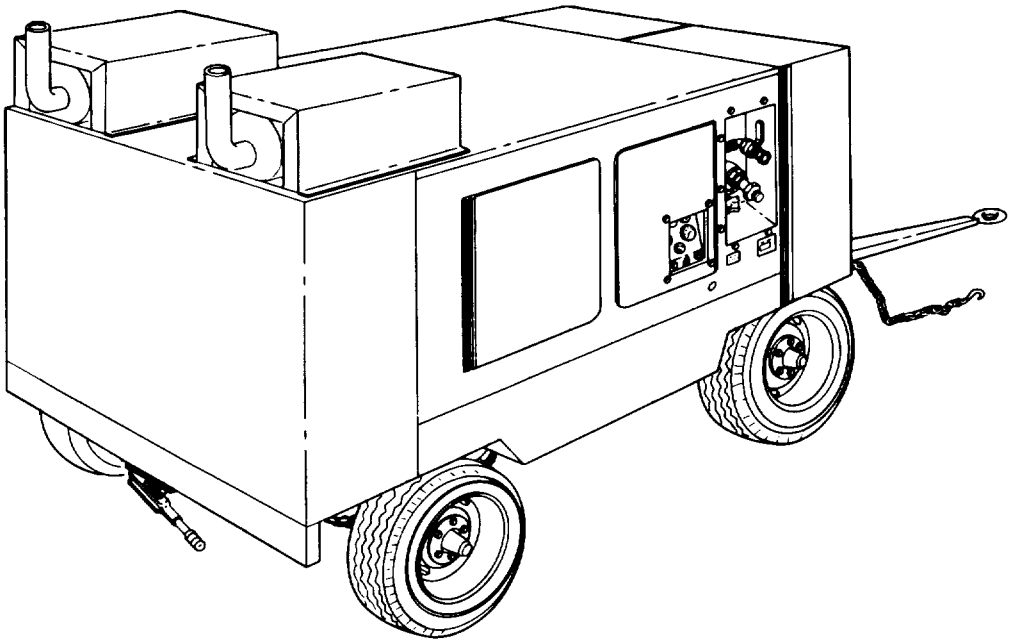
TECHNICAL MANUAL
OPERATOR'S, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL
FOR
COMPRESSOR, AIR: ROTARY SCREW, 750 CFM, 100 PSI , WHEEL-MOUNTED, DED
SULLAIR MODEL 750 DP
(NSN 4310-01-053-3891)



This manual and TM 5-4310-451-24P supersede TM 5-4310-451-14&P, dated 14 December 1979, and all changes.

Approved for public release; distribution Is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1993

FOR INFORMATION ON FIRST AID, REFER TO FM 21-11.

WARNING

CARBON MONOXIDE EXHAUST GASES CAN KILL!

Carbon monoxide is colorless, odorless, deadly poisonous gas, which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air containing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death can result from severe exposure.

Carbon monoxide occurs in exhaust fumes of internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to ensure safety of personnel when engine is operated for any purpose.

(1) DO NOT operate engine in enclosed areas.
(2) DO NOT idle engine without ventilator blower operating.
(3) BE ALERT at all times for exhaust odors.
(4) BE ALERT for exhaust poisoning symptoms. They are:
- Headache
- Dizziness
- Sleepiness
- Loss of muscular control

(5) If you see another person with exhaust poisoning symptoms:
- Remove person from area
- Expose to fresh air
- Keep person warm
- DO NOT permit physical exercise
- Administer artificial respiration, if necessary
- Notify a medic

(6) BE AWARE: The field protective mask for chemical-biological-radiological (CBR) protection will not protect you from carbon monoxide poisoning.

The Best Defense Against Carbon Monoxide Poisoning Is Good Ventilation.

WARNING

ASBESTOS HAZARD

DO NOT handle brakeshoes, brakedrums, or other brake components unless area has been properly cleaned. There may be asbestos dust on these components which can be dangerous if you touch it or breathe it. Wear an approved filter mask and gloves. Never use compressed air or a dry brush to clean brake components. Dust may be removed using an industrial-type vacuum cleaner. Clean dust or mud away from brake components with water and a wet, soft brush or cloth. Failure to follow this warning may result in serious illness or death to personnel.

WARNING

COMPRESSED AIR

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid injury to personnel.

WARNING

DRY CLEANING SOLVENT

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (380C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

WARNING

LIVE STEAM

Avoid contact with live steam. Live seam can bum skin, cause blindness, and cause other serious injury. Be sure to wear protective apron, gloves, and safety goggles when using live steam.

WARNING

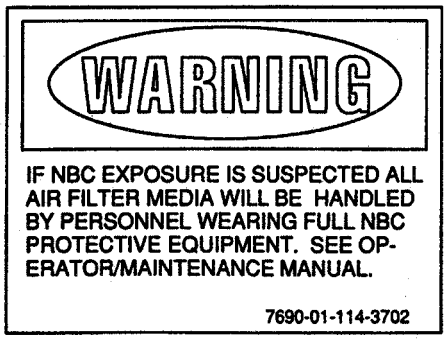
STORAGE BATTERIES

- Remove all jewelry such as dog tags, rings, bracelets, etc. If jewelry or disconnected battery ground cable battery terminal, a direct short will result, causing serious injury or death to personnel.
- Battery acid (electrolyte) is extremely dangerous. Always wear goggles and rubber gloves when performing checks or inspections. Serious injury to personnel will result if battery acid contacts skin or eyes.
- DO NOT perform battery system checks or inspections while smoking or near fire, flames, or sparks. Batteries may explode, causing serious injury or death to personnel.

WARNING

NBC EXPOSURE

If NBC exposure is suspected, all engine air cleaner air filter media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures. Failure to follow this warning may result in serious injury or death to personnel.



To order this NBC decal use:
National Stock Number (NSN) - 7690-01-114-3702
Part Number (PN) - 12296626
Commercial and Government Entity Code (CAGEC) - 19207

WARNING

NOISE

Always wear ear plugs or other types of hearing protection while engine is running. Damage to hearing will occur without protection.

WARNING

SPRAY GUN

Never aim the spray gun at any person or part of the body. Pressure is strong enough to puncture skin and cause serious injury to personnel.

c/(d Blank)

TECHNICAL MANUAL
TM 5 431W-451-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C., 3 May 1993

OPERATOR'S, UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

FOR
COMPRESSOR, AIR: ROTARY SCREW, 750 CFM,
100 PSI, WHEEL-MOUNTED, DED
SULLAIR MODEL 750 DP
(NSN 4310-01-053-3891)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual, direct to: Commander, U.S. Army Tank-Automotive Command, ATTN: AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

TABLE OF CONTENTS

* This manual and TM 5-4310-451-24P supersede TM 9-4310-451-14&P, dated 14 December 1979, and all changes.

TABLE OF CONTENTS (Con't)

TABLE OF CONTENTS (Con't)

HOW TO USE THIS MANUAL

This manual is designed to help maintain the Sullair Model 750 DP, 750 CFM Air Compressor Unit. It describes in detail the Operator/Crew, Unit, Direct Support, and General Support Maintenance prescribed by the Maintenance Allocation Chart (see Appendix B) and the Source, Maintenance, and Recoverability (SMR) Codes (see TM 5-4310-451-24P).

FEATURES OF THIS MANUAL:

- Bleed-to-edge indicators on the cover and on the edge of the applicable manual pages provide quick access to chapter and sections most often used.
- A table of contents Is provided for all chapters, sections, and appendices.
- WARNINGs, CAUTIONs, and NOTEs, subject headings, and other important information are highlighted in bold print as a visual aid.
- Statements and words of particular importance are printed in capital letters to create emphasis.
- Instructions are located together with illustrations that show the specific task on which the maintainer is working.
- Equipment locator illustrations are provided throughout the maintenance procedures. These illustrations are for use in locating components and assemblies of the overall equipment. It should be noted that the locator illustrations do not always reflect the equipment condition listed in the initial setup at the beginning of each task.
- An alphabetical index is provided at the end of the manual to assist in locating information not readily found in the table of contents.
- Technical instructions Include metric In addition to standard units. A metric conversion chart is provided on the Inside back cover.
- A standard torque chart is provided at Appendix G.

FOLLOW THESE GUIDELINES WHEN YOU USE THE MANUAL:

- The maintainer should read through this manual and become familiar with its contents before proceeding to specific maintenance tasks.
- A warning summary is provided at the beginning of this manual and should be read before performing any maintenance tasks.
- In the actual maintenance tasks, follow all WARNINGs, CAUTION s, and NOTEs. These are given immediately preceding the procedural steps to which they apply. If these instructions are not followed or care is not taken, Injury to personnel or equipment damage may result.
- Within a chapter, section, or paragraph, headings are used to help group the material and assist in quickly finding tasks. Read all preliminary information found at the beginning of each task. After completing a task, ALWAYS perform the follow-on maintenance at the end of the task.
- A subject index is located at the beginning of each section to help you find the exact paragraph you need.

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

This manual describes the operation and Unit, Direct Support, and General Support Maintenance for the 750 CFM Air Compressor Unit.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Form 738-750, The Army Maintenance Management System (TAMMS).

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

For destruction of Army materiel to prevent enemy use, refer to TM 750-244-3.

1-4. PREPARATION FOR STORAGE OR SHIPMENT.

For information on preparing the 750 CFM Air Compressor Unit for storage or shipment, refer to Chapter 4, Section XXII.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs).

If your air compressor unit needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF Form 368 (Product Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Tank-Automotive Command, ATTN: AMSTA-MP, Warren, Ml 48397-5000. We will send you a reply.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-6. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

a. The 750 CFM Air Compressor Unit Is designed to operate rock drilling equipment and pneumatic tool outfits In engineering construction units.

b. The air compressor unit is equipped with:

(1) Sound deadening Insulation to reduce noise emission. Hearing protection Is still required.

(2) Emergency stop control which allows operator to quickly shut down air compressor In case of emergency.

(3) An ether starting aid kit used to assist in engine starting.

(4) Cold start valve provided for cold weather starting.

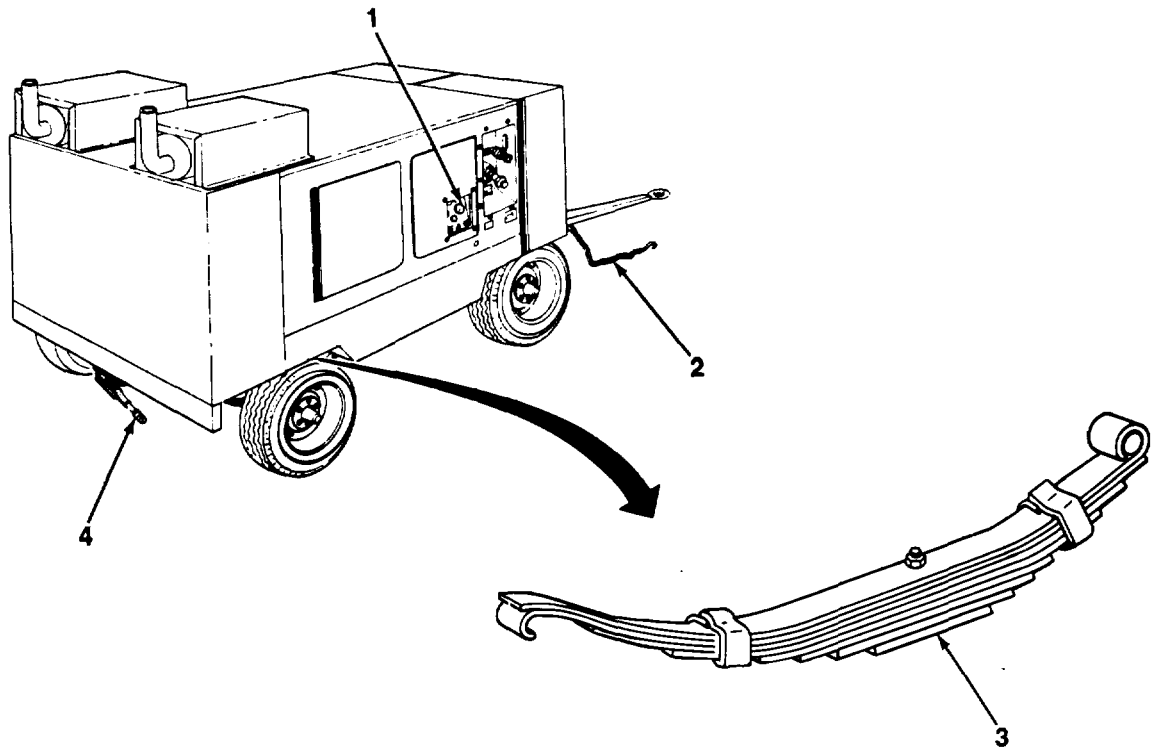
(5) Manually operated handbrake lever used to secure the air compressor unit when stopped or parked.

(6) An Industrial engine designed to provide enough horsepower for more than adequate reserve at rated conditions.

(7) A 24-volt electrical system.

(8) Leaf spring suspension to absorb road shock.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.



Key	Component	Description
1	Control Panel	Provides the necessary controls to safely operate and monitor the engine and air compressor assembly.
2	Safety Chains	Hook to towing vehicle to prevent the air compressor unit from fully breaking away.
3	Leaf Spring	Component of suspension system which serves to cushion road shock; located at each wheel.
4	Handbrake Lever	Activates handbrake when air compressor unit is stopped or parked.

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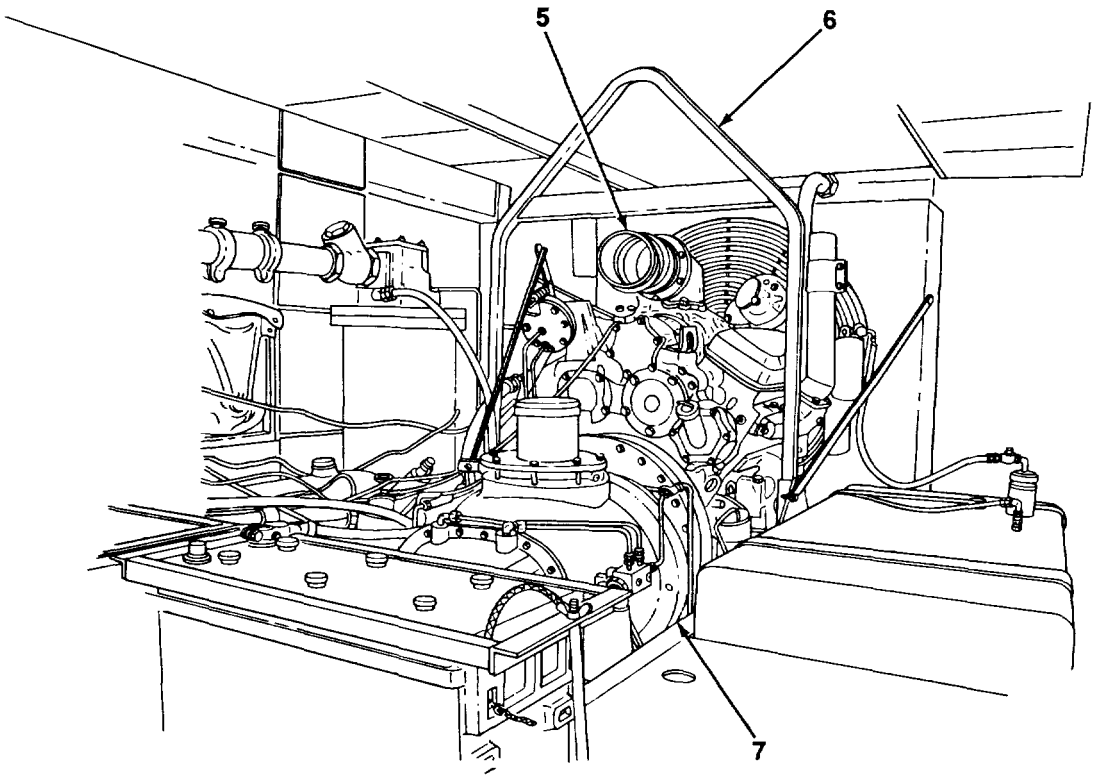
1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Con't).



Key	Component	Description
5	Engine	Provides power to drive the air compressor.
6	Lifting Bail	Allows for lifting of air compressor unit.
7	Air Compressor	Engine-driven to compress air to 750 cfm (354 l/sec).

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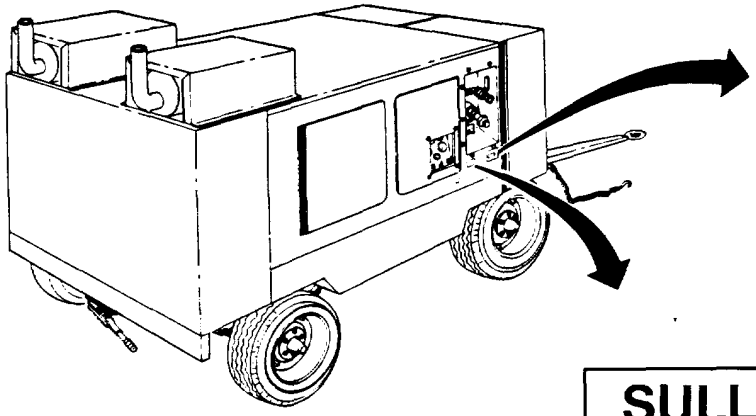
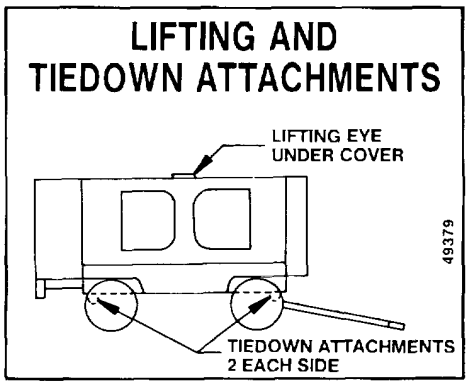
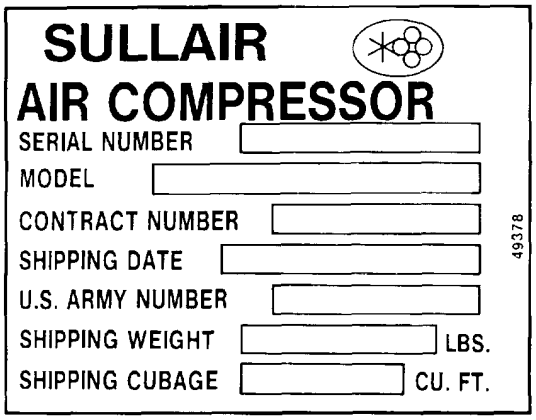
1-8. LOCATION AND CONTENTS OF DATA PLATES.

The following illustrations show the location and contents of all air compressor unit data plates.







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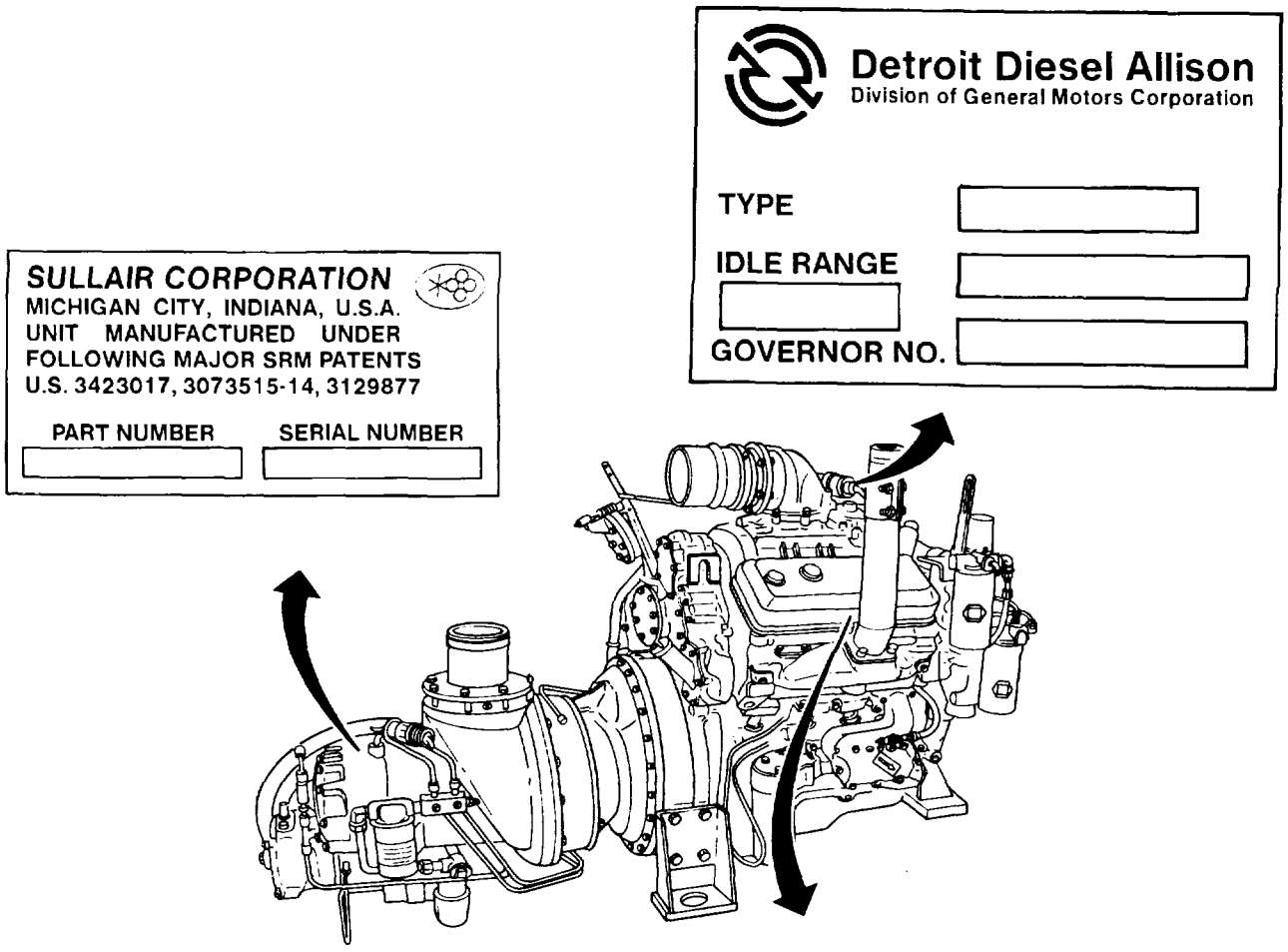
1-8. LOCATION AND CONTENTS OF DATA PLATES (Con't).



TYPE	EQUIPMENT	TYPE	EQUIPMENT	TYPE	EQUIPMENT	TYPE	EQUIPMENT
103	AIR BOX DRAIN	32	ENG LIFT BKT	188	F/W HOUSING	83	FLYWHEEL
164	OIL PAN	131	OIL PUMP	10	OIL PRESS REG	438	OIL DIST
47	OIL FIL TUBE	572	OIL COOLER	348	DIPSTICK	204	OIL FILTER
291	VENT SYSTEM	44	BAL WT COVER	1282	FAN	139	C/S PULLEY
206	C/S PUL BELT	74	THERMOSTAT	229	EXH MFLD	126	FUEL PUMP
97	INJECTOR N65	338	FUEL FILTER	1213	FUEL LINES	258	AIR INLT HSG
241	INJECTOR CONT	1054	GOVERNOR MECH	333	ROCKER COVER	1825	BATT CHRG GEN
35	STARTING MTR	234	MUFFLER CONN	NONE	INSTRUMENTS	1	TACH DRIVE
					GOV'T WARRANTY		MAX RPM NL 02275 ADV GT-ADV CA4

UNIT 6VA107519 MODEL 70637000

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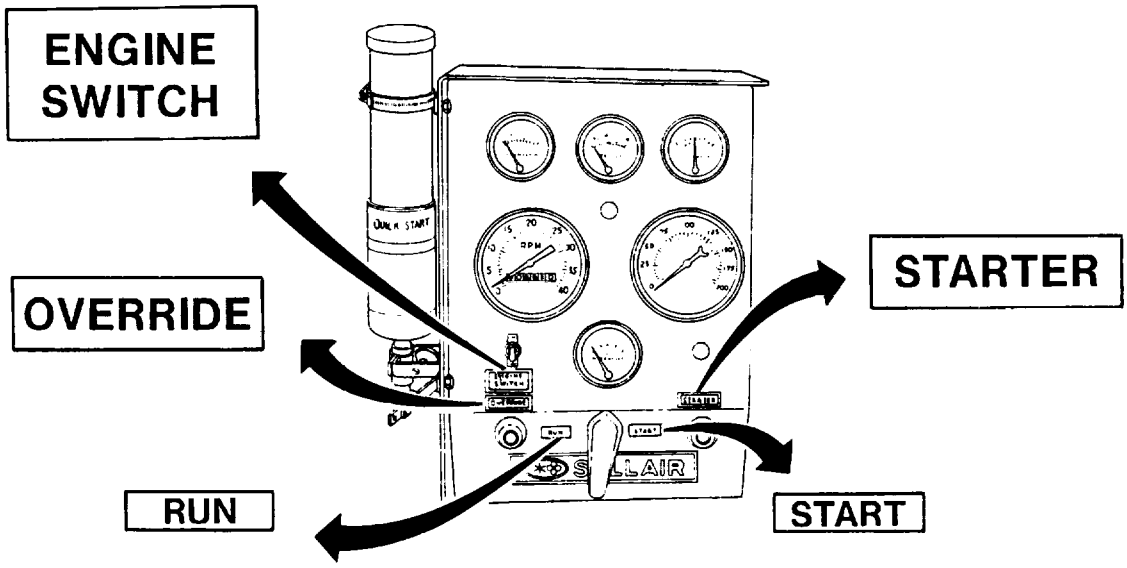
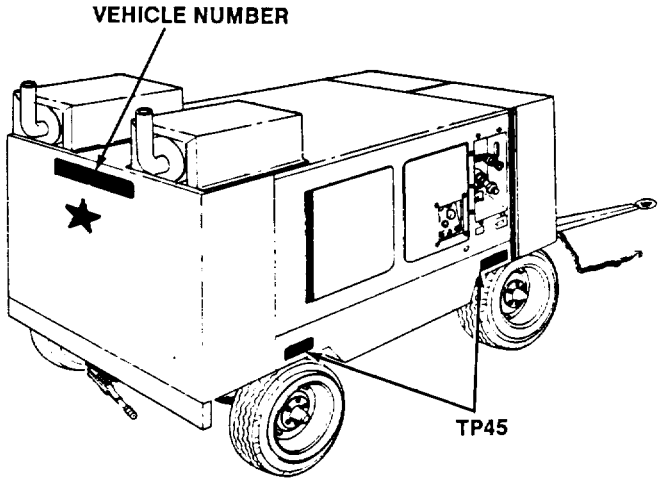
1-8. LOCATION AND CONTENTS OF DATA PLATES (Con't).



1-9. LOCATION AND CONTENTS OF STENCIL MARKINGS.



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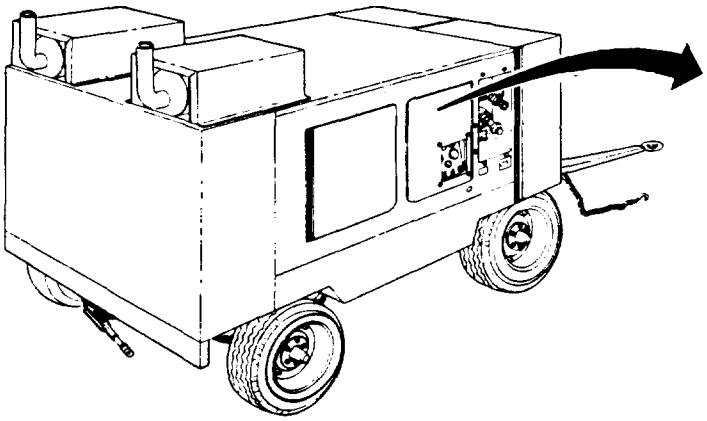
1-10. LOCATION AND CONTENTS OF DECALS.

The following illustrations show the location and contents of all air compressor unit decals.



OPERATION AND MAINTENANCE INSTRUCTIONS

SULLAIR QUIET PORTABLE COMPRESSORS

OPERATION

TO START:

1. CHECK ENGINE OIL, ENGINE COOLANT, FUEL AND COMPRESSOR OIL LEVELS.
2. CLOSE AND LATCH ALL DOORS EXCEPT INSTRUMENT PANEL DOOR.
3. CLOSE ALL SERVICE VALVES AND TURN 3-WAY VALVE TO "START" POSITION.
4. IN COLD WEATHER USE STARTING AID PER INSTRUCTIONS PRINTED ON STARTING AID DEVICE, IF INSTALLED.
5. TURN ENGINE SWITCH TO "ON" POSITION.
6. PUSH CIRCUIT OVERRIDE BUTTON AND HOLD IN.
7. PUSH STARTER BUTTON AND HOLD IN UNTIL ENGINE STARTS (MAX. 15 SECONDS).
8. RELEASE CIRCUIT OVERRIDE BUTTON WHEN ENGINE OIL PRESSURE REACHES 20 P.S.I.
9. CLOSE INSTRUMENT PANEL DOOR AND OBSERVE GAUGES THROUGH INSTRUMENT PANEL WINDOW.
10. WHEN ENGINE WATER TEMPERATURE REACHES 130 F (54 C), OPENDOOR AND TURN 3-WAY VALVE TO "RUN" POSITION.
11. CLOSE AND LATCH INSTRUMENT PANEL DOOR. MACHINE IS NOW READY FOR FULL LOAD OPERATION.

TO STOP:

1. CLOSE ALL SERVICE VALVES AND ALLOW MACHINE TO OPERATE AT IDLE FOR SEVERAL MINUTES.
2. OPEN INSTRUMENT PANEL DOOR AND TURN ENGINE SWITCH TO "OFF" POSITION.
3. ON G.M. DIESEL ENGINES, IF MACHINE FAILS TO STOP, PULL EMERGENCY STOP CABLE. RECTIFY CAUSE OF ABNORMAL SHUTDOWN AND RESET THE BLOWER INLET FLAP PRIOR TO RESTARTING.

MAINTENANCE

REFER TO MANUALS FOR MORE DETAILED INSTRUCTIONS

AS REQUIRED

SERVICE AIR FILTER AND FUEL STRAINER FILTERS

100 HOURS

CHANGE ENGINE OIL & FILTER
CHECK BATTERY ELECTROLYTE
LUBRICATE CONTROL LINKAGE

500 HOURS

CHANGE COMPRESSOR OIL AND FILTERS
DRAIN FUEL TANK MOISTURE

1000 HOURS

LUBRICATE CHASSIS AND WHEEL BEARINGS
CLEAN AND FLUSH RADIATOR AND ADD RUST INHIBITOR OR PERMANENT ANTI-FREEZE

ENGINE OIL

REFER TO ENGINE OPERATORS MANUAL FOR LUBRICATING OIL RECOMMENDATIONS

COMPRESSOR OIL

REFER TO SULLAIR OPERATORS MANUAL FOR COMPRESSOR LUBRICATING OIL RECOMMENDATIONS

NOTE:

FOR OPERATING AT AMBIENTS BELOW 0 F(-17.7 C) CONTACT THE FACTORY FOR SPECIAL LUBRICATING OIL RECOMMENDATIONS

(Located on Inside of Door)

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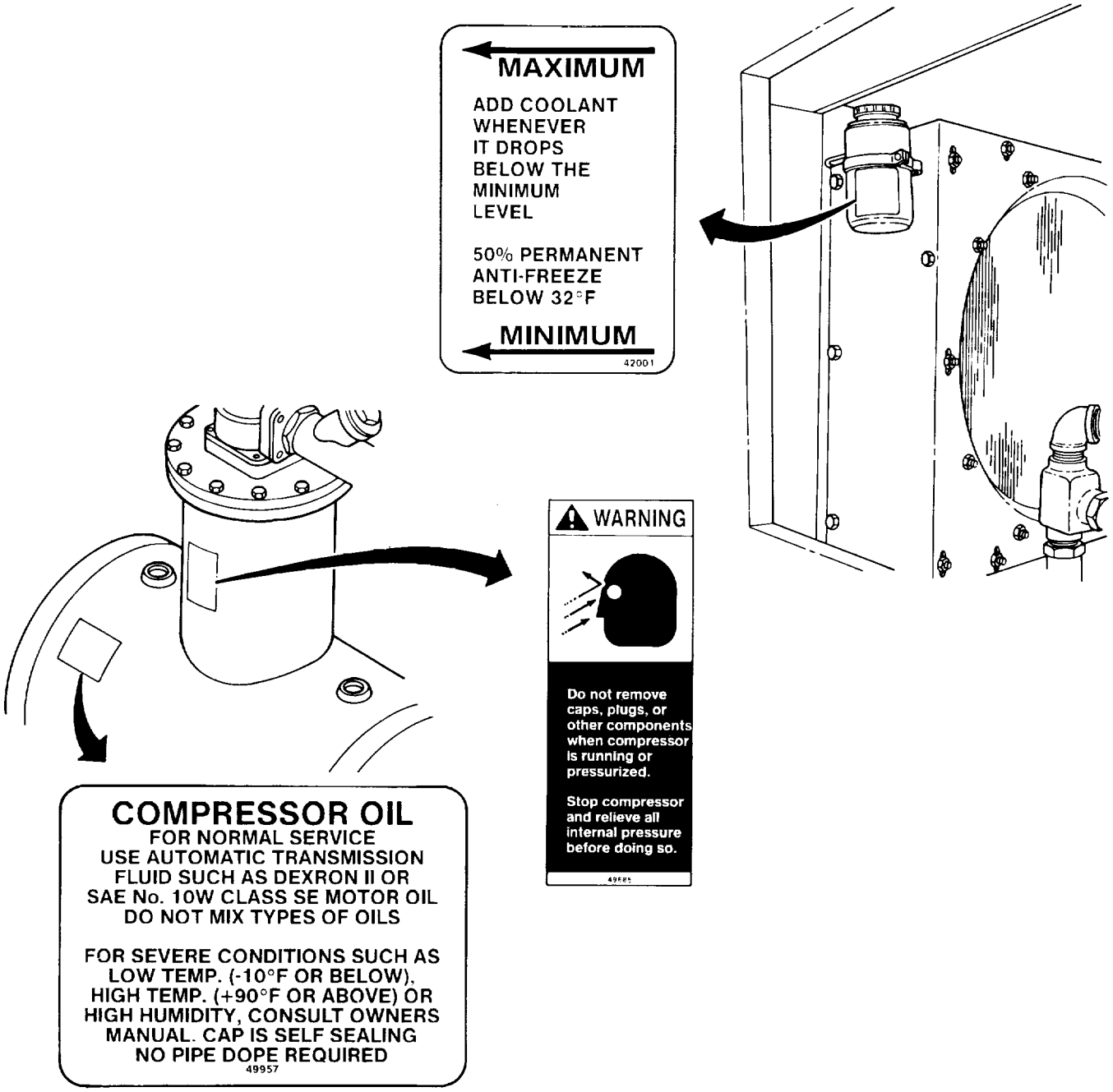
1-10. LOCATION AND CONTENTS OF DECALS (Con't).



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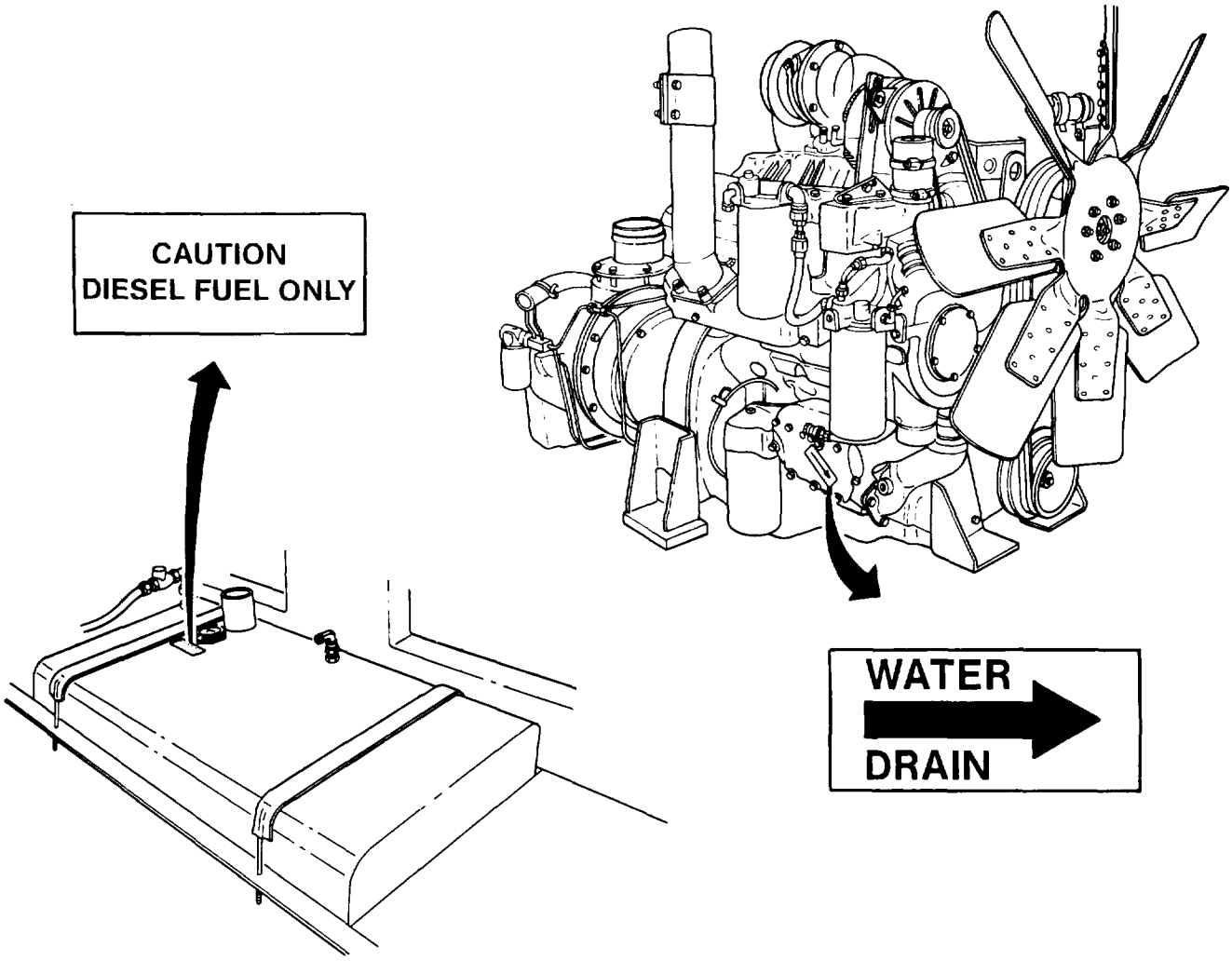
1-10. LOCATION AND CONTENTS OF DECALS (Con't).



1-11. EQUIPMENT DATA.

General	
Height (Over Mufflers)	109.5 in. (278.1 cm)
Width	90.0 in. (228.6 cm)
Length (Including Drawbar)	181.5 in. (461.0 cm)
Wheel Base Width	68.0 in. (172.7 cm)
Weight:	
Dry	10,730 lb (4871 kg)
Gross	11,000 lb (4994 kg)
Electrical System:	
Voltage	24 volts
Battery	Amp/Hr @ 20 Hr Rate

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1-11. EQUIPMENT DATA (Con't).

Electrical System (Con't):	
Alternator	65 amp
Wheels:	
Quantity	4
Rim Size	16 X 5.50
Number of Stud Holes	6
Wheel Bolt Torque	80-90 lb.-ft. (108-122 N.m)
Tires:	
Quantity	4
Size	7.50 X 16LT Load Range D
Inflation	45 ps (310 kPa)
Air Compressor Assembly.	
Manufacturer	Sullair Corporation
Model	750 DP
Type	Rotary Screw, Oil Flood
Lubrication	
Output	750 cfm (354 l/sec)
Rated Operating Pressure	100 psi (690 kPa)
Maximum Operating Pressure	125 psi (862 kPa)
Operating Tilt (MAX)	15°
Stage	Single
Cooling System	Pressurized Oil
Oil Separator Capacity	30.0 gal. (113.6 1)
Engine	
Manufacturer	Detroit Diesel
Model	6V-71
Type	Diesel, Liquid-cooled
Rated rpm	2100 rpm
Idle rpm	1050 rpm
Horsepower @ 850F (29 C)/500 ft (153 m) Alt	228 hp (170 Kw)
Number of Cylinders	6
Number of Main Bearings	4
Number of Cycles	2
Bore	4.25 in. (10.80 cm)
Stroke	5.0 in. (12.7 cm)
Total Displacement	426 cu in. (6.98 1)
Compression Ratio	18.7 to 1
Lubrication System	Full Pressure Oil
Crankcase Capacity	6.5 gal. (24.6 1)
Fan Belt Tension	60-80 lb (27-36 kg)
Alternator Belt Tension	50-70 lb (23-32 kg)
Radiator Capacity	17.0 gal. (64.3 1)
Fuel Tank Capacity	110.0 gal. (416.4 1)

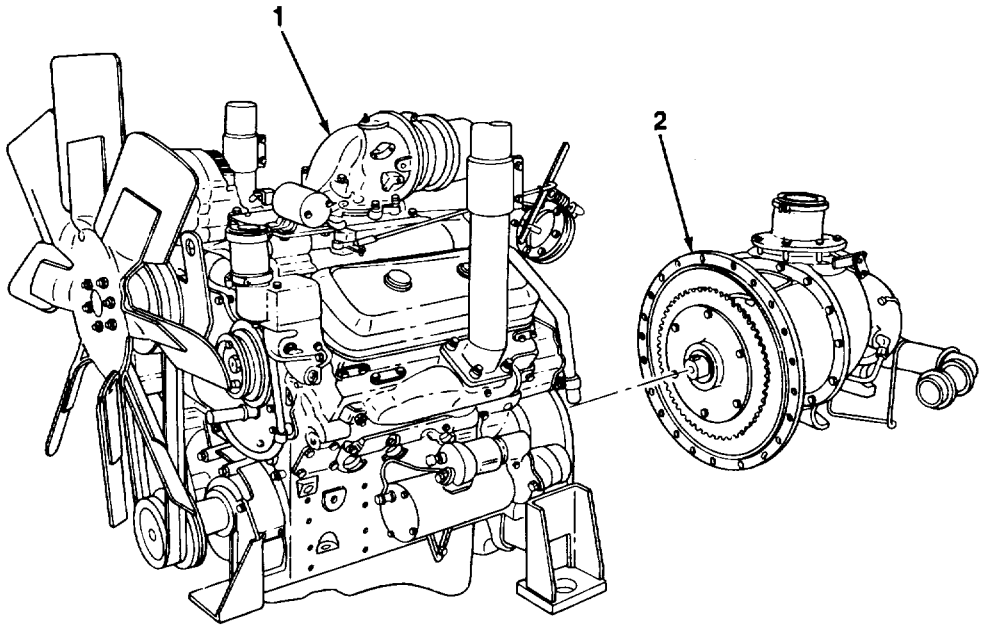
Section III. TECHNICAL PRINCIPLES OF OPERATION

1-12. GENERAL.

a. The air compressor is driven by a liquid-cooled diesel engine.

b. The engine (1) and air compressor assembly (2) are constructed as an integral unit; the air compressor is direct-driven from the engine. The engine and air compressor are enclosed in a housing and carried on a common trailer.

c. The air compressor unit must be level to the ground within 15° when operating at a work site.



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1-13. ENGINE.

The engine for this air compressor unit is a Detroit Diesel, six-cylinder, two-cycle engine. For information on engine technical principles of operation, refer to TM 9-8000.

1-14. AIR COMPRESSOR ASSEMBLY

a. General.

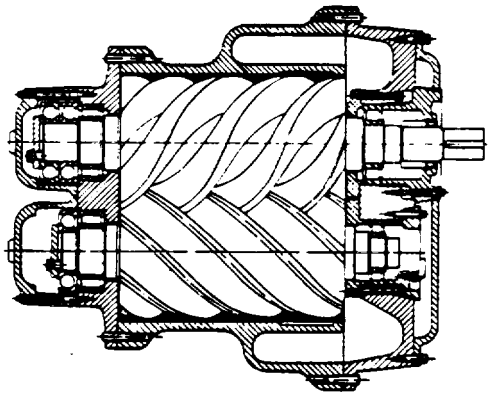
(1) The air compressor assembly is a single stage, positive displacement, flood lubricated type which provides continuous pulse-free compression.

(2) Oil is injected into the air compressor and mixes directly with the air as the rotors turn, compressing the air.

(3) The oil flow has three primary functions:

(a) As a coolant, it controls the rise of air temperature normally associated with the heat of compression.

(b) Seals the leakage paths between the rotors and stator, and also between the rotors them- selves.



TYPICAL CROSS-SECTION

(c) Acts as a lubricating film between the rotors, allowing one rotor to directly drive the other, which acts as an idler.

(4) After the air/oil mixture is discharged from the air compressor, the oil is separated from the air. At this time, the air flows to the service line and the oil is cooled in preparation for reinjection.

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1-14. AIR COMPRESSOR ASSEMBLY (Con't).

b. Cooling and Lubricating System.

(1) The air compressor cooling and lubrication system is designed to provide adequate lubrication as will as maintain the proper operating temperature of the unit.

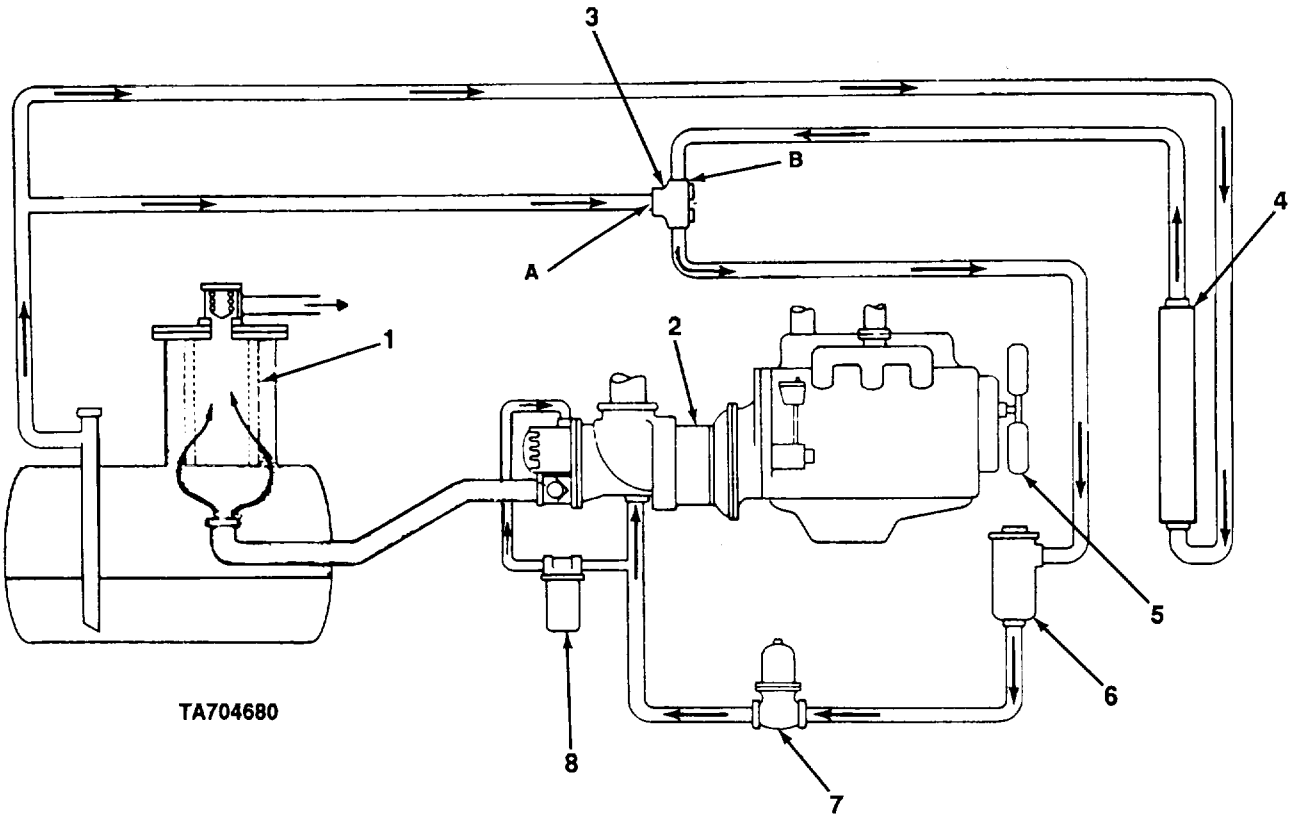
(2) The cooling and lubrication system consists of a main oil filter (6), a thermal valve (3), bearing oil filter (8), and oil stop valve (7), in addition to an oil cooler (4) and fan (5).

(3) Oil is used in the system as a coolant and lubricant. Oil is housed in the oil separator (1). Upon startup of the air compressor assembly, the temperature of the oil is cool and routing to the oil cooler (4) is not necessary. The oil, taking the path of least resistance, flows to the thermal valve (3).

(4) The thermal valve (3) has two entrance ports, A and B, and one exit port. Port A accepts oil from the oil separator (1) and Port B accepts oil from the oil cooler (4).

(5) The oil first enters the thermal valve (3) and then flows on to the air compressor (2), bypassing the oil cooler (4) As the air compressor assembly continues to operate, the temperature of the oil rises and Port A of the thermal valve begins to close. The closing of Port A forces a portion of the oil through the oil cooler. The oil cooler is a radiator-type cooler that works In conjunction with fan (5). The fan forces air through the radiator-tube oil cooler reducing the temperature of the oil. From the oil cooler, the oil is routed back to the thermal valve, entering at Port B.

Before the temperature of the oil becomes high enough to completely close Port A, cooled oil entering at Port B is missed with warmer oil entering at Port A. When the temperature of the oil reaches 1400F (60 C), Port A is completely closed, causing all oil to flow to the oil cooler.



1-14. AIR COMPRESSOR ASSEMBLY (Con't).

(6) After the oil passes through the thermal valve (3), it is directed through the main oil filter (6) where it is filtered. The filter has a replaceable filter element and a built-in bypass valve. The bypass valve allows the oil to flow even when the filter element becomes plugged and requires changing or when viscosity of the oil is too high for adequate flow.

(7) After the oil is properly filtered, it flows through the oil stop valve (7). The oil stop valve functions on shutdown when it shuts off the oil supply to the air compressor (2). The oil stop valve is held open by a pressure signal from the air compressor. At shutdown the pressure signal is lost and the oil stop valve closes, isolating the air compressor from the cooling system.

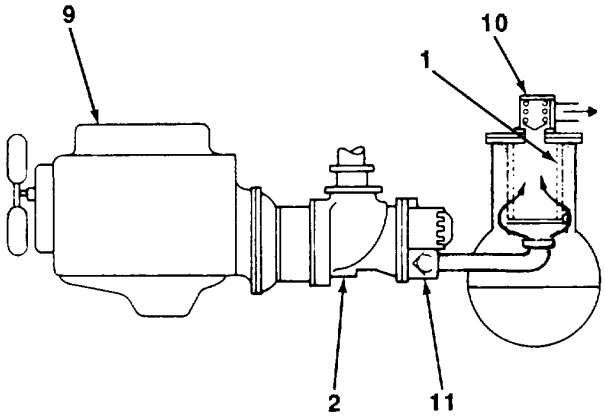
(8) A portion of the oil flowing to the air compressor (2) is routed to a bearing oil filter (8). All oil flowing to the gears, shaft seal, and internal bearings of the air compressor flows through this extra-fine filter ensuring the cleanest possible oil for these components. This filter also has a built-in bypass valve and a replaceable filter element.

c. Discharge System.

(1) The air compressor (2), which uses a separate oil system from the engine (9), discharges a compressed air/oil mixture through a compressor discharge check valve (11) into the oil separator (1). The dis- charge check valve prevents discharged air from returning to the compression chamber after shutdown.

(2) From the compressor discharge check valve (11), the air/oil mixture Is directed to the oil separator (1). The oil separator has three functions:

(a) Acts as a primary oil separator.
(b) Serves as the air compressor oil separator.
(c) Houses the final oil separator.



(3) The compressed air/oil mixture enters the oil separator (1) and is directed against the side wall. By change of direction and reduction of velocity, large droplets of oil fall to the bottom of the oil separator. The small percent of oil remaining in the compressed air collects on the surface of the final separator element as the compressed airflows through the separator. As more and more oil collects on the element surface, the oil descends to the bottom of the oil separator. A return line (or scavenge tube) leads from the bottom of the final separator element of the inlet region of the air compressor (2). Oil collecting on the bottom of the final separator element is returned to the air compressor by the pressure difference between the area surrounding the final separator element and the air compressor inlet. An opening, protected by a strainer, is included in this return line to ensure proper flow.

(4) The oil separator (1) is rated at 150 psi (1034 kPa) working pressure. A minimum pressure valve (10), located downstream from the oil separator, ensures a minimum receiver pressure of 40 psi (276 kPa) during all conditions. This pressure is necessary for proper air/oil separation and proper oil circulation.

(5) A check valve at the outlet of the receiver is installed to prevent compressed air in the service line from bleeding back into the receiver on shutdown when the air compressor unit is being run In parallel with other air compressor units tied to large air system. The check valve is also necessary when the air compressor unit is functioning with a pressure pot sandblasting operation.

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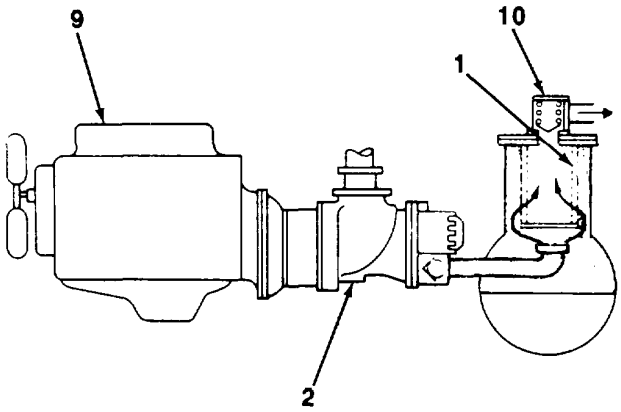
1-14. AIR COMPRESSOR ASSEMBLY (Con't).

(6) A safety relief valve, located within the separator discharge check valve (12), is set to open if the oil separator (1) pressure exceeds 140 psi (965 kPa). A temperature switch will shut down the air compressor unit if the discharge temperature reaches 240°F (116°0C).

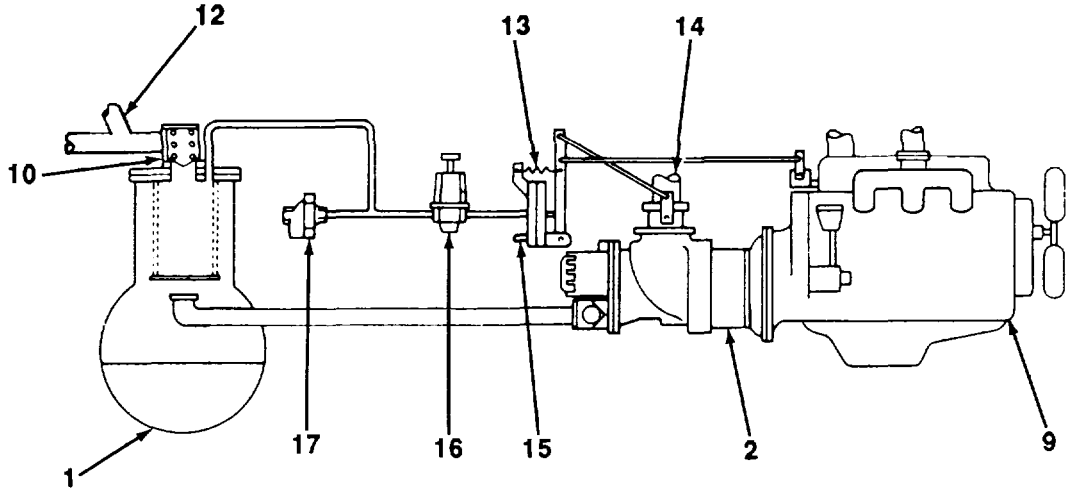
(7) Oil is added to the oil separator (1) through a capped oil filler. An oil level gage enables the operator to visually monitor the oil separator oil level.



d. Control System. The purpose of the control system is to regulate the amount of air intake In accordance with the amount of compressed air being used. The control system consists of a sullicon control (13), pressure regulating valve (16), blowdown valve (17), and link rods which connect the sullicon control to the inlet valve (14) and engine (9) governor.

(1) During startup the pressure regulating valve (16) and the sullicon control (13) are Inoperative. When the air compressor unit is started, the oil separator (1) pressure will quickly rise from 0 to 40 psi (0 to 276 kPa). The spring on the sulllcon control holds the butterfly valve fully open and the air compressor assembly operates at full rated capacity. As the air compressor assembly operates at full capacity, the engine (9) runs at full speed. The rising oil separator pressure is Isolated from the service line by the minimum pressure valve (10) which is set at approximately 40 psi (276 kPa).

(2) When the oil separator (1) pressure rises above 40 psi (276 kPa), the minimum pressure valve (10) opens and delivers compressed air to the service line. The sullicon control (13) remains inoperative, holding the inlet valve (14) fully open for maximum air output. The engine (9) will continue to run at full speed.



1-14. AIR COMPRESSOR ASSEMBLY (Con't).

(3) If less than the rated capacity of air is required, the service line pressure will rise above 100 psi (690 kPa). The pressure regulating valve (16) gradually opens, applying pressure to the diaphragms on the sullicon control (13). This causes the sullicon control to partially close the inlet valve (14) and reduce the speed of the engine (9). As the pressure increases, the sullicon control will further close the inlet valve and continue reducing the engine speed until it reaches loaded speed. The sullicon control has an opening (15) in its cover which vents a small amount of air to the atmosphere when the pressure regulating valve is open. This allows the sullicon control to vary air output matching air demand. The opening also bleeds any accumulated moisture from the sullicon control. The air compressor assembly will continue to run in this manner until air demand increases. As air demand increases, pressure in the oil separator (1) will fall below 100 psi (690 kPa). The pressure regulating valve will close, the inlet valve will be fully open, and the engine will once again run at full speed.

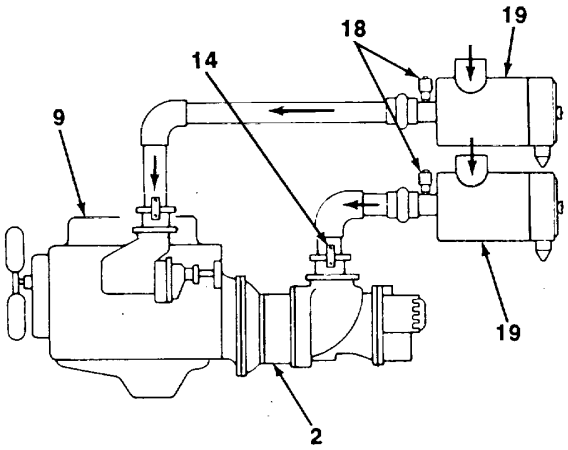
(4) The blowdown valve (17) is held closed by a pressure signal from the air compressor (2). Upon shutdown, the pressure signal is lost and the blowdown valve opens venting oil separator pressure to the atmosphere.

e. <u>Air Inlet System</u>.

(1) The air inlet system consists of two air cleaners (19) and restriction indicators (18), an air inlet valve (14), and interconnecting piping to the engine (9) and air compressor assembly.

(2) The air inlet valve (14) controls the amount of air intake to the air compressor (2) in response to the operation of the sullicon control (see subpara graph d).

(3) The air cleaners (19) are three-stage dry element type filters. These filters are capable of cleaning extremely dirty air; however, in such cases more frequent checks of the restriction Indicators (18) will be required. The restriction indicator will be red when restriction of air passing through the air cleaner becomes too high.



f. Instrument Panel Group. The instrument panel group consists of a panel containing an engine coolant temperature gage, engine oil pressure gage, air pressure gage, air compressor discharge temperature gage, ammeter, tach/hourmeter, ON/OFF engine switch, engine start button, override button, emergency stop control which is located on the outside just below the instrument panel window, a cold start valve, fuse, and ether starting aid kit.

g. Electrical System.

(1) Refer to the wiring diagram in paragraph 4-61 for the location of major components of the electrical system.

(2) The electrical system is comprised of not only the necessary equipment required to operate the air compressor unit, but also a system to shut down the air compressor unit in the event of a malfunction.

(3) The components of the electrical system are:

(a) Engine starter with an integral solenoid.

(b) Two batteries.

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1-14. AIR COMPRESSOR ASSEMBLY (Con't).

(c) Alternator with built-in voltage regulator.
(d) Governor control solenoid.
(e) Air compressor discharge temperature switch which will shut down the air compressor if air compressor temperature exceeds 240°F (116°C).
(f) Engine coolant temperature switch set to shut down air compressor unit when coolant temperature exceeds 2100F (990C).
(g) Engine oil pressure switch provided to shut down air compressor unit when engine oil pressure becomes insufficient. When starting the air compressor unit, it is necessary to override or bypass the engine oil pressure switch by pressing the override button on the instrument panel until oil pressure throughout the system Is high enough to close the switch and complete the circuit to the governor control solenoid.

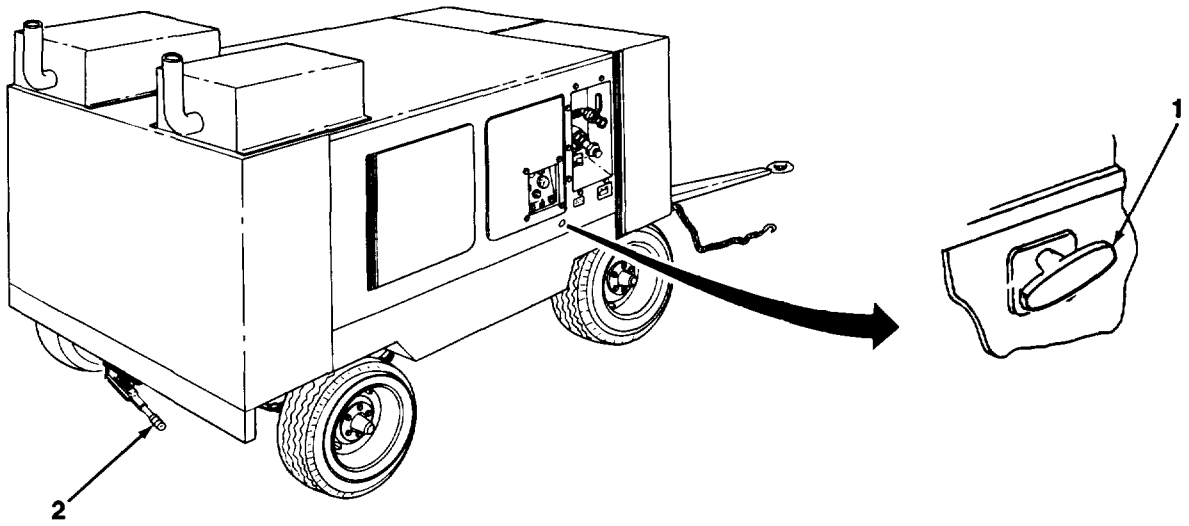
CHAPTER 2
OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. GENERAL.

This section shows the location and function of all air compressor unit controls and indicators. Review this section thoroughly before operating the air compressor unit.

2-2. CONTROLS AND INDICATORS.



Key	Control or Indicator	Function
1	Emergency Stop Control	Shuts down air compressor in case of emergency. Air compressor immediately shuts down when control is pulled.
2	Handbrake Lever	Activates handbrake when air compressor unit is stopped or parked.

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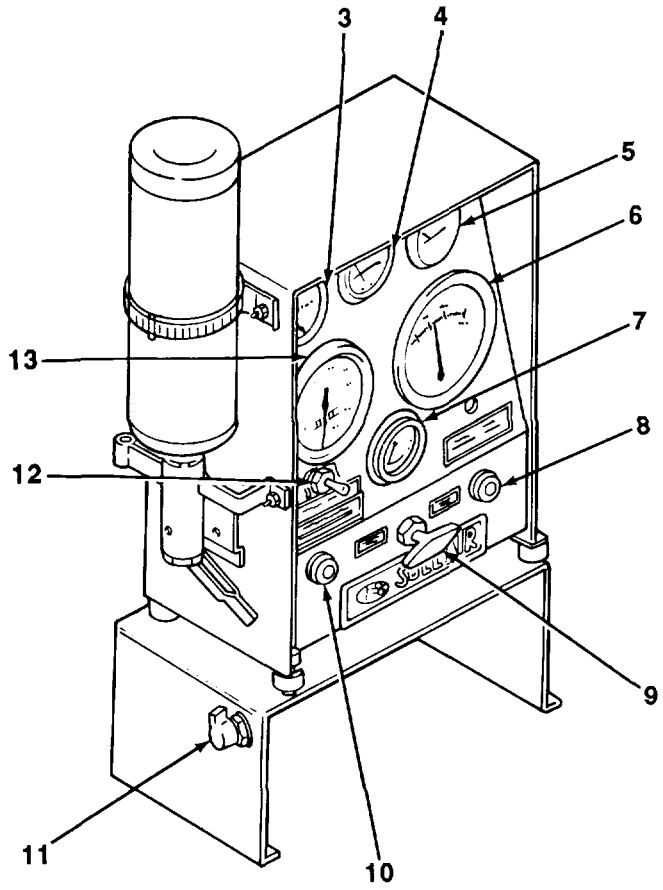
2-2. CONTROLS AND INDICATORS (Con't).



Key	Control or Indicator	Function
3	Engine Coolant Temperature Gage	Indicates engine coolant temperature. Normal reading is 160°F-180°F (71 °C-82°C).
4	Engine Oil Pressure Gage	Indicates engine oil pressure. Normal reading is 40-60 psi (276-414 kPa) at 1050 rpm.
5	Ammeter	Indicates if alternator function is normal. Needle should indicate on the "charge" side of zero (0) while air compressor unit is running.
6	Air Pressure Gage	Indicates air pressure inside oil separator.
7	Discharge Temperature Gage	Indicates temperature of air/oil mixture leaving the air compressor. Normal reading is 180°F (82°C).
8	Engine Start Button	Engages engine starter to turn and start engine.

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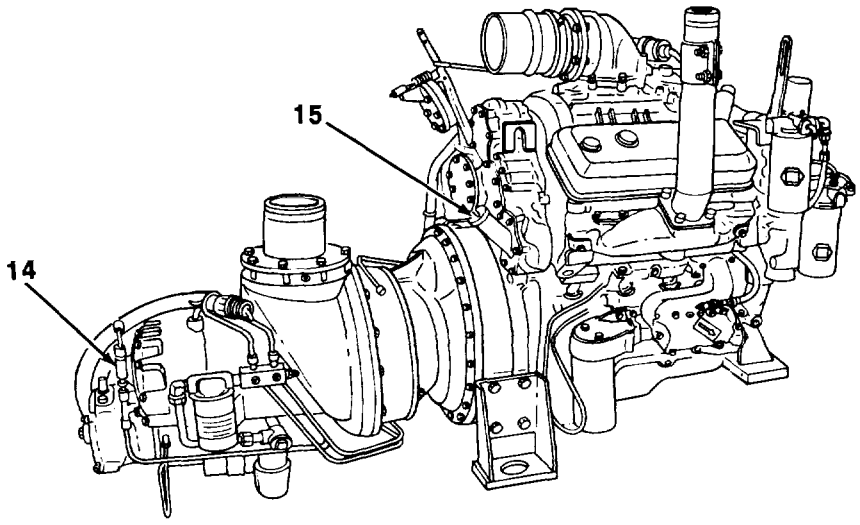
2-2. CONTROLS AND INDICATORS (Con't).

Key	Control or Indicator	Function
9	Cold Start Valve	Allows engine to run at unload speed (low pressure) until properly warmed up. Used for cold weather starting.
10	Engine Override Button	Bypasses oil pressure switch when starting engine.
11	Master Battery Switch	Provides power for instrument panel when in ON position.
12	ON/OFF Engine Switch	Energizes electrical system when in ON position.
13	Tach/Hourmeter	Tachometer portion indicates engine revolutions per minute (rpm). Hourmeter portion indicates and records total number of hours of actual operation.



Key	Control or Indicator	Function
14	Air Compressor Oil Sight Gage	Indicates air compressor oil level. Oil level must be present in sight gage before operating air compressor unit.
15	Engine Oil Dipstick	Indicates level of oil in engine crankcase.

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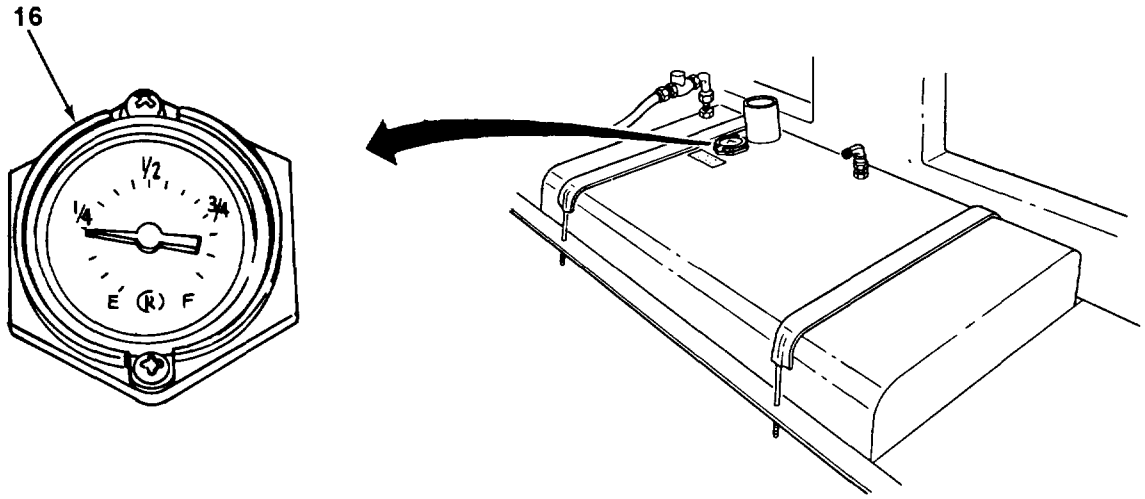
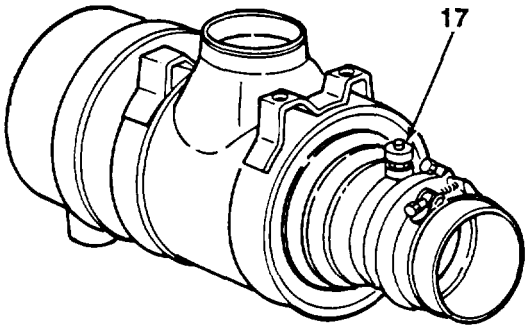
2-2. CONTROLS AND INDICATORS (Con't).



Key	Control or Indicator	Function
16	Fuel Gage	Indicates level of diesel fuel in fuel tank.



Key	Control or Indicator	Function
17	Air Cleaner Restriction Indicators	Indicates air restriction in air cleaners. One Indicator located on each of two air cleaners.

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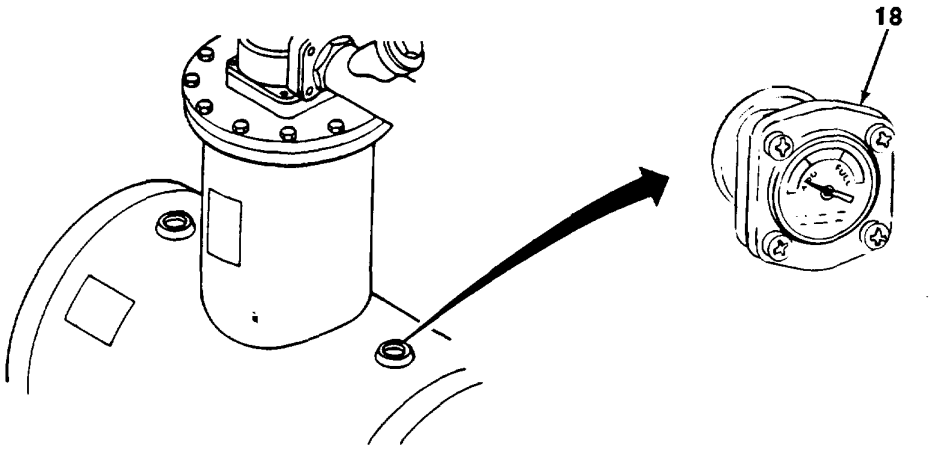
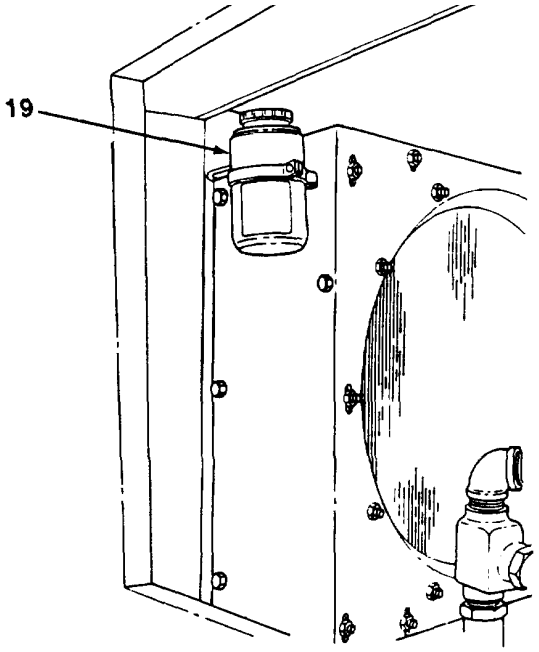
2-2. CONTROLS AND INDICATORS (Con't).



Key	Control or Indicator	Function
18	Air Compressor Oil Level Gage	Indicates how much oil is In oil separator.



Key	Control or Indicator	Function
19	Coolant Overflow Tank	Indicates level of coolant in radiator.

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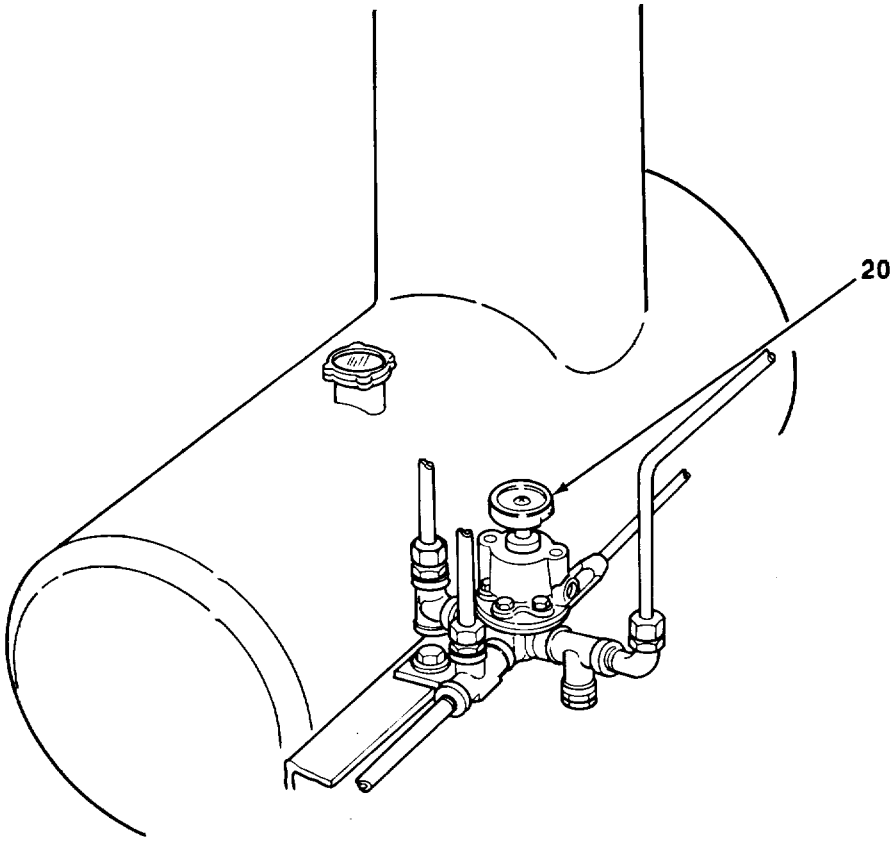
2-2. CONTROLS AND INDICATORS (Con't).



Key	Control or Indicator	Function
20	Pressure Regulating Valve	Opens pressure line between oil separator and sullicon control allowing sullicon control to regulate air delivery according to air demand. Adjustment range is 100-125 psi (690-861 kPa).

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Section II. OPERATOR/CREW PREVENTIVE MAINTENANCE

CHECKS AND SERVICES (PMCS)

2-3. GENERAL.

a. To ensure that the air compressor unit is ready for operation at all times, it must be inspected on a regular basis so that defects may be found before they result in serious damage, equipment failure, or injury to personnel. This section contains systematic Instructions on Inspections, adjustments, and corrections to be performed by the operator/crew.

b. While performing PMCS, read and follow all safety instructions found in the Warning Summary at the front of this manual. Keep In mind all WARNINGs and CAUTIONs.

2-4. SERVICE INTERVALS.

Perform PMCS, found in Table 2-1, at the following intervals:

(1) Perform Before (B) PMCS just before operating the air compressor unit.
(2) Perform During (D) PMCS while operating the air compressor unit.
(3) Perform After (A) PMCS right after operating the air compressor unit.
(4) Perform Weekly ON) PMCS once each week.

2-5. REPORTING REPAIRS.

All defects which the operator cannot fix must be reported on a DA Form 2404, Equipment Inspection and Maintenance Worksheet, immediately after completing PMCS. If a serious problem is found, IMMEDIATELY report it to your supervisor.

2-6. GENERAL PMCS PROCEDURES.

WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

a. Keep equipment clean. Dirt, oil, and debris may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (Item 38, Appendix E) on all metal surfaces. Use dishwashing compound (Item 13, Appendix E) and water on rubber, plastic, and painted surfaces.

2-6. GENERAL PMCS PROCEDURES (Con't).

b. While performing specific PMCS procedures, Inspect the following components:

(1) **Bolts, Nuts, and Screws**. Ensure that they are not loose, missing, bent, or broken, Report loose or missing bolts, nuts, and screws to Unit Maintenance.

(2) **Welds**. Inspect for gaps where parts are welded together. Check for loose or chipped paint, rust, and cracks. Report bad welds to Unit Maintenance.

(3) **Electric Conduit, Wires, and Connectors**. Inspect for cracked or broken conduit insulation, bare wires, and loose or broken connectors. Report loose connections and faulty wiring to Unit Maintenance.

(4) **Hoses, Lines, and Fittings**. Inspect for wear, damage, and leaks. Ensure that clamps and fittings are tight. Report any damage, leaks, or loose fittings and clamps to Unit Maintenance.

c. Check that components are adequately lubricated in accordance with Lubrication Instructions (see Chapter 3, Section I).

2-7. SPECIFIC PMCS PROCEDURES.

a. Operator/Crew PMCS are provided in Table 2-1. Always perform PMCS in the order listed. Once it becomes a habit, anything that is not right can be spotted in a minute.

b. Before performing PMCS, read all the checks required for the applicable Interval and prepare all the tools needed. Have several clean rags (Item 35, Appendix E) handy. Perform ALL Inspections at the applicable Interval.

c. If anything wrong is discovered through PMCS, perform the appropriate troubleshooting task In Chapter 3, Section II. If any component or system is not serviceable, or if a given service does not correct the problem, notify your supervisor.

d. The columns in Table 2-1 are defined as follows:

(1) **Item No**. Provides a logical sequence for PMCS to be performed and is used as a source of item numbers for the "TM ITEM NO." column when recording PMCS results on DA Form 2404.

(2) **Interval**. Specifies the interval at which PMCS is to be performed.

(3) **Item to be Inspected**. Lists the system and common name of items that are to be inspected. Included in this column are specific servicing, Inspection, replacement, or adjustment procedures to be followed.

NOTE

The terms "ready/available" and "mission-capable" refer to the same status: Equipment is on hand and is able to perform its combat missions (AR 700-138)

(4) **Equipment is Not/Ready Available If**: Explains when and why the air compressor unit cannot be used.

2-8. LEAKAGE DEFINITIONS.

a. It is Important to know how fluid leakage affects the status of the air compressor unit. Following are types/classes of leakage an operator must know to determine whether the air compressor unit is mission-capable. Learn these leakage definitions. When In doubt, notify your supervisor.

Leakage Definitions for Operator/Crew PMCS

Class I	Seepage of fluid (as Indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops, but not great enough to cause drops to drip from item being Inspected.
Class III	Leakage of fluid great enough to form drops that fall from the item being inspected.

2-8. LEAKAGE DEFINITIONS (Con't).

CAUTION

When operating with Class I or II leaks, check fluid levels In addition to that required In PMCS. Parts without fluid will stop working or may be damaged.

b. Equipment operation Is allowed with minor (Class I or II) leakage. Fluid levels in an Item/system affected with such leakage must be checked more frequently than required in PMCS. When In doubt, notify your supervisor.

c. Report Class III leaks IMMEDIATELY to your supervisor.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) (Con't)

B-BEFORE **D-DURING** **A-AFTER** **W-WEEKLY**

ITEM NO.	INTERVAL B	D	A	W	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED.	EQUIPMENT IS NOT READY/AVAILABLE IF
					NOTE Perform Weekly (W) as well as Before (B) PMCS If: • You are the assigned operator but have not operated the air compressor unit since the last Weekly. • You are operating the air compressor unit for the first time.	
1					**VEHICLE EXTERIOR**	
	•				a. Check for fluid leakage or appearance of fluid leakage.	Any Class III leaks are found.
	•				b. Visually check for damaged piping or hoses, and loose, missing, or damaged parts	Piping or hoses are leaking or broken. Parts are missing or damaged.
2					**HANDBRAKE LEVER**	
	•				Check for tension in cable when applied	No tension in cable.
3					**TIRES**	
	•				a Inspect tires for unusual wear or damage	Tires have damage which could result in failure.
•	•				b Visually check for evidence of low air pressure.	
•	•				c Inspect wheels for cracks and other damage Check for signs of looseness or missing wheel nuts.	Wheel is damaged or wheel nuts are loose or missing.

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) (Con't).

B-BEFORE **D-DURING** **A-AFTER** **W-WEEKLY**

ITEM NO.	INTERVAL B	D	A	W	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED.	EQUIPMENT IS NOT READY/AVAILABLE IF
	4				**AIR FILTERS** **WARNING** If NBC exposure Is suspected, all engine air cleaner air filter media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.	
		•			Visually check air restriction Indicator. If indicator shows a red condition, clean air cleaner (see paragraph 3-6).	
	5				**BATTERY** **WARNING** • Remove all Jewelry such as dog tags, rings, bracelets, etc. If Jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result, causing serious Injury or death to personnel. • Storage battery acid (electrolyte) Is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or Inspections. Serious Injury to personnel will result if battery acid contacts skin or eyes. • DO NOT perform storage battery checks or Inspections while smoking or near fire, flames, or sparks. Storage batteries may explode, causing serious Injury or death to personnel.	
				•	a Check electrolyte level in storage batteries	Electrolyte level is below top of plates.
	•				b Check storage batteries and storage batteries box for corrosion and obvious damage	Storage battery or storage batteries box corrosion or damage is found. Storage battery is missing or engine will not crank.

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) (Con't).

B-BEFORE **D-DURING** **A-AFTER** **W-WEEKLY**

ITEM NO.	INTERVAL B	D	A	W	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED.	EQUIPMENT IS NOT READY/AVAILABLE IF
	6				**AIR COMPRESSOR OIL LEVEL** **WARNING** Air compressor lubrication/cooling system Is under pressure. DO NOT remove drain plug or filler plug from air compressor lubrication/cooling system while under pressure or Injury to personnel may result.	
	•	•			Check air compressor oil level in sight tube. Oil must be present in sight tube when unit is running.	No oil is present in sight tube.
	7				**ENGINE OIL LEVEL** **NOTE** Air compressor unit must be level to perform this check.	
	•				Check engine oil level on dipstick. Oil level should be between "ADD" and "FULL" marks.	Oil is below "ADD" mark.
8					**DRIVEBELTS**	
	•				a. Visually check for broken or missing belts.	Belts are broken or missing.
	•				b. Press down on belts and measure the deflection with rule .	Belts deflect A in. (12.3 mm) or more. Belts are cracked or deteriorated.
9					**FUEL SYSTEM**	
	•				a. Visually inspect fuel system for signs of leakage.	Any fuel leakage is present.
	•				b. Visually inspect fuel tank for damage.	Fuel tank damage which could result in fuel leakage.
			•		c. Check fuel level on fuel level gage.	Fuel tank is empty.
10					**RADIATOR**	
	•				Check coolant level at tank.	Coolant is below minimum level.
11					**ELECTRICAL**	
	•				Check electrical wires for looseness or damage.	Wires are loose or damaged.

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) (Con't).

B-BEFORE **D-DURING** **A-AFTER** **W-WEEKLY**

ITEM NO.	INTERVAL B	D	A	W	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED.	EQUIPMENT IS NOT READY/AVAILABLE IF
	12				**FIRE EXTINGUISHER** **WARNING** Handle charged fire extinguisher cylinders with care. DO NOT jar or expose cylinder to temperatures above 140 °F (60 °C). Failure to follow this warning may cause an explosion, resulting In serious Injury or death to personnel. **NOTE** Refer to TB 5-4200-200-10 for guidance on fire extinguishers.	
	•				Check for broken or missing seal. Check security of mounting device	Seal is broken or missing. Fire extinguisher is missing.
13					**EXHAUST SYSTEM** **WARNING** Before checking any part of exhaust system, allow exhaust system to cool. Failure to follow this warning may result In serious burns.	
	•				Visually check exhaust system for signs of leaks, cracks, or breaks and loose or missing mounting clamps	Exhaust system has signs of leaks, cracks, or breaks. Mounting clamps are loose or missing.
14					**INSTRUMENTS AND GAGES**	
		•			Check for proper indication and operation: (1) Engine Oil Pressure 40-60 psi (276-414 kPa) at 1050 rpm	Not within normal operating range or nonoperational.
		•			(2) Air Compressor Discharge Temperature 180°F (82°C) normal operating pressure	Not within normal operating range or nonoperational.

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services (PMCS) (Con't).

B-BEFORE **D-DURING** **A-AFTER** **W-WEEKLY**

ITEM NO.	INTERVAL B	D	A	W	ITEM TO BE INSPECTED PROCEDURE: CHECK FOR AND HAVE REPAIRED, FILLED, OR ADJUSTED AS NEEDED.		EQUIPMENT IS NOT READY/AVAILABLE IF
14					**INSTRUMENTS AND GAGES (Con't)**		
		•			(3) Ammeter	Should Indicate "charge" side of meter	Not within normal operating range or nonoperational.
		•			(4) Engine Coolant Temperature	160°F-180°F (71°C-82°C) normal operating temperature	Not within normal operating range or nonoperational.

Section III. OPERATION UNDER USUAL CONDITIONS

2-9. GENERAL.

a. This section contains instructions for safely operating the air compressor unit under usual conditions. Unusual operating conditions are defined and described in Section IV of this chapter.

b. Perform PMCS in Table 2-1 before operating the air compressor unit.

2-10. START AIR COMPRESSOR UNIT.

NOTE

Ensure that air compressor unit Is parked on level ground prior to starting engine.

a. Set handbrake lever (10).

NOTE

Perform step b only at Initial startup.

b. Open service line (1).

c. Turn cold start valve (6) to START position.

d. Move master battery switch (8) to ON position.

e. Turn ON/OFF engine switch (2) to ON position.

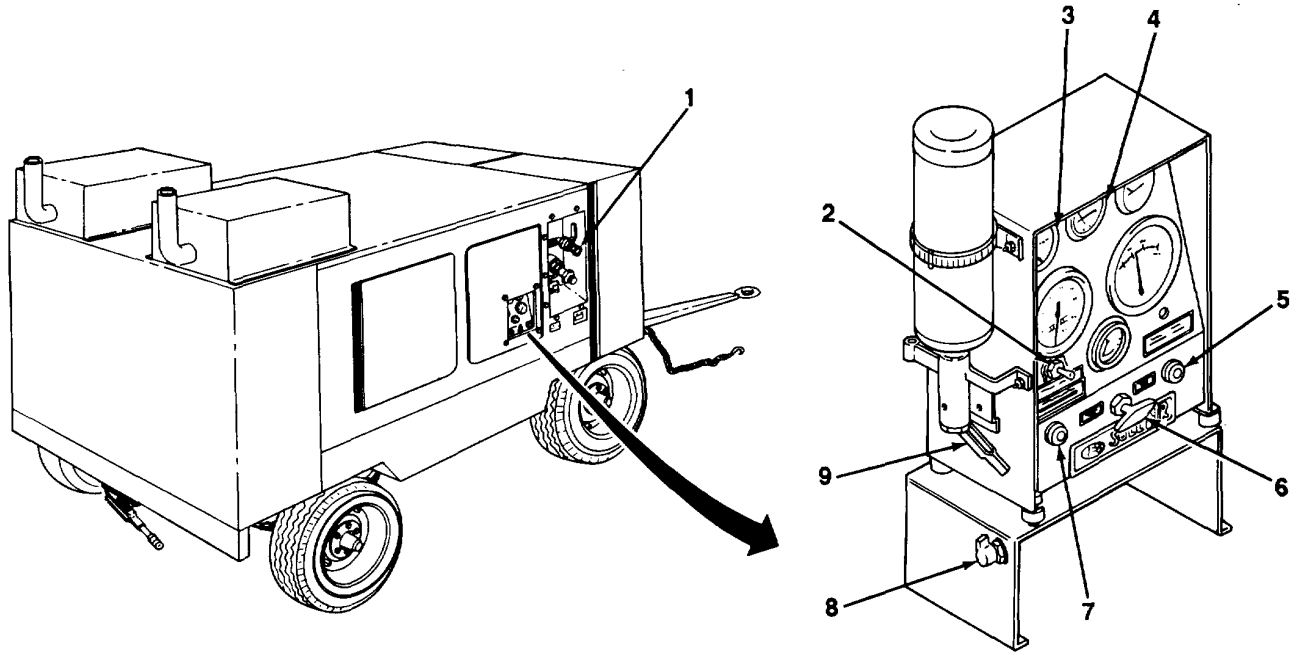
f. Simultaneously push engine start button (5) and engine override button (7). Release engine start button as soon as engine starts and release engine override button as soon as oil pressure reaches 20 psi (138 kPa) on engine oil pressure gage (4).

WARNING

Use extreme caution when using ether. It Is an extremely volatile gas with combustion temperature lower than that of vaporized diesel fuel. Too much ether can cause an uncontrolled explosion and may result in Injury or death to personnel and severe damage to engine.

g. If engine does not start, press lever (9) and release ether starting aid. Repeat step f.

2-10. START AIR COMPRESSOR UNIT (Con't).



h. When engine coolant temperature reaches 1300F (540C) on engine coolant temperature gage (3), move cold start valve (6) to RUN position.

i. When air compressor unit is running normally and before using air compressor, close and secure all doors.

J. Close service line if initial startup.

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2-11. DURING OPERATION.

CAUTION

- **Care must be taken to prevent air In fuel system. Never allow fuel tank to run dry. Air In fuel system will cause engine powerloss, rough running, or engine to stall and not restart.**
- **Ensure that all doors are closed for proper cooling and noise suppression.**

a. General.

(1) Perform all During (D) PMCS.

(2) Become familiar with the normal operation of the air compressor unit and with readings or Indicators. Damage to equipment, extensive repairs, and downtime can be avoided by an alert operator who car detect problems In early stages and help Unit Maintenance correct them before they become serious.

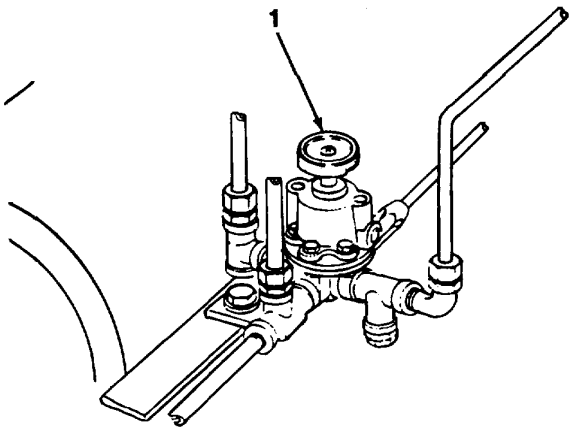
b. Discharge Pressure Operation.

NOTE

Perform this adjustment If air compressor does not discharge at 100 psi (690 kPa) during operation.

(1) While operating air compressor unit, turn pressure regulating valve (1) clockwise to Increase or counterclockwise to decrease discharge pressure.

(2) Repeat step 1 until air pressure gage reads 100 psi (689.5 kPa).



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2-12. STOP AIR COMPRESSOR UNIT.

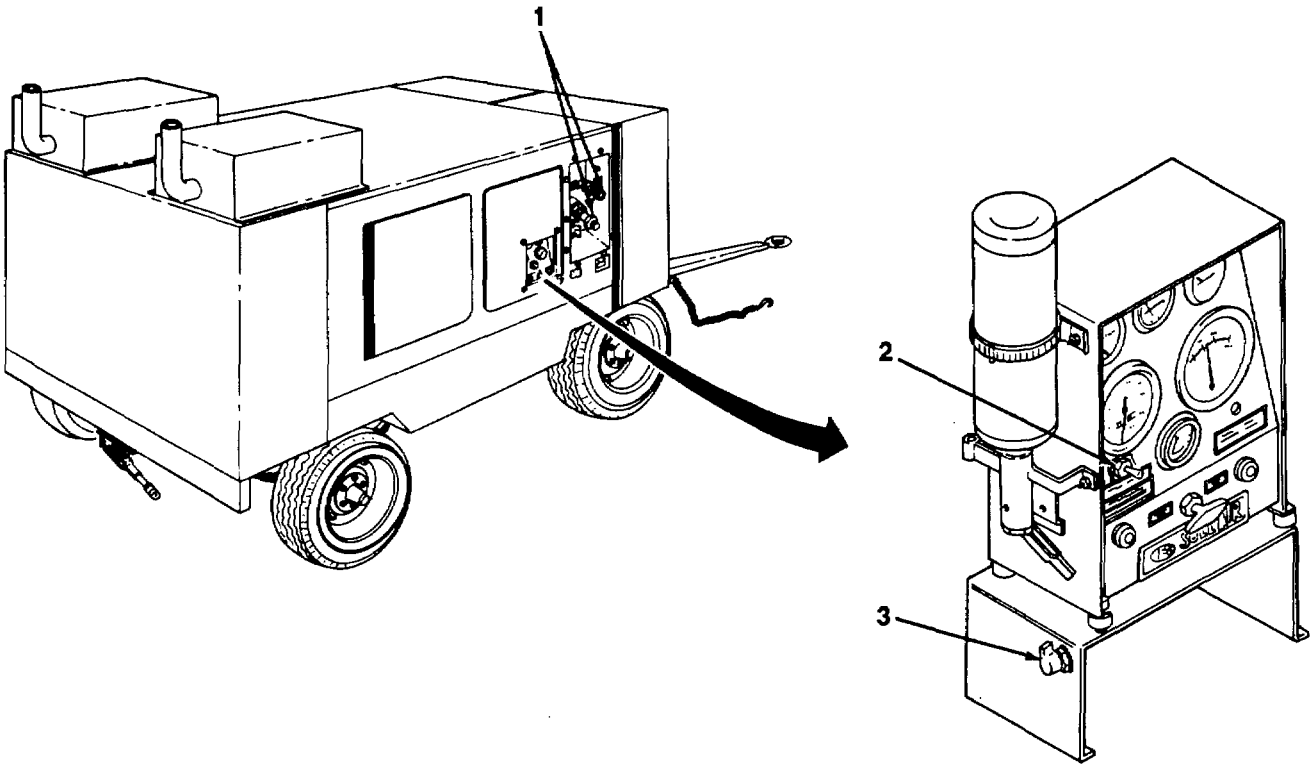
CAUTION

Allow engine to Idle approximately five minutes without a load to allow It to cool down before shutdown. Failure to follow this caution may result in damage to engine.

a. Close two service valves (1).

b. Turn ON/OFF engine switch (2) to OFF position.

c. Turn master battery switch (3) to OFF position.



2-13. COUPLE AIR COMPRESSOR UNIT TO TOWING VEHICLE.

WARNING

All personnel must stand clear of towing vehicle and air compressor unit during coupling operation. Failure to follow this warning may result In serious Injury or death.

CAUTION

Have ground guide direct you during backing operations. Damage to equipment may result if caution Is not followed.

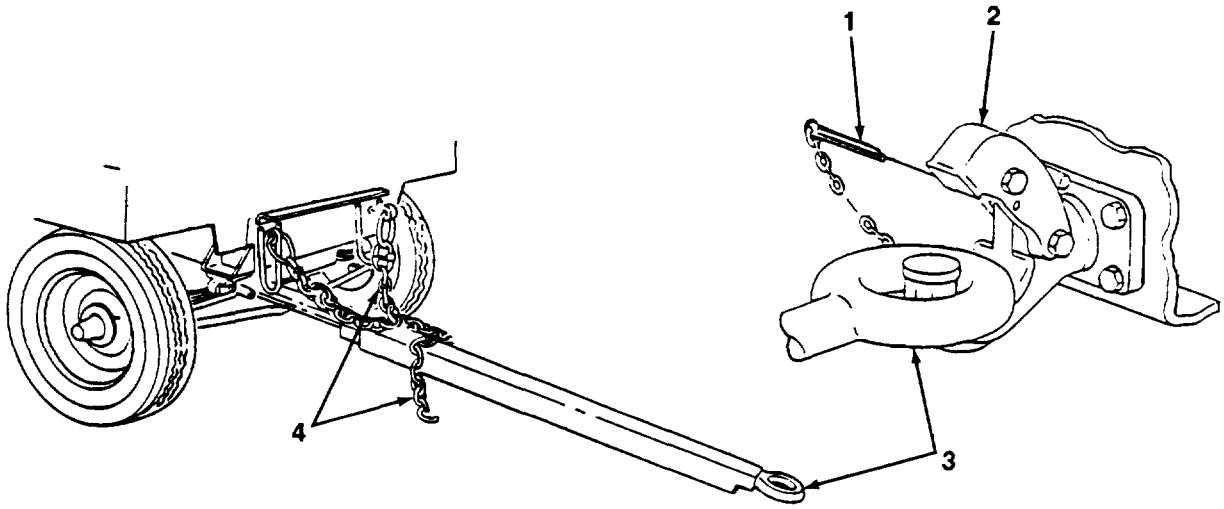
a. Remove pintle lockpin (1) and open pintle (2).

b. Aline towing vehicle with air compressor unit and slowly back towing vehicle until pintle (2) is positioned in drawbar ring (3).

c. Close pintle (2) and install pintle lockpin (1).

d. Release air compressor unit handbrake lever.

e. Cross safety chains (4) under drawbar ring (3) and attach to towing vehicle.



2-14. TOW AIR COMPRESSOR UNIT.

a. General.

Refer to FM 21-305 for further information on proper driving practices.

b. Driving.

(1) Keep In mind overall length of towing vehicle and air compressor unit when passing other vehicles, turning, and backing.

(2) Always tow air compressor unit at speeds less that 15 mi/h (24 km/h).

(3) When turning corners, remember that air compressor unit wheels turn inside turning radius of towing vehicle.

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2-14. TOW AIR COMPRESSOR UNIT (Con't)

(4) When making a right-hand turn at an intersection, drive towing vehicle about halfway into intersection and then cut sharply to right. This will allow for shorter tuning radius of air compressor unit and will keep it off the curb.

(5) Avoid backing whenever possible.

(6) If backing is unavoidable, have a ground guide direct you while backing. Maneuver In a manner that will not exceed freedom of rotation of drawbar ring within d6cpling device, in either horizontal or vertical planes.

(7) Air compressor unit does not have service brakes; therefore, applying brakes of towing vehicle does not immediately affect the air compressor unit. Apply-towing vehicle brakes gradually and smoothly, and allow for adequate distance to stop.

c. Parking.

(1) Park air compressor unit on level area, if possible. If not possible, park across grade so that air compressor unit will not roll downhill.

(2) Park air compressor unit with front wheels in straight ahead position and chock all four wheels.

(3) When parking for extended periods, set handbrake levers on both towing vehicle and air compressor unit.

(4) Park air compressor unit so that wind, if any, will carry exhaust fumes away from personnel and air compressor air inlet openings. Also, park so that air compressor unit will not be exposed to excessive dust from work site.

2-15. UNCOUPLE AIR COMPRESSOR UNIT FROM TOWING VEHICLE.

WARNING

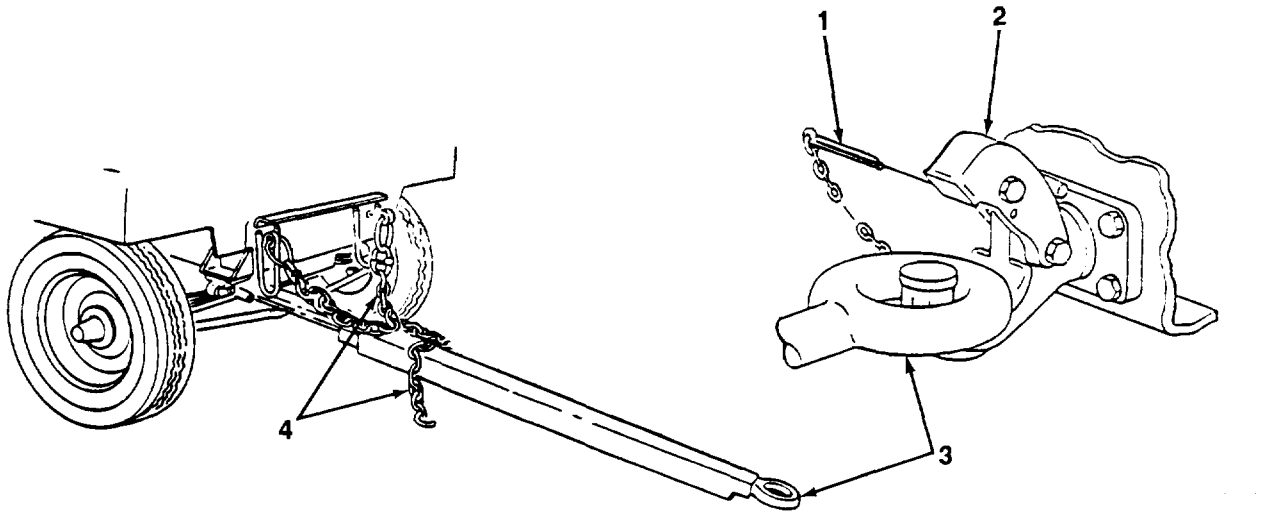
All personnel must stand clear of towing vehicle and air compressor unit during uncoupling operation. Failure to follow this warning may result In serious Injury or death.

a. Disconnect safety chains (4) from towing vehicle and stow on air compressor unit.

b. Remove pintle lockpin (1) and open pintle (2).

c. Apply air compressor unit handbrake lever. Lift drawbar ring (3) from pintle (2).

d. Move towing vehicle away from air compressor unit.



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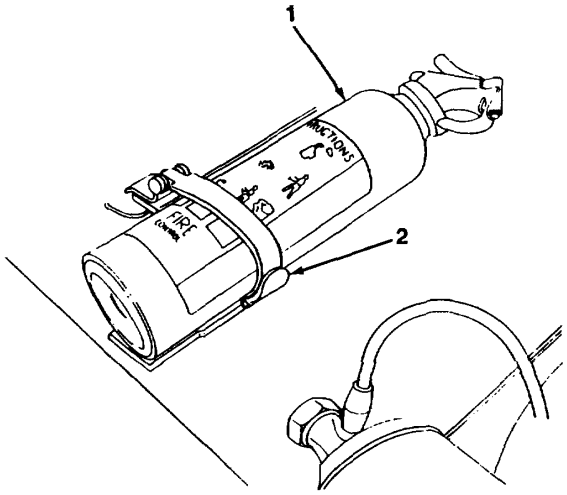
2-16. OPERATE PORTABLE FIRE EXTINGUISHER.

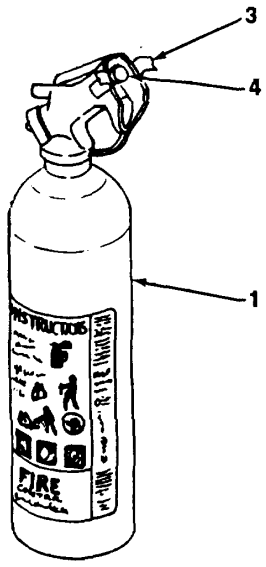
WARNING

Handle charged fire extinguisher cylinders with care. DO NOT Jar or expose cylinder to temperatures above 140°F (60°C). Failure to follow this warning may cause an explosion, resulting in serious Injury or death to personnel.
Portable fire extinguisher Is a dry chemical fire extinguisher. DO NOT use on trash, wood, or paper fires. Dry chemical fire extinguishers are not effective on these fires.

a. Remove fire extinguisher (1) from storage



b. Break seal (3) on fire extinguisher (1).
c. Hold fire extinguisher (1) level.
d. Take fire extinguisher (1) as close as possible to fire and point directly at base of flames.
e. Press down on button (4) to release fire extinguisher (1) contents.
f. Tag fire extinguisher (1) with word EMPTY.



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Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-17. GENERAL.

a. This section contains Instructions for safely operating the air compressor unit under unusual conditions. In additional to normal preventive maintenance, special care must be taken to keep air compressor unit operational in extreme temperatures and other environmental conditions.

b. Refer to FM 21-305 and FM 55-30 for information on special driving instructions under unusual conditions.

c. Refer to FM 9-207 for Information on operation in cold weather.

d. Refer to FM 90-3 for information on operation in extreme heat, dusty, or sandy conditions.

2-18. OPERATION IN DUSTY OR SANDY AREAS.

a. In dusty or sandy areas, guard against sand or dust getting Into air compressor unit.

b. Clean, inspect, and lubricate air compressor unit more often In sandy or dusty areas.

c. Clean all filler caps before servicing any lubricant. Ensure that caps are tightened securely after servicing.

d. Keep governor control rods clean and free of dust or sand. Wipe off any excess oil or grease spilled on air compressor unit as this will attract and hold dust and sand.

WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

e. Clean radiator core with compressed air daily or more often if needed. Clear dust and sand out opposite way it enters radiator.

f. Ensure that oil cooler fins are clear and free of dust and sand buildup. Keep fan belts adjusted to proper tension.

g. Ensure that fan shroud is tight against radiator to prevent recirculation of air. Ensue that radiator cap is secure.

h. Clean or change engine and air compressor air cleaners, oil filters, and fuel filters as needed.

i. If engine temperature rises above 200°F (93 °C), remove load on air compressor unit and allow engine to Idle until normal operating temperature is obtained.

2-19. OPERATION IN EXTREME HEAT.

a. Refer to Chapter 3, Section I for proper lubrication during extreme heat conditions.
b. Shelter or cover air compressor unit with canvas covers, if available.
c. Check oil levels In engine and oil separator tank often.
d. Frequently check cooling fan belts for wear and proper tension.
e. Frequently check air compressor discharge temperature gage.
f. Ensure that cooling fins and cooling fan are kept clean and unobstructed.

2-20. OPERATION IN AREAS OF HIGH HUMIDITY, HEAVY RAIN, OR SALTWATER.

a. Air compressor units, Inactive for long periods of time In hot and humid weather, are subject to rapid rusting and accumulation of fungus. Frequently Inspect, clean, and lubricate to prevent deterioration of painted surfaces. Refer to Lubrication Instructions (see Chapter 3, Section I).

b. Dampness Increases chances of corrosion. Inspect all surfaces and electrical connections for signs of corrosion.

c. Check twice daily for water In oil of both engine and air compressor.

2-21. OPERATION IN EXTREME COLD OR SNOW.

a. General.

(1) Refer to Lubrication Instructions (see Chapter 3, Section I) for proper lubricants to use In extreme cold.

(2) Care must be taken when handling cables. Extreme cold weather can cause insulation material on electrical wire to crack, causing short circuits.

(3) When parking for any period of time, park in sheltered area out of wind and clean off any buildup of snow or ice. Place footing of planks or brush under tires to prevent tires from freezing to ground. Ensure that tires are properly inflated (see paragraph 1-11). Underinflated tires will freeze, resulting in flat spots.

(4) Use care when placing air compressor unit in motion after shutdown. Thickened lubricants may cause failure of components. Free tires frozen to ground with care.

(5) If available, use canvas covers to shield air compressor unit. Keep cover ends off ground to keep them from freezing to ground.

(6) Ensure that radiator fins are clear and free of snow buildup. Keep fan belts adjusted to proper tension.

(7) At temperatures below -4°F (-20°C), engine must be warmed up before starting operations.

2-21. OPERATION IN EXTREME COLD OR SNOW (Con't).

b. **Jump Starting Engine with Jumper Cables.**

WARNING

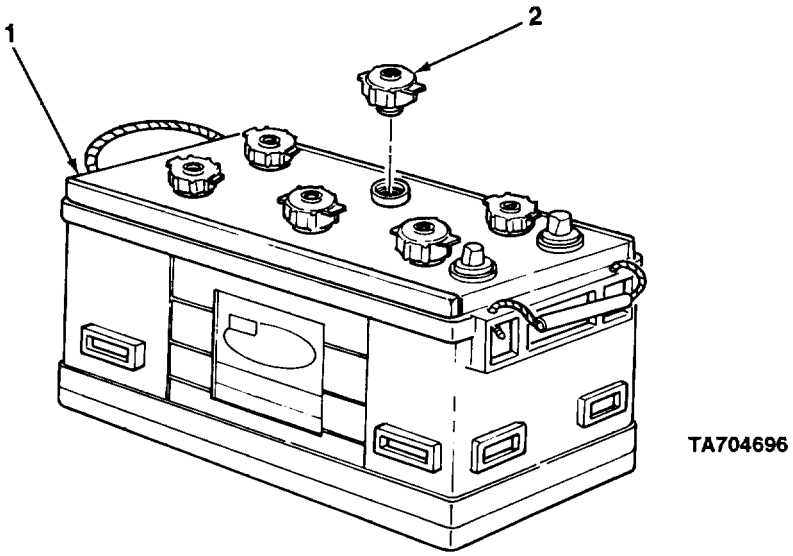
- **Remove all jewelry such as dog tags, rings, bracelets, etc. If Jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result. Failure to follow proper disconnection procedures will result In serious Injury or death to personnel or equipment damage.**
- **Battery acid (electrolyte) Is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or Inspections. Serious Injury to personnel will result If battery acid contacts skin or eyes.**
- **DO NOT perform battery system checks or Inspections while smoking or near fire, flames, or sparks. Batteries may explode, causing serious Injury or death to personnel.**
- **Batteries generate hydrogen, a highly explosive gas. To prevent sparks from igniting battery gases, DO NOT connect negative (-) Jumper cable to negative (-) terminal on weak battery. Failure to follow this warning may result In serious Injury or death to personnel.**

NOTE

- **This task should be performed with assistance of Unit Maintenance.**
- **Jump start only with vehicle having 24-volt electrical system and negative ground. Source battery/batteries must be of comparable size.**

(1) Remove 12 vent caps (2) from two batteries (1).

(2) Check fluid level in two batteries (1). If low, bring to proper level.



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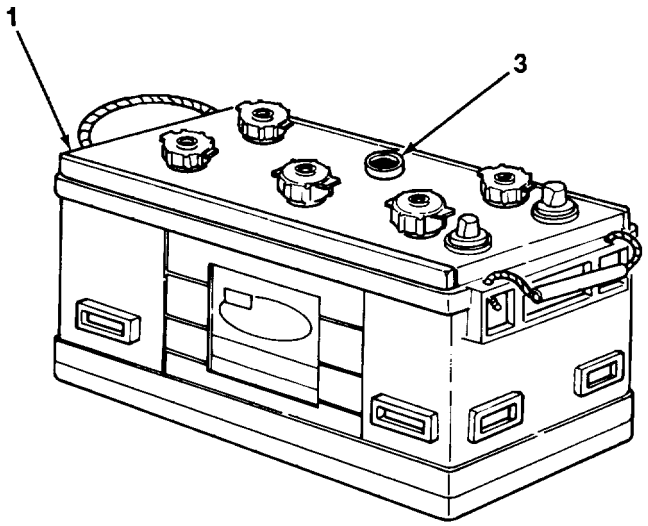
2-21. OPERATION IN EXTREME COLD OR SNOW (Con't).

WARNING

DO NOT attempt to Jump start If battery fluid appears frozen. Bring temperature of batteries up to 40 F (4 0C) before attempting to Jump start. Failure to follow this warning may cause an explosion, resulting In serious Injury to personnel.

(3) Cover 12 open cells (3) of two batteries (1) with clean dampened cloths.



WARNING

DO NOT attempt to jump start with two 12-volt passenger car batteries connected In series. Both 12-volt batteries must have an ampere rating equivalent to or larger than 24-volt batteries supplied with air compressor unit. If batteries overheat, Injury to personnel will result.

(4) Position starting vehicle next to air compressor unit. Do not permit metal-to-metal contact between air compressor unit and starting vehicle.

(5) Set handbrake lever on air compressor unit and parking brake on starting vehicle.

(6) Place starting vehicle in neutral or park and turn off all nonessential accessory electrical loads. Keep engine running.

WARNING

- **Use only Jumper cables that are clean, In good condition, and are heavy enough to handle starting current. A shorted or melted wire will result In Injury to personnel.**
- **Avoid contact between Jumper cable terminal clamp and any metallic portion of either air compressor unit or starting vehicle. A direct short will result In Injury to personnel.**

(7) Connect red positive (+) cable to positive (+) terminal of starting vehicle battery. If starting vehicle Is equipped with two 12-volt batteries connected in series, connect jumper cable to positive (+) terminal of ungrounded battery.

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2-21. OPERATION IN EXTREME COLD OR SNOW (Con't).

(8) Connect other end of red positive (+) cable to positive (+) terminal of ungrounded air compressor unit battery.

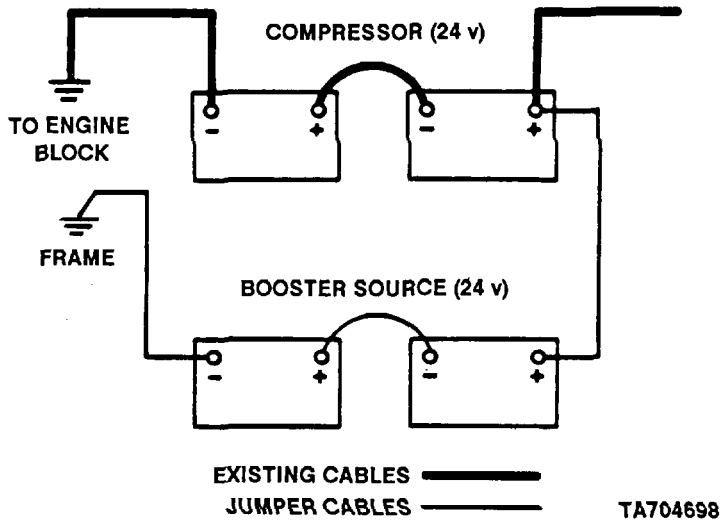
(9) Connect black negative (-) cable to grounded negative terminal of starting vehicle battery. If starting vehicle is equipped with two 12-volt batteries connected in series, connect jumper cable to negative (-) terminal of grounded battery.

(10) Connect other end of black negative (-) cable to air compressor unit frame.

(11) Start air compressor unit (see paragraph 2-10). Avoid prolonged cranking. If necessary, check jumper cables, terminals, and batteries frequently for overheating. If hot to touch, wait for item to cool before attempting to start again.

(12) Allow air compressor unit engine to warm up. When engine Is warm and operating smoothly at normal idle rpm, disconnect black negative (-) cable first from air compressor unit frame and then from starting vehicle battery.

(13) Disconnect red positive (+) cable first from air compressor unit battery and then from starting vehicle battery.

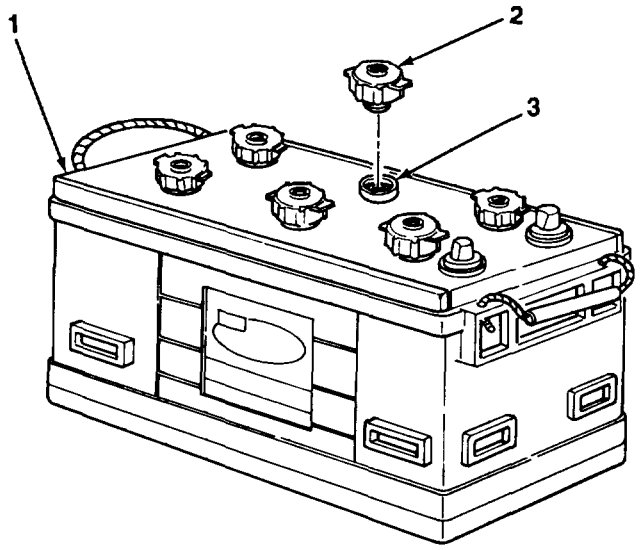


2-21. OPERATION IN EXTREME COLD OR SNOW (Con't).

WARNING

Battery acid (electrolyte) Is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or Inspections. Serious Injury to personnel will result If battery acid contacts skin or eyes.

(14) Remove and carefully dispose of dampened cloths from 12 open cells (3).
(15) Install 12 vent caps (2) on two batteries (1).



2-22. OPERATION AT HIGH ALTITUDES.

a. Due to thinner air at higher altitudes, the air compressor unit will operate at reduced capacity (i.e., the higher the altitude, the lower the capacity). Engine will produce less power and air compressor will have less air to compress. It will take longer to arrive at operating pressure and it will be slower to replenish.

b. Frequently check discharge temperature gage. If air compressor unit overheats, stop use of all tools and allow air compressor unit to run, unloaded, until it cools down to a more acceptable operating temperature, 185°F (85 °C).

2-23. FORDING.

CAUTION

To prevent severe damage and contamination of Internal components, DO NOT ford this air compressor unit in water with depth greater than 30 In. (76 cm).

a. **Before Fording**.

(1) Refer to towing vehicle operating instructions for information on fording. Towing vehicle instructions are also applicable to the the air compressor unit.
(2) Ensure that all filler caps, plugs, and valves are closed and secure.
(3) Do not attempt to ford an area that has a swift current, high banks, or overhanging trees or boulders that appear to be in danger of toppling.

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2-23. FORDING (Con't).

b. **During Fording.**
(1) At safe operating speed, carefully move across area to be forded.
(2) Do not stop or attempt to back up.

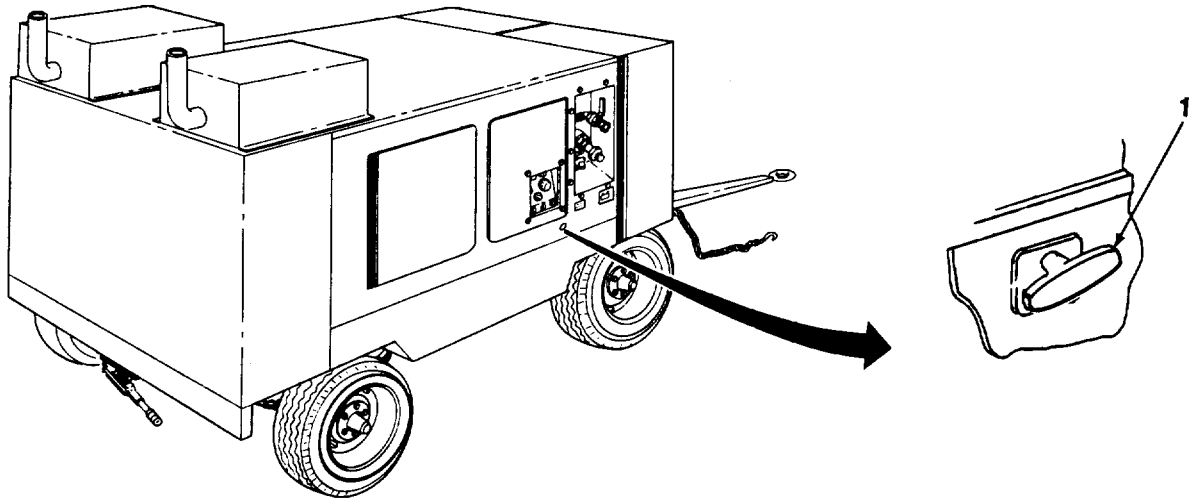
c. **After Fording**.
(1) Check oil levels of engine and air compressor, and check for water contamination. If oil levels are too high, water has entered and oil must be replaced.
(2) Wipe dry and/or allow time to dry all electrical components and wires.

2-24. EMERGENCY ENGINE STOPPING.

CAUTION

Emergency engine shutdown should only be used in case of emergency. Use of emergency engine shutdown can cause oil to be sucked past oil seals and Into blower housing.

a. Pull out emergency stop control (1) fully.

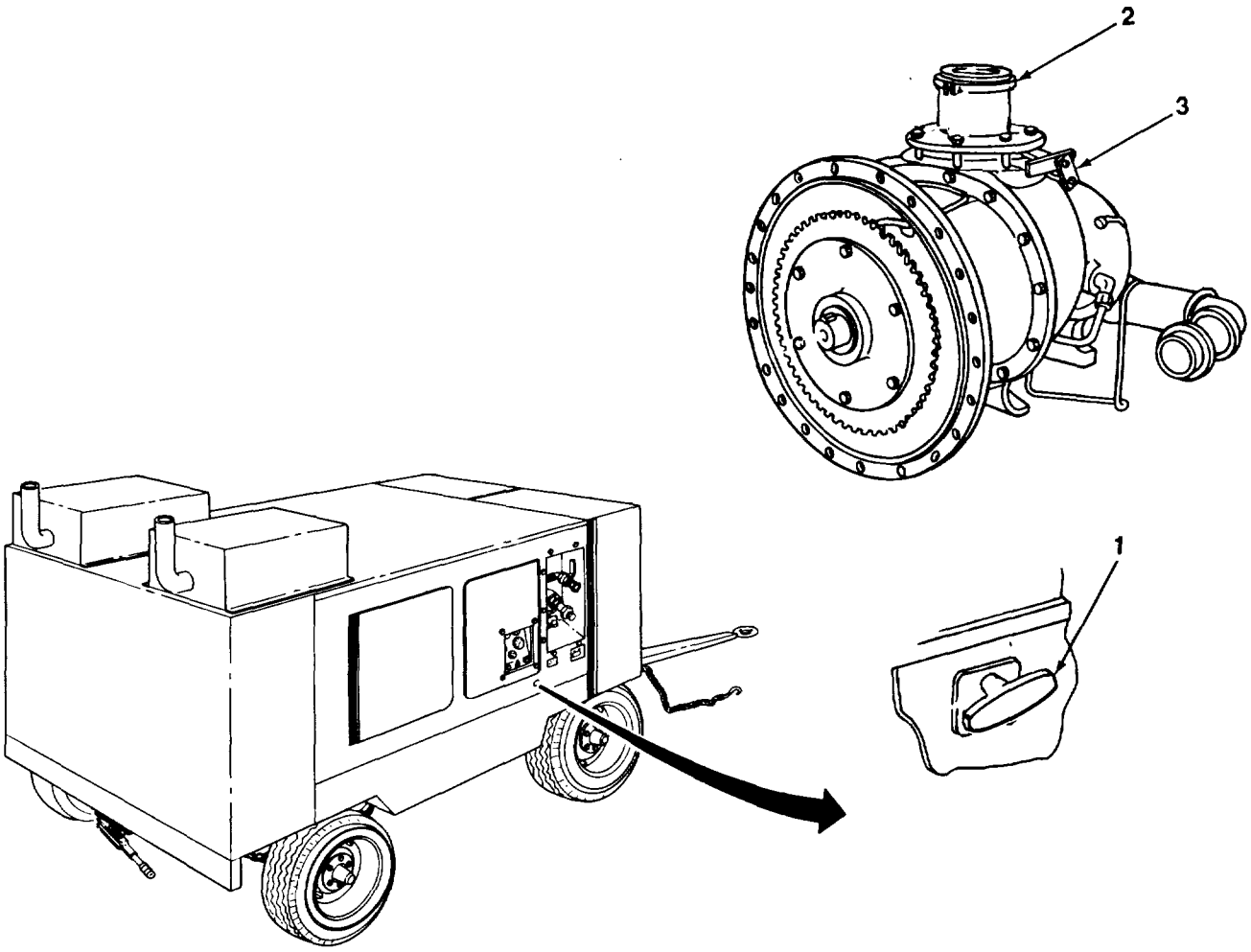


2-24. EMERGENCY ENGINE STOPPING (Con't).

CAUTION

DO NOT attempt to start engine again until cause of malfunction has been found and corrected.

b. Reset air shutoff valve (3) on blower inlet housing (2) by turning lever 450 toward ground.
c. Push in emergency stop control (1) fully.



CHAPTER 3
OPERATOR MAINTENANCE

Section I. LUBRICATION INSTRUCTIONS

3-1. GENERAL

NOTE

These Instructions are MANDATORY.

a. The air compressor unit must receive lubrication at recommended intervals in order to be mission-ready at all times.

b. The KEY lists lubricants to be used in all temperature ranges and shows the intervals.

c. The Lubrication Chart shows lubrication points, names items to be lubricated, the required lubricants, and the recommended interval for lubrication. Any special lubricating instructions required for specific components are contained in the NOTES section of the chart.

d. Recommended intervals are based on normal conditions of operation, temperature, and humidity. When operating under extreme conditions, lubricants should always be changed more frequently. When in doubt, notify your supervisor.

3-2. SPECIFIC LUBRICATION INSTRUCTIONS.

a. Keep all lubricants in closed containers and store in clean, dry place away from extreme heat. Keep container covers clean and do not allow dust, dirt, or other foreign material to mix with lubricants. Keep all lubrication equipment clean and ready for use.

b. Maintain a record of lubrication performed and report any problems noted during lubrication. Refer to DA Pam 738-750 for maintenance forms and procedures to record and report any findings.

c. Keep all external parts of equipment not requiring lubrication free of lubricants. After lubrication, wipe off excess oil or grease to prevent accumulation of foreign matter.

d. Refer to FM 9-207 for lubrication instructions in cold weather.

e. After operation in muddy, sandy, or dusty conditions, clean and inspect all points of lubrication for contaminated lubricants. Change lubricants as required.

LUBRICATION CHART

**COMPRESSOR, AIR: ROTARY SCREW, 750 CFM,
100 PSI, WHEEL-MOUNTED, DED
SULLAIR MODEL 750 DP
(NSN 4310-01-053-3891)**

Intervals (on-condition or hard time) and related man-hour times are based on normal operation. The man-hour time specified is the time you need to do al services prescribed for a particular interval. De-crease the intervals if your lubricants are contaminated, or If you are operating equipment under adverse conditions, including longer-than-usual operating hours. The intervals may be extended during periods of low activity. If extended, adequate preservation precautions must be taken.

Dotted leader lines indicate lubrication Is required or both sides of the equipment.

WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

Clean all fittings and area around lubrication points with dry cleaning solvent (Item 38, Appendix E) or equivalent before lubricating equipment. After lubrication, wipe off excess oil or grease to prevent accumulation of foreign matter.

The lowest level of maintenance authorized to lubricate a point is indicated in parentheses by use of the following: (C) Operator/Crew; or (O) Organizational Maintenance.

LUBRICANT • INTERVAL

Air Compressor Oil Filter (Replace) (Note 9) (O) — 100

Engine Oil Level Gage (Check level) (Note 4) (O) — 10

Engine Oil Filter (Replace) (Note 6 and View A) (O) — OC or 100

Engine Oil (Drain and Refill) (Note 4 and Views B and C) (O) — OE/HDO S

Primary Fuel Filter (Replace) (View D) (O) — A

Secondary Fuel Filter (Replace) (View E) (O) — A

Wheel Bearings (Note 11 and View F) (O) — GAA A

INTERVAL • LUBRICANT

S GAA — **Steering Arm** (2 Fittings) (View G) (O)

S GAA — **Steering Knuckle** (2 Fittings) (View H) (O)

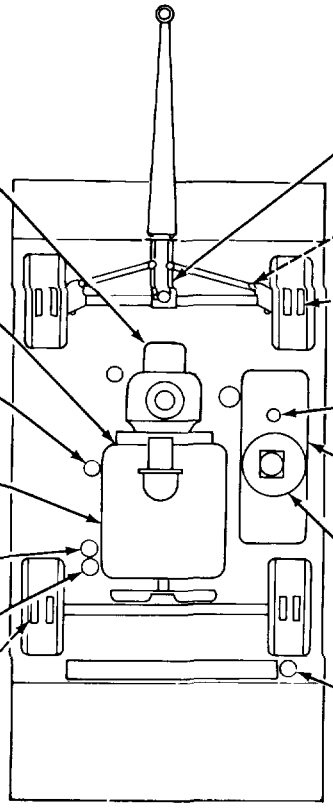
A GAA — **Wheel Bearings** (Note 11 and View I) (O)

10 — **Oil Separator Level Gage** (Check level) (Note 7) (O)

500 — **Oil Separator Drain Valve** (Drain and Refill) (Note 8) (O)

4000 OE/HDO — **Oil Separator Element** (Note 10) (O)

D Coolant — **Cooling System** (Check Coolant Level at Overflow Tank)Coolant (O)



TOTAL MAN-HOURS*		TOTAL MAN-HOURS*	
INTERVAL	MAN-HOUR	INTERVAL	MAN-HOUR
D	0.1	10 hr	0.1
S	0.5	100 hr	1.5
A	1.5	500 hr	0.5
		4000 hr	0.5

* The man-hour time specified is the time you need to do all services prescribed for a particular interval.

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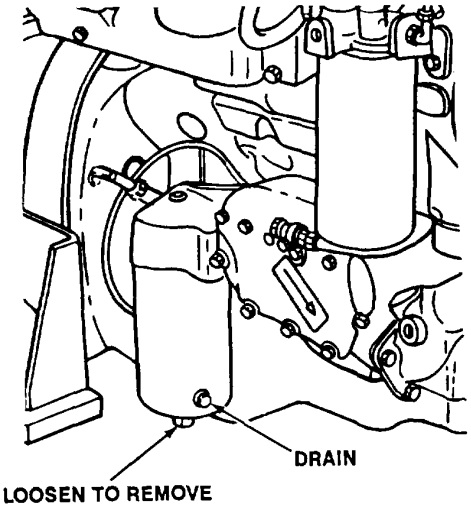
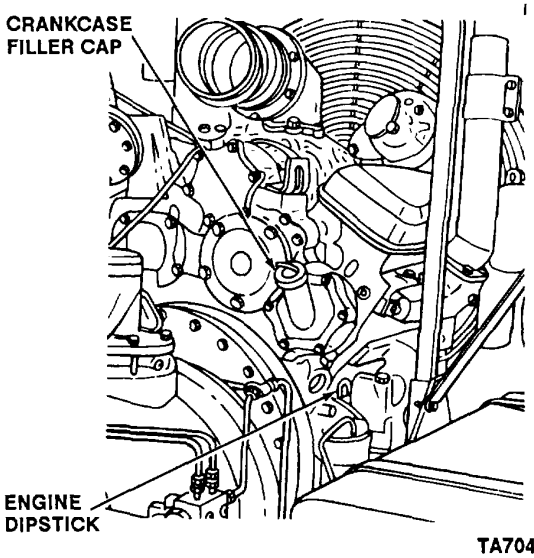
– KEY –

LUBRICANTS	EXPECTED TEMPERATURES			FOR ARCTIC OPERATIONS, REFER TO FM 9-207	INTERVALS
	ABOVE +32°F (ABOVE 0°C)	+40°F to -10°F (+4°C to -23°C)	0°F to -65°F (-18°C to -54°C)		
OE/HDO (MIL-L-2104) Lubricating Oil, Internal Combustion Engine, Tactical Service	OE/HDO-30	OE/HDO-10	–		OC – On Condition; secure when directed by AOAP laboratory. D – Daily S – Semiannual A – Annual Intervals given are in hours of normal operation.
OEA (MIL-L-46167) Lubricating Oil, Internal Combustion Engine, Arctic	–	–	OEA		
(MIL-A-46153) Antifreeze, Ethylene Glycol, Inhibited, Heavy-Duty, Single Package	MIL-A-46153	MIL-A-46153	–		
(MIL-A-11755) Antifreeze, Arctic Type	–	–	MIL-A-11755		
GAA (MIL-G-10924) Grease, Automotive and Artillery	All Temperatures				

(A) ENGINE OIL FILTER



(B) LEFT SIDE OF ENGINE



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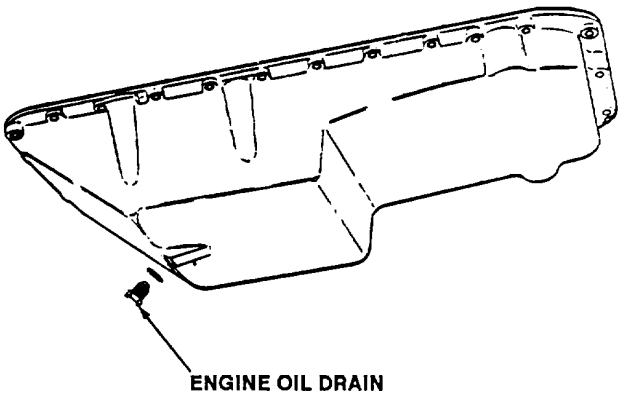
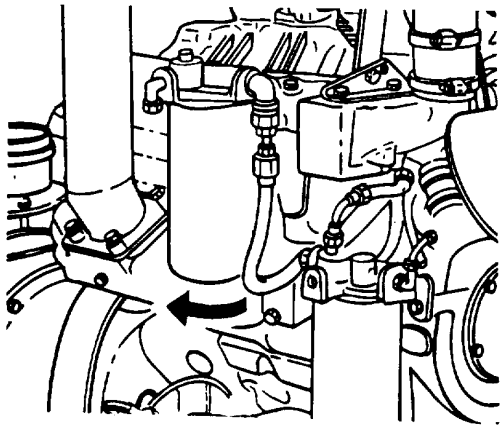
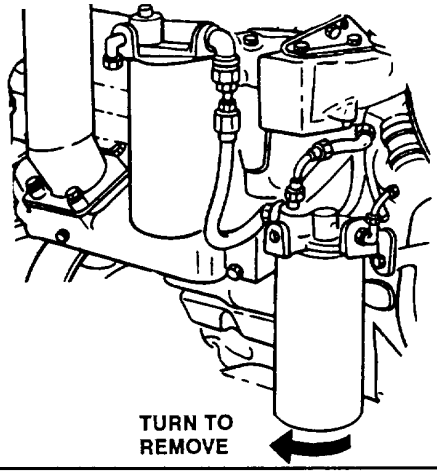
Ⓒ ENGINE CRANKCASE DRAIN



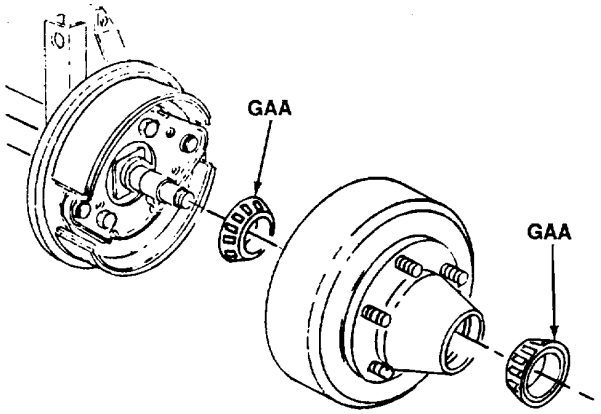
Ⓓ PRIMARY FUEL FILTER



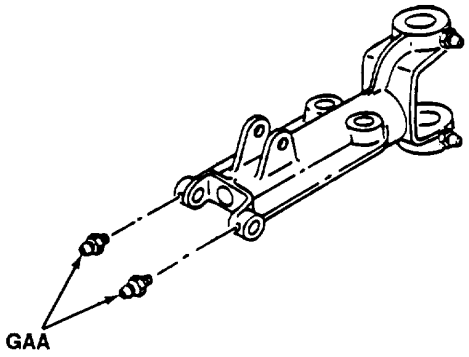
Ⓔ SECONDARY FUEL FILTER



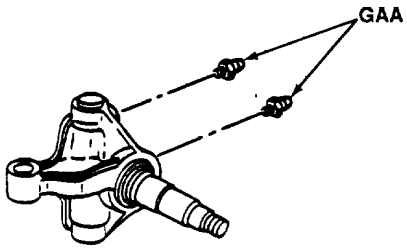
Ⓕ WHEEL BEARINGS



Ⓖ STEERING ARM



Ⓗ STEERING KNUCKLE



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NOTES:

1. ARMY OIL ANALYSIS PROGRAM (AOAP). For Active Army units, obtain samples from engine every 50 hours of operation or 90 days (whichever comes first). Reserve and National Guard activities will use 50 hours or 180 days as the prescribed sample intervals. Reserve and National Guard equipment in frequent use during active training period will adhere to the schedule for Active Army units. As a minimum, one sample from each item of equipment will be submitted for each units' two week active training period. Send these samples to the nearest AOAP laboratory. Refer to TB 43-0120 for sampling instructions. When or if AOAP laboratory support is unavailable, hard time intervals will apply.

NOTE

- **DO NOT hold oil samples. Submit oil samples as soon as they have been taken.**
- **Seasonal oil changes will be made due to expected temperatures (see KEY).**

2. FOR OPERATION OF EQUIPMENT IN PRO-TRACTED COLD TEMPERATURES BELOW -15°F (-26°C). Remove lubricants prescribed in Key for temperatures above -15°F (-26°C). Relubricate with lubricants specified in Key for temperatures below -15°F (-26°C). If OEA lubricant is required to meet the temperature ranges prescribed in the Key, OEA lubricant is to be used in place of OE/HDO-10 lubricant for all temperature ranges where OE/ HDO-10 is specified in the Key.

3. OIL CAN POINTS. Each 50 hours, lubricate side door hinges, front door hinges, hand brake assembly, and linkage with OE/HDO.

4. ENGINE OIL LEVEL CHECK. Engine oil level should be between "HIGH" and "LOW" marks on dipstick (allow to sit five minutes before checking).

5. ENGINE. Oil is to be changed each time an engine oil change is directed by AOAP laboratory. When AOAP laboratory support is not available, change oil each 100 hours. Drain when oil is warm.

6. ENGINE OIL FILTER. Filter is to be replaced each time an engine oil change is directed by AOAP laboratory. After installing new filter element, fill crankcase and operate engine five minutes. Check for leaks, check crankcase oil level, and bring to full mark. When AOAP laboratory support is not available, install new filter element each 100 hours.

7. OIL SEPARATOR LEVEL. Each 10 hours, check level. Maintain level to full mark with OE/HDO.

8. OIL SEPARATOR. Each 500 hours, change oil. Drain when lubricant is warm. After refill, operate for five minutes, check for leaks, and bring to full mark.

9. AIR COMPRESSOR OIL FILTER. Each 100 hours, remove filter element, clean housing, and install new filter element. After installing new filter element, fill air compressor, operate for five minutes, check for leaks, and bring to full mark.

WARNING

DO NOT attempt to clean the element or reuse the element because of its clean appearance. Metal salts are deposited on the element as the oil is separated from the air. Pollution of metal salts on the element will lower the flash point and can cause a fire in the separator. Destroy used element to pre- vent accidental reuse.

10. OIL SEPARATOR ELEMENT. Each 4000 hours, replace oil separator element.

11. WHEEL BEARINGS. Annually remove, clean, and pack wheel bearings with GAA (see TM 9-214).

Section II. OPERATOR/CREW TROUBLESHOOTING

3-3. GENERAL.

a. This section provides information for identifying and correcting malfunctions which may develop while operating your air compressor unit.

b. The Troubleshooting Symptom Index in paragraph 3-5 lists common malfunctions which may occur and refers you to the proper page in Table 3-1 for a troubleshooting procedure.

c. If you are unsure of the location of an item mentioned in troubleshooting, refer to paragraph 1-7 or to the maintenance task where the item is replaced.

d. Before performing troubleshooting, read and follow all safety instructions found in the warning summary at the front of this manual.

e. This section cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by the listed corrective actions, notify your supervisor.

f. When troubleshooting a malfunction:

(1) Locate the symptom or symptoms in paragraph 3-5 that best describe the malfunction.

(2) Turn to the page in Table 3-1 where the troubleshooting procedures for the malfunction in question are described. Headings at the top of each page show how each troubleshooting procedure is organized: MALFUNCTION, TEST OR INSPECTION (in step number order), and CORRECTIVE ACTION.

(3) Perform each step in the order listed until the malfunction is corrected. DO NOT perform any maintenance task unless the troubleshooting procedure tells you to do so.

3-4. EXPLANATION OF COLUMNS.

The columns in Table 3-1 are defined as follows:

(1) MALFUNCTION. A visual or operational indication that something is wrong with the air compressor unit.

(2) TEST OR INSPECTION. A procedure to isolate the problem in a component or system.

(3) CORRECTIVE ACTION. A procedure to correct the problem.

3-5. TROUBLESHOOTING SYMPTOM INDEX.

Table 3-1. Operator/Crew Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ENGINE
1. ENGINE WILL NOT START.
Step 1. Check that emergency stop control is pushed in. Push in emergency stop control.

Table 3-1. Operator/Crew Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 2 Check level of fuel in fuel tank.

If empty, fill tank with fuel.

WARNING

- **Remove all Jewelry such as dog tags, rings, bracelets, etc. If Jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result. Failure to follow proper disconnection procedures will result in serious injury or death to personnel or equipment damage.**
- **Battery acid (electrolyte) is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or inspections. Serious injury to personnel will result if battery acid contacts skin or eyes.**
- **DO NOT perform battery system checks or inspections while smoking or near fire, flames, or sparks. Batteries may explode, causing serious injury or death to personnel.**

Step 3. Check for loose, dirty, or corroded battery terminals.

If battery terminals are loose, dirty, or corroded, notify your supervisor.

WARNING

If NBC exposure is suspected, all engine air cleaner air filter media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

Step 4. Check engine air cleaner restriction indicator.

If red condition is present, clean air cleaner (see paragraph 3-6).

Step 5. Check fuel lines for leaks, kinks, and restrictions.

If leaks, kinks, or restrictions are found, notify your supervisor.

Step 6. Check electrolyte level in batteries (see paragraph 3-8).

If fluid level is low, notify your supervisor.

2. ENGINE DIFFICULT TO START.

Step 1. Check that emergency stop control is pushed in.

Push in emergency stop control.

Table 3-1. Operator/Crew Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

WARNING

- **Remove all Jewelry such as dog tags, rings, bracelets, etc. If Jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result. Failure to follow proper disconnection procedures will result in serious injury or death to personnel or equipment damage.**
- **Battery acid (electrolyte) is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or inspections. Serious injury to personnel will result if battery acid contacts skin or eyes.**
- **DO NOT perform battery system checks or inspections while smoking or near fire, flames, or sparks. Batteries may explode, causing serious injury or death to personnel.**

Step 2. Check for loose, dirty, or corroded battery terminals.

If battery terminals are loose, dirty, or corroded, notify your supervisor.

WARNING

If NBC exposure is suspected, all engine air cleaner air filter media should be handled y personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

Step 3. Check engine air cleaner restriction indicator.

If red condition is present, clean air cleaner (see paragraph 3-6).

3. UNUSUAL AMOUNT OF SMOKE FROM EXHAUST.

Check color of exhaust smoke.

If smoke is blue, notify your supervisor.

WARNING

If NBC exposure is suspected, all engine air cleaner air filter media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

If smoke is black, check air cleaner restriction indicator. If red condition is present, clean air cleaner (see paragraph 3-6).

4. ENGINE OVERHEATS.

WARNING

Cooling system is pressurized. Remove cap slowly and only when engine is cool. Failure to follow this warning may result in serious injury to personnel.

Step 1. Check coolant level in overflow tank.

Add coolant as required (see Lubrication Instructions, Chapter 3, Section I).

Table 3-1. Operator/Crew Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
Step 2.	Check radiator for restricted air flow.
	Clear air flow restriction.
Step 3.	Check engine oil level.
	If oil level is low, add engine oil (see Lubrication Instructions, Chapter 3, Section I).
Step 4.	Check for loose, slipping, or broken fan belt.
	If fan belt is loose, slipping, or broken, notify your supervisor.
5. ENGINE OIL PRESSURE TOO LOW.	
Step 1.	Check engine oil level.
	If oil level is low, add engine oil (see Lubrication Instructions, Chapter 3, Section 1).
Step 2.	Ensure that air compressor unit is level.
	Reposition air compressor unit as required.
Step 3.	Check lubrication oil system for leaks.
	If leaks are found, notify your supervisor.
	BRAKE SYSTEM
6. HANDBRAKE WILL NOT HOLD TRAILER.	
Check adjustment on handbrake lever.	
	Adjust handbrake lever (see paragraph 3-7).
	If handbrake lever still does not hold trailer, notify your supervisor.
	TIRES
7. ABNORMAL TIRE WEAR.	
Step 1.	Visually check tires for correct pressure.
	Inflate tires to proper pressure (see paragraph 1-11).
Step 2.	Check for loose wheel nuts.
	Notify Unit Maintenance to apply proper torque.

Table 3-1. Operator/Crew Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 3. Check for loose, cracked, bent, or broken rim or wheel. If rim or wheel is loose, cracked, bent, or broken, notify your supervisor.
8. AIR LEAKAGE FROM TIRES.
Step 1. Check valve core for looseness or damage. If valve core is loose or damaged, notify your supervisor.
Step 2. Check tires for cracks, gouges, and other damage. If tires are damaged, notify your supervisor.
9. NOISY OR WOBBLY WHEELS.
Check for loose wheel nuts. Notify Unit Maintenance to apply proper torque.
SUSPENSION
10. TRAILER SAGS TO ONE SIDE.
Step 1. Visually check tires for correct pressure. Inflate tires to proper pressure.
Step 2. Visually check for broken leaf springs. If leaf springs are broken, notify your supervisor.
AIR COMPRESSOR
11. EXCESSIVE OIL CARRY-OVER AT AIR DISCHARGE.
Check oil level in oil separator. If oil is over full, notify your supervisor.
12. AIR COMPRESSOR OVERHEATS.
Step 1. Check oil level in oil separator. If oil level is low, add oil as required (see Lubrication Instructions, Chapter 3, Section I).

Table 3-1. Operator/Crew Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 2. Check for dirty or clogged air compressor oil cooler.

Clean air compressor oil cooler.

Step 3. Check for loose, slipping, or broken fan belt.

If fan belt is loose, slipping, or broken, notify your supervisor.

13. AIR COMPRESSOR SHUTS DOWN WITH AIR DEMAND PRESENT.

Step 1. Check level of fuel in fuel tank.

If empty, fill tank with fuel (see Lubrication Instructions, Chapter 3, Section I).

Step 2. Check oil level in oil separator.

If oil level is low, fill oil separator with oil (see Lubrication Instructions, Chapter 3, Section I).

14. AIR DISCHARGE CAPACITY TOO LOW.

WARNING

If NBC exposure is suspected, all engine air cleaner air filter media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

Step 1. Check air compressor air cleaner restriction indicator.

If red condition Is present, clean air compressor air cleaner (see paragraph 3-6).

Step 2. Check to see if air compressor maintains proper air line pressure of 100 psi (690 kPa) on discharge gage.

If air compressor does not maintain proper air line pressure, notify your supervisor.

Step 3. Check service lines for leaks.

If leaks are found, notify your supervisor.

15. OIL CONSUMPTION TOO HIGH.

Step 1. Ensure that air compressor unit is level.

Reposition air compressor unit as required.

Step 2.. Check lubrication oil system for leaks.

If leaks are found, notify your supervisor.

Section III. MAINTENANCE PROCEDURES

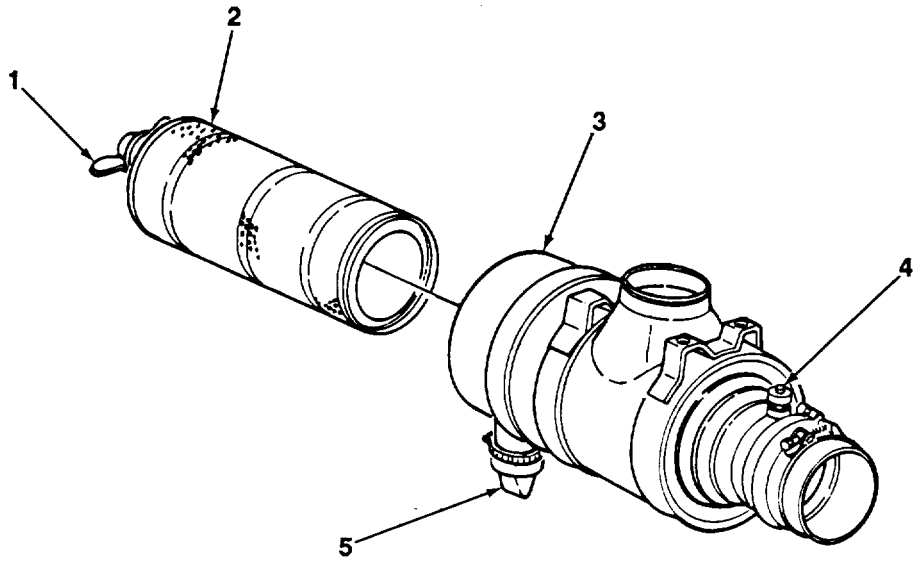
3-6. PRIMARY AIR CLEANER FILTER ELEMENT CLEANING.

WARNING

If NBC exposure is suspected, all engine air cleaner air filter media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

a. **Removal**.

(1) Loosen wingnut (1) and remove primary air cleaner filter element (2) from air cleaner body (3).
(2) Visually inspect primary air cleaner filter element (2) for tears or damage. If tears or damage are found, notify Unit Maintenance.



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3-6. PRIMARY AIR CLEANER ELEMENT CLEANING (Con't).

b. **Cleaning with Compressed Air.**

WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid injury to personnel.

(1) Direct compressed air through primary air cleaner filter element (2) in opposite direction of normal air flow. Using air gun, move up and down while directing compressed air through filter element.

(2) Using a light inside primary air cleaner filter element (2), visually inspect for tears or holes. If filter element has tears or holes, or is contaminated with dry or greasy dirt or oil, it must be replaced. Notify your supervisor.

(3) Clean air cleaner body (3) and dust collector (5) with rag (Item 35, Appendix E). Inspect air cleaner body and dust collector for cracks, breaks, or dents. If damaged, notify your supervisor.

c. **Cleaning with Mild Detergent**.

(1) Direct water through primary air cleaner filter element (2) up and down pleats of filter element from inside surface.

(2) Using a light inside primary air cleaner filter element (2), visually inspect for tears and holes. If primary air cleaner filter element has tears or holes, it must be replaced. Notify your supervisor.

(3) Visually inspect primary air cleaner filter element (2) for dry or greasy dirt or oil. If filter elements are contaminated with dry or greasy dirt or oil, agitate filter elements in solution of dishwashing compound (Item 13, Appendix E) and water. Add 4 tbsp (10 g) of dishwashing compound to 1 gal. (4 1) of lukewarm water and mix well. After washing, rinse thoroughly and carefully shake out excess water. Lay primary air cleaner filter element on side and allow to dry.

(4) Using a light inside primary air cleaner filter element (2), visually inspect for tears and holes. If primary air cleaner filter element has tears or holes, it must be replaced. Notify your supervisor.

(5) Visually inspect primary air cleaner filter element (2) for dirt and oil. If primary air cleaner filter element is still contaminated with dry or greasy dirt or oil, it must be replaced. Notify your supervisor.

(6) Clean air cleaner body (3) with rag (Item 35, Appendix E). Inspect air cleaner body and dust collector (5) for cracks, breaks, or dents. If damaged, notify your supervisor.

d. **Installation**.

(1) Install primary air cleaner filter element (2) in air cleaner body (3) with wingnut (1).

(2) Reset air restrictor Indicator (4) by pressing down on top of it. Ensure that red indicator disappears.

3-7. HANDBRAKE LEVER ADJUSTMENT.

NOTE

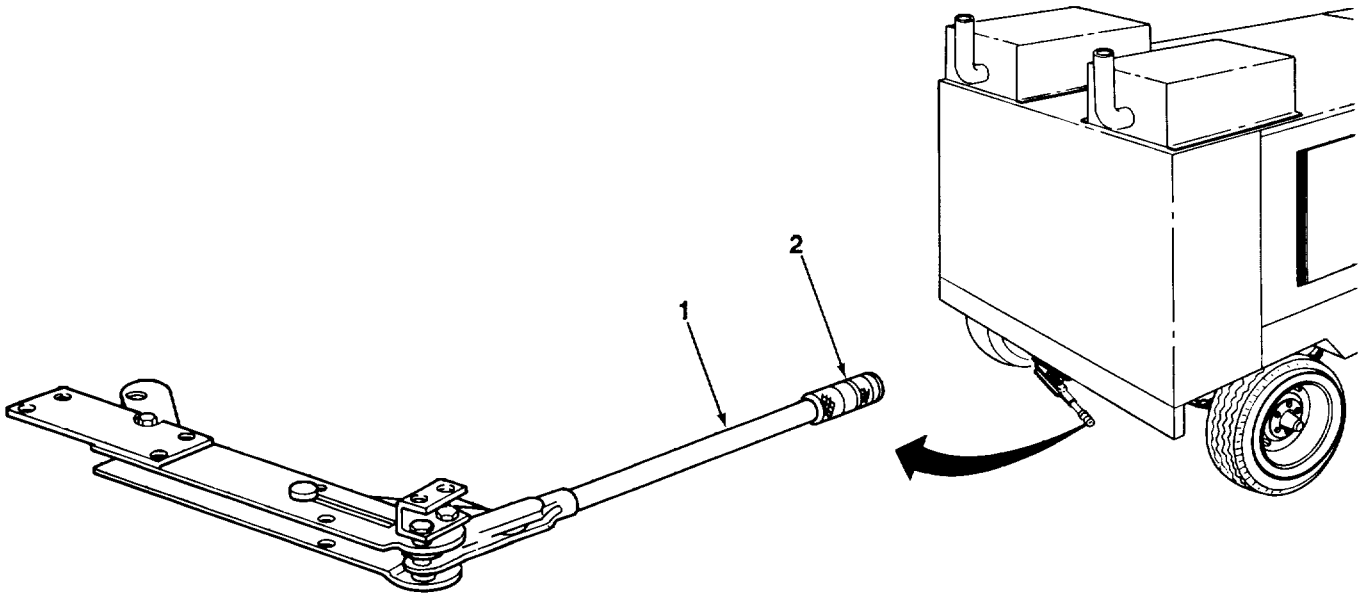
- **Handbrake lever is properly adjusted when additional force is needed to move lever beyond halfway point toward applied position.**
- **Handbrake is applied when lever is pulled forward until even with rear of air compressor unit.**

a. Release handbrakes by pushing handbrake lever (1) 450 toward front of air compressor unit.

b. Rotate adjustment knob (2) clockwise to tighten or counterclockwise to loosen.

c. Check adjustment.

d. Repeat steps a and b as necessary.



3-8. STORAGE BATTERY INSPECTION.

WARNING

- **Remove all Jewelry such as dog tags, rings, bracelets, etc. If Jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result. Failure to follow proper disconnection procedures will result in serious injury or death to personnel or equipment damage.**

- **Battery acid (electrolyte) is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or inspections. Serious injury to personnel will result if battery acid contacts skin or eyes.**

- **DO NOT perform battery system checks or inspections while smoking or near fire, flames, or sparks. Batteries may explode, causing serious injury or death to personnel.**

NOTE

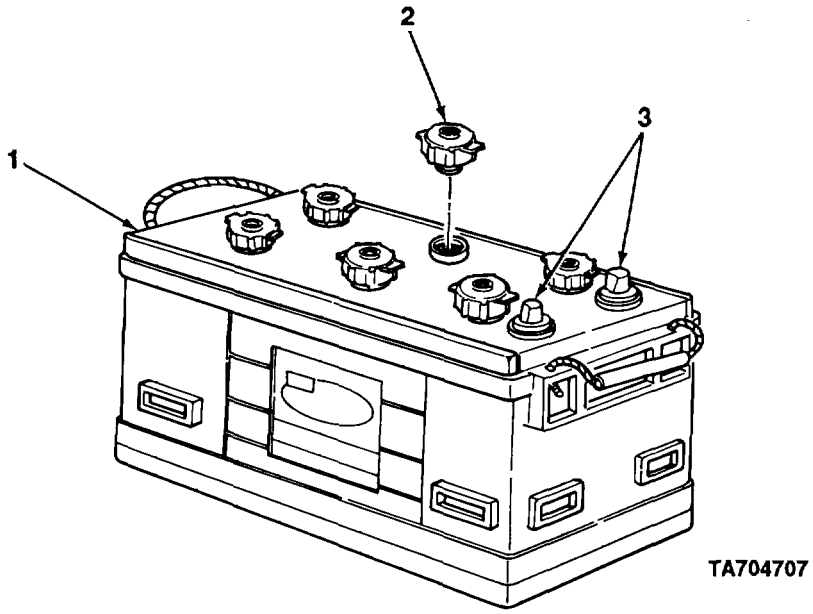
- **Refer to TM 9-6140-200-14 for additional instructions on inspecting batteries.**

- **Repeat steps a through c for each battery.**

a. Visually inspect battery (1) for damage and corrosion. Notify your supervisor if damage or corrosion is present.

b. Inspect two battery terminals (3) for looseness or damage. Notify your supervisor if battery terminals are loose or damaged.

c. Remove six vent caps (2) from battery (1) and check fluid level. Notify your supervisor if fluid level is low.



CHAPTER 4
UNIT MAINTENANCE

Section I. REPAIR PARTS; SPECIAL TOOLS; TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

4-1. COMMON TOOLS AND EQUIPMENT.

Refer to your Modified Table of Organization and Equipment (MTOE) for authorized common tools and equipment applicable to your unit.

4-2. SPECIALTOOLS; TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT.

For authorization of special tools; test, measurement, and diagnostic equipment (TMDE); and support equipment required to maintain the air compressor unit, refer to Appendix B, Maintenance Allocation Chart.

4-3. REPAIR PARTS.

Repair parts are listed and illustrated in TM 5-4310-451-24P.

Section II. SERVICE UPON RECEIPT

4-4. GENERAL.

When a new, used, or reconditioned air compressor unit is first received, determine whether it has been properly prepared for service and is in condition to perform its mission. Follow inspection instructions in paragraph 4-5 and servicing instructions in paragraph 4-7.

4-5. INSPECTION INSTRUCTIONS.

a. Refer to DD Form 1397 for procedures on unpacking air compressor unit.

b. Remove all straps, plywood, tape, seals, and wrappings.

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

c. Remove rust preventive compound from coated exterior parts of the air compressor unit using dry cleaning solvent (Item 38, Appendix E) and rags (Item 35, Appendix E).

d. Inspect air compressor unit for damage incurred during shipment. Check also to see if the equipment has been modified.

e. Check equipment against packing list to ensure that shipment is complete. Report any discrepancies in accordance with instructions in DA Pam 738-750.

4-6. PREPARE FOR USE.

DA Form 2258, attached to the air compressor unit, contains the checklist of items that must be accomplished before use. All items on DA Form 2258 must be properly completed before the air compressor unit can be safely operated.

4-7. SERVICING INSTRUCTIONS.

a. Perform all Operator/Crew and Unit PMCS. Schedule the next PMCS on DD Form 314.

b. Lubricate all lubrication points as described in Lubrication Instructions (see Chapter 3, Section I) regardless of interval.

c. Report any problems on DA Form 2404.

Section III. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

4-8. GENERAL.

To ensure that the air compressor unit is ready for operation at all times, it must be inspected on a regular basis so that defects may be found before they result in serious damage, equipment failure, or injury to personnel. This section contains systematic instructions on inspections, adjustments, and corrections to be performed by Unit Maintenance.

4-9. SERVICE INTERVALS.

Perform PMCS, found in Table 4-1, at the following intervals:

(1) Perform Quarterly (Q) PMCS once every three months.

(2) Perform Semiannual (S) PMCS once every six months.

(3) Perform Annual (A) PMCS once each year.

(4) Perform Hourly (H) PMCS based upon number of operating hours listed in column.

4-10. REPORTING REPAIRS.

Report all defects and corrective actions on DA Form 2404. If a serious problem is found, report it to your supervisor immediately.

4-11. GENERAL PMCS PROCEDURES.

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

a. Keep equipment clean. Dirt, oil, and debris may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (Item 38, Appendix E) on all metal surfaces. Use dishwashing compound (Item 13, Appendix E) and water on rubber, plastic, and painted surfaces.

4-11. GENERAL PMCS PROCEDURES (Con't).

b. While performing PMCS, inspect the following components:

(1) Bolts, Nuts, and Screws. Ensure that they are not loose, missing, bent, or broken. Tighten any that are loose.

(2) Welds. Inspect for cracks where parts are welded together. Report bad welds to your supervisor.

(3) Electric Wires or Connectors. Inspect for corroded, cracked or broken insulation, bare wires, and loose, broken, or cracked connectors. Make repairs or replace as required.

(4) Hoses, Lines, and Fittings. Inspect for wear, damage, and leaks. Ensure that clamps and fittings are tight. If a leak is caused by a loose fitting or connector, tighten it. If a component is broken or worn, correct problem If authorized by the Maintenance Allocation Chart (MAC) (Appendix B). If not authorized, report it to your supervisor.

4-12. SPECIFIC PMCS PROCEDURES.

a. Unit PMCS is provided in Table 4-1. Always perform PMCS in the order listed. Once it becomes a habit, any deficiency can be spotted in a minute. If any deficiency is discovered through PMCS, perform appropriate troubleshooting task in Section IV of this chapter. If any component or system is not serviceable, or if given service does not correct deficiency, notify your supervisor.

b. Before performing preventive maintenance, read all the checks required for the applicable interval and prepare tools needed to make all checks. Have several clean rags (item 35, Appendix E) handy. Perform ALL inspections at the applicable interval.

c. The columns in Table 4-1 are defined as follows:

(1) Item No. Provides a logical sequence for PMCS to be performed and is used as a source of item numbers for the "TM ITEM NO" column on DA Form 2404 in recording PMCS results.

(2) Interval. Specifies Interval at which PMCS is to be performed.

(3) Item to be inspected. Lists system and common name of items that are to be inspected.

(4) Procedures. Tells you how to do required check or service.

Table 4-1. Unit Preventive Maintenance Checks and Services (PMCS).

Q-QUARTERLY S-SEMIANNUAL A-ANNUAL H-HOURLY

Item No.	Interval Q	S	A	H	Item to be Inspected	Procedure
1	•				**LEVERS, LINKAGE, AND CABLES**	Inspect levers, linkage, and cables for missing parts, wear, mounting, and ease of operation.
2			•		**FRAME AND DRAWBAR RING**	Visually inspect frame and drawbar ring for broken welds, cracks, or other obvious damage.
3			•		**WHEEL BEARINGS**	Check bearings for wear or damage. Pack wheel bearings (see paragraphs 4-68 and 4-69).

Table 4-1. Unit Preventive Maintenance Checks and Services (PMCS) (Con't).

Q-QUARTERLY S-SEMIANNUAL A-ANNUAL H-HOURLY

Item No.	Interval Q	S	A	H	Item to be Inspected	Procedure
4			•		SPRINGS	Check springs for broken or damaged leaves. Check for loose or twisted U-bolts or other signs of obvious damage.
5			•		HANDBRAKE	Inspect handbrake lever and linkage to ensure proper operation and adjustment.
6				200	FUEL FILTERS	Change fuel filters (see paragraph 4-34 and 4-35).
7	•				RADIATOR	Check radiator for dirt or debris covering cooling fins.
8	•				FUEL SYSTEM	Check fuel system to include pumps, hoses, fittings, and tank for leaks or loose connections.
9		•			BATTERY	**WARNING** • **Remove all jewelry such as dog tags, rings, bracelets, etc. If Jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result. Failure to follow proper disconnection procedures will result in serious injury or death to personnel or equipment damage.** • **Battery acid (electrolyte) is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or inspections. Serious injury to personnel will result if battery acid contacts skin or eyes.** • **DO NOT perform battery system checks or inspections while smoking or near fire, flames, or sparks. Batteries may explode, causing serious injury or death to personnel.** • **Batteries generate hydrogen, a highly explosive gas. To prevent sparks from igniting battery gases, DO NOT connect negative (-) Jumper cable to negative (-) terminal on weak battery. Failure to follow this warning may result in serious injury or death to personnel.** Test battery for specific gravity. Inspect cables and clamps for corrosion and tightness.
10		•			GENERATOR AND STARTER	Inspect generator and starter mounting hardware.

Table 4-1. Unit Preventive Maintenance Checks and Services (PMCS) (Con't).

Q-QUARTERLY S-SEMIANNUAL A-ANNUAL H-HOURLY

Item No.	Interval Q	S	A	H	Item to be Inspected	Procedure
11		•			**WIRING AND SWITCHES**	Inspect wiring for defective insulation, breaks, and loose or corroded connections. Check switches for proper operation and visual defects.
12	•				**GAGES**	Visually inspect all gages for loose connections, proper operation, and other defects.
13	•				**AUTOMATIC ELECTRICAL SHUTDOWN SYSTEM**	Check shutdown system for proper operation.
14				200	**V-BELTS**	**NOTE** Replace all V-belts in a match set even if only one V-belt is worn. Inspect V-belts and adjust as needed (see paragraph 4-52).

Section IV. UNIT TROUBLESHOOTING PROCEDURES

4-13. GENERAL.

a. This section provides information for identifying and correcting malfunctions which may develop when operating or maintaining the air compressor unit. Electrical malfunctions are isolated to an individual circuit or component.

b. The Troubleshooting Symptom Index in paragraph 4-15 lists common malfunctions which may occur and refers you to the proper page in Table 4-2 or Table 4-3 for troubleshooting procedure.

c. This section cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by listed corrective actions, notify your supervisor.

d. Check the condition of the storage batteries prior to making any electrical checks (see TM 9- 6140-200-14).

e. When troubleshooting a malfunction:

(1) Question the operator to obtain any information that might help determine the cause of the problem. Before continuing, ensure that all applicable operator/crew troubleshooting was performed.

(2) Locate the symptom(s) in paragraph 4-15 that best describes the malfunction. If appropriate symptom is not listed, notify your supervisor.

(3) Turn to the page in Table 4-2 or Table 4-3 where troubleshooting procedure for the malfunction in question is described. Headings at the top of each page show how each troubleshooting procedure is organized: MALFUNCTION, TEST OR INSPECTION (in step number order) and CORRECTIVE ACTION.

(4) Perform each step in order listed until the malfunction is corrected. Do not perform any maintenance task unless the troubleshooting procedure tells you to do so.

4-14. EXPLANATIONS OF COLUMNS.

The columns in Table 4-2 and Table 4-3 are defined as follows:

(1) MALFUNCTION. A visual or operational indication that something is wrong with the air compressor unit.

(2) TEST OR INSPECTION. A procedure to isolate the problem in a component or system.

(3) CORRECTIVE ACTION. A procedure to correct the problem.

4-15 4-1 4.TROUBLESHOOTING SYMPTOM INDEX.

Table 4-2. Mechanical Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ENGINE

1. ENGINE TURNS OVER BUT WILL NOT START.

Check to see if fuel filter is clogged.

Replace fuel filter element (see paragraph 4-34 or 4-35).

2. TURNS OFF PREMATURELY.

Step 1 Check for any broken or loose electrical connections.

Test and tighten loose electrical connections.

Step 2 Check for faulty engine oil pressure switch, engine coolant temperature switch, or compressor discharge temperature switch.

Locate faulty switch and replace (see paragraph 4-76, 4-79, or 4-80).

3. WILL NOT RUN AT CORRECT SPEED.

Step 1 Check to see if fuel filter is clogged.

Replace fuel filter element (see paragraph 4-34 or 4-35).

WARNING

If NBC exposure is suspected, all engine air cleaner air filter media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

Step 2 Check to see if engine air cleaner filter is clogged.

Clean or replace engine air filter (see paragraph 4-31).

4. ENGINE OVERHEATS.

Check for dirty radiator core.

Clean radiator core.

BRAKES

5. HANDBRAKE WILL NOT HOLD AIR COMPRESSOR UNIT.

Check adjustment of handbrake cable and linkage.

Adjust handbrake cable and linkage (see paragraph 4-65).

Table 4-2. Mechanical Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
TIRES
6. ABNORMAL TIRE WEAR.
Step 1 Check for loose wheel bearings.
Adjust wheel bearings (see paragraph 4-68 or 4-69).
Step 2 Check for deformed brakedrum.
Replace brakedrum (see paragraph 4-69).
7. NOISY OR WOBBLY WHEELS.
Check for loose or worn wheel bearings.
Adjust or replace wheel bearings (see paragraph 4-68 or 4-69).
SUSPENSION
8. AIR COMPRESSOR UNIT LEANS TO ONE SIDE.
Check for broken spring leaves, center bolts, and clips.
Replace springs (see paragraph 4-75).
9. AIR COMPRESSOR UNIT PULLS TO ONE SIDE.
Step 1 Check wheel bearing adjustment.
Adjust wheel bearings (see paragraph 4-68 or 4-69).
Step 2 Check for loose springs.
Tighten U-bolts (see paragraph 4-75).
AIR COMPRESSOR
10. BLOWDOWN VALVE OPERATES ERRATICALLY
Step 1 Check for dirty blowdown valve.
Inspect and clean blowdown valve (see paragraph 4-88).

Table 4-2. Mechanical Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
Step 2	Check for defective blowdown valve diaphragm.
	Replace blowdown valve (see paragraph 4-88).
11. EXCESSIVE OIL IN DISCHARGE LINE.	
Check for oil carry-over into discharge line.	
	Replace oil separator element (see paragraph 4-90).
12. AIR DISCHARGE PRESSURE TOO LOW.	
Step 1	Check blowdown valve for leaks.
	Tighten or replace blowdown valve (see paragraph 4-88).
Step 2	Check pressure regulating valve for leaks.
	Tighten or replace pressure regulating valve (see paragraph 4-87).
Step 3	Check pressure regulating valve adjustment.
	Adjust pressure regulating valve (see paragraph 2-11).
Step 4	Check for damaged oil separator element.
	Replace oil separator element (see paragraph 4-90).
13. EXCESSIVE OIL CONSUMPTION.	
Step 1	Check for defective blowdown valve.
	Replace blowdown valve (see paragraph 4-88).
Step 2	Check for damaged oil separator element or oil carry-over into discharge line.
	Replace oil separator element (see paragraph 4-90).
14. UNIT WILL NOT UNLOAD.	
Step 1	Check for blocked regulating valve inlet.
	Remove and clean pressure regulating valve (see paragraph 4-87).
Step 2	Check pressure regulating valve adjustment.
	Perform pressure regulating valve adjustment (see paragraph 2-11).
Step 3	Check for defective blowdown valve.
	Replace blowdown valve (see paragraph 4-88).

Table 4-2. Mechanical Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
Step 4	Check for plugged oil separator element. Replace oil separator element (see paragraph 4-90).
15. IMPROPER UNLOADING CAUSING SAFETY RELIEF VALVE TO OPEN.	
Step 1	Check pressure regulating valve adjustment. Adjust pressure regulating valve (see paragraph 2-11).
Step 2	Check for blocked pressure regulating valve Inlet. Remove and clean pressure regulating valve (see paragraph 4-87).
Step 3	Check for defective blowdown valve, Replace blowdown valve (see paragraph 4-88).
Step 4	Check for plugged element in oil separator. Replace oil separator element (see paragraph 4-90).
Step 5	Check for defective pressure regulating valve. Replace pressure regulating valve (see paragraph 4-87).
Step 6	Check for jammed governor and sullicon control linkage. Notify Direct Support Maintenance.
Step 7	Check for restrictions in sullicon control system lines. Clear restrictions or replace lines (see paragraph 4-40).
16. START PRESSURE TOO HIGH.	
Step 1	Check for blocked pressure regulating valve inlet. Remove and clean pressure regulating valve (see paragraph 4-87).
Step 2	Check for defective blowdown valve. Replace blowdown valve (see paragraph 4-88).
17. EXCESSIVE VIBRATION.	
Step 1	Check for loose fan hub. Tighten fan hub (see paragraph 4-48).
Step 2	Check for collapsed, torn, or loose engine motor mounts. Notify Direct Support Maintenance.

Table 4-2. Mechanical Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
Step 3	Check that engine is operating properly. Troubleshoot engine.
18. AIR COMPRESSOR SHUTS DOWN WITH AIR DEMAND PRESENT.	
Step 1	Check for faulty thermostat in thermal valve. Replace thermal valve elements (see paragraph 4-89).
Step 2	Check for clogged compressor main oil filter. Clean or replace main oil filter element (see paragraph 4-93).
Step 3	Check for dirty radiator core. Clean radiator core.
19. AIR COMPRESSOR OVERHEATS.	
Step 1	Check for faulty thermostat in thermal valve. Replace thermal valve elements (see paragraph 4-89).
Step 2	Check for plugged oil cooler hoses. Notify Direct Support Maintenance.
Step 3	Check for clogged air compressor main oil filter. Clean or replace main oil filter element (see paragraph 4-93).
Step 4	Check for plugged oil return line. Clean or replace oil return line (see paragraph 4-101).

Table 4-3. Electrical Troubleshooting.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1 ENGINE WILL NOT CRANK.

NOTE

- **Ensure that batteries are fully charged.**
- **Ensure that cables are in good condition and installed correctly.**
- **Ensure that connectors are clean and secure on terminals.**

Step 1 Check starter circuit fuse.

If bad, replace fuse (see paragraph 4-57).

If good, perform step 2.

NOTE

- **When testing for voltage, negative lead from multimeter should be ground (air compressor unit frame).**
- **An assistant is required to push and hold engine start button and engine override button.**

Step 2 Push engine start button and test for voltage at button terminals. Is voltage present?

If NO, replace engine button start (see paragraph 4-56). Start engine to verify malfunction has been corrected.

If YES, perform step 3.

Step 3 Push engine start button and test for voltage at engine starter solenoid. Is voltage present?

If NO, replace wire from engine start button to engine starter solenoid (see paragraph 4-59). Start engine to verify malfunction has been corrected.

If YES, replace engine starter (see paragraph 4-53). Start engine to verify malfunction has been corrected.

2. ENGINE CRANKS SLOWLY.

Step 1 Test voltage of batteries (see TM 9-6140-200-14).

If NOT OK, charge or replace storage batteries (see paragraph 4-60).

If OK, perform step 2.

Step 2 Check battery cables for proper size, freedom of corrosion, and proper installation

If NOT OK, repair or replace wiring harness (see paragraph 4-61).

If OK, perform step 3.

Table 4-3. Electrical Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

NOTE

If ambient temperature is below 32 °F (0 °C), check that engine oil and diesel fuel ratings are correct.

Step 3. Test current draw of engine starter.

If NOT OK, replace engine starter (see paragraph 4-53).

If OK, start engine.

3. AMMETER INDICATES NO/LOW "CHARGE" CONDITION WITH ENGINE IDLING.

Step 1. Check for loose, broken, or slipping belt.

If NOT OK, adjust or replace alternator belt (see paragraph 4-52). Start engine to verify malfunction has been corrected.

If OK, perform step 2.

Step 2. Was charging system operating time limited? If NOT OK, charge batteries as necessary (see TM 9-6140-200-14). Start engine to verify malfunction has been corrected.

If OK, perform step 3.

Step 3. Check for loose, dirty, and corroded terminals, leads, plugs, and connectors.

If NOT OK, clean, repair, or replace terminals, leads, plugs, or connectors as required (see paragraph 4-61). Start engine to verify malfunction has been corrected.

If OK, perform step 4.

Step 4. Check output condition of batteries (see TM 9-6140-200-14).

If NOT OK, replace batteries (see paragraph 4-60). Start engine to verify malfunction has been corrected.

If OK, perform step 5.

Step 5. With engine Idling, check voltage at voltage regulator terminal.

If voltage Is 1.5-4 volts, replace alternator (see paragraph 4-51). Start engine to verify that malfunction has been corrected.

4. AMMETER INDICATES CONSTANT "CHARGE" CONDITION WITH ENGINE IDLING.

Check for loose, dirty, and corroded voltage regulator leads or terminals.

Clean, repair, or replace as required (see paragraph 4-61). Start engine to verify malfunction has been corrected.

Section V. GENERAL MAINTENANCE INSTRUCTIONS

4-16. GENERAL.

a. These general maintenance instructions contain general shop practices and specific procedures you must be familiar with to properly maintain your air compressor unit. You should read and understand these practices and procedures before performing any Unit Maintenance procedures.

b. Before beginning a task, find out how much repair, modification, or replacement is needed to fix the equipment. Sometimes the reason for equipment failure can be seen right away and complete teardown is not necessary. Disassemble equipment only as far as necessary to repair or replace damaged parts.

c. In some cases, a part may be damaged by removal. If the part appears to be good, and other parts behind it are not defective, leave it on and continue with the procedure. Here are a few simple rules.

(1) Do not remove dowel pins or studs unless loose, bent, broken, or otherwise damaged.

(2) Do not remove bearings or bushings unless damaged. If you need to remove them to access parts behind, carefully pull out bearings and bushings.

(3) Replace all gaskets, lockwashers, locknuts, seals, cotter pins, and preformed packings.

d. The following "Initial Setup" information applies to all procedures.

(1) Resources are not listed unless they apply to the procedure.

(2) "Personnel Required" is listed only if more than one technician is required to complete the task. If "Personnel Required" is not listed, one technician can complete the task.

e. All tags and forms attached to equipment must be checked to learn the reason for removal of equipment from service. Modification Work Orders (MWOs) and Technical Bulletins (TBs) must also be checked for equipment changes and updates.

4-17. WORK SAFETY.

a. Before beginning a procedure, think about the safety risks and hazards to yourself and others. Wear protective gear such as safety goggles or lenses, safety shoes, rubber apron, or gloves.

4-17. WORK SAFETY (Con't).

b. Immediately clean up spilled fluids to avoid slipping.

c. When lifting heavy parts, have someone help you. Ensure that lifting/jacking tool is working properly, that it meets weight requirement of part being lifted, and that it is securely fastened to part.

d. Always use power tools carefully.

e. Observe all WARNINGs and CAUTIONs.

4-18. CLEANING INSTRUCTIONS.

WARNING

Improper cleaning methods and use of unauthorized cleaning liquids or solvents can injure personnel and damage equipment. To prevent this, refer to TM 9-247 for further instruction.

a. **General**. Cleaning Instructions will be the same for the majority of parts and components which make up the air compressor unit. The following applies to all cleaning operations.

(1) Clean all parts before Inspection, after repair, and before assembly.

(2) Keep hands free of grease which can collect dust, dirt, and grit.

(3) After cleaning, all parts should be covered or wrapped to protect them from dust and dirt. Parts that are subject to rust should be lightly oiled (see paragraph 4-19).

b. **Steam Cleaning**.

(1) Before steam cleaning exterior of air compressor unit, protect all electrical equipment which could be damaged by steam or moisture.

WARNING

Avoid contact with live steam. Live steam can burn skin, cause blindness, and cause other serious Injury. Be sure to wear protective apron, gloves, and safety goggles when using live steam.

(2) Place disassembled parts in a suitable container to steam clean. Parts that are subject to rust should be dried and lightly oiled after cleaning (see paragraph 4-19).

c. Castings, Forgings, and Machined Metal Parts.

WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

(1) Clean inner and outer surfaces with dry cleaning solvent (Item 38, Appendix E).

(2) Remove grease and accumulated deposits with a scrub brush (Item 7, Appendix E).

4-18. CLEANING INSTRUCTIONS (Con't).

WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

(3) Clean all threaded holes with compressed air to remove dirt and cleaning fluids.

CAUTION

DO NOT wash oil seals, electrical cables, and flexible hoses with dry cleaning solvent or mineral spirits. Serious damage or destruction of material will result.

d. **Oil Seals, Electrical Cables, and Flexible Hoses**. Wash oil seals, electrical cables, and flexible hoses with a solution of dishwashing compound (Item 13, Appendix a) and water and wipe dry.

e. **Bearings**. Clean bearings In accordance with TM 9-214.

f. **General Cleaning Covered by Other Manuals**.

(1) TB 43-0212, *Purging, Cleaning and Coating Interior Ferrous and Terne Sheet Vehicle Fuel Tanks.*

(2) TB 750-1047, *Elimination of Combustibles from Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks.*

(3) TM 9-247, *Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel and Related Items Including Chemicals.*

4-19. PRESERVATION OF PARTS.

Unpainted metal parts that will not be installed immediately after cleaning may be covered with a thin coat of engine oil (Item 31, Appendix E).

4-20. PAINTING.

On painted areas where paint has been removed, paint in accordance with procedures outlined in TM 43-0139 and TB 43-0209. For camouflage painting instructions, refer to FM 5-20.

4-21. INSPECTION INSTRUCTIONS.

NOTE

All damaged areas should be marked for repair or replacement.

a. All components and parts must be carefully checked to determine if they are serviceable for use, can be repaired, or must be scrapped.

b. Inspect drilled and tapped (threaded) holes for the following:

(1) Wear, distortion, cracks, and any other damage in or around holes.

(2) Threaded areas for wear distortion (stretching) and evidence of cross-threading.

c. Inspect metal lines, flexible lines (hoses), and metal fittings and connectors for the following:

(1) Metal lines for sharp kinks, cracks, bad bends, and dents.

(2) Flexible lines for fraying, evidence of leakage, and loose metal fittings or connectors.

(3) Metal fittings and connectors for thread damage and worn or rounded hex heads.

4-21. INSPECTION INSTRUCTIONS (Con't).

d. Inspect castings, forgings, and machined metal parts for the following:

(1) Machined surfaces for nicks, burrs, raised metal wear, and other damage.
(2) Inner and outer surfaces for breaks and cracks.

e. Inspect bearings in accordance with TM 9-214.

4-22. REPAIR INSTRUCTIONS.

a. Repair castings, forgings, and machined metal parts using the following instructions:

(1) Repair minor cracked castings or forgings in accordance with TM 9-237.
(2) Repair minor damage to machined surfaces with a fine mill file or an abrasive cloth (Item 10, Appendix E).
(3) Replace any deeply nicked machined surface that could affect the assembly operation.
(4) Repair minor damage to threaded capscrew holes with thread tap of same size to prevent cutting oversize.

b. After repair, thoroughly clean all parts to prevent dirt, metal chips, and other foreign matter from entering any working parts.

4-23. TAGGING PARTS.

a. Use marker tags (Item 40, Appendix E) to identify all electrical wires, fuel, oil, and coolant lines, and any other parts which may be hard to identify or replace later. Fasten tags to parts during removal by wrapping wire fasteners around or through parts and twisting ends together. Position tags to be out of the way during cleaning, inspection, and repair. Mark tags with a pencil, pen, or marker.

b. Whenever possible, Identify electrical wires with number of terminal or wire to which it connects. If no markings can be found, tag both wires or wire and terminal, and use same identifying mark for both. If you cannot tag wire because it must fit through small hole or you cannot reach it, write down description of wire and the point to which it connects or draw a simple diagram on paper. Be sure to write down enough information so you will be able to properly connect wires during assembly. If you need to identify a loose wire, look for identifying numbers near end of wire, stamped on a permanent metal tag. Compare this number to wire numbers on appropriate electrical schematic.

c. Identify fuel, oil, and coolant lines whenever you are taking off more than one line at the same time. Mark tags with points to which lines and hoses must be connected. If it is not obvious which end of a line goes where, tag each end of line.

d. Identify and tag other parts as required by name and installed location.

4-24. ELECTRICAL GROUND POINTS.

Many electrical problems are the result of poor ground connections. You can ensure that ground connections are good by performing the following steps:

WARNING

Although master battery switch must be on and battery ground cable connected to test electrical circuit voltage, turn off master battery switch or disconnect battery ground cable before doing resistance tests or replacing parts. This will keep you from getting shocked and prevent damage to parts and equipment.

(1) Remove hardware connecting ground cable terminal lug to ground point.

4-24. ELECTRICAL GROUND POINTS (Con't).

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

(2) Clean mounting hardware, ground cable terminal lug, and ground point with dry cleaning solvent (Item 38, Appendix E) and scrub brush (Item 7, Appendix E).

(3) Remove any rust with wire brush (Item 9, Appendix E) and abrasive cloth (Item 10, Appendix E).

(4) Look for cracks, loose terminal lug, and stripped threads. Replace any defective parts.

(5) Install hardware connecting ground cable terminal lug to ground point. Ensure that all hardware is tight.

4-25. LINES AND PORTS.

To keep dirt from contaminating fluid systems when removing and installing fuel, oil, and coolant lines, perform the following steps: (1) Clean fittings and surrounding area before disconnecting lines.

(2) Cover, cap, plug, or tape lines and ports after disconnecting lines. When these are not available, use hand-carved wooden plugs, clean rags (Item 35, Appendix E), duct tape (Item 42, Appendix E), or other similar materials to prevent dirt from entering system.

(3) Ensure that new and used parts are clean before installing.

(4) Wait to uncover, uncap, unplug, or remove tape from lines and ports until just before connecting lines.

4-26. ANTISEIZING TAPE.

New antiseizing tape (Item 41, Appendix E) may be used to keep connections from leaking whenever you are connecting fuel, oil, and hydraulic system lines and fittings without compression sleeves or packings. Perform the following steps:

(1) Ensure that threads are clean and dry.

(2) Start tape one or two threads from small or leading edge of fitting, joining tape together with an overlap of about 0.125 in. (3.175 mm) for fittings with fine threads. For fittings with coarse threads, tape should be wrapped around threads two or three times.

(3) Wrap tape tightly in opposite direction as you tighten a nut. Tape must be pressed into threads without cutting or ripping.

CAUTION

DO NOT exceed specified torque or use power tools to tighten fittings taped with antiselzing tape. Overtightening could damage fitting threads and cause connection to leak.

(4) Using hand tools, tighten fittings to specified torque.

4-27. TUBES AND COMPRESSION FITTINGS.

a. Tubes with inverted nuts and compression fittings are designed for one time assembly. Once assembled, they must be replaced as a unit if any parts are found defective. Used parts may not seal properly when used with new ones.

b. Used tube assemblies in good condition can be Installed to their original location without leaking.

c. Assemble new tubes, compression sleeves, and inverted nuts as follows:

(1) Slide Inverted nut onto end of tube.

(2) Slide compression sleeve onto end of tube.

(3) Repeat steps 1 and 2 for other end of tube as required.

d. Install new tube assemblies as follows: (1) Insert end of tube as far as it will go into fitting to which tube Is being installed.

(2) Twist Inverted nut Into fitting and tighten It against compression sleeve with open-end wrench. Compression sleeve will clamp down around tube and conform to internal surface of fitting and inverted nut.

(3) Repeat steps 1 and 2 for other end of tube as required.

4-28. FLUID DISPOSAL.

Dispose of contaminated drained fluids In accordance with the Standard Operating Procedures (SOP) of your unit.

Section VI. ENGINE COMPONENT MAINTENANCE

4-29. ROCKER ARM COVERS REPLACEMENT.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Equipment Conditions:
•Master battery switch in OFF position.
•Primary fuel filter and bracket removed (right rocker arm cover only) (see paragraph 4-34).

Materials/Parts:
•One gasket

Tools/Test Equipment:
•General mechanic's tool kit

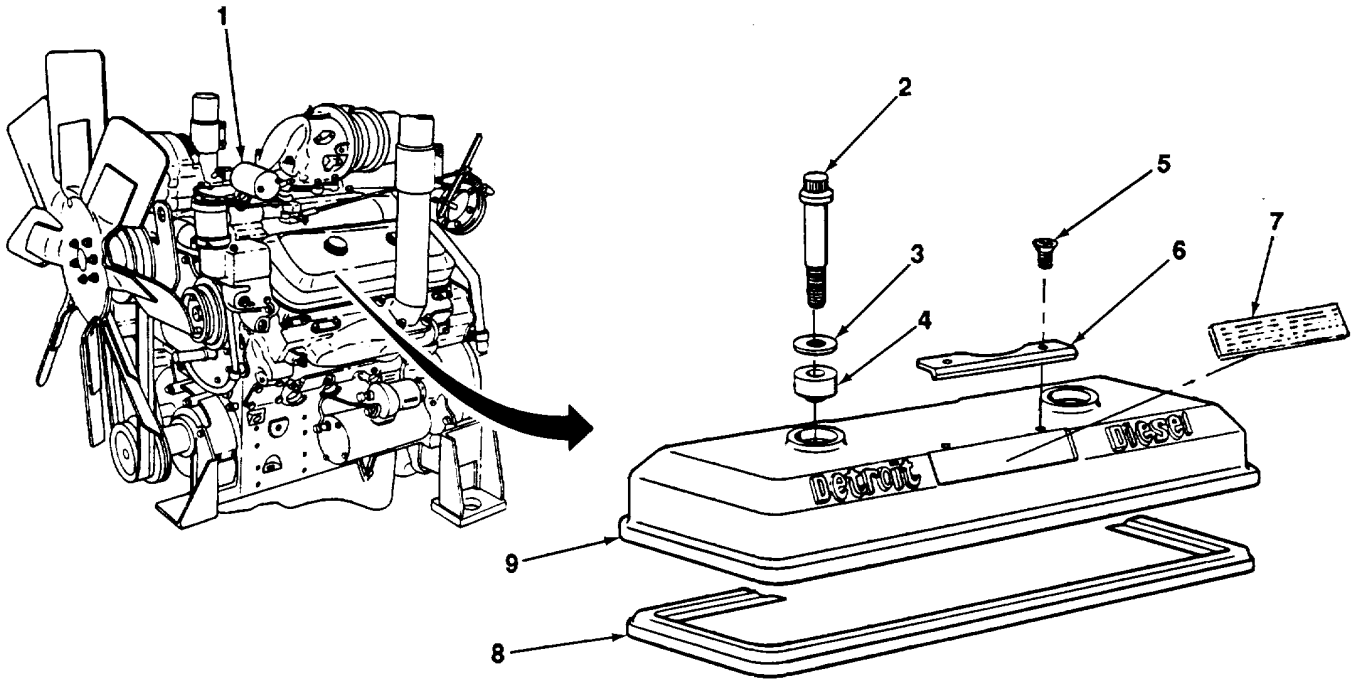
4-29. ROCKER ARM COVERS REPLACEMENT (Con't).

a. REMOVAL

NOTE

Left and right rocker arm covers are removed same way. This procedure covers left rocker arm cover.

1. Remove two bolts (2), washers (3), resilient mounts (4), rocker arm cover (9), and gasket (8) from engine (1). Discard gasket.
2. Remove two screws (5), retainer plate (6), and identification plate (7) from rocker arm cover (9).



b. INSTALLATION

NOTE

Left and right rocker arm covers are installed same way. This procedure covers left rocker arm cover.

1. Install identification plate (7) on rocker arm cover (9) with retainer plate (6) and two screws (5).
2. Install new gasket (8) and rocker arm cover (9) on engine (1) with two resilient mounts (4), washers (3), and bolts (2).

FOLLOW-ON TASKS:

- Install primary fuel filter and bracket (right rocker arm cover only) (see paragraph 4-34).
- Start engine (see paragraph 2-10) and check for leaks around gasket.

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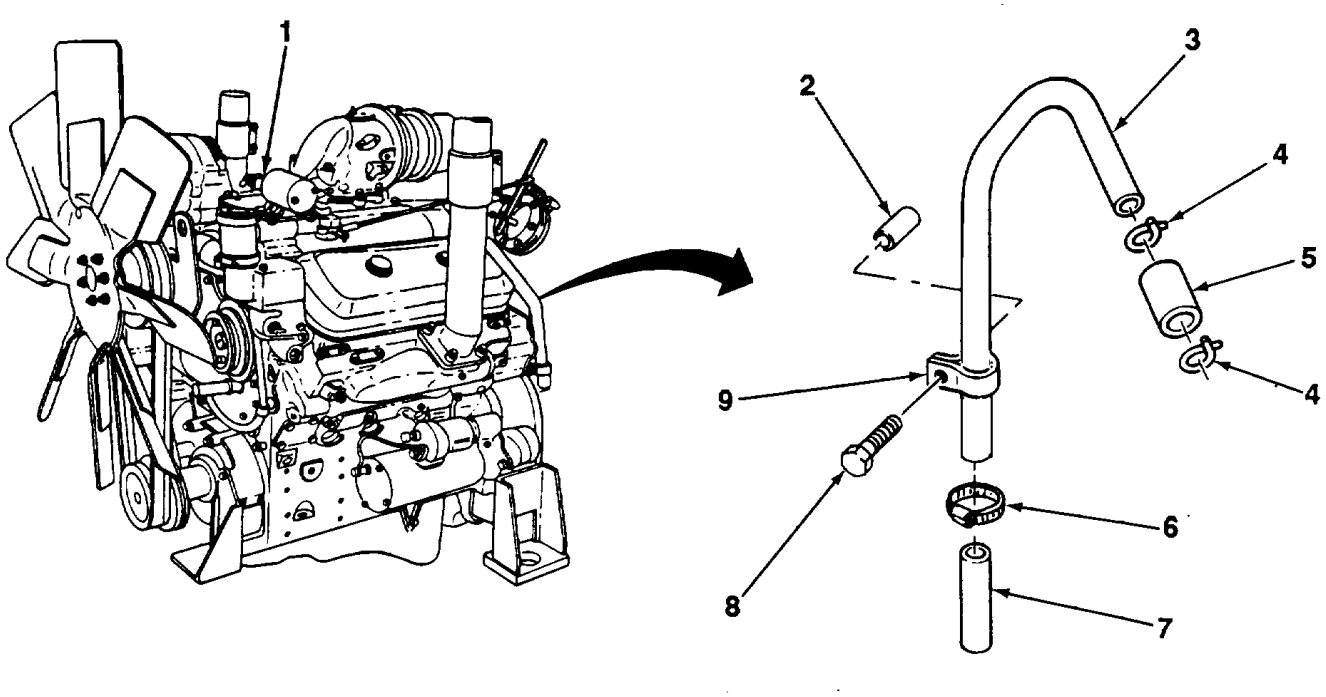
4-30. ENGINE BREATHER REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:
Tools/Test Equipment:
•General mechanic's tool kit

a. REMOVAL

1. Remove clamp (6) and hose (7) from breather tube (3).
2. Remove screw (8), spacer (2), and clamp (9) from breather tube (3).
3. Remove two clamps (4), breather tube (3), and hose (5) from engine block (1).



b. INSTALLATION

1. Install hose (5) on engine block (1).
2. Slide two clamps (4) over hose (5).
3. Install breather tube (3) into hose (5) and slide one clamp (4) over hose and breather tube.
4. Install clamp (9) over breather tube (3) and secure to engine block (1) with spacer (2) and screw (8).
5. Install hose (7) on breather tube (3) with clamp (6).

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Section VII. ENGINE LUBRICATION SYSTEM MAINTENANCE

4-31. ENGINE AIR CLEANER ASSEMBLY MAINTENANCE.

This Task Covers:

a. Elements Replacement
b. Air Cleaner Assembly Removal
c. Air Cleaner Assembly Installation

Initial Setup:

Equipment Conditions:
- Master battery switch in OFF position.

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- One cotter pin
- One gasket
- Six lockwashers

Personnel Required: Two

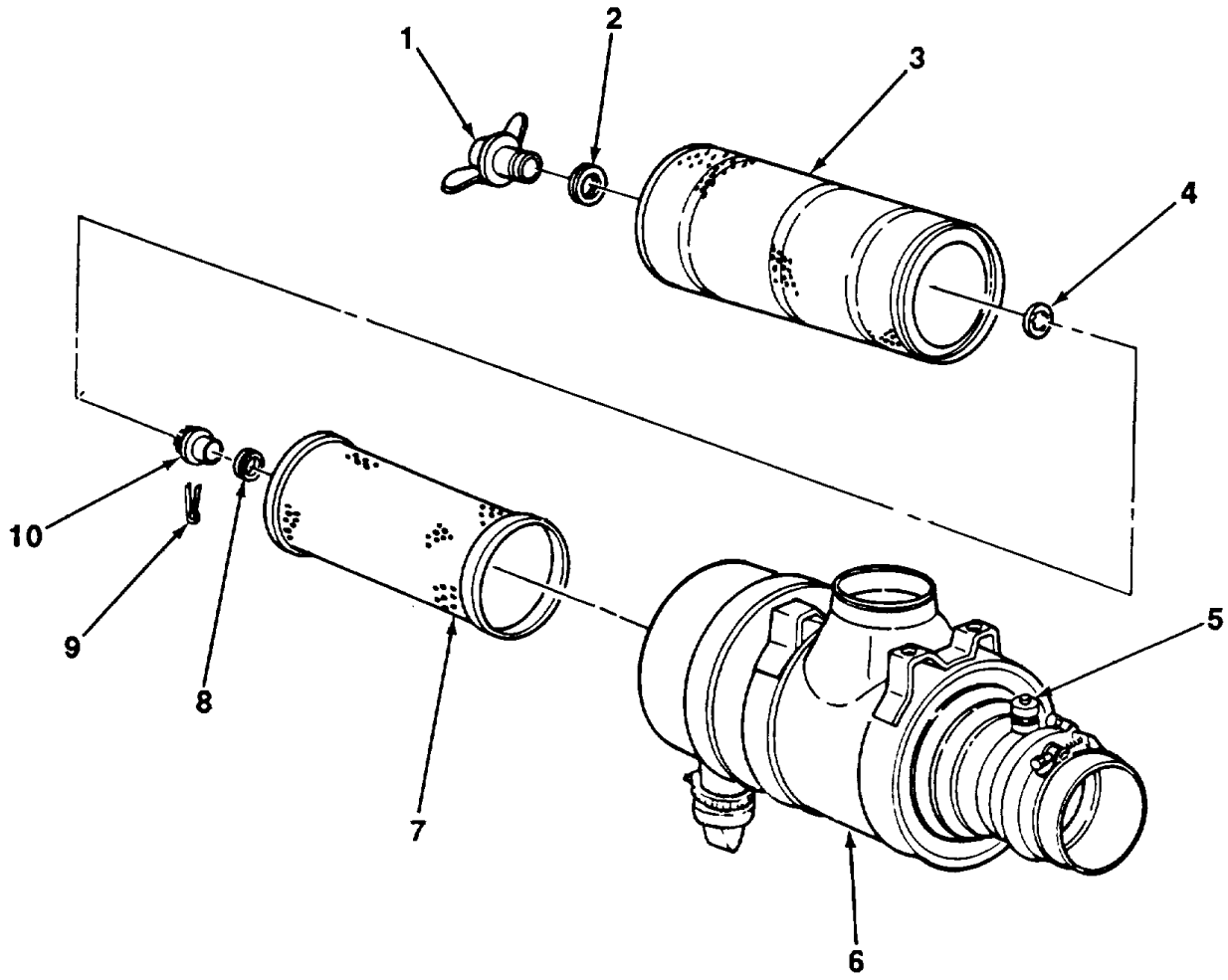
WARNING

If NBC exposure is suspected, all engine air cleaner air filter media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

4-31. ENGINE AIR CLEANER ASSEMBLY MAINTENANCE (Con't).

a. ELEMENTS REPLACEMENT

1. Loosen wingnut (1) and sealing washer (2) and remove primary element (3) from air cleaner body (6).
2. Remove retaining ring (4), sealing washer (2), and wingnut (1) from primary element (3).
3. Remove cotter pin (9), nut (10), sealing washer (8), and secondary element (7) from air cleaner body (6). Discard cotter pin.
4. Install secondary element (7) in air cleaner body (6) with sealing washer (8) and nut (10). Install new cotter pin (9) in nut.
5. Install sealing washer (2) and wingnut (1) to primary element (3) with retaining ring (4).
6. Install primary element (3) In air cleaner body (6) with sealing washer (2) and wingnut (1).
7. Press down on top of restriction Indicator (5) to reset.



b. AIR CLEANER ASSEMBLY REMOVAL

1. Loosen clamp (20) and remove dust collector (21) and clamp from air cleaner assembly (19).
2. Remove restriction indicator (5) from air cleaner assembly (19).

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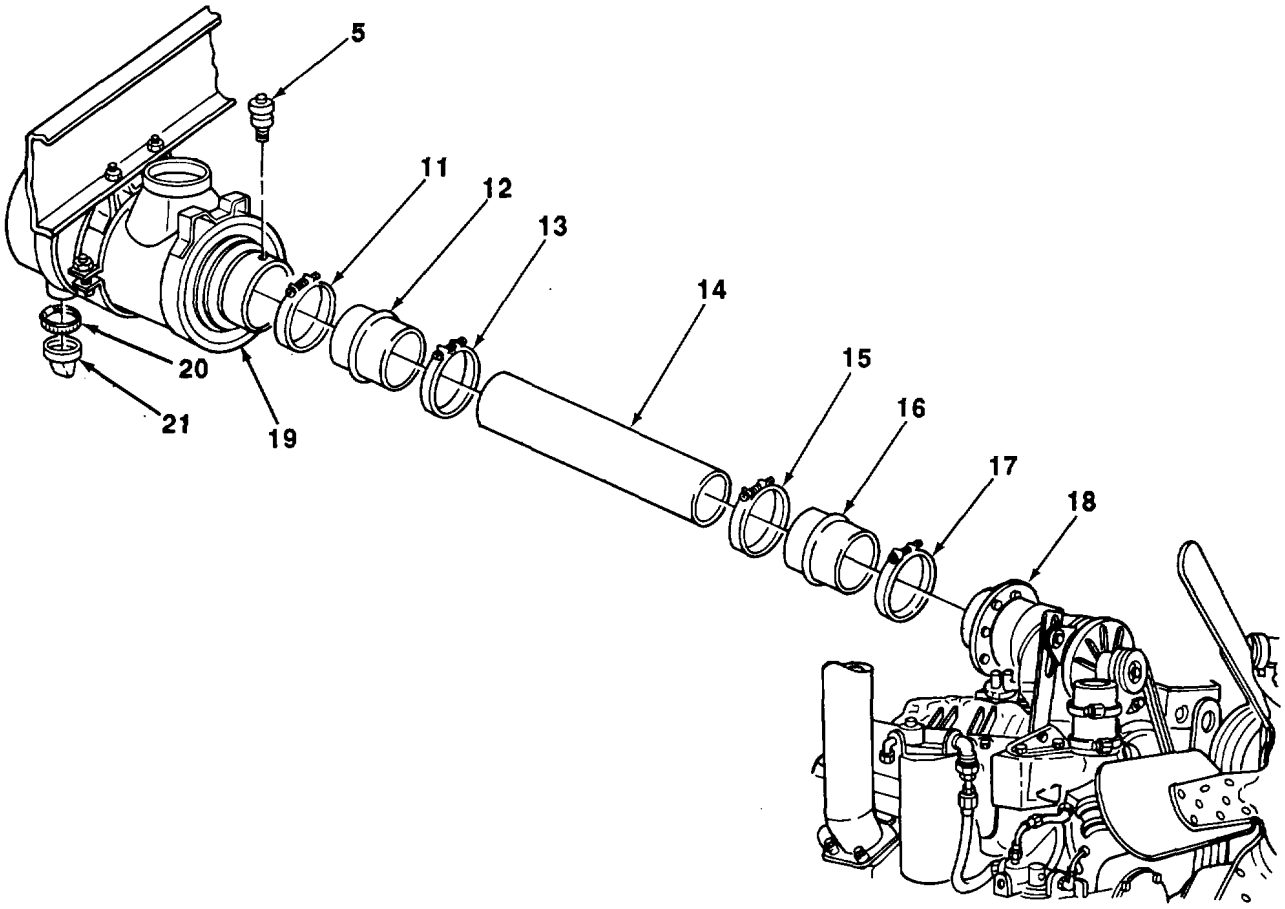
4-31. ENGINE AIR CLEANER ASSEMBLY MAINTENANCE (Con't).

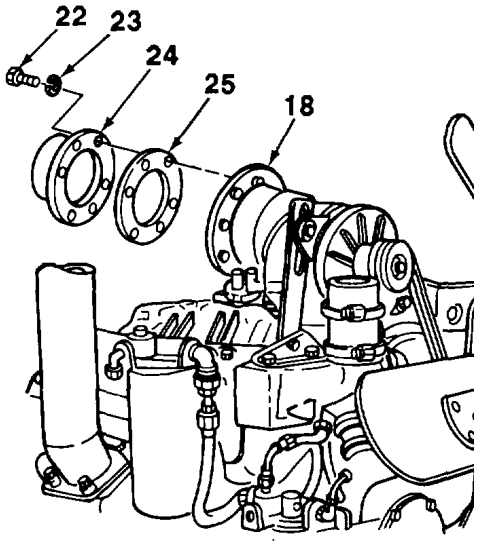


3. Loosen clamps (11 and 13) and remove hose connector (12) from air cleaner assembly (19) and air tube (14).

4. Loosen clamp (15) and remove air tube (14) from hose connector (16).

5. Loosen clamp (17) and remove hose connector (16) from engine air inlet (18).

6. Remove six screws (22), lockwashers (23), engine inlet adapter (24), and gasket (25) from engine air inlet (18). Discard lockwashers and gasket.



TA704711

4-31. ENGINE AIR CLEANER ASSEMBLY MAINTENANCE

7. Have assistant support air cleaner assembly (19). Remove two nuts (30) and bolts (29) and let two clamps (27) open. Remove air cleaner assembly from clamps.

NOTE

Each clamp is removed same way.

8. If damaged, remove two nuts (31), screws (28), and clamp (27) from support (26).

c. AIR CLEANER ASSEMBLY INSTALLATION.

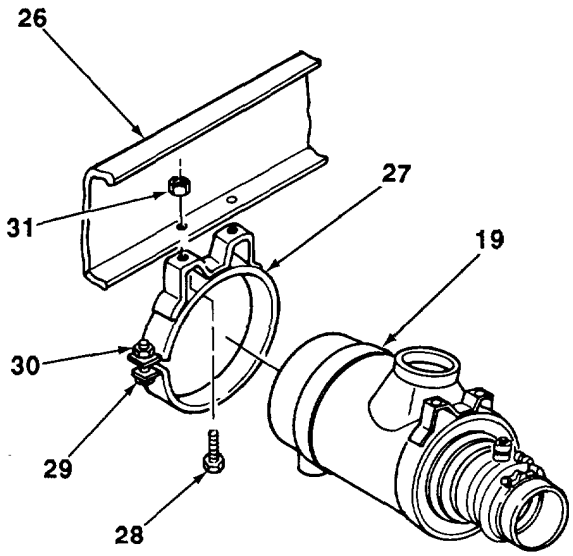
NOTE

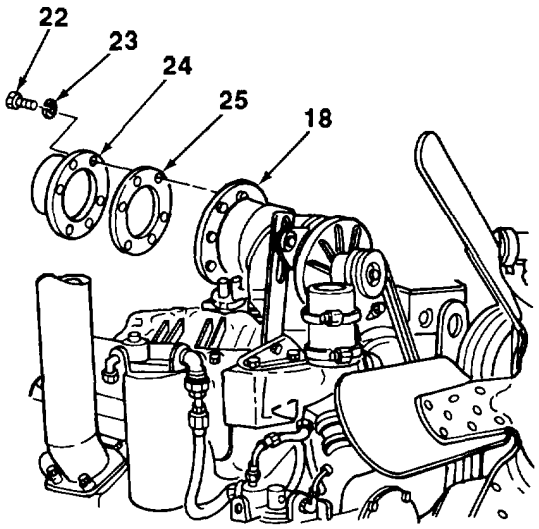
Each clamp is installed same way.

1. If removed, install clamp (27) on support (26) with two screws (28) and nuts (31).

2. Position air cleaner assembly (19) in two clamps (27). Install two bolts (29) and nuts (30) into two clamps. Tighten two clamps to secure air cleaner assembly.

3. Install new gasket (25) and engine inlet adapter (24) on engine air inlet (18) with six new lockwashers (23) and screws (22).





TA704712

4-31. ENGINE AIR CLEANER ASSEMBLY MAINTENANCE (Con't).

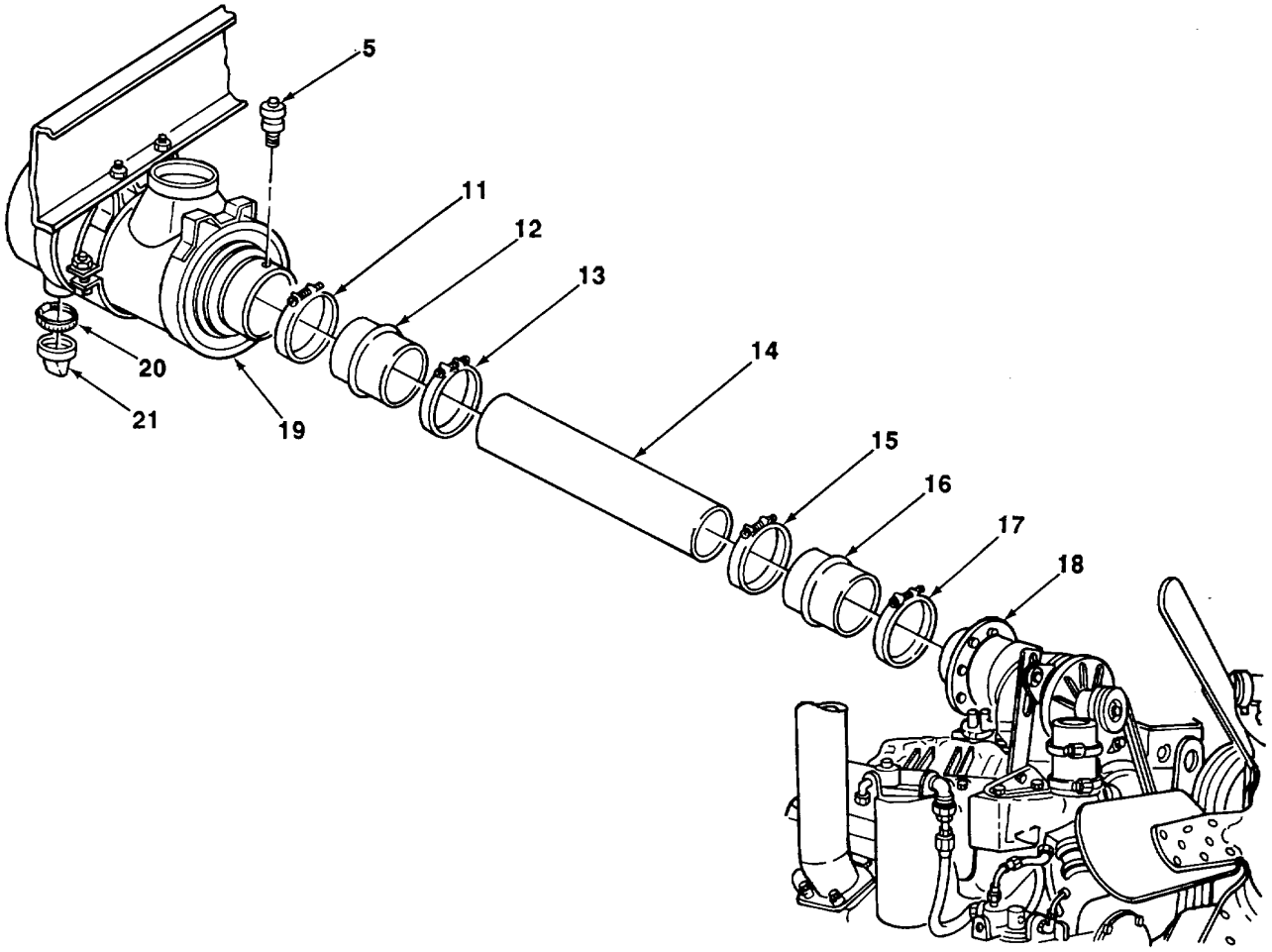
4. Position hose connector (16) on engine air inlet (18) and tighten clamp (17).

5. Position air tube (14) on hose connector (16) and tighten clamp (15).

6. Position hose connector (12) on air tube (14) and air cleaner assembly (19) and tighten clamps (11 and 13).

7. Install restriction indicator (5) on air cleaner assembly (19).

8. Install dust collector (21) and clamp (20) on air cleaner assembly (19). Tighten clamp.



TA704713

4-32. OIL PAN AND MAGNETIC PLUG REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:

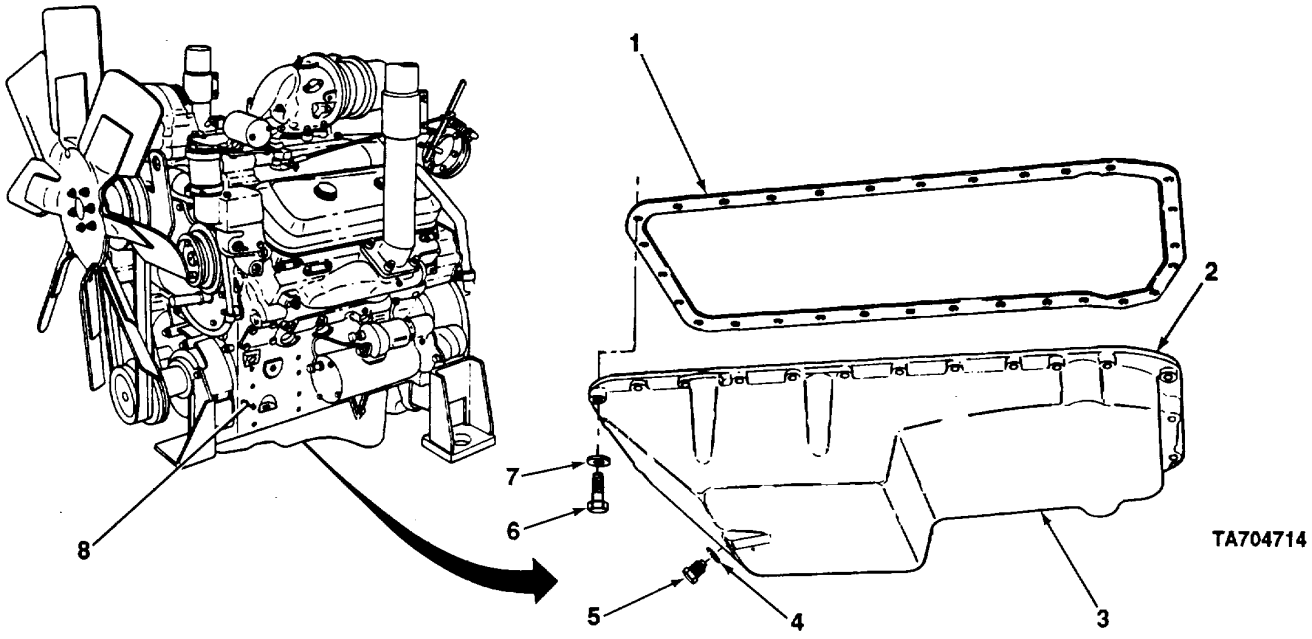
Equipment Conditions:
- Center bottom cover removed (see paragraph 4-81).

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

Materials/Parts:
- Adhesive (Item 1, Appendix E)
- Two gaskets
- Twenty-four lockwashers

a. REMOVAL

1. Remove magnetic plug (5) and drain oil into suitable container.
2. Remove gasket (4) from magnetic plug (5). Discard gasket.
3. Remove 24 bolts (6), lockwashers (7), oil pan (3), and gasket (1) from engine block (8). Discard lockwashers and gasket.



4-32. OIL PAN AND MAGNETIC PLUG REPLACEMENT (Con't).

b. INSTALLATION

1. Apply adhesive to gasket mating surface (2) of oil pan (3).
2. Aline new gasket (1) with oil pan (3) and install gasket on oil pan.
3. Position oil pan (3) under engine block (8) and install 24 new lockwashers (7) and bolts (6). Torque bolts to 20 lb.-ft. (27 N•m).
4. Install new gasket (4) on magnetic plug (5).
5. Install magnetic plug (5) in oil pan (3).

FOLLOW-ON TASKS:

- Install center bottom cover (see paragraph 4-81).
- Fill crankcase with oil (see Lubrication Instructions, Chapter 3, Section I).

4-33. OIL FILTER AND ADAPTER MAINTENANCE.

This Task Covers:

a. Filter Element Removal
b. Filter Disassembly
c. Adapter Removal
d. Adapter Disassembly
e. Adapter Assembly
f. Adapter Installation
g. Filter Assembly
h. Filter Element

Installation

Initial Setup:

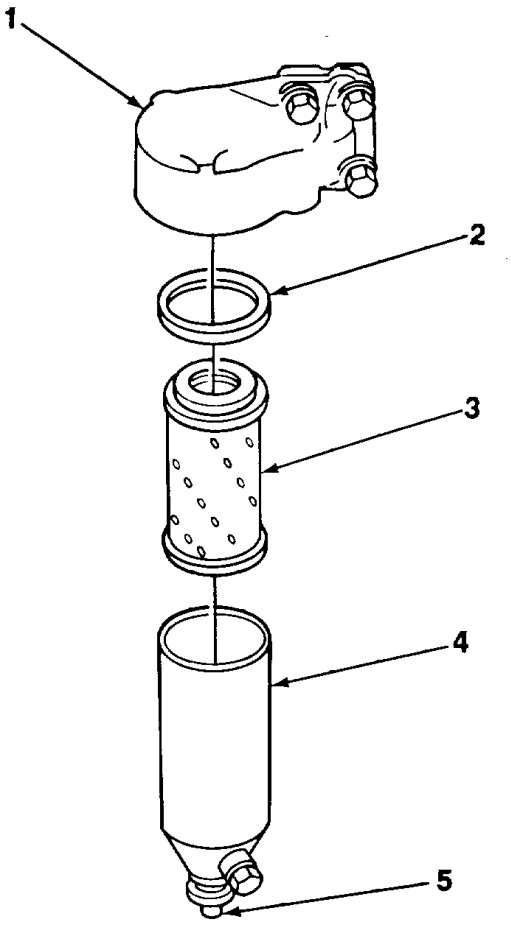
Equipment Conditions:
- Master battery switch in OFF position.

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- One filter element
- One preformed packing
- Four gaskets
- Four lockwashers

a. FILTER ELEMENT REMOVAL

1. Remove bolt (5) with cover (4) from adapter (1).
2. Remove filter element (3) from cover (4). Discard filter element.
3. Remove gasket (2) from adapter (1). Discard gasket.



TA704715

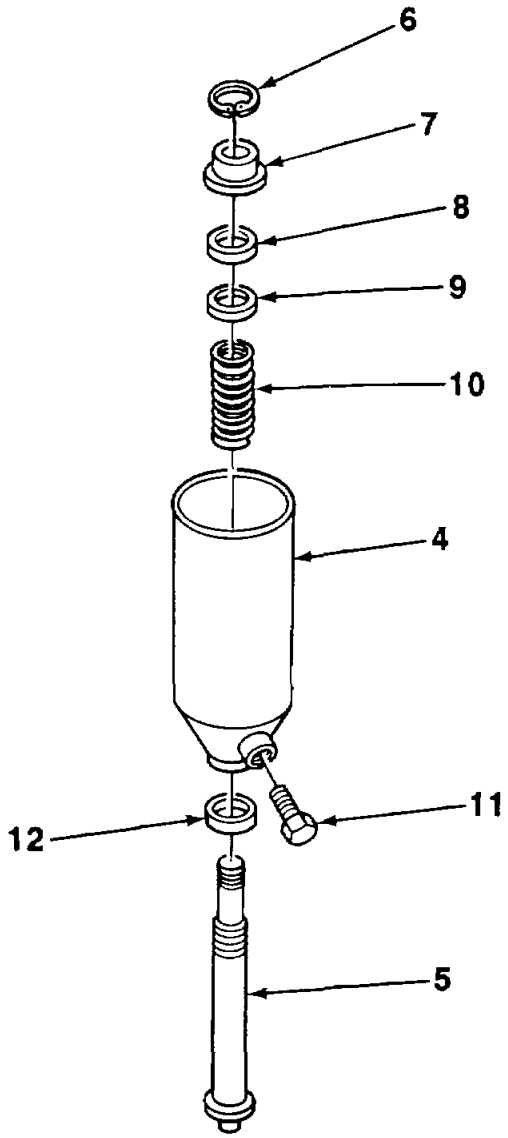
4-33. OIL FILTER AND ADAPTER MAINTENANCE (Con't).

b. FILTER DISASSEMBLY

1. Remove retaining ring (6), nut (7), spacer (8) gasket (9), and spring (10) from bolt (5). Discard gasket.

2. Remove bolt (5) and preformed packing (12) from cover (4). Discard preformed packing.

3. Remove plug (11) from cover (4).



TA704716

4-33. OIL FILTER AND ADAPTER MAINTENANCE

c. ADAPTER REMOVAL

1. Remove bolt (16) and lockwasher (17) from adapter (1). Discard lockwasher.

2. Remove three bolts (15), lockwashers (14), adapter (1), and gasket (13). Discard lockwashers and gasket.

d. ADAPTER DISASSEMBLY

Remove screw (18), retainer (19), gasket (20), spring (21), and disk valve (22) from adapter (1). Discard gasket.

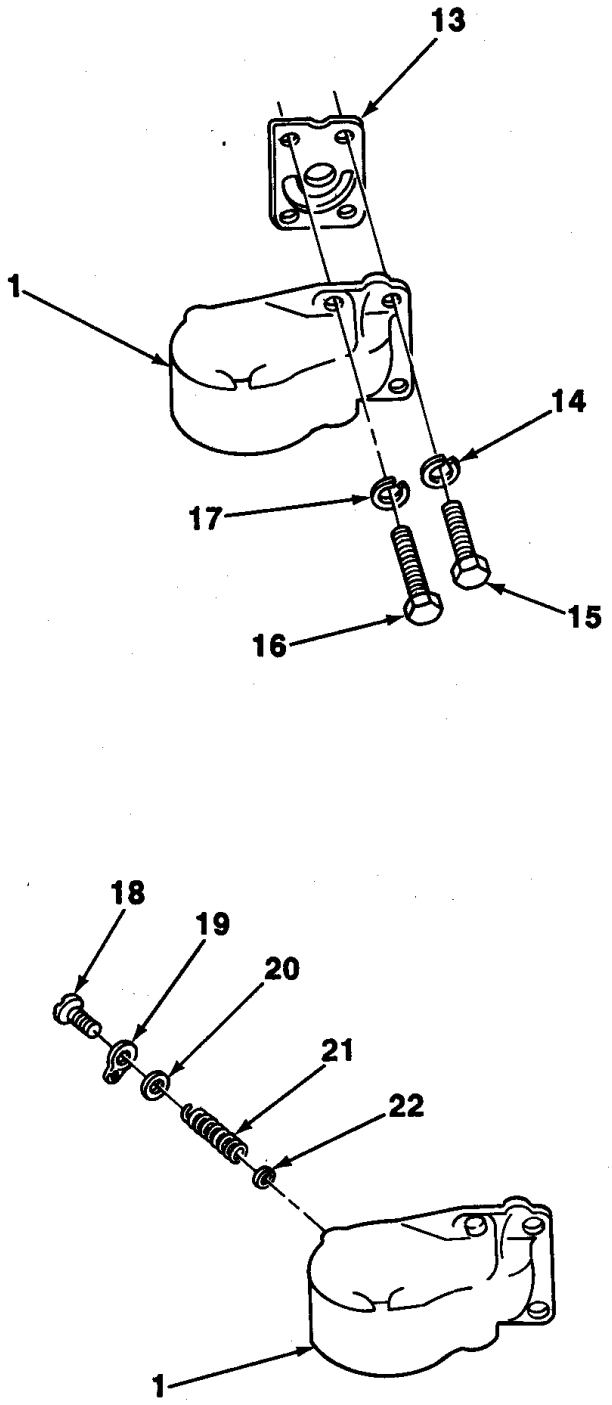
e. ADAPTER ASSEMBLY

Install disk valve (22), spring (21), new gasket (20), and retainer (19) in adapter (1) with screw (18).

f. ADAPTER INSTALLATION

1. Install new gasket (13) and adapter (1) with three new lockwashers (14) and bolts (15).

2. Install new lockwasher (17) and bolt (16).

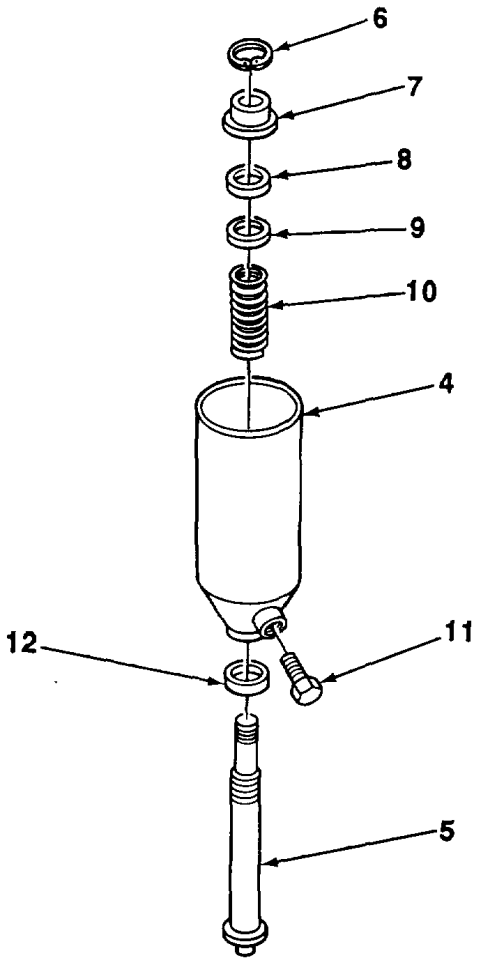


TA704717

4-33. OIL FILTER AND ADAPTER MAINTENANCE (Con't).

g. FILTER ASSEMBLY I

1. Install plug (11) in cover (4).
2. Install new preformed packing (12) and bolt (5) in cover (4).
3. Install spring (10), new gasket (9), spacer (8), nut (7), and retaining ring (6) on bolt (5).

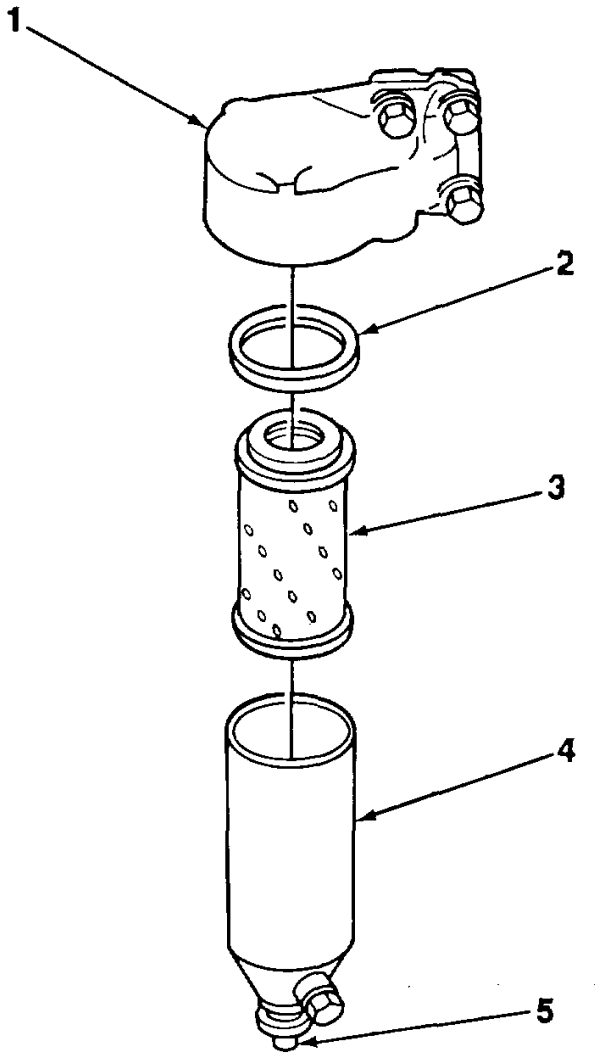


TA704718

4-33. OIL FILTER AND ADAPTER MAINTENANCE (Co

h. FILTER ELEMENT INSTALLATION

1. Install new filter element (3) in cover (4).
2. Install new gasket (2) in adapter (1).
3. Install cover (4) on adapter (1) with bolt (5).



TA704719

FOLLOW-ON TASKS:

- Fill with engine oil as necessary (see Lubrication Instructions, Chapter 3, Section 1).

Section VIII. ENGINE FUEL SYSTEM MAINTENANCE

4-34. PRIMARY FUEL FILTER MAINTENANCE.

This Task Covers:

a. Fuel Filter Element Replacement
b. Fuel Filter Base Removal
c. Fuel Filter Base Installation

Initial Setup:

Equipment Conditions:
- Master battery switch in OFF position.

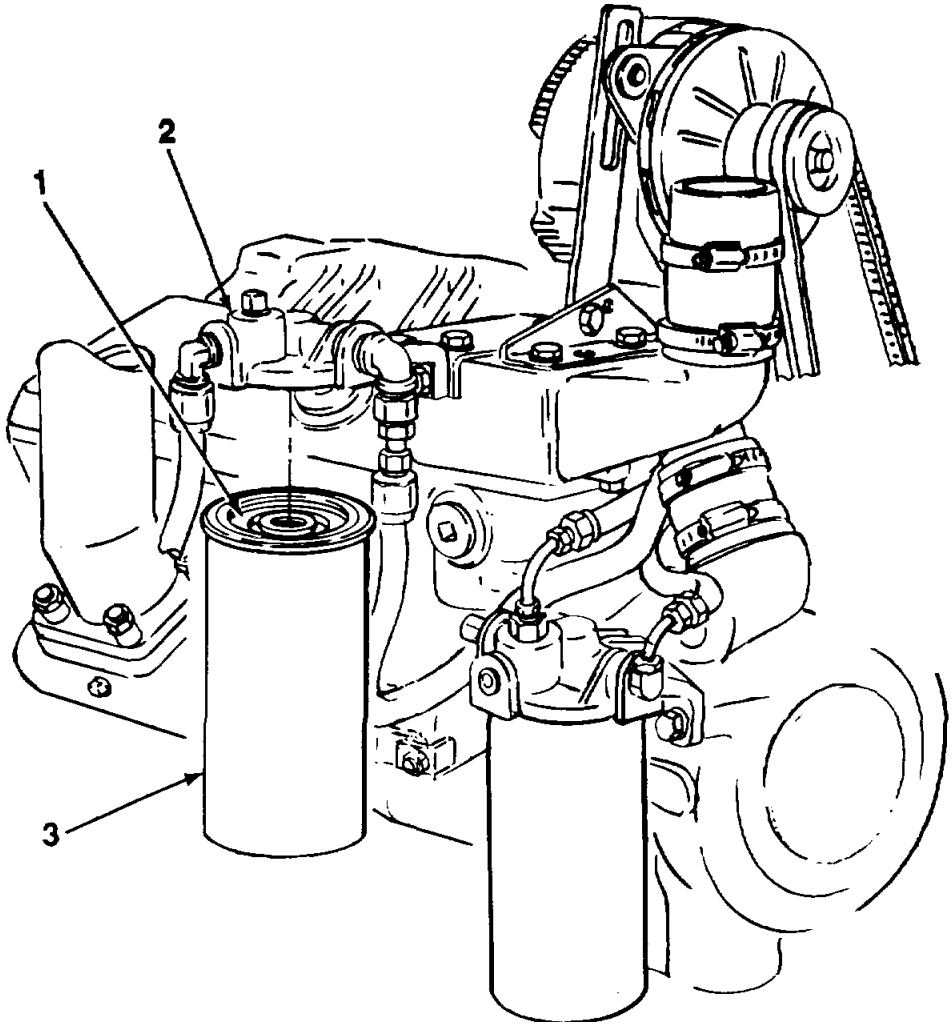
Tools/Test Equipment:
- General mechanic's tool kit
- Filter wrench

Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- Diesel fuel (Item 20, Appendix E)
- One fuel filter element
- Two locknuts
- Two lockwashers

4-34. PRIMARY FUEL FILTER MAINTENANCE (Con't).

a. FUEL FILTER ELEMENT REPLACEMENT

1. Remove fuel filter element (3) from fuel filter base (2) with filter wrench. Discard fuel filter element.
2. Apply a thin coat of diesel fuel on gasket (1) in recess of new fuel filter element (3).
3. Fill fuel filter element (3) with clean diesel fuel.
4. Install fuel filter element (3) on fuel filter base (2) with filter wrench until gasket (1) seats, then turn another 3/4 turn.
5. Start engine (see paragraph 2-10) and check fuel filter for leaks.

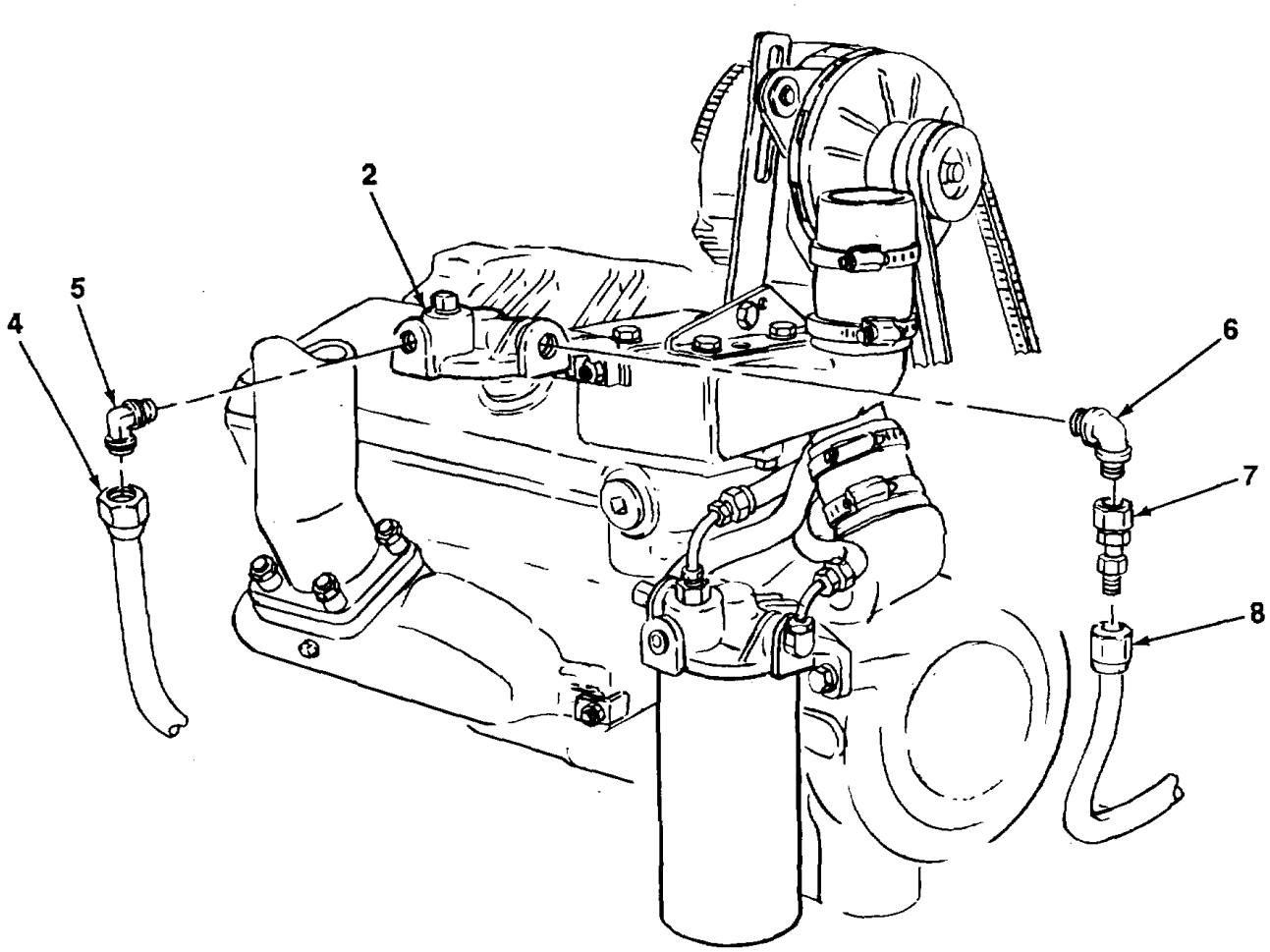


TA704720

4-34. PRIMARY FUEL FILTER MAINTENANCE (Con't).

b. FUEL FILTER BASE REMOVAL

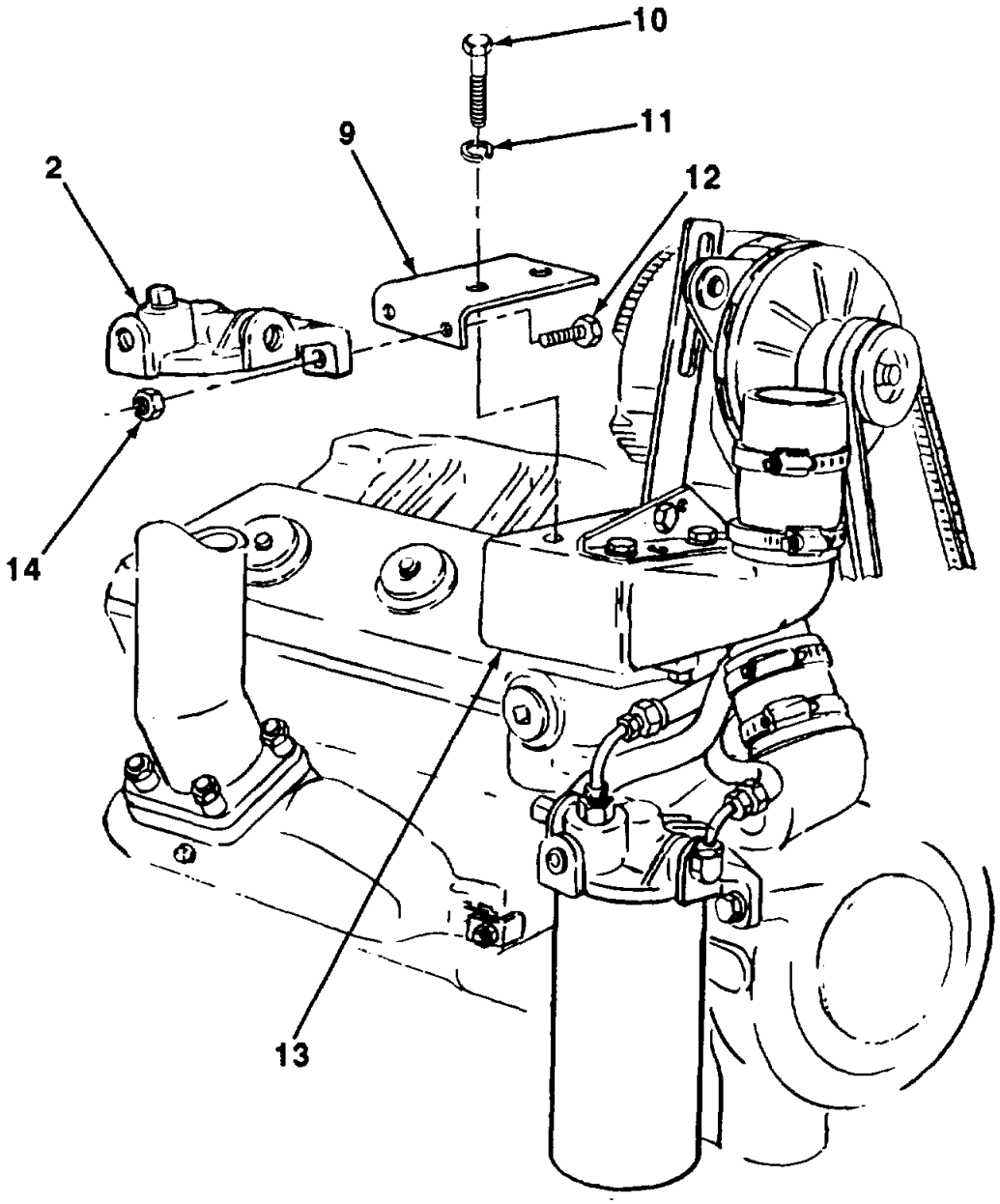
1. Remove fuel filter element (see subparagraph a).
2. Remove hose (4) and elbow (5) from fuel filter base (2).
3. Remove hose (8), adapter (7), and elbow (6) from fuel filter base (2).



TA704721

4-34. PRIMARY FUEL FILTER MAINTENANCE (Con't).

4. Remove two locknuts (14), bolts (12), and fuel filter base (2) from bracket (9). Discard locknuts.
5. If damaged, remove two bolts (10), lockwashers (11), and bracket (9) from left thermostat housing (13). Discard lockwashers.

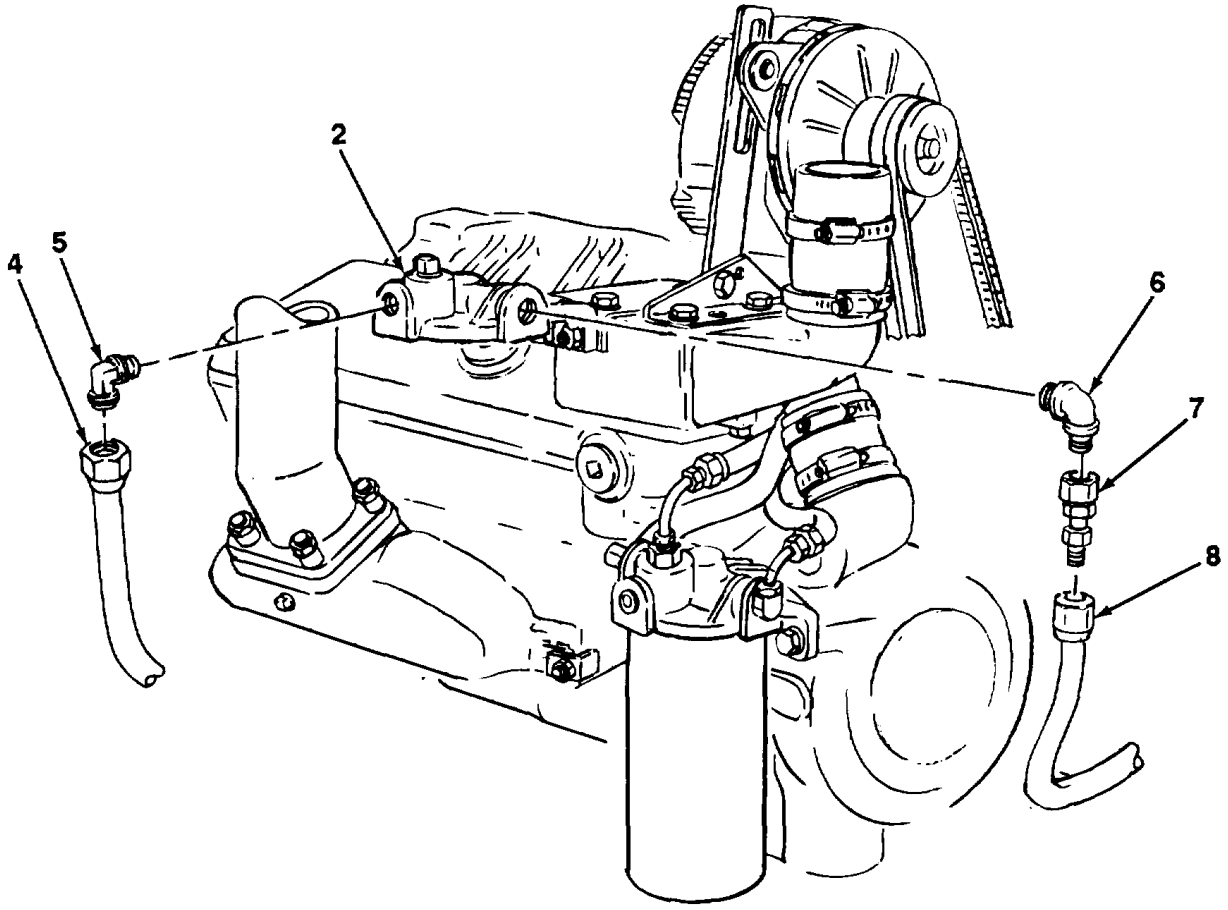


TA704722

4-34. PRIMARY FUEL FILTER MAINTENANCE (Con't).

c. FUEL FILTER BASE INSTALLATION

1. If removed, install bracket (9) on left thermostat housing (13) with two bolts (10) and new lockwashers (11).
2. Install fuel filter base (2) on bracket (9) with two bolts (12) and new locknuts (14).
3. Apply sealing compound to threads of adapter (7) and elbow (6) and install elbow, adapter, and hose (8) on fuel filter base (2).
4. Apply sealing compound to threads of elbow (5) and install elbow and hose (4) on fuel filter base (2).
5. Install fuel filter element (see subparagraph a).



TA704723

4-35. SECONDARY FUEL FILTER MAINTENANCE.

This Task Covers:

a. Fuel Filter Element Replacement
b. Fuel Filter Base Removal
c. Fuel Filter Base Installation

Initial Setup:

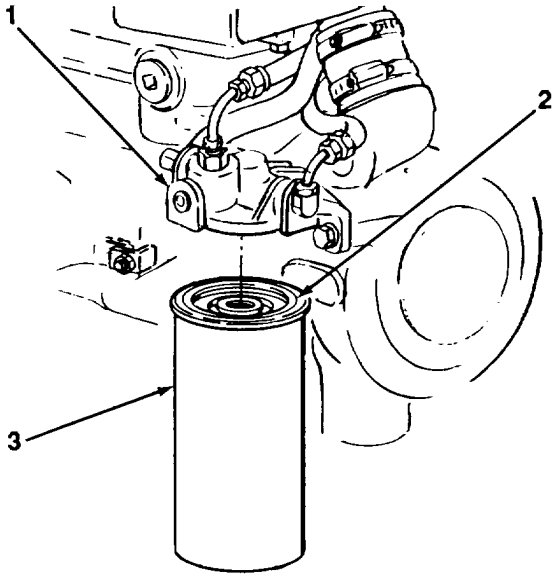
Equipment Conditions:
- Master battery switch in OFF position.

Tools/Test Equipment:
- General mechanic's tool kit
- Filter wrench

Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- Diesel fuel (Item 20, Appendix E)
- One fuel filter element
- Two lockwashers

a. FUEL FILTER ELEMENT REPLACEMENT

1. Remove fuel filter element (3) from fuel filter base (1) with filter wrench. Discard fuel filter element.
2. Apply a thin coat of diesel fuel on gasket (2) in recess of new fuel filter element (3).
3. Fill fuel filter element (3) with clean diesel fuel.
4. Install fuel filter element (3) on fuel filter base (1) with filter wrench until gasket (2) seats, then turn another 3/4 turn.
5. Start engine (see paragraph 2-10) and check fuel filter for leaks.

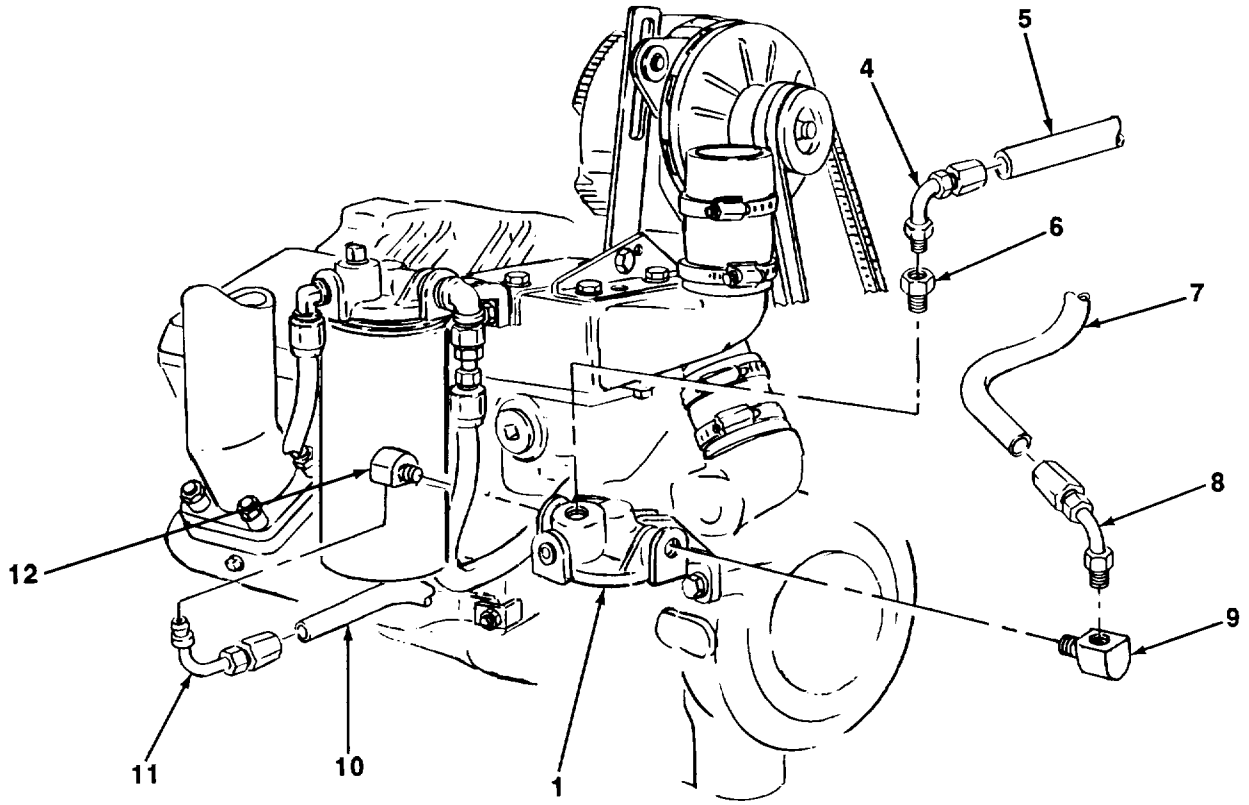


TA704724

b. FUEL FILTER BASE REMOVAL

1. Remove fuel filter element (see subparagraph a).
2. Remove hose (5), elbow (4), and connector (6) from fuel filter base (1).
3. Remove hose (7), elbow (8), and elbow (9) from fuel filter base (1).
4. Remove hose (10), elbow (11), and elbow (12) from fuel filter base (1).

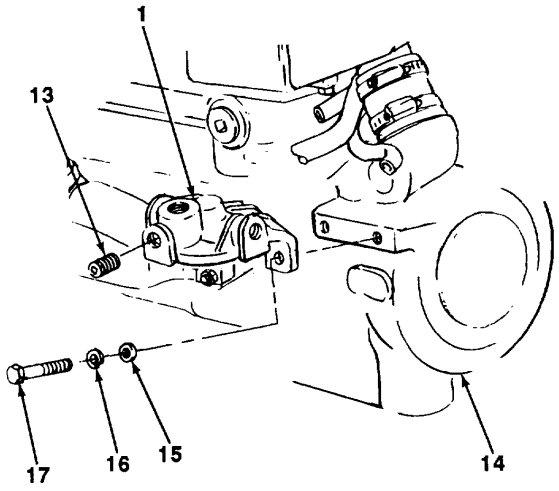
4-35. SECONDARY FUEL FILTER MAINTENANCE (Con't).



5. Remove two bolts (17), lockwashers (16), washers (15), and fuel filter base (1) from water pump (14). Discard lockwashers.
6. Remove plug (13) from fuel filter base (1).

c. FUEL FILTER BASE INSTALLATION I

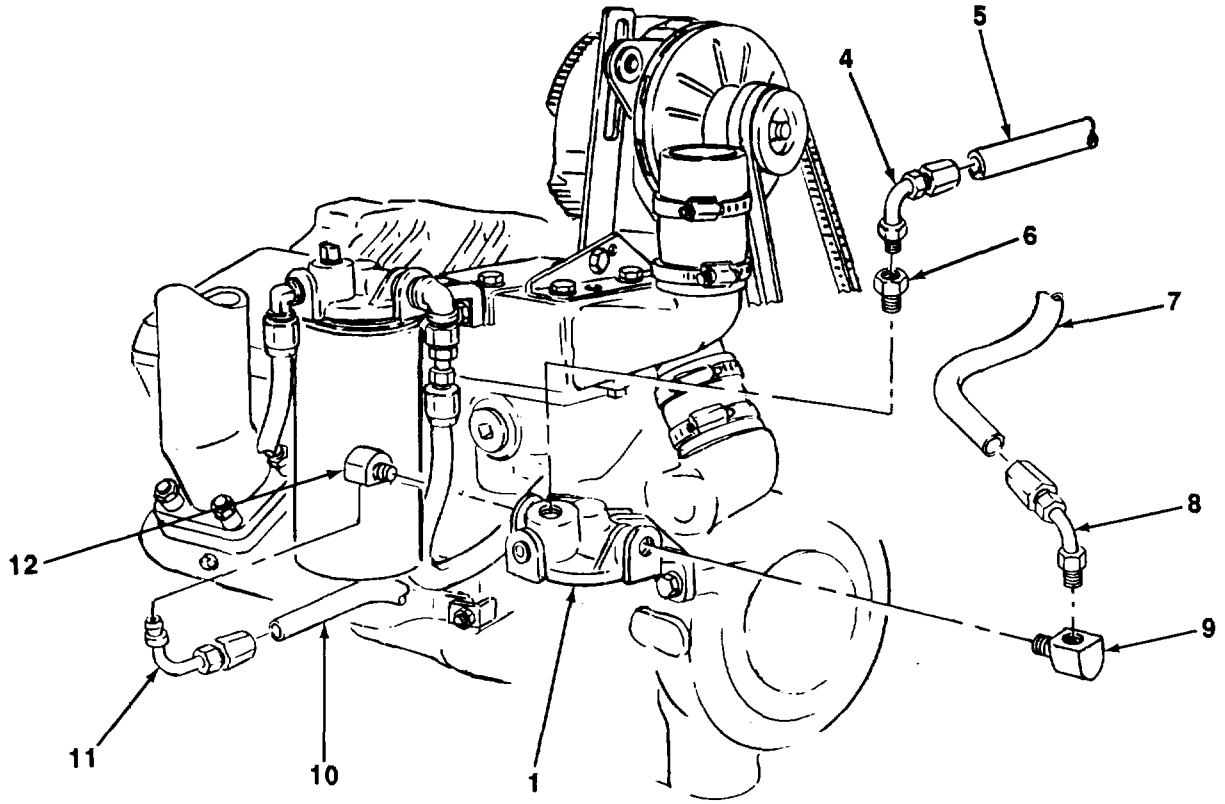
1. Apply sealing compound to threads of plug (13) and install plug in fuel filter base (1).
2. Install fuel filter base (1) on water pump (14) with two washers (15), new lockwashers (16), and bolts (17).



TA704725

4-35. SECONDARY FUEL FILTER MAINTENANCE (Con't).

3. Apply sealing compound to threads of elbows (11 and 12).
4. Install elbows (11 and 12) and hose (10) on fuel filter base (1).
5. Apply sealing compound to threads of elbows (8 and 9).
6. Install elbows (8 and 9) and hose (7) on fuel filter base (1).
7. Apply sealing compound to threads of connector (6) and elbow (4) and install connector, elbow, and hose (5) on fuel filter base (1).
8. Install fuel filter element (see subparagraph a).



TA704726

4-36. FUEL TANK REPLACEMENT.

This Task Covers:

a.Draining
b.Removal
c. Installation

Initial Setup:

Equipment Conditions::
- Master battery switch in OFF position.
- Batteries, battery trays, and battery hold-downs removed (see paragraph 4-60).

Tools/Test Equipment:
- General mechanic's tool set
- Hydraulic Jack

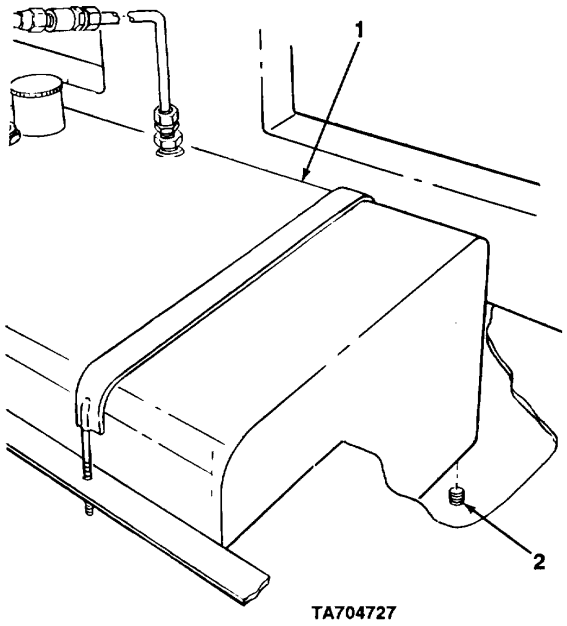
Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- Four lockwashers

Personnel Required: Two

a. DRAINING

NOTE
A suitable container should be used to catch any draining fuel. Ensure that all spills are cleaned up.

1. Remove drainplug (2) from fuel tank (1). Allow all fuel to drain.
2. Install drainplug (2) in fuel tank (1).



4-36. FUEL TANK REPLACEMENT (Con't).

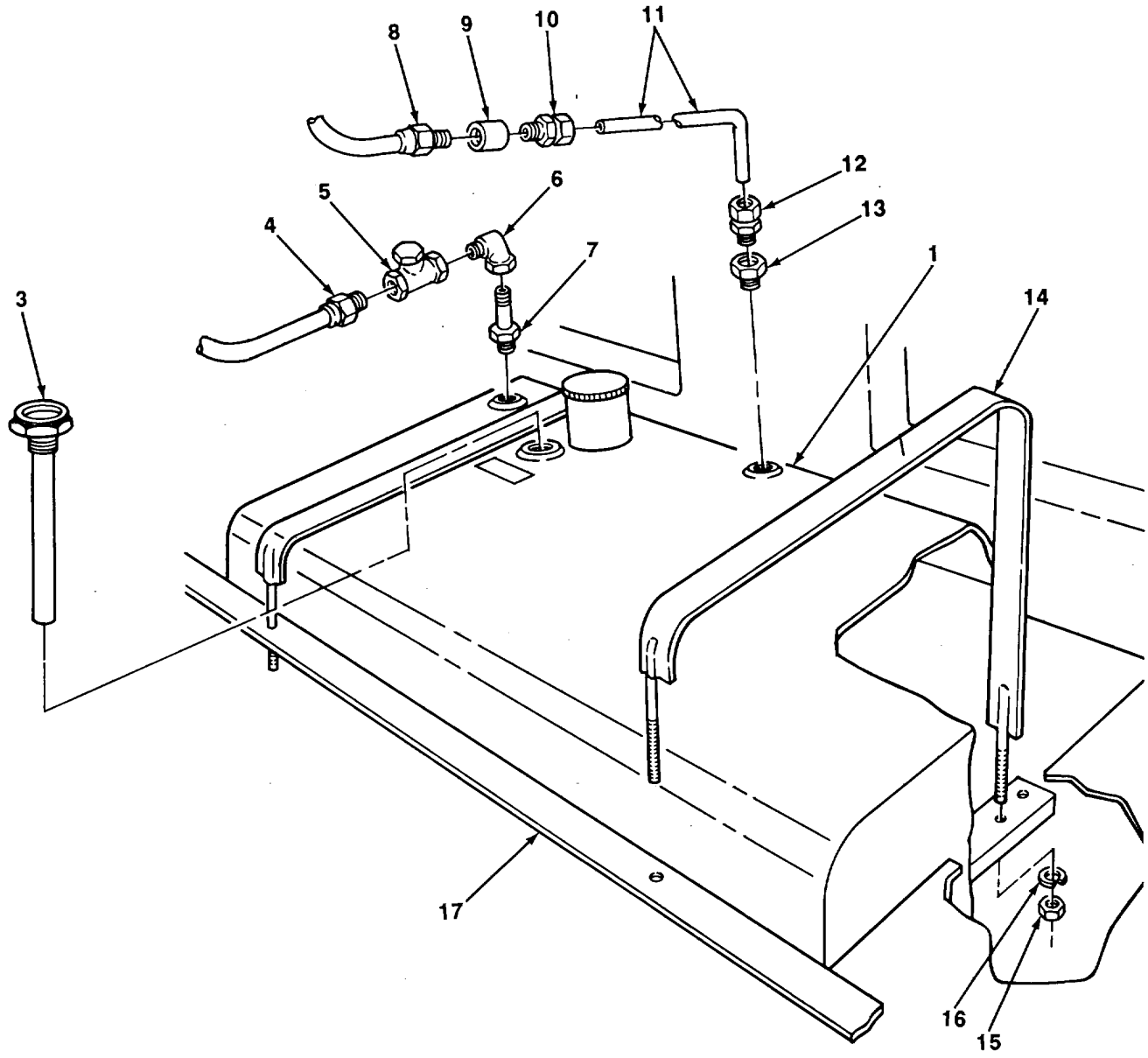
b. REMOVALI

1. Remove hose (8), coupling (9), and connector (10) from fuel return line (11).
2. Remove fuel return line (11), connector (12), and bushing (13) from fuel tank (1).
3. Remove primary fuel hose (4), check valve (5), elbow (6), and fuel suction tube (7) from fuel tank (1).
4. Remove fuel level gage (3) from fuel tank (1).
5. Remove four nuts (15), lockwashers (16), and two straps (14) from fuel tank (1). Discard lockwasher.
6. Position hydraulic jack under fuel tank (1) and raise fuel tank until clear of edge of fender well.
7. Slide fuel tank (1) onto left front fender well.
8. Remove fuel tank (1) from air compressor unit.

c. INSTALLATION I

1. Slide fuel tank (1) onto left front fender well.
2. Position fuel tank (1) on hydraulic jack and lower fuel tank onto two brackets (17).
3. Install two straps (14) on fuel tank (1) and brackets (17) with four new lockwashers (16) and nuts (15).
4. Install fuel level gage (3) on fuel tank (1).
5. Apply sealing compound to threads of fuel suction tube (7), elbow (6), and primary fuel hose (4).
6. Install fuel suction tube (7), elbow (6), check valve (5), and primary fuel hose (4) on fuel tank (1).
7. Apply sealing compound to threads of bushing (13) and connector (12).
8. Install bushing (13), connector (12), and fuel return line (11) on fuel tank (1).
9. Apply sealing compound to threads of connector (10) and hose (8).
10. Install connector (10), coupling (9), and hose (8) on fuel return line (11).

4-36. FUEL TANK REPLACEMENT (Con't).



- Install battery hold-downs, battery trays, and batteries (see paragraph 4-60).

TA704728

4-37. FUEL HOSES AND FITTINGS REPLACEMENT.

This Task Covers:

a. Fuel Tank-to-Primary Fuel Filter Fuel Hose Replacement
b. Primary Fuel Filter-to-Fuel Pump Fuel Hose Replacement
c. Fuel Pump-to-Secondary Fuel Filter Fuel Hose Replacement
d. Secondary Fuel Filter-to-Left and Right Heads Fuel Hoses Replacement
e. Crossover Fuel Hose Replacement
f. Left Head-to-Fuel Tank Fuel Hose Replacement

Initial Setup:

Equipment Conditions::

- Master battery switch in OFF position.
- Crossover tube removed (see paragraph 4-49).

Tools/Test Equipment:

- General mechanic's tool kit

Materials/Parts:

- Sealing compound (Item 14, Appendix E)

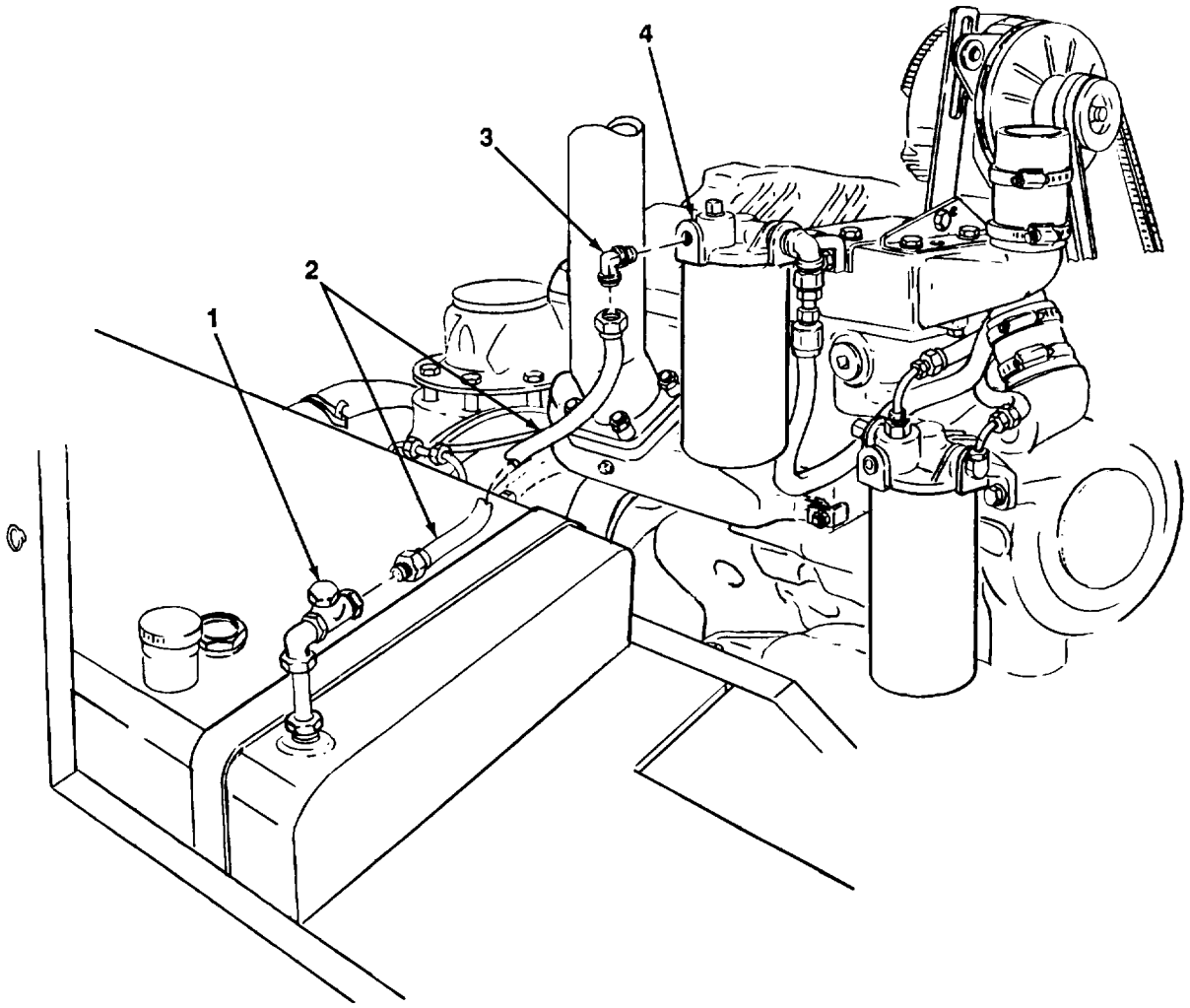
NOTE

Clean up all spills as they occur.

a. FUEL TANK-TO-PRIMARY FUEL FILTER FUEL HOSE REPLACEMENT I

1. Remove fuel hose (2) from check valve (1) and elbow (3).
2. Remove elbow (2) from primary fuel filter (4).
3. Apply sealing compound to threads of elbow (3) and install elbow on primary fuel filter (4).
4. Install fuel hose (2) on elbow (3) and check valve (1).

4-37. FUEL HOSES AND FITTINGS REPLACEMENT (Con't).

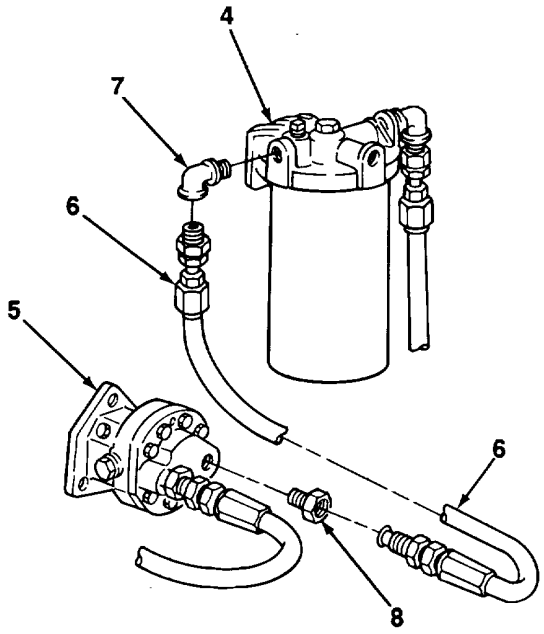


TA704729

4-37. FUEL HOSES AND FITTINGS REPLACEMENT (Con't).

b. PRIMARY FUEL FILTER-TO-FUEL PUMP FUEL HOSE REPLACEMENT I

1. Remove fuel hose (6) from adapter (8) and elbow (7).
2. Remove adapter (8) from fuel pump (5).
3. Remove elbow (7) from primary fuel filter (4).
4. Apply sealing compound to threads of elbow (7) and install elbow on primary fuel filter (4).
5. Apply sealing compound to threads of adapter (8) and install adapter on fuel pump (5).
6. Install fuel hose (6) on elbow (7) and adapter (8).

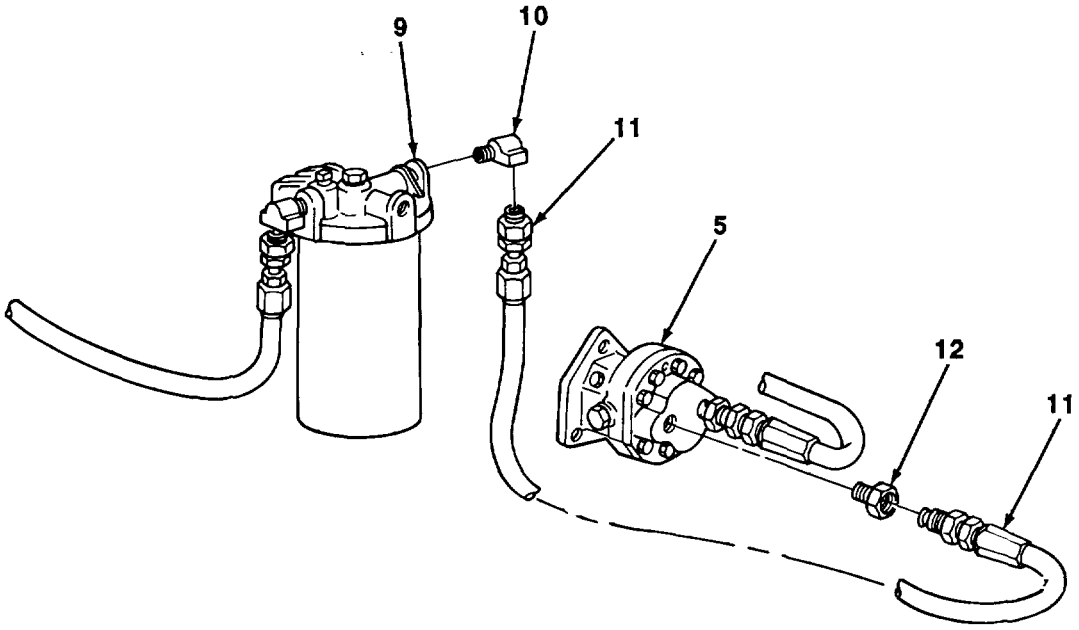


TA704730

4-37. FUEL HOSES AND FITTINGS REPLACEMENT (Con't).

c. FUEL PUMP-TO-SECONDARY FUEL FILTER FUEL HOSE REPLACEMENT I

1. Remove fuel hose (11) from adapter (12) and elbow (10).
2. Remove adapter (12) from fuel pump (5).
3. Remove elbow (10) from secondary fuel filter (9).
4. Apply sealing compound to threads of elbow (10) and install elbow on secondary fuel filter (9).
5. Apply sealing compound to threads of adapter (12) and install adapter on fuel pump (5).
6. Install fuel hose (11) on elbow (10) and adapter (12).

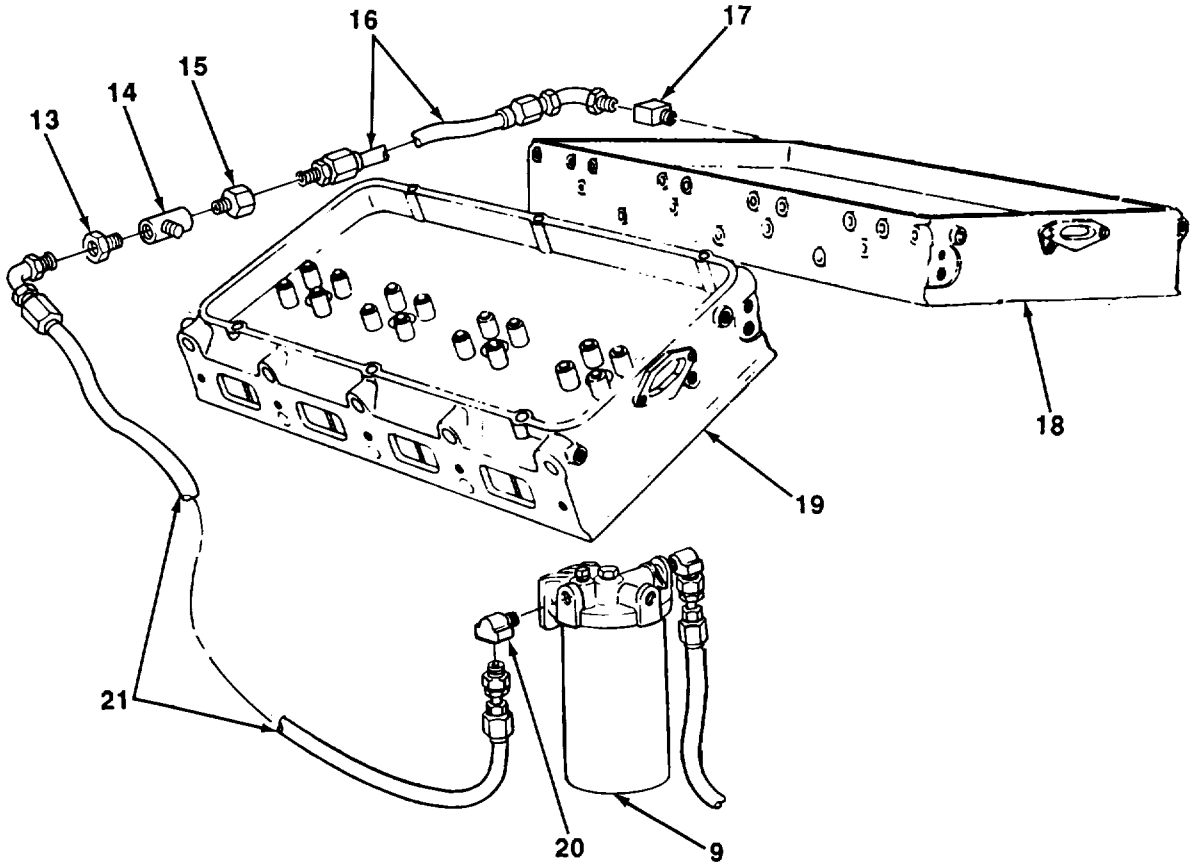


TA704731

4-37. FUEL HOSES AND FITTINGS REPLACEMENT (Con't).

d. SECONDARY FUEL FILTER-TO-LEFT AND RIGHT HEADS FUEL HOSES REPLACEMENT I

1. Remove fuel hose (21) from elbow (20) and adapter (13).
2. Remove elbow (20) from secondary fuel filter (9).



3. Remove adapter (13) from tee (14).
4. Remove fuel hose (16) from adapters (15 and 17).
5. Remove adapter (15) from tee (14) and remove tee from right head (19).
6. Remove adapter (17) from left head (18).
7. Apply sealing compound to threads of adapter (17) and install adapter on left head (18).
8. Apply sealing compound to threads of tee (14) and adapter (15) and install tee on right head (19) and install adapter on tee.
9. Install fuel hose (16) on adapters (15 and 17).
10. Apply sealing compound to threads of adapter (13) and install adapter on tee (14).

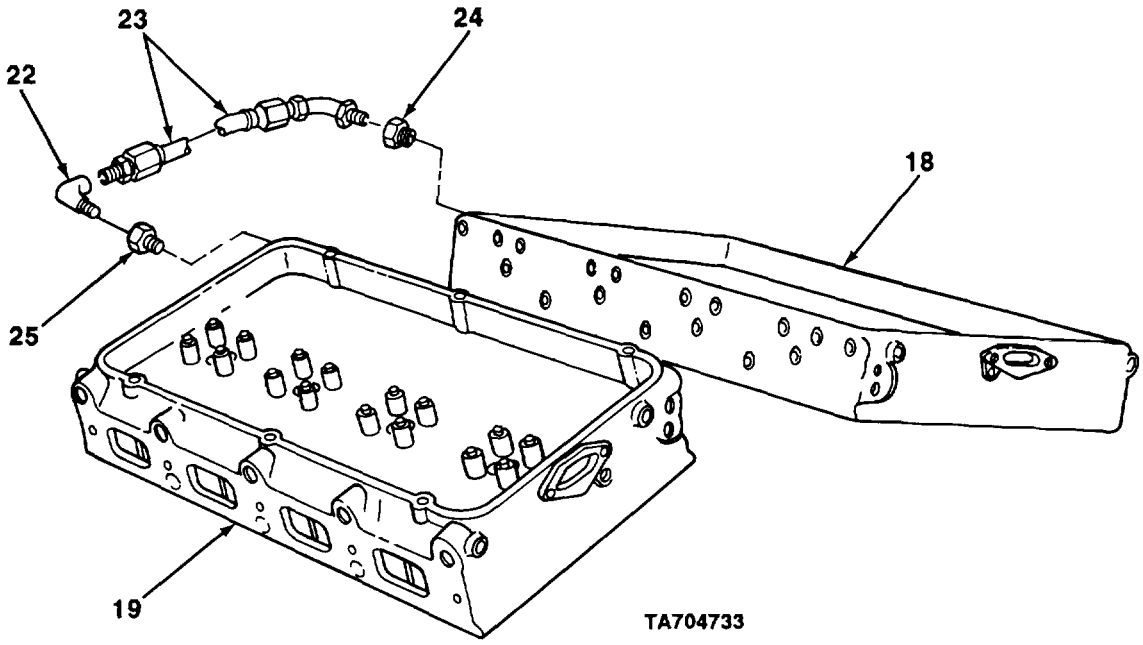
TA704732

4-37. FUEL HOSES AND FITTINGS REPLACEMENT (Con't).

11. Apply sealing compound to threads of elbow (20) and install elbow on secondary fuel filter (9).
12. Install fuel hose (21) on adapter (13) and elbow (20).

e. CROSSOVER FUEL HOSE REPLACEMENT I

1. Remove fuel hose (23) from elbow (22) and adapter (24).
2. Remove elbow (22) and adapter (25) from right head (19).
3. Remove adapter (24) from left head (18).
4. Apply sealing compound to threads of adapter (24) and install adapter on left head (18).
5. Apply sealing compound to threads of adapter (25) and elbow (22) and install adapter and elbow on right head (19).
6. Install fuel hose (23) on adapter (24) and elbow (22).

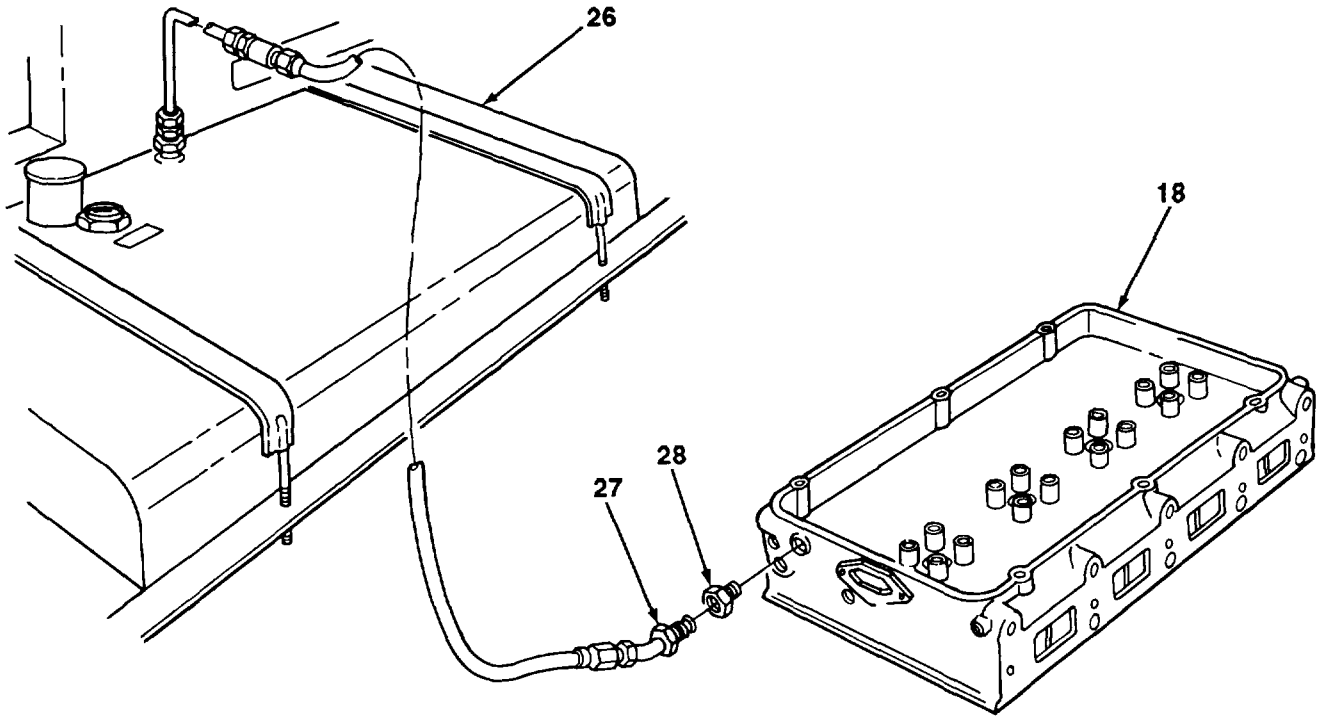


TA704733

4-37. FUEL HOSES AND FITTINGS REPLACEMENT (Con't).

f. LEFT HEAD-TO-FUEL TANK FUEL HOSE REPLACEMENT i

1. Remove fuel hose (27) from adapter (28) and fuel tank (26).
2. Remove adapter (28) from left head (18).
3. Apply sealing compound to threads of adapter (28) and install adapter on left head (18).
4. Install fuel hose (27) on fuel tank (26) and adapter (28).



FOLLOW-ON TASKS:

- Install crossover tube (see paragraph 4-49).

TA704734

4-38. ETHER START KIT REPLACEMENT.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Equipment Conditions::

- Master battery switch In OFF position.

Tools/Test Equipment:

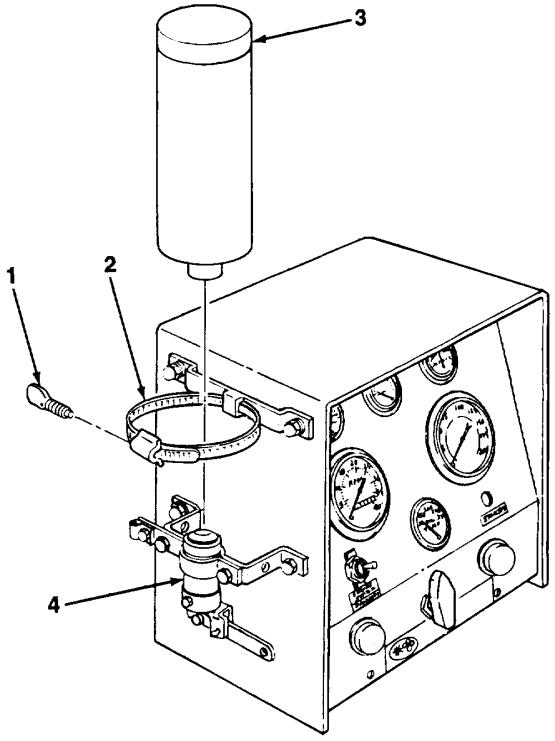
- General mechanic's tool kit

a. REMOVAL

NOTE

If removing cylinder only, perform steps 1 and 2.

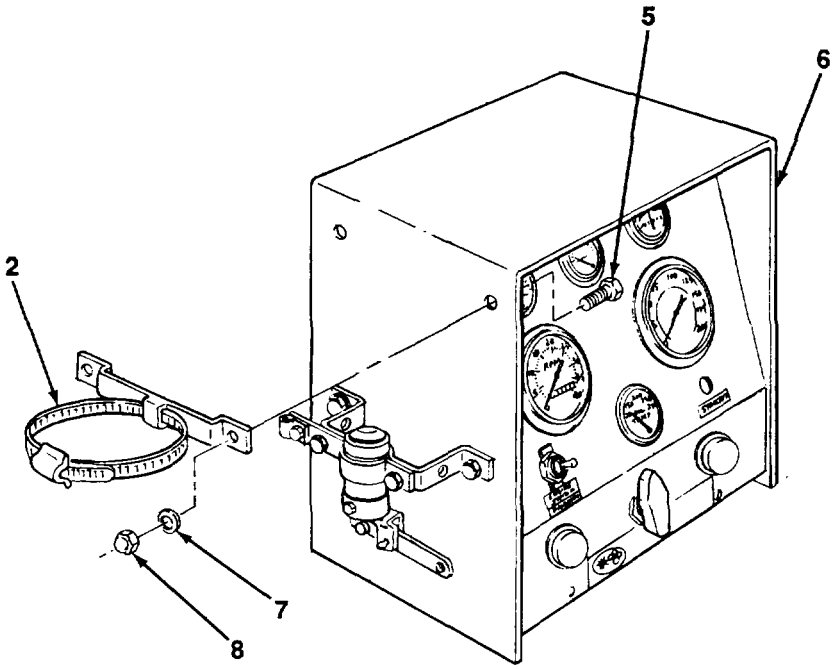
1. Loosen screw (1) in clamp (2) and cylinder (3).
2. Remove cylinder (3) from valve (4).



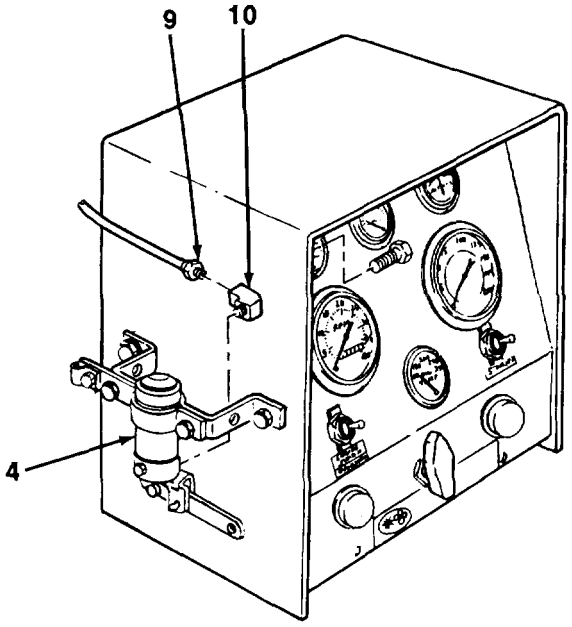
TA704735

4-38. ETHER START KIT REPLACEMENT (Con't).

3. Remove two nuts (8), washers (7), screws (5), and clamp (2) from Instrument panel (6).



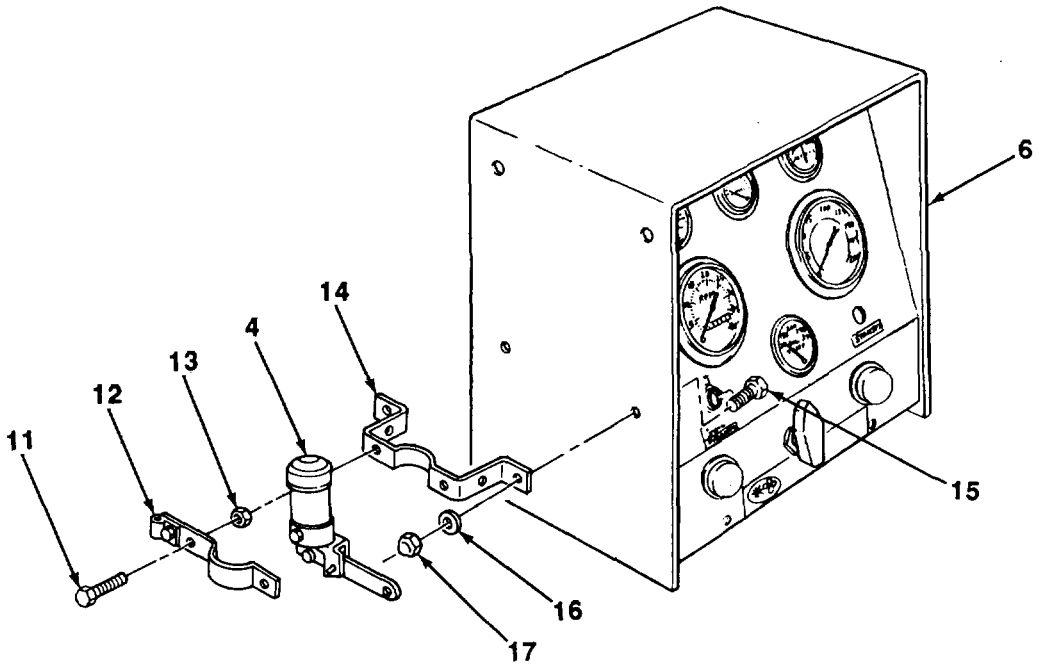
4. Remove line (9) and elbow (10) from valve (4)



TA704736

4-38. ETHER START KIT REPLACEMENT (Con't).

5. Remove two screws (11), bracket (12), two nuts (13), and valve (4) from bracket (14).
6. Remove two nuts (17), washers (16), screws (15), and bracket (14) from instrument panel (6).



b. INSTALLATION I

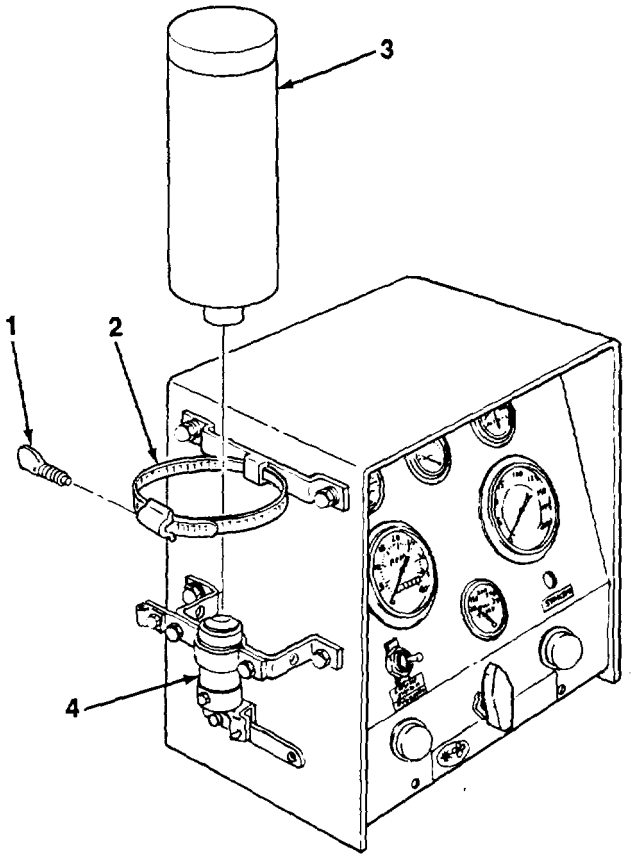
NOTE
If Installing cylinder only, perform steps 5 and 6.

1. Install bracket (14) on instrument panel (6) with two screws (15), washers (16), and nuts (17).
2. Position valve (4) on bracket (14) and Install bracket (12) with two nuts (13) and screws (11).
3. Install elbow (10) and line (9) on valve (4).
4. Install clamp (2) on Instrument panel (6) with two screws (5), washers (7), and nuts (8).

TA704737

4-38. ETHER START KIT REPLACEMENT (Con't).

5. Install cylinder (3) on valve (4).
6. Tighten clamp (2) by turning screw (1) to secure cylinder (3) In clamp.



TA704738

4-39. EMERGENCY STOP CABLE REPLACEMENT.

This Task Covers:

a. Removal
b. Installation
c. Adjustment

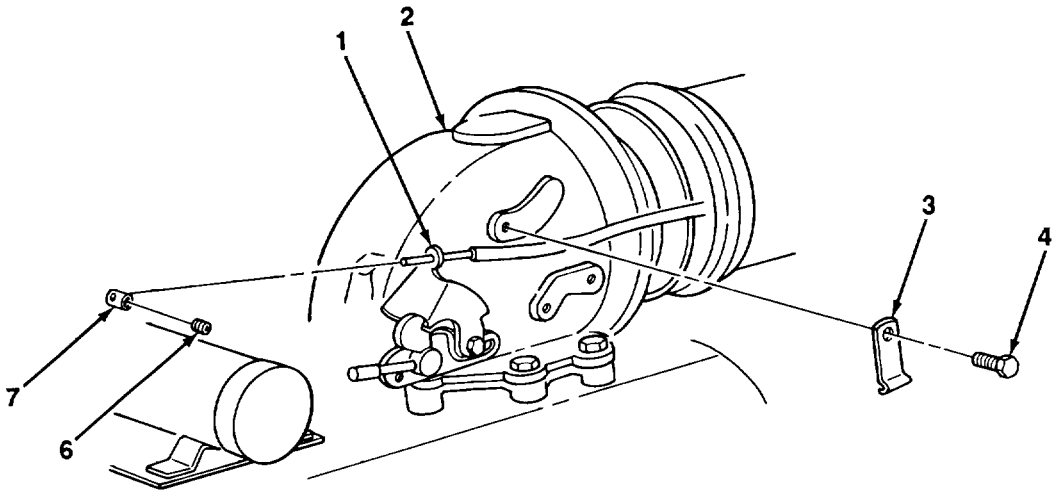
Initial Setup:

Equipment Conditions::
- Master battery switch in OFF position.

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL I

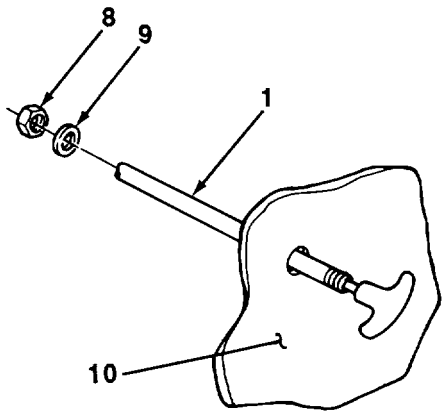
1. Remove setscrew (6) and stop (7) from emergency stop cable (1).
2. Remove screw (4) and bracket (3) from air inlet housing (2).



TA704739

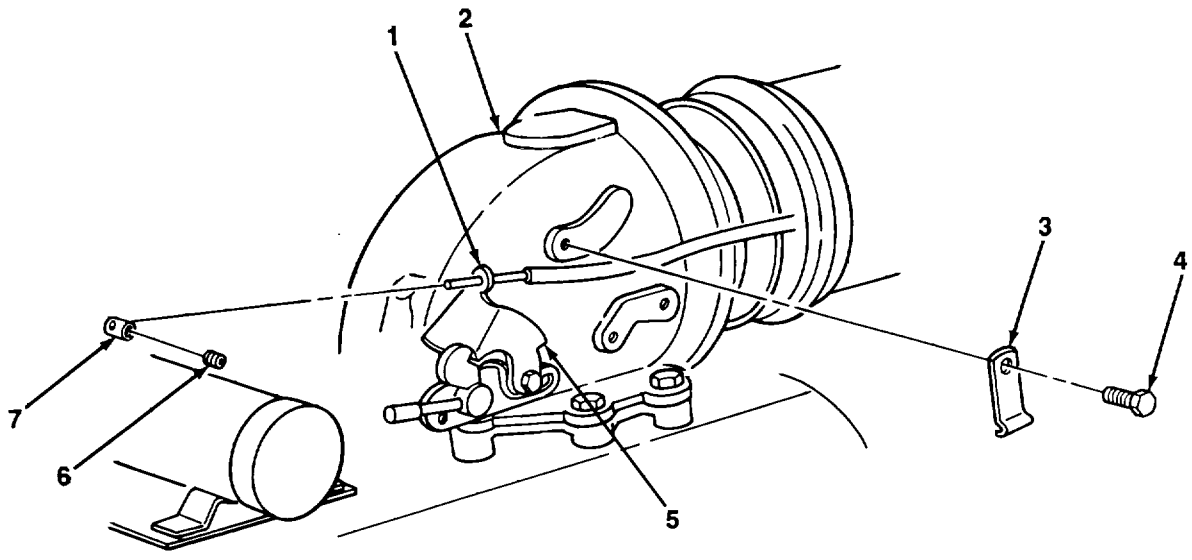
4-39. EMERGENCY STOP CABLE REPLACEMENT (Con't).

3. Remove nut (8) and washer (9) from emergency stop cable (1).
4. Pull emergency stop cable (1) out of side panel (10).



b. INSTALLATION I

1. Thread emergency stop cable (1) through side panel (10) and install washer (9) and nut (8).
2. Install bracket (3) on air inlet housing (2) with screw (4).
3. Install emergency stop cable (1) through lever (5) and install stop (7) and setscrew (6).
4. Perform adjustment (see subparagraph c).



TA704740

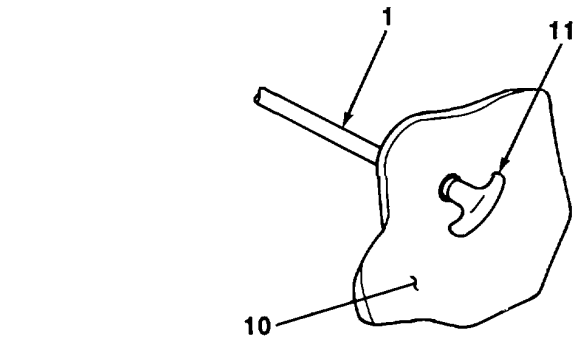
4-39. EMERGENCY STOP CABLE REPLACEMENT (Con't).

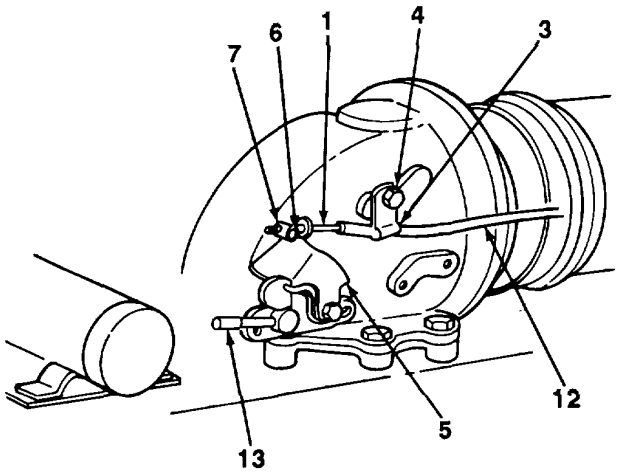
c. ADJUSTMENTI

1. Ensure that emergency stop control (11) is pushed in on side panel (10).
2. Ensure that lever (13) is in operational position.
3. Measure distance from cable housing (12) to lever (5). Distance should be 1.0 in. (2.5 cm).

NOTE
Perform steps 4 through 7 only If distance measurement Is Incorrect.

4. Loosen setscrew (6) and slide stop (7) toward end of emergency stop cable (1).
5. Loosen screw (4) and move bracket (3) until cable housing (12) is 1.0 In. (2.5 cm) from lever (5). Tighten screw.
6. Slide stop (7) forward until approximately 0.06 in.(1.mm) from lever (5).
8. Operate emergency stop control (11) and ensure that emergency stop cable (1) is properly adjusted; tripping to OFF position.
9. Repeat steps 1 and 2.





TA704741

4-40. ENGINE CONTROL ASSEMBLY MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation

Initial Setup:

Equipment Conditions::
- Master battery switch in OFF position.

Tools/Test Equipment:

Tools/Test Equlpment:
- General mechanic's tool kit

Materials/Parts:
- Dry cleaning solvent (Item 38, Appendix E)

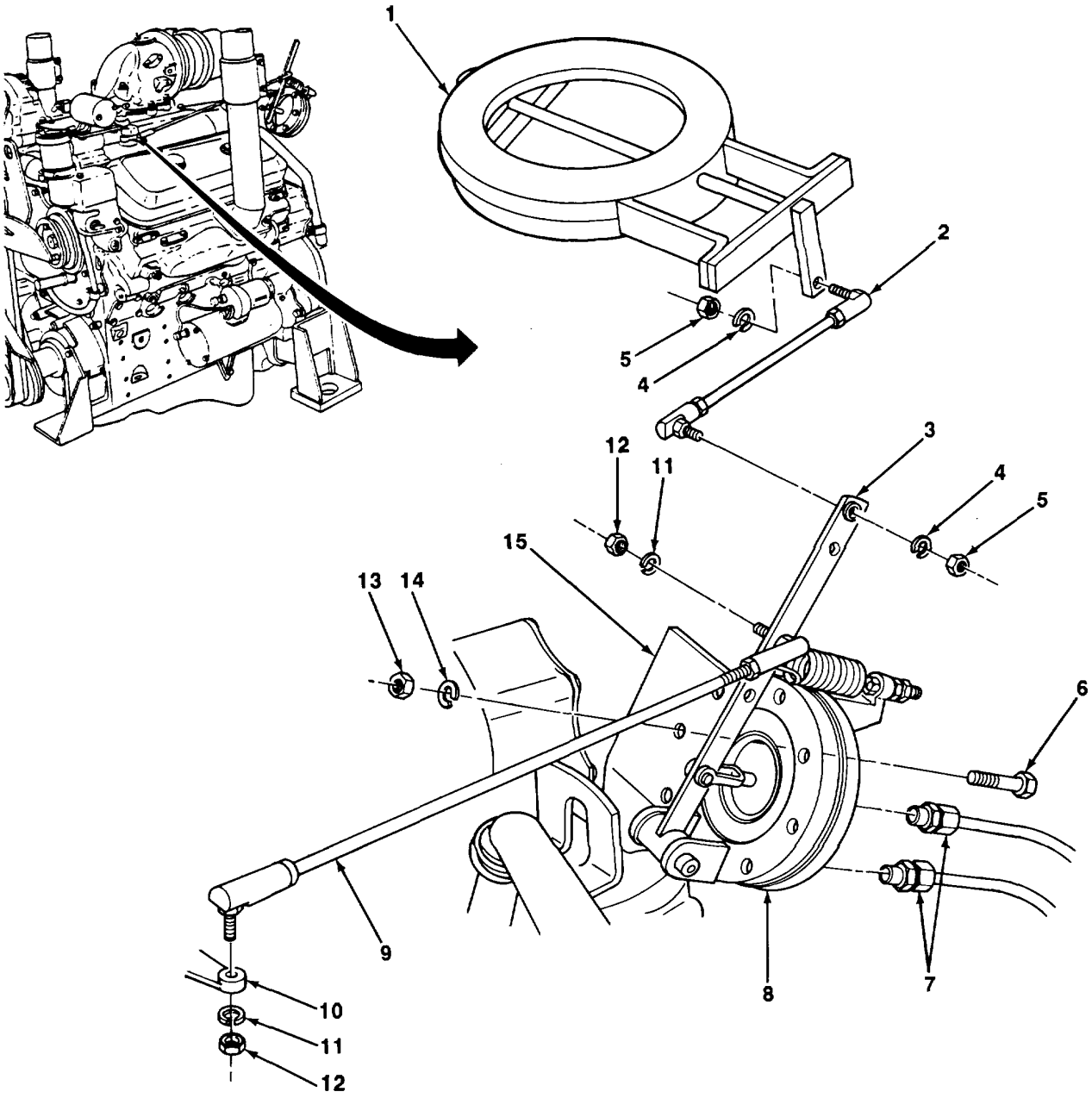
Marker tags (Item 40, Appendix E)
- One cotter pin
- Twelve lockwashers

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. REMOVALI

1. Tag and remove two lines (7) from engine control assembly (8).
2. Remove two nuts (5), lockwashers (4), and compressor control rod (2) from inlet valve (1) and connecting link (3). Discard lockwashers.
3. Remove two nuts (12), lockwashers (11), and engine control rod (9) from connecting link (3) and governor lever (10). Discard lockwashers.
4. Remove three nuts (13), lockwashers (14), screws (6), and engine control assembly (8) from bracket (15). Discard lockwashers.

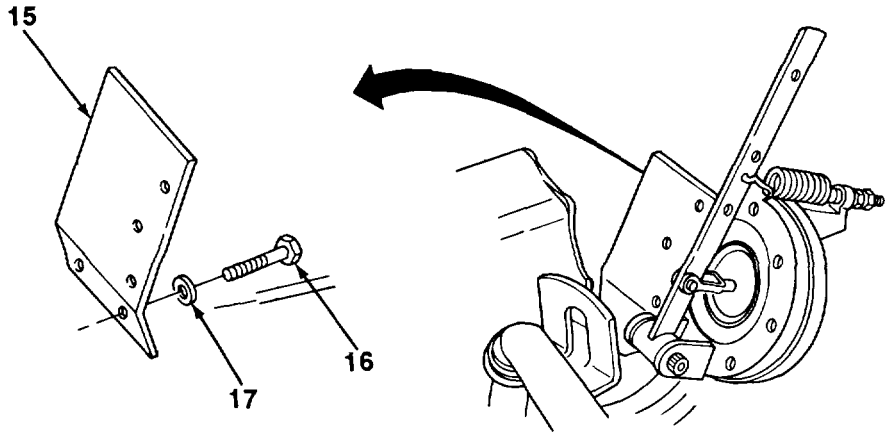
4-40. ENGINE CONTROL ASSEMBLY MAINTENANCE (Con't).



TA704742

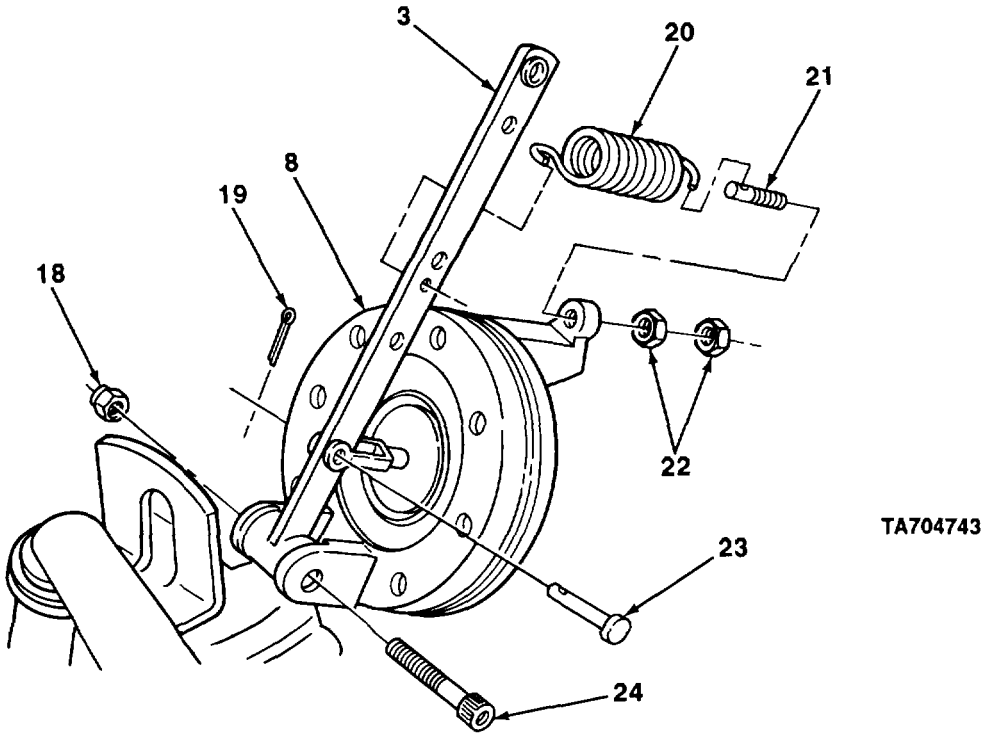
4-40. ENGINE CONTROL ASSEMBLY MAINTENANCE (Con't).

5. Remove two screws (16), lockwashers (17), and bracket (15). Discard lockwashers.



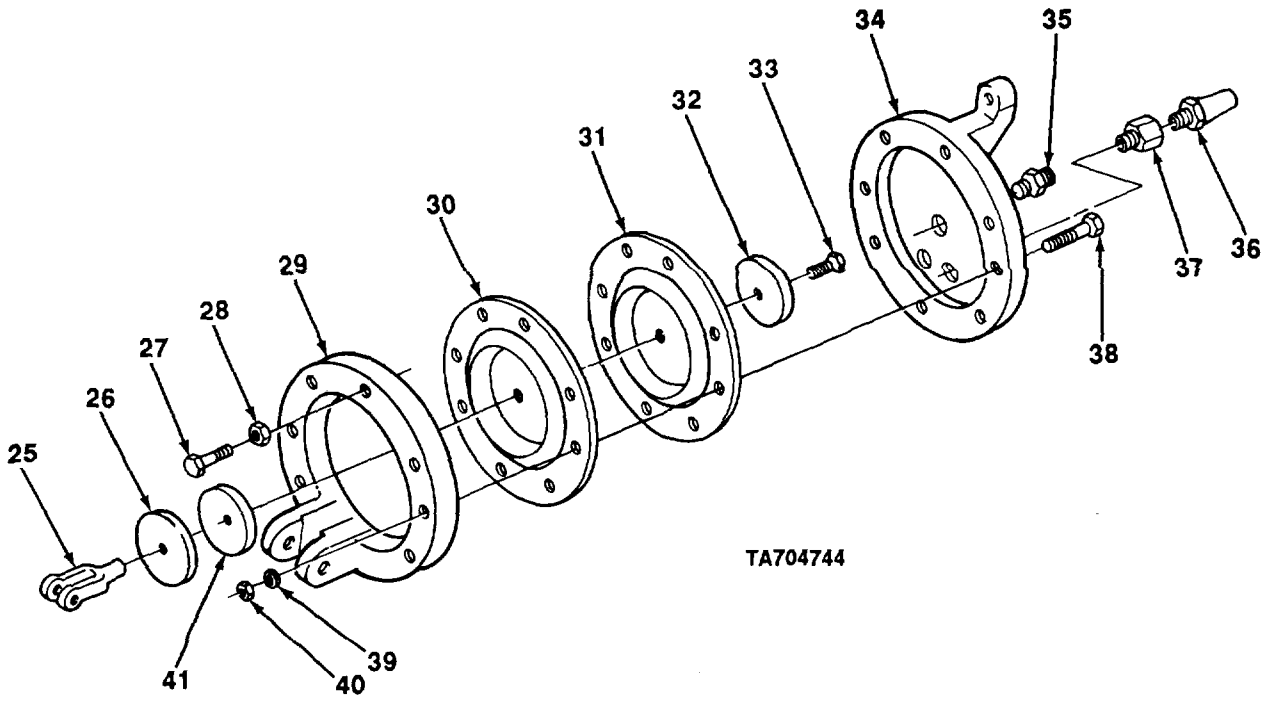
b. DISASSEMBLY I

1. Remove two nuts (22), adjusting screw (21), and spring (20) from connecting link (3).
2. Remove spring (20) from adjusting screw (21).
3. Remove cotter pin (19) and pin (23). Discard cotter pin.
4. Remove nut (18), screw (24), and connecting link (3) from engine control assembly (8).



4-40. ENGINE CONTROL ASSEMBLY MAINTENANCE (Con't).

5. Remove silencer (36) and adapter (37) from cover (34).
6. Remove two adapters (35) from cover (34).
7. Remove screw (27) and nut (28) from body (29).
8. Remove three nuts (40), lockwashers (39), screws (38), and cover (34) from body (29).
9. Remove screw (33), cle'vis (25), recessed washer (26), compression cup (41), washer (32), and diaphragms (30 and 31) from cover (34).



4-40. ENGINE CONTROL ASSEMBLY MAINTENANCE (Con't).

c. CLEANING AND INSPECTION I

WARNING

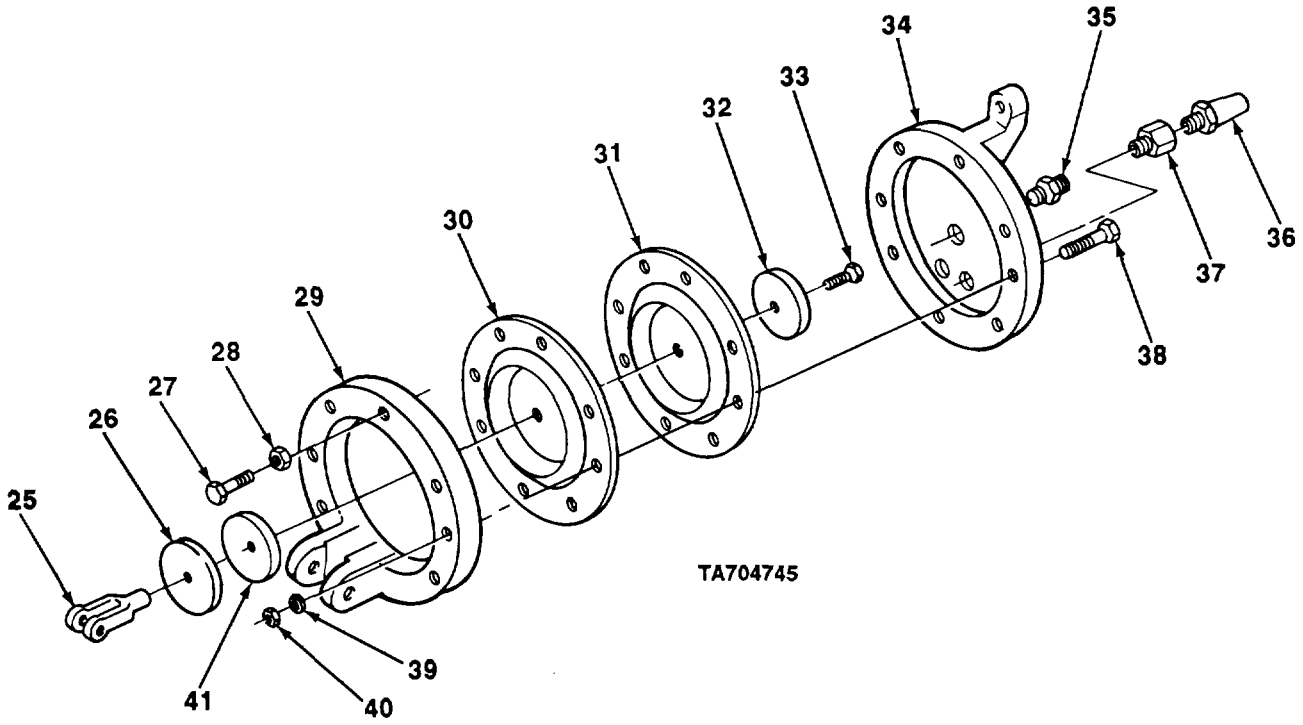
- **Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-1380F (38°C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.**

- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.**

1. Clean all metal parts with dry cleaning solvent and dry with compressed air.
2. Inspect diaphragms for holes and tears. Replace if damaged.
3. Inspect cover and body for cracks, breaks, and warpage. Replace if cracked, broken, or warped.

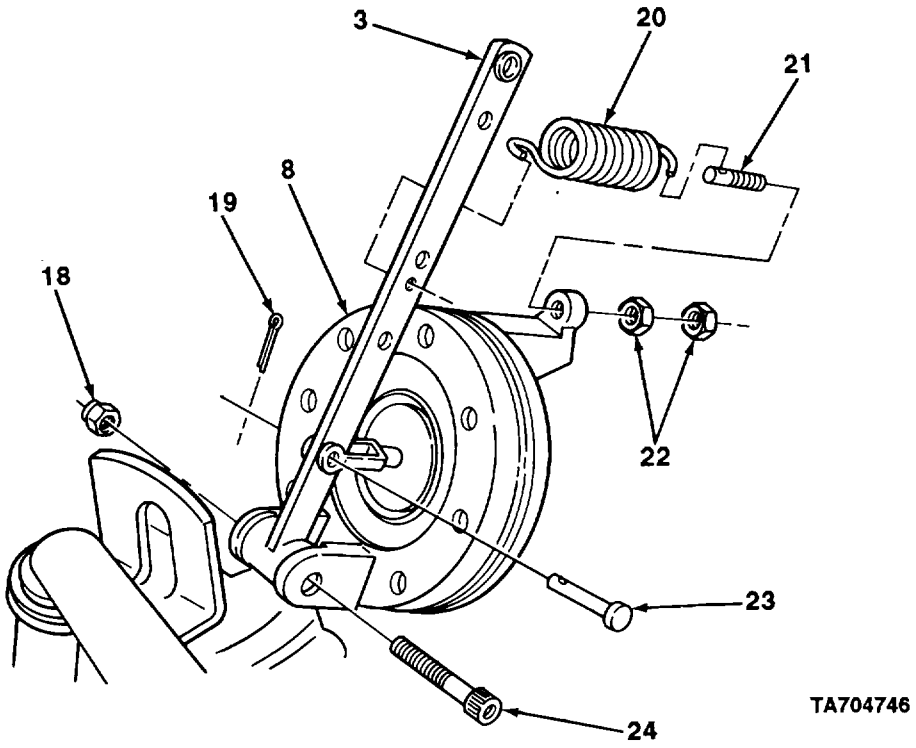
d. ASSEMBLYI

1. Install diaphragms (30 and 31) with washer (32), compression cup (41), recessed washer (26), clevis (25), and screw (33).



4-40. ENGINE CONTROL ASSEMBLY MAINTENANCE (Con't).

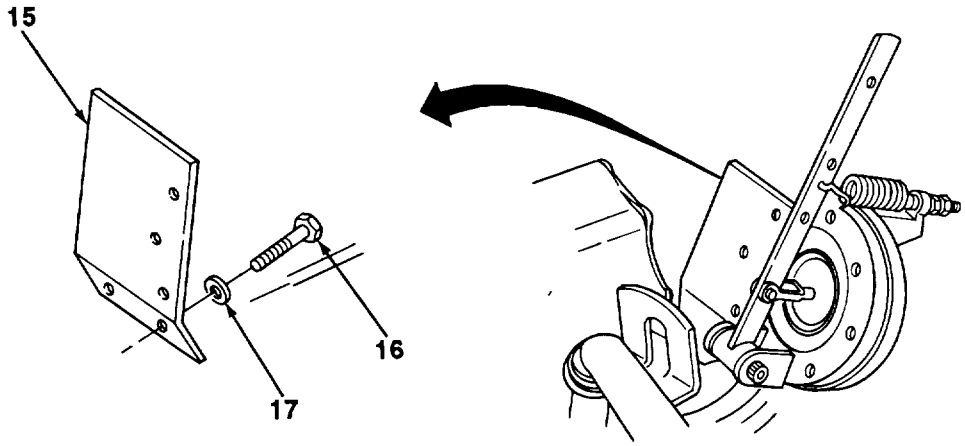
2. Place assembled parts in cover (34).
3. Install body (29) over assembled parts on cover (34) using three screws (38), new lockwashers (39), and nuts (40).
4. Install nut (28) and screw (27).
5. Install two adapters (35) in cover (34).
6. Install adapter (37) and silencer (36).
7. Install connecting link (3) on engine control assembly (8) with screw (24) and nut (18).
8. Install pin (23) and new cotter pin (19).
9. Install adjusting screw (21) in engine control assembly (8).
10. Install spring (20) on adjusting screw (21) and connecting link (3).
11. Install one nut (22) on adjusting screw (21). Tighten until tension is on spring (20).
12. Install second nut (22) on adjusting screw (21) until tight against first nut (22).



4-40. ENGINE CONTROL ASSEMBLY MAINTENANCE (Con't).

e. INSTALLATION I

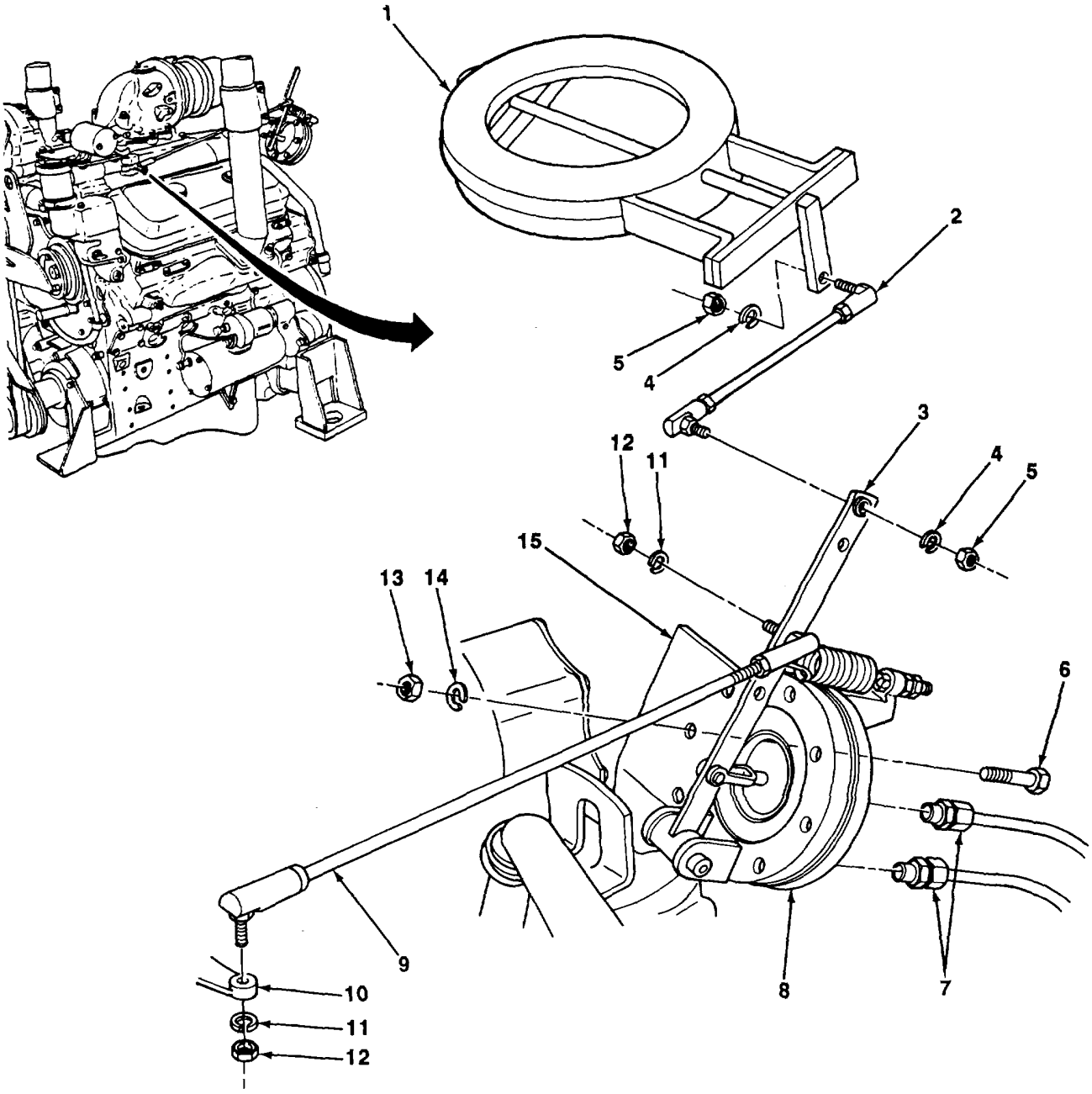
1. Install bracket (15) with two new lockwashers (17) and screws (16).



2. Install engine control assembly (8) on bracket (15) with three screws (6), new lockwashers (14), and nuts (13).
3. Install engine control rod (9) on governor lever (10) and connecting link (3) with two new lockwashers (11) and nuts (12).
4. Install compressor control rod (2) on connecting link (3) and inlet valve (1) with two new lockwashers (4) and nuts (5).
5. Install two lines (7) on engine control assembly (8).

TA704747

4-40. ENGINE CONTROL ASSEMBLY MAINTENANCE (Con't).



TA704748

FOLLOW-ON TASKS:

- Adjust engine control assembly (see paragraph 4-41).

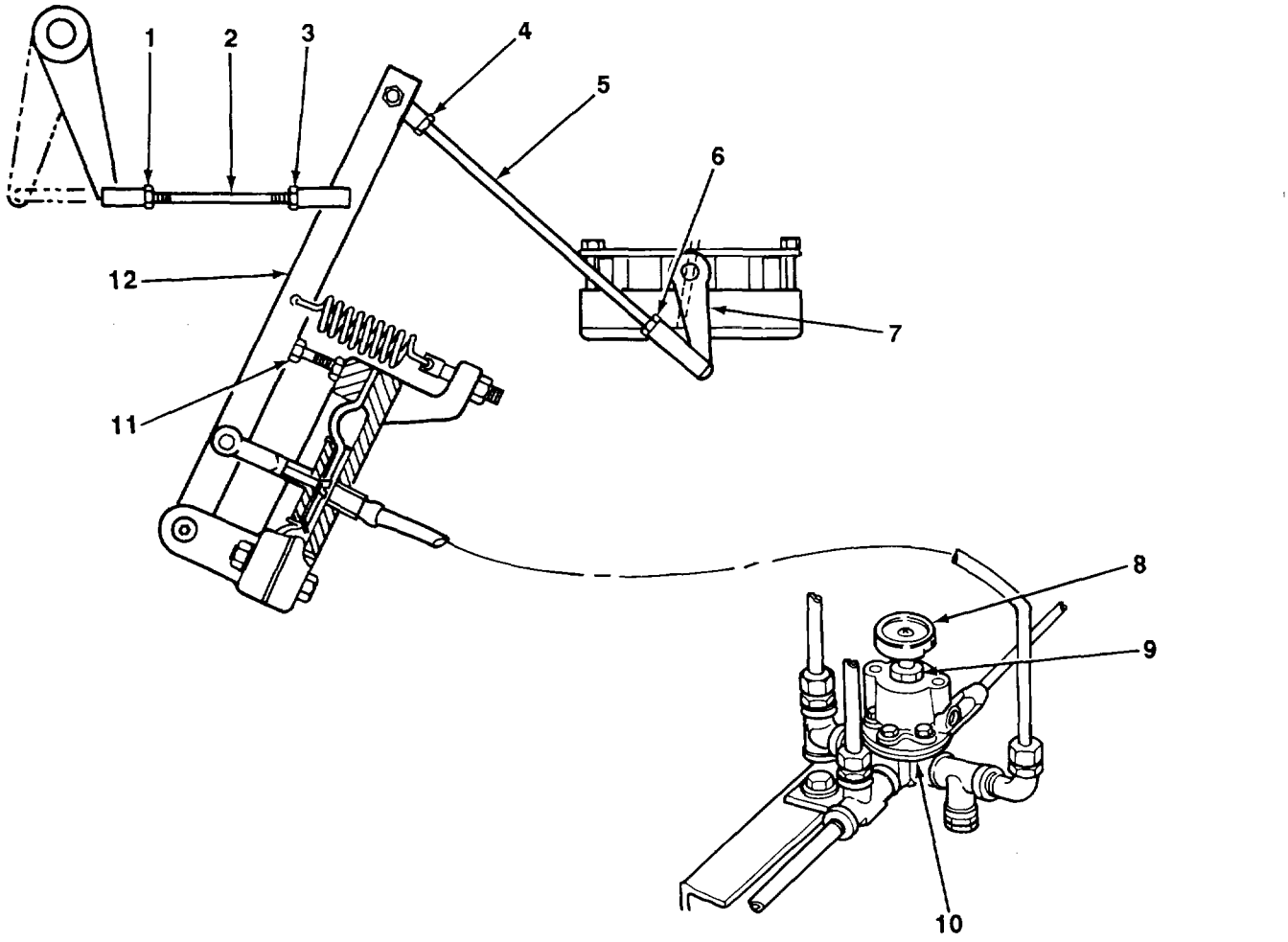
4-41. ENGINE CONTROL ASSEMBLY ADJUSTMENT.

This Task Covers: Adjustment

Initial Setup:
Tools/Test Equipment:
- General mechanic's tool kit

a. ADJUSTMENTI

1. Loosen nuts (1 and 3) on engine control rod (2).
2. Loosen nuts (4 and 6) on compressor control rod (5).
3. Turn engine control rod (2) clockwise or counterclockwise until measurement between nuts (1 and 3) is 18.25 in.(46. cm). Do not tighten nuts.
4. Turn compressor control rod (5) clockwise or counterclockwise until measurement between nuts (4 and 6) is 25.0 in. (63.5 cm). Do not tighten nuts.



TA704749

4-41. ENGINE CONTROL ASSEMBLY ADJUSTMENT (Con't).

5. Check that inlet valve (7) is in fully open position, approximately 15°-20° off vertical center of shaft.

NOTE
Ensure all service valves are closed before starting engine.

6. Start engine (see paragraph 2-10) and allow it to reach normal operating temperature.
7. Run engine until air pressure gage reads 95-100 psi (655-690 kPa).
8. Check that connecting link (12) is resting against stop screw (11).

NOTE
If connecting link Is not resting against stop screw, perform steps 9 through 11; if connecting link is resting against stop screw, perform step 12.

9. Loosen nut (9) on pressure regulator (10) and turn adjusting knob (8) slightly clockwise until 100 psi (690 kPa) reading is reached.
10. Once pressure reading is reached, turn adjusting knob (8) counterclockwise until connecting link (12) moves slightly off stop screw (11).
11. Tighten nut (9).
12. Check that engine speed reads 2375-2475 rpm.

NOTE
- **If rpm reading is below 2375, perform step 13. If rpm reading Is above 2475, perform step 14. If rpm reading Is within range, perform step 15.**
- **Pressure will Increase or decrease as step 13 or 14 Is performed. Check pressure reading after each adjustment.**

13. Open service valve to hold pressure at 90 psi (621 kPa) and turn stop screw (11) on engine control rod (2) clockwise to raise engine speed. Tighten nuts (1 and 3).
14. Open service valve to hold pressure at 90 psi (621 kPa) and turn stop screw (11) on engine control rod (2) counterclockwise to lower engine speed. Tighten nuts (1 and 3).
15. Close service valve until speed of 1150-1250 rpm is stable with service valve fully closed.
16. Check that pressure reads 110-125 psi (758-862 kPa). If pressure reads within range, adjustment is complete. If pressure reading is lower or higher, perform step 17.
17. Reset pressure regulator (10) and adjust compressor control rod (5) until idle speed reads 1150-1250 rpm.
18. Tighten four nuts (1, 3, 4, and 6).

Section IX. EXHAUST SYSTEM MAINTENANCE

4-42. MUFFLER AND EXHAUST PIPE REPLACEMENT.

This Task Covers:

a Removal

b Installation

Initial Setup:

Equipment Conditions:
- Master battery switch In OFF position

Materials/Parts:
- Six lockwashers

Tools/Test Equipment:
- General mechanic's tool kit

Personnel Required: Two

WARNING

Before attempting to replace any part of exhaust system, allow exhaust system to cool. Failure to follow this warning may result In serious burns.

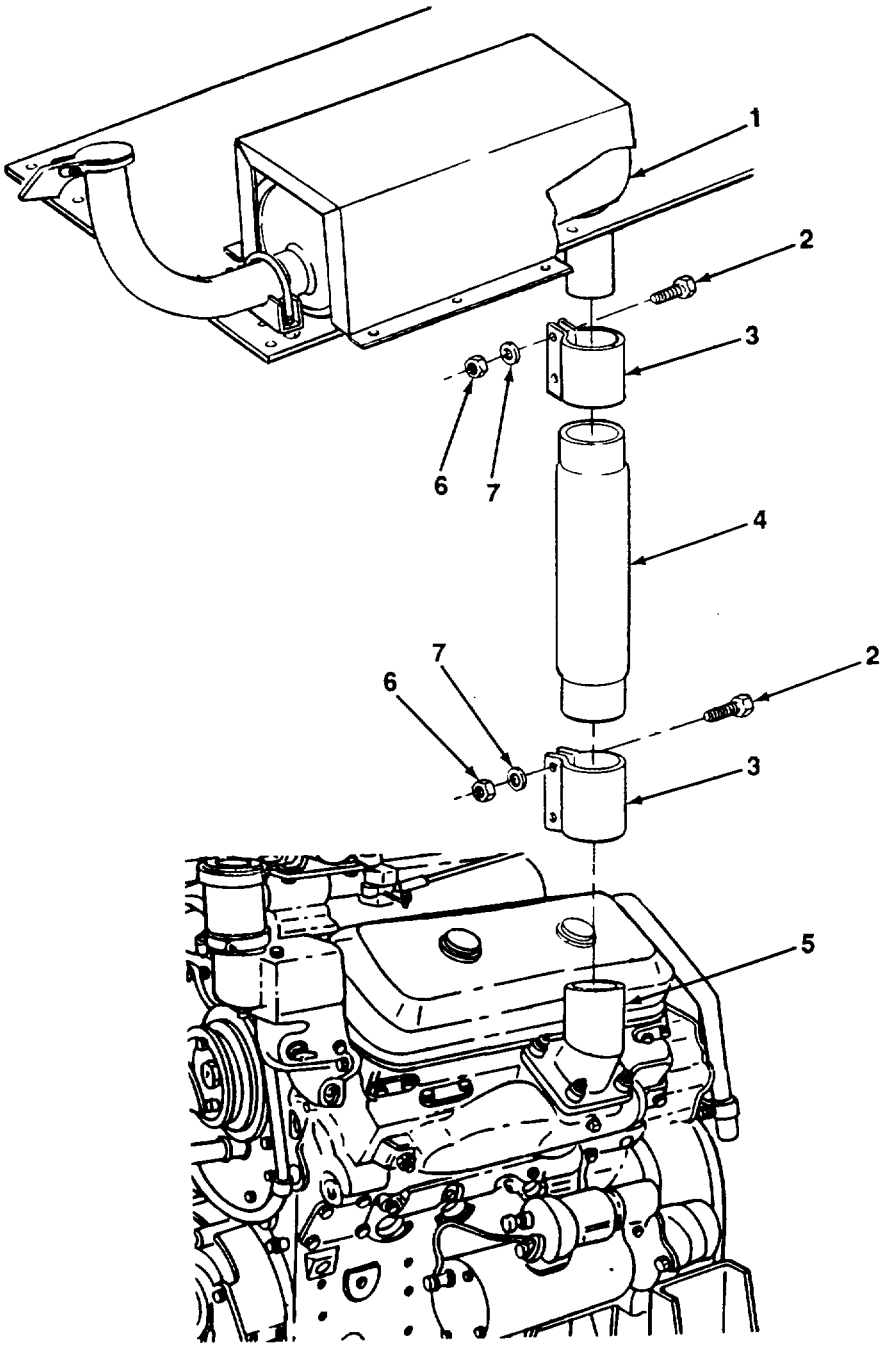
4-42. MUFFLER AND EXHAUST PIPE REPLACEMENT (Con't).

a. REMOVAL

NOTE

Both mufflers and exhaust pipes are removed same way. This procedure covers one muffler and exhaust pipe.

1. Remove four nuts (6), lockwashers (7), screws (2), two clamps (3), and pipe (4) from muffler (1) and manifold (5). Discard lockwashers.

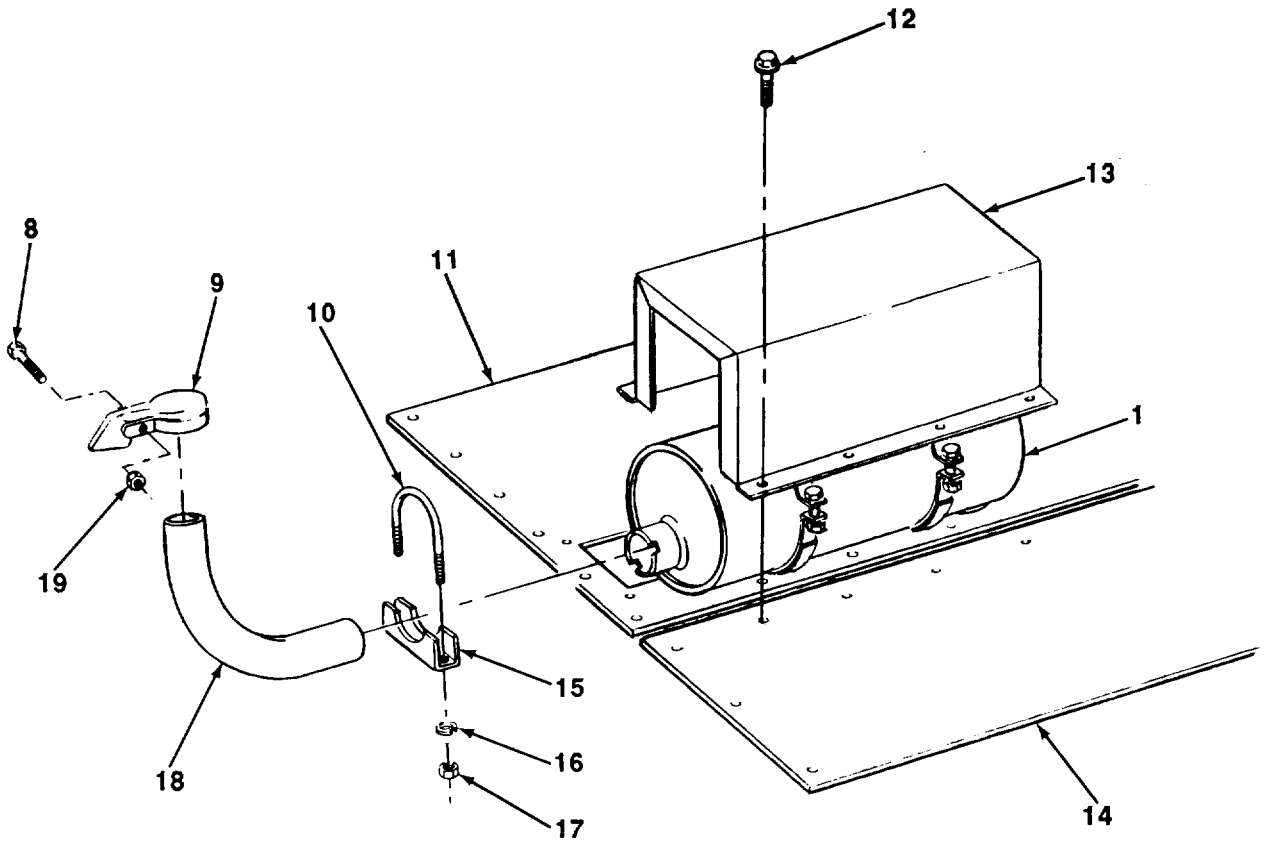


4-42. MUFFLER AND EXHAUST PIPE REPLACEMENT (Con't).

2. Remove seven screws (12) and muffler guard 913) from center roof panel (11) and side roof panel (14).

3. Remove two nuts (17), lockwashers 916), U-bolt (10), clamp (15), and exhaust pipe 918) from muffler (1). Discard lockwashers.

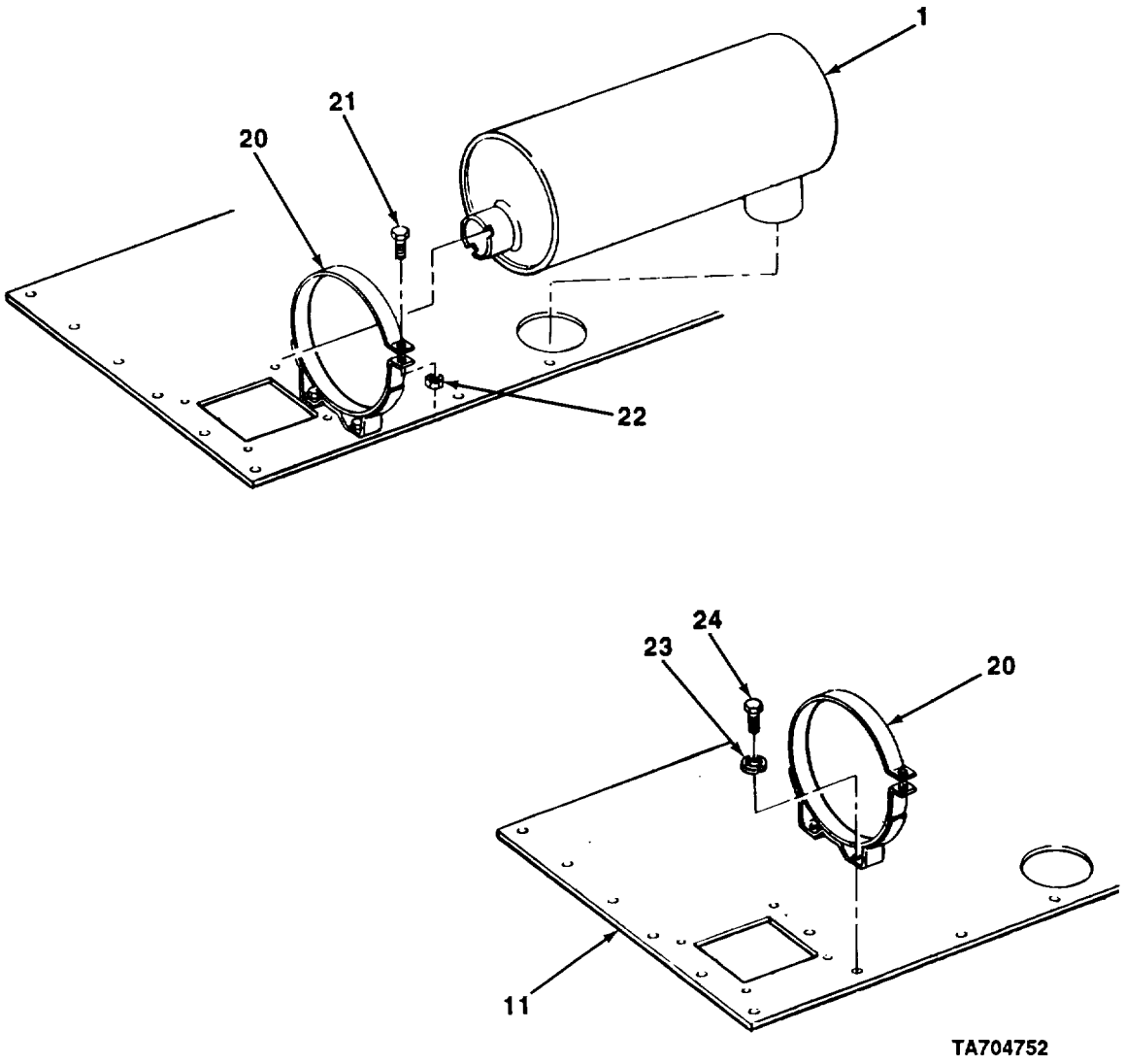
4. Remove nut (19), bolt (8), and rain cap (9) from exhaust pipe (18).



TA704753

4-42. MUFFLER AND EXHAUST PIPE REPLACEMENT (Con't).

5. Remove two nuts (22) and screws (21) from two mounting bands (20).
6. Remove muffler (1) from two mounting bands (20).



7. If damaged, remove four screws (24), lockwashers (23), and two mounting bands (20) from center roof panel (11). Discard lockwashers.

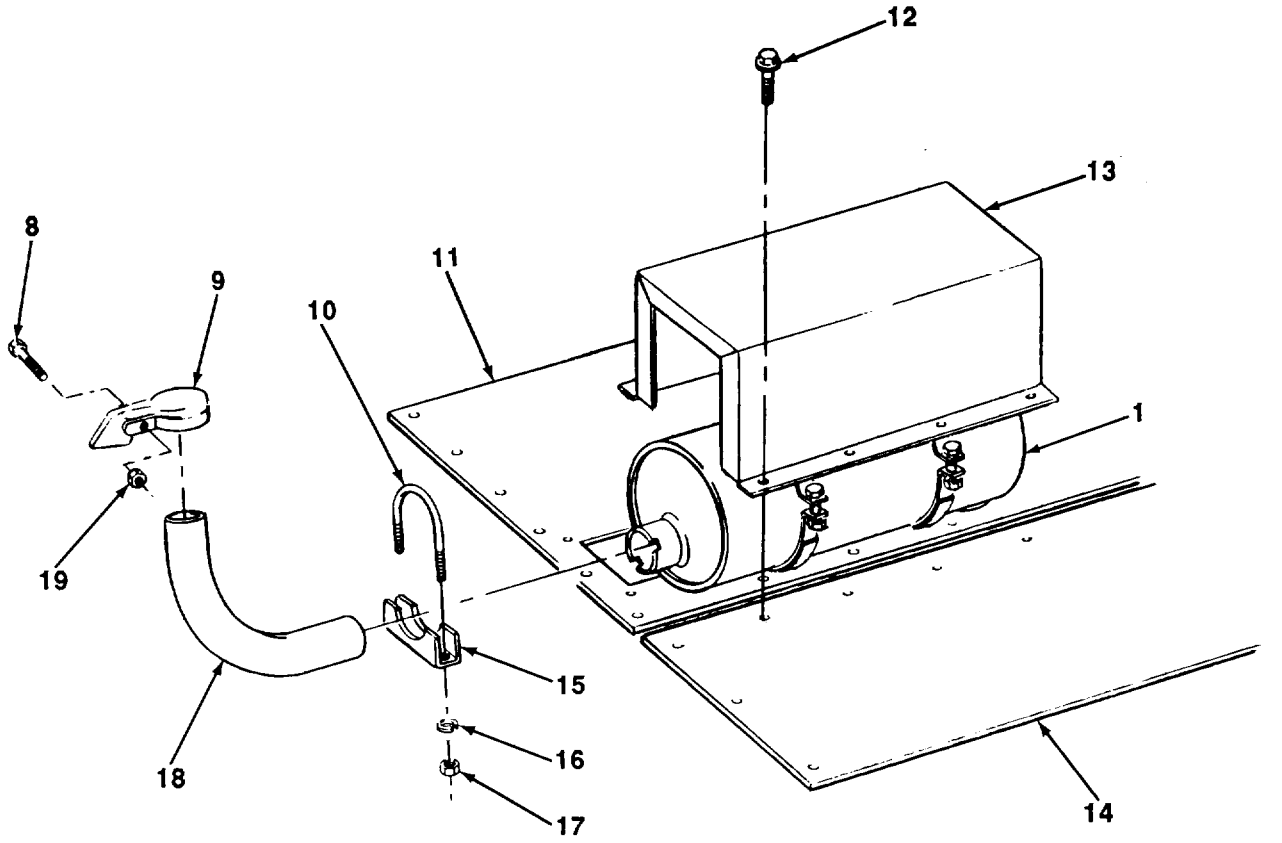
4-42. MUFFLER AND EXHAUST PIPE REPLACEMENT (Con't).

b. INSTALLATION

NOTE

Both mufflers and exhaust pipes are Installed same way. This procedure covers one muffler and exhaust pipe.

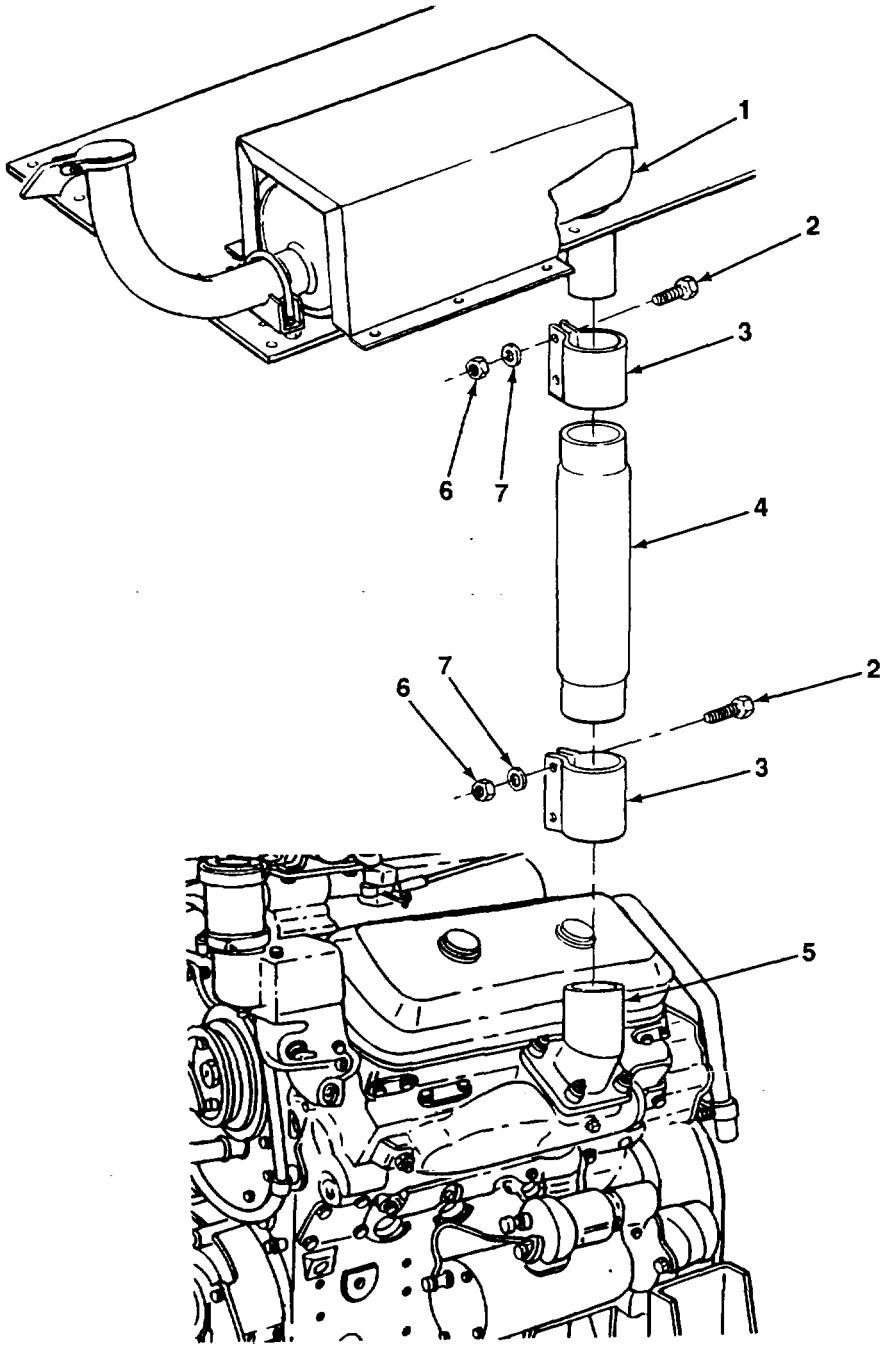
1. If removed, install two mounting bands (20) on center roof panel (11) with four new lockwashers (23) and screws (24).
2. Position muffler (1) in two mounting bands (20).
3. Install two screws (21) and nuts (22) In two mounting bands (20).
4. Install rain cap (9) onto exhaust pipe (18) with bolt (8) and nut (19).
5. Position exhaust pipe (18) and clamp (15) on muffler (1) and install U-bolt (10) with two new lockwashers (16) and nuts (17).
6. Install muffler guard (13) on center roof panel (11) and side roof panel (14) with seven screws (12).



TA704753

4-42. MUFFLER AND EXHAUST PIPE REPLACEMENT (Con't).

7. Position pipe (4) on manifold (5) and muffler (1) and install two clamps (3) with four screws (2), new lockwashers (7), and nuts (6).



4-43. EXHAUST MANIFOLDS REPLACEMENT.

This Task Covers:
a. Removal b. Installation

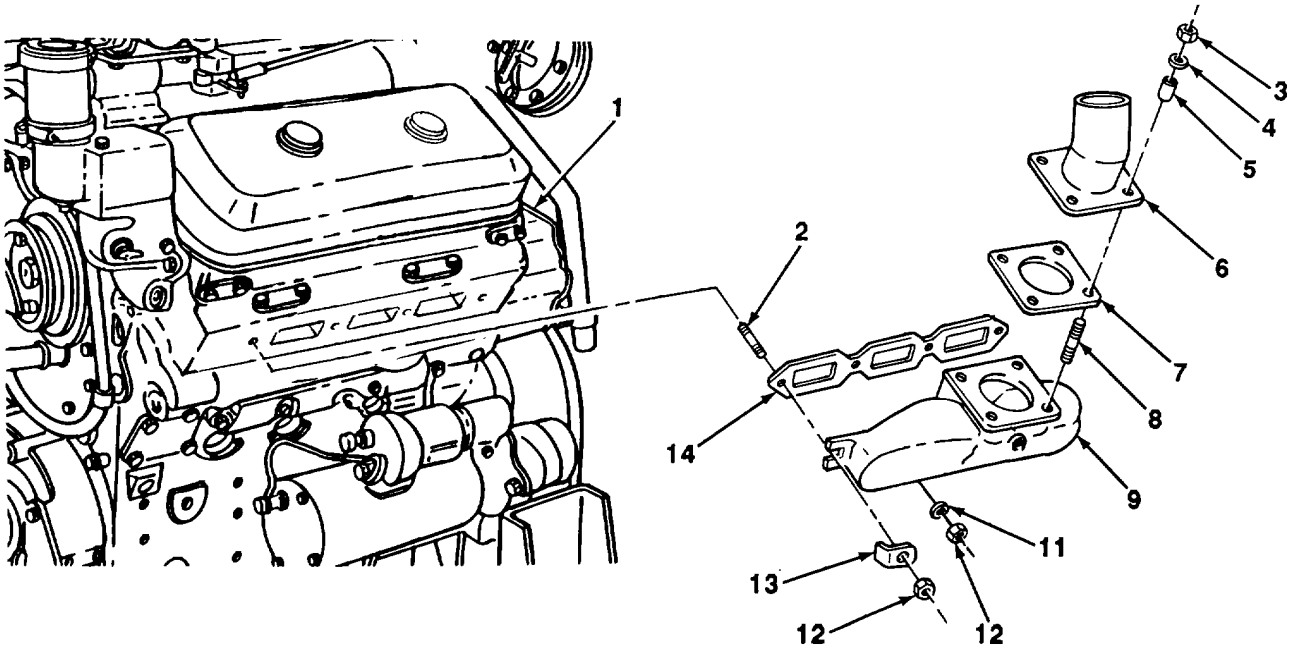
Initial Setup:
Equipment Conditions:
- Muffler and exhaust pipe disconnected from manifold (see paragraph 4-42).

Materials/Parts:
- Two gaskets

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

a. REMOVAL

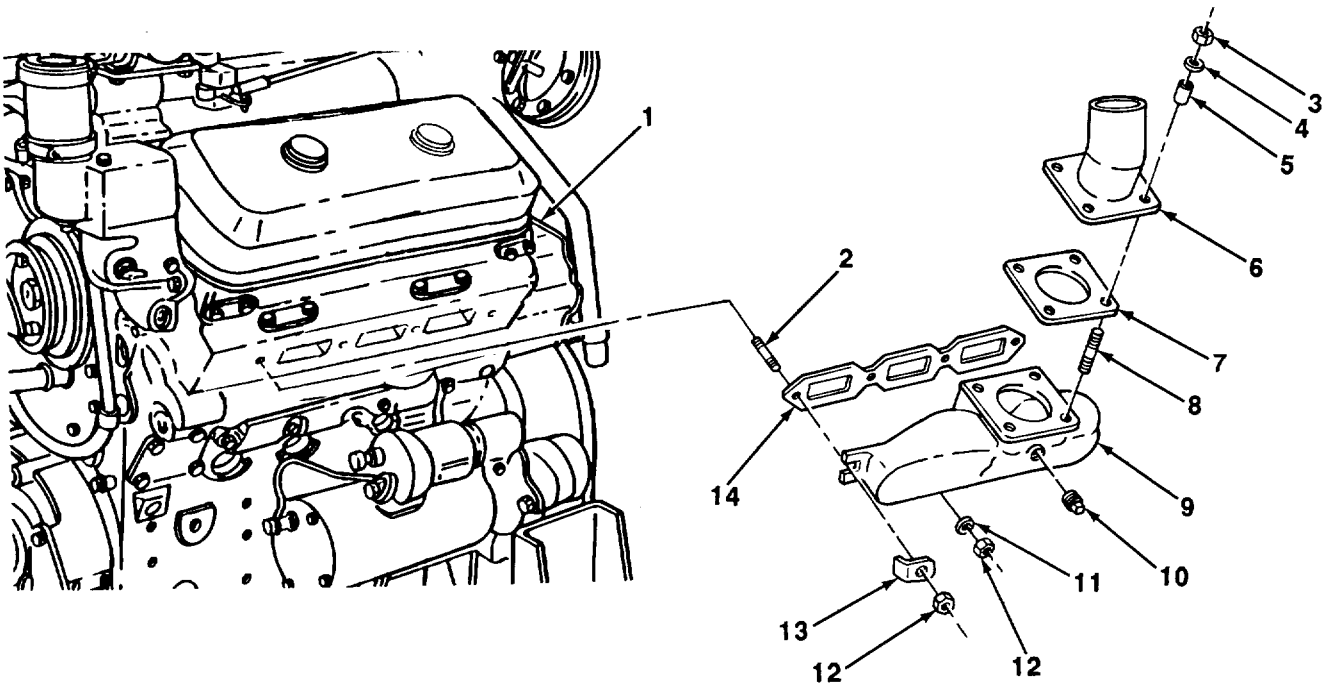
1. Remove four nuts (3), washers (4), and spacers (5) from studs (8).
2. Remove pipe (6) and gasket (7) from four studs (8) and manifold (9). Discard gasket.
3. If damaged, remove four studs (8) from manifold (9).
4. Remove four nuts (12), two brackets (13), two washers (11), manifold (9), and gasket (14) from four studs (2) and engine (1). Discard gasket.



TA704755

4-43. EXHAUST MANIFOLDS REPLACEMENT (Con't).

5. Remove plug (10) from manifold (9).
6. If damaged, remove four studs (2) from engine (1).



b. INSTALLATION I

1. If removed, install four studs (2) on engine (1).
2. Install plug (10) on manifold (9).
3. Install new gasket (14), manifold (9), two washers (11), and brackets (13) on four studs (2) with four nuts (12).
4. If removed, install four studs (8) on manifold (9).
5. Install new gasket (7) and pipe (6) on four studs (8) and manifold (9) with four spacers (5), washers (4), and nuts (3).

FOLLOW-ON TASKS:

- Connect muffler and exhaust pipe to manifold (see paragraph 4-42). TA704756

Section X. COOLING SYSTEM MAINTENANCE

4-44. COOLANT OVERFLOW BOTTLE AND BRACKET REPLACEMENT.

This Task Covers:

a. Removal
b. Installation

Initial Setup:

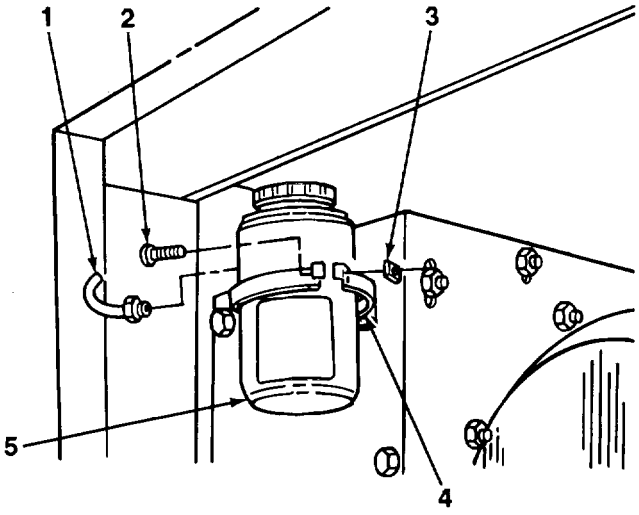
Equipment Conditions:
- Master battery switch in OFF position.
- Fan guard removed (see paragraph 4-47).

Materials/Parts:
- Two locknuts

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

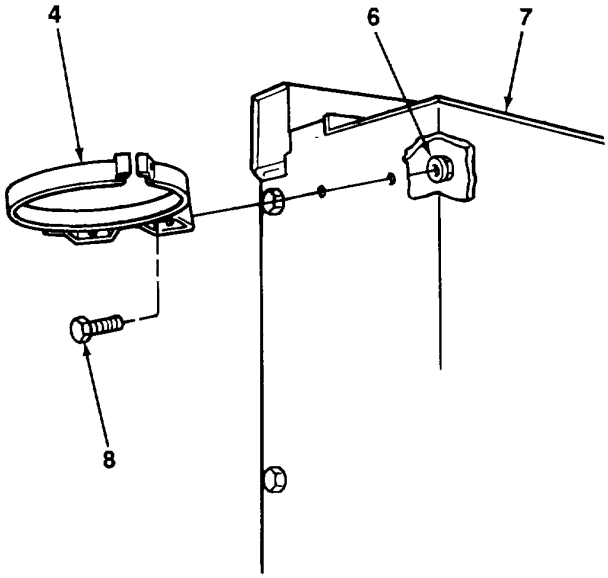
1. Disconnect line (1) from coolant overflow bottle (5).
2. Remove nut (3), screw (2), and coolant overflow bottle (5) from bracket (4).



TA704757

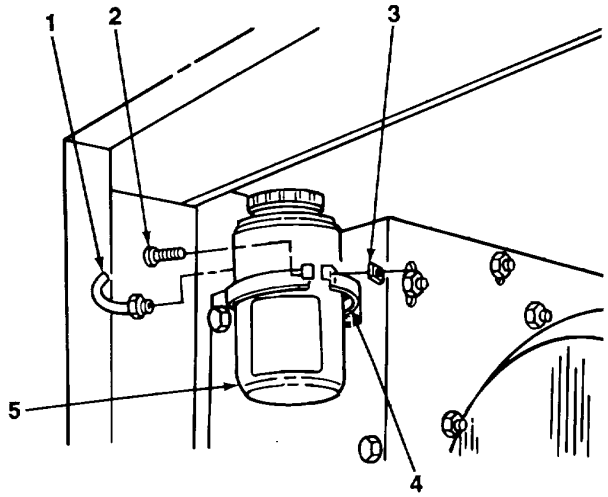
4-44. COOLANT OVERFLOW BOTTLE AND BRACKET REPLACEMENT (Con't).

3. Remove two locknuts (6), screws (8), and bracket (4) from radiator shroud (7). Discard locknuts.



b. INSTALLATION

1. Install bracket (4) on radiator shroud (7) with two screws (8) and new locknuts (6).
2. Install coolant overflow bottle (5) in bracket (4) with screw (2) and nut (3).
3. Connect line (1) to coolant overflow bottle (5).
4. Fill coolant overflow bottle half-way between MINIMUM and MAXIMUM lines (see Lubrication Instructions, Chapter 3, Section I).



TA704758

FOLLOW-ON TASKS:

• Install fan guard (see paragraph 4-47).

4-45. OIL COOLER ELBOW AND HOSE REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:

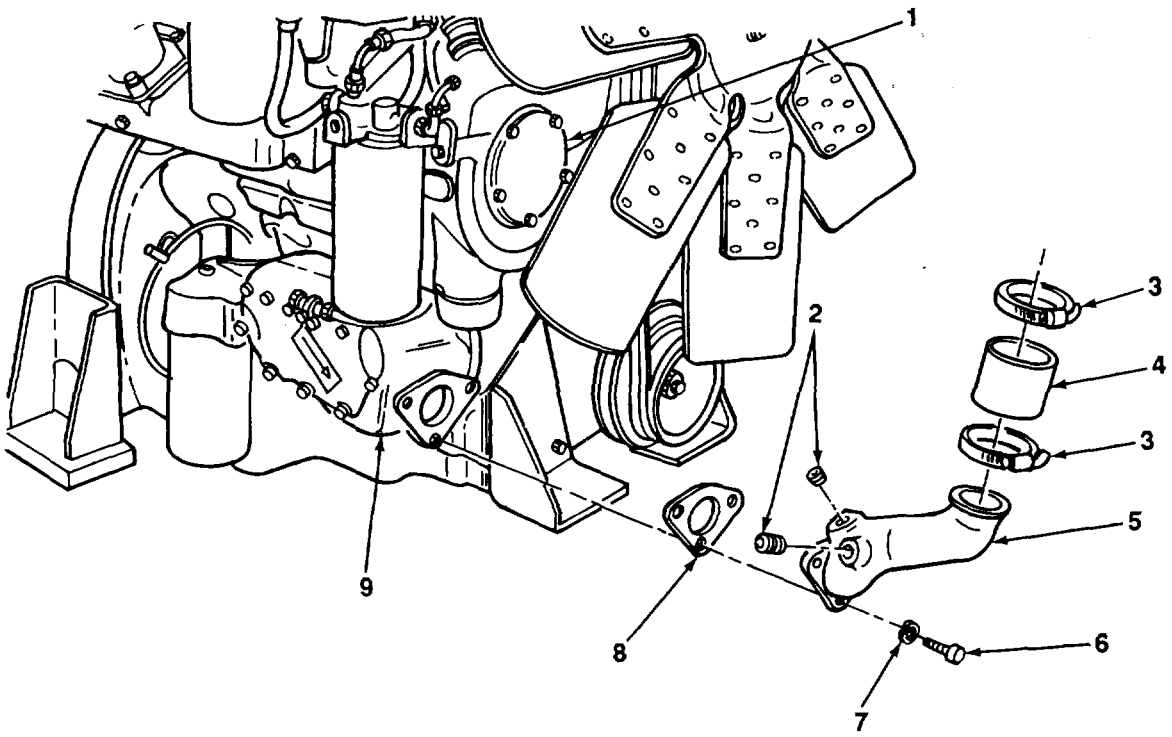
Equipment Conditions:
- Coolant drained (see Lubrication Instructions, Chapter 3, Section I)

Materials/Parts:
- One gasket
- Three lockwashers

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVALI

1. Loosen two clamps (3).
2. Remove hose (4) and two clamps (3) from water pump (1) and elbow (5).
3. Remove three bolts (6), lockwashers (7), elbow (5), and gasket (8) from oil cooler (9). Discard lockwashers and gasket.
4. Remove two plugs (2) from elbow (5).

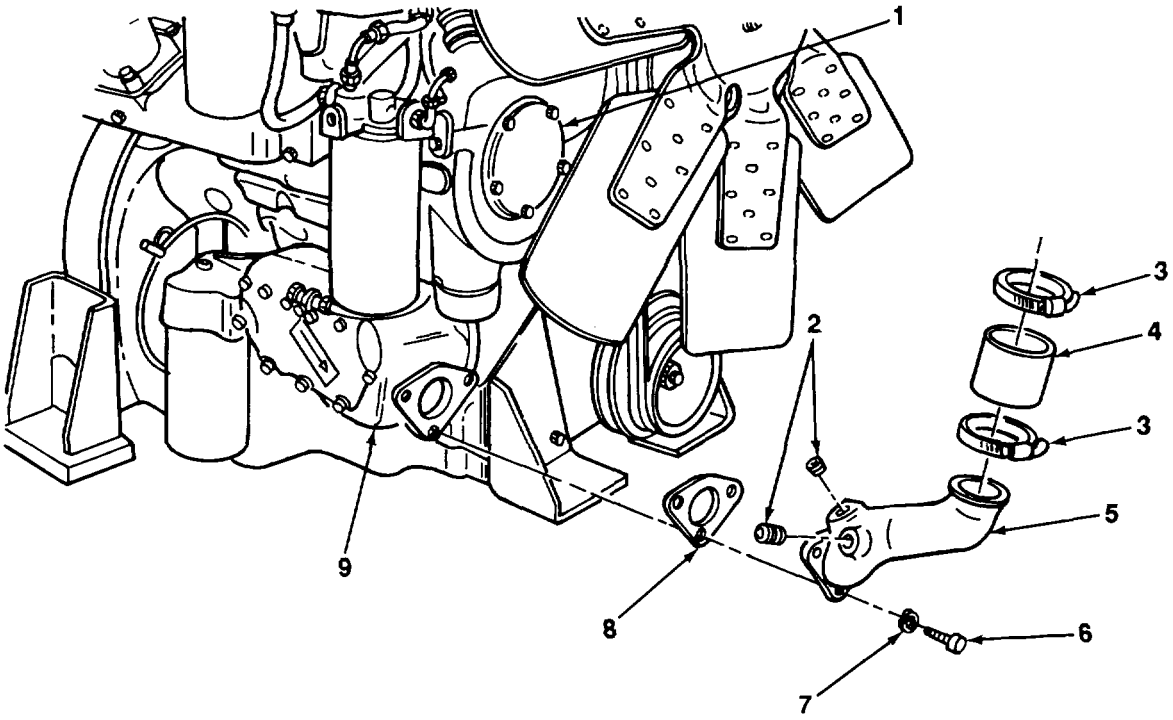


TA704759

4-45. OIL COOLER ELBOW AND HOSE REPLACEMENT (Con't).

b. INSTALLATION

1. Install two plugs (2) in elbow (5).
2. Install new gasket (8) and elbow (5) on oil cooler (9) with three new lockwashers (7) and bolts (6).
3. Place two clamps (3) on hose (4) and install hose to elbow (5) and water pump (1).
4. Position two clamps (3) on elbow (5) and water pump (1) and tighten.



FOLLOW-ON TASKS:

- Fill cooling system with coolant (see Lubrication Instructions, Chapter 3, Section I).
- Start engine (see paragraph 2-10) and check for leaks.

TA704760

4-46. FAN BELTS REPLACEMENT.

This Task Covers:

This Task Covers:
a. Removal
b. Installation
c. Adjustment

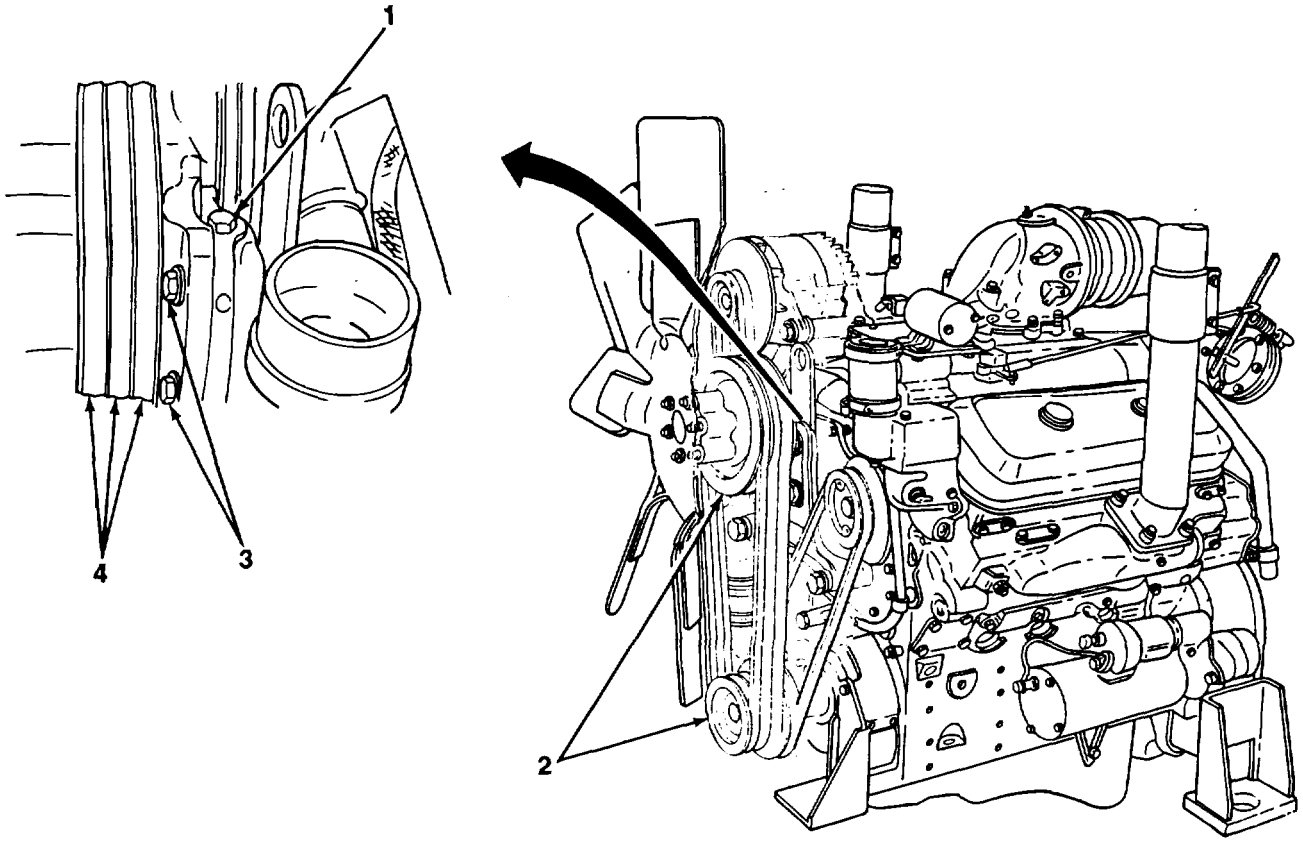
Initial Setup:

Equipment Conditions:
- Master battery switch In OFF position
- Fan guard removed (see paragraph 4-47).

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

1. Loosen four mounting bolts (3).
2. Turn adjusting screw (1) counterclockwise until fan belts (4) are loose enough to be removed from three pulleys (2).
3. Remove fan belts (4) from three pulleys (2).

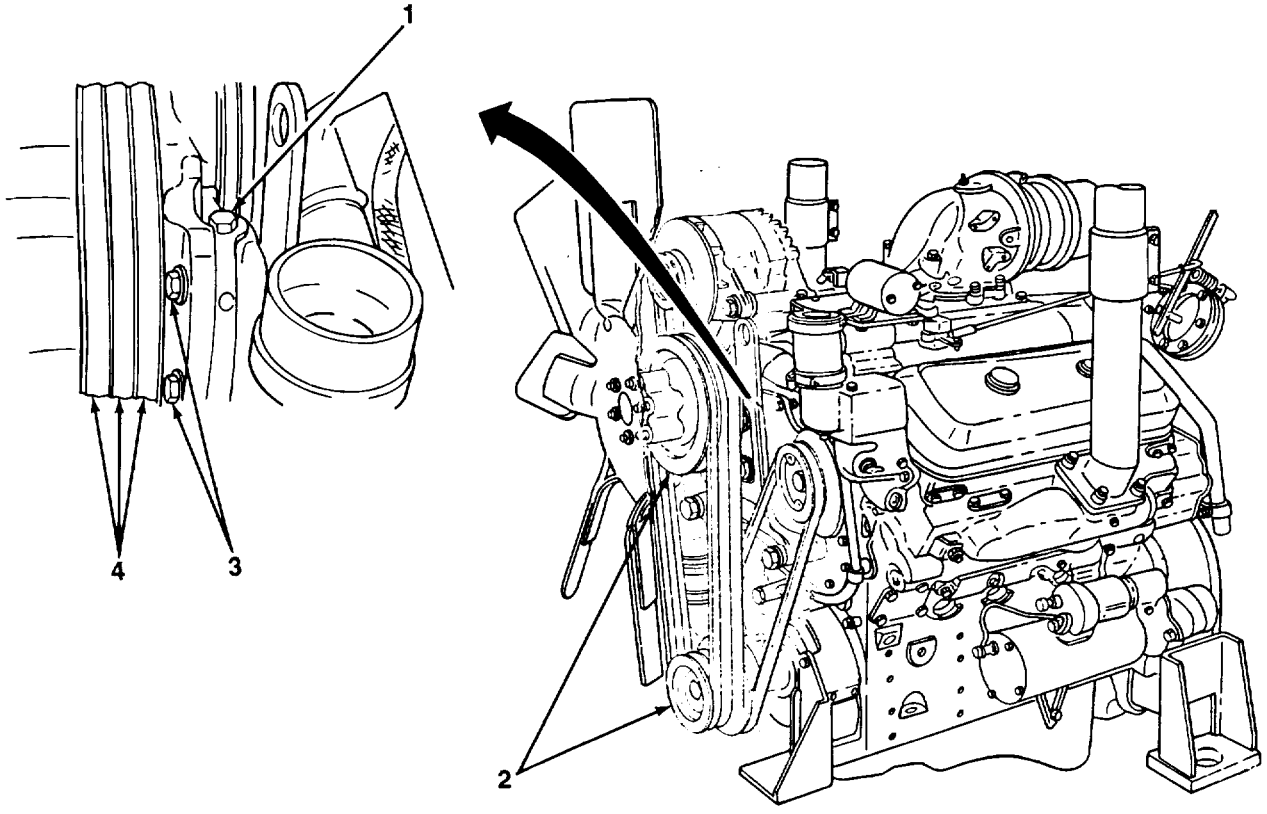


TA704761

4-46. FAN BELTS REPLACEMENT (Con't).

b. INSTALLATION I

1. Position fan belts (4) on three pulleys (2).
2. Turn adjusting screw (1) clockwise until fan belts (4) are tight.



c. ADJUSTMENTI

1. Turn adjusting screw (1) clockwise until fan belts (4) deflect X in. (12.7 mm) midway between three pulleys (2) when pushing firmly.

2. Tighten four mounting bolts (3).

FOLLOW-ON TASKS:
• Install fan guard (see paragraph 4-47).

TA704762

4-47. FAN REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:
Equipment Conditions:
- Master battery switch in OFF position.

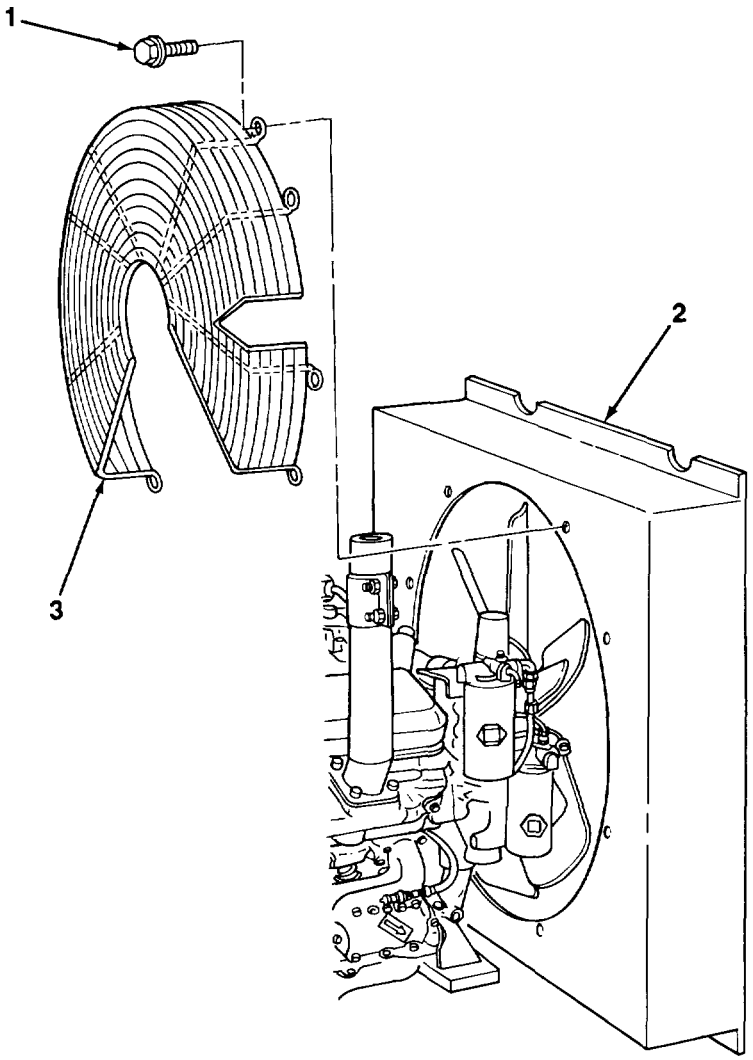
Materials/Parts:
- Six lockwashers

Tools/Test Equipment:
- General mechanic's tool kit

Personnel Required: Two

a. REMOVAL

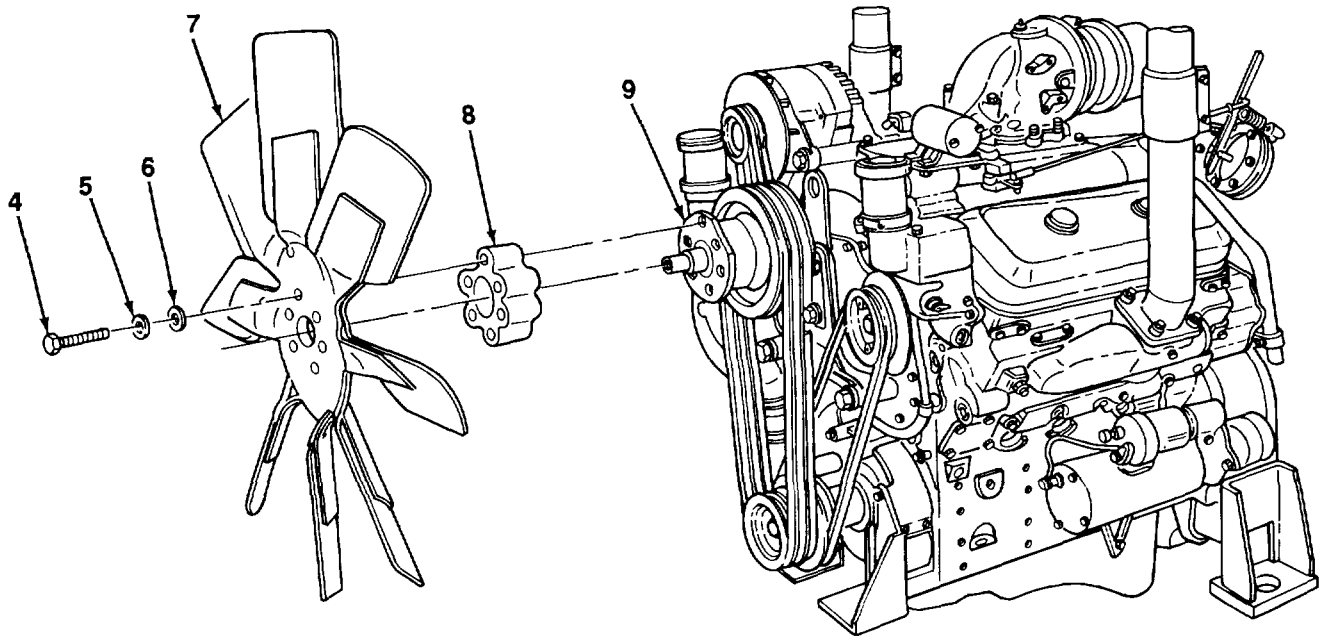
1. Remove eight screws (1) and fan guard (3) from shroud (2).



TA704763

4-47. FAN REPLACEMENT (Con't).

2. Disconnect secondary fuel filter line and remove elbow (see paragraph 4-35).
3. Disconnect left radiator hose (see paragraph 4-49).
4. Remove six screws (4), lockwashers (5), flatwashers (6), fan (7), and spacer (8) from fan hub (9). Discard lockwashers.



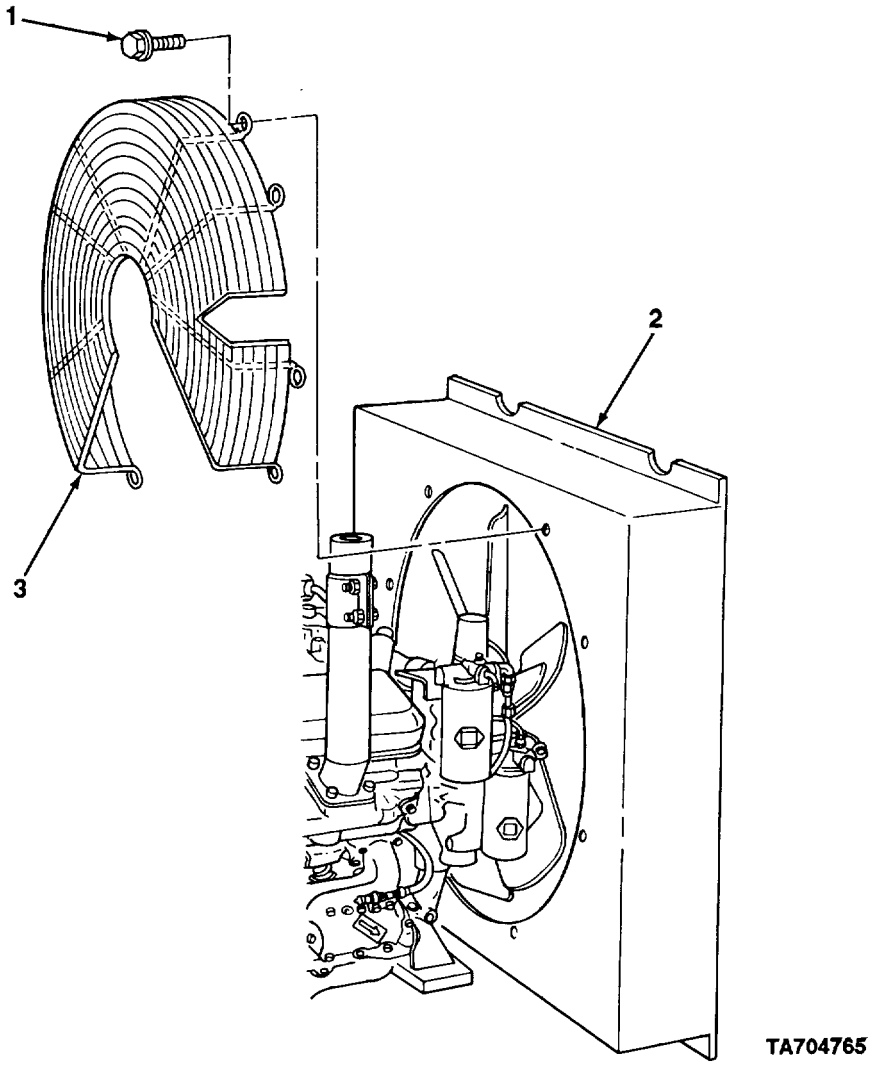
b. INSTALLATION I

1. Install spacer (8) and fan (7) on fan hub (9) with six flatwashers (6), new lockwashers (5), and screws (4).
2. Connect left radiator hose (see paragraph 4-49).

TA704764

4-47. FAN REPLACEMENT (Con't).

3. Install elbow and connect secondary fuel filter line (see paragraph 4-35).
4. Install fan guard (3) on shroud (2) with eight screws (1).



4-48. FAN HUB REPLACEMENT.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Installation

Initial Setup:

Equipment Conditions:
- Fan removed (see paragraph 4-47)
- Fan belts removed (see paragraph 4-46)

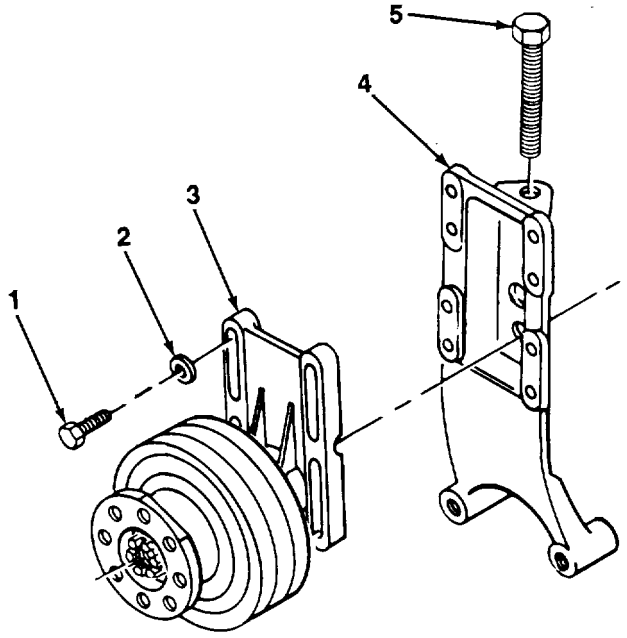
Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

Materials/Parts:
- Grease (Item 22, Appendix E)
- One cotter pin
- One lockring

References:
- TM 9-214

a. REMOVAL

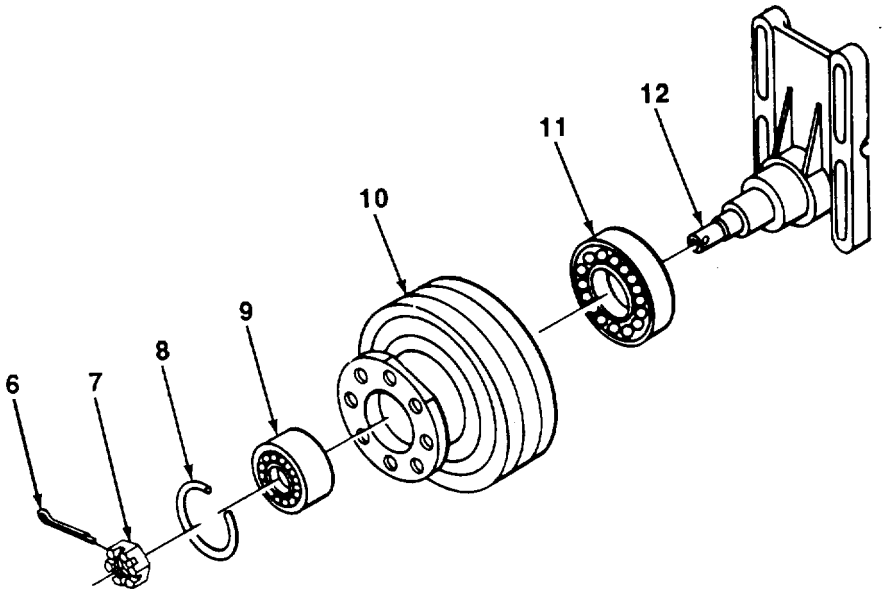
1. Remove adjusting screw (5) from support (4).
2. Remove four bolts (1), washers (2), and bracket (3) from support (4).



TA704766

3. Remove cotter pin (6) and nut (7) from shaft (12). Discard cotter pin.
4. Remove lockring (8) from groove pulley (10). Discard lockring.
5. Remove bearing (9) from groove pulley (10) and shaft (12).
6. Using puller, remove groove pulley (10) and bearing (11) from shaft (12).

4-48. FAN HUB REPLACEMENT (Con't).



TA704767

b. CLEANING AND INSPECTIONI

1. Clean and inspect bearings (see TM 9-214).
2. Inspect support castings for cracks. Replace support if cracked.

c. INSTALLATION I

1. Install bearings (9 and 11) in groove pulley (10).
2. Install new lockring (8) on groove pulley (10).
3. Install groove pulley (10) on shaft (12).
4. Install nut (7) on shaft (12). Torque nut to 60-90 lb.-ft. (81-122 N-m).
5. Install new cotter pin (6) on nut (7).
6. Install bracket (3) on support (4) with four washers (2) and bolts (1).
7. Install adjusting screw (5) on support (4).

FOLLOW-ON TASKS:

- Install fan belts (see paragraph 4-46).
- Install fan (see paragraph 4-47).

4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVER TUBE REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:
Equipment Conditions:
- Coolant drained (see Lubrication Instructions, Chapter 3, Section I)

Tools/Test Equipment:
- Twelve lockwashers
- General mechanic's tool kit

Materials/Parts:
- Adhesive (Item 1, Appendix E)
- Two seals
- Four gaskets
- Four gaskets

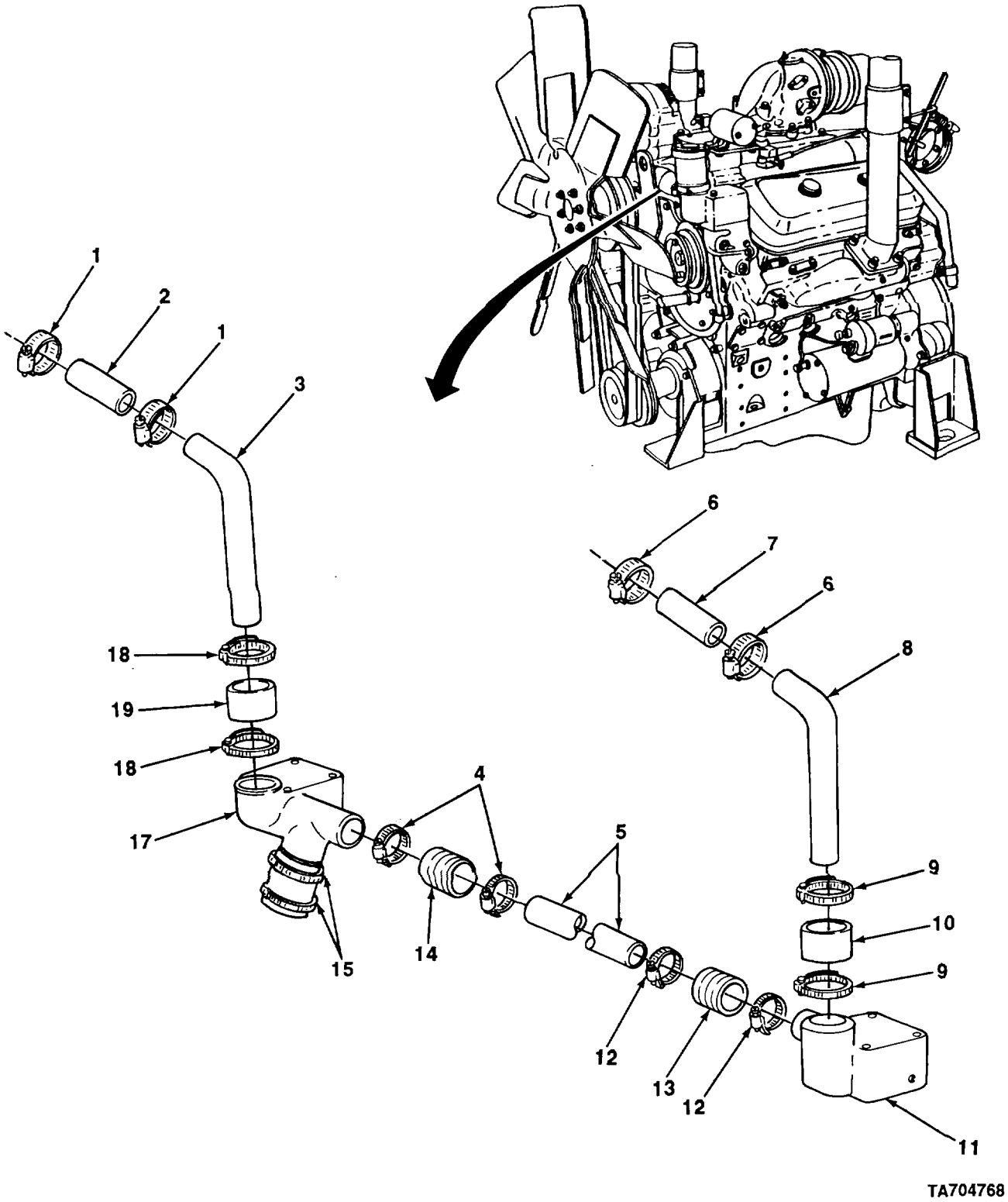
a. REMOVAL

WARNING

Servicing of engine cooling system should only be performed on a cool engine. Never remove clamps or hoses when engine Is hot. Pressurized steam or hot water will cause serious burns.

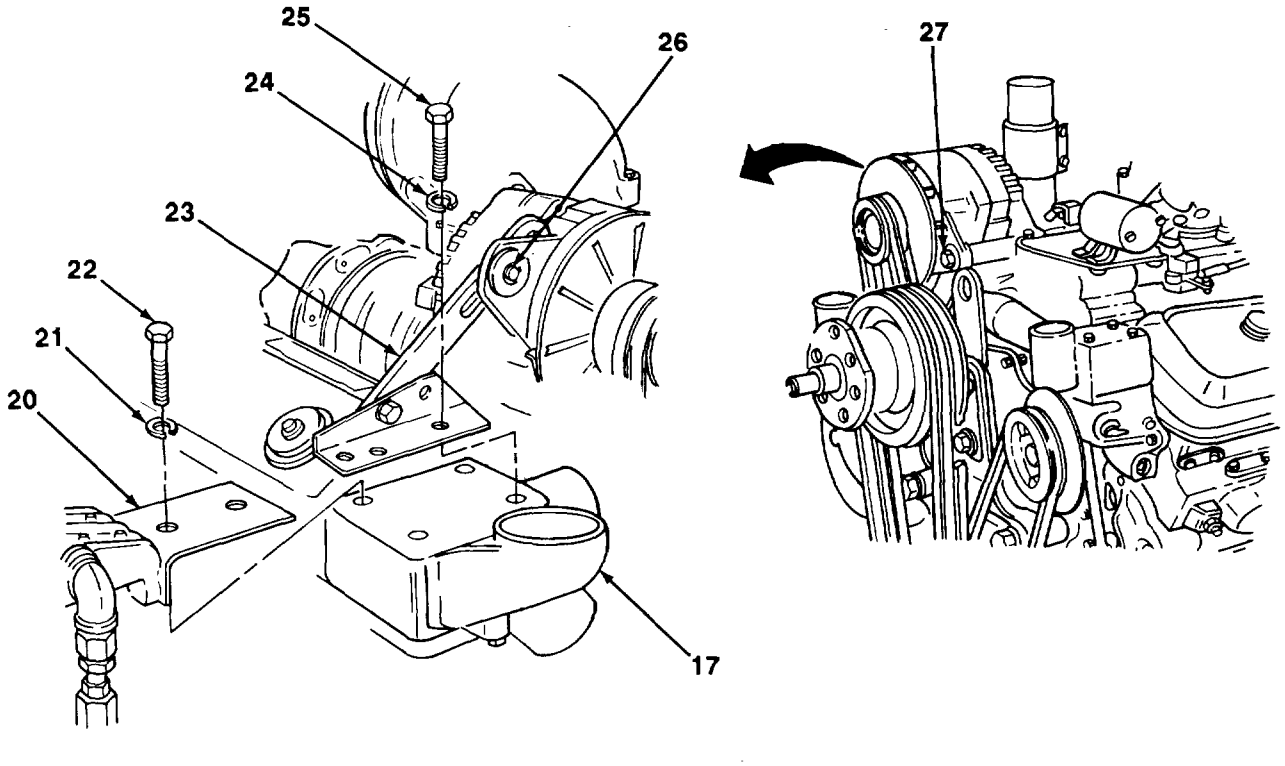
1. Loosen four clamps (4 and 12) and remove crossover tube (5), two hoses (13 and 14), and clamps from left and right thermostat covers (11 and 17).
2. Loosen two clamps (6) and remove hose (7) from radiator.
3. Loosen two clamps (9) and remove hose (10), clamps, and pipe (8) from right thermostat cover (11).
4. Loosen two clamps (1) and remove hose (2) from radiator.
5. Loosen two clamps (18) and remove hose (19), clamps, and pipe (3) from left thermostat cover (17).
6. Loosen two clamps (15) at left thermostat cover (17).

4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVER TUBE REPLACEMENT (Con't).



4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVERTUBE REPLACEMENT (Con't).

7. Remove two bolts (22), lockwashers (21), and move primary fuel filter bracket (20) aside. Discard lockwashers.
8. Loosen bolts (26 and 27).
9. Remove two screws (25), lockwashers (24), and alternator bracket (23) from left thermostat cover (17). Move alternator aside. Discard lockwasher.



TA704769

4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVERTUBE REPLACEMENT (Con't).

10. Remove left thermostat cover (17) and gasket (29) from left water outlet (31). Discard gasket.

11. Remove two clamps (15) and hose (16) from left thermostat cover (17).

12. Remove seal (28) and thermostat (30) from left water outlet (31). Discard seal.

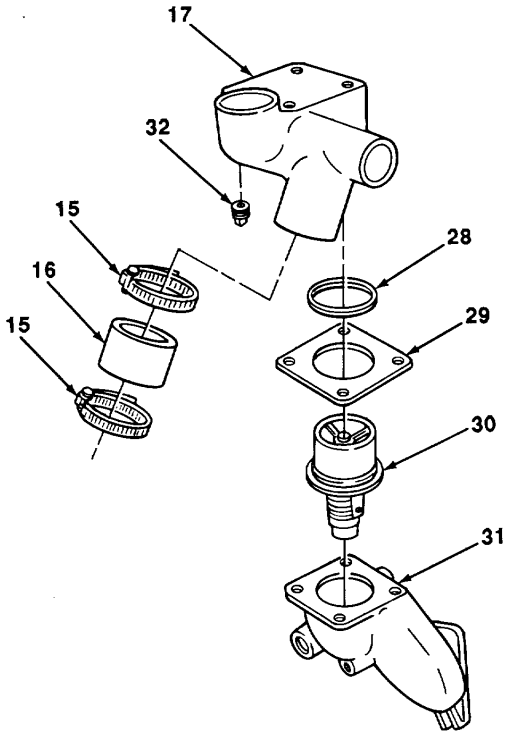
13. Remove plug (32) from left thermostat cover (17).

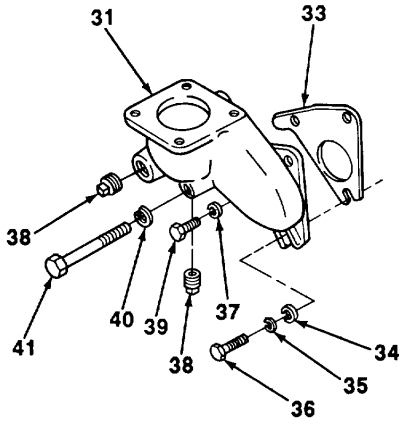
14. Remove bolt (36), washer (35), and lockwasher (34) from left water outlet (31). Discard lockwasher.

15. Remove bolt (39) and lockwasher (37) from left water outlet (31). Discard lockwasher.

16. Remove bolt (41), lockwasher (40), left water outlet (31), and gasket (33). Discard lockwasher and gasket.

17. Remove two plugs (38) from left water outlet (31).

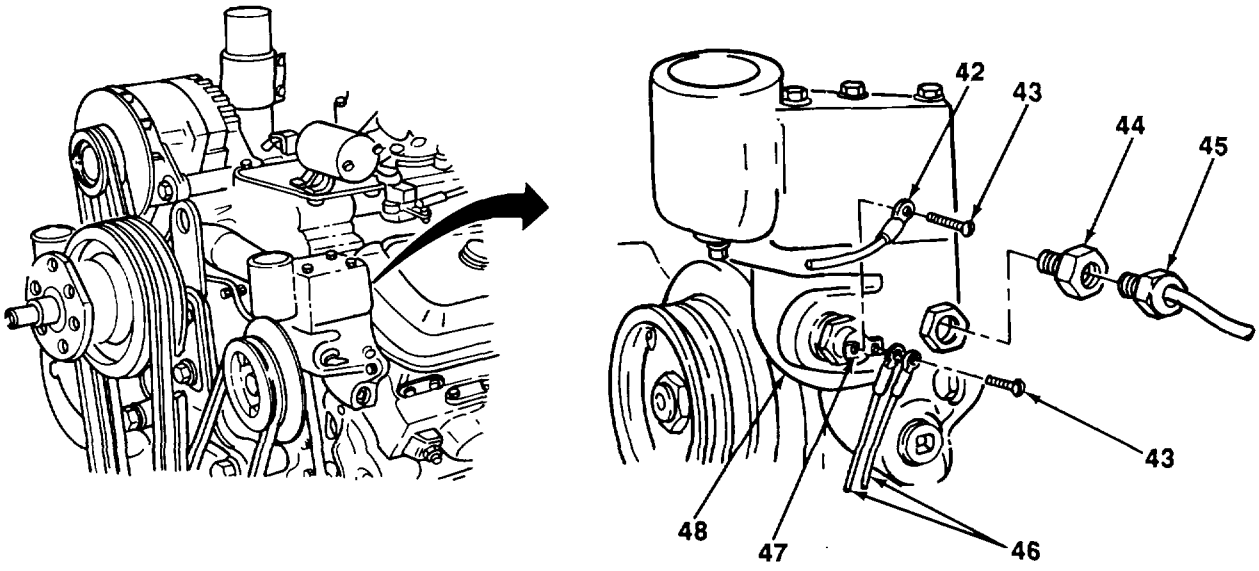




TA704770

4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVER TUBE REPLACEMENT (Con't).

18. Remove two screws (43) and three wires (42 and 46) from cold start valve (47).
19. Remove cold start valve (47) from right water outlet (48).
20. Remove temperature gage line (45) and bushing (44) from right water outlet (48).



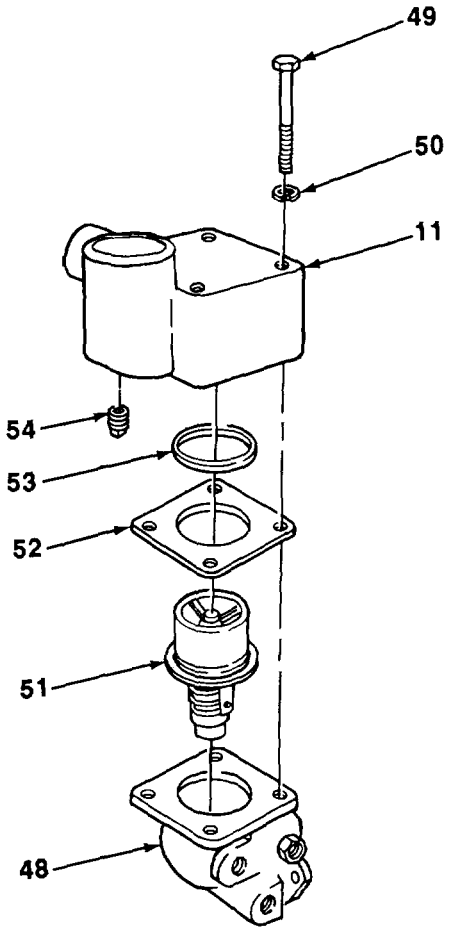
TA704771

4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVER TUBE REPLACEMENT (Con't).

21. Remove four bolts (49), lockwashers (50), gasket (52), and right thermostat cover (11) from right water outlet (48). Discard lockwashers and gasket.

22. Remove seal (53) and thermostat (51) from right water outlet (48). Discard seal.

23. Remove plug (54) from right thermostat cover (11).



TA704772

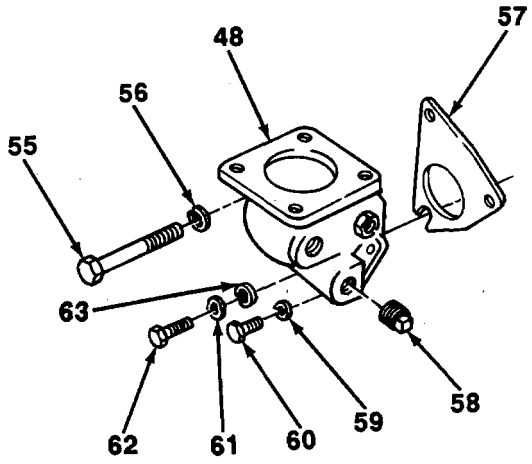
4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVER TUBE REPLACEMENT (Con't).

24. Remove bolt (60) and lockwasher (59) from right water outlet (48). Discard lockwasher.

25. Remove bolt (62), washer (61), and lockwasher (63) from right water outlet (48). Discard lockwasher.

26. Remove bolt (55), lockwasher (56), right water outlet (48), and gasket (57). Discard lockwasher and gasket.

27. Remove plug (58) from right water outlet (48).



b. INSTALLATION

1. Install plug (58) into right water outlet (48).
2. Apply adhesive to new gasket (57) and install on right water outlet (48).
3. Install right water outlet (48) with new lockwasher (56) and bolt (55).
4. Install new lockwasher (63), washer (61), and bolt (62) on right water outlet (48).
5. Install new lockwasher (59) and bolt (60) on right water outlet (48).

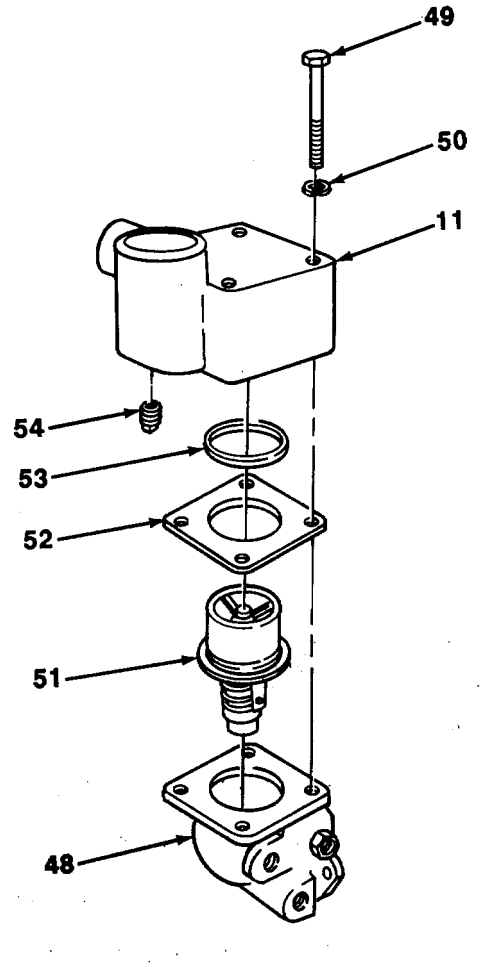
TA704773

4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVERTUBE REPLACEMENT (Con't).

6. Install plug (54) In right thermostat cover (11).

7. Install thermostat (51) and new seal (53) in right water outlet (48).

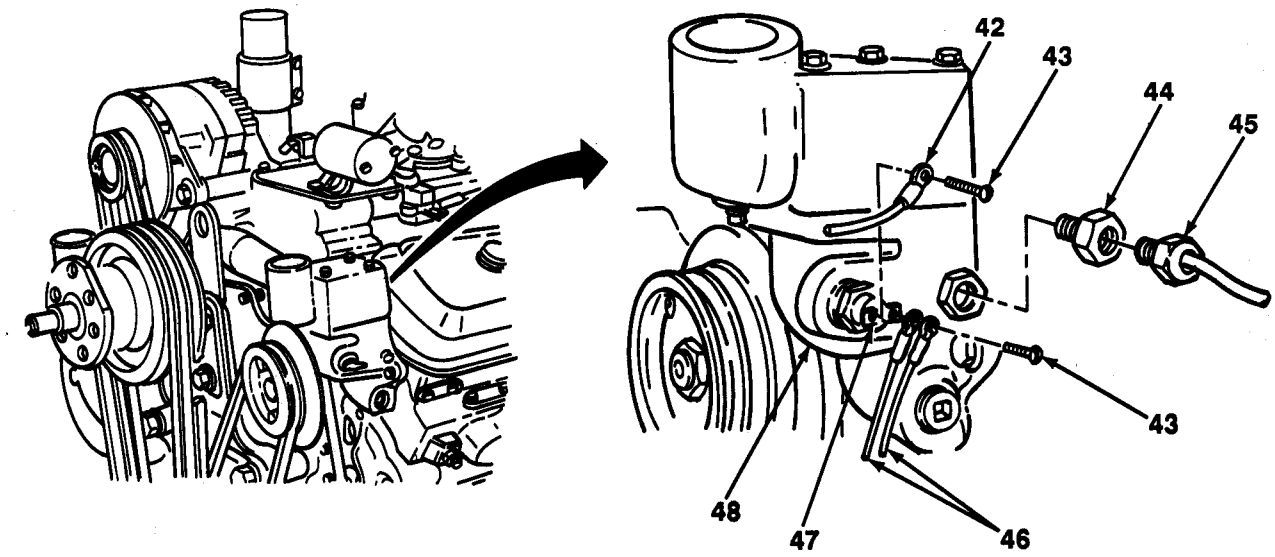
8. Apply adhesive to new gasket (52) and install on right water outlet (48)., 9. Install right thermostat cover (11) on right water outlet (48) with four new lockwashers (50) and bolts (49).



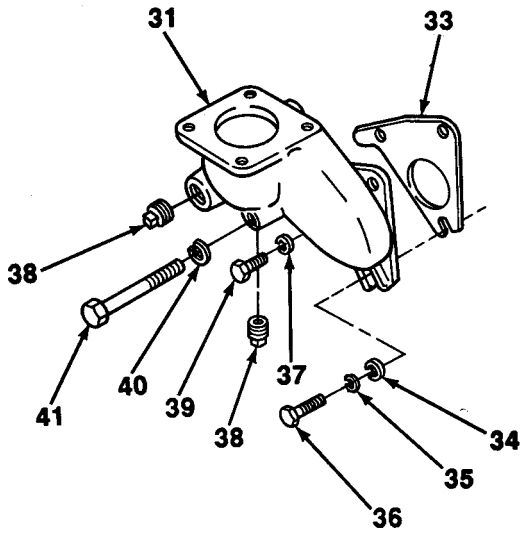
TA704774

4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVER TUBE REPLACEMENT (Con't).

10. Install temperature gage line (45) and bushing (44) on right water outlet (48).
11. Install cold start valve (47) on right water outlet (48).
12. Position three wires (42 and 46) on cold start valve (47) and tighten two screws (43).



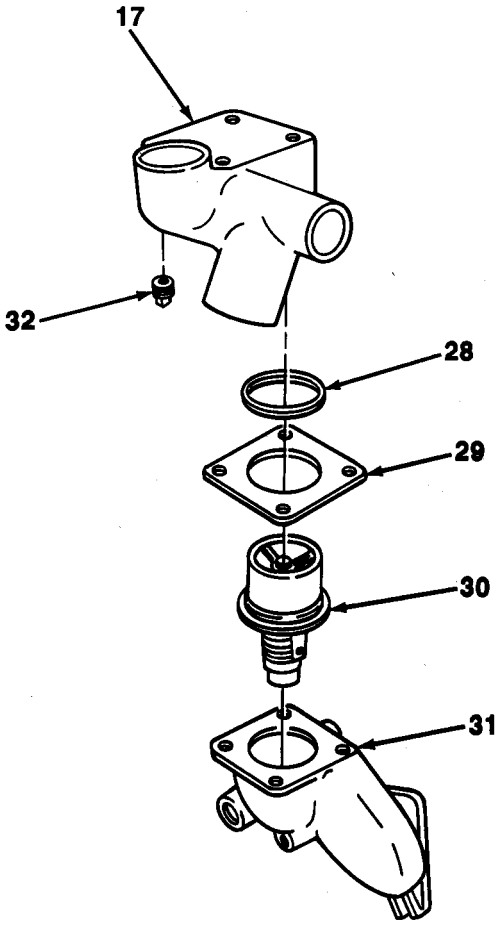
13. Install two plugs (38) In left water outlet (31).
14. Apply adhesive to new gasket (33) and install on left water outlet (31).
15. Install left water outlet (31) with new lockwasher (40) and bolt (41).
16. Install new lockwasher (37) and bolt (39) on left water outlet (31).
17. Install new lockwasher (34), washer (35), and bolt (36) on left water outlet (31).



TA704775

4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVER TUBE REPLACEMENT (Con't).

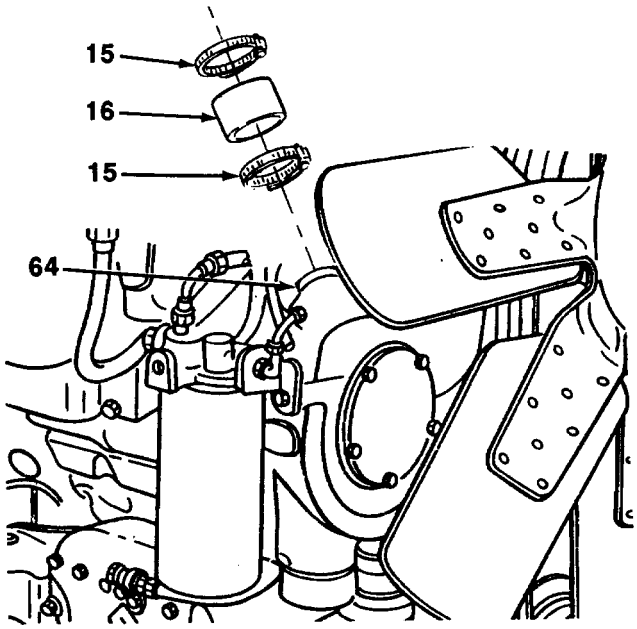
18. Install plug (32) in left thermostat cover (17).
19. Install thermostat (30) and new seal (28) in left water outlet (31).
20. Apply adhesive to new gasket (29) and install on left water outlet (31).
21. Position left thermostat cover (17) on left water outlet (31).



TA704776

4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET AND CROSSOVER TUBE REPLACEMENT (Con't).

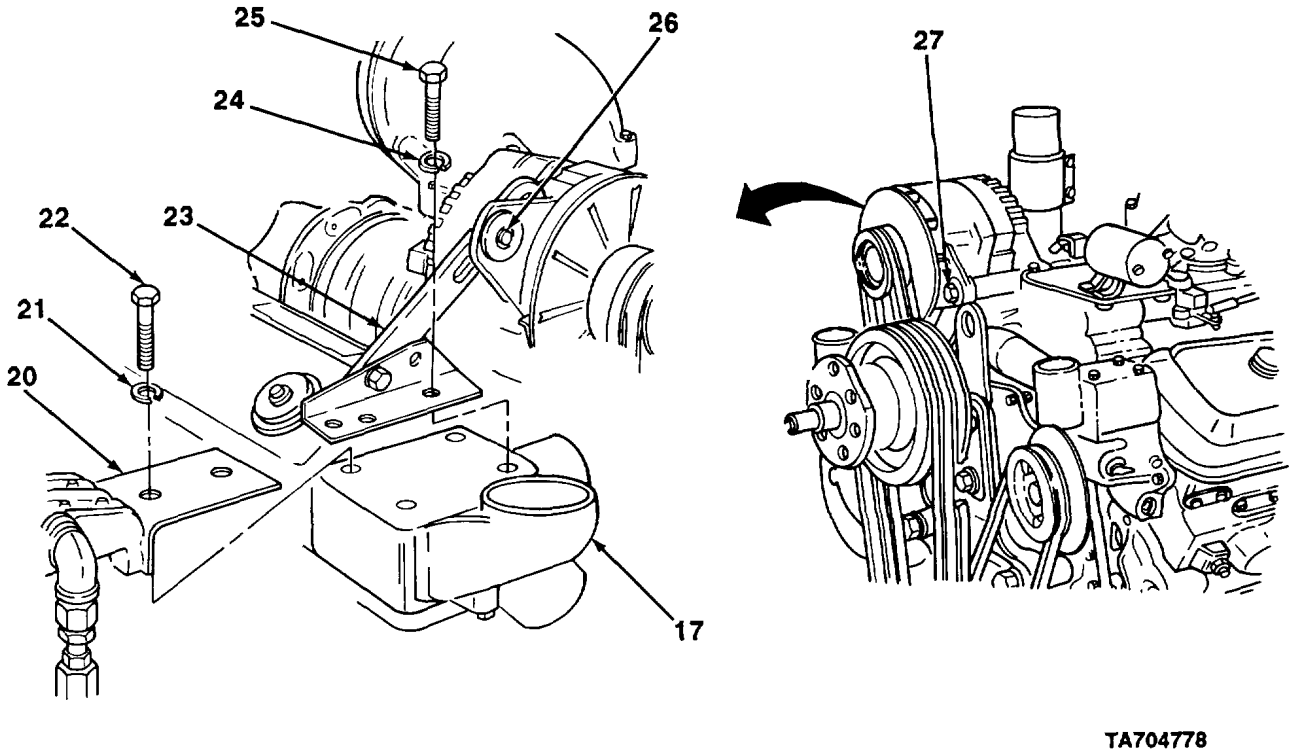
22. Install two clamps (15) and hose (16) on water pump (64). Do not tighten clamps.



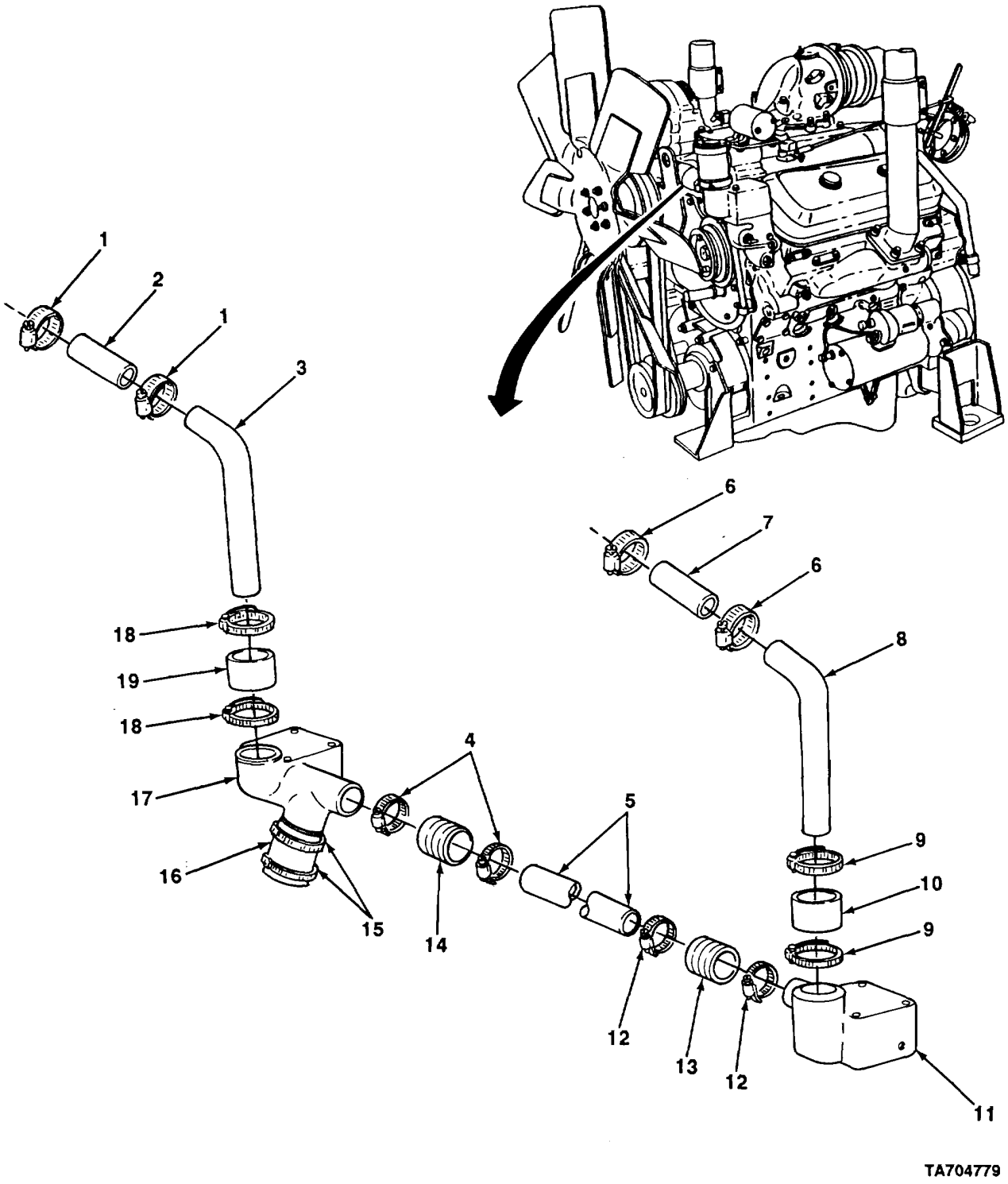
TA704777

4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVER TUBE REPLACEMENT (Con't).

23. Install alternator bracket (23) on left thermostat cover (17) with two new lockwashers (24) and screws (25).
24. Tighten bolts (26 and 27).
25. Position primary fuel filter bracket (20) and Install two new lockwashers (21) and bolts (22).



4-49. THERMOSTAT, THERMOSTAT COVERS, WATER OUTLET, AND CROSSOVERTUBE REPLACEMENT (Con't).



4-49. THERMOSTAT, THERMOSTATCOVERS, WATER OUTLET, AND CROSSOVERTUBE REPLACEMENT (Con't).

26. Install hose (16) over left thermostat cover (17) and tighten two clamps (15).
27. Install pipe (3) and hose (2) using two clamps (1).
28. Install hose (19) on left thermostat cover (17) and pipe (3) using two clamps (18).
29. Install pipe (8) and hose (7) using two clamps (6).
30. Install hose (10) on right thermostat cover (11) and pipe (8) using two clamps (9).
31. Install hoses (13 and 14) on crossover tube (5).
32. Install four clamps (4 and 12) over two hoses (13 and 14). Do not tighten clamps.
33. Install crossover tube (5), two hoses (13 and 14), and four clamps (4 and 12) over left and right thermostat covers (11 and 17).
34. Tighten four clamps (4 and 12).

FOLLOW-ON TASKS:

- Adjust alternator belts (see paragraph 4-52).
- Fill cooling system with coolant (see Lubrication Instructions, Chapter 3, Section I).

4-50. LOWER RADIATOR TUBE AND HOSE REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:

Equipment Conditions:
- Coolant drained (see Lubrication Instructions, Chapter 3, Section I).

Tools/Test Equipment:
- General mechanic's tool kit

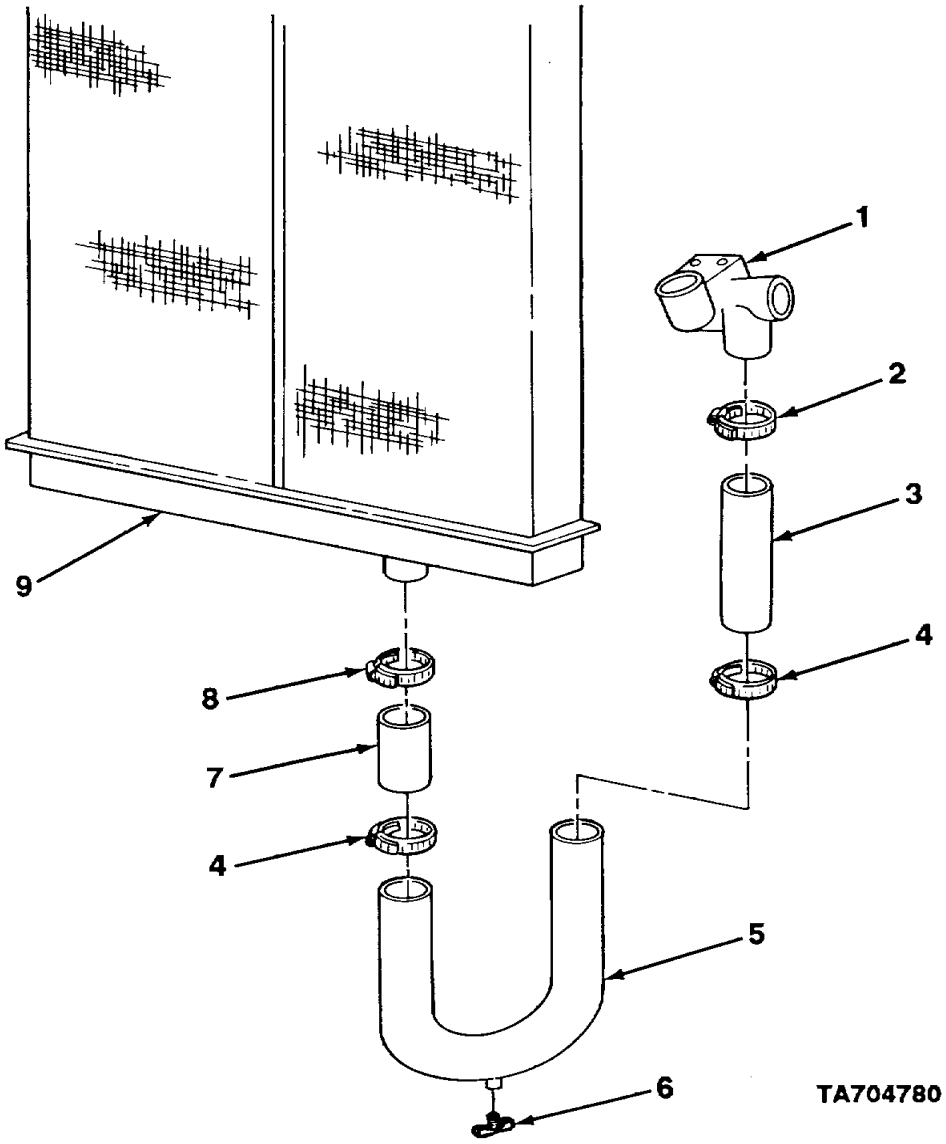
a. REMOVALI

1. Loosen two clamps (4) and remove tube (5) from hoses (3 and 7).
2. Remove two clamps (4) from tube (5).
3. Loosen clamp (2) and remove hose (3) from right thermostat cover (1).
4. Loosen clamp (8) and remove hose (7) from radiator (9).
5. Remove clamps (2 and 8) from hoses (3 and 7).
6. Remove draincock (6) from tube (5).

b. INSTALLATION I

1. Install draincock (6) in tube (5).
2. Slide clamp (8) on hose (7) and install on radiator (9). Tighten clamp.
3. Install clamp (2) on hose (3) and install on right thermostat cover (1). Tighten clamp.
4. Slide two clamps (4) on tube (5).
5. Position tube (5) on hoses (3 and 7) and tighten two clamps (4).

4-50. LOWER RADIATOR TUBE AND HOSE REPLACEMENT (Con't).



FOLLOW-ON TASKS:

- Fill cooling system with coolant (see Lubrication Instructions, Chapter 3, Section 1).
- Start engine (see paragraph 2-10) and check for leaks.

Section XI. ELECTRICAL SYSTEM MAINTENANCE

4-51. ALTERNATOR REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:

Equipment Conditions:
- Alternator belts removed (see paragraph 4-52).

Tools/Test Equipment:
- General mechanic's tool kit
- Common no.

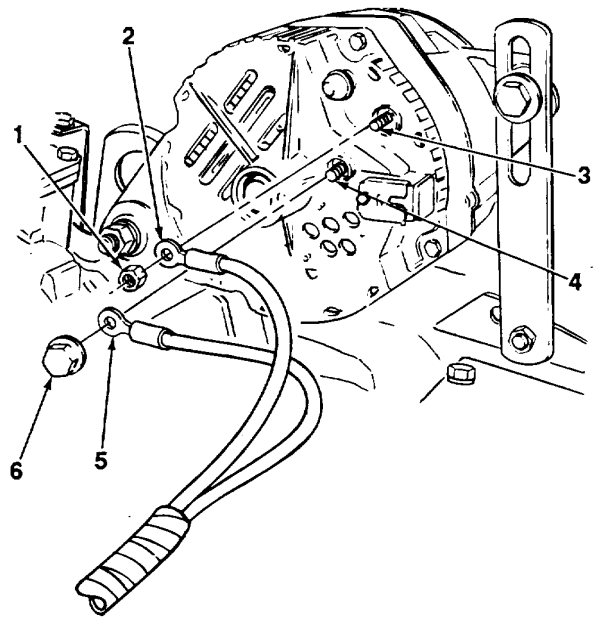
Materials/Parts:
- Marker tags (Item 40, Appendix E)
- Two lockwashers

1 shop set

4-51. ALTERNATOR REPLACEMENT (Con't).

a. REMOVALI

1. Tag wire (2) and remove nut (1) and wire from stud (3).
2. Tag wire (5) and remove nut (6) and wire from stud (4).



3. Remove bolt (7) and washer (8) from alternator (10) and bracket (9).
4. Remove nut (13), lockwasher (12), washer (11), bolt (16), washer (15), and alternator (10) from bracket (14). Discard lockwasher.

NOTE
Perform step 5 only If alternator Is to be replaced.

5. Remove nut (18) and using puller, remove pulley (17).

NOTE
Perform steps 6 and 7 only If alternator brackets are damaged.

6. Remove nut (23), lockwasher (22), bolt (19), and bracket (9) from bracket (21). Discard lockwasher.
7. Remove two bolts (25), lockwashers (24), and bracket (21) from left thermostat cover (20). Discard lockwashers.

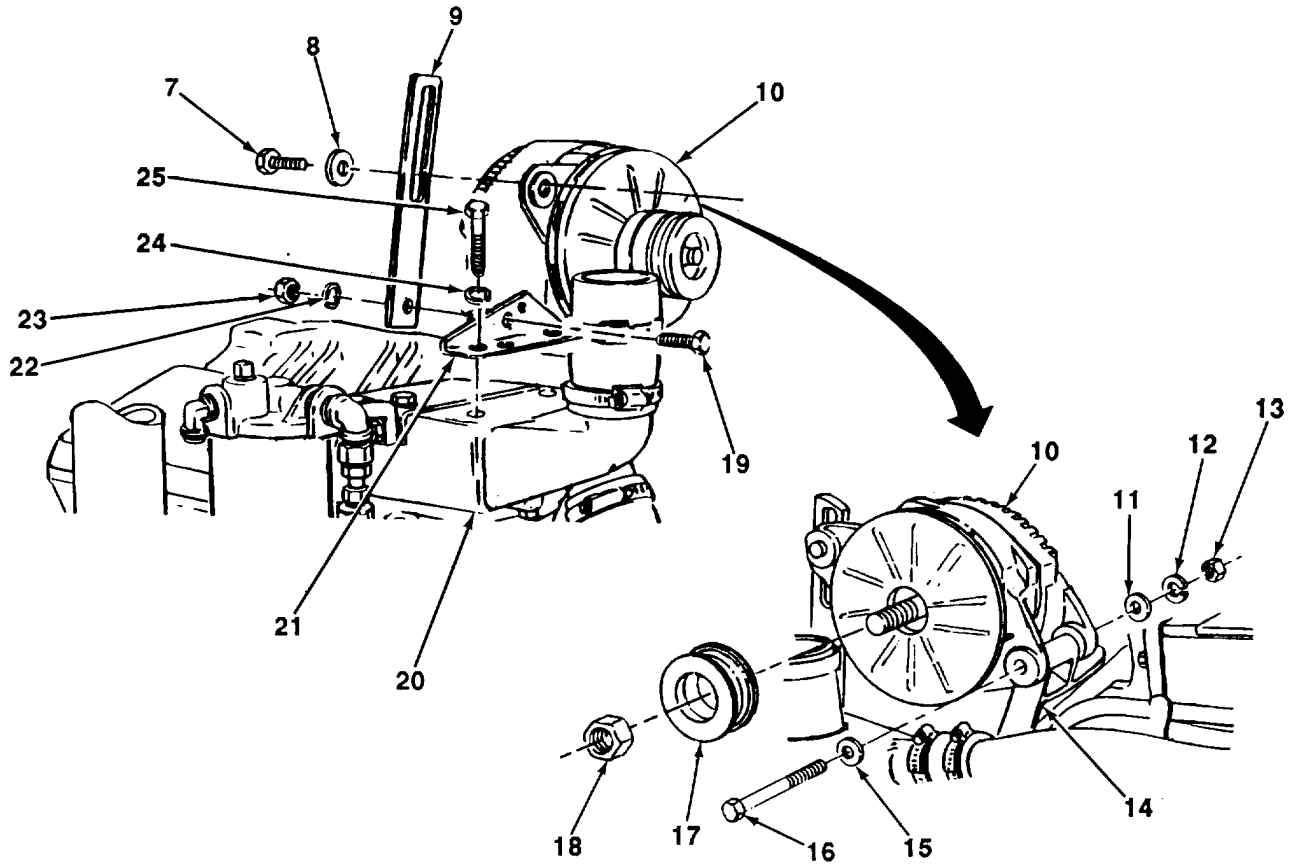
b. INSTALLATIONI

NOTE
Perform steps 1 and 2 only If alternator brackets were removed.

1. Install bracket (21) on left thermostat cover (20) with two new lockwashers (24) and bolts (25).

TA704781

4-51. ALTERNATOR REPLACEMENT (Con't).



2. Install bracket (9) on bracket (21) with bolt (19), new lockwasher (22), and nut (23).
3. If removed, install pulley (17) and nut (18) on alternator (10).
4. Position alternator (10) on bracket (14) and install washer (15), bolt (16), washer(11), new lockwasher (12), and nut (13).
5. Install washer (8) and bolt (7) into alternator (10) through bracket (9).
6. Install wire (5) and nut (6) on stud (4).
7. Install wire (2) and nut (1) on stud (3).

FOLLOW-ON TASKS:

- Install alternator belts (see paragraph 4-52).

TA704782

4-52. ALTERNATOR BELTS REPLACEMENT.

This Task Covers:
a. Removal
b. Installation
c. Adjustment

Initial Setup:
Equipment Conditions:
- Battery cables disconnected (see paragraph 4-60).

Materials/Parts:
- One alternator belt set

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVALI

NOTE
Belts must be replaced as a set. If one needs to be replaced, replace all belts.

1. Loosen bolt (2) and nut (7).
2. Loosen bolt (4).
3. Push alternator (1) downward until alternator belts (6) are loose.
4. Remove alternator belts (6) from alternator pulley (3) and crankshaft pulley (5). Discard alternator belts.

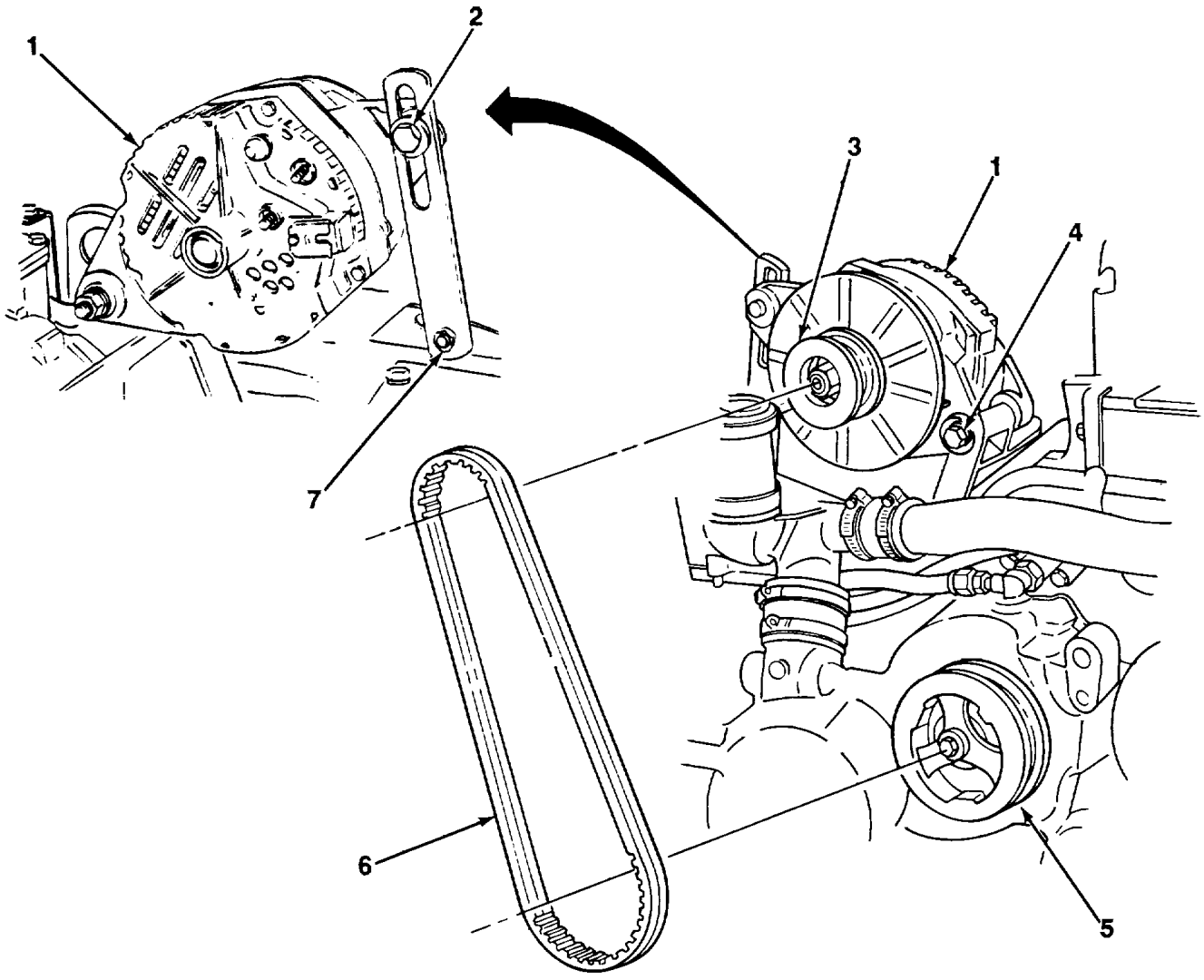
b. INSTALLATIONI

1. Install new alternator belts (6) in place on crankshaft pulley (5) and alternator pulley (3).
2. Raise alternator (1) until alternator belts (6) are tight.

c. ADJUSTMENTI

1. Press down on alternator belts (6) with thumb and adjust position of alternator (1) until altemator belts deflect no more than 0.5 in. (12.7 mm).
2. Tighten bolt (2) and nut (7).
3. Tighten bolt (4).

4-52. ALTERNATOR BELTS REPLACEMENT (Con't).



TA704783

FOLLOW-ON TASKS:

- Connect battery cables (see paragraph 4-60).

4-53. ENGINE STARTER REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:
Equipment Conditions:
- Battery cables disconnected (see paragraph 4-60).

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Marker tags (Item 40, Appendix E)
- Three lockwashers

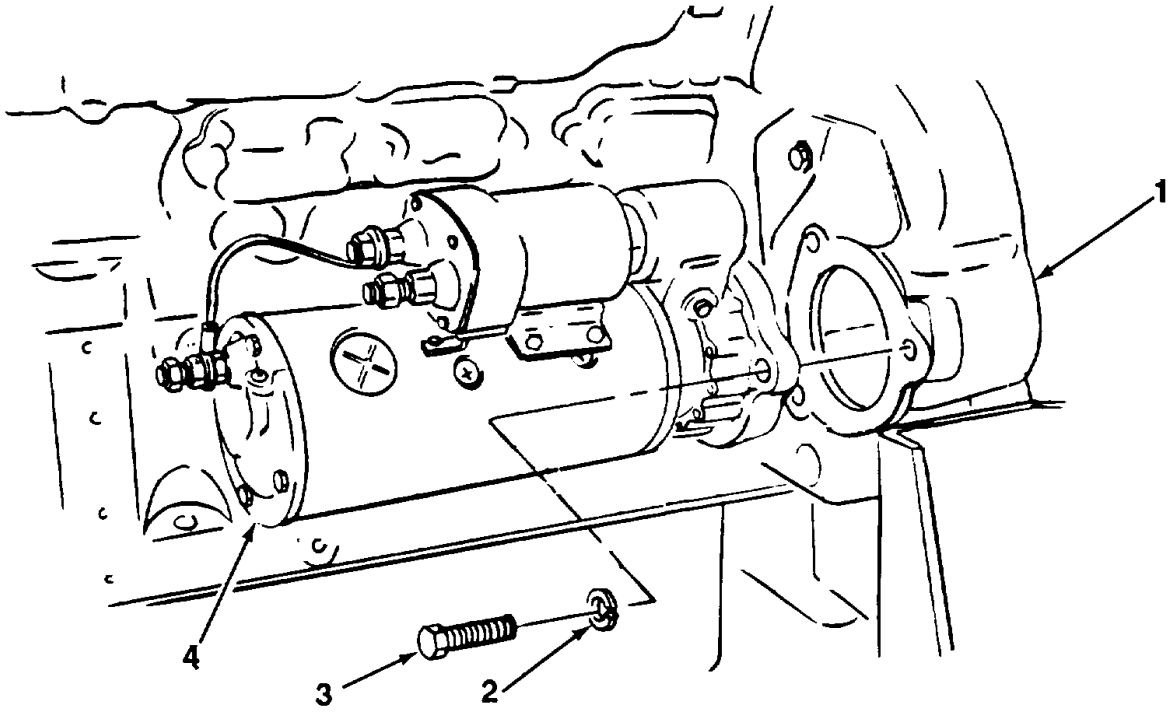
a. REMOVAL I

1. Tag and disconnect wires.

NOTE

Bolts are different. Note location of bolts for Installation.

2. Remove three bolts (3), lockwashers (2), and engine starter (4) from flywheel housing (1). Discard lockwashers.



b. INSTALLATION I

1. Install engine starter (4) on flywheel housing (1) with three new lockwashers (2) and bolts (3).
2. Connect wires as tagged.

FOLLOW-ON TASKS:

- Connect battery cables (see paragraph 4-60).

TA704784

4-54. MASTER BATTERY SWITCH REPLACEMENT.

This Task Covers:
a. Removal b. Installation

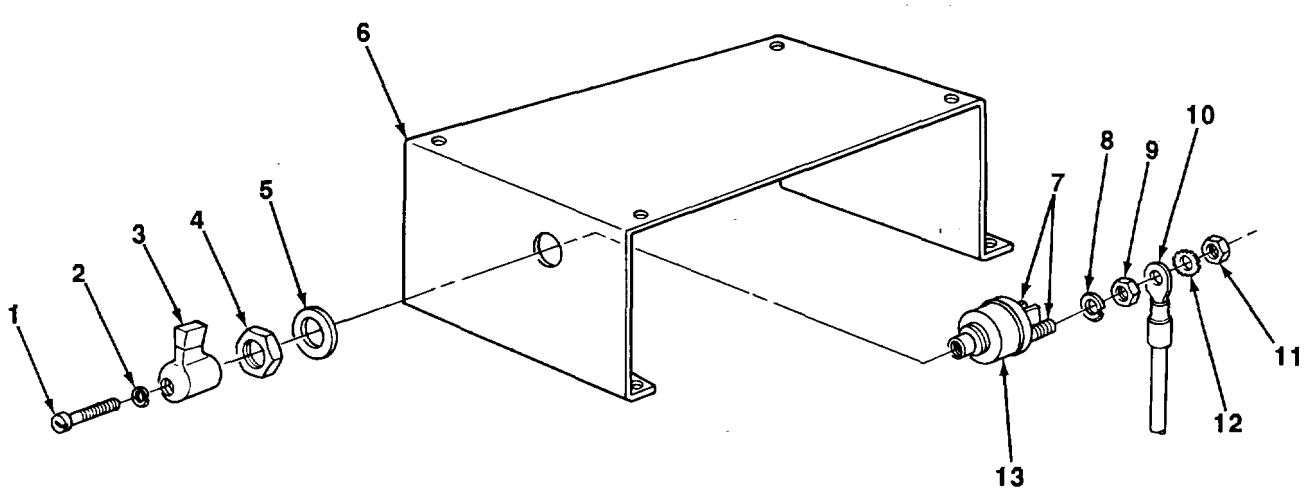
Initial Setup:
Equipment Conditions:
- Battery cables disconnected (see paragraph 4-60).

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Marker tags (Item 40, Appendix E)
- Five lockwashers

a. REMOVALI

1. Tag two leads (10) and remove two nuts (11), lockwashers (12), and leads from studs (7). Discard lockwashers.
2. Remove two nuts (9) and lockwashers (8) from studs (7). Discard lockwashers.
3. Remove screw (1), lockwasher (2), and lever (3) from master battery switch (13). Discard lockwasher.
4. Remove nut (4), washer (5), and master battery switch (13) from bracket (6).

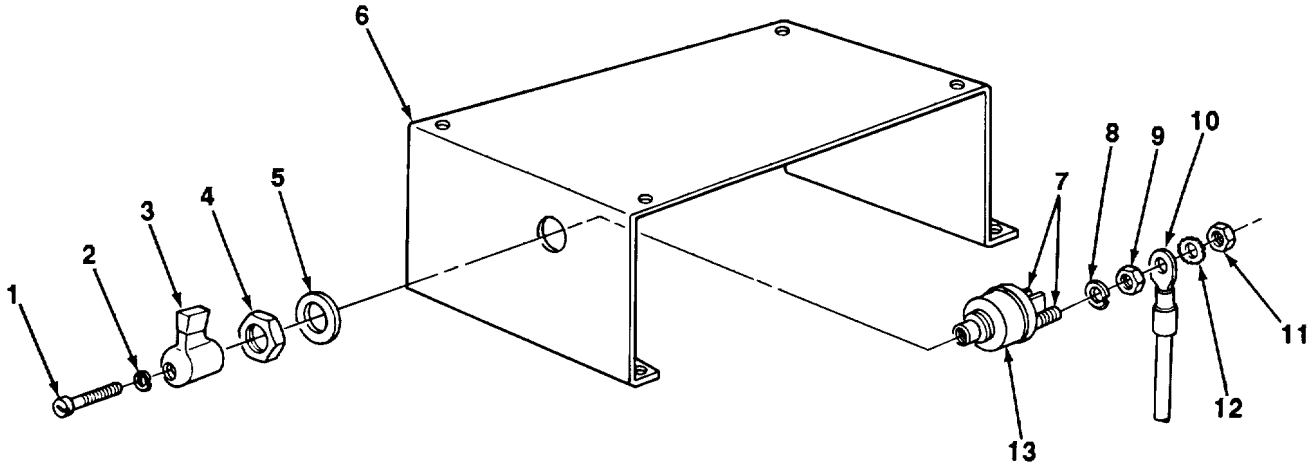


TA704785

4-54. MASTER BATTERY SWITCH REPLACEMENT (Con't).

b. INSTALLATION I

1. Position master battery switch (13) on bracket (6) and install washer (5) and nut (4).
2. Install lever (3) on master battery switch (13) with new lockwasher (2) and screw (1).
3. Install two new lockwashers (8) and nuts (9) on studs (7).
4. Install two leads (10) on studs (7) with two new lockwashers (12) and nuts (11).



FOLLOW-ON TASKS:

- Connect battery cables (see paragraph 4-60).

TA704786

4-55. ENGINE OVERRIDE AND ENGINE START BUTTONS REPLACEMENT.

This Task Covers:
a. Test
b. Removal
c. Installation

Initial Setup:

Equipment Conditions:
- Battery cables disconnected (see paragraph 4-60).

Materials/Parts:
- Marker tags (Item 40, Appendix E)

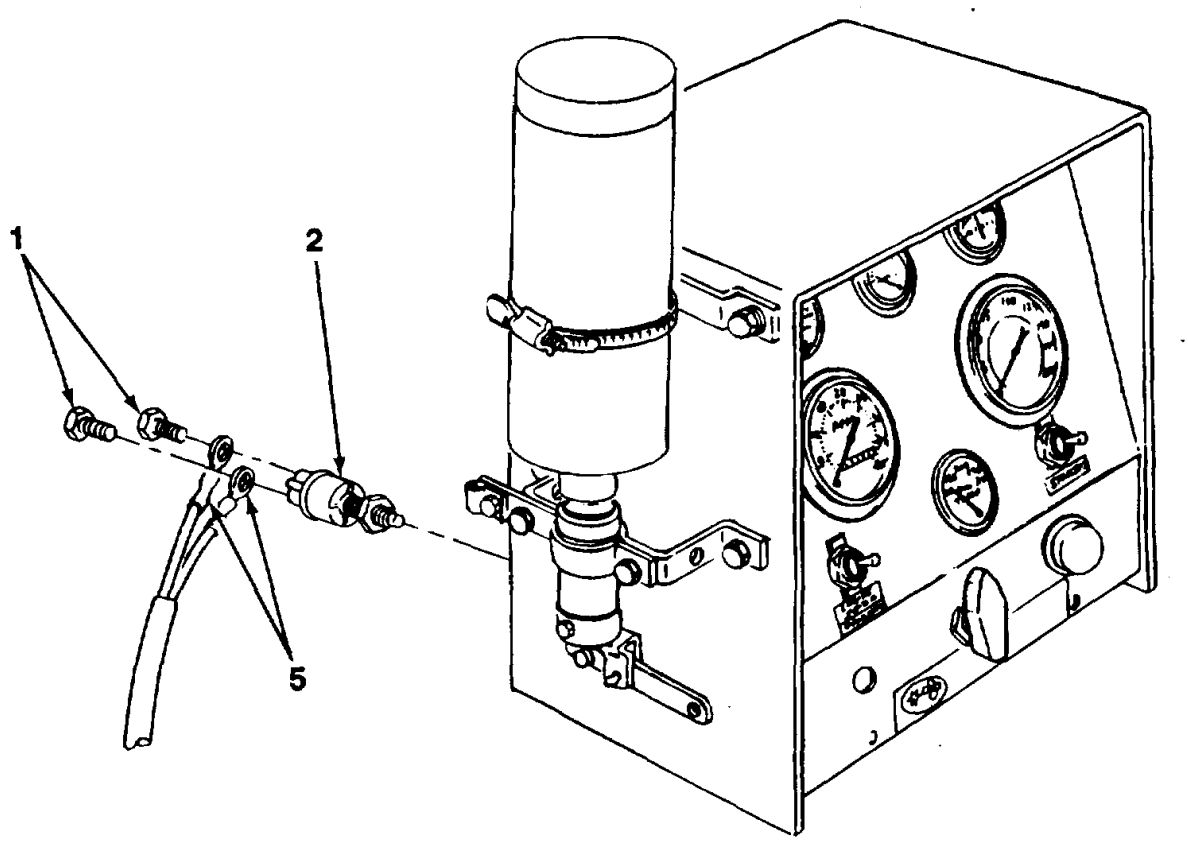
Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 2 shop set

a. TESTING

NOTE

Engine override and engine start buttons are tested same way. Engine override button Is Illustrated.

1. Tag electrical leads (5). Remove two screws (1) and electrical leads from button (2). Visually inspect button for damage.
2. Using multimeter, test button (2) for continuity and function. Replace button If damaged or defective.



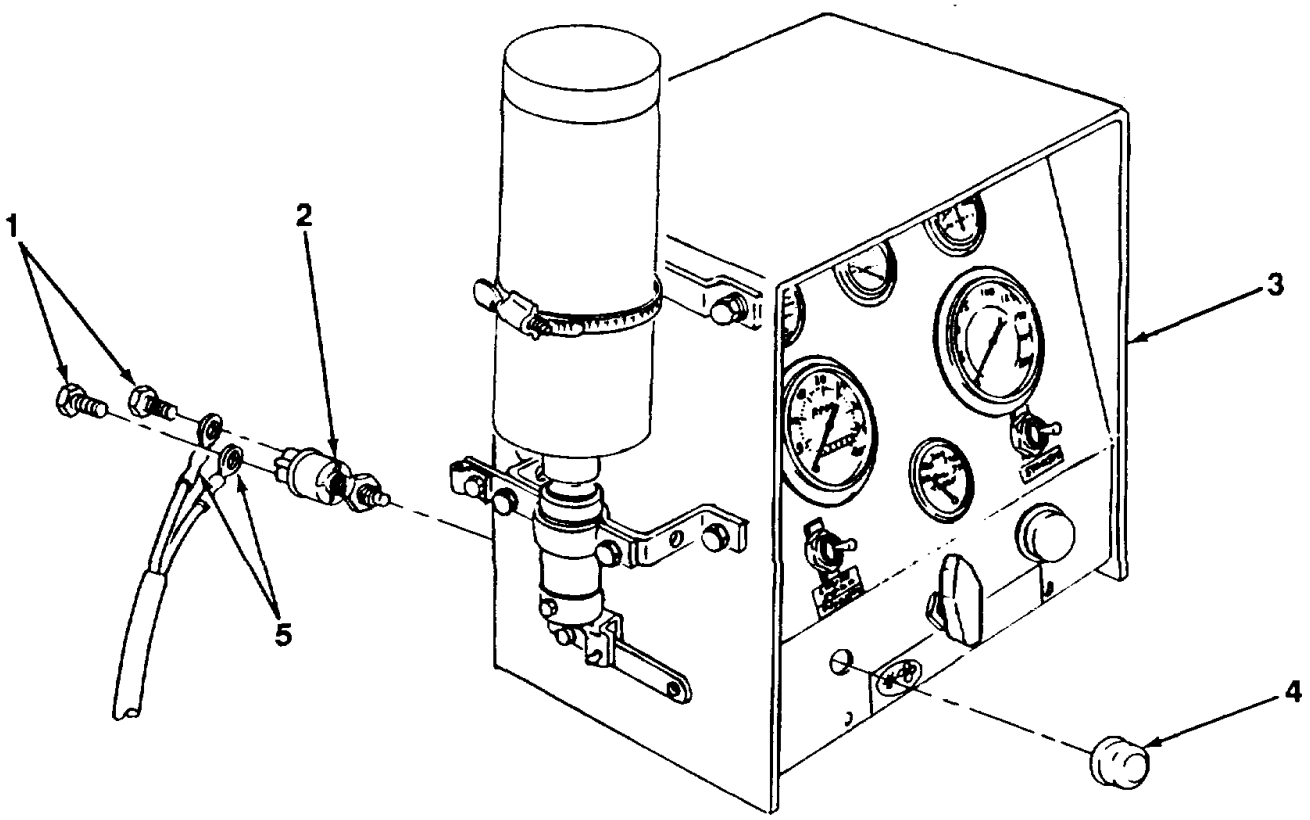
4-55. ENGINE OVERRIDE AND ENGINE START BUTTONS REPLACEMENT (Con't).

b. REMOVAL

NOTE

Engine override and engine start buttons are removed same way. Engine override button is illustrated.

1. Remove boot nut (4) from button (2).
2. Remove button (2) from Instrument panel (3).



c. INSTALLATION I

NOTE

Engine override and engine start buttons are Installed same way. Engine override button is iliustrated.

1. Position button (2) In place in instrument panel (3) and Install boot nut (4) on button.
2. Install two electrical leads (5) on button (2) with two screws (1).

FOLLOW-ON TASKS:

- Connect battery cables (see paragraph 4-60).

TA704788

4-56. ON/OFF ENGINE SWITCH REPLACEMENT.

This Task Covers:
a. Test
b. Removal
c. Installation

Initial Setup:

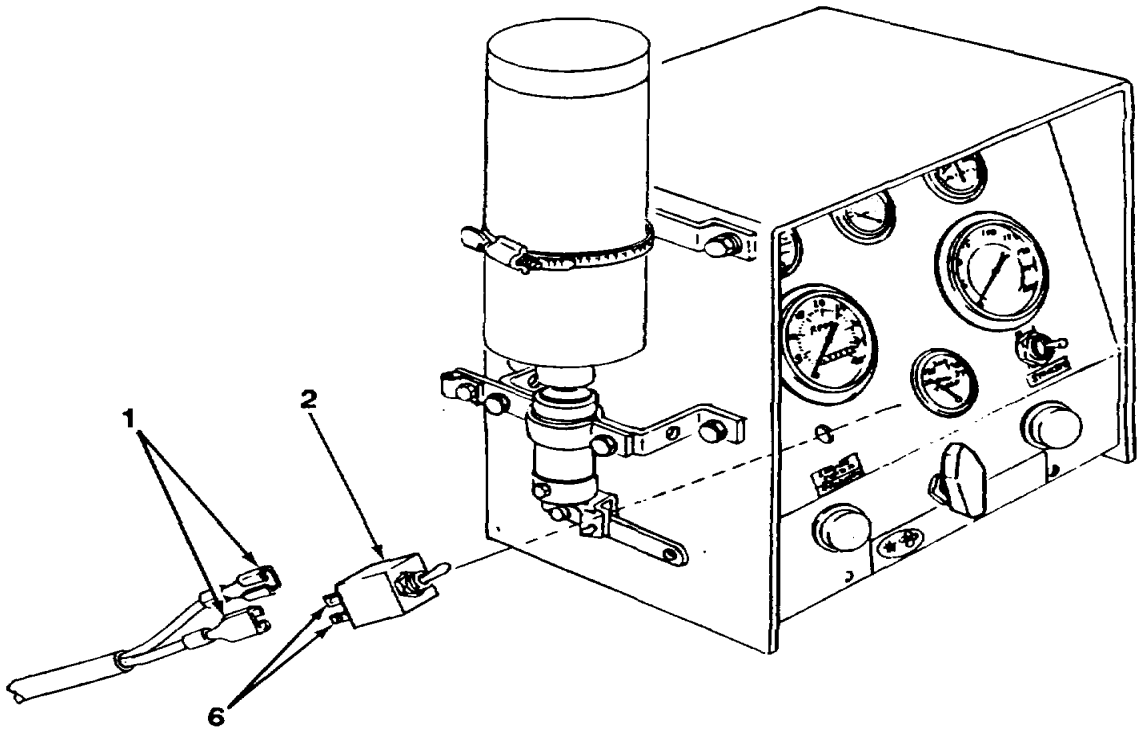
Equipment Conditions:
- Battery cables disconnected (see paragraph 4-60).

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 2 shop set

Materials/Parts:
- Marker tags (Item 40, Appendix E)

a. TESTI

1. Tag electrical leads (1). Remove two electrical leads from switch terminals (6). Visually inspect switch (2) for damaged or broken switch terminals.
2. Using multimeter, test switch (2) for continuity and function. Replace switch if damaged or defective.

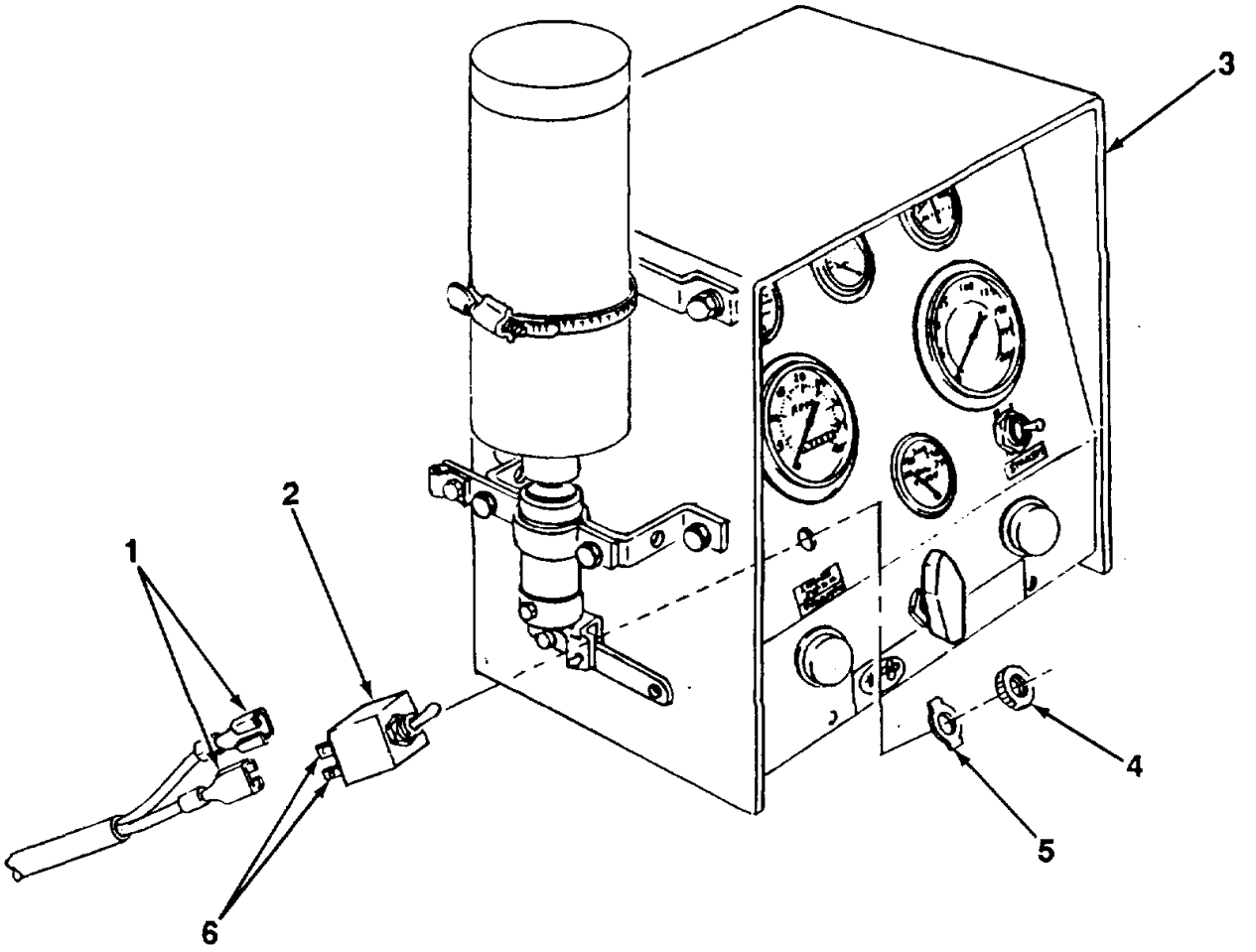


TA704789

4-56. ON/OFF ENGINE SWITCH REPLACEMENT (Con't).

b. REMOVAL

1. Remove ring (4) and plate (5) from switch (2).
2. Remove switch (2) from instrument panel (3).



TA704790

c. INSTALLATION I

1. Position switch (2) in place In instrument panel (3) and install plate (5) and ring (4).
2. Install two electrical leads (1) on switch terminals (6).

FOLLOW-ON TASKS:

- Connect battery cables (see paragraph 4-60).

4-57. FUSE REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:
Equipment Conditions:
- Battery cables disconnected (see paragraph 4-60).

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Marker tags (Item 40, Appendix E)

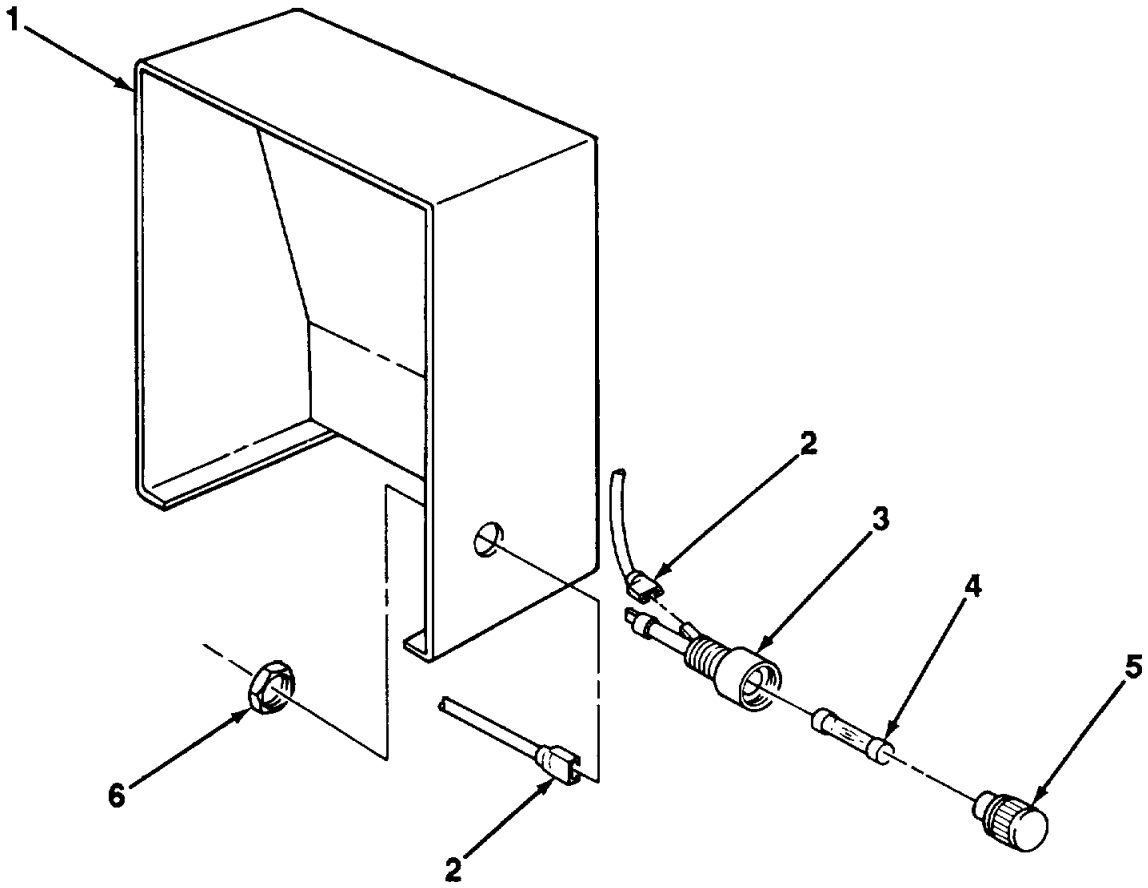
a. REMOVAL

1. Remove cap (5) from fuse holder (3).
2. Remove fuse (4) from cap (5).

NOTE

Perform steps 3 through 5 only if fuse holder requires replacement.

3. Tag and remove two electrical leads (2) from fuse holder (3).
4. Remove nut (6) from fuse holder (3).
5. Remove fuse holder (3) from Instrument panel (1).



TA704791

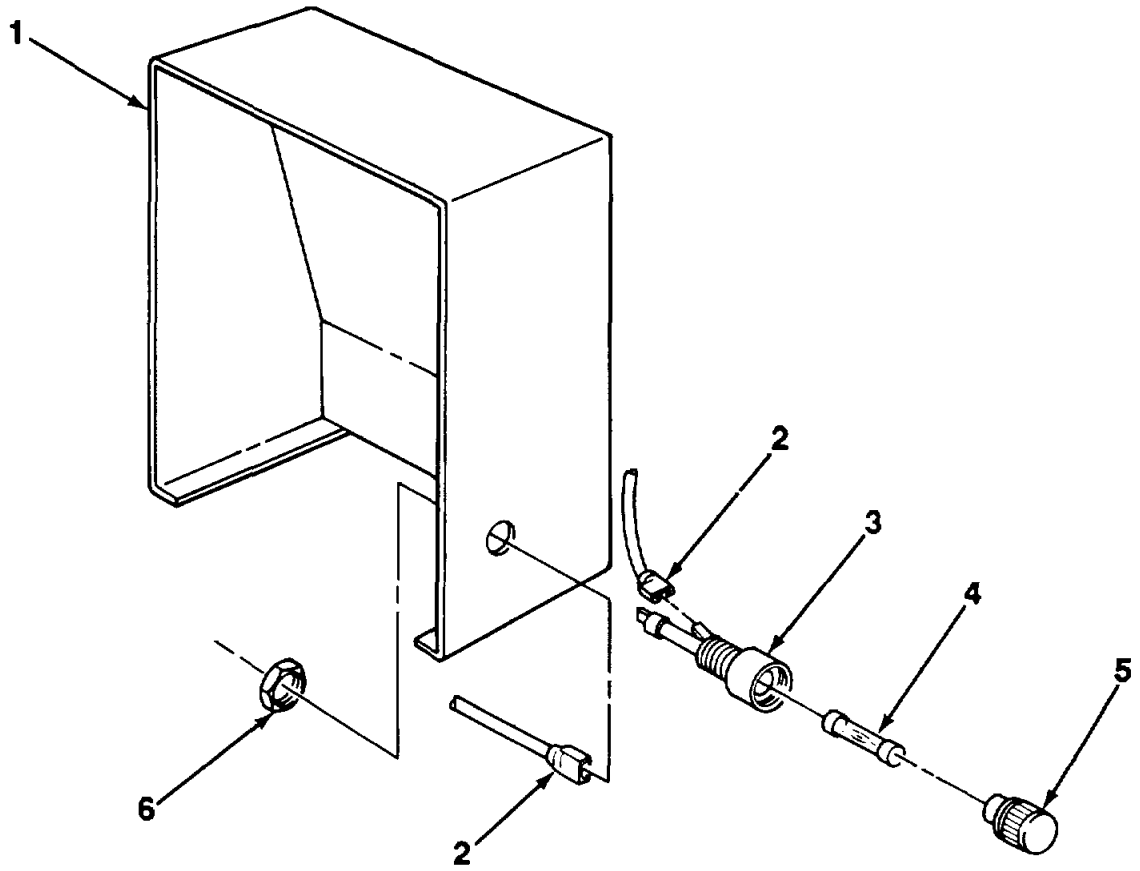
4-57. FUSE REPLACEMENT (Con't).

b. INSTALLATION I

NOTE

Perform steps 1 and 2 only if fuse holder was removed.

1. Position fuse holder (3) in place in instrument panel (1) and install nut (6).
2. Install two electrical leads (2) on fuse holder (3).
3. Position fuse (4) in cap (5).
4. Install cap (5) on fuse holder (3).



FOLLOW-ON TASKS:

- Connect battery cables (see paragraph 4-60).

TA704792

4-58. AMMETER REPLACEMENT.

This Task Covers:
a. Removal b. Installation

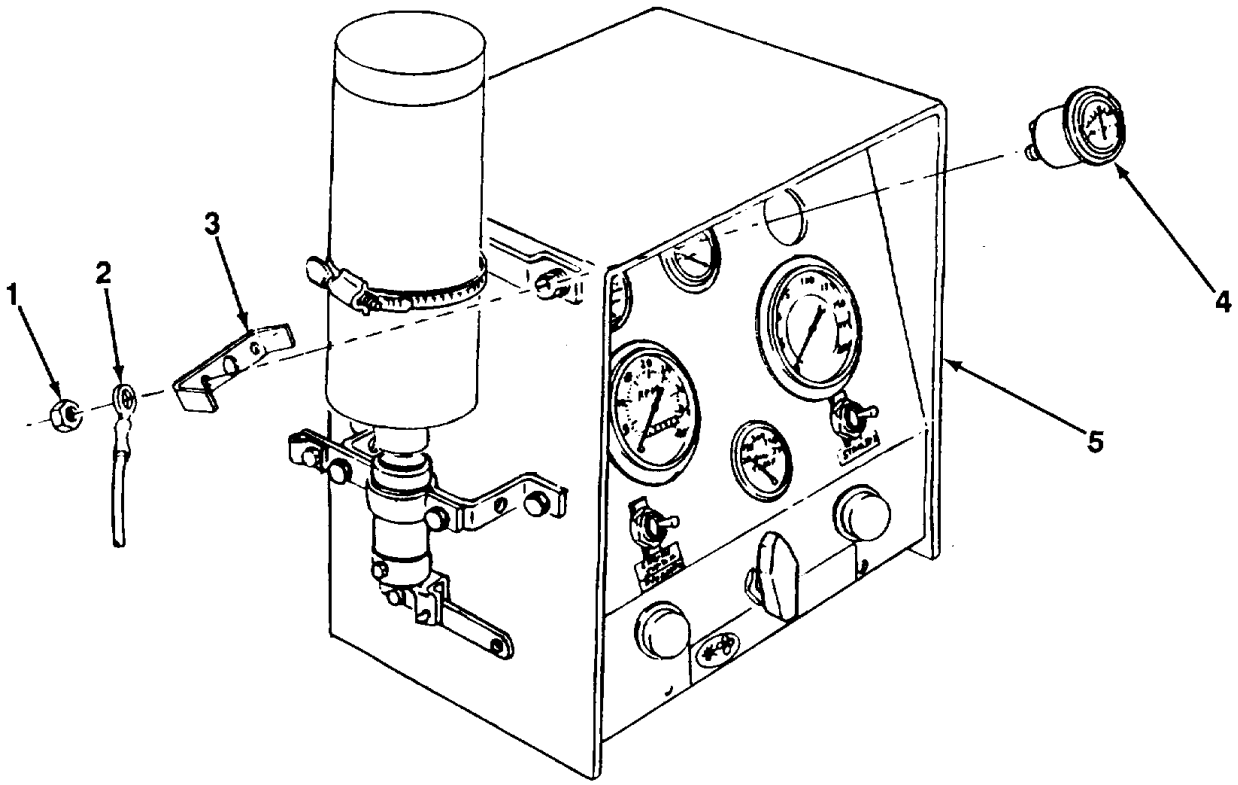
Initial Setup:
Equipment Conditions:
- Battery cables disconnected (see paragraph 4-60).

Materials/Parts:
- Marker tags (Item 40, Appendix E)

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

1. Tag electrical leads (2).Remove two nuts (1), electrical leads, and bracket (3) from ammeter (4) and instrument panel (5).
2. Remove ammeter (4) from Instrument panel (5).



b. INSTALLATION I

1. Position ammeter (4) in Instrument panel (5).
2. Install bracket (3) and two electrical leads (2) on ammeter (4) and instrument panel (5) with two nuts (1).

FOLLOW-ON TASKS:
- Connect battery cables (see paragraph 4-60).

TA704793

4-59. INSTRUMENT PANEL REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:

Equipment Conditions:
- Engine coolant temperature gage removed (see paragraph 4-76).
- Engine oil pressure gage removed (see paragraph 4-80).
- Ammeter removed (see paragraph 4-58).
- Tach/hourmeter removed (see paragraph 4-77).
- Air pressure gage removed (see paragraph 4-78).
- Air compressor discharge temperature gage removed (see paragraph 4-79).
- Engine override and engine start button removed (see paragraph 4-55).
- Ether start kit removed (see paragraph 4-38).

Equipment Conditions (Con't):
- Cold start valve removed (see paragraph 4-77).
- ON/OFF engine switch removed (see paragraph 4-56).
- Master battery switch removed (if removing bracket) (see paragraph 4-54).
- Fuse and fuse holder removed (see paragraph 4-57).

Materials/Parts:
- Eight lockwashers

Tools/Test Equipment:
- General mechanic's tool kit

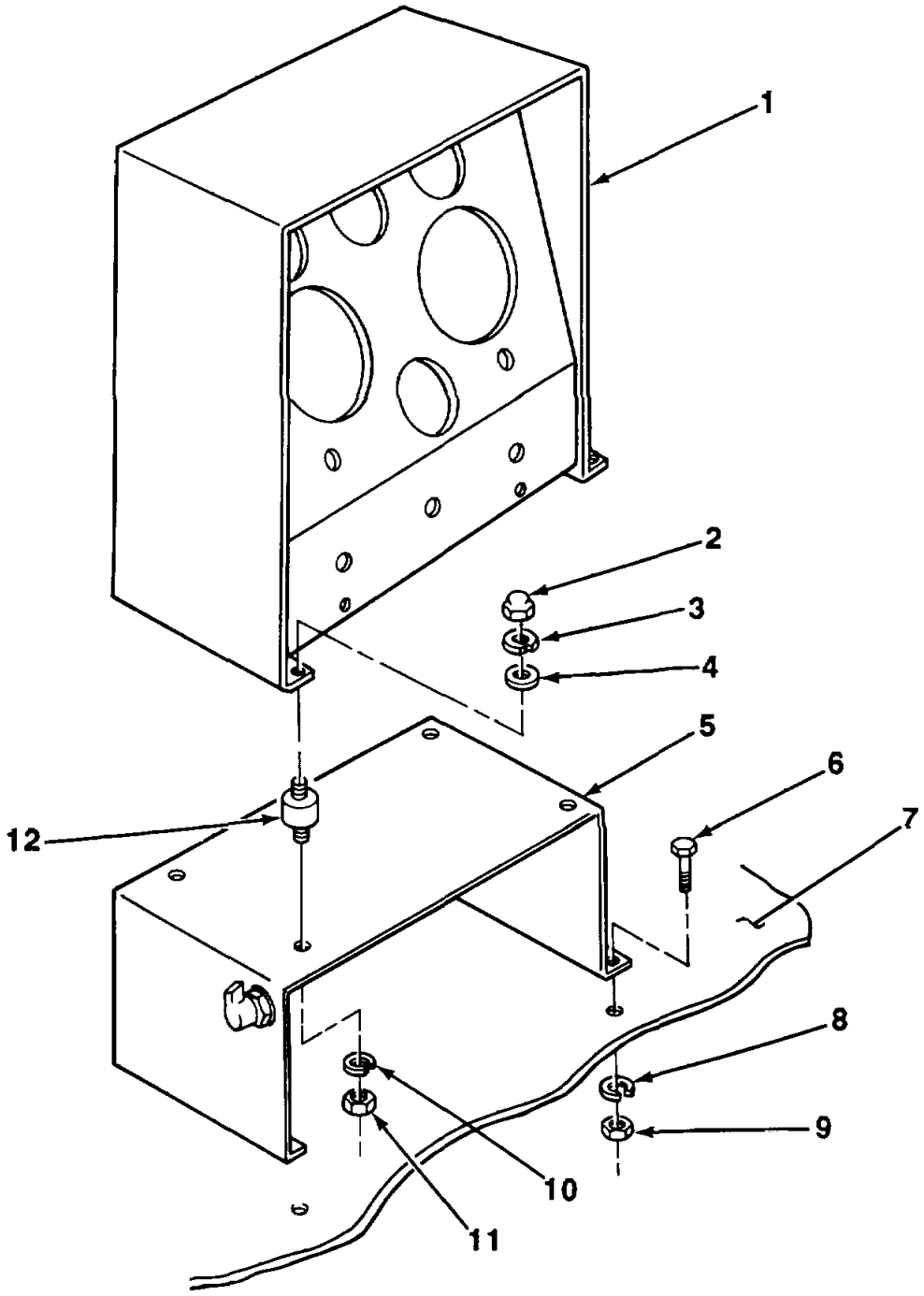
a. REMOVAL

1. Remove four nuts (2), lockwashers (3), flatwashers (4), and instrument panel (1) from four vibration Isolators (12). Discard lockwashers.
2. Remove four nuts (11), lockwashers (10), and vibration Isolators (12) from bracket (5). Discard lockwashers.
3. If damaged, remove four nuts (9), lockwashers (8), bolts (6), and bracket (5) from fender (7). Discard lockwashers.

b. INSTALLATIONI

1. If removed, Install bracket (5) on fender (7) with four bolts (8), new lockwashers (8), and nuts (9).
2. Install four vibration Isolators (12) on bracket (5) with four new lockwashers (10) and nuts (11).
3. Install instrument panel (1) on four vibration Isolators (12) with four flatwashers (4), new lockwashers (3), and nuts (2).

4-59. INSTRUMENT PANEL REPLACEMENT (Con't).



TA704794

4-59. INSTRUMENT PANEL REPLACEMENT (Con't).

FOLLOW-ON TASKS:

- Install fuse and fuse holder (see paragraph 4-57).
- Install battery master switch (if bracket removed) (see paragraph 4-54).
- Install engine override and engine start button (see paragraph 4-55).
- Install ether start kit (see paragraph 4-38).
- Install cold start valve (see paragraph 4-77).
- Install air compressor discharge temperature gage (see paragraph 4-79).
- Install air pressure gage (see paragraph 4-78).
- Install tach/hourmeter (see paragraph 4-77).
- Install ammeter (see paragraph 4-58).
- Install engine oil pressure gage (see paragraph 4-80).
- Install engine coolant temperature gage (see paragraph 4-76)

4-60. STORAGE BATTERIES REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:

Equipment Conditions:
- Master battery switch in OFF position.
- Four locknuts

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Marker tags (Item 40, Appendix E)
- Four lockwashers

Personnel Required: Two

General Safety Instructions:
- Remove all jewelry.
- Always wear goggles and rubber gloves when performing battery checks or inspections.
- DO NOT perform battery checks while smoking or near fire, flames, or sparks.

WARNING

- Remove all Jewelry such as dog tags, rings, bracelets, etc. If Jewelry or disconnected battery ground cable contacts battery terminal, a direct short will result. Failure to follow proper disconnection procedures will result In serious Injury or death to personnel or equipment damage.

- Battery acid (electrolyte) Is extremely dangerous. Always wear goggles and rubber gloves when performing battery checks or Inspections. Serious Injury to personnel will result if battery acid contacts skin or eyes.

- DO NOT perform battery system checks or Inspections while smoking or near fire, flames, or sparks. Batteries may explode, causing serious Injury or death to personnel.

4-60. STORAGE BATTERIES REPLACEMENT (Con't).

a. REMOVALI

1. Tag and remove four clamps (3) on battery terminals (5) and disconnect battery cables (2).
2. Remove four wingnuts (4) and two battery retainers (1) from two storage batteries (6).

WARNING

Storage batteries are heavy. Use battery handles to remove storage batteries to prevent Injury.

NOTE

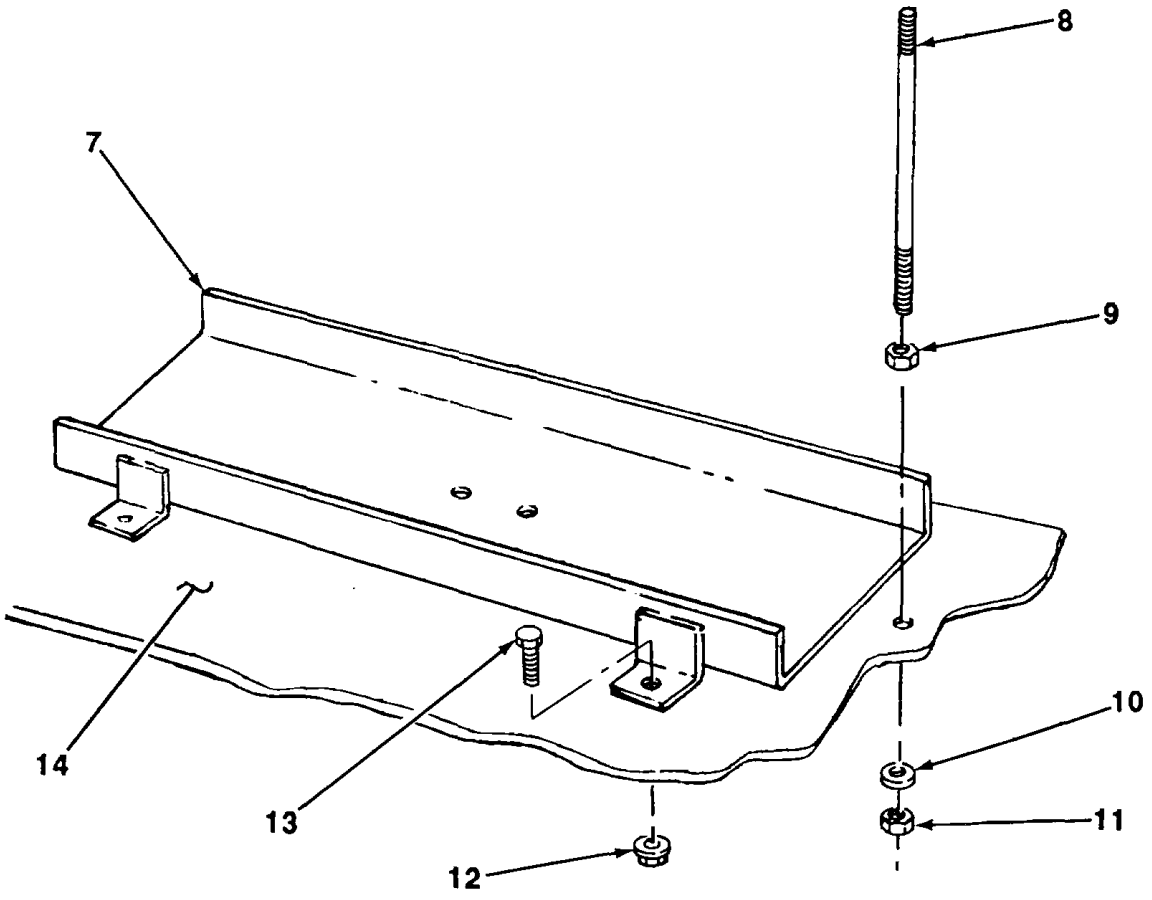
Note battery terminal location for Installation.

3. Remove two storage batteries (6) from battery tray (7).

NOTE

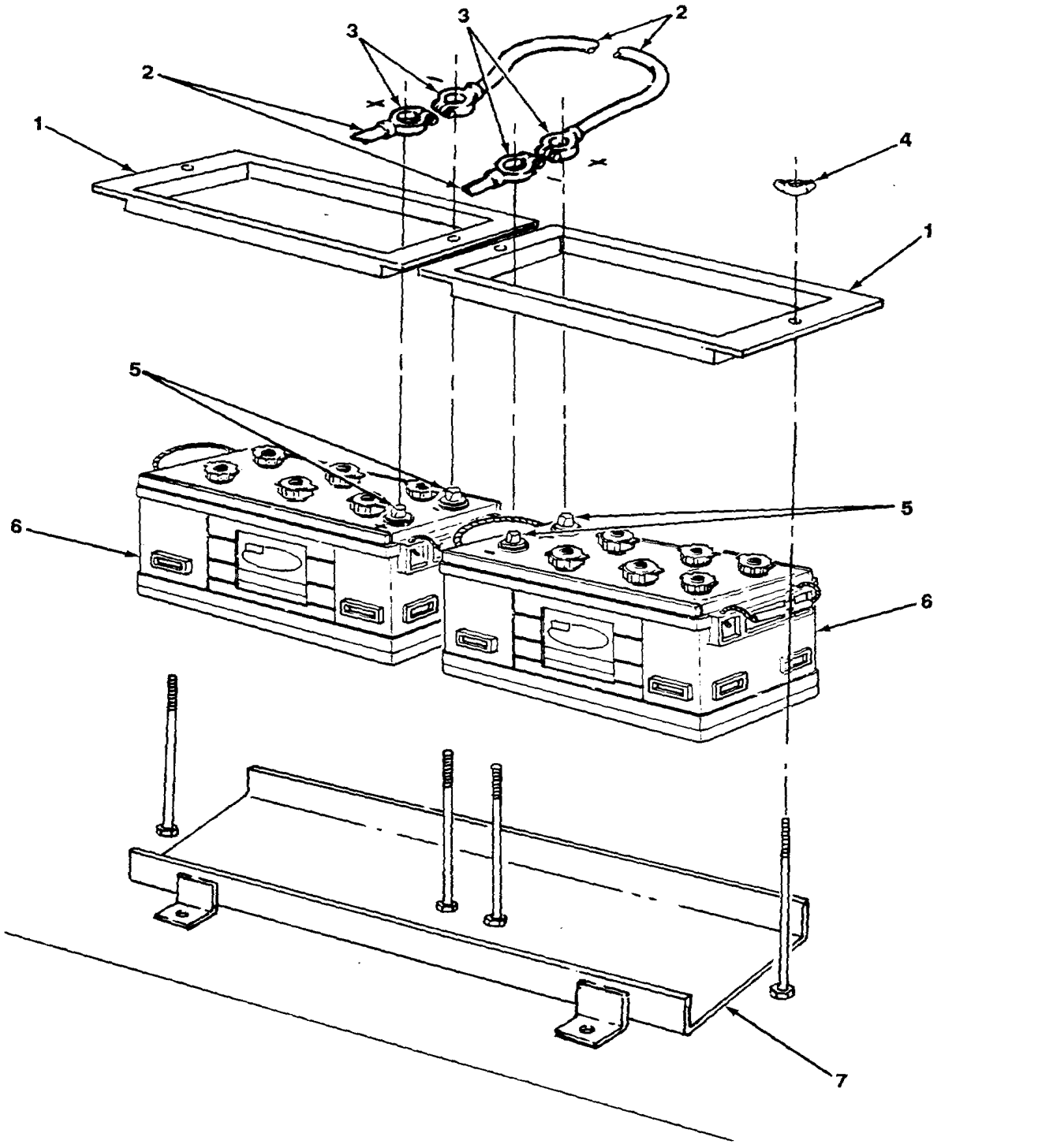
Perform steps 4 and 5 only if components damaged.

4. Remove four nuts (9), nuts (11), lockwashers (10), and hold-down rods (8) from battery tray (7) and body (14). Discard lockwashers.
5. Remove four locknuts (12), screws (13), and battery tray (7) from body (14). Discard locknuts.



TA704795

4-60. STORAGE BATTERIES REPLACEMENT (Con't).

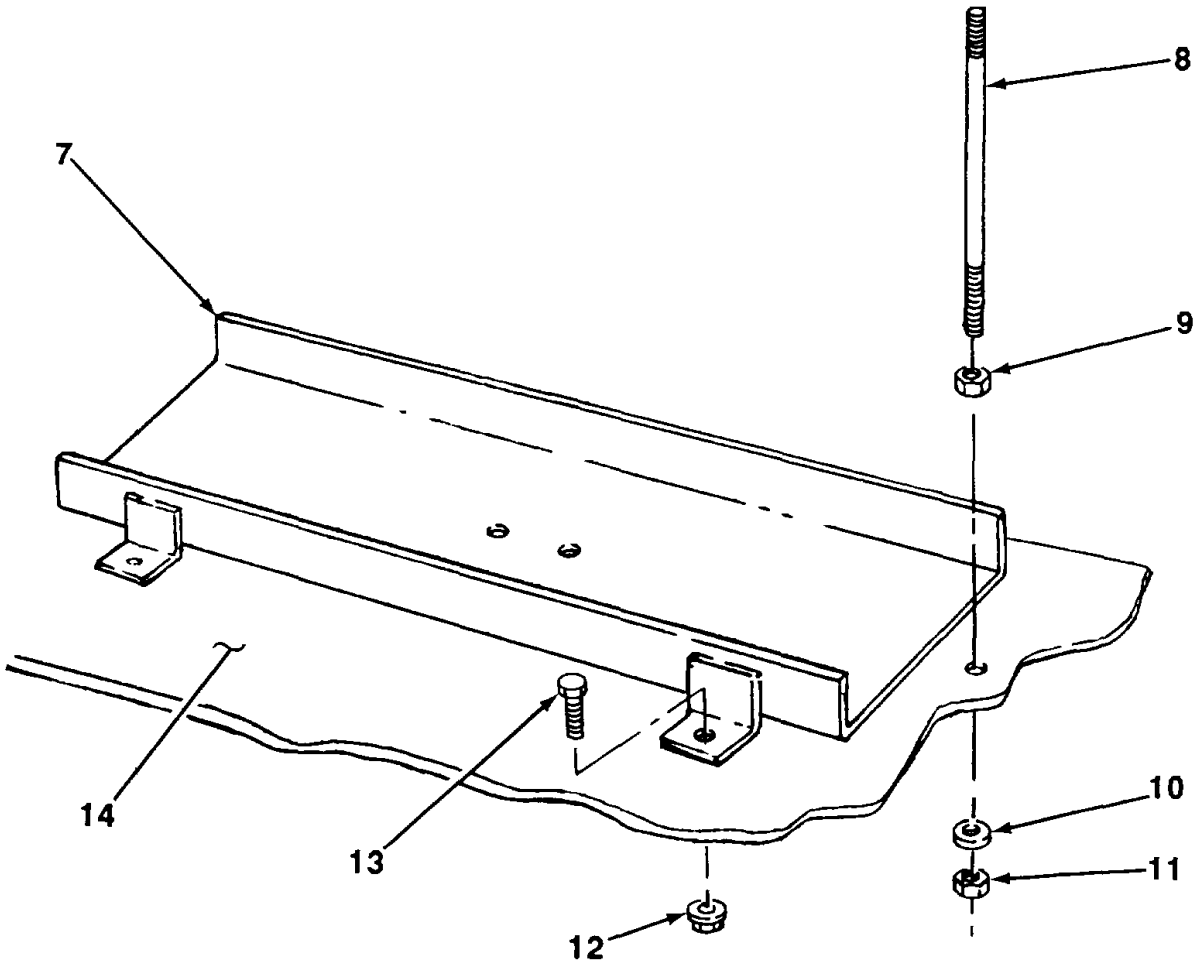


4-60. STORAGE BATTERIES REPLACEMENT (Con't).

b. INSTALLATION

NOTE
Perform steps 1 and 2 only if components were removed.

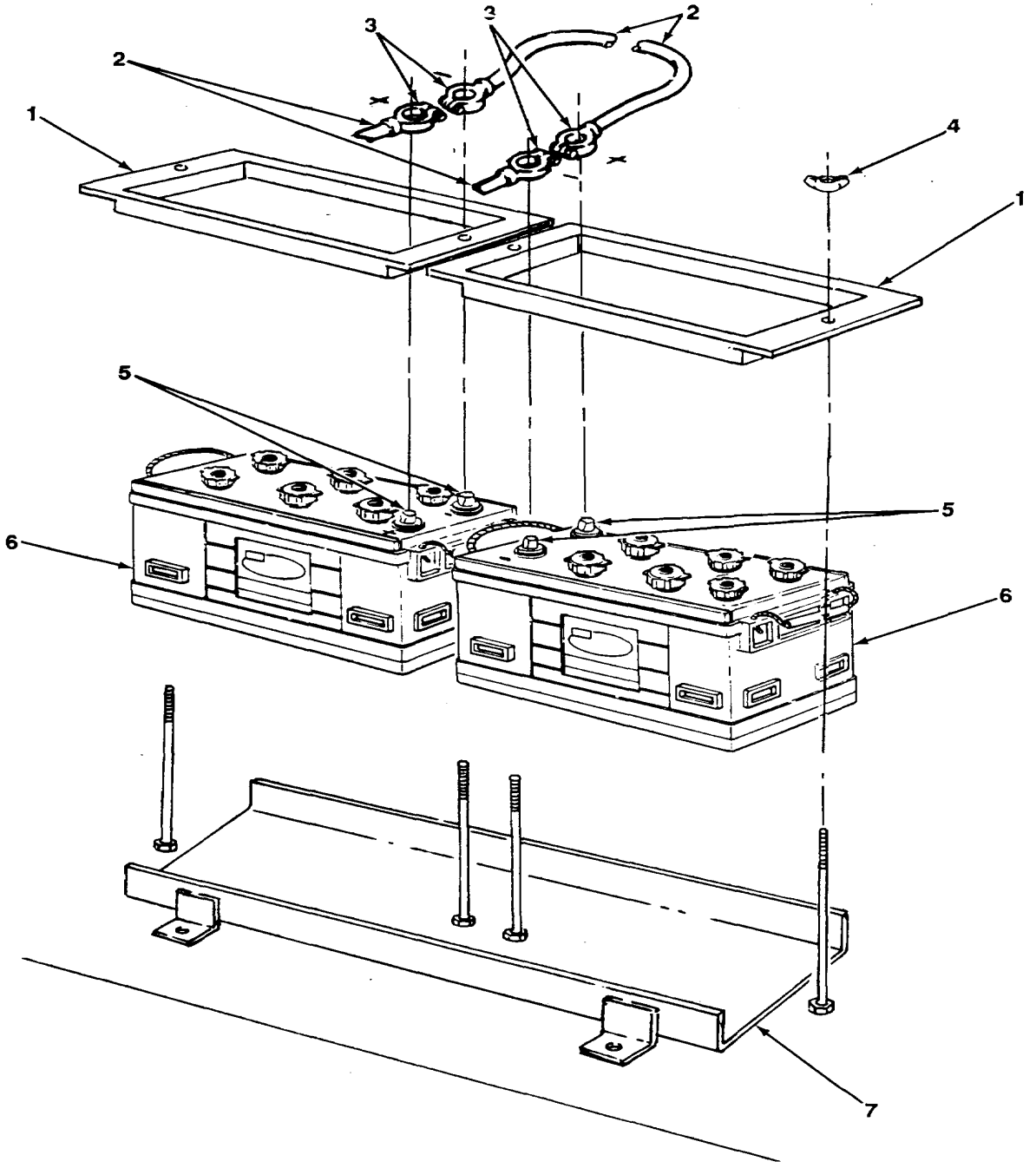
1. Install battery tray (7) on body (14) with four screws (13) and new locknuts (12).
2. Install four hold-down rods (8) on battery tray (7) and body (14) with four nuts (9), new lockwashers (10), and nuts (11).



3. Position two storage batteries (6) in place on battery tray (7).
4. Install two battery retainers (1) on two storage batteries (6) with four wingnuts (4).
5. Connect battery cables (2) on battery terminals (5) and tighten clamps (3).

TA704797

4-60. STORAGE BATTERIES REPLACEMENT (Con't).



4-61. WIRING HARNESS REPAIR.

This Task Covers:

a. General
b. Identification Band Replacement
c. Terminal Replacement
d. Male Connector Repair
e. Female Connector Repair

Initial Setup:

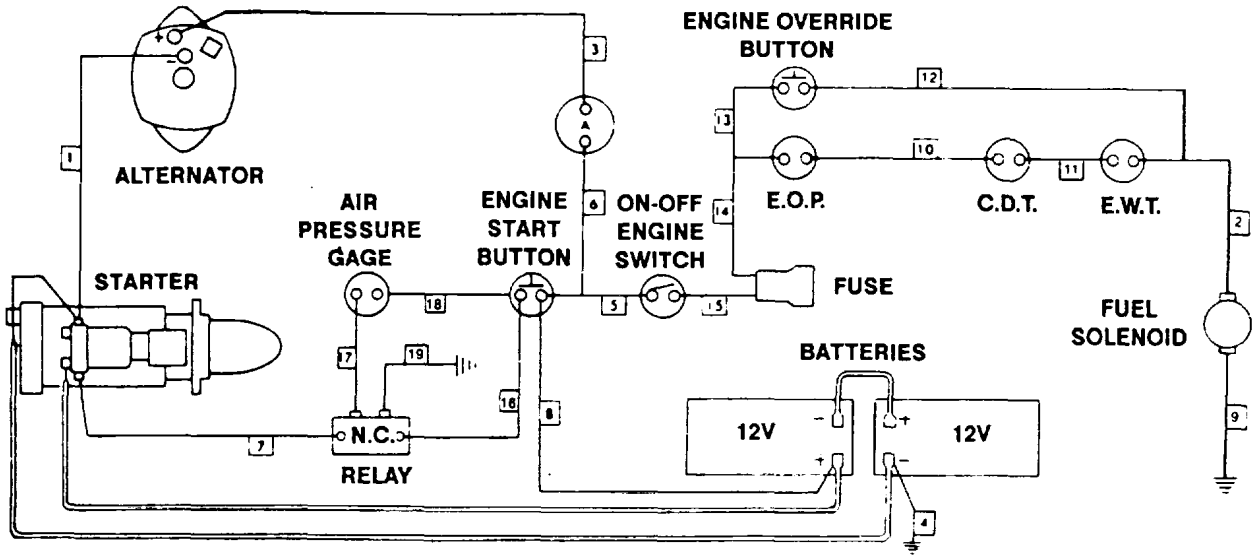
Equipment Conditions:
- Battery cables disconnected (see paragraph 4-60).

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

Materials/Parts:
- Insulation sleeving (Item 23, Appendix E)
- Solder (Item 37, Appendix E)
- Identification bands (as required)
- Terminals (as required)

a. GENERAL

1. A switch or sending unit Is more likely to be defective than a gage or Indicator. The least likely cause of a problem would be In the wiring or harness.
2. Before performing any tests of circuits, you must read and understand paragraph 4-5.
3. When Installing a replacement wire, ensure that wire Is the same gage as the wire being replaced. Identify the new wire by using color-coded tape that matches the color of the wire replaced. Match type and size of connectors from old wire to new wire.
4. If a wire Is spliced, use Insulation sleeving to Insulate area spliced. Use a suitable heat source to shrink Insulation sleeving.
5. Perform continuity test on new wires before Installing them into the unit.
6. Refer to wiring diagram when performing electrical troubleshooting and when performing electrical repair and maintenance.



E.O.P. - ENGINE OIL PRESSURE
E.W.T. - ENGINE WATER TEMPERATURE
C.D.T. SWITCH - COMPRESSOR DISCHARGE TEMPERATURE

TA704799

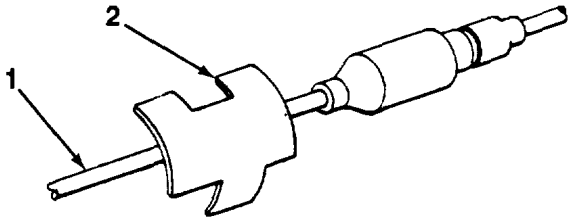
4-61. WIRING HARNESS REPAIR (Con't).

b. IDENTIFICATION BAND REPLACEMENT

1.Remove identification band (2) from wire lead (1) and discard.

2.Mark new identification band (2) with proper identification number.

3.Position new identification band (2) on wire lead (1) and bend tabs over wire lead.

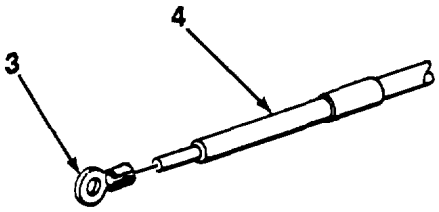


c. TERMINAL REPLACEMENT

1. Cut terminal (3) off wire lead (4) and discard.

2. Strip insulation off wire lead (4) equal to depth of new terminal (3).

3.Position new terminal (3) on wire lead (4). Crimp terminal.

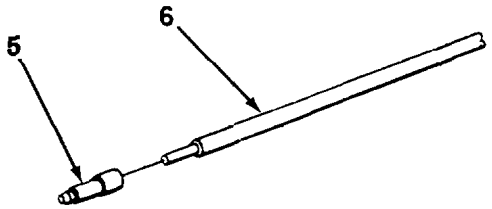


d. MALE CONNECTOR REPAIR

1. Cut contact (5) from wire lead (6) and discard.

2. Strip insulation off wire lead (6) equal to depth of new contact (5).

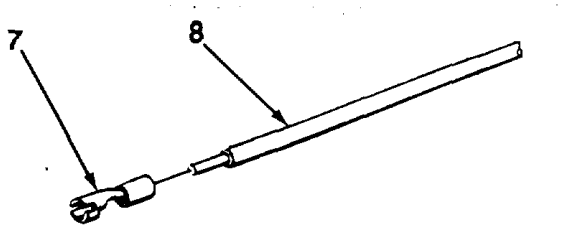
3.Position new contact (5) on wire lead (6) and crimp



TA704800

4-61. WIRING HARNESS REPAIR (Con't).

e. FEMALE CONNECTOR REPAIR



1. Cut terminal (7) from wire lead (8) and discard.

2. Strip insulation off wire lead (8) equal to depth of new terminal (7).

3.Position new terminal (7) on wire lead (8) and crimp.

FOLLOW-ON TASKS:

- Connect battery cables (see paragraph 4-60).

Section XII. AXLE MAINTENANCE

4-62. FRONT AXLE REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

• Air compressor unit frame supported on Jackstands.

Personnel Required: Two

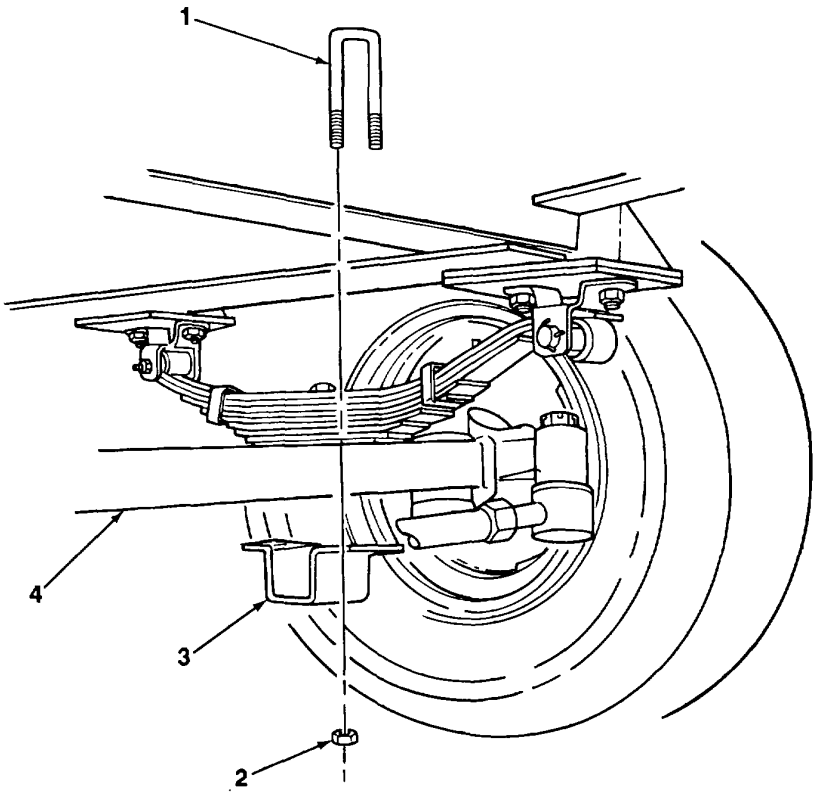
Tools/Test Equipment:

• General mechanic's tool kit
• Common no. 1 shop set
• Suitable lifting device

4-62. FRONT AXLE REPLACEMENT (Con't).

a. REMOVAL

1. Position suitable lifting device under midpoint of axle (4).
2. Remove eight nuts (2), four U-bolts (1), and two brackets (3) from axle (4).
3. Lower axle (4) and remove from under air compressor unit.
4. Raise axle (4) and place on jackstands.
5. Remove drawbar (see paragraph 4-73).
6. Remove tie-rods (see paragraph 4-72).
7. Remove steering knuckles (see paragraph 4-70).
8. Remove hubs and wheel bearings (see paragraph 4-68).



4-62. FRONT AXLE REPLACEMENT (Con't).

b. INSTALLATION

1. Install hubs and wheel bearings (see paragraph 4-68).
2. Install steering knuckles (see paragraph 4-70).
3. Install tie-rods (see paragraph 4-72).
4. Install drawbar (see paragraph 4-73).
5. Remove axle (4) from jackstands.

NOTE

Ensure that pin on spring aligns with hole in axle.

6. Position axle (4) under air compressor unit and raise Into position.
7. Install two brackets (3) and four U-bolts (1) on axle (4) with eight nuts (2).
8. Remove lifting device from under axle (4).

FOLLOW-ON TASKS:

- Remove air compressor unit frame from jackstands.

4-63. REAR AXLE REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Air compressor unit frame supported on jackstands.
- Wheels removed (see paragraph 4-67).
- Handbrake cables removed from axle brackets (see paragraph 4-65).

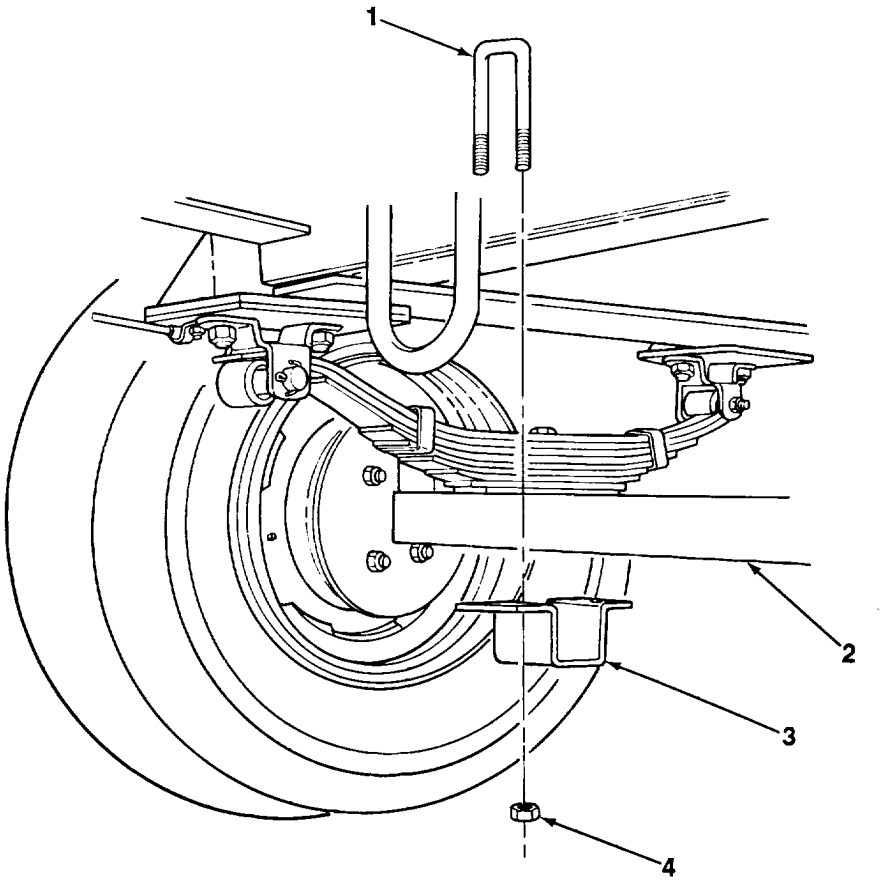
Tools/Test Equipment:

- General mechanic's tool kit
- Common no. 1 shop set
- Suitable lifting device

Personnel Required: Two

a. REMOVAL

1. Position suitable lifting device under midpoint of axle (2).
2. Remove eight nuts (4), four U-bolts (1), and two brackets (3) from axle (2).
3. Lower axle (2) and remove from under air compressor unit.



TA704803

4-63. REAR AXLE REPLACEMENT (Con't).

4. Raise axle (2) and place on jackstands.

5. Remove brakeshoes (see paragraph 4-66).

b. INSTALLATIONI

1. Install brakeshoes (see paragraph 4-66).

2. Remove axle (2) from jackstands.

NOTE

Ensure that pin on spring aligns with hole In axle.

3. Position axle (2) under air compressor unit and raise into position.

4. Install two brackets (3) and four U-bolts (1) on axle (2) with eight nuts (4).

5. Remove lifting device from under axle (2).

FOLLOW-ON TASKS:

- Install handbrake cables in axle brackets (see paragraph 4-65).
- Install wheels (see paragraph 4-67).
- Remove compressor unit frame from jackstands.

Section XIII. BRAKE SYSTEM MAINTENANCE

4-64. HANDBRAKE LEVER REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:
- Wheels choked.

Tool /Test Equipment:
- General mechanic's tool kit

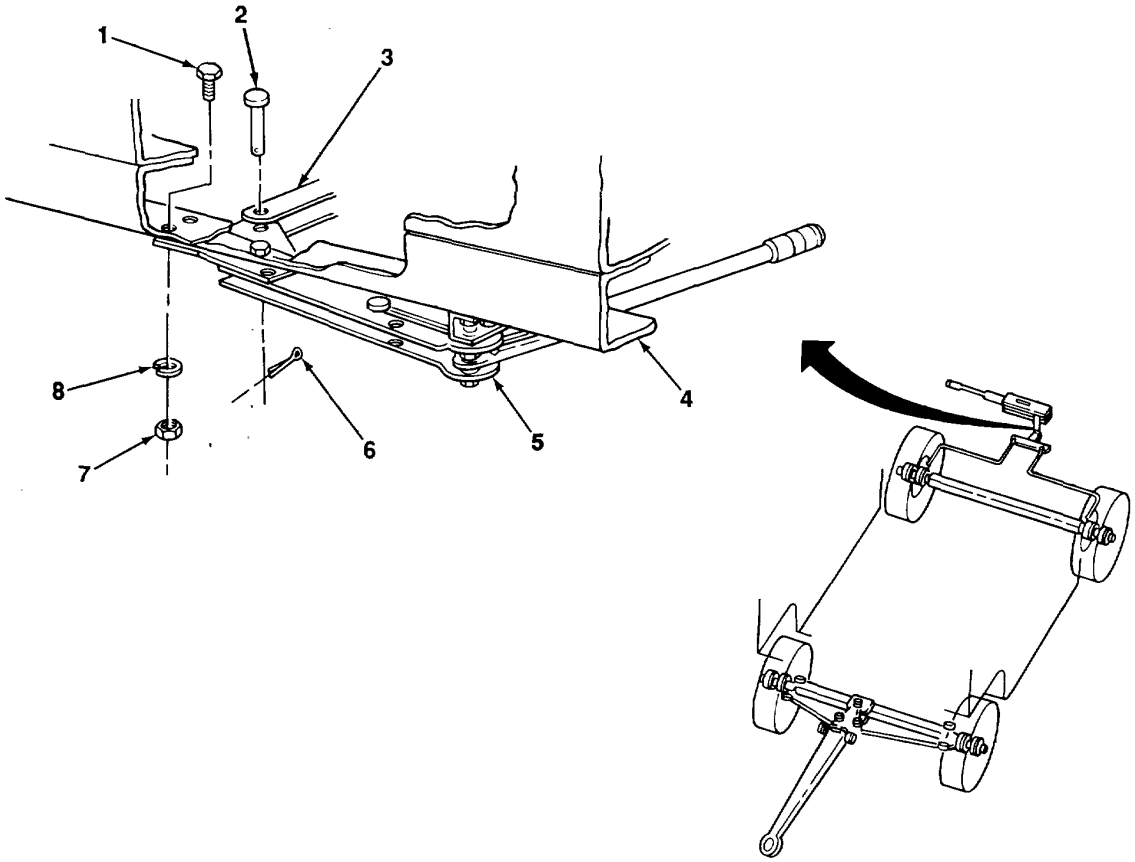
Materials/Parts:
- One cotter pin
- Four lockwashers

4-64. HANDBRAKE LEVER REPLACEMENT (Con't).

a. REMOVAL

1. Remove cotter pin (6), clevis pin (2), and clevis (3) from handbrake lever (5). Discard cotter pin.

2. Remove four nuts (7), lockwashers (8), screws (1), and handbrake lever (5) from bumper (4). Discard lockwashers.



b. INSTALLATION

1. Install handbrake lever (5) on bumper (4) with four screws (1), new lockwashers (8), and nuts (7).

2. Install clevis (3) on handbrake lever (5) with clevis pin (2) and new cotter pin (6).

TA704804

4-65. HANDBRAKE CABLE REPLACEMENT.

This Task Covers:

a. Removal
b. Installation
c. Adjustment

Initial Setup:

Equipment Conditions:
• Wheels choked.
Tools/Test Equipment:
• General mechanic's tool kit

Materials/Parts:
• Two locknuts
• Three cotter pins

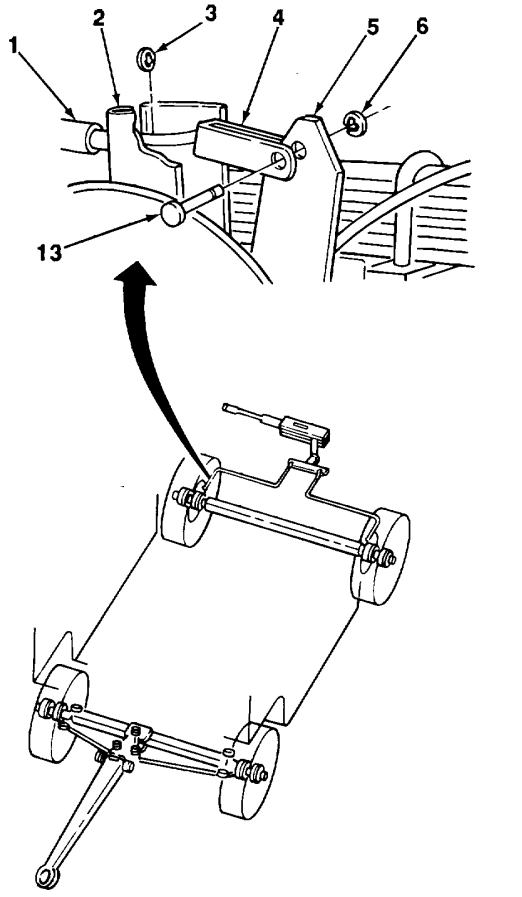
a. REMOVAL

NOTE

Both handbrake cables are removed same way. This procedure covers left handbrake cable.

1.Remove retaining ring (6), clevis pin (13), and clevis (4) from lever (5). Discard cotter pin.

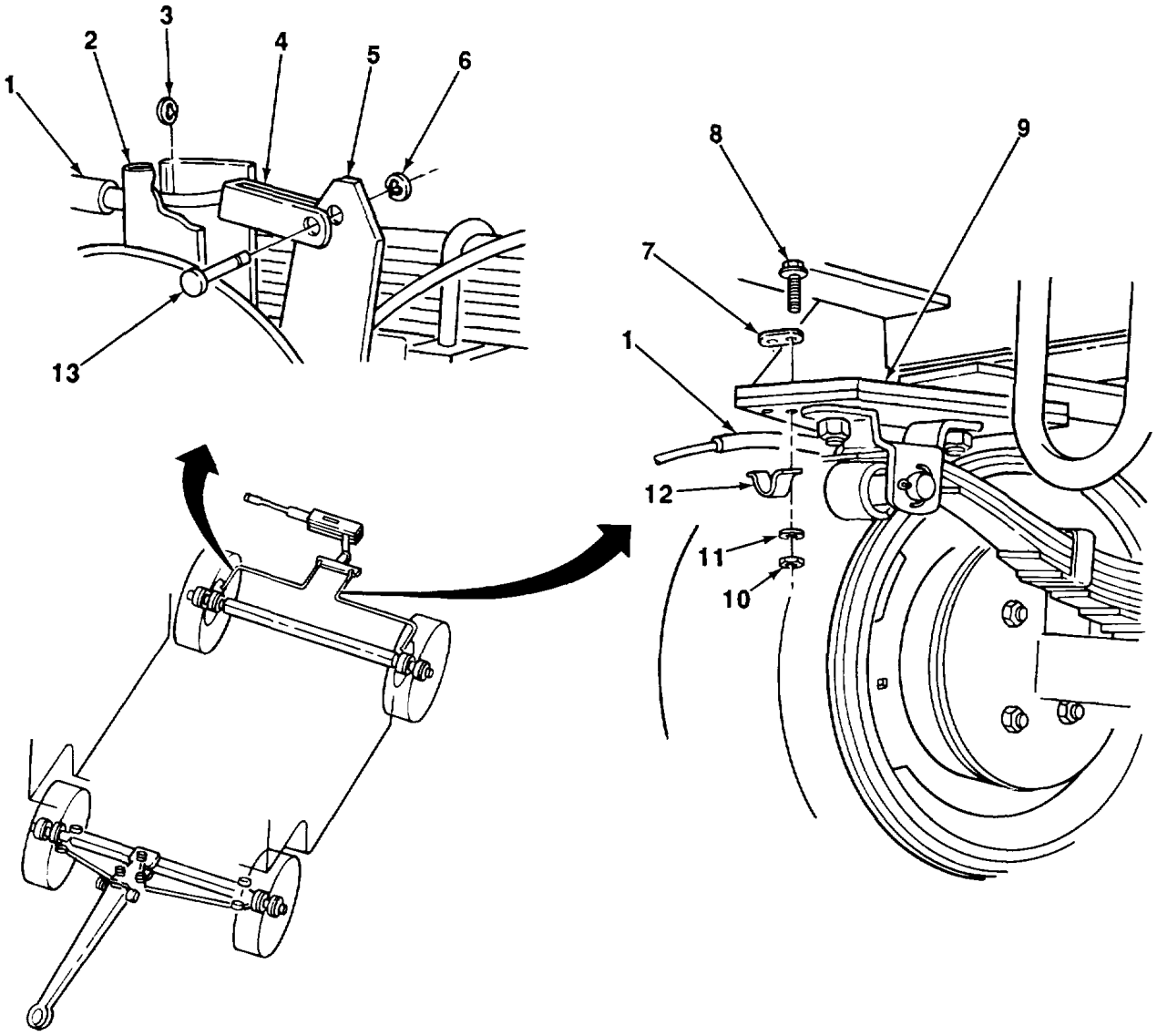
2.Remove retaining clip (3) and handbrake cable (1) from bracket (2)



TA704805

4-65. HANDBRAKE CABLE REPLACEMENT (Con't).

3. Remove two locknuts (10), washers (11), bracket (12), handbrake cable (1), two screws (8), and spacer (7) from spring plate (9). Discard locknuts.



4. Remove cotter pin (18), clevis pin (16), and clevis (15) from handbrake lever (17). Discard cotter pin.

b. INSTALLATION

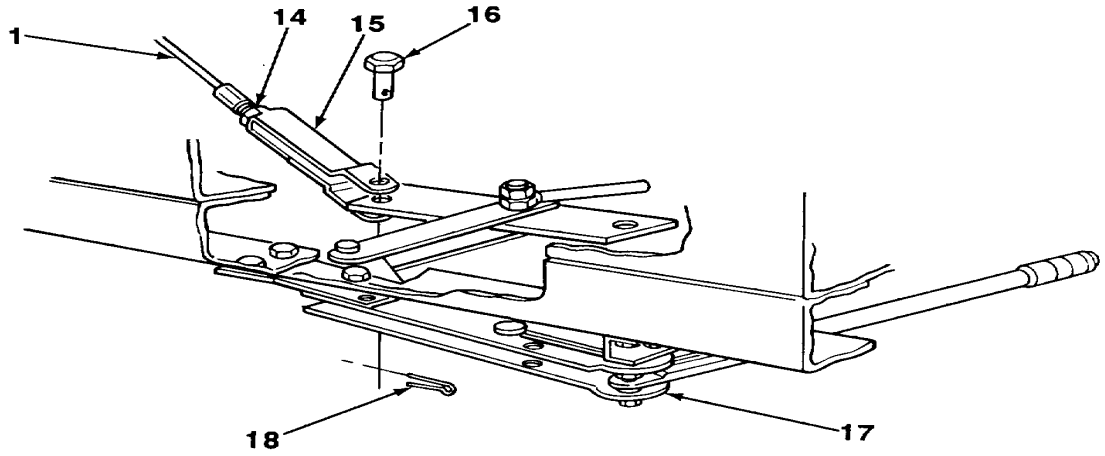
NOTE

Both handbrake cables are Installed same way. This procedure covers left handbrake cable.

1. Install clevis (15) on clevis (17) with clevis pin (16) and new cotter pin (18).

TA704806

4-65. HANDBRAKE CABLE REPLACEMENT (Con't).



2. Position handbrake cable (1), bracket (12), and spacer (7) on spring plate (9) and Install two screws (8), washers (11), and new locknuts (10).

3. Position handbrake cable (1) in bracket (2) and install retaining clip (3).

4. Install clevis (4) on lever (5) with clevis pin (13) and retaining ring (6).

c. ADJUSTMENT

NOTE

Handbrake cable Is properly adjusted when handbrake lever requires only X of its full travel to apply.

1. Release handbrake lever (17).

2. Loosen nut (14). Remove cotter pin (18) and clevis pin (16), and disconnect clevis (15) from handbrake lever (17). Discard cotter pin.

3. Turn clevis (15) clockwise to tighten or counterclockwise to loosen handbrake cable (1).

4. Tighten nut (14) on handbrake cable (1) and clevis (15).

5. Connect clevis (15) to handbrake lever (17) with clevis pin (16) and new cotter pin (18).

6. Repeat steps 1 through 5 for other handbrake cable.

7. Check handbrake lever (17) and handbrake cable (1) for proper operation. Make final adjustment as necessary (see paragraph 3-8).

TA704807

4-66. BRAKESHOE REPLACEMENT.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Installation

Initial Setup:

Equipment Conditions:
- Hub and brakedrum removed (see paragraph 4-69).

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

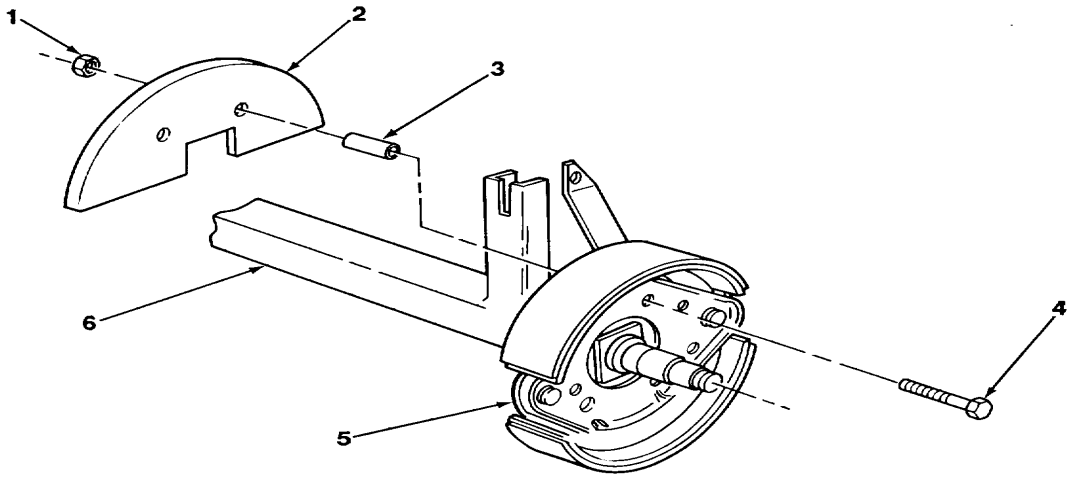
General Safety Instructions:
- DO NOT use a dry brush or compressed air to clean brake components.

a. REMOVAL

WARNING

DO NOT handle brakeshoes, brakedrums, or other brake components unless area has been properly cleaned. There may be asbestos dust on these components which can be dangerous If you touch It or breathe It. Wear an approved filter mask and gloves. Never use compressed air or a dry brush to clean brake components. Dust may be removed using an Industrial-type vacuum cleaner. Clean dust or mud away from brake components with water and a wet, soft brush or cloth. Failure to follow this warning may result In serious Illness or death to personnel.

1. Remove two nuts (1), screws (4), spacers (3), and upper backing plate (2) from mounting plate (5) and axle (6).

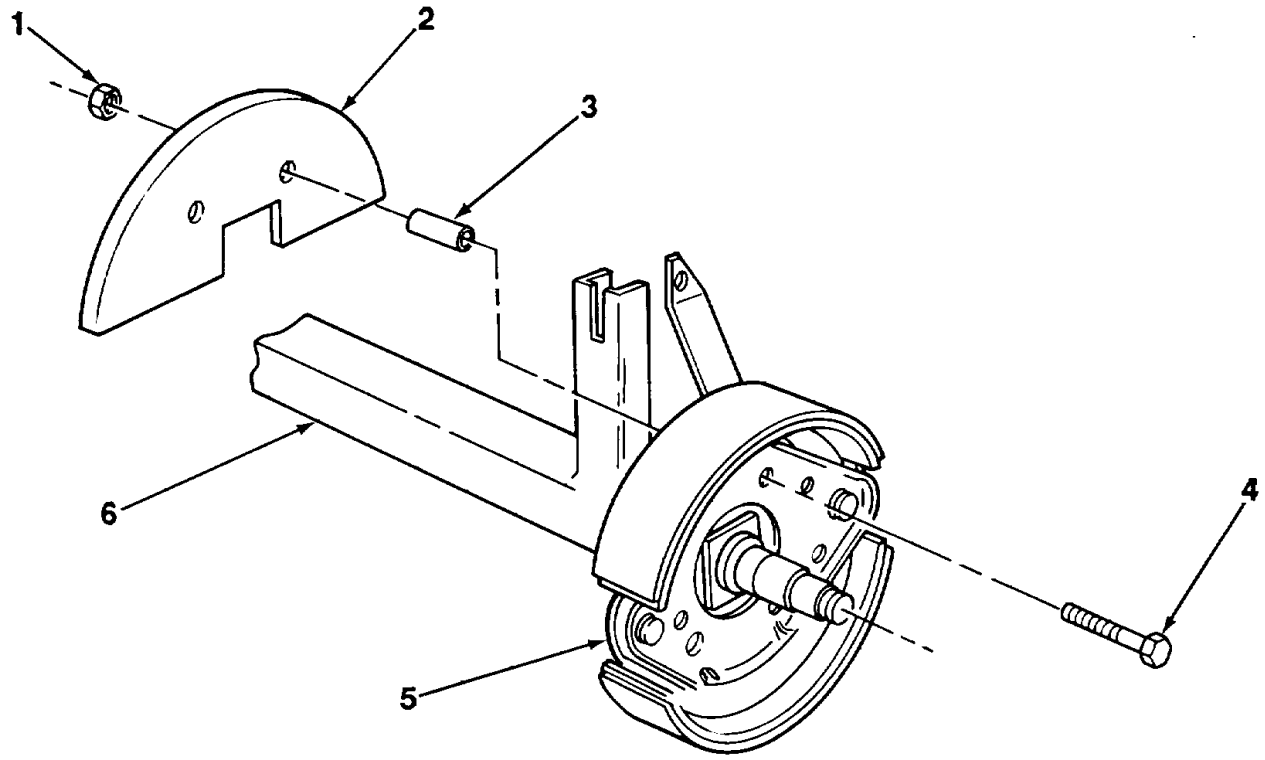


TA704808

4-66. BRAKESHOE REPLACEMENT (Con't).

2. Remove two nuts (10), screws (7), spacers (8), and lower backing plate (9) from mounting plate (5) and axle (6).

3. Remove mounting plate (5) from axle (6).



TA704809

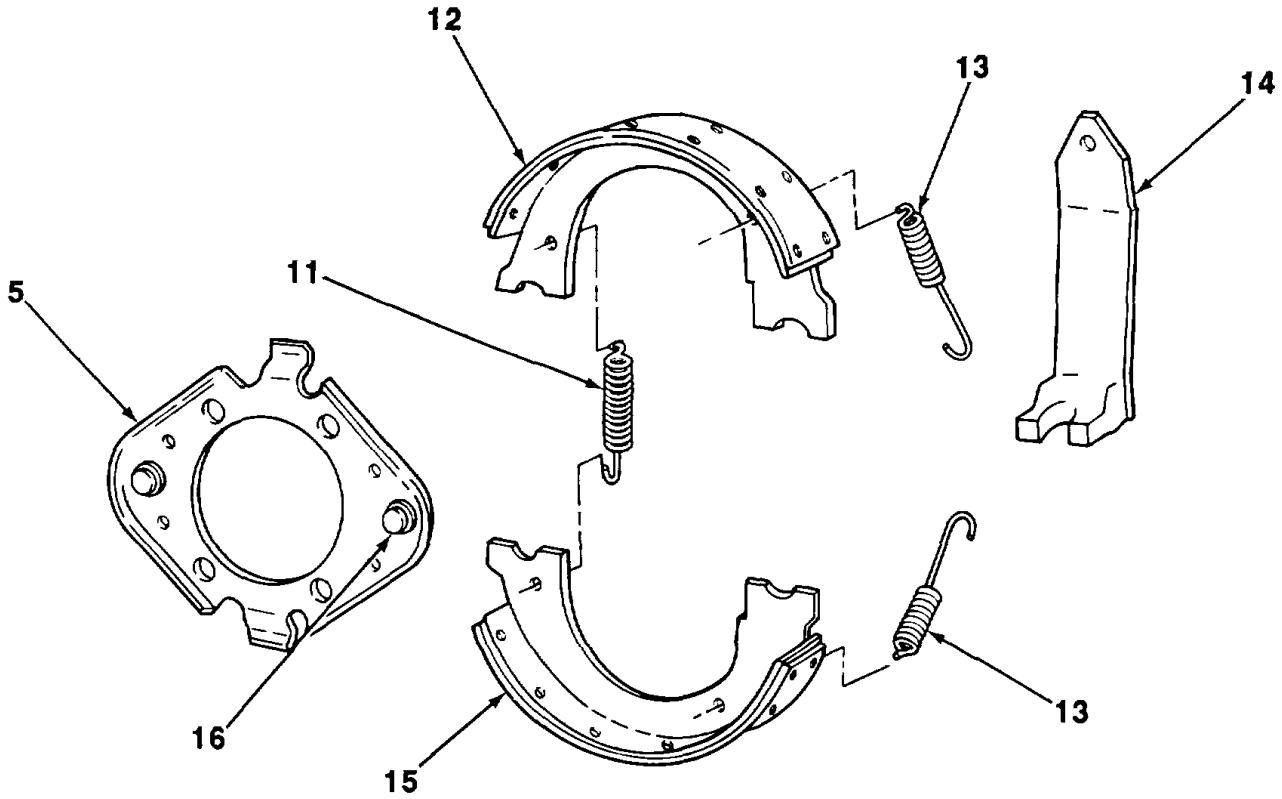
4-66. BRAKESHOE REPLACEMENT (Con't).

4. Remove lever (14) from mounting plate (5).

5. Remove two springs (13) from brakeshoes (12 and 15) and anchor pin (16).

6. Remove spring (11) from brakeshoes (12 and 15).

7. Remove brakeshoes (12 and 15) from mounting plate (5).



b. CLEANING AND INSPECTION

WARNING

DO NOT handle brakeshoes, brakedrums, or other brake components unless area has been properly cleaned. There may be asbestos dust on these components which can be dangerous if you touch It or breathe It. Wear an approved filter mask and gloves. Never use compressed air or a dry brush to clean brake components. Dust may be removed using an Industrial-type vacuum cleaner. Clean dust or mud away from brake components with water and a wet, soft brush or cloth. Failure to follow this warning may result In serious Illness or death to personnel.

1. Clean all brake parts and dry thoroughly.

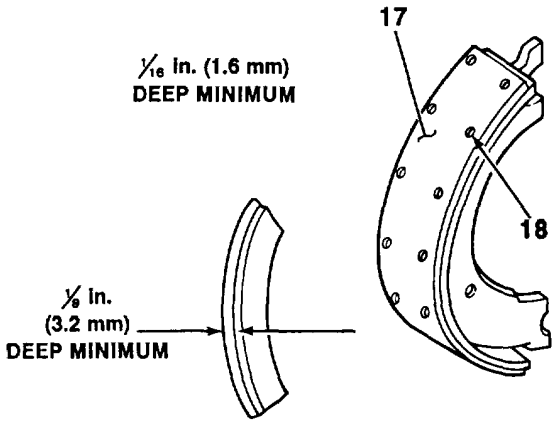
2. Inspect all components for damage and wear. Replace parts as necessary.

TA704810

4-66. BRAKESHOE REPLACEMENT (Con't).

3. Inspect brakeshoe linings (17) for cracks. Brakeshoe linings should have a minimum thickness of X In. (3.2 mm). Replace brakeshoes if cracked or if lining thickness Is less than X in. (3.2 mm)

4. Measure rivets (18) for Y%8 in. (1.6 mm) depth below brakeshoe lining (17). Replace brakeshoes if depth of rivets Is not at least Y6 In. (1.6 mm) below brakeshoe lining.



c. **INSTALLATION**

1. Position brakeshoes (12 and **15)** on mounting plate (5).TA704811

2. Install spring (11) on brakeshoes (12 and 15).

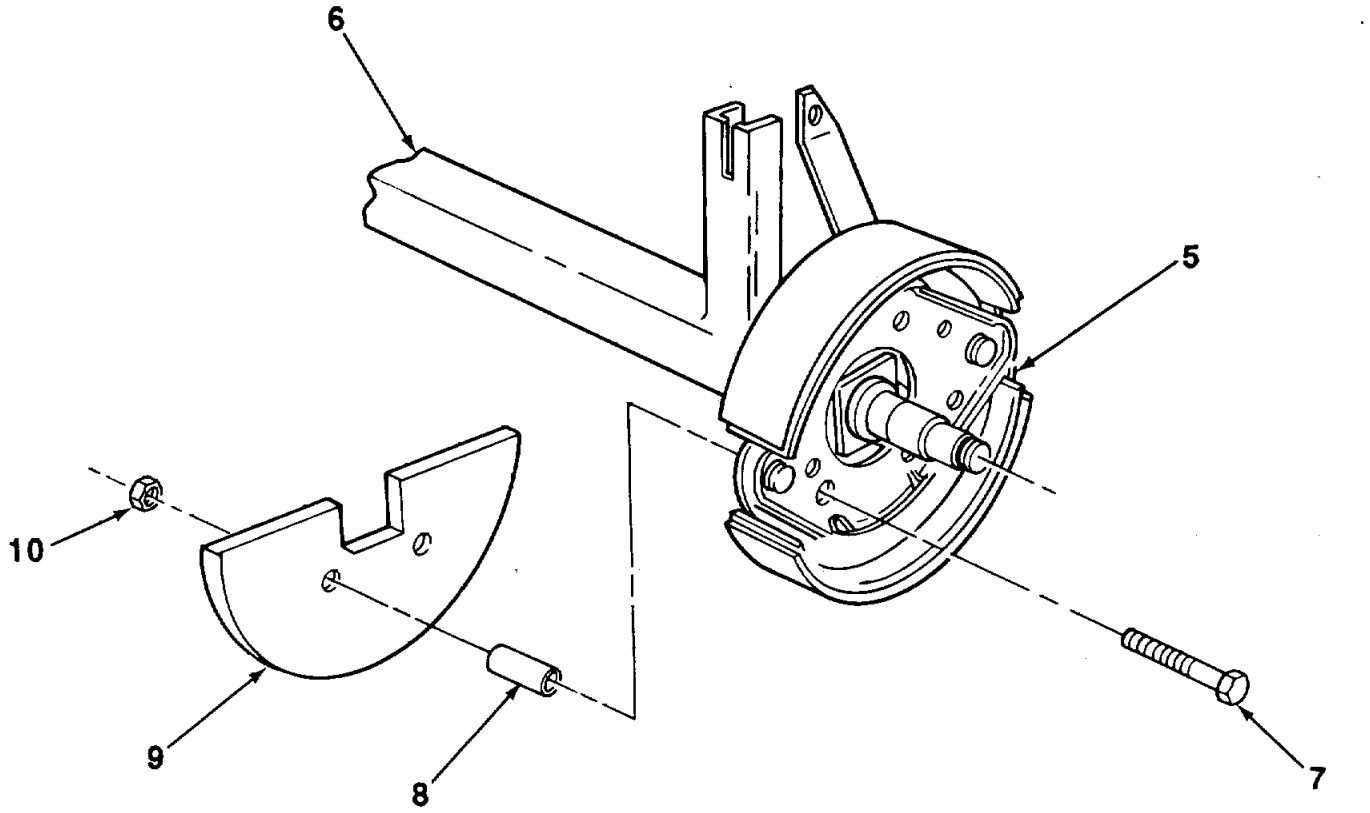
3. Install two springs (13) on brakeshoes (12 and 15) and anchor pin (16).

4. Position lever (14) on mounting plate (5).

4-66. BRAKESHOE REPLACEMENT (Con't).

5. Position mounting plate (5) on axle (6).

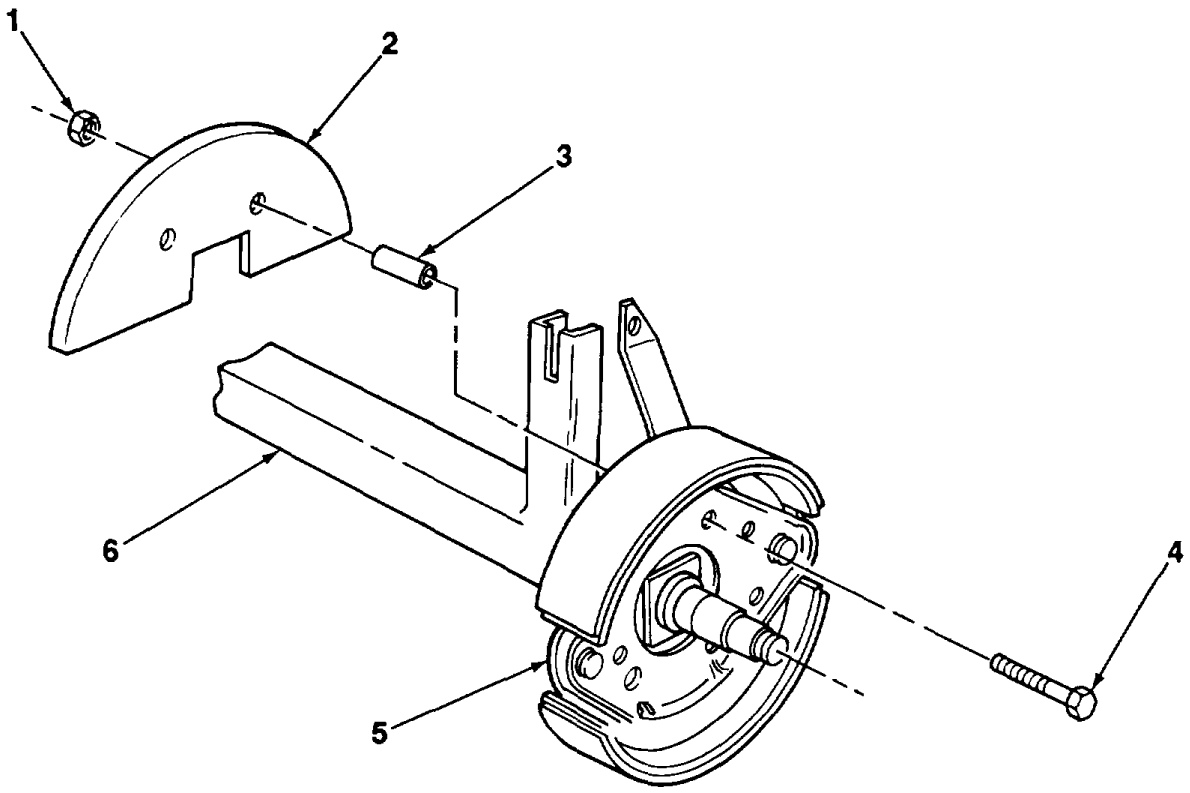
6. Position two screws (7) through mounting plate (5) and Install two spacers (8) and lower backing plate (9) with two nuts (10).



TA704812

4-66. BRAKESHOE REPLACEMENT (Con't).

7.Position two screws (4) through mounting plate (5) and install two spacers (3) and upper backing plate (2) with two nuts (1).



FOLLOW-ON TASKS:

- Install hub and brakedrum (see paragraph 4-69).

TA704813

Section XIV. WHEELS AND BRAKEDRUMS MAINTENANCE

4-67. WHEEL AND TIRE MAINTENANCE.

This Task Covers:

a. Removal
b. Repair
c. Installation

Initial Setup:

Equipment Conditions:
- Wheels choked.

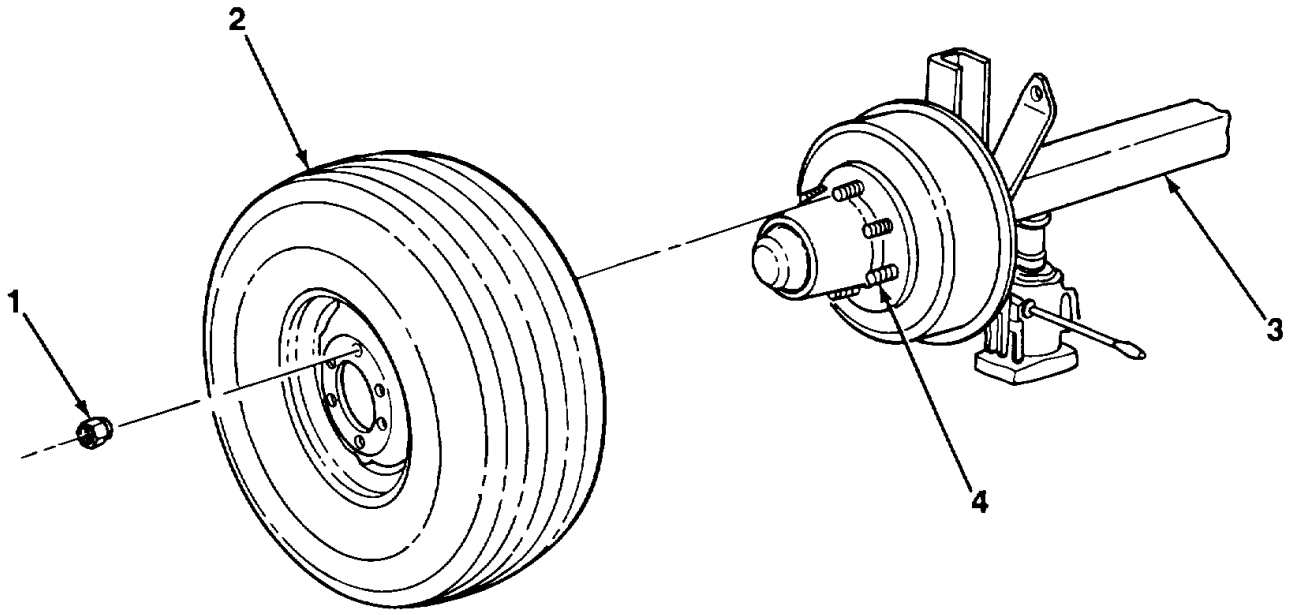
References:
- TM 92610-200-14

Tools/Test Equipment:
* General mechanic's tool kit
* Common no. 1 shop set ·

4-67. WHEEL AND TIRE MAINTENANCE (Con't).

a. REMOVAL

1. Apply handbrake.
2. Loosen, but do not remove, six nuts (1) from wheel (2).
3. Position floor Jack under axle (3) near wheel (2) to be removed, and raise air compressor unit until wheel and tire are off ground.
4. Remove six nuts (1).
5. Remove wheel (2) from studs (2).



TA704814

4-67. WHEEL AND TIRE MAINTENANCE (Con't).

b. REPAIR

Refer to TM 9-2610-200-14 for instructions on dismounting tire and tube from wheel and for repairing tube.

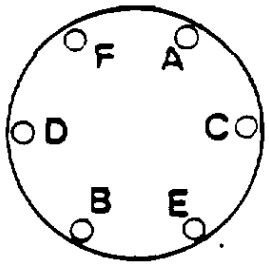
c . INSTALLATION

1. Position wheel (2) on studs (4).

2. Install six nuts (1).

3. Lower floor Jack until wheel (2) and tire is on ground. Remove floor jack.

4 Tighten six nuts (1) using tightening sequence shown. Torque nuts to 80-90 Ib.-ft. (108122 Nom).



TIGHTENING SEQUENCE

TA704815

4-68. FRONT WHEEL BEARINGS AND HUB MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Assembly
d. Installation
e. Wheel Bearing Adjustment

Initial Setup:

Equipment Conditions:
- Wheel removed (see paragraph 4-67).

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

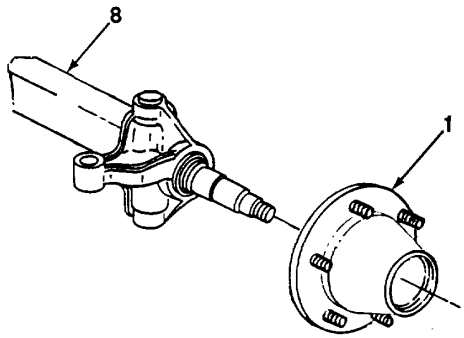
References:
- TM 9-214

Materials/Parts:
- Grease (Item 22, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- One cotter pin
- One oil seal

General Safety Instructions:
Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

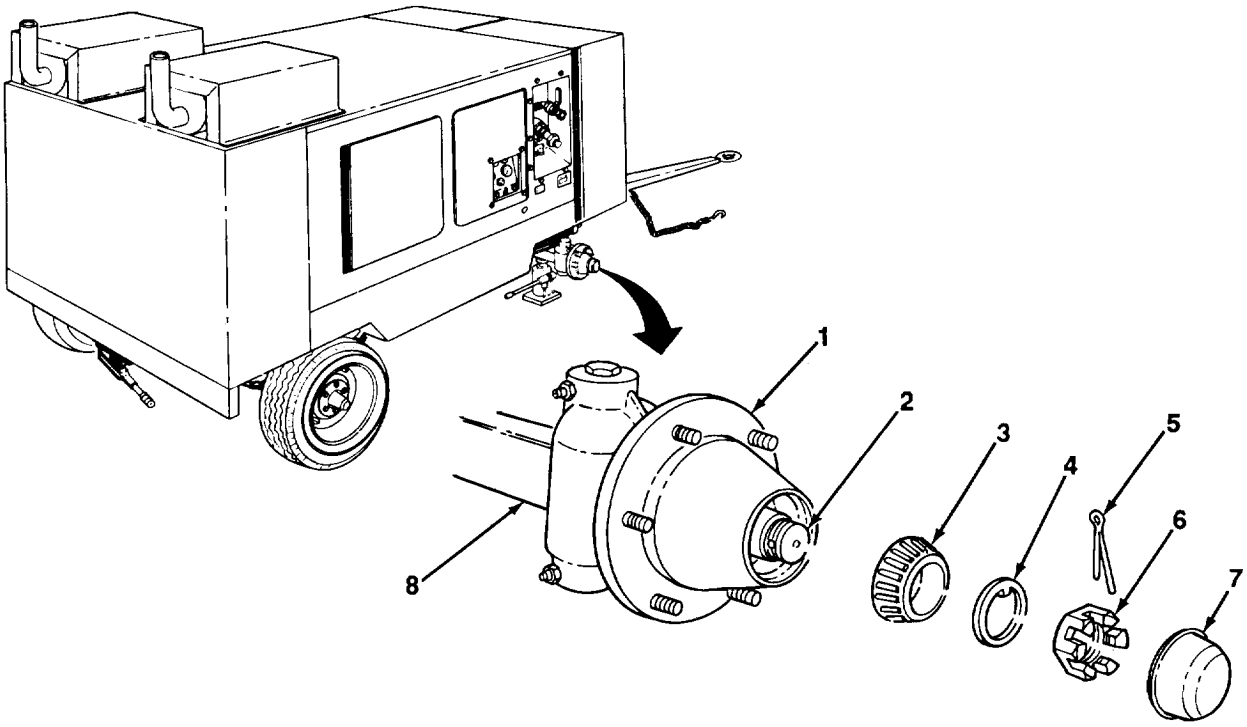
a. REMOVAL

1. Position jackstand under axle (8) and remove floor jack.
2. Remove dust cap (7) from hub (1).
3. Remove cotter pin (5) from slotted nut (6) and spindle (2). Discard cotter pin.
4. Remove slotted nut (6) from spindle (2).
5. Remove keywasher (4) from spindle (2).
6. Pull hub (1) out slightly on axle (8) to loosen outer wheel bearing cone (3). Remove outer wheel bearing cone from hub and axle.
7. Remove hub (1) from axle (8).



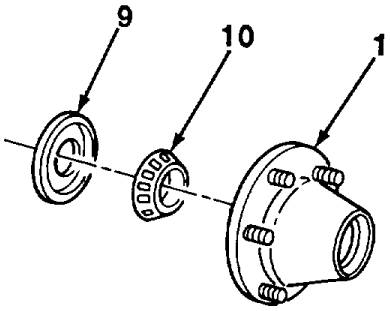
TA704816

4-68. FRONT WHEEL BEARINGS AND HUB MAINTENANCE (Con't).



b. DISASSEMBLY

1 Remove oil seal (9) and inner wheel bearing cone (10) from hub (1). Discard oil seal.



TA704817

4-68. FRONT WHEEL BEARINGS AND HUB MAINTENANCE (Con't).

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-1380F (38°C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

NOTE

If outer and inner wheel bearing cones need replacing, bearing cups must also be replaced.

2. Clean and inspect outer and inner wheel bearing cones in accordance with TM 9-214. Discard if damaged.

NOTE

Perform step 3 only if bearing cups are being replaced. Bearing cups should always be replaced when outer and Inner wheel bearing cones are replaced.

3. Remove two bearing cups (11) from hub (1).

4. If damaged, remove six wheel studs (12) from hub (1).

c. ASSEMBLY

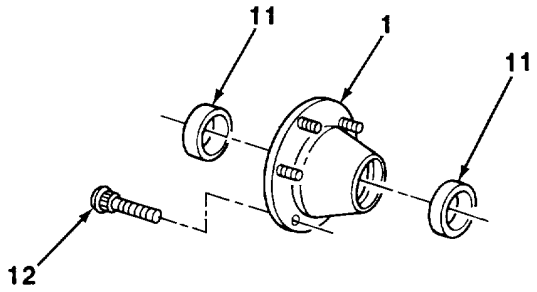
1. If removed, Install six wheel studs (12) in hub (1).

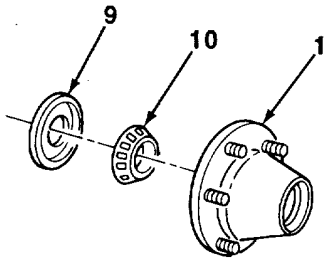
2. If removed, install two bearing cups (11) into position in hub (1).

NOTE

For Instructions on packing outer and Inner wheel bearing cones refer to TM 9-214.

3. Pack inner wheel bearing cone (10) with grease, position in hub (1), and install new oil seal (9).





4-68. FRONT WHEEL BEARINGS AND HUB MAINTENANCE (Con't).

d. INSTALLATION

1. Position hub (1) on axle (8).
2. Pack outer wheel bearing cone (3) with grease. Position outer wheel bearing cone on hub (1) and axle (8), and Install keywasher (4) and slotted nut (6) on spindle (2).

e. WHEEL BEARING ADJUSTMENT

1. Tighten slotted nut (6) while turning hub (1) until drag is felt.
2. Rotate hub (1) one full turn and loosen slotted nut (6) while rocking hub back and forth until looseness Is felt.
3. Tighten slotted nut (6) until looseness is no longer felt.
4. Install new cotter pin (5) in slotted nut (6) and spindle (2).
5. Install dust cap (7) on hub (1).

FOLLOW-ON TASKS:

- Install wheel (see paragraph 4-67).

TA704819

4-69. REAR WHEEL BEARINGS AND BRAKEDRUM MAINTENANCE.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Installation
d. Wheel Bearing Adjustment

Initial Setup

Equipment Conditions:

- Wheel removed (see paragraph 4-67).
- Handbrake cable removed from axle bracket (see paragraph 4-65).

Materials/Parts:

- Grease (Item 22, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- One cotter pin
- One oil seal

Tools/Test Equipment:

- General mechanic's tool kit
- Common no. 1 shop set

References:

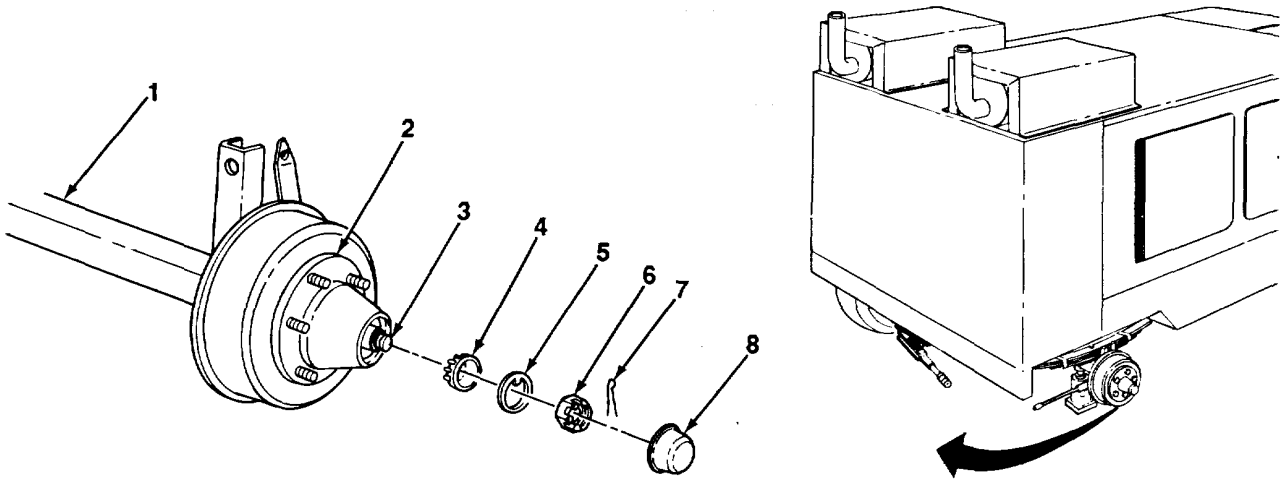
- TM 9-214

General Safety Instructions:

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- DO NOT use a dry brush or compressed air to clean brake assembly or brake components.

a. REMOVAL

1. Position jackstand under axle (1) and remove floor Jack.
2. Remove dust cap (8) from hub (2).
3. Remove cotter pin (7) from slotted nut (6) and spindle (3). Discard cotter pin.
4. Remove slotted nut (6) from spindle (3).



TA704820

4-69. REAR WHEEL BEARINGS AND BRAKEDRUM MAINTENANCE (Con't).

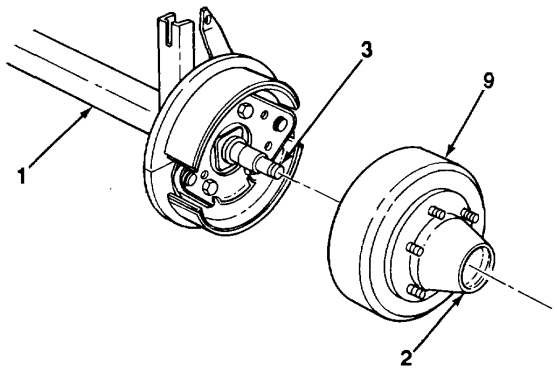
5. Remove keywasher (5) from spindle (3).

6. Pull hub (2) out slightly on axle (1) to loosen outer wheel bearing cone (4). Remove outer wheel bearing cone from hub and spindle.

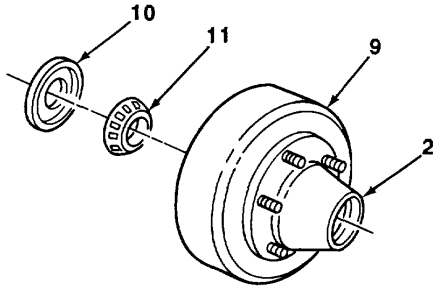
WARNING

DO NOT handle brakeshoes, brakedrums, or other brake components unless area has been properly cleaned. There may be asbestos dust on these components which can be dangerous If you touch It or breathe ft. Wear an approved filter mask and gloves. Never use compressed air or a dry brush to clean brake components. Dust may be removed using an Industrial-type vacuum cleaner. Clean dust or mud away from brake components with water and a wet, soft brush or cloth. Failure to follow this warning may result In serious Illness or death to personnel.

7. Remove hub (2) and brakedrum (9) from axle (1).



8. Remove oil seal (10) and inner wheel bearing cone (11) from hub (2). Discard oil seal



TA704821

4-69. REAR WHEEL BEARINGS AND BRAKEDRUM MAINTENANCE (Con't).

NOTE

If outer and Inner wheel bearing cones need replacing, bearing cups must also be replaced.

9. Clean and inspect outer and inner wheel bearing cones in accordance with TM 9-214. Discard if damaged.

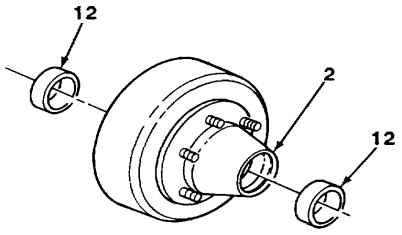
WARNING

DO NOT handle brakeshoes, brakedrums, or other brake components unless area has been properly cleaned. There may be asbestos dust on these components which can be dangerous If you touch It or breathe It. Wear an approved filter mask and gloves. Never use compressed air or a dry brush to clean brake components. Dust may be removed using an Industrial-type vacuum cleaner. Clean dust or mud away from brake components with water and a wet, soft brush or cloth. Failure to follow this warning may result in serious illness or death to personnel.

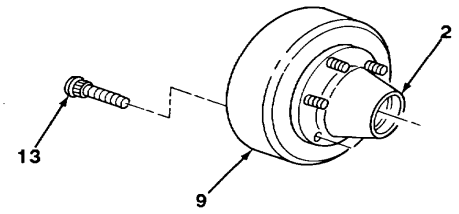
NOTE

Perform step 10 only if bearing cups are being replaced. Bearing cups should always be replaced when outer and Inner wheel bearing cones are replaced.

10. Remove two bearing cups (12) from hub (2).



11. If damaged, remove six wheel studs (13) and hub (2) from brakedrum (9).



TA704822

4-69. REAR WHEEL BEARINGS AND BRAKEDRUM MAINTENANCE (Con't).

b. CLEANING AND INSPECTION

WARNING

- **DO NOT handle brakeshoes, brakedrums, or other brake components unless area has been properly cleaned. There maybe asbestos dust on these component swhich can be dangerous If you touch it or breathe it. Wear an approved filter mask and gloves. Never use compressed air or a dry brush to clean brake components. Dust may be removed using an Industrial-type vacuum cleaner. Clean dust or mud away from brake components with water and a wet, soft brush or cloth. Failure to follow this warning may result In serious Illness or death to personnel.**

- **Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 1000F-1380F (38°C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.**

1. Use dry cleaning solvent to remove grease and oil from all metal parts. Dry thoroughly.

2. Inspect brakedrum and hub for cracks and other signs of damage.
3. Inspect braking surface of brakedrum for scoring or uneven wear.

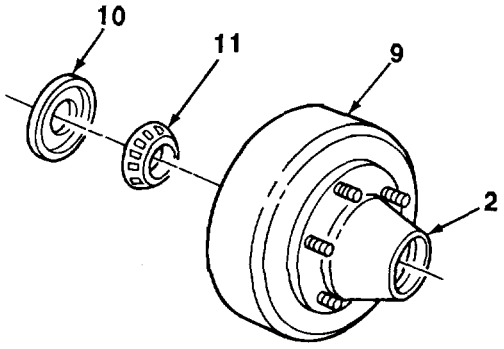
C. INSTALLATION

1. If removed, install hub (2) on brakedrum (9) with six wheel studs (13).
2. If removed, install two bearing cups (12) into position in hub (2).

NOTE

For Instructions on packing outer and Inner wheel bearing cones refer to TM 9-214.

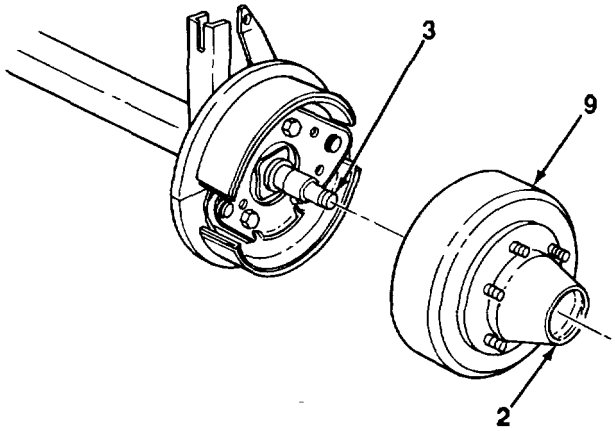
3. Pack inner wheel bearing cone (11) with grease, position in hub (2) and brakedrum (9), and install new oil seal (10).



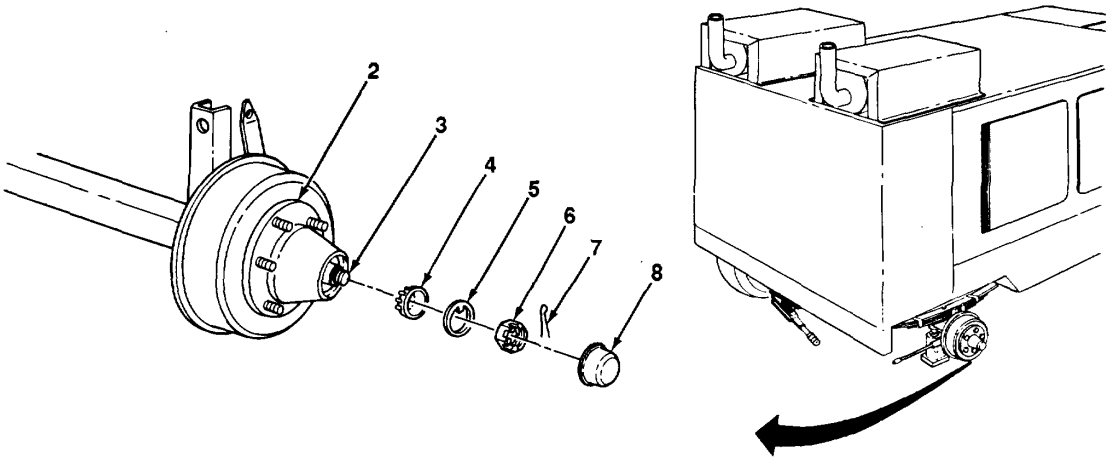
TA704823

4-69. REAR WHEEL BEARINGS AND BRAKEDRUM MAINTENANCE (Con't).

4. Position hub (2) and brakedrum (9) on spindle (3



5. Pack outer wheel bearing cone (4) with grease. Position outer wheel bearing cone on hub (2) and spindle (3) and install key washer (5) and slotted nut (6).



4-69. REAR WHEEL BEARINGS AND BRAKEDRUM MAINTENANCE (Con't).

d. WHEEL BEARING ADJUSTMENT

1. Tighten slotted nut (6) while turning hub (2) until drag is felt.
2. Rotate hub (2) one full turn and loosen slotted nut (6) while rocking hub back and forth until looseness is felt.
3. Tighten slotted nut (6) until looseness Is no longer felt.
4. Install new cotter pin (7) in slotted nut (6) and spindle (3).
5. Install dust cap (8) on hub (2).

FOLLOW-ON TASKS:

- Install wheel (see paragraph 4-67).
- Install handbrake cable to axle bracket (see paragraph 4-65).

Section XV. STEERING SYSTEM MAINTENANCE

4-70. STEERING KNUCKLE REPLACEMENT.

This Task Covers:

a Removal
b. Cleaning and Inspection
c Installation

Initial Setup:

Equipment Conditions:
- Hub and wheel bearings removed (see paragraph 4-68)

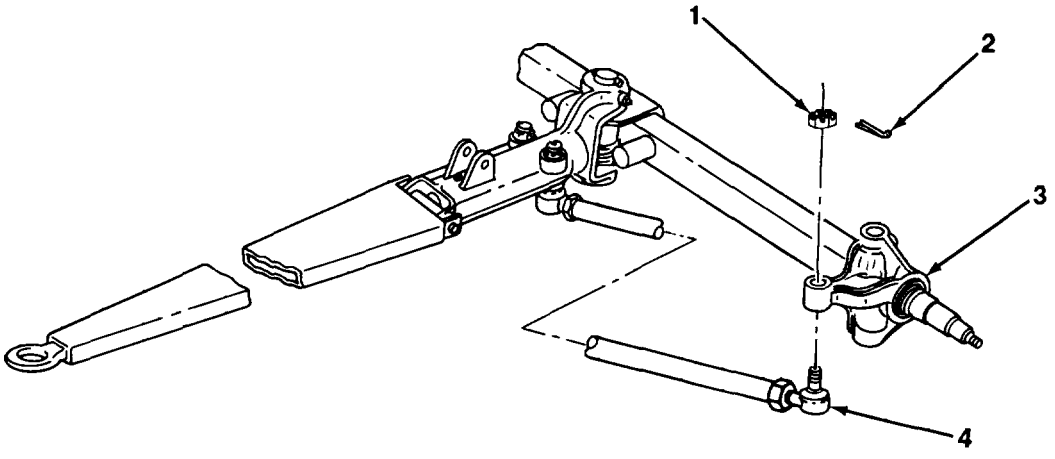
Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

Materials/Parts:
- Dry cleaning solvent (item 38, Appendix E)
- One cotter pin
- One spring pin

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

a. REMOVAL

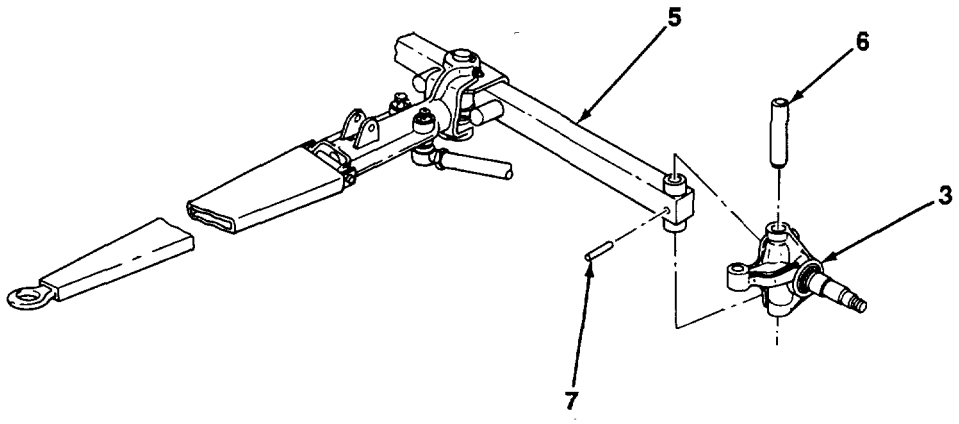
1. Remove cotter pin (2), slotted nut (1), and tie-rod end (4) from steering knuckle (3). Discard cotter pin.



TA704825

4-70. STEERING KNUCKLE REPLACEMENT (Con't).

2. Remove spring pin (7) from axle (5) and kingpin (6). Discard spring pin.
3. Remove kingpin (6) from steering knuckle (3) and axle (5).
4. Remove steering knuckle (3) from axle (5).



b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean all parts with dry cleaning solvent.

2. Inspect kingpin for nicks, burrs, and other damage. Remove burrs. Replace kingpin if otherwise damaged.

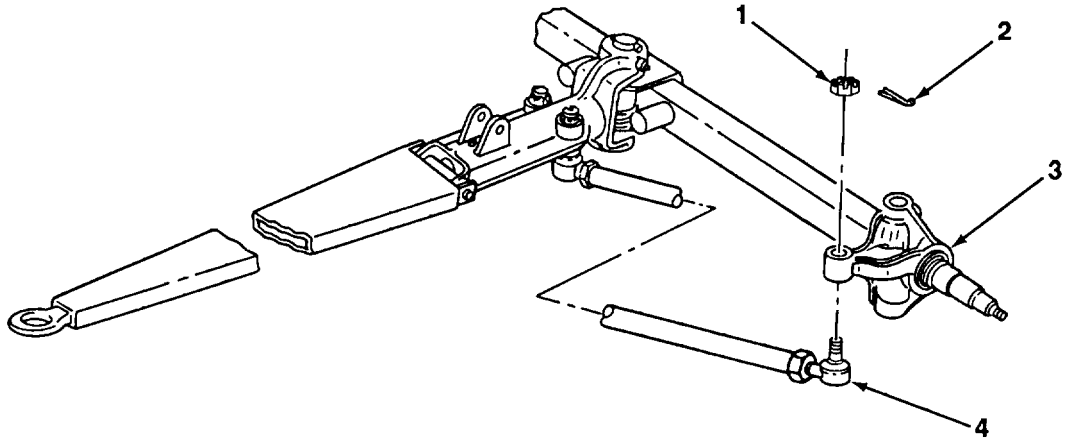
3. Inspect two lubrication fittings (8) In steering knuckle (3). Remove and discard lubrication fittings if damaged.

c. INSTALLATION

1. If removed, install two new lubrication fittings (8) in steering knuckle (3).

4-70. STEERING KNUCKLE REPLACEMENT (Con't).

2. Position steering knuckle (3) on axle (5).
3. Install kingpin (6) through axle (5) and steering knuckle (3) with spring pin hole alined.
4. Install new spring pin (7) through axle (5) and kingpin (6).
5. Install tie-rod end (4) on steering knuckle (3) with slotted nut (1) and new cotter pin (2).



FOLLOW-ON TASKS:

- Install hub and wheel bearings (see paragraph 4-68).

TA704827

4-71. STEERING ARM REPLACEMENT.

This Task Covers:

a Removal
b. Cleaning and Inspection
c Installation

Initial Setup:

Equipment Conditions:
- Drawbar removed (see paragraph 4-73).

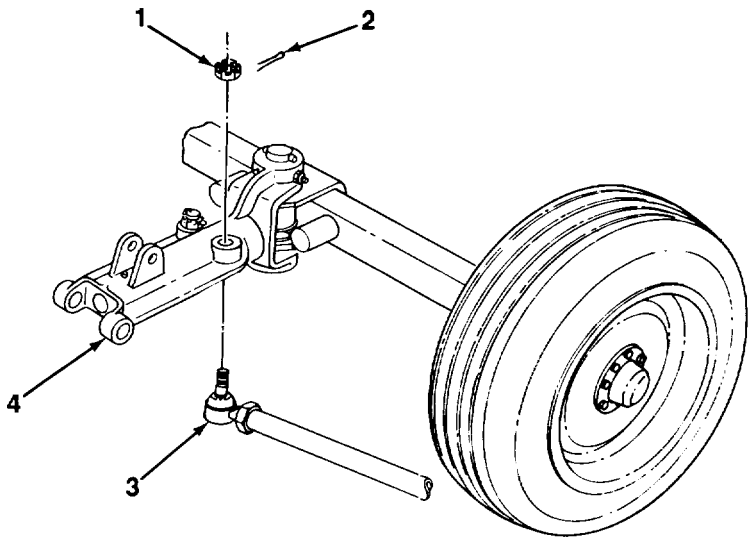
Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

Materials/Parts:
- Dry cleaning solvent (Item 38, Appendix E)
- Two cotter pins
- Two spring pins

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

a. REMOVAL

1. Remove two cotter pins (2), slotted nuts (1), and tie-rod ends (3) from steering arm (4). Discard cotter pins.

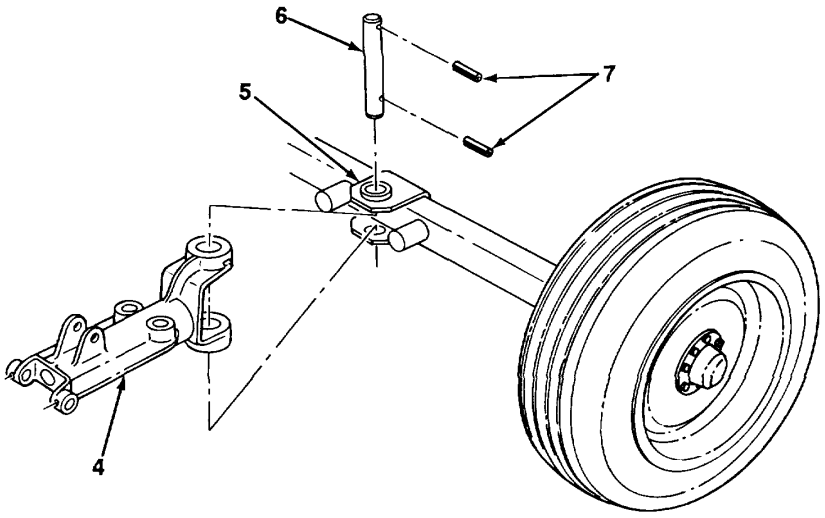


2. Remove two spring pins (7) from pin (6). Discard spring pins.

3. Remove pin (6) and steering arm (4) from axle bracket (5).

TA704828

4-71. STEERING ARM REPLACEMENT (Con't).



b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean all parts with dry cleaning solvent. Allow to dry.

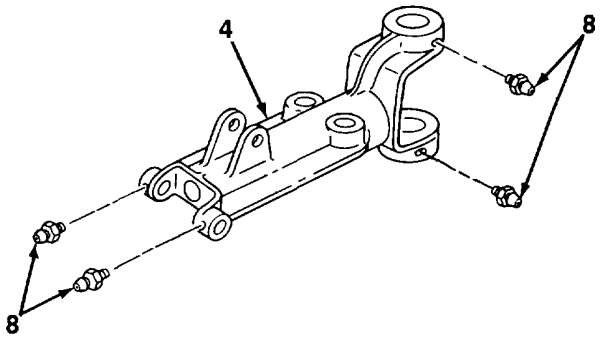
2. Inspect pin for burrs, nicks, and other damage. Remove burrs. Replace if otherwise damaged.

3. Inspect steering arm (4) for damage. Replace if damaged.

4. Inspect four lubrication fittings (8) in steering arm (4) for damage. Remove and discard lubrication fittings if damaged.

c INSTALLATION

1. If removed, install four lubrication fittings (8) in steering arm (4).

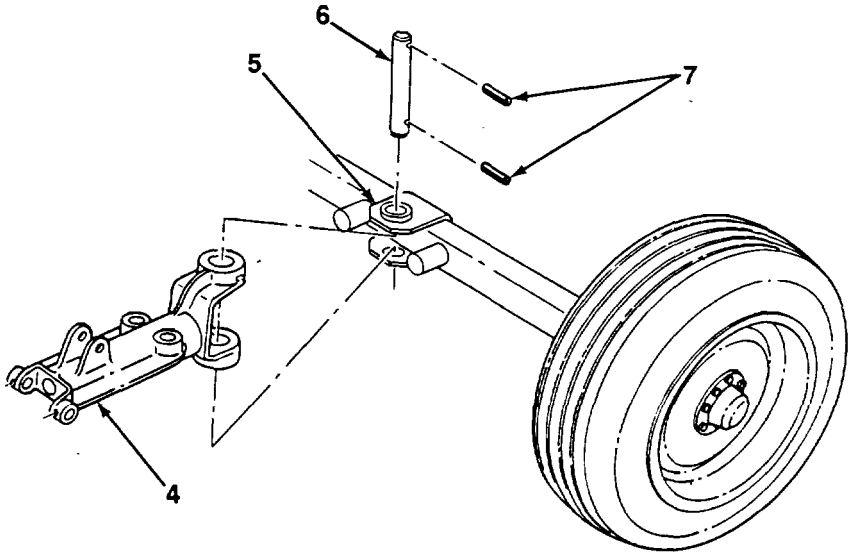


TA704829

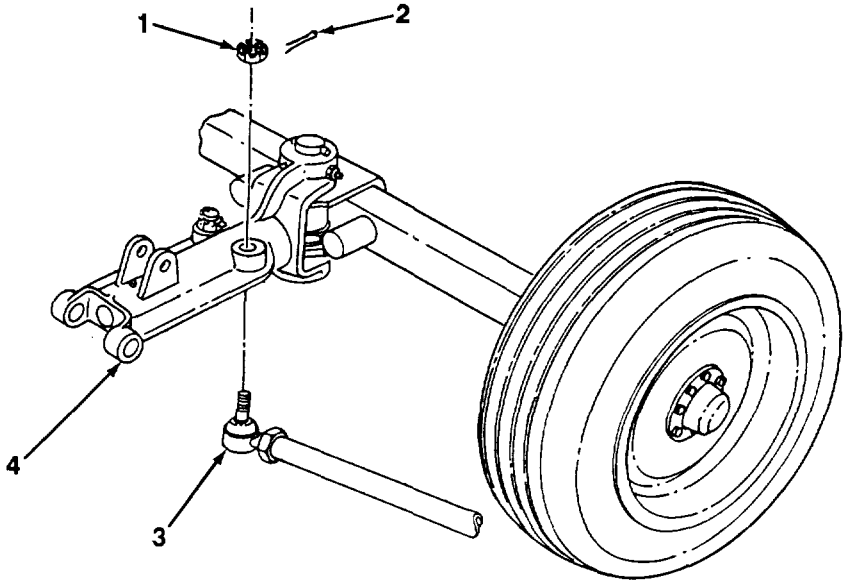
4-71. STEERING ARM REPLACEMENT (Con't).

2. Install steering arm (4) on axle bracket (5) with pin (6).

3. Install two new spring pins (7) in pin (6).



4. Install two tie-rod ends (3) on steering arm (4) with two slotted nuts (1) and new cotter pins (2).



FOLLOW-ON TASKS:

- Install drawbar (see paragraph 4-73).

TA704830

4-72. TIE-ROD MAINTENANCE.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Installation
d. Adjustment

Initial Setup:

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

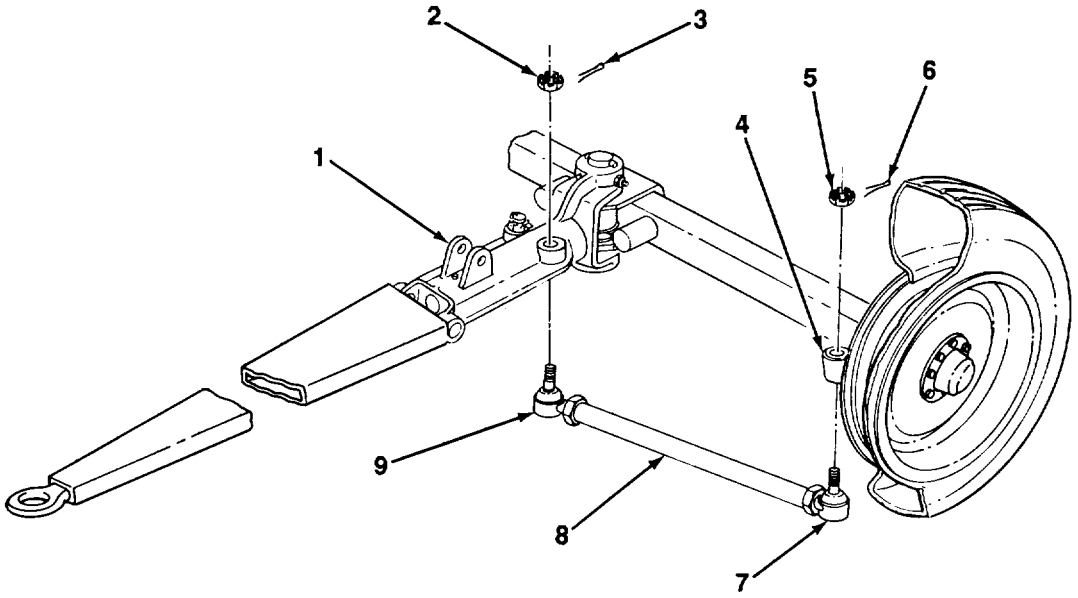
Materials/Parts:
- Dry cleaning solvent (Item 38, Appendix E)
- Two cotter pins

General Safety Instructions:
- Dry cleaning solvent Is flammable and must not be used near open flame. Use only in a well-ventilated area.

References:
- TM 9-8000

a. REMOVAL

1. Remove cotter pin (3) and slotted nut (2) from tie-rod end (9). Discard cotter pin.
2. Remove cotter pin (6) and slotted nut (5) from tie-rod end (7). Discard cotter pin.
3. Remove tie-rod (8) from steering arm (1) and steering knuckle (4).



TA704831

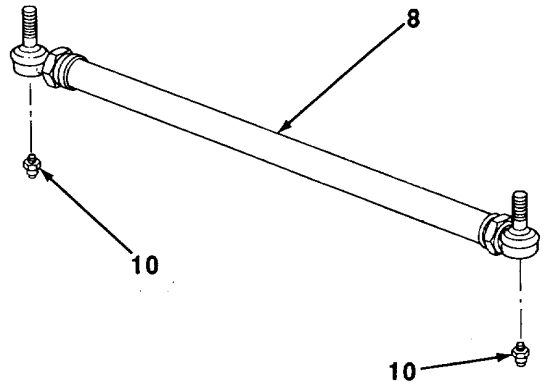
4-72. TIE-ROD MAINTENANCE (Con't).

b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 1000F-1380F (380C-590C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

1. Clean tie-rod with dry cleaning solvent. Allow to dry.
2. Inspect tie-rod for bends and cracks or signs of looseness. Replace tie-rod if bent, broken, or loose.
3. Inspect two lubrication fittings (10) in tie-rod (8) for damage. Remove and discard lubrication fittings If damaged.

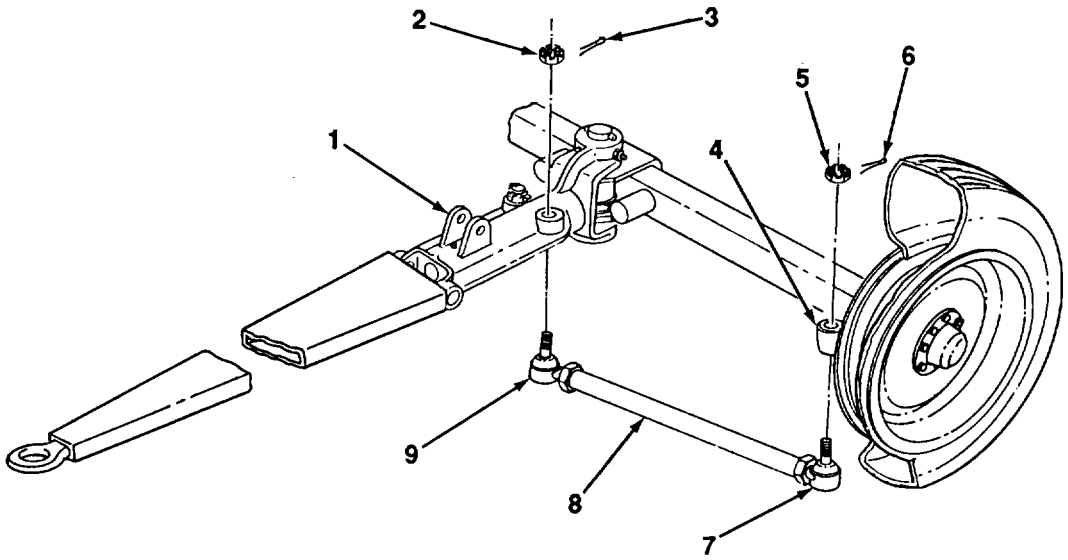


c. INSTALLATION

1. If removed, install two lubrication fittings (10) in tie-rod (8).
2. Position tie-rod (8) on steering knuckle (4) and steering arm (1).
3. Install nut (5) and new cotter pin (6) on tie-rod end (7).
4. Install nut (2) and new cotter pin (3) on tie-rod end (9).

TA704832

4-72. TIE-ROD MAINTENANCE (Con't).

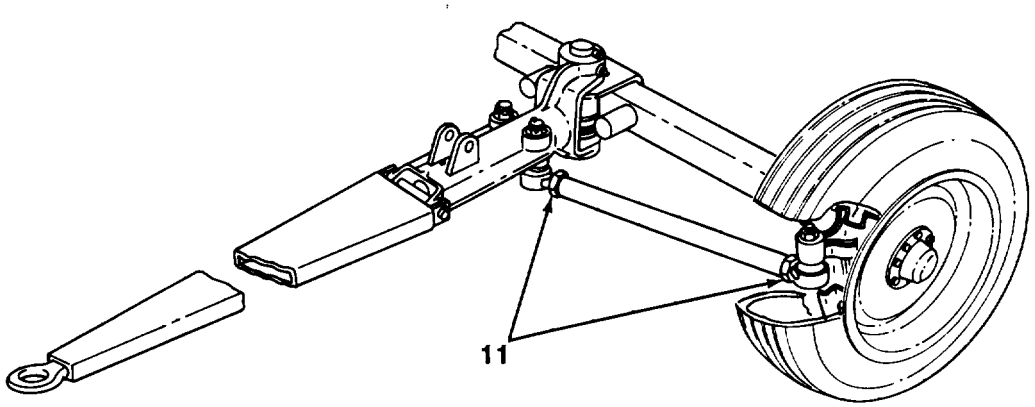


d. ADJUSTMENT

NOTE

Refer to TM 9-8000 for additional Information on adjusting toe-in.

1. Measure distance at rear of front tires from center to center. Record measurement.
2. Measure distance at front of front tires from center to center. Record measurement.
3. Adjust tie-rods by turning nuts (11) until front measurement is X in. (3.2 mm) less than rear measurement.



TA704833

Section XVI. FRAME AND TOWING ATTACHMENTS MAINTENANCE

4-73. DRAWBAR REPLACEMENT.

This Task Covers:

a Removal

b Installation

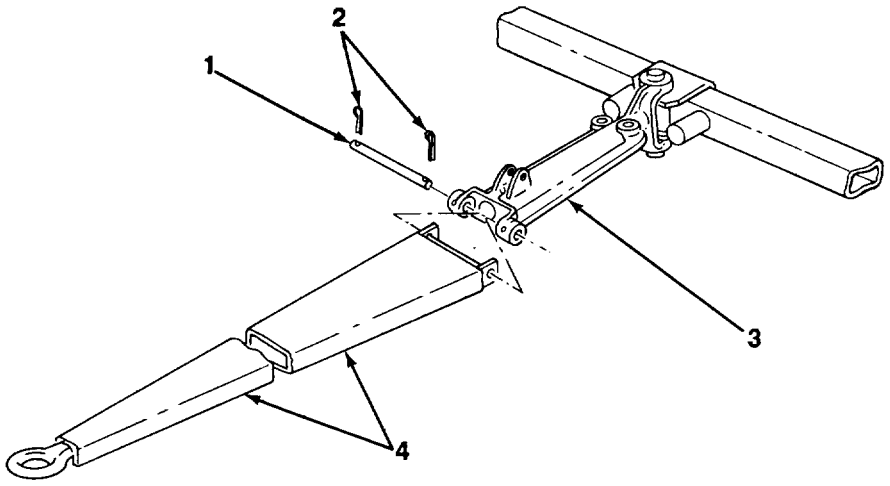
Initial Setup:

Materials/Parts:
- Two cotter pins

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

1. Remove two cotter pins (2) from pin (1). Discard cotter pins.
2. Remove pin (1) and drawbar (4) from steering arm (3).



b. INSTALLATION

1. Install drawbar (4) on steering arm (3) with pin (1).
2. Install two new cotter pins (2) in pin (1).

TA704834

4-74. SAFETY CHAIN REPLACEMENT.

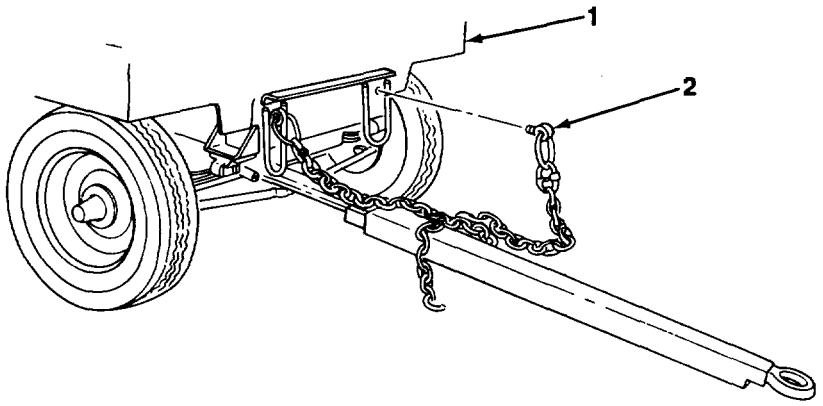
This Task Covers:
a Removal
b Installation

Initial Setup:

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

Remove eyebolt and chain assembly (2) from frame (1).



b. INSTALLATION

Install eyebolt and chain assembly (2) on frame (1).

TA704835

Section XVII. SUSPENSION MAINTENANCE

4-75. SPRING REPLACEMENT.

This Task Covers:

a Removal

b Installation

Initial Setup:

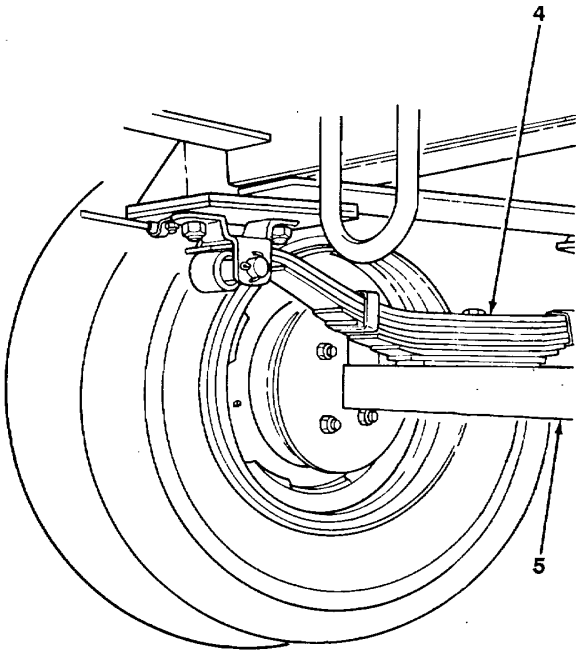
Equipment Conditions:
- Handbrake cable disconnected from spring plate (rear spring only) (see paragraph 4-65).

Materials/Parts:
- One cotter pin
- Four locknuts

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

a. REMOVAL

1. Position suitable floor Jack under axle (5) and raise air compressor unit until tires clear ground.
2. Position jack stand under rear comer of air compressor unit.
3. Lower floor jack until tires rest on ground. Remove floor jack. Jack stand holds weight of air compressor unit off spring (4).



TA704836

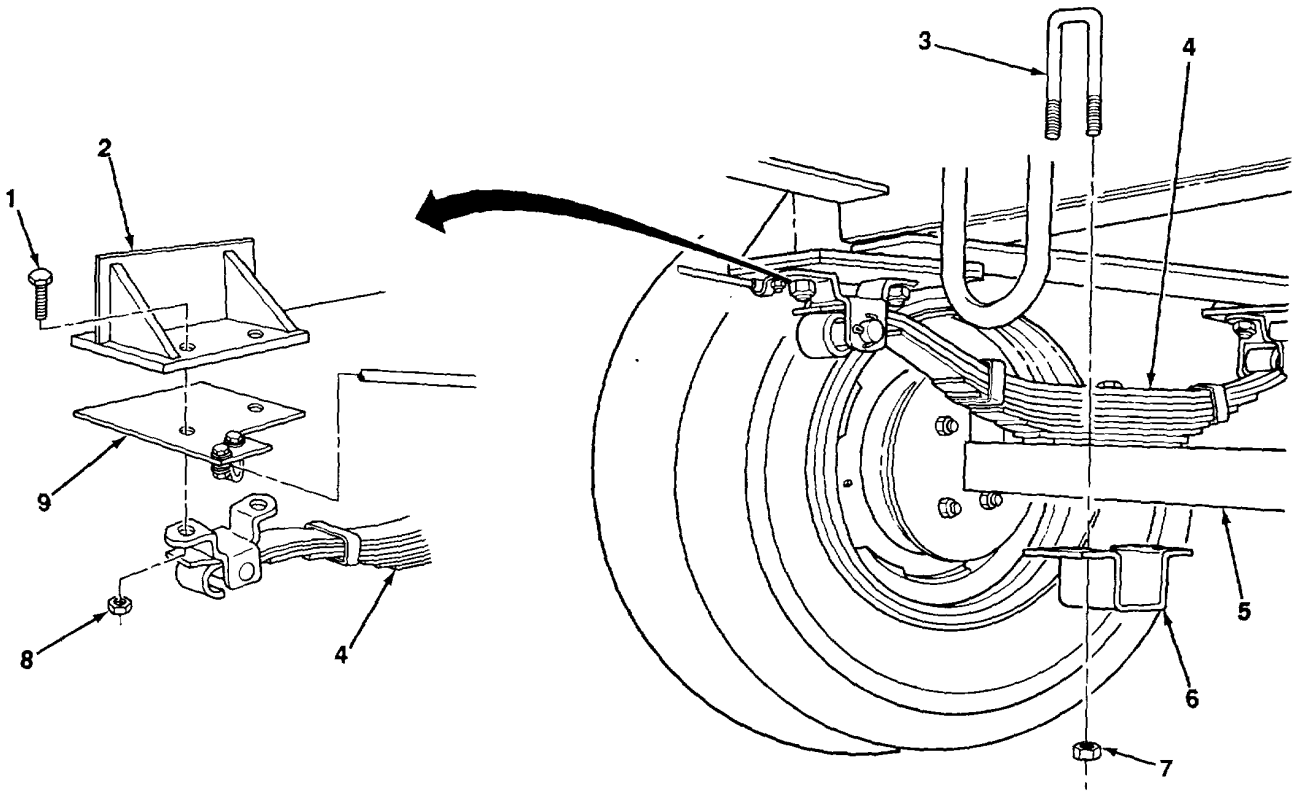
4-75. SPRING REPLACEMENT (Con't).

4. Remove four locknuts (8) and screws (1) from bracket (2) and spring (4). Discard locknuts.

5. Remove four nuts (7), two U-bolts (3), and bracket (6) from spring (4) and axle (5).

NOTE
Plate is present on rear springs only. Note position of plate for Installation.

6. Remove spring (4) and plate (9) from axle (5) and bracket (2).



7. Remove cotter pin (12), pin (10), and bracket (11) from spring (4). Discard cotter pin.

8. Remove nut (15), screw (13), spacer (16), and bracket (14) from spring (4).

b. INSTALLATION

1. Install spacer (16) and bracket (14) on spring (4) with screw (13) and nut (15).

2. Install bracket (11) on spring (4) with pin (10) and new cotter pin (12).

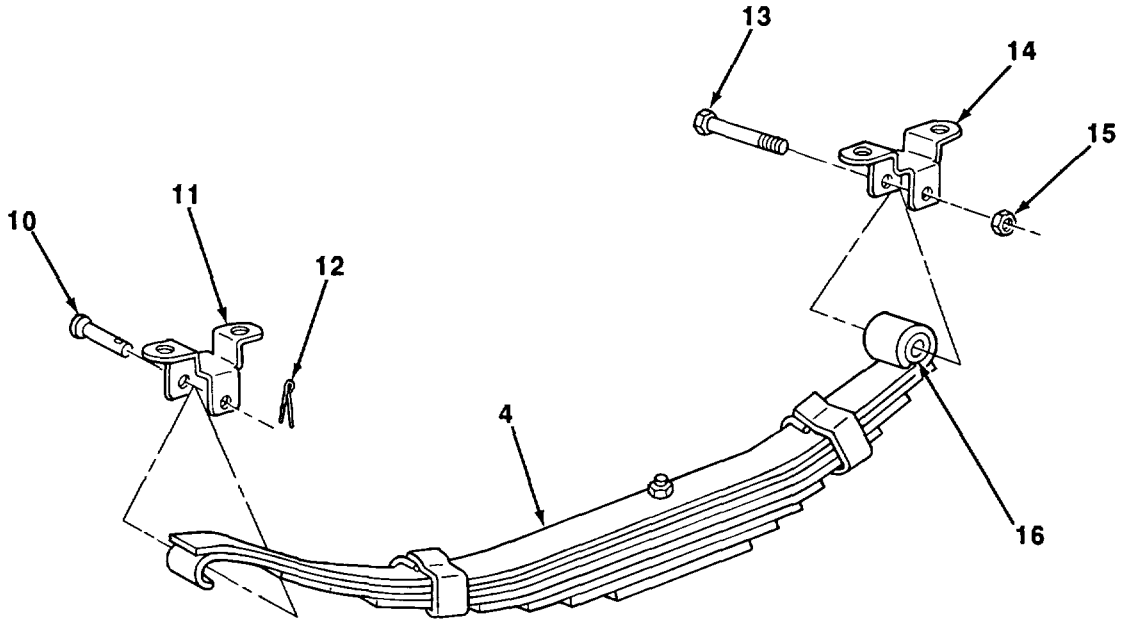
NOTE

Plate is present on rear springs only.

3. Position plate (9) on spring (4).

TA704837

4-75. SPRING REPLACEMENT (Con't).



4. Position spring (4) on axle (5). Ensure that spring seats properly on axle.
5. Install bracket (6) on spring (4) and axle (5) with two U-bolts (3) and four nuts (7).
6. Install spring (4) on bracket (2) with four screws (1) and new locknuts (8).
7. Using floor jack, raise axle (5) so that tires are off ground.
8. Remove jack stand from under air compressor unit.
9. Lower floor jack and remove from under air compressor unit.

FOLLOW-ON TASKS:

- Connect handbrake cable to spring plate (rear spring only) (see paragraph 4-65).

TA704838

Section XVIII. NONELECTRICAL GAGES REPLACEMENT

4-76. ENGINE COOLANT TEMPERATURE GAGE REPLACEMENT.

This Task Covers:

a Removal

b Installation

Initial Setup:

Equipment Conditions:

- Coolant drained (see Lubrication Instructions, Chapter 3, Section I).

Materials/Parts:

- Two lockwashers

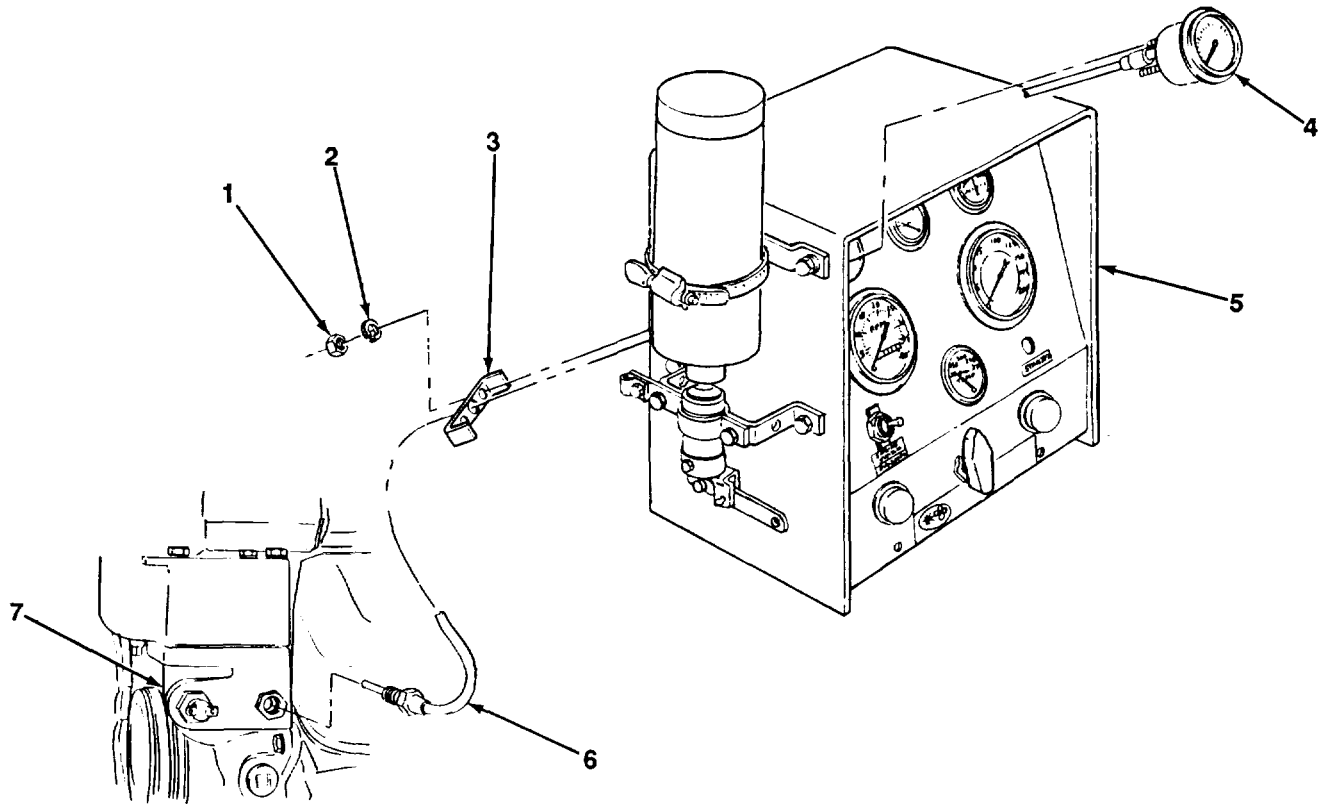
Tools/Test Equipment:

- General mechanic's tool kit

4-76. ENGINE COOLANT TEMPERATURE GAGE REPLACEMENT (Con't).

a. REMOVAL L

1. Remove line (6) from water outlet (7).
2. Remove two nuts (1), lockwashers (2), and bracket (3) from gage (4) and instrument panel (5). Discard lockwashers.
3. Remove gage (4) from Instrument panel (5).



b. INSTALLATION

1. Thread line (6) through instrument panel (5) and position gage (4) In instrument panel.
2. Install bracket (3) on gage (4) and instrument panel (5) with two new lockwashers (2) and nuts (1).
3. Install line (6) in water outlet (7).

FOLLOW-ON TASKS:

- Fill cooling system with coolant (see Lubrication Instructions, Chapter 3, Section I).

TA704839

4-77. TACH/HOURMETER GAGE AND CABLE REPLACEMENT.

This Task Covers:

a Removal

b Installation

Initial Setup:

Materials/Parts:

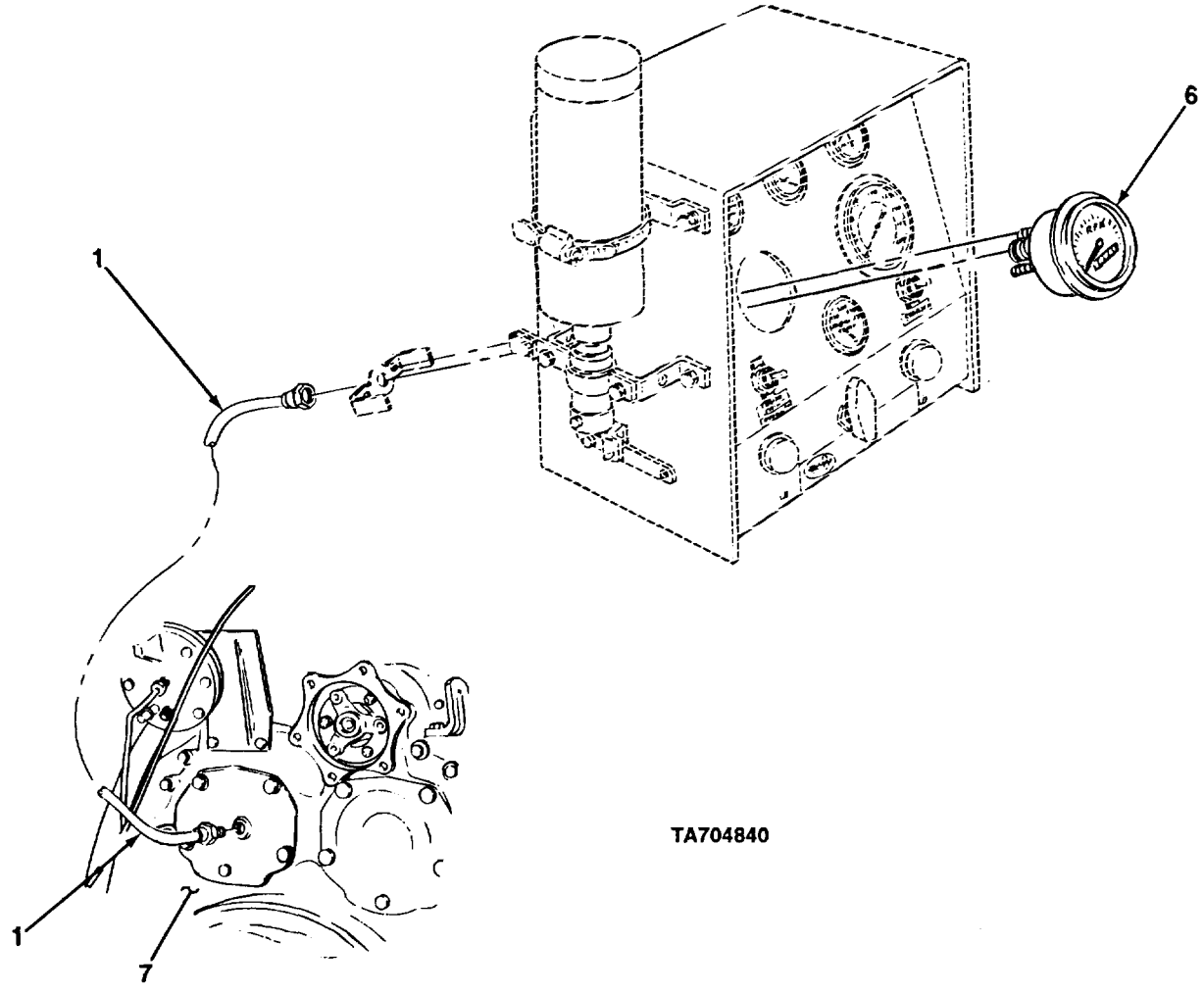
- Two lockwashers

Tools/Test Equipment:

- General mechanic's tool kit

a. REMOVAL

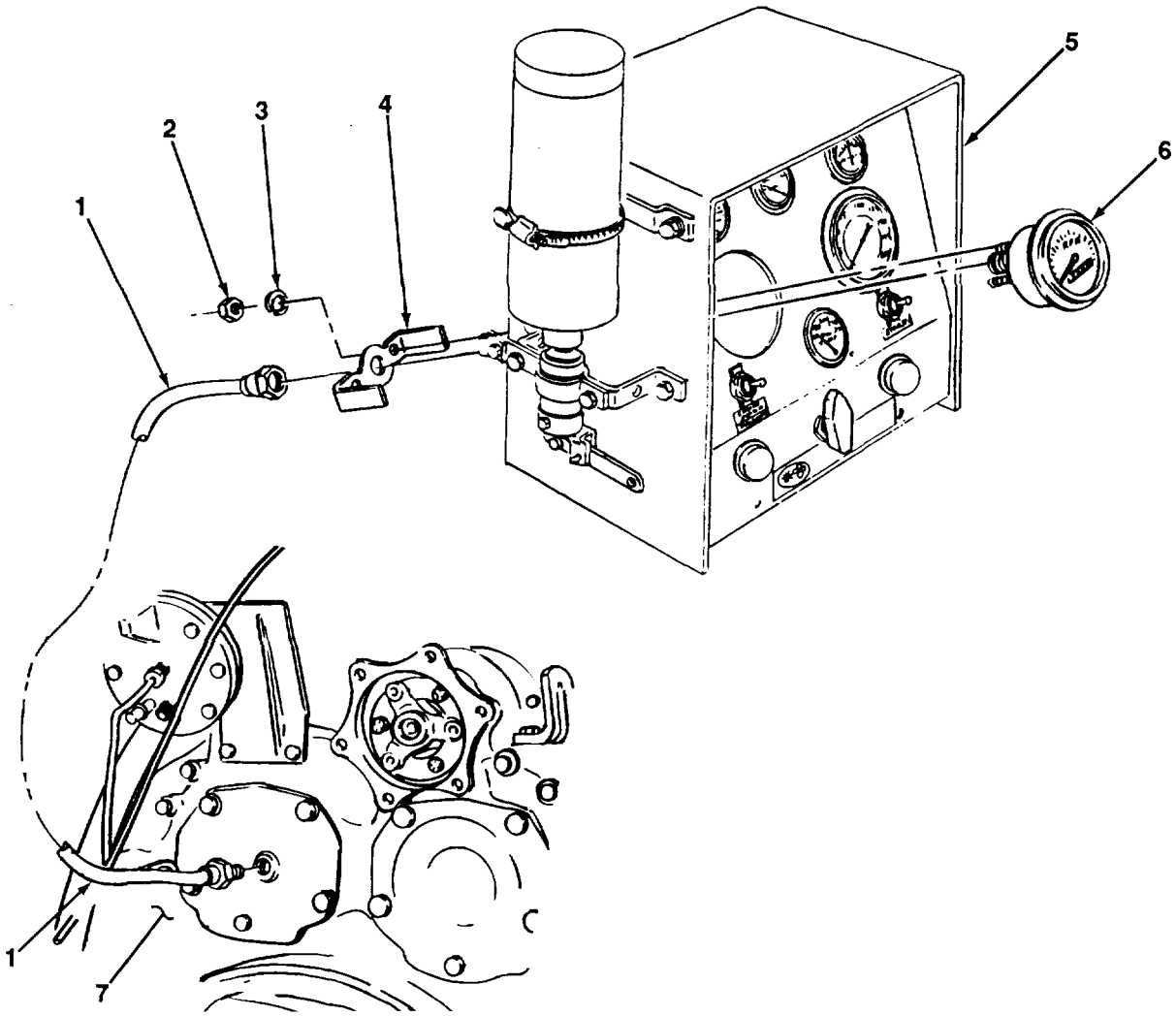
1. Remove cable (1) from gage (6) and engine (7).



TA704840

4-77. TACH/HOURMETER GAGE AND CABLE REPLACEMENT (Con't).

2. Remove two nuts (2), lockwashers (3), and bracket (4) from instrument panel (5) and gage (6). Discard lockwashers.
3. Remove gage (6) from instrument panel (5).



b. INSTALLATION

1. Position gage (6) in Instrument panel (5).
2. Install bracket (4) on gage (6) and instrument panel (5) with two new lockwashers (3) and nuts (2).
3. Install cable (1) on gage (6) and engine (7).

TA704841

4-78. AIR PRESSURE GAGE AND LINE REPLACEMENT.

This Task Covers.
a Removal
b Installation

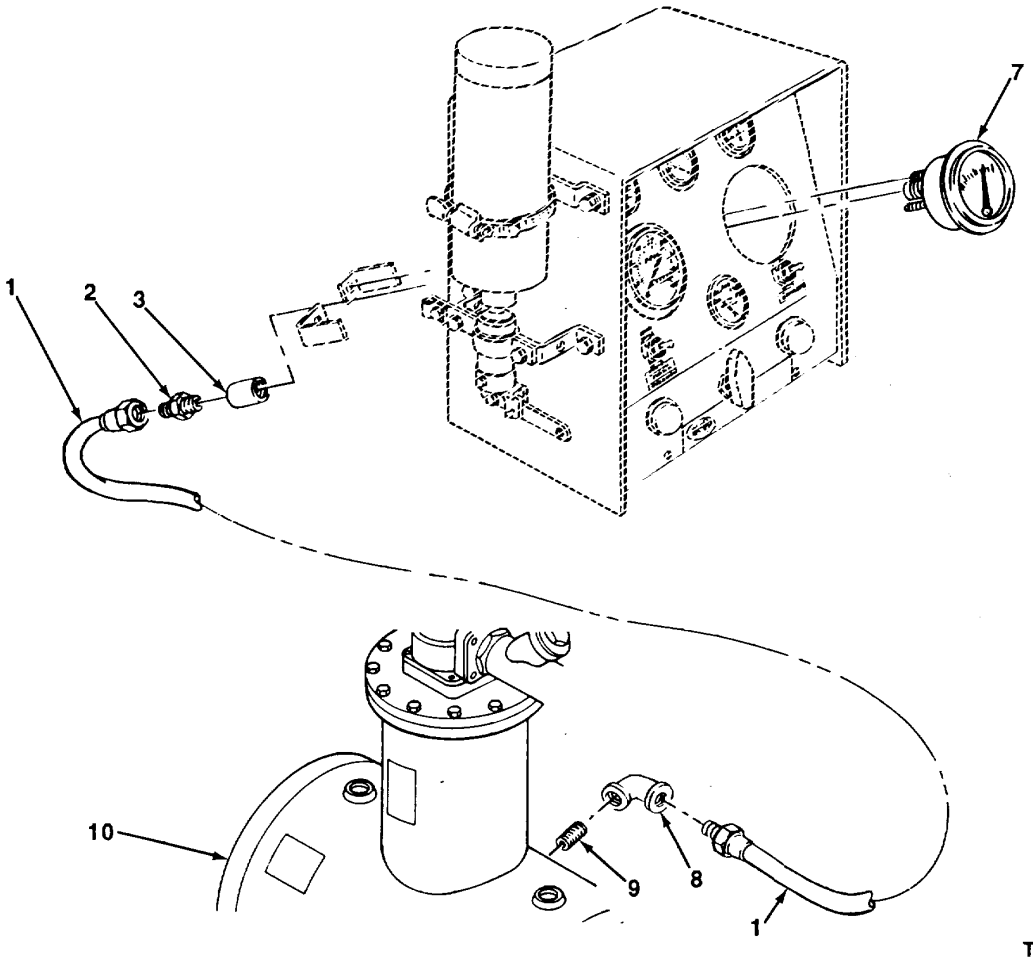
Initial Setup:

Equipment Conditions:
- Air drained from oil separator.

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

1. Remove line (1), adapter (2), and pipe coupling (3) from gage (7).
2. Remove line (1), elbow (8), and nipple (9) from oil separator (10).

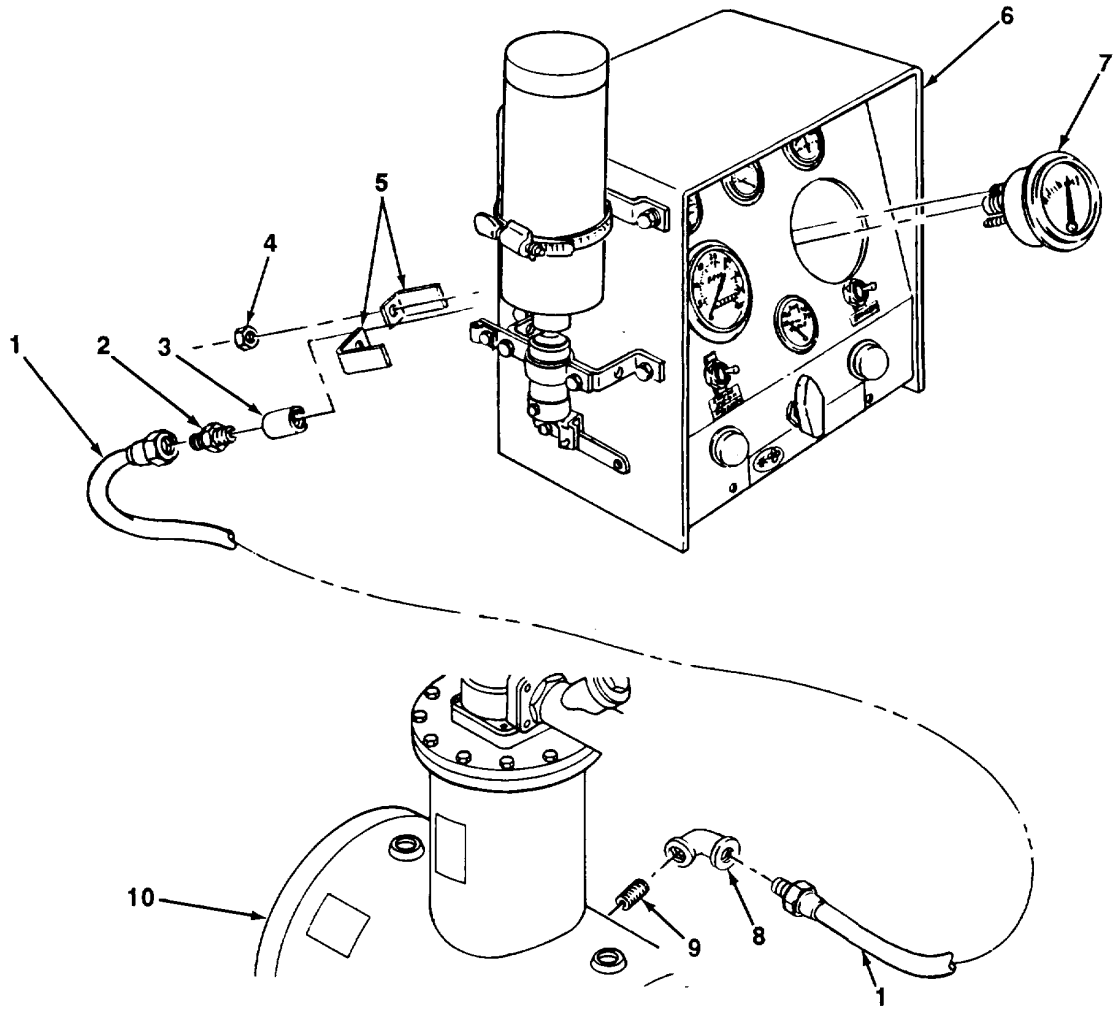


TA704842

4-78. AIR PRESSURE GAGE AND LINE REPLACEMENT (Con't).

3. Remove two nuts (4) and brackets (5) from gage (7) and instrument panel (6).

4. Remove gage (7) from instrument panel (6).



b. INSTALLATION ON

1. Position gage (7) in Instrument panel (6).

2. Install two brackets (5) on gage (7) and instrument panel (6) with two nuts (4).

3. Install nipple (9), elbow (8), and line (1) on oil separator (10).

4. Install pipe coupling (3), adapter (2), and line (1) on gage (7).

TA704843

4-79. AIR COMPRESSOR DISCHARGE TEMPERATURE GAGE AND SWITCH REPLACEMENT.

This Task Covers:

a Removal

b Installation

Initial Setup:

Equipment Conditions:

- Master battery switch in OFF position.

Tools/Test Equipment:

- General mechanic's tool kit

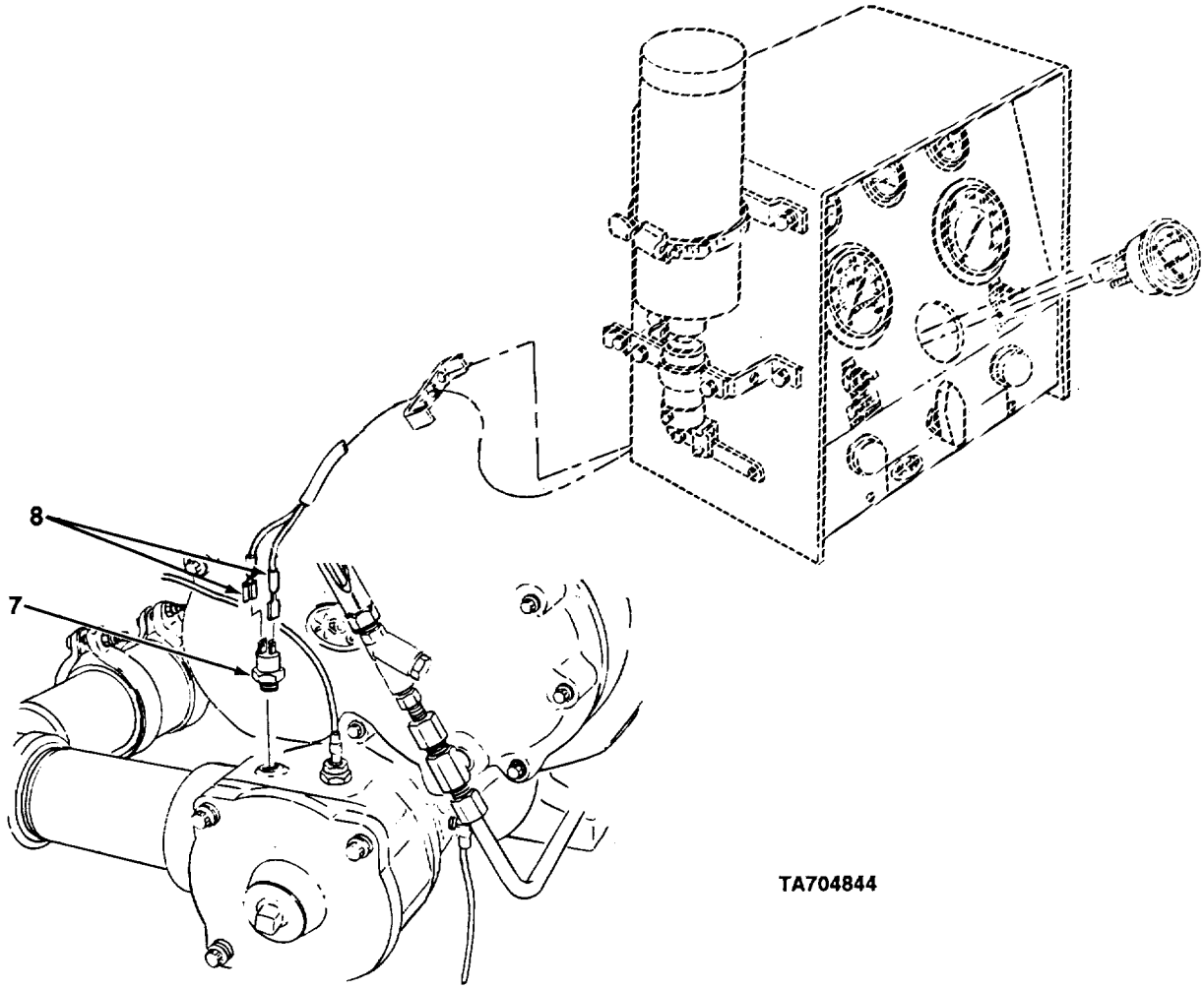
Materials/Parts:

- Marker tags (Item 40, Appendix E)
- Two lockwashers

a. REMOVAL

L

1. Tag and remove two leads (8) from switch (7).

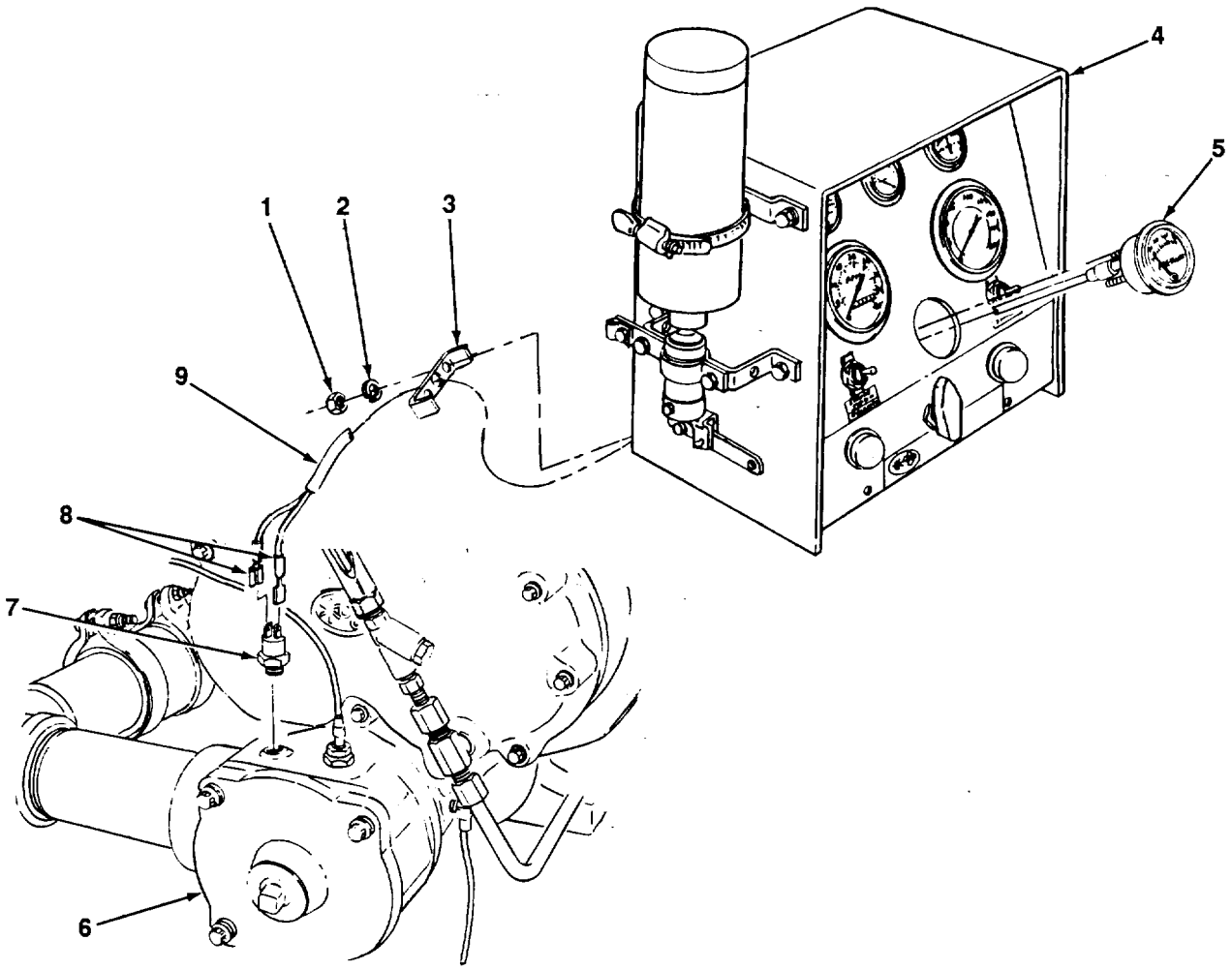


4-79. AIR COMPRESSOR DISCHARGE TEMPERATURE GAGE AND SWITCH , REPLACEMENT (Con't).

2. Remove switch (7) from discharge valve (6).

3. Remove two nuts (1), lockwashers (2), and bracket (3) from gage (5) and instrument panel (4). Discard lockwashers.

4. Remove gage (5) from instrument panel (4).



b. INSTALLATION

1. Thread line (9) through Instrument panel (4) and position gage (5) on Instrument panel.

2. Install bracket (3) on gage (5) and instrument panel (4) with two new lockwashers (2) and nuts (1).

3. Install switch (7) on discharge valve (6).

4. Install two leads (8) on switch (7).

TA704845

4-80. ENGINE OIL PRESSURE GAGE AND HOSE REPLACEMENT.

This Task Covers:

a Removal

b Installation

Initial Setup:

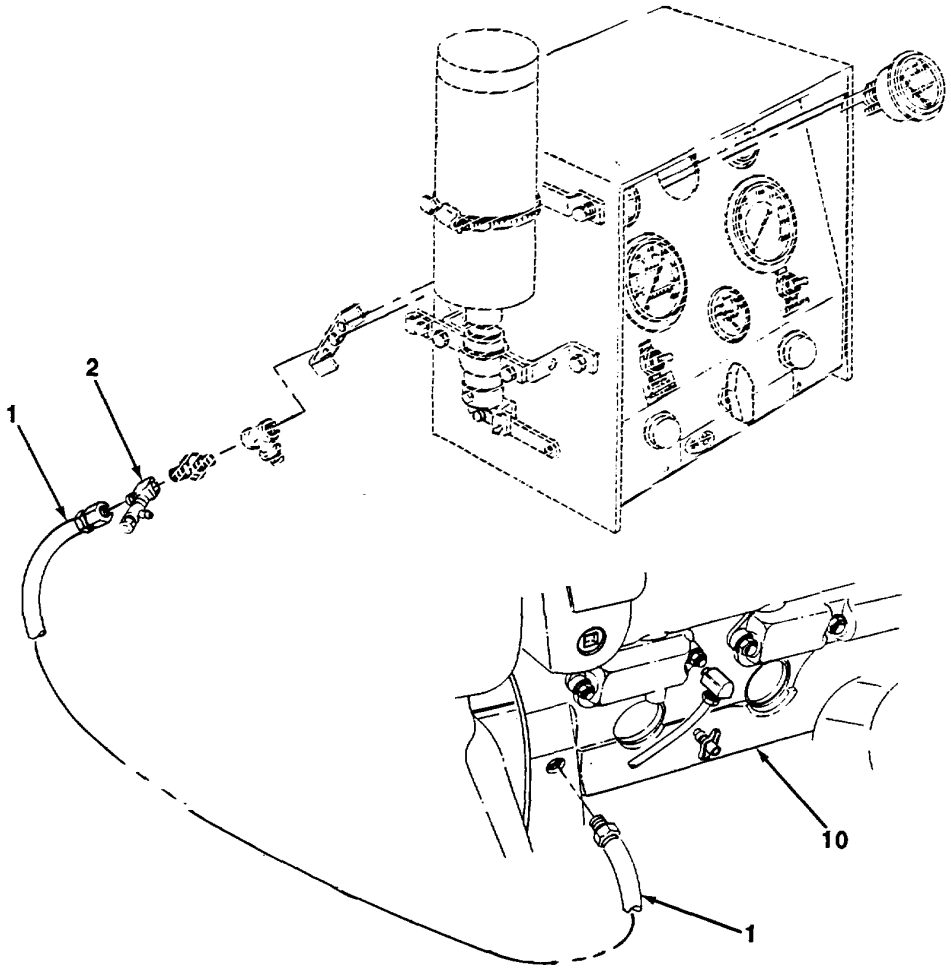
Equipment Conditions:
- Master battery switch in OFF position.

Materials/Parts:
- Sealing compound (Item 14, Appendix E)

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

1. Remove hose (1) from valve (2) and engine (10).



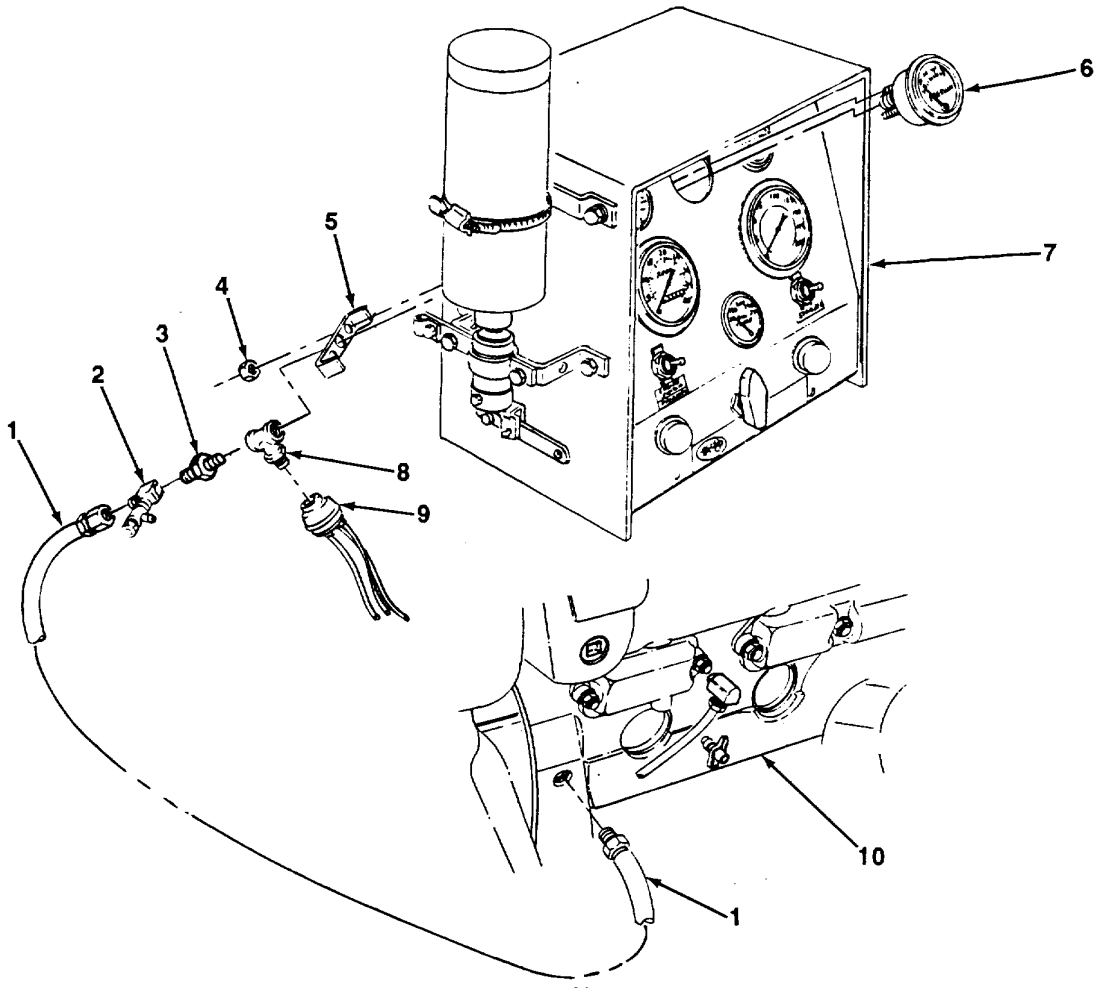
TA704846

4-80. ENGINE OIL PRESSURE GAGE AND HOSE REPLACEMENT (Con't).

2. Remove valve (2), adapter (3), and sensor (9) from tee (8).

3. Remove tee (8) from gage (8).

4. Remove two nuts (4), bracket (5), and gage (6) from instrument panel (7).



b. INSTALLATION

1. Install gage (6) and bracket (5) in instrument panel (7) with two nuts (4).

2. Apply sealing compound to threads of tee (8) and install tee on gage (6).

3. Apply sealing compound to threads of valve (2), sensor (9), and adapter (3) and install valve, sensor, and adapter on tee (8).

4. Apply sealing compound to threads of hose (1) at engine end and install hose on engine (10) and valve (2).

TA704847

Section XIX. BODY MAINTENANCE

4-81. BOTTOM PANELS REPLACEMENT.

This Task Covers:

a. Bottom Front Panel Replacement
b. Bottom Middle Panel Replacement
c. Bottom Rear Panel Replacement

Initial Setup:

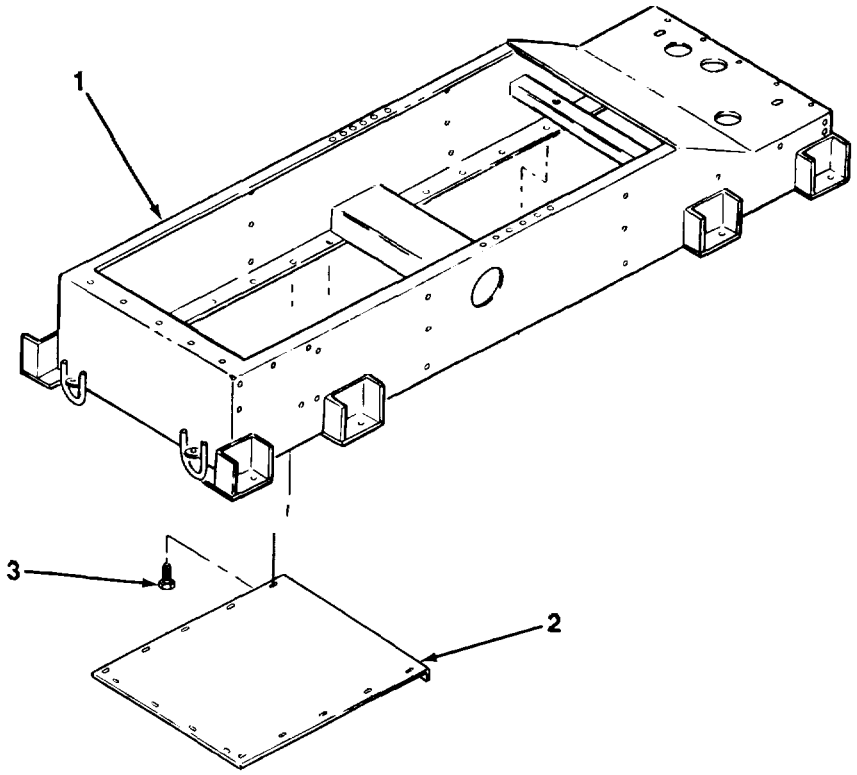
Tools/Test Equipment:

- General mechanic's tool kit

4-81. BOTTOM PANELS REPLACEMENT (Con't).

a. BOTTOM FRONT PANEL REPLACEMENT

1. Remove 14 screws (3) and bottom front panel (2) from frame (1).
2. Install bottom front panel (2) on frame (1) with 14 screws (3).



b. BOTTOM MIDDLE PANEL REPLACEMENT

1. Remove ten screws (5) and bottom middle panel (4) from frame (1).
2. Install bottom middle panel (4) on frame (1) with ten screws (5).

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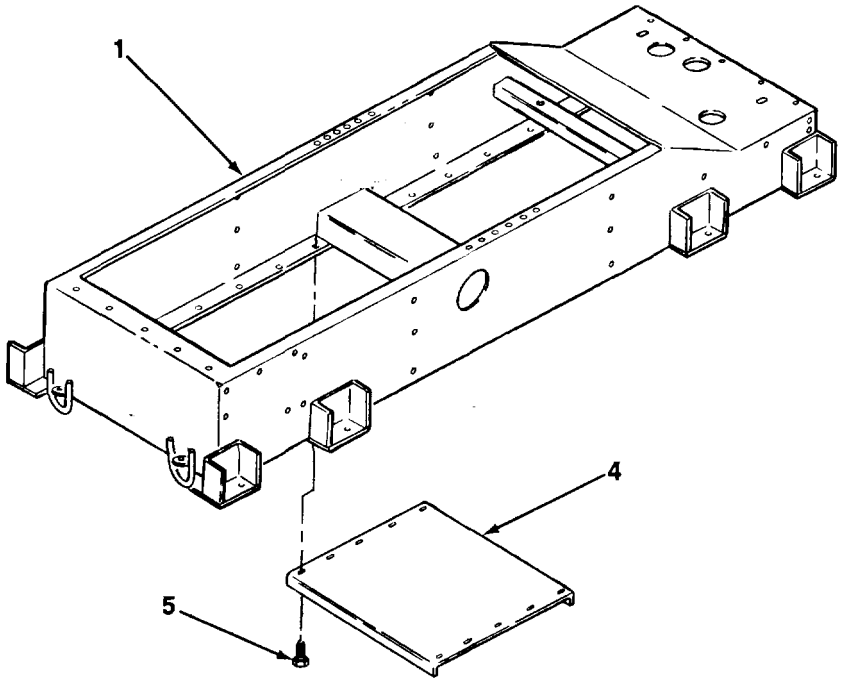
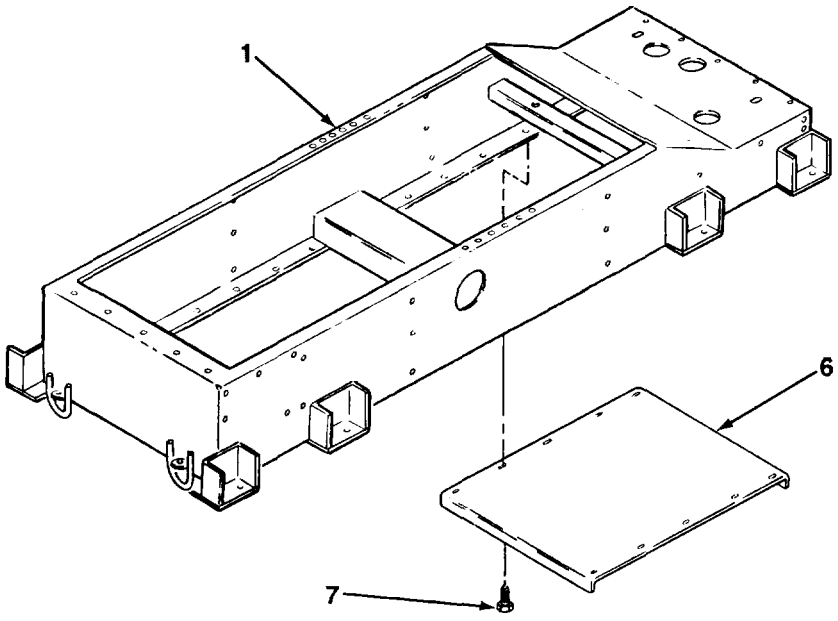
4-81. BOTTOM PANELS REPLACEMENT (Con't).



c. BOTTOM REAR PANEL REPLACEMENT

1. Remove ten screws (7) and bottom rear panel (6) from frame (1).
2. Install bottom rear panel (6) on frame (1) with ten screws (7).



TA704849

4-82. PAMPHLET BAG REPLACEMENT.

This Task Covers:
a. REMOVAL b. INSTALLATION

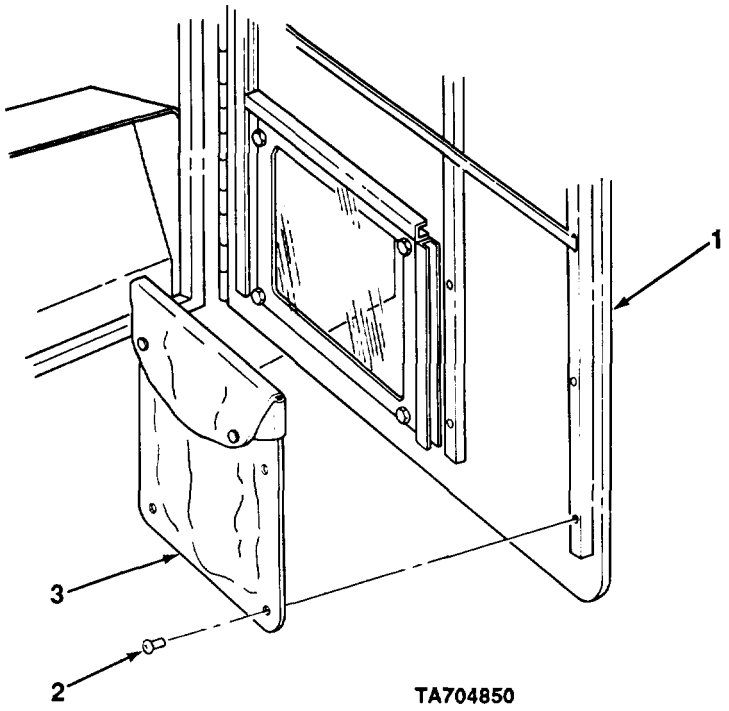
Initial Setup:

Materials/Parts:
- Six rivets

Tools/Test Equipment:
- Common no. 2 shop set

a. REMOVAL

Remove six rivets (2) and pamphlet bag (3) from door (1). Discard rivets.



b. INSTALLATION

Install pamphlet bag (3) on door (1) with six new rivets (2).

4-83. HINGED DOOR REPLACEMENT.

This Task Covers:
a. REMOVAL b. INSTALLATION

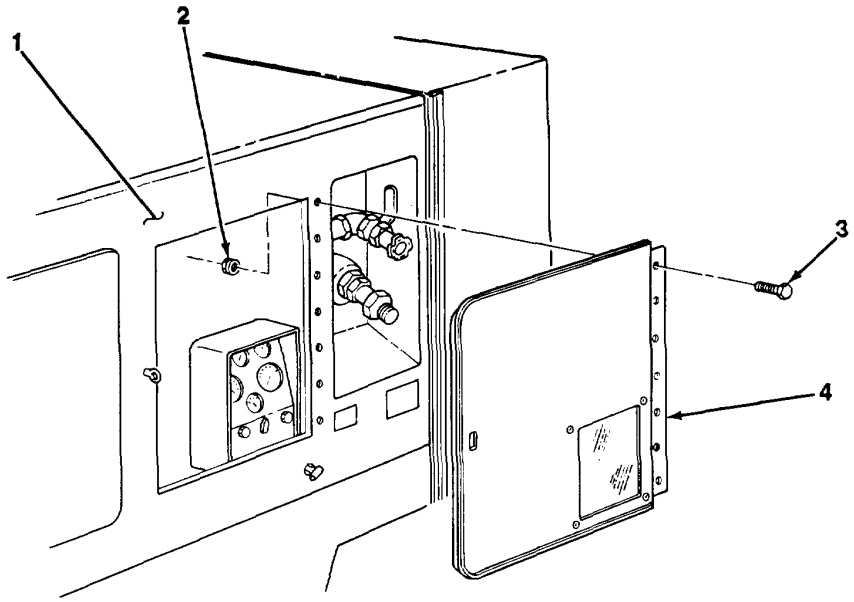
Initial Setup:
Equipment Conditions
- Plexiglas removed (see paragraph 4-84).
- Pamphlet bag removed (see paragraph 4-82).

Materials/Parts:
- Five locknuts

Personnel Required: Two

a. REMOVAL

1. Open door (4).
2. Remove five locknuts (2), screws (3), and door (4) from body (1). Discard locknuts.



b. INSTALLATION

1. Install door (4) on body (1) with five screws (3) and new locknuts (2). TA704851
2. Close and secure door (4).

FOLLOW-ON TASKS:
- Install pamphlet bag (see paragraph 4-82).
- Install plexiglas (see paragraph 4-84).

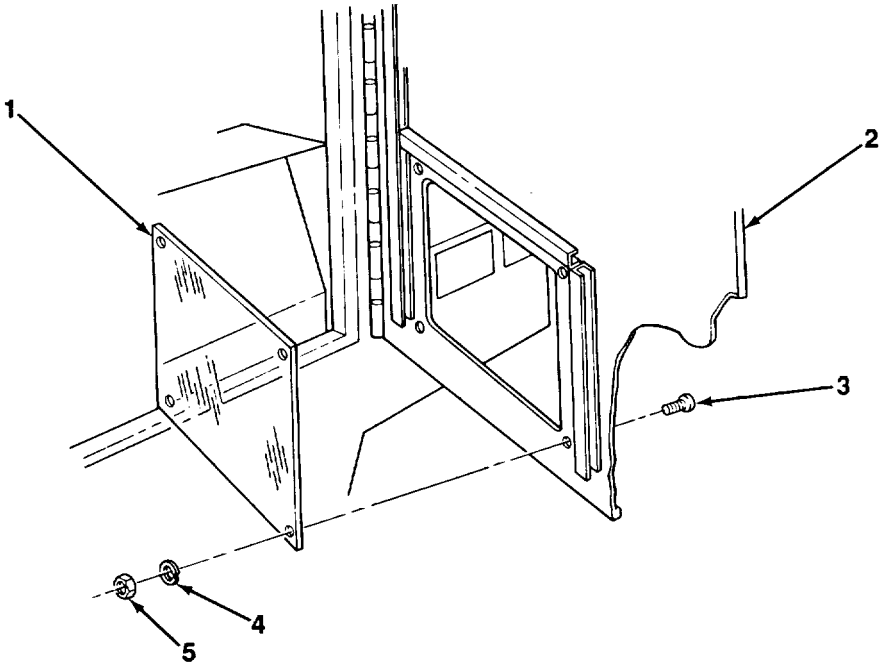
4-84. PLEXIGLAS REPLACEMENT.

This Task Covers:
a. REMOVAL
b. INSTALLATION

Initial Setup:
Materials/Parts:
- Four lockwashers

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL



Remove four nuts (5), lockwashers (4), screws (3), and plexiglas (1) from door (2). Discard lockwashers.

b. INSTALLATION

Install plexiglas (1) on door (2) with four screws (3), new lockwashers (4), and nuts (5).

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4-85. RADIATOR FILL COVER REPLACEMENT.

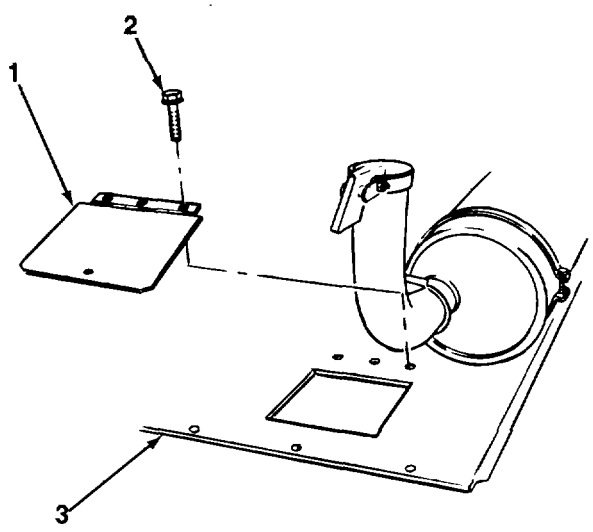
This Task Covers:
a. REMOVAL b. INSTALLATION

Initial Setup:
Equipment Conditions
- Master battery switch in OFF position.

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

Remove three screws (2) and fill cover (1) from hood (3).



b. INSTALLATION

Install fill cover (1) on hood (3) with three screws.(2).

TA704853

4-86. AIR CLEANER SUPPORTS REPLACEMENT.

This Task Covers:
a. REMOVAL b. INSTALLATION

Initial Setup:
Equipment Conditions
- Air cleaners removed (see paragraphs 4-31 and 4-102).

Tools/Test Equipment:
- General mechanic's tool kit

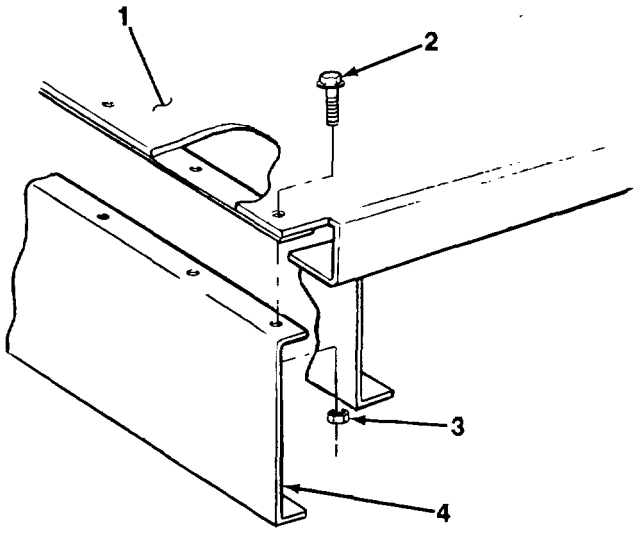
Materials/Parts:
- Four locknuts

Personnel Required: Two

a. REMOVAL

NOTE
Both air cleaner supports are removed same way. This procedure covers one support.

Remove four locknuts (3), screws (2), and air cleaner support (4) from top center panel (1). Discard locknuts.



b. INSTALLATION

NOTE
Both air cleaner supports are Installed same way. This procedure covers one support.

Install air cleaner support (4) on top center panel (1) with four screws (2) and new locknuts (3).

FOLLOW-ON TASKS:
- Install air cleaners (see paragraphs 4-31 and 4-102).

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Section XX. AIR COMPRESSOR ASSEMBLY MAINTENANCE

4-87. PRESSURE REGULATING VALVE REPLACEMENT.

This Task Covers:
a. REMOVAL b. INSTALLATION

Initial Setup:

Equipment Conditions
- System pressure relieved.

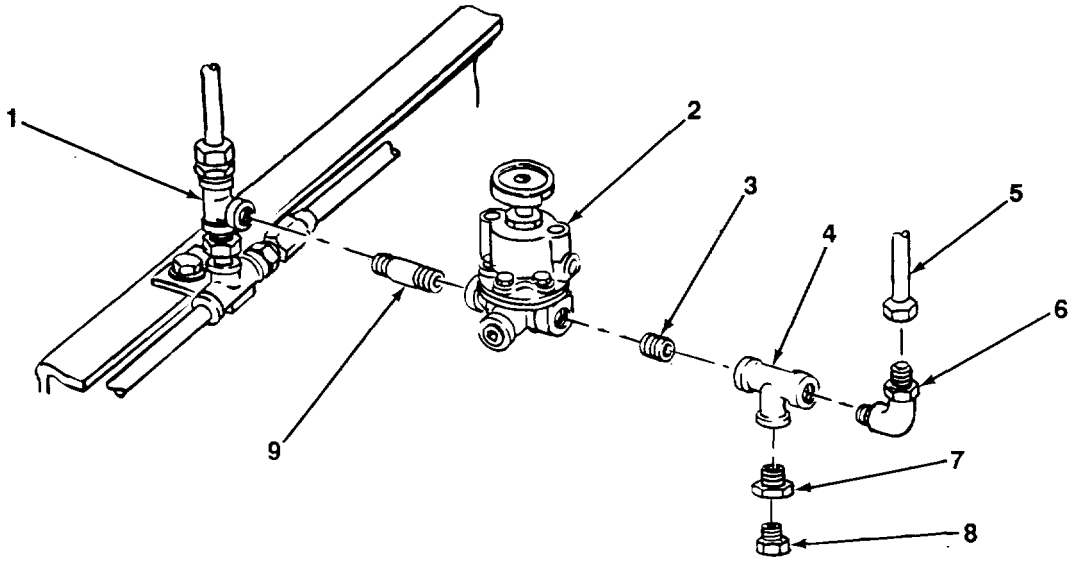
Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Sealing compound (Item 14, Appendix E)

4-87. PRESSURE REGULATOR VALVE REPLACEMENT (Con't).

a. REMOVAL

1. Remove hose (5) and elbow (6) from tee (4).
2. Remove tee (4) and nipple (3) from pressure regulating valve (2).
3. Remove bushing (8) and drain valve (7) from tee (4).
4. Remove pressure regulating valve (2) and nipple (9) from tee (1).



b. INSTALLATION

1. Apply sealing compound to threads of nipple (9) and install nipple and pressure regulating valve (2) on tee (1).
2. Apply sealing compound to threads of bushing (8) and drain valve (7). Install bushing and drain valve on tee (4).
3. Apply sealing compound to threads of nipple (3) and install nipple and tee (4) on pressure regulating valve (2).
4. Apply sealing compound to threads of elbow (6) and hose (5). Install elbow and hose on tee (4).

FOLLOW-ON TASKS:

- Start air compressor unit (see paragraph 2-10) and check hose and fittings for leaks.
- Adjust pressure regulating valve (see paragraph 2-11).

TA704855

4-88. BLOWDOWN VALVE REPLACEMENT.

This Task Covers:

a. REMOVAL b. INSTALLATION

Initial Setup:

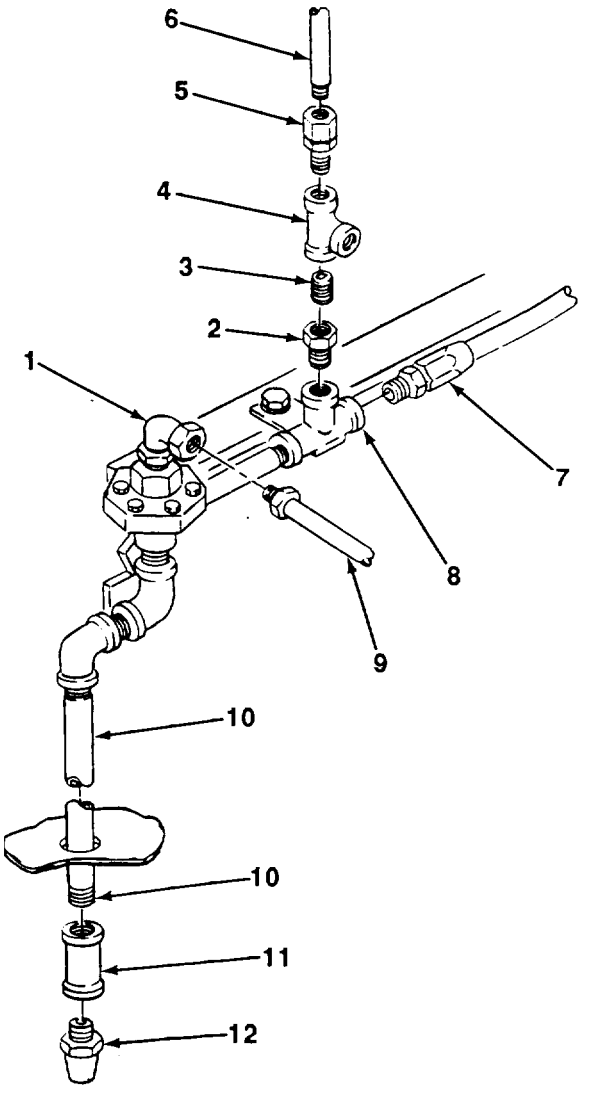
Equipment Conditions
- Pressure regulating valve removed (see paragraph 4-87).

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- One lockwasher

a. REMOVAL

1. Remove line (6) from adapter (5) and cold start valve.
2. Remove adapter (5), tee (4), nipple (3), and adapter (2) from tee (8).
3. Remove hose (7) from tee (8) and minimum pressure valve.
4. Remove line (9) from elbow (1) and discharge valve.
5. Remove coupler (11) and silencer (12) from nipple (10).



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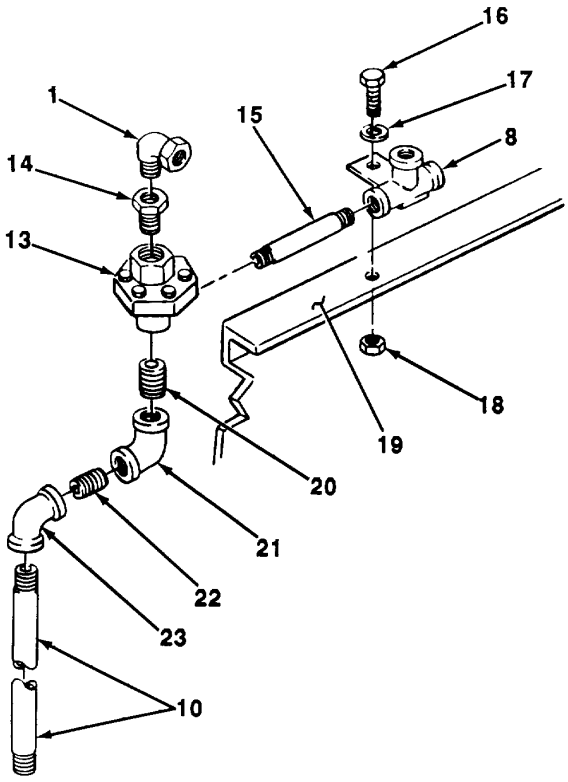
4-88. BLOWDOWN VALVE REPLACEMENT (Cc

6. Remove nut (18), screw (16), lockwasher (17), and tee (8) from frame (19). Discard lockwasher.
7. Remove tee (8) and nipple (15) from blowdown valve (13).
8. Remove elbow (1) and adapter (14) from blowdown valve (13).
9. Remove nipple (10), elbow (23), nipple (22), and elbow (21) from nipple (20).
10. Remove nipple (20) from blowdown valve (13).



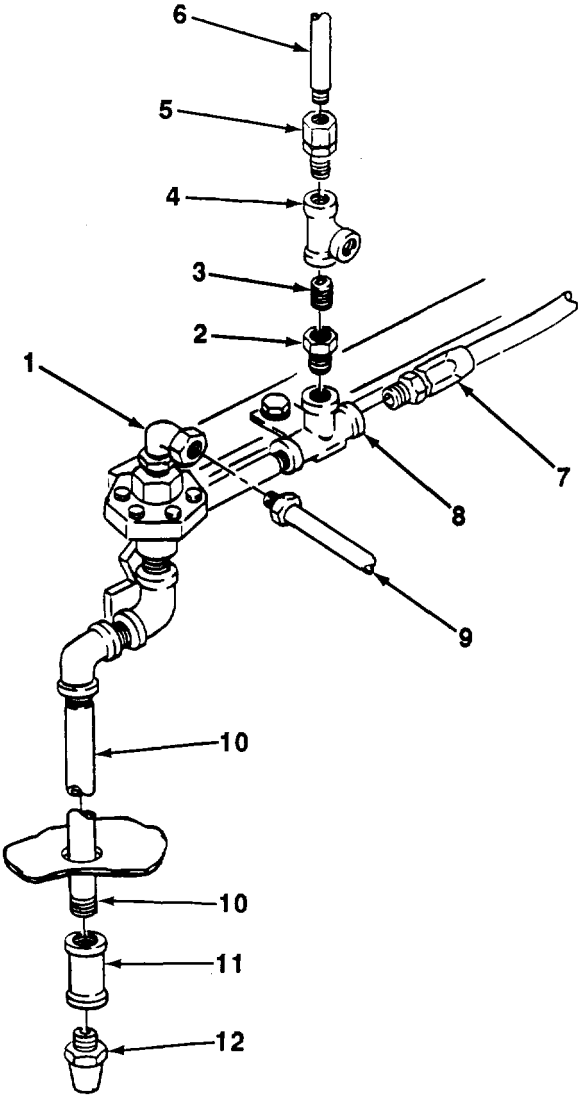
b. INSTALLATION

1. Apply sealing compound to threads of nipple (20) and install nipple and elbow (21) on blowdown valve (13).
2. Apply sealing compound to threads of nipple (22) and install nipple and elbow (23) on elbow (21).
3. Apply sealing compound to threads of nipple (10) and install nipple on elbow (23).
4. Apply sealing compound to threads of adapter (14) and elbow (1) and install adapter and elbow on blowdown valve (13).
5. Apply sealing compound to threads of nipple (15) and install nipple and tee (8) on blowdown valve (13).
6. Install tee (8) on frame (19) with new lockwasher (17), screw (16), and nut (18).

TA704857

4-88. BLOWDOWN VALVE REPLACEMENT (Cor

7. Apply sealing compound to threads of silencer (12) and install coupler (11) and silencer on nipple (10).
8. Apply sealing compound to threads of line (9) and install line on elbow (1) and discharge valve.
9. Apply sealing compound to threads of hose (7) and install hose on tee (8) and minimum pressure valve.
10. Apply sealing compound to threads of adapter (2) and nipple (3), and Install adapter, nipple, and tee (4) on tee (8).
11. Apply sealing compound to threads of adapter (5) and Install adapter on tee (4).
12. Apply sealing compound to threads of line (6) and Install line on adapter (5) and cold start valve.



TA704858

FOLLOW-ON TASKS:

- Install pressure regulator valve (see paragraph 4-87).

4-89. THERMAL VALVE MAINTENANCE.

This Task Covers:
a. Element Replacement
b. Removal
c. Installation

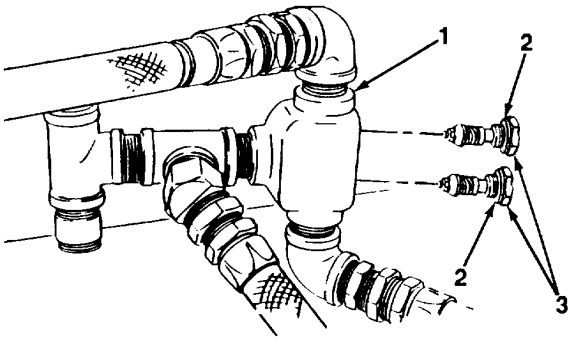
Initial Setup:
Equipment Conditions
- System pressure relieved.

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- Two elements

a. ELEMENT REPLACEMENT

1. Remove and discard two elements (3) with seal rings (2) from thermal housing (1).
2. Inspect thermal housing (1) for cracks, burrs, and obstructions. Replace thermal housing if damaged.
3. Install two new elements (3) in thermal housing (1).



b. REMOVAL

1. Remove two hoses (7) and adapters (6) from elbows (5).
2. Remove hose (9) and adapter (8) from tee (12).
3. Remove thermal housing (1) from nipple (13).
4. Remove two elbows (5) and nipples (4) from thermal housing (1).
5. Remove nipple (13), tee (12), and nipple (11) from oil fill tube (10).

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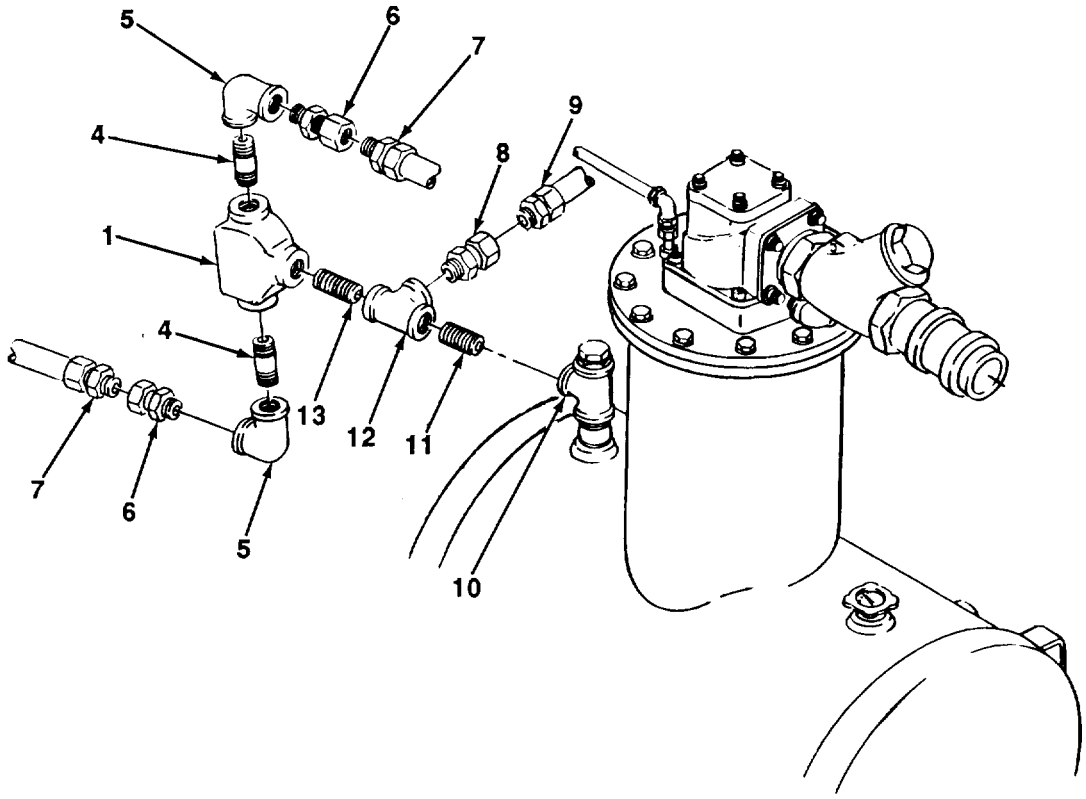
4-89. THERMAL VALVE MAINTENANCE (Con't).



c. INSTALLATION

1. Apply sealing compound to threads of nipple (11) and nipple (13).
2. Install nipple (11), tee (12), and nipple (13) on oil fill tube (10).
3. Apply sealing compound to threads of two nipples (4).
4. Install two nipples (4) and elbows (5) on thermal housing (1).
5. Install thermal housing (1) on nipple (13).
6. Apply sealing compound to threads of adapter (8).
7. Install adapter (8) and hose (9) on tee (12).
8. Apply sealing compound to threads of two adapters (6).
9. Install two adapters (6) and hoses (7) on elbows (5).

TA704860

4-90. OIL SEPARATOR ELEMENT REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:
Equipment Conditions
- System pressure relieved.
- One element

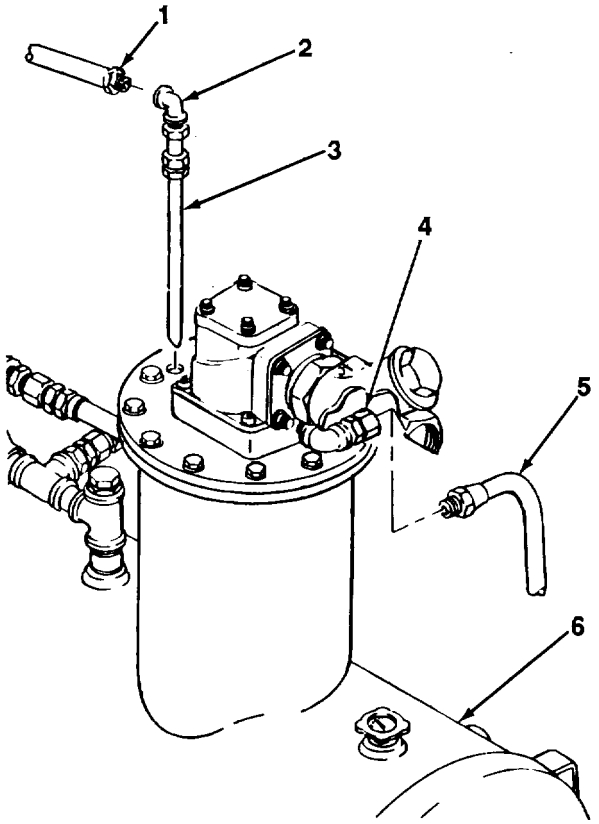
Tools/Test Equipment:
- Common no. 2 shop set

Personnel Required: Two

Materials/Parts:
* Sealing compound (Item 14, Appendix E)
* Two gaskets
* Twelve lockwashers

a. REMOVAL

1. Remove line (1) from elbow (2).
2. Remove oil return line (3) from oil separator (6).



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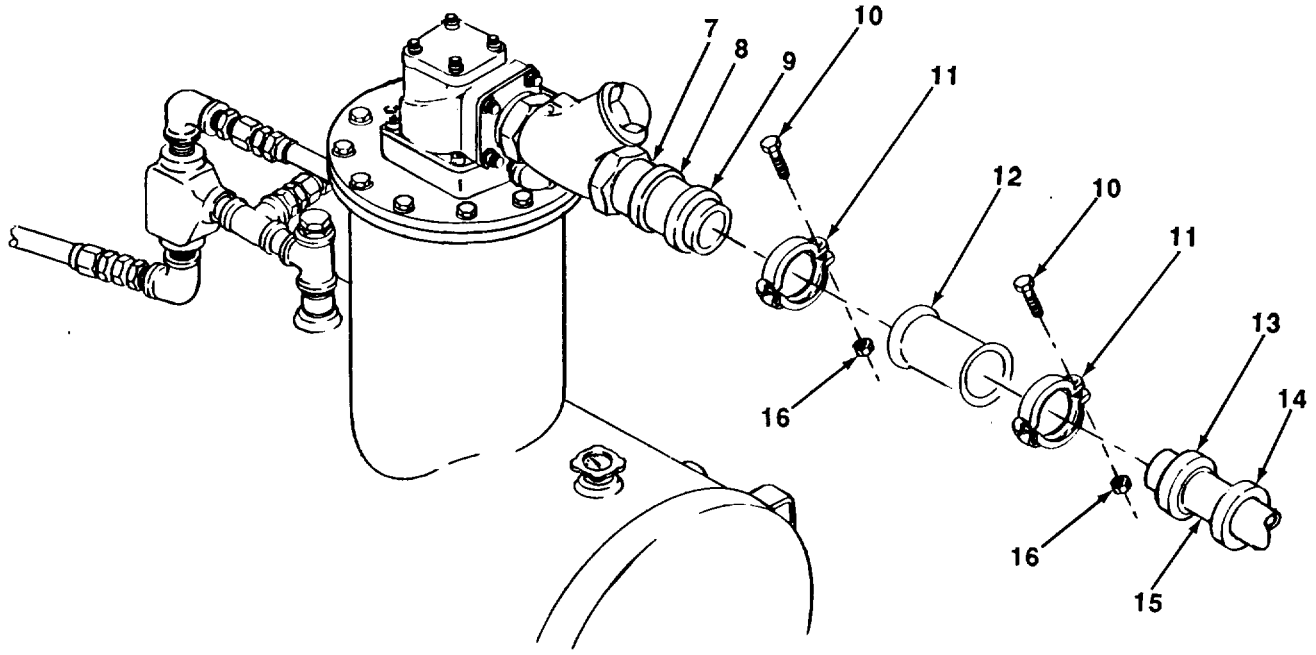
4-90. OIL SEPARATOR ELEMENT REPLACEMENT (Con't).

4. Remove two nuts (16), screws (10), and clamps (11) from nipples (7 and 15).
5. Slide ring (8) and seal (9) back on nipple (7).
6. Slide ring (14), seal (13), and coupler (12) back on nipple (15).



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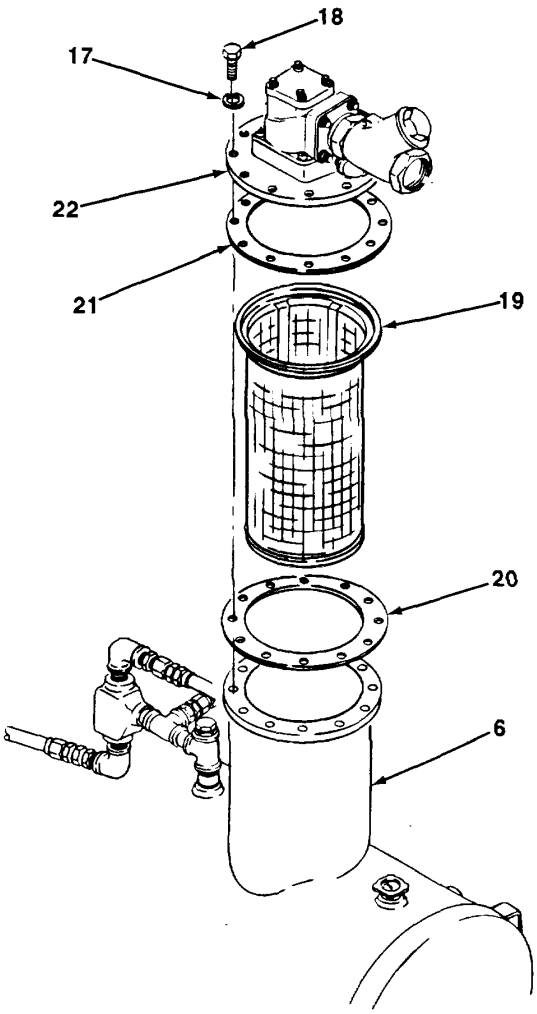
4-90. OIL SEPARATOR ELEMENT REPLACEM

7. Remove 12 bolts (18), lockwashers (17), cover (22), and gasket (21) from oil separator (6). Discard lockwashers and gasket.
8. Remove element (19) and gasket (20) from oil separator (6). Discard element and gasket.

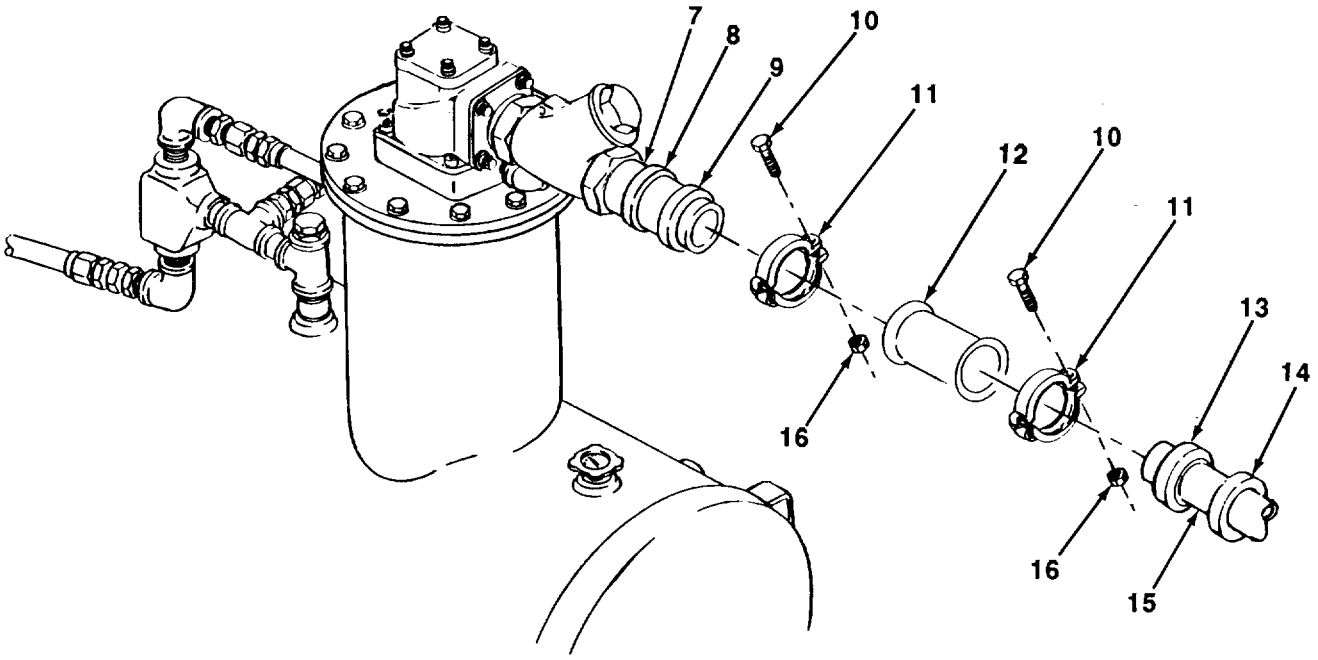
b. INSTALLATIONI

1. Position new gasket (20) and new element (19) In oil separator (6).
2. Install new gasket (21) and cover (22) on oil separator (6) with 12 new lockwashers (17) and bolts (18).



4-90. OIL SEPARATOR ELEMENT REPLACEMENT (Con't).

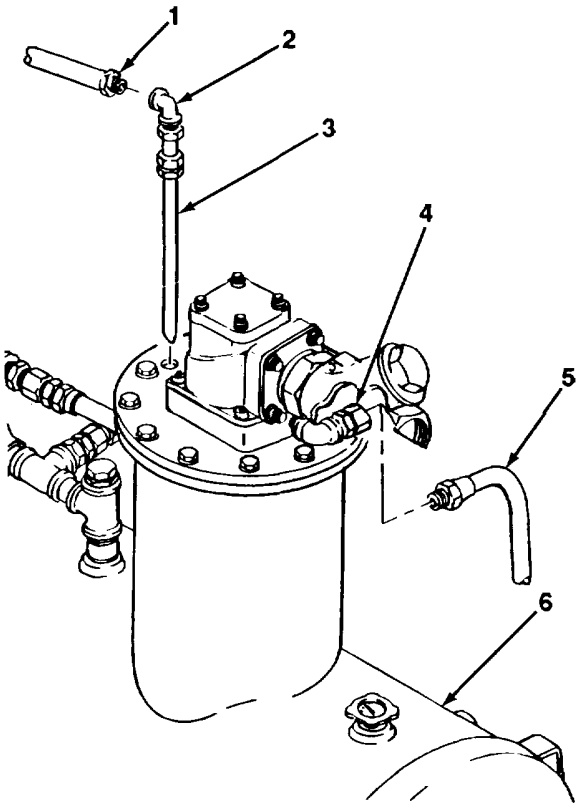
3. Slide coupler (12), seal (13), and ring (14) in position on nipple (15).
4. Slide ring (8) and seal (9) into position on nipple (7).
5. Install two clamps (11) on nipples (7 and 15) with two screws (10) and nuts (16).



TA704864

4-90. OIL SEPARATOR ELEMENT REPLACEMENT (C

6. Install hose (5) on adapter (4).
7. Apply sealing compound to threads of oil return line (3) and install oil return line on oil separator (6).
8. Install line (1) on elbow (2).



FOLLOW-ON TASKS:

- Start air compressor unit (see paragraph 2-10) and check for leak

4-91. OIL SEPARATOR OIL LEVEL GAGE REPLACEMENT.

This Task Covers:
a. REMOVAL b. INSTALLATION

Initial Setup:
Equipment Conditions
- System pressure relieved.

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

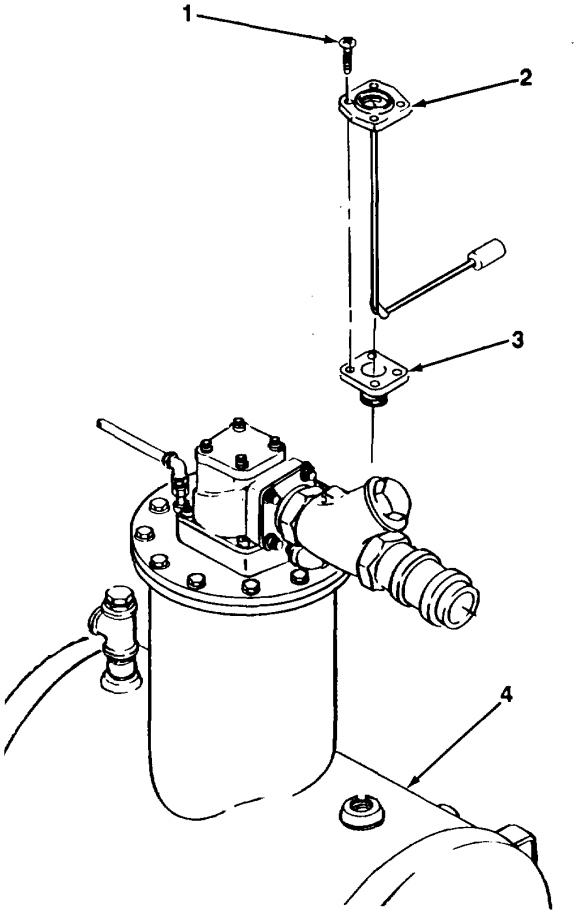
Materials/Parts:
- Sealing compound (Item 14, Appendix E)

a. REMOVALI

1. Remove four screws (1) and oil level gage (2) from adapter (3).
2. Remove adapter (3) from oil separator (4).

b. INSTALLATIONI

1. Apply sealing compound to threads of adapter (3) and install adapter on oil separator (4).
2. Install oil level gage (2) on adapter (3) with four screws (1).



TA704866

4-92. OIL SEPARATOR OIL FILL TUBE REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:
Equipment Conditions
- system pressure relieved.
- Thermal housing removed (see paragraph 4-89).

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

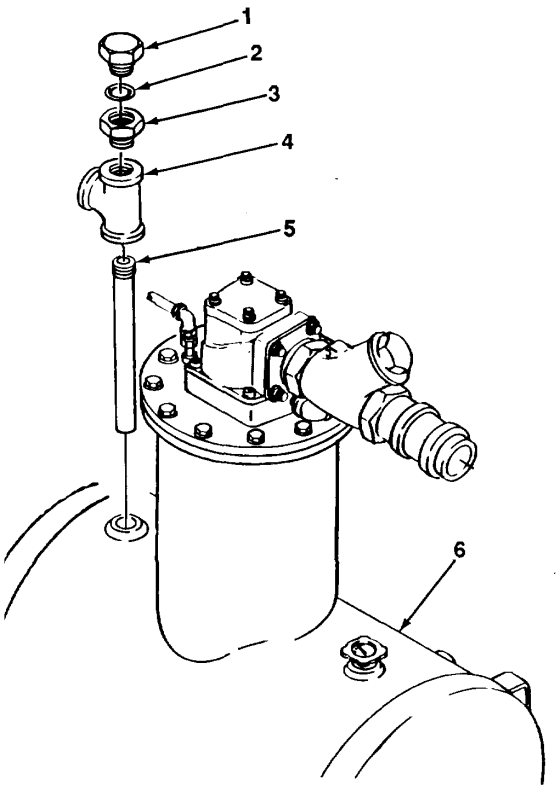
Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- One preformed packing

a. REMOVAL

1. Remove cap (1) and preformed packing (2) frorr adapter (3). Discard preformed packing.
2. Remove adapter (3) and tee (4) from tube (5).
3. Remove tube (5) from oil separator (6).

lb. INSTALLATION I

1. Apply sealing compound to threads of tube (5, and install tube on oil separator (6).
2. Apply sealing compound to threads of tee (4) anc adapter (3) and install tee and adapter on tube (5).
3. Install new preformed packing (2) and cap (1) or adapter (3).



FOLLOW-ON TASKS:
- Install thermal housing (see paragraph 4-89).

4-93. AIR COMPRESSOR MAIN OIL FILTER ASSEMBLY MAINTENANCE.

This Task Covers:
a. Filter Element Replacement
b. Filter Assembly Removal
c. Filter Assembly Installation

Initial Setup:

Equipment Conditions
- Master battery switch in OFF position.

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

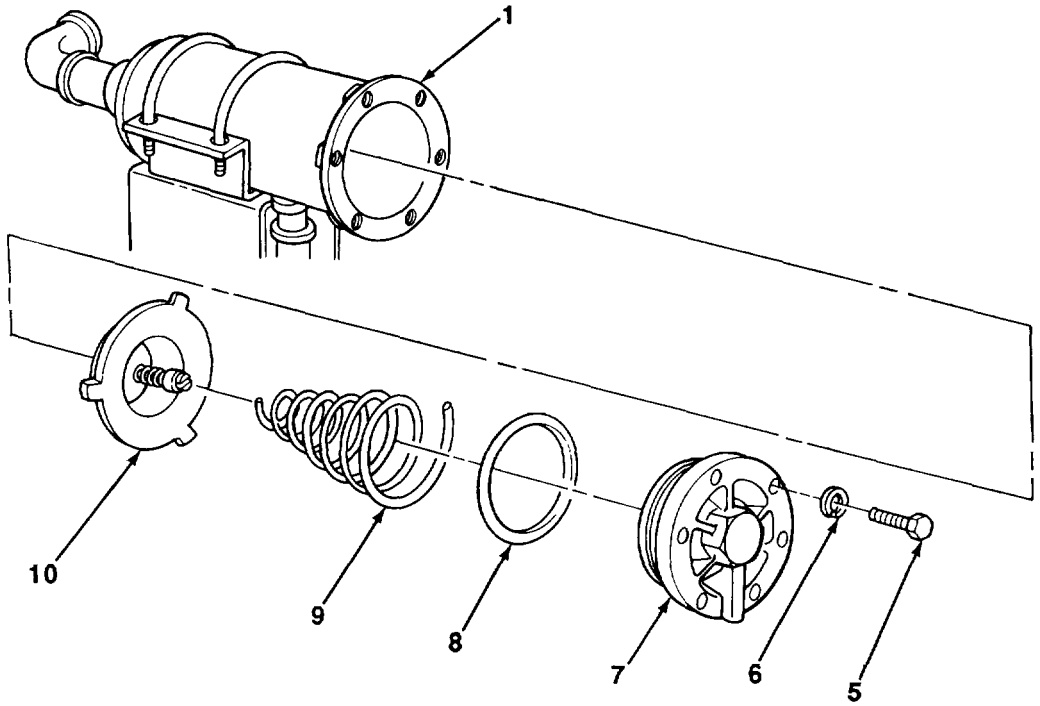
Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- One preformed packing
- Four locknuts
- Ten lockwashers

a. FILTER ELEMENT REPLACEMENT

NOTE

A suitable container should be used to catch any draining oil. Ensure that all spills are cleaned up.

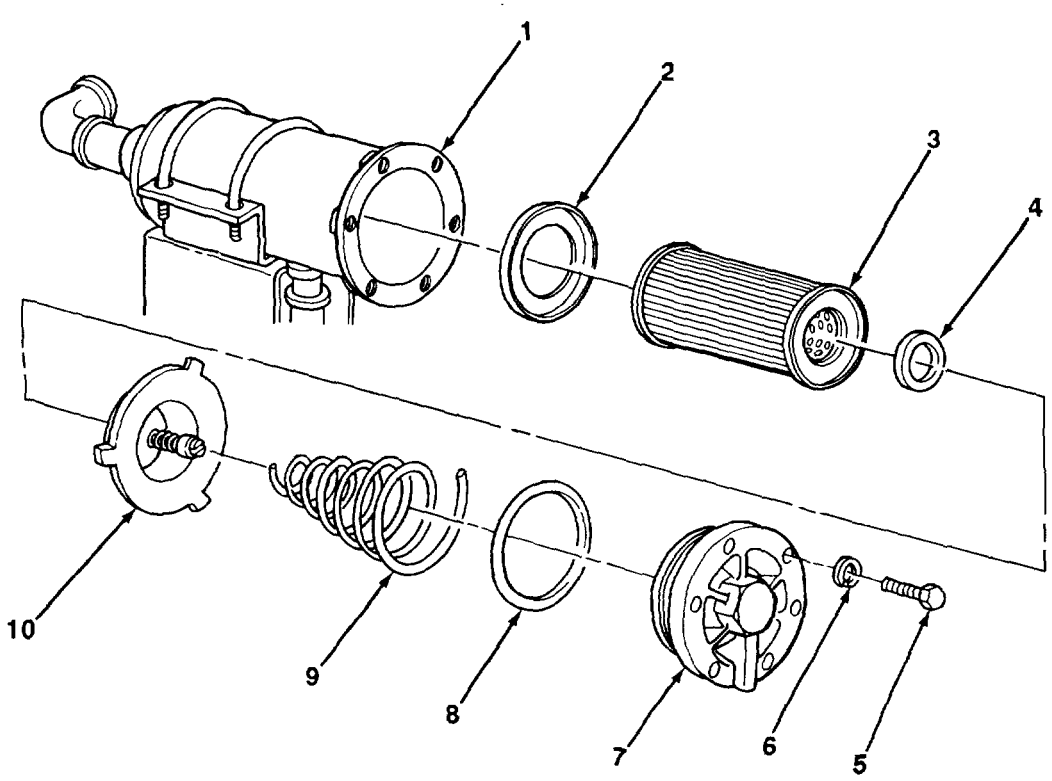
1. Remove six bolts (5), lockwashers (6), and cap (7) from housing (1). Discard lockwashers.
2. Remove preformed packing (8) from cap (7). Discard preformed packing.
3. Remove spring (9) and valve (10) from housing (1).



TA704868

4-93. AIR COMPRESSOR MAIN OIL FILTER ASSEMBLY MAINTENANCE (Con't).

4. Remove filter element (3) from housing (1).
5. Remove two gaskets (2 and 4) from filter element (3).
6. Install two gaskets (2 and 4) on filter element (3).
7. Position filter element (3) in housing (1).
8. Install new preformed packing (8) on cap (7).
9. Position spring (9) and valve (10) on cap (7) and install cap on housing (1) with six new lockwashers (6) and bolts (5).



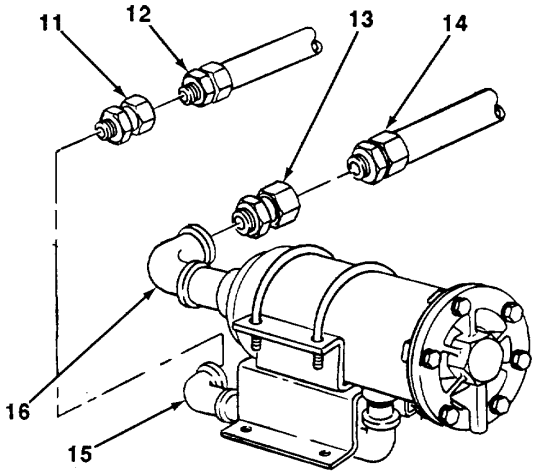
TA704869

4-93. AIR COMPRESSOR MAIN OIL FILTER ASSEMBLY MAINTENANCE (Con't).

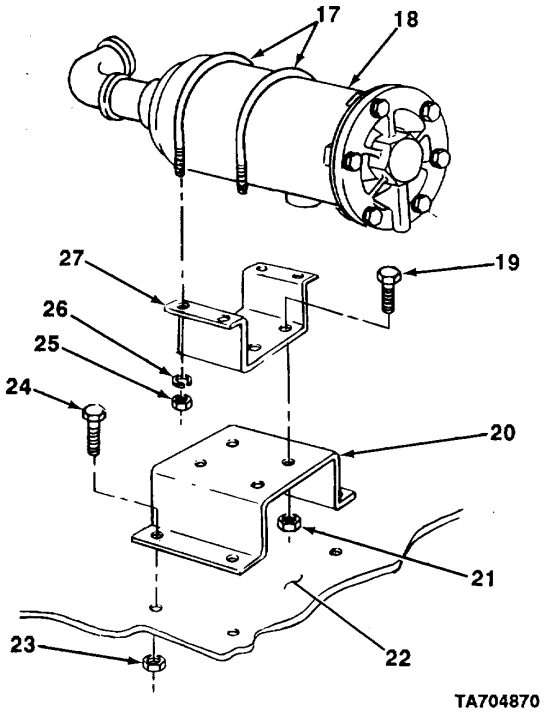
b. FILTER ASSEMBLY REMOVAL

NOTE
A suitable container should be used to catch any draining oil. Ensure that all spills are cleaned up.

1. Remove hose (14) and adapter (13) from elbow (16).
2. Remove hose (12) and adapter (11) from elbow (15).



3. Remove four nuts (25), lockwashers (26), two U-bolts (17), and filter assembly (18) from bracket (27). Discard lockwashers.
4. If damaged, remove four locknuts (21), bolts (19), and bracket (27) from bracket (20). Discard locknuts.
5. If damaged, remove four nuts (23), bolts (24), and bracket (20) from body (22).

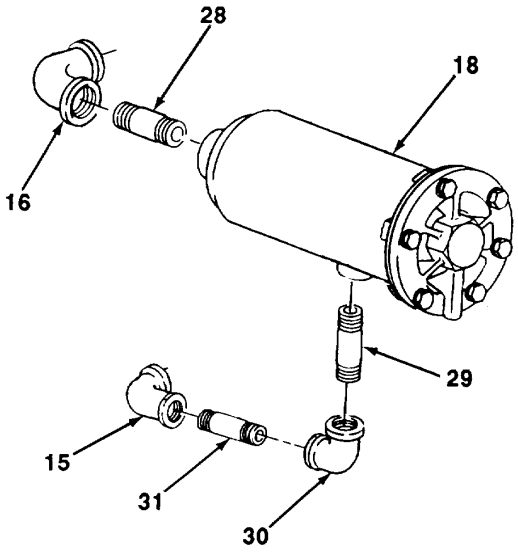


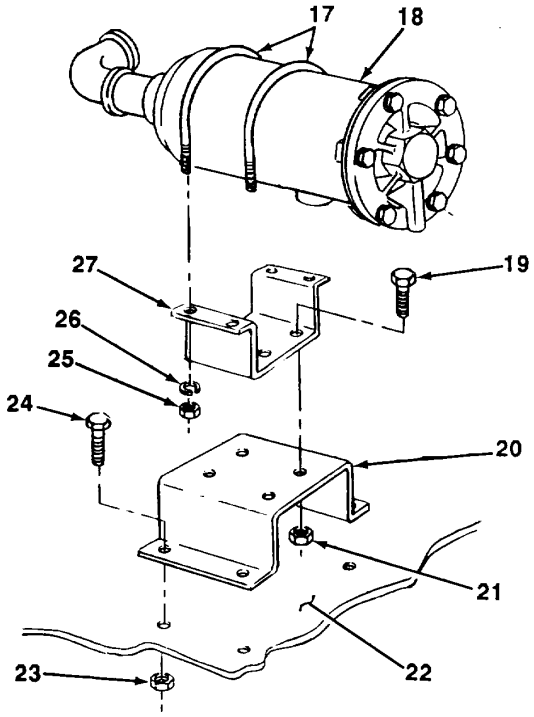
4-93. AIR COMPRESSOR MAIN OIL FILTER

6. Remove elbow (16) and nipple (28) from filter assembly (18).
7. Remove elbow (15), nipple (31), elbow (30), and nipple (29) from filter assembly (18).

c. FILTER ASSEMBLY INSTALLATION

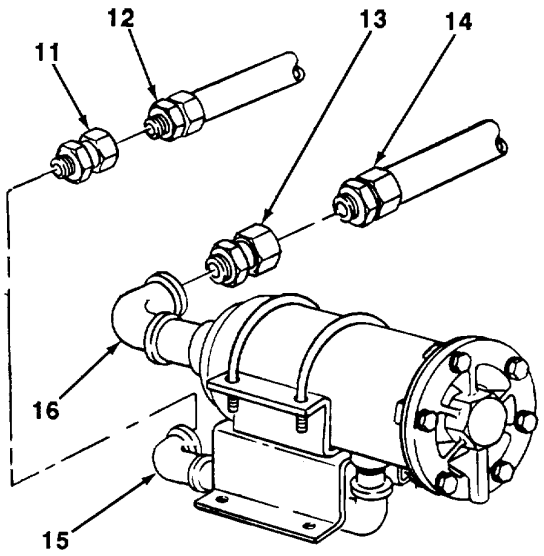
1. Apply sealing compound to threads of nipple (29) and install nipple and elbow (30) on filter assembly (18).
2. Apply sealing compound to threads of nipple (31) and install nipple and elbow (15) on elbow (30).
3. Apply sealing compound to threads of nipple (28) and install nipple and elbow (16) on filter assembly (18).
4. If removed, install bracket (20) on body (22) with four bolts (24) and nuts (23).
5. If removed, install bracket (27) on bracket (20) with four bolts (19) and new locknuts (21).
6. Install filter assembly (18) on bracket (27) with two U-bolts (17), four new lockwashers (26), and nuts (25).





4-93. AIR COMPRESSOR MAIN OIL FILTER ASSEMBLY MAINTENANCE (Con't).

7. Apply sealing compound to threads of adapter (11) and install adapter and hose (12) on elbow (15).
8. Apply sealing compound to threads of adapter (13) and install adapter and hose (14) on elbow (16).



TA704872

4-94. OIL SEPARATOR DRAIN VALVE REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:
Equipment Conditions
- System pressure relieved.

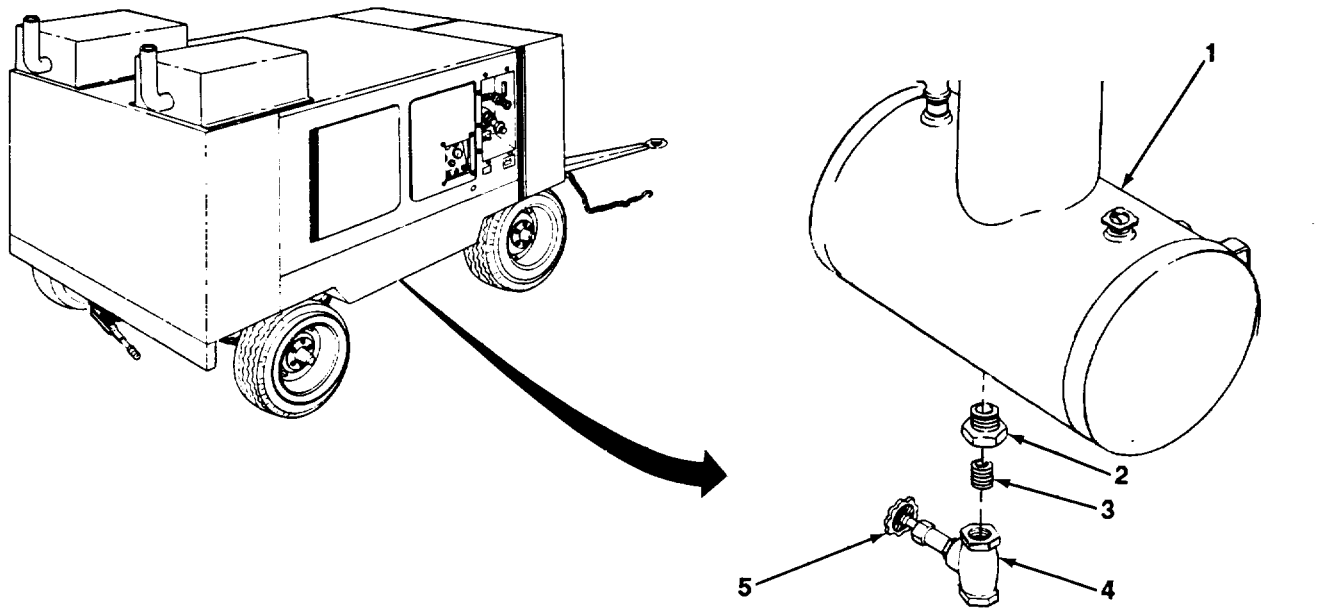
Tools/Test Equipment:
- Common no. 1 shop set

Materials/Parts:
- Sealing compound (Item 14, Appendix E)

a. REMOVAL

NOTE
A suitable container should be used to catch any draining oil. Ensure that all spills are cleaned up.

1. Turn knob (5) counterclockwise and allow all oil to drain from oil separator (1).
2. Remove drain valve (4), nipple (3), and bushing (2) from oil separator (1).



TA704873

4-94. OIL SEPARATOR DRAIN VALVE REPLACEMENT (Con't).

b. INSTALLATION I

1. Apply sealing compound to threads of bushing (2) and nipple (3).
2. Install bushing (2), nipple (3), and drain valve (4) on oil separator (1).
3. Turn knob (5) clockwise to close drain valve (3).

FOLLOW-ON TASKS:

- Fill oil separator with oil (see Lubrication Instructions, Chapter 3, Section I).

4-95. AIR COMPRESSOR OIL STOP VALVE REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:
Equipment Conditions
- System pressure relieved.
- Bottom front panel removed (see paragraph 4-81).

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

Materials/Parts:
- Sealing compound (Item 14, Appendix E)

a. REMOVAL

NOTE

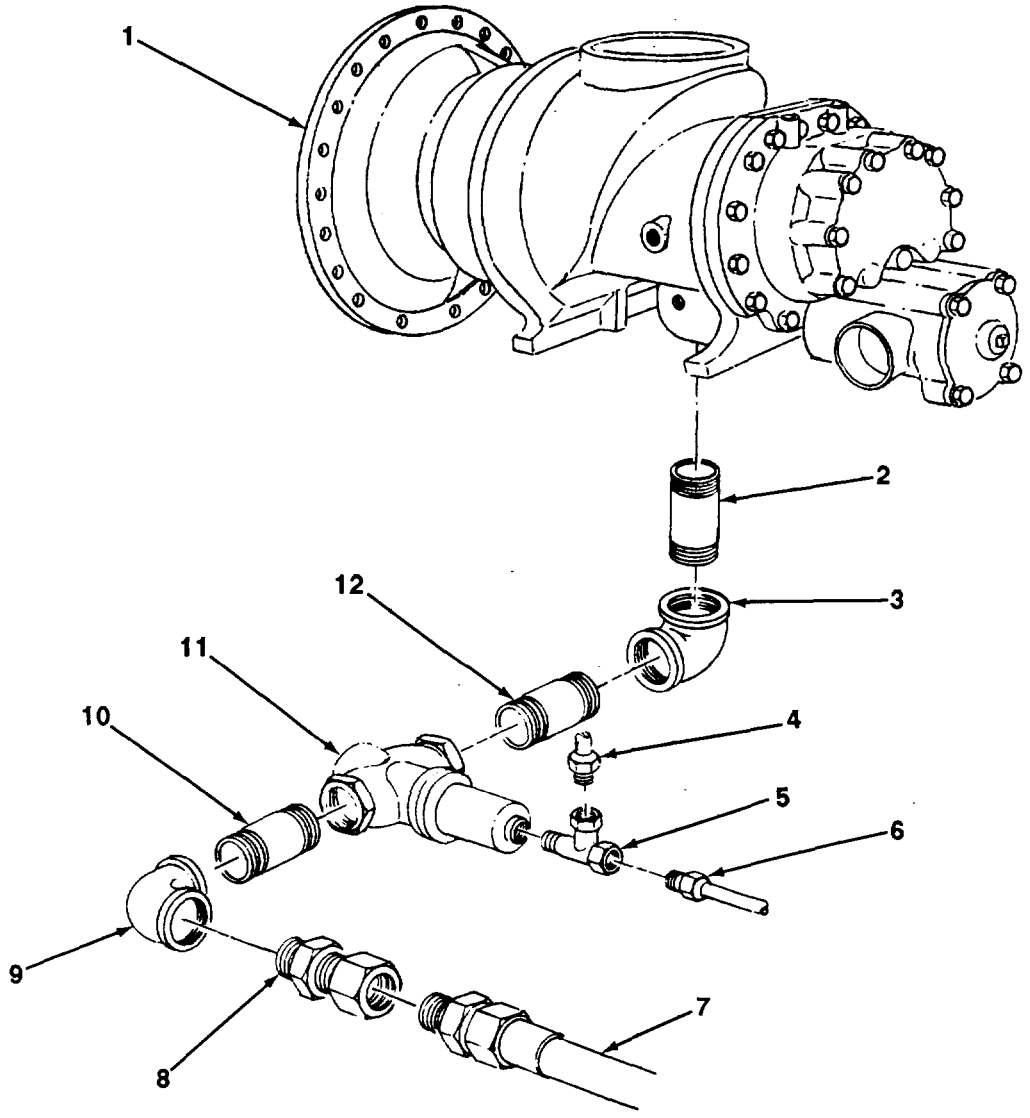
A suitable container should be used to catch any draining oil. Ensure that all spills are cleaned up.

1. Remove hose (7) and adapter (8) from elbow (9).
2. Remove tube (4) and tube (6) from tee (5).
3. Remove elbow (9) and nipple (10) from oil stop valve (11).
4. Remove oil stop valve (11) from nipple (12).
5. Remove tee (5) from oil stop valve (11).
6. Remove nipple (12), elbow (3), and nipple (2) from air compressor (1).

b. INSTALLATIONI

1. Apply sealing compound to threads of nipples (2 and 12).
2. Install nipple (2), elbow (3), and nipple (12) on air compressor (1).
3. Apply sealing compound to threads of tee (5) and install tee in oil stop valve (11).
4. Install oil stop valve (11) on nipple (12).
5. Apply sealing compound to threads of nipple (10) and install nipple and elbow (9) on oil stop valve (11).
6. Apply sealing compound to threads of tubes (4 and 6) and install tubes on tee (5).
7. Apply sealing compound to threads of adapter (8) and install adapter and hose (7) on elbow (9).

4-95. AIR COMPRESSOR OIL STOP VALVE REPLACEMENT (Con't).



FOLLOW-ON TASKS:

- Install bottom front panel (see paragraph 4-81).

TA704874

4-96. SAFETY RELIEF VALVE REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:
- System pressure relieved

Materials/Parts:
- Antiseizing tape (Item 41, Appendix E)

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

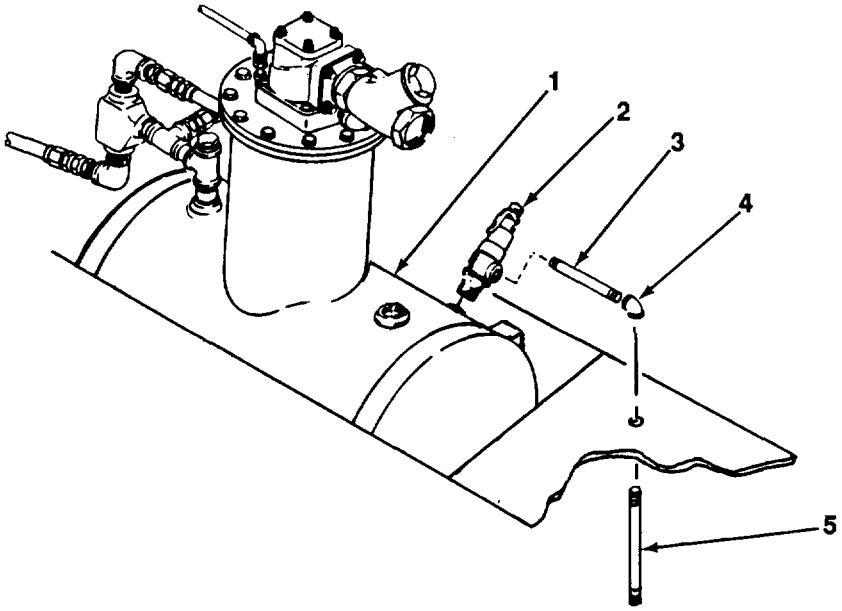
a. REMOVAL

1. Remove pipe (5) from elbow (4).
2. Remove elbow (4) and pipe (3) from safety relief valve (2).
3. Remove safety relief valve (2) from oil separator (2).

b. INSTALLATION

1. Apply antiseizing tape to threads of safety relief valve (2) and install safety relief valve on oil separator (1).
2. Apply antiseizing tape to threads of pipe (3) and install pipe and elbow (4) on safety relief valve (2).
3. Apply antiseizing tape to threads of pipe (5) and install pipe on elbow (4).

4-96. SAFETY RELIEF VALVE REPLACEMENT (Con't).



4-97. AIR COMPRESSOR OIL SIGHT GAUGE REPLACEMENT

This Task Covers:
a. Removal
b. Installation

Initial Setup:

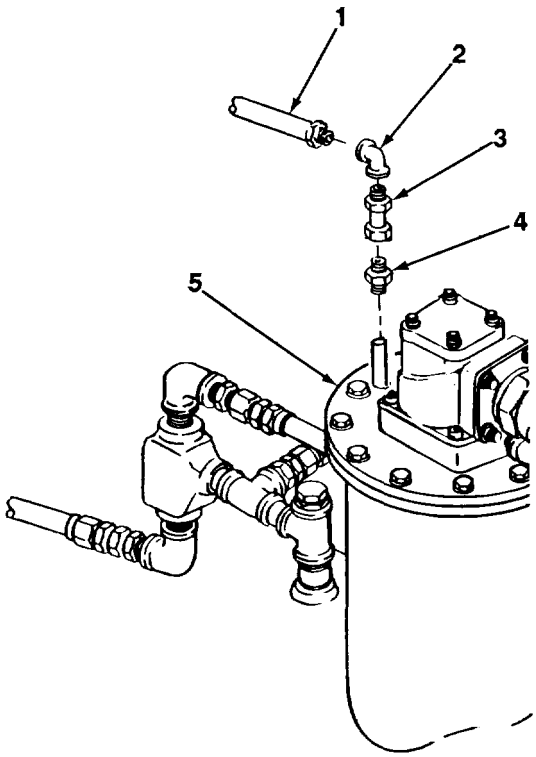
Equipment Conditions:
- System pressure relieved.
- Bottom front panel removed (see paragraph 4-81

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Sealing compound (Item 14, Appendix E)

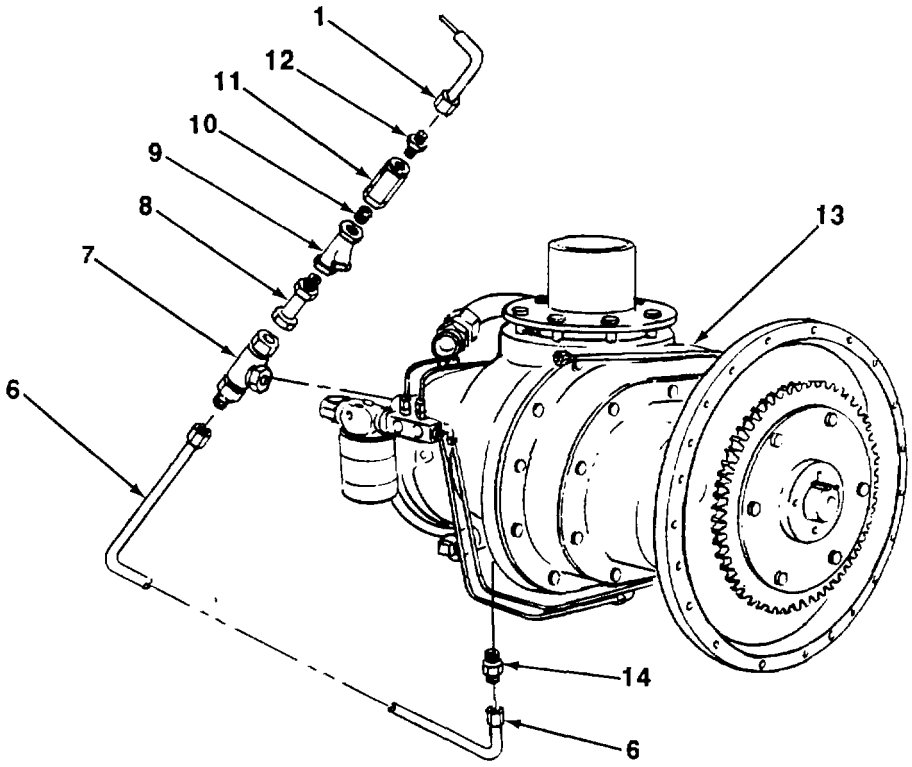
a. REMOVAL

1. Remove line (1), elbow (2), line (3), and adapter (4) from oil separator (5).



4-97. AIR COMPRESSOR OIL SIGHT GAGE REPLACEMENT (Con't).

2. Remove line (1) and adapter (12) from sight gage (11).
3. Remove sight gage (11), nipple (10), strainer (9), and line (8) from tee (7).
4. Remove line (6) from tee (7) and adapter (14).
5. Remove tee (7) from air compressor (13).
6. Remove adapter (14) from air compressor (13).



b. INSTALLATION

1. Apply sealing compound to threads of adapter (14) and Install adapter on air compressor (13).
2. Apply sealing compound to threads of tee (7) and install tee on air compressor (13).
3. Install line (6) on tee (7) and adapter (14).
4. Apply sealing compound to threads of line (8) and nipple (10), and install line, strainer (9), nipple, and sight gage (11) on tee (7).
5. Apply sealing compound to threads of adapter (12). Install adapter and line (1) on sight gage (11).

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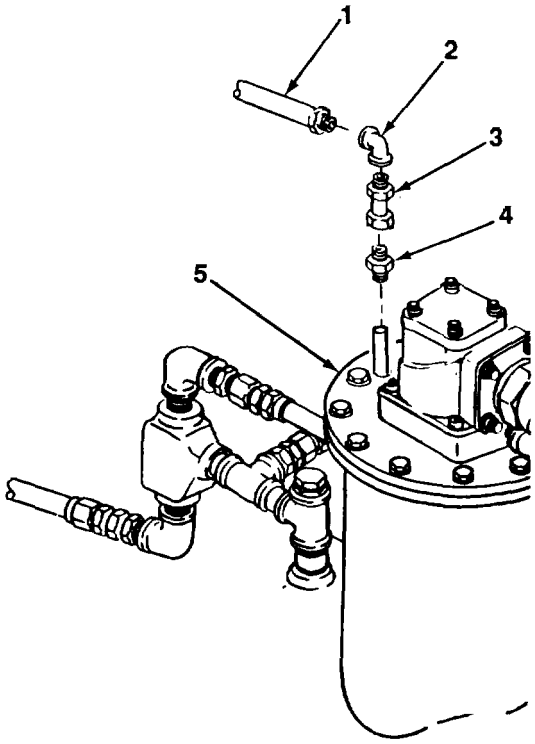
4-97. AIR COMPRESSOR OIL SIGHT GAGE REPLACEI

6. Apply sealing compound to threads of adapter (4) and line (3) and install adapter, line, elbow (2), and line (1) on oil separator (5).



FOLLOW-ON TASKS:

- Install bottom front panel (see paragraph 4-81).
- Start air compressor unit (see paragraph 2-10) and check for leaks.

4-98. AIR COMPRESSOR OIL FILTER ELEMENT REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

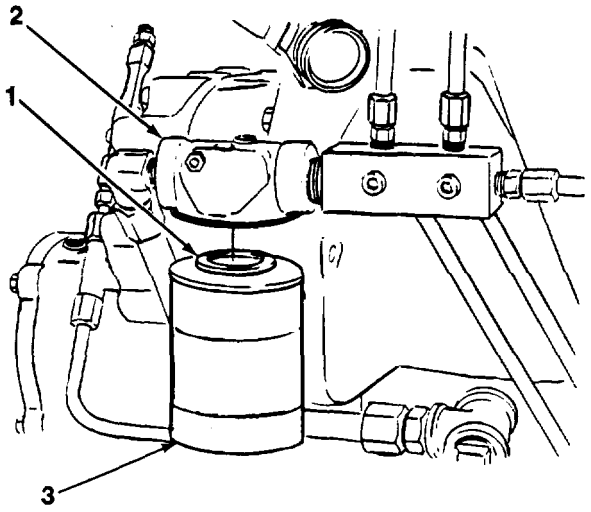
Equipment Conditions:
- Master battery switch in OFF position
- System pressure relieved

Tools/Test Equipment:
- Common no. 1 shop set

Materials/Parts:
- Lubricating oil (Item 28, Appendix E)
- One gasket
- One oil filter element

a. REMOVAL

Remove oil filter element (3) and gasket (1) from filter head (2). Discard gasket and oil filter element.



b. INSTALLATION I

1. Apply a thin coat of lubricating oil on new gasket (1).
2. Install gasket and new oil filter element (3) on filter head (2) until gasket contacts filter head, then tighten.
3. Check air compressor oil level and fill if necessary (see Lubrication Instructions, Chapter 3, Section I).
4. Start air compressor unit (see paragraph 2-10) and check oil filter element for leaks.

TA704879

4-99. DISCHARGE VALVES, LINES, AND FITTINGS REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:

Equipment Conditions:
- System pressure relieved.

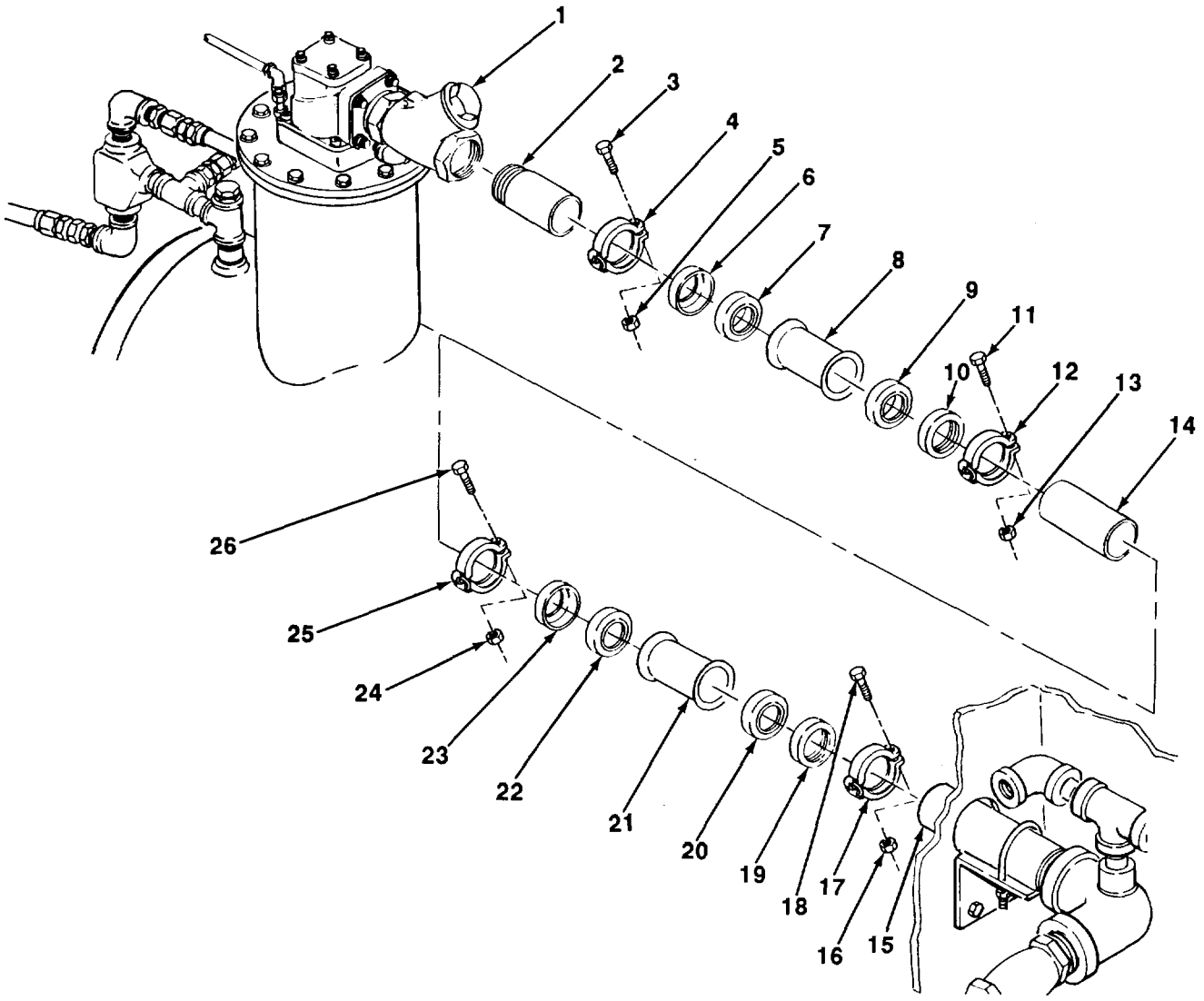
Materials/Parts:
- Sealing compound (Item 14, Appendix E)

Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

a. REMOVAL

1. Remove nut (5), screw (3), and clamp (4) from pipe (2) and coupling (8).
2. Remove nut (13), screw (11), and clamp (12) from coupling (8) and pipe (14).
3. Slide two rings (6 and 10) away from coupling (8) and remove coupling and two gaskets (7 and 9) from pipe (2) and pipe (14).
4. Remove two rings (6 and 10) from coupling (8).
5. Remove pipe (2) from check valve (1).
6. Remove nut (24), screw (26), and clamp (25) from pipe (14) and coupling (21).
7. Slide ring (23) away from coupling (21) and remove pipe (14) and gasket (22) from coupling.
8. Remove nut (16), screw (18), and clamp (17) from coupling (21) and pipe (15).
9. Slide ring (19) away from coupling (21) and remove coupling and gasket (20) from pipe (15).

4-99. DISCHARGE VALVES, LINES, AND FITTINGS REPLACEMENT (Con't).



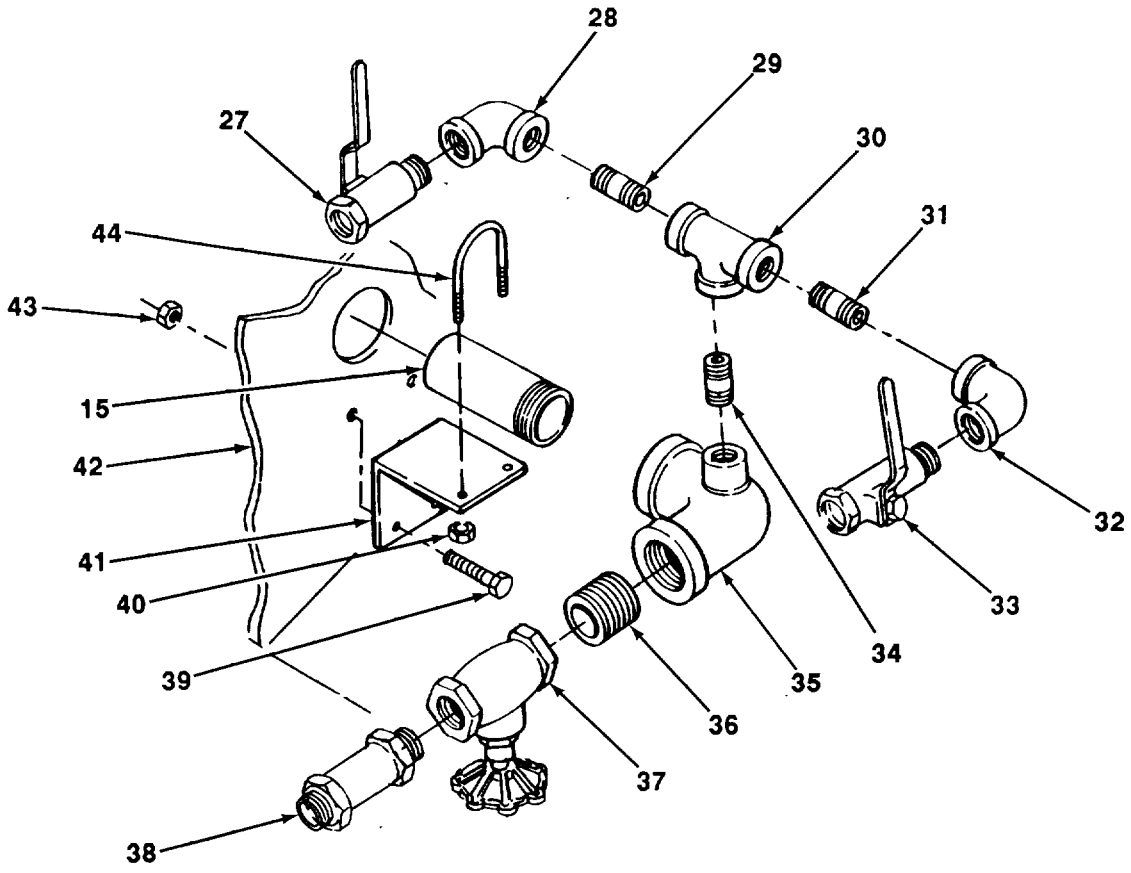
4-99. DISCHARGE VALVES, LINES, AND FITTINGS REPLACEMENT (Con't).

10. Remove pipe (38) from discharge valve (37).
11. Remove discharge valve (37) and nipple (36) from elbow (35).
12. Remove two nuts (40) and U-bolt (44) from pipe (15).
13. Remove pipe (15) from elbow (35) and service box (42).
14. Remove two discharge valves (27 and 33), elbows (28 and 32), and nipples (29 and 31) from tee (30).
15. Remove tee (30) and nipple (34) from elbow (35).
16. If damaged, remove two nuts (43), screws (39), and bracket (41) from service box (42).

b. INSTALLATION

1. If removed, install bracket (41) on service box (42) with two screws (39) and nuts (43).
2. Apply sealing compound to threads of nipple (34) and install nipple and tee (30) on elbow (35).
3. Apply sealing compound to threads of two nipples (29 and 31) and install nipples and two elbows (28 and 32) on tee (30).
4. Apply sealing compound to threads of two discharge valves (27 and 33) and install discharge valves on two elbows (28 and 32).
5. Apply sealing compound to threads of pipe (15) and install pipe on elbow (35).
6. Position pipe (15) through service box (42) and install on bracket (41) with U-bolt (44) and two nuts (40).
7. Apply sealing compound to threads of nipple (36) and install nipple and discharge valve (37) on elbow (35).
8. Apply sealing compound to threads of pipe (38) and install pipe on discharge valve (37).

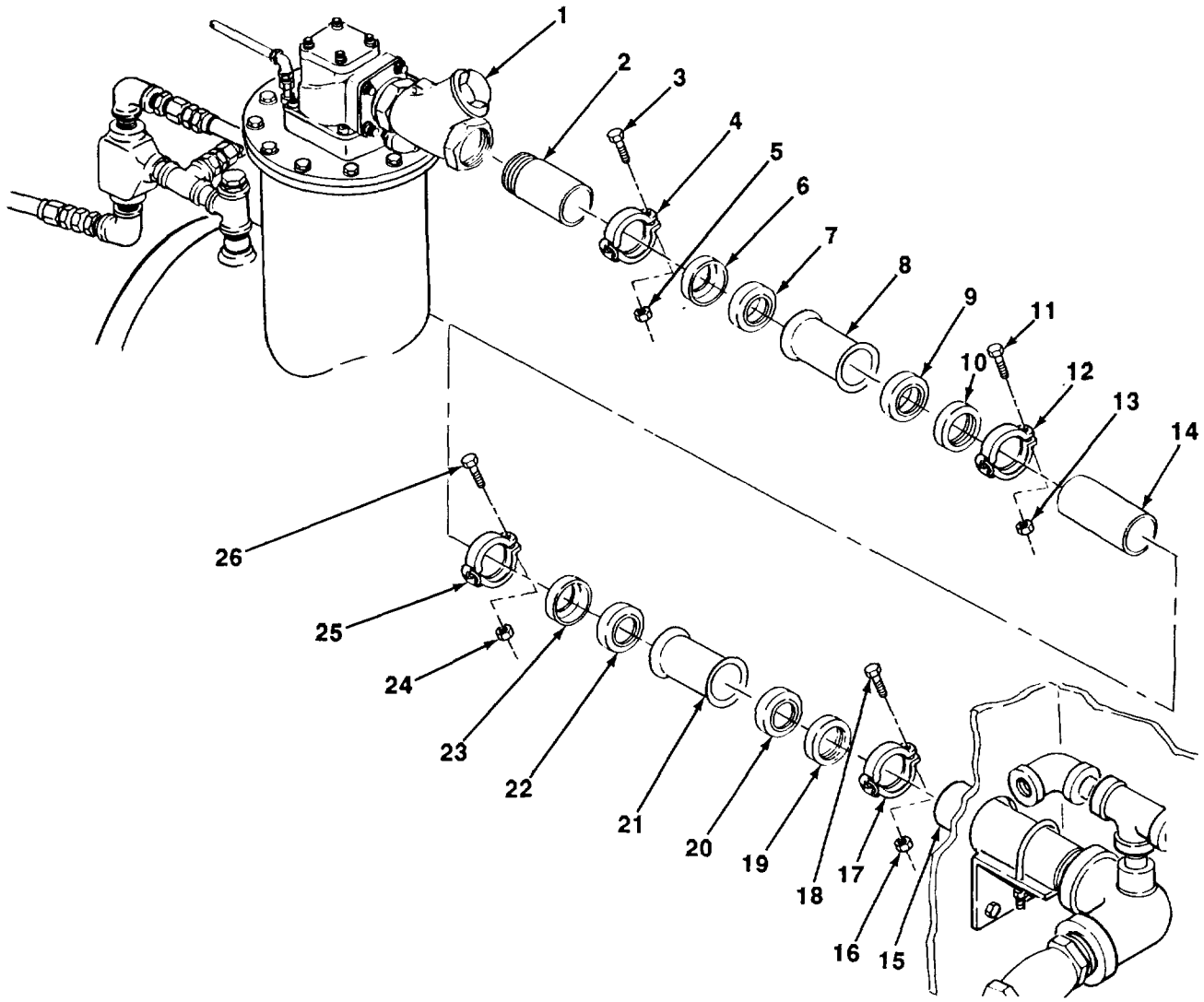
4-99. DISCHARGE VALVES, LINES, AND FITTINGS REPLACEMENT (Con't).



4-99. DISCHARGE VALVES, LINES, AND FITTINGS REPLACEMENT (Con't).

9. Slide ring (19) and gasket (20) on pipe (15).
10. Position coupling (21) on pipe (15) and install clamp (17) with screw (18) and nut (16).
11. Slide ring (23) and gasket (22) on pipe (14).
12. Position pipe (14) on coupling (21) and install clamp (25) with screw (26) and nut (24).
13. Apply sealing compound to threads of pipe (2) and install pipe on check valve (1).
14. Slide ring (6) and gasket (7) on pipe (2). Slide ring (10) and gasket (9) on pipe (14).
15. Position coupling (8) on pipe (2) and install clamp (4) with screw (3) and nut (5).
16. Position coupling (8) on pipe (14) and install clamp (12) with screw (11) and nut (13).

4-99. DISCHARGE VALVES, LINES, AND FITTINGS REPLACEMENT (Con't).



FOLLOW-ON TASKS:

• Start air compressor unit (see paragraph 2-10) and check for leaks.

TA704882

4-100. AIR COMPRESSOR ASSEMBLY HOSES REPLACEMENT.

This Task Covers:

a Main Oil Filter Assembly-to-Oil Stop Valve Hose Replacement
b Main Oil Filter Assembly-to-Thermal Valve Inlet Port Hose Replacement
c Thermal Valve Exit Port-to-Oil Cooler Hose Replacement
d Oil Cooler-to-Thermal Valve Inlet Port Hose Replacement

Initial Setup:

Equipment Conditions:
- System pressure relieved
- Bottom front and rear panels removed (see paragraph 4-81).

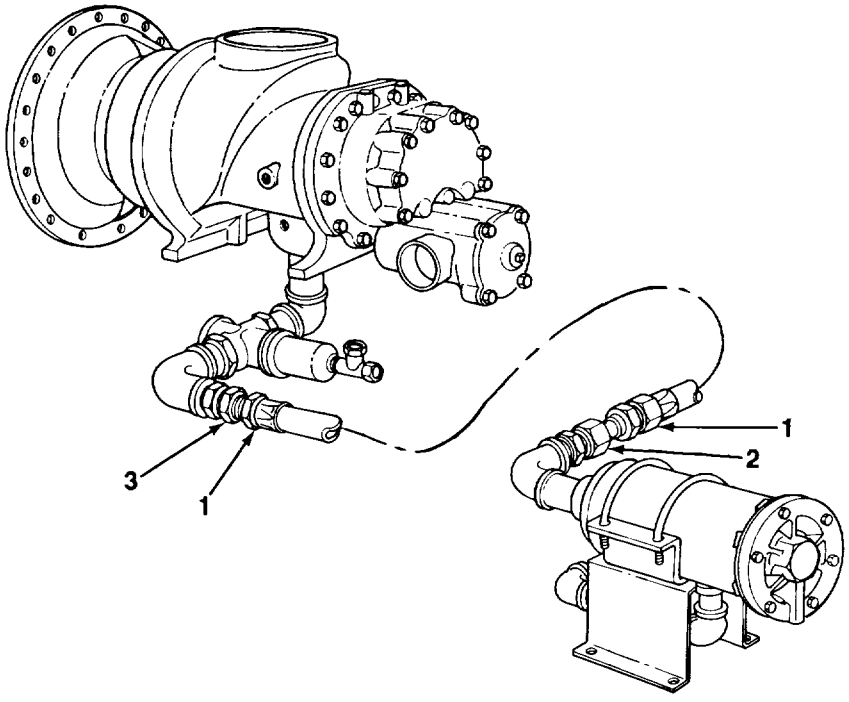
Tools/Test Equipment:
- General mechanic's tool kit
- Common no. 1 shop set

a. MAIN OIL FILTER ASSEMBLY-TO-OIL STOP VALVE HOSE REPLACEMENT

NOTE

A suitable container should be used to catch any draining oil. Ensure that all spills are cleaned up.

1. Remove hose (1) from adapters (2 and 3).
2. Install hose (1) to adapters (2 and 3).



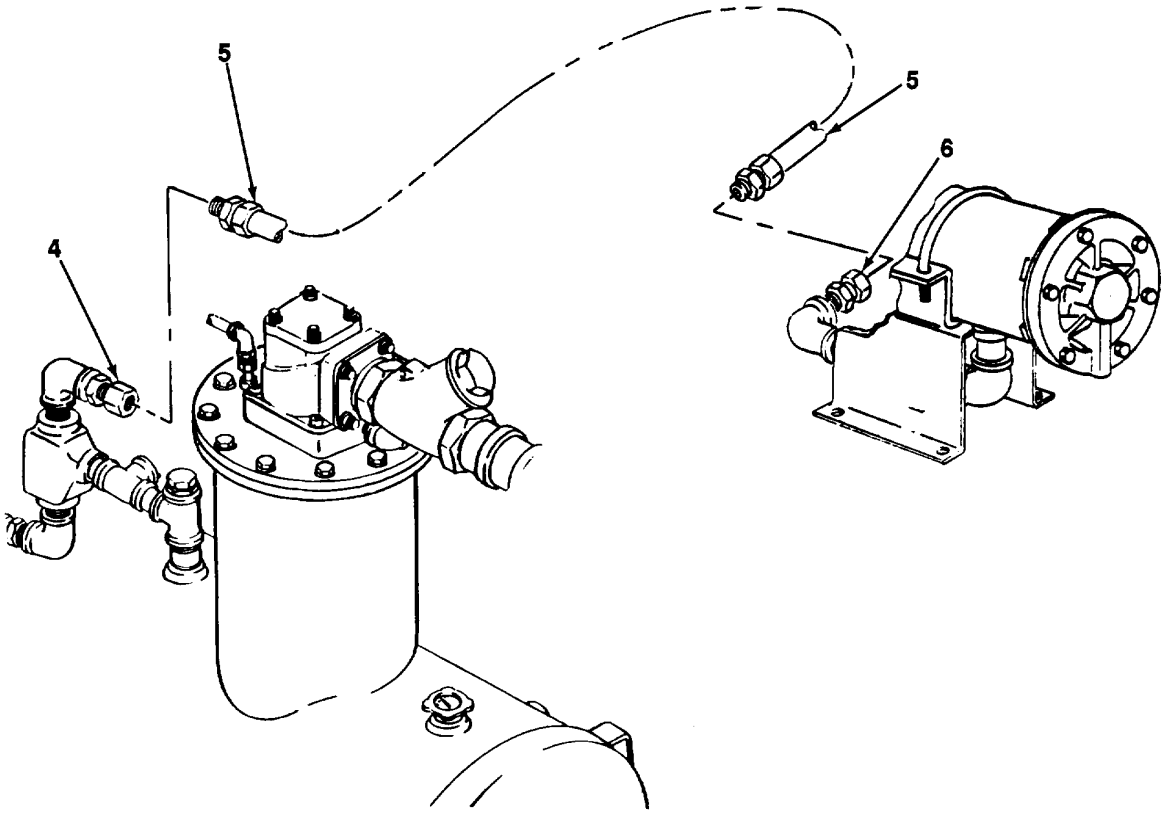
4-100. AIR COMPRESSOR ASSEMBLY HOSES REPLACEMENT (Con't).

b. MAIN OIL FILTER ASSEMBLY-TO-THERMAL VALVE INLET PORT HOSE REPLACEMENT

NOTE

A suitable container should be used to catch any draining oil. Ensure that all spills are cleaned up.

1. Remove hose (5) from adapters (4 and 6).
2. Install hose (5) to adapters (4 and 6).



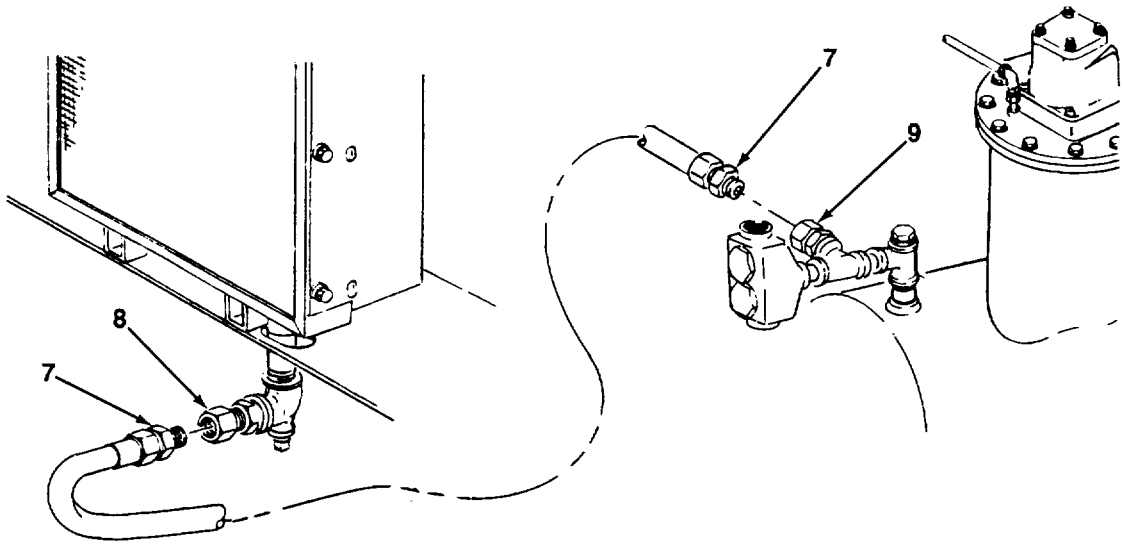
4-100. AIR COMPRESSOR ASSEMBLY HOSES REPLACEMENT (Con't).

c. THERMAL VALVE EXIT PORT-TO-OIL COOLER HOSE REPLACEMENT I

NOTE

A suitable container should be used to catch any draining oil. Ensure that all spills are cleaned up.

1. Remove hose (7) from adapters (8 and 9).
2. Install hose (7) to adapters (8 and 9).



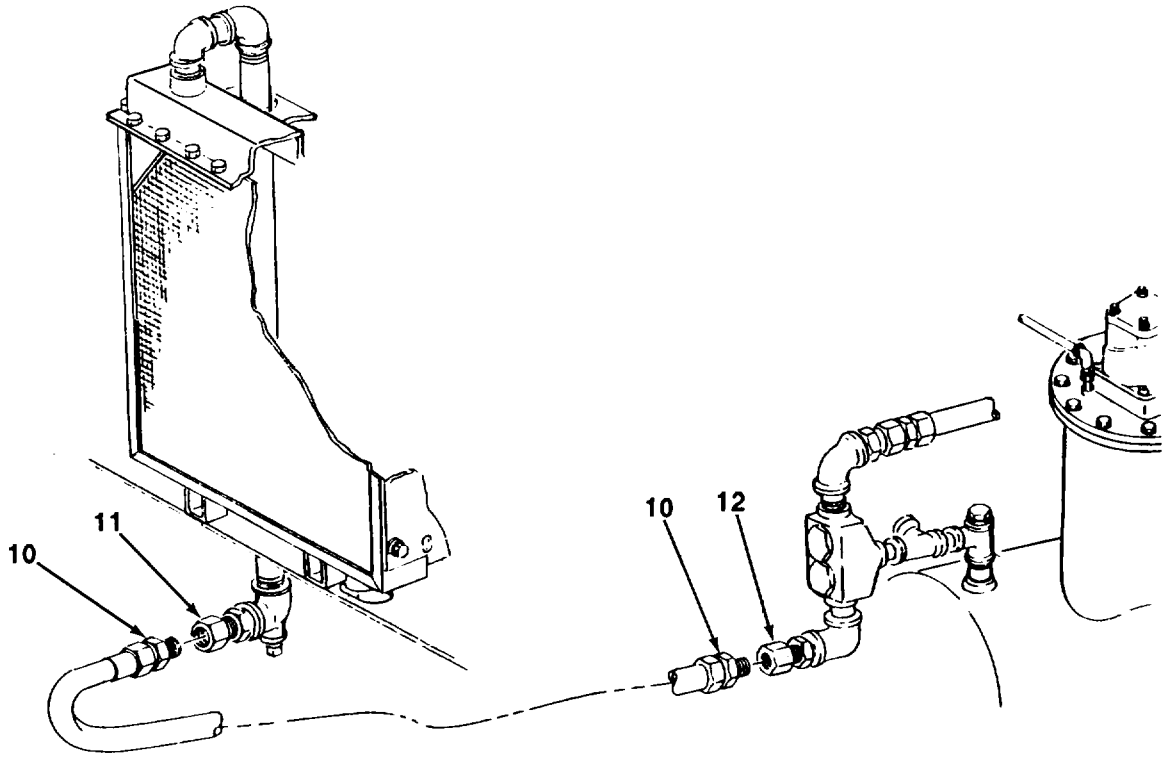
4-100. AIR COMPRESSOR ASSEMBLY HOSES REPLACEMENT (Con't).

d. OIL COOLER-TO-THERMAL VALVE INLET PORT HOSE REPLACEMENT

NOTE

A suitable container should be used to catch any draining oil. Ensure that all spills are cleaned up.

1. Remove hose (10) from adapters (11 and 12).
2. Install hose (10) to adapters (11 and 12).



FOLLOW-ON TASKS:

- Install bottom front and rear panels (see paragraph 4-81).
- Start air compressor unit (see paragraph 2-10) and check hoses for leaks.

TA704886

4-101. AIR COMPRESSOR OIL LINES REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:

Equipment Conditions:
- Air compressor oil filter element removed (see
- paragraph 4-98).

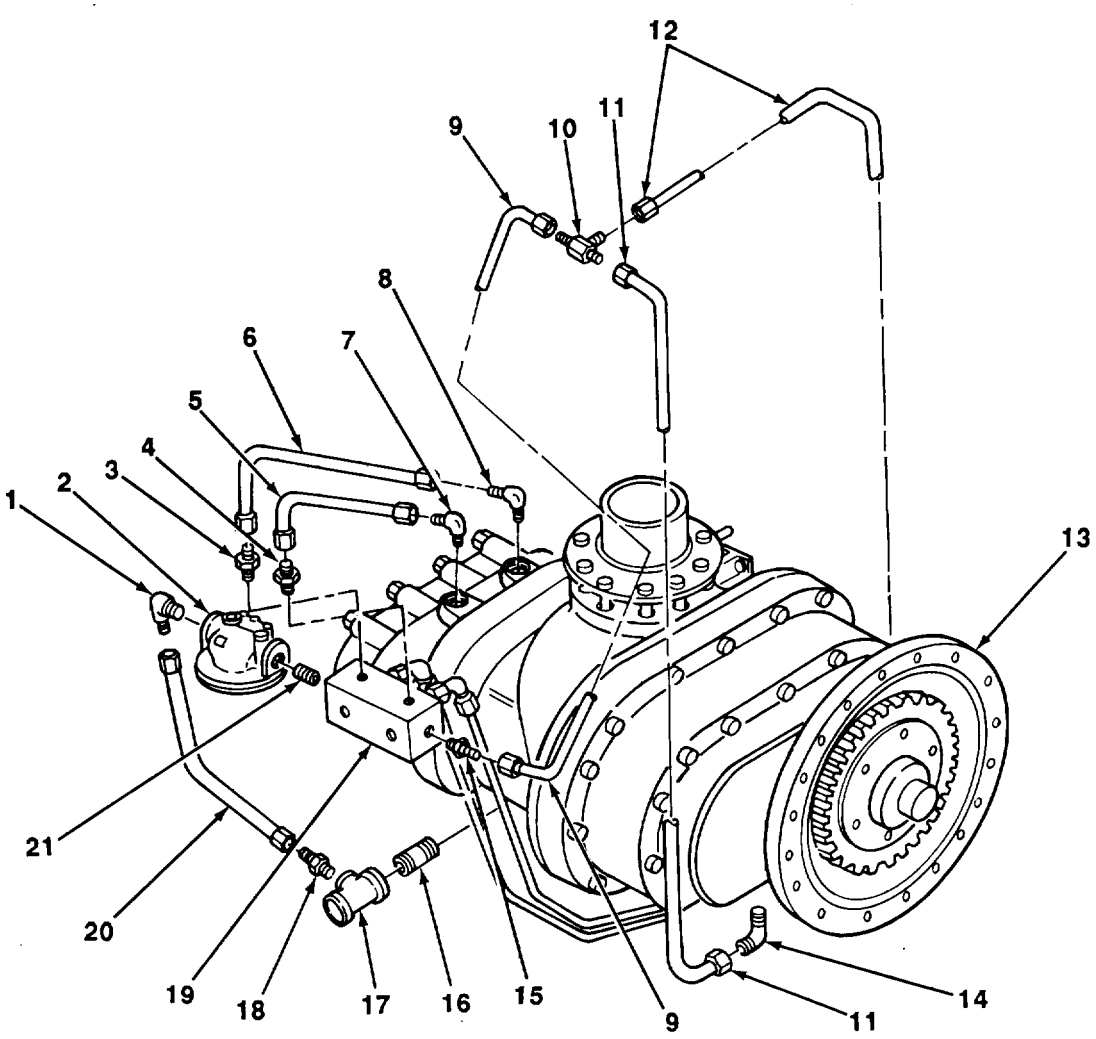
Materials/Parts:
- Sealing compound (Item 14, Appendix E)

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVALI

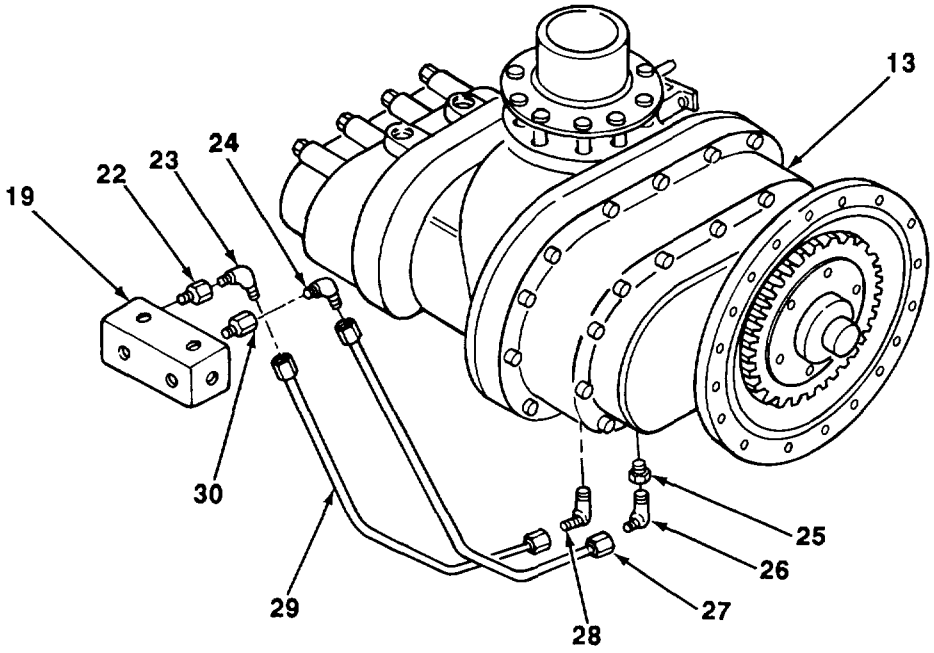
1. Remove line (5) from adapter (4) and elbow (7).
2. Remove adapter (4) from oil flow adapter (19).
3. Remove elbow (7) from air compressor (13).
4. Remove line (6) from adapter (3) and elbow (8).
5. Remove adapter (3) from oil flow adapter (19).
6. Remove elbow (8) from air compressor (13).
7. Remove line (9) from adapter (15) and tee (10).
8. Remove adapter (15) from oil flow adapter (19).
9. Remove line (12) from tee (10).
10. Remove tee (10), line (11), and elbow (14) from air compressor (13).
11. Remove line (20) from elbow (1) and adapter (18).
12. Remove elbow (1), filter head (2) and nipple (21) from oil flow adapter (19).
13. Remove adapter (18), tee (17), and nipple (16) from air compressor (13).

4-101. AIR COMPRESSOR OIL LINES REPLACEMENT (Con't).



4-101. AIR COMPRESSOR OIL LINES REPLACEMENT (Con't).

14. Remove line (27) from elbows (24 and 26).
15. Remove elbow (24) and connector (30) from oil flow adapter (19).
16. Remove elbow (26) and connector (25) from air compressor (13).
17. Remove line (29) from elbows (23 and 28).
18. Remove elbow (23) and connector (22) from oil flow adapter (19).
19. Remove elbow (28) from air compressor (13).



b. INSTALLATION

1. Apply sealing compound to threads of elbow (28) and install elbow on air compressor (13).
2. Apply sealing compound to threads of connector (22) and elbow (23) and install connector and elbow on oil flow adapter (19).
3. Install line (29) on elbows (23 and 28).
4. Apply sealing compound to threads of connector (25) and elbow (26). Install connector and elbow on air compressor (13).
5. Apply sealing compound to threads of connector (30) and elbow (24). Install connector and elbow on oil flow adapter (19).
6. Install line (27) on elbows (24 and 26). TA704888

4-101. AIR COMPRESSOR OIL LINES REPLACEMENT (Con't).

7. Apply sealing compound to threads of nipple (16) and adapter (18). Install nipple, tee (17), and adapter on air compressor (13).

8. Apply sealing compound to threads of nipple (21) and elbow (1). Install nipple, filter head (2), and elbow on oil flow adapter (19).

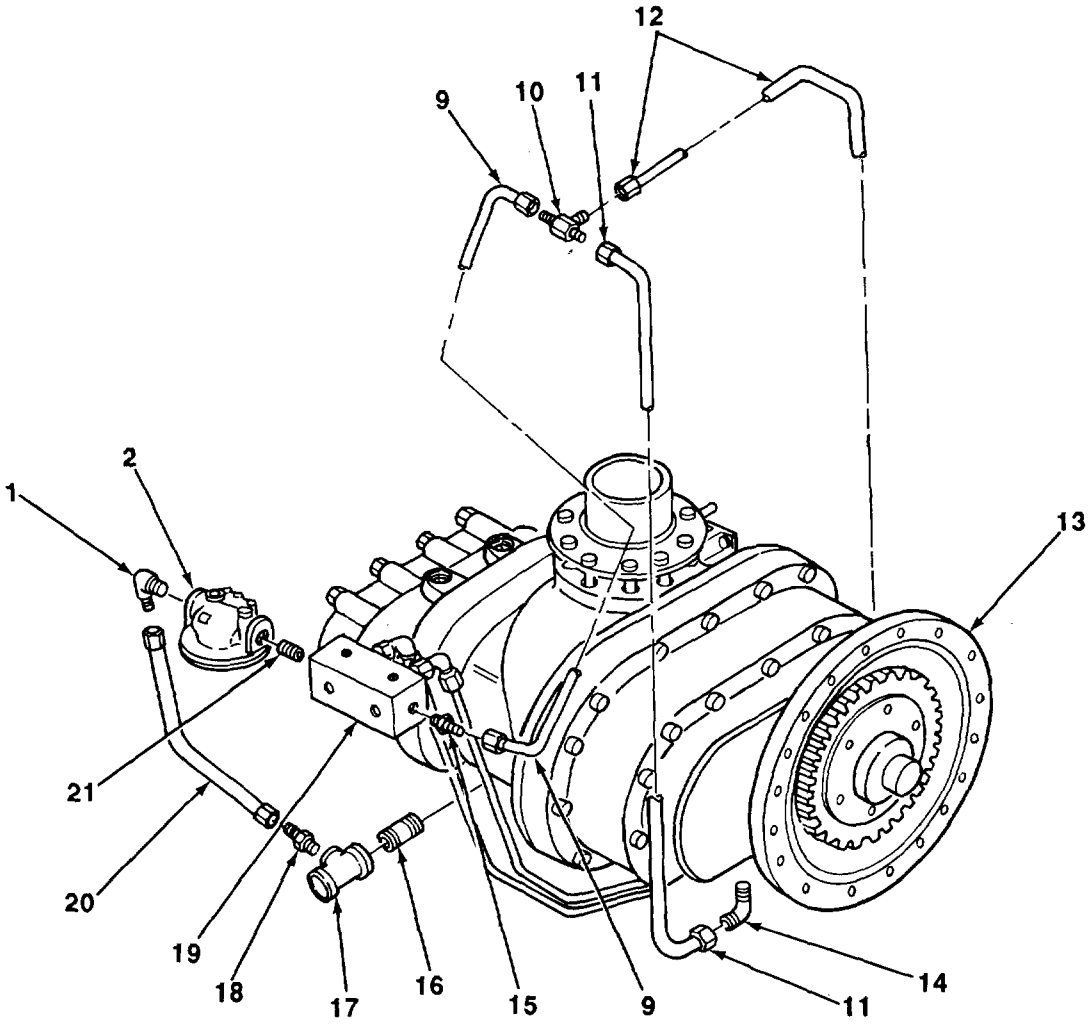
9. Install line (20) on elbow (1) and adapter (18).

10. Apply sealing compound to threads of elbow (14) and tee (10). Install elbow, line (11), and tee on air compressor (13).

11. Install line (12) on tee (10).

12. Apply sealing compound to threads of adapter (15) and install adapter on oil flow adapter (19).

13. Install line (9) on adapter (15) and tee (10).



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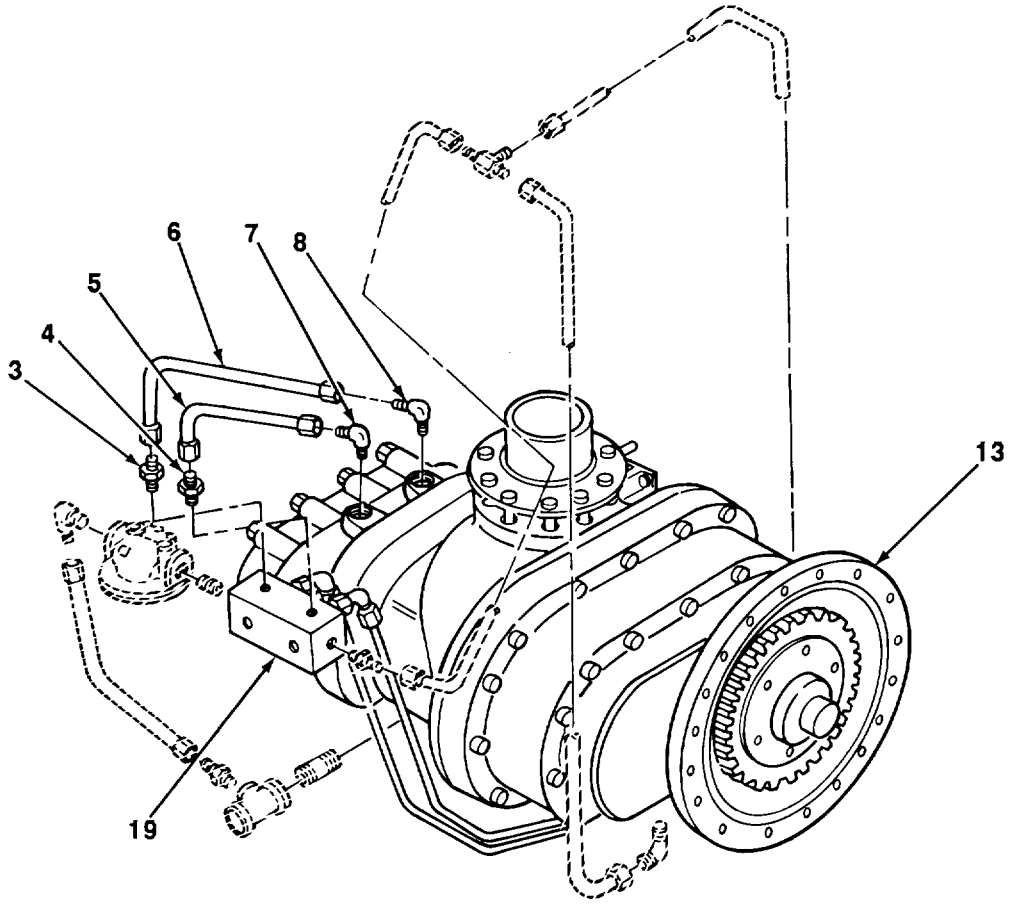
4-101. AIR COMPRESSOR OIL LINES REPLACEMENT (Con't).

14. Apply sealing compound to threads of elbow (8) and install elbow on air compressor (13).
15. Apply sealing compound to threads of adapter (3) and install adapter on oil flow adapter (19).
16. Install line (6) on elbow (8) and adapter (3).
17. Apply sealing compound to threads of elbow (7) and install elbow on air compressor (13).
18. Apply sealing compound to threads of adapter (4) and install adapter on oil flow adapter (19).
19. Install line (5) on elbow (7) and adapter (4).



FOLLOW-ON TASKS:

- Install air compressor oil filter element (see paragraph 4-98).
- Check air compressor oil level (see Lubrication Instructions, Chapter 3, Section I).
- Start air compressor unit (see paragraph 2-10) and check for leaks.

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4-102. AIR COMPRESSOR AIR CLEANER ASSEMBLY MAINTENANCE.

This Task Covers:

a. Elements Replacement
b. Air Cleaner Assembly Removal
c. Air Cleaner Assembly Installation

Initial Setup:

Equipment Conditions:
- Master battery switch in OFF position

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- One cotter pin
- Two gaskets
- Eight lockwashers

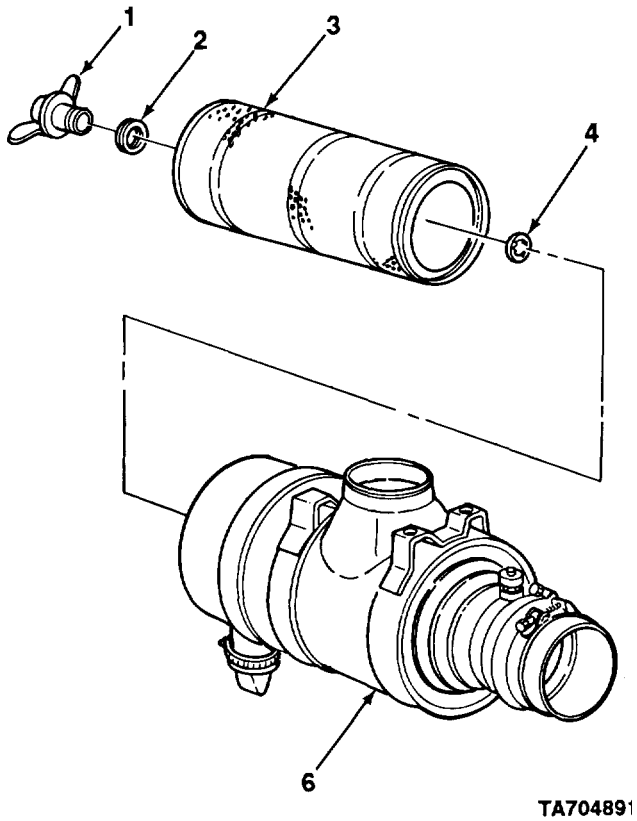
Personnel Required: Two

WARNING

If NBC exposure Is suspected, all engine air cleaner air filter media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

a. ELEMENTS REPLACEMENT

1. Loosen wingnut (1) and sealing washer (2) and remove primary element (3) from air cleaner body (6).
2. Remove retaining ring (4), sealing washer (2), and wingnut (1) from primary element (3).



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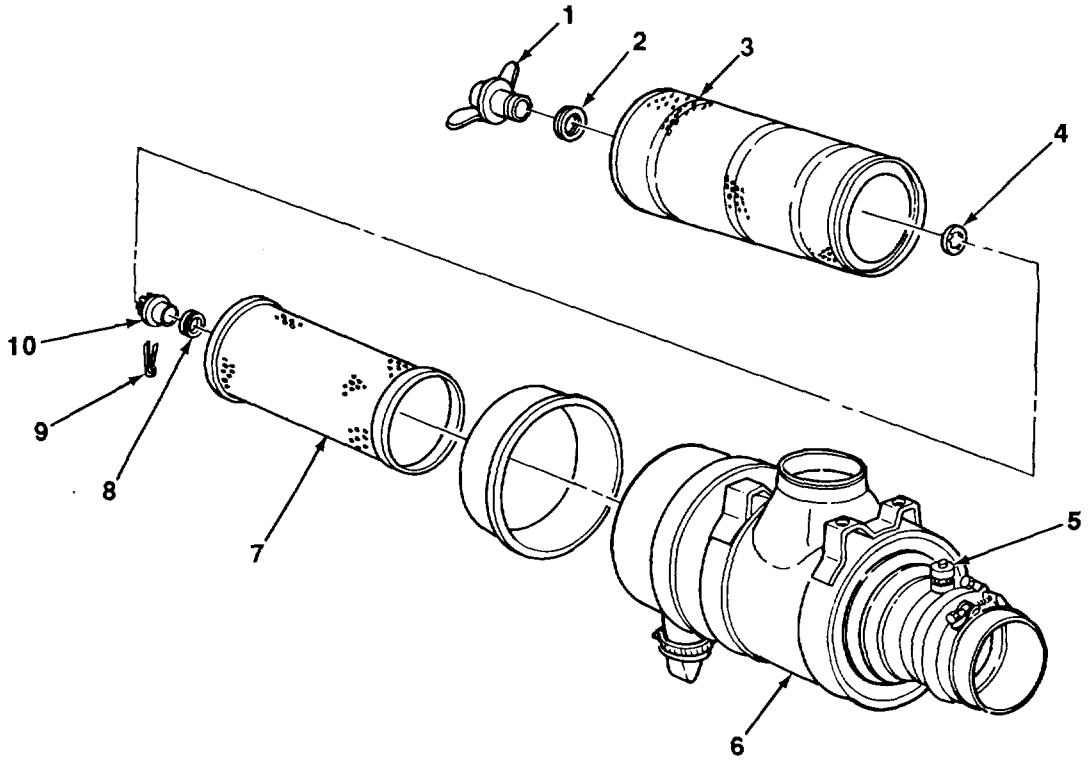
4-102. AIR COMPRESSOR AIR CLEANER ASSEMBLY MAINTENANCE (Con't).

3. Remove cotter pin (9), nut (10), sealing washer (8), and secondary element (7) from air cleaner body (6). Discard cotter pin.
4. Install secondary element (7) in air cleaner body (6) with sealing washer (8) and nut (10). Install new cotter pin (9) in nut.
5. Install sealing washer (2) and wingnut (1) to primary element (3) with retaining ring (4).
6. Install primary element (3) in air cleaner body (6) with sealing washer (2) and wingnut (1).
7. Press down on top of restriction indicator (5) to reset.



b. AIR CLEANER ASSEMBLY REMOVAL

1. Loosen clamp (21) and remove dust collector (20) and clamp from air cleaner assembly (19).
2. Remove restriction indicator (5) from air cleaner assembly (19).
3. Loosen clamps (11 and 13) and remove elbow (12) from air cleaner assembly (19) and air tube (14).
4. Loosen clamp (15) and remove air tube (14) from elbow (16).
5. Loosen clamp (17) and remove elbow (16) from adapter duct (18).

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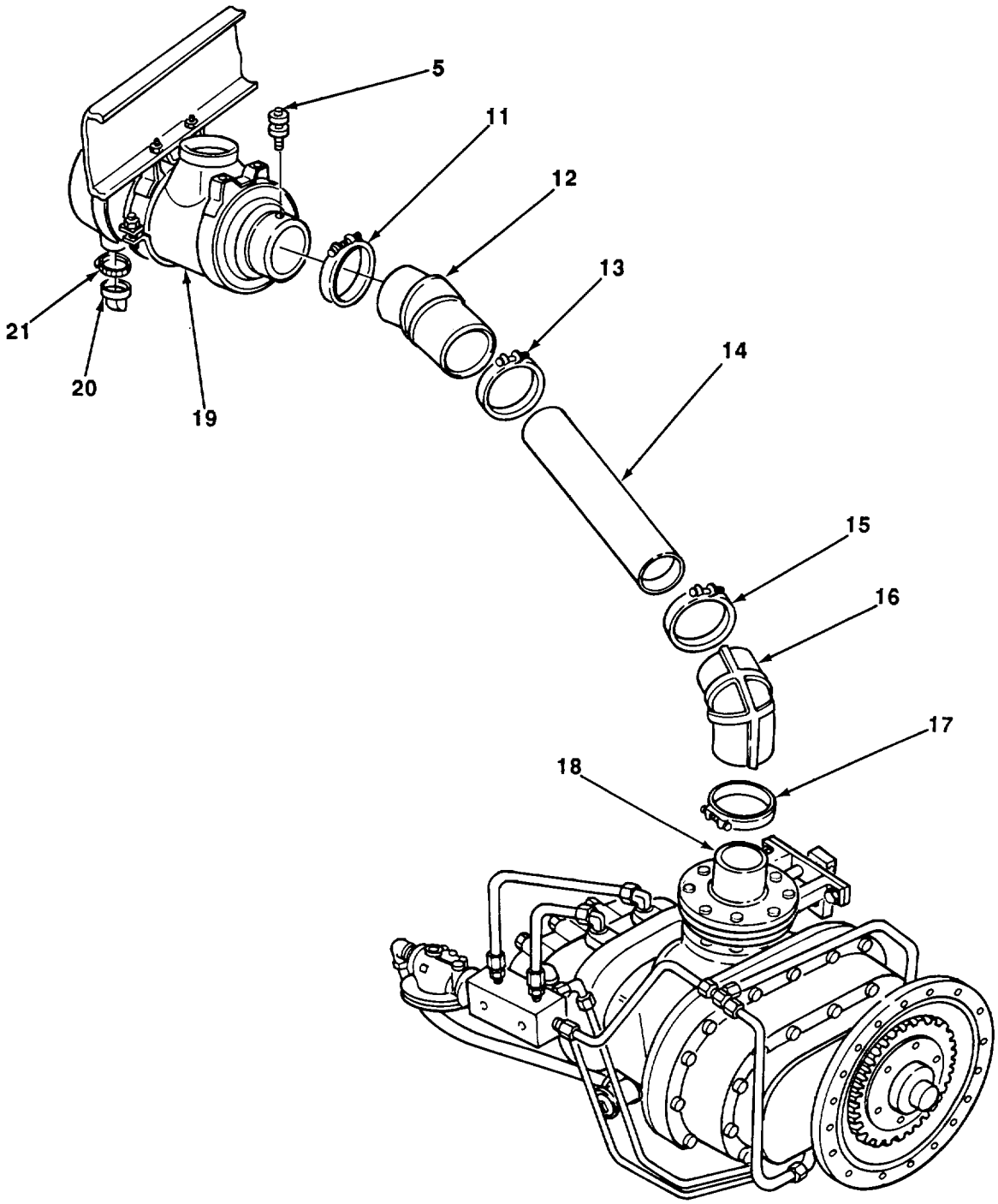
4-102. AIR COMPRESSOR AIR CLEANER ASSEMBLY MAINTENANCE (Con't).

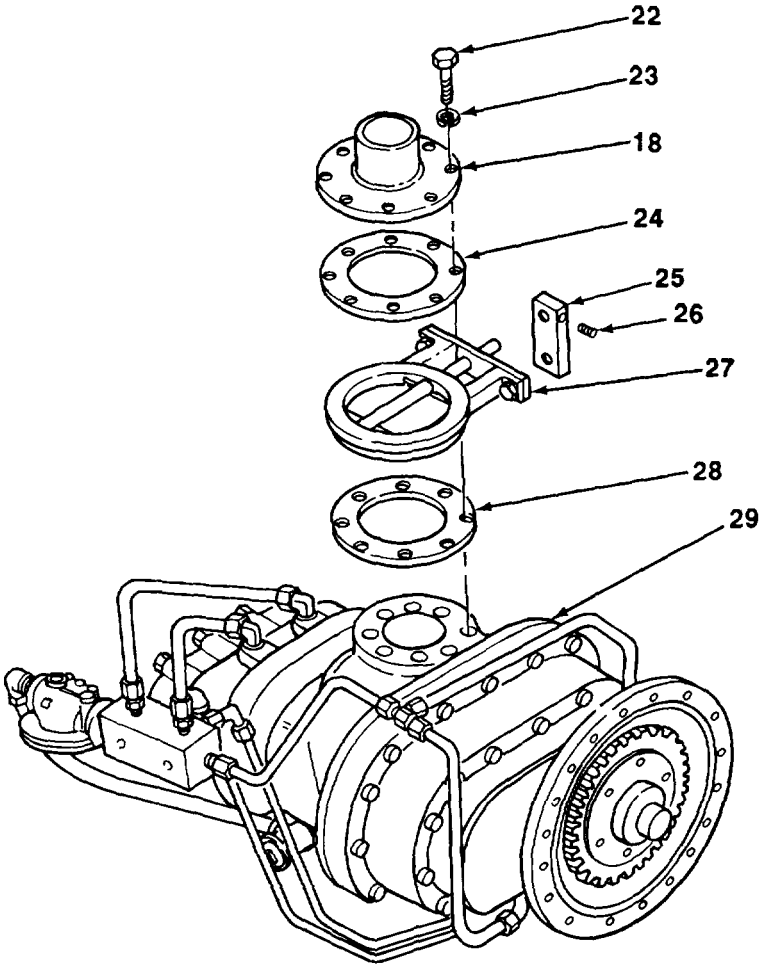


4-102. AIR COMPRESSOR AIR CLEANER ASSEMBLY MAINTENANCE (Con't).

6. Remove eight screws (22), lockwashers (23), adapter duct (18), and gasket (24) from inlet valve (27). Discard lockwashers and gasket.

7. Remove inlet valve (27) and gasket (28) from air compressor (29). Discard gasket.

8. Loosen setscrew (26) and remove inlet valve lever (25) from inlet valve (27).

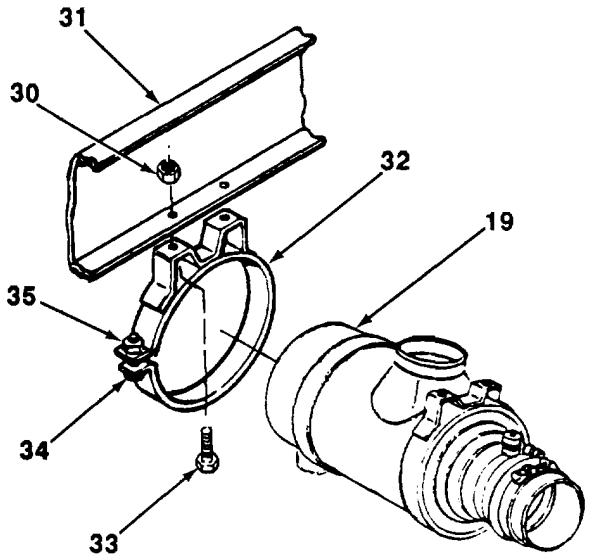


4-102. AIR COMPRESSOR AIR CLEANER AIR CLEANER ASSEMBLY MAINTENANCE (Con't)

9. Have an assistant support air cleaner assembly (19). Remove two nuts (35) and bolts (34) and let two clamps (32) open. Remove air cleaner assembly from clamps.

NOTE
Each clamp Is removed same way.

10. If damaged, remove two nuts (30), screws (33), and clamp (32) from support (31).



c. AIR CLEANER ASSEMBLY INSTALLATION

NOTE
Each clamp Is Installed same way.

1. If removed, install clamp (32) on support (31) with two screws (33) and nuts (30).

2. Position air cleaner assembly (19) in two clamps (32). Install two bolts (34) and nuts (35) into two clamps (32). Tighten clamps to secure air cleaner assembly.

3. Install new gasket (28), air inlet valve (27), new gasket (24), and adapter duct (18) on air compressor (29) with eight new lockwashers (23) and screws (22).

4. Position inlet valve lever (25) on inlet valve (27) and tighten setscrew (26).

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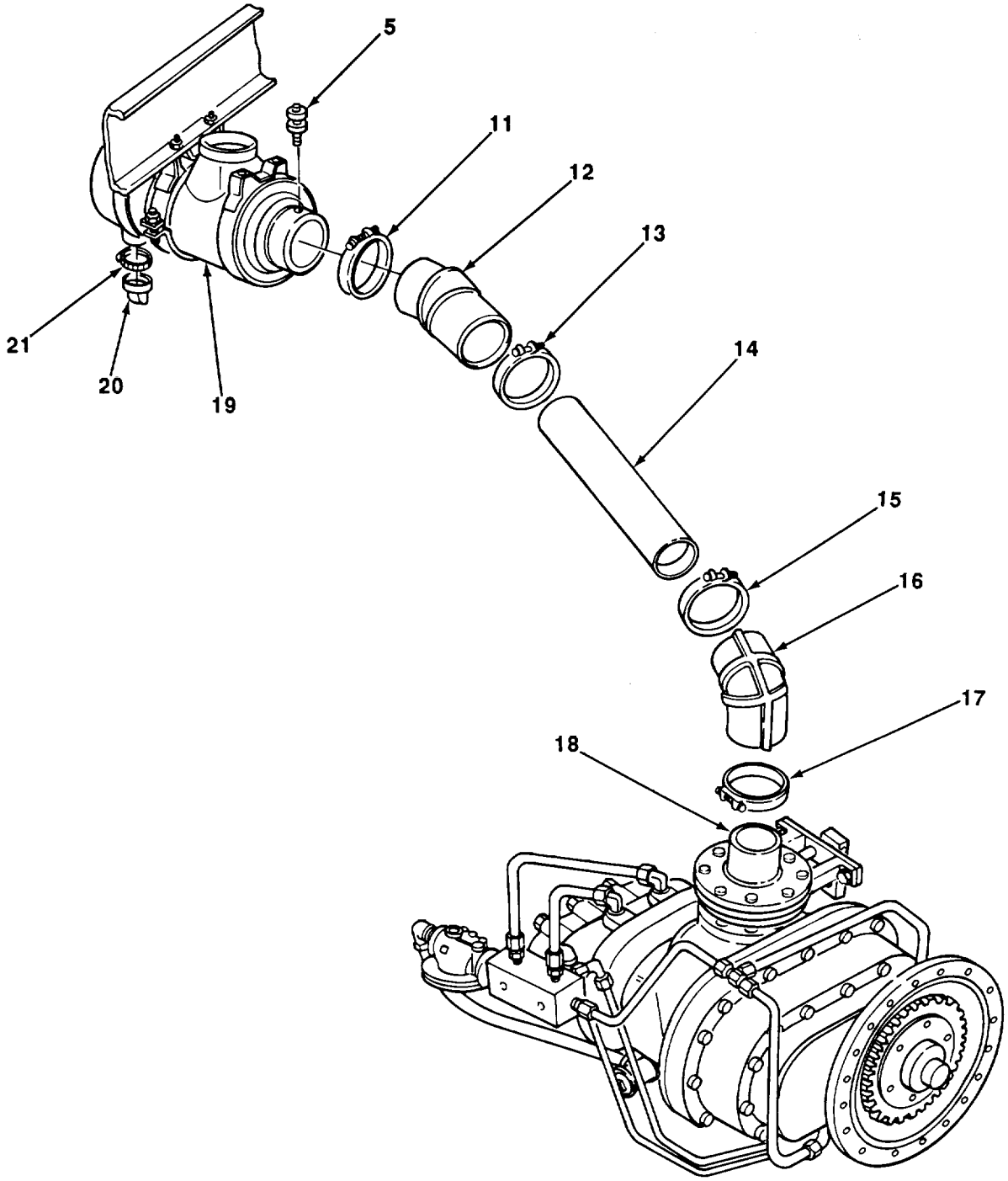
4-102. AIR COMPRESSOR AIR CLEANER ASSEMBLY MAINTENANCE (Con't)..



4-102. AIR COMPRESSOR AIR CLEANER ASSEMBLY MAINTENANCE (Con't).

5. Position elbow (16) on adapter duct (18) and tighten clamp (17).
6. Position air tube (14) on elbow (16) and tighten clamp (15).
7. Position elbow (12) on air tube (14) and air cleaner assembly (19) and tighten clamps (11 and 13).
8. Install restriction Indicator (5) on air cleaner assembly (19).
9. Install dust collector (20) and clamp (21) on air cleaner assembly (19). Tighten clamp.

Section XXI. PAINTING AND IDENTIFICATION MARKING

4-103. PAINTING AND IDENTIFICATION MARKING.

Refer to TM 43-0139 for instructions on painting and stenciling the air compressor unit.

Section XXII. PREPARATION FOR STORAGE OR SHIPMENT

4-104. GENERAL.

a. This section contains requirements and procedures for administrative storage of equipment that is issued to and in use by Army activities worldwide.

b. The requirements specified herein are necessary to maintain equipment in administrative storage in such a way as to achieve the maximum readiness condition.

c. Equipment that is placed in administrative storage should be capable of being readied to perform its mission within a 24-hour period, or as otherwise prescribed by the approving authority. Before equipment is placed in administrative storage, a current Preventive Maintenance Checks and Services (PMCS) should be completed and deficiencies corrected.

d. Report equipment in administrative storage as prescribed for all reportable equipment.

e. Perform inspections, maintenance services, and lubrication as specified herein.

f. Records and reports to be maintained for equipment in administrative storage are those prescribed by DA Pam 738-750, for equipment in use.

g. A 10% variance is acceptable on time, running hours, or mileage used to determine the required maintenance actions.

h. Accomplishment of applicable PMCS, as mentioned throughout this section, will be on a quarterly basis.

4-105. DEFINITION OF ADMINISTRATIVE STORAGE.

The placement of equipment in administrative storage can be for short periods of time when a shortage of maintenance effort exists. Items should be ready for use within the time factors as determined by the directing authority. During the storage period, appropriate maintenance records will be kept.

4-106. PREPARATION OF EQUIPMENT FOR ADMINISTRATIVE STORAGE.

a. **Storage Site.**

(1) Select the best available site for administrative storage. Separate stored equipment from equipment in use. Conspicuously mark the area "Administrative Storage."

(2) Covered space is preferred.

(3) Open sites should be improved hardstand, if available. Unimproved sites should be firm, well-drained, and kept free of excessive vegetation.

4-106. PREPARATION OF EQUIPMENT FOR ADMINISTRATIVE STORAGE (Con't)

b. **Storage Plan**.

(1) Store equipment so as to provide maximum protection from the elements and to provide access for Inspection, maintenance, and exercising. Anticipate removal or deployment problems and take suitable precautions.

(2) Take into consideration environmental conditions, such as extreme heat and cold; high humidity; blowing sand, dust, or loose debris; soft ground; mud; heavy snows; or combinations thereof, and take adequate precautions.

(3) Establish a fire plan and provide for adequate firef ighting equipment and personnel.

c. **Maintenance Services and Inspection**.

(1) Maintenance Services. Prior to storage, perform the next scheduled Unit PMCS.

(2) Inspection. Inspect and approve the equipment prior to storage. Do not place equipment in storage if in a nonmission-capable condition.

d. **Auxiliary Equipment and Basic Issue Items.**

(1) Process auxiliary and basic issue items simultaneously with the major item to which they are assigned.

(2) If possible, store auxiliary and basic issue items with the major item.

(3) If stored apart from the major item, mark auxiliary and basic issue items with tags indicating the major item, its registration or serial number and location, and store in protective type closures. In addition, place a tag or list indicating the location of the removed items In a conspicuous place on the major item.

e. **Engine Preparation.** To preserve the engine for storage, perform the following:

NOTE

Make a list of all the preservation measures you take and place the list In the manual holder. These preservation measures will protect the engine for a period of six to twelve months, depending on weather and locale.

(1) Clean the outside of the engine with a reliable detergent (Item 16, Appendix E) or diesel fuel (Item 19, Appendix E).

CAUTION

The anticorrosive lubricating oils used should conform to MIL-L-21260.

(2) While engine Is still hot, drain the oil from the oil separator and fill with anticorrosive lubricating oil (Item 25, Appendix E).

(3) Drain the fuel from the tank into a container. Mix it with a 10% anticorrosive lubricating oil (Item 25, Appendix E) and pour back into the tank. An alternative is to fill the tank with an injection pump test oil (Item 24, Appendix E) that has corrosion inhibiting properties, for example, Calibration Fluid B.

(4) Run the engine for approximately ten minutes. This will fill the pipes, filter, pump, and nozzles with the preservation mixture.

(5) Stop the engine. Remove the valve covers and injection pump covers, and spray the rocker chambers and the pump chambers with the preservation mixture. Install the valve covers.

(6) Turn the engine over several times by hand. This will spray the mixture into the combustion chamber.

(7) Close the intake and exhaust openings tightly.

4-106. PREPARATION OF EQUIPMENT FOR ADMINISTRATIVE STORAGE (Con't).

f. **Correction of Shortcomings and Deficiencies.** Correct all shortcomings and deficiencies prior to storage, or obtain a deferment from the approving authority.

g. **Lubrication.** Lubricate equipment in accordance with Lubrication Instructions (see Chapter 3, Section I).

h. **General Cleaning, Painting, and Preservation.**

CAUTION

Do not direct water or steam, under pressure, against unsealed electrical systems or any exterior opening. Failure to follow this caution may result in damage to equipment.

(1) **Cleaning.** Clean the equipment of dirt, grease, and other contaminants, but do not use vapor degreasing.

(2) **Painting**. Remove rust and damaged paint by scraping, wire brushing, sanding, or buffing. Sand to a smooth finish and spot paint as necessary (see TB 43-0209).

(3) **Preservation.** After cleaning and drying, immediately coat unpainted metal surfaces with oil or grease, as appropriate (see Lubrication Instructions, Chapter 3, Section I).

CAUTION

Place a piece of barrier material (Item 5, Appendix E) between desiccant bags and metal surfaces.

NOTE

Air circulation under draped covers reduces deterioration from moisture or heat.

(4) **Weatherproofing.** Sunlight, heat, moisture (humidity), and dirt tend to accelerate deterioration. Install all covers (including vehicle protective closures) authorized for the equipment. Close and secure all openings except those required for venting and draining. Seal openings to prevent the entry of rain, snow, or dust. Insert desiccant when complete seal is required. Place equipment and provide blocking or framing to allow for ventilation and water drainage. Support cover away from item surfaces which may rust, rot, or mildew.

4-107. CARE OF EQUIPMENT IN ADMINISTRATIVE STORAGE.

a. **Maintenance Services**. After equipment has been placed in administrative storage, Inspect, service, and exercise as specified herein.

b. **Inspection.** Inspection will usually be visual and must consist of at least a walk around examination of all equipment to detect any deficiencies. Inspect equipment in open storage weekly and equipment in covered storage monthly. Inspect all equipment immediately after any severe storm or environmental change. The following are examples of things to look for during a visual inspection:

(1) Low or flat tires.
(2) Condition of preservatives, seals, and wraps.
(3) Corrosion or other deterioration.
(4) Missing or damaged parts.
(5) Water in compartments.
(6) Any other readily recognizable shortcomings or deficiencies.

4-107. CARE OF EQUIPMENT IN ADMINISTRATIVE STORAGE (Con't).

c. **Repair During Administrative Storage.** Keep equipment in an optimum state of readiness. Accomplish the required services and repairs as quickly as possible. Whenever possible, perform all maintenance on-site.

d. **Exercising.** Exercise equipment in accordance with Table 4-4, Exercise Schedule, and the following instructions:

(1) Vehicle Major Exercise. Depreserve equipment by removing only that material restricting exercise. Close all drains, remove blocks, and perform all before-operation checks. Couple air compressor unit to towing vehicle and drive for at least 25 mi (40 km).Make several right and left 900 turns. Make several hard braking stops without skidding. Do the following during exercise when it is convenient and safe: operate all other functional components and perform all during- and after-operation checks.

(2) Scheduled Services. Scheduled services will include inspection per subparagraph b and will be conducted in accordance with Table 4-4. Lubricate in accordance with Lubrication Instructions (see Chapter 3, Section I).

(3) Corrective Action. Immediately take action to correct shortcomings and deficiencies noted. Record inspection and exercise results on DA Form 2404. Record and report all maintenance actions on DA Form 2407. After exercising, restore the preservation to the original condition. Replenish lubricants used during exercising and note the amount on DA Form 2408.

Table 4-4. Exercise Schedule.

Weeks	2	4	6	8	10	12	14	16	18	20	22	24
PMCS						X						X
Scheduled Services		X		X		X		X		X		
Major Exercies												X

e. **Rotation.** Rotate items in accordance with any rotational plan that will keep the equipment in an operational condition and reduce the maintenance effort.

4-108. PROCEDURES FOR COMMON COMPONENTS AND MISCELLANEOUS ITEMS.

a. **Tires**. Visually inspect tires during each walk around inspection. This inspection includes checking tires with a tire gage. Inflate, repair, or replace as necessary those found to be low, damaged, or excessively worn. Mark inflated and repaired tires with a crayon for checking at the next Inspection.

b. **Seals.** Seals may develop leaks during storage, or shortly thereafter. If leaking persists, refer to the applicable maintenance section in this manual for corrective maintenance procedures.

4-109. REMOVAL OF EQUIPMENT FROM ADMINISTRATIVE STORAGE.

a. **Activation.** Restore the equipment to normal operating condition in accordance with the instructions contained in Chapter 4, Section II.

b. **Servicing.** Resume the maintenance service schedule in effect at the commencement of storage, or service the equipment before the scheduled dates in order to produce a staggered workload.

4-110. PREPARATION OF EQUIPMENT FOR SHIPMENT.

a. Refer to TM 55-21, TM 55-601, and TM 743-200-1 for additional instructions on processing, storage, and shipment of material.

b. Air compressor units that have been removed from storage for shipment do not have to be reprocessed if they will reach their destination within the administrative storage period. Reprocess only if inspection reveals any corrosion or if anticipated in-transit weather conditions make it necessary.

4-110. PREPARATION OF EQUIPMENT FOR STORAGE (Con't)

c. When an air compressor unit is received and has already been processed for domestic shipment, as Indicated on DD Form 1397, the air compressor unit does not have to be reprocessed for storage unless corrosion and deterioration are found during the Inspection upon receipt. List on SF Form 364 all discrepancies found because of poor preservation, packaging, packing, marking, handling, loading, storage, or excessive preservation. Repairs that cannot be handled by the receiving unit must have tags attached listing needed repairs. A report of these conditions will be submitted by the unit commander for action by ordnance maintenance unit.

CHAPTER 5
DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE

Section I. TROUBLESHOOTING PROCEDURES

5-1. GENERAL.

a. This section provides information for Identifying and correcting malfunctions which may develop when operating or maintaining the air compressor unit.

b. The Troubleshooting Symptom Index In paragraph 5-3 lists common malfunctions which may occur and refers you to the proper page In Table 5-1 for a troubleshooting procedure.

c. This section cannot list all malfunctions that may occur, nor all tests or Inspections and corrective actions. If a malfunction is not listed, or Is not corrected by the listed corrective actions, notify your supervisor.

d. When troubleshooting a malfunction:

(1) Ensure that all applicable Unit troubleshooting was performed.

(2) Locate the symptom(s) in paragraph 53 that best describes the malfunction. If appropriate symptom is not listed, notify your supervisor.

(3) Turn to the page in Table 5-1 where troubleshooting procedure for the malfunction in question Is described. Headings at top of each page show how each troubleshooting procedure is organized: MALFUNCTION, TEST OR INSPECTION (in step number order), and CORRECTIVE ACTION.

(4) Perform each step in the order listed until the malfunction is corrected. DO NOT perform any maintenance task unless the troubleshooting procedure tells you to do so.

5-2. EXPLANATIONS OF COLUMNS.

The columns in Table 5-1 are defined as follows:

(1) MALFUNCTION. A visual operational indication that something is wrong with the air compressor unit.

(2) TEST OR INSPECTION. A procedure to isolate the problem in a component or system.

(3) CORRECTIVE ACTION. A procedure to correct the problem.

5-3. TROUBLESHOOTING SYMPTOM INDEX.

Table 5-1. Direct Support and General Support Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ENGINE
1. DIFFICULT TO START/PERFORMS POORLY.
Check for proper valve clearance.
Adjust valve clearance (see paragraph 5-49).
2. EXHAUST SMOKES EXCESSIVELY.
Check for proper valve clearance.
Adjust valve clearance (see paragraph 5-49).
3. TURNS OFF PREMATURELY.
Check to see if engine idle speed is too low.
Adjust throttle control (see paragraph 5-54).
4. VIBRATES EXCESSIVELY.
Step 1. Check to see if engine idle speed is too low.
Adjust throttle control (see paragraph 5-54).
Step 2. Check for proper valve clearance.
Adjust valve clearance (see paragraph 5-49).

Table 5-1. Direct Support and General Support Troubleshooting (Con't).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
5. ENGINE OVERHEATS.
Check for defective water pump.
Replace water pump (see paragraph 572).
AIR COMPRESSOR
6. EXCESSIVE OIL IN DISCHARGE LINE.
Check for defective minimum pressure valve.
Repair or replace minimum pressure valve (see paragraph 5-104).
7. AIR DISCHARGE PRESSURE TOO LOW.
Step 1. Check to see if engine Idle speed is too low.
Adjust throttle control (see paragraph 5-54).
Step 2. Check for defective minimum pressure valve.
Repair or replace minimum pressure valve (see paragraph 5-104).
8. UNIT WILL NOT UNLOAD.
Check to see if engine idle speed is too low.
Adjust throttle control (see paragraph 5-54).

Section II. GENERAL ENGINE MAINTENANCE INSTRUCTIONS

5-4. GENERAL.

These general engine maintenance Instructions contain general shop practices and specific procedures you must be familiar with to properly maintain your engine. You should read and understand these practices and procedures before performing any Direct Support or General Support Maintenance engine procedures.

5-5. WORK SAFETY.

a. Before beginning a procedure, think about the safety risks and hazards to yourself and others. Wear protective gear such as safety goggles or lenses, safety shoes, rubber apron, or gloves.

b. Immediately clean up spilled fluids to avoid slipping.

c. When lifting heavy parts, have someone help you. Ensure that the lifting/jacking tool is working properly, that it meets the weight requirement of the part being lifted, and that it is securely fastened to the part.

d. Always use power tools carefully.

e. Observe all WARNINGs and CAUTIONs.

5-6. CLEANING INSTRUCTIONS.

WARNING

Improper cleaning methods and use of unauthorized cleaning liquids or solvents can Injure personnel and damage equipment. To prevent this, refer to TM 9-247 for further Instructions.

a. **General.** Cleaning instructions will be the same for the majority of parts and components that make up the engine assembly. The following applies to all cleaning operations.

(1) Clean all parts before inspection, after repair, and before assembly.

(2) Keep hands free of grease which can collect dust, dirt, and grit.

(3) After cleaning, all parts should be covered or wrapped to protect them from dust and dirt. Parts that are subject to rust should be lightly oiled.

b. **Tools.** Do not use scrapers, wire brushes, abrasive wheels, or compounds to clean parts unless called for In detailed instructions. These tools normally alter the size of machined surfaces and may weaken a highly stressed part.

5-6. CLEANING INSTRUCTIONS (Con't).

c. **Rubber Parts**. Clean rubber parts with clean dry lint-free rag (Item 35, Appendix E).

d. **Bearings.** Refer to TM 9-214 for instructions on cleaning bearings.

WARNING

- **Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 1000F-1380F (380C-590C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.**

- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.**

- **Avoid contact with live steam. Live steam can burn skin, cause blindness, and cause other serious Injury. Be sure to wear protective apron, gloves, and safety goggles when using live steam.**

e. **Steam Cleaning.** Before steam cleaning exterior of engine, remove all electrical equipment and other parts that could be damaged by steam or moisture. Close all openings with waterproof tape or suitable plugs. Thoroughly clean all external parts and outer surfaces. Ensure that no foreign materials enter the working parts of the engine. Clean engine using water under pressure to remove mud and dirt. Remove oil and grease using a scrub brush (Item 7, Appendix E) and dry cleaning solvent (Item 38, Appendix E). Dry engine with compressed air..

f. **Carbon Removal.** To remove carbon deposits from metal parts, follow these instructions: (1) Soak parts for a minimum of 75 minutes in heated solvent mixture of one part carbon removing compound (Item 11, Appendix E) and four parts water. The mixture container should be equipped with an exhaust system to expel fumes, and provide facilities for heating the solution to 140°F (60°C).

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

(2) Rinse parts in dry cleaning solvent (Item 38, Appendix E). A scrub brush (Item 7, Appendix E) may be used to remove carbon deposits remaining after soaking compound.

5-6. CLEANING INSTRUCTIONS (Con't).

WARNING

- Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 1000F-138°F (38°C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

- Never aim the spray gun at any person or part of the body. Pressure Is strong enough to puncture skin and cause serious Injury to personnel.

g. **Degreasing Machine.** A degreasing machine may be used to remove heavy grease and oil accumulations from metal parts. Use dry cleaning solvent (Item 38, Appendix E) in degreasing machine as degreasing agent. After removing parts from degreasing machine and before coating with rust preventive (Item 12, Appendix E) check all oil passages and cavities for dirt or blockage. A thin flexible wire should be run through oil passages to ensure that they are not clogged. Individual passages that are dirty may be cleared using a pressure spray gun and dry cleaning solvent (Item 38, Appendix E).

5-7. INSPECTION INSTRUCTIONS.

NOTE
All damaged areas should be marked for repair or replacement.

a. Inspection instructions will be the same for the majority of parts and components that make up the engine assembly. Inspection consists of the following:

(1) Checking for defects such as distortion, wear, cracks, and pitting.

(2) Checking for proper wear limits and tolerances.

b. Parts under heavy load or pressure must be inspected more thoroughly.

c. Inspect surfaces in contact with gaskets or seals for nicks, burrs, and scratches which could damage new gaskets or seals. Remove any defects before assembly.

d. Inspect electrical lines and connectors for the following:

(1) Wiring harnesses for chafed and burned insulation.

(2) Terminal connectors for loose connections and broken parts.

e. Inspect metal lines, flexible lines (hoses), and metal fittings and connectors for the following:

(1) Metal lines for sharp kinks, cracks, bad bends, and dents.

(2) Flexible lines (hoses) for fraying, evidence of leakage, and loose metal fittings or connectors.

(3) Metal fittings and connectors for thread damage and worn or rounded hex heads.

f. Inspect castings, for giongs, and machined metal parts for the following:

(1) Machined surfaces for nicks, burrs, raised metal wear, and other damage.

(2) Inner and outer surfaces for breaks and cracks.

g. Inspect bearings in accordance with TM 9-214.

5-7. INSPECTION INSTRUCTIONS (Con't).

h. Inspect shaft splines for wear, pitting, rolling, peening, and fatigue cracks.

i. Inspect gears for the following:

(1) Worn or broken teeth. Wear must not prevent gears from meshing or performing properly.

(2) Scoring or burrs on face of gears. Remove defects with soft stone, then clean thoroughly. If scoring or burrs cannot be removed with soft stone, replace gear.

(3) Chipped and burred splines. Remove burrs with soft stone, then clean thoroughly. Spline wear is not considered cause for part replacement.

(4) Burning indicated by discoloration and loss of hardness due to excessive heat.

J. Perform a fluorescent penetrant inspection of steel parts which are not easily replaced, of steel parts which have been reworked or reground, and of parts containing areas where fatigue can be expected. The following procedure should be followed when performing fluorescent penetrant Inspection:

(1) Clean and warm parts before applying penetrant. A vapor degreaser may be used as necessary to clean part.

(2) Apply penetrant to all surfaces to be examined by dipping, painting, or spraying. Penetration time for various metals are as follows:

(a) Aluminum Alloy - no less than 20 minutes.

(b) Magnesium Alloy - no less than 20 minutes.

(c) Brass or Bronze - no less than 30 minutes.

(d) Ferrous Alloys - no less than 60 minutes.

(3) Clean penetrant from all surfaces using slightly warm water. Water must be no warmer than 1200 F (490C) to prevent removal of penetrant from cracks. Cool water may be used when necessary, but cleaning time will be longer. Pressurized water spray may be used to shorten the washing cycle.

(4) Dry and develop parts using one of the following methods:

(a) Wet Developer Method. Cover parts completely with developer by spraying or dipping. Dry parts and develop in a recirculating hot air dryer for one-half the penetration time.

(b) Dry Developer Method. Dry parts completely. Cover all surfaces with developing powder by dipping or dusting. Develop parts for one-half the penetration time.

(c) No Developer Method. Drying and developing time must be at least equal to the penetration time to allow for sufficient bleeding of penetrant from the defects. Dry developer may be used as necessary for additional clarity during inspection by applying to questionable areas with a hand powder bulb.

(5) Inspect parts for cracks under black light. If cracks are evident, replacement of part is required.

(6) Clean parts thoroughly with dry cleaning solvent (Item 38, Appendix E) and lubricate with preservative oil (Item 29, Appendix E).

5-8. REPAIR INSTRUCTIONS.

a. Repair castings, for giong, and machined metal parts using the following Instructions:

(1) Repair minor cracked castings or for giong in accordance with TM 9-237.

(2) Repair minor damage to machined surfaces with a fine mill file or an abrasive cloth (Item 9, Appendix E).

(3) Replace any part with deeply nicked machined surface that could affect the assembly operation.

(4) Repair minor damage to threaded capscrew holes with thread tap of same size to prevent cutting oversize.

b. Reshape oval mounting holes to round. Drill to receive bushing with required inner diameter. Stake bushing in place with center punch.

c. Replace any bolt, screw, nut, or fitting with damaged threads. Inspect tapped holes for thread damage. If cross-threading or spalling is evident, retap the hole for the next oversize screw or stud. If retapping will weaken part, or if cost of part makes retapping impractical, replace damaged part. Chasing threads with the proper size tap or die may often be enough.

d. After repair, clean all parts thoroughly to prevent dirt, metal chips, and other foreign matter from entering any working parts.

5-9. ASSEMBLY INSTRUCTIONS.

a. Extreme care must be used In all component assembly operations to ensure satisfactory engine performance. Follow the guidelines below when assembling components:

(1) Cleanliness Is essential in all component assembly operations. Dirt and dust, even In very small quantities, are abrasive. Parts must be cleaned as specified and kept clean until assembly. Wrap or cover parts and components when assembly procedures are not immediately completed.

(2) Coat all bearings and contact surfaces with engine oil (Item 31, Appendix E) to ensure lubrication of parts during initial engine starting.

(3) Replace all gaskets and performed packings during assembly.

b. During assembly of shafts and bearings In housings, first mount bearing on shaft. Install the assembly by applying force to the shaft. When mounting bearings on shafts, always apply force to inner races.

c. When Installing oil seals, perform the following steps:

(1) Coat oil seals evenly with oil or grease.

(2) If oil seals are to be installed over keyed or splined shafts, use a guide constructed of very thin gage sheet metal shaped to the required diameter. This will prevent sharp edge of keyway or splines from cutting the oil seal.

(3) Install oil seals with seal lip facing in, applying an even force to the outer edge of the oil seal.

d. Apply sealing compound (Item 14, Appendix E) to threads of pipe plugs before installation. This will provide a better seal and will permit easier removal of pipe plug.

5-10. LINES AND PORTS.

To keep dirt from contaminating fluid systems when removing and installing fuel, oil, and coolant lines, perform the following steps:

(1) Clean fittings and surrounding area before disconnecting lines.

5-10. LINES AND PORTS (Con't).

(2) Cover, cap, plug, or tape lines and ports after disconnecting lines. When these are not available, use handcarved wooden plugs, clean rags (Item 35, Appendix E), duct tape (Item 42, Appendix E), or other similar materials to prevent dirt from entering system.

(3) Ensure that new and used parts are clean before installing.

(4) Wait to uncover, uncap, unplug, or remove tape from lines and ports until just before installing lines.

5-11. TUBES AND COMPRESSION FITTINGS.

NOTE

- Use this procedure to assemble compression fittings on engine fuel lines.
- Refer to Appendix F for Instructions on manufacturing engine fuel lines.

a. Slide nonmetallic hose inside compression sleeve of tapered fitting until hose reaches stop in sleeve.

b. Twist tapered fitting inside end of hose and tighten against hose. This forces hose against threads of compression sleeve and forms a seal.

5-12. FLUID DISPOSAL.

Dispose of contaminated drained fluids in accordance with the Standard Operating Procedures (SOP) of your unit.

Section III. ENGINE MAINTENANCE

5-13. ENGINE LIFT EYES REPLACEMENT.

This Task Covers:

a Engine Front Lift Eye Replacement

b Engine Rear Lift Eyes Replacement

Initial Setup:

Equipment Conditions:
- Master battery switch In OFF position
- Fan hub removed (see paragraph 4-48) (Front lift eye only)

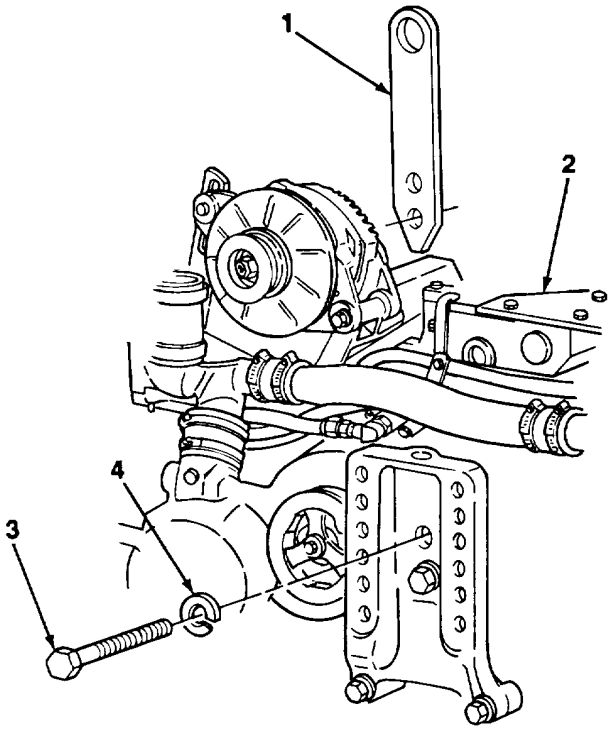
Materials/Parts:
- Two lockwashers

Tools/Test Equipment:
- General mechanic's tool kit

a. ENGINE FRONT LIFT EYE REPLACEMENT

1. Remove two bolts (3), lockwashers (4), and front lift eye (1) from engine (2). Discard lockwashers.

2. Install front lift eye (1) on engine (2) with two new lockwashers (4) and bolts (3).



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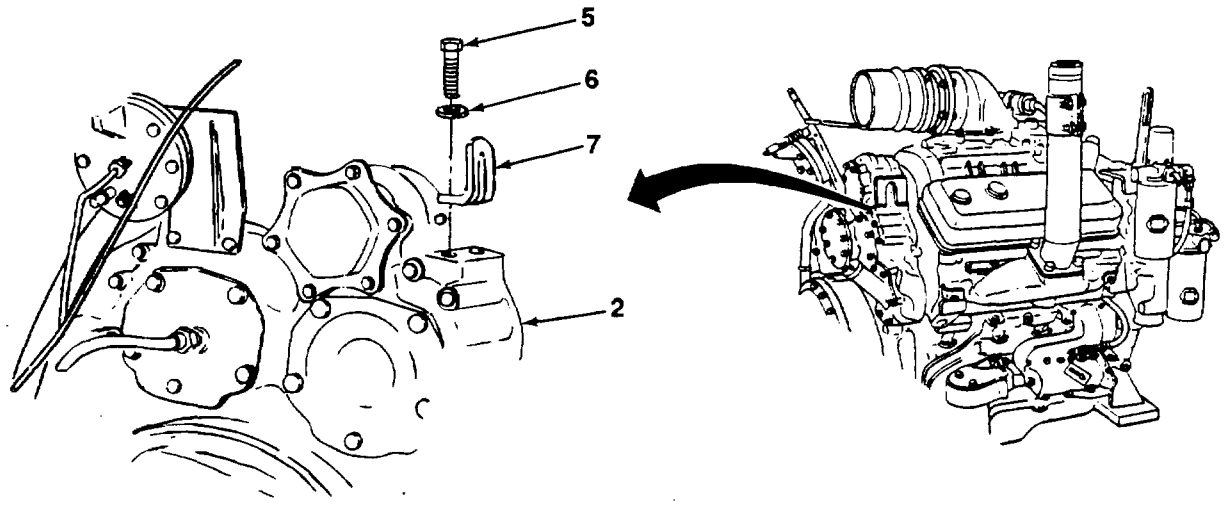
5-13. ENGINE LIFT EYES REPLACEMENT (Con't).

b. ENGINE REAR LIFT EYES REPLACEMENT

NOTE

Both rear lift eyes are replaced same way. This procedure covers one rear lift eye.

1. Remove two bolts (5), lockwashers (6), and rear lift eye (7) from engine (2). Discard lockwashers.
2. Install rear lift eye (7) on engine (2) with two new lockwashers (6) and bolts (5).



FOLLOW-ON TASKS:

- Install fan hub (see paragraph 4-48) (front lift eye only).

TA704898

5-14. AIR INLET HOUSING MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Assembly
d. Installation

Initial Setup:

Equipment Conditions:
- Engine inlet adapter and gasket removed (see paragraph 4-31)
- Emergency stop cable disconnected (see paragraph 4-39)

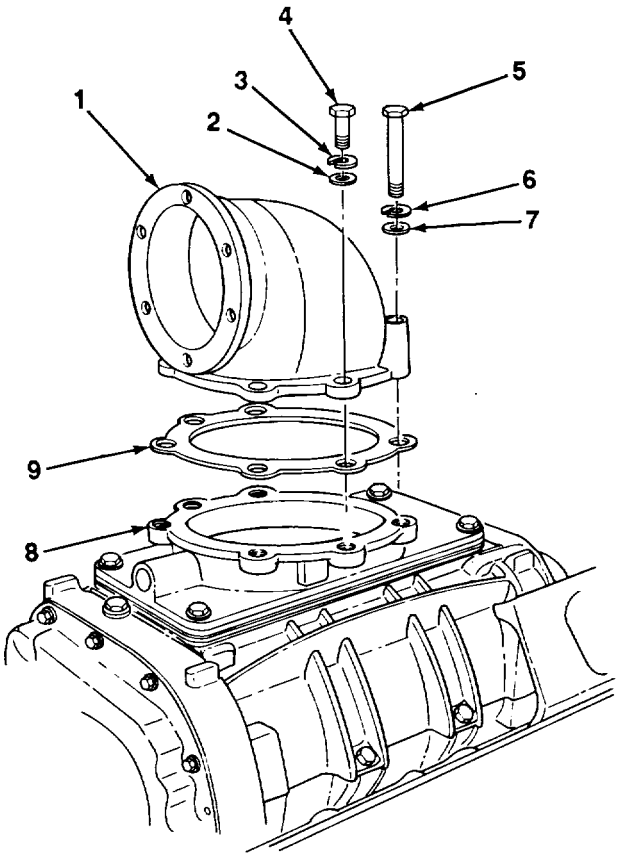
Materials/Parts:
- Two preformed packings
- Three gaskets
- Three pins
- Thirteen lockwashers

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

1. Remove two bolts (5), lockwashers (6), and washers (7) from air inlet housing (1). Discard lockwashers.

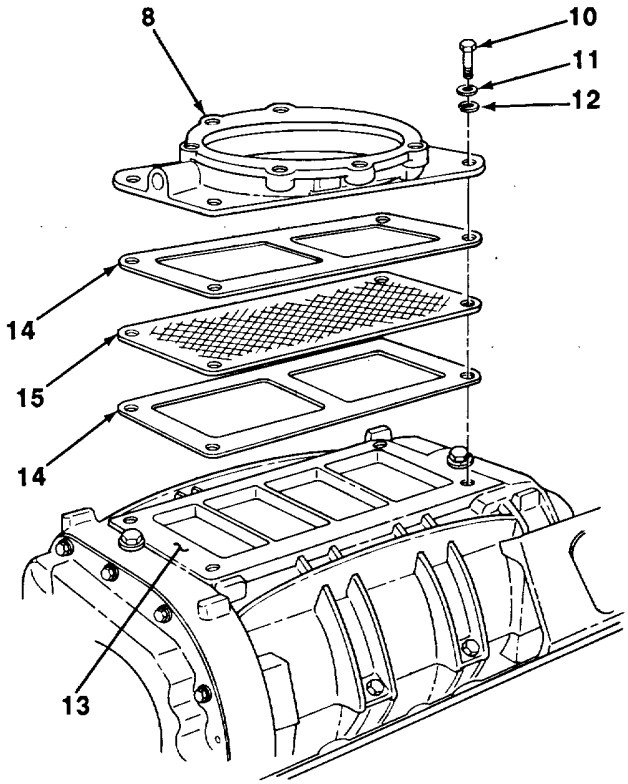
2. Remove four bolts (4), lockwashers (3), washers (2), air inlet housing (1), and gasket (9) from adapter (8). Discard lockwashers and gasket.



TA704899

5-14. AIR INLET HOUSING MAINTENANCE (Con't).

3. Remove six bolts (10), washers (11), lockwashers (12), adapter (8), two gaskets (14), and screen (15) from blower housing (13). Discard lockwashers and gaskets.

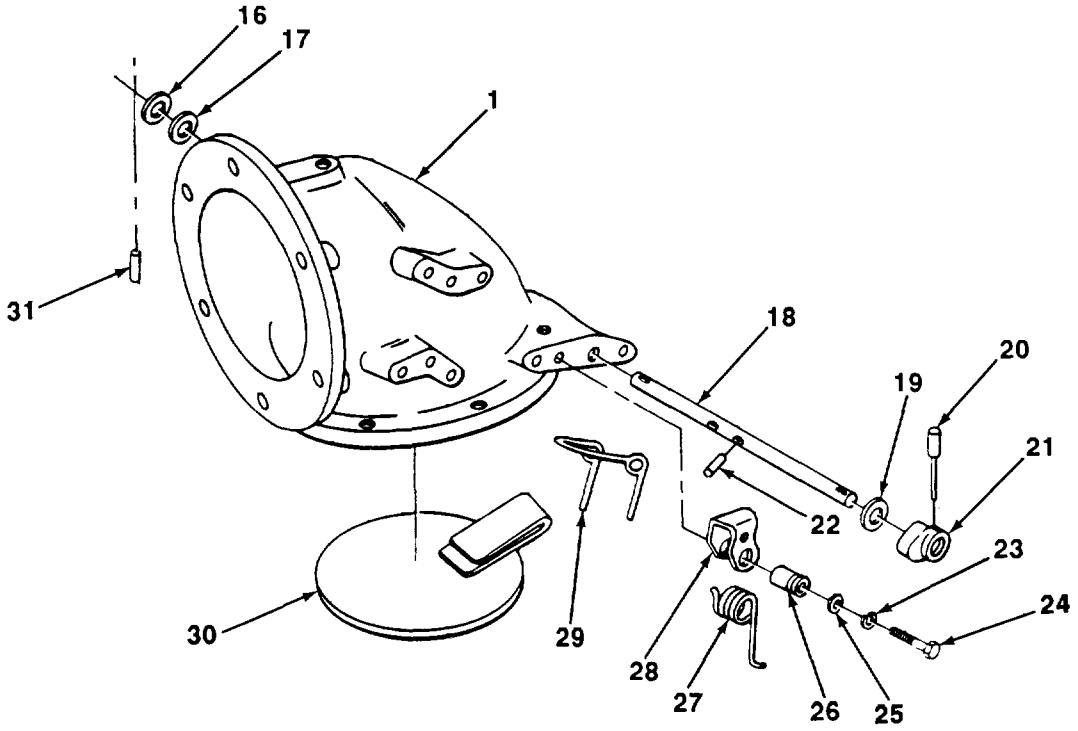


TA704900

5-14. AIR INLET HOUSING MAINTENANCE (Con't).

b. DISASSEMBLY

1. Remove bolt (24), lockwasher (23), and nut (25) from air inlet housing (1). Discard lockwasher.
2. Remove latch (28), spring (27), and bushing (26) from air inlet housing (1).
3. Remove handle (20), cam (21), and preformed packing (19) from shaft (18). Discard preformed packing.
4. Remove pin (31), washer (16), and preformed packing (17)from shaft (18). Discard pin and preformed packing.
5. Remove two pins (22) from shaft (18). Discard pins.
6. Remove shaft (18), spring (29), and valve (30) from air inlet housing (1).



c. ASSEMBLY

1. Install shaft (18) through spring (29) and valve (30) in air inlet housing (1).
2. Install two new pins (22) in shaft (18).
3. Install new preformed packing (17), washer (16), and new pin (31) in shaft (18).
4. Install new preformed packing (19) and cam (21) on shaft (18).
5. Install handle (20) in cam (21).

TA704901

5-14. AIR INLET HOUSING MAINTENANCE (Con't).

6. Position spring (27) in latch (28) and install bushing (26) through latch and spring.

7. Install latch (28) on air inlet housing (1) with nut (25), new lockwasher (23), and bolt (24).

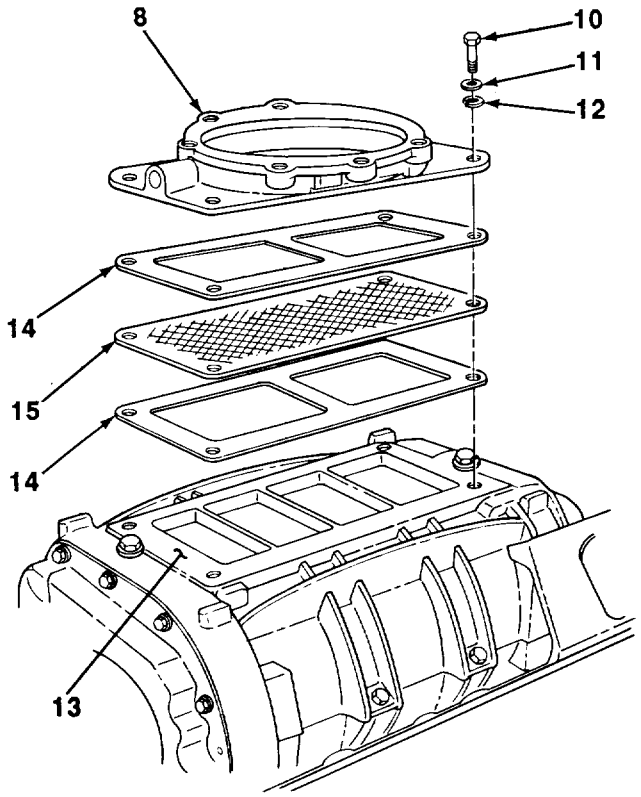
d. INSTALLATION

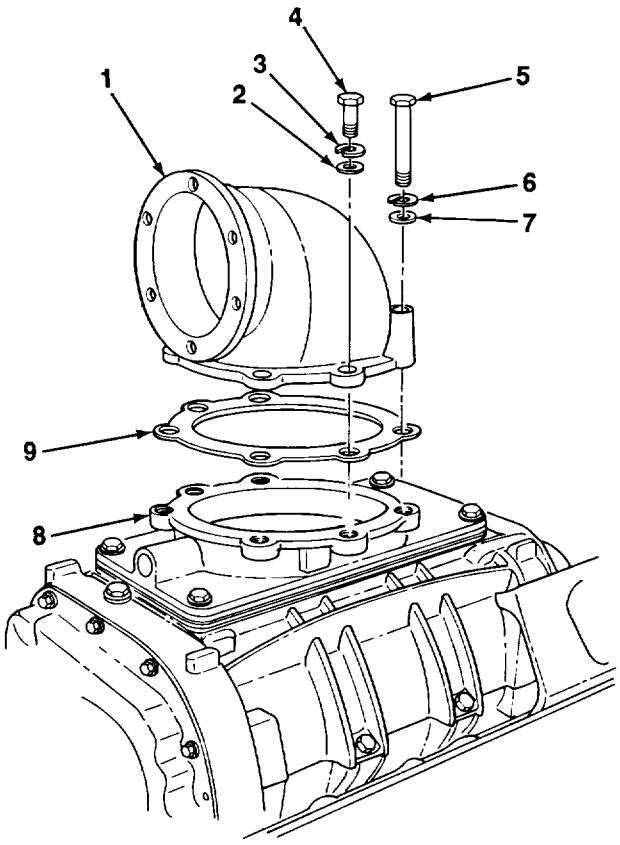
1. Aline two new gaskets (14) and screen (15) with mounting holes on blower housing (13).

2. Install adapter (8) on two gaskets (14), screen (15), and blower housing (13) with six new lockwashers (12), washers (11), and bolts (10).

3. Install new gasket (9) and air inlet housing (1) on adapter (8) with four washers (2), new lockwashers (3), and bolts (4).

4. Install two washers (7), new lockwashers (6), and bolts (5) on air inlet housing (1).





FOLLOW-ON TASKS:

- Install engine inlet adapter and gasket (see paragraph 4-31).
- Connect emergency stop cable and adjust emergency stop control (see paragraph 4-39).

TA704902

5-15. ENGINE AND AIR COMPRESSOR REPLACEMENT.

This Task Covers:

a Removal

b Installation

Initial Setup:

Equipment Conditions:

- Batteries disconnected (see paragraph 4-60)
- Wheels chocked
- Engine coolant drained (see Lubrication Instructions, Chapter 3, Section I)
- Center roof panel removed (see paragraph 5-85)
- Radiator housing side braces removed (see paragraph 571)
- Lift bail removed (see paragraph 5-97)
- Center bottom cover removed (see paragraph 4-81)
- Rear bottom cover removed (see paragraph 4-81)
- Fuel tank-to-engine fuel line removed (see paragraph 4-34).
- Fuel return line removed (see paragraph 4-37)
- Radiator hoses removed (see paragraphs 4-49 and 5-105).
- Alternator electrical lead disconnected (see paragraph 4-51)
- Starter electrical lead disconnected (see paragraph 4-54).
- Engine temperature gage line removed (see paragraph 4-77)
- Cold stop valve leads disconnected (see paragraph 4-49)
- Engine fuel stop control solenoid disconnected (see paragraph 5-66)
- Governor control assembly line disconnected (see paragraph 4-40)
- Emergency stop cable disconnected from engine governor (see paragraph 4-39)

Equipment Conditions (Con't):

- Ether line disconnected from blower inlet tube (see paragraph 5-14).
- Tachometer drive disconnected at engine (see paragraph 4-77).
- Governor linkage removed from governor and air compressor (see paragraph 4-40).
- Discharge temperature switch disconnected from air compressor discharge housing (see paragraph 4-79).
- Air compressor discharge temperature lead disconneted (see parag
- Pressure regulating valve removed (see paragraph 4-87).
  - Air compressor main oil filter lines disconnected (see paragraph 4-101).
- Air compressor disconnected from oil separator (see-paragraph 5-102).
- Fan assembly removed (see paragraph 4-47).

Materials/Parts:

- Four locknuts

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set
- Suitable lifting device

Personnel Required: Three

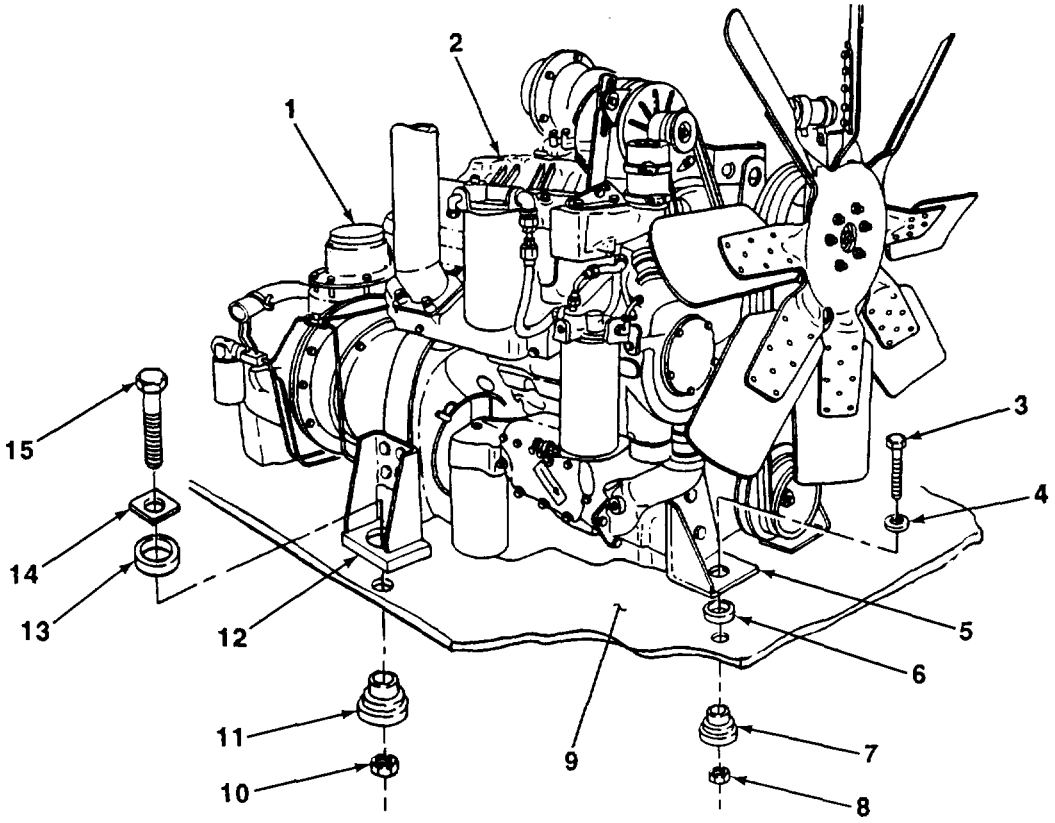
a. REMOVAL

CAUTION

Engine and air compressor must be removed as a complete unit. If engine and air compressor are separated before removal, major damage to engine, air compressor, and trailer can result.

1. Position suitable lifting device over engine (2) and air compressor (1). Attach lifting sling to engine and around air compressor. Take up slack in lifting sling and lifting device.
2. Remove two locknuts (8) from screws (3) at front engine mounts (5). Discard locknuts.

5-15. ENGINE AND AIR COMPRESSOR REPLACEMENT (Con't).



3. Remove two locknuts (10) from screws (15) at rear engine mounts (12). Discard locknuts.

WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep lear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

4. Using suitable lifting device, raise engine (2) and air compressor (1) out of trailer.

5. Remove four insulators (6 and 7) from crossmember (9).

6. Remove two Insulators (11) from crossmember (9).

7. Remove two screws (3) and washers (4) from front engine mounts (5).

8. Remove two screws (15), plates (14), and insulators (13) from rear engine mounts (12).

CAUTION

DO NOT rest engine on oil pan. Damage to engine will result.

9. Lower engine and air compressor onto wood blocks.

TA704903

5-15. ENGINE AND AIR COMPRESSOR REPLACEMENT (Con't).

10. Remove lifting device and lifting sling from engine (2) and air compressor (1).

NOTE

Refer to paragraph 5-100 to remove air compressor from engine.

b. INSTALLATION

1. Attach suitable lifting sling to engine (2) and around air compressor (1).
2. Position two Insulators (13), plates (14), and screws (15) on rear engine mounts (12).
3. Position two washers (4) and screws (3) on front engine mounts (5).
4. Position four Insulators (6 and 7) on crossmember (9).
5. Position two insulators (11) on crossmember (9).

WARNING

Use extreme caution when handling heavy parts. Lifting device Is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

6. Using suitable lifting device, raise engine (2) and air compressor (1) off wood blocks and lower in place in trailer.

TA704904

5-15. ENGINE AND AIR COMPRESSOR REPLACEMENT (Con't).

7. Install two new locknuts (8) on screws (3) at front engine mounts (5).

8. Install two new locknuts (10) on screws (15) at rear engine mounts (12).

FOLLOW-ON TASKS:

- Install fan assembly (see paragraph 4-47).
- Connect air compressor to oil separator (see paragraph 5-102).
- Connect air compressor main oil filter lines (see paragraph 4-101).
- Install pressure regulating valve (see paragraph 4-87).
- Connect air compressor discharge temperature lead (see paragraph 4-79).
- Connect discharge temperature switch to air compressor discharge housing (see paragraph 4-79).
- Install governor linkage on governor and air compressor (see paragraph 4-40).
- Connect tachometer drive to engine (see paragraph 4-77).
- Connect ether line to blower inlet tube (see paragraph 5-14).
- Connect emergency stop cable to engine governor (see paragraph 4-39).
- Connect governor control assembly line (see paragraph 4-40).
- Connect engine fuel stop control solenoid (see paragraph 5-66).
- Connect cold stop valve leads (see paragraph 4-49).
- Install engine temperature gage line (see paragraph 4-77).
- Connect starter electrical lead (see paragraph 4-53).
- Connect alternator electrical lead (see paragraph 4-51).
- Install radiator hoses (see paragraphs 4-49 and 5-105).
- Install fuel return line (see paragraph 4-37).
- Install fuel tank-to-engine fuel line (see paragraph 4-34).
- Install rear bottom cover (see paragraph 4-81).
- Install center bottom cover (see paragraph 4-81).
- Install lift bail (see paragraph 5-97).
- Install radiator housing side braces (see paragraph 5-71).
- Install center roof panel (see paragraph 5-85).
- Fill radiator with coolant (see Lubrication Instructions, Chapter 3, Section 1).
- Connect batteries (see paragraph 4-60).

5-16. ENGINE MOUNTS REPLACEMENT.

This Task Covers:

a Front Engine Mounts Replacement

b Rear Engine Mounts Replacement

Initial Setup:

Equipment Conditions:
- Engine removed (see paragraph 5-15).

Materials/Parts:
- Seven lockwashers

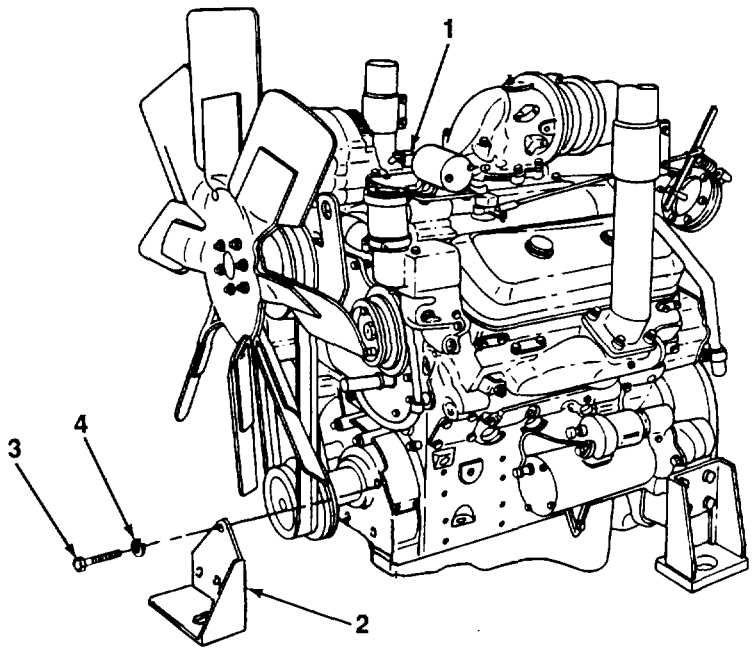
Tools/Test Equipment:
- General mechanic's tool kit

a. FRONT ENGINE MOUNTS REPLACEMENT

NOTE

Both front engine mounts are replaced same way. This procedure covers one front engine mount.

1. Remove three bolts (3), lockwashers (4), and front engine mount (2) from engine (1). Discard lockwashers.
2. Install front engine mount (2) on engine (1) with three new lockwashers (4) and bolts (3).



TA704905

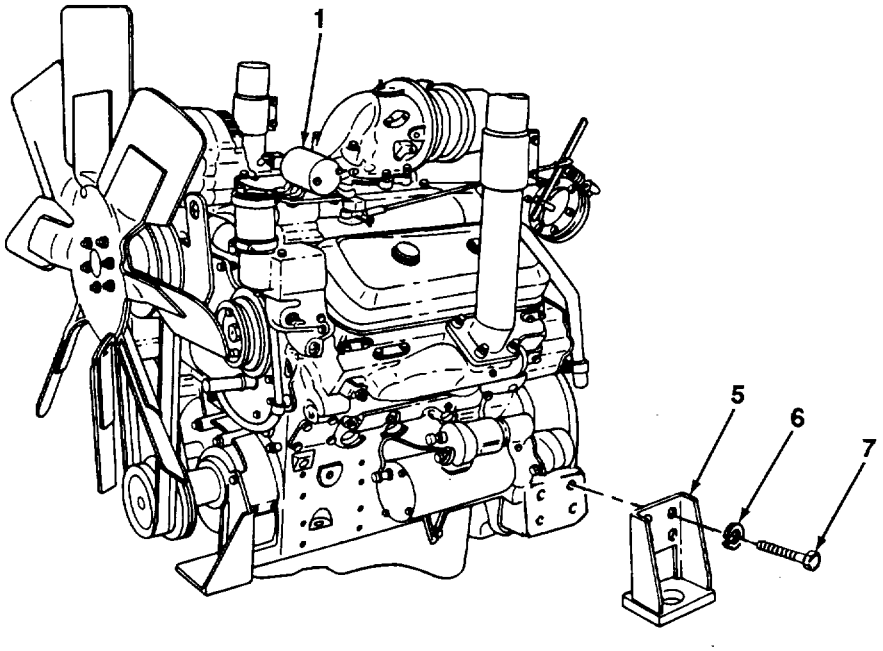
5-16. ENGINE MOUNTS REPLACEMENT (Con't).

b. REAR ENGINE MOUNTS REPLACEMENT

NOTE

Both rear engine mounts are replaced same way. This procedure covers one rear engine mount.

1. Remove four bolts (7), lockwashers (6), and rear engine mount (5) from engine (1). Discard lockwashers.
2. Install rear engine mount (5) on engine (1) with four new lockwashers (6) and bolts (7).



FOLLOW-ON TASKS:

- Install engine (see paragraph 5-15).

TA704906

5-17. ENGINE BLOCK REPAIR.

This Task Covers:

a Disassembly
b Cleaning and Inspection
c Assembly

Initial Setup:

Equipment Conditions:
- Engine starter removed (see paragraph 4-53)
- Oil cooler removed (see paragraph 5-47)
- Engine removed (see paragraph 5-15).
- Front end plate removed (see paragraph 5-18)
- Rear end plate removed (see paragraph 5-19)
- Engine air boxes removed (see paragraph 5-20)
- Engine air box drain tubes and fittings removed (see paragraph 5-21).
- Engine breather removed (see paragraph 4-30).
- Crankshaft removed (see paragraph 5-32)
- Cylinder heads removed (see paragraph 5-28)

Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- One gasket

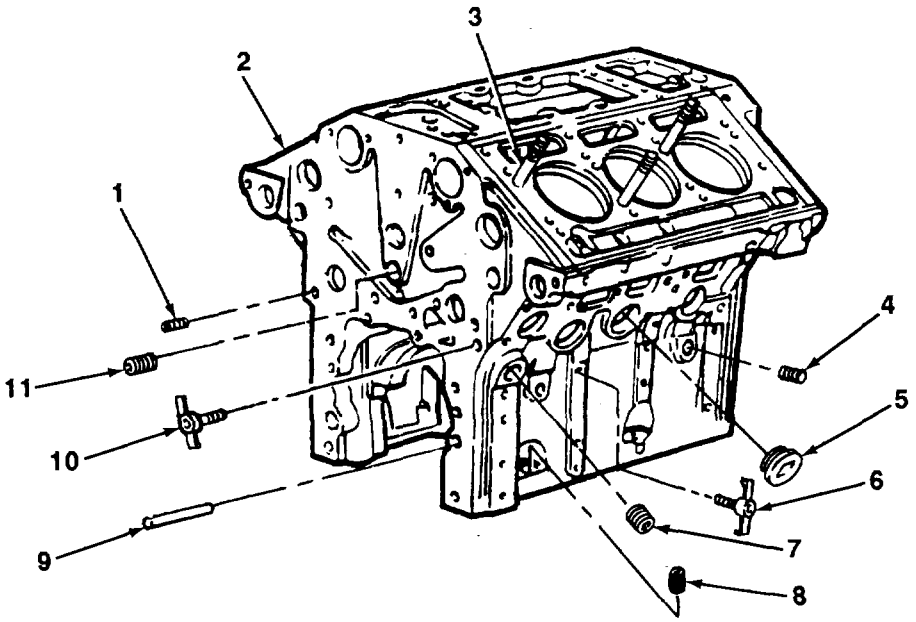
Tools/Test Equipment:
General mechanic's tool kit
Field automotive shop set
Cylinder checking gage, J5347-01
Cylinder Inner depth gage, J24898

General Safety Instructions:
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

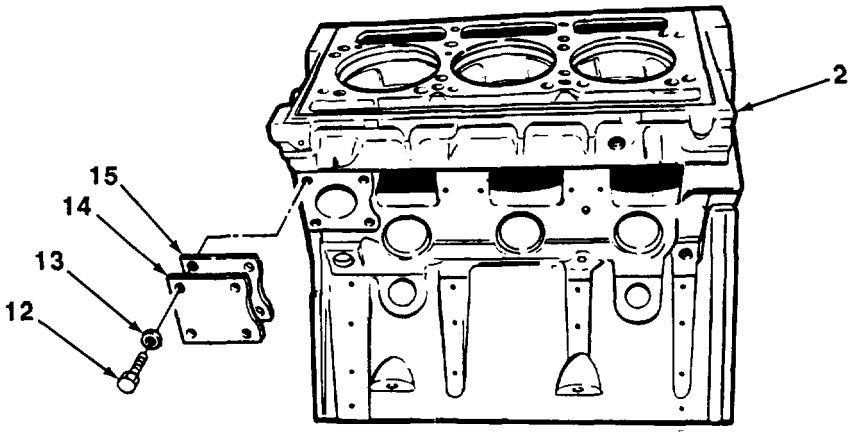
a. DISASSEMBLY I

1. Remove four pipe plugs (1), six pipe plugs (11), four pipe plugs (4), six pipe plugs (7), and five pipe plugs (8) from engine block (2).
2. Remove two draincocks (6) and draincock (10).
3. If damaged, remove two dowel pins (9) from front and two dowel pins (9) from rear of engine block (2).
4. Remove three cup plugs (5) from right and left side of engine block (2).
5. If damaged, remove three cylinder head studs (3) from each side of engine block (2).

5-17. ENGINE BLOCK REPAIR (Con't).



6. Remove four screws (12), washers (13), plate (14), and gasket (15) from engine block (2). Discard gasket.



5-17. ENGINE BLOCK REPAIR (Con't).

b. CLEANING AND INSPECTION

1. Scrape gasket material and sealing compound off engine block (2) surfaces.

WARNING

High pressure steam can cause particles to fly Into eyes, cause severe burns, and create hazardous noise levels. Eye, skin, and hearing protection Is required.

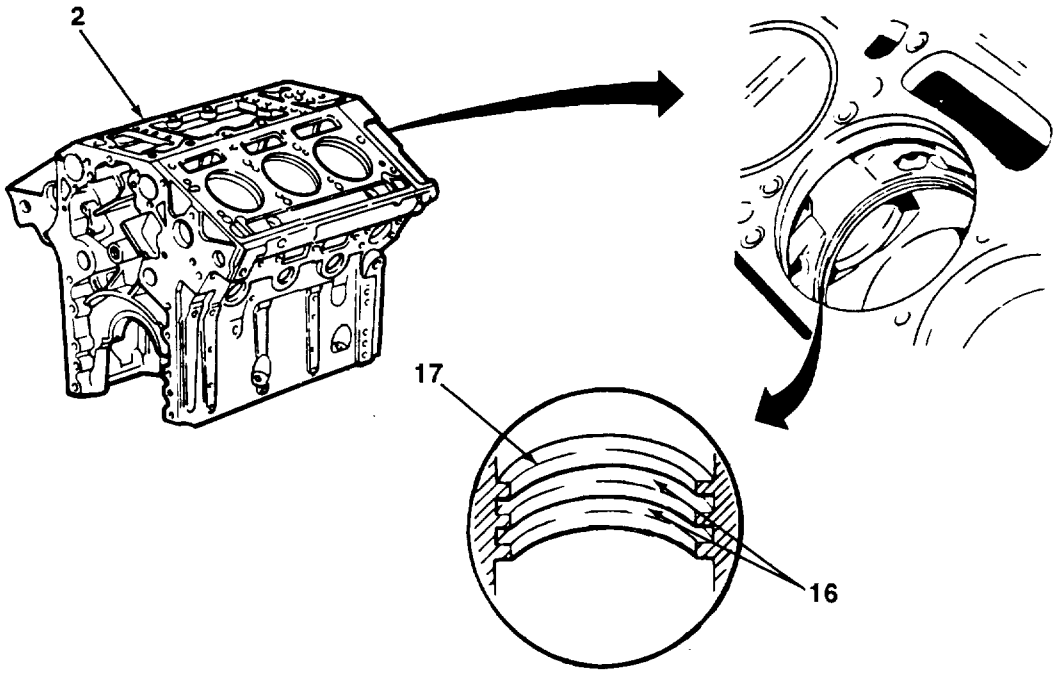
2. Steam clean engine block (2). Ensure that oil and water galleries are thoroughly cleaned.

WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

3. Dry engine block (2) with compressed air.

4. Inspect grooves (16) and lands (17) for pitting and erosion.



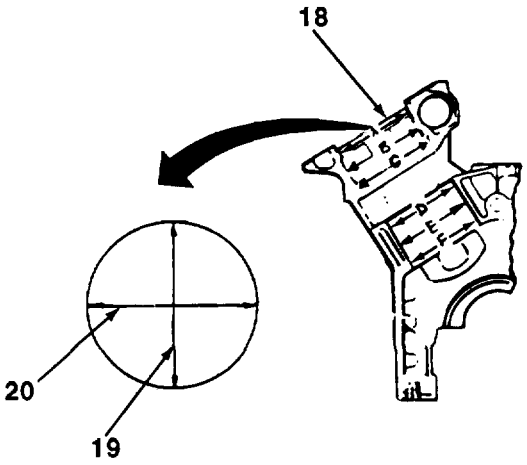
NOTE
Six cylinder bores are measured same way.

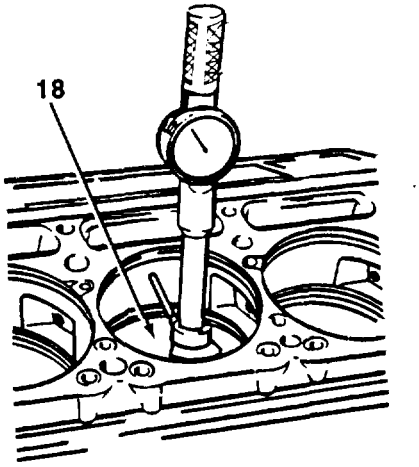
5. Make two cylinder bore (18) measurements (19 and 20) using cylinder bore gage. Record measurements.

6. Measurement at position A should read 4.6260-4.6270 in. (117.5004-117.5258 mm).

TA704908

5-17. ENGINE BLOCK REPAIR (Con't).





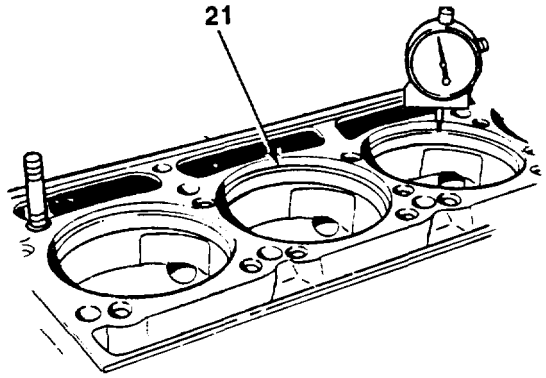
7. Set dial scale to zero (0), then turn dial clockwise to read 8. Take measurements at positions B, C, D, E, and F of cylinc from zero (0) mark on gage.

9. Out-of-round or taper must not be greater than 0.002 in.

10. Measure diameter of counterbores (21). Reading must be 5.046-5.051 in. (128.168-128.295 mm).

11. Measure depth of counterbores (21). Reading must be 0.477-0.495 in. (12.116-12.573 mm). If counterbore varies more than 0.0015 in. (0.0381mm) around edge of cylinder, engine block must be replaced.

12. No two adjacent counterbores may vary more than 0.001 in. (0.025 mm) when measured along cylinder centerline.

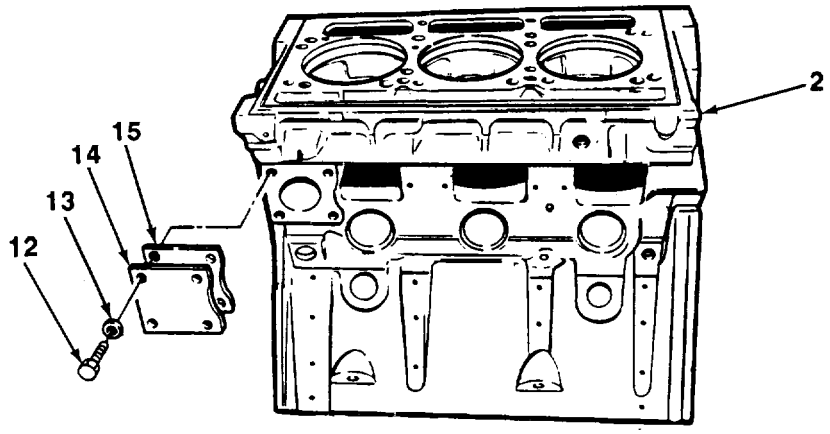


TA704909

5-17. ENGINE BLOCK REPAIR (Con't).

c. ASSEMBLY

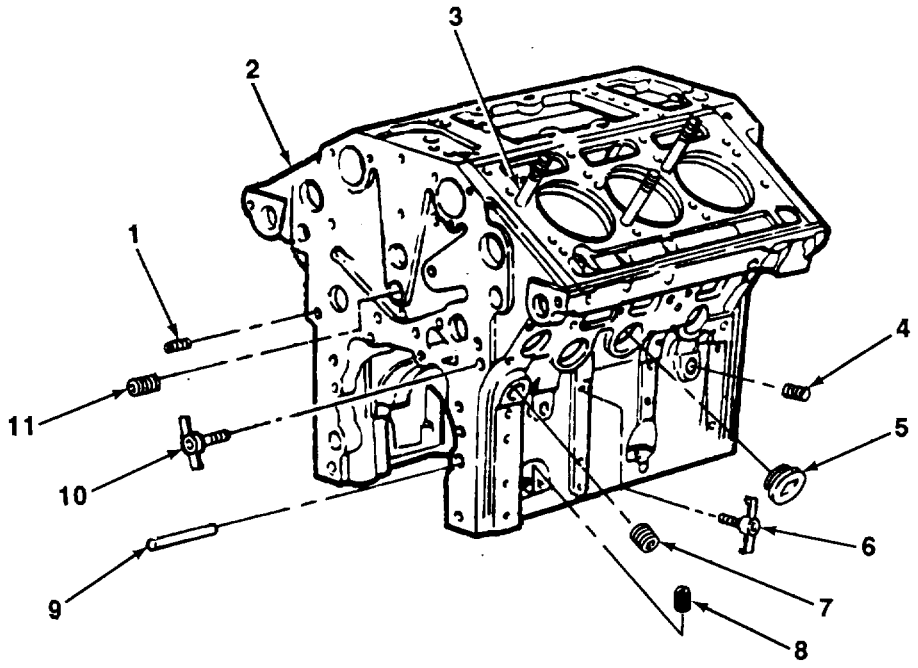
1. Install new gasket (15) and plate (14) on engine block (2) using four washers (13) and screws (12).



2. If removed, Install six cylinder head studs (3).
3. If any cylinder head studs (3) were replaced, perform steps 4 and 5. Otherwise, perform step 6.
4. Torque cylinder head stud (3) to 75 lb.-ft. (102 Nom) minimum.
5. Check that replaced cylinder head stud (3) measures 4.375 in. (111.125 mm) above engine block (2).
6. Install three cup plugs (5) in right and left side of engine block (2).
7. If removed, install two dowel pins (9) in front and two dowel pins (9) in rear of engine block (2). Ensure that dowel pins extend 0.88 in. (22.35 mm) from ends of engine block.
8. Install draincock (10) and two draincocks (6).
9. Apply sealing compound to threads of all pipe plugs and install five pipe plugs (8), six pipe plugs (7), four pipe plugs (4), six pipe plugs (11), and four pipe plugs (1) in engine block (2).

TA704910

5-17. ENGINE BLOCK REPAIR (Con't).



FOLLOW-ON TASKS:

- Install cylinder heads (see paragraph 5-28).
- Install crankshaft (see paragraph 5-32).
- Install engine breather (see paragraph 4-30).
- Install engine air box drain tubes and fittings (see paragraph 5-21).
- Install engine air boxes (see paragraph 5-20).
- Install rear end plate (see paragraph 5-19).
- Install front end plate (see paragraph 5-18).
- Install engine (see paragraph 5-15).
- Install oil cooler (see paragraph 5-47).
- Install engine starter (see paragraph 4-53).

TA704911

5-18. FRONT END PLATE REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:

Equipment Conditions:
Engine removed (see paragraph 5-15)
Camshafts removed (see paragraph 5-39)

Materials/Parts:
Grease (Item 22, Appendix E)
Two gaskets
Fifteen lockwashers

Tools/Test Equipment:
General mechanic's tool kit

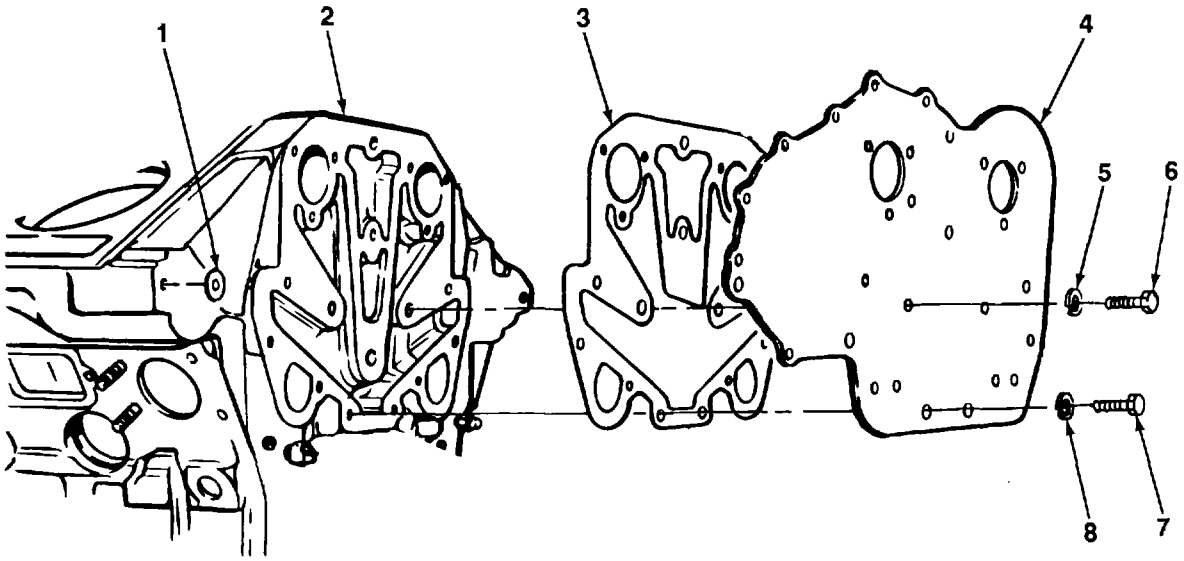
a. REMOVAL

1. Remove two bolts (7) and lockwashers (8) from front end plate (4). Discard lockwashers.

CAUTION
Support front end plate on flat, even surface to prevent bending and warping.

2. Remove 13 bolts (6), lockwashers (5), front end plate (4), and gasket (3) from engine block (2). Discard lockwashers and gasket.

3. Remove gasket (1) from engine block (2). Discard gasket.



5-18. FRONT END PLATE REPLACEMENT (Con't).

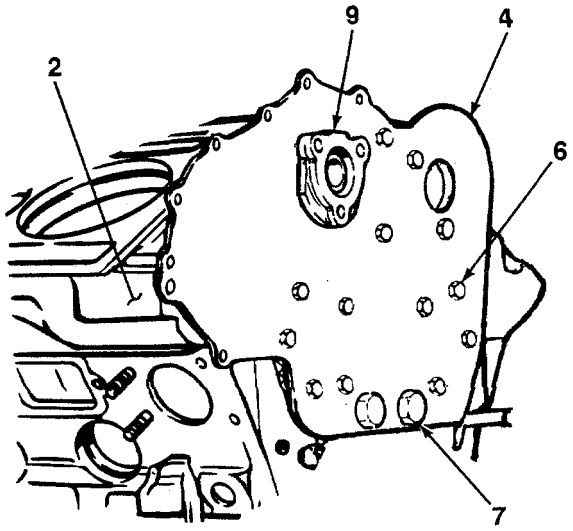
b. INSTALLATIONI

1. Install new gasket (1) on engine block (2).
2. Coat new gasket (3) with grease and install on engine block (2).
3. Install front end plate (4) on engine block (2) with two bolts (7), new lockwashers (8), 13 bolts (6), and new lockwashers (5). Tighten bolts fingertight.

NOTE

Use sleeve bearings removed in paragraph 5-39 as a pilot to aline front end plate with engine block.

4. Install two sleeve bearings (9) through front en plate (4) and engine block (2).
5. Tighten bolts (6 and 7).
6. Remove two sleeve bearings (9) from front en plate (4) and engine block (2).



FOLLOW-ON TASKS:

- Install camshafts (see paragraph 5-39).
- Install engine (see paragraph 5-15).

5-19. REAR END PLATE REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Engine removed (see paragraph 5-15).
- Idler gear removed (see paragraph 5-40).

Tools/Test Equipment:

- General mechanic's tool kit

Materials/Parts:

Grease (Item 22, Appendix E)
One gasket
Eleven lockwashers

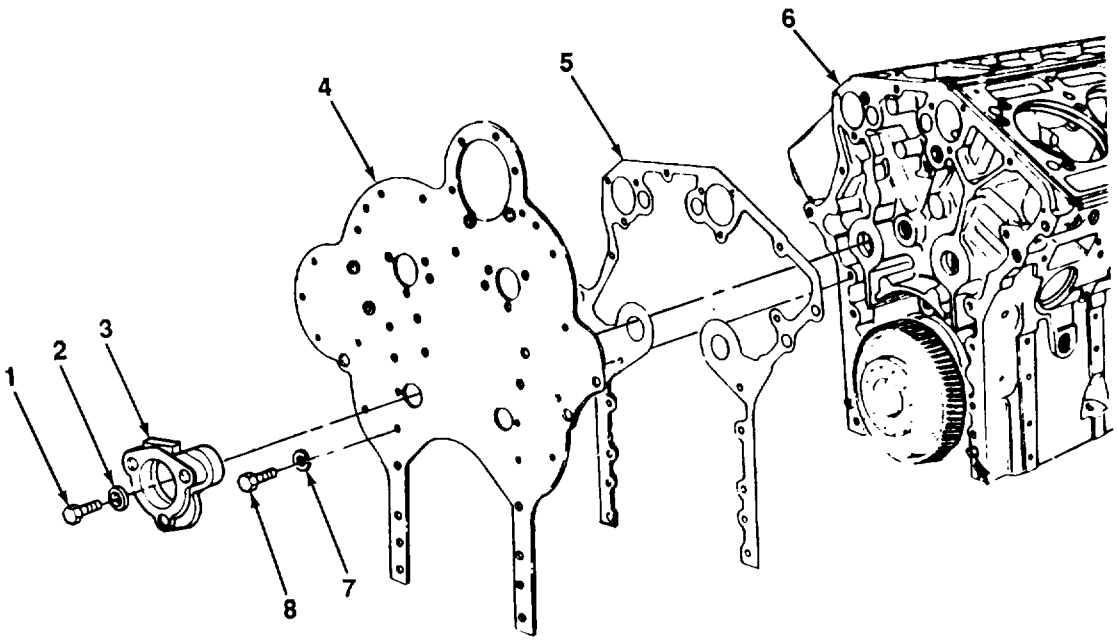
a. REMOVALI

1. Remove screw (1), washer (2), and sleeve bearing (3) from rear end plate (4).

CAUTION

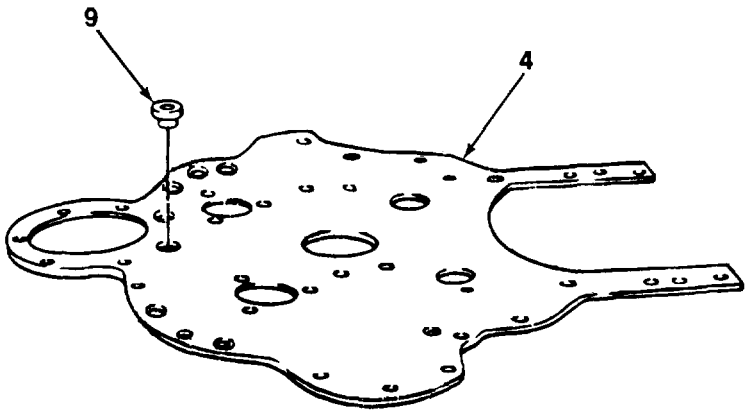
Support rear end plate on flat, even surface when removing screw Inserts to prevent bending and warping.

2. Remove ten bolts (8), lockwashers (7), rear end plate (4), and gasket (5) from engine block (6). Discard lockwashers and gasket.



5-19. REAR END PLATE REPLACEMENT (Con't).

3. If damaged, place rear end plate (4) on flat, even surface and remove screw inserts (9).



b. INSTALLATION

CAUTION

Support rear end plate on flat, even surface when Installing screw Inserts to prevent bending and warping.

1. If removed, install screws inserts (9) in back of rear end plate (4).
2. Coat new gasket (5) with grease and install on engine block (6).
3. Install rear end plate (4) on gasket (5) and engine block (6) with ten new lockwashers (7) and bolts (8). Tighten bolts fingertight.
4. Install sleeve bearing (3) through rear end plate (4) with washer (2) and screw (1). Tighten screw fingertight.

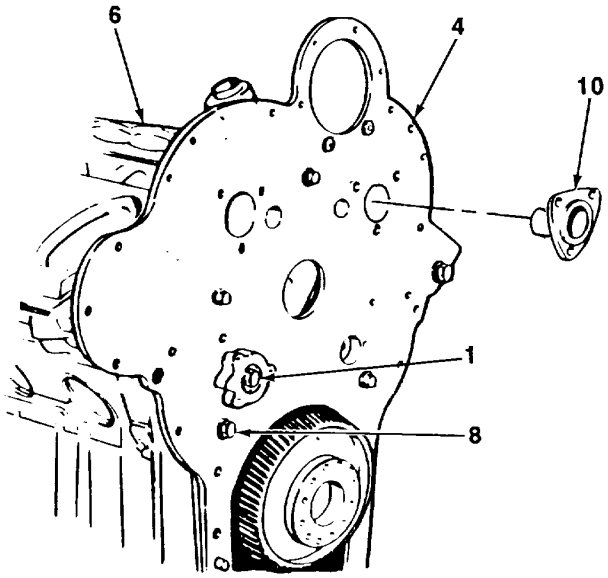
TA704915

5-19. REAR END PLATE REPLACEMENT (Con't).

NOTE

Use sleeve bearings removed In paragraph 5-40 as pilots to aline rear end plate with engine block.

5. Install two sleeve bearings (10) through rear end plate (4) and engine block (6).
6. Tighten bolts (8) and screw (1).
7. Remove two sleeve bearings (10) from rear end plate (4) and engine block (6).



FOLLOW-ON TASKS:

- Install idler gear (see paragraph 5-40).
- Install engine (see paragraph 5-15).

5-20. ENGINE AIR BOX REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:

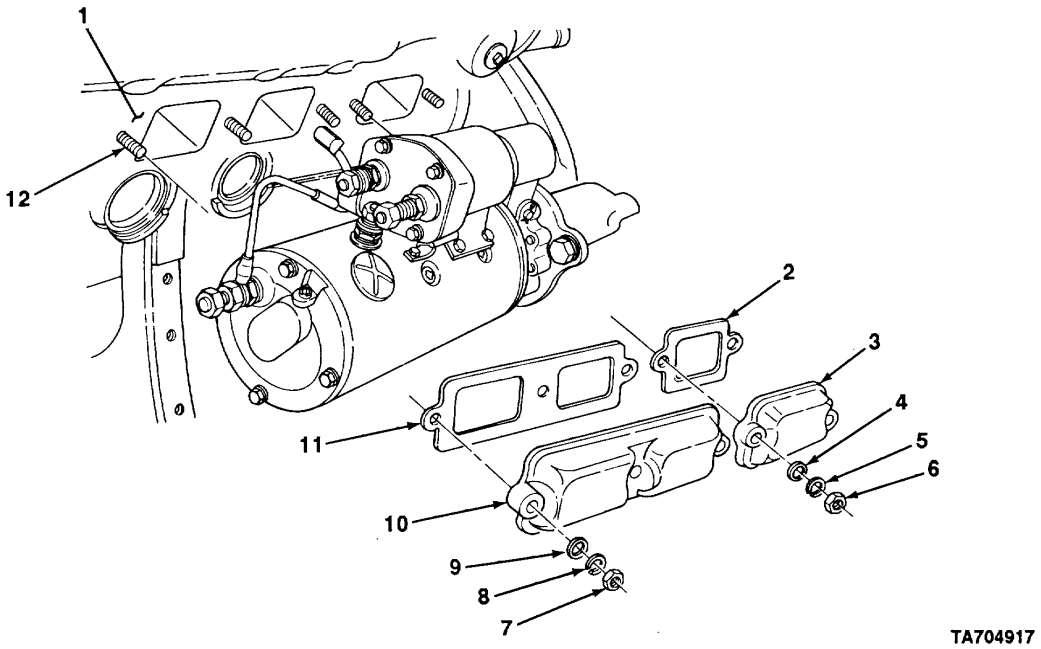
Equipment Conditions:
- Master battery switch in OFF position.
- Handbrake set.
- Engine cool.

Materials/Parts:
- Adhesive (Item 1, Appendix E)
- Four gaskets
- Ten lockwashers

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

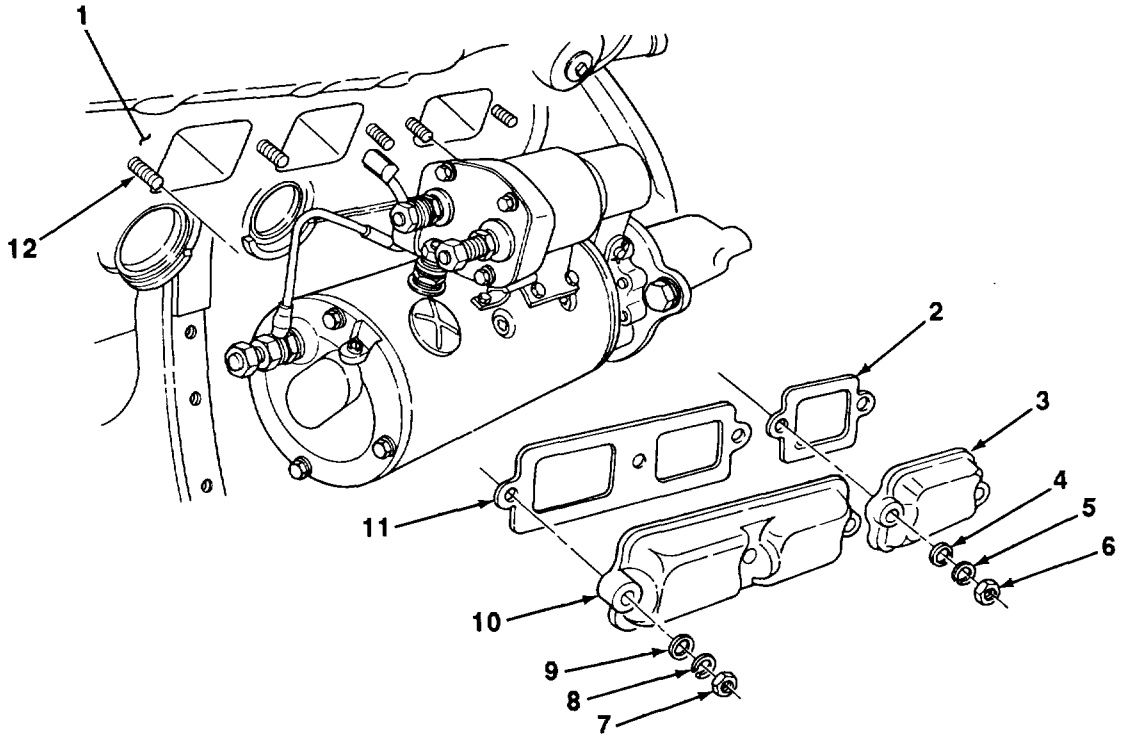
1. Remove three nuts (7), lockwashers (8), and washers (9). Discard lockwashers.
2. Remove air box (10) and gasket (11) from engine block (1). Discard gasket.
3. Remove two nuts (6), lockwashers (5), and washers (4). Discard lockwashers.
4. Remove air box (3) and gasket (2) from engine block (1). Discard gasket.
5. If damaged, remove five studs (12).
6. Repeat steps 1 through 5 for air boxes on other side of engine block (1).



5-20. ENGINE AIR BOX REPLACEMENT (Con't).

b. INSTALLATION

1. If removed, install five studs (12).
2. Coat new gaskets (2 and 11) with adhesive and install on engine block (1).
3. Install air box (3) with two washers (4), new lockwashers (5), and nuts (6).
4. Install air box (10) with three washers (9), new lockwashers (8), and nuts (7).
5. Repeat steps 1 through 4 for air boxes on other side of engine block (1).



TA704918

5-21. ENGINE AIR BOX DRAIN TUBES AND FITTINGS REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

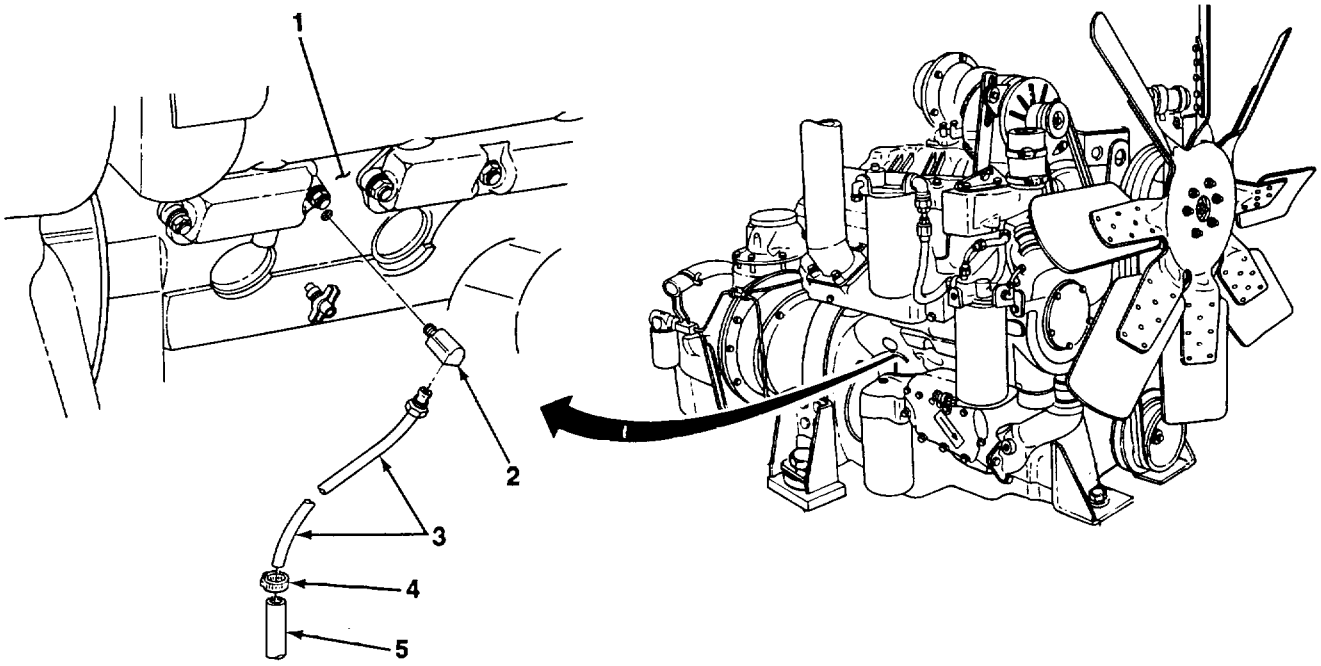
- Master battery switch In OFF position.
- Engine cool.

Tools/Test Equipment:

- General mechanic's tool kit

a. REMOVAL

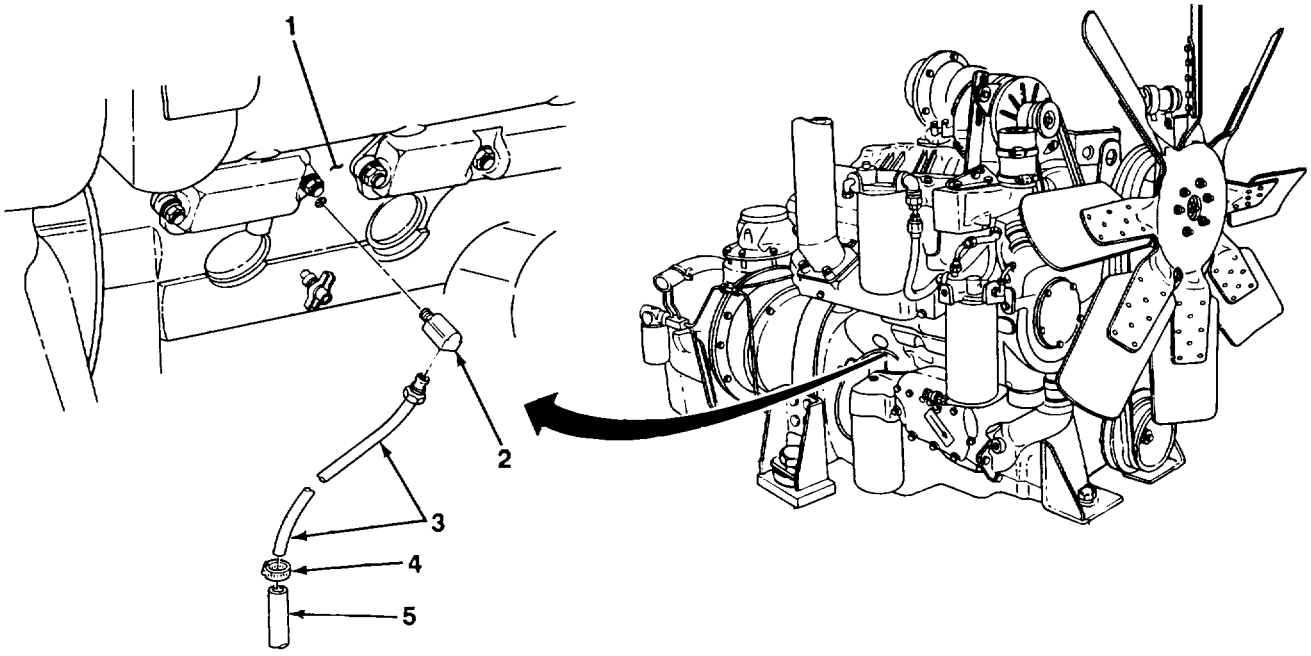
1. Remove drain tube (3) from elbow (2).
2. Loosen clamp (4) and remove hose (5) from drain tube (3). Remove clamp.
3. Remove elbow (2) from engine block (1).
4. Repeat steps 1 through 3 for drain tube (3) on other side of engine block (1).



5-21. ENGINE AIR BOX DRAIN TUBES AND FITTINGS REPLACEMENT (Con't).

b. INSTALLATION

1. Install elbow (2) in engine block (1).
2. Install clamp (4) on hose (5) and install hose on drain tube (3). Tighten clamp.
3. Install drain tube (3) on elbow (2).
4. Repeat steps 1 through 3 for drain tube (3) on other side of engine block (1).



5-22. VALVE BRIDGE GUIDE PINS REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:
Equipment Conditions:
- Fuel injectors removed (see paragraph 5-57).
- Exhaust valves removed (see paragraph 5-24).

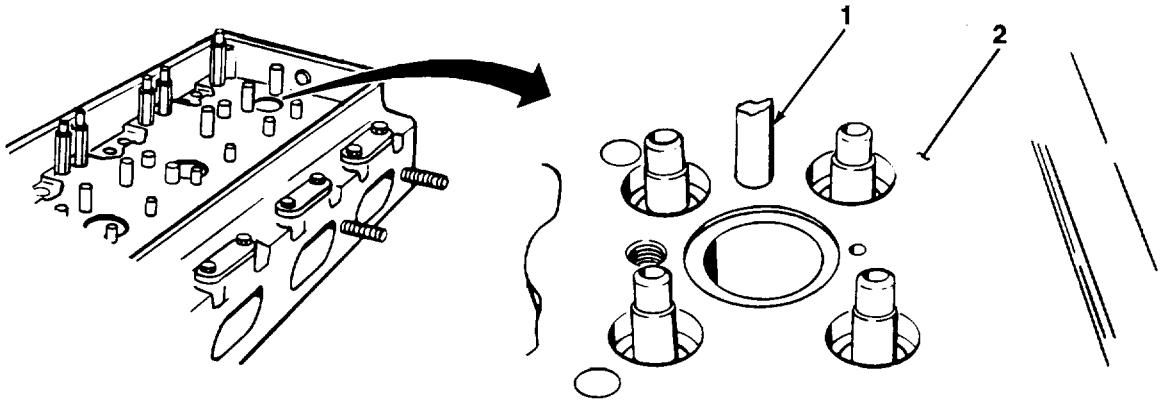
Tools/Test Equipment:
- Field automotive shop set
- Valve bridge guide installer, J7482

a. REMOVAL

NOTE

- **All twelve valve bridge guide pins are removed same way. This procedure covers one guide pin.**
- **If replacing defective guide pin, perform steps 1 through 4. If replacing broken off guide pin, perform step 5.**

1. File two notches Y1 in. (1.59 mm) deep about 1X in. (3.81 cm) from top of guide pin (1).
2. Install remover over guide pin (1) and aline two setscrews in remover with notches in guide pin. Tighten setscrews.
3. Install long spacer over remover.
4. Thread nut on remover and turn clockwise to remove guide pin (1) from cylinder head (2).
5. Center punch guide pin (1) and drill a hole using no. 3 (0.213 in.) drill bit.
6. Thread remover into guide pin (1) and remove guide pin from cylinder head (2).



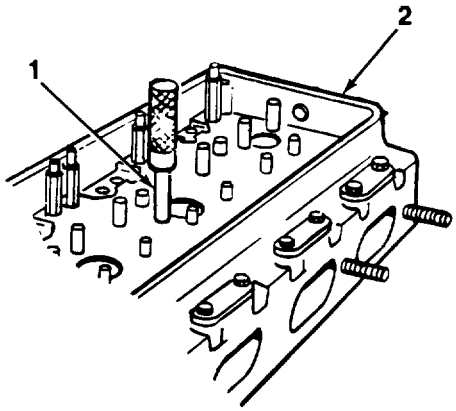
5-22. VALVE BRIDGE GUIDE PINS REPLACEMENT (Con't).

b. INSTALLATION

NOTE

All guide pins are Installed same way. This procedure covers one pin.

Install undercut edge of guide pin (1) in cylinder head (2) using valve bridge guide installer.



FOLLOW-ON TASKS:

- Install exhaust valves (see paragraph 5-24).
- Install fuel injectors (see paragraph 5-57).

5-23. VALVE GUIDE STEM REPLACEMENT.

This Task Covers:

a. Removal
b. Installation

Initial Setup:

Equipment Conditions:
Cam follower assembly removed (see paragraph 5-25).

Materials/Parts:
- Bore brush (Item 6, Appendix E)

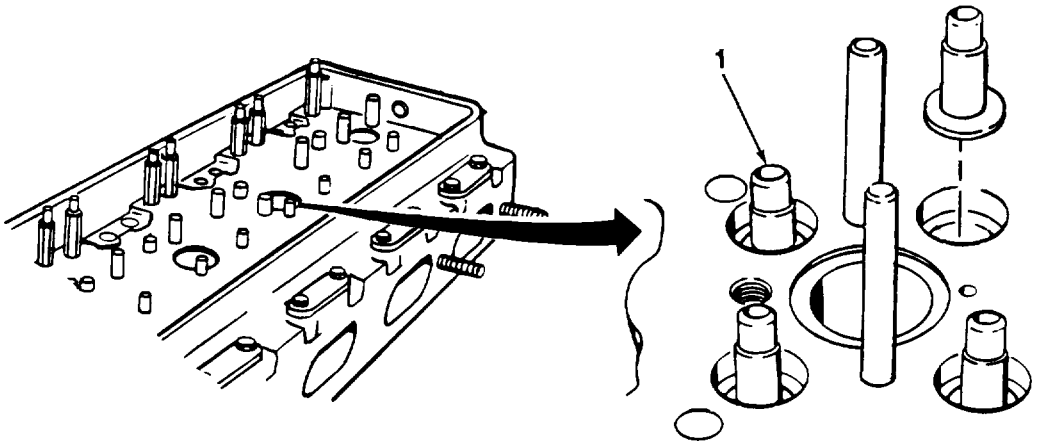
Tools/Test Equipment:
- General mechanic's tool kit
- Valve guide remover, J7715
- Valve guide installer, J9730

a. REMOVAL

NOTE

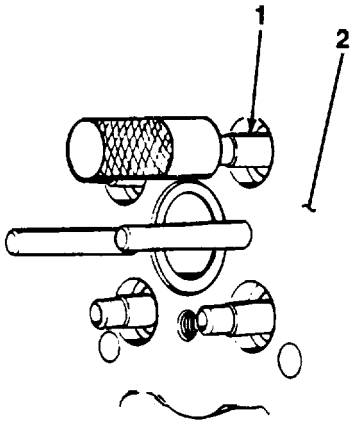
- **All 24 valve guide stems are removed same way. This procedure covers one valve guide stem.**
- **Remove valve guide stem only If replacement Is necessary.**

1. Clean valve guide stem (1) with bore brush.



5-23. VALVE GUIDE STEM REPLACEMENT (Con't).

2. With cylinder head (2) upside down, use valve guide remover and drive valve guide stem (1) out of cylinder head.



b. INSTALLATION

NOTE

All 24 valve guide stems are Installed same way. This procedure covers one valve guide stem.

1. Install threaded end of valve guide stem (1) into valve guide installer.
2. Install valve guide stem (1) in cylinder head (2) until valve guide installer contacts cylinder head.
3. Remove valve guide installer from valve guide stem (1).

FOLLOW-ON TASKS:

- Install cam follower assembly (see paragraph 5-25).

TA704924

5-24. EXHAUST VALVES MAINTENANCE.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Repair
d. Installation

Initial Setup:

Equipment Conditions:
Exhaust valve bridges removed (see paragraph 5-26)
Cam follower assemblies and pushrods removed (see paragraph 5-25)

Tools/Test Equipment:
General mechanic's tool kit
Field automotive shop set

Materials/Parts:
- Lubricating oil (Item 29, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- Marker tags (Item 40, Appendix E)
- One seal

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be
- used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should
- never exceed 30 psi (207 kPa).

a. REMOVAL

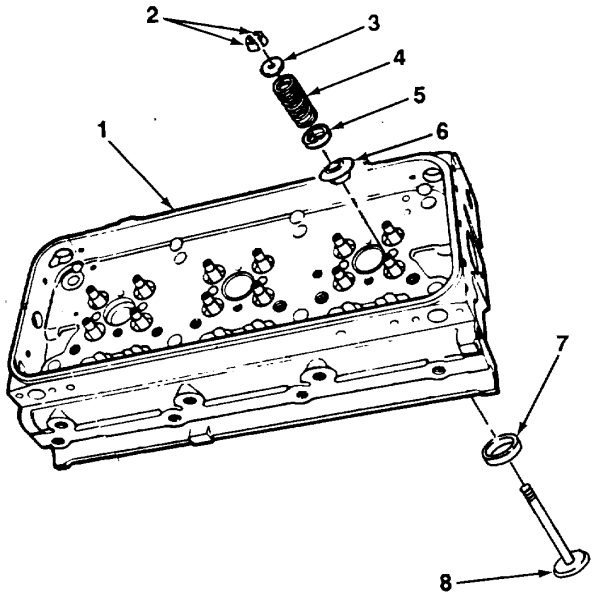
NOTE

- **All exhaust valves are removed same way. This procedure covers one exhaust valve.**
- **Tag and mark exhaust valves on removal to assist in Installation.**

2. Remove seat (3), spring (4), washer (5), and seal (6). Discard seal.

3. Remove exhaust valve (8) from cylinder head (1).

4. If damaged, removed insert (7) from cylinder head (1).



5-24. EXHAUST VALVES MAINTENANCE (Con't).

b. CLEANING AND INSPECTION

WARNING

- **Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 1000F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.**

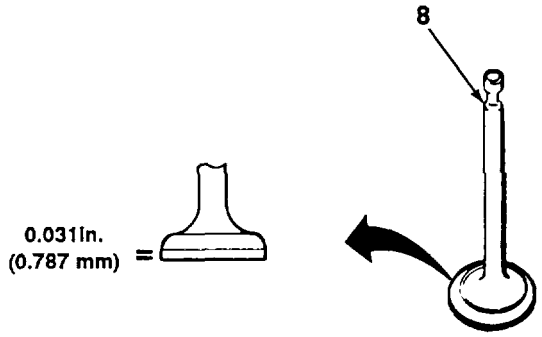
- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.**

1. Clean all metal parts with dry cleaning solvent and dry with compressed air.
2. Inspect spring for pitting and damage.
3. Check spring tension. Replace spring when a load of less than 25 lb (11.35 kg) will compress spring to 1.8 in. (4.6 cm).
4. Inspect exhaust valve stem and face for cracks, pitting, and warping.
5. Inspect outer diameter of exhaust valve face for damage. Grind or replace as required.

c. REPAIR

NOTE
Exhaust valve seat must be ground before Installation.

1. Grind exhaust valve (8) using 30° grinding stone.
2. Edge of exhaust valve (8) must be at least 0.031 in. (0.787 mm) thick after grinding.



5-24. EXHAUST VALVES MAINTENANCE (Con't).

WARNING

- **Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.**

- **Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.**

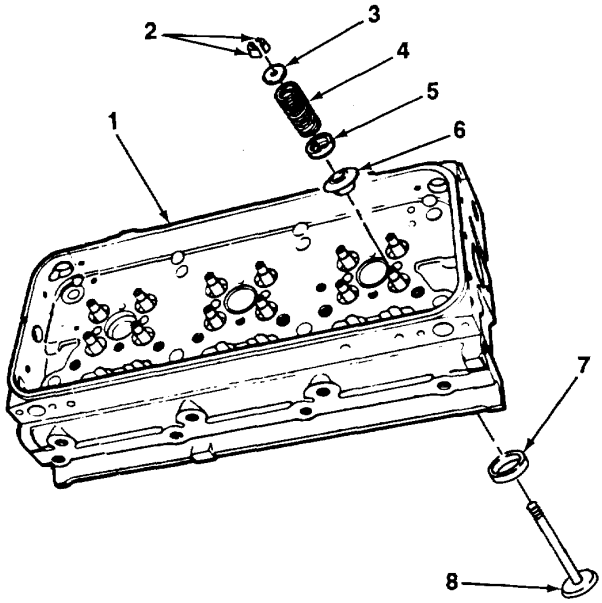
3. Clean exhaust valve (8) with dry cleaning solvent and dry with compressed air.

d. INSTALLATION

NOTE

All exhaust valves are Installed same way. This procedure covers one exhaust valve.

1. If removed, install insert (7) into cylinder head (1).
2. With cylinder head (1) on its side, apply a small amount of lubricating oil to exhaust valve (8) and install exhaust valve in cylinder head.
3. Install new seal (6), washer (5), spring (4), and seat (3) in cylinder head (1).
4. Compress spring (4) and install lock (2).
5. Release pressure on spring (4).



FOLLOWING-ON TASKS:

- Install cam follower assemblies and pushrods (see paragraph 5-25).
- Install exhaust valve bridges (see paragraph 5-26).

TA704927

5-25. CAM FOLLOWER ASSEMBLY AND PUSHROD REPLACEMENT.

This Task Covers:

a. Removal
b. Installation

Initial Setup:

Equipment Conditions:
- Cylinder head removed (see paragraph 5-28)
- Rocker arms removed (see paragraph 5-41)

Materials/Parts:
- Marker tags (Item 40, Appendix E)
- One locknut
- Two lockwashers

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

a. REMOVAL

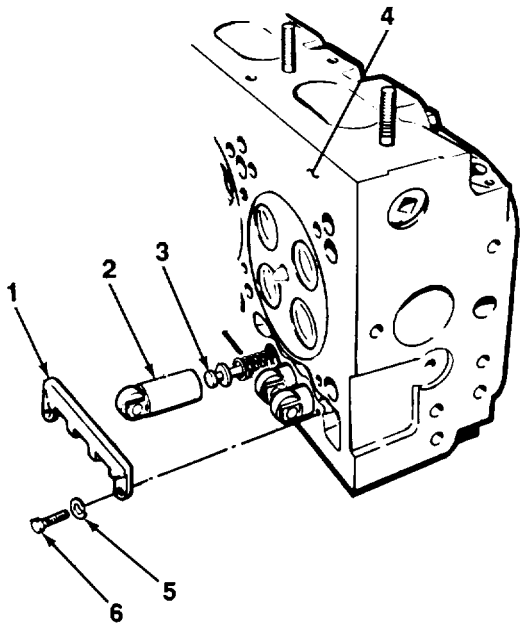
NOTE

- **All cam follower assemblies and parts are removed same way. This procedure covers one cam follower assembly and parts.**
- **Tag cam follower assembly and parts to assist In installing in original location.**

2. Remove two screws (6), lockwashers (5), and guide (1) from cylinder head (4). Discard lock- washers.

3. Remove cam follower assembly (2) and pushrod (3) as a unit from cylinder head (4).

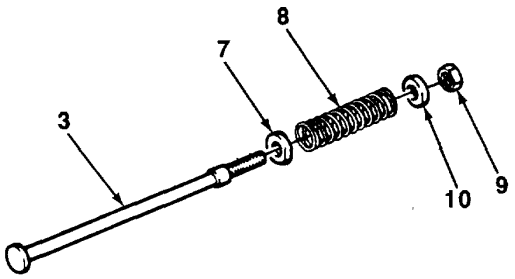
4. Remove cam follower assembly (2) from pushrod (3).



TA704928

5-25. CAM FOLLOWER ASSEMBLY AND PUSHROD REPLACEMENT (Con't).

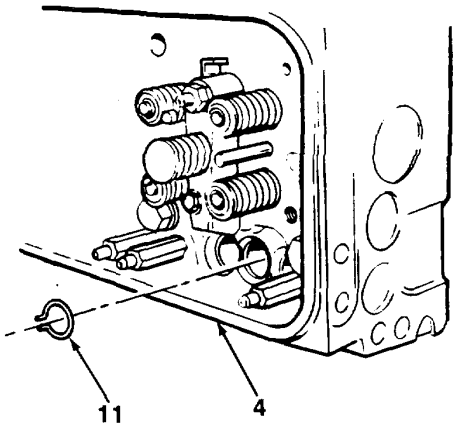
5. Remove locknut (9), upper spring seat (10), spring (8), and lower spring seat (7) from pushrod (3). Discard locknut.



NOTE

Mark direction of retaining ring to assist In Installation.

6. Remove retaining ring (11) from cylinder head (4).



b. INSTALLATION

NOTE

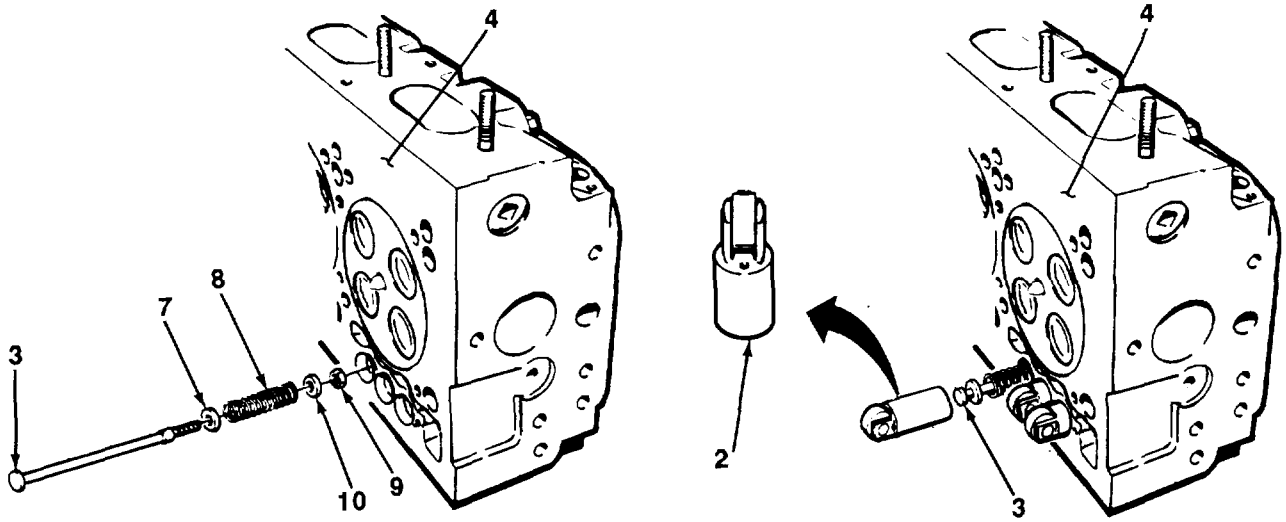
All cam follower assemblies and parts are Installed same way. This procedure covers one cam follower assembly and parts.

1. Install retaining ring (11) in bore of cylinder head (4) as marked.

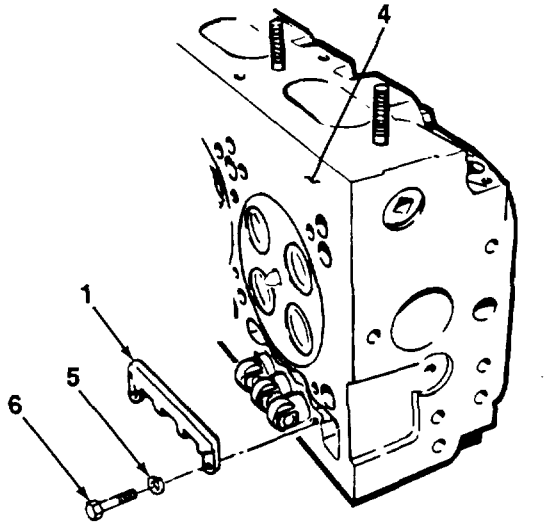
TA704929

5-25. CAM FOLLOWER ASSEMBLY AND PUSHROD REPLACEMENT (Con't).

2. Install lower spring seat (7), spring (8), upper spring seat (10), and new locknut (9) on pushrod (3).
3. Install pushrod (3) with parts in cylinder head (4).
4. Install cam follower assembly (2), with oil hole points facing away from exhaust valves, over pushrod (3) and into cylinder head (4).



5. Install guide (1) on cylinder head (4) with two new lockwashers (5) and screws (6).
6. Torque screws (6) to 15 lb.-ft. (20 Nom).

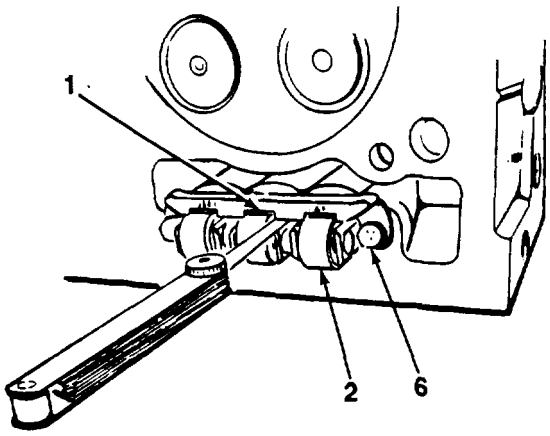


TA704930

5-25. CAM FOLLOWER ASSEMBLY AND PUSHROD REPLACEMENT (Con't).

7. Insert feeler gage between cam follower assembly (2) and legs of guide (1). Clearance between legs of guide and cam follower assembly should be 0.005 in. (0.127 mm).

8. If clearance is less than 0.005 in. (0.127 mm), loosen two screws (6), adjust position of guide (1), and repeat steps 6 and 7.



FOLLOW-ON TASKS:

- Install rocker arms (see paragraph 5-41).
- Install cylinder head (see paragraph 5-28).

5-26. EXHAUST VALVE BRIDGES REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Rocker arms removed (see paragraph 5-41)
- Marker tags (Item 40, Appendix E)

Materials/Parts:

- Lubricating oil (Item 29, Appendix E)

Tools/Test Equipment:

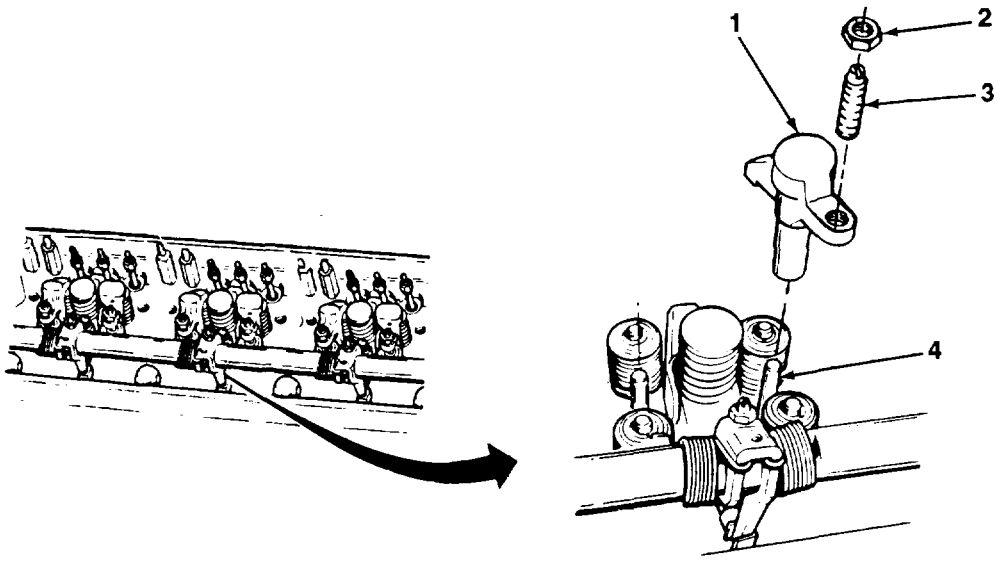
- General mechanic's tool kit
- Field automotive shop set

a. REMOVAL

NOTE

- **All exhaust valve bridges are removed same way. This procedure covers one exhaust valve bridge.**
- **Tag exhaust valve bridges for Installation.**
-

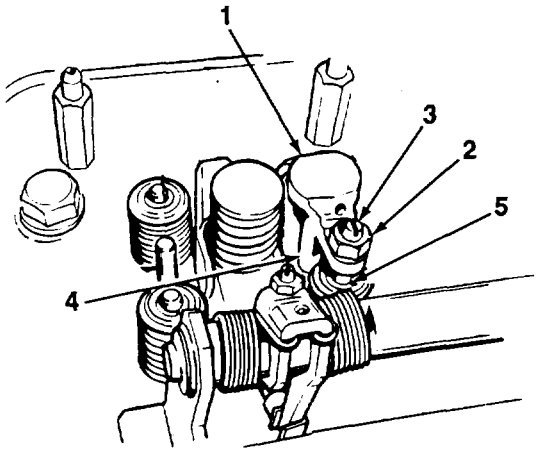
1. Remove exhaust valve bridge (1) from guide pin (4).
2. If damaged, remove screw (3) and nut (2) from exhaust valve bridge (1).
3. If damaged, remove nut (2) from screw (3).



5-26. EXHAUST VALVE BRIDGES REPLACEMENT (Con't).

b. INSTALLATION

NOTE
All exhaust valve bridges are Installed same way. This procedure covers one exhaust valve bridge.



1. If removed, install screw (3) in exhaust valve bridge (1).
2. If removed, Install nut (2) on screw (3). Do not tighten.
3. Install exhaust valve bridge (1) over guide pin (4) until seated.
4. Push down on exhaust valve bridge (1) and turn screw (3) until it touches valve stem (5).
5. Turn screw (3) an additional Y turn and tighten nut (2) fingertight.
6. Remove exhaust valve bridge (1) from guide pin (4).
7. Hold screw (3) and torque nut (2) 20-25 lb.-ft. (27-34 Nom).
8. Apply coat of lubricating oil to exhaust valve bridge (1) and guide pin (4).
9. Install exhaust valve bridge (1) on guide pin (4).
10. Place a 0.0015 in. feeler gage between exhaust valve bridge (1) and valve stem (5).
11. Press down on exhaust valve bridge (1) until feeler gage is tight.
12. Remove feeler gage.

FOLLOW-ON TASKS:
- Install rocker arms (see paragraph 541).

5-27. VALVE SEAT INSERT REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Rocker arms removed (see paragraph 5-41)
- Cam follower assemblies and pushrods removed (see paragraph 5-25)
- Exhaust valve bridges removed (see paragraph 5-26).
- Fuel injectors removed (see paragraph 5-57).
- Exhaust valves removed (see paragraph 5-24).

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set
- Installer tool, J24357
- Valve seat collet, J23479-13

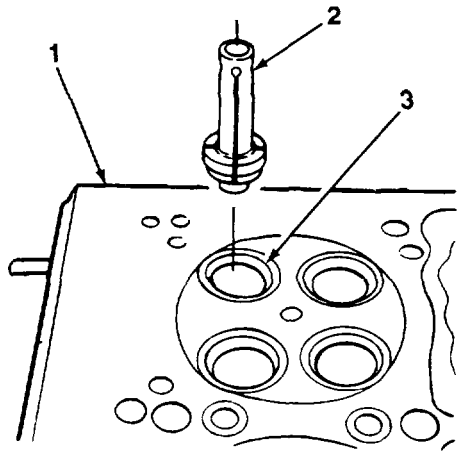
a. REMOVAL

NOTE

All 12 valve seat Inserts are removed same way.

1. Support cylinder head (1) with bottom side up.

2. Using valve seat collet (2) and puller, remove valve seat insert (3) from cylinder head (1)



5-27. VALVE SEAT INSERT REPLACEMENT (Con't).

b. INSTALLATION

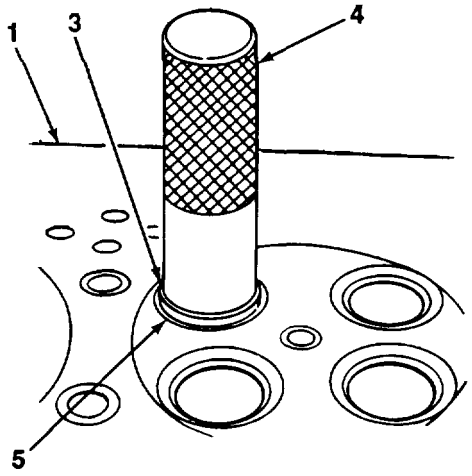
WARNING

Wear protective gloves and clothing to prevent Injury when handling heated parts.

NOTE

All 12 valve seat Inserts are Installed same way.

1. Place cylinder head (1) in water heated to temperature of 180°F-200°F (82°C-930C) for not less than 30 minutes.
2. Support cylinder head (1) with bottom side up and place valve seat insert (3) with seat side up In counterbore (5).
3. Install valve seat insert (3) into cylinder head (1) until seated using valve seat Insert installer (4).
4. Set dial indicator on cylinder head (1) and check roundness of valve seat insert (3) relative to valve guide. Total runout must not exceed 0.002 in.(0. mm).
5. If runout exceeds 0.002 In. (0.051 mm), check valve guide for damage.



FOLLOW-ON TASKS:

- Install cam follower assemblies and pushrods (see paragraph 5-
- Install exhaust valves (see paragraph 5-24).
- Install fuel injectors (see paragraph 5-57).
- Install exhaust valve bridges (see paragraph 5-26).
- Install rocker arms (see paragraph 5-41).

TA704935

5-28. CYLINDER HEAD REPLACEMENT.

This Task Covers:
a. Removal
b. Cleaning and Inspection
c. Installation

Initial Setup:
Equipment Conditions:
- Thermostat housings removed (see paragraph 4-49).
- Fuel injector control tube removed (see paragraph 559).
- Governor cover removed (see paragraph 5-67).
- Left and right bank fuel rods removed (see paragraph 5-41).
- Fuel lines disconnected (see paragraph 4-37).
- Fuel injectors removed (see paragraph 5-57).
- Exhaust manifold removed (see paragraph 4-43).

Materials/Parts:
- Dry cleaning solvent (Item 38, Appendix E)
- Eight gaskets
- Sixteen seals

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set
- Cylinder head guide studs, J24748-1

Personnel Required: **Two**
General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

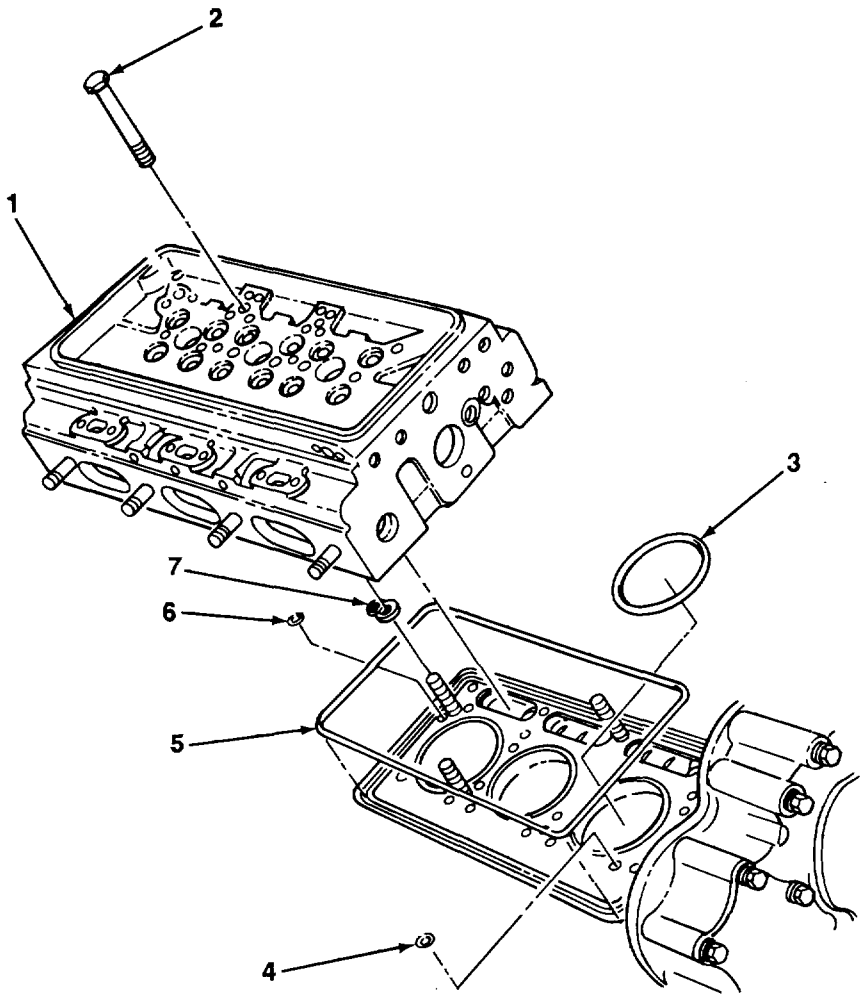
a. REMOVAL

1. Remove eight bolts (2) from cylinder head (1).
2. Remove cylinder head (1).

CAUTION
Position cylinder head on work area to prevent damage to cam followers and Injector spray tips.

3. Remove head gasket (5), three cylinder gaskets (3), seals (7), seals (4), and two seals (6). Discard gaskets and seals.
4. Repeat steps 1 through 3 for other cylinder head (1).

5-28. CYLINDER HEAD REPLACEMENT (Con't).



TA704936

5-28. CYLINDER HEAD REPLACEMENT (Con't).

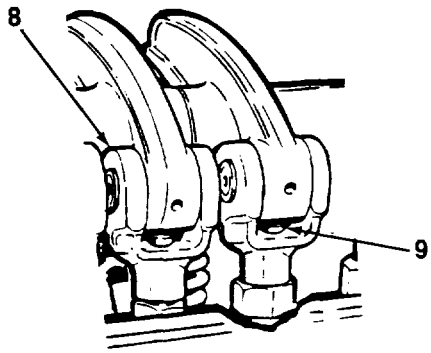
b. CLEANING AND INSPECTIONI

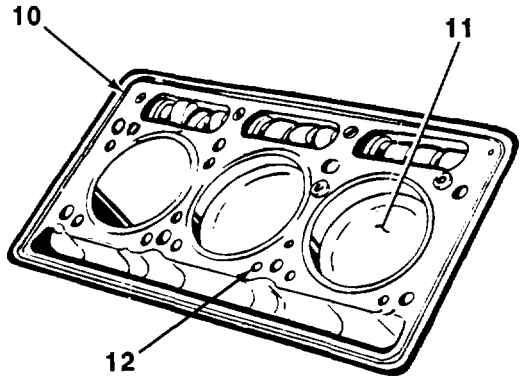
WARNING

- Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (380C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

- Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

1. Clean cylinder head and metal components with dry cleaning solvent and dry with compressed air.
2. Inspect cylinder head for cleanliness and burrs.
3. Ensure that pushrod ends (9) are threaded on clevis (8) until end of pushrod projects through clevis.
4. Ensure that piston crowns (1 1), head gasket surface (10), and seal grooves (12) are clean and free of foreign material.
5. Ensure that bolt holes are clean.



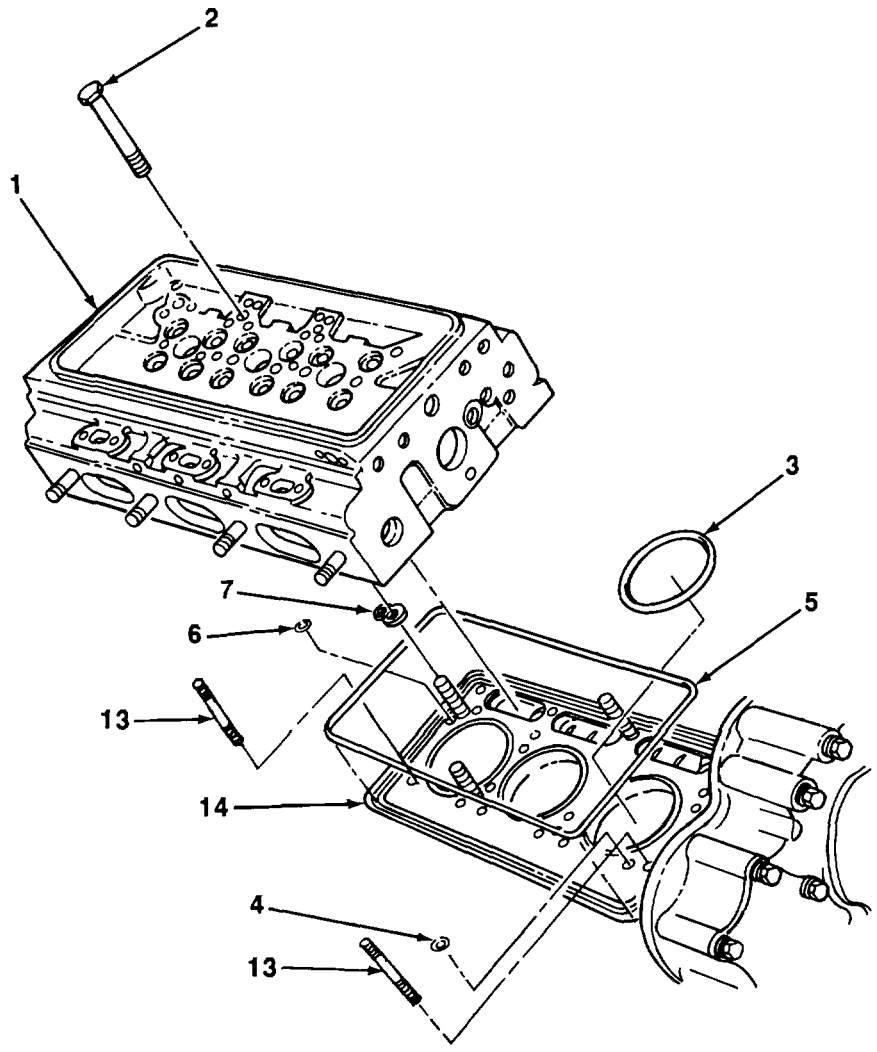


c. INSTALLATION I

1. Install three new cylinder gaskets (3), two new seals (6), three new seals (4), new seals (7), and new head gasket (5).
2. Install two cylinder head guide studs (13) into bottom comers of cylinder block (14).

TA704937

5-28. CYLINDER HEAD REPLACEMENT (Con't).



NOTE

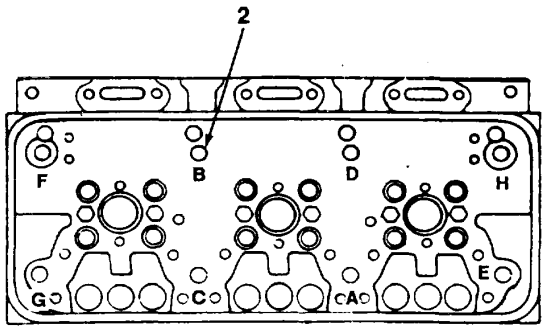
Ensure that seals and gaskets are properly seated before Installing cylinder head on cylinder block.

3. Install cylinder head (1) on cylinder block (14).
4. Apply small amount of lubricating oil to eight bolts (2), and install six bolts in cylinder head (1) to draw cylinder head down lightly.
5. Remove two cylinder head guide studs (13).
6. Install remaining two bolts (2) in cylinder head (1).

TA704938

5-28. CYLINDER HEAD REPLACEMENT (Con't).

7. Tighten eight bolts (2)) turn at a time In sequence shown until 185 lb.-ft. (251 Nom) torque is reached.



TA704939

FOLLOW-ON TASKS:

- Install left and right bank fuel rods (see paragraph 5-41).
- Install fuel injector control tube (see paragraph 5-59).
- Install fuel lines (see paragraph 4-37).
- Install governor cover (see paragraph 5-67).
- Install thermostat housings (see paragraph 4-50).
- Install fuel injectors (see paragraph 5-57).
- Install exhaust manifold (see paragraph 4-43).

TA704939

5-29. CYLINDER HEAD REPAIR.

This Task Covers:
a. Disassembly
b. Cleaning and Inspection
c. Assembly

Initial Setup:

Equipment Conditions:
- Cylinder head removed (see paragraph 5-28).
- Rocker arms removed (see paragraph 5-41).
- Exhaust valve bridges removed (see paragraph 5-26).
- Exhaust valves removed (see paragraph 5-24).
- Cam follower assemblies removed (see paragraph 5-25).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Dry cleaning solvent (Item 38, Appendix E)
- Two expansion plugs
- Six gaskets
- Twelve lockwashers

References
- TM 9-237

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. DISASSEMBLY

NOTE

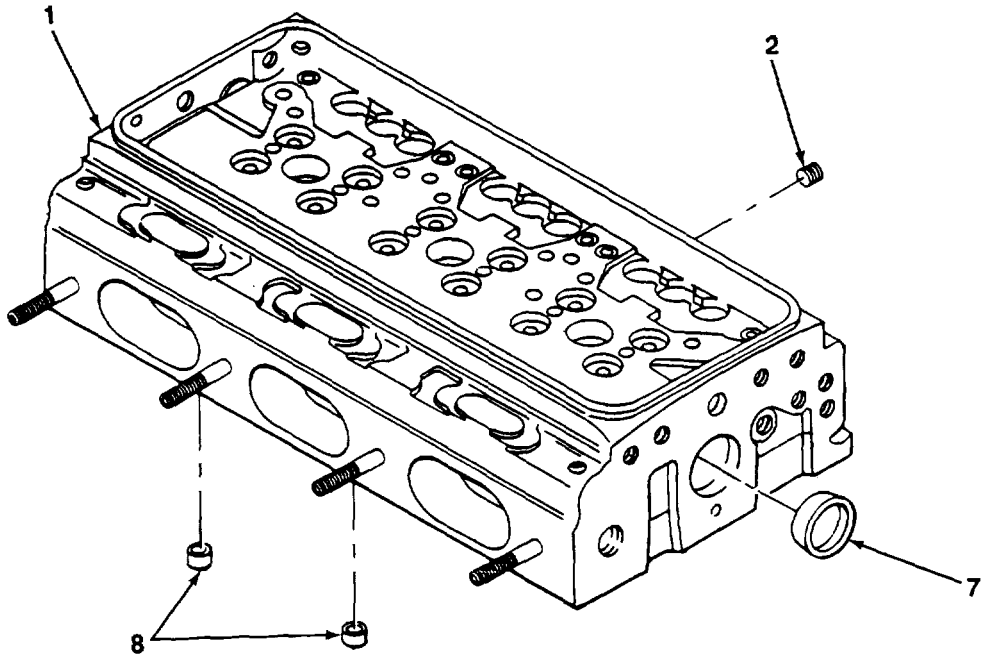
Right and left bank cylinder heads are disassembled same way. This procedure covers one cylinder head.

1. Remove two screws (3), lockwashers (4), access cover (5), and gasket (6) from cylinder head (1). Discard gasket and lockwashers.

TA704940

5-29. CYLINDER HEAD REPAIR (Con't).

2. If damaged, remove 21 pipe plugs (2) from cylinder head (1).
3. Remove two expansion plugs (7). Discard expansion plugs.
4. Remove four water nozzles (8).

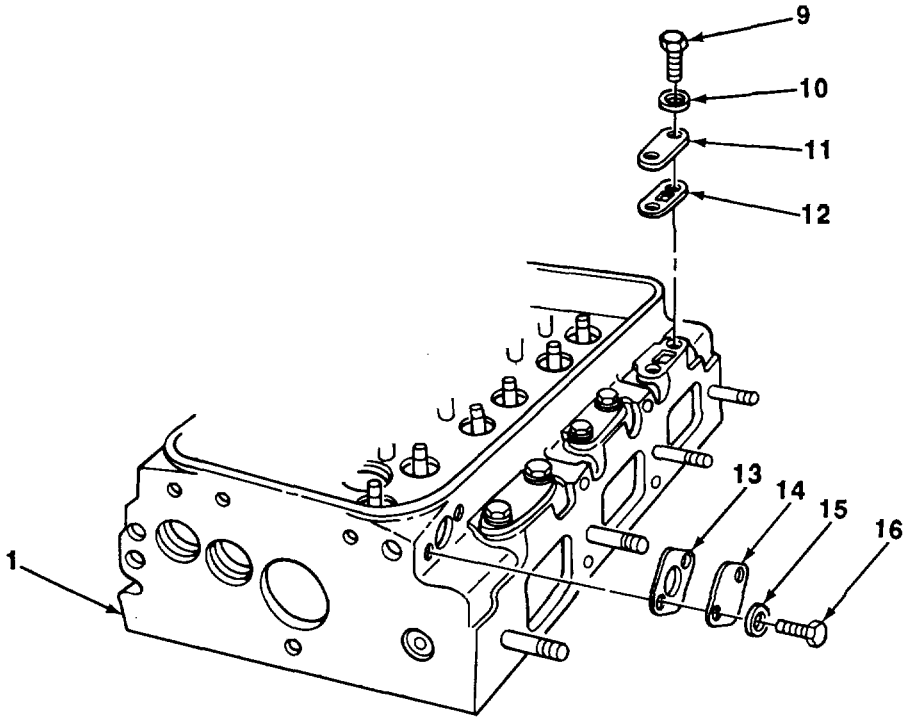


5. Remove four screws (16), lockwashers (15), two cover plates (14), and gaskets (13) from cylinder head (1). Discard lockwashers and gaskets.
6. Remove six screws (9), lockwashers (10), three plates (11), and gaskets (12). Discard lockwashers and gaskets.

TA704941

5-29. CYLINDER HEAD REPAIR (Con't).

b. CLEANING AND INSPECTION I



WARNING

- Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

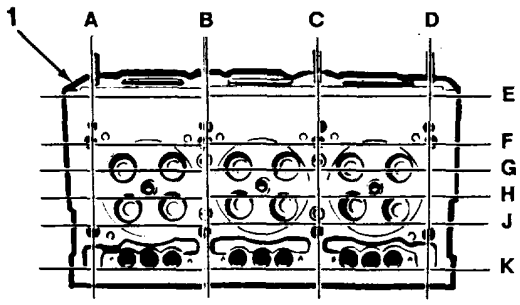
- Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

1. Clean cylinder head with dry cleaning solvent and dry with compressed air.
2. Perform magnetic particle test on cylinder head (see TM 9-237).

TA704942

5-29. CYLINDER HEAD REPAIR (Con't).

3. Aline straightedge along lines A, B, C, and D on cylinder head (1).
4. Using feeler gage, measure for warp at points where lines E, F, G, H, J, and K intersect straightedge.
5. Warp measurement In step 4 must not be larger than 0.004 in. (0.102 mm) at any point. If warp exceeds limit, replace cylinder head.
6. Aline straightedge along lines E, F, G, H, J, and K on cylinder head (1).



7. Using feeler gage, measure for warp at points where lines A, B, C, and D intersect straightedge.
8. Warp measurement in step 7 must not be larger than 0.0055 in. (0.1397 mm) at any point. If warp exceeds limit, replace cylinder head.

c. ASSEMBLY

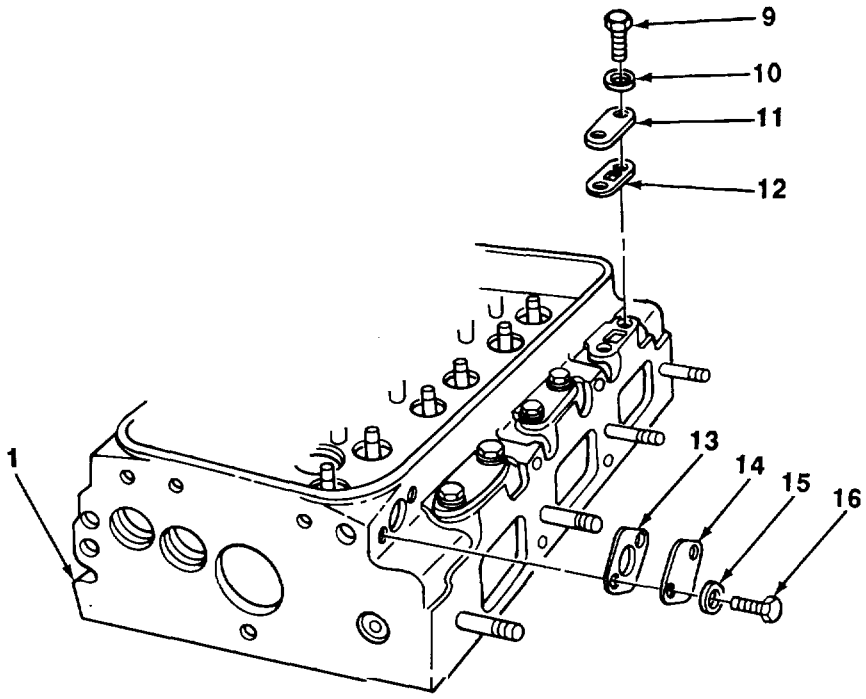
NOTE

Right and left bank cylinder heads are assembled same way. This procedure covers one cylinder head.

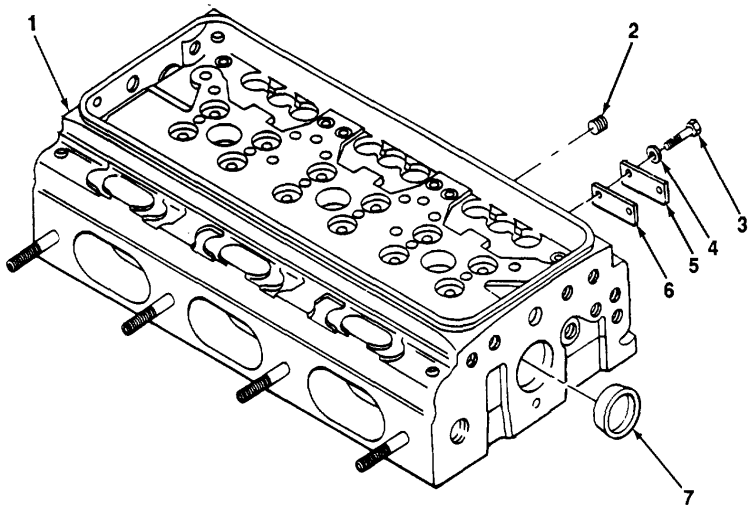
1. Install three plates (11) and new gaskets (12) on cylinder head (1) using six screws (9) and new lockwashers (10).
2. Install two cover plates (14) and new gaskets (13) on cylinder head (1) using four screws (16) and new lockwashers (15).

TA704943

5-29. CYLINDER HEAD REPAIR (Con't).



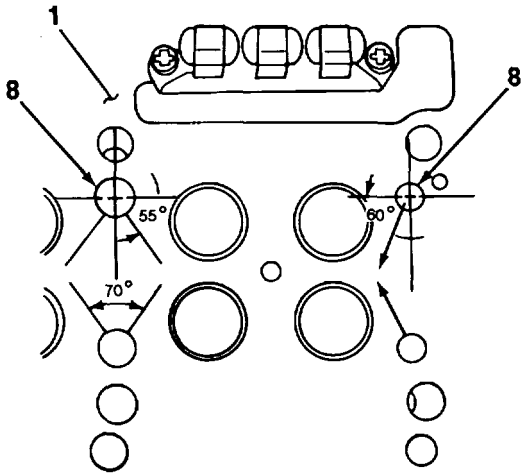
3. Install two new expansion plugs (7).
4. If removed, install 21 pipe plugs (2) into cylinder head (1).
5. Install access cover (5) and new gasket (6) on cylinder head (1) using two screws (3) and new lockwashers (4).



TA704944

5-29. CYLINDER HEAD REPAIR (Con't).

6. Install four water nozzles (8) in bottom of cylinder head (1) at angles shown.



FOLLOW-ON TASKS:

- Install cam follower assemblies (see paragraph 5-25).
- Install exhaust valves (see paragraph 5-24).
- Install exhaust valve bridges (see paragraph 5-26).
- Install rocker arms (see paragraph 5-41).
- Install cylinder head (see paragraph 5-28).

5-30. INJECTOR TUBE REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:
Equipment Conditions:
- Cylinder head removed (see paragraph 5-28).
- Rocker arms removed (see paragraph 5-41).
- Exhaust valve bridges removed (see paragraph 5-26).
- Fuel injectors removed (see paragraph 5-57).
- Exhaust valve removed (see paragraph 5-24).
- Cam follower assemblies and pushrods removed (see paragraph 5-25).

General Safety Instructions:
- Dry cleaning solvent Is flammable and must not be used near open flame. Use only In a well-ventilated area.

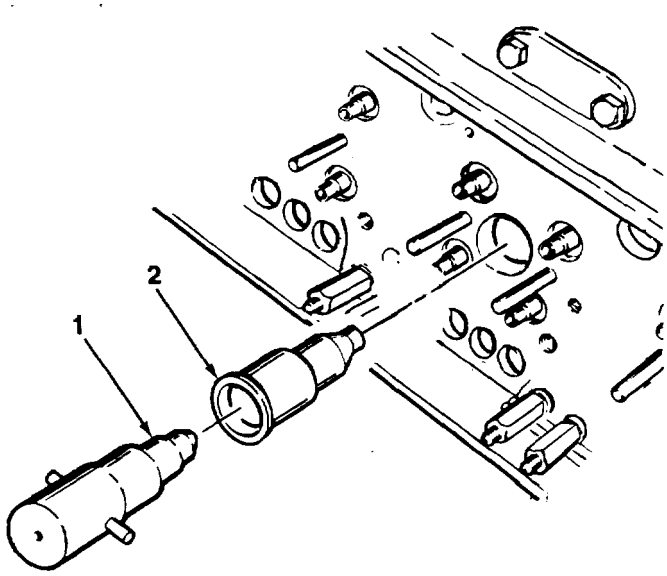
Materials/Parts:
- Lubricating oil (Item 28, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- One preformed packing

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set
- Injector set, J25521
- Reconditioning set, J22525

a. REMOVAL

NOTE
All Injector tubes are removed same way.

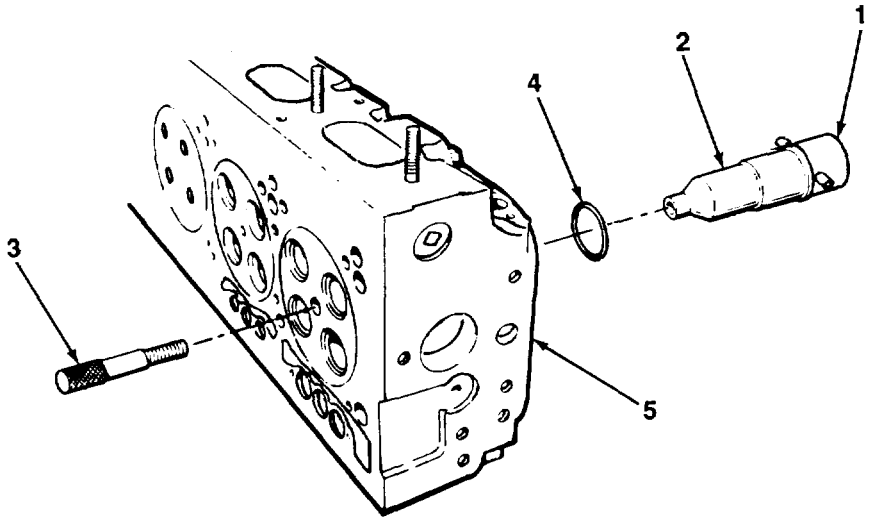
1. Insert injector tube installer (1) in injector tube (2).



TA704946

5-30. INJECTOR TUBE REPLACEMENT (Con't).

2. Install pilot (3) into injector tube installer (1) through bottom of cylinder head (5).
3. Tap pilot (3) to loosen injector tube (2).
4. Remove injector tube (2), preformed packing (4), pilot (3), and injector tube installer (1) from cylinder head (5). Discard preformed packing.



b. INSTALLATION I

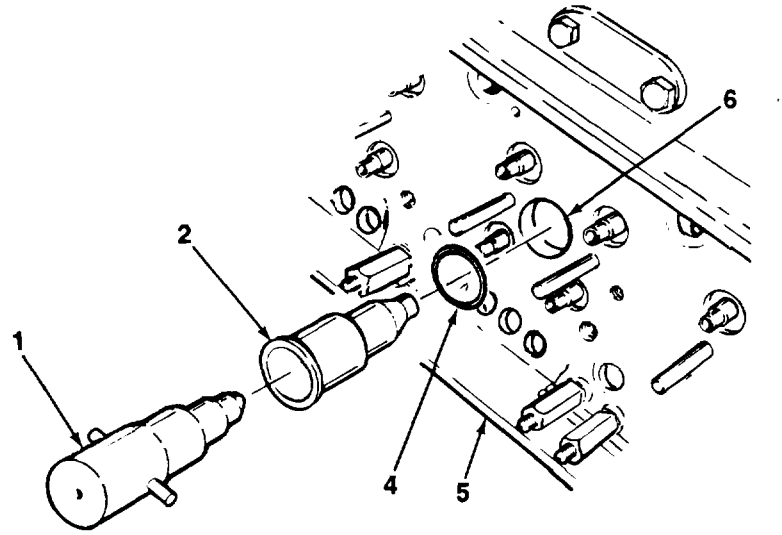
NOTE

- **New Injector tubes must be reamed before fuel Injectors can be Installed.**
- **All Injector tubes are Installed same way.**

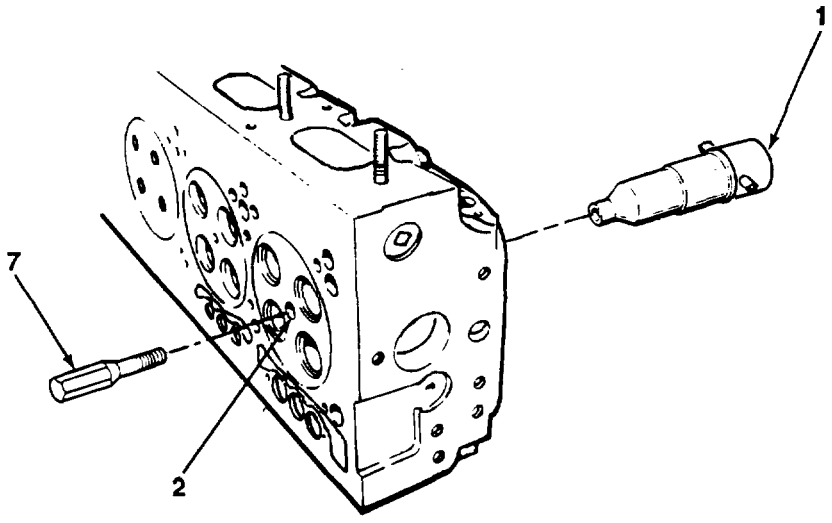
1. Ensure that injector tube (2) and counterbore (6) are clear of dirt and debris.
2. Install new preformed packing (4) into counterbore (6).
3. Using injector tube installer (1), install injector tube (2) into counterbore (6) until bottom rim of injector tube Installer is flush with cylinder head (5).

TA704947

5-30. INJECTOR TUBE REPLACEMENT (Con't).



4. Using upsetting die (7), seat injector tube (2). Torque upsetting die to 30 lb.-ft. (41 Nom).
5. Remove injector tube Installer (1) and upsetting die (7) from injector tube (2).



TA704948

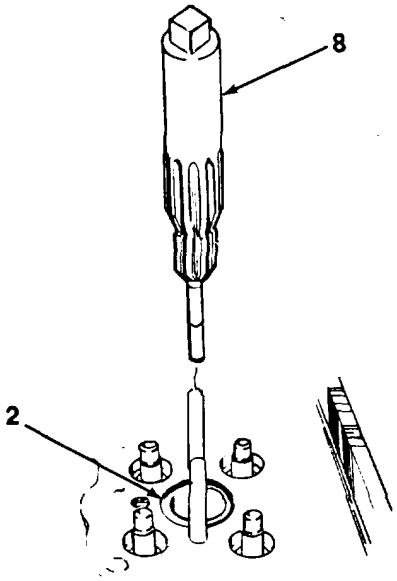
5-30. INJECTOR TUBE REPLACEMENT (Con't).

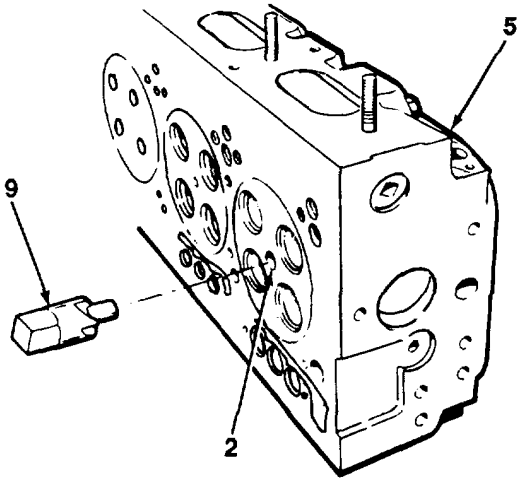
6. Apply light coat of lubricating oil to blades of first operation reamer (8).

CAUTION

Reaming must be done slowly and lightly in clockwise direction only. Injector tube walls are thin and undue force or speed can cause damage to walls. Turning reamer In counterclockwise direction will cause damage to reamer and Injector tube.

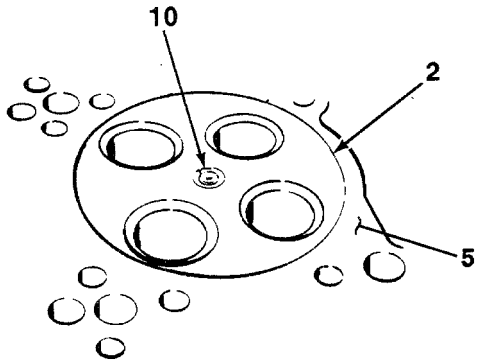
7. Insert first operation reamer (8) into injector tube (2) and ream Injector tube in clockwise direction.
8. Remove first operation reamer (8) and clean metal filings from Injector tube (2).
9. Repeat steps 6 through 8 until shoulder of first operation reamer (8) rests on top of injector tube (2).
10. With cylinder head (5) on side, remove excess material from tip of Injector tube (2) using tube tip refinisher (9) until lower end of injector tube is flush to 0.005 in. (0.127 mm) below finished surface of cylinder head.
11. Clean excess material from injector tube (2).





5-30. INJECTOR TUBE REPLACEMENT (Con'

12. Install fuel injector in injector tube (2). Using sled gage, measure depth of spray tip (10) beneath surface of cylinder head (5).
13. Measurement taken in step 12 must read 00.015 in. (0-0.381 mm).
14. If measurement is correct, perform step 20. If measurement is more than 0.015 in. (0.381 mm) above zero (0) reading, replace injector tube (2) and perform steps 15 through 18.



WARNING

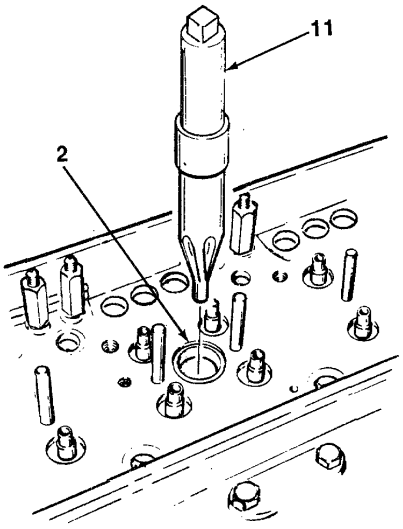
Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-1380F (38°C-590C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

15. Clean injector tube (2) with dry cleaning solvent.
16. Apply light coat of lubricating oil to second operation reamer (11) blades.

CAUTION

Reaming must be done slowly and lightly in clockwise direction only. Injector tube walls are thin and undue force or speed can cause damage to walls. Turning reamer In counterclockwise direction will cause damage to reamer and injector tube.

17. Insert second operation reamer (11) into injector tube (2) and ream in clockwise direction.



TA704950

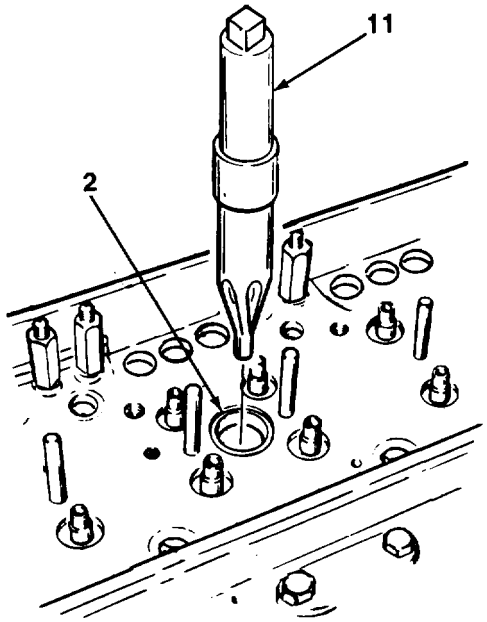
5-30. INJECTOR TUBE REPLACEMENT (Con't).

18. Remove second operation reamer (11) and clean filings from injector tube (2).
19. Repeat steps 15 through 18 until measurement given In step 13 is obtained.

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-590°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

20. Clean Injector tube (2) with dry cleaning solvent.



FOLLOW-ON TASKS:

- Install cam follower assemblies and pushrods (see paragraph 5-25
- Install exhaust valve (see paragraph 5-24).
- Install fuel injectors (see paragraph 5-57).
- Install exhaust valve bridges (see paragraph 5-26).
- Install rocker arms (see paragraph 5-41).
- Install cylinder head (see paragraph 5-28).

TA704951

5-31. CRANKSHAFT PULLEY REPLACEMENT.

This Task Covers:
a. Removal b. Installation

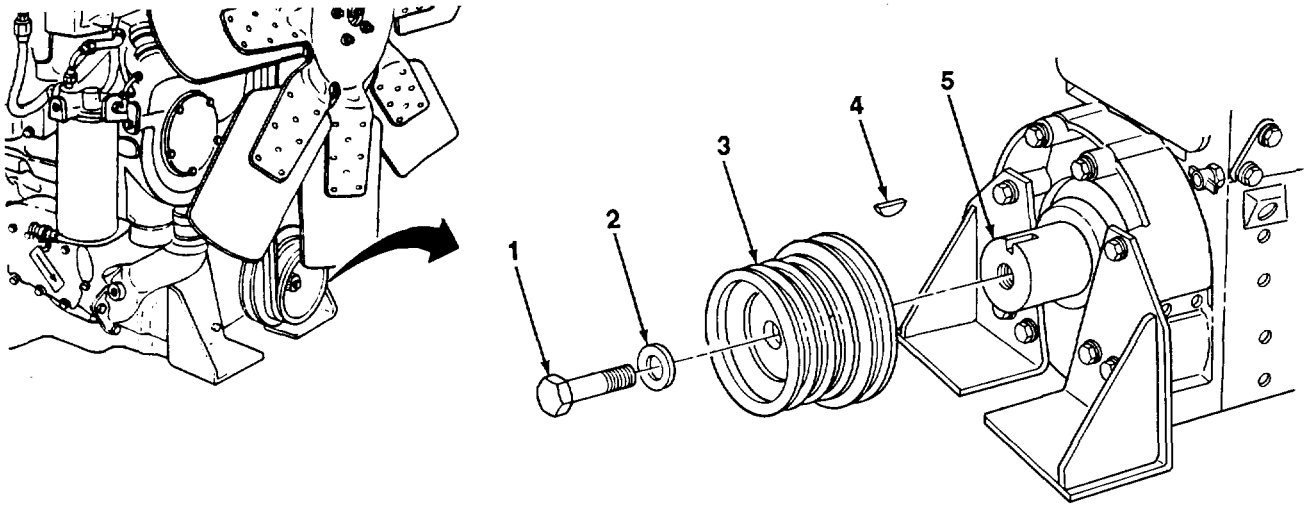
Initial Setup:
Equipment Conditions:
- Engine removed (see paragraph 5-15).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Lubricating oil (Item 28, Appendix E)

a. REMOVAL

1. Remove bolt (1) and washer (2) from crankshaft pulley (3).
2. Remove crankshaft pulley (3) and woodruff key (4) from crankshaft (5).

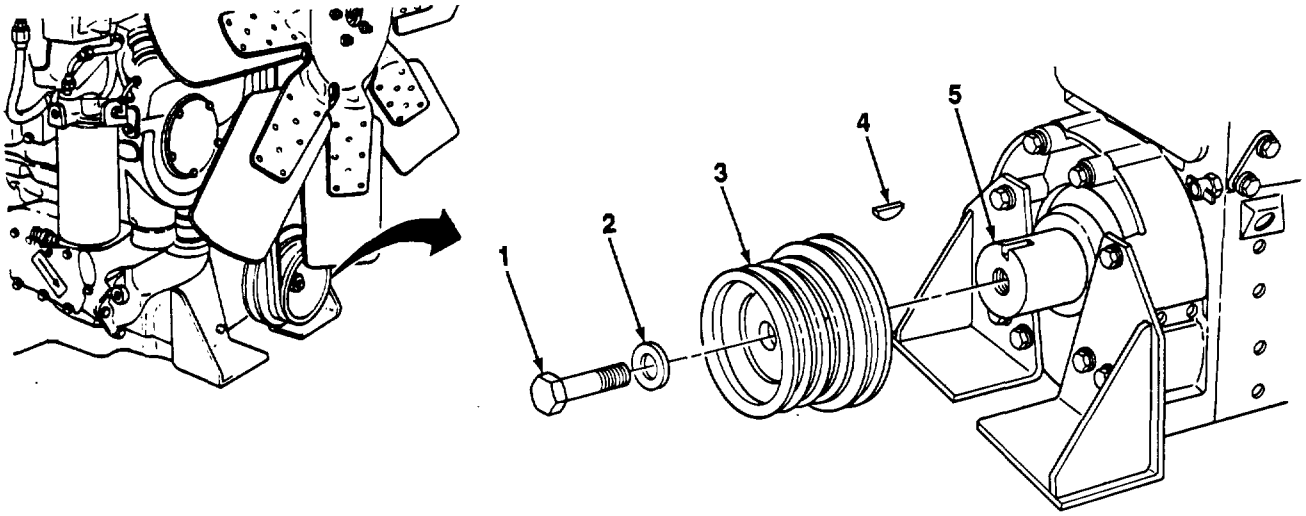


TA704952

5-31. CRANKSHAFT PULLEY REPLACEMENT (Con't).

b. INSTALLATIONI

1. Apply lubricating oil to end of crankshaft (5).
2. Install woodruff key (4) in end of crankshaft (5).
3. Install crankshaft pulley (3) on crankshaft (5).
4. Install washer (2) and bolt (1). Torque bolt to 190 lb.-ft. (258 Nom).
5. Strike head of bolt (1) with soft-faced hammer, then torque bolt to 310 lb.-ft. (420 Nom).



FOLLOW-ON TASKS:

- Install engine (see paragraph 5-15).

TA704953

5-32. MAIN BEARINGS AND CRANKSHAF

This Task Covers:

a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation

Initial Setup:

Equipment Conditions:

- Oil pump drive gear removed (see paragraph 5-43).
- Idler gear removed (see paragraph 5-40).
- Pistons, connecting rods, and cylinder sleeves removed (see paragraph 5-35).

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set
- Suitable lifting device

Personnel Required: Two

Materials/Parts:

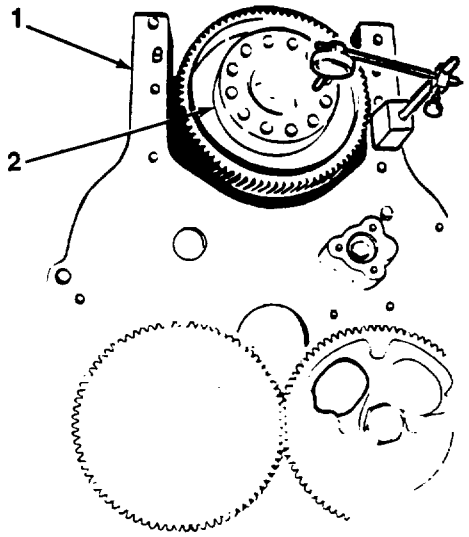
- Abrasive cloth (Item 10, Appendix E)
- Plastic gage (Item 21, Appendix E)
- Lubricating oil (Item 31, Appendix E)
- Rags (Item 35, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- Marker tags (Item 40, Appendix E)

General Safety Instructions:

- Dry cleaning solvent is flammable and must not be used near open flame. Use only In a well-ventilated area.

a. REMOVAL

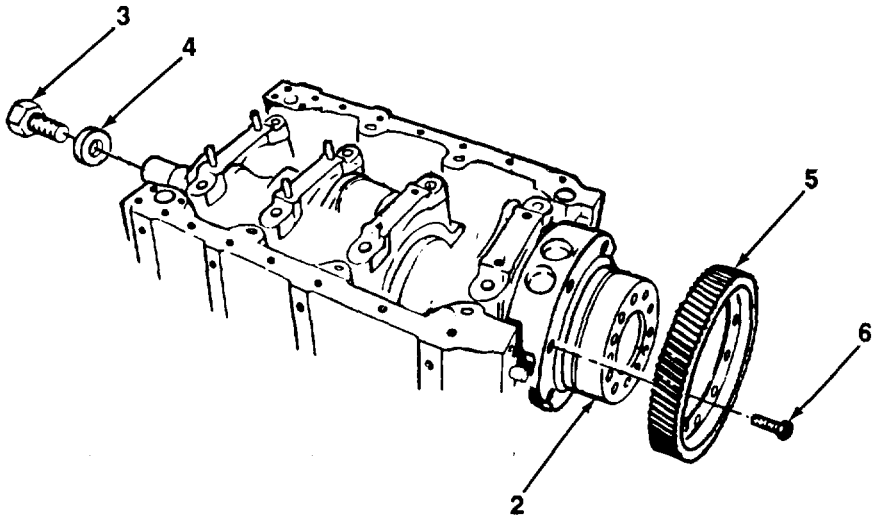
1. Install dial Indicator on engine block (1). While assistant pushes crankshaft (2) toward gage using pry bar, adjust dial Indicator gage to zero (0).
2. While assistant forces crankshaft (2) in opposite direction using pry bar, note end play.



TA704954

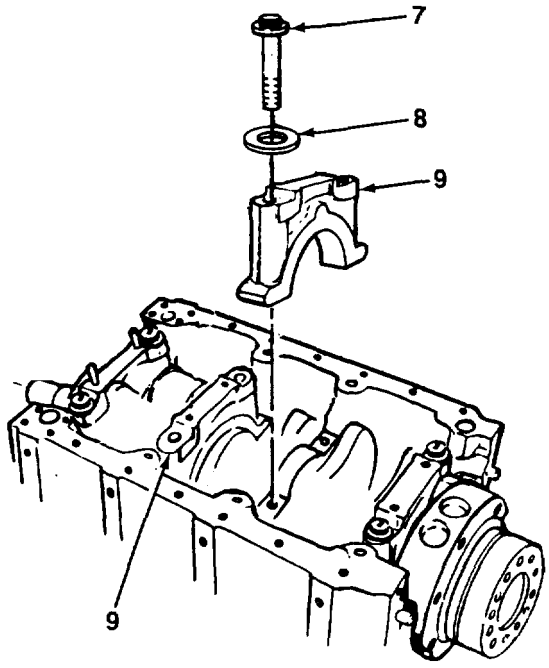
5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

3. Remove six locking bolts (6) and timing gear (5) from crankshaft (2).
4. Install spacer (4) and screw (3) removed during crankshaft pulley removal (see paragraph 5-31).



NOTE
Bearing caps should be marked to assist in installation.

5. Remove four bolts (7), washers (8), and two bearings caps (9).



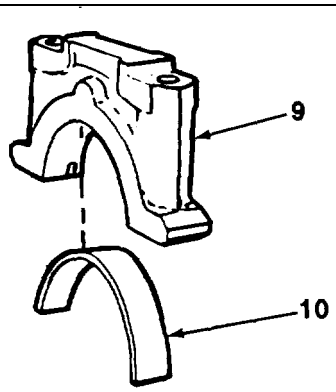
TA704955

5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

NOTE

If bearing shells are to be reused, tag and mark for Installation.

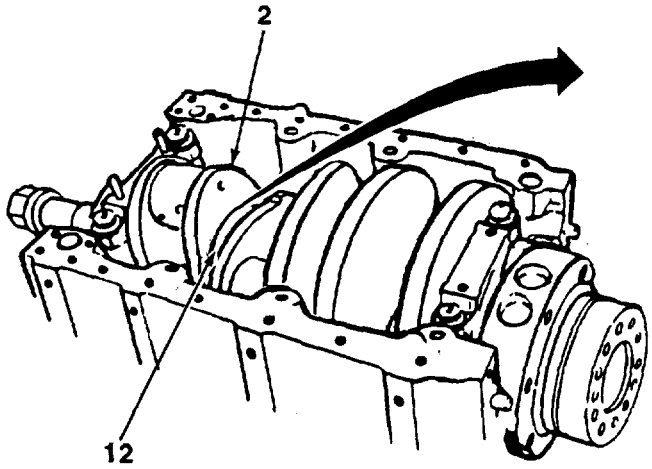
6. Remove lower bearing shells (10) from two bearing caps (9).

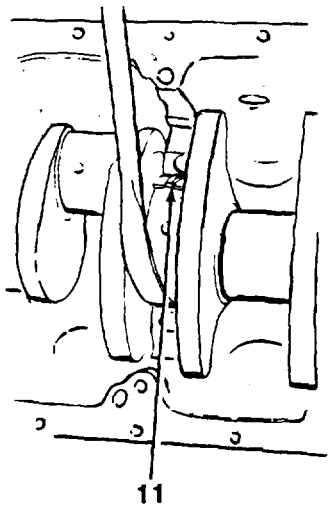


NOTE

Turn crankshaft to assist In removing bearing shells.

7. Remove upper bearing shell (11) from under crankshaft (2) and main bearing journal no. 2 (12) using bearing shell remover.

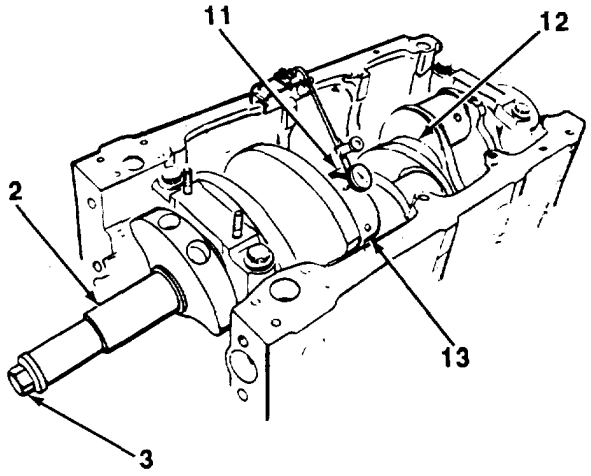




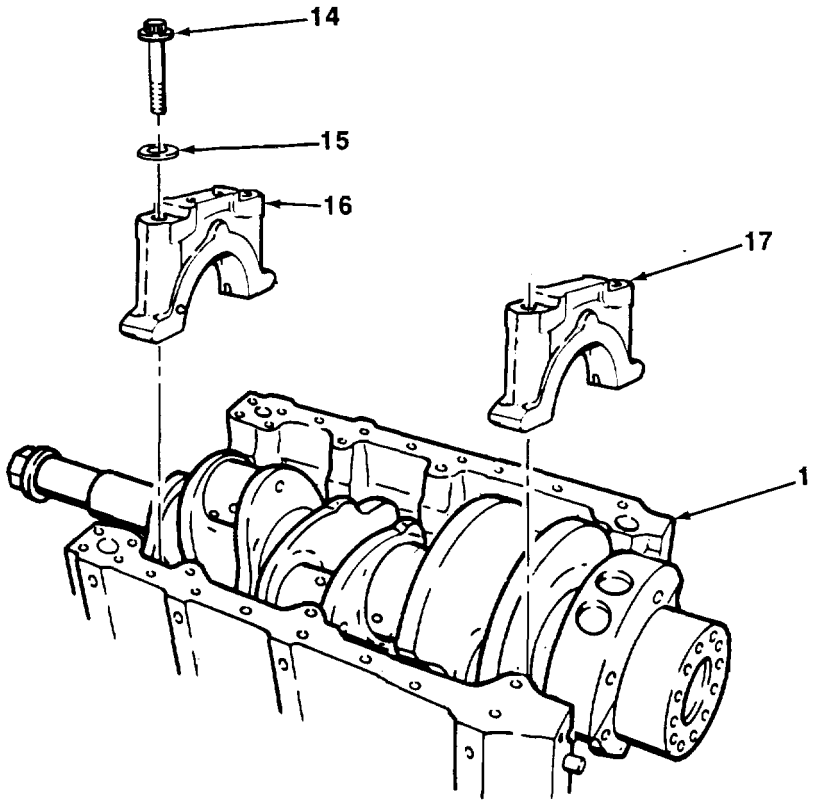
TA704956

5-32. MAIN BEARINGS AND CRANKSHAFT MAINT

8. Remove upper bearing shell (11) from under crankshaft (2) and main bearing journal no. 3 (13) using bearing shell remover.
9. Position dial indicator to read runout of main bearing journals (12 and 13).
10. While assistant turns screw (3), read runout of main bearing journals (12 and 13) using dial Indicator.
11. If runout is greater than 0.002 in. (0.051 mm), crankshaft must be replaced.



12. Remove four bolts (14), washers (15), and front and rear bearing caps (16 and 17) from engine block (1).



TA704957

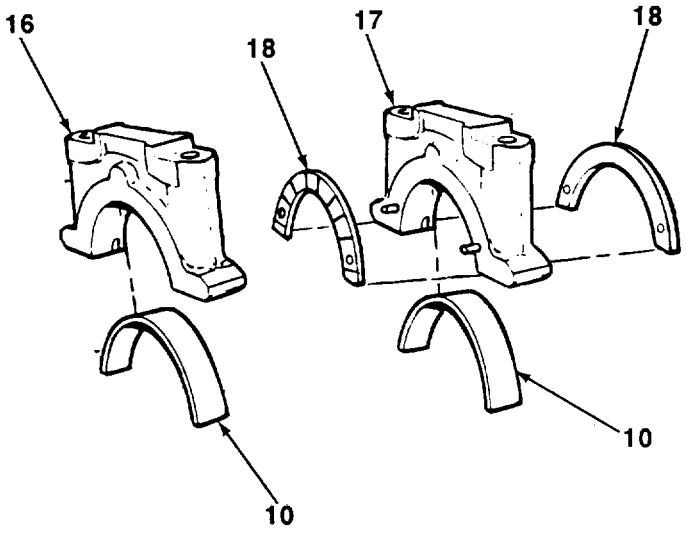
5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

13. Remove lower bearings shells (10) from front and rear bearing caps (16 and 17).

NOTE

Tag thrust washers to assist In Installation.

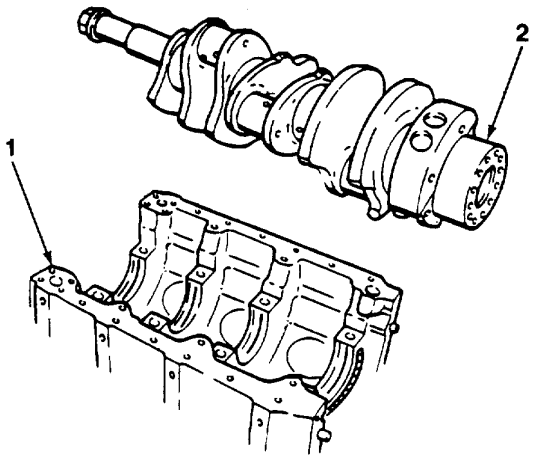
14. Remove two thrust washers (18) from rear bearing cap (17).



CAUTION

Always store crankshaft on end. If stored on side, crankshaft may bend.

15. Using a suitable lifting device, remove crankshaft (2) from engine block (1).



TA704958

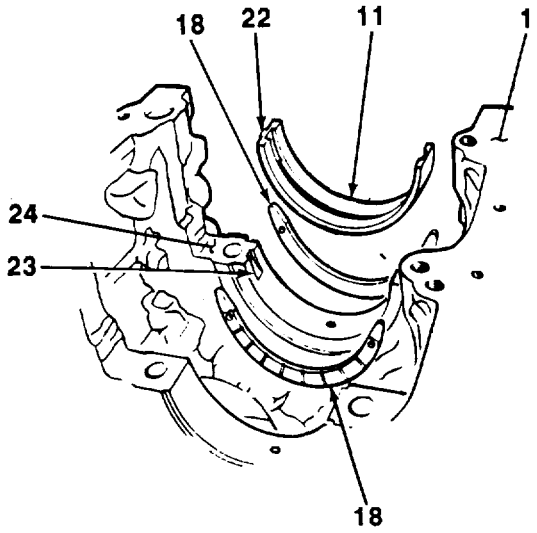
5-32. MAIN BEARINGS AND CRANKSHAFT MI

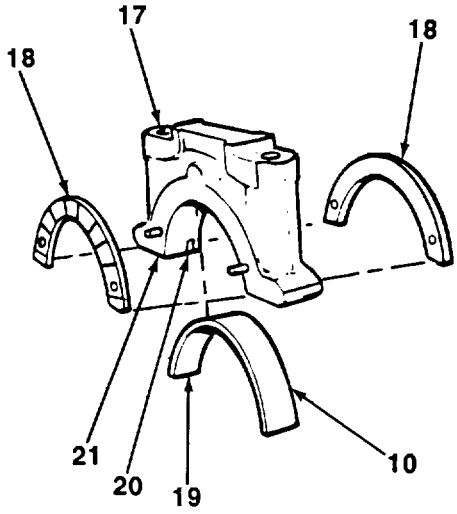
16. Remove two upper bearing shells (11) from front and rear of engine block (1).
17. Remove two thrust washers (18) from rear of engine block (1).

NOTE

Perform steps 18 through 31 to check If bad bearing shell caused crankshaft runout. If runout was within limits, removal procedures end here.

18. Aline tab (22) of new upper bearing shell (11) with slot (23) on engine block (1).
19. Install upper bearing shell (11), ensuring that both ends of upper bearing shell are flush with bearing cap mounting surfaces (24).
20. Repeat step 19 for mounting cap surfaces of other end of engine block (1).
21. Aline tabs (19) with slots (20) and install new lower bearing shells (10), ensuring that both ends of lower bearing shells are flush with bearing cap mounting surfaces (21).
22. Install two new thrust washers (18) on rear bearing cap (17) with grooved sides of thrust washers facing away from bearing cap.

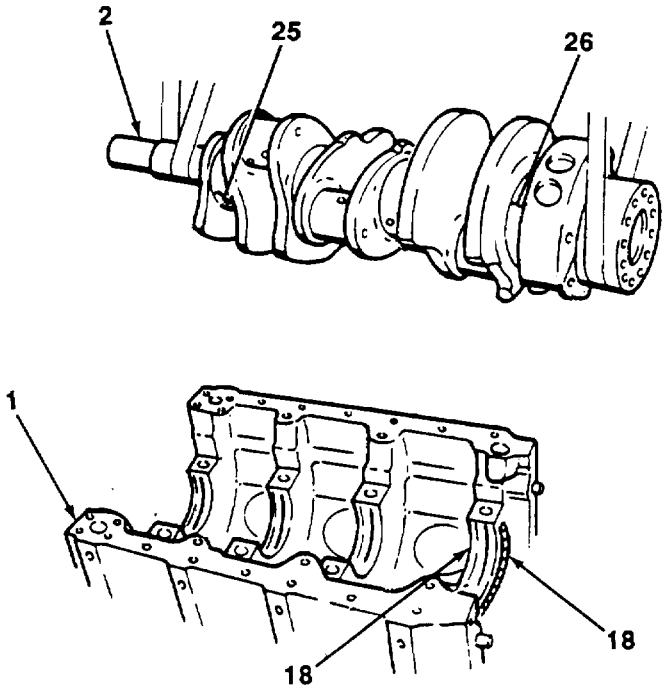




TA704959

5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

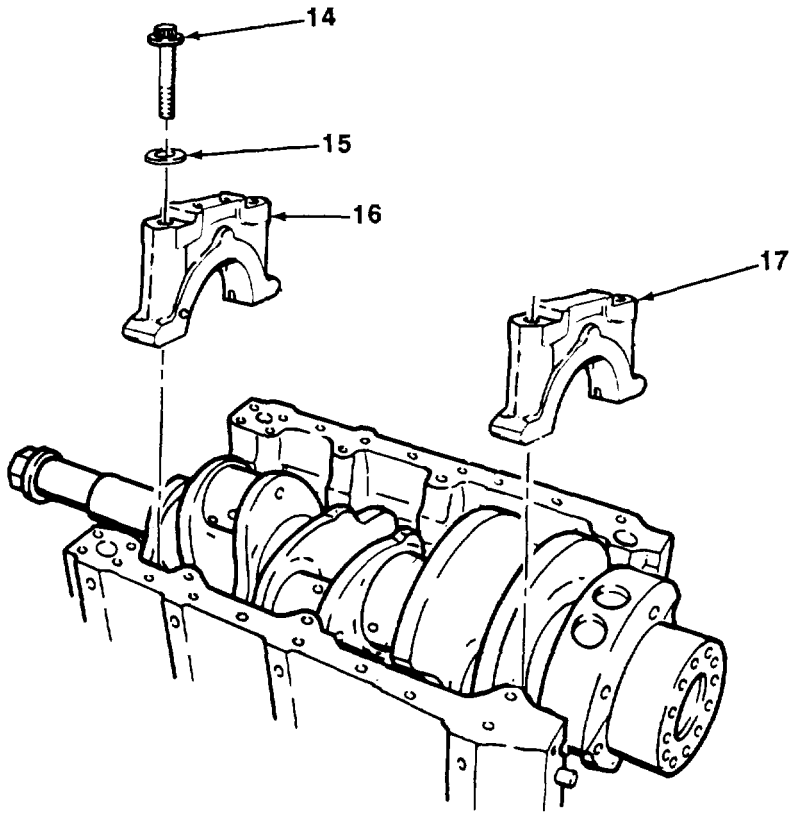
23. Apply lubricating oil to front and rear crankshaft bearing journals (25 and 26).
24. Using a suitable lifting device, position crankshaft (2) on engine block (1).
25. Push crankshaft (2) to front and install thrust washer (18).
26. Push crankshaft (2) to rear and install other thrust washer (18).



TA704960

5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

27. Install front and rear bearing caps (16 and 17).
28. Install four bolts (14) and washers (15) in front and rear bearing caps (16 and 17).
29. Tap front and rear bearing caps (16 and 17) with soft-faced hammer and torque four bolts (14) to 180-190 lb.-ft.(244-258 N-m).
30. Check runout by repeating steps 9 and 10. If runout is still too high, replace crankshaft.
31. Perform steps 12 through 17.



TA704961

5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

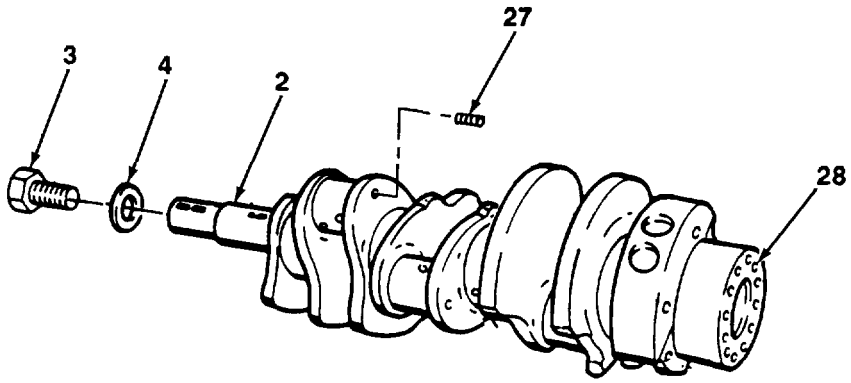
b. DISASSEMBLY

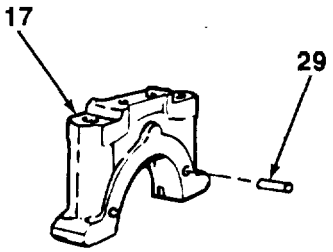
1. Remove screw (3) and spacer (4) from crankshaft (2).

NOTE

Perform steps 2 through 4 only If plugs and pins are loose or damaged.

2. Remove three plugs (27) from crankshaft (2).
3. Remove two pins (28) from end of crankshaft (2).





4. Remove four pins (29) from rear bearing cap (17).

TA704962

5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

c. CLEANING AND INSPECTION I

WARNING

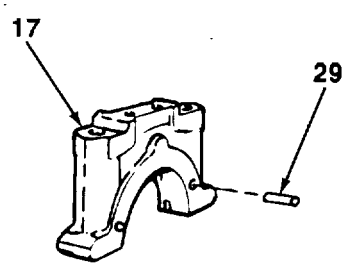
Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 1000F-1380F (38OC-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean crankshaft and bearing caps with dry cleaning solvent and rag.
2. Flush oil passages in crankshaft.
3. Inspect crankshaft for scoring and overheating.
4. Inspect crankshaft and journals for deep scratches and cracks. Replace crankshaft if damaged.
5. Inspect crankshaft keyway for damage and cracks.
6. Inspect rear oil seal contact surface for deep scratches. If scratches cannot be smoothed out with abrasive cloth, replace crankshaft.
7. Inspect timing gear for chipped teeth.
8. Measure and note thickness of thrust washers. Measurement must be 0.1205-0.1220 in. (3.0607-3.0988 mm).
9. Check measurement of main bearing journals. Measurement must be 4.499-4.500 in. (11.427-11.430 cm).
10. Check measurement of connecting rod journals. Measurement must be 2.999-3.000 in. (7.617-7.620 cm).
11. Check that maximum out-of-round for all journals does not exceed 0.0015 in. (0.0381 mm).
12. Check that minimum taper of all journals is 0.0010 in. (0.0254 mm).
13. Measure Inside diameter of main bearings (vertical axis). Measurement must read 4.5016-4.5040 in. (11.- 11.4402 cm).
14. Measure bearing thickness 900 from parting line. Minimum allowable measurement is 0. 1540 in. (3.9116 mm).
15. Measure bearing-to-journal clearance. Maximum allowable measurement is 0.0060 in. (0.1524 mm).

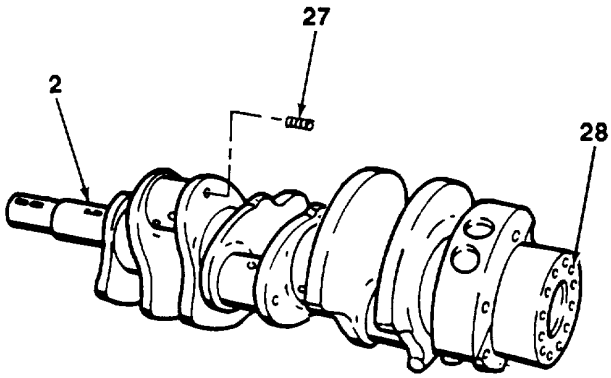
5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

d. ASSEMBLY

1. If removed, install two pins (29) In rear bearing cap (17).



2. If removed, Install two pins (28) in end of crankshaft (2).
3. If removed, install three plugs (27) in crankshaft (2).



5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

e. INSTALLATION

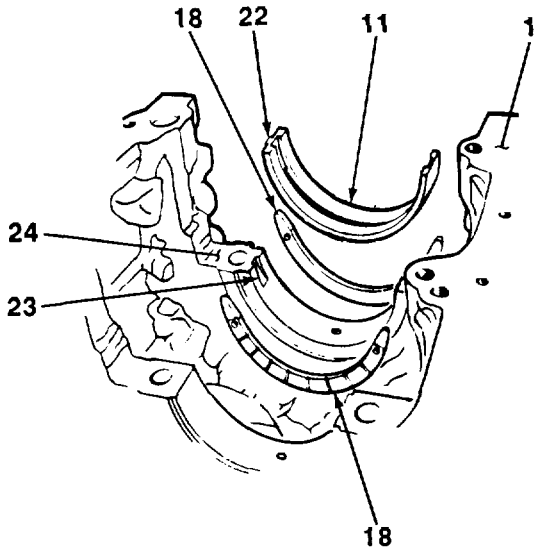
CAUTION

DO NOT handle bearing shells and thrust washers more than necessary for Installation. Oil from hands can cause damage.

NOTE

Bearing surfaces are marked 1 to 4 from front to rear of engine block.

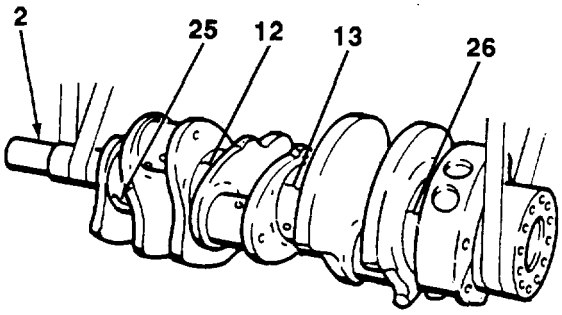
1. Aline tab (22) on upper bearing shell (11) with slot (23) on bearing cap mounting surface (24).
2. Install upper bearing shell (11), ensuring that both ends of upper bearing shell are flush with bearing cap mounting surfaces (24).
3. Repeat steps 1 and 2 for other three upper bearing shells.
4. Apply coat of lubricating oil to upper bearing shells (11) after installation.

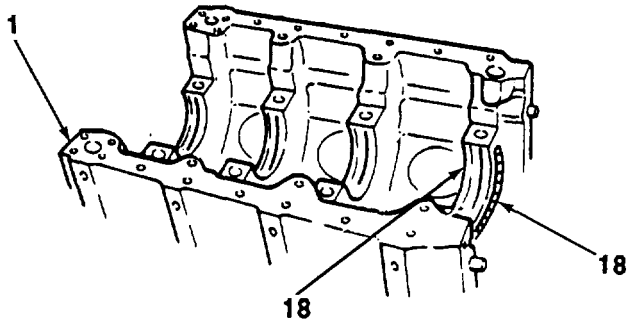


5. Apply coat of lubricating oil to front crankshaft bearing journal (25), main bearing journals (12 and 13), and rear crankshaft bearing journal (26).
6. Using a suitable lifting device, position crankshaft (2) on engine block (1).
7. Push crankshaft (2) to front and install thrust washer (18).
8. Push crankshaft (2) to rear and Install other thrust washer (18).

TA704964

5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

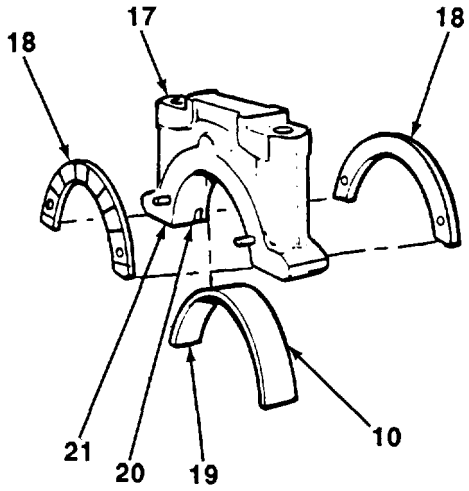




9. Aline tab (19) with slot (20) and install lower bearing shell (10), ensuring that both ends are flush with bearing cap mounting surfaces (21).

10. Repeat step 9 for other three lower bearing shells (10).

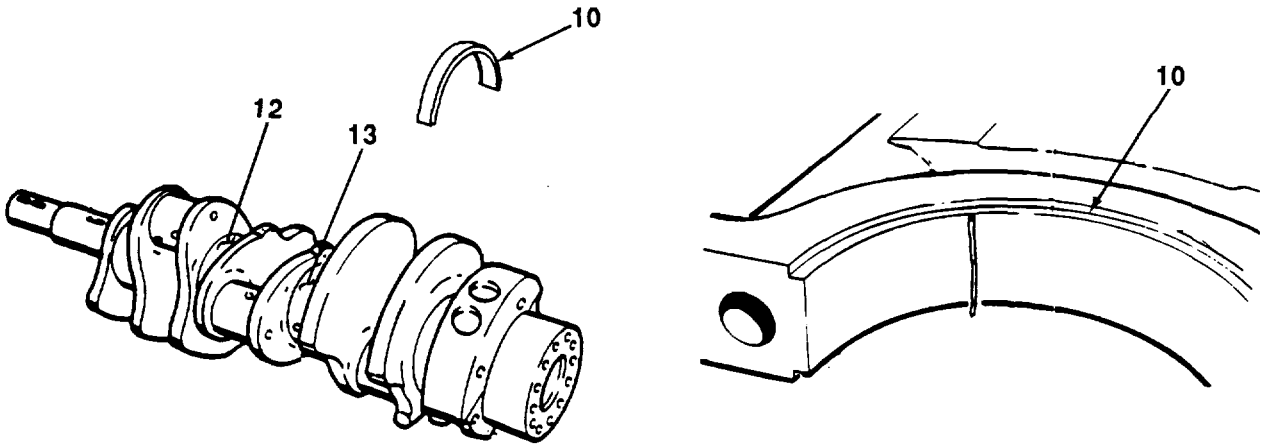
11. Install two thrust washers (18) on rear bearing cap (17) with grooved sides of thrust washers facing away from rear bearing cap.



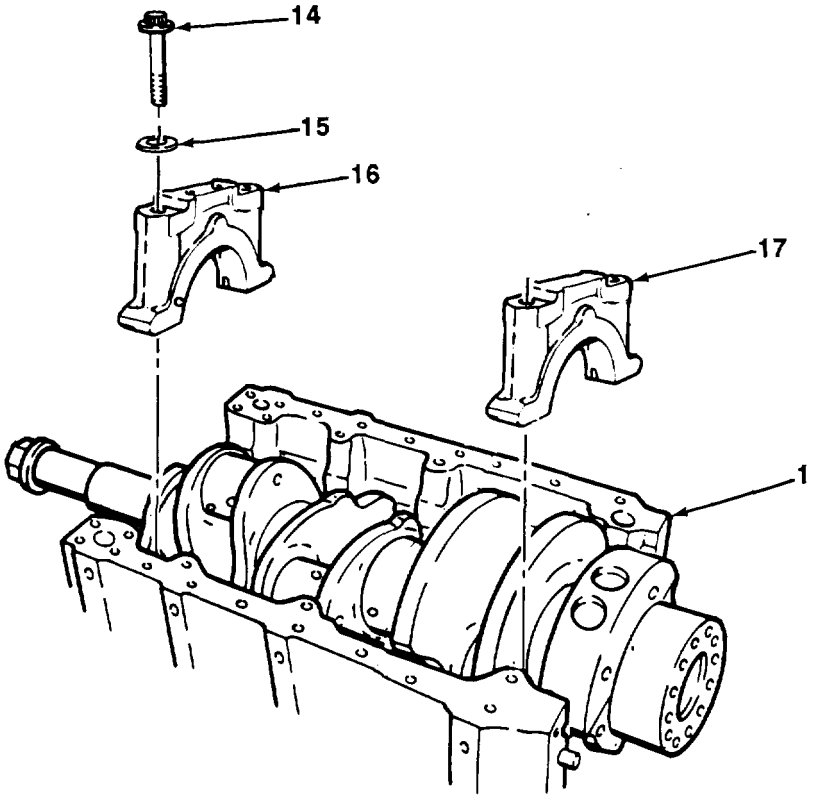
5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

12. Wipe lubricating oil from lower bearing shells (10) and main bearing journals (12 and 13).

13. Place strip of plastic gage across width of four lower bearing shells (10) about y in. (6.35 mm) off center.



14. Install front and rear bearing caps (16 and 17) on engine block (1) using four washers (15) and bolts (14).



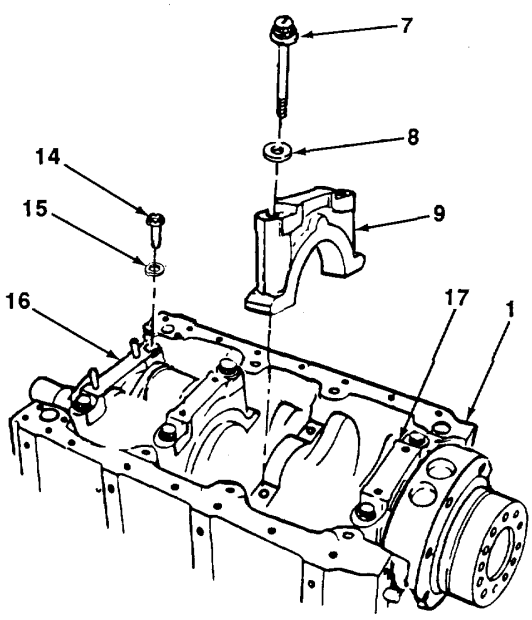
5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

15. Install two bearing caps (9) on engine block (1) using four washers (8) and bolts (7).

16. Tap bearing caps (9, 16, and 17) with soft-faced hammer.

17. Torque four bolts (7 and 14) to 180-190 lb.-ft. (244-258 N-m).

18. Remove four bolts (7), washers (8), bolts (14), washers (15), and bearings caps (9, 16, and 17).

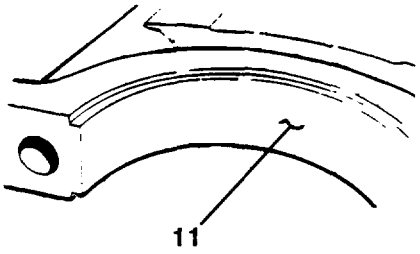


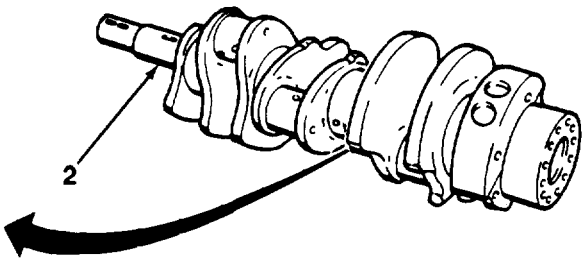
NOTE
Perform step 19 for all four upper bearing shells.

19. Measure width of plastic gage with measuring strip. Width must be no greater than 0.006 in. (0.15 mm). If width Is greater, replace upper bearing shell (11).

20. Remove plastic gage from crankshaft (2) and four upper bearing shells (11).

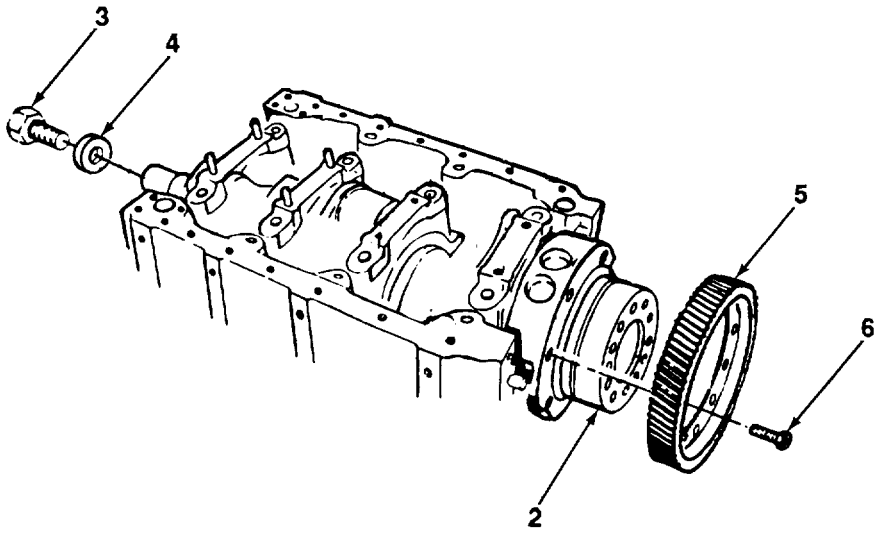
21. Repeat steps 14 through 17.



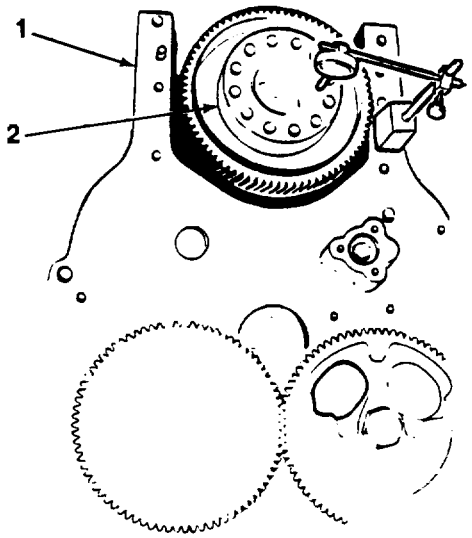


5-32. MAIN BEARINGS AND CRANKSHAFT MAINTENANCE (Con't).

22. Install washer (4) and screw (3) in crankshaft (2).
23. Install timing gear (5) on crankshaft (2) with six locking bolts (6).
24. Torque six locking bolts (6) to 40 lb.-ft. (54 N.m) while assistant holds front end of crankshaft (2).
25. Remove screw (3) and spacer (4).



26. Install dial indicator on engine block (1). Have assistant push crankshaft (2) toward gage and adjust dial indicator gage to zero (0).
27. Read end play while assistant forces crankshaft (2) in opposite direction.
28. End play must be 0.004-0.018 in. (0.102-0.mm). If end play is outside limits, replace crankshaft (2).



FOLLOW-ON TASKS:

- Install pistons, connecting rods, and cylinder sleeves (see paragraph 5-35).
- Install idler gear (see paragraph 5-40).
- Install oil pump drive gear (see paragraph 5-43).

5-33. FLYWHEEL REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

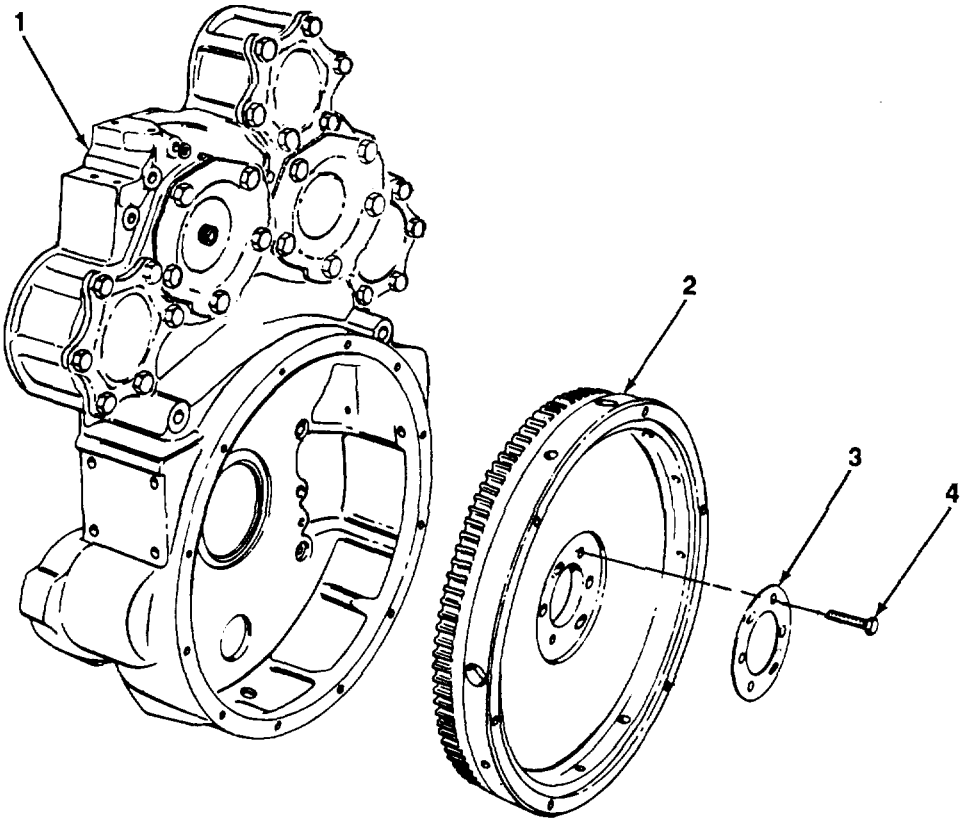
Initial Setup:
Equipment Conditions:
- Air compressor removed (see paragraph 5-100).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Personnel Required: Two

a. REMOVAL

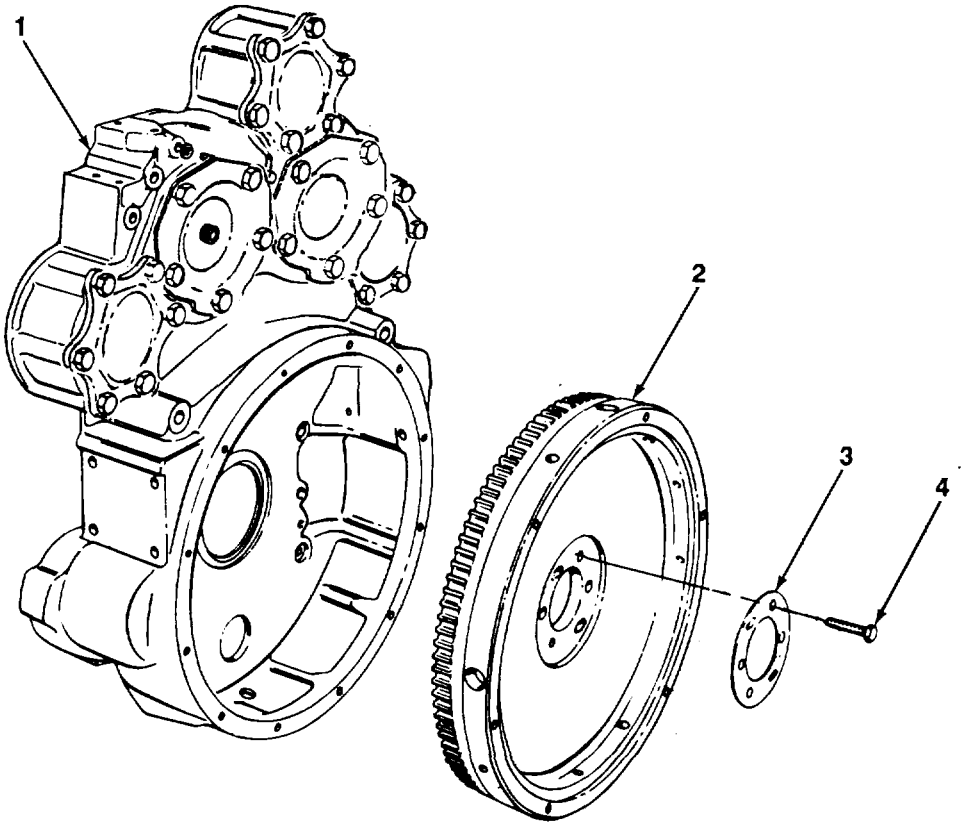
1. Remove six bolts (4) and retaining plate (3) from flywheel (2).
2. Remove flywheel (2) from flywheel housing (1).



5-33. FLYWHEEL REPLACEMENT (Con't).

b. INSTALLATION

1. Position flywheel (2) in flywheel housing (1).
2. Install retaining plate (3) on flywheel (2) using six bolts (4). Torque bolts to 190 lb.-ft. (258 N.m).



TA704970

FOLLOW-ON TASKS:
- Install air compressor (see paragraph 5-100).

5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Air compressor drive ring removed (see paragraph 5-100)
- Governor control bracket removed (see paragraph 4-40)
- Engine starter removed (see paragraph 4-53)
- Rear engine mounts removed (see paragraph 5-16)
- Flywheel removed (see paragraph 5-33)
- Engine breather removed (see paragraph 4-30)

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set
- Alignment stud set
- Suitable lifting device

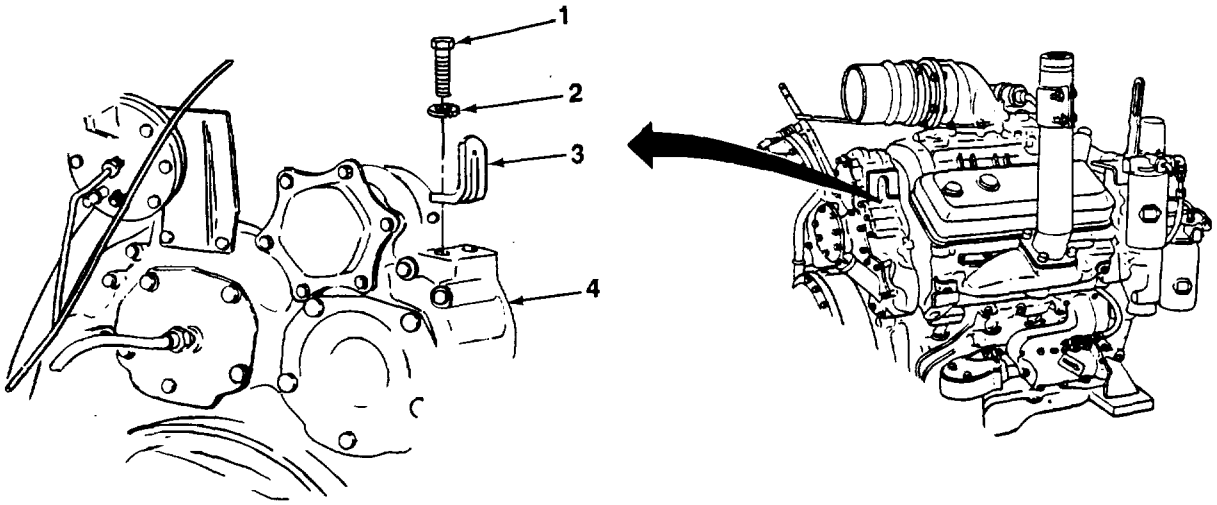
Materials/Parts:

- Adhesive (Item 1, Appendix E)
- Grease (Item 22, Appendix E)
- Lubricating oil (Item 29, Appendix E)
- Marker tags (Item 40, Appendix E)
- One copper washer
- One oil seal
- One screw
- Five gaskets
- Thirty-four lockwashers

Personnel Required: Two

a. REMOVAL

1. Aline engine lifting bracket (3) with threaded hole of screw removed from governor control bracket.
2. Install washer (2) and screw (1) in engine lifting bracket (3) and flywheel housing (4) and attach lifting device.



5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).

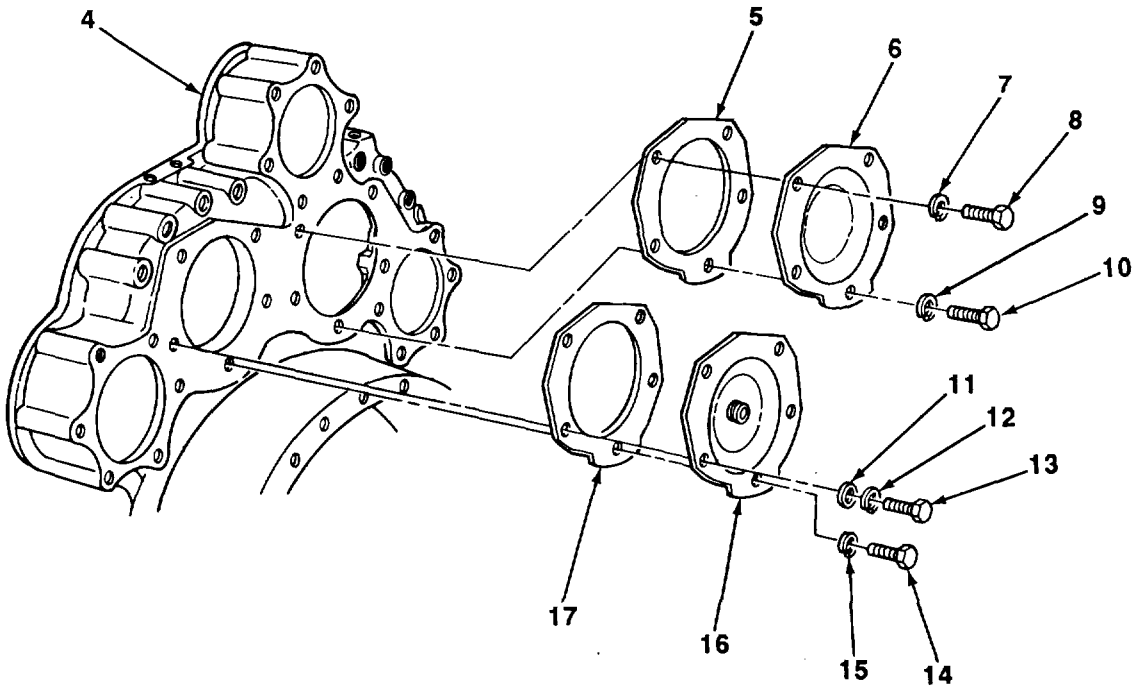
3. Remove four screws (8) and lockwashers (7). Discard lockwashers.

4. Remove screw (10), lockwasher (9), access cover (6), and gasket (5) from flywheel housing (4). Discard lockwasher and gasket.

NOTE
Note location of spacer when removing four screws and lockwashers to assist In Installation.

5. Remove four screws (14) and lockwashers (15). Discard lockwashers.

6. Remove screw (13), lockwasher (12), spacer (11), tachometer drive cover (16), and gasket (17) from flywheel housing (4). Discard lockwasher and gasket.



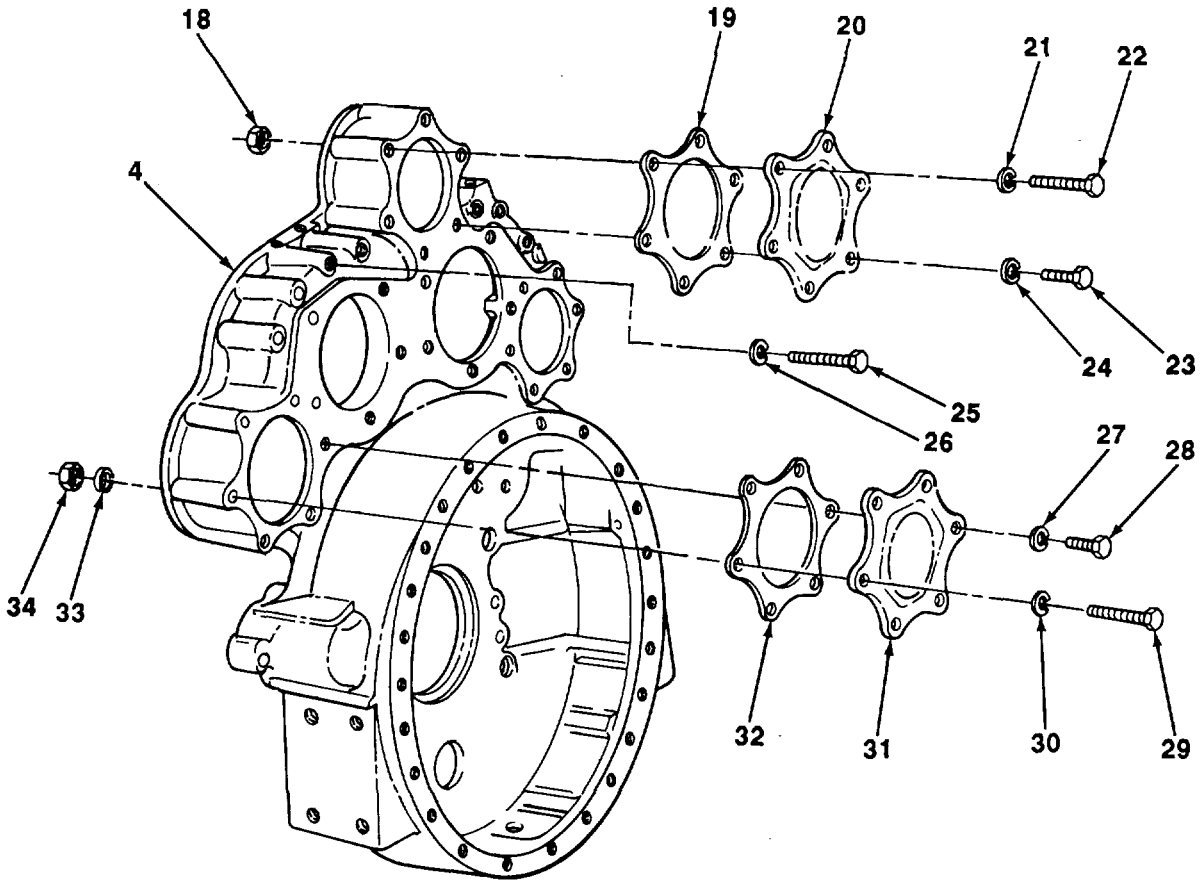
NOTE
Note location of nut when removing screws to assist In Installation.

7. Remove nut (18), four screws (22), and lockwashers (21). Discard lockwashers.

8. Remove two screws (23), lockwashers (24), access cover (20), and gasket (19). Discard lockwashers and gasket.

TA704972

5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).



NOTE
Note that screws differ In length. Tag when removing to assist In Installation.

9. Remove four nuts (34), lockwashers (33), screws (29), and washers (30). Discard lockwashers.
10. Remove two screws (28), lockwashers (27), access cover (31), and gasket (32). Discard lockwashers and gasket.
11. Remove five screws (25) and lockwashers (26). Discard lockwashers.

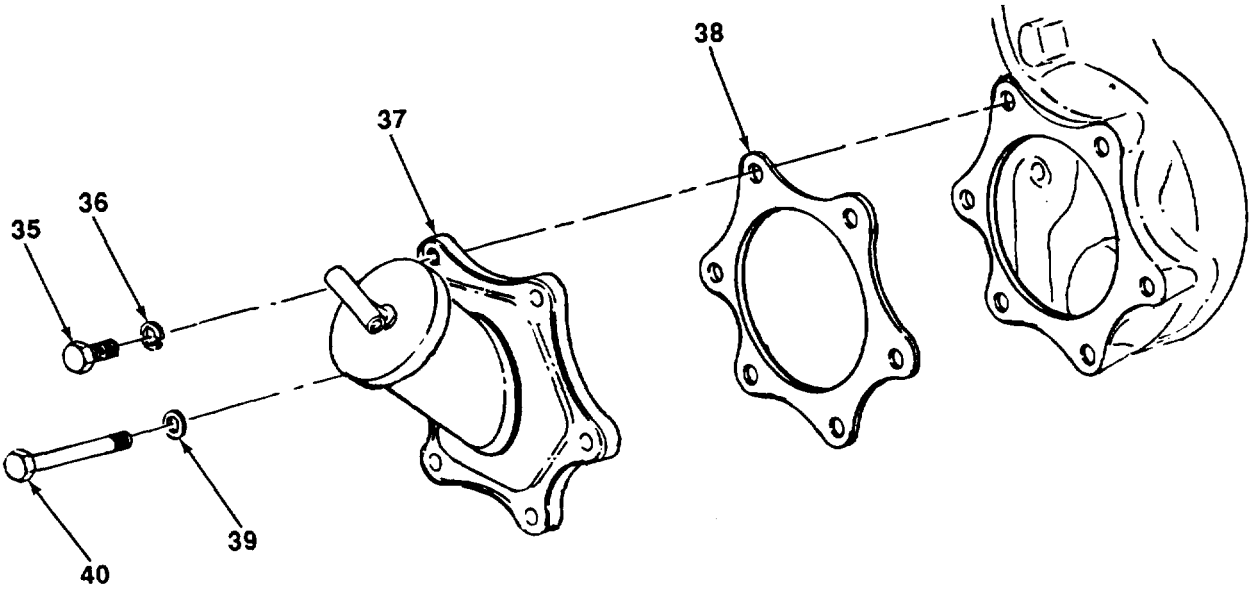
TA704973

5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).

NOTE
Copper washer Is used on long screw.

12. Remove screw (40) and copper washer (39). Discard copper washer.

13. Remove five screws (35), lockwashers (36), oil filler cover (37), and gasket (38). Discard lockwashers and gasket.

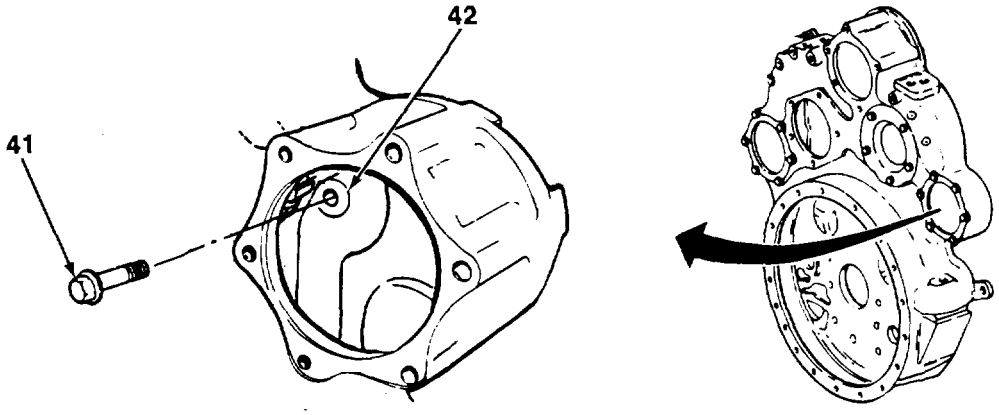


CAUTION
Screw located inside access cover hole must be removed. Failure to remove screw will cause damage to flywheel housing.

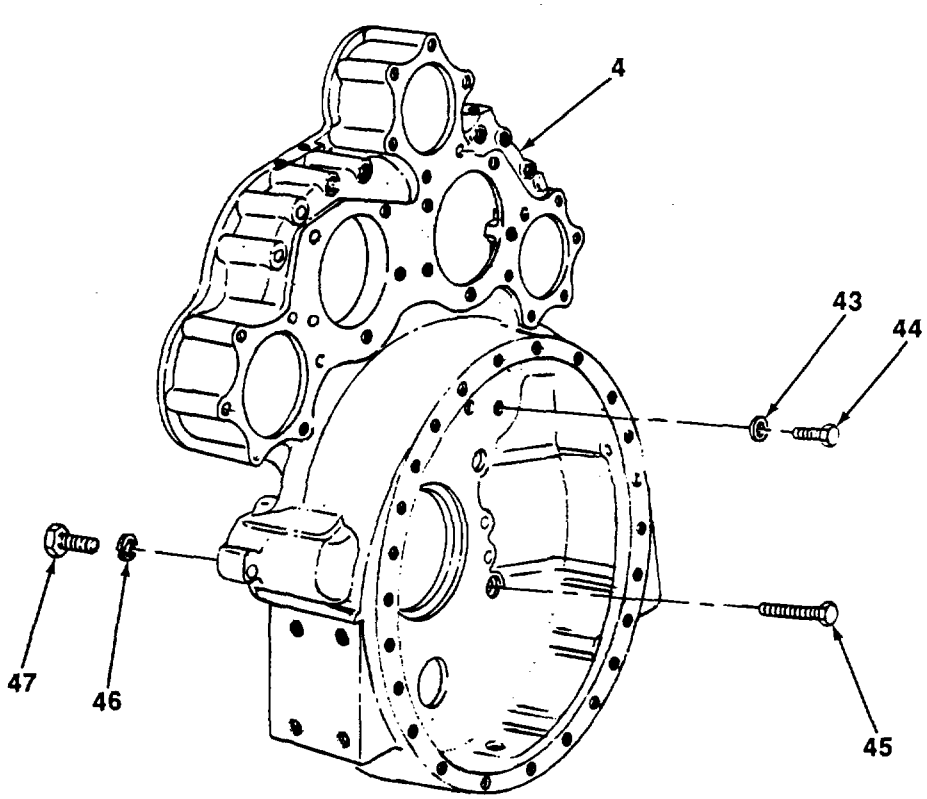
14. Remove screw (41) from oil filler access hole (42). Discard screw.

TA704974

5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).

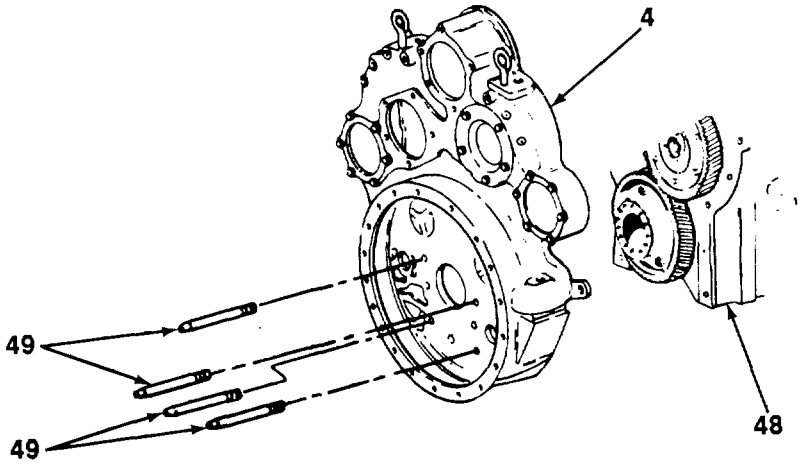


15. Remove six screws (44) and washers (43) from flywheel housing (4).
16. Remove six screws (45).
17. Remove two screws (47) and lockwashers (46), one on each side of flywheel housing (4). Discard lockwashers.



5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).

18. Install four aligning studs (49), part of alignment stud set, through flywheel housing (4) into engine block (48).



WARNING

Use extreme caution when handling heavy parts. Lifting device Is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

NOTE

Gasket may stick to flywheel housing or rear end plate.

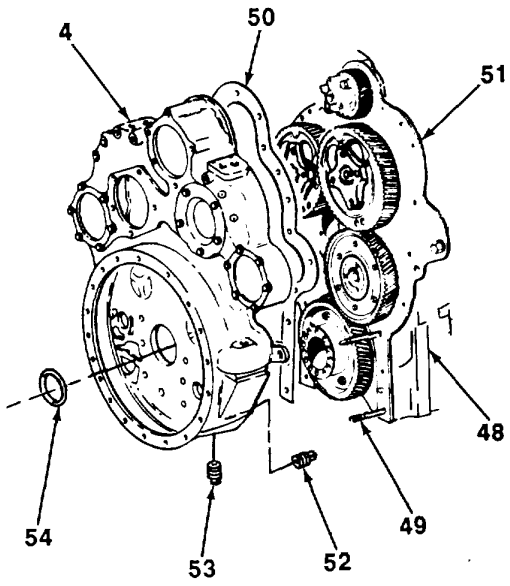
19. Remove flywheel housing (4) from rear end plate (51).

20. Remove gasket (50) from flywheel housing (4) or rear end plate (51).

21. If damaged, remove pipe plugs (52 and 53) from flywheel housing (4).

22. Remove four aligning studs (49) from engine block (48).

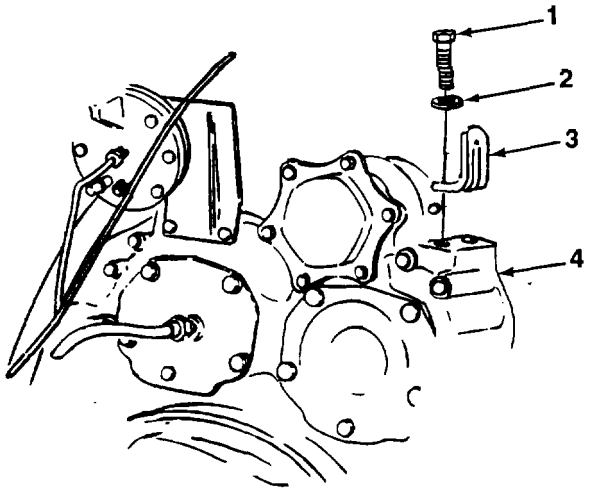
23. Remove oil seal (54) from flywheel housing (4). Discard oil seal.



TA704976

5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).

24. Remove four screws (1), washers (2), and two engine lifting brackets (3) from flywheel housing (4), if replacing flywheel housing.



b. INSTALLATION

1. If removed, install two engine lifting brackets (3) on flywheel housing (4) with four washers (2) and screws (1).
2. Install new oil seal (54), numbered side up, in flywheel housing (4).
3. Apply grease to flywheel housing (4) and install new gasket (50).
4. Apply grease on gasket (50).
5. If removed, apply adhesive to threads of pipe plugs (52 and 53) and install In flywheel housing (4).
6. Apply light coat of lubricating oil to inside diameter of oil seal (54).
7. Install four aligning studs (49) in engine block (48).

WARNING

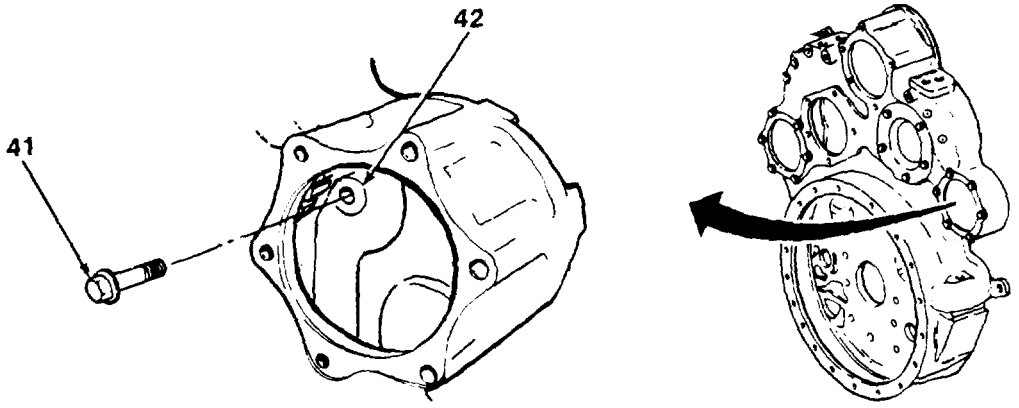
Use extreme caution when handling heavy parts. Lifting device Is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

8. Install flywheel housing (4) and gasket (50) on rear end plate (51) and engine block (48).

TA704977

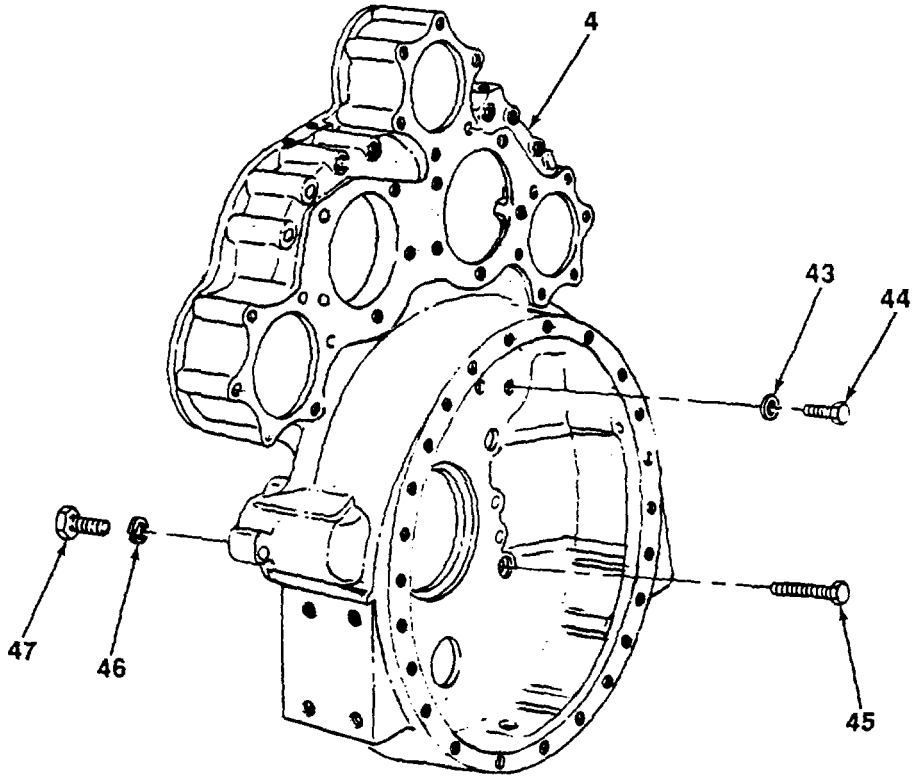
5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).

9. Install new screw (41) in oil filler access hole (42).



10. Install six screws (45), washers (43), and screws (44) in flywheel housing (4).

11. Install two new lockwashers (46) and screws (47), one on each side of flywheel housing (4).

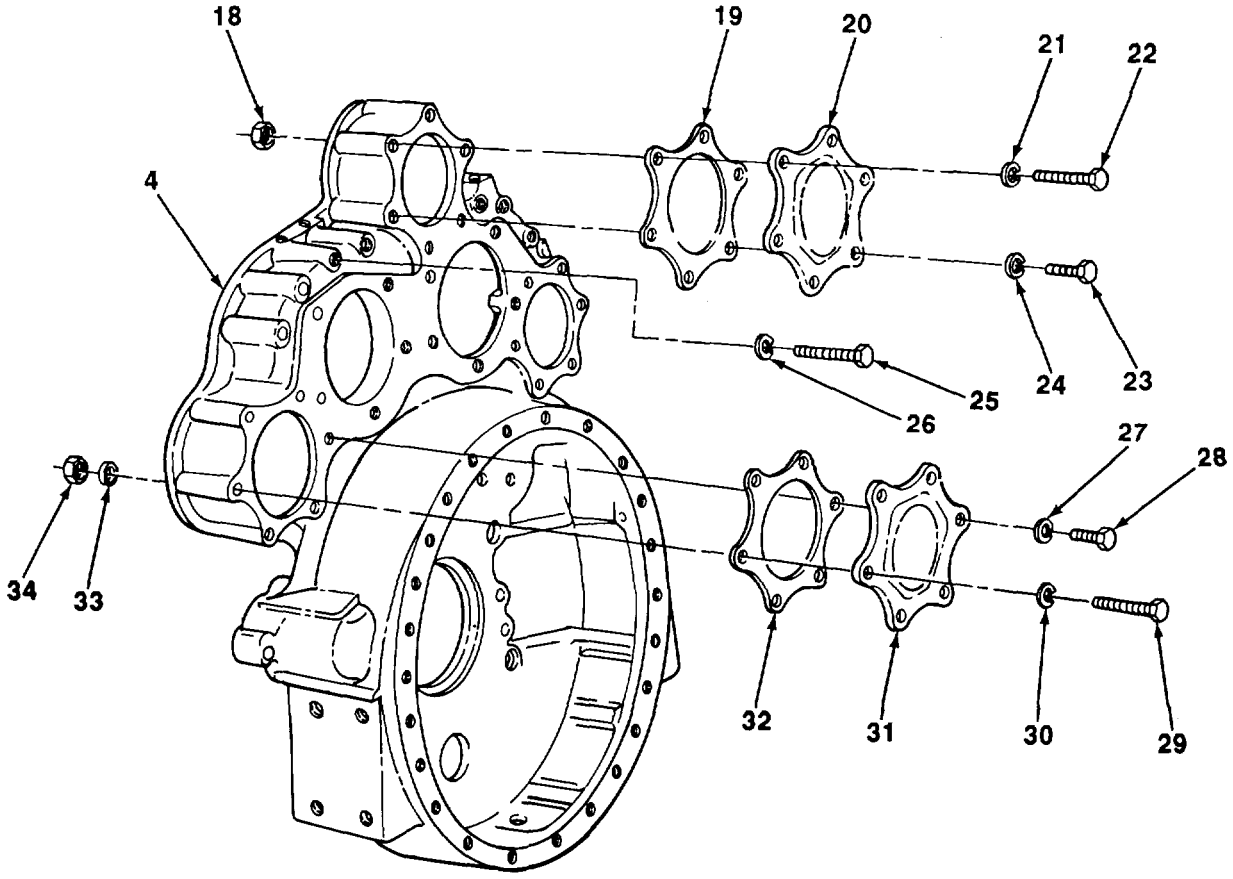


5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).

12. Install five new lockwashers (26) and screws (25).
13. Apply coat of grease to new gasket (32) and install on access cover (31).
14. Install access cover (31) and gasket (32) on flywheel housing (4) with two new lockwashers (27) and screws (28).
15. install four washers (30), screws (29), new lockwashers (33), and nuts (34).
16. Apply coat of grease to new gasket (19) and install on access cover (20).
17. Install access cover (20) and gasket (19) on flywheel housing (4) with two new lockwashers (24) and screws (23).

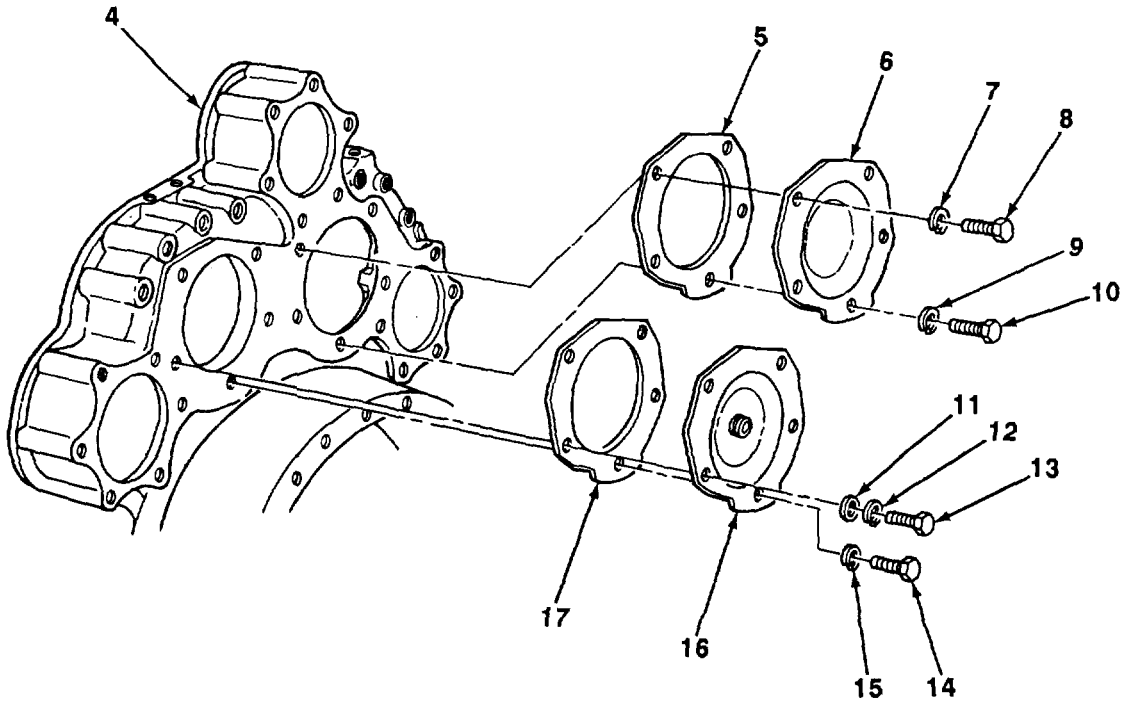
NOTE
Install nut In same position from which it was removed.

18. Install four new lockwashers (21), screws (22), and nut (18).



5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).

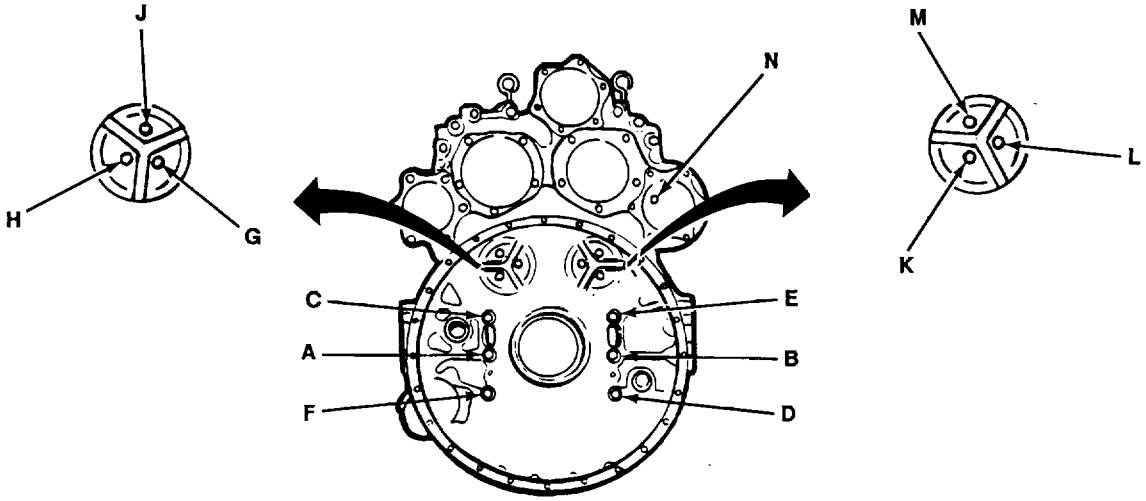
19. Apply coat of grease to new gasket (17) and install on tachometer drive cover (16).
20. Install tachometer drive cover (16) and gasket (17) on flywheel housing (4) with spacer (11), new lockwasher (12), and screw (13).
21. Install four new lockwashers (15) and screws (14).
22. Apply coat of grease to new gasket (5) and install on access cover (6).
23. Install access cover (6) and gasket (5) on flywheel housing (4) with new lockwasher (9) and screw (10).
24. Install four new lockwashers (7) and screws (8).



5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).

NOTE
Screws are lettered to show tightening sequence. Tighten screws In order shown.

25. Torque screws A through F to 90-100 lb.-ft. (122-136 Nom).
26. Torque screws G through M to 40-45 lb.-ft. (54-61 Nom).
27. Torque all other screws to 25-30 lb.-ft. (34-41 Nom).
28. Torque screw N to 25-30 lb.-ft. (34-41 Nom).



5-34. FLYWHEEL HOUSING AND REAR OIL SEAL REPLACEMENT (Con't).

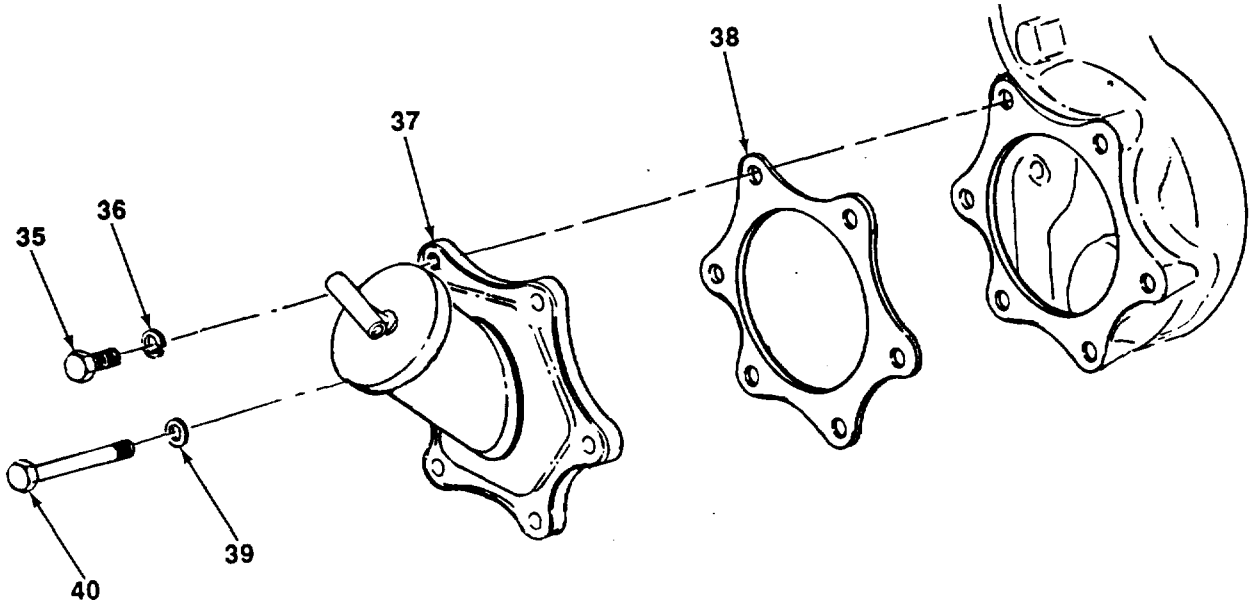
29. Apply coat of grease to new gasket (38) and install gasket on oil filler cover (37).

30. Install oil filler cover (37) and gasket (38) using five new lockwashers (36) and screws (35).

NOTE
Copper washer Is used on long screw.

31. Install new copper washer (39) and screw (40) fingertight.

32. Torque screws (35) to 25-30 lb.-ft. (34-41 Norm).



FOLLOW-ON TASKS:

- Install flywheel (see paragraph 5-33).
- Install air compressor drive ring (see paragraph 5-100).
- Install rear engine mounts (see paragraph 5-16).
- Install engine starter (see paragraph 4-53).
- Install governor control bracket (see paragraph 4-40).
- Install engine breather (see paragraph 4-30).

TA704982

5-35. PISTONS, CONNECTING RODS, AND CYLINDER SLEEVES REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:
- Engine removed (see paragraph 5-15)
- Oil pan removed (see paragraph 4-32)
- Cylinder head removed (see paragraph 5-28)

Tools/Test Equipment:
- Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

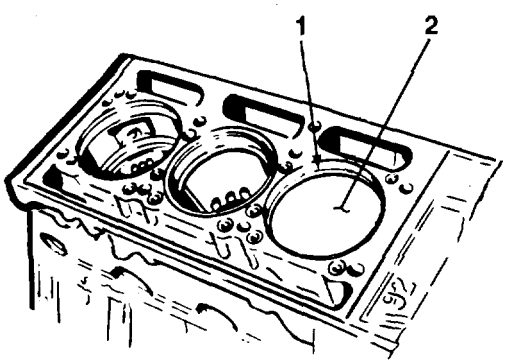
Materials/Parts:
- Lubricating oil (Item 31, Appendix E)
- Rags (Item 35, Appendix E)
- Marker tags (Item 40, Appendix E)

Personnel Required: Two

a. REMOVAL

NOTE
Perform steps 1 through 5 for each of six pistons.

1. Position piston (2) so top of piston is above ports In cylinder sleeve (1).
2. Cover top of piston (2) with clean rag.
3. Remove ring ridge at top of cylinder sleeve (1).



5-35. PISTONS, CONNECTING RODS, AND CYLINDER SLEEVES REPLACEMENT (Con't).

CAUTION

DO NOT use scribe or punch to mark piston, connecting rod, or cylinder head mounting surface of engine crankcase.

4. Tag piston (2), connecting rod (7), and engine crankcase (3).

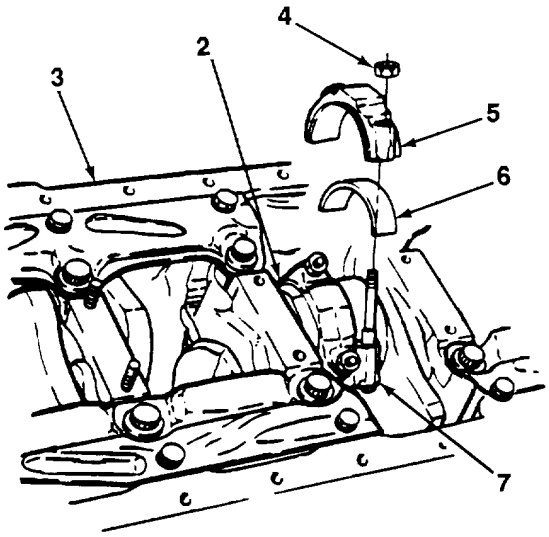
5. Rotate engine crankcase (3) so bearing cap (5) faces upward.

6. Remove rag.

NOTE

Perform steps 7 through 9 for each of six pistons.

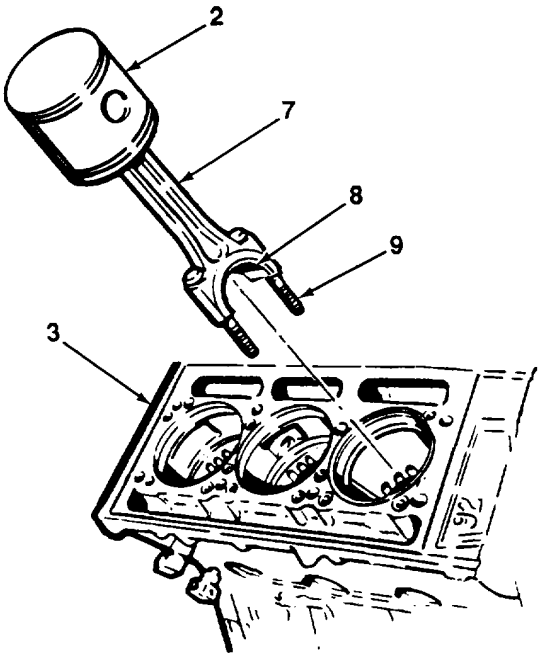
7. Remove two nuts (4) and bearing cap (5) with sleeve bearing (6) from connecting rod (7).



NOTE

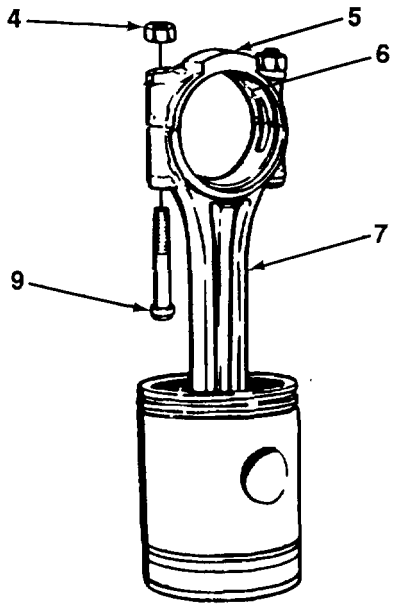
Cylinder sleeve may be removed with piston.

8. Remove piston (2), connecting rod (7), two bolts (9), and sleeve bearing (8) from engine crankcase (3) as an assembly.



5-35. PISTONS, CONNECTING RODS, AND CYLINDER SLEEVES REPLACEMENT Con't .

9. Install sleeve bearing (6) and bearing cap (5) to connecting rod (7) with two bolts (9) and nuts (4). Do not tighten nuts.



10. Rotate engine crankcase (3) to upright position.

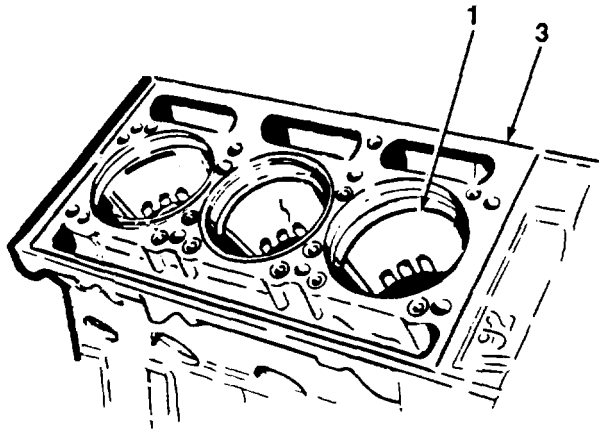
NOTE

- **Perform steps 11 through 13 for each of six cylinder sleeves.**
- **Rotate crankshaft, If necessary, to allow clearance for tool.**

11. Mark cylinder sleeve (1) and engine crankcase (3).

12. Using cylinder sleeve removal tool, remove cylinder sleeve (1).

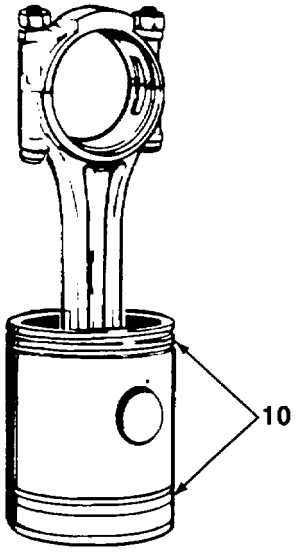
13. Tag cylinder sleeve (1).



5-35. PISTONS, CONNECTING RODS, AND CYLINDER SLEEVES REPLACEMENT (Con't).

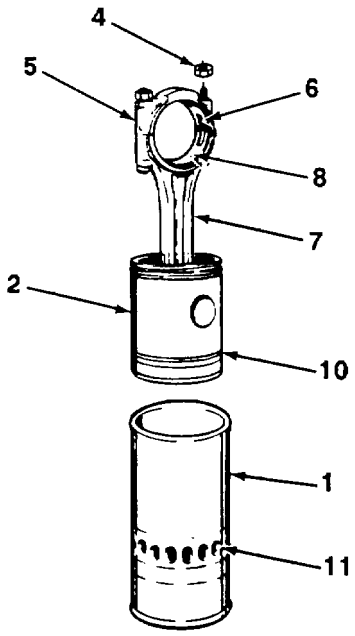
b. INSTALLATION

1. Apply coat of lubricating oil to piston rings (10).



NOTE
Perform steps 2 through 16 for each of six cylinder sleeves.

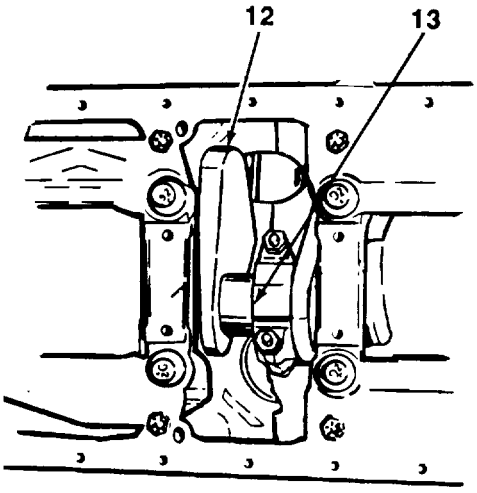
2. Apply coat of lubricating oil to inside surface of cylinder sleeve (1).
3. Position cylinder sleeve (1), flange end down, on wood block.
4. Position piston ring gaps (see paragraph 5-36).
5. Install piston ring compressor tool around piston (2) assembly.
6. Aline numbers on bearing cap (5) with marks on cylinder sleeve (1).
7. Install piston (2) assembly into cylinder sleeve (1) and remove piston ring compressor tool.
8. Remove two nuts (4), bearing cap (5), and two sleeve bearings (6 and 8) from connecting rod (7).
9. Push piston (2) into cylinder sleeve (1) until piston rings (10) pass ports (11) in cylinder sleeve.
10. Apply coat of lubricating oil to surfaces of sleeve bearings (6 and 8).



5-35. PISTONS, CONNECTING RODS, AND CYLINDER SLEEVES REPLACEMENT (Con't).

11. Rotate engine crankshaft (12) so that connecting rod journal (13) is at bottom of travel.

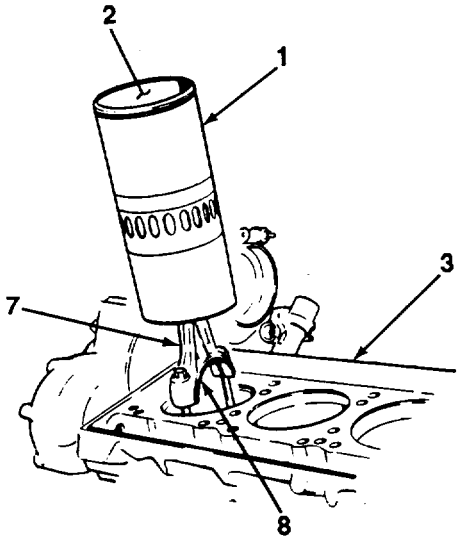
12. Apply coat of lubricating oil to connecting rod journal (13).



13. Position sleeve bearing (8) to connecting rod (7).

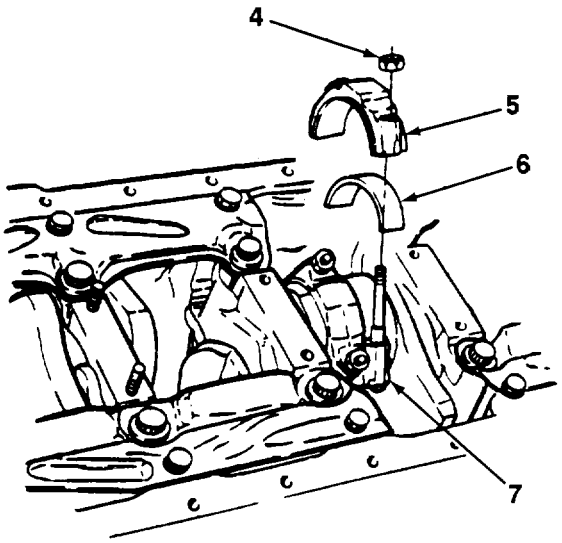
14. Aline marks on cylinder sleeve (1) and engine crankcase (3).

15. Install piston (2) assembly and cylinder sleeve (1) into engine crankcase (3).

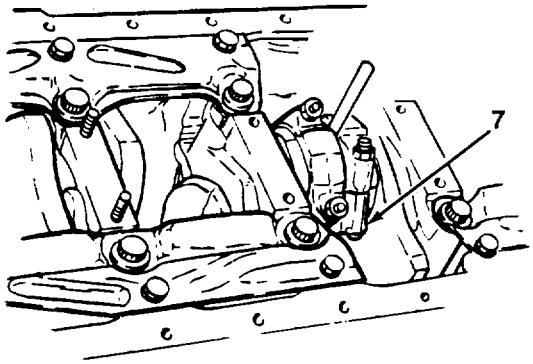


5-35. PISTONS, CONNECTING RODS, AND CYLINDER SLEEVES REPLACEMENT (Con't).

16. Install sleeve bearing (6) and bearing cap (5) to connecting rod (7) with two nuts (4). Torque nuts to 65-75 lb. ft. (88-102 N.m).



17. Using feeler gage, measure clearance between connecting rod (7) at each of three crankshaft journals. Clearance should be 0.008-0.016 in. (0.203-0.406 mm).



FOLLOW-ON TASKS:

- Install cylinder head (see paragraph 5-28).
- Install oil pan (see paragraph 4-32).
- Install engine (see paragraph 5-15).

5-36. PISTON REPAIR.

This Task Covers:

a. Disassembly
b. Cleaning and Inspection
c. Assembly

Initial Setup:

Equipment Conditions:
- Pistons removed (see paragraph 5-35)

Tools/Test Equipment
- General mechanic's tool kit
- Field automotive shop set
- Four oil rings

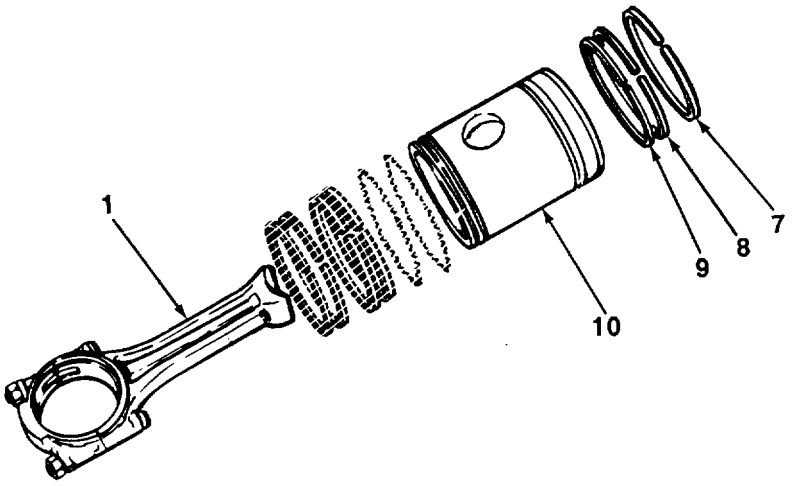
Materials/Parts:
- Lubricating oil (Item 31, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- Marker tags (Item 40, Appendix E)
- Two oil ring expanders
- Two pin retainers
- Three compression piston rings

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. REMOVAL

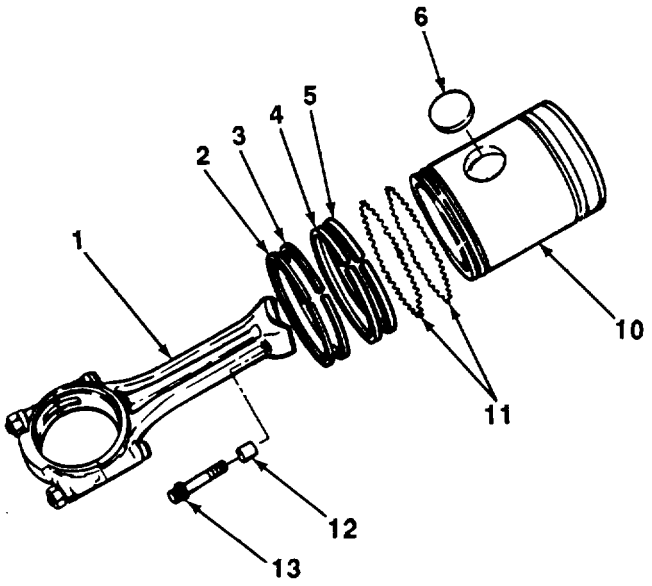
1. Place connecting rod (1) into vise with soft jaws.

2. Using compression piston ring remover and installer tool, remove three compression piston rings (7, 8, and 9) from piston (10) assembly. Discard compression piston rings.



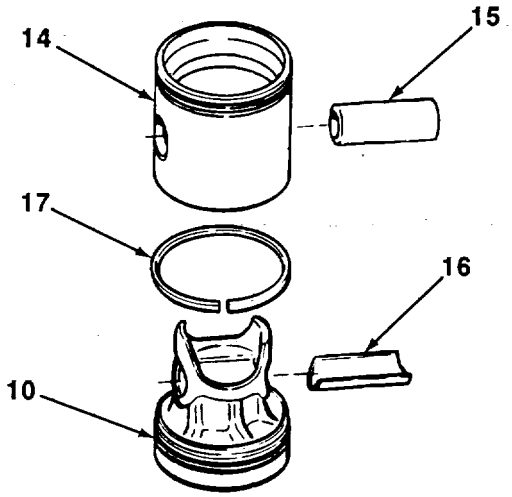
5-36. PISTON REPAIR (Con't).

3. Remove four oil rings (2, 3, 4, and 5) by hand. Discard oil rings.
4. Remove two oil ring expanders (11). Discard oil ring expanders.
5. Punch hole in one of two pin retainers (6) and remove from piston (10) assembly. Drive out other pin retainer. Discard pin retainers.
6. Loosen two bolts (13).
7. Remove connecting rod (1) from vise.
8. Mark connecting rod (1) and piston (10) assembly.
9. Remove two bolts (13), sleeve bushings (12), and piston (10) assembly from connecting rod (1).



5-36. PISTON REPAIR (Con't).

10. Mark piston (10), piston skirt (14), piston pin (15), and sleeve bearing (16).
11. Remove piston pin (15) and piston skirt (14) from piston (10).
12. Remove spacer ring (17) and sleeve bearing (16) from piston (10).



WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 1000F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean all parts with dry cleaning solvent.

2. Clean ring grooves and oil holes in piston.

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 1000F-1380F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

3. Clean piston with dry cleaning solvent.

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5-36. PISTON REPAIR (Con't).

WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

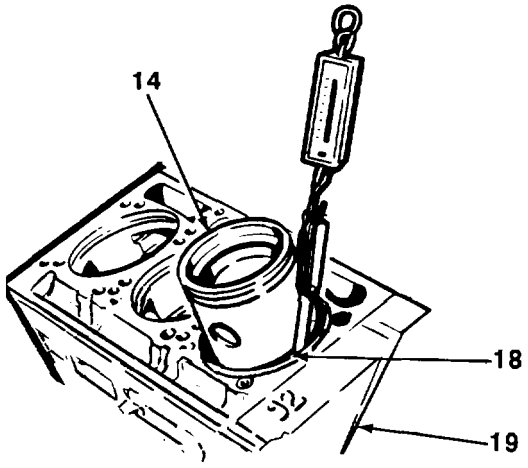
4. Dry parts with compressed air.

5. Inspect all parts for damage. Replace damaged parts.

NOTE

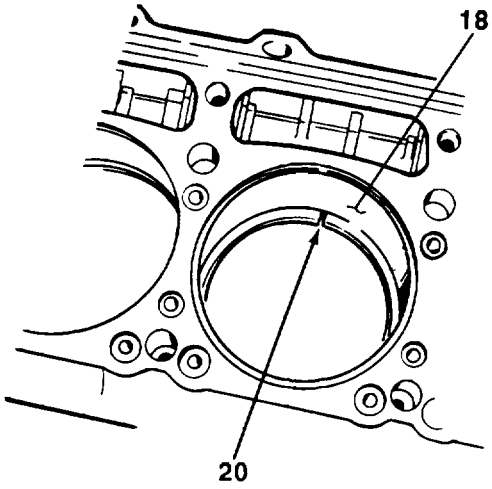
Piston, sleeve bearing, and piston pin are a matched set and must be replaced as an assembly.

6. Measure diameter of piston skirt (14) and check for out-of-round. Diameter must be at least 4.2428 in. (10.7767 mm) at any point.
7. Check piston skirt-to-cylinder sleeve clearance as follows:
   (a) With cylinder sleeve (18) installed In engine crankcase (19), install piston skirt (14) up- side down into cylinder sleeve.
   (b) Using feeler gage and spring scale, determine feeler gage thickness required to withdraw feeler gage from between piston skirt (14) and cylinder sleeve (18). Pull should be 6 lb (2.72 kg).
   (c) Minimum clearances will be 0.001 in. (0.025 mm).
   (d) If clearance is greater than 0.0120 in. (0.3048 mm), replace piston skirt (14).



5-36. PISTON REPAIR (Con't).

8. Check compression piston ring gaps as follows:



   (a) Place three new compression piston rings into cylinder sleeve (18), one at a time, to depth of 2-3 in. (5.08-7.62 cm). Piston skirt may be used to position compression piston rings parallel to top of cylinder sleeve.

   (b) Measure compression piston ring gaps (20) with feeler gage. Compression piston ring gaps should be less than 0.0600 in. (1.5240 mm).

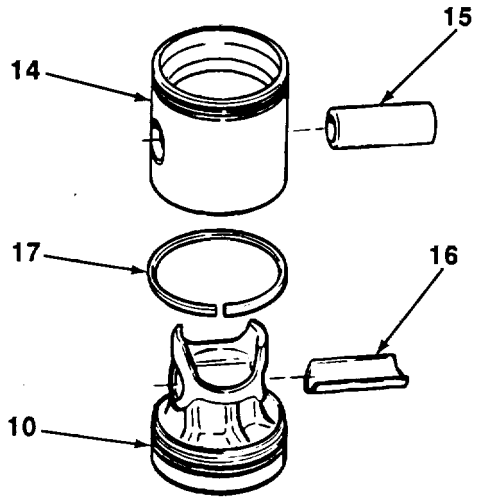
   (c) Repeat step a for four new oil rings.

   (d) Measure oil ring gaps with feeler gage. Maximum oil ring gap should be 0.0430 in. (1.0922 mm).

9. Check compression piston ring side clearance as follows:

   (a) Measure compression piston ring side clearances with feeler gage. Top compression piston ring maximum side clearance should be 0.0100 in. (0.2540 mm). No. 2 compression piston ring maximum side clearance should be 0.0220 in. (0.5588 mm). No. 3 compression piston ring maximum side clearance should be 0.0150 in. (0.3810 mm).
   (b) Measure oil ring side clearances with feeler gage. Oil ring maximum side clearance should be 0.0080 in. (0.2032 mm) for each of four oil rings.

c. ASSEMBLY



1. Place piston (10), top down, on work surface. Install sleeve bearing (16) to piston.

2. Apply coat of lubricating oil to spacer ring (17).

3. Install spacer ring (17), bevel side up, to piston (10). Ensure that spacer ring rotates freely on piston with no sticking or binding.

4. While compressing spacer ring (17), install piston skirt (14) to piston (10). Ensure that piston skirt rotates freely on piston with no binding.

5. Apply coat of lubricating oil to piston pin (15).

6. Install piston pin (15) through piston skirt (14) and piston (10) with threaded holes facing upward.

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5-36. PISTON REPAIR (Con't).

7. Press In two new pin retainers (6).

8. Using leak detector, apply 10 in. (25.4 cm) of vacuum to each pin retainer (6). There should be no loss of vacuum.

9. Install connecting rod (1) to piston (10) assembly with two sleeve bushings (12) and bolts (13). Tighten bolts fingertight.

10. Place connecting rod (1) into vise with soft jaws.

11. Torque two bolts (13) to 55-60 lb.-ft. (75-81 Nom).

12. Apply coat of lubricating oil to piston (10) assembly.

13. Adjust position of connecting rod (1) in vise.

CAUTION

Ensure that ends of oil ring expanders DO NOT overlap. Oil rings will be damaged when ring compressor Is Installed.

14. Install two new oil ring expanders (11) to piston (10) assembly with ends facing upward.

15. Install four new oil rings (2, 3, 4, and 5) to piston (10) assembly with bevel side up.

16. Install three new compression piston rings (7, 8, and 9) to piston (10) assembly with ring marked "T" as top ring.

17. Position compression piston ring and oil ring gaps as follows:

    (a) Position oil ring (2) with gap 1800 from gap in oil expander ring (11).

    (b) Position oil ring (3) with gap 900 from gap In oil ring (2).

    (c) Position oil ring (4) with gap 1800 from gap in oil expander ring (11).

    (d) Position oil ring (5) with gap 900 from gap in oil ring (4).

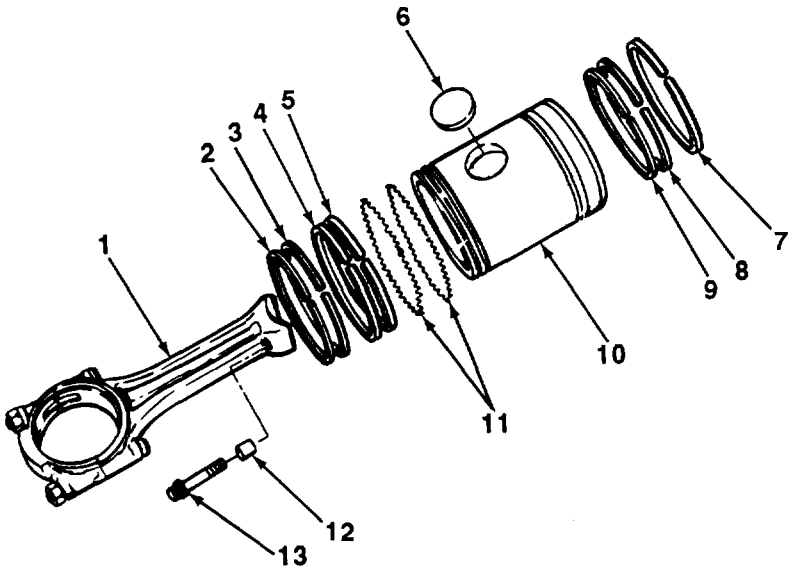
    (e) Position compression piston ring (7) with gap 1800 from gap in oil ring (5).

    (f) Position compression piston ring (8) with gap 900 from gap in compression piston ring (7).

    (g) Position compression piston ring (9) with gap 1800 from gap in compression piston ring (8).

18. Remove connecting rod (1) from vise.

5-36. PISTON REPAIR (Con't).



FOLLOW-ON TASKS:

- Install pistons (see paragraph 5-35).

TA704994

5-37. FRONT BALANCE COVER AND PULLEY REPLACEMENT

This Task Covers:

a. Removal

b. Installation

Initial Setup:

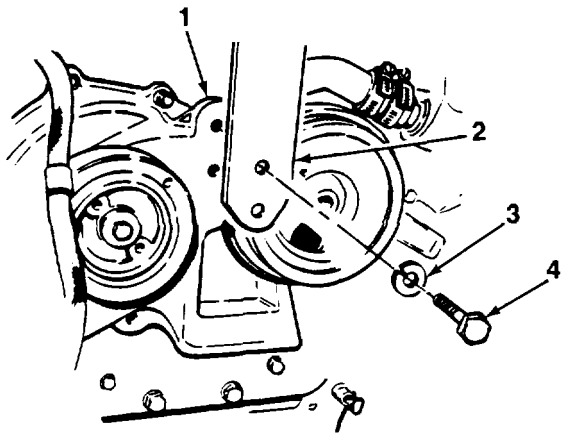
Equipment Conditions:
- Fan support removed (see paragraph 5-98).
- Water pump removed (see paragraph 5-72).

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Grease (Item 22, Appendix E)
- Lubricating oil (Item 31, Appendix E)
- Marker tags (Item 40, Appendix E)
- One gasket
- One oil seal
- Eleven lockwashers

a. REMOVAL

1. Remove screw (4), lockwasher (3), and engine lifting bracket (2) from front balance cover (1). Discard lockwasher.

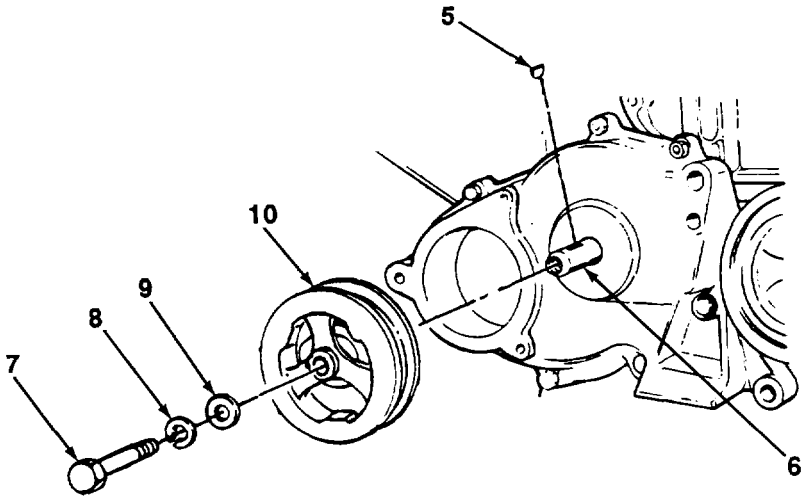


2. Remove screw (7), lockwasher (8), and washer (C

3. Remove pulley (10) from shaft (6).

4. Remove woodruff key (5) from shaft (6).

5-37. FRONT BALANCE COVER AND PULLEY REPLACEMENT (Con't).



NOTE

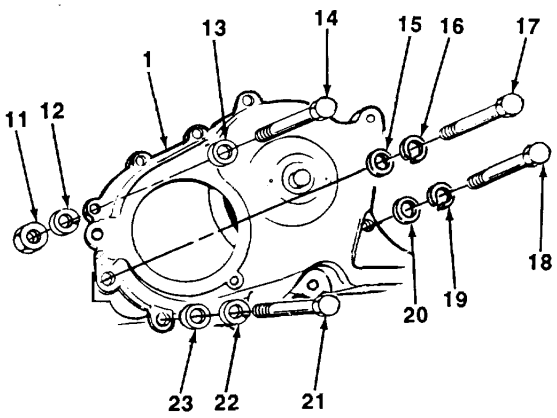
Screws are different lengths. Tag screws when removing to assist In Installation.

5. Remove screw (17), lockwasher (16), and washer (15). Discard lockwasher.

6. Remove screw (18), lockwasher (19), and washer (20). Discard lockwasher.

7. Remove two screws (21), lockwashers (22), and washers (23). Discard lockwashers.

8. Remove five nuts (11), lockwashers (12), screws (14), and washers (13) from front balance cover (1). Discard lockwashers.

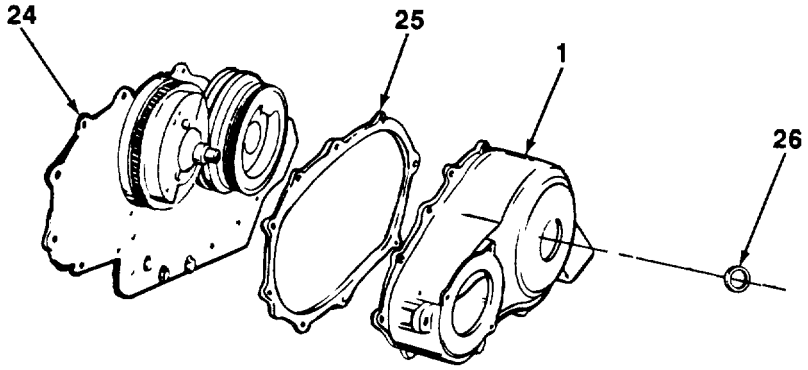


TA704996

5-37. FRONT BALANCE COVER AND PULLEY REPLACEMENT (Con't).

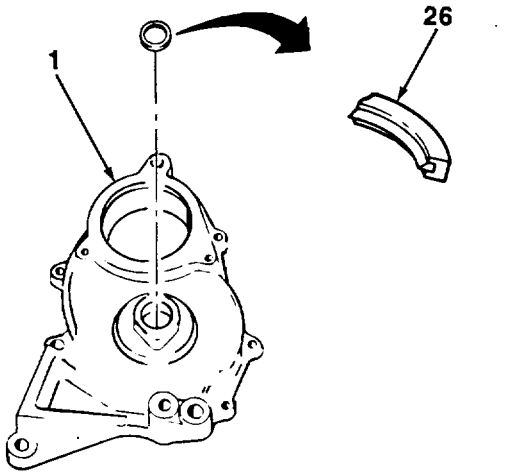
9. Remove front balance cover (1) and gasket (25) from end plate (24). Discard gasket.

10. Remove oil seal (26) from front balance cover (1). Discard oil seal.



b. INSTALLATION

1. Install new oil seal (26) in front balance cover (1) and apply coat of lubricating oil to oil seal.



2. Coat new gasket (25) with grease and install on front balance cover (1).

3. Aline dowel pins (27) on front balance cover (1) with mating holes in end plate (24) and install front balance cover on end plate.

4. Install five washers (13), screws (14), new lockwashers (12), and nuts (11). Torque nuts to 30 lb.-ft. (41 Nom).

5. Install two washers (23), new lockwashers (22), and screws (21). Torque screws to 90 lb.-ft. (122 Nom).

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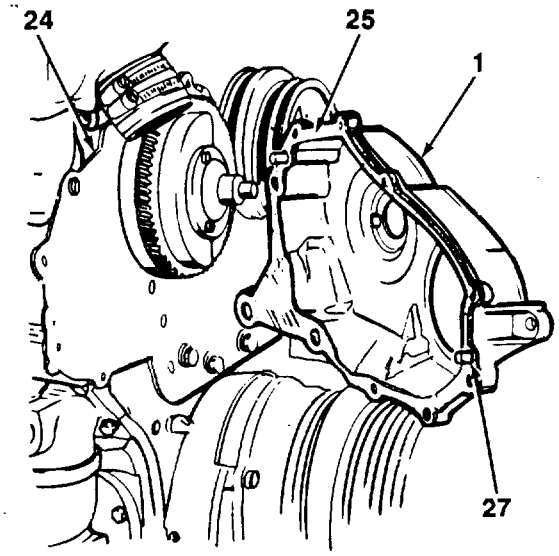
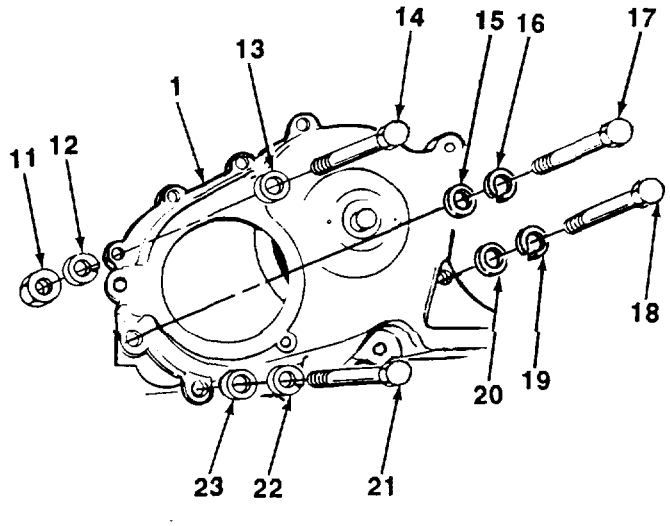
5-37. FRONT BALANCE COVER AND PULLEY REPLACEMENT (Con't).



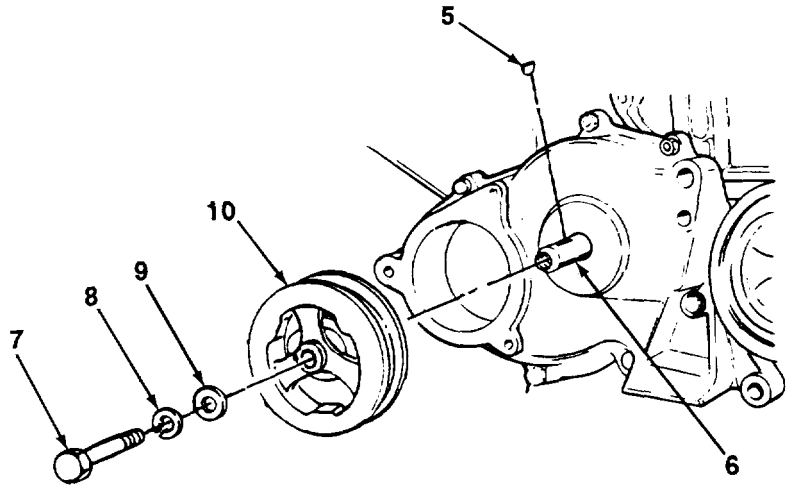


6. Install washer (20), new lockwasher (19), and screw (18). Torque screw to 90 lb.-ft. (122 Nom).

7. Install washer (15), new lockwasher (16), and screw (17). Torque screw to 30 lb.-ft. (41 Nom).

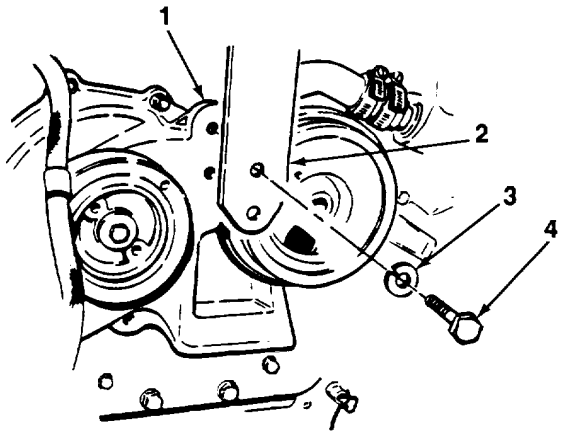
8. Install woodruff key (5) and pulley (10) on shaft (6).

9. Install washer (9), new lockwasher (8), and screw (7).



5-37. FRONT BALANCE COVER AND PULLEY REI

10. Install engine lifting bracket (2) on front balance cover (1) with new lockwasher (3) and screw (4).



FOLLOW-ON TASKS:

- Install water pump (see paragraph 5-72).
- Install fan support (see paragraph 5-98).

5-38. RIGHT BANK CAM GEAR REPLACEMENT

This Task Covers:

a. Removal

b. Installation

Initial Setup:

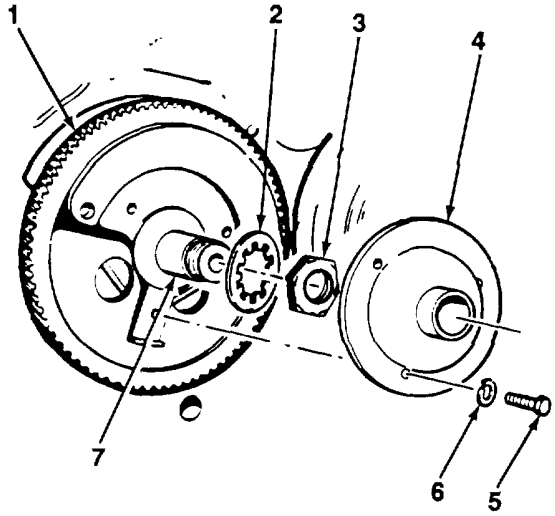
Equipment Conditions:
- Front balance cover and pulley removed (see paragraph 5-37).

Tools/Test Equipment:
- General mechanic's tool kit

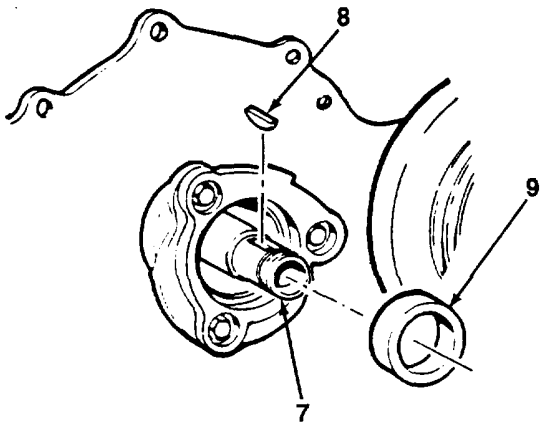
Materials/Parts:
- Four lockwashers

a. REMOVAL

1. Remove three screws (5), lockwashers (6), and hub (4) from right bank cam gear (1). Discard lockwashers.
2. Remove nut (3) and lockwasher (2) from camshaft (7). Discard lockwasher.
3. Remove right bank cam gear (1) from camshaft (7).



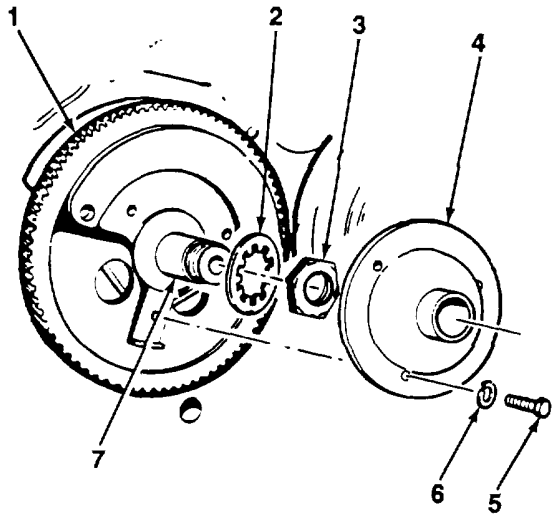
4. Remove spacer (9) and key (8) from camshaft (7).



5-38. RIGHT BANK CAM GEAR REPLACEMENT (Con'

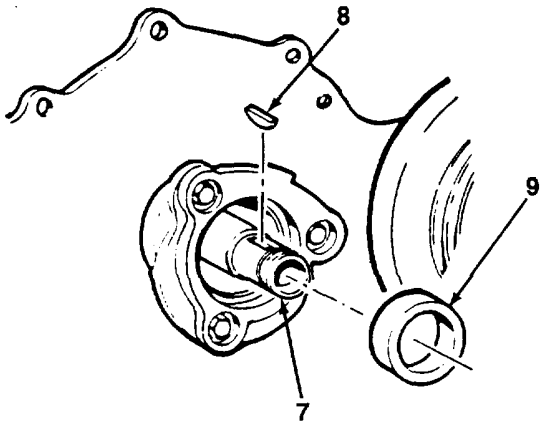
b. INSTALLATION

1. Install spacer (9) and key (8) on camshaft (7).



2. Install right bank cam gear (1), new lockwasher (2) and nut (3) on camshaft (7). Torque nut to 325 lb.-ft. (440 Nom).

3. Install hub (4) on right bank cam gear (1) using three new lockwashers (6) and nuts (5).



FOLLOW-ON TASKS:

- Install front balance cover and pulley (see paragraph 5-37).

5-39. CAMSHAFT MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Inspection
d. Assembly
e. Installation

Initial Setup:

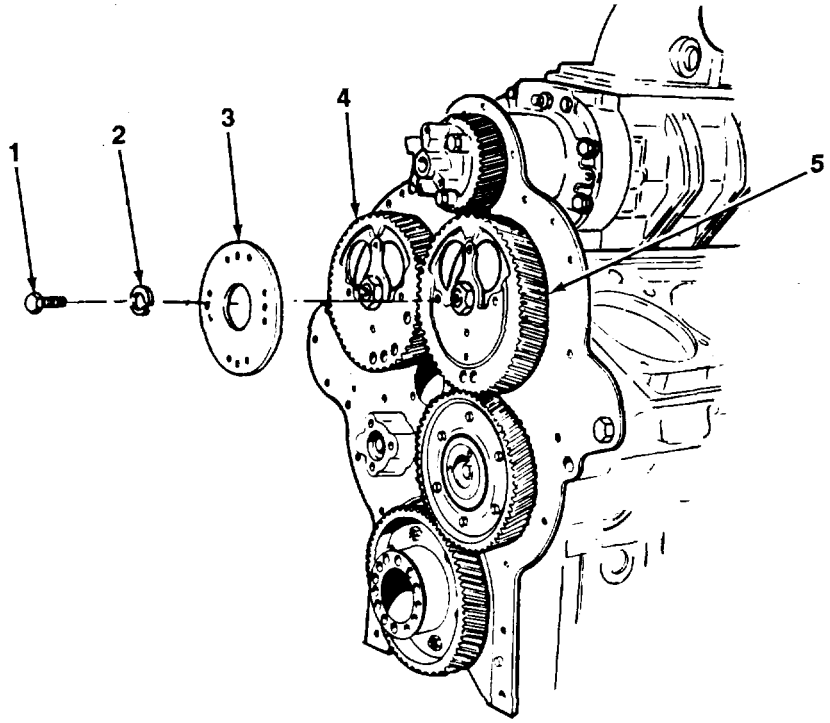
Equipment Conditions:
- Cylinder heads removed (see paragraph 5-28).
- Flywheel housing removed (see paragraph 5-34).
- Right bank cam gear removed (see paragraph 5-38).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Grease (Item 22, Appendix E)
- Lubricating oil (Item 28, Appendix E)
- Rags (Item 35, Appendix E)
- Marker tags (Item 40, Appendix E)
- One seal
- Two gaskets
- Fourteen lockwashers

a. REMOVAL

1. Remove four screws (1), lockwashers (2), and retaining plate (3) from left camshaft gear (4) and right camshaft gear (5). Discard lockwashers.



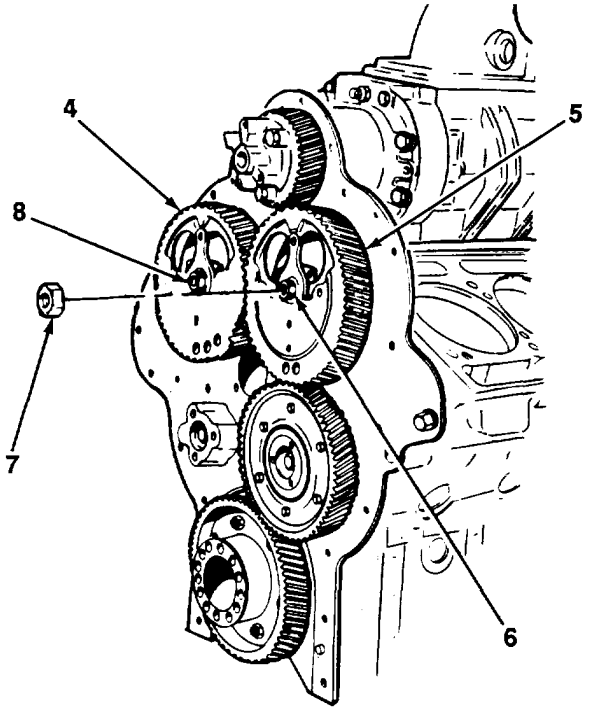
TA705002

5-39. CAMSHAFT MAINTENANCE (Con't).

NOTE
Rag Is used between camshaft gears to prevent gears from turning.

2. Place clean rag between left camshaft gear (4) and right camshaft gear (5).

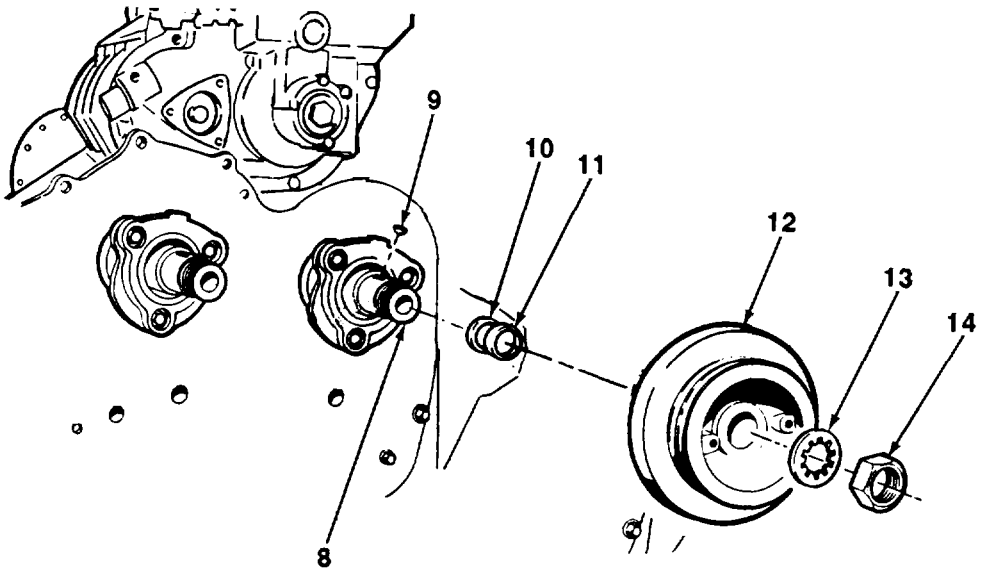
3. Remove nut (7) from rear end of each of two camshafts (6 and 8).



4. Remove nut (14), lockwasher (13), and accessory drive pulley (12) from front of camshaft (8). Discard lockwasher.

5. Remove woodruff key (9) and spacer (11) from camshaft (8).

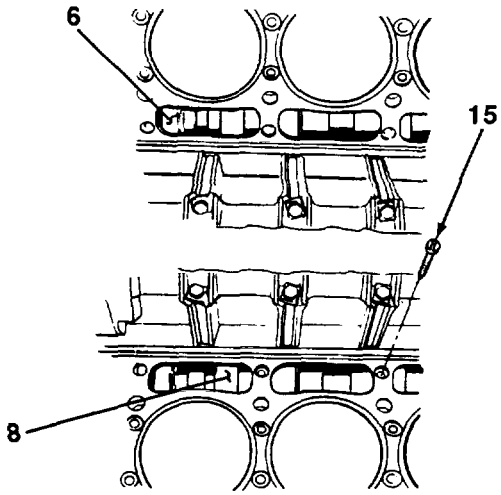
6. Remove seal (10) from camshaft (8). Discard seal.



TA705003

5-39. CAMSHAFT MAINTENANCE (Con't).

7. Remove two bearing lockscrews (15) from each of two camshafts (6 and 8).



NOTE

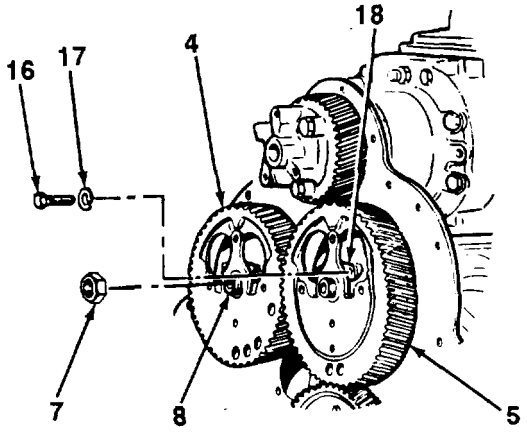
Nut previously removed from camshafts can be used to turn gears for access to bearing screws.

8. Remove rag from between left camshaft gear (4) and right camshaft gear (5).

9. Install nut (7), previously removed, on rear end of camshaft (8).

10. Remove three screws (16) and lockwashers (17) from two rear camshaft bearings (18). Discard lockwashers.

11. Remove nut (7).



TA705004

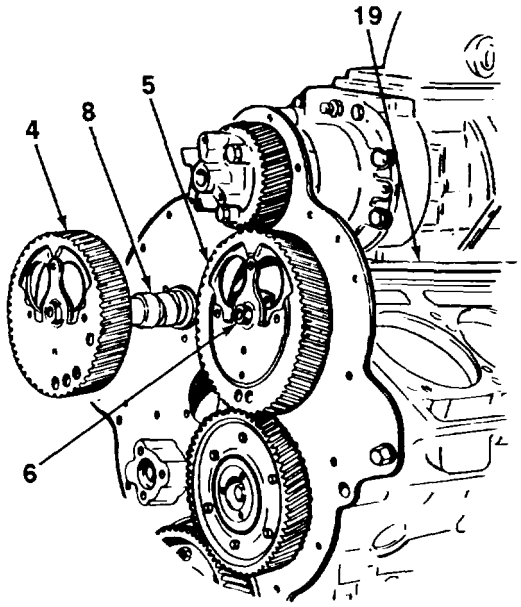
5-39. CAMSHAFT MAINTENANCE (Con't).

CAUTION

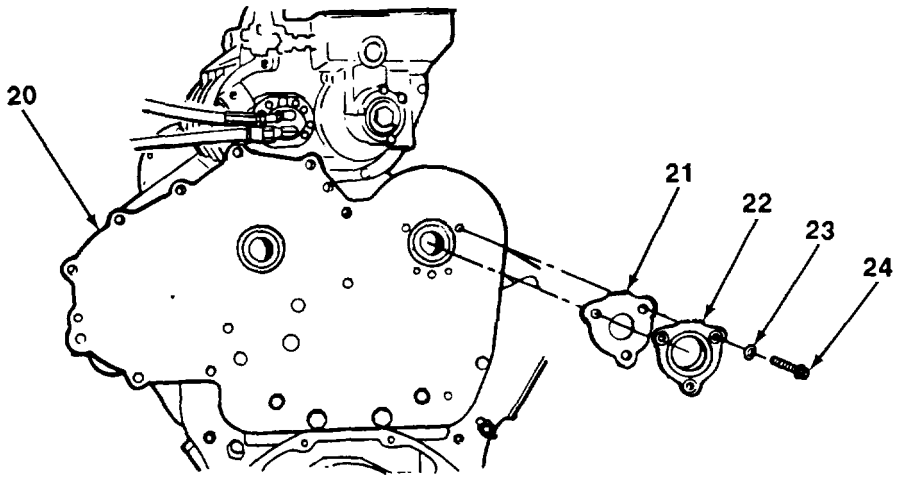
Use care when removing camshafts. Damage may occur if camshafts or bearings scrape or hit hard surface of engine block.

NOTE
Tag and mark all parts to assist In Installation.

12. Remove left camshaft gear (4) and right camshaft gear (5) and two camshafts (6 and 8) as assemblies from engine block (19).



13. Remove six screws (24), lockwashers (23), two bearings (22), and gaskets (21) from front end plate (20). Discard lockwashers and gaskets.



TA705005

5-39. CAMSHAFT MAINTENANCE (Con't).

b. DISASSEMBLY

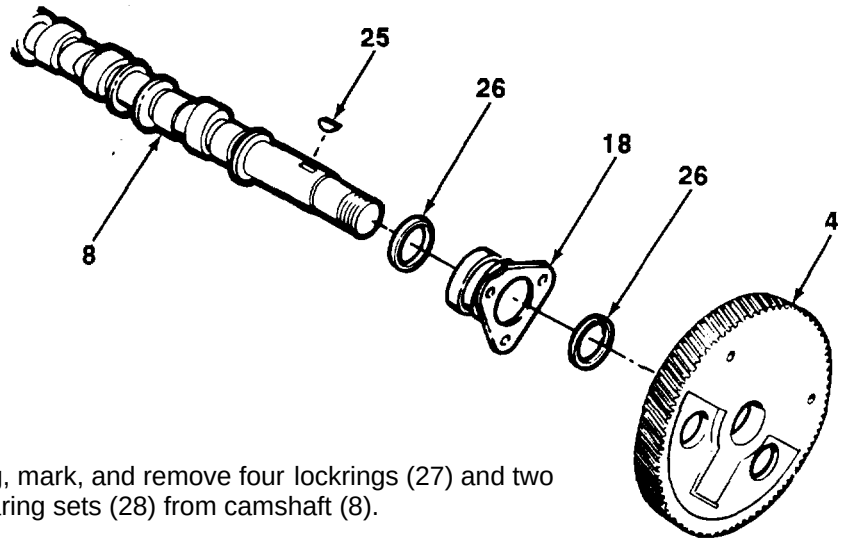
NOTE

Left and right camshaft gears, camshafts, and bearings are disassembled same way. Left camshaft and gear Is shown. Repeat steps 1 through 4 for right camshaft and gear.

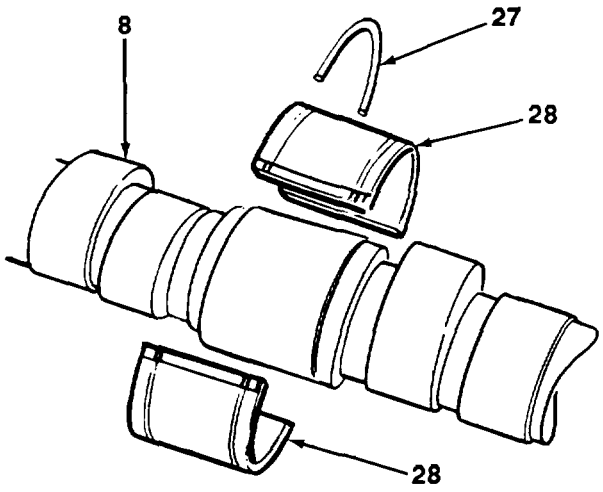
1. Remove left camshaft gear (4) from camshaft (8).

2. Remove woodruff key (25) from camshaft (8).

3. Remove two thrust washers (26) and bearing (18) from camshaft (8).



4. Tag, mark, and remove four lockrings (27) and two bearing sets (28) from camshaft (8).



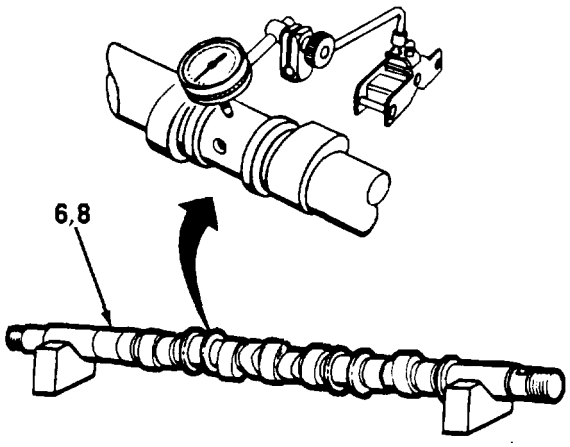
TA705006

5-39. CAMSHAFT MAINTENANCE (Con't).

c. INSPECTION

1. Place camshaft (6 or 8) in V-blocks. Use dial indicator to check center bearing surface for runout. Runout must not exceed 0.002 in. (0.051 mm).

2. If runout exceeds 0.002 in. (0.051 mm), replace camshaft (6 or 8).



3. Measure and note diameters of two bearing Journals (30). Replace camshaft (6 or 8) if diameter Is less than 1.4980 In. (3.8049 cm).

4. Measure and note diameter of two end bearing Journals (29). Replace camshaft (6 or 8) if diameter is less than 1.4970 in. (3.8024 cm).

5. Inspect bushings in bearings (18 and 22). If badly worn, replace bearings.

6. Inside diameter of bushings in bearing (18) must be square within 0.0015 in. (0.0381 mm) of total indicator reading, and concentric with outside of housing within 0.002 in. (0.051 mm) of total indicator reading.

7. Bushings in bearing (18) must project 0.045-0.055 in. (1.143-1.397 mm) from each end of bearing.

8. Bushings in bearing (22) must be flush with ends of bearing bore.

9. Clearance between end bearing journals (29) and bushings in bearings (18 and 22) is 0.0025-0.006 in. (0.-.152 mm).

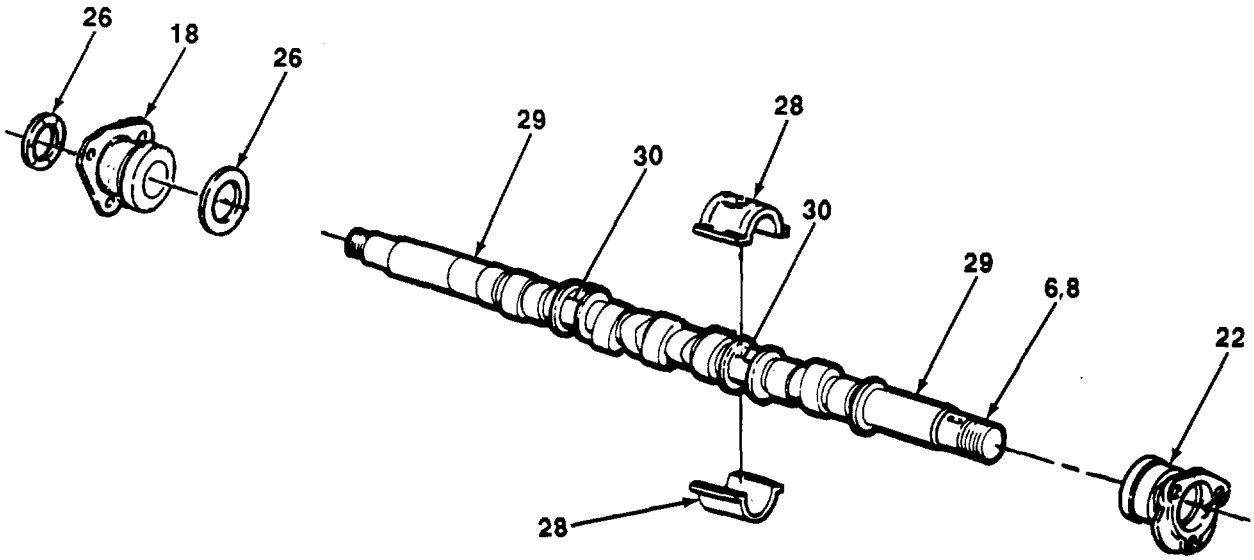
10. Inspect two bearing sets (28) for excessive wear and scoring. Clearance between bearing journals (30) and bearing sets must be 0.0025-0.009 in. (0.0635-0.229 mm).

11. Measure thickness of four thrust washers (26). Replace if less than 0.120 in. (3.048 mm).

12. Inspect left and right camshaft gears for scoring, pitting, and worn or damaged teeth.

TA705007

5-39. CAMSHAFT MAINTENANCE (Con't).



d. ASSEMBLY

NOTE

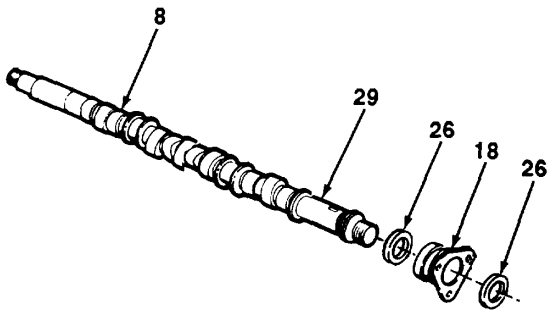
Left and right camshaft gears, camshafts, and bearings are assembled same way. Left camshaft and gear Is shown. Repeat steps 1 through 10 for right camshaft and gear.

1 Apply grease to steel faces of two thrust washer (26).

2. Install two thrust washers (26), with steel faces facing bearing (18), against each end of bearing.

3. Apply light coat of lubricating oil to rear end bearing journal (29).

4. Install two thrust washers (26) and bearing (18) on camshaft (8).



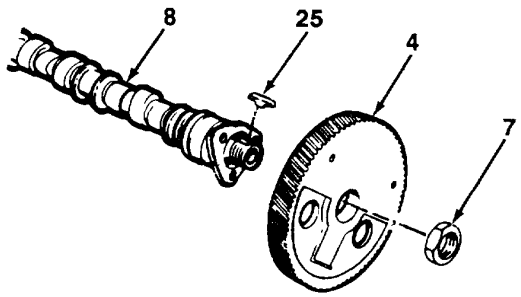
TA705008

5-39. CAMSHAFT MAINTENANCE (Con't).

5. Install woodruff key (25) in camshaft (8).

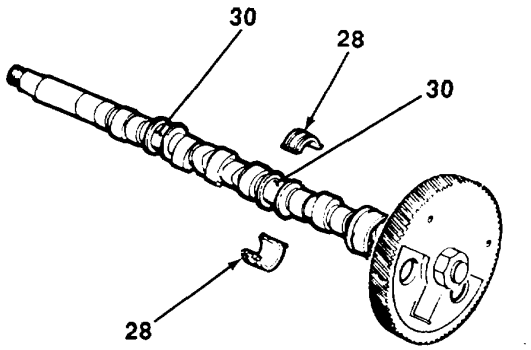
6. Aline left camshaft gear (4) with woodruff key (25) and install left camshaft gear on camshaft (8).

7. Install nut (7) on camshaft (8) and tighten finger-tight.



8. Apply light coat of lubricating oil to two bearing journals (30).

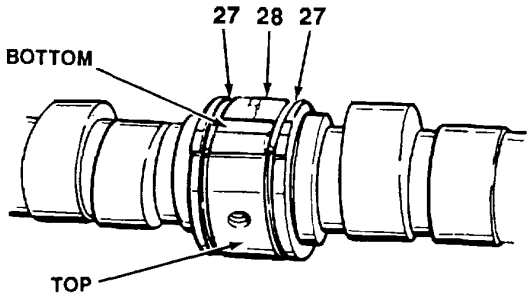
9. Place four halves of bearing sets (28) on two bearing journals (30).



NOTE

Both ends of lockrings must cover split of bearing set and be installed over bottom half of bearing set. Bottom half of bearing set is one without hole.

10. Install four lockrings (27) over bottom half of two bearing sets (28).



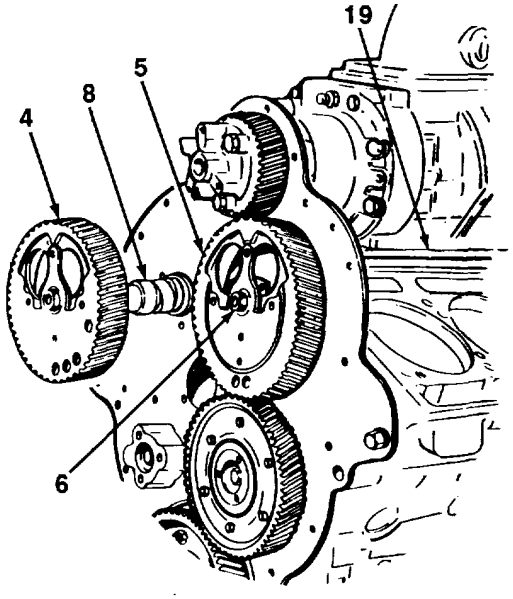
TA705009

5-39. CAMSHAFT MAINTENANCE (Con't).

e. INSTALLATION

1. Partially install camshaft (6) and right camshaft gear (5) in engine block (19).

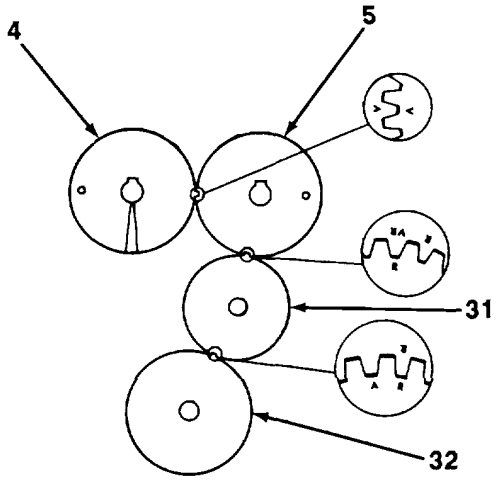
2. Partially install camshaft (8) and left camshaft gear (4) in engine block (19).



3 Aline left camshaft gear (4), right camshaft gear (5), idler gear (31), and crankshaft timing gear (32) so timing marks line up.

4 Complete installation of left camshaft gear (4) and right camshaft gear (5) with idler gear (31) until gears are fully meshed.

5 Ensure that timing marks on all gears are still alined.

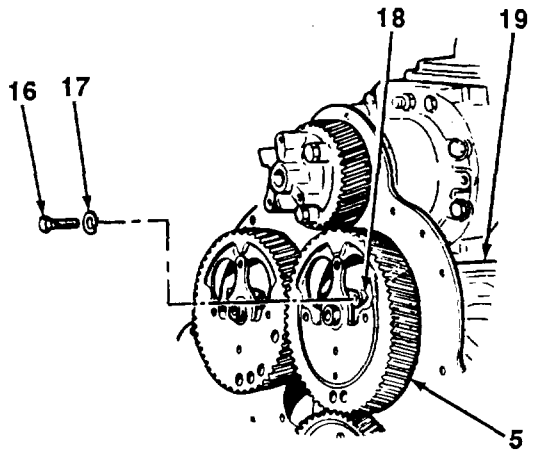


TA705010

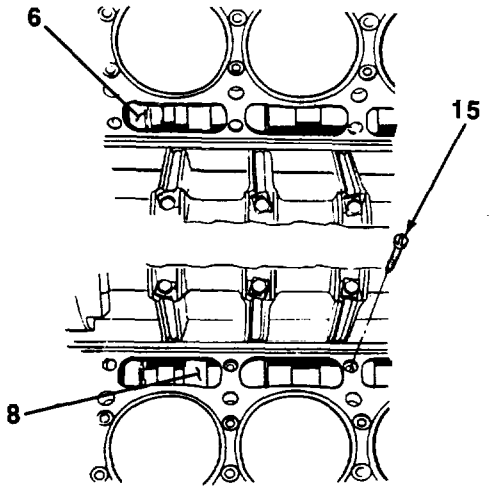
5-39. CAMSHAFT MAINTENANCE (Con't)

6 Turn right camshaft gear (5) to reach threaded holes in engine block (19).

7 Install three screws (16) and new lockwashers (17) In two rear camshaft bearings (18). Torque screws to 40 lb.-ft. (54 Nom).



8 Aline holes and install two bearing lock screws (15) in camshafts (6 and 8).



(Blower Removed For Clarity)

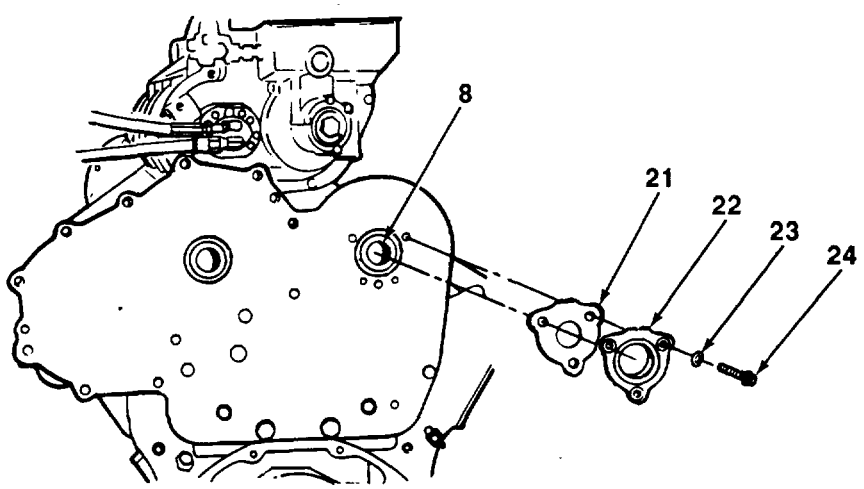
9. Apply a light coat of lubricating oil to front end of camshaft (8).

10. Install new gasket (21) and bearing (22) on camshaft (8).

11. Install three screws (24) and new lockwashers (23). Torque screws to 40 lb.-ft. (54 Nom).

TA708011

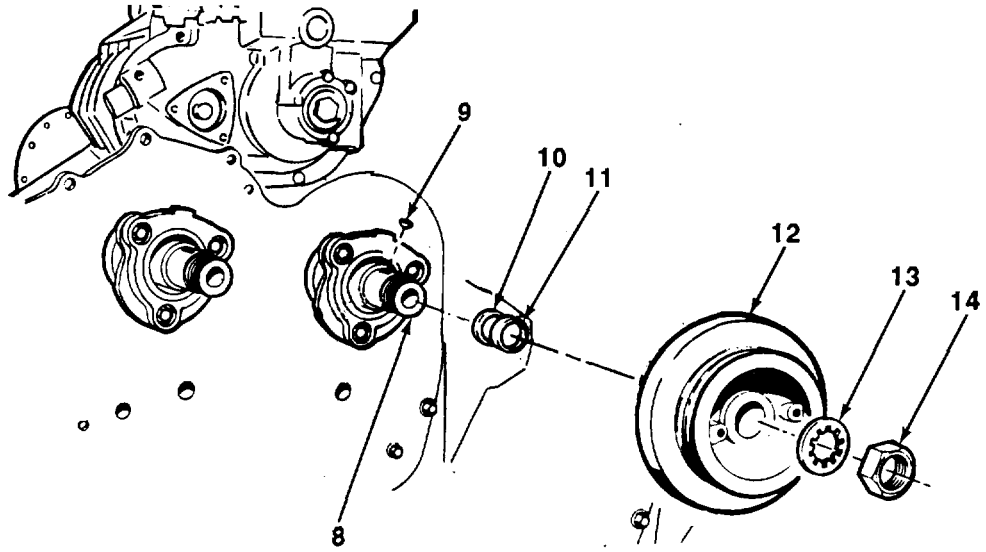
5-39. CAMSHAFT MAINTENANCE (Con't).



12. Install new seal (10) and spacer (11) on camshaft (8).

13. Install woodruff key (9) in camshaft (8).

14. Install accessory drive pulley (12) on camshaft (8) with new lockwasher (13) and nut (14). Tighten nut fingertight.

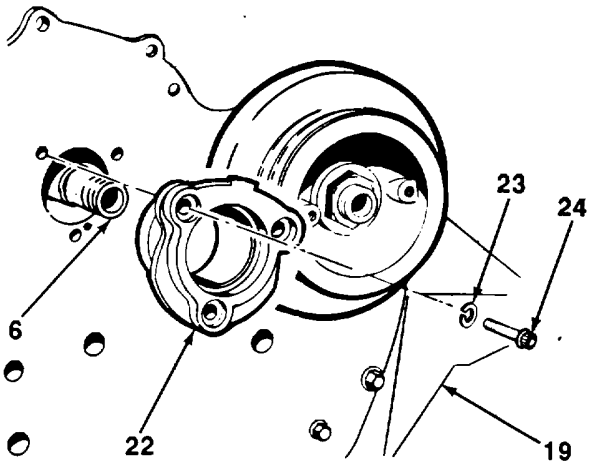


TA705012

5-39. CAMSHAFT MAINTENANCE (Con't).

15 Apply light coat of lubricating oil to camshaft (6) and install bearing (22) on camshaft.

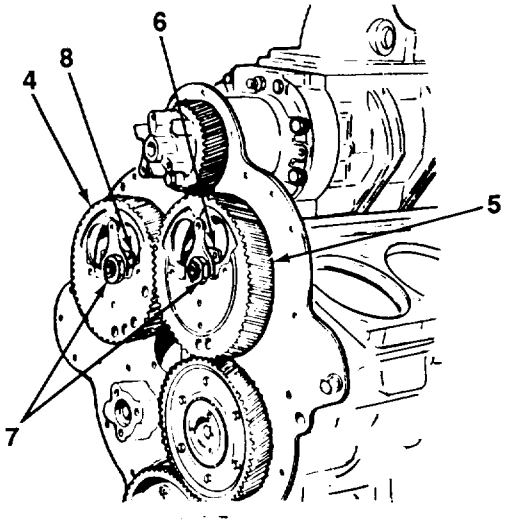
16 Install three screws (24) and new lockwashers (23) in bearing (22) on engine block (19). Torque screws to 40 lb.-ft. (54 Nom).

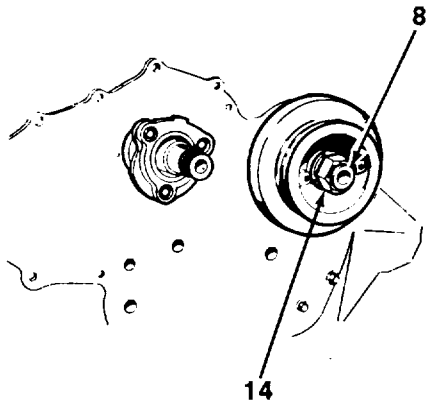


17. Place clean rag between left camshaft gear (4) and right camshaft gear (5).

18. Torque nuts (7) on rear end of camshafts (6 and 8) to 325 lb.-ft. (441 Nom).

19. Torque nut (14) on front end of camshaft (8) to 325 lb.-ft. (441 Nom).



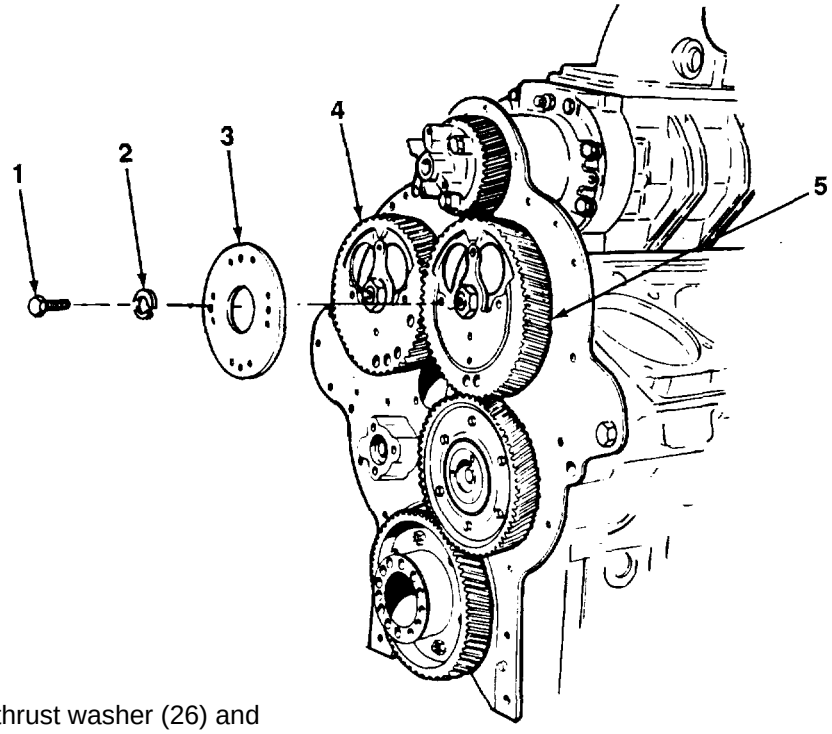


TA705013

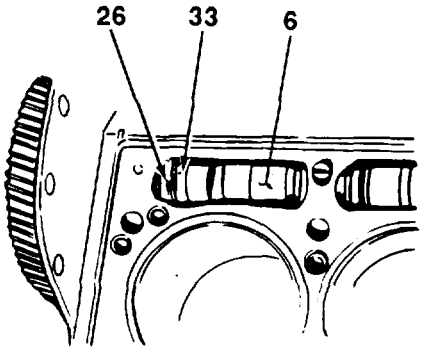
5-39. CAMSHAFT MAINTENANCE (Con't).

20. Install two retaining plates (3) on left camshaft gear (4) and right camshaft gear (5).

21. Install eight screws (1) and new lockwashers (2). Torque screws to 39 lb.-ft. (53 Nom).



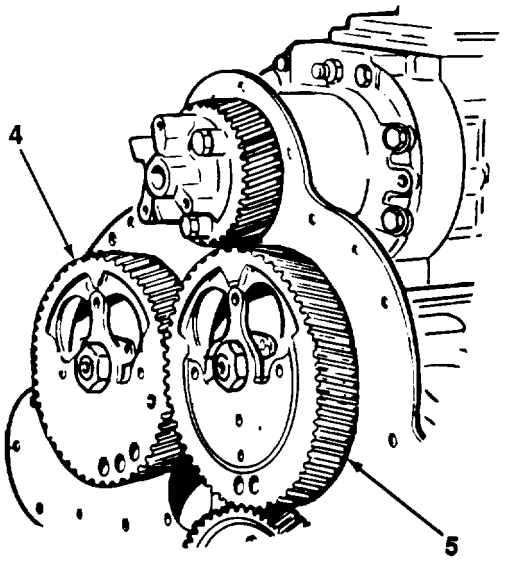
22. Check clearance between thrust washer (26) and shoulder (33) of camshaft (6). If clearance is less than 0.004 in. (0.102 mm), or greater than 0.018 in. (0.457 mm), replace camshaft.



TA705014

5-39. CAMSHAFT MAINTENANCE (Con't).

23. Check backlash between left camshaft gear (4) and right camshaft gear (5). Minimum backlash is 0.003 in. (0.076 mm). Maximum backlash is 0.010 in. (0.254 mm).



FOLLOW-ON TASKS:

- Install right bank cam gear (see paragraph 5-38).
- Install flywheel housing (see paragraph 5-34).
- Install cylinder heads (see paragraph 5-28).

TA705015

5-40. IDLER GEAR MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation

Initial Setup:

Equipment Conditions:
- Flywheel housing removed (see paragraph 5-34).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set
- Gear bearing plate kit

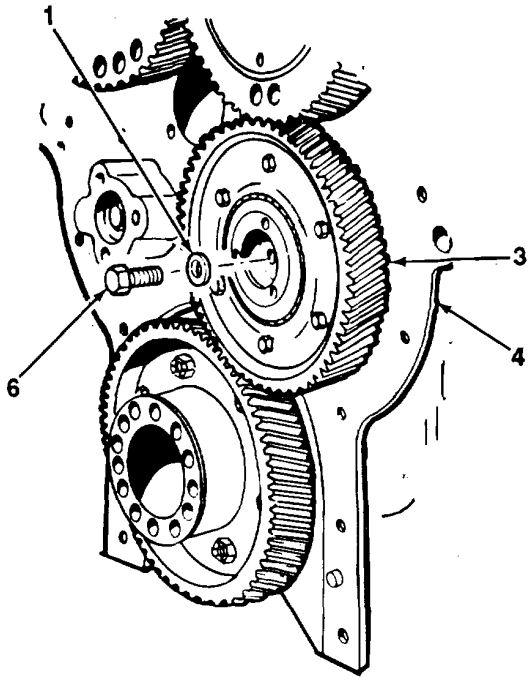
Materials/Parts:
- Lubricating oil (Item 28, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)

General Safety Instructions:
- Dry cleaning solvent Is flammable and must not be used near open flame. Use only In a well-ventilated area.

a. REMOVAL

1. Remove screw (6) and special washer (1) from Idler gear (3).

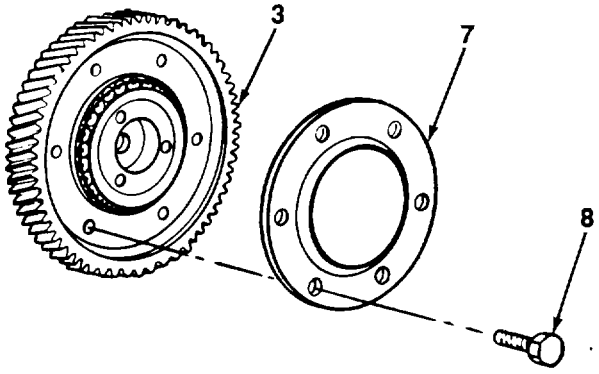
2. Remove Idler gear (3) and component parts as an assembly from rear end plate (4).



5-40. IDLER GEAR MAINTENANCE (Con't).

b. DISASSEMBLY

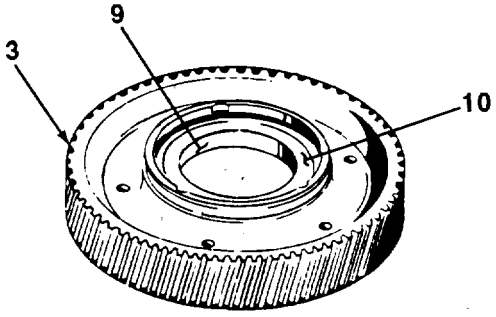
1. Remove six screws (8) and retainer (7) from idler gear (3).

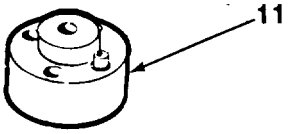


CAUTION

Idler gear must be turned while removing from bearing cones to prevent damage to bearing cones.

2. Rotate idler gear (3) while pressing gear hub (11) out from bearing cones (9 and 10).

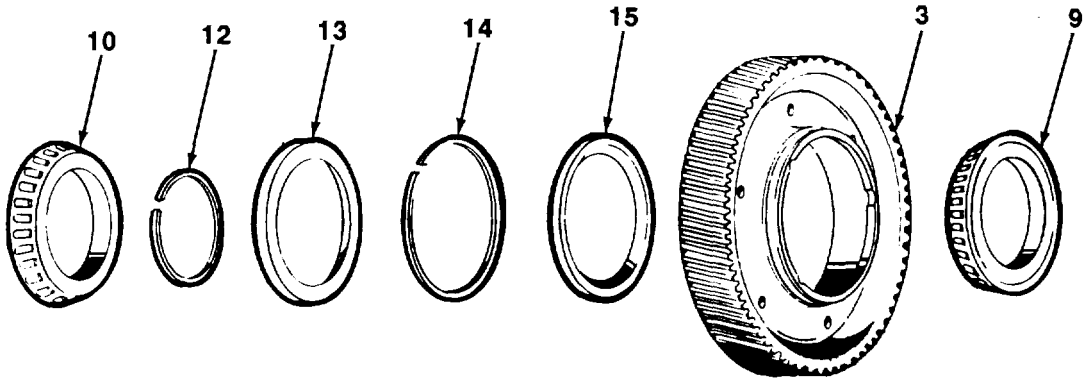




5-40. IDLER GEAR MAINTENANCE (Con't).

3. Remove outer bearing cone (10), inner spacer ring (12), and inner bearing cone (9) from idler gear (3).

4. Remove outer bearing cup (13), outer spacer ring (14), and inner bearing cup (15) from idle gear (3).



c. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 1000F-1380F (380C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean idler gear and bearing parts with dry cleaning solvent.

2. Inspect bearings for scoring, pitting, and flat spots on rollers or cones.

3. Inspect bearing cups for scoring, pitting, and dents in bearing surface.

4. Examine gear teeth for scoring, pitting, and chips.

5. Replace all damaged parts.

6. Coat all parts with lubricating oil.

TA705018

5-40. IDLER GEAR MAINTENANCE (Con't).

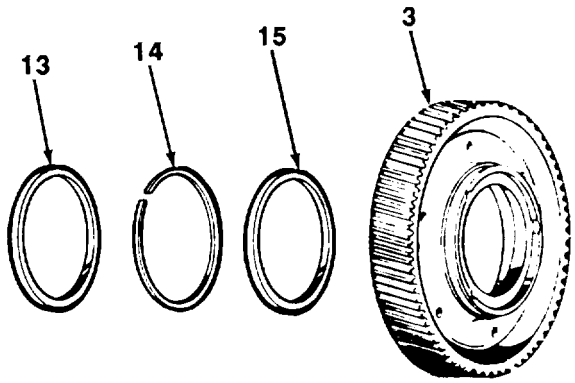
d. ASSEMBLY

1 Apply small amount of lubricating oil to inner bearing cup (15) and install numbered side up in idler gear (3).

2 Press inner bearing cup (15) until seated against shoulder of idler gear (3).

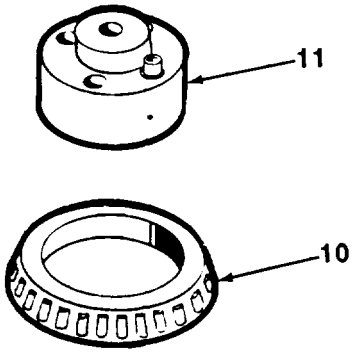
3 Install outer spacer ring (14) on inner bearing cup (15).

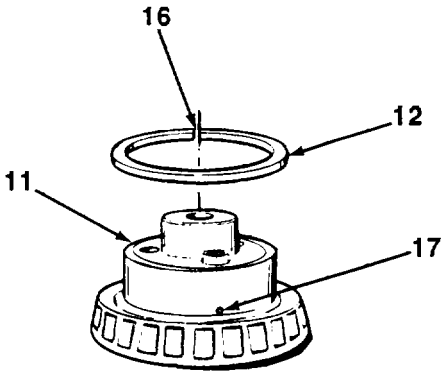
4 Apply small amount of lubricating oil to outer bearing cup (13) and install numbered side down into idler gear (3) until seated against outer spacer ring (14).



5 Apply small amount of lubricating oil to all parts and install gear hub (11) into outer bearing cone (10) until bottom of gear hub is flush with bottom of bearing cone.

6 Install inner spacer ring (12) on gear hub (11) with gap (16) in inner spacer ring on side opposite oil hole (17) in gear hub.





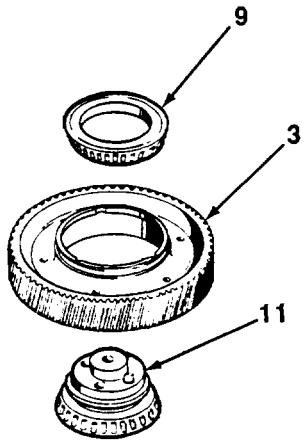
5-40. IDLER GEAR MAINTENANCE (Con't).

7. Install idler gear (3) on gear hub (11).

CAUTION

Turn Idler gear while pressing bearing cone on gear hub to prevent damage to bearing cups.

8. Turn idler gear (3) while pressing inner bearing cone (9), numbered side up, on gear hub (11).
9. Hold gear hub (11) and turn idler gear (3) to see if binding occurs.



NOTE

Perform steps 10 through 22 to check idler gear preload.

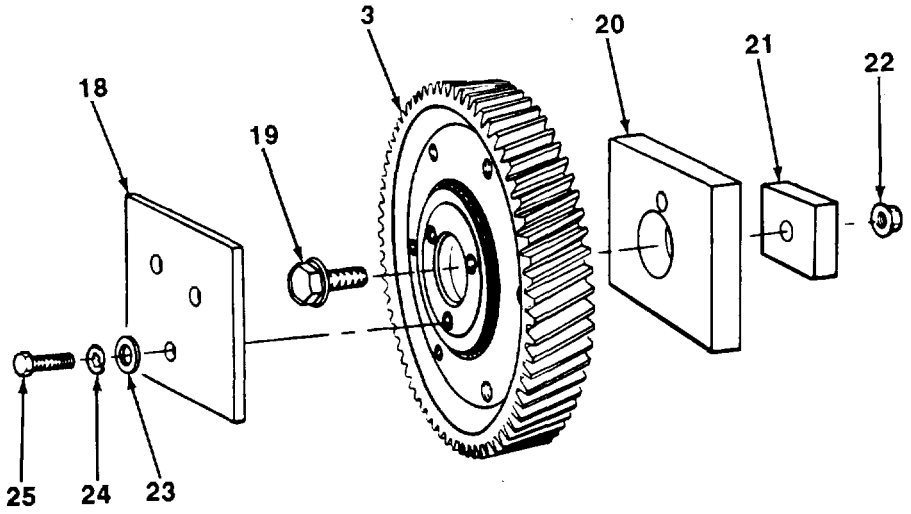
10. With idler gear (3) mounted in soft-jawed vise, install two test fixture plates (20 and 21) on idler gear using screw (19) and nut (22).

11. Torque screw (19) to 90 lb.-ft. (122 Nom).

12. Install test fixture plate (18) on idler gear (3) using three screws (25), lockwashers (24), and washers (23).

13. Torque three screws (25) to 40 lb.-ft. (54 Nom).

14. Remove idler gear (3) from vise and place test fixture plate (21) in vise.



5-40. IDLER GEAR MAINTENANCE (Con't).

NOTE

Pull required to start Idler gear moving must be at least 0.5 lb (0.2 kg) but less than 4.0 lb (1.8 kg).

15 Wrap A in. (3.18 mm) thick lint-free cord around idler gear (3) several times and attach to spring scale.

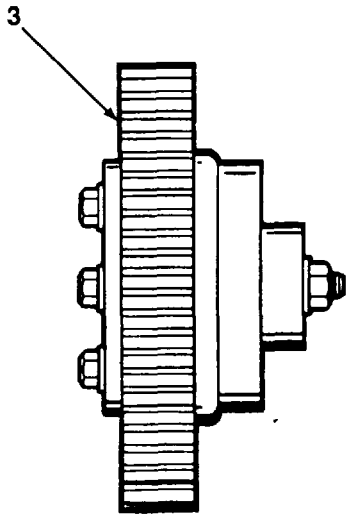
16 Keeping a steady pull on cord, pull cord several times and note scale reading to start idler gear (3) turning.

17 A pull between 0.5 and 6.0 lb 12 oz (0.2-3.1 kg) is acceptable as long as the maximum pull differences between pulls Is not more than 2.0 lb 11 oz (1.2 kg).

18 Scale reading of more than 0.5 lb (0.2 kg) indicates worn bearings.

19 Scale reading of more than 6.0 lb 12 oz (3.1 kg) Indicates binding of rollers or improper assembly.

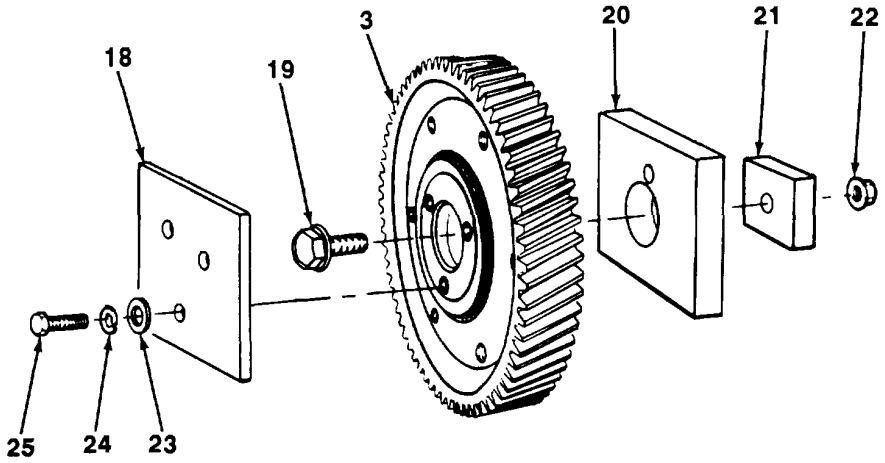
20 Scale fluctuations between pulls of more than 2.0 lb 11 oz (1.2 kg) indicates binding of rollers or Improper assembly.



21 If any of the readings In steps 17 through 20 are not met, disassemble and repeat steps 1 through 20 of subparagraph d.

22 Remove three screws (25), lockwashers (24), washers (23), and test fixture plate (18) from idler gear (3).

23 Remove nut (22), screw (19), and two test fixture plates (20 and 21) from idler gear (3).

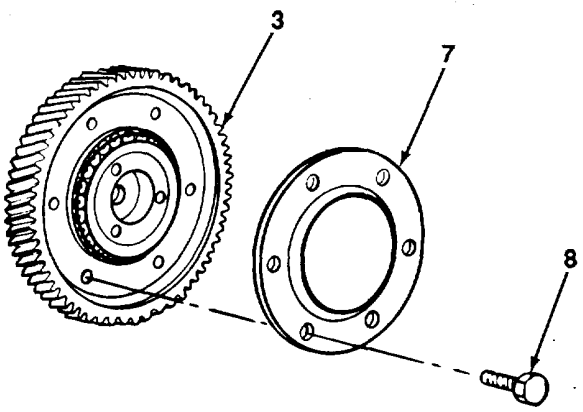


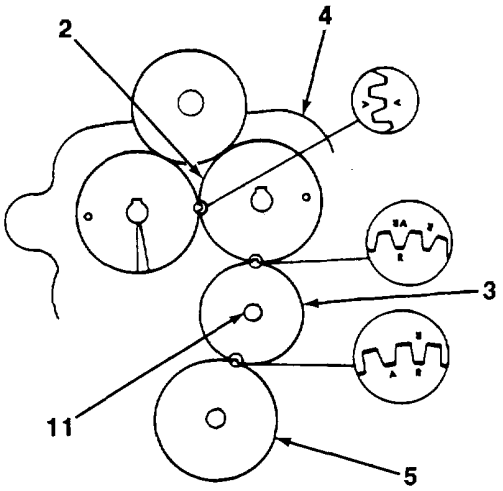
5-40. IDLER GEAR MAINTENANCE (Con't).

24. Install retainer (7) on idler gear (3) using six screws (8). Torque screws to 29 lb.-ft. (39 Nom).

e. INSTALLATION

1. Aline timing marks on camshaft gear (2) and crankshaft gear (5) with idler gear (3).
2. Install idler gear (3) in rear end plate (4) until idler gear is fully meshed with camshaft gear (2) and crankshaft gear (5).
3. Rotate gear hub (11) until dowel in gear hub alines with hole in rear end plate (4).
4. Tap gear hub (11) until seated with rear end plate (4).
5. Ensure that timing marks on idler gear (3), camshaft gear (2), and crankshaft gear (5) are still alined.





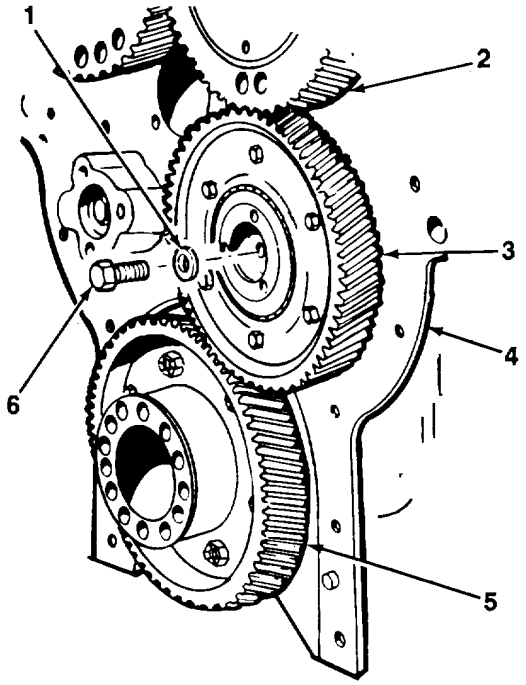
TA705022

5-40. IDLER GEAR MAINTENANCE (Con't).

6. Install screw (6) and special washer (1) in idler gear (3).
7. Torque screw (6) to 90 lb.-ft. (122 Nom).
8. Apply a light coat of lubricating oil to idler gear (3) bearing.
9. Mount dial indicator on rear end plate (4) and check backlash between camshaft gear (2), idler gear (3), and crankshaft gear (5). Minimum backlash allowed is 0.003 in. (0.076 mm). Maximum backlash allowed is 0.010 in. (0.254 mm).

FOLLOW-ON TASKS:

- Install flywheel housing (see paragraph 5-34).



TA705023

5-41. ROCKER ARM MAINTENANCE.

This Task Covers:
a. Removal
b. Disassembly
d. Assembly
e. Installation
c. Cleaning and Inspection

Initial Setup:

Equipment Conditions:
- Rocker arm covers removed (see paragraph 4-29).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Lubricating oil (Item 31, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- Marker tags (Item 40, Appendix E)
- Tape (Item 43, Appendix E)

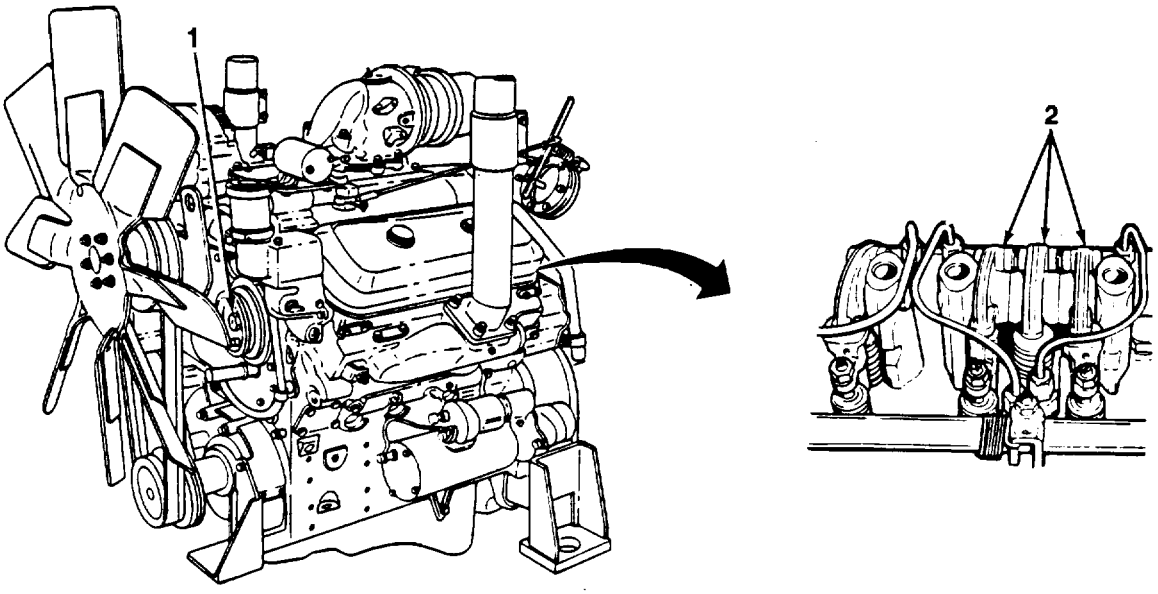
General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

a. REMOVAL

NOTE

All rocker arms are removed same way. This procedure covers one set of rocker arms.

1. Turn nut (1) until three rocker arms (2) aline.



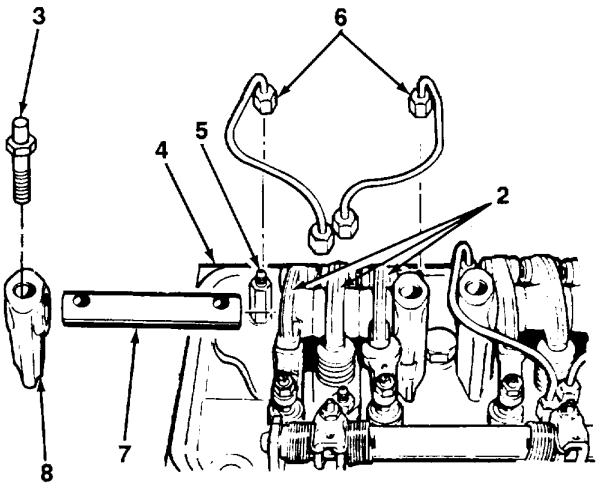
5-41. ROCKER ARM MAINTENANCE (Con't).

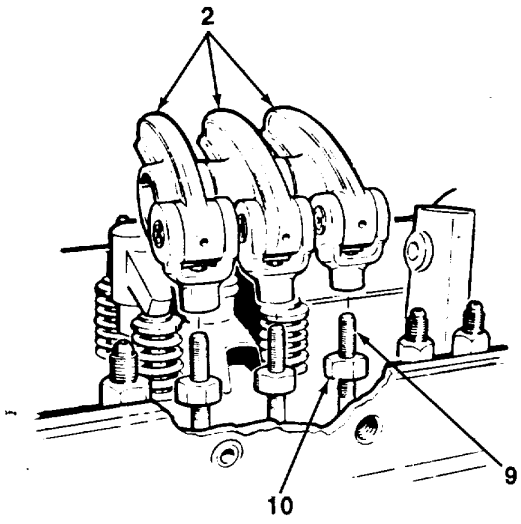
2. Tag and remove two fuel lines (6).
3. Cover four fuel line connectors (5) with tape to prevent contamination.
4. Remove two screws (3) and brackets (8) from cylinder head (4).

CAUTION

DO NOT force rocker arms back while shaft Is In place. Pushrods may be damaged.

5. Move rocker arms (2) and remove shaft (7).
6. Hold pushrods (9) and loosen three locknuts (10).
7. Tag and remove three rocker arms (2) from pushrods (9).

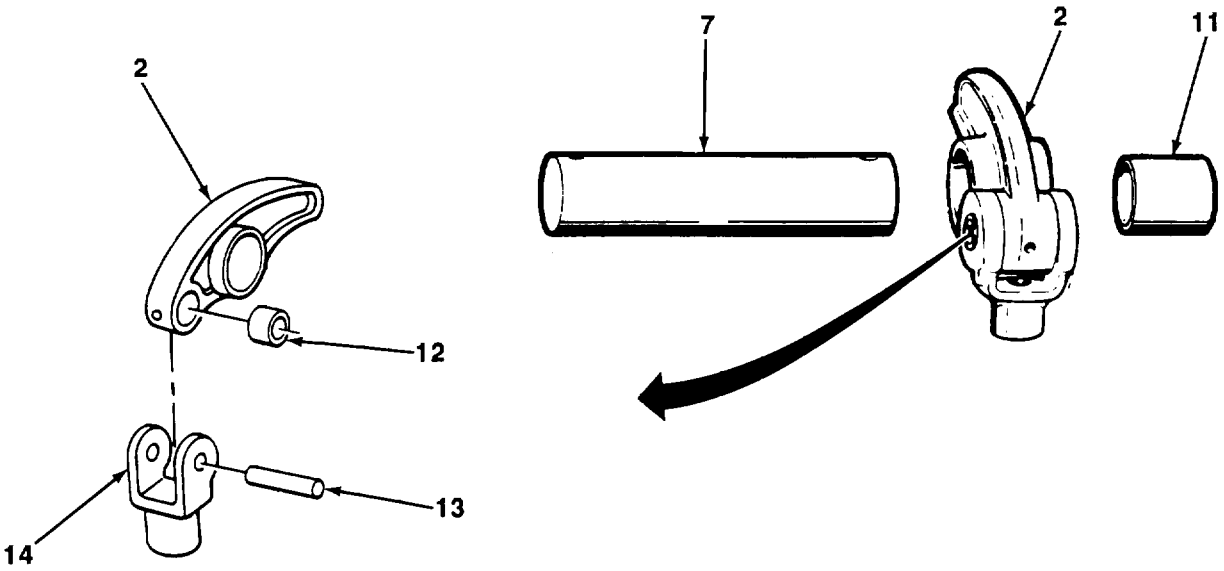




TA705025

5-41. ROCKER ARM MAINTENANCE (Con't).

8. Measure inside diameter of bushing (11) and outside diameter of shaft (7). If clearance between bushing and shaft is larger than 0.004 in. (0.102 mm), disassemble rocker arm (2).



b. DISASSEMBLY

1. Remove bushing (11) from rocker arm (2).
2. Remove pin (13) and clevis yoke (14) from rocker arm (2).
3. Remove two bushings (12) from clevis yoke (14).

c. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean metal parts with dry cleaning solvent.
2. Inspect parts for cracks and other damage.

TA705026

5-41. ROCKER ARM MAINTENANCE (Con't).

d. ASSEMBLY

1. Install two bushings (12) in clevis yoke (14).
2. Install clevis yoke (14) on rocker arm (2) with pin (13).
3. Install bushing (11) in rocker arm (2).
4. Ream bushing (11) to 0.875 in. (22.225 mm).

e. INSTALLATION

1. Thread three rocker arms (2) on pushrods (9) until end of pushrods are above inside of clevis yoke (14).
2. Coat shaft (7) with lubricating oil and slide through three rocker arms (2).

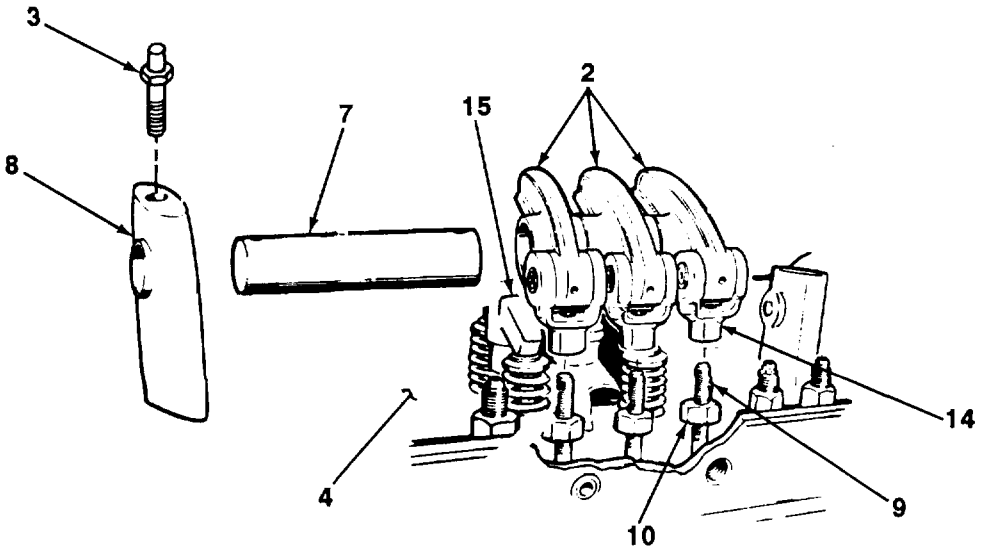
NOTE

Ensure that finished faces of brackets are next to rocker arms.

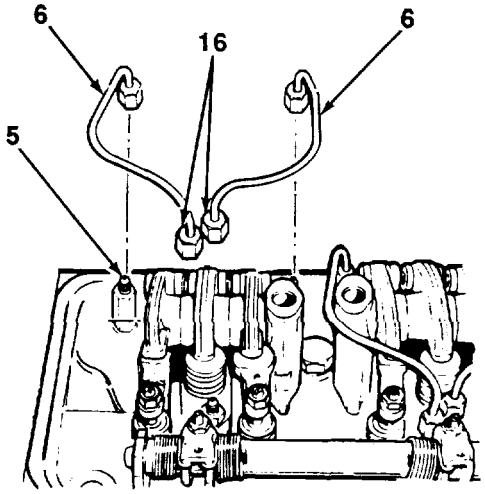
3. Install two brackets (8) on cylinder head (4) with two screws (3).
4. Position three rocker arms (2) down on valve bridge (15).
5. Hold each pushrod (9) while tightening locknut (10).

TA705027

5-41. ROCKER ARM MAINTENANCE (Con't).



6. Remove tape from four fuel line connectors (5) and install two fuel lines (6).
7. Tighten four nuts (16).



FOLLOW-ON TASKS:

- Install rocker arm covers (see paragraph 4-29).

5-42. OIL PUMP ASSEMBLY MAINTENANCE.

This Task Covers:
a. Removal
b. Disassembly
c. Assembly
d. Installation

Initial Setup:

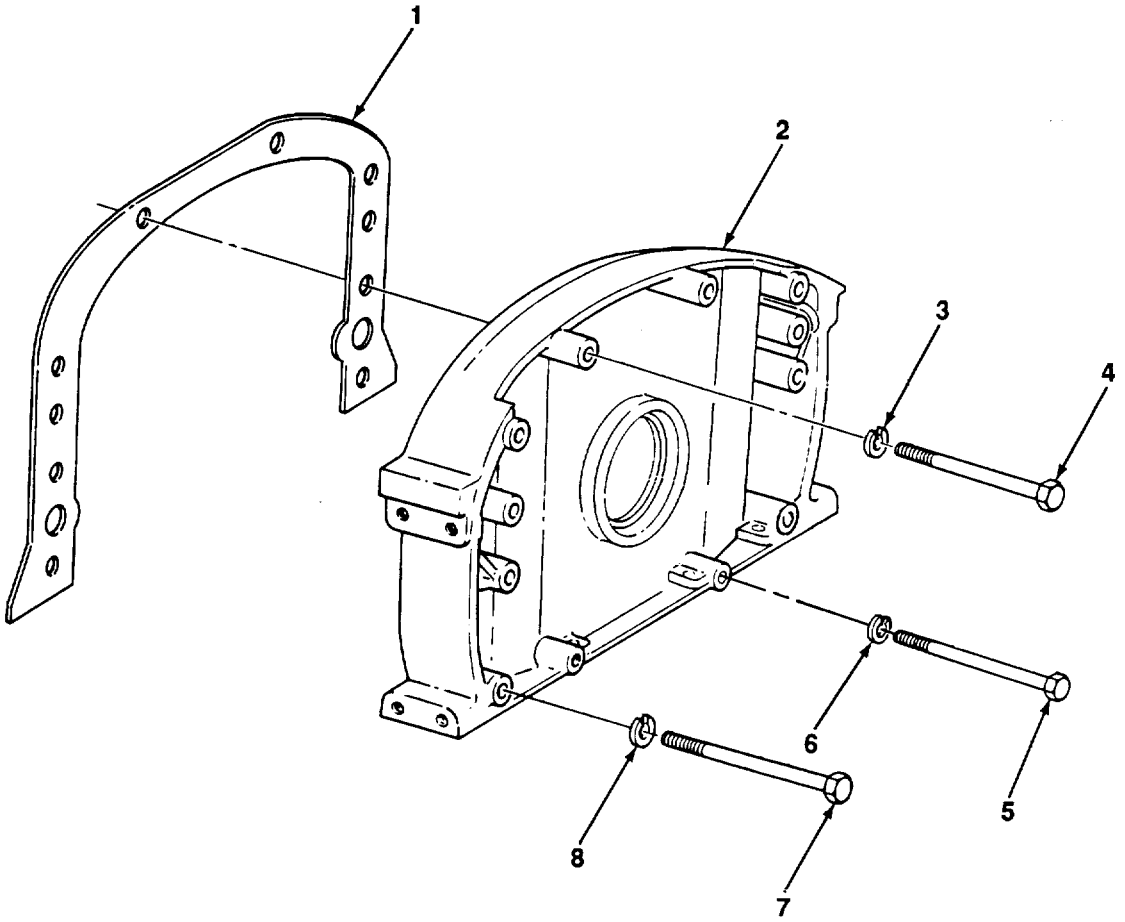
Equipment Conditions:
- Crankshaft pulley removed (see paragraph 5-31).
- Front engine mounts removed (see paragraph 5-16).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Grease (Item 22, Appendix E)
- One gasket
- Eight lockwashers

a. REMOVAL

1. Remove two bolts (4) and lockwashers (3). Discard lockwashers.
2. Remove two bolts (7) and lockwashers (8). Discard lockwashers.



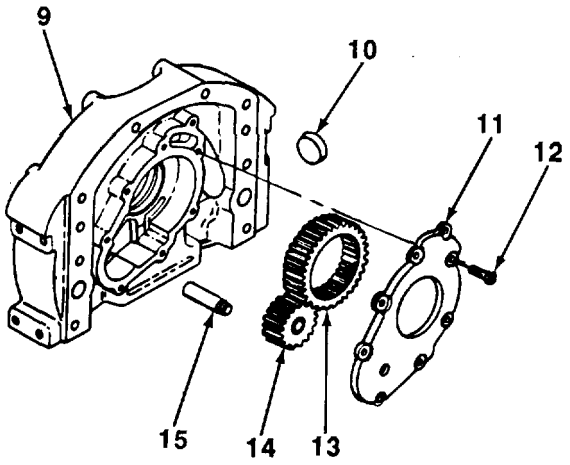
TA705029

5-42. OIL PUMP ASSEMBLY MAINTENANCE (Con't).

3. Remove four bolts (5), lockwashers (6), oil pump assembly (2), and gasket (1). Discard lockwashers and basket.

b. DISASSEMBLY

1. Remove eight locking screws (12) and cover (11) from oil pump housing (9).
2. Remove gear (13) from oil pump housing (9).
3. Remove gear (14) from shaft (15).
4. Remove shaft (15).
5. Remove plug (10) from oil pump housing (9).



c. ASSEMBLY

1. Install plug (10) on oil pump housing (9).
2. Install shaft (15).

NOTE

Gears must be replaced as a matched set.

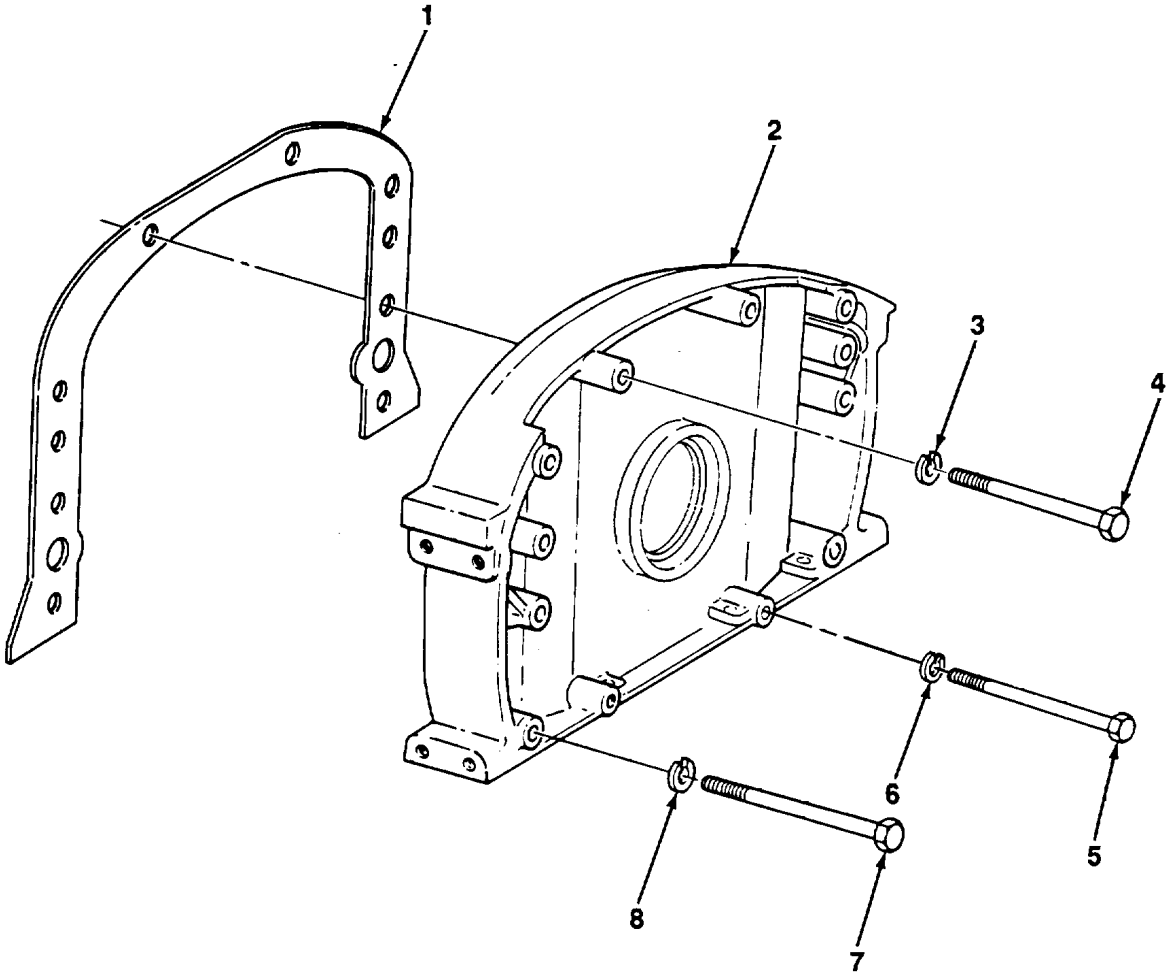
3. Install gear (14) on shaft (15).
4. Install gear (13) in oil pump housing (9).
5. Aline cover (11) on oil pump housing (9) and install eight locking screws (12).

TA705030

5-42. OIL PUMP ASSEMBLY MAINTENANCE (Con't).

d. INSTALLATION

1. Coat new gasket (1) with grease.
2. Install gasket (1) and oil pump assembly (2) using four bolts (5), two bolts (7), two bolts (4), and eight new lockwashers (3, 6, and 8).



FOLLOW-ON TASKS:

- Install front engine mounts (see paragraph 5-16).
- Install crankshaft pulley (see paragraph 5-31).

TA705031

5-43. OIL PUMP DRIVE GEAR REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:

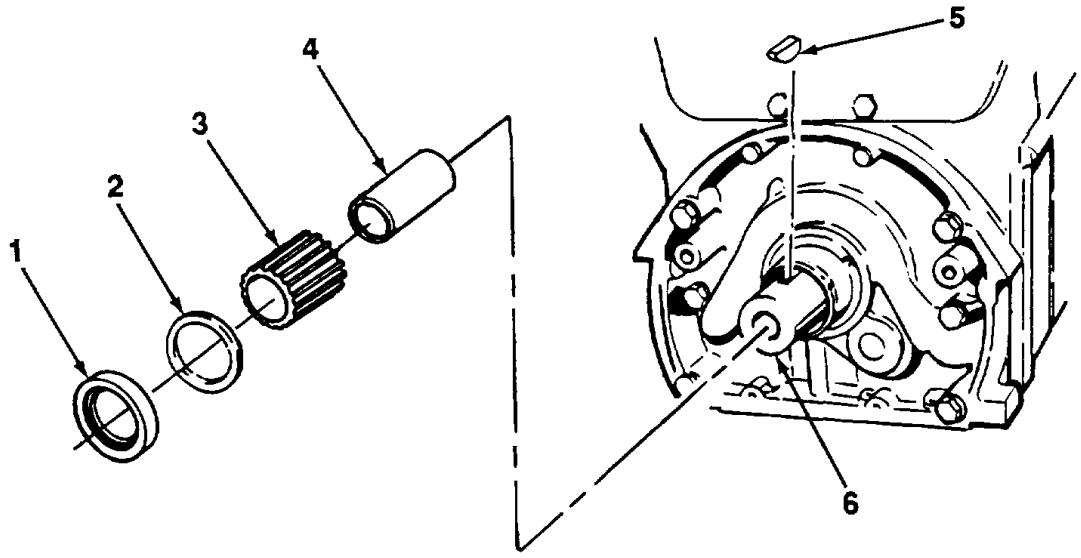
Equipment Conditions:
- Oil pump assembly removed (see paragraph 5-42)

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- One seal

a. REMOVAL

1. Remove seal (1), spacer (2), and drive gear (3) from spacer (4). Discard seal.
2. Remove spacer (4) and woodruff key (5) from crankshaft (6).



b. INSTALLATION

1. Install woodruff key (5) and spacer (4) on crankshaft (6).
2. Install drive gear (3), spacer (2), and new seal (1) on spacer (4).

FOLLOW-ON TASKS:

- Install oil pump assembly (see paragraph 5-42).

TA705032

5-44. OIL PICKUP SCREEN AND TUBE REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:
Equipment Conditions:
- Oil pan removed (see paragraph 4-32).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Three gaskets
- Eight lockwashers

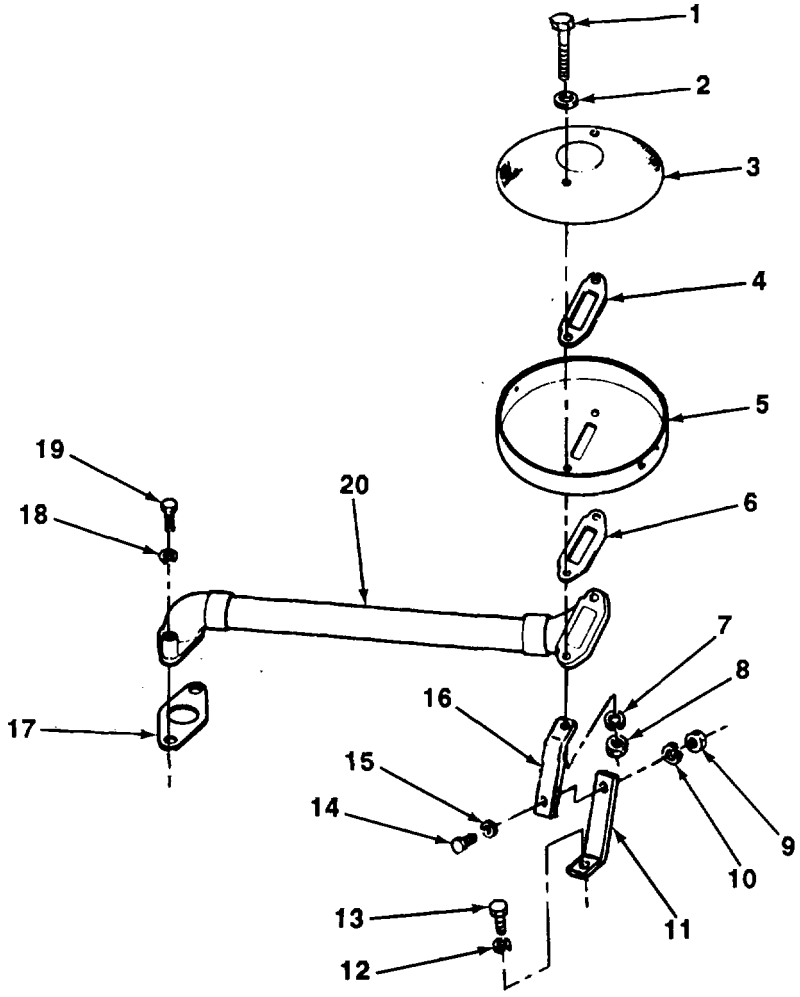
a. REMOVAL

1. Remove two screws (19) and lockwashers (18). Discard lockwashers.
2. Remove two screws (13), lockwashers (12), oil pickup tube (20), and gasket (17). Discard lockwashers and gasket.
3. Remove two nuts (8), lockwashers (7), bolts (1), washers (2), and bracket assemblies (16) from oil pickup tube (20). Discard lockwashers.
4. Remove screen (3), gasket (4), screen cover (5), and gasket (6) from oil pickup tube (20). Discard gaskets.
5. Remove two nuts (9), lockwashers (10), screws (14), washers (15), and four brackets (11). Discard lockwashers.

b. INSTALLATION

1. Aline four brackets (11) and install two screws (14),washers (15), new lockwashers (10), and nuts (9) fingertight.
2. Aline new gasket (6), screen cover (5), new gasket (4), and screen (3) on oil pickup tube (20) and install two washers (2) and bolts (1).
3. Aline two bracket assemblies (16) on two bolts (1) and install two new lockwashers (7) and nuts (8).
4. Aline one end of oil pickup tube (20) and two bracket assemblies (16) with holes in engine block and install two screws (19), screws (13), new lockwashers (18), and new lockwashers (12).
5. Tighten two screws (14) and nuts (9).

5-44. OIL PICKUP SCREEN AND TUBE REPLACEMENT (Con't).



FOLLOW-ON TASKS:

- Install oil pan (see paragraph 4-32).

TA705033

5-45. ENGINE OIL PRESSURE REGULATING VALVE MAINTENANCE.

This Task Covers:
a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation

Initial Setup:
Equipment Conditions:
- Oil pan removed (see paragraph 4-32).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

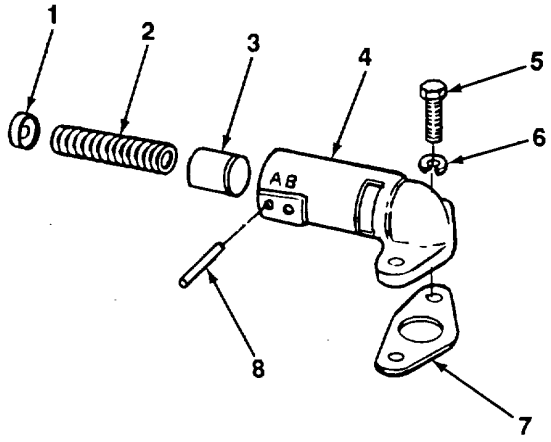
Materials/Parts:
- Lubricating oil (Item 28, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- One gasket
- Two lockwashers

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only In a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. REMOVAL

ating

2. Remove regulating valve body (4) and gasket (7). Discard gasket.



5-45. ENGINE OIL PRESSURE REGULATING VALVE MAINTENANCE (Con't).

b. DISASSEMBLY

WARNING

Spring Is under tension and can cause Injury if released suddenly. Keep spring under tension when removing pin.

NOTE

Note location of pin during disassembly to assist In assembly.

1. Compress spring (2) and remove pin (8) from regulating valve body (4).
2. Slowly release pressure on spring (2) and remove spring seat (1), spring, and valve (3) from regulating valve body (4).

c. CLEANING AND INSPECTION

WARNING

- Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 1000F-138°F (38°C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.
- Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

1. Clean metal parts with dry cleaning solvent and dry with compressed air.
2. Inspect all parts for damage.

d. ASSEMBLY

1. Apply lubricating oil to valve (3). Insert valve, closed end first, into regulating valve body (4).
2. Install spring (2) in regulating valve body (4). Install spring seat (1) with open end over spring.
3. Compress spring seat (1) and install pin (8) in noted location.

e. INSTALLATION

1. Aline new gasket (7) and regulating valve body (4) on engine block.
2. Install two bolts (5) and new lockwashers (6) in regulating valve body (4).

FOLLOW-ON TASKS:

- Install oil pan (see paragraph 4-32).
- Start engine (see paragraph 2-10) and check oil pressure.

5-46. ENGINE OIL SAFETY RELIEF VALVE MAINTENANCE.

This Task Covers:
a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation

Initial Setup:
Equipment Conditions:
- Oil pan removed (see paragraph 4-32).

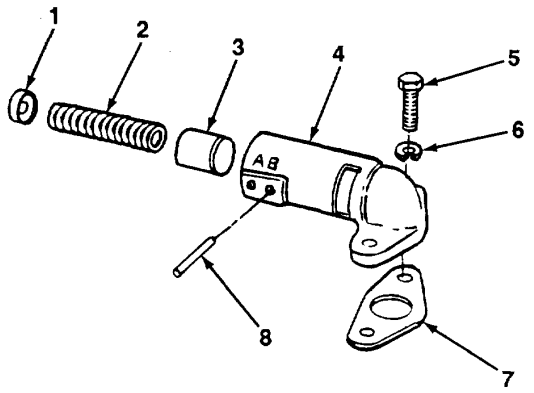
Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Lubricating oil (item 28, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- One gasket
- Two lockwashers

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. REMOVAL

1. Remove two bolts (5) and lockwashers (6) from relief valve body (4). Discard lockwashers.
2. Remove relief valve body (4) and gasket (7). Discard gasket.



5-46. ENGINE OIL SAFETY RELIEF VALVE MAINTENANCE (Con't).

b. DISASSEMBLY

WARNING

Spring Is under tension and can cause Injury If released suddenly. Keep spring under tension when removing pin.

NOTE

Note location of pin during disassembly to assist In assembly.

1. Compress spring (2) and remove pin (8) from relief valve body (4).
2. Slowly release pressure on spring (2) and remove spring seat (1), spring, and valve (3) from relief valve body (4).

c. CLEANING AND INSPECTION

WARNING

- Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.
- Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

1. Clean metal parts with dry cleaning solvent and dry with compressed air.
2. Inspect all parts for damage.

d. ASSEMBLY

1. Apply lubricating oil to valve (3). Insert valve, closed end first, into relief valve body (4).
2. Install spring (2) in relief valve body (4). Install spring seat (1) with open end over spring.
3. Compress spring seat (1) and install pin (8) in noted location.

e. INSTALLATION

1. Aline new gasket (7) and relief valve body (4) on engine block.
2. Install two bolts (5) and new lockwashers (6) in relief valve body (4).

FOLLOW-ON TASKS:

- Install oil pan (see paragraph 4-32).
- Start engine (see paragraph 2-10) and check oil pressure.

5-47. ENGINE OIL COOLER REPLACEMENT.

This Task Covers:
a. Removal
b Repair
c. Installation

Initial Setup:
Equipment Conditions:
- Oil cooler elbow removed (see paragraph 4-45).
- Twelve lockwashers

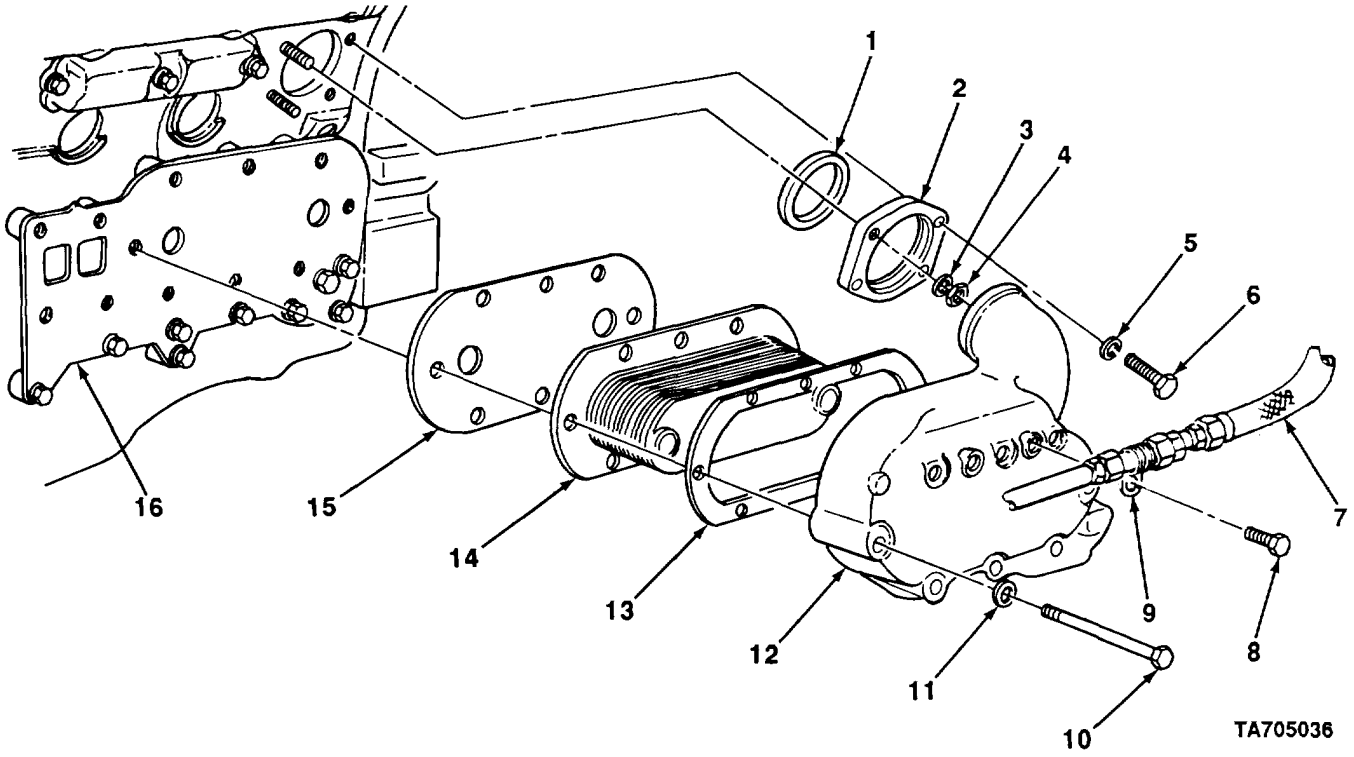
Materials/Parts:
- Three gaskets

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

References:
- TM 750-254

a. REMOVAL

1. Remove screw (8) and move clamp (9) and fuel line (7) aside.
2. Remove two nuts (4) and lockwashers (3). Discard lockwashers.
3. Remove two screws (6), lockwashers (5), flange (2), and gasket (1). Discard gasket and lockwashers.
4. Remove eight bolts (10), lockwashers (11), and oil cooler housing (12). Discard lockwashers.



5-47. ENGINE OIL COOLER REPLACEMENT (Con't).

5. Remove gasket (13) from oil cooler housing (12). Discard gasket.
6. Remove oil cooler core (14) and gasket (15) from cover (16). Discard gasket.

b. REPAIR

Repair oil cooler core in accordance with TM 750-254.

c. INSTALLATION

1. Install new gasket (15) on oil cooler core (14).
2. Install new gasket (13) on oil cooler housing (12).
3. Place flange (2) and new gasket (1) on oil cooler housing (12).
4. Install oil cooler housing (12), gasket (13), oil cooler core (14), and gasket (15) on cover (16) with eight new lockwashers (11) and bolts (10).
5. Install flange (2) with two new lockwashers (3) and nuts (4).
6. Install two new lockwashers (5) and screws (6).
7. Position fuel line (7) and clamp (9) on oil cooler housing (12) and install screw (8).

FOLLOW-ON TASKS:

- Install oil cooler elbow (see paragraph 4-45).

5-48. ENGINE OIL COOLER ADAPTER REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:

Equipment Conditions:
- Oil cooler removed (see paragraph 5-47)
- One copper washer

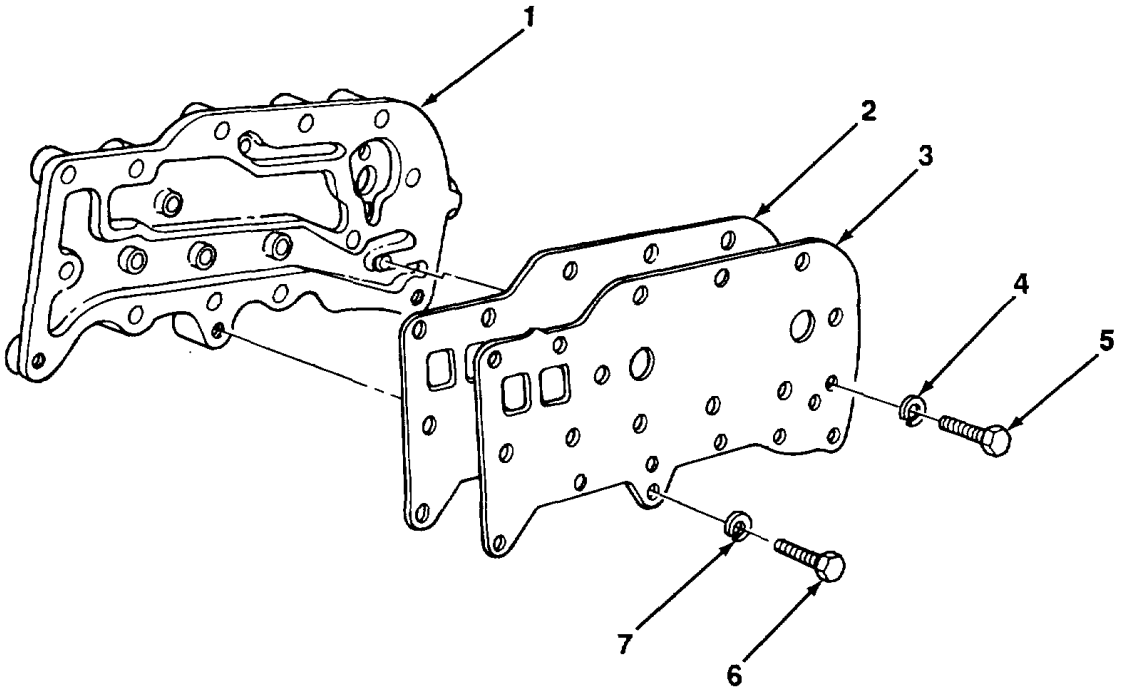
Tools/Test Equipment:
- Three gaskets
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Marker tags (Item 40, Appendix E)
- One cpper washer
- Twelve lockwashers

a. REMOVAL

NOTE
Tag bolts as removed to assist In Installation.

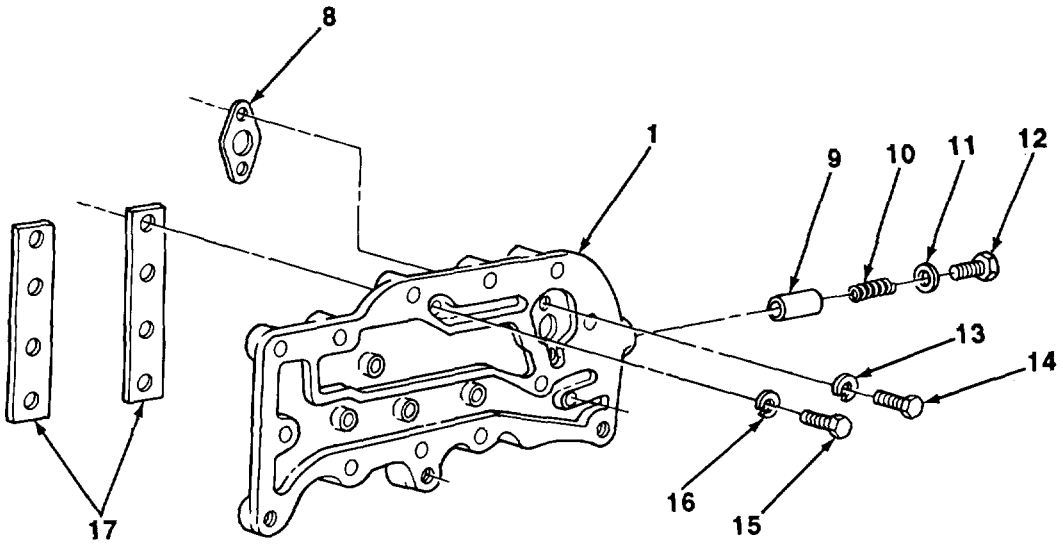
1. Remove five bolts (5) and lockwashers (4). Discard lockwashers.
2. Remove five bolts (6) and lockwashers (7). Discard lockwashers.



3. Pry cover (3) and gasket (2) from oil cooler adapter (1). Discard gasket.
4. Remove bolt (15) and copper washer (16). Discard copper washer.
5. Remove two bolts (14), lockwashers (13), oil cooler adapter (1), and two shims (17). Discard lockwashers.

TA705037

5-48. ENGINE OIL COOLER ADAPTER REPLACEMENT (Con't).



6. Remove plug (12), washer (11), spring (10), and pressure valve (9) from oil cooler adapter (1).
7. Remove two gaskets (8) from oil cooler adapter (1). Discard gaskets.

b. INSTALLATION

1. Install pressure valve (9), spring (10), washer (11), and plug (12) in oil cooler adapter (1).
2. Install two new gaskets (8) on oil cooler adapter (1).
3. Aline two shims (17) with oil cooler adapter (1) and install oil cooler adapter with two new lockwashers (13) and bolts (14).
4. Install new copper washer (16) and bolt (15).
5. Install new gasket (2) and cover (3) on oil cooler adapter (1) with five new lockwashers (7) and bolts (6).
6. Install five new lockwashers (4) and bolts (5).

FOLLOW-ON TASKS:

- Install oil cooler (see paragraph 5-47).

TA705038

5-49. EXHAUST VALVE CLEARANCE ADJUSTMENT.

This Task Covers: Clearance Adjustment

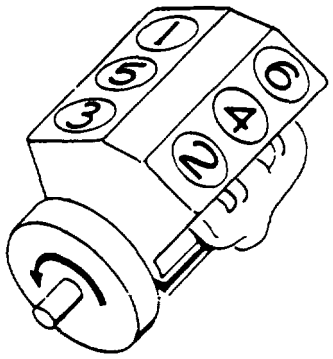
Initial Setup:
Equipment Conditions:
- Engine cool.
- Rocker arm covers removed (see paragraph 429).

Tools/Test Equipment:
- General mechanic's tool kit

CLEARANCE ADJUSTMENT

1. Place ON/OFF engine switch in OFF position (see paragraph 2-12)

NOTE
- Perform steps 2 through 7 at each of six cyl-Inders.
- All exhaust valve clearances may be adjusted during one full revolution of crankshaft. Refer to Illustration for firing order.



FIRING ORDER

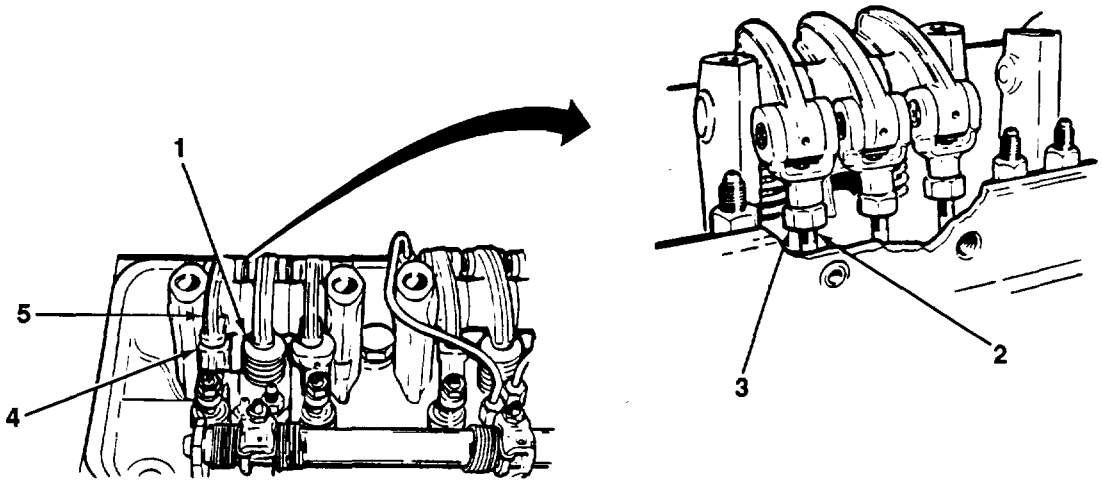
2. Using engine starter, rotate crankshaft until injector (1) is fully depressed.

CAUTION
Exhaust valve clearance is adjusted at pushrod. DO NOT disturb exhaust valve bridge adjusting screw or damage to engine could occur.

3. Loosen pushrod locknut (3).
4. Insert 0.017 in. (0.432 mm) feeler gage between top of exhaust valve bridge (4) and rocker arm (5).

TA705039

5-49. EXHAUST VALVE CLEARANCE ADJUSTMENT (Con't).



5. Rotate pushrod (2) until slight drag is felt on feeler gage.
6. Remove feeler gage and tighten locknut (3) while holding pushrod (2).
7. Check clearance with feeler gage. If adjustment is correct, 0.015 In. (0.381 mm) feeler gage will pass freely, but 0.017 in. (0.432 mm) feeler gage will not.

FOLLOW-ON TASKS:

- Install rocker arm covers (see paragraph 4-29).

TA705040

5-50. FUEL INJECTOR TIMING ADJUSTMENT.

This Task Covers: Timing Adjustment

Initial Setup:
Equipment Conditions:
- Rocker arm covers removed (see paragraph 4-29).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

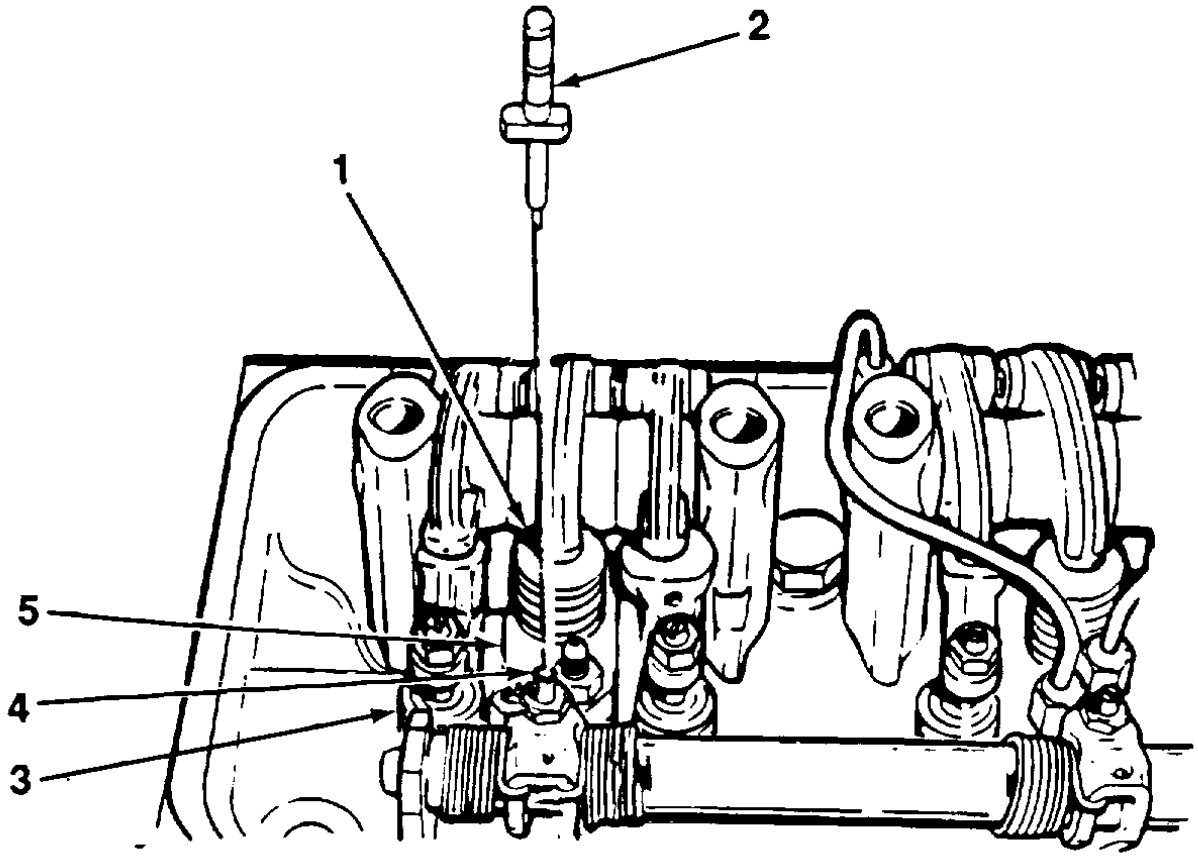
TIMING ADJUSTMENT

1. Place ON/OFF engine switch In OFF position (see paragraph 2-12).

NOTE

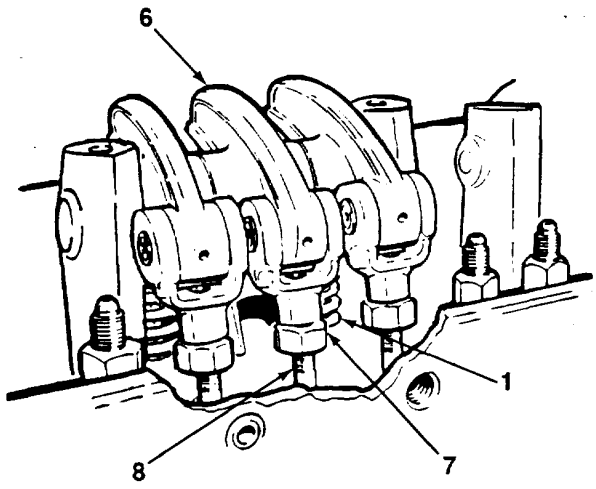
Perform steps 2 through 7 at each of six cylinders.

2. Using engine starter, rotate crankshaft until exhaust valves (3) are fully opened.
3. Place injector timing gage (2) in hole (4) at top of fuel injector body (5) with flat side of gage facing injector follower (1).



5-50. FUEL INJECTOR TIMING ADJUSTMENT (Con't).

4. Loosen pushrod locknut (7).
5. Rotate pushrod (8), and adjust injector rocker arm (6) so that when injector timing gage is rotated 900, extended lip of injector timing gage just clears top of injector follower (1).
6. Remove injector timing gage and tighten locknut (7) while holding pushrod (8).
7. Check clearance and repeat steps 4 through 6 if necessary.



FOLLOW-ON TASKS:

- Install rocker arm covers (see paragraph 4-29).

5-51. GOVERNOR GAP ADJUSTMENT.

This Task Covers: Adjustment

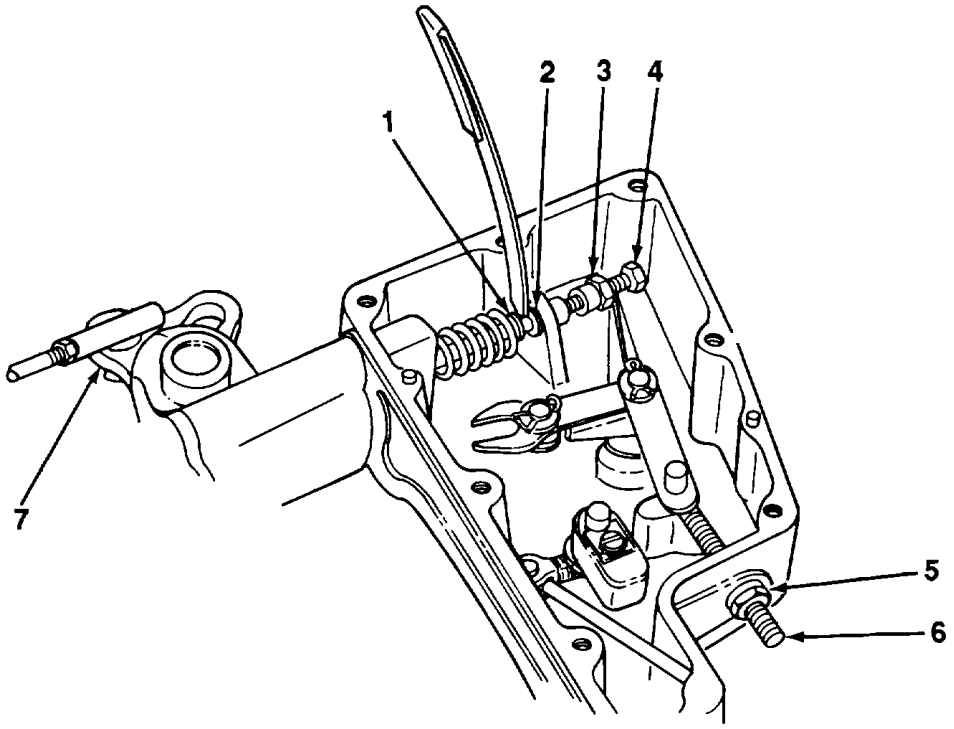
Initial Setup:

Equipment Conditions:
- Govemor cover removed (see paragraph 5-67).

Tools/Test Equipment:
- General mechanic's tool kit

ADJUSTMENT

1. Loosen nut (5) and rotate buffer screw (6) outward until end of buffer screw extends approximately 5/8 in. (15.88 mm) from nut.
2. Place speed control lever (7) in maximum speed position.
3. Place 0.006 in. (0.152 mm) feeler gage between plunger (1) and guide (2) and check for a slight drag on feeler gage.
4. If necessary, loosen nut (3) and rotate adjusting screw (4) until gap is 0.006 in. (0.152 mm).
5. While holding buffer screw (6), tighten nut (5).
6. Check gap and repeat steps 4 and 5 if necessary.
7. While holding adjusting screw (4), tighten nut (3).



FOLLOW-ON TASKS:
- Install governor cover (see paragraph 5-67).
- Adjust buffer screw (see paragraph 5-53).

TA705043

5-52. INJECTOR RACK CONTROL LEVER ADJUSTMENT.

This Task Covers: Adjustment

Initial Setup:

Equipment Conditions:
- Exhaust valve clearance adjusted (see paragraph 5-49).
- Fuel injector timing adjusted (see paragraph 5-50).
- Governor gap adjusted (see paragraph 5-51).
- Rocker arm covers removed (see paragraph 4-29).

Materials/Parts:
- Two cotter pins

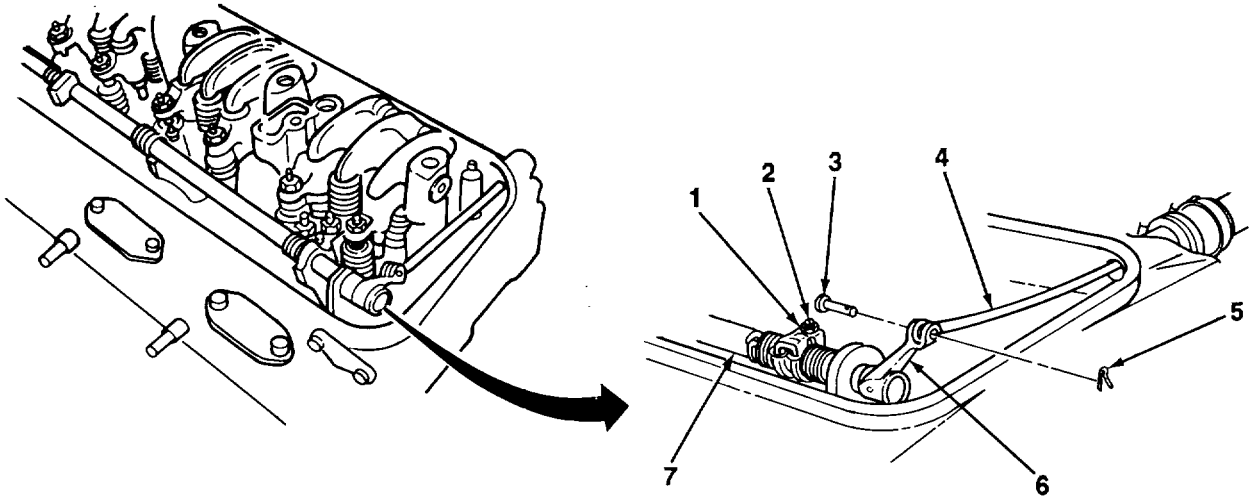
Tools/Test EquIpment
- General mechanic's tool kit
- Field automotive shop set

ADJUSTMENT

NOTE

Adjust Injector rack control lever at left-front of engine first, then adjust Injector rack control lever at right-front of engine.

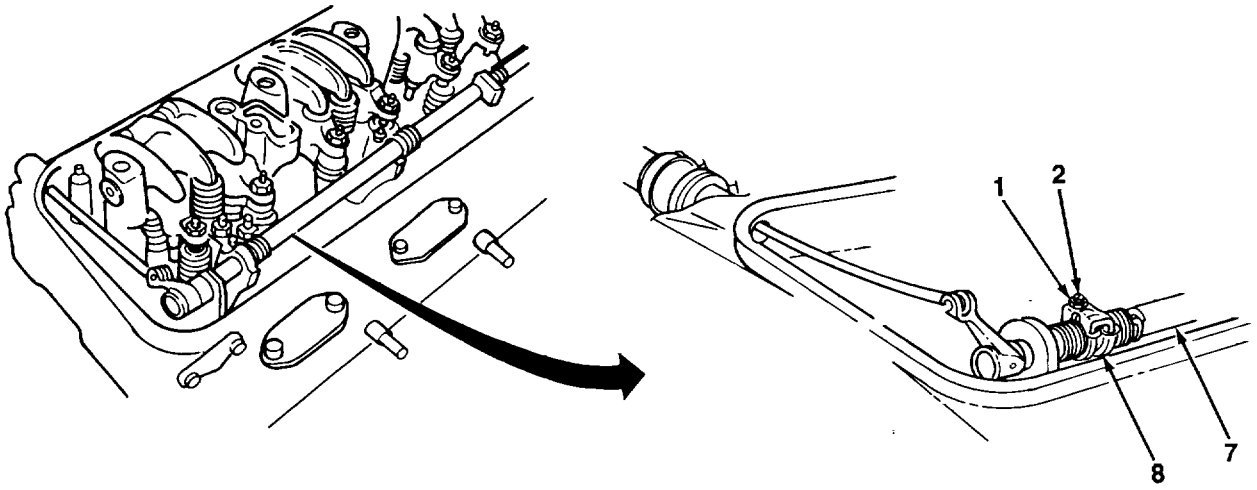
1. Remove cotter pin (5) and clevis pin (3) to disconnect fuel rod (4) from right Injector control tube lever (6). Discard cotter pin.
2. Loosen three locknuts (1) and screws (2) on right injector control tube (7).



RIGHT

5-52. INJECTOR RACK CONTROL LEVER ADJUSTMENT (Con't).

3. Loosen three locknuts (1) and screws (2) on left injector control tube (7).
4. Check that all six injector rack control levers (8) are loose on left injector control tube (7).

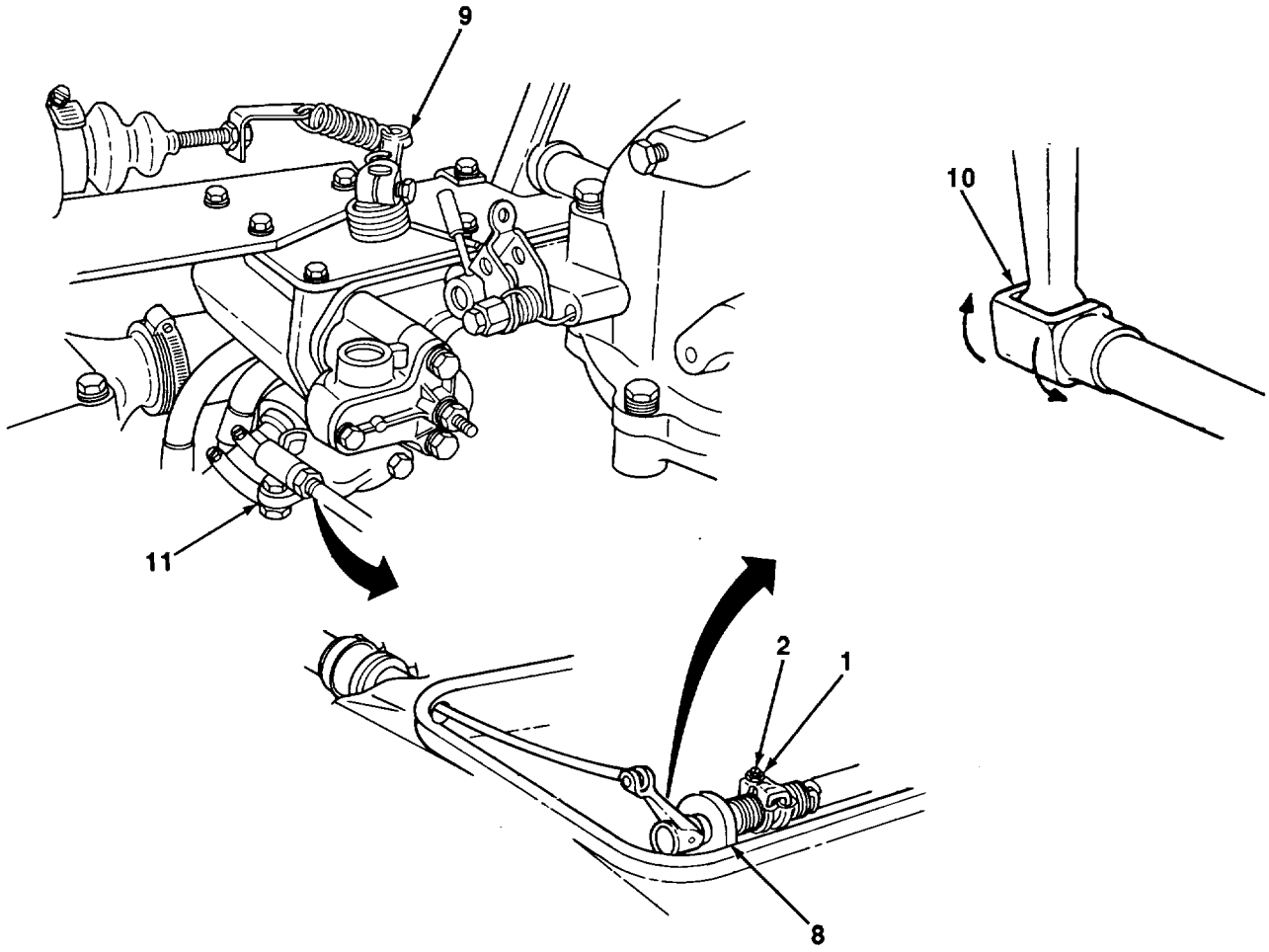


LEFT

5. Place speed control lever (11) in maximum speed position.
6. Rotate governor control lever (9) to RUN position and hold in place with light finger pressure.
7. Rotate screw (2), on left-front injector rack control lever (8), inward until a slight movement of governor control lever (9) is felt.
8. Release governor control lever (9).
9. While holding screw (2), tighten locknut (1).

TA705045

5-52. INJECTOR RACK CONTROL LEVER ADJUSTMENT (Con't).

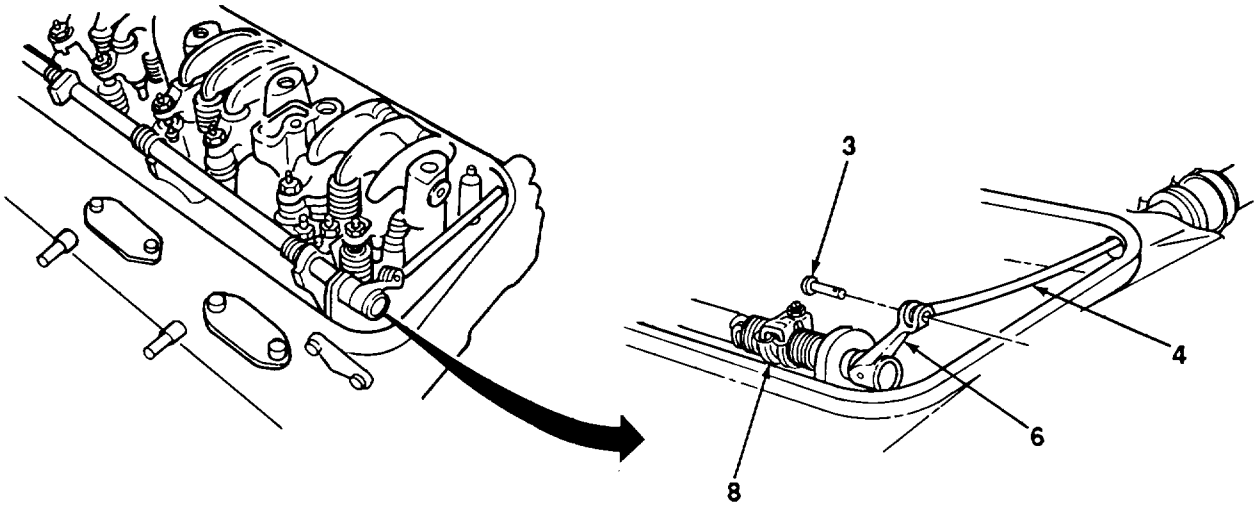


10. Check for correct left-front injector rack control lever adjustment as follows:
    (a) While holding governor control lever (9) in RUN position, ensure that injector control rack (10) is free to rotate slightly in a clockwise and counterclockwise direction.
    (b) While again holding governor control lever (9) in RUN position, press downward at end of injector control rack (10). End should spring upward slightly as pressure Is released.
11. If checks performed in step 10 indicate adjustment is not correct, repeat steps 5 through 9.

TA705046

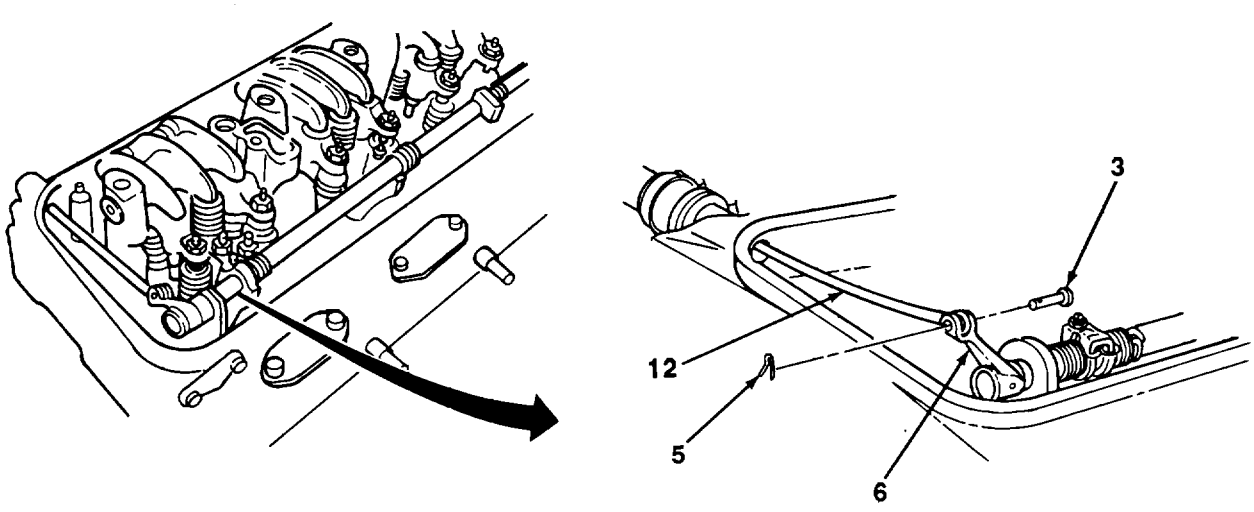
5-52. INJECTOR RACK CONTROL LEVER ADJUSTMENT (Con't).

12. Remove cotter pin (5) and clevis pin (3) to disconnect fuel rod (12) from left Injector control tube lever (6). Discard cotter pin.



LEFT

13. Install clevis pin (3) only to connect fuel rod (4) to right injector control tube lever (6).
14. Repeat steps 5 through 10 to adjust right-front Injector rack control lever (8).
15. Remove clevis pin (3) to disconnect fuel rod (4) from right injector control tube lever (6).



RIGHT

TA705047

5-52. INJECTOR RACK CONTROL LEVER ADJUSTMENT (Con't).

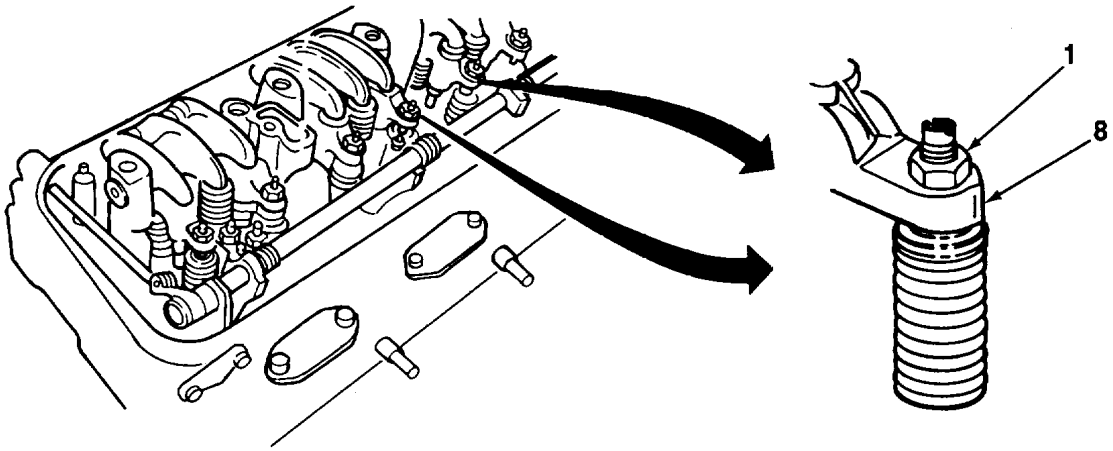
NOTE

- **Left-front and right-front Injector rack control levers have been adjusted.** DO **NOT change adjustment setting on these two levers.**
- **Perform following steps to adjust remaining four Injector rack control levers.**

16. Loosen four remaining locknuts (1).

17. Rotate and hold left injector control tube (7) in full-fuel position.

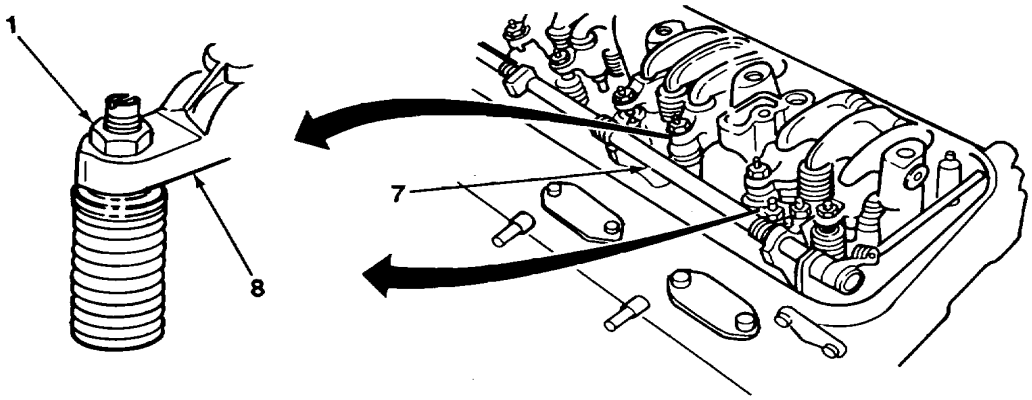
18. Perform step 10 for each of two Injector rack control levers (8). Adjust as necessary.



LEFT

19. Rotate and hold right injector control tube (7) in full-fuel position.

20. Perform step 10 for each of two injector rack control levers (8). Adjust as necessary.

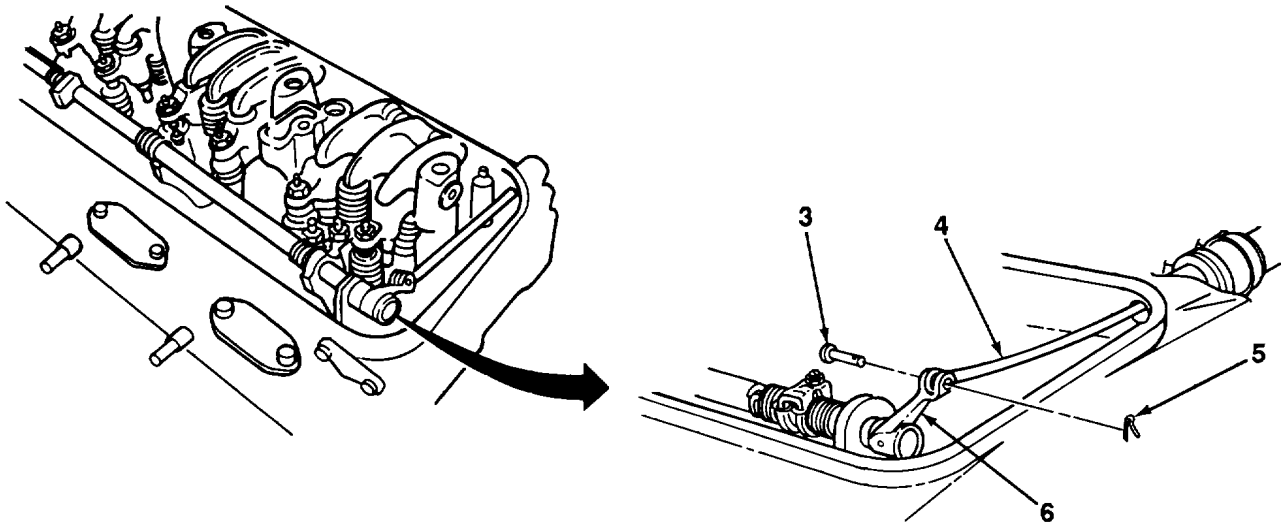


RIGHT

TA705048

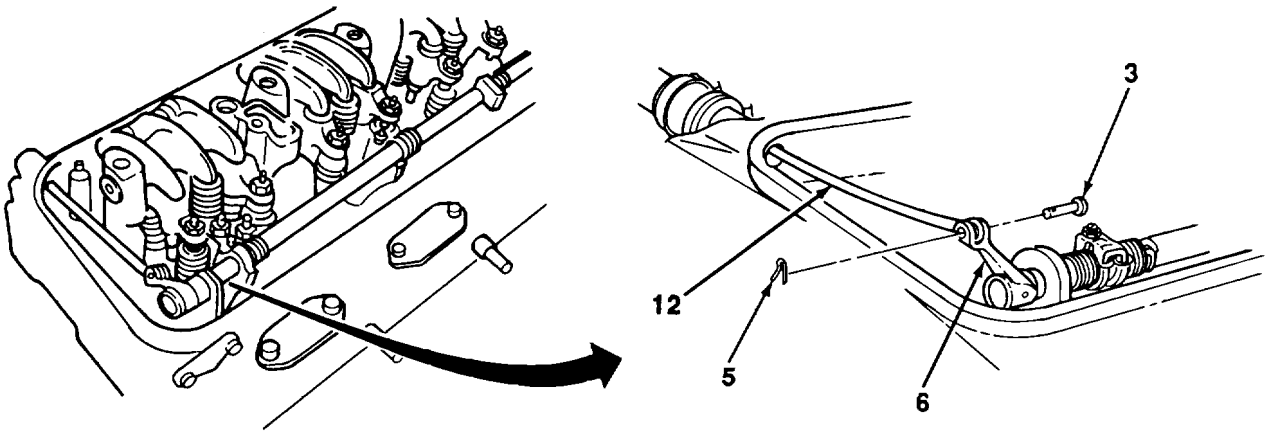
5-52. INJECTOR RACK CONTROL LEVER ADJUSTMENT (Con't).

21. Install clevis pin (3) and new cotter pin (5) to connect fuel rod (4) to right injector control tube lever (6).



RIGHT

22. Install clevis pin (3) and new cotter pin (5) to connect fuel rod (12) to left injector control tube lever (6).



TA705049

FOLLOW-ON TASKS:

- Install rocker arm covers (see paragraph 4-29).

LEFT

5-53. BUFFER SCREW ADJUSTMENT.

This Task Covers: Adjustment

Initial Setup:

Equipment Conditions:

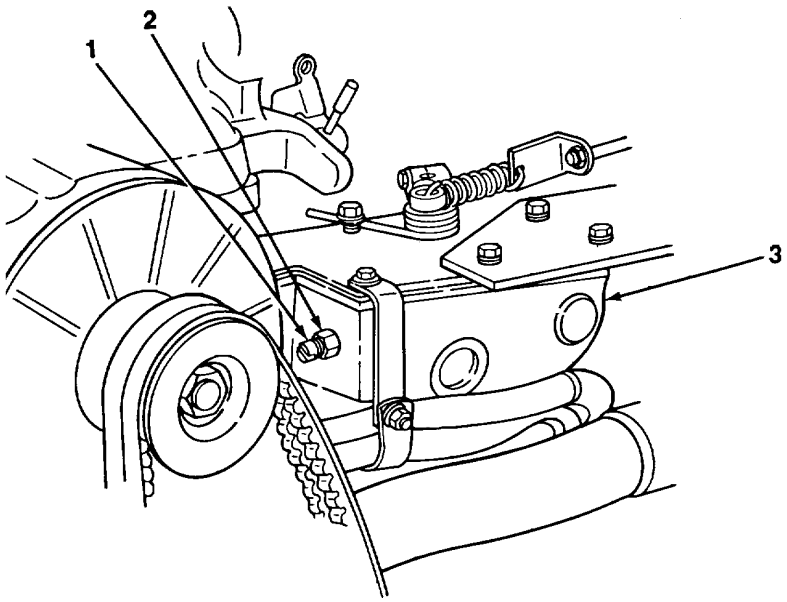
- Engine Idle speed adjusted (see paragraph 5-56).

Tools/Test Equipment:

- General mechanic's tool kit

ADJUSTMENT

1. Start engine (see paragraph 2-10).
2. With engine at idle speed, loosen nut (2) at side of engine governor (3).
3. Rotate buffer screw (1) inward until buffer screw contacts differential lever assembly inside engine governor (3) as lightly as possible but far enough to prevent engine rpm variations.
4. While holding buffer screw (1), tighten nut (2).
5. Check engine rpm. If engine rpm is more than 550 rpm, adjust engine idle speed (see paragraph 5-56).
6. Stop engine (see paragraph 2-12).



TA705050

5-54. ENGINE SPEED ADJUSTMENT.

This Task Covers: Adjustment

Initial Setup:

Materials/Parts:

- Two lockwashers

Tools/Test Equipment:

- General mechanic's tool kit

ADJUSTMENT

1. Start engine (see paragraph 2-10).
2. Check and record maximum engine no-load speed.
3. Stop engine (see paragraph 2-12).
4. Disconnect spring (1) and lever return spring (3) from governor control lever (2) on governor (8).
5. Remove two bolts (5), lockwashers (4), and variable speed housing (6) from governor (8). Discard lockwashers.

CAUTION

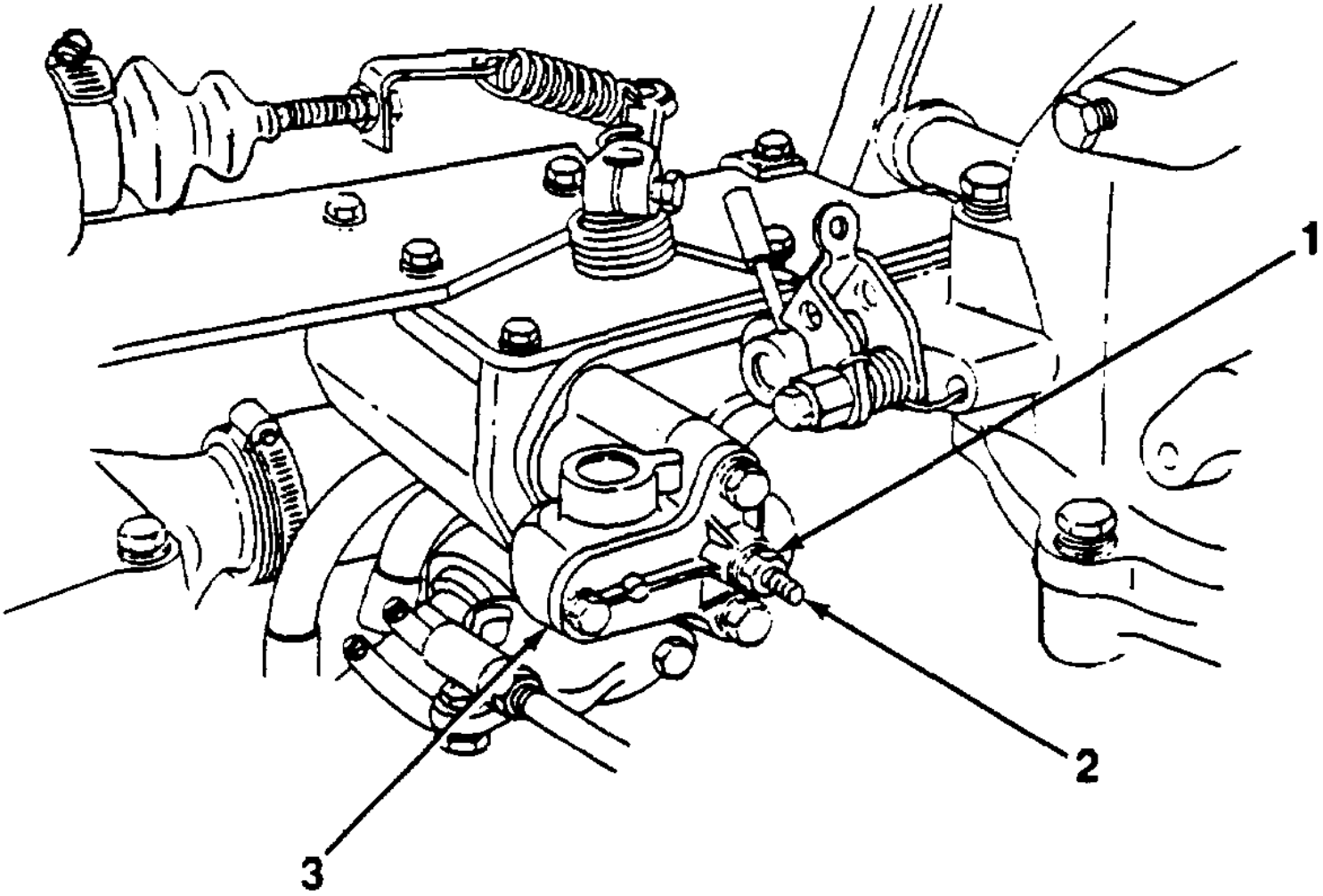
Maximum speed of loaded engine must not be more than 2100 rpm. If **maximum loaded speed Is exceeded, damage to engine may result.**

NOTE

Maximum no-load speed of engine must not be more than 2240 rpm. Add or remove shims, If necessary. Each 0.01 In. (0.25 mm) thick shim will change engine speed approximately 10 rpm. Add shims to raise engine speed. Remove shims to lower engine speed.

6. Add or remove shim(s) (7), as necessary.
7. Install variable speed housing (6) to governor (8) with two new lockwashers (4) and bolts (5).
8. Connect spring (1) and lever return spring (3) to governor control lever (2).
9. Start engine (see paragraph 2-10) and check maximum engine no-load speed.
10. Stop engine (see paragraph 2-12) and repeat steps 4 through 8 if necessary.

5-54. ENGINE SPEED ADJUSTMENT (Con't).



TA705051

5-55. ENGINE COMPRESSION CHECK.

This Task Covers: Compression Check

Initial Setup

Equipment Conditions:
- Engine at normal operating temperature (see paragraph 2-10).
- Fuel injector removed (see paragraph 5-57).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

COMPRESSION CHECK

1. Install adapter and compression pressure gage (4) to top of cylinder head (5).

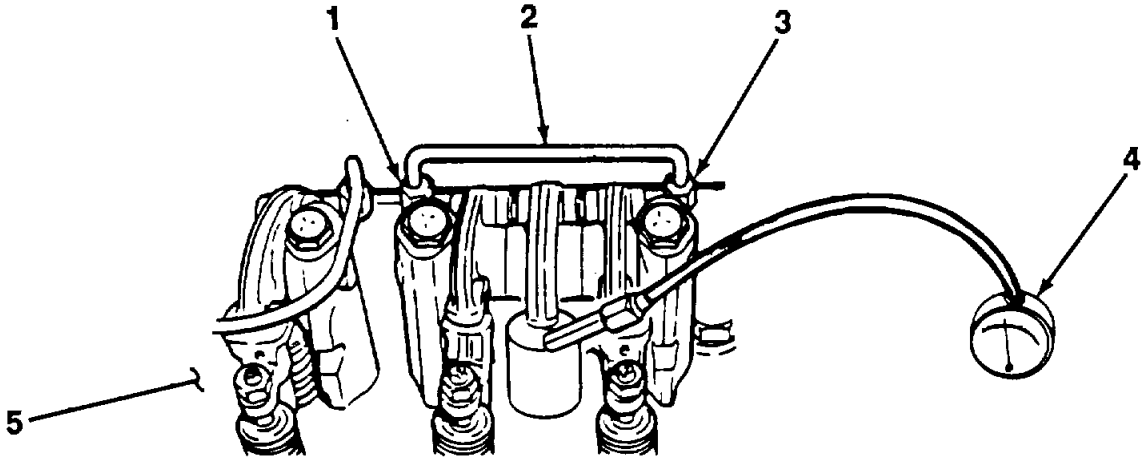
2. Install jumper connection (2) between fuel inlet (3) and fuel return manifold (1).

CAUTION

DO NOT crank engine with engine starter to obtain compression. Engine must be running. Failure to *follow* this caution may result in damage to engine.

3. Start engine (see paragraph 2-10) and run at 600 rpm.
4. Observe and record compression pressure indicated on compression pressure gage.
5. Perform steps 1 through 4 for each of six cylinders.
6. Depending on elevation at which compression check is performed, compression pressures are as follows:
   (a) At sea level, compression pressure must not be less than 425 psi (2930 kPa).
   (b) At 2500 ft (763 m), compression pressure must not be less than 395 psi (2724 kPa).
   (c) At 5000 ft (1525 m), compression pressure must not be less than 364 psi (2510 kPa).
   (d) At 7500 ft (2288 m), compression pressure must not be less than 340 psi (2344 kPa).
   (e) At 10, 000 ft (3050 m), compression pressure must not be less than 315 psi (2172 kPa).
7. Pressure variation between any two cylinders must not exceed 25 psi (172 kPa).
8. Stop engine (see paragraph 2-12).
9. Remove jumper connection (2) between fuel inlet (3) and fuel return manifold (1).
10. Remove compression pressure gage (4) and adapter from top of cylinder head (5).

5-55. ENGINE COMPRESSION CHECK (Con't).



FOLLOW-ON TASKS:

- Install fuel injector (see paragraph 5-57).

TA705052

5-56. ENGINE IDLE SPEED ADJUSTMENT.

This Task Covers: Adjustment

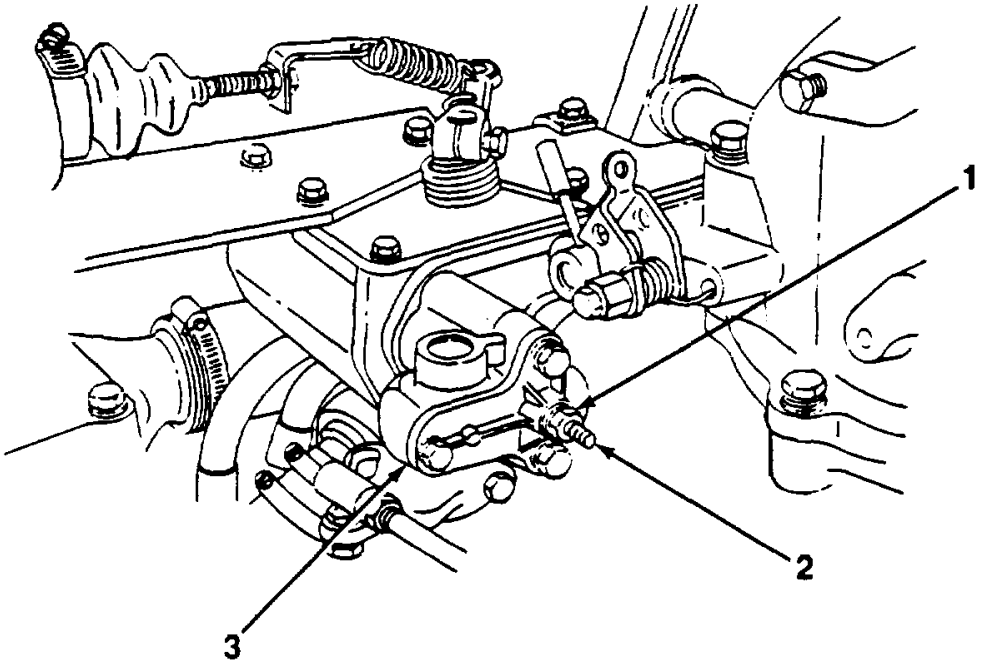
Initial Setup:

Equipment Conditions:
- Engine started (see paragraph 2-10).

Tools/Test Equipment:
- General mechanic's tool kit

ADJUSTMENT

1. Loosen locknut (1) at engine governor (3).
2. Rotate engine idle speed adjusting screw (2) until engine speed is 550 rpm.
3. While holding engine idle speed adjusting screw (2), tighten locknut (1).



FOLLOW-ON TASKS:
- Stop engine (see paragraph 2-12).

Section IV. ENGINE FUEL SYSTEM MAINTENANCE

5-57. FUEL INJECTOR REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:
- Rocker arms removed (see paragraph 5-41).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Diesel fuel (Item 20, Appendix E)
- Rags (Item 35, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)

General Safety Instructions:

- DO NOT perform this procedure near fire, flames, or sparks.
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

5-57. FUEL INJECTOR REPLACEMENT (Con't).

WARNING

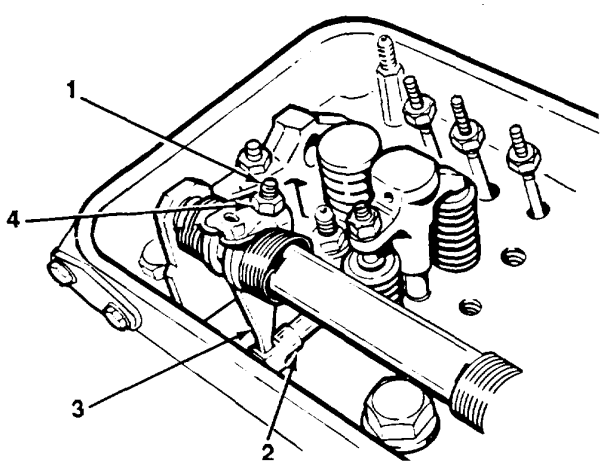
No open flame, welding, grinding, smoking, or use of heat producing devices, permitted nearby when using fuel. Fuel burns easily and fumes are explosive. Keep battery disconnected. DO NOT breathe fuel fumes. They are toxic and can cause serious medical problems. Failure to observe these precautions may cause serious Injury or death to personnel.

a. REMOVAL

NOTE

All fuel Injectors are removed same way. This procedure covers one fuel Injector.

1. Loosen retaining nut (4) and adjusting screw (1) on control rack lever (3).
2. Slide control rack lever (3) away from control rack (2).
3. Mark and remove screw (6), convex washer (7), and clamp (8) from cylinder head (9).



CAUTION

Cover hole left by fuel Injector to keep out dirt which may damage cylinder head.

4. Remove fuel injector (12) from cylinder head (9) and cover injector hole (10).

WARNING

• Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (380C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

• Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

5. Clean outside of fuel injector (12) with dry cleaning solvent and compressed air.

TA705054

5-57. FUEL INJECTOR

REPLACEMENT (Con't).

b. INSTALLATION

1. Add diesel fuel to fuel inlet filter cap (5) until fuel injector (12) is full.

2. Aline dowel pin (11) with hole In cylinder head (9) and install fuel injector (12) in injector hole (10) in cylinder head.

3. Slide control rack lever (3) into control rack (2).

CAUTION

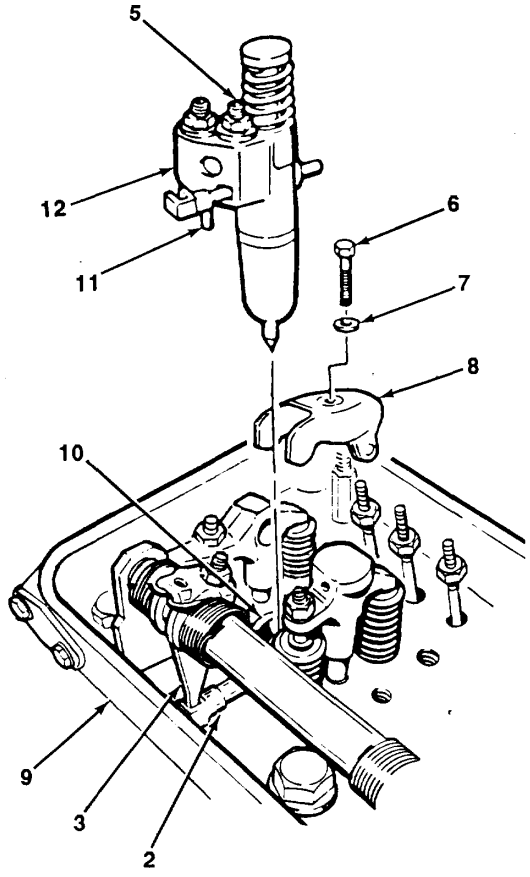
Ensure that clamp does not Interfere with fuel Injector or valve springs. Interference may cause damage to components.

4. Install clamp (8), screw (6), and convex washer (7) on cylinder head (9). Torque screw to 25 lb.-ft. (34 Nom).

5. Check control rack (2) for free movement. If tight, loosen screw (6) and torque to 25 lb.-ft. (34 Nom).

FOLLOW-ON TASKS:

- Install rocker arms (see paragraph 5-41).
- Adjust exhaust valve clearance (see paragraph 5-49).
- Adjust fuel injector timing (see paragraph 5-50).
- Adjust injector rack control lever (see paragraph 5-52).



TA705055

5-58. FUEL INJECTOR TESTING.

This Task Covers:

a. Fuel Injector Test Kit Setup
b. Testing

Initial Setup:

Equipment Conditions:
- Fuel injector removed (see paragraph 5-57).

Tools/Test Equipment:
- Injector test kit, J23O010A
- Rack tester kit, J22396
- Spray tip gage, J9462-02

.

Materials/Parts:
- Injector test oil (Item 24, Appendix E)
- Tie-down straps (Item 39, Appendix E)

General Safety Instructions:
- DO NOT perform this procedure near fire, flames, or sparks.
- When testing or adjusting fuel injectors, DO NOT place hands or arms in front of injector spray tip.

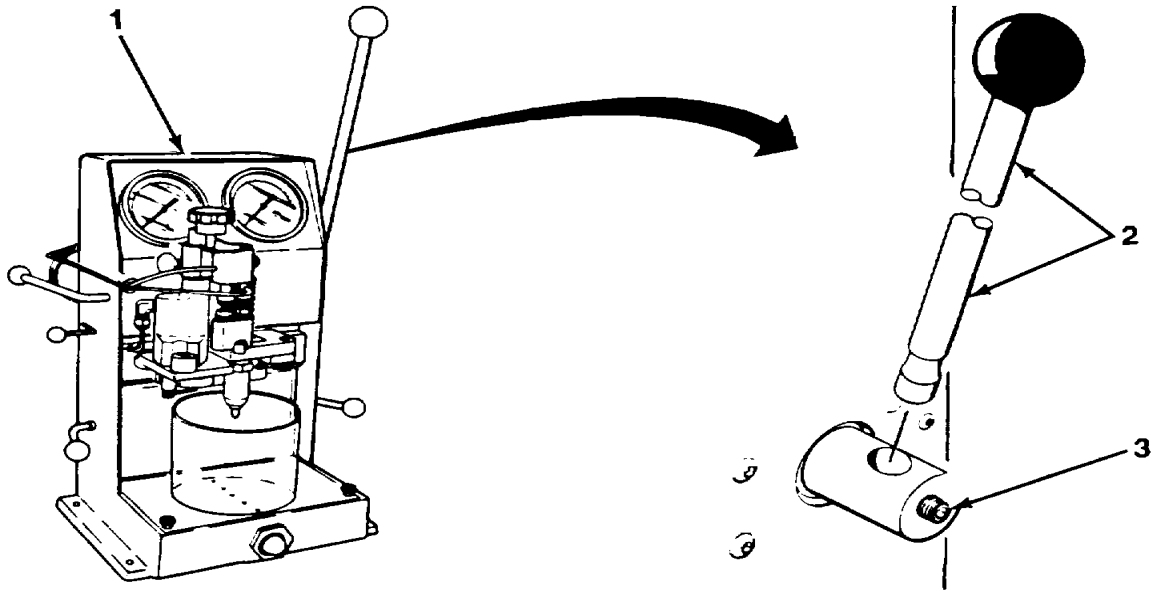
a. FUEL INJECTOR TEST KIT SETUP

WARNING

No open flame, welding, grinding, smoking, or use of heat producing devices, permitted nearby when using fuel. Fuel burns easily and fumes are explosive. Keep battery disconnected. DO NOT breathe fuel fumes. They are toxic and can cause serious medical problems. Failure to observe these precautions may cause serious Injury or death to personnel.

1. Loosen setscrew (3).

2. Install pump lever (2) on test kit (1) and tighten setscrew (3).



TA705056

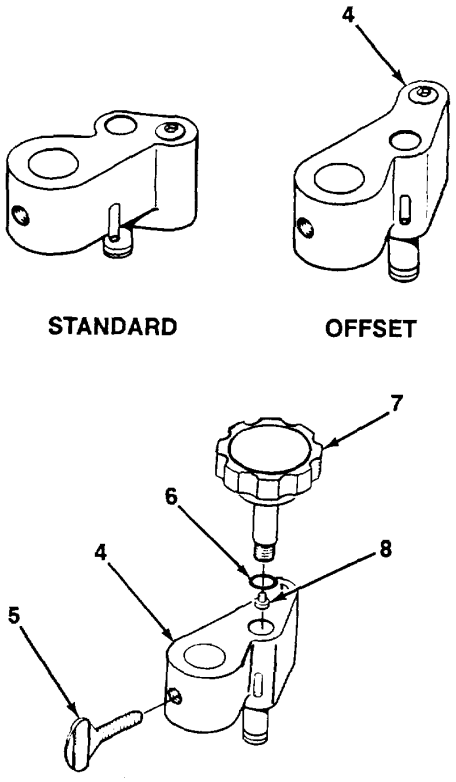
5-58. FUEL INJECTOR TESTING (Con't).

NOTE

Two clamping heads are supplied with test kit.

3. Select offset clamping head (4).

4. Install preformed packing (6) and valve tip (8) on control valve (7).
5. Install control valve (7) in offset clamping head (4).
6. Install thumbscrew (5) in offset clamping head (4).



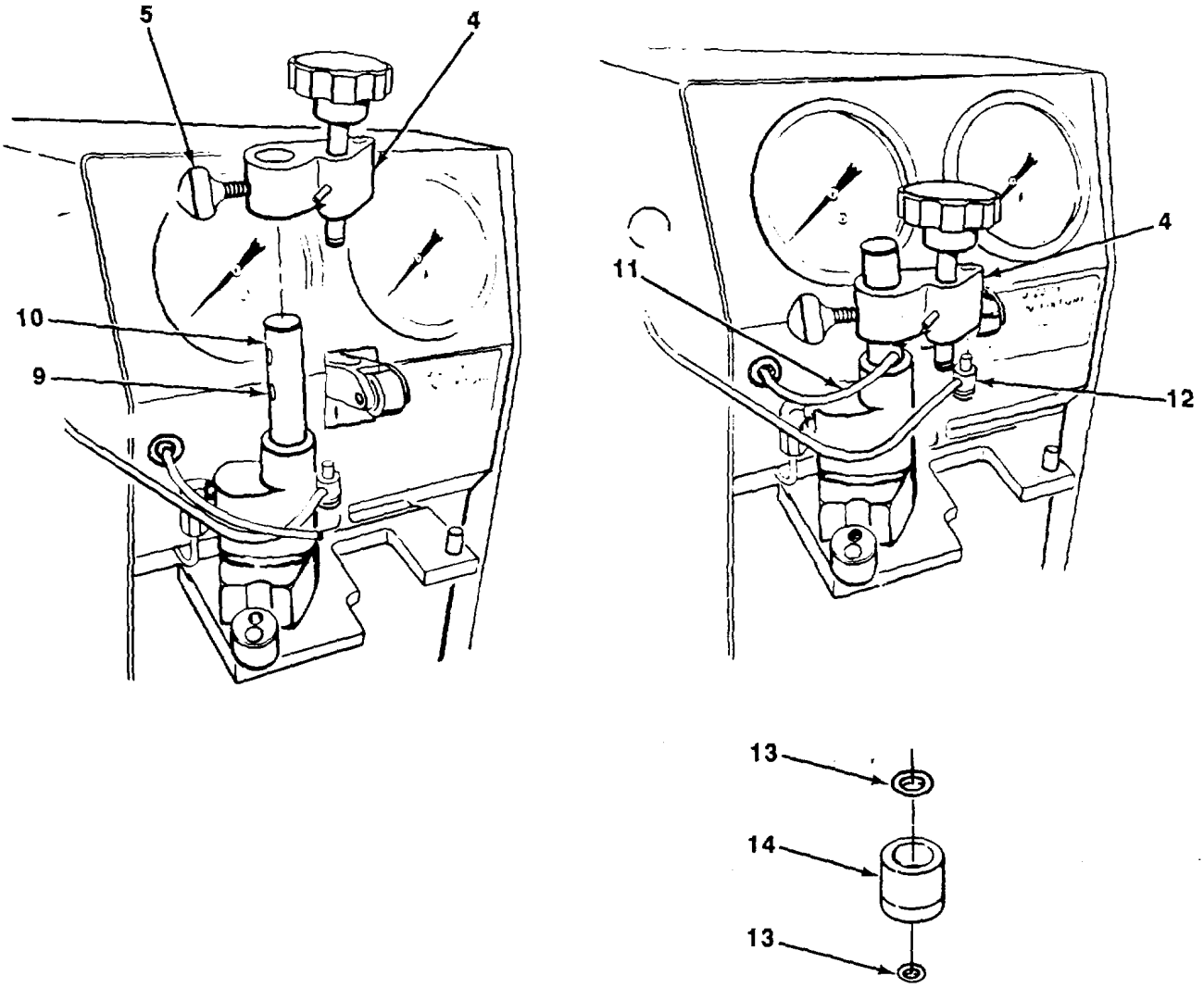
TA705057

5-58. FUEL INJECTOR TESTING (Con't).

7. Install offset clamping head (4) on post (10) so that thumbscrew (5) fits in lower hole (9) of post.

8. Install fuel discharge line (11) on offset clamping head (4) with tie-down straps.

9. Install fuel delivery line (12) on offset clamping head (4).



10. Install four preformed packings (13) on two fuel connector adapters (14).

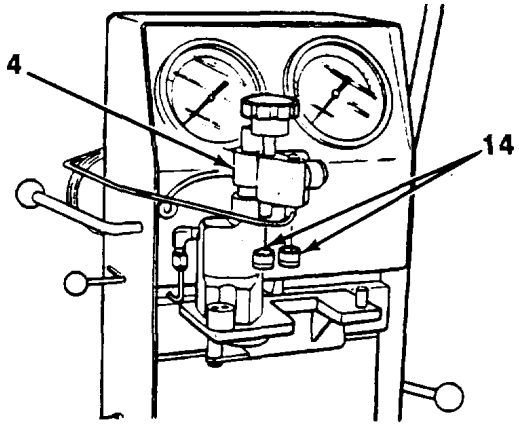
TA705058

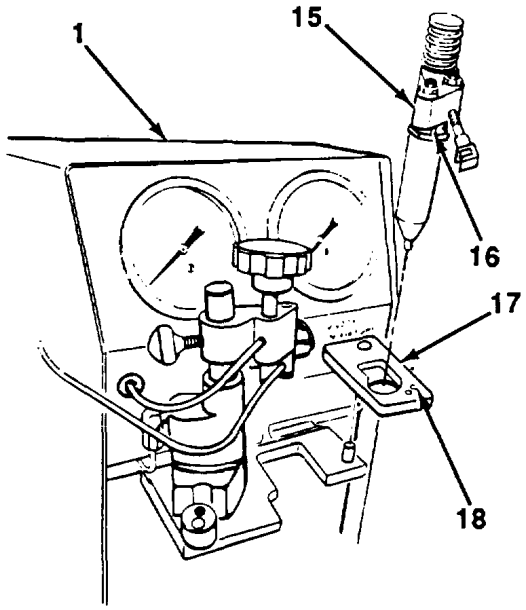
5-58. FUEL INJECTOR TESTING (Con't).

11. Install two fuel connector adapters (14) on offset clamping head (4).

12. Install adapter plate (17) on test kit (1).

13. Install fuel injector (15) in adapter plate (17) with locating pin (16) In hole (18).



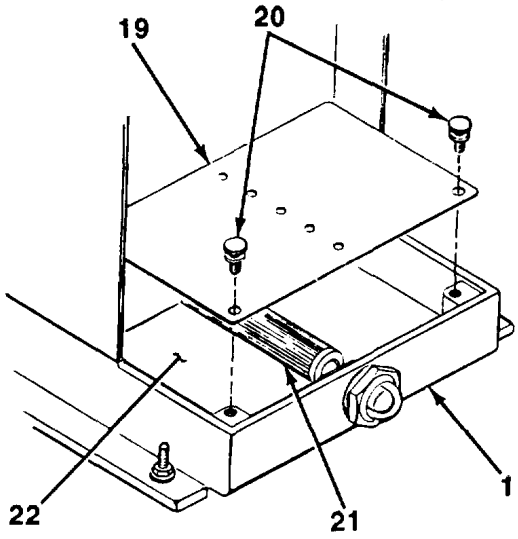


14. Remove two screws (20) and drain plate (19) from test kit (1).

NOTE
Reservoir holds 1 qt (0.95 l) of Injector test oil.

15. Fill reservoir (22) to top of filter (21).

16. Install drain plate (19) with two screws (20).



TA705059

5-58. FUEL INJECTOR TESTING (Con't).

17. Install spray shield (25).

18. Position two fuel connector adapters (14) over fuel injector adapters (24).

19. Push plunger position lever (23) to rear of test kit (1).

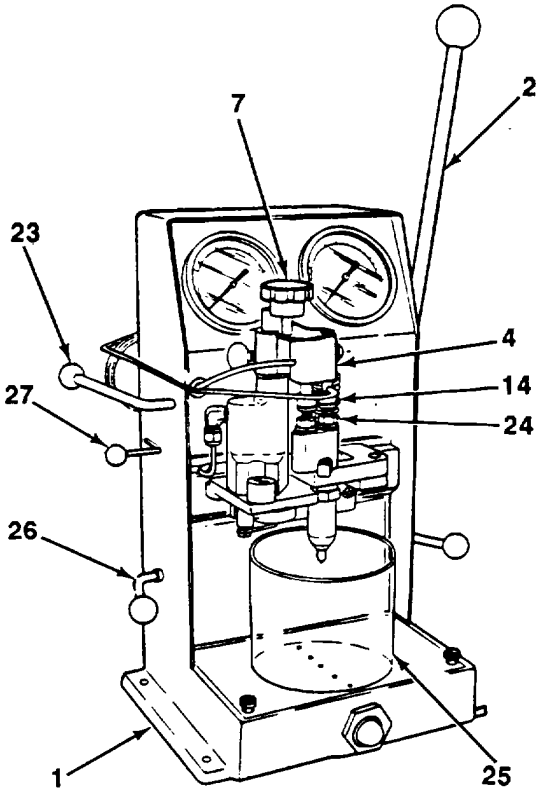
20. Push rocker arm engagement lever (27) to rear to test kit (1).

21. Push valve lever (26) so It points forward.

22. Open control valve (7).

23. Move pump lever (2) down to seat offset clamping head (4) on two fuel injector adapters (24).

24. Push valve lever (26) down.



25. Pull pump lever (2) and observe flow of injector test oil passing through fuel discharge line (11) until no air bubbles are seen.

26. Push rack (33) in to full fuel position.

27. Position pump lever (2) to point straight up.

28. Move rocker arm engagement lever (27) to forward position.

WARNING

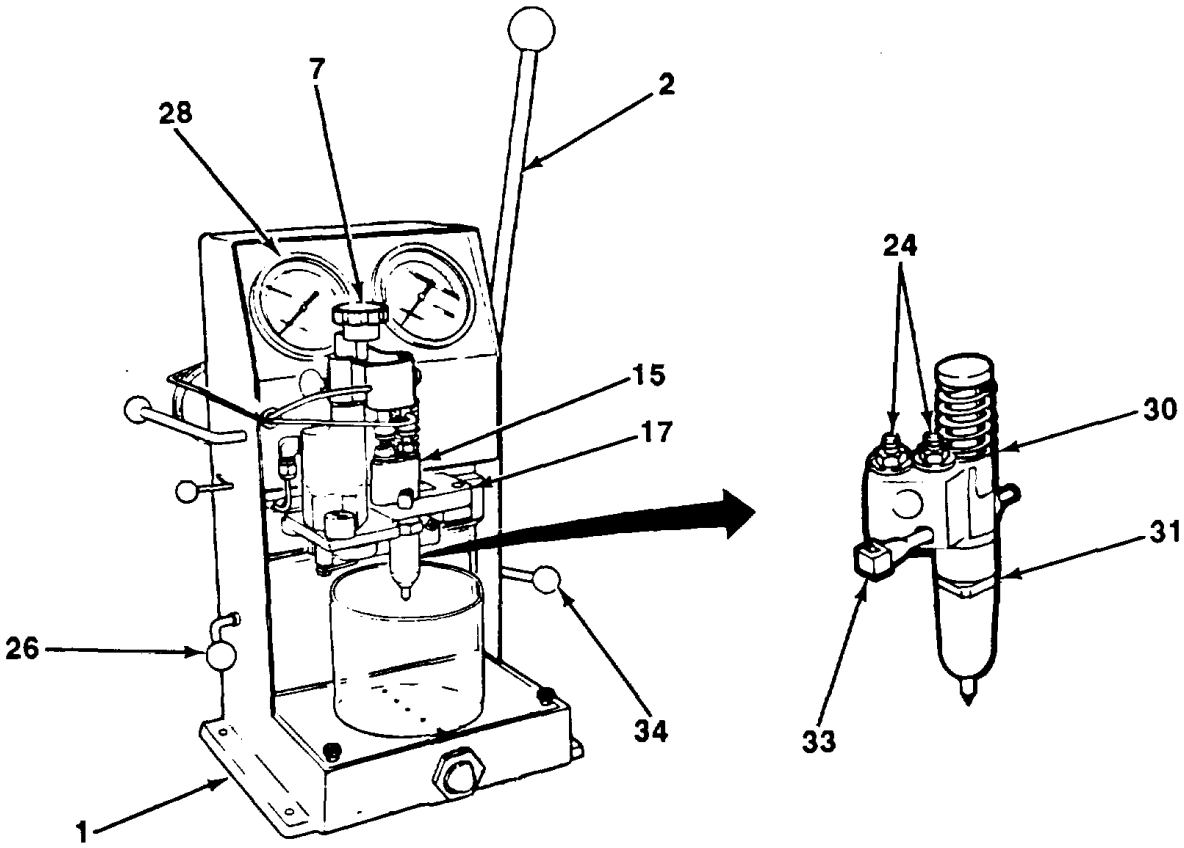
When testing fuel Injector, DO NOT place hands or arms In front of fuel Injector spray tip. Fuel spray from fuel Injector has sufficient penetrating power to puncture the flesh and destroy tissue. Should fuel enter the bloodstream, blood poisoning may result.

29. Pull pump lever (2) forward 40-80 times a minute with steady strokes and note highest reading reached on gage (29).

30. If highest reading is less than 138 psi (952 kPa) or more than 162 psi (1117 kPa), replace fuel injector (see paragraph 5-57).

TA705060

5-58. FUEL INJECTOR TESTING (Con't).



WARNING

When testing fuel Injector, DO NOT place hands or arms In front of fuel Injector spray tip. Fuel spray from fuel Injector has sufficient penetrating power to puncture the flesh and destroy tissue. Should fuel enter the bloodstream, blood poisoning may result.

31.Pull pump lever (2) forward several times with steady strokes and observe spray pattern of fuel injector tip assembly (32).

32.If spray pattern Is uneven or Injector test oil does not become a fine mist, replace fuel injector (see paragraph 5-57).

33. Set pump lever (2) to point straight up.

34. Move rocker arm engagement lever (27) to rear of test kit (1).

CAUTION

DO NOT overtighten control valve. Bushing may be damaged, causing fuel Injector to malfunction.

35. Close control valve (7).

36. Pull pump lever (2) forward several times to build 1600-2000 psi (11, 032-13, 790 kPa) on gage (28).

TA705061

5-58. FUEL INJECTOR TESTING (Con't).

37. Check fuel injector adapters (24), plugs (30), rack (33), and injector valve nut (31) for leaks.

38. Open control valve (7).

39. Close control valve (7).

CAUTION

DO NOT overtighten control valve. Bushing may be damaged, causing fuel Injector to malfunction.

40. Pull pump lever (2) forward several times to build 500 psi (3448 kPa) on gage (28).

41. Move valve lever (26) to point forward.

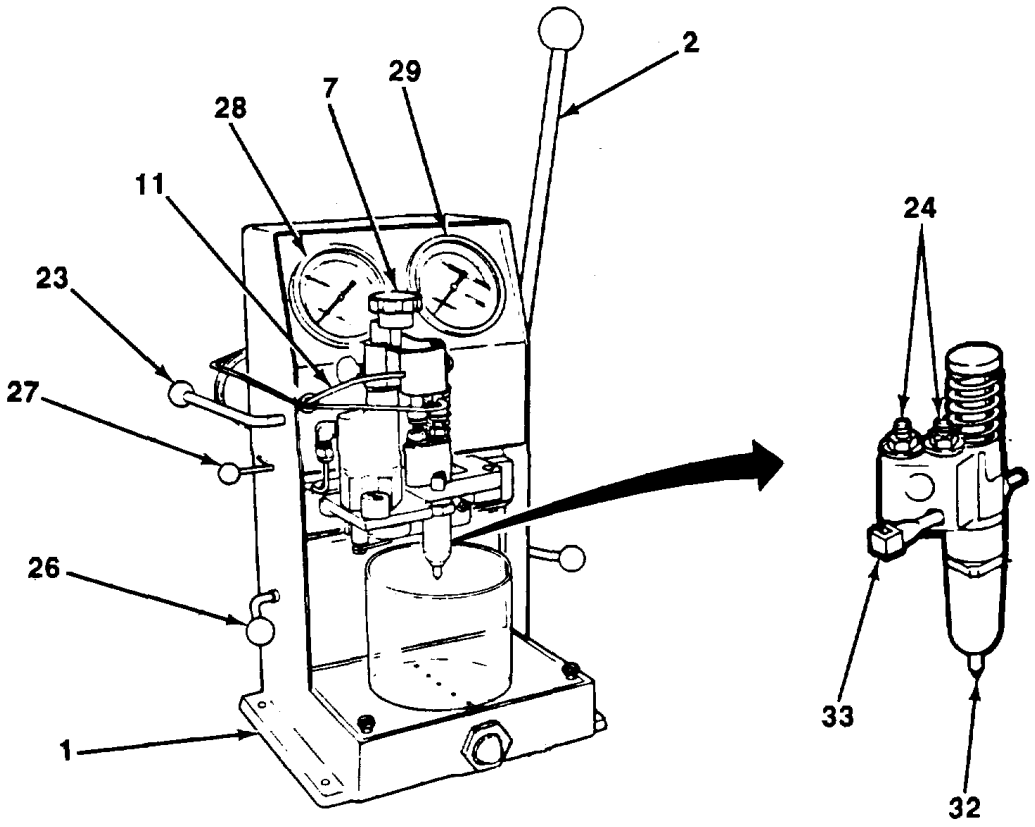
42. If pressure on gage (28) drops from 450-250 psi (3103-1724 kPa) in less than 40 seconds, replace fuel injector (see paragraph 5-57).

43. Open control valve (7).

44. Move clamp release lever (34) down.

45. Remove fuel injector (15) along with adapter plate (17) from test kit (1).

46.



5-58. FUEL INJECTOR TESTING (Con't).

b. TESTING

WARNING

No open flame, welding, grinding, smoking, or use of heat producing devices, permitted nearby when using fuel. Fuel burns easily and fumes are explosive. Keep battery disconnected. DO NOT breathe fuel fumes. They are toxic and can cause serious medical problems. Failure to observe these precautions may cause serious Injury or death to personnel.

1. Fuel injector that passes all testing can be installed (see paragraph 5-57).

2. Repeat all tests on fuel injectors before replacing. Replace fuel injectors (see paragraph 5-57) that fail one or more tests.

NOTE

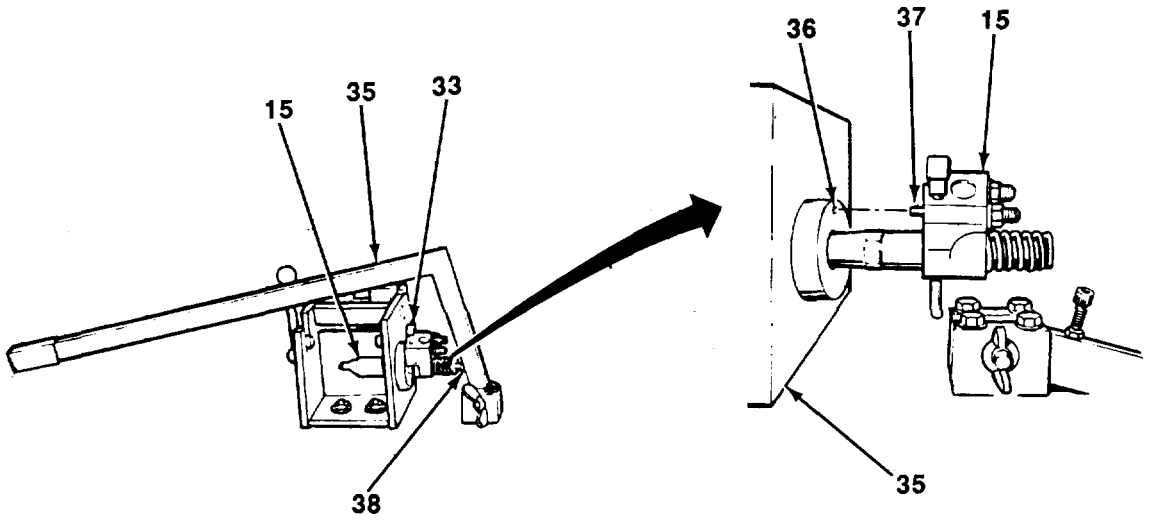
Perform steps 3 through 10 on rack tester.

3. Install fuel injector (15) in rack tester (35).

4. Ensure that dowel (37) on fuel injector (15) is situated in hole (36) of rack tester (35).

5. Install rack tester (35) handle on top of fuel injector (15) follower guide (38).

6. Pull rack (33) out of no-fuel position and push follower guide (38).



TA705063

5-58. FUEL INJECTOR TESTING (Con't).

7. Loosen nut (39) and adjust screw (40) so that it is at center of follower guide (38) when spring (41) is fully compressed. Tighten nut.

8. Release rack tester (35) handle while moving rack (33) up and down to test freedom of movement. Rack must move freely

9. Loosen Injector valve nut (31) and turn fuel Injector tip assembly (32). Torque Injector valve nut to 55-65 lb.-ft. (75-88 N.m) and repeat steps 4 through 8 until rack (33) moves freely.

10. If rack (33) does not move freely, replace fuel Injector (15) (see paragraph 5-57).

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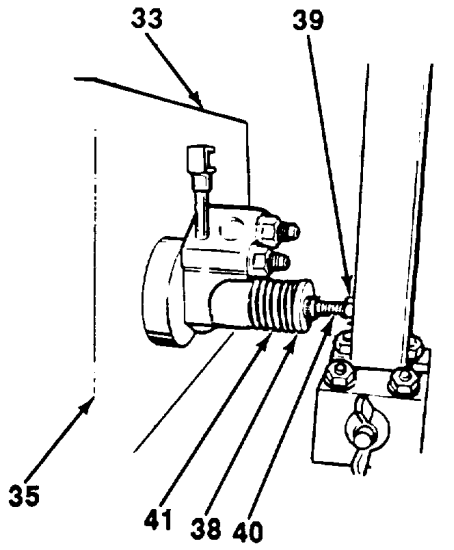
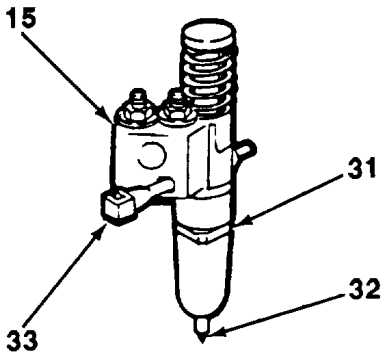




TA705064

5-59. FUEL INJECTOR CONTROL TUBE MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation

Initial Setup:

Equipment Conditions:
- Rocker arm covers removed (see paragraph 4-29).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Dry cleaning solvent (Item 38, Appendix E)
- Two cotter pins
- Two spring pins
- Six locknuts

General Safety Instructions:
- Dry cleaning solvent Is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

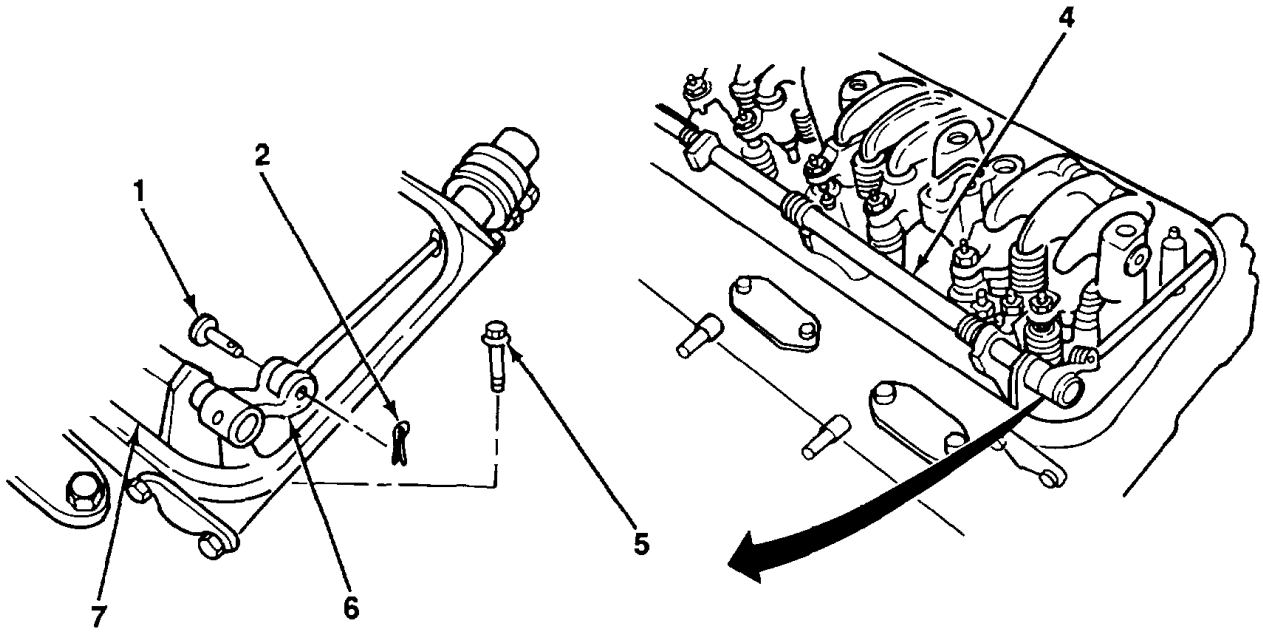
a. REMOVAL

NOTE

Right and left bank Injector control tubes are removed same way. This procedure covers right bank Injector control tube.

1. Remove cotter pin (2) and pin (1) from clevis (6). Discard cotter pin.

2. Remove four screws (5) and control tube (4) from cylinder head (7).



RIGHT BANK

TA705065

5-59. FUEL INJECTOR CONTROL TUBE MAINTENANCE (Con't).

b. **DISASSEMBLY**

NOTE

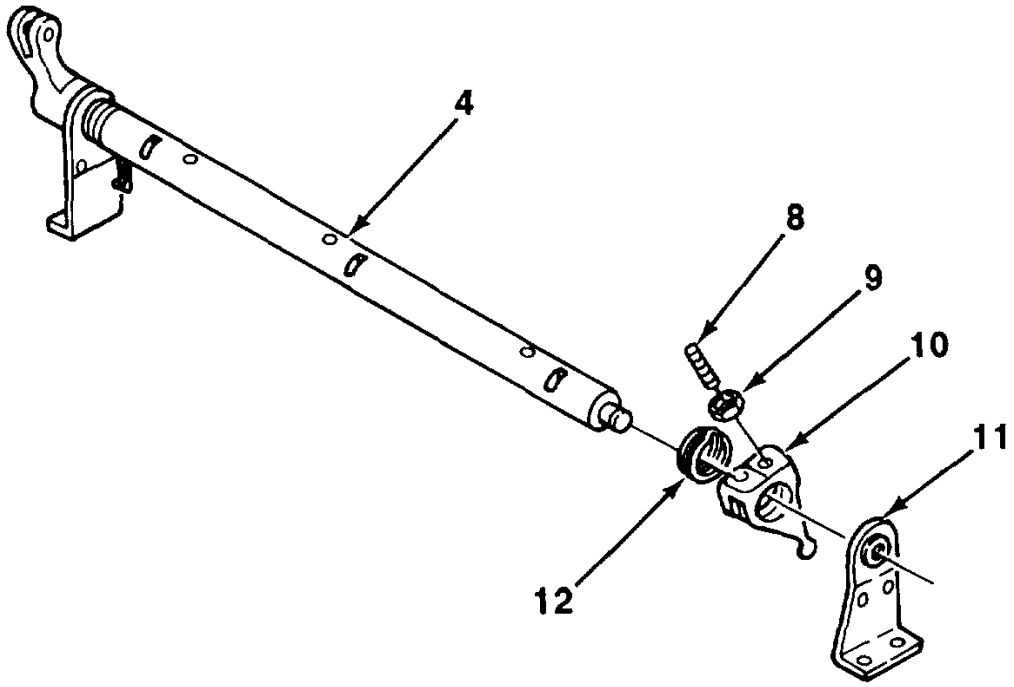
Steps 1 through 6 are for disassembly of left bank Injector control tube. Steps 7 through 13 are for disassembly of right bank Injector control tube.

1. Remove bracket (11) from control tube (4).

NOTE

Three control levers are removed same way.

2. Loosen locknut (9) and screw (8) and remove three control levers (10) from control tube (4).
3. Remove locknut (9) and screw (8). Discard locknut.
4. Remove spring (12) from control lever (10).

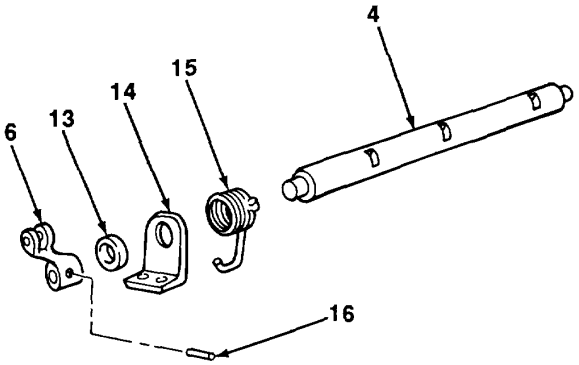


TA705066

5-59. FUEL INJECTOR CONTROL TUBE MAINTENANCE (Con't).

5. Remove pin (16) and clevis (6) from control tube (4). Discard pin.

6. Remove spacer (13), bracket (14), and spring (15).



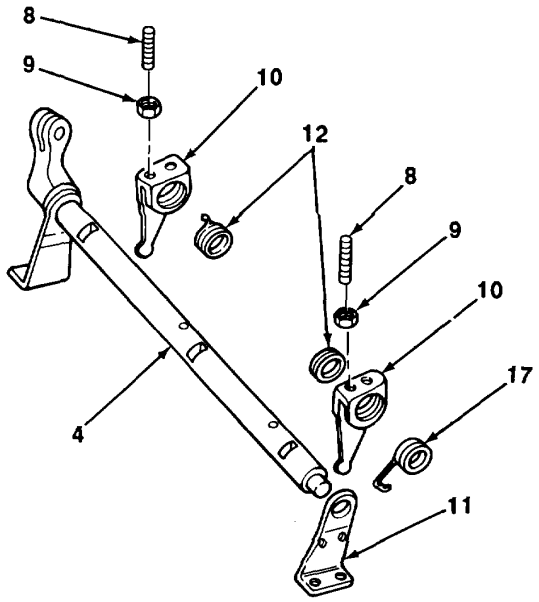
7. Remove bracket (11) and spring (17) from control tube (4).

8. Loosen locknut (9) and screw (8) and remove control lever (10).

9. Remove locknut (9) and screw (8). Discard locknut.

10. Remove spring (12) from control lever (10).

11. Repeat steps 8 through 10 for two remaining control levers (10).

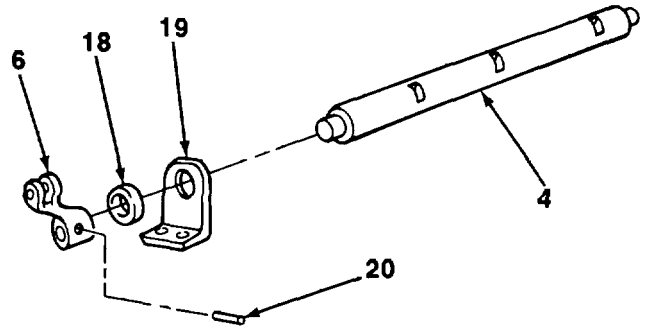


TA705067

5-59. FUEL INJECTOR CONTROL TUBE MAINTENANCE (Con't).l

12. Remove pin (20) and clevis (6) from control tube (4). Discard pin.

13. Remove spacer (18) and bracket (19) from control tube (4).



RIGHT BANK CONTROL TUBE

c. CLEANING INSPECTION

WARNING

- Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (380C-59°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

- Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psl (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

1. Clean all parts with dry cleaning solvent and dry with compressed air.

2. Inspect parts for damage. Replace damaged parts.

d. ASSEMBLY

NOTE

Steps 1 through 8 are for assembly of right bank Injector control tube. Steps 9 through 14 are for assembly of left bank Injector control tube.

1. Install bracket (19) and spacer (18) on control tube (4).

2. Install clevis (6) on control tube (4) with new pin (20).

TA705068

5-59. FUEL INJECTOR CONTROL TUBE MAINTENANCE (Con't).

3. Position control lever (10) and spring (12) over slot In control tube (4).

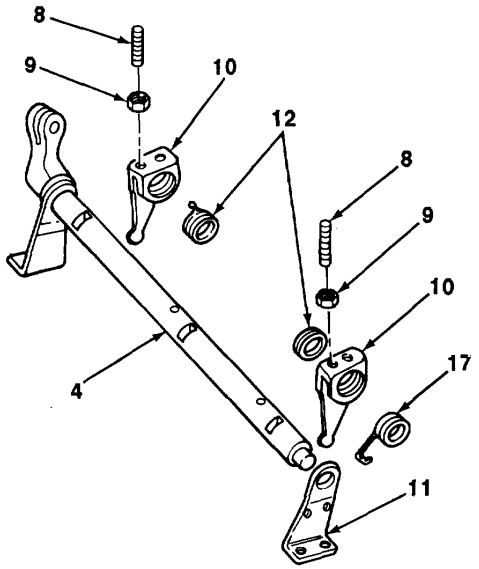
4. Install control lever (10) with screw (8) and new locknut (9).

5. Repeat steps 3 and 4 for other control lever.

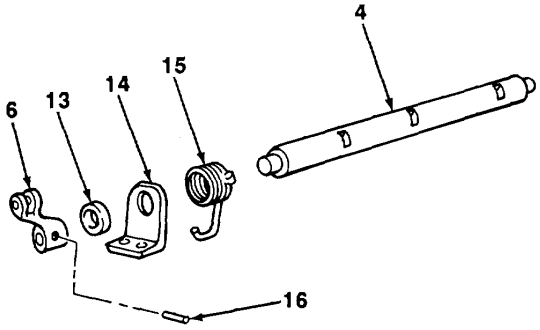
6. Position spring (12) and control lever (10) over slot In control tube (4).

7. Install control lever (10) with screw (8) and new locknut (9).

8. Install spring (17) and bracket (11).



9. Install spring (15), bracket (14), and spacer (13) on control tube (4).
10. Install clevis (6) on control tube (4) with new pin (16).



TA708069

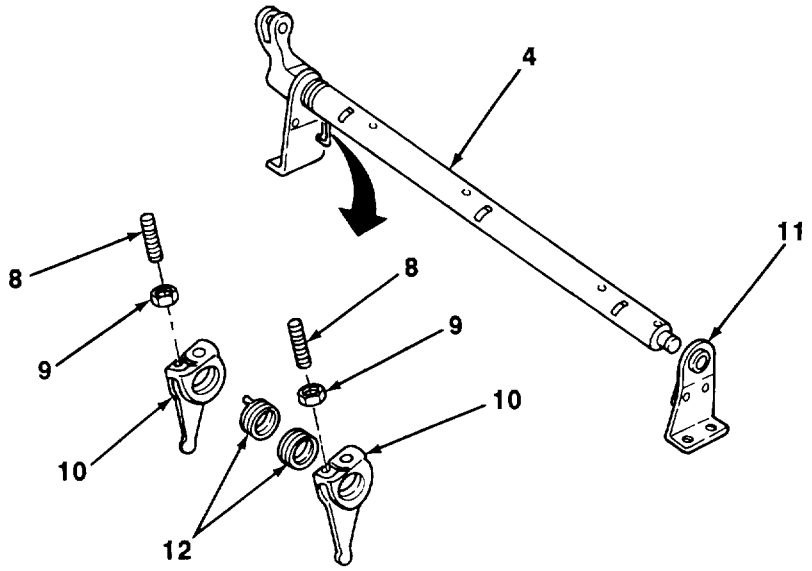
5-59. FUEL INJECTOR CONTROL TUBE MAINTENANCE (Con't).

11. Position control lever (10) and spring (12) over slot in control tube (4).

12. Install control lever (10) on control tube (4) with screw (8) and new locknut (9).

13. Repeat steps 11 and 12 for next two control levers (10).

14. Install bracket (11).



LEFT BANK INJECTOR CONTROL TUBE

e. INSTALLATION

NOTE

Right and left bank Injector control tubes are Installed same way. This procedure covers right bank Injector control tube.

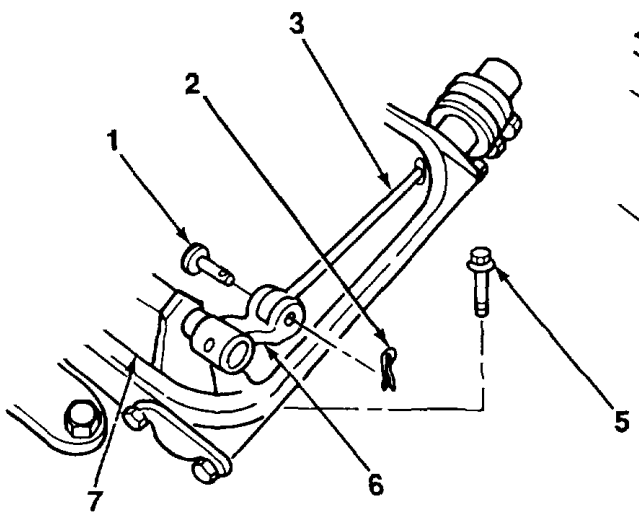
1. Install control tube (4) in cylinder head (7) using four screws (5).

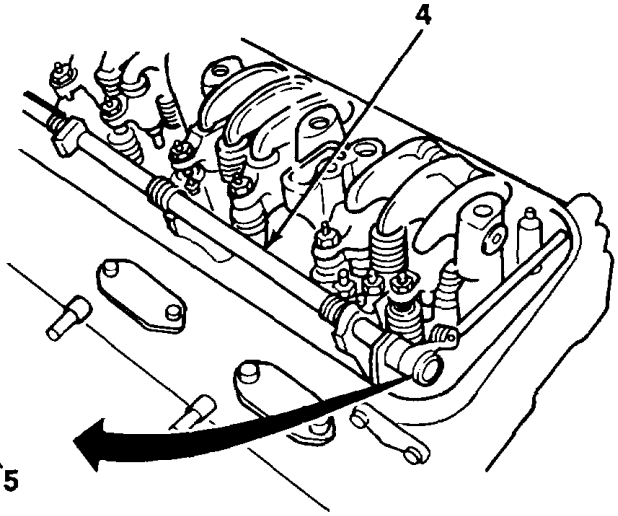
2. Install pin (1) through clevis (6) and governor rod (3).

3. Install new cotter pin (2) through pin (1).

TA705070

5-59. FUEL INJECTOR CONTROL TUBE MAINTENANCE (Con't).

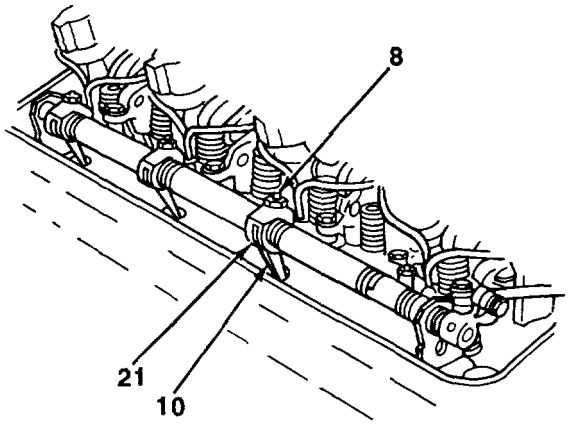




4. Seat six control levers (10) in injector control rack (21).

5. Tighten six screws (8).

RIGHT BANK



FOLLOW-ON TASKS:

- Adjust injector rack control lever (see paragraph 5-52).
- Install rocker arm covers (see paragraph 4-29).

TA705071

5-60. METERING FUEL PUMP REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

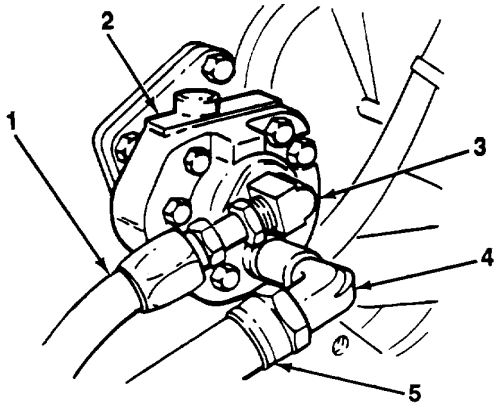
Equipment Conditions:
- Thermostat crossover tube removed (see paragraph 4-49).

Tools/Test Equipment:
- General mechanic's tool kit

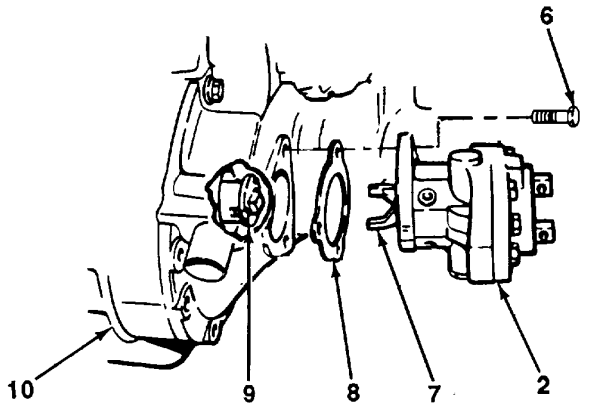
Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- Grease (Item 22, Appendix E)
- One gasket

a. REMOVAL

1. Disconnect fuel hose (1) from elbow (3).
2. Disconnect fuel hose (5) from elbow (4).
3. Remove elbows (3 and 4) from fuel pump (2).



4. Remove three screws (6), fuel pump (2), and gasket (8) from governor housing (10). Discard gasket.
5. Remove fork (7) from fuel pump (2).



TA705072

5-60. METERING FUEL PUMP REPLACEMENT (Con't).

b. INSTALLATION

1. Install fork (7) in fuel pump (2).
2. Apply grease to new gasket (8) and install on governor housing (10).
3. Aline fork (7) with blower shaft (9) in governor housing (10) and install fuel pump (2) to governor housing.
4. Apply sealing compound to threads of three screws (6) and install in fuel pump (2) and governor housing (10).
5. Apply sealing compound to threads of elbows (3 and 4).
6. Install elbows (3 and 4) In fuel pump (2).
7. Connect fuel hose (5) to elbow (4) and fuel hose (1) to elbow (3).

FOLLOW-ON TASKS:

- Install thermostat crossover tube (see paragraph 4-49).
- Start engine (see paragraph 2-10) and check for fuel and coolant leaks.

5-61. BLOWER ACCESSORY DRIVE HUB REPLACEMENT.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Installation

Initial Setup:

Equipment Conditions:
- Master battery switch in OFF position.
- Engine cool.

Tools/Test Equipment:
- Two gaskets
- General mechanic's tool kit* Eleven lockwashers
- Field automotive shop set

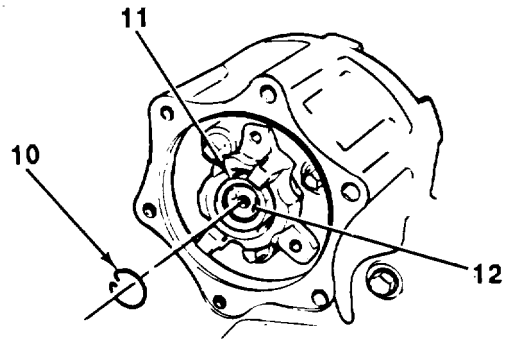
Materials/Parts:
- Dry cleaning solvent (Item 38, Appendix E)
- Marker tags (Item 40, Appendix E)
- One copper washer
- One Copper washer

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. REMOVAL

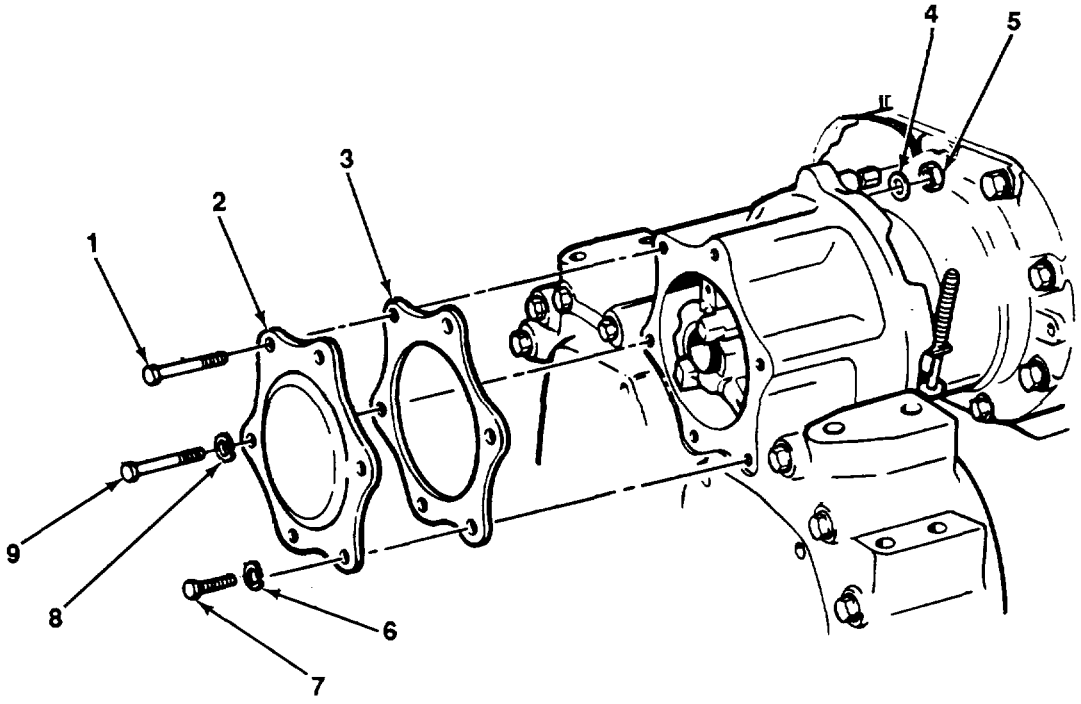
NOTE
Tag screws when removing to assist In Installation.

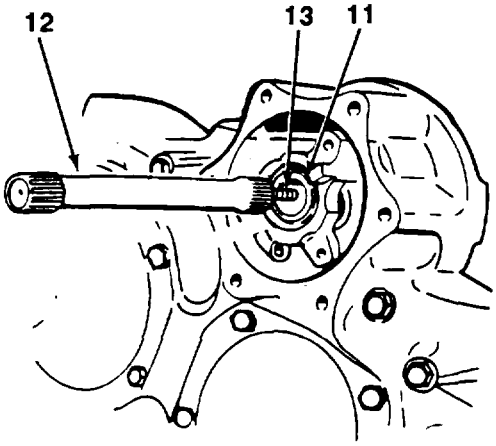
1. Remove nut (5), copper washer (4), and screw (1). Discard copper washer.
2. Remove three screws (9) and lockwashers (8). Discard lockwashers.
3. Remove two screws (7), lockwashers (6), cover (2), and gasket (3). Discard lockwashers and gasket.
4. Remove retaining ring (10) from drive adapter (11).



TA705073

5-61. BLOWER ACCESSORY DRIVE HUB REPLACEMENT (Con't).





NOTE

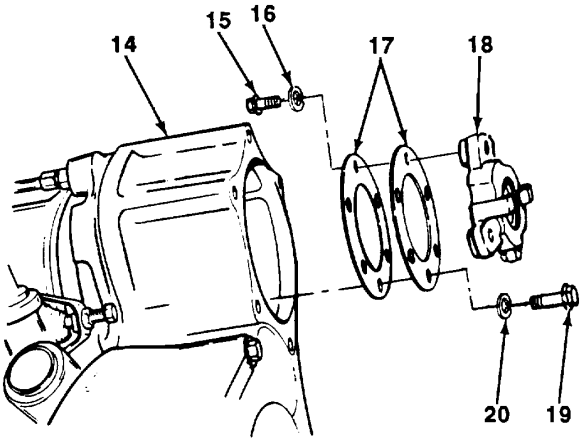
Spring may fall out when removing drive shaft.

TA705074

5. Remove drive shaft (12) and spring (13).

5-61. BLOWER ACCESSORY DRIVE HUB REPLACEMENT (Con't).

6. Remove three screws (19), lockwashers (20), and drive hub (18) with two plates (17) as an assembly from rear housing (14). Discard lockwashers.
7. Remove three screws (15), lockwashers (16), and two plates (17) from drive hub (18). Discard lockwashers.



b. CLEANING AND INSPECTION

WARNING

- Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

- Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

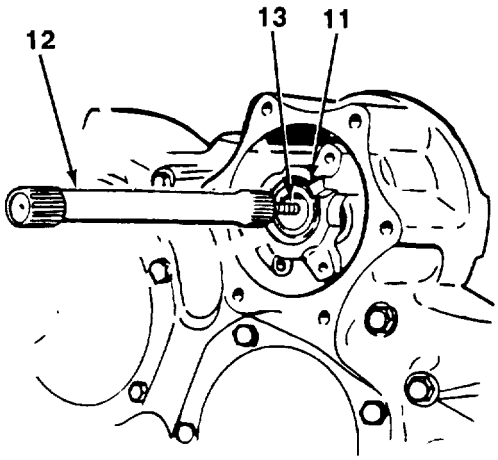
1. Clean metal parts with dry cleaning solvent and dry with compressed air.
2. Inspect splines In bore of drive hub. If defective, replace drive hub.
3. Inspect plates and washers for breaks, cracks, dents, and distortion. Replace if defective.
4. Inspect drive hub bosses for stripped threads.

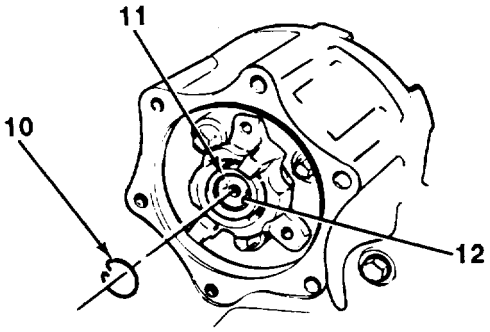
TA705075

5-61. BLOWER ACCESSORY DRIVE HUB REPLACEMENT (Con't).

c. INSTALLATION I

1. Install two plates (17) on drive hub (18) with three new lockwashers (16) and screws (15).
2. Install drive hub (18) and two plates (17) as an assembly in rear housing (14) with three new lockwashers (20) and screws (19). Torque six screws (15 and 19) to 35-39 lb.-ft. (47-53 N.m).
3. Install spring (13) in drive shaft (12) and install in drive adapter (11).



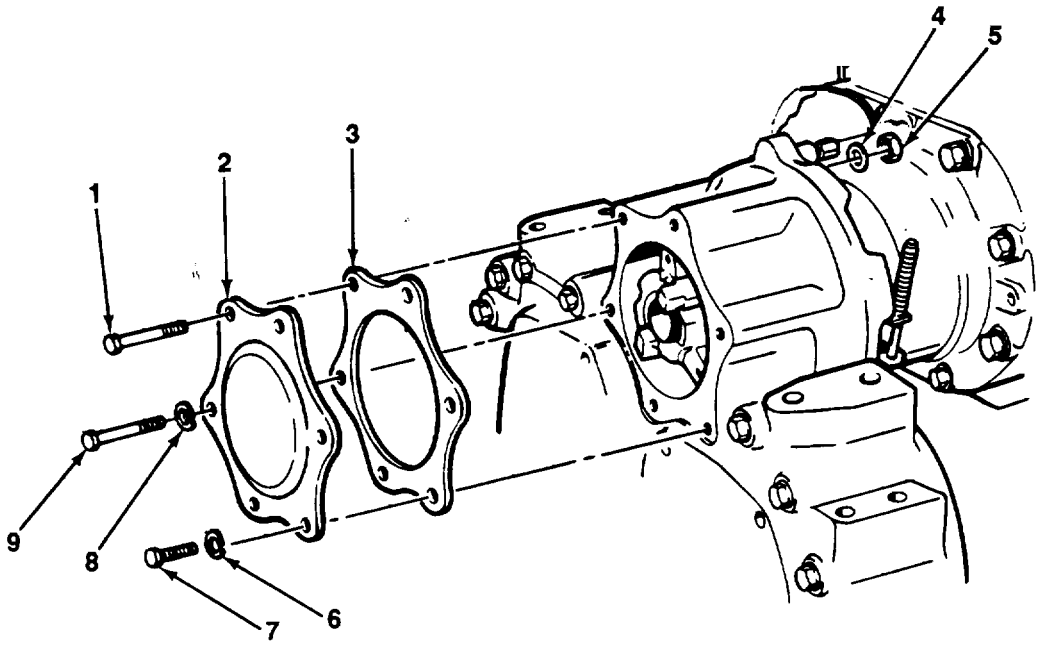


4. Push in on drive shaft (12) and install retaining ring (10) in drive adapter (11).

TA70576

5-61. BLOWER ACCESSORY DRIVE HUB REPLACEMENT (Con't).

5. Install new gasket (3) and cover (2) with screw (1), new copper washer (4), and nut (5).
6. Install three screws (9) and new lockwashers (8).
7. Install two screws (7) and new lockwashers (6).
8. Torque five screws (7 and 9) to 35-39 lb.-ft. (47-53 Nom).



FOLLOW-ON TASKS:

- Start engine (see paragraph 2-10) and check for oil leaks.

TA705077

5-62. BLOWER OIL PIPE AND FITTING REPLACEMENT.

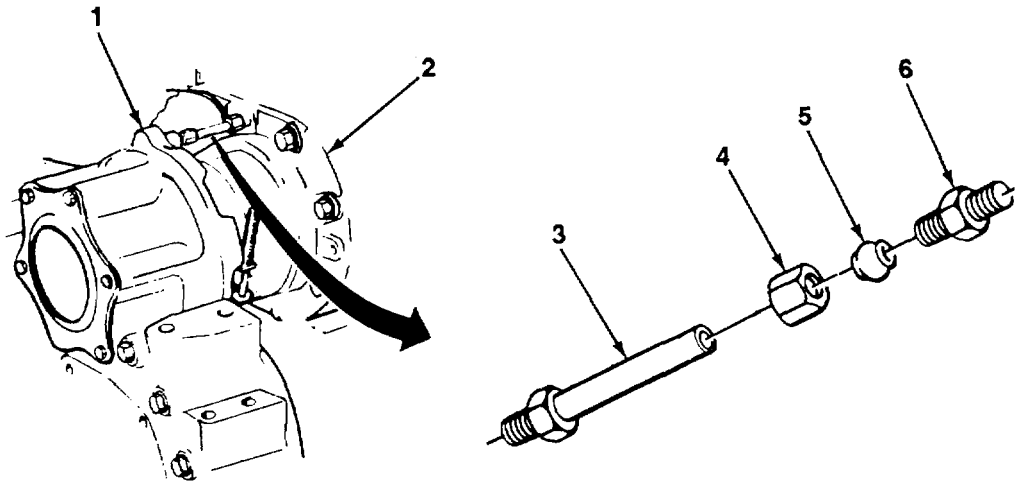
This Task Covers:
a. Removal b. Installation

Initial Setup:
Equipment Conditions:
· Master battery switch In OFF position.
· Engine cool.
Tools/Test Equipment:
* General mechanic's tool kit

Materials/Parts:
· One preformed packing

a. REMOVALI

1. Loosen nut (4) from adapter (6).
2. Disconnect oil pipe (3) from blower drive support (1).
3. Remove oil pipe (3), preformed packing (5), and adapter (6) from cover (2). Discard preformed packing.
4. Remove nut (4) from oil pipe (3).



b. INSTALLATION

1. Place nut (4) on oil pipe (3).
2. Install adapter (6) in cover (2).
3. Position new preformed packing (5) and oil pipe (3) on adapter (6).
4. Connect oil pipe (3) to blower drive support (1).
5. Tighten nut (4) on adapter (6).

FOLLOW-ON TASKS:

- Start engine (see paragraph 2-10) and check for oil leaks.

TA705078

5-63. BLOWER ASSEMBLY REPLACEMENT.

This Task Covers:
a. Removal b. Installation

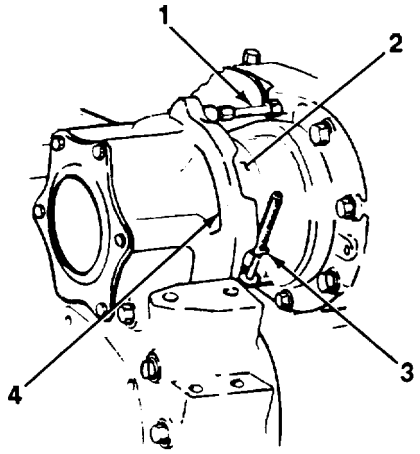
Initial Setup:
Equipment Conditions:
- Alternator bracket removed (see paragraph 4-51).
- Rocker arm covers removed (see paragraph 4-29).
- Governor cover removed (see paragraph 5-67).
- Metering fuel pump removed (see paragraph 5-60).
- Air inlet valve removed (see paragraph 5-14).
- Five lockwashers

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Grease (Item 22, Appendix E)
- Marker tags (Item 40, Appendix E)
- One copper washer
- Two cotter pins
- Two gaskets

a. REMOVAL

1. Disconnect blower oil pipe (1).
2. Loosen clamp (3) on drive support seal (2) and front end plate (4).

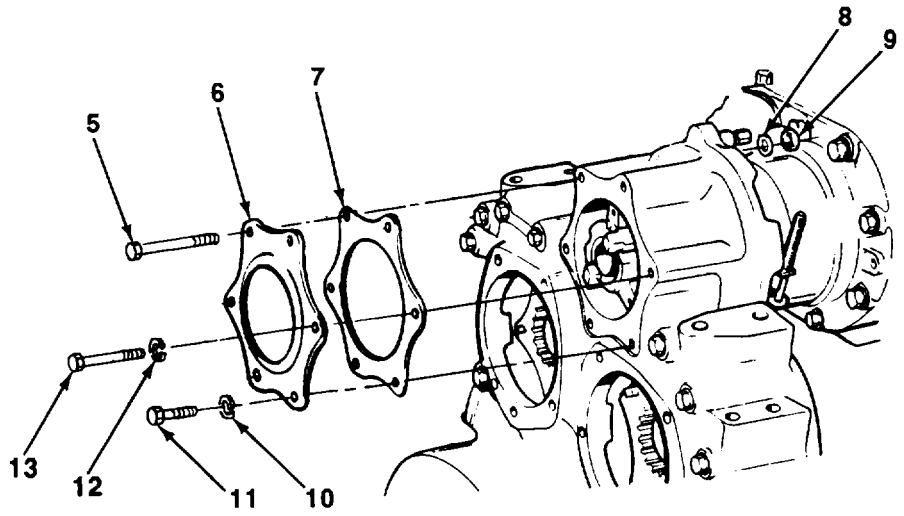


TA705079

5-63. BLOWER ASSEMBLY REPLACEMENT (Con't).

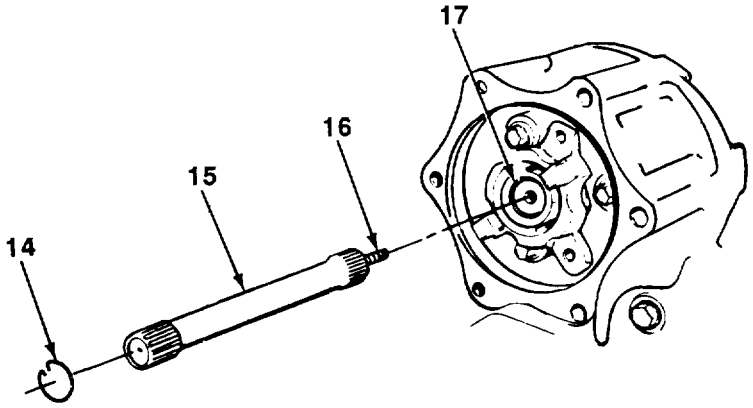
NOTE
Tag screws when removing to assist In Installation.

3. Remove nut (9), copper washer (8), and screw (5). Discard copper washer.
4. Remove three screws (13) and lockwashers (12). Discard lockwashers.
5. Remove two screws (11), lockwashers (10), cover (6), and gasket (7). Discard lockwashers and gasket.



NOTE
Spring may fall out when removing blower drive shaft.

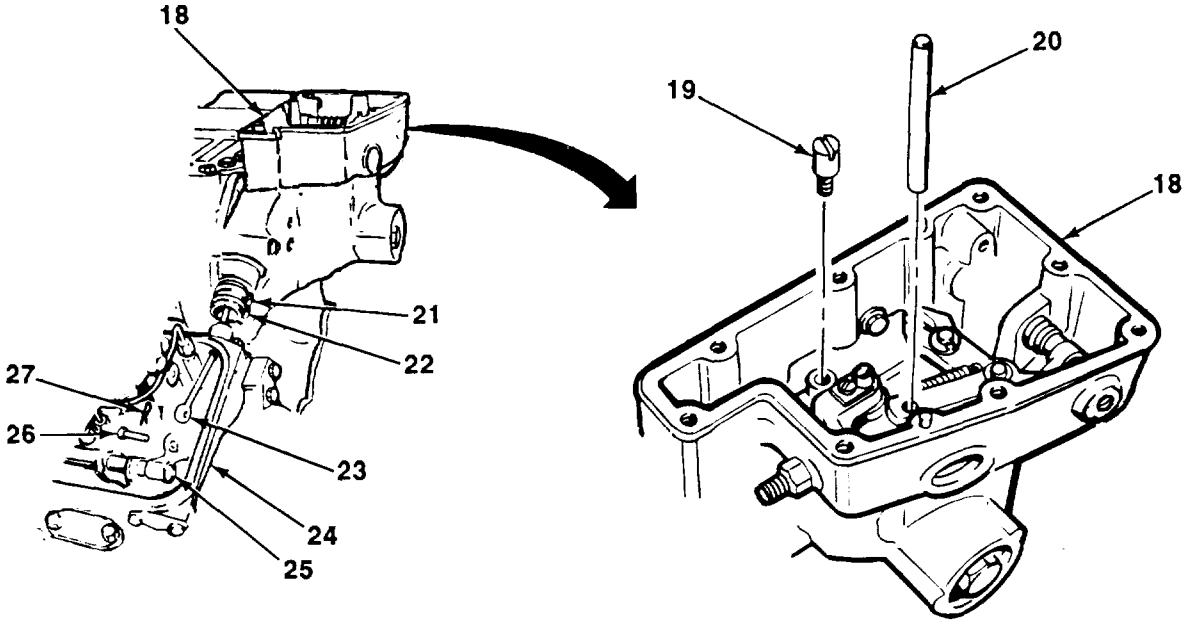
6. Remove retaining ring (14), drive shaft (15), and spring (16) from drive adapter (17).



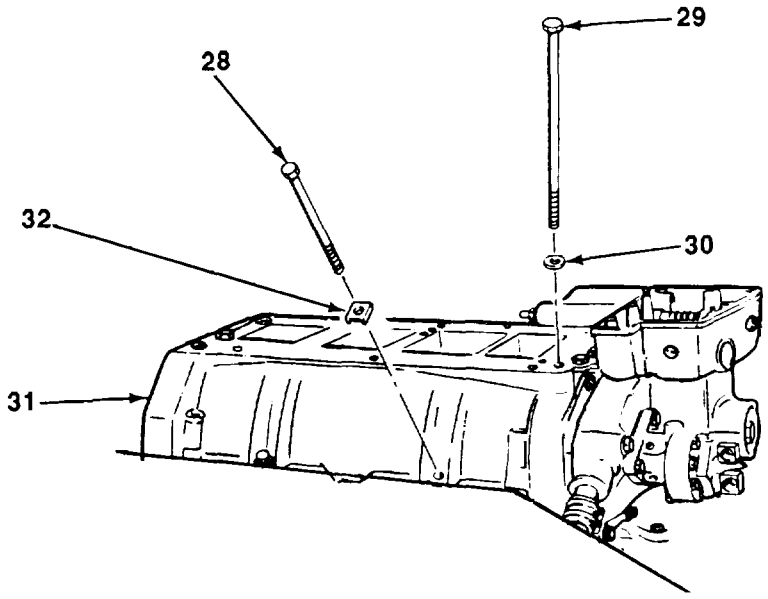
TA705081

5-63. BLOWER ASSEMBLY REPLACEMENT (Con't).

7. Remove cotter pin (27) and pin (26) from control tube devises (25) in both cylinder heads (24). Discard cotterpins.
8. Remove connecting pin (20) and fuel rod connecting pin (19) from governor (18).
9. Remove two fuel control rods (23) through cylinder heads (24).
10. Loosen two clamps (21) on each side of governor (18) and slide hoses (22) on qovernor.



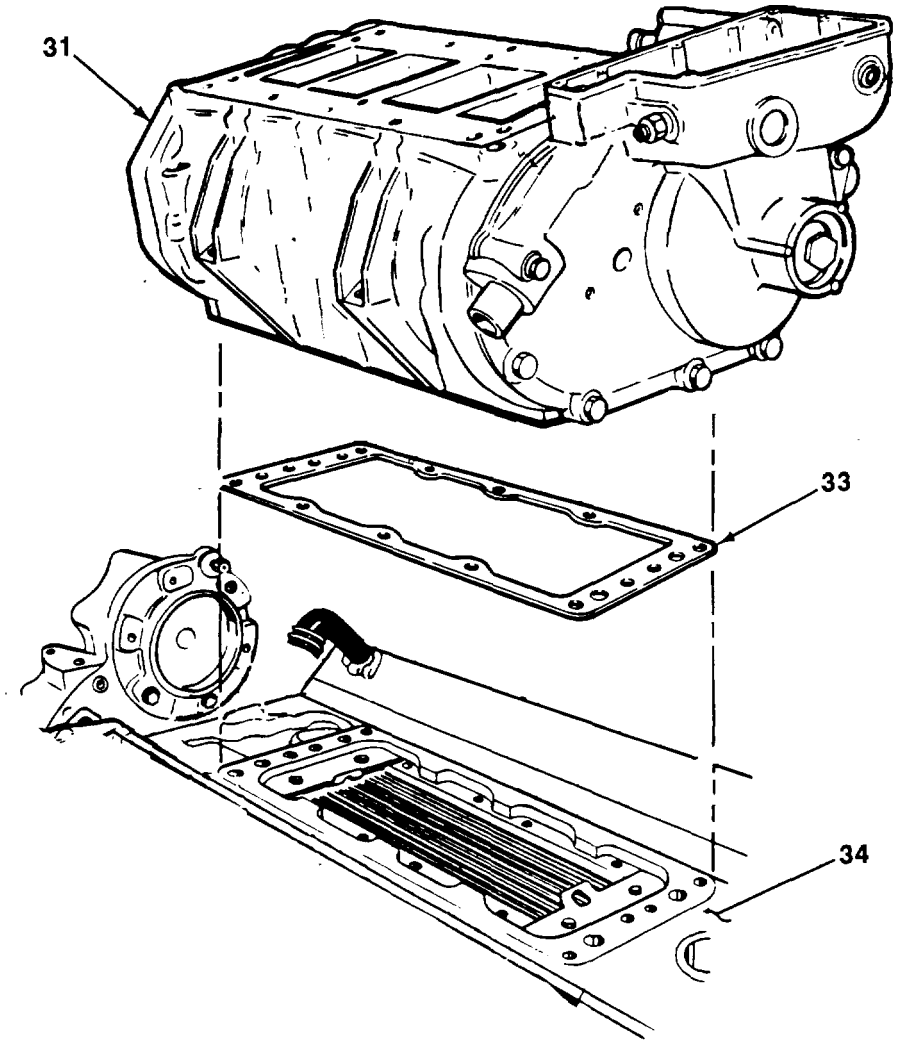
11. Remove two screws (29) and washers (30) from blower assembly (31).



TA705081

5-63. BLOWER ASSEMBLY REPLACEMENT (Con't).

12. Remove four screws (28) and retainers (32).
13. Remove blower assembly (31) and gasket (33) from engine block (34). Discard gasket.
14. Remove governor housing (see paragraph 5-69).

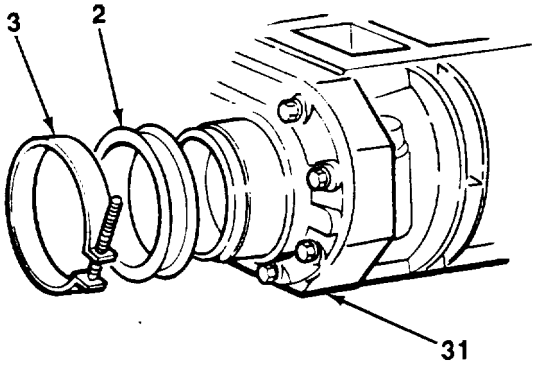


TA705082

5-63. BLOWER ASSEMBLY REPLACEMENT (Con't).

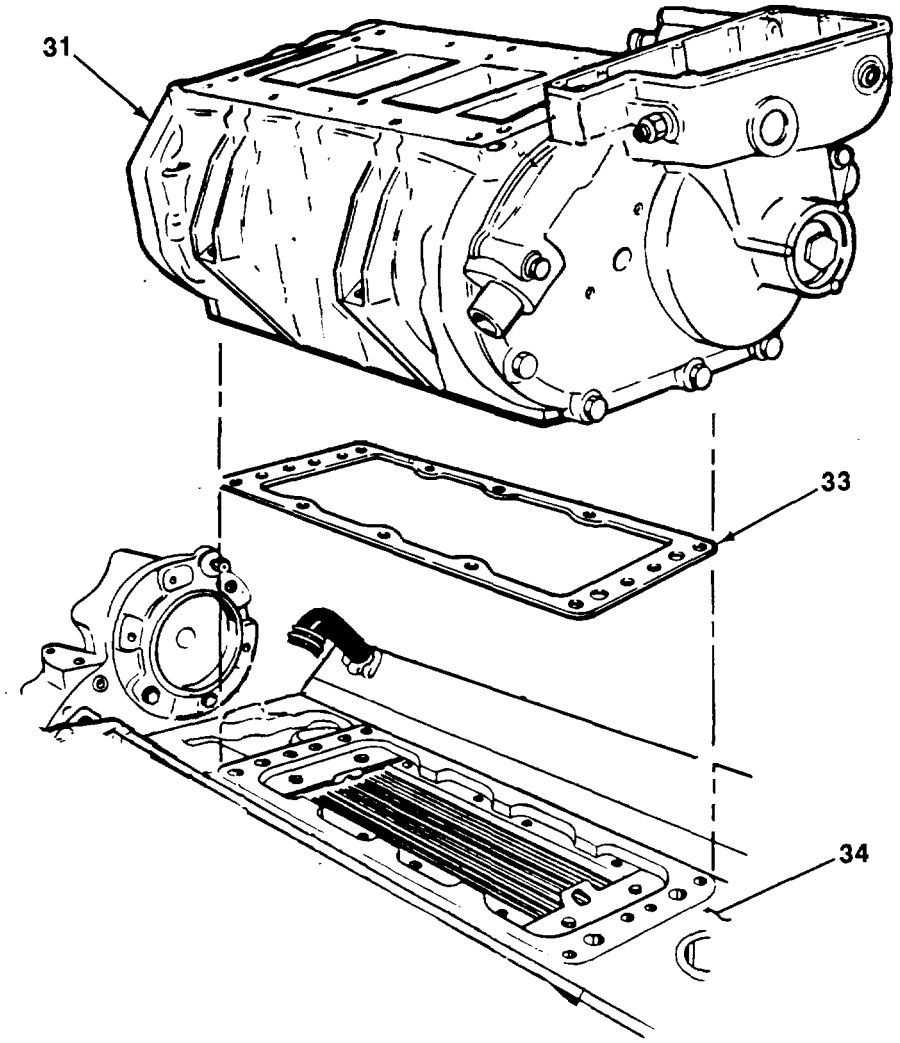
15. Remove clamp (3) and drive support seal (2) from

blower assembly (31).



b. INSTALLATION I

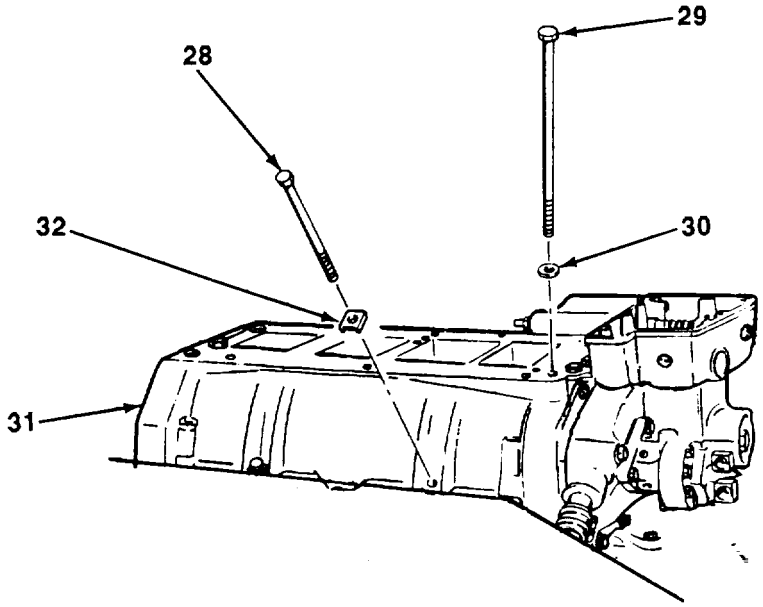
1. Place drive support seal (2) and clamp (3) on blower assembly (31). Do not tighten clamp.
2. Apply grease to bottom of new gasket (33) and Install on engine block (34).
3. Install governor housing (see paragraph 5-69).
4. Aline and install blower assembly (31) on engine block (34).



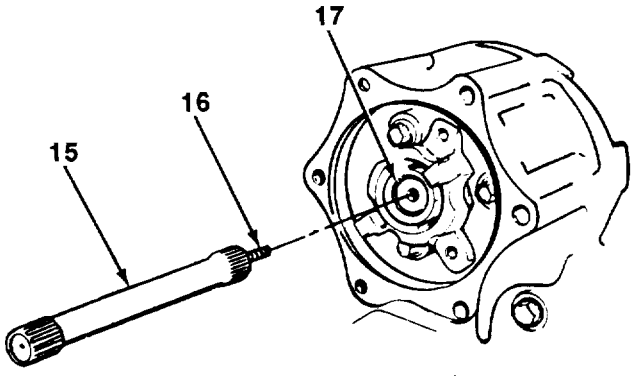
TA705083

5-63. BLOWER ASSEMBLY REPLACEMENT (Con't).

5. Install two washers (30) and screws (29) fingertight.
6. Install four retainers (32) and screws (28) fingertight.



7. Install spring (16) and drive shaft (15) In drive adapter (17).



TA705084

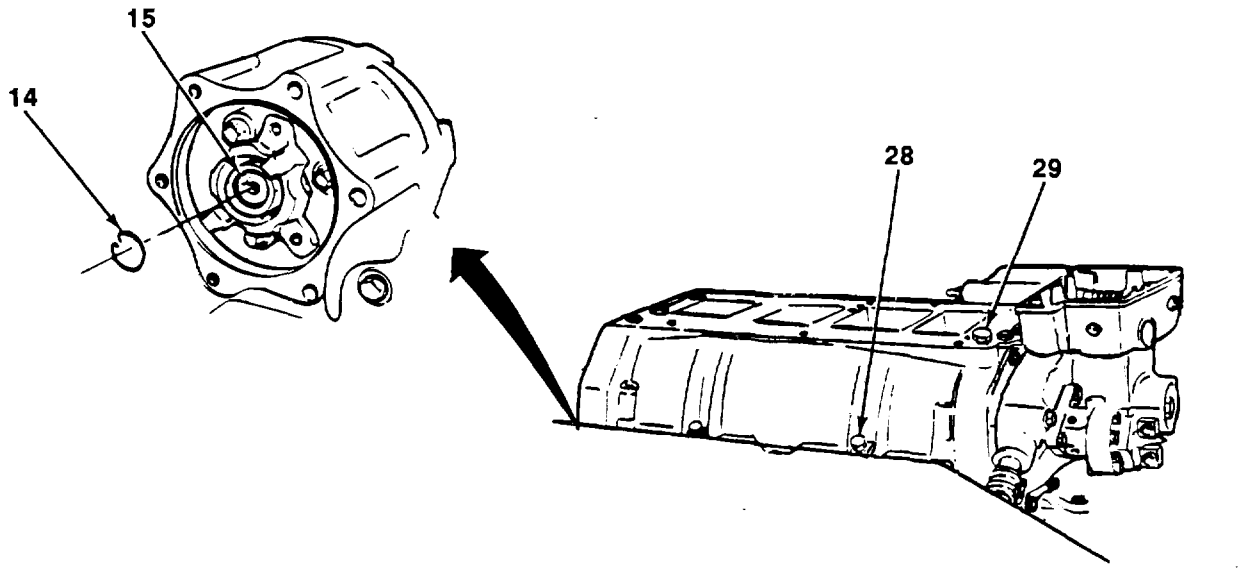
5-63. BLOWER ASSEMBLY REPLACEMENT (Con't).

8. Torque two screws (29) to 40-45 lb.-ft. (54-61 Nom).
9. Torque four screws (28) evenly to 30-35 lb.-ft. (41-47 Nom).
10. Repeat step 8.

NOTE

Drive shaft must move freely. Perform step 11 If it does not.

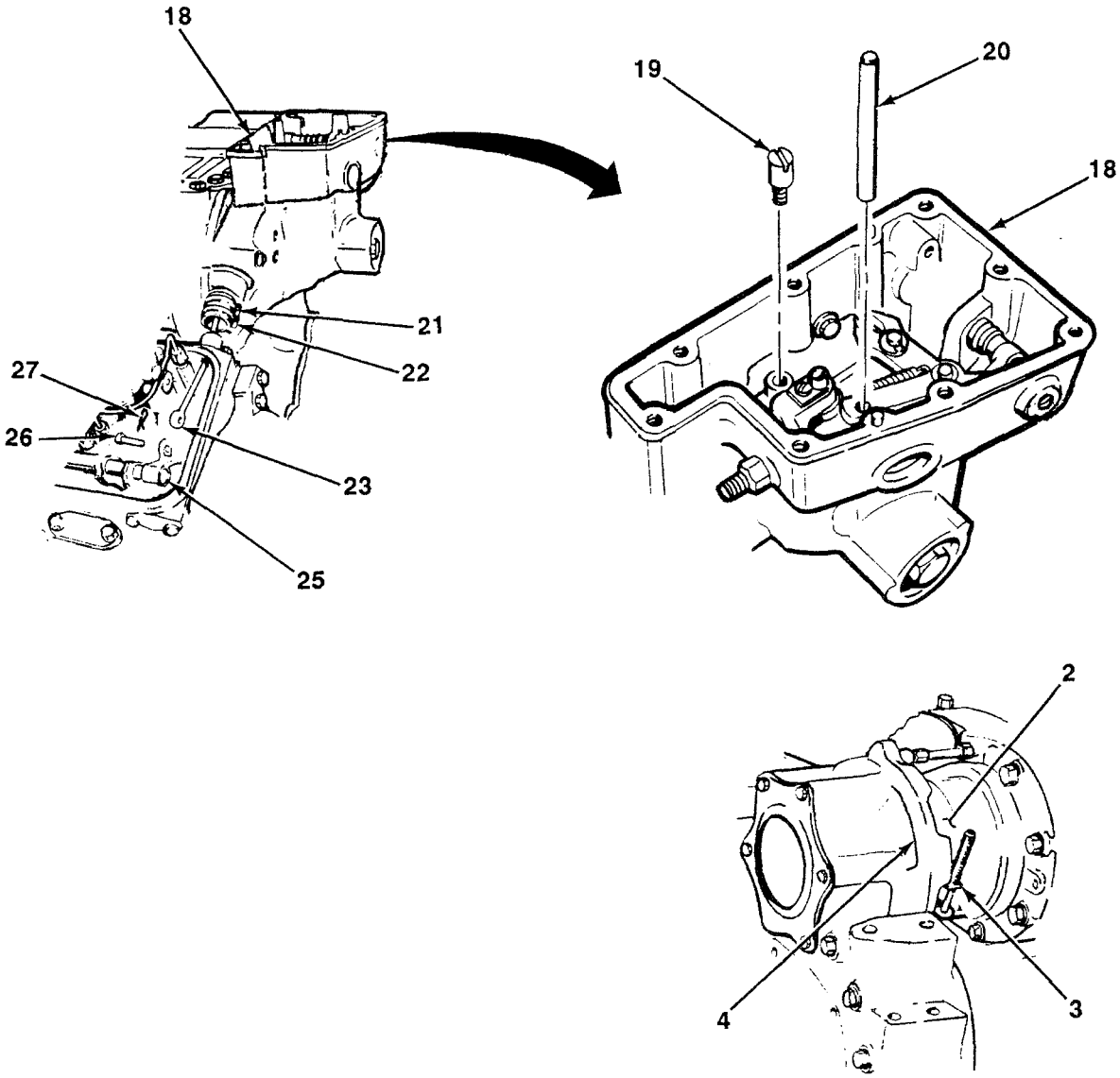
11. Check movement of drive shaft (15). If drive shaft does not move freely, loosen screws (28 and 29) and repeat steps 8 through 10.
12. Push In on drive shaft (15) and install retaining ring (14).



13. Install hoses (22), one on each side of governor (18), and tighten two clamps (21) over hoses.
14. Install two fuel control rods (23), one through each side of governor (18), and install fuel rod connecting pin (19) and connecting pin (20).
15. Install other end of fuel control rods (23) to control tube devises (25) with pins (26) and new cotter pins (27).

TA705085

5-63. BLOWER ASSEMBLY REPLACEMENT (Con't).

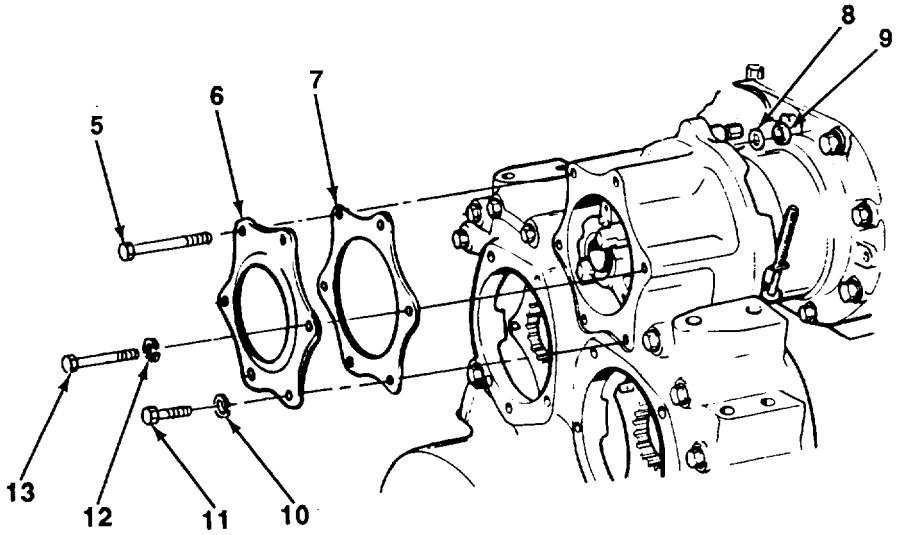


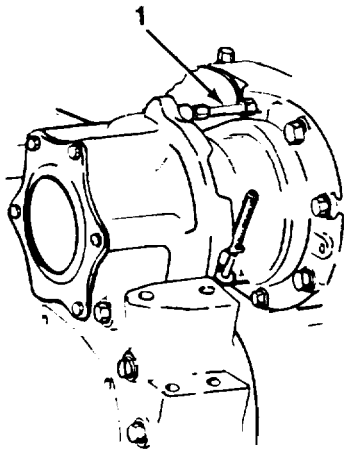
TA705086

16. Position drive support seal (2) over front end plate (4). Position clamp (3) in groove of drive support seal and tighten clamp.

5-63. BLOWER ASSEMBLY REPLACEMENT (Con't).

17. Install new gasket (7) and cover (6) with three new lockwashers (12) and screws (13).
18. Install two new lockwashers (10) and screws (11).
19. Install screw (5), new copper washer (8), and nut (9).





20. Connect and tighten blower oil pipe (1).

FOLLOW-ON TASKS:

- Install air inlet valve (see paragraph 514).
- Install governor cover (see paragraph 5-67).
- Install rocker arm covers (see paragraph 4-29).
- Install metering fuel pump (see paragraph 5-60).
- Install alternator bracket (see paragraph 4-51).

TA705087

5-64. BLOWER ASSEMBLY REPAIR.

This Task Covers:

a. Disassembly
b. Cleaning and Inspection
c. Assembly

Initial Setup:

Equipment Conditions:
- Blower assembly removed (see paragraph 5-63).
- Variable speed governor housing removed (see paragraph 5-69).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set
- Blower and governor tool set

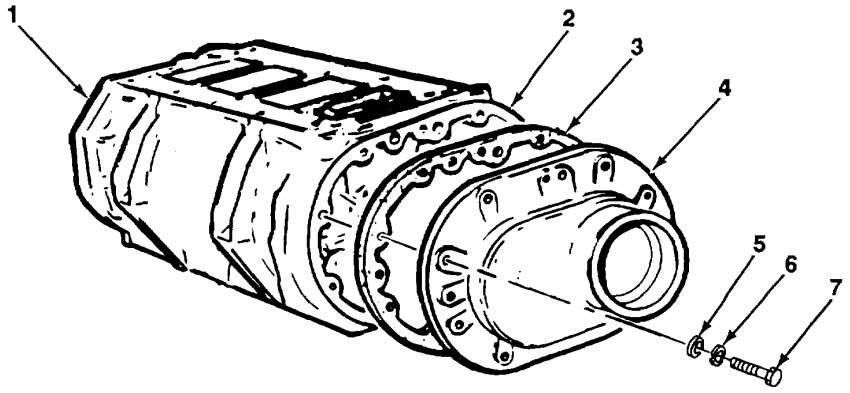
Personnel Required: Two

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

Materials/Parts:
- Abrasive cloth (Item 9, Appendix E)
- Grease (Item 22, Appendix E)
- Lubricating oil (Item 28, Appendix E)
- Lubricating oil (Item 31, Appendix E)
- Dry cleaning solvent (item 38, Appendix E)
- Marker tags (Item 40, Appendix E)
- One gasket
- Two A -20 UNC x 14 in. screws
- Two large plain washers
- Four 6s -18 UNC x 1% in. bolts
- Four seals
- Five 16 -24 UNC x 1 X in. screws
- Six / -20 UNC x 1X in. screws
- Eight washers
- Thirteen screws
- Twenty-nine lockwashers

a. REMOVAL

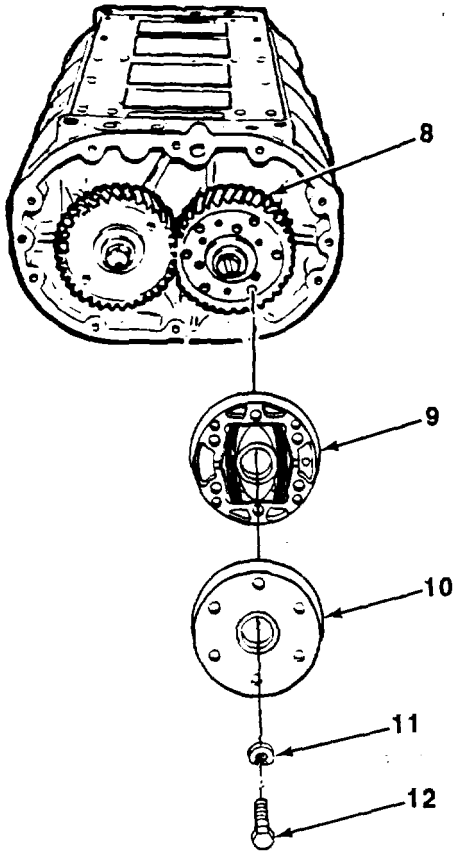
1. Remove ten screws (7), lockwashers (6), washers (5), cover (4), and gasket (3) from blower housing (1) rear endplate (2). Discard lockwashers and gasket.



TA705088

5-64. BLOWER ASSEMBLY REPAIR (Con't).

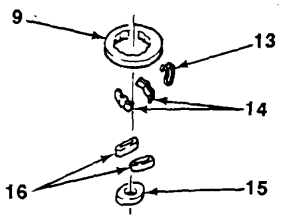
2. Remove six screws (12), lockwashers (11), retainer (10), and coupling support (9) from gear (8). Discard lockwashers.



NOTE

Handle spring pack carefully when removing. Spring pack will fall apart when removed.

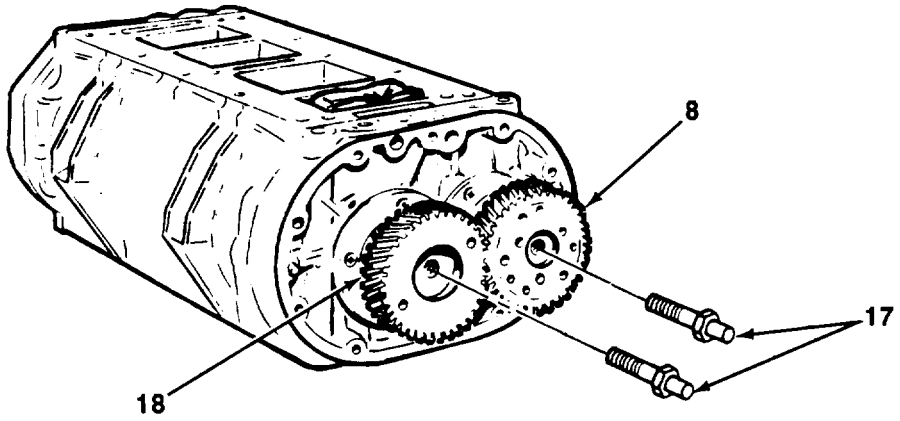
3. Remove cam (15), spring packs (16), four spring retainers (13), and two spring seats (14) from coupling support (9).



TA705089

5-64. BLOWER ASSEMBLY REPAIR (Con't).

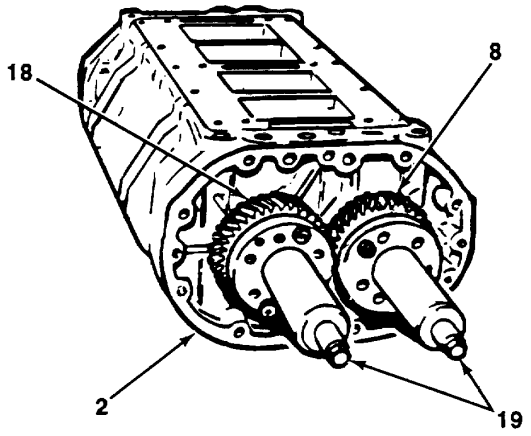
4. Remove two special screws (17) from gears (8 and 18).



5. Install puller tools on gears (8 and 18) using two Ye1 -24 UNC x 1I in. puller screws (19) on gear (8) and three on gear (18).

CAUTION
Tighten puller screws evenly to prevent damage to gears.

6. Tighten two puller screws (19) evenly and remove gears (8 and 18).
7. Remove puller screws (19) and puller tools from gears (8 and 18).
8. Mark rear end plate (2) to indicate top.

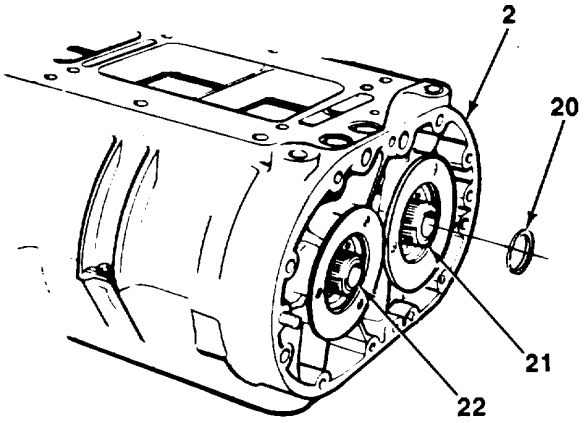


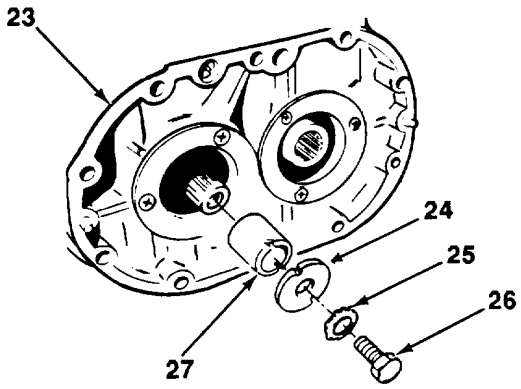
TA705090

5-64. BLOWER ASSEMBLY REPAIR (Con't).

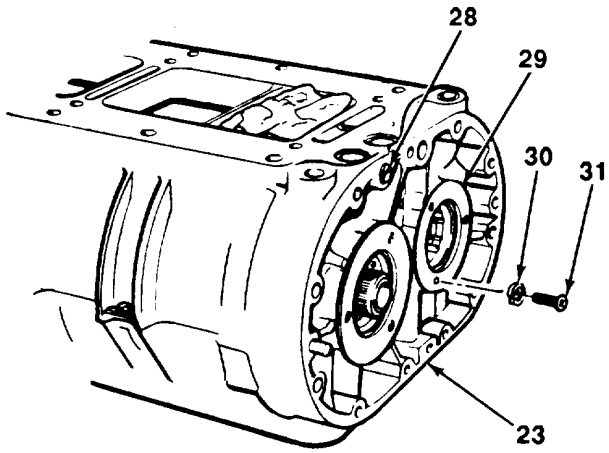
NOTE
Quantity of shims will differ on blowers.

9. Tag, mark, and remove shims (20) from rotor shafts (21 and 22).
10. Bend tangs of lockwasher (25) and remove screw (26), lockwasher, disk (24), and spacer (27) from front end plate (23). Discard lockwasher.





FRONT VIEW

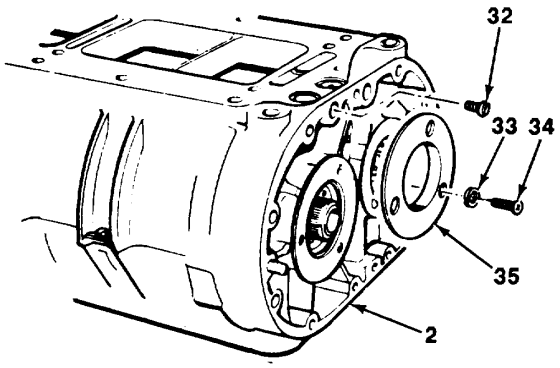


11. Remove six screws (31), lockwashers (30), and two bearing retainers (29) from front end plate (23). Discard lockwashers.
12. Loosen two screws (28) three turns.

TA705091

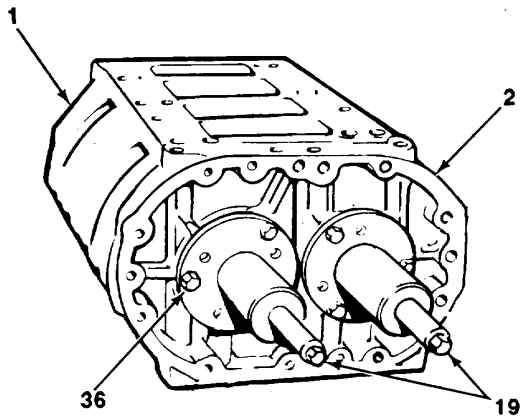
5-64. BLOWER ASSEMBLY REPAIR (Con't).

13. Remove six screws (34), lockwashers (33), and two bearing retainers (35) from rear end plate (2). Discard lockwashers.
14. Remove two screws (32) from rear end plate (2).



REAR VIEW

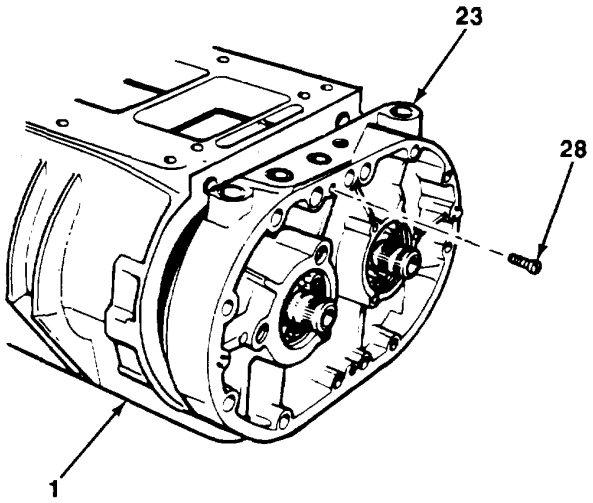
15. Aline puller tools on rear end plate (2) and install six y -20 UNC x 1 in. screws (36).
16. Tighten two puller screws (19) evenly and remove rear end plate (2) from blower housing (1).
17. Remove puller screws (19) and puller tools.



TA705092

5-64. BLOWER ASSEMBLY REPAIR (Con't).

18. Mark front end plate (23) and blower housing (1) to Indicate top.
19. Remove two screws (28) from front end plate (23).
20. Repeat steps 15 through 17for front end plate (23).



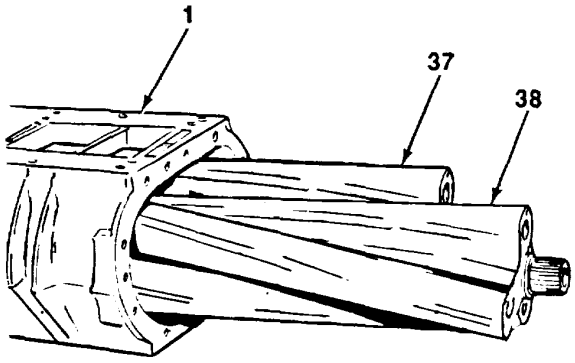
FRONT VIEW

CAUTION

Handle rotors with care to prevent scratching surfaces.

NOTE
Tag rotors to assist In Installation.

21. Remove right rotor (37) and left rotor (38) from blower housing (1).



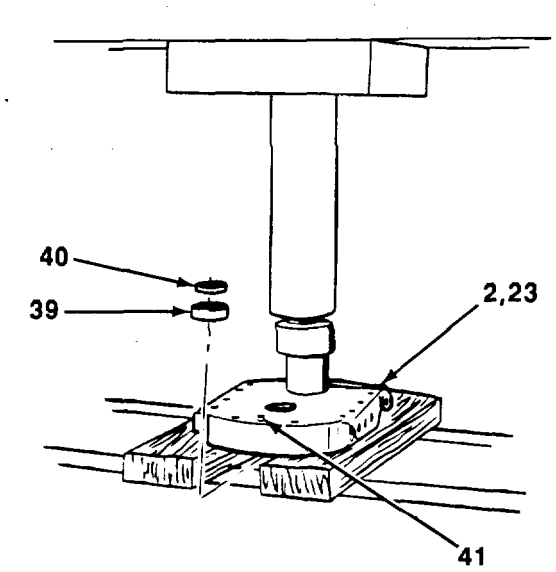
TA705093

TA705093

5-64. BLOWER ASSEMBLY REPAIR (Con't).

NOTE
Step 22 applies to front end plate and rear end plate.

22. Remove two seals (40) and ball bearings (39) from front end plate (23) and rear end plate (2) using remover tool and arbor press. Discard seals.
23. Check that dowel pins (41) project 0.380 in. (9.mm) from surface of front end plate (23).



b. CLEANING AND INSPECTION

WARNING

- Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 1000F-1380F (380C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

- Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

CAUTION

DO NOT use compressed air on ball bearings. Allow to air dry. Compressed air may cause damage to bearings.

1. Clean metal parts with dry cleaning solvent. Dry parts other than ball bearings with compressed air.
2. Inspect ball bearings for corrosion, scoring, pitting, and other damage.
3. Inspect both gears at teeth and at bore splines for chips and nicks.

TA705094

5-64. BLOWER ASSEMBLY REPAIR (Con't).

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 1000F-138°F (38°C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

4. Inspect oil holes. If clogged, clean with dry cleaning solvent.
5. Inspect all finished surfaces for burrs and scoring. Use abrasive cloth to clean.

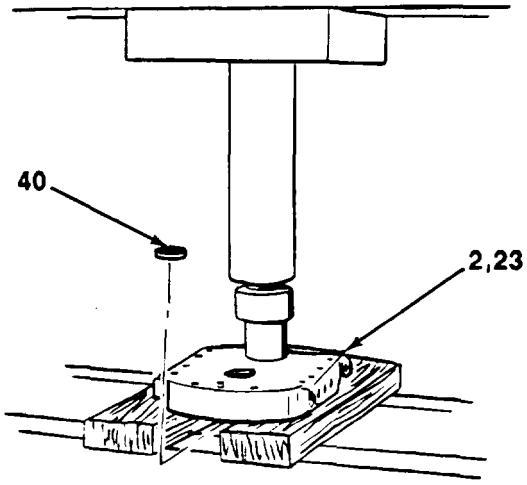
c. ASSEMBLY

1. Apply lubricating oil (Item 28, Appendix E) to outside of four new seals (40).

NOTE

Steps 2 and 3 apply to front end plate and rear end plate.

2. Press two seals (40) Into rear end plate (2) and front end plate (23) with beveled side up, until remover and installer tool contacts end plate.
3. Check that seals (40) seat 0.005 in. (0.127 mm) below finished face of rear end plate (2) and front end plate (23).



4. Support front end plate (23) 4 in. (10 cm) off work area.

CAUTION

Handle rotors with care to prevent scratching surfaces.

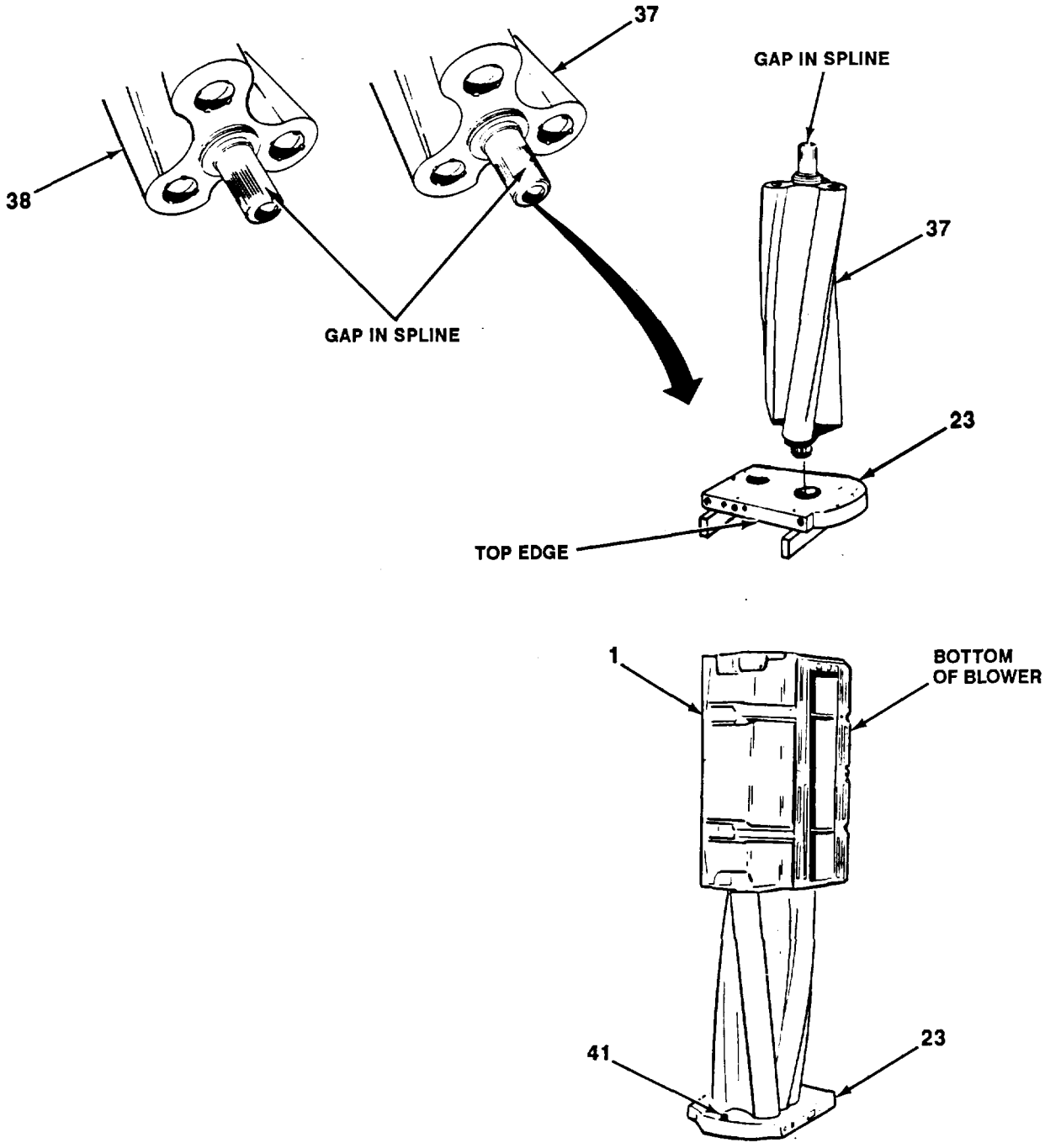
NOTE

Gap In splines on rotor shaft must face up and aline with each other.

5. Install right rotor (37) in right-hand side of front end plate (23).
6. Repeat step 5 for left rotor (38).

TA705095

5-64. BLOWER ASSEMBLY REPAIR (Con't).

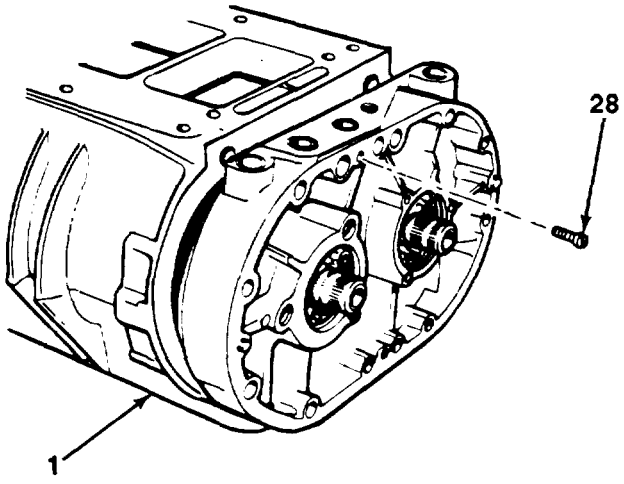


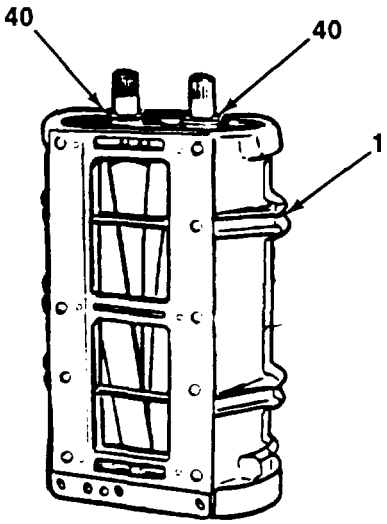
TA705096

7. Apply thin coat of grease to front end plate (23) side of blower housing (1).
8. Aline top of blower housing (1) with top edge of front end plate (23).
9. Aline with two dowel pins (41) and install front end plate (23) in blower housing (1).

5-64. BLOWER ASSEMBLY REPAIR (Con't).

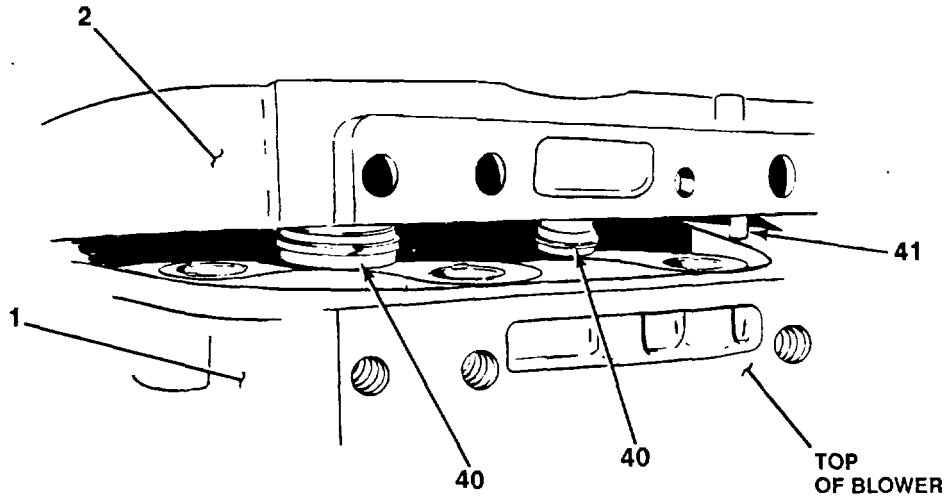
10. Install two screws (28) and torque to 10 lb.-ft. (14 Nom).
11. Apply lubricating oil (Item 28, Appendix E) to seals (40) and light coat of grease to rear end plate surface of blower housing (1).





FRONT VIEW

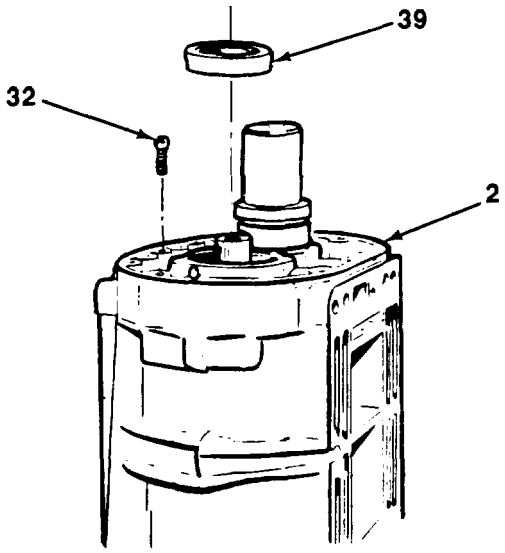
12. Check that dowel pins (41) In rear end plate (2) project 0.270 in. (6.858 mm).
13. Aline rear end plate (2) with gaps of seals (40) facing top of blower housing (1).
14. Aline rear end plate (2), seals (40), and dowel pins (41) with blower housing (1) and install rear end plate on blower housing.



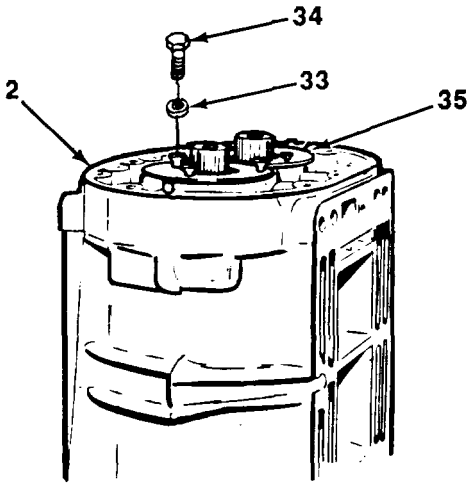
TA705097

5-64. BLOWER ASSEMBLY REPAIR (Con't).

15. Install two screws (32) and torque to 10 lb.-ft. (14 N.).
16. Apply lubricating oil (Item 31, Appendix E) to two ball bearings (39) and install numbered side up in rear end plate (2) using bearing installer tool.



17. Install two bearing retainers (35) on rear end plate (2) using six new lockwashers (33) and screws (34). Torque screws to 7-9 lb.-ft. (9-12 Nom).



TA705098

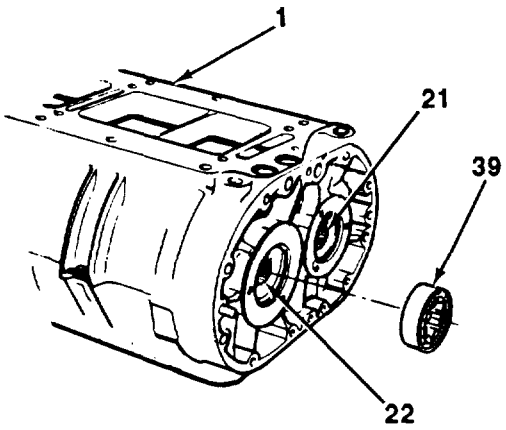
5-64. BLOWER ASSEMBLY REPAIR (Con't).

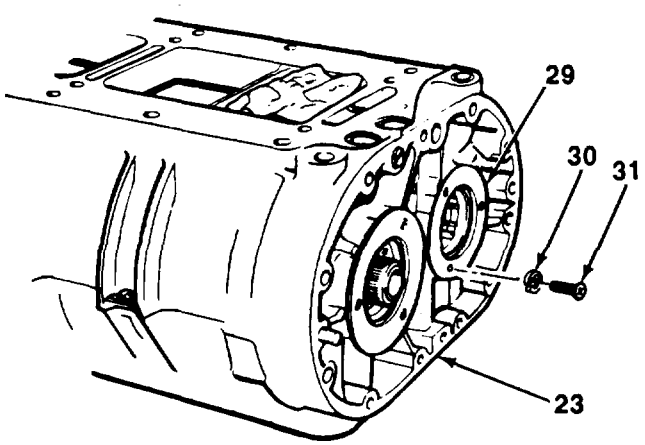
18. Turn blower housing (1) over, apply lubricating oil (Item 31, Appendix E) to two ball bearings (39) and install ball bearings on rotor shafts (21 and 22) using bearing installer tool.

NOTE

Flanges on bearing retainers face front end plate.

19. Install two bearings retainers (29) on front end plate (23) using six new lockwashers (30) and screws (31). Torque screws to 7-9 lb.-ft. (9-12 Nom).

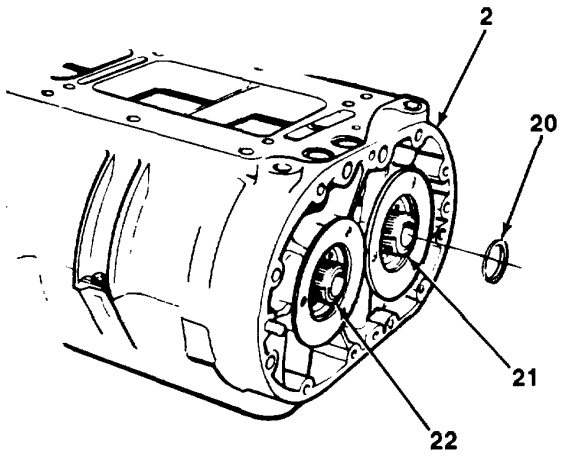




WARNING

DO NOT place fingers between rotors. If rotors turn they can cause serious injury.

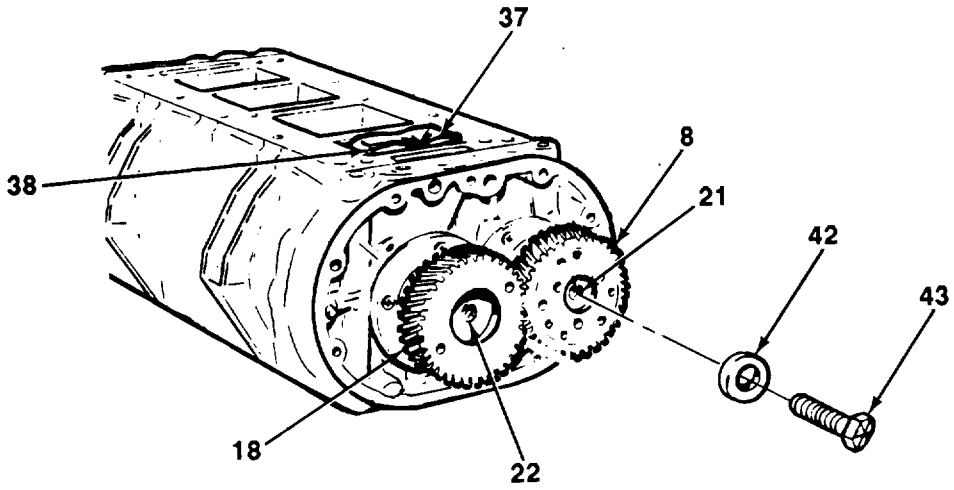
20. Turn rotor shafts (21 and 22) at rear end plate (2) to aline gap In splines with each other.
21. Install shims (20) on rotor shafts (21 and 22).
22. Apply lubricating oil (Item 31, Appendix E) to splines of rotor shafts (21 and 22).



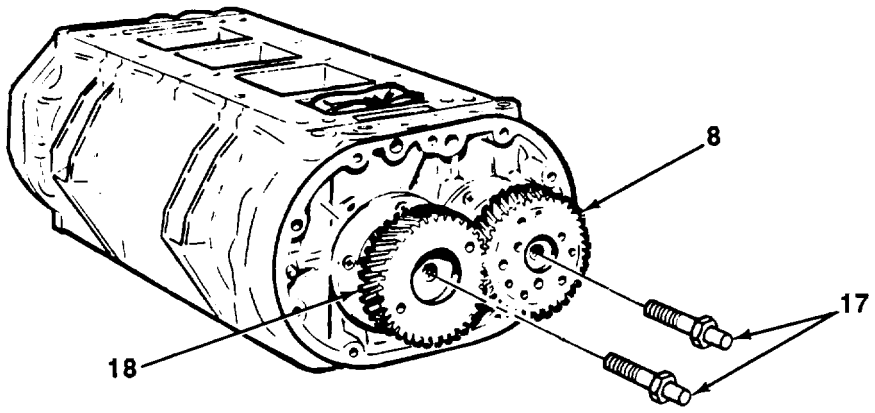
TA705099

5-64. BLOWER ASSEMBLY REPAIR (Con't).

23. Install gears (8 and 18) with omitted splines in gears alined with omitted splines in rotor shafts (21 and 22).
24. Install two j1 -20 UNC x 14 in. screws (43) and large plain washers (42) in rotor shafts (21 and 22). Torque screws to 17 lb.-ft. (23 Nom).
25. Place clean rag between lobes of rotors (37 and 38).
26. Tighten two screws (43) evenly until gears (8 and 18) are drawn tight.
27. Remove two screws (43) and large plain washers (42).



28. Lubricate threads of two special screws (17) with grease.
29. Install two special screws (17) and torque to 55-65 lb.-ft. (75-88 Nom).



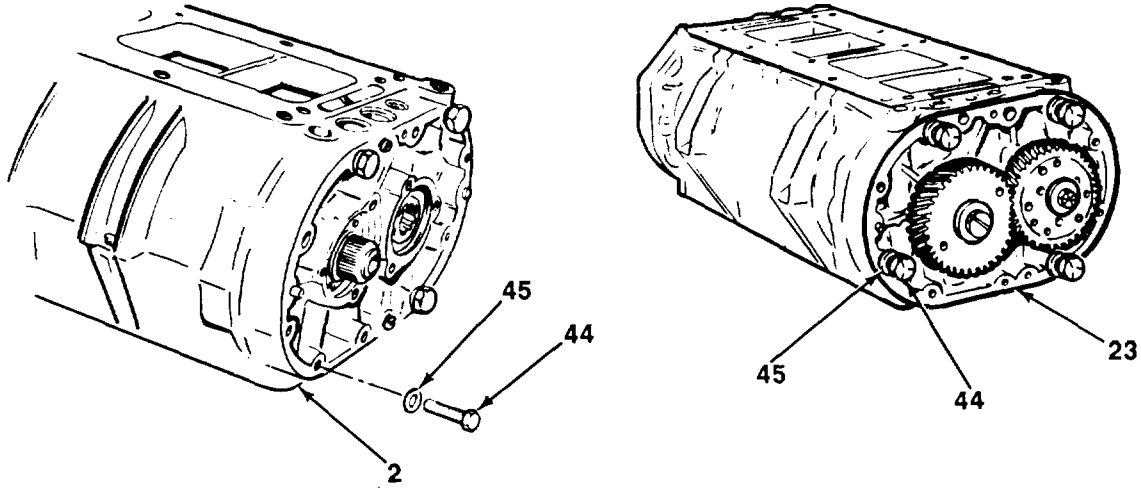
TA705100

5-64. BLOWER ASSEMBLY REPAIR (Con't).

NOTE

Steps 30 through 32 must be preformed before timing rotors.

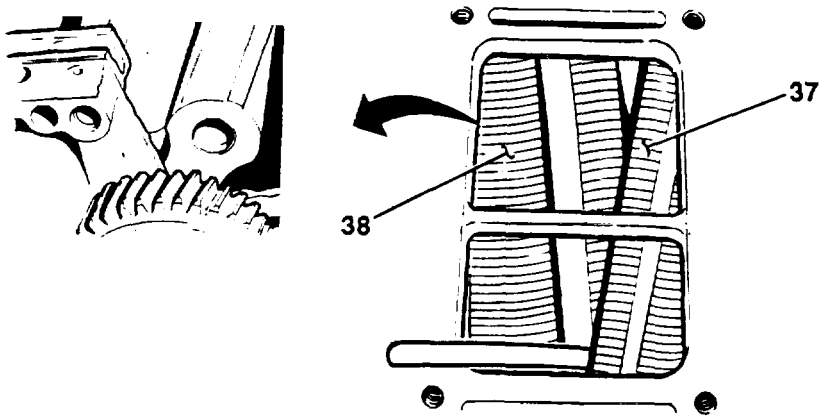
30. Install four 5/ 8UNC x 1'7/8 in. bolts (44) and washers (45) in front end plate (23) and rear end plate (2).
31. Torque eight bolts (44) to 15 lb.-ft. (20 Nom).
32. Remove rag.



NOTE

- Correct rotor operating range Is 0.002-0.006 In. (0.051-0.152 mm).
- Clearance of lobes of rotors must be measured 1 In. (2.54 cm) from end plate.

33. Place 0.002 in. (0.051 mm) feeler gage between lobes of rotors (37 and 38) and turn rotors while gage is in place. Rotors must move freely.
34. Remove feeler gage.

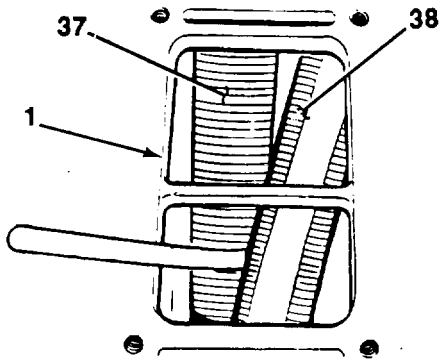


TOP VIEW

TA705101

5-64. BLOWER ASSEMBLY REPAIR (Con't)

35. Turn blower housing (1) upside down and place 0.002 in. (0.051 mm) feeler gage between lobes of rotors (37 and 38). Turn rotors while gage is in place. Rotors must move freely.
36. Remove feeler gage.

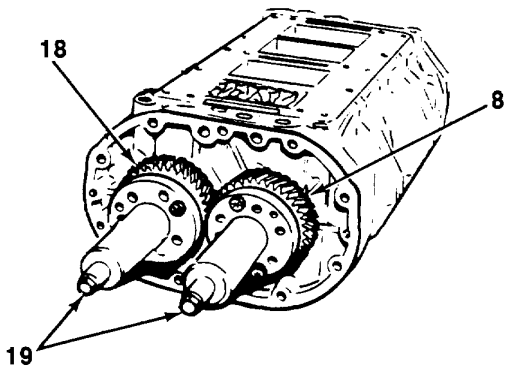


BOTTOME VIEW

NOTE

To Increase or decrease gap between trailing edge of right rotor lobe and leading edge of left rotor lobe, perform steps 37 through 41.

37. Install puller tool on gear (8) using two Y6 -24 UNC x 1I1 in. screws.
38. Install puller tool on gear (18) using three Y16 - 24 UNC x 1)1 in. screws.
39. Place clean rag between lobes of rotors.
40. Tighten two screws (19) evenly and remove gears (8 and 18).

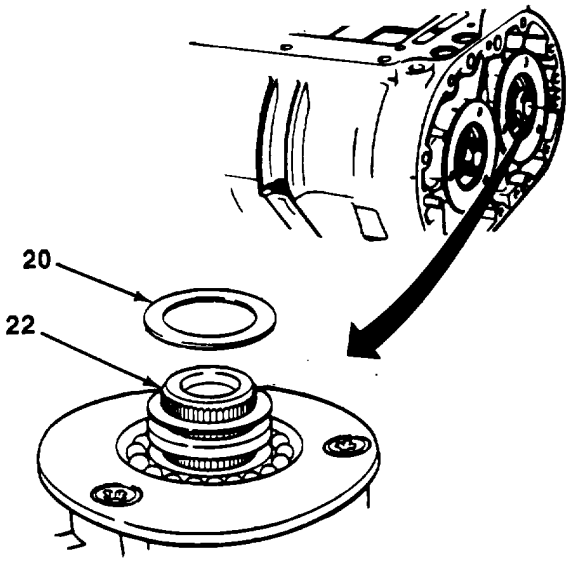


TA705102

5-64. BLOWER ASSEMBLY REPAIR (Con't).

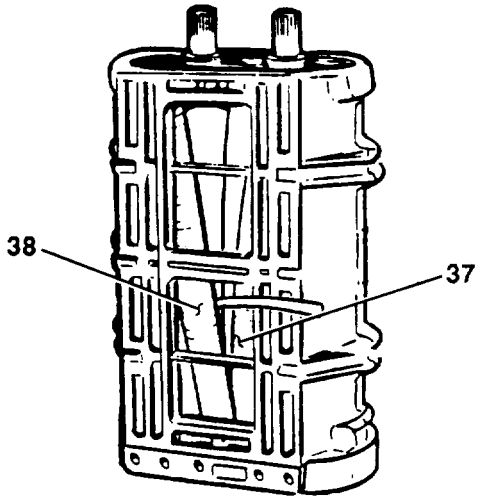
NOTE
To change gap between lobes of rotors by 0.001 in. (0.025 mm) 0.003 In. (0.076 mm) shim.

41. Add or remove shims (20) on rotor shaft (22) as necessary.
42. Repeat steps 22 through 29. Skip steps 30 and 31.
43. Repeat steps 32 through 36.



NOTE
Correct rotor operating range Is 0.007-0.012 In. (0.178-0.305 mm meet this range, perform step 50.

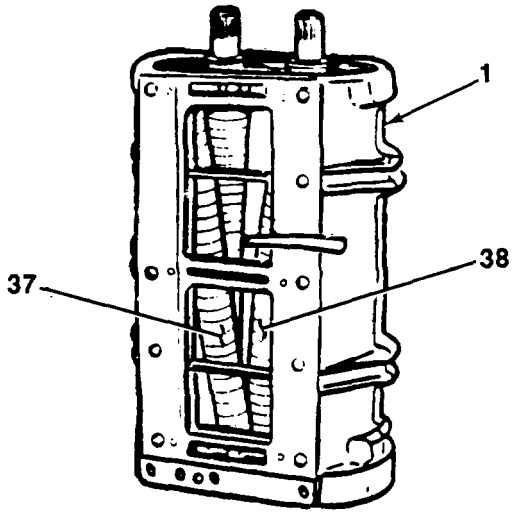
44. Place 0.007 in. (0.178 mm) feeler gage between lobes of rotors (37 and 38).
45. Turn lobes of rotors (37 and 38) while gage is in place. Rotors must move freely.
46. Remove feeler gage.



TA705103

5-64. BLOWER ASSEMBLY REPAIR (Cont.).

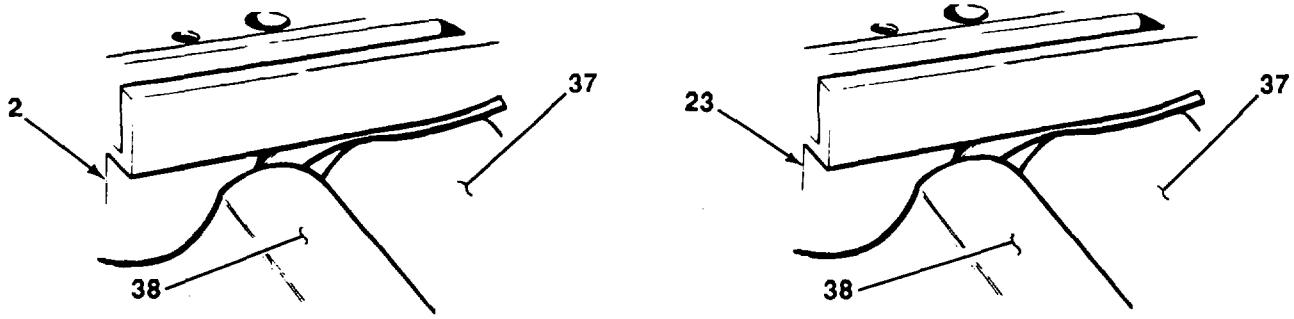
47. Turn blower housing (1) over and place 0.007 in. (0.178 mm) feeler gage between lobes of rotors (37 and 38).
48. Turn lobes of rotors (37 and 38) while gage is in place. Rotors must move freely.
49. Remove feeler gage.
50. To Increase or decrease gap between leading edge of lobe of right rotor (37) and trailing edge of left rotor (38), repeat steps 37 through 41. If clearance cannot be corrected with shims, replace rotors (subparagraph a, steps 4 through 21 and subparagraph c, steps 4 through 49).



NOTE

There are 12 measurements. Six between rear end plate and lobes of rotors and six between front end plate and lobes of rotors.

51. Using a 0.007 in. (0.178 mm) feeler gage, check clearance between rear end plate (2) and lobes of both rotors (37 and 38). If clearance is not correct, replace rear end plate.
52. Using a 0.012 in. (0.305 mm) feeler gage, check clearance between front end plate (23) and lobes of both rotors (37 and 38). If clearance is not correct, replace front end plate.



TA705104

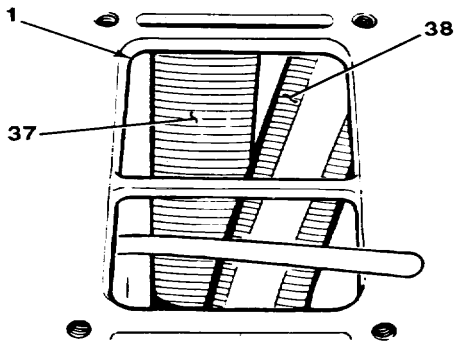
5-64. BLOWER ASSEMBLY REPAIR (Cont.).

NOTE

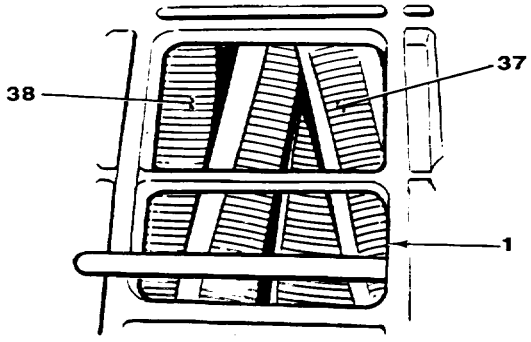
There are 12 measurements. Six between lobes of rotors on each end of rotor housing.

53. Using a 0.016 in. (0.406 mm) feeler gage, check clearance between lobes of rotors (37 and 38) and blower housing (1) while turning rotors. If clearance Is not correct, replace blower housing.

54. Using a 0.004 in. (0.102 mm) feeler gage, check clearance between lobes of rotors (37 and 38) and blower housing (1) while turning rotors. If clearance Is not correct, replace blower housing:

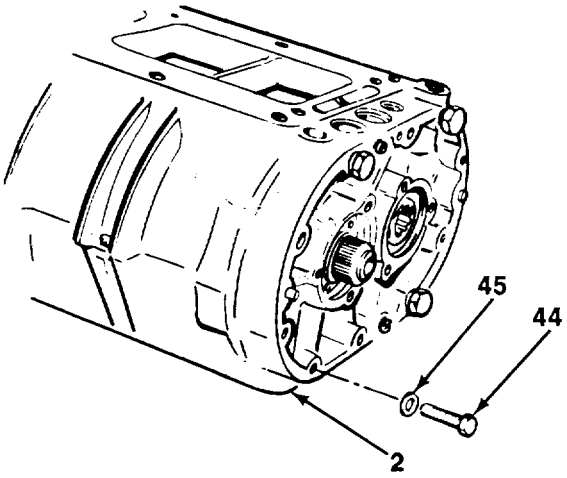


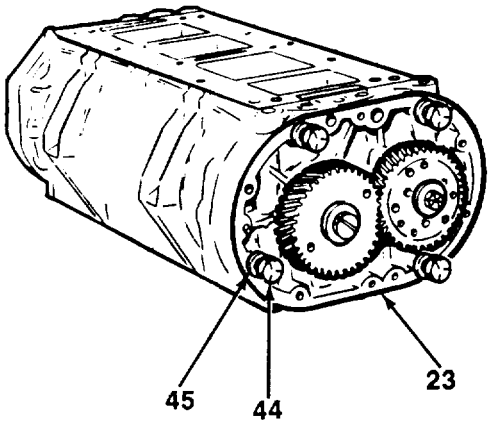
TOP VIEW



BOTTOM VIEW

55. Remove four bolts (44) and washers (45) from front end plate (23) and rear end plate (2).



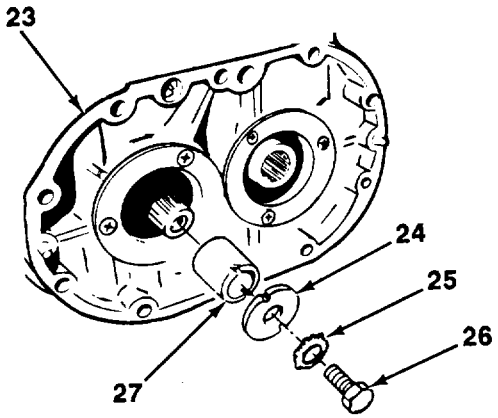


TA705105

5-64. BLOWER ASSEMBLY REPAIR (Cont.).

56. Install spacer (27), disk (24), new lockwasher (25), and screw (26) in front end plate (23). Torque screw to 65 lb.-ft. (88 Nom).

57. Bend two or more tangs of lockwasher (25) contacting flat side of screw (26).



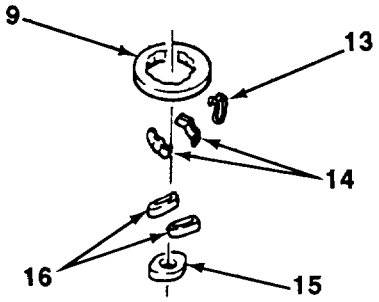
58. Apply a light coat of grease to back of two spring seats (14).

59. Place four spring retainers (13) in grooves of coupling support (9).

60. Install two spring seats (14) Inside coupling support (9).

61. Coat spring packs (16) lightly with lubricating oil (Item 31, Appendix E) and install in coupling support (9).

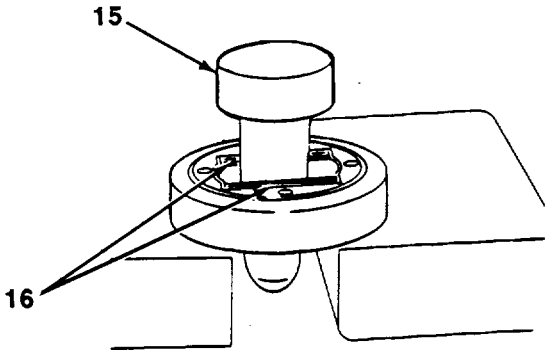
FRONT VIEW



62. Place cam (15) over end of installer tool with large chamfered end of cam facing up.

63. Insert installer tool between spring packs (16) until cam (15) is centered between spring packs.

64. Remove installer tool.



TA705106

5-64. BLOWER ASSEMBLY REPAIR (Cont.).

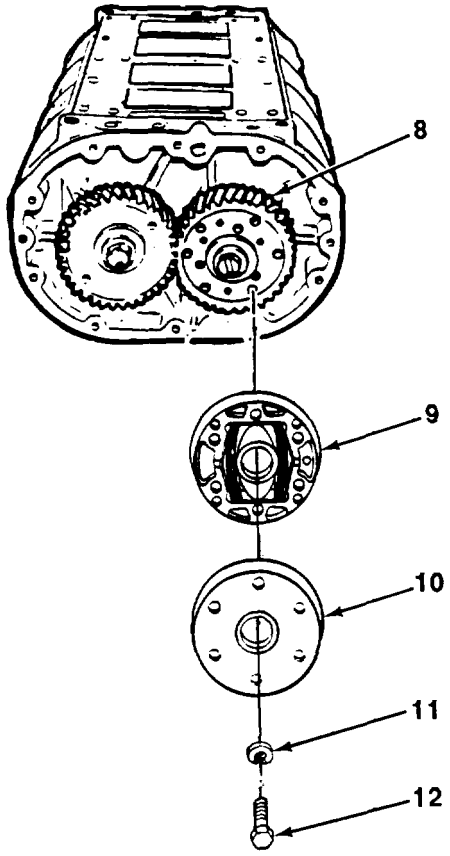
65. Install retainer (10), flat side down, over coupling support (9).

66. Aline holes In retainer (10) with coupling support (9) and gear (8) and install six screws (12) and new lockwashers (11).

CAUTION

Coupling support must be centered on gear to prevent misalignment of shaft causing damage to blower.

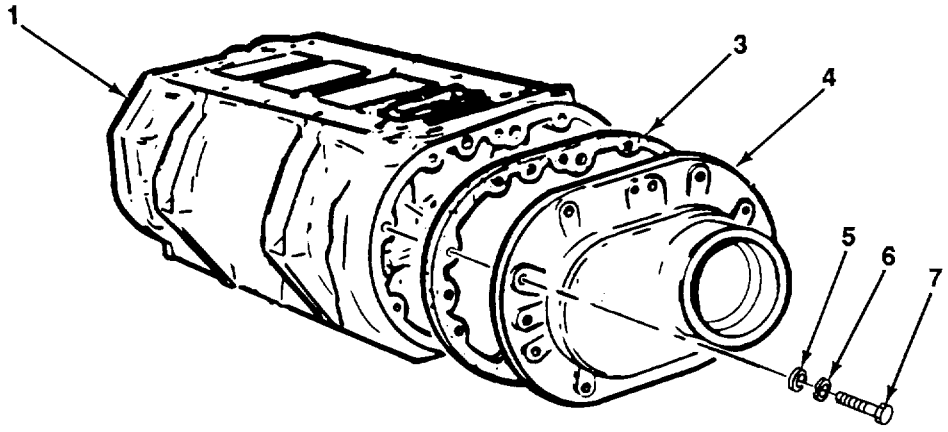
67. Ensure that coupling support (9) is centered on gear (8) and torque six screws (12) to 25 lb.-ft. (34 N•m).



TA705107

5-64. BLOWER ASSEMBLY REPAIR (Cont.).

68. Install cover (4) and new gasket (3) on blower housing (1) with ten washers (5), new lockwashers (6), and screws (7).
69. Torque screws (7) to 15 lb.-ft. (20 N•m).



FOLLOW-ON TASKS:

- Install variable speed governor housing (see paragraph 5-69).
- Install blower assembly (see paragraph 5-63).

TA705108

5-65. BLOWER DRIVE SUPPORT MAINTENANCE

This Task Covers:

a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation

Initial Setup:

Equipment Conditions:

- Blower assembly removed (see paragraph 5-63).
- Blower oil pipe and fitting removed (see paragraph 5-62).

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:

- Grease (Item 22, Appendix E)
- Lubricating oil (Item 28, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- Marker tags (Item 40, Appendix E)
- One gasket
- Two copper washers
- Seven lockwashers

General Safety Instructions:

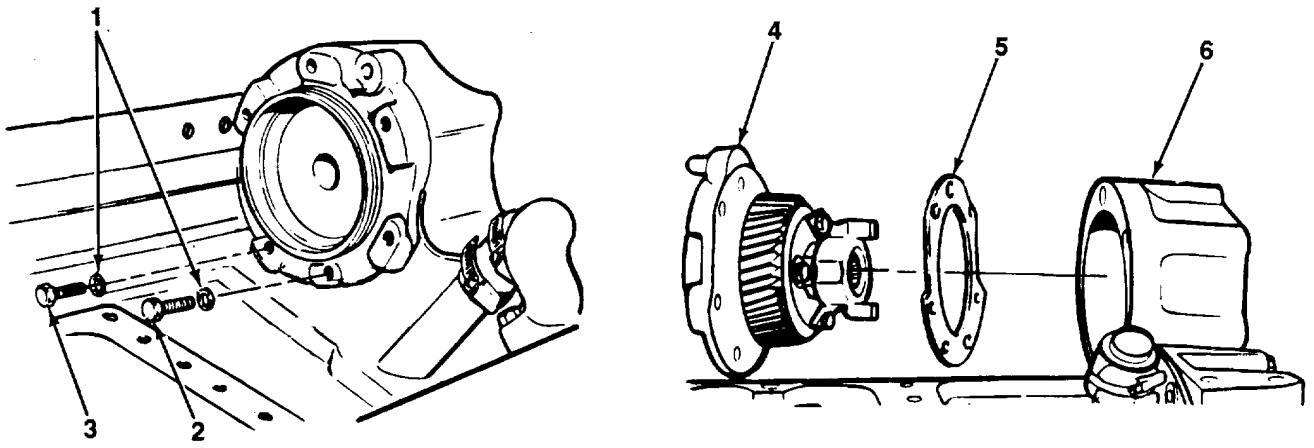
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

a. REMOVAL

NOTE

Screws are different In size. Tag when removing.

1. Remove two screws (2 and 3) and copper washers (1). Discard copper washers.
2. Remove drive support assembly (4) and gasket (5) from rear housing (6). Discard gasket.

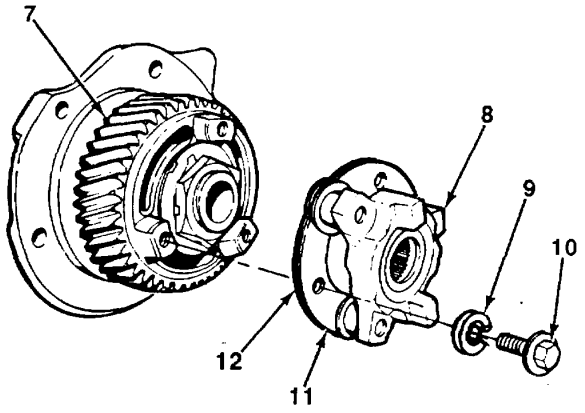


TA705109

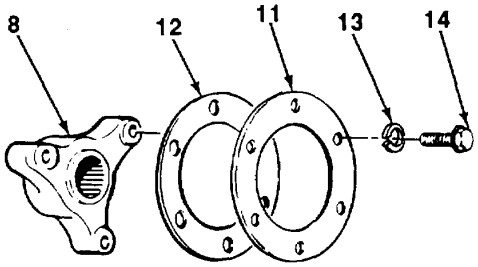
5-65. BLOWER DRIVE SUPPORT MAINTENANCE (Cont.)

b. DISASSEMBLY

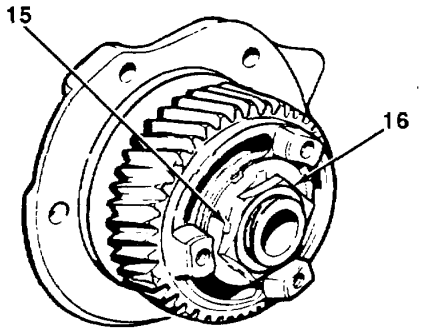
1. Remove three screws (10) and lockwashers (9). Discard lockwashers.
2. Remove plates (11 and 12) and hub (8) as an assembly from drive gear (7).



3. Remove three screws (14), lockwashers (13), and plates (11 and 12) from hub (8). Discard lockwashers.



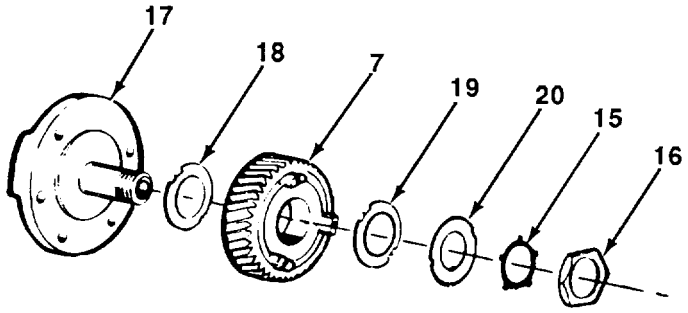
4. Bend tangs of lockwasher (15) away from nut (16).



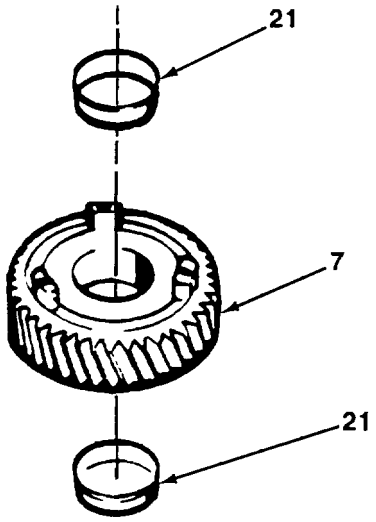
TA705110

5-65. BLOWER DRIVE SUPPORT MAINTENANCE (Cont.)

5. Remove nut (16), lockwasher (15), thrust washer (20), thrust bearing (19), drive gear (7), and thrust bearing (18) from drive support (17). Discard lockwasher.



6. Remove two bushings (21) from drive gear (7) If replacement Is required.



c. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean all metal parts with dry cleaning solvent.

TA705111

5-65. BLOWER DRIVE SUPPORT MAINTENANCE (Cont.)

WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

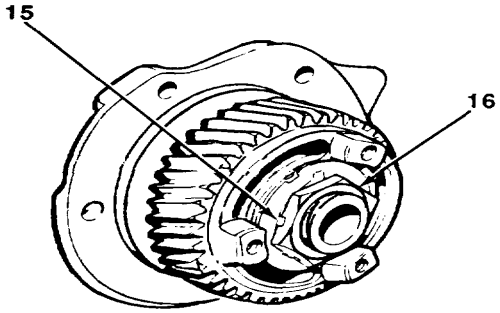
2. Dry parts, except thrust bearings, with compressed air. Let thrust bearings air dry.
3. Ensure that oil passages are clear.
4. Inspect threads for damage. Replace parts if damaged.
5. Check that thrust washer thickness is between 0.2300-0.2500 in. (5.8420-6.3500 mm). Inspect thrust washer for scoring.
6. Check that thickness of two thrust bearings Is between 0.0590-0.0610 in. (1.4986-1.5494 mm). Inspect thrust bearings for scoring.
7. Check that inside diameter of support bushing is between 1.6260-1.6265 in. (41.3004-41.3131 mm). Record diameter.
8. Check diameter of hub at base. It must be between 1.6240-1.6250 in. (41.2496-41.2750 mm). Record diameter.
9. Subtract diameter recorded in step 7 from diameter recorded in step 8. Ensure that maximum clearance between drive hub and support bushing is 0. in. (0.127 mm).
10. If support bushing is worn beyond limits in step 7, replace bushing.
11. Inspect drive gear teeth for scoring, pitting, and burning (blue or dark spots). Replace if teeth are defective.
12. Inspect drive hub for cracks, breaks, stripped threads or worn-out splines in bore. Replace if damaged.
13. Inspect both plates for cracks, distortion, and other damage. Replace if defective.

d. ASSEMBLY

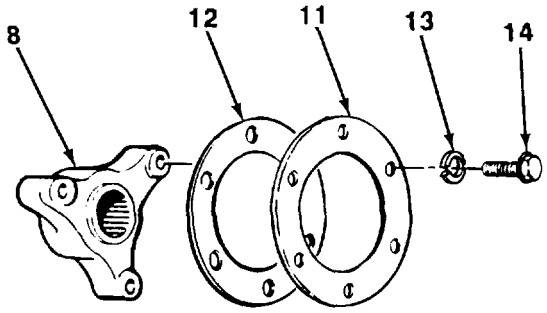
1. If removed, install two bushings (21) flