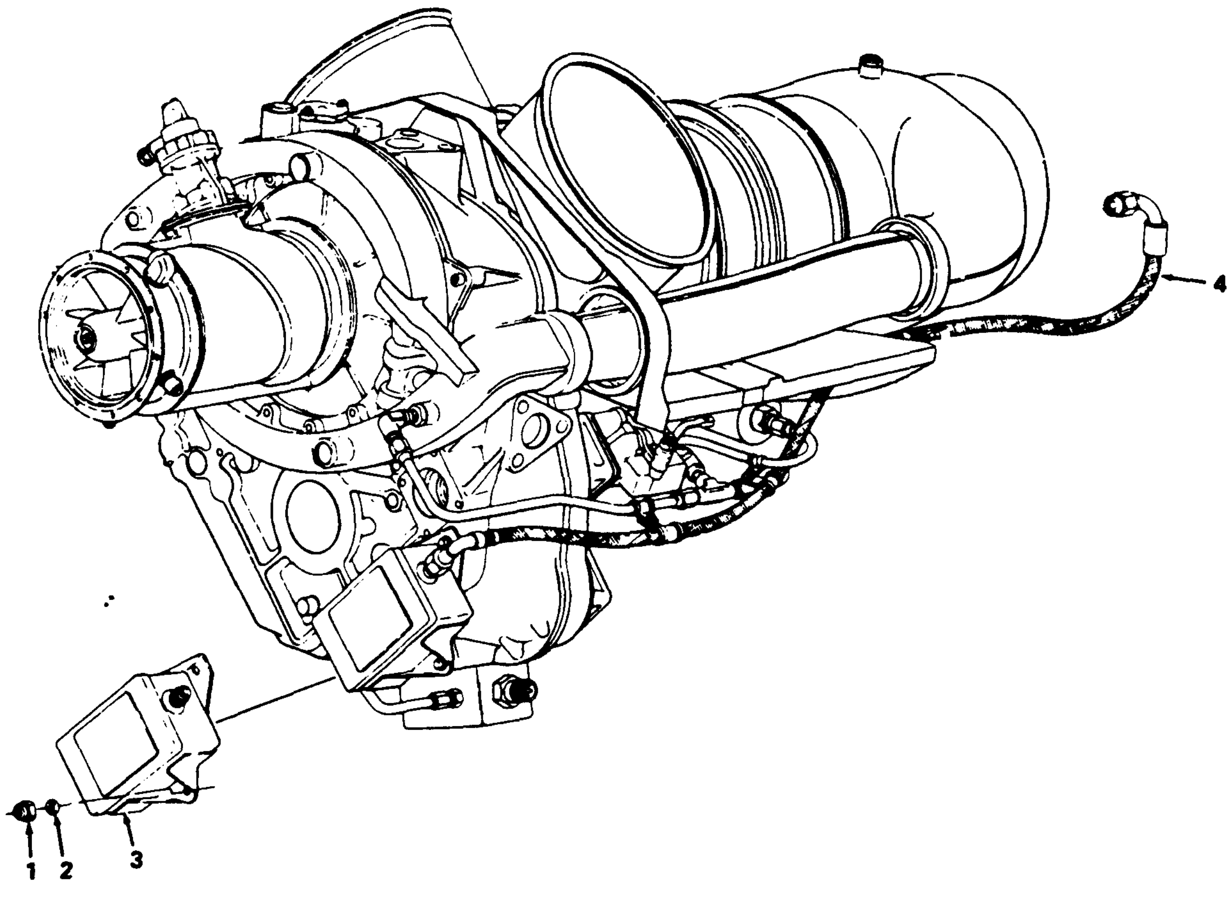
7-3. Ignition Exciter - Removal, Inspection and Installation

INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION

ENGINE/
Ignition Exciter



WARNING

To avoid electrical shock insure ignition system has been off for at least five minutes before disconnecting any leads, Ground leads to engine using an insulated screwdriver.

7-3. Ignition Exciter - Removal, Inspection and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/Ignition Exciter - Continued		
1. Removal		**Disconnect** power input lead and igniter lead (4) from exciter.
		Remove three nuts (1) and washers (2) which secure exciter (3) to gearbox housing.
2. Inspection		Visually **inspect** for general condition of exciter, input power terminal, and igniter lead connector. Nicks, dents, etc are acceptable if damage does not extend through the case or cover. Bent or misaligned eletrical connector is acceptable if the connector base is not excessively distorted, bulged, or cracked. The connector ends must assemble properly with no evidence of internal damage.
		Connect a known satisfactory igniter lead and spark igniter of type used on engine to the ignition exciter.
	CAUTION **Do not energize ignition exciter if spark igniter and lead are disconnected.**	
		Apply 28 volts dc to the input terminal of the ignition exciter using a minimum wire size of **16** gauge. Observe firing. If a repetitive spark rate of less than six sparks per second is observed, **replace** the ignition exciter.

7-3. Ignition Exciter - Removal, Inspection and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ignition Exciter - Continued	**CAUTION** **Do not operate the exciter for more than 4 minutes in any 30 minute period.**	
3. Installation		**Install** serviceable exciter on the engine and connect electrical leads. **Tighten** attaching self-locking nuts (1) to 30-40 in. lb (0.4-0.5 kg/m). **Tighten** the igniter lead (4) coupling to 50-70 in. lb (0.6-0.8 kg/m). **Tighten** input lead nut to 8-12 in. lb (0.1-0.15 kg/ m).

7-4. Spark Igniter - Removal, Cleaning, Inspection, Testing and Installation

INITIAL SETUP

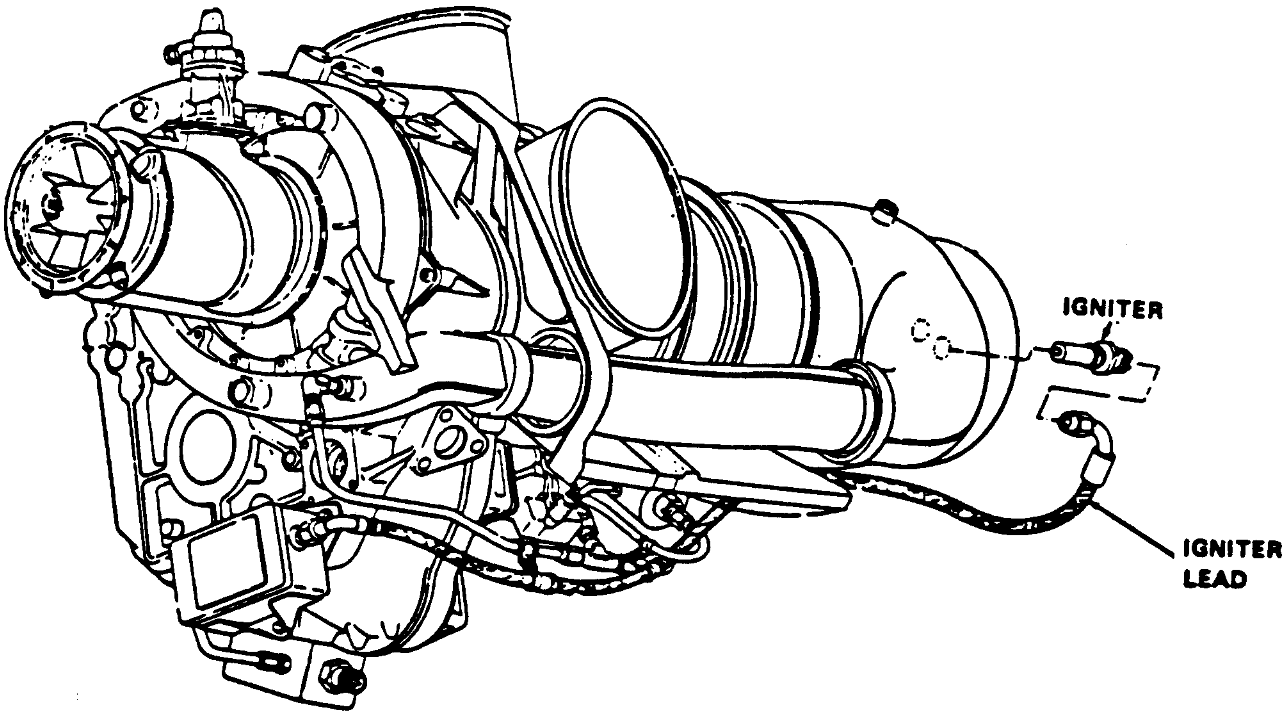
Applicable Configuration
All

Consumable Materials
Lockwire (item 17, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Spark Igniter	**WARNING** **To avoid electrical shock, insure ignition system has been off for at least five minutes before removing igniter to dissipate all energy stored in condenser. Ground igniter lead to engine using an indicated screwdriver.**	

7-4. Spark Igniter - Removal, Cleaning, Inspection, Testing and Inspection - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/Spark Igniter - Continued		

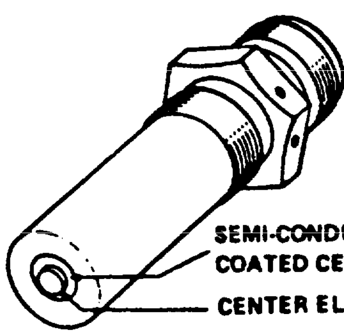


CAUTION

To preclude the possibility of the combustion chamber becoming misaligned, do not remove the fuel nozzle and the spark igniter at the same time.

LOCATION/ITEM	REMARKS	ACTION
1. Removal		**Disconnect** igniter lead at igniter. Prevent lead from twisting while removing nut. **Separate** lead from igniter by pulling straight out without any rotational motion. **Remove** lockwire and unscrew igniter.

7-4. Spark Igniter - Removal, Cleaning, Inspection, Testing and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Spark Igniter - Continued		
	CAUTION **The igniter connector well must be kept dry and free from foreign material.**	
2. Cleaning		a. Clean igniter connector well with a clean dry cloth. Do not wash with solvent.
	CAUTION **Under no circumstances, wire brush, sand blast, vapor blast, or scrape the igniter. Any of these cleaning methods can damage the semiconductor.**	
		b. Normal soot or carbon formation on the tip is not detrimental to igniter operation and need not be removed. If cleaning is desired, wipe the metal tip with a soft dry cloth.
		c. Remove any sizeable carbon deposits with a blunt nonmetallic instrument. Be careful not to damage the semiconductor material.
3. Inspection		a. Inspect center electrode; replace igniter if electrode if loose.
		b. Inspect ceramic for cracks; if any cracks are visible through carbon coating, replace igniter.

7-4. Spark Igniter - Removal, Cleaning, Inspection and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Spark Igniter - Continued		
4. Testing		a. With a good exciter and igniter lead, **check** igniter operation before installing in engine. b. **Apply** 28 volts dc to the exciter; **observe** the rate of firing. Normal operation is six sparks per second minimum. c. **Replace** igniter if it fails to fire or fires intermittently.
5. Installation	**Lockwire (item 7, Appendix D)**	**Install** serviced or new igniter; tighten to 150-200 in. lb (1.7-2.3 kg/m) and lockwire to fuel nozzle. **Connect** igniter lead; tighten to 70-90 in. lb (0.8-1.0 kg/m).

7-5. Spark Igniter Lead -Removal, Inspection, Installation and Check

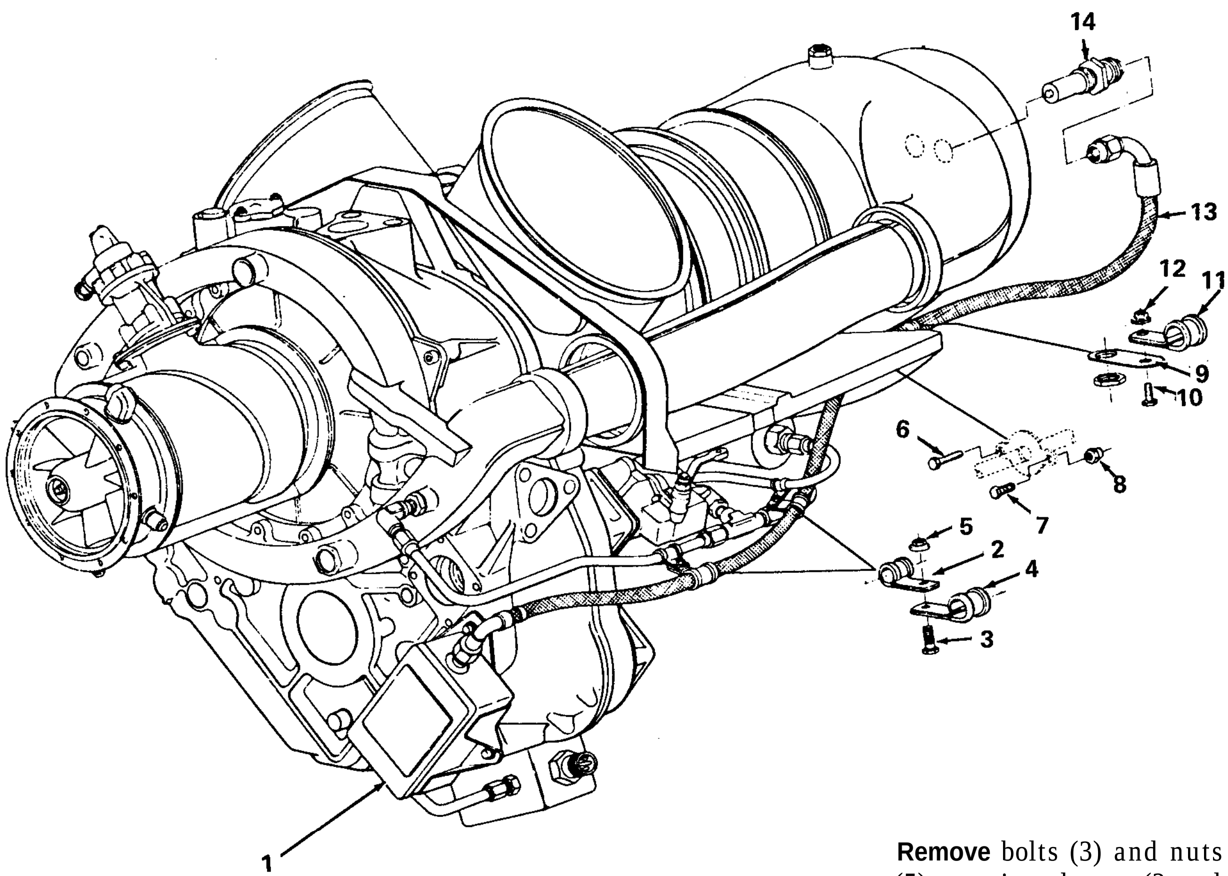
INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/Spark Igniter Lead	**WARNING** **To avoid electrical shock, insure ignition system has been off for at least five minutes before disconnecting igniter lead. Ground lead to engine using an insulated screwdriver.**	

7-5. Spark Igniter Lead - Removal, Inspection, Installation and Check - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Spark Igniter Lead - Continued		
1. Removal		**Remove** lead (13) from the ignition exciter (1) and spark igniter (14).



Remove bolts (3) and nuts (5) securing clamps (2 and 4) together.

Remove bolt (10) and nut (12) securing clamp (11) to bracket (9).

Remove two bolts (6 and 7) and nuts (8) securing the lead to the fireshield. **Remove** the lead.

7-5. **Spark Igniter Lead - Removal, Inspection, Installation and Check - Continued**

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Spark Igniter Lead - Continued		
	NOTE Bolt (6) also secures the accumulator bracket and spacer to the fireshield.	
2. Inspection		a. **Inspect** the outer part of the lead for braid damage; **replace** lead if there are more than five broken strands in any localized area, the braided conduit is punctured, or discolored and brittle from extreme heat.
		b. **Inspect** terminals of lead to ensure all parts are intact and no pitting is evident; **replace** lead if any part is missing or pitting is present.
3. Installation		**Insert** the igniter lead (13) through the hole in the fireshield. **Secure** the lead to the fireshield with bolt (7) and nut (8). **Secure** accumulator clamp, spacer, and igniter lead with bolt (6) and nut (8). **Tighten** the nuts to 35-40 in. lb (0.4-0.5 kg/m).
		Connect the igniter lead to the ignition exciter (1) and **tighten** the coupling nut to 50-70 in. lb (0.6-0.8 kg/m).
		Connect the igniter lead to the spark igniter (14) and **tighten** the coupling nut to 70-90 in. lb (0.8-1.0 kg/m).

7-5. Spark Igniter Lead - Removal, Inspection, Installation and Check - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/Spark Igniter Lead - Continued		
		Secure the lead to the air tubing at the power turbine governor with four clamps (2 and 4), two bolts (5) and nuts (7). **Tighten** the nuts to 35-40 in. lb (0.4-0.5 kg/m).
		Secure the igniter lead to bracket (9) with clamp (11), bolt (10) and nut (12). **Tighten** the nut to 35-40 in. lb (0.4-0.5 kg/m)
ENGINE/ Ignition System		
4. Check	The following procedure can be used to check the operation of the ignition system. **CAUTION** **To preclude the possibility of the combustion chamber becoming misaligned, do not remove the fuel nozzle and the spark igniter at the same time.**	
		Remove the spark igniter lead (13) from the spark igniter.
		Remove the spark igniter (14).
	CAUTION **When assembling or disassembling a lead and an igniter which is not installed on the engine, turn the lead nut and not the spark igniter.**	

7-5. Spark Igniter Lead - Removal, Inspection, Installation and Check - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ Ignition System - Continued		
		Attach the spark igniter lead to the spark igniter.
		Apply 28 volts dc across the ignition exciter. Observe or listen for spark.
		Install spark igniter and spark igniter lead on the engine. **Tighten** the spark igniter to 150-200 in. lb (1.7-2.3 kg/m) and lockwire to the fuel nozzle. **Tighten** the lead to 70-90 in. lb (0.8-1.0 kg/m).

CHAPTER 8

OIL SYSTEM

OVERVIEW

This chapter contains procedures for the maintenance and preservation of the oil system. Paragraphs following outline disassembly, inspection, repair and additional requirements needed to maintain the oil system and related parts. Procedures requiring maintenance on the Aviation Intermediate Maintenance (AVIM) level are specified and must be performed as such. Paragraphs in which the maintenance level is not specified shall be considered Aviation Unit Maintenance (AVUM) and may be performed at this level or a higher level of maintenance.

8-1. OIL SYSTEM MAINTENANCE PROCEDURES.

Visually inspect all subassemblies and accessories removed from the engine's oil system. Check for loose or missing parts. Note any damage or excessive wear. Repair damaged parts where possible. Replace damaged parts that cannot be repaired. Disassembly procedures provided enable required cleaning, inspection, repair or replacement.

8-2. 0il Filter Housing - Removal and Installation

INITIAL SETUP

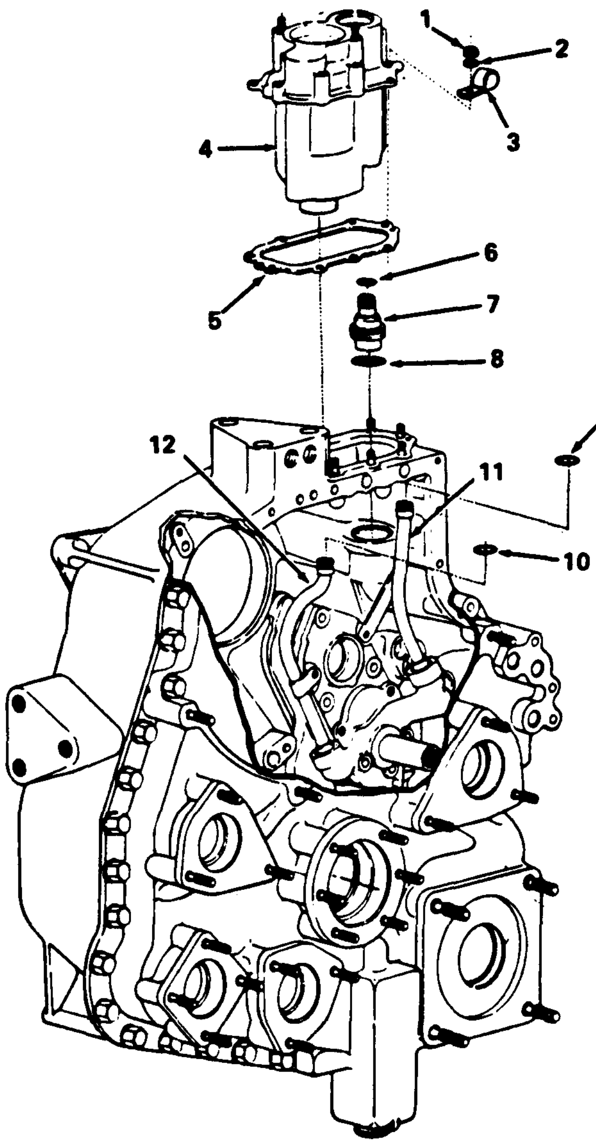
Applicable Configuration
All

Consumable Materials
Lubricating Oil (item 5, Appendix D)

LOCATION/ITEM	REMARKS	ACTION

ENGINE/

1. Oil Filter Housing
Removal



a. **Remove** eight self-locking nuts (1) and washers (2). **Disengage** clamp (3) from the stud at the RH side of the housing (if installed).

b. **Lift** housing (4) out of the gearbox. **Discard** gasket (5).

c. **Remove** check valve (7). **Discard** preformed packings (6) and (8).

d. **Remove** preformed packings (9 and 10) from oil tubes (11 and 12) and **discard** preformed packings.

8-2. Oil Filter Housing - Removal and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
	WARNING **Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.**	
2. Installation	Lubricating Oil (item 5, Appendix D).	a. **Lubricate** new preformed packings (9 and 10) with oil and **install** on oil tubes (11 and 12) and **install** on check valve (7). **Install** the check valve in the gearbox.
		b. **Place** new gasket (5) on the gearbox.
		c. **Insert** housing (4) into the gearbox and **engage** the mounting studs. **Insure** that the housing is mated with oil tubes (11 and 12) and with check valve (7).
		d. T63-A-700 only. If the engine has an auto reignition system installed, **place** tube clamp (3) on the stud at the RH aide of the housing.
		e. Retain the oil filter housing with eight washers (2) and self-locking nuts (l). **Tighten** the nuts to 35-40 in. lb (0.4-.5 kg/m).

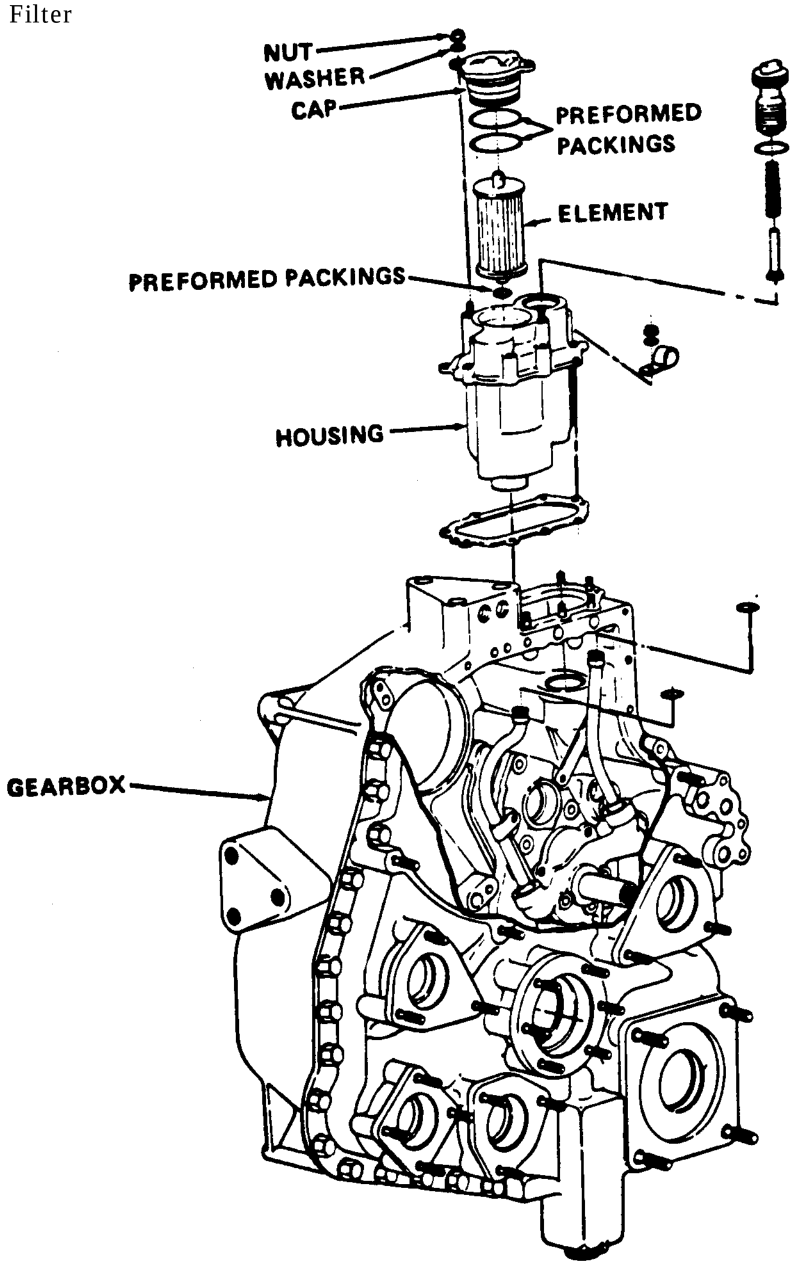
8-3. Oil Filter - Removal

INITIAL SETUP

Applicable Configuration
All

Special Tools
Puller, Tool No. 6798860

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Oil Filter		a. **Remove** nuts and washers. Using puller, slowly **remove** cap with preformed packings from housing located on top of gearbox.
		b. **Use** a clean suction gun or another suitable device to remove puddled oil from within the filter housing before removing filter element. **Do not damage** filter element. **Examine** sediment for evidence of metal particles.
		c. **Remove** filter element and preformed packing. Discard the preformed packing.
		d. Temporarily **reinstall** cap to prevent dirt from entering the housing.



8-4. **OIL FILTER – CLEANING**

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Drycleaning Solvent (item 1, Appendix D)

Special Tools
Ultrasonic Cleaning Equipment
(if available)

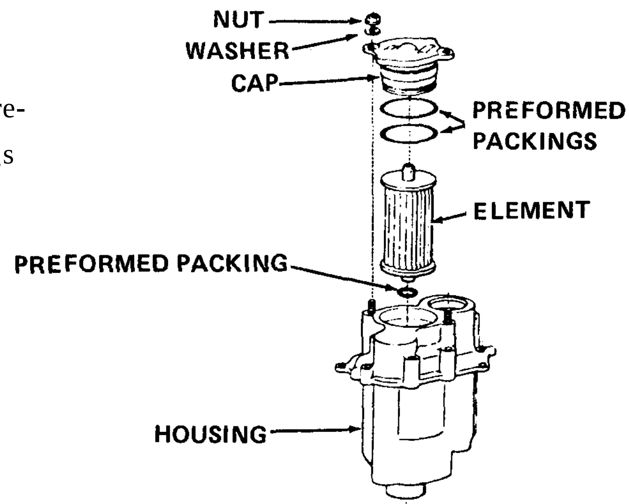
LOCATION/ITEM	REMARKS	ACTION
OIL FILTER/		
	WARNING Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100°F -138°F (38°C-59°C).	
1. Element	Solvent (item 1, Appendix D).	**Agitate** filter element in solvent until clean.
	Thoroughly clean oil filter cavity of all residual oil and/or sludge prior to the installation of a cleaned or new filter element. If metal particles are present, remove and examine magnetic plugs in gear case.	**Air dry** filter element.

8-5. Oil Filter - Installation

INITIAL SETUP

Applicable Configuration	**Consumable Materials**
All	Lubricating Oil (item 5, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
OIL FILTER/	**WARNING** **Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.**	
1. Cap and Preformed Packings	Lubricating Oil (item 5, Appendix D)	**Remove** cap with preformed packings from housing. **Discard** preformed packings. **Clean** cap with a clean lint-free cloth. **Install** new preformed packings lubricated with lubricating oil on filter cap.
2. Element and Preformed Packings		**Install** new preformed packing and cleaned filter element in filter housing.
3. Cap		**Install** filter cap.
4. Nuts		**Tighten** nuts which secure filter cap to housing to 30-45 in. lb (0.3-0.5 kg/m).



After the filter element has been cleaned or replaced, run the engine for a short duration and check the splitline for leaks.

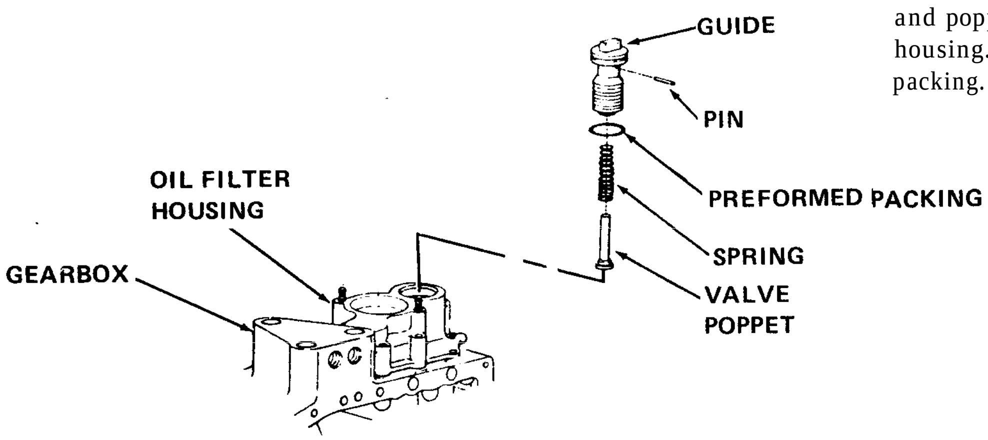
8-6. OIL PRESSURE REGULATOR – REMOVAL, INSTALLATION, INSPECTION, TESTING AND ADJUSTMENT

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Lubricating Oil (item 5, Appendix D)
Lockwire (item 17, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	**NOTE** Do not remove the pressure regulator unless the oil pressure cannot be adjusted within limits.	
1. Oil Pressure Regulator Removal		**Remove** lockwire and turn guide (see figure) out of housing. **Remove** spring and poppet from the housing. **Discard** preformed packing.



WARNING

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LOCATION/ITEM	REMARKS	ACTION
2. Installation	Lubrication oil (item 5, Appendix D).	**Lubricate** preformed packing with oil and **place** on guide. **Install** poppet, spring, and guide in housing. **Turn** the guide in until it bottoms then **back it out** 5½ turns.

8-6. Oil Pressure Regulator - Removal, Installation, Inspection, Testing and Adjustment - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		**Adjust** the regulating valve as outlined in item 5, Adjustment.
3. Inspection		a. **Check** external condition of regulator; **insure** that the regulator is lockwired. If regulator is not lockwired, **check** the adjustment as outlined in item 5, Adjustment. b. If oil pressure cannot be adjusted within limits, **remove** the regulator. **Check** for a broken spring or evidence of poppet sticking. **Check** for damage or wear on the poppet seating surface.
4. Testing	**NOTE** Oil pressure limits apply to an engine that is at normal operating temperature.	a. With engine running at ground idle, **check** that the oil pressure is 50 psig minimum. b. With engine operating at maximum speed, **check** that oil pressure is within limits. (**Refer** to following table.)

Item	Limit	Remarks
Oil pressure		
During start	Increasing pressure by the time 20% N1 is reached	Abort start if pressure does not start increasing.
Idle to 78% N1	50 psig minimum	
78-89% N1	90-130 psig	
90% N1 and above	115-130 psig	

8-6. Oil Pressure Regulator - Removal, Installation, Testing and Adjustment - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued	**NOTE** Oil pressure limits are based on an oil inlet temperature of 180° F-225°F (82.2°C-93.3°C).	
Oil temperature		
For starting	-65°F(-54°C) minimum	
*For operation above idle	35°F(1.7°C) minimum	Operate at idle until within limit.
Normal range	180°F-200°F(82.2°C-93.3°C)	
Maximum	225°F(107.2°C)maximum	Reduce power to maintain limit.
*For test cell only.	**NOTE** During cold weather operations, 150 psig engine oil pressure is permitted following engine start. When the 130 psig limit is exceeded, operate engine at idle RPM until normal engine oil pressure is obtained. When engine oil pressure is within normal limits, engine may be operated within full range of temperature limits (-54°C to 107°C) without regard to engine oil temperature markings.	
	NOTE Any adjustment made to the oil pressure regulator should be verified by a calibrated direct-reading pressure gage connected at the oil pressure sensing port on the front of the gearbox.	
5. Adjustment		a. **Remove** the lockwire from the pressure regulator. b. Using a wrench, **turn** guide clockwise to increase pressure; counterclockwise to decrease. **Adjust** the regulator until oil pressure is within limits of preceding item 4. One turn will change oil pressure approximately 13 psig.

8-6. Oil Pressure Regulator - Removal, Installation, Testing and Adjustment - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
	NOTE An approximate starting adjustment can be made by bottoming guide; then backing out 5½ turns.	
	Lockwire (item 17, Appendix D).	c. **Lockwire** guide after adjustment to **prevent** movement in either direction.

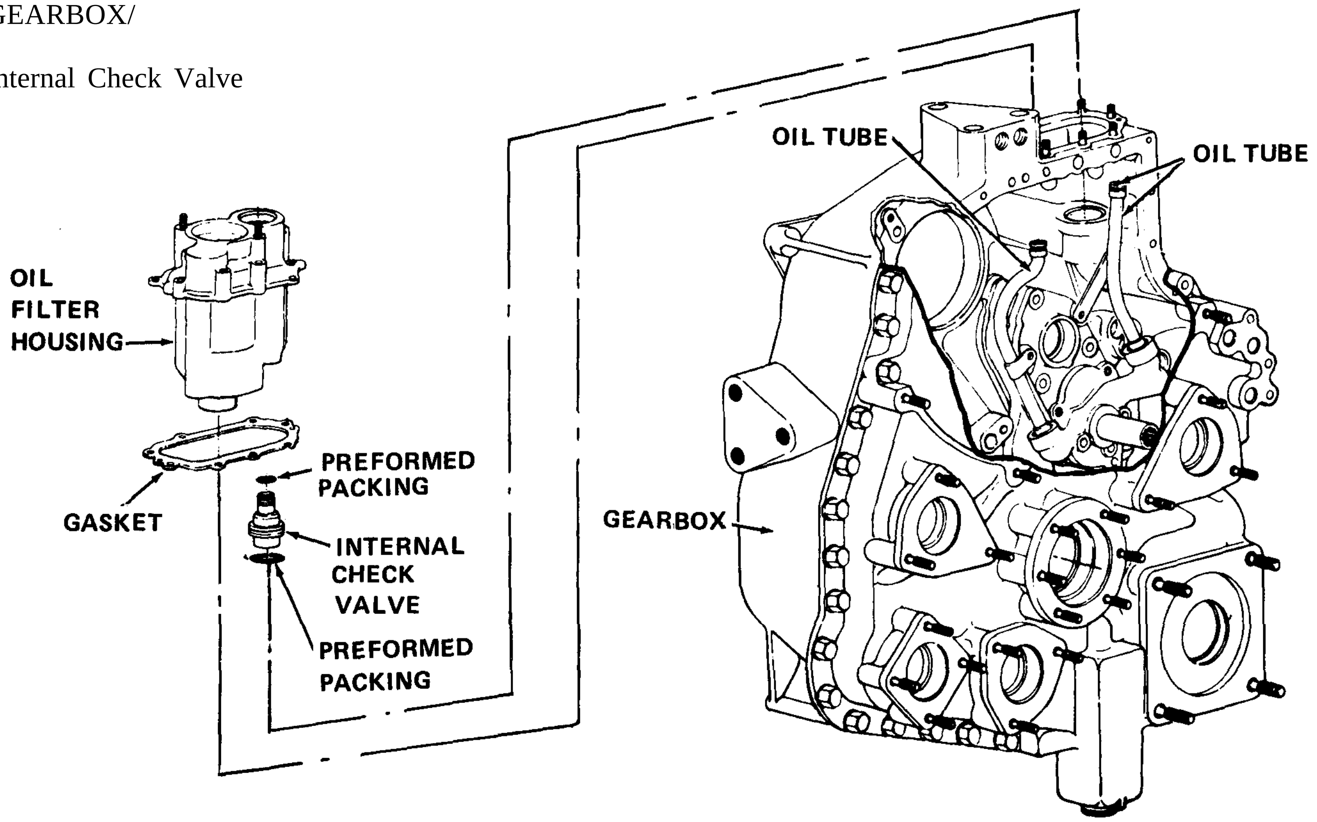
8-7. Internal Oil Check Valve - Removal and Installation

INITIAL SETUP

Applicable Configuration
All

References
Para 8-2

LOCATION/ITEM	REMARKS	ACTION
GEARBOX/		
Internal Check Valve		



8-7. Internal Oil Check Valve - Removal and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
GEARBOX/		
	The internal oil check valve is located under the oil filter housing, inside the gearbox. It serves to prevent oil from draining out of the oil tank and into the gearbox while the engine is shut down.	
1. Removal	Refer to paragraph 8-2.	
2. Installation	Refer to paragraph 8-2.	

8-8. External Oil Check Valve - Removal, Cleaning, Inspection and Installation

INITIAL SETUP

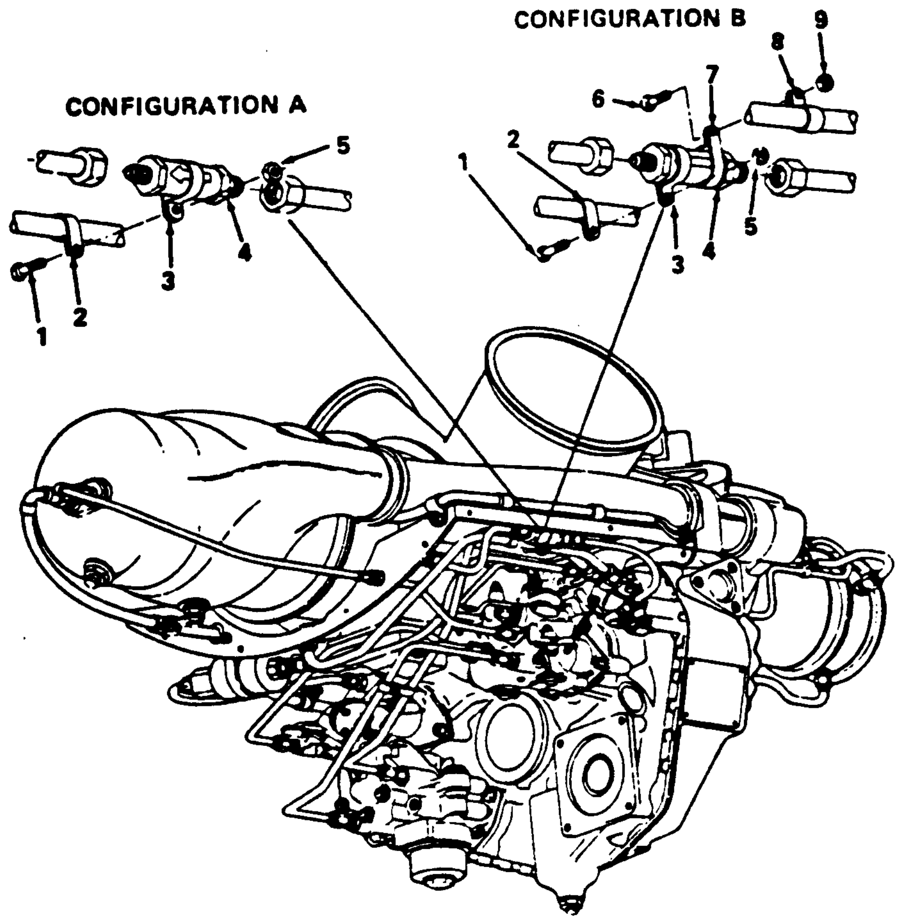
Applicable Configuration
All

Consumable Materials
Drycleaning Solvent (item 1, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
External Oil Check Valve	The external check valve (4) is located in the oil supply tube to the turbine. It serves to prevent oil from draining into the turbine bearing cavities while the engine is shut down.	
1. Removal		**Remove** self-locking nut (5) and bolt (1) that secure clamps (2 and 3) together. Configuration B only — **remove** self-locking nut (9) and bolt (6) that secure clamps (7 and 8) together. **Loosen** the two oil tube coupling nuts and remove check valve (4) from the engine.

8-8. External Oil Check Valve - Removal, Cleaning, Inspection and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/External Oil Check Valve - Continued		



WARNING

Drycleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Avoid prolonged or repeated breathing of vapors. Do not use near open flame or excessive heat. Flash point of solvent is 100° F-138°F (38°C-59°C).

2. Cleaning	Solvent (item 1, Appendix D)	**Clean** external check valve by flushing with solvent and air dry.

8-8. External Oil Check Valve - Removal, Cleaning, Inspection and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
3. Inspection		**Replace** the valve if it is not within the following limits: a. Cracking pressure: 5 ± 1 (0.35 + 0.07 kg/sq cm) psi. b. Leakage (internal): 10 drops per minute max at 3 psi (0.21 kg/sq cm). c. Leakage (external): None allowed. If external leakage is encountered, reject valve.
	CAUTION **Be sure the check valve is installed with the hex end marked "OUT" and the arrow pointing toward the rear of the engine.**	
4. Installation		a. **Install** the check valve (4) in the pressure oil tube with the hex end marked "OUT" and the arrow pointing towards the rear of the engine, **Tighten** the coupling nuts to 80-120 in. lb (0.9- 1.4 kg/m). b. Configuration B only - secure clamps (7 and 8) together with bolt (6) and nut (9). Tighten the nut to 35-40 in. lb (0.4-0.5 kg/ m). c. **Secure** clamps (2 and 3) together with bolt (1) and nut (5). **Tighten** the nut to 35-40 in. lb (0.4-0.5 kg/ m).

8-9. Oil Pressure Reducer - Removal and Installation

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Lubricating Oil (item 5. Appendix D)

LOCATION/ITEM	REMARKS	ACTION

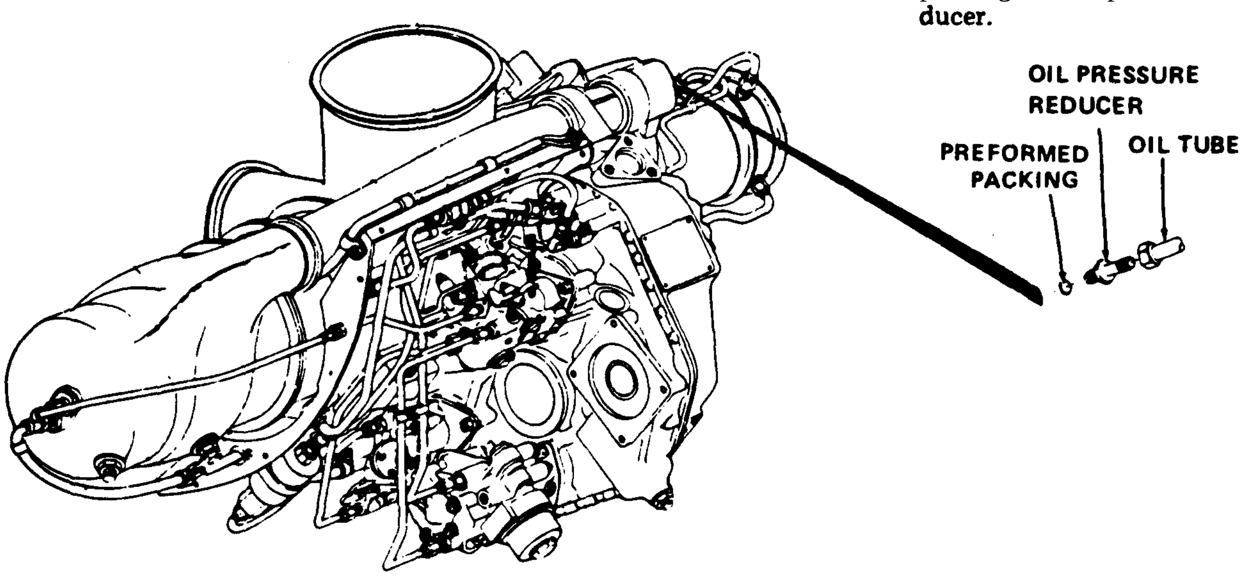
ENGINE/

Oil Pressure Reducer

1. Removal

Disconnect the oil tube from the oil pressure reducer.

Remove oil pressure reducer from the compressor front support. **Discard** preformed packing and oil pressure reducer.



WARNING

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8-9. Oil Pressure Reducer - Removal and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
2. Installation	Lubricating Oil (item 5, Appendix D).	**Lubricate** new preformed packing with oil and place on oil pressure reducer. **Install** oil pressure reducer on the compressor front support and tighten to 50-75 in. lb (0.6-0.9 kg/m). **Connect** oil tube (12) to the oil pressure reducer and tighten coupling nut to 65-100 in. lb

8-10. Oil Tubing and Fittings - Inspection and Replacement

INITIAL SETUP

Applicable Configuration

All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/	The tubing used in the oil system are rigid stainless steel assemblies incorporating permanent fittings.	
Oil tubes		**Inspect** oil tubes for kinks, uniformity of diameter, breaks, and freedom from interference with adjoining structure or other components. **Replace** defective oil tubes. **Inspect** fittings and hardware for cracks, crossed threads, obstructions in openings, burrs, or other damage. **Replace** all damaged fittings. **Replace** all seals, packings, cotter pins, and lockwire when they are removed from unit. **Tighten** No. 4 size coupling nuts to 80-120 in. lb (0.9-1.4 kg/m) and No. 5 size coupling nuts to 150-200 in. lb (1.7-2.3 kg/m).

8-11. Inspection Procedures

INITIAL SETUP

Applicable Configuration

All

ENGINE/

LOCATION/ITEM	REMARKS	ACTION
1. Inspection Procedures.		The following oil checks are to be performed during scheduled oil changes. Refer to TM 55-2840-231-23P for figure and item numbers.
	NOTE These procedures to insure adequate oil flow shall he accomplished when a new, newly overhauled or depreserved engine is placed in service.	
		a. Drain the oil tank.
		b. Remove the magnetic chip detector, figure 6, item 65, from the bottom of the gearbox and drain residual oil.
		c. Remove and clean or replace the oil filter, figure 16, item 50.
		d. Refill the oil tank with engine oil (MIL-L-23699 or MIL-L-7808).
		e. Remove and clean the magnetic chip detector on the forward side of the gearbox. While both magnetic plugs are removed, motor engine with the starter and permit a small amount of oil (1 or 2 ounces) to flow from the openings in the gearbox. This will assist in rinsing the gearbox of carbon particles. Reinstall the cleaned magnetic plugs.
		f. Loosen the fittings and remove the line, figure 5, item 58B, going to the “T” fitting, figure 5, item 51B, that feeds oil to the number six and seven bearing (pressure oil fitting screen, figure 5, item 19A, assembly). Motor the engine and permit a small amount of oil (1 or 2 ounces) to come out the end of the oil tube. Clean and reinstall the screen and tube assembly. Tighten pressure oil tube coupling nuts to 80 to 120 in. lbs. Tighten clamp nuts, figure 5, item 13, to 35 to 40 in. lbs.

8-11. Inspection Procedures - Continued

ENGINE/ - Continued

LOCATION/ITEM	REMARKS	ACTION

g. Perform a scavenge oil flow check as follows.

(1) Measure the quantity of oil flow from the power turbine support scavenge oil external sump. To ensure consistency, make the measurement under the following conditions.

(a) Engine oil temperature not cooler than 10°C (50°F) nor hotter than normal operating temperature.

(b) Use exterior power source to ensure N1 rotation of 16 percent (TM 55-1520-228-23).

(c) Remove external sump to gearbox scavenge oil tube, figure 15, item 18, by loosening tube nut and tube at the external sump, figure 5, item 36, fitting. Connect tube (NSN 4710-01-087-1629) to oil sump scavenge fitting to direct oil flow.

(d) Open ignition circuit breaker and make a preliminary rotation of the engine for 15 seconds to ensure that the oil lines and external sump are full of oil and there is oil flow.

(2) With the ignition circuit breakers open, rotate the engine for exactly 15 seconds. At least 16 percent N1 speed must be achieved. Collect and measure the oil flow during the 15 seconds of rotation period and during coastdown until the engine stops. It is not necessary to collect and measure minor drips.

(3) A flow of less than 90cc (3 counces) indicates a significant restriction of the oil nozzle and/or passages and is cause for engine removal or if oil flow is less than 90cc, inspect external check valve for proper operation in accordance with paragraph 8-8.3 of this manual. Inspection prior to engine removal.

8-11. Inspection Procedures - Continued

ENGINE/ - Continued

LOCATION/ITEM	REMARKS	ACTION
	NOTE **Cleaning of the lubrication system internal components should be done only at depot level maintenance.**	
		(4) Remove the oil drain tube.
		(5) Install the oil scavenge tube to external sump. Tighten coupling nuts to 150-200 in.-lbs.
		h. Motor the engine with the starter until positive oil pressure indication is obtained. Do not exceed starter limitation (refer to TM 55-1520-214-10/TM 55-1520-228-10).
		i. After all work is completed make a ground run. Check for leaks and monitor oil pressure for the first five minutes of engine operation. Check and reservice the oil tank to proper level.

8-12. External Sump Removal and Installation

INITIAL SETUP

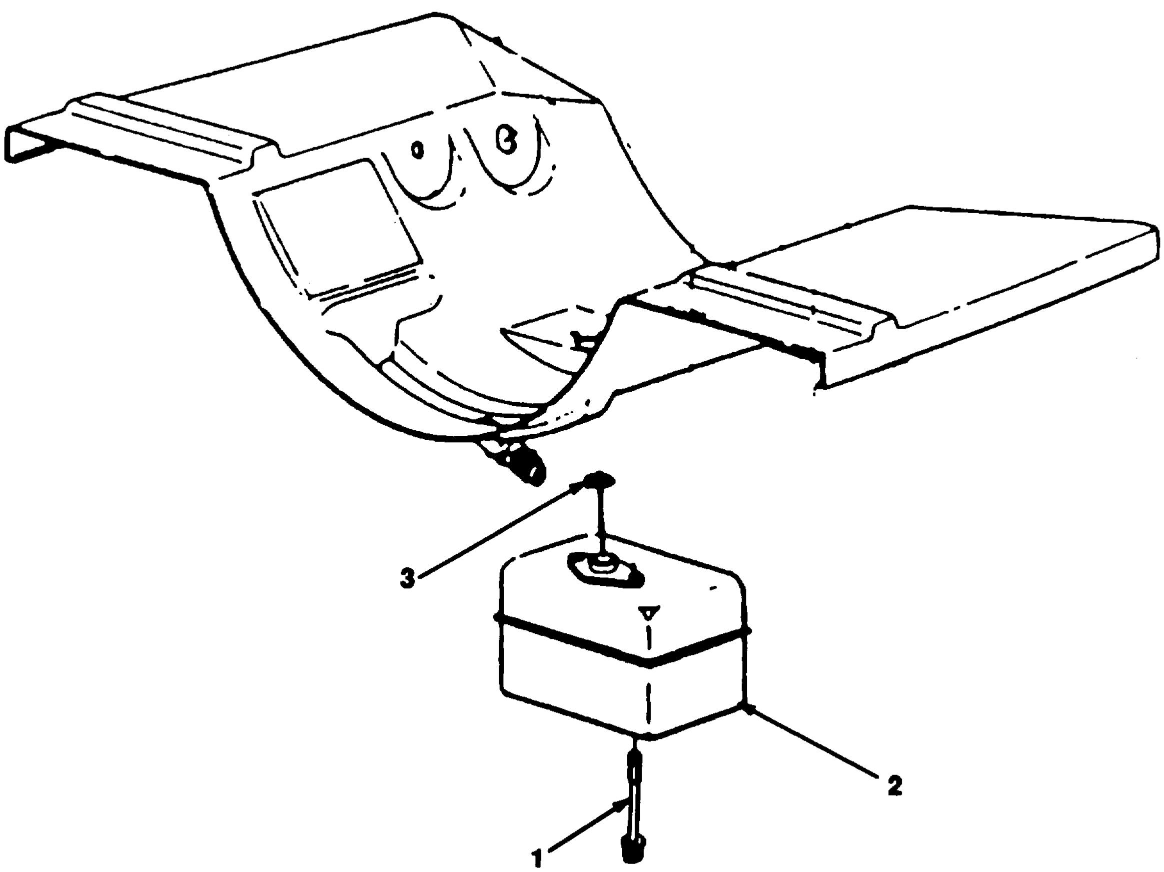
Applicable Configuration

All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Removal		a. **Remove** two bolts (1) holding the scavenge oil external sump (2) to the firewall shield. **Remove** sump. **Discard** preformed packing (3).
2. Installation		b. **Install** preformed packing (3) in the seal groove over the power turbine support scavenge oil opening. **Apply** a light coat of sealer (Permatex 1372W), NSN 8030-00-599-7753) over the preformed packing. **Position** sump (2) on the firewall shield, apply high temperature lubricant (Never Seez Compound Corp., 2910 South 18th Ave., Broadview, IL., 60153, NSN 8030-00-105-0270, to two bolts (1) and install. **Tighten** bolts to 35 to 40 in.-lb and secure with lockwire (P/N MS20995C20, NSN 9505-00-596-5101).

8-12. External Sump Removal and Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
External Sump Removal and Installation - continued		



CHAPTER 9

MISCELLANEOUS EQUIPMENT/AIR SYSTEM

OVERVIEW

This chapter contains procedures for the maintenance and preservation of the miscellaneous equipment. Paragraphs following outline disassembly, inspection, repair and additional requirements needed to maintain miscellaneous equipment and related parts. Procedures requiring maintenance on the Aviation Intermediate Maintenance (AVIM) level are specified and must be performed as such. Paragraphs in which the maintenance level is not specified shall be considered Aviation Unit Maintenance (AVUM) and may be performed at this level or a higher level of maintenance.

9.1 MISCELLANEOUS EQUIPMENT MAINTENANCE PROCEDURES.

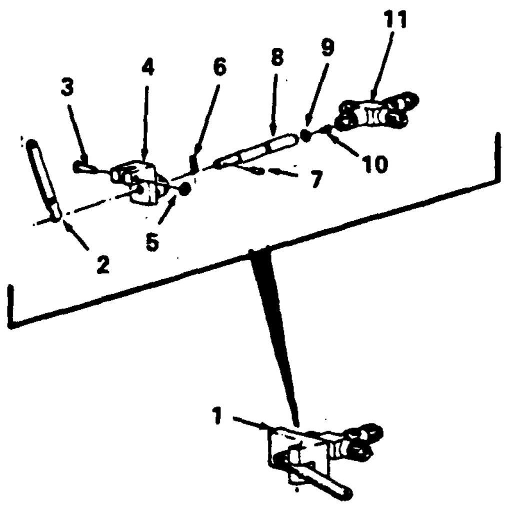
Visually inspect all subassemblies and accessories removed from the engine. Check for loose or missing parts. Note any damage or excessive wear. Repair damaged parts where possible. Replace damaged parts that cannot be repaired. Disassembly procedures provided enable required cleaning, inspection, repair or replacement of the miscellaneous equipment.

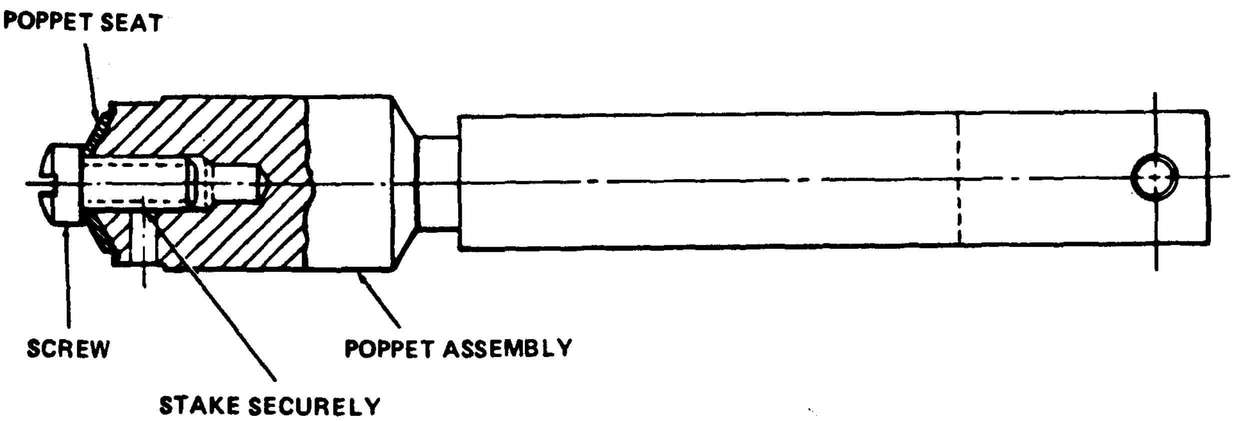
9-2. Anti-Icing Valve Poppet Seat - Replacement

INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
ANTI-ICING VALVE/		
1. Poppet Seat		**Replace** teflon poppet seat as follows:
		a. **Remove** cotter pin (6), washer (5) and pin (3). **Detach** actuating lever (2) from valve. **Discard** cotter pin.
		b. **Remove** lockwire and unscrew poppet guide (4) from valve body (11). **Separate** poppet (8) from the body.





c. **Remove** screw (10) and separate poppet seat (9) from the poppet.

d. **Install** replacement poppet seat (9). **Retain** the seat with screw (10). Stake screw securely as shown in figure.

9-2. Anti-Icing Valve Poppet Seat - Replacement - Continued

LOCATION/ITEM	REMARKS	ACTION
ANTI-ICING VALVE/ - Continued		
		e. **Insert** poppet and seat into valve body (11) and **screw** the poppet guide (4) onto the body. **Tighten** coupling nut to 65-75 in. lb (0.7-0.9 kg/m). Do **not lockwire** at this time.
		f. **Aline** actuating lever (2) with hole in poppet guide (notch in the lever toward the guide) and **insert** pin (3). **Secure** pin with washer (5) and cotter pin (6).
		g. **Recheck** valve for leakage. **Replace** valve assembly if leakage is still excessive.

9-3. Anti-Icing Valve Poppet Seat - Installation

INITIAL SETUP

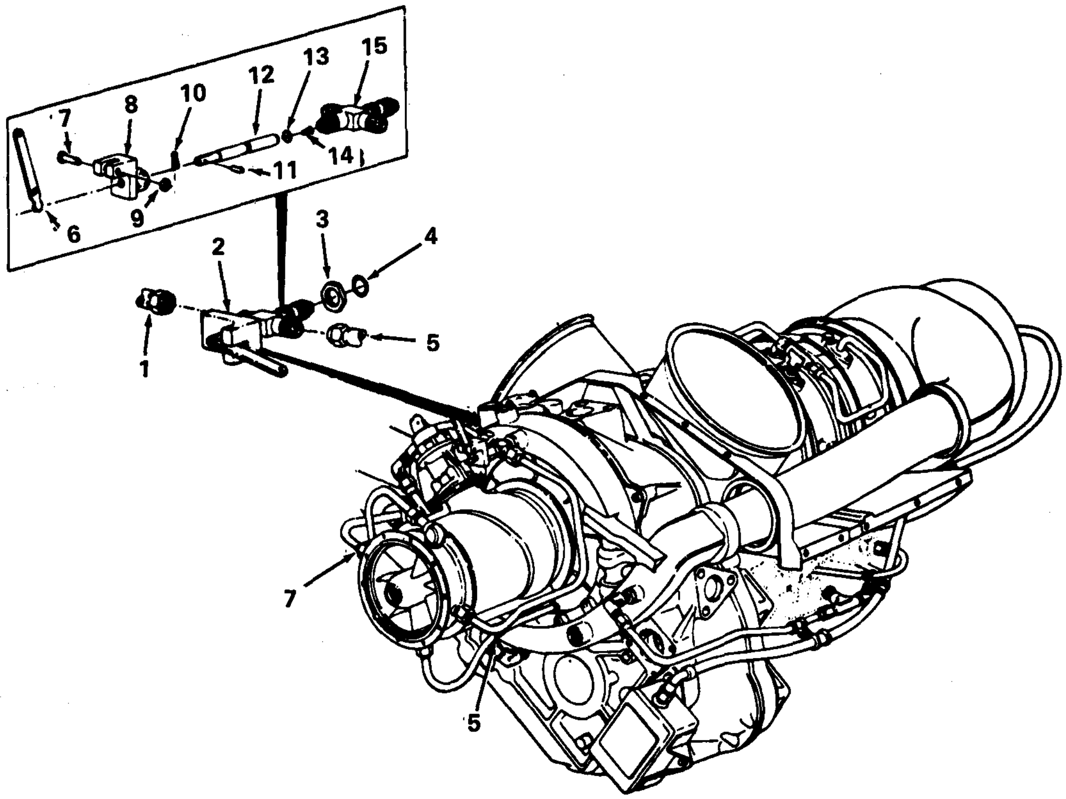
Applicable Configuration
All

Consumable Materials
Antiseize Compound (item 6, Appendix D)
Lockwire (item 7, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/		
1. Preformed Packing (4)	Antiseize Compound (item 6, Appendix D).	**Place** new preformed packing (4) with backed-off jam nut (3) on anti-icing valve (2). **Apply** antiseize compound lightly to treads and **install** valve in diffuser scroll. **Do not tighten** jam nut (3).

9-3. Anti-Icing Valve Poppet seat - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
COMPRESSOR/-Continued		



LOCATION/ITEM	REMARKS	ACTION
2. Air Tubes (1 and 5)	Lockwire (item 7, Appendix D)	**Connect** air tubes (1 and 5) to valve. **Tighten** coupling nuts to 150-200 in. lb (l.7-2.8 kg/m). **Tighten** jam nut (3) to 100-150 in. lb (1.2-1.7 kg/m) and **lockwire.**
3. OH-6 HELICOPTER Poppet Guide (8) and Lever (6)	Lockwire (item 7, Appendix D)	**Loosen** poppet guide (8) and position lever (6) parallel with vertical centerline of engine. **Tighten** poppet guide to 65-75 in. lb (0.7-0.9 kg/m) and **lock-wire.**
4. OH-58 HELICOPTER Poppet Guide (8) and Lever (6)	Lockwire (item 7, Appendix D)	**Loosan** poppet guide (8) and position lever (6) parallel with horizontal centerline of engine. **Tighten** poppet guide to 65-75 in. lb (0.7-0.9 kg/m) and **lockwire.**

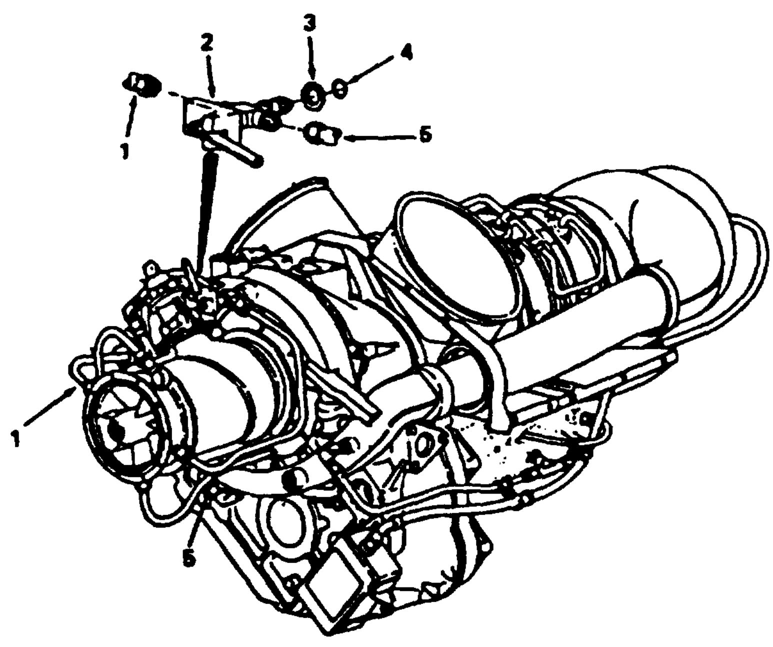
9-4. Anti-Icing Air Valve - Removal

INITIAL SETUP

Applicable Configuration

All

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Air Tubes (1 and 5)		**Disconnect** air tubes (1 and 5) at anti-icing air valve (2). **Disconnect** air tubes at compressor front support only if necessary.
AIRFRAME/		
2. Aircraft Linkage		**Disconnect** aircraft linkage from valve lever.
ENGINE/		
3. Air Valve		**Remove** lockwire, **loosen** jam nut (3), **remove** air tube (1) and **unscrew** valve from diffuser scroll. **Discard** preformed packing.



9-5. Anti-Icing Air Valve - Testing

INITIAL SETUP

Applicable Configuration
All

LOCATION/ITEM	REMARKS	ACTION
ANTI-ICING VALVE/		
Testing		a. Apply 100 psig air pressure to the valve inlet with a 0.025 in. orifice installed between the air source and valve inlet after installing gauges to monitor the air pressure on both sides of the orifice.
		b. Apply 3.75 lb maximum force to hold lever in the closed position.
		c. Allow air pressure on both sides of the orifice to stabilize, maintaining pressure at the orifice inlet at 100 psig.
	If the valve leakage is excessive such that pressure downstream of the orifice decreases, replace the assembly.	

9-6. Compressor Bleed Valve-Testing

INITIAL SETUP

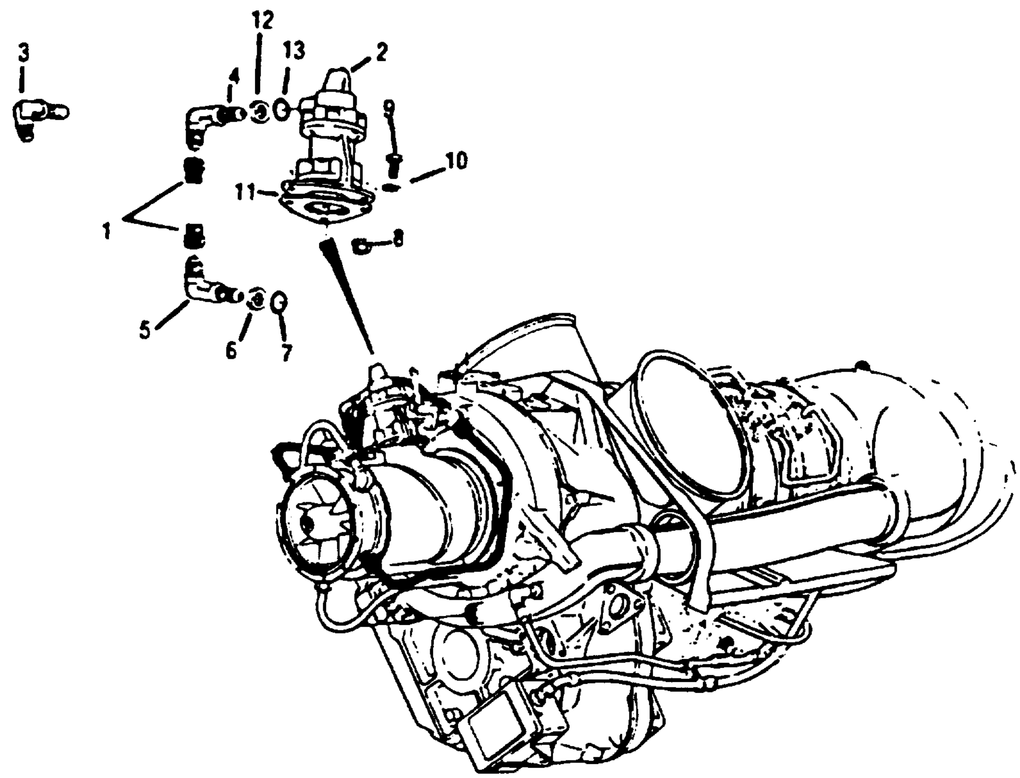
Applicable Configuration
All

Equipment Condition
Bleed Valve must be on engine

LOCATION/ITEM	REMARKS	ACTION
	NOTE • (For OH-6A AIRCRAFT) Replace OH-6A elbow jet assembly (4) with a standard elbow (3) prior to testing. The bleed valve operation figure **DOES NOT APPLY** when jet assembly (4) is installed. Reinstall OH-6A jet assembly (4) when testing is completed. Retain standard elbow for future use. • OH-58A aircraft shall have the standard elbow (3) installed.	
ENGINE/		
1. Bleed Valve		
2. Jet Assembly (4)		Jet assembly (4) must be **removed** and **replaced** with a standard elbow fitting (3) prior to testing. **Turn off** all bleed air.

9-6. Compressor Bleed Valve - Testing - Continued

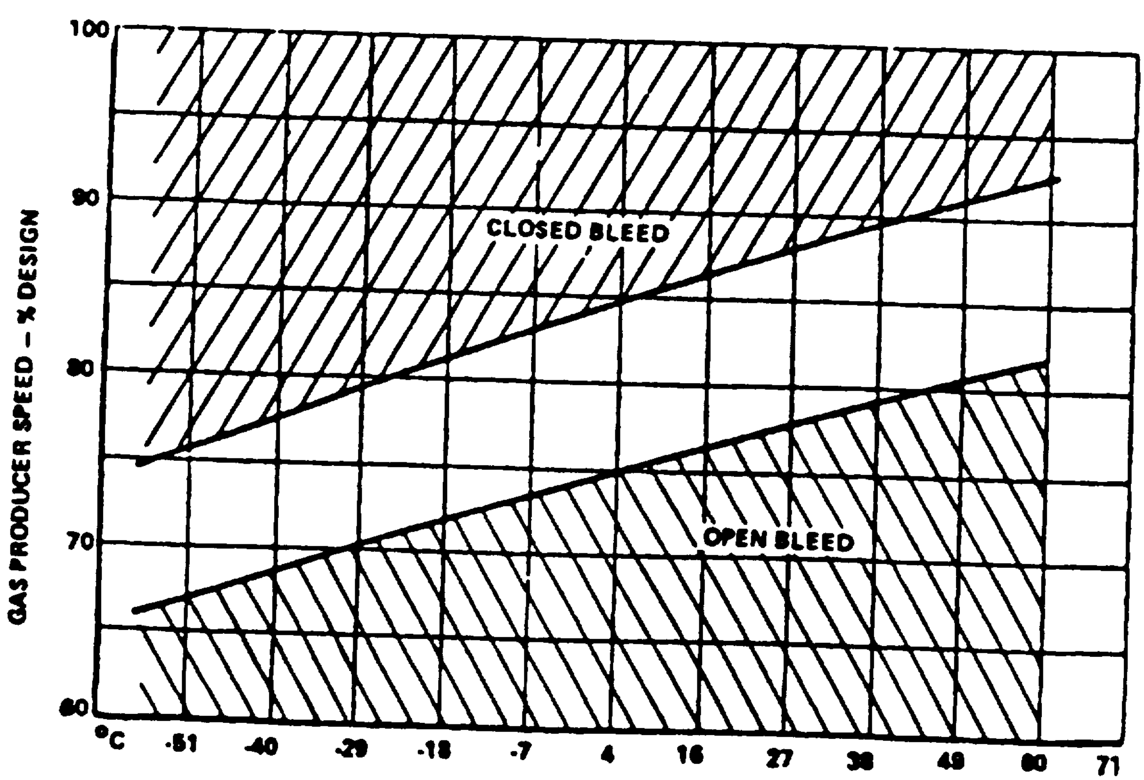
LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
3. Deleted.		



LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/		
4. Engine	Have observer monitor the bleed valve.	Run up engine to 103% N2.
	Pilot and observer use helmets and extension cord to passenger communication box.	
	observer use flash light.	
5. Bleed Valve		a. Bleed valve is not fully closed. (1) Apply collective until valve is fully closed. (2) It may be necessary to increase the aircraft gross weight to avoid liftoff.

9-6. Compressor Bleed Valve - Testing - Continued

LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/ - Continued		b. With the bleed valve closed. friction collective and reduce throttle to engine idle. Let N2 stabilize. Observer should check that bleed valve is fully open.
		C. Slowly increase throttle until observer indicates bleed valve starts to close record N1.
		d. Coontinue to increase throttle until observer indicates bleed valve is fully closed record N1.
	Bleed valve should start closing on or above the lower line of unshaded area and be fully closed on off. or below the upper line of the unshaded area of the bleed valve operation chart below.	e. Collective - down, friction

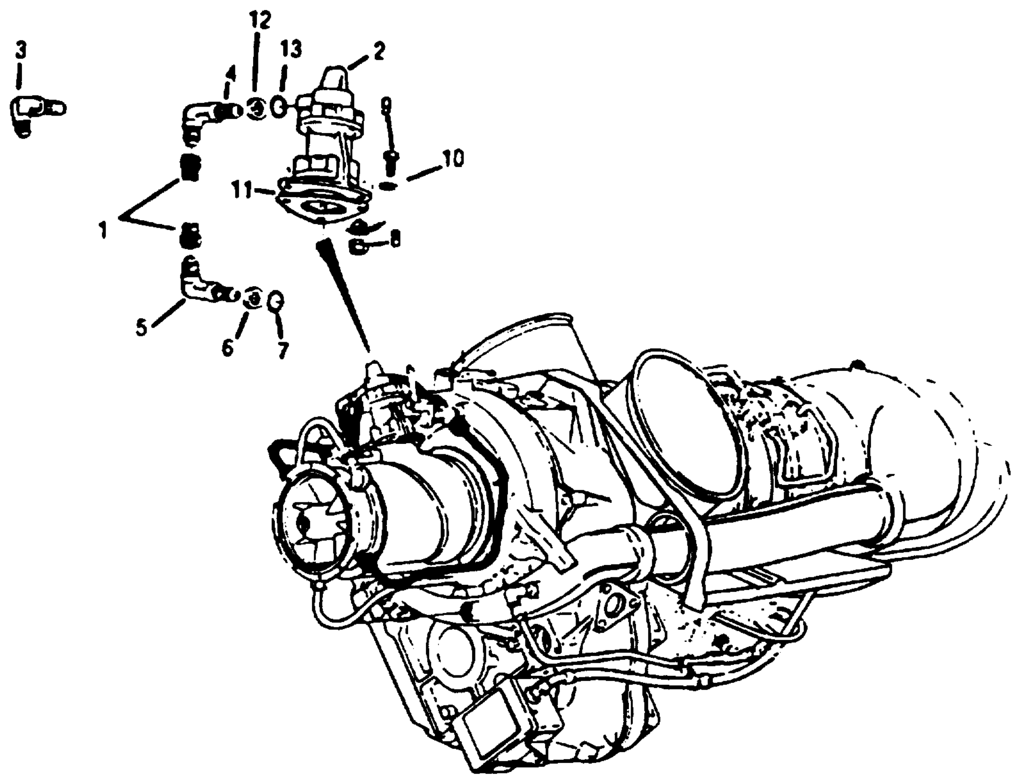


AMBIENT TEMPERATURE

After testing retain the standard elbow fitting (3) [for OH-58 aircraft], or reinstall the jet assembly [(4) for OH-6A aircraft], and Connect all Pc lines.

9-6. Compressor Bleed Valve - Testing - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/ - Continued		
3. Deleted.		



LOCATION/ITEM	REMARKS	ACTION
AIRFRAME/		
4. Engine	Have observer monitor the bleed valve. Pilot and observer use helmets and extension cord to passenger communication box. observer use flash light.	**Run up** engine to 103% N2.
5. Bleed Valve		a. Bleed valve is not fully closed. (1) **Apply** collective until valve is fully closed. (2) It may be necessary to **increase** the aircraft gross weight to avoid liftoff.

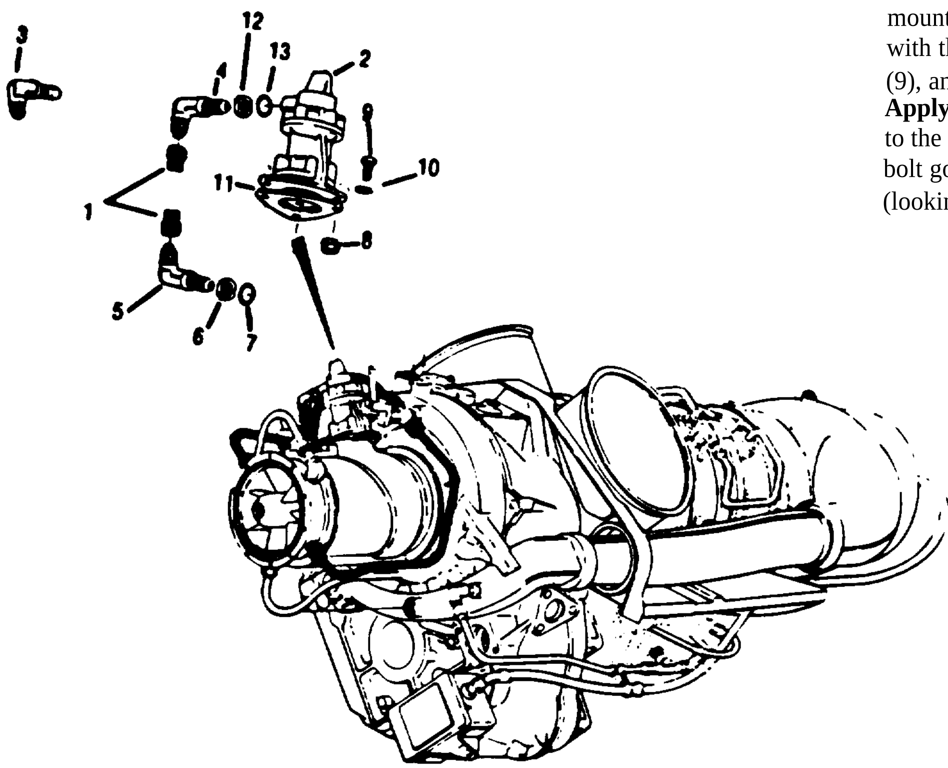
9-8. Compressor Bleed Valve - Installation

INITIAL SETUP

Applicable Configuration
All

Consumable Materials
Lubricating Oil (item 5, Appendix D)
Antiseize Compound (item 6, Appendix D)

LOCATION/ITEM	REMARKS	ACTION
ENGINE/		
1. Bleed Valve	Antiseize compound (item 6, Appendix D)	a. **Install** bleed valve (2) and new gasket (11) in mounting flange. **Retain** with three nuts (8), bolts (9), and washers (10). **Apply** antiseize compound to the bolts. The 1/4-28 bolt goes in the left hole (looking forward).



LOCATION/ITEM	REMARKS	ACTION
		b. **Tighten** nut on 1/4-28 bolt to 70-85 in. lb (0.8-1.0 kg/m) and the other two nuts to 35-40 in. lb (0.4-0.5 kg/m).

9-8. Compressor Bleed Valve - Installation - Continued

LOCATION/ITEM	REMARKS	ACTION
ENGINE/-Continued		
2. Deleted		
3. ENGINE/Preformed Packing (13), Elbow (3), or Jet Assembly (4).	**WARNING** **Prolonged contact with lubricating oil (item 5, Appendix D) may cause a skin rash. Those areas of skin and clothing that come in contact with lubricating oil should be thoroughly washed immediately. Enclosed areas where lubricating oil is used should be adequately ventilated to keep mist and fumes to a minimum.** **CAUTION** **Use jet assembly P/N 6875147 on OH-6A aircraft only. Use standard elbow P/N MS24394J4 or remove the orifice from the P/N 6875147 assembly on OH-58A aircraft.**	**Lubricate** preformed packing with engine oil and place on elbow (3) or jet assembly (4). **Install** elbow or jet assembly in the bleed valve. **Do not tighten** the jam nut.
ENGINE/ 4. Compressor Discharge Pressure Sensing Tube (1)		**Attach** compressor discharge pressure sensing tube (1) to valve elbow (3) or jet assembly (4). **Tighten** coupling nut to 80-120 in. lb (0.9-1.4 kg/m). **Tighten** jam nut (12) to 55-80 in. lb (0.6-0.9 kg/m).
5. Deleted.		

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APPENDIX A

REFERENCES

AR 750-22	Maintenance of Supplies and Equipment, Army Oil Analysis Program
DA Pamphlet 738-751	Functional Users/Manual for the Army Maintenance Management System - Aviation (TAMMS-A)
MIL-M-3171	Magnesium Alloy, Processes for Pretreatment and Prevention of Corrosion
MIL-STD-129	Marking for Shipment and Storage
TB 55-1500-314-24	Handling, Storage and Disposal of Army Aircraft Components Containing Radioactive Materials
TM 55-1500-333-24	Cleaning Procedures for Army Aircraft
TB 43-0106	Aeronautical Equipment Army Oil Analysis Program (AOAP)
TB 55-9150-200-24	Engine and Transmission Oils, Fuels, and Additives for Army Aircraft
TM 55-1500-204-25/1	General Aircraft Maintenance Manual
TM 55-1520-214-10	Operator's Manual: Helicopter, Observation OH-6A (Hughes)
TM 55-1520-214-23	AVUM and AVIM Maintenance Manual: Helicopter, Observation OH-6A (Hughes)
TM 55-1520-228-10	Operator's Manual: Army Model OH-58A Helicopter
TM 55-1520-228-23	AVUM and AVIM Maintenance Manual: Army Model OH-58A Helicopter
TM 55-4920-243-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Vibration Monitoring Kit
TM 55-4920-244-14	Tester, Exhaust Gas Temperature, Model BH 112JA36
TM 750-244-1-5	Procedures for the Destruction of Aircraft and Associated Equipment to Prevent Enemy Use
TM 55-1500-328-25	Aeronautical Equipment Maintenance Management Policies and Procedures
TB 55-8100-200-24	Maintenance of Specialized Reuseable Containers for Aircraft Equipment
TM 55-4920-328-13	Operator's Organizational DS and GS Maintenance Manual for Engine Test System

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. MAINTENANCE ALLOCATION CHART.

a. This Maintenance Allocation Chart (MAC) (Section II) assigns maintenance functions in accordance with the Three Levels of Maintenance concept for army aircraft. These maintenance levels, Aviation Unit Maintenance (AVUM); Aviation Intermediate Maintenance (AVIM) and Depot Maintenance are depicted on the MAC as:

AVUM which corresponds to the O Code in the RPSTL

AVIM which corresponds to an F Code in the RPSTL

DEPOT which corresponds to a D Code in the 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 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, and number of spaces 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 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 easy to use/interpret diagnostic/fault isolation devices (TMDE). Replace worn or damaged modules/components which do not require complex adjustments or system alinement and which can be removed/installed with available skills, tools and 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 fuelsystems. Accomplish air frame repair which 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, responsible "One Stop" maintenance support. (Maintenance functions which are not conducive to sustaining air mobility will be assigned to depot maintenance). Performs 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. Establish 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. Inspects, troubleshoots, tests, diagnoses, repairs, adjusts, calibrates, and alines aircraft system 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 reparable modules/components and end items which are beyond the capability of AVIM to repair will be evacuated to Depot Maintenance. This level 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.)

B-2. USE OF THE MAINTENANCE ALLOCATION CHART.

a. The Maintenance Allocation Chart assigns maintenance functions based on past experience and the following consideration:

(1) Skills available.

(2) Time required.

(3) Tools and test equipment required and/or available.

b. The assigned levels of maintenance authorized to perform a maintenance function is indicated.

c. A maintenance function assigned to a lower maintenance level to be performed at any higher maintenance level.

d. A maintenance function that cannot be performed at the assigned level of maintenance for any reason may be evacuated to the next higher maintenance organization. Higher maintenance levels will perform the maintenance functions of lower maintenance levels when required or directed by the appropriate commander.

e. The assignment of a maintenance function will not be construed as authorization to carry the associated repair parts in stock. Information to requisition or otherwise secure the necessary repair parts will be as specified in the Repair Parts, Special Tools List.

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 lever 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 of the function. The higher level of maintenance has the authority to determine:

(1) If the lower level is capable of performing the work.

(2) If the lower level will require assistance or technical supervision and on-site inspection.

(3) If the authorization will be granted.

g. Maintenance of the US Army Communications and Electronics Material Readiness Command equipment will be performed by designated US Army CERCOM personnel.

h. Changes in 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. DEFINITIONS.

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.

b. Test. To verify serviceability and detect incipient failure by measuring the mechanical 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 (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressor air supplies.

d. Adjust. To maintain, with prescribed limits, by bringing into proper or exact position, or by setting the opening 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 equipment 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. Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart,

i. Repair. The application of maintenance services or other maintenance actions to restore serviceability to an item by correcting specific damage, fault, malfunctions, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e. DMWR) in appropriate technical publications. 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 necesssary 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 meaaurements:(houm/mfles, etc.) considered in classifying &my equipments/components.

B-4. STANDARD GROUPS.

The standard groupings shown below are used, as applicable, throughout this MAC. Maintenance manuals and RPSTLs will reflect these standard groupings as individual chapters with sections in each chapter relative to the individual complete systems, subsystems, modules components, assemblies, or specific parts noted.

B-5. SYMBOLS.

The letters "AVUM, AVIM and Depot" as placed on the Maintenance Allocation Chart, indicate the level of Maintenance responsible for performing the particular maintenance function based upon assigned skills, tools and test equipment and time required to accomplish maintenance.

Group Number	Description
0400	ENGINE SYSTEM
0401	ENGINE GENERAL
	Servicing, handling, inspection requirements, lubrication charts, overhaul & retirement schedules. External lines & hoses. (As applicable.)
0402	COMPRESSOR SECTION
	Rotor, blades, vanes, impeller, stators, inlet guide vanes, main frame, particle separator, bleed valve, bearings, seals external lines & hoses.
0403	COMBUSTION SECTION
	Liners, nozzles, stators, rotor, seals, couplings, blades.
0404	POWER-TURBINE
	Nozzles, rotors, blades, exit guide vanes, exhaust frame, drive shaft, bearings, seals, external lines & hoses.

Group Number	Description
0405	ACCESSORY GEARBOX Input and output gears, seals, chip detector, housings, drive shaft, bearings, Seals.
0406	FUEL SYSTEM Fuel Control, fuel boost pump, governor, fuel filter assembly, sequence valve, fuel manifold fuel nozzle, external lines & hoses.
0407	ELECTRICAL SYSTEM Electrical control units, exciters, thermocouples, ignition harness, electrical cables, history recorders, torque overspeed sensor, NP sensor, alternate stator, blowers.
0408	OIL SYSTEM Tanks, oil filter, oil cooler, lube and scavenge pumps, oil filter bypass sensor, external lines & hoses.

B-6. WORK TIMES.

The symbol _._ identifies the lowest level of maintenance authorized to perform a maintenance function and indicates that work time figures are being developed and will be entered at a later date. When developed, this time will appear: for example as, 0.1 and also indicates the lowest level of authorized maintenance.

B-7. TOOLS AND TEST EQUIPMENT (Section III).

Special totals, teat, and support equipment required to do maintenance functions are listed 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 and, if applicable, the number to aid in identifying the tool/device.

B-8. REMARKS (Section IV).

Column 6 of the MAC contains alphabetic reference codes which are explained in Section IV of this appendix.

Section II. MAINTENANCE ALLOCATION CHART

NOMENCLATURE OF END ITEMS

ENGINE AIRCRAFT GAS TURBINE
MODEL T63-A-700

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category AVUM	AVIM	Depot	(5) Tools and Equipment	(6) Remarks
	NOTE The AVUM Maintenance functions identified herein are restricted to Company size (AVUM No. 2) units. These units are authorized SC 4920-99 - CL-A92 (AVUM No. 2) Tool Set and have 10 or more Aircraft assigned. Refer to paragraph 5-16(1) (a) and (b).						
04	ENGINE SYSTEM						
0401	TURBINE ENGINE	INSPECT	—			17	
		TEST	—			02,06,17	A
				—		09	B
		SERVICE	—			05,17	C
		INSTALL	—			07,16,17,19	D
		REPLACE	—			07,10,16,17,19	D
		REPAIR	—			16,17,19	
				—		08,23	
		OVERHAUL					
0402	COMPRESSOR SECTION						
040201	COMPRESSOR ASSEMBLY	INSPECT	—			17	
		SERVICE	—			05,17	C
		INSTALL	—			01,03,04,07,10, 15,16,17	
		REPLACE	—			01,03,04,07,10, 15,16,17	
		REPAIR	—			17,19	
040202	INLET GUIDE VANES	INSPECT	—			17	
040203	COMPRESSOR CASE HALVES	INSPECT	—			17	
		SERVICE	—			05,17	C
		INSTALL	—			01,16,17	
		REPLACE	—			01,16,17	
		REPAIR	—			17,19	E

NOMENCLATURE OF END ITEMS

ENGINE AIRCRAFT GAS TURBINE

MODEL T63-A-700

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category AVUM	AVIM	Depot	(5) Tools and Equipment	(6) Remarks
040204	ROTOR ASSEMBLY	INSPECT	–			17	
		SERVICE	–			05, 17	C
		INSTALL			–		
		REPLACE			–		
		REPAIR	–			17, 19	E
040205	DIFFUSER SCROLL	INSPECT	–			17	
		INSTALL			–		
		REPLACE			–		
		REPAIR	–			16, 17, 19	
040206	DIFFUSER VENT ORIFICE AND VENT TUBE	INSPECT	–			17	
		INSTALL	–			16, 17	
		REPLACE	–			16, 17	
040207	COMPRESSOR BLEED VALVE	INSPECT	–			17	
		TEST	–			17	
		SERVICE	–			17	
		INSTALL	–			16, 17	
		REPLACE	–			16, 17	
040208	OIL PRESSURE REDUCER	INSPECT	–			17	
		INSTALL	–			16, 17	
		REPLACE	–			16, 17	
0403	COMBUSTION SECTION						
040301	OUTER CASE	INSPECT	–			17	
		INSTALL	–			03, 04, 16, 17	
		REPLACE	–			03, 04, 16, 17	
		REPAIR		–		16, 17, 19, 25	F
040302	COMBUSTION LINER	INSPECT	–			17	
		INSTALL	–			03, 04, 16, 17	
		REPLACE	–			03, 04, 16, 17	
		REPAIR		–		17, 19, 22 24, 25	F

NOMENCLATURE OF END ITEMS

ENGINE AIRCRAFT GAS TURBINE MODEL T63-A-700

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category AVUM	AVIM	Depot	(5) Tools and Equipment	(6) Remarks
040303	DISCHARGE AIR TUBES	INSPECT	—			17	
		INSTALL	—			03, 04, 16, 17	
		REPLACE	—			03, 04, 16, 17	
		REPAIR		—		17, 19, 25	F
0404	TURBINE SECTION						
040401	TURBINE ASSEMBLY	INSPECT	—			17	
		INSTALL			—		
		REPLACE			—		
		REPAIR			—		
040402	FIRST STAGE NOZZLE	INSPECT	—			17	
040403	FIRST STAGE NOZZLE SHIELD	INSPECT	—			17	
		INSTALL	—				
		REPLACE	—				
040404	FIRST STAGE TURBINE BLADES	INSPECT	—			17	
040405	BURNER DRAIN VALVE	INSPECT	—			17	
		TEST	—			16, 17	
		SERVICE	—			17	
		INSTALL	—			16, 17	
		REPLACE	—			16, 17	
0405	ACCESSORY GEARBOX						
040501	EXTERNAL SEALS	INSPECT	—			17	
		INSTALL			—	08, 17, 21	
		REPLACE			—	08, 17, 21	
040502	EXTERNAL STUDS	INSPECT	—			17	
		INSTALL			—	16, 17, 19, 21, 24	
		REPLACE			—	16, 17, 19, 21, 24	

NOMENCLATURE OF END ITEMS

ENGINE AIRCRAFT GAS TURBINE
MODEL T63-A-700

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category AVUM	AVIM	Depot	(5) Tools and Equipment	(6) Remarks
040503	MAGNETIC CHIP DETECTOR	INSPECT	—			17	
		TEST	—			17	
		SERVICE	—			17	
		INSTALL	—			17	
		REPLACE	—			17	
0406	FUEL SYSTEM						
040601	FUEL CONTROL	INSPECT	—			17	
		TEST	—			11,17	
		SERVICE	—			17	
		ADJUST	—			11,12,14,17	
		INSTALL	—			16,17,19	
		REPLACE	—			16,17,19	
		REPAIR	—			16,17,19	
		OVERHAUL			—		
040602	FUEL CONTROL FUEL FILTER	INSPECT	—			17	
		SERVICE	—			17	
		INSTALL	—			16,17	
		REPLACE	—			16,17	
040603	GOVERNOR	INSPECT	—			17	
		TEST	—			16,17	
		ADJUST		—		17	
		INSTALL	—			16,17	
		REPLACE	—			16,17	
040604	FUEL PUMP	INSPECT	—			17	
		INSTALL	—			16,17	
		REPLACE	—			16,17	
		REPAIR	—			16,17	
		OVERHAUL			—		
040605	FUEL FILTER	INSPECT	—			17	
		SERVICE	—			17	
		INSTALL	—			16,17	
		REPLACE	—			16,17	

NOMENCLATURE OF END ITEMS

ENGINE AIRCRAFT GAS TURBINE
MODEL T63-A-700

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category AVUM	AVIM	Depot	(5) Tools and Equipment	(6) Remarks
040605	Pc AIR FILTER	INSPECT	—			16	
		SERVICE	—			16	
		INSTALL	—			16	
040606	FUEL NOZZLE	INSPECT	—			17	
		SERVICE	—			17	
		INSTALL	—			16,17	
		REPLACE	—			16,17	
040607	DOUBLE CHECK VALVE	INSPECT	—			17	
		INSTALL	—			16,17	
		REPLACE	—			16,17	
		REPAIR			—		
040608	ACCUMULATORS	INSPECT	—			17	
		TEST	—			16,17	
		SERVICE	—			17	
		INSTALL	—			16,17	
		REPLACE	—			16,17	
040609	FUEL CHECK VALVE	INSPECT	—			17	
		INSTALL	—			16,17	
		REPLACE	—			16,17	
040610	DELETED						
040611	EXTERNAL LINES AND HOSES	INSPECT	—			17	
		INSTALL	—			17	
		REPLACE	—			17	
0407	ELECTRICAL SYSTEM						
040701	EXCITER ASSEMBLY	INSPECT	—			17	
		TEST	—			17	
		INSTALL	—			16,17	
		REPLACE	—			16,17	

NOMENCLATURE OF END ITEMS

ENGINE AIRCRAFT GAS TURBINE
MODEL T63-A-700

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category AVUM	AVIM	Depot	(5) Tools and Equipment	(6) Remarks
040702	SPARK IGNITER	INSPECT	—			17	
		TEST	—			17	
		SERVICE	—			17	
		INSTALL	—			16, 17	
		REPLACE	—			16, 17	
040703	SPARK IGNITER LEAD	INSPECT	—			17	
		INSTALL	—			16, 17	
		REPLACE	—			16, 17	
040704	AUTO REIGNITION CONTROL	INSPECT	—			17	
		INSTALL	—			16, 17	
		REPLACE	—			16, 17	
040705	THERMOCOUPLE ASSEMBLY	INSPECT	—			17	
		TEST	—			16, 18	
				—		20	
		INSTALL	—				
		REPLACE	—				
040706	THERMOCOUPLE TERMINAL ASSEMBLY	INSPECT	—			17	
		INSTALL	—			16, 17	
		REPLACE	—			16, 17	
0408	OIL SYSTEM						
040801	OIL FILTER HOUSING	INSPECT	—			17	
		INSTALL	—			16, 17	
		REPLACE	—			16, 17	
040802	OIL FILTER	INSPECT	—			17	
		SERVICE	—			17	
		INSTALL	—			16, 17	
		REPLACE	—			13, 16, 17	
040803	OIL PRESSURE REGULATOR	INSPECT	—			17	
		TEST	—			17	
		ADJUST	—			17	
		INSTALL	—			16, 17	
		REPLACE	—			16, 17	

NOMENCLATURE OF END ITEMS

ENGINE AIRCRAFT GAS TURBINE

MODEL T63-A-700

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category AVUM	AVIM	Depot	(5) Tools and Equipment	(6) Remarks
040804	INTERNAL OIL CHECK VALVE	INSPECT	–			17	
		SERVICE	–			17	
		INSTALL	–			16, 17	
		REPLACE	–			16, 17	
040805	EXTERNAL OIL CHECK VALVE	INSPECT	–			17	
		SERVICE	–			17	
		INSTALL	–			16, 17	
		REPLACE	–			16, 17	
040806	EXTERNAL LINES AND FITTINGS	INSPECT	–			17	
		INSTALL	–			17	
		REPLACE	–			17	
0410	MISCELLANEOUS EQUIPMENT						
041001	ANTI-ICE VALVE	INSPECT	–			17	
		TEST	–			16, 17	
		INSTALL	–			16, 17	
		REPLACE	–			16, 17	
		REPAIR	–			16, 17	
041002	FAT THERMOMETER	TEST	–			17	
		INSTALL	–			17	
		REPLACE	–			17	
041003	TURBINE OUTLET TEMPERATURE GAUGE	INSPECT	–			17, 26	
		INSTALL	–			17	
		REPLACE	–			17	
041004	TACHOMETER	TEST	–			26	
		INSTALL	–			17	
		REPLACE	–			17	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

NOMENCLATURE OF END ITEMS

ENGINE AIRCRAFT GAS TURBINE
MODEL T63-A-700

Tool or Test Equipment Reference Code	Maintenance Category	Nomenclature	National/NATO Stock Number	Tool Number
01	AVUM	ADAPTER, ENGINE TURNING	4920-00-923-3188	6799790
02	AVUM	BRACKET MOUNTING COMPRESSOR VIBRATION PICKUP	4920-00-030-1022	6872539
03	AVUM	CLAMP, LOOP	5340-00-945-0244	6799952
04	AVUM	CLAMP, LOOP	5340-00-945-0242	6799953
05	AVUM	KIT, PROTECTOR COMPRESSOR CLEANING	1730-00-122-5244	6798861
06	AVUM	KIT, VIBRATION SIGNAL SOURCE	4920-00-879-0331	171170-0104
07	AVUM	LIFT, ENGINE ASSEMBLY	5120-00-924-7722	6796963
08	AVIM	PULLER KIT, MECHANICAL	5120-00-945-0186	6796941
09	AVIM	STAND TEST, ENGINE, MODULAR	4920-00-167-9178	LTCT10465-02
10	AVUM	STAND, ENGINE TURNOVER	4920-00-924-5726	6795579
11	AVUM	STOP WATCH	6645-00-250-4680	10531878
12	AVUM	WRENCH, GROUND IDLE	5120-00-763-7565	6798292
13	AVUM	PULLER, LUBE OIL FILTER CAP	5120-00-088-1071	6798860
14	AVUM	FIXTURE , SETTING	9820-00-028-0083	6872482
15	AVUM	FIXTURE ASSEMBLY COMPRESSOR	4920-00-923-3190	679566-100
16	AVUM	TOOL SET AVUM SET NO. 2	4920-00-567-0476	SC492099CLA92
17	AVUM	TOOL KIT, AIRCRAFT MECHANICS GENERAL	5180-00-323-4692	SC518099CLA01
18	AVUM	TOOL KIT, ELECTRICAL REPAIRMANS	5180-00-323-4915	SC518099CLA06
19	AVUM	TOOL KIT, ENGINE REPAIRMANS	5180-00-323-4944	SC518099CL07
20	AVIM	SHOP SET, AVIM, ELECTRICAL INSTRUMENT	4920-00-165-1453	SC492099CL91 ELAM
21	AVIM	SHOP SET, AVIM, MACHINE SHOP	4920-00-405-9279	SC492099CLA91 MAAM
22	AVIM	SHOP SET, AVIM, SHEET METAL	4920-00-166-5505	SC492099CLA915 MAM
23	AVIM	SHOP SET, AVIM, TOOL CRIB	4920-00-472-4183	SC492099CLA91 TCAM
24	AVIM	SHOP SET, AVIM, TURBINE ENGINE	4920-00-224-3684	SC492099CLA91 ENTAM
25	AVIM	SHOP SET, AVIM, WELDING	4920-00-163-5093	SC492099CLAW EAM
26	AVUM	JET-CAL ANALYSER	4920-00-673-5514	BH-112-JA-36

Section IV. REMARKS

T63-A-700 TURBINE ENGINE

Reference Code	Remarks/Notes
A	Functional Test at AVUM — Engine in Airframe
B	Functional Test at AVIM — Engine in METS
C	Water/Solvent Solution Wash
D	Reference TM 55-1520-228-23
E	Blend-Repair Only
F	Weld-Repair

APPENDIX C

SPECIAL TOOLS AND SUPPORT EQUIPMENT

OVERVIEW

A listing and illustration of special tools and support equipment is presented in this Appendix. This listing provides a convenient reference for special tools and support equipment available to perform maintenance functions on the engine. It is primarily intended as a ready reference for maintenance personnel in determining what equipment is available. All tools and equipment are arranged numerically according to part number.

Figure	Nomenclature	Part Number	National/NATO Stock Number
—	Magnifying Glass, 10x	66M95	6650-00-490-2627
C-8	Stand, Turnover Engine Assembly	6795579	4920-00-924-5726
C-10	Wrench, Box, Straight	6795588	5120-00-761-3646
C-3	Fixture, Assembly, Compressor	6795966-100	4920-00-923-3190
C-6	Puller Kit, Mechanical	6796941	5120-00-945-0186
C-4	Lift, Engine Assembly	6796963	5120-00-924-7722
C-5	Puller, Compressor	6798250	5120-00-759-8369
C-11	Wrench, Ground Idle	6798292	5120-00-763-7565
C-12	Puller, Lube Oil Filter Cap	6798860	5120-00-088-1071
C-7	Protector Kit, Compressor	6798861	1730-00-122-5244
C-1	Adapter, Engine Turning	6799790	4920-00-923-3188
C-2	Clamp, Loop	6799952	5340-00-945-0244
C-2	Clamp, Loop	6799953	5340-00-945-0242
C-13	Fixture Max Stop Screw	6872482	4920-01-028-0083
C-9	Stand, Test, Engine, Modular	LTCT10465-02	4920-00-167-9178
—	Tester, Jet Ignition System	11-4700-1	4920-00-587-5886
—	Kit, Vibration Monitoring	171170-0104	4920-00-879-0331
—	Key Socket, Head Screw-Hex Type No. 9/64 In.	GGGK00275	5120-00-984-0247
—	Wrench, Torque, 1/4 In. Drive, 30 No. to 150 No., Click	GGG-W-686 Type III Class 1	5130-00-542-4489
—	Tool Kit, Engine Repairmans	SC5780-00-CL-A07	5180-00-323-4944
—	Shop Set, Aircraft Maintenance Fixed Base, Welding, Set C	SC4920-99-CL-A10	4920-00-163-5093
—	Tool Set, Set No. 2	SC492099CLA92	4920-00-567-0476

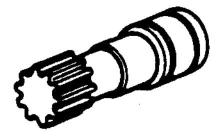


Figure C-1. Engine Turning Adapter 6799790

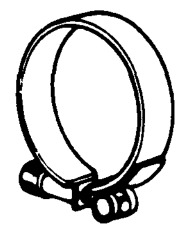


Figure C-2. Loop Clamps 6799952 and 6799953

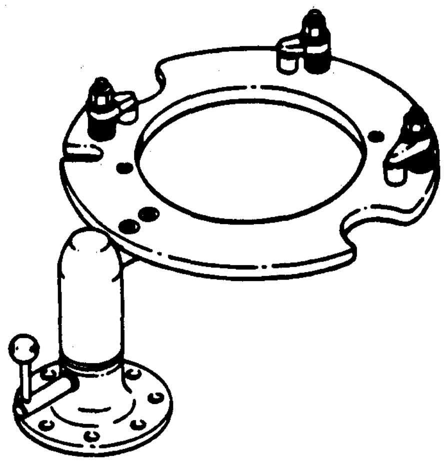


Figure C-3. Compressor Assembly Fixture 6795966-100

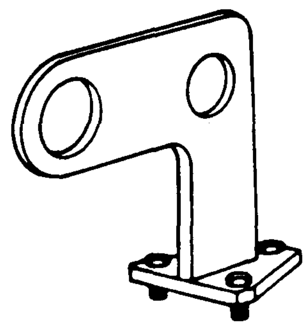


Figure C-4. Engine Assembly Lift 6796963

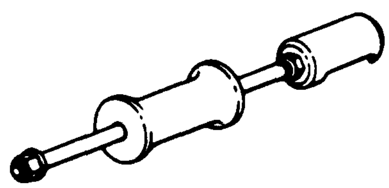


Figure C-5. Compressor Puller 6798250

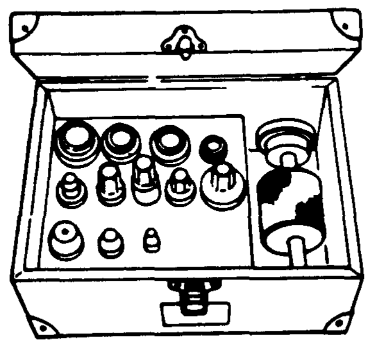


Figure C-6. Mechanical Puller Kit 6796941

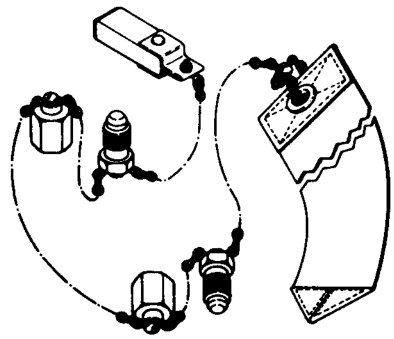


Figure C-7. Compressor Protector Kit 6798861

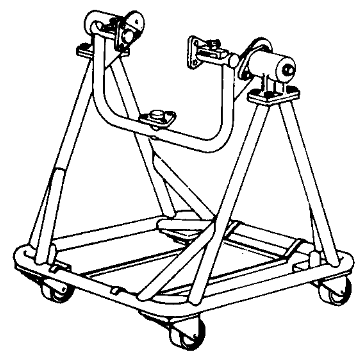


Figure C-8. Engine Assembly Turnover Stand 6795579

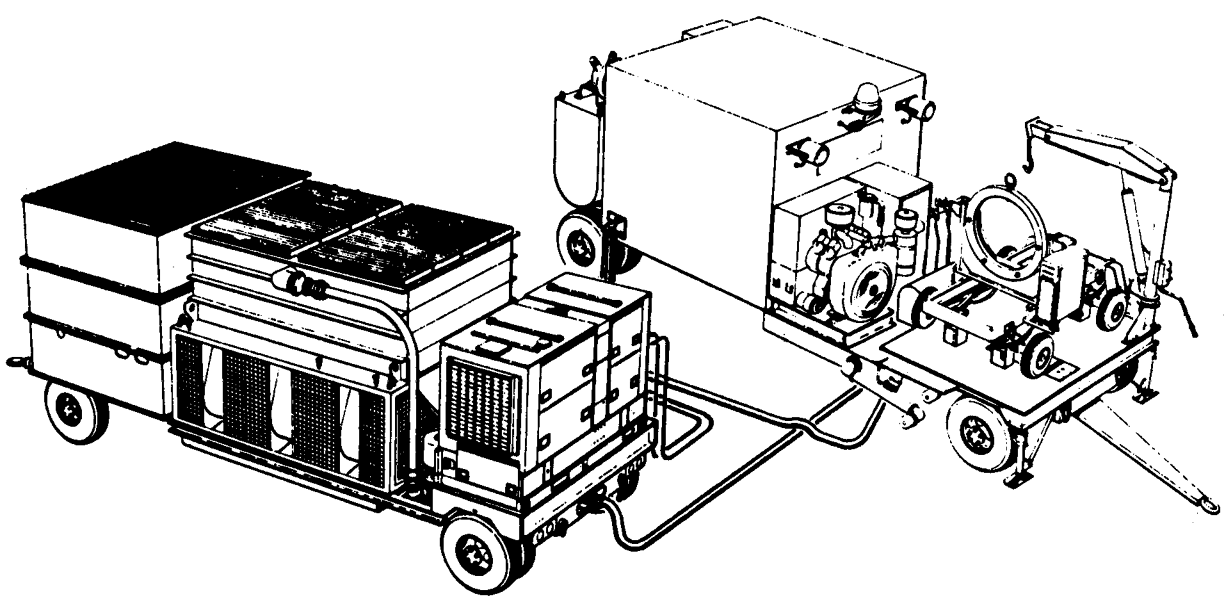


Figure C-9. Modular Engine Test Stand LTCT10465-02

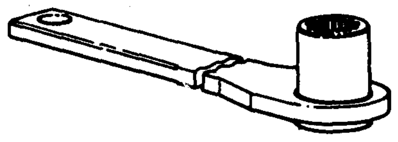


Figure C-10. Straight Box Wrench
6795588

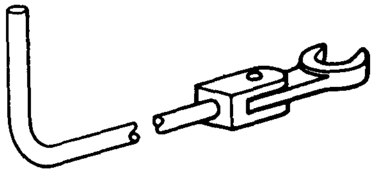


Figure C-11. Ground Idle Wrench
6798292

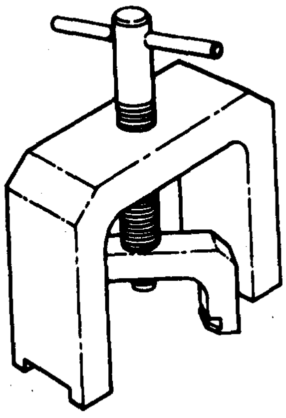


Figure C-12. Lube Oil Filter Cap Puller
6798860

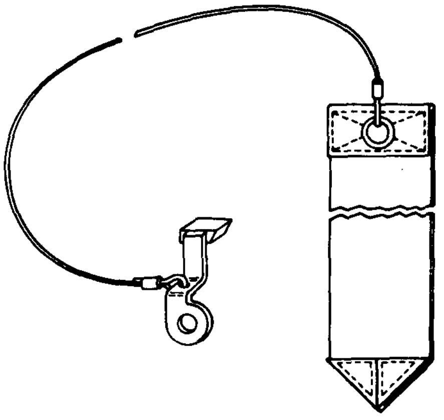


Figure C-13. Fixture Setting, Fuel Control
Maximum Stop Screw 6872482

APPENDIX D

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. SCOPE.

This appendix lists expendable supplies and materials you will need to operate and maintain the T63-A-700 Turboshaft engine. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

D-2. EXPLANATION OF COLUMNS

a. Column 1- Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., “Use cleaning compound (item 5, Appendix D”) .

b. Column 2- Level. This column identifies the lowest level of maintenance that requires the listed item.

c. Column 3- National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column 4- Description. Indicates the Federal item name alphabetically 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 applicable.

e. Column 5- 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 Number	(2) Level	(3) Nat Stock Number	(4) Description	(5) U
1	AVUM	6850-00-264-9038	Drycleaning Solvent (Petroleum solvent) P-D-680, Type I	
1A	AVUM	6850-00-274-5421	Drycleaning Solvent P-D-680, Type II	
2	AVUM	8135-00-282-0565	Barrier Material, Water-Vaporproof MIL-B-131, Class 1	
3	AVUM	7510-00-890-9872	Tape, Packaging, Waterproof PPP-T-60, Type IV	
4	AVUM	9150-00-273-2388	Lubricating Oil (for assembly and preservation only) MIL-L-6081, Grade 1010	
5	AVUM	9150-00-180-6266	Lubricating Oil MIL-L-7808 or MIL-L-23699	
6	AVUM	9150-00-543-7220	Antiseize Compound MIL-L-25681	
7	AVUM	9505-00-618-0257	Lockwire, 0.020-in. dia MS20995C20	
8	AVUM	6850-00-264-6572	Dehydrating Agent (desiccant, 16 unit bag) MIL-D-3464	
9	AVUM	8030-00-244-1298	Corrosion Preventive Compound MIL-C-16173, Grade 3	
10	AVUM	7510-00-227-1444	White Stencil Ink TT-I-1795	QT
11	AVUM	6850-00-209-7235	Corrosion Preventive Compound MIL-C-6529, Type III	
12	AVUM	8131-00-664-0057	Cushioning Material, Bound Fiber PPP-C-1120, Type III	
13	AVUM	6810-00-184-4800	Trichlorethylene O-T-634	
14	AVUM	8115-01-053-	Fiberboard Container PPP-B-636	
15	AVUM	8135-00-224-8885	Barrier Material, Greaseproofed, Waterproofed MIL-B-121, Type I, Grade A, Class 1	

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
16	AVUM	9150-00-616-9020	Aircraft Grease MIL-G-25537	LB
17	AVUM	9505-00-293-4208	Lockwire, 0.032 in. dia MS20995C32	
18	AVUM	9150-00-223-4003	Grease MIL-G-3545	1 LB
19	AVUM	9150-00-753-4649	Lubriplate 130A or equivalent VV-G-632, Type B, Grade 1	
20	AVUM	6810-00-880-7383	Denatured Alcohol Commercial	GL
21	AVUM	6850-00-550-5565	Solvent Turco 481 MIL-C-16480	
22	AVUM	6850-00-803-6420	Carbon Removal Compound Turco, Super Carb MIL-D-26549	GL
23	AVUM	6850-00-597-1528	Cresol Base Cleaning Compound Turco Products Inc. Formula 3097 or equivalent	
24	AVUM	6850-00-209-7230	Rust Preventive Cities Service Anti-Corrode 204 or equivalent	
25	AVUM	9150-00-235-9061	Oil MIL 3100	GL
26	AVUM	6850-00-181-7594	Water Soluble Cleaner (B & B 3100)	
27	AVUM	5350-00-246-0338	Abrasive Paper, Grade 320	
28	AVUM	5350-00-186-8856	Emery Cloth, No. 400 grit	
29	AVUM	8010-00-831-5935	Paint Thinner	GL
30	AVUM	8010-00-831-5934	Gray Corrosion Resistant Paint	QT
31	AVUM	5350-00-186-8855	Emery Cloth, No. 500 grit	
32	AVUM	6810-00-281-2785	Methylethylketone TT-M-261	GL
33	AVUM	8010-00-831-9398	Heat Resistant Aluminum Paint	QT

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
34	AVUM	8010-00-831-5934	Corrosion Resistant Paint Saran Chemical Co. HC100 or WC100, Detroit, MI	GL
35	AVUM	8010-00-160-5787	Lacquer Thinner, Fed. Sped. TT-T-266	
36	AVUM	5350-00-224-7201	Abrasive Paper, No. 400 wet or dry P-P-101	
37	AVUM	9150-00-944-8953	Grease MIL-G-81322	LB
38	AVUM	8030-00-209-8005	Antiseize Compound TT-A-580	
39	AVUM	6810-00-184-4796	Acetone O-A-51	
40	AVIM	3439-00-166-9584	Weld Rod AMS 5786	
41	AVUM	9150-00-754-0064	Molykote (Lubri-Bond A, Electrofilm Inc.) MIL-L-23398	
42	AVUM	5350-00-221-0572	Crocus Cloth FSP-C-458	
43	AVUM	9130-00-256-8613	Fuel MIL-T-5624, Grade JP-4	
44	AVUM	NO NSN ASSIGNED	Sermetel Paint Teleflex Inc. Sermetel 196	
45	AVUM	8520-00-228-0598	Liquid Soap Solution P-S-624	
46	AVUM	NO NSN ASSIGNED	Cleated Plywood Box (12 × 12 × 14 inches) PPP-13-601	
47	AVUM	6810-00-275-6010	Methanol (Grade A or B) O-M-232	GL
48	AVUM	7510-00-285-5812	Marking Pencil (Yellow) Colorbright No. 2107 (73865) or Equivalent	
49	AVUM	8030-00-938-1947	Corrosion Preventative Compound Clear-WD40 or equivalent 16 oz MIL-C-81309	
50	AVUM	NO NSN ASSIGNED	Nickel Ease, Anti-Seize Compound, Fel Pro Inc, Skokie, IL 60076	

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
51	AVUM	8040-00-941-9984	Sealant, RTV GE-106, MIL-A-46106 (acetic acid base), or	
			Sealant, RTV DC-732, MIL-A-46106 (acetic acid base), or	
		NO NSN ASSIGNED	Sealant, RTV DC-738 White (alcohol base), or	
			Sealant, RTV DC-739 Black or White (alcohol base), or	
			Sealant, RTV DC-3145 Clear (alcohol base), or	
			Sealant, RTV GE-162 White (alcohol base), or	
			Sealant, RTV GE-189 Gray (alcohol base)	
52	AVIM	6850-00-550-5565	Ultrasonic cleaner solvent Richardson Chemical Co., Allied-Kelite Div. Kelite No. 235, Chicago, IL	
53	AVIM	NO NSN ASSIGNED	Mineral Spirits	
54	AVIM	NO NSN ASSIGNED	Sewing Thread	
55	AVUM	6850-01-372-8303	Type II (MIL-C-85704)	5 Gal
56	AVUM	6850-01-372-8304	Type II (MIL-C-85704)	55 Gal
57	AVUM	6850-01-370-5245	Type IIA (MIL-C-85704)	5 Gal
58	AVUM	6850-01-370-5244	Type IIA (Mil-C-85704)	55 Gal

APPENDIX E

SCHEMATIC DIAGRAMS

(Not Applicable)

APPENDIX F

ILLUSTRATED LIST OF MANUFACTURED ITEMS

(Not Applicable)

APPENDIX G

TORQUE VALUES AND DIMENSIONAL LIMITS, OVERHAUL AND RETIREMENT SCHEDULE

Section I. TORQUE VALUES

G-1. GENERAL.

This appendix contains information for tightening bolts, nuts, and connectors used for components and modular assemblies of the engine. This information includes minimum and maximum torque values, wrench arc angles, and special instructions.

G-2. Torque Values. Torque values are listed in table G-1 of this section. The table contains torque yalues for bolts, screws, studs, flared tubing, tube fittings, flexible hose connectors, etc. and are presented as a specific value for each individual application. The torque values are listed in numerical order by figure reference number.

G-3. Dimensional Limits. Dimensional limits are listed in table G-2 of Section II. The table provides dimensional limits for determining and maintaining proper relationship between mating parts within an assembly. The table also includes all clearances, backlashes, plugs, runouts, etc., arranged in numerical order by figure reference number.

G-4. Overhaul Interval and Retirement Schedule. The overhaul interval and retirement schedule is listed in table G-3, Section III. Items which have an established operating interval before they are overhauled or retired from service are contained in this table.

Table G-1. Torque Values

Ref. No.	Fig. No.	Description	Minimum (kg/m) (in. lb)	Maximum (kg/m) (in. lb)
1	G-1	Shipping Container Closure Flange Nuts	(1.7) 150	(1.9) 165
2	G-1	Shipping Container Mounting Adapter Nut	(0.5) 40	(0.6) 50
3	G-1	Shipping Container Mounting Bracket Bolts	(1.0) 85	(1.3) 110
4	G-1	Shipping Container Records Receptacle Nuts	(0.3) **30**	(0.5) 45
5	G-1	Shipping Container Service Receptacle Nuts	(0.2) 15	(0.3) 25
None	G-2	Compressor Shipping Container Locking Ring Nut	(0.7) 65	(0.9) 75

Table G-1. Torque Values - Continued

Ref. No.	Fig. No.	Description	Minimum (kg/m)	Minimum (in. lb)	Maximum (kg/m)	Maximum (in. lb)
1	G-3	Auto Reignition Sensing Tube Coupling Nuts	(0.9)	80	(1.4)	120
2	G-3	Compressor Front Support Scavenge Oil Tube				
		Fitting Jam Nut	(0.9)	75	(1.3)	110
		Coupling Nuts	(1.7)	150	(2.3)	200
3	G-3	Compressor Mounting Bolts	(0.8)	70	(1.0)	85
1	G-4	Outer Combustion Case Splitline Nuts	(0.2)	20	(0.3)	30
2&3	G-4	Burner Drain Valve	(1.4)	120	(1.6)	140
4	G-4	Ignition Lead-to-Combustion Case Bracket Nut	(0.6)	55	(0.9)	80
2	G-5	Governor-to-Check Valve Air Tube				
		Fitting (in governor)	(0.9)	75	(1.3)	110
		Coupling Nuts	(0.9)	80	(1.4)	120
3	G-5	Governor-to-Control Air Tube				
		Fitting (in control)	(0.9)	75	(1.3)	110
		Coupling Nuts	(0.9)	80	(1.4)	120
5	G-5	Scroll-to-Governor Air Tube				
		Fitting Jam Nuts	(0.6)	55	(0.9)	80
		Coupling Nuts	(0.9)	80	(1.4)	120
1	G-5	Accumulator-to-Check Valve	(0.6)	55	(0.9)	80
None	None	Accumulator Clamp Attaching Nut	(0.4)	35	(0.5)	40
4	G-5	Control-to-Regulator Air Tube				
		Fitting Jam Nuts	(0.6)	55	(0.9)	80
		Coupling Nuts	(0.9)	80	(1.4)	120
12	G-5	Pump-to-Control Fuel Tube				
		Fittings	(0.9)	75	(1.3)	110
		Coupling Nuts	(1.7)	150	(2.3)	200
13	G-5	Control-to-Pump Fuel Tube				
		Fittings	(0.9)	75	(1.3)	110
		Coupling Nuts	(1.7)	150	(2.3)	200

Table G-1. Torque Values - Continued

Ref. No.	Fig. No.	Description	Minimum (kg/m) (in. lb)	Maximum (kg/m) (in. lb)
8	G-5	Control-to-Fireshield Fuel Tube		
		Fireshield Fitting Jam Nut	(0.6) 55	(0.9) 80
		Coupling Nuts	(0.9) 80	(1.4) 120
9	G-5	Gas Turbine Scavenge Oil Tube		
		Fitting Jam Nut	(0.9) 75	(1.3) 110
		Coupling Nuts	(1.7) 150	(2.3) 200
10	G-5	External Sump Scavenge Oil Tube		
		Fitting Jam Nut	(0.9) 75	(1.3) 110
		Coupling Nuts	(1.7) 150	(2.3) 200
11	G-5	Check Valve-to-Turbine Pressure Oil Tube		
		Fitting Jam Nut	(0.9) 75	(1.3) 110
		Coupling Nuts	(0.9) 80	(1.4) 120
7	G-5	Accumulator-to-Control Air Tube		
		Fitting Jam Nuts	(0.6) 55	(0.9) 80
		Coupling Nuts	(0.9) 80	(1.4) 120
18	G-5	Gearbox-to-Check Valve Pressure Oil Tube		
		Fitting Jam Nut	(0.9) 75	(1.3) 110
		Coupling Nuts	(1.7) 150	(2.3) 200
14	G-5	Fuel Supply Hose		
		Fitting	(0.9) 75	(1.3) 110
		Coupling Nut	(1.7) 150	(2.3) 200
15	G-5	Fuel Pump Seal Drain Hose		
		Fitting	(0.6) 55	(0.9) 80
		Coupling Nut	(0.9) 80	(1.4) 120
16	G-5	Before Filter Pressure Hose		
		Fitting	(0.6) 55	(0.9) 80
		Coupling Nut	(0.9) 80	(1.4) 120
17	G-5	After Filter Pressure Hose		
		Fitting	(0.6) 55	(0.9) 80
		Coupling Nut	(0.9) 80	(1.4) 120
6	G-5	Fireshield-to-Fuel Nozzle Hose Coupling Nuts	(0.9) 80	(1.4) 120
1	G-6	Fuel Nozzle	(2.3) 200	(3.5) 300
2	G-6	Power Turbine Governor Mounting Flange Nuts	(0.8) 70	(1.0) 85

Table G-1. Torque Valves - Continued

REF. NO.	FIG. NO.	DESCRIPTION	MINIMUM (kg/m)	MINIMUM (in.lb)	MAXIMIM (kg/m)	MAXIMIM (in.lb)
3	G-6	Fuel Pump Mounting Flange Nuts	(0.8)	70	(1.0)	85
4	G-6	Auto Reignition Mount Plate-to-Bracket Bolts	(0.4)	35	(0.5)	40
5	G-6	Gas Producer Fuel Control Mounting Flange Nuts	(0.8)	70	(1.0)	85
None	G-7	Fuel Filter Cover	(2.1)	180	(2.3)	200
6	G-8	Fuel Control Fuel Filter Plug	(0.7)	65	(0.8)	70
7-8	G-8	Fuel Control and Governor Lever Shaft Nuts	(0.5)	40	(0.7)	60
None	G-9	Magnetic Chip Detectors	(0.7)	60	(0.9)	80
1	G-10	Oil Filter Cap Nuts	(0.3)	30	(0.5)	45
2	G-10	Oil Filter Housing Mounting Flange Nuts	(0.4)	35	(0.5)	40
l&2	G-11	External Oil Check Valve Clamp Nuts	(0.4)	35	(0.5)	40
3	G-11	Oil Pressure Reducer	(0.6)	50	(0.9)	75
4	G-11	Compressor Front Support Pressure Oil Tube				
		Fitting	(0.6)	50	(0.9)	75
		Coupling Nuts	(0.7)	65	(1.2)	100
1	G-12	Scroll-to-Bleed Valve Air Tube				
		Fitting Jam Nuts	(0.7)	55	(0.9)	80
		Coupling Nuts	(0.9)	80	(1.4)	120
2	G-12	Bleed Valve Mounting Flange Nuts				
		1/4-28 Nut	(0,8)	70	(1.0)	85
		10-32 Nuts	(0.4)	35	(0.5)	40
3	G-12	Anti-Icing Air Tube (RH) Coupling Nuts	(1.7)	150	(2.3)	200
4	G-12	Anti-Icing Valve Jam Nut	(1.2)	100	(1.7-)	150
5	G-12	Anti-Icing Air Tube (LH) Coupling Nuts	(1.7)	150	(2.3)	200
6	G-12	Anti-Icing Valve Poppet Guide	(0.7)	65	(0.9)	75
None	None	Fuel Control Heater Valve Nipples	(0.6)	55	(0.9)	80

Table G-1. Torque Values - Continued

Ref. No.	Para No.	Description	Minimum (kg/m)	Minimum (in. lb)	Maximum (kg/m)	Maximum (in. lb)
None	None	Fuel Control Heater Valve Mounting clamp Nuts	(0.4)	35	(0.5)	40
None	None	Fuel Control Heater Hose Coupling Nuts	(0.9)	80	(1.4)	120
1	G-13	Ignition Exciter Mounting Nuts	(0.3)	30	(0.5)	40
2&5	G-13	Igniter Lead Clamp Nuts	(0.4)	35	(0.5)	40
3	G-13	Igniter Lead-to-Fireshield Attaching Nuts	(0.4)	35	(0.5)	40
4	G13	Igniter Lead-to-Combustion Case Mounting Bracket Nut	(0.6)	55	(0.9)	80
6	G-13	Igniter Lead Coupling Nuts				
		Lead-to-Exciter	(0.6)	50	(0.8)	70
		Lead-to-Igniter	(0.8)	70	(1.0)	90
None	None	Ignition Exciter Input Lead Nut	(0.1)	8	(0.1)	12
7	G-13	Spark Igniter	(1.7)	150	(2.3)	200
8	G-13	Auto Reignition Control Mounting Bolts	(0.4)	35	(0.5)	40
9	G-13	Auto Reignition Control Mounting Nuts	(0.4)	35	(0.5)	40
None	None	Thermocouple Terminal Assembly Mounting Nuts	(0.4)	35	(0.5)	40
None	None	Thermocouple Leads-to-Terminal Assembly Nuts				
		No. 8-32 Nut	(0.2)	17	(0.3)	25
		No. 10-32 Nut	(0.2)	17	(0.3)	25
1	G-14	Compressor Case-to-Front Support Nuts	(0.1)	10	(0.2)	15
2	G-14	Compressor Case-to-Front Diffuser Nuts	(0.1)	10	(0.2)	15
3	G-14	Compressor Case Horizontal Splitline Nuts	(0.1)	10	(0.2)	15
None	G-15	Diffuser Scroll Mounting Screws	(0.2)	16	(0.2)	17
None	G-16	Adapter Spur Gearshaft Retaining Nut	(0.5)	50	(0.6)	55

Table G-1. Torque Values - Continued

Ref. No.	Para No.	Description	Minimum (kg/m) (in. lb)	Maximum (kg/m) (in. lb)
1	G-17	Turbine-to-Gearbox Mounting Stud (Upper)	(1.2) 105	(2.4) 210
2	G-17	Turbine-to-Gearbox Mounting Studs (Lower)	(0.6) 50	(1.2) 100
3	G-17	Rear Power Takeoff Pad Studs	(0.6) 50	(1.2) 100
4	G-17	Fuel Control and Governor Pad Studs	(0.6) 50	(1.2) 100
5	G-17	Starter-Generator Pad Studs	(1.2) 105	(2.4) 210
6	G-17	Fuel Pump and Spare Accessory Pad Studs	(0.6) 50	(1.2') 100
7	G-17	Oil Filter Housing Mounting Studs (Short Studs)	(0.2) 20	(0.5) 40
8	G-17	Oil Filter Housing Mounting Studs (Long Studs)	(0.2) 20	(0.5) 40
9	G-17	Oil Filter Housing Mounting Studs (Medium Length Stud)	(0.2) 20	(0.5) 40
10	G-17	Tachometer Pad Studs	(0.6) 50	(1.2) 100
11	G-17	Front Power Takeoff Pad Studs	(0.6) 50	(1.2) 100
12	G-17	Ignition Exciter Mounting Studs	(0.2) 20	(0.5) 40

Section II. DIMENSIONAL LIMITS

Table G-2. Dimensional Limits

Ref. No.	Fig. No.	Description	Minimum (cm)	Minimum (in.)	Maximum (in.)	Maximum (cm)
None	G-16	Adapter Spur Gearshaft Runout	(0.000)	0.000 TIR	0.003 TIR	(0.008)
1	G-1 7	Turbine-to-Gearbox Mounting Stud (Upper) Setting Height	(1.68)	0.66	0.70	(1.78)
2	G-17	Turbine-to-Gearbox Mounting Studs (Lower) Setting Height	(1.52)	0.60	0.64	(1.63)
3	G-17	Rear Power Takeoff Pad Studs Setting Height				
		P/N 6851928 and 6870734 Cover	(2.31)	0.91	0.95	(2.41)
		P/N 6856797 Cover	(1.22)	0.48	0.52	(1.32)
4	G-17	Fuel Control and Governor Pad Studs Setting Height	(1.52)	0.60	0.64	(1.63)
5	G-17	Starter-Generator Pad Studs Setting Height	(2.26)	0.89	0.93	(2.36)
6	G-17	Fuel Pump and Spare Accessory Pad Studs Setting Height	(2.16)	0.85	0.89	(2.26)
7,8,9	G-17	Oil Filter Housing Mounting Studs Setting Height				
		Short Studs	(1.37)	0.54	0.58	(1.47)
		Long Studs	(2.97)	1.17	1.21	(3.07)
		Medium Length Studs	(2.01)	0.79	0.83	(2.11)
10	G-17	Tachometer Pad Studs Setting Height	(1.57)	0.62	0.66	(1.68)
11	G-17	Front Power Takeoff Pad Studs Setting Height	(1.57)	0.62	0.66	(1.68)
12	G-17	Ignition Exciter Mounting Studs Setting Height	(1.07)	0.42	0.46	(1.17)

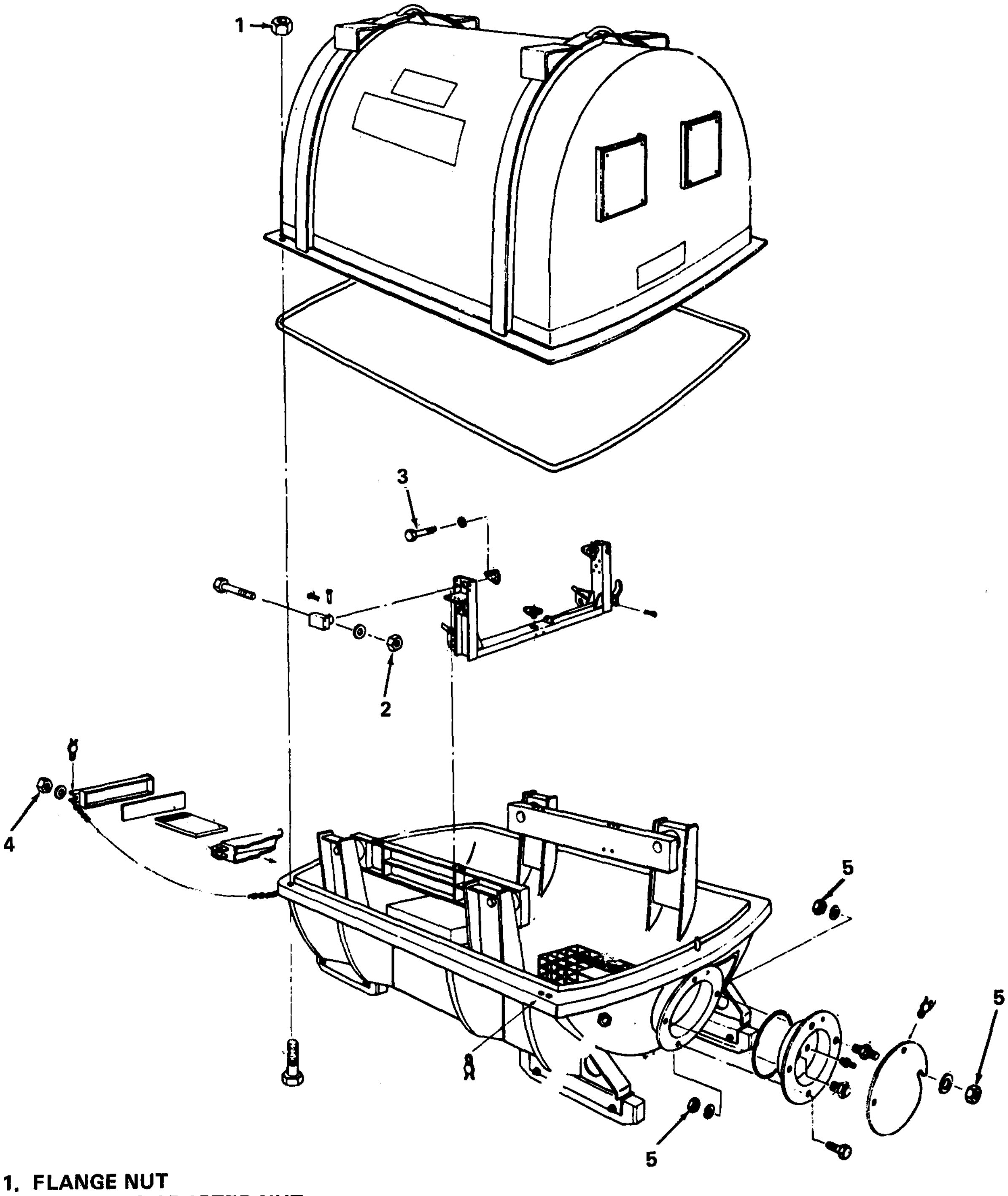


Figure G-1. Engine Shipping Container Parts Requiring Special Torque Values

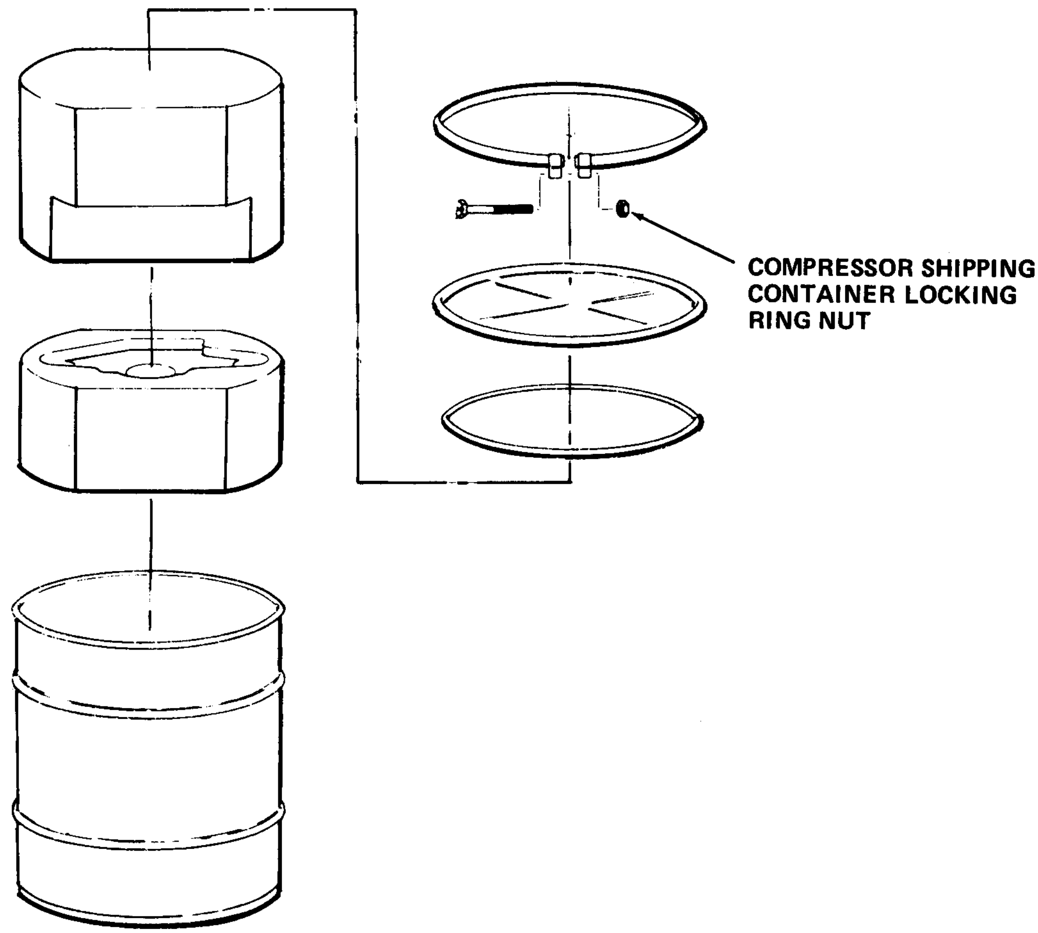
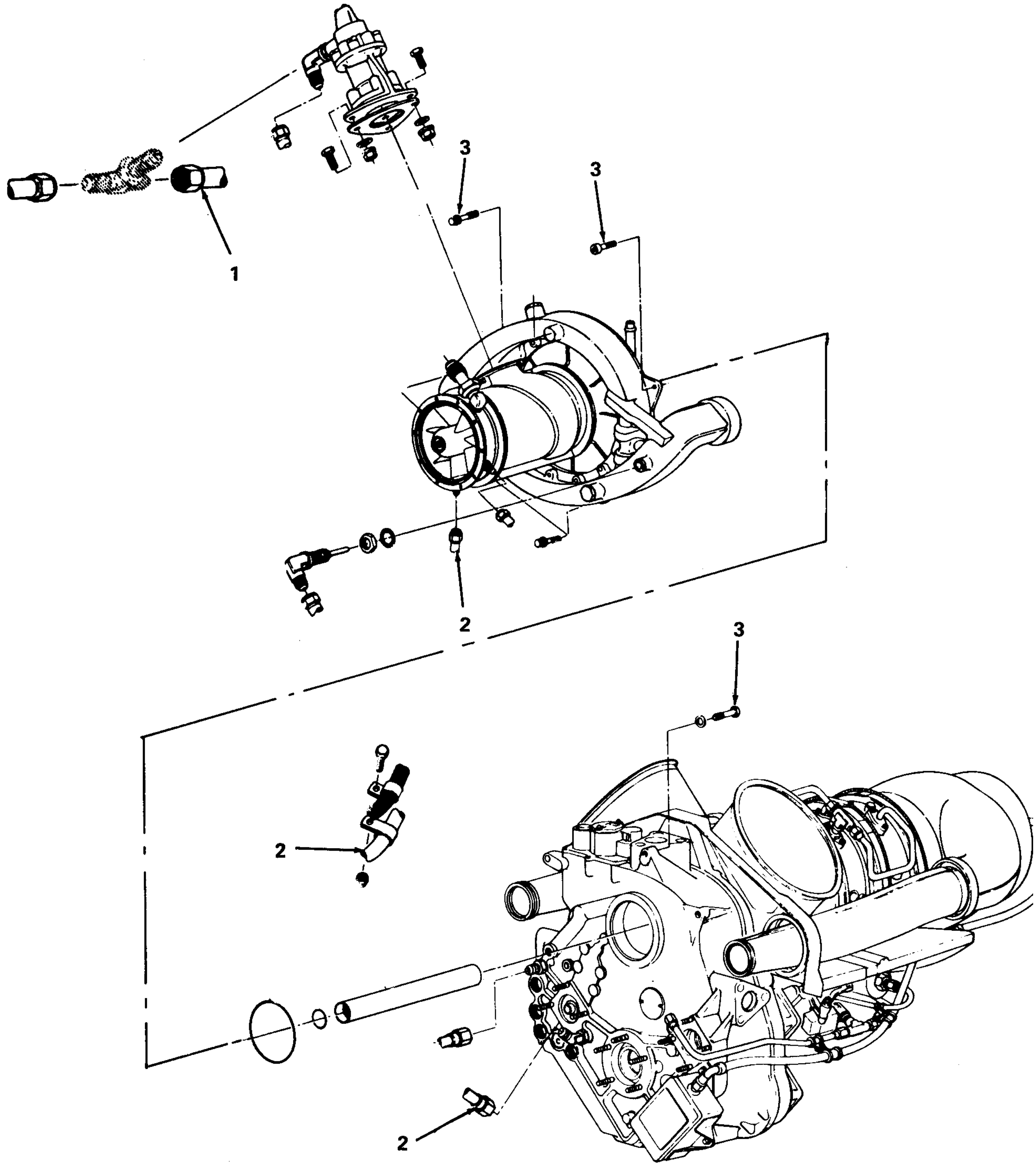
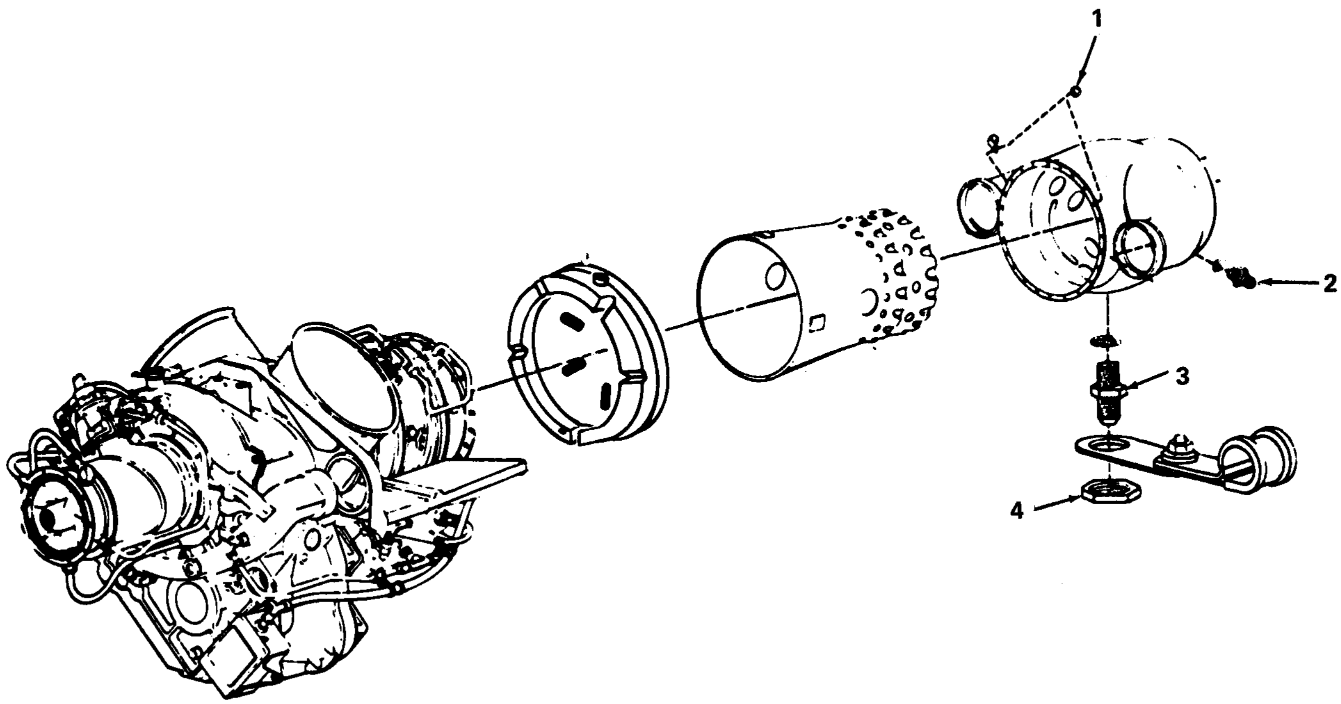


Figure G-2. Compressor Shipping Parts Requiring Special Torque Values



AUTO IGNITION TUBE
SCAVENGE OIL TUBE
COMPRESSOR MOUTNTING BOLTS (5)

Figure G-3. Compressor Parts Requiring Special Torque Values



1. NUT (24)
2. DRAIN VALVE (T63-A-5A)
   PLUG (T63-A-700)
3. PLUG (T63-A-5A)
   DRAIN VALVE (T63-A-700)
4. JAM NUT

Figure G-4. Combustion Section Parts Requiring Special Torque Values

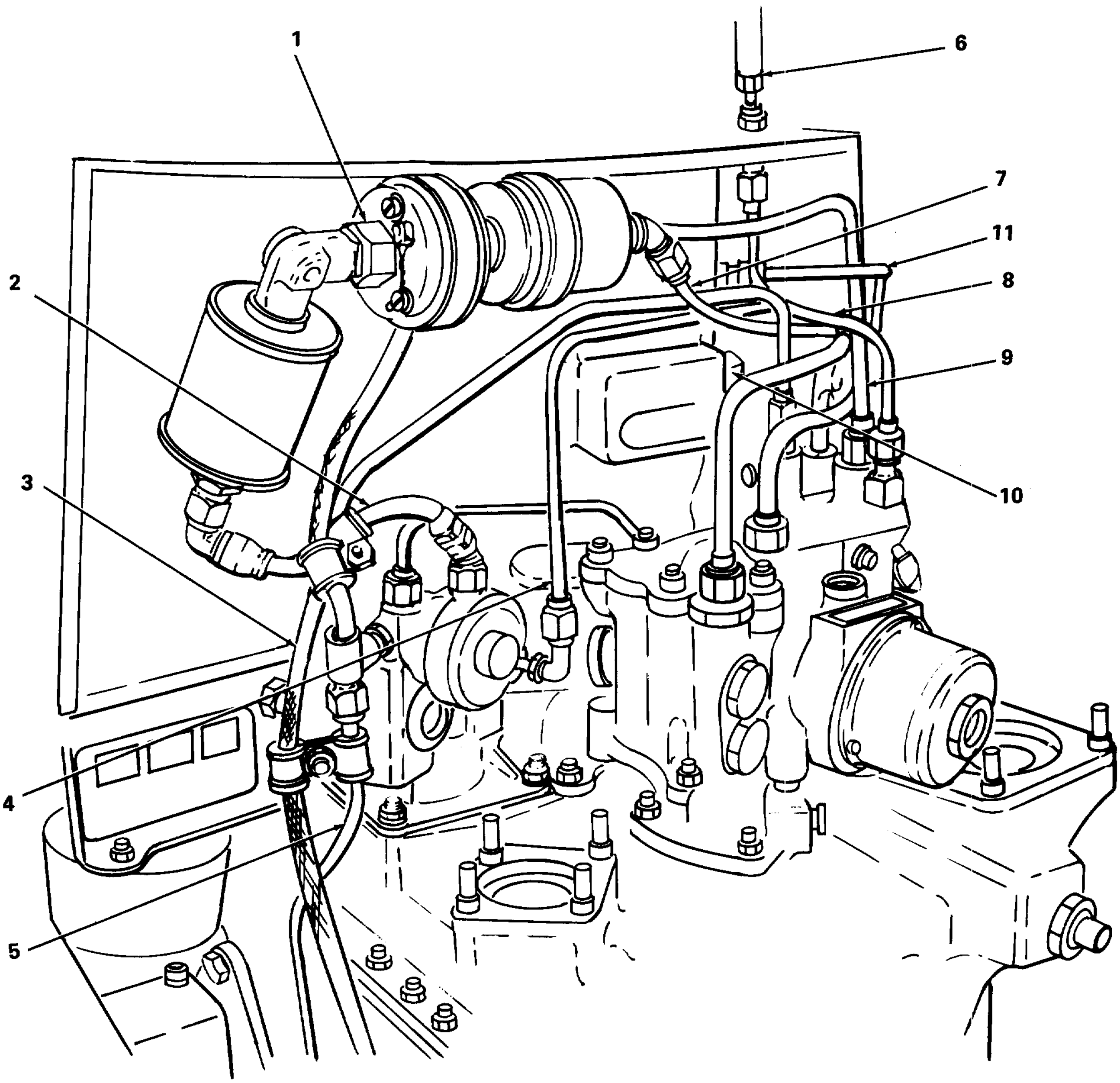


Figure G-5. Fuel, Oil, and Air Tubing Parts Requiring Special Torque Values
(Sheet 1 of 2)

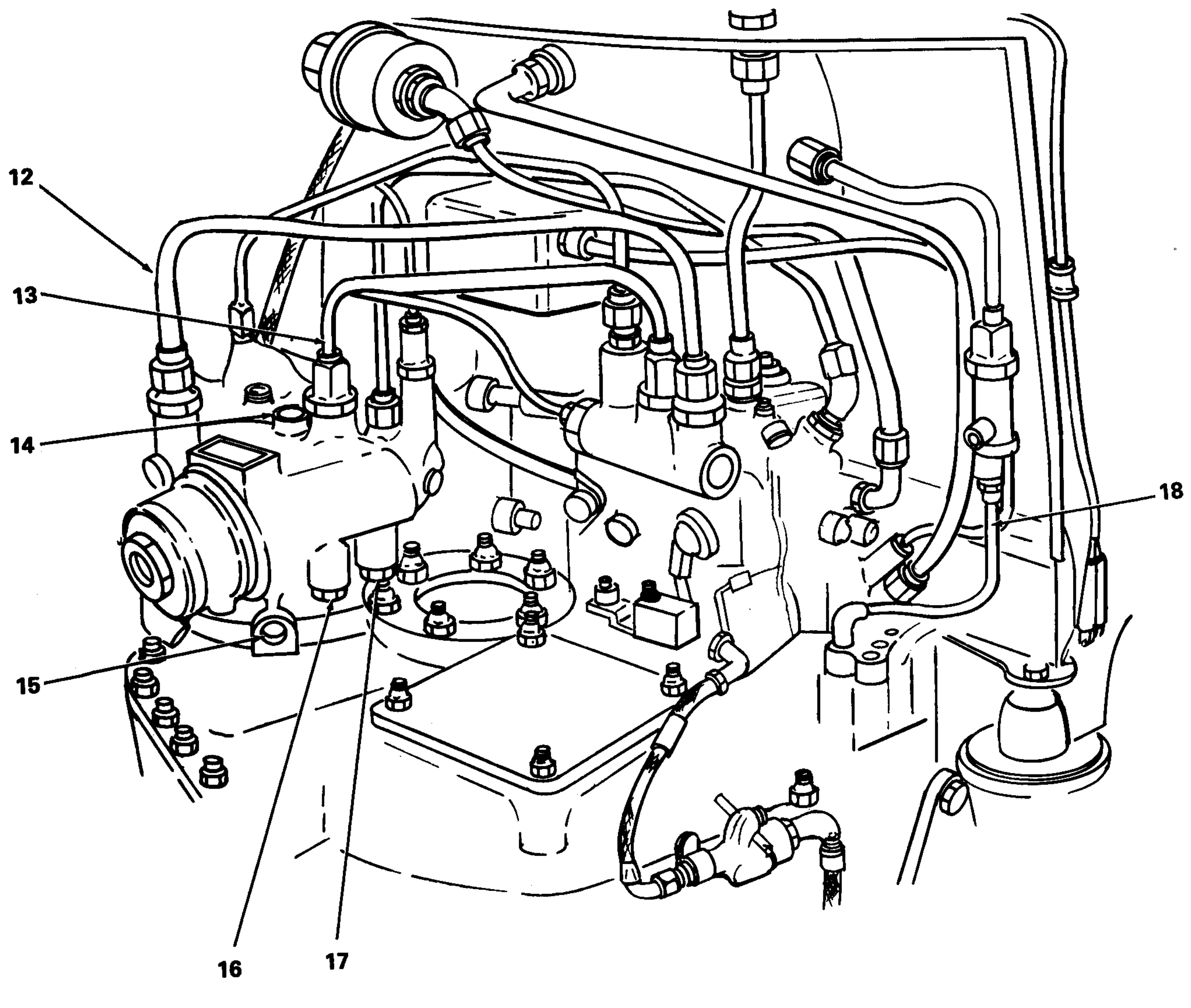
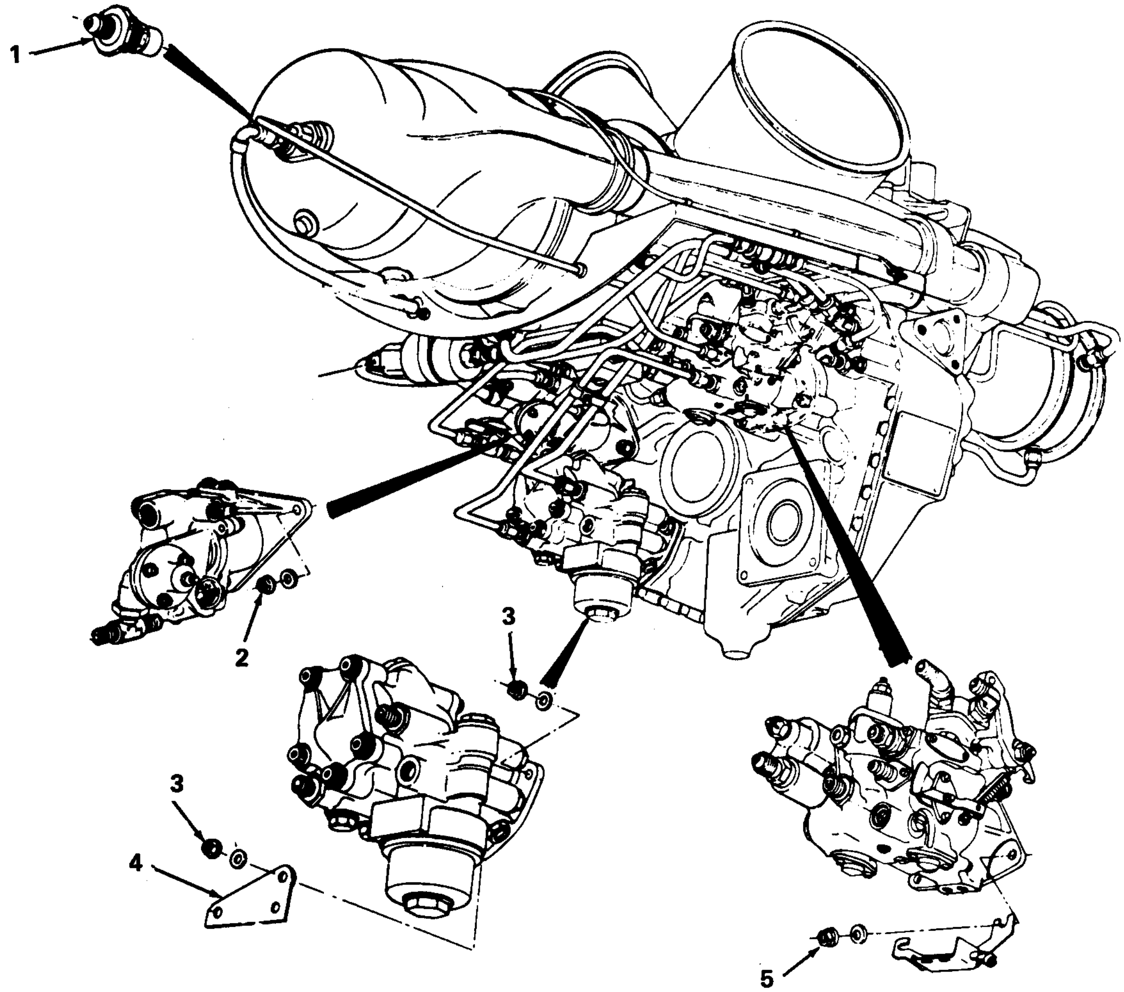


Figure G-5. Fuel, Oil, and Air Tubing Parts Requiring Special Torque Values
(Sheet 2 of 2)



1. FUEL NOZZLE
2. NUT (3)
3. NUT (3)
4. PLATE
5. NUT (3)

Figure G-6. Fuel System Parts Requiring Special Torque Values

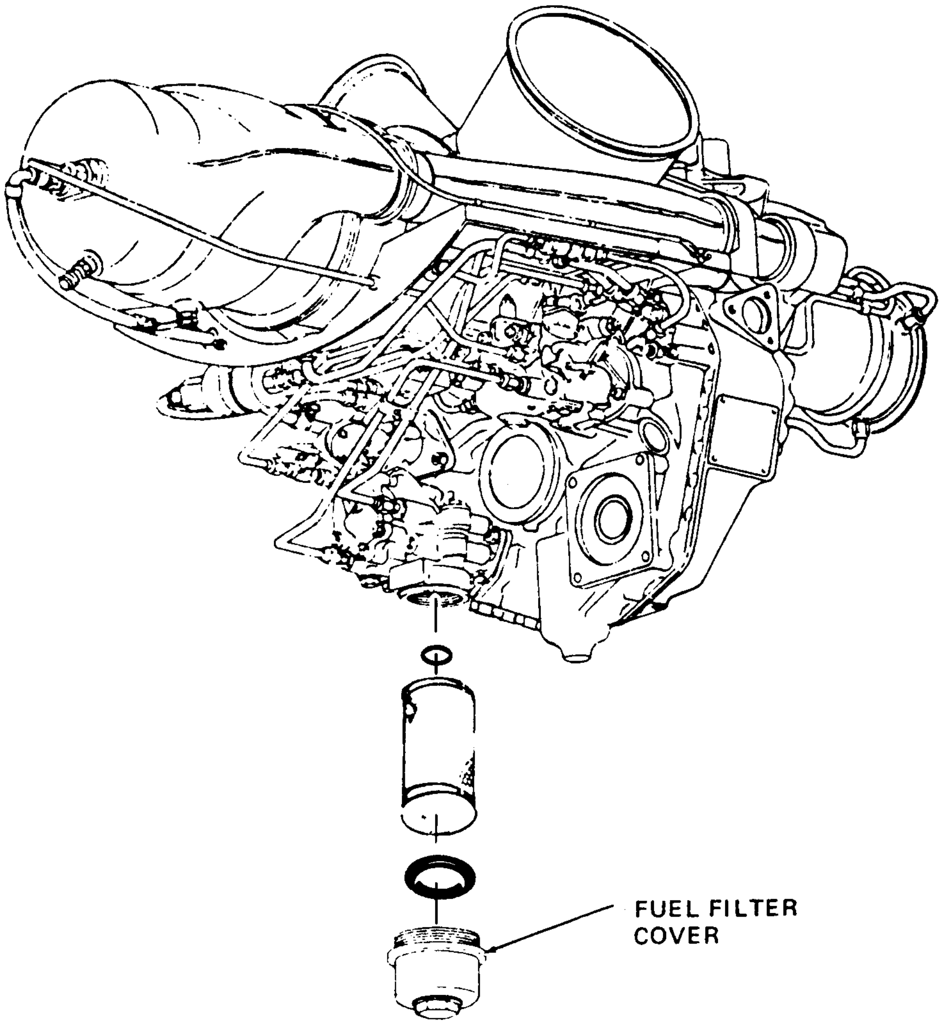


Figure G-7. Fuel Filter Cover

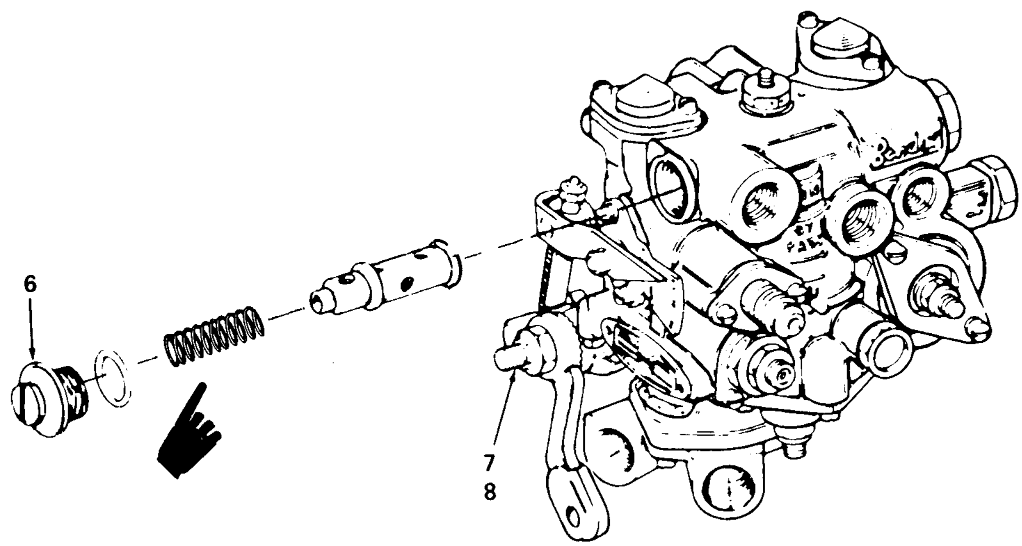
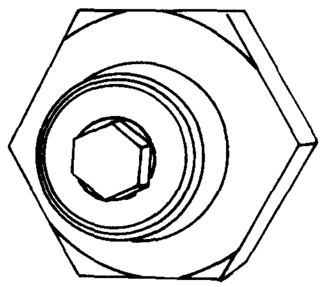
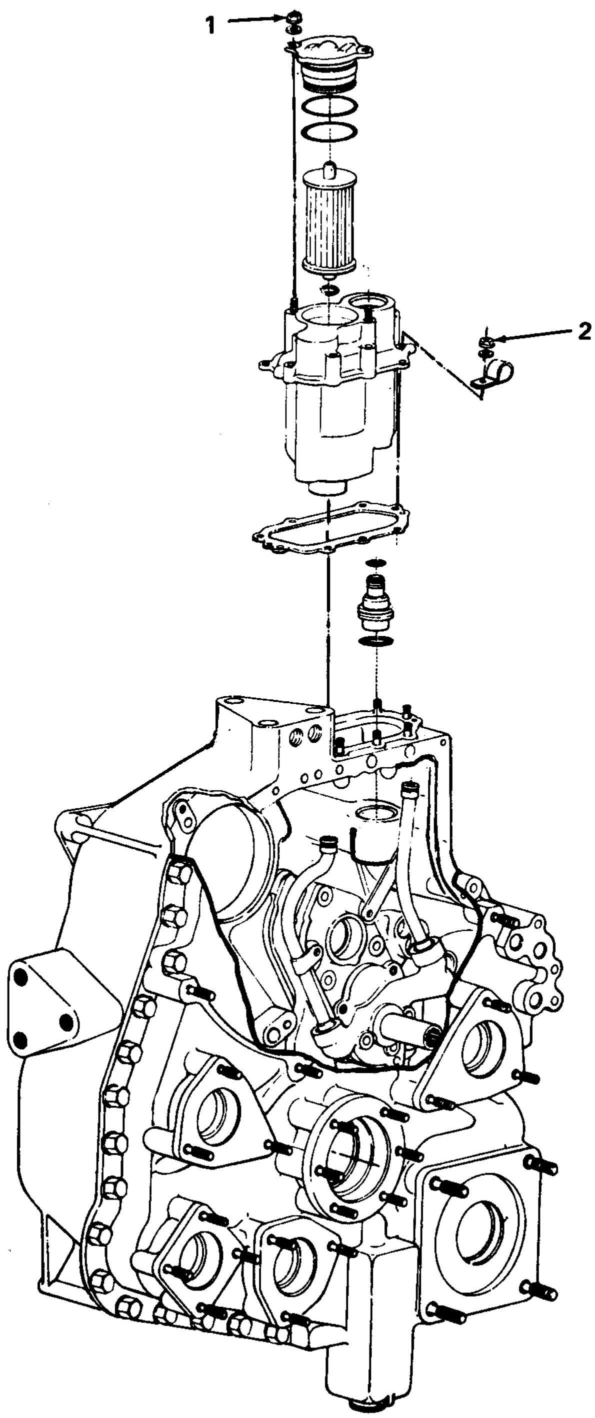


Figure G-8. Fuel Control Fuel Filter Plug and Fuel Control and Governor Lever Shaft Nut Location



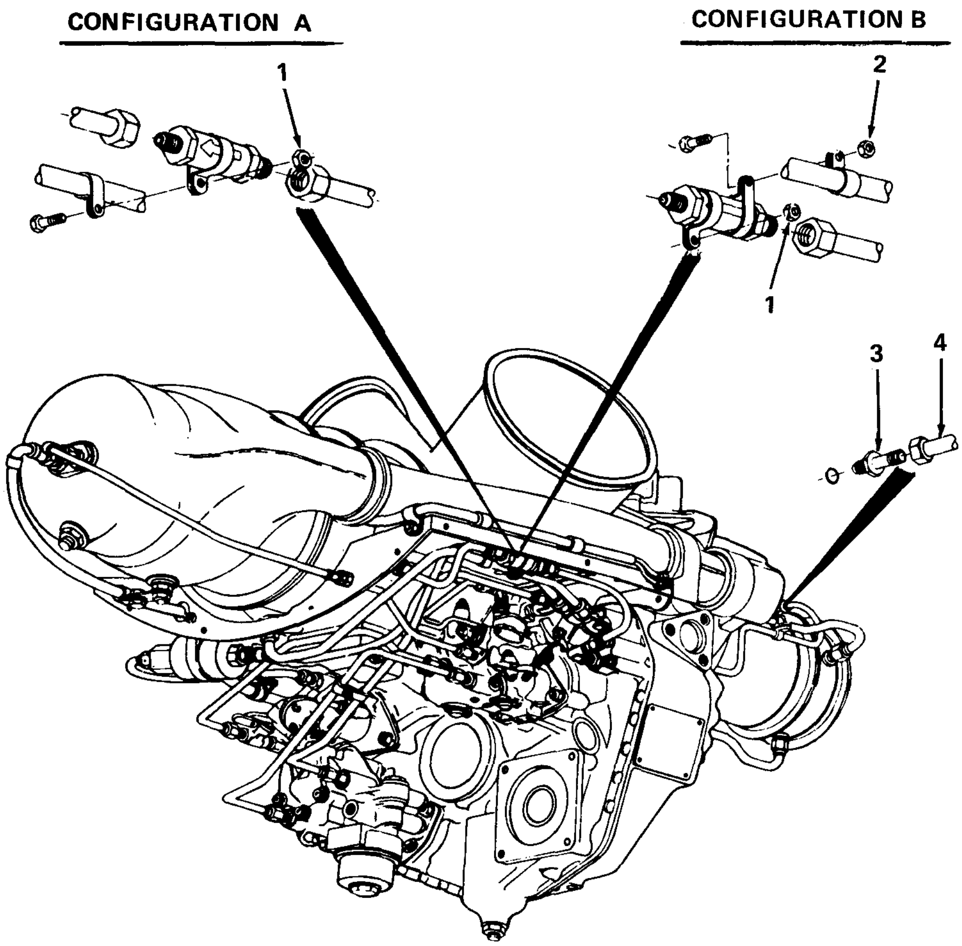
NOTE: THERE ARE TWO MAGNETIC CHIP DETECTORS. ONE IS LOCATED AT THE OIL OUTLET PORT AND THE OTHER IS LOCATED AT THE BOTTOM OF THE ACCESSORY GEARBOX.

Figure G-9. Magnetic Chip Detector



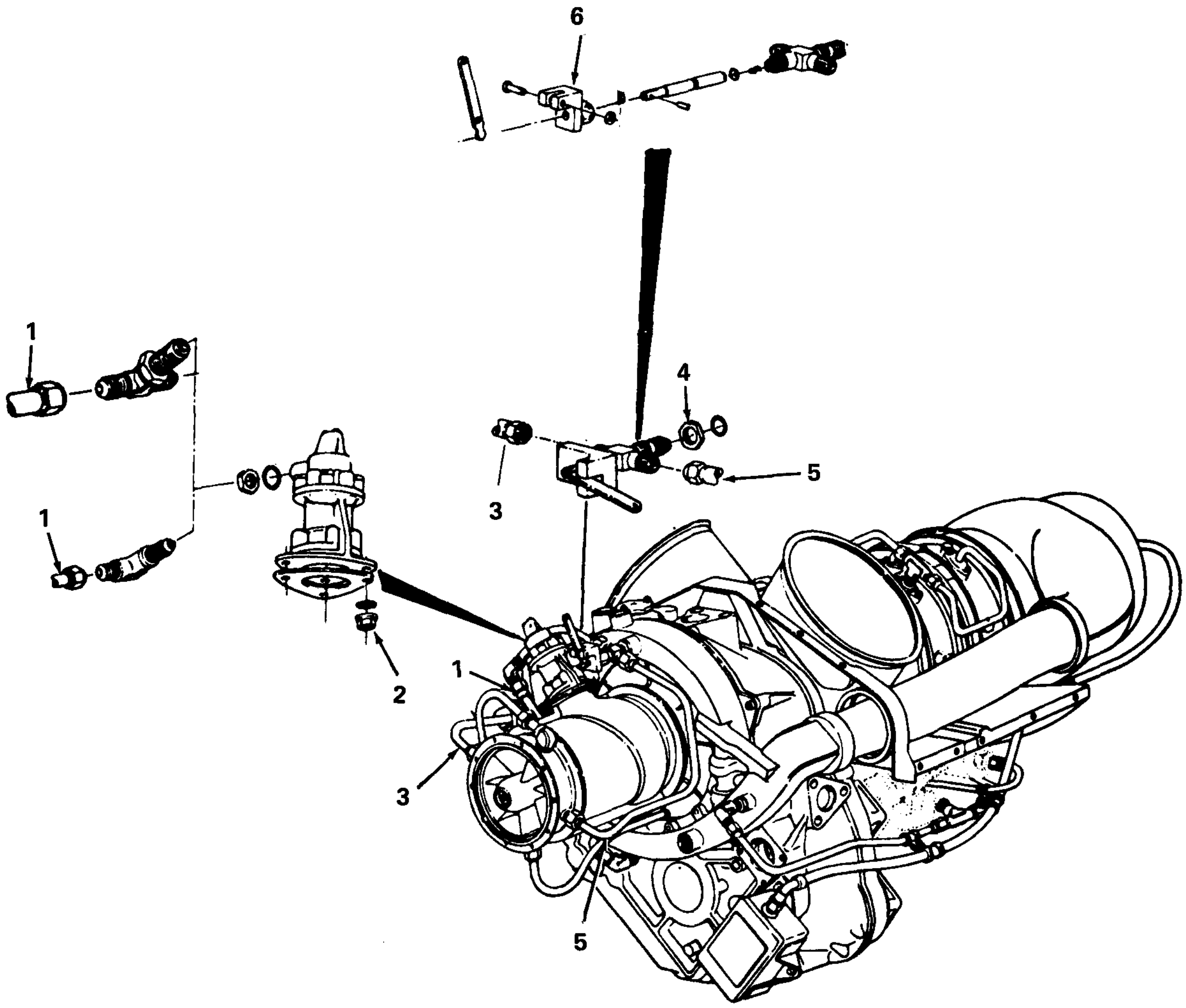
1. NUT (2)
2. NUT (8)

Figure G-10. Oil Filter and Related Parts Requiring Special Torque Values



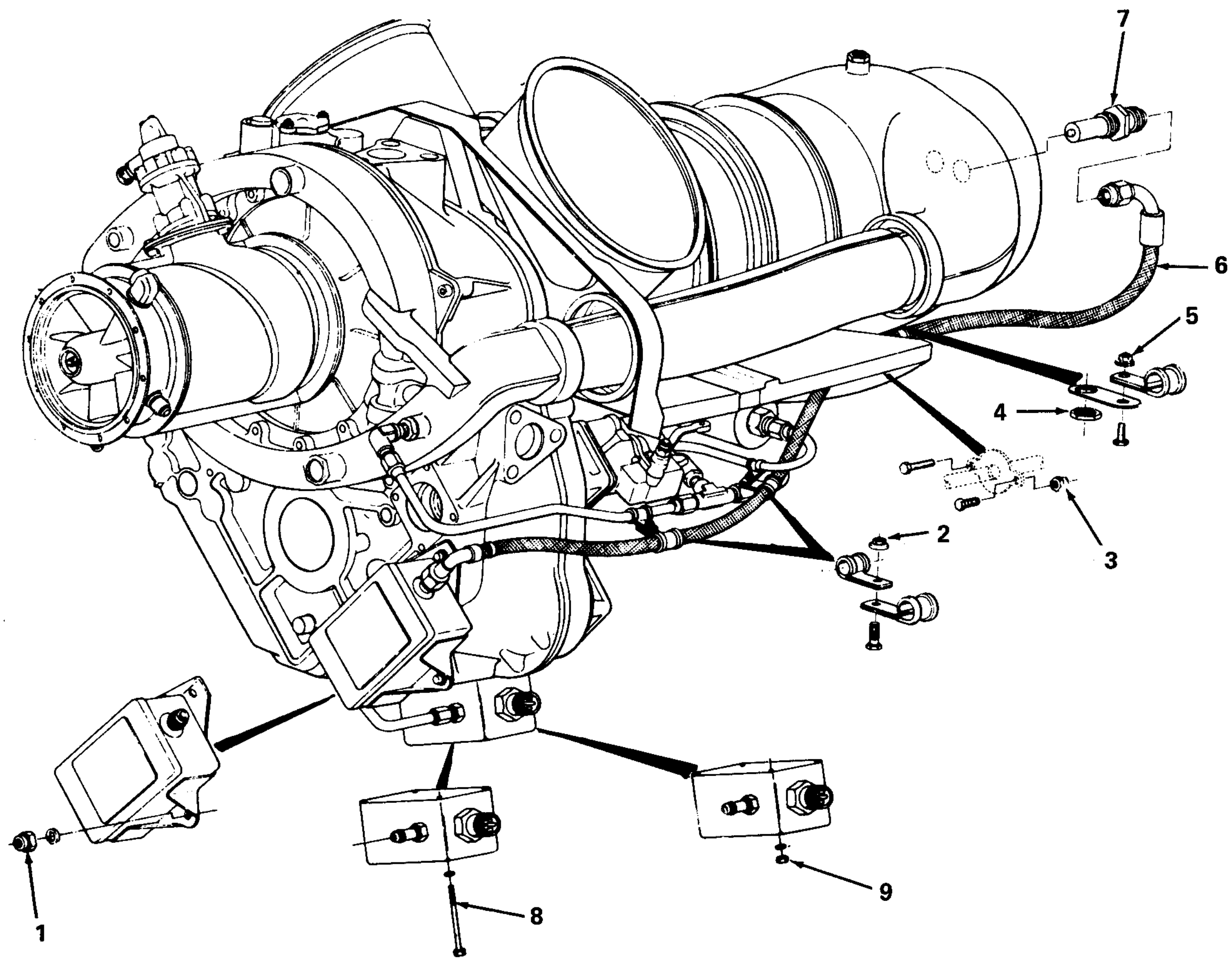
1. NUT
2. NUT
3. OIL PRESSURE REDUCER
4. OIL TUBE

Figure G-11. External Oil Lines and Related Parts Requiring Special Torque Values



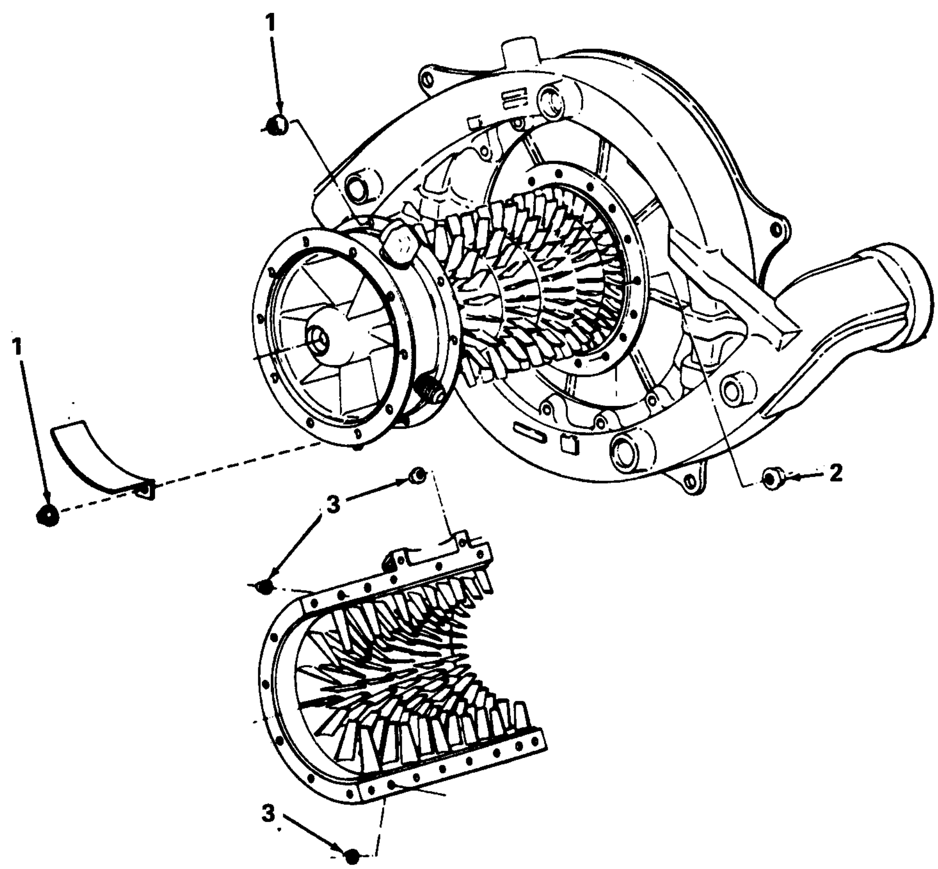
1. AIR TUBE
2. NUT (3)
3. AIR TUBE
4. JAM NUT
5. AIR TUBE
6. POPPET GUIDE

Figure G-12. Air Tubes, Poppet Guides, and Related Parts Requiring Special Torque Values



1. NUT (3)
2. NUT (2)
3. NUT (2)
4. NUT
5' NUT
6. IGNITER LEAD
7. SPARK IGNITER
8. BOLT (4)
9. NUT (4)

Figure G-13. Ignition System and Related Parts Requiring Special Torque Values



1. NUT (10)
2. NUT (16)
3. NUT (16)

Figure G-14. Compressor Case Assembly and Related Parts Requiring Special Torque Values

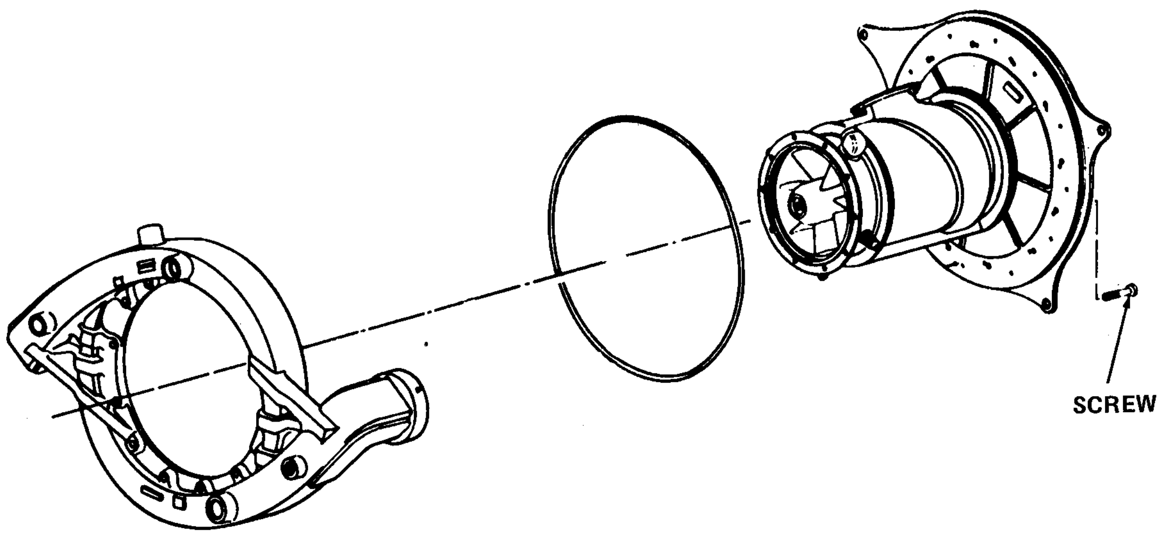


Figure G-15. Diffuser Scroll

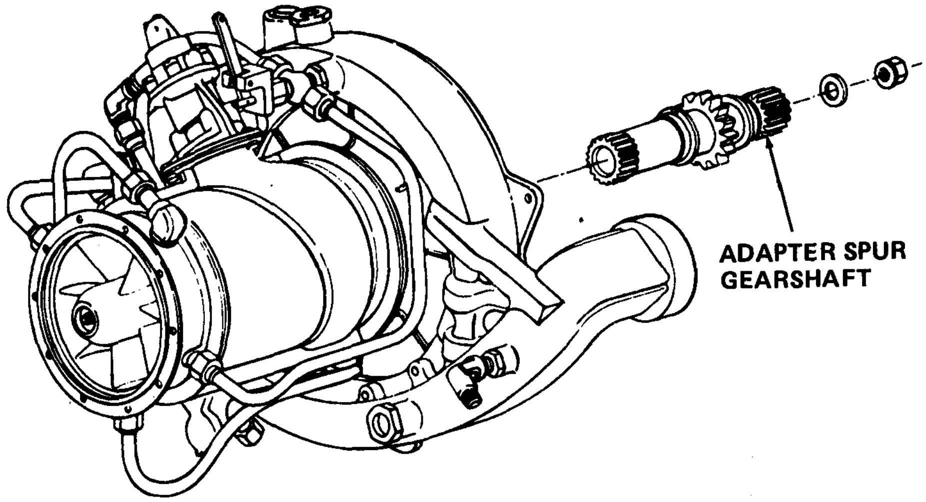


Figure G-16. Adapter Spur Gearshaft

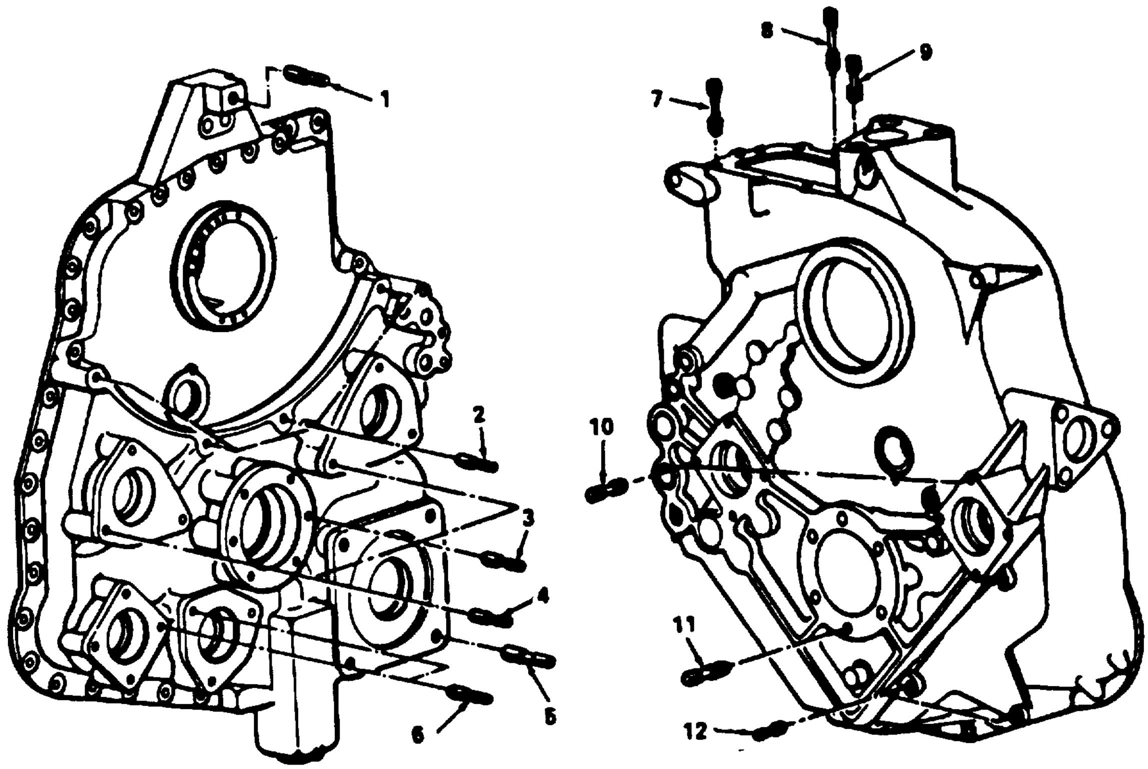


Figure G-17. Location of Gearbox External Studs

Section III. OVERHAUL AND RETIREMENT INTERVAL

Table G-3. Overhaul and Retirement Interval - Continued

Overhaul Interval (hr)	Retirement Interval (hr)	Item	Part Number
		Engine	6852600
1000		Engine	6874201
750		Compressor	6876265
1000		Compressor	6876266
1000		Fuel Pump (024731-102)	6854292
2000		Fuel Pump	6899253
1000		Bleed Valve (A45413A)	6870460
1000		Bleed Valve	6874979

NOTE

AU compressors with yellow plastic liners installed shall have an overhaul interval of 450 hours.

NOTE

Only the engines identified by the suffix "B" after the engine serial number and its applicable compo-ments indicated in Table G-3 will have the 1000 hour (TBO). Example: AE40100AB; AE402603B. On all other T63 engines not identified by the suffix "B" after the engine serial number, the TBO will remain 750 hours and the fuel control, power turbine governor, fuel pump. bleed valve and compressor will be returned with the engine to overhaul when the engine reaches its 750 hour TBO.

Overhaul Interval (hr)	Retirement Interval (hr)	Item	Part Number
450		Fuel Control	6858454 (2524246-5)
750		Fuel Control	6872037 (2524246-6)
2000		Oil Pump Assy	386500-5

Table G-3. Overhaul and Retirement Interval - Continued

Overhaul Interval (hr)	Retirement Interval (hr)	Item	Part Number
1000		Fuel Control	6871111 (2524437-3)
2000		Fuel Control	23006271 (2524909-1)
2000		Fuel Control	23007859 (2524909-2)
2000		Fuel Control	23037271 (2424909-3)
2000		Fuel Control	2524909-4
2000		Governor	23006272 (2524910-1)
2000		Governor	23007876 (2524910-2)
2000		Governor	23030647 (2524910-3)
1000		Governor	6874255 (2524438-1)
	2000	Impeller	6851116
	2000	Impeller	6854131
	3050	Impeller	6876367

NOTE

First stage wheels have a retirement life of 1550 hours on engines that have a "B" in the suffix on the serial number. If an engine does not have a "B" in the suffix on the serial number. If an engine does not have a "B" in the Suffix of the serial number, the retirement life is 750 hours.

NOTE

Retirement life depends on the specific part number and application, whether used in a T63-A-700 or T63-A-720.

Table G-3. Overhaul and Retirement Interval - Continued

Overhaul Interval (hr)	Retirement Interval (hr)	Item	Part Number
	1550	1st Stage Wheel	6852171
	1550	1st Stage Wheel	6886407
	1550	2nd Stage Wheel	6857912
	1550	2nd Stage Wheel	6898782
	1550	2nd Stage Wheel	6877092
	2500	3rd Stage Wheel	6843393
	2500	4th Stage Wheel	6847449

APPENDIX H

GENERAL MAINTENANCE PRACTICES

H-1. APPENDIX OVERVIEW.

This appendix contains general maintenance practices. Maintenance personnel will become familiar with them before starting to work on the engine or on any of the engine subassemblies or components.

H-2. LUBRICANTS.

Be sure to comply with all assembly lubrication procedures. Failure to do so could result in oil system contamination.

CAUTION

- **Antiseize compounds will not be used to lubricate a surface that will come in contact with engine oil.**
- **Do not use a lubricant on carbon seals.**

The lubricants used during assembly are listed under Expendable Supplies and Materials in appendix D.

Be sure all surfaces that need lubrication are clean and free of moisture and solvents before applying the lubricant.

Do not contaminate highly-finished surfaces with body moisture or other agents before lubricating. This could cause corrosion after lubricant is applied.

Lubricating oil (item 5, Appendix D) is the type of oil meant wherever the term "light coat of oil" or the word "oil" is used in assembly procedures.

Unless otherwise noted, use a light coat of lubricating oil to lubricate threads of bolts, screws, studs, coupling nuts and fasteners used in assembly. Failure to do this may cause bolts to be improperly torqued or may cause shank nuts to become loosened during assembly, and may cause bolt seizure and/or failure during removal.

H-3. USE OF JACKING SCREWS.

Jacking screws are used to remove tight-fitting covers and flanged parts.

Bolts referenced in disassembly procedures are used as jacking screws.

In procedures that specify using jacking screws, do the following:

a. Manually thread bolts into holes until they bottom.

b. Alternately turn bolts clockwise one-quarter of a turn, one at a time, until part being jacked can be freely removed from engine.

H-4. CAPTIVE BOLTS.

Captive bolts are part of a component and remain installed (captive) on the component after being unthreaded from the mounting surface in which they are threaded.

When the word “loosen” is used in reference to a captive bolt, it means that the captive bolt must be removed from the mounting surface but not from the component to which it is captive.

To remove captive bolts from parts to which they are attached, pull bolt away from part until threads engage threaded hole in part. Then turn bolt counterclockwise until it is disengaged.

Replace captive bolts as follows:

a. AVUM: Try to remove bolt by hand. If bolt hangs up, return part to AVIM.

CAUTION

Cap or plug all openings.

b. AVIM: Chase threads enough to allow removal by hand. Inspect insert in accessory for damage.

H-5. ELECTRICAL CONNECTORS.

There are two types of electrical coupling connectors: those with hex coupling nuts and those with knurled coupling rings. Observe the following practices:

CAUTION

- **Do not lubricate electrical connectors.**
- **Do not use tools on knurled coupling rings.**
- **Do not cross thread coupling connectors.**

Hex coupling nuts. Install, hand-tighten, and wrench arc tighten hex coupling nuts according to the assembly instructions in this manual.

Knurled coupling rings. Mate connectors that have knurled coupling rings as follows:

NOTE

When mating or disconnecting a connector that has a knurled coupling ring, ratcheting will be felt as the ring is turned. This is normal. It is part of the self-locking feature of the connector. If there is no ratcheting, the cable will be removed and the. connector replaced.

a. Check mating receptacle for bent pins. If they are bent, see applicable inspection paragraph for repair limits.

b. Aline axis of electrical cable plug connector with axis of mating receptacle to avoid damage to pins in receptacle.

c. Aline keys of plug connector and keyways of receptacle by rotating connector until it slides into mating receptacle.

NOTE

There is a colored circumferential line (dark band) around the mating receptacle. When this line is covered (no longer visible), and the connectors are firmly seated, the connectors are fully mated.

Aircraft electrical connectors may also have a colored line and may require a different mating procedure. See applicable aircraft manual for instructions.

d. Push in on plug connector. Carefully thread coupling ring onto mating receptacle. Alternately push in on plug connector and hand-tighten coupling ring until plug connector is firmly seated and dark band on mating receptacle is covered (no longer visible).

e. Apply a side-load to plug connector. There will be no movement between the plug connector and receptacle.

H-6. PREFORMED PACKINGS.

Unless otherwise specified, apply a light coat of lubricating oil to packings.

Before installing packings and parts containing packings, lubricate all grooves, lead-in chamfers, bores, and surfaces with lubricating oil.

Wipe off excess oil before assembling parts.

Do not reuse packings that were removed during disassembly. Use new packings at final assembly.

Remove packings by hand if possible. Use the following procedure to remove packings if they are difficult to remove by hand.

CAUTION

Tools can damage packing grooves, causing fuel or oil leaks.

a. Stick a scriber into the packing. Do not touch packing groove with the scriber.

b. Lift packing out of groove.

c. Discard packing.

H-7. WRENCH-ARC METHOD FOR TIGHTENING.

a. The following information applies to all wrench-arc tightening procedures.

(1) Before tightening, be sure that all threads and that all sealing and mating surfaces are clean and free of nicks, burrs, and scratches.

(2) Lubricant used on threads will be the same as that used in the engine oil system. Do not lubricate electrical connectors.

(3) Open-end wrenches with 15° offset angled heads will normally be used for wrench-me tightening.

b. When specified in the assembly or installation procedures, use the following procedures to tighten threaded parts.

NOTE

The snug (no torque) condition is reached when a positive increase in resistance (on the nut) to turning is felt (greater than run-on torque), when parts appear to be properly seated, and when no looseness between mating parts is noted.

(1) Tightening to 15° wrench arc.

(a) Snug the nut.

(b) Place an open-end wrench on nut.

(c) Establish a line of sight using wrench handle.

(d) Use the angular difference between handle and wrench flats (15°) to visually measure amount that the nut will have to be turned.

(e) Turn wrench until flats on nut (engaged by wrench) are alined with line of sight established by handle in step (c).

(2) Alternate method for tightening to 15° wrench arc.

(a) Snug the nut.

(b) Place an open-end wrench on nut.

(c) Use the engaged nut flats to establish a line of sight.

(d) Turn wrench until handle is alined with line of sight,

(3) Tightening to 60° and 120°wrench arc. In this method of tightening, primarily used for tube fittings, the flats on the union are-used as a reference. Wrenches other than open-end wrenches (crowfeet or tubing wrenches) may be used.

(a) Snug the nut.

(b) Use the corners on the coupling nut between the flats on mating union to gage the amount that coupling nut will have to move.

(c) Turn coupling nut 1 flat for 60° wrench arc.

(d) Turn coupling nut 2 flats for 120° wrench arc.

(4) Tightening to 30° wrench arc.

(a) Snug the nut.

(b) Place an open-end wrench on nut.

(c) Note position of wrench handle. (Pick out point of reference on engine in line with handle.)

(d) Invert wrench using the same nut flats. The angular difference between the centerlines of the wrenches in the two positions is 30°.

(e) Turn wrench to position established in step (c).

H-8. ENGINE POWER LOSS, N2 DROOP OR FLAMEOUT.

Check maintenance procedures for OH-58 aircraft when a power loss, N2 droop, or flameout occurs. N2 droop may occur during a normal flight maneuver requiring a rapid increase in power (i.e., rapid collective and/or tail rotor inputs, high G turn, steep turn). If N2 droop occurs, but low RPM warning is not activated and N2 recovers to 103 percent on OH-58A aircraft, and further N2 droop is not experienced, no maintenance action is required.

NOTE

For all maintenance actions noted below, pneumatic line fittings are to be torqued to specified values utilizing a torque wrench. All lines are to be installed so that there is no preload or deformation of the line in accordance with applicable TM's.

a. When a power loss, N2 droop, or flameout occurs (in parameters other than those established in paragraph above), check/inspect to determine the reason/reasons in accordance with the troubleshooting charts in TM 55-2840-231-23 for OH-58A/-700 engine.

b. If the reason/reasons for power degradation cannot be established using the procedures specified in paragraph above, request assistance horn AVIM maintenance and proceed with the maintenance actions noted in paragraphs (1) through (4) below. If this is a recurrence of power degradation on this aircraft/engine and the maintenance actions listed below have been complied within the last 100 flying hours, replace the engine.

(1) Recheck engine throttle controls for proper rigging. Check the throttle angle on the fuel control at the idle detent for the pilot's and copilot's twist grip and physical contact with minimum and maximum stops. Maximum allowable variation between the pilot's and copilot's twist grip is 5/64 inch as measured on the fuel control sector at idle. Re-rig controls if not within specifications in accordance with TM 55-1520-228-23 and TM 55-2840-231-23 for OH-58A aircraft.

(2) Remove engine fuel and pneumatic lines. Inspect fittings and lines for cracks, chafing, scratches/dents and improper seating on sealing surfaces. Inspect for contamination. Clean all lines in accordance with applicable technical manuals. Reinstall pneumatic lines and filter. Leak check pneumatic system in accordance with TM 55-2840-231-28.

(3) Remove all hoses, fittings and valves including shut-off valve from the fuel boost pump to the engine. Clean and inspect for damage and restrictions in accordance with TM 55-1520-228-23. Reinstall or replace as applicable. Bleed the fuel system in accordance with the appropriate technical manual. With the aircraft fuel shutoff valve open, start the fuel boost pump and check all accessible fuel line connections and fittings outside the fuel cell for leakage, inspect and lubricate starter generator splines. Check calibration of dual tachometer (N2 and rotor RPM).

(4) Check main and tail rotor systems for proper rigging and pitch angle, and re-rig as necessary.

c. If the reason/reasons for power degradation cannot be established using the procedures specified in paragraphs a. and b. above, replace the fuel control governor and double check valve (unless replaced in para a. above). Perform deceleration check, if satisfactory, perform test flight in accordance with established procedures.

d. Aircraft are restricted from NOE contour, low level, and night flight for 10 hours after completion of the preceding procedures and must be flown at an altitude to allow safe autorotation as defined in TM 55-1520-228-10 or TM 55-1520-235-10 charts. After completion of the 10-hour restriction, repeat deceleration check. If satisfactory, perform test flight in accordance with established procedures. No further flight restrictions are imposed.

GLOSSARY

This glossary contains abbreviations and definitions of unusual terms found throughout this manual. Section 1 lists abbreviations and the word or phrase from which the abbreviation is derived. Section II contains definitions of unusual terms. Terms are listed alphabetically. Efforts have been made to include terms that may cause disagreement among those using this manual.

Section I. ABBREVIATIONS

APU	Auxiliary Power Unit
cm	Centimeter
cu ft	Cubic Feet
Dia	Diameter
est.	Estimate
FOD	Foreign Object Damage
GPTOT	Gas Producer Turbine Outlet Temperature
ft-lb	Foot-Pound
HIT	Health Indicator Test
in.	Inch
in.-lb	Inch-Pound
kg/m	Kilogram/Meter
l	Liter
lb	Pound
LE	Leading Edge
LH	Left Hand
m	Meter
MAC	Maintenance Allocation Chart
max.	Maximum
min.	Minimum

Section I. ABBREVIATIONS - Continued

mm	Millimeter
OAT	Outside Air Temperature
OD	Outside Diameter
P_a	Ambient Pressure
P_c	Compressor Discharge Pressure
P_g	Governing Reset Pressure
P_o	Control Bypass
P_r	Regulated Air Pressure
Psig	Pound Square Inch Gauge
Pt	Acceleration Billows Pressure
Py	Governor Servo Pressure
P_1	Control Inlet Fuel
P_2	Metered Fuel Flow
QA/QC	Quality Assurance/Quality Control
qt	Quart
R	Radius
RH	Right Hand
SHP	Shaft Horse Power
TE	Trailing Edge
TIR	Total Indicated Reading
TMDE	Test, Measurement and Diagnostic Equipment
TOT	Turbine Outlet Temperature

Section II. DEFINITION OF UNUSUAL TERMS

A

ABRASION - A roughened surface.

ABRASIVE CLOTH - A cloth coated with grit, used for hand cleaning, polishing, removing corrosion and paint, etc. Sometimes referred to as emery cloth.

ACCESSORY - A self-contained unit, mounted on a higher assembly, designed to do a specific job. Fuel pumps, fuel controls and like parts are typical accessories.

ADAPTER - Any device that makes it possible to use parts or pieces of equipment that were not designed to be used together.

ASSEMBLY - A unit normally removed and reassembled as a single item, consisting of accessories and components that operate together for a specific purpose. Typical assemblies are: engine, torque sensor shaft and sleeve assembly, power takeoff assembly.

AVERAGE DIAMETER - A number found by adding several measurements, usually 3 or more, of the same diameter and dividing the sum by the number of measurements taken.

B

BACKLASH - A term used to describe the distance that a working part has to move before it moves its mating part. The motion lost between two connected parts when the direction of motion is changed is also considered backlash. This loss of motion or looseness, is caused by design tolerances or by the wearing of working parts (such as clevis pin in rod-end bearing).

BEND - Distortion in a part.

BLENDING - An operation in which surfaces are worked by hand to produce a smooth surface without abruptly changing its contour.

BREAK - Separation of part.

BUCKLING - A large-scale deformation of the original ‘contour of a part, usually due to pressure or impact from a foreign object, structural stresses, excessive localized heating, high-pressure differentials, or to any combination of these.

BULGE - An area on a sheet metal part that has swelled outward.

BURR - A rough or sharp edge on a hole or comer, usually caused by machining, sometimes by wearing.

C

CALIBRATE - The work done in testing and/or adjusting an instrument or accessory to known standards.

CHIPPING - Breaking away of metallic particles.

COMPONENT - A unit somewhat similar to an accessory in that it is self-contained but differing in that it is designed to control operations. Valves, switches, solenoids, etc., are typical components.

CONFIGURATION - A term referring to the form, shape or contour of a part or parts.

CONTAMINATION (FOREIGN MATERIAL) - Any foreign substance such as metal chips, lint, rust and water that would be harmful to the functioning of a part or system.

CORROSION - A mass of small pits which cumulatively create a large cavity (usually shallow) in the surface of the parent metal.

CRACK - Parting of parent metal.

D

DEFECT - A general term covering any flaw affecting the usefulness or serviceability of a part.

DENT - A completely smooth surface depression caused by pressure or impact from a smooth ball-like foreign object. The parent material is displaced, but usually none is separated.

DESICCANT - A drying agent; usually place in containers, along with parts being stored, to absorb moisture and prevent rusting.

DIAMETER - The length of a chord passing through the center of a circle.

DISCOLORATION - The change in color of a surface, which usually becomes darker. Usually caused by heat or buildup of varnish film.

DISTORTION - Twisting or bending out of a normal, natural or original shape, usually caused from being exposed to excessive pressure or temperature either when restrained or unrestrained.

E

EROSION - The clearing away of metal.

F

FIT - The amount of tightness or looseness between mating parts when assembled together.

FLAKING - Breaking away of paint or plate.

FLUSH - A shop term used in describing two surfaces that are even with each other. The term is also used to describe the washing or cleaning of chips or dirt by pressure flushing.

FOREIGN MATERIAL - See CONTAMINATION.

FOREIGN OBJECT - Any object such as a tool, piece of equipment, engine part (nut, bolt, lockwire) that could in any way damage the engine.

FRAYING - Wearing or rubbing of areas, generally used in reference to darnage on wire-braid covering (of Teflon hose) or on thermocouple harnesses.

FRETTING - Wearing away of metal by rubbing against another metal (generally associated with press fit or close fitting parts).

G

GAP - An opening or space; a break in continuity.

GLAZING - A hard, glossy surface.

GOUGE - A wide rough scratch or group of scratches, usually with one or more sharply impressed corners, and frequently accompanied by deformation or removal of parent material.

GROOVE - A long narrow, continuous cavity or impression caused by pressure of a moving surface in contact with the parent material.

I

INDICATIONS - Surface defect, not necessarily a crack.

INTERFERENCE - Anything that prevents a part, component, etc. from being assembled or disassembled.

L

LAPPING - Smoothing or polishing two surfaces, with or without abrasives, to a high degree of accuracy.

LEAK - The entering, escaping or by-passing (contrary to intention) of liquids or gases from their normal passage or containment, usually caused by a hole or improper sealing. The act of leaking is called leakage and the measurement of leakage is called leakage rate.

LOOSE - Abnormal movement of a part.

M

MATCHED - Fitted together or made suitable to be fitted together.

MATING SURFACES - Two surfaces that join or fit together.

N

NICK - A surface impression with sharp comers or bottom, usually caused by pressure or impact from a sharp-edged foreign body. The parent material is displaced but usually none is separated.

NOISY - An abnormal sound condition of moving parts, usually an increase in volume or a change of pitch.

P

PEENING - Surface deformation.

PICKUP - Transfer of one material onto another.

PIT'TING - Very shallow depressions in a surface, usually caused by chemical reaction, (rusting chemical corrosion).

S

SCORING - Multiple scratches, usually parallel and resulting from the same cause.

SCRATCH - A long, narrow sharp-cornered impression caused by the movement of a sharp object across the surface of the parent material.

SETUP - A general term used to describe the work done in setting up tools, fixtures, etc. to do a specific job.

T

TEAR - A forcible, somewhat crude pulling or wrenching away of material so that ragged or irregular edges result.

TOLERANCE - The range of variation allowed in maintaining a specified dimension in making a part.

TORQUE - To tighten a nut, bolt, or fitting, using a torque wrench, to a specified value expressed as inch-pounds or as foot-pounds.

TOTAL INDICATOR READING (TIR) - Is the total movement of the pointer of an indicator when measuring the amount of out-of-roundness, out-of-flatness or other deviations of a part.

U

UNBALANCE - Unequal distribution of weight about the axis of rotation; usually results in vibration.

W

WARPED - Not true to an established plane or line; out of true shape.

WEAR - Relatively slow removal of parent material from any cause, frequently not visible to the naked eye.

WELD - Metal fused by heating, with or without pressure applied, with or without using filler material.

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ALPHABETICAL INDEX - Continued

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PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
6	2-1 a			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.
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

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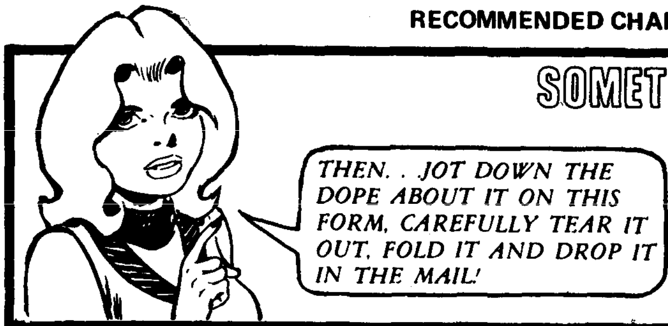

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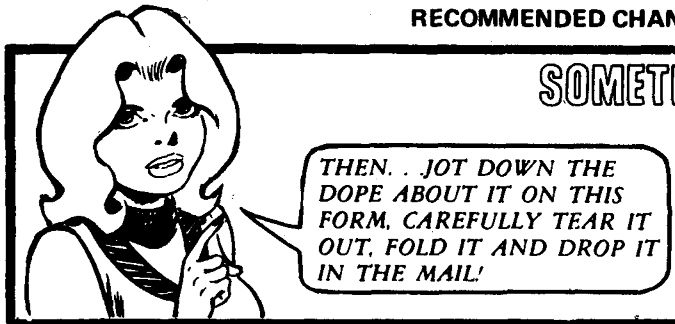

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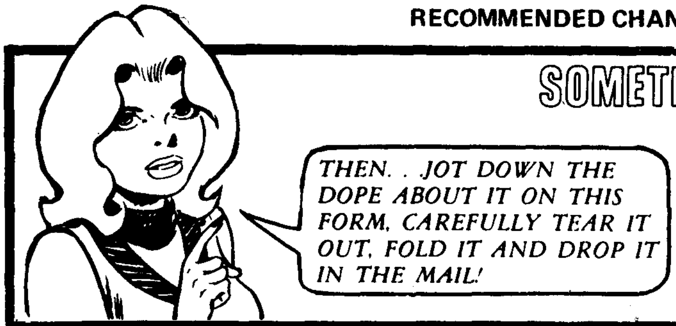

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The Metric System and Equivalents

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 milliters = .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*
inches	centimeters	2.540
feet	meters	.305
yards	meters	.914
miles	kilometers	1.609
square inches	square centimeters	6.451
square feet	square meters	.093
square yards	square meters	.836
square miles	square kilometers	2.590
acres	square hectometers	.405
cubic feet	cubic meters	.028
cubic yards	cubic meters	.765
fluid ounces	milliliters	29,573
pints	liters	.473
quarts	liters	.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	.454
short tons	metric tons	.907
pound-feet	newton-meters	1.365
pound-inches	mewton-meters	.11375

To change	To	*Multiply by*
ounce-inches	newton. meters	
centimeters	inches	.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	.621
square centimeters	square inches	.155
square meters	square feet	10.764
square meters	square yards	1.196
square kilometers	square miles	.386
square hectometers	acres	2.471
cubic meters	cubic feet	35.315
cubic meters	cubic yards	1.308
milliliters	fluid ounces	.034
liters	pints	2.113
liters	quarts	1.057
liters	gallons	.264
grams	ounces	.035
kilograms	pounds	2.205
metric tons	short tons	1.102

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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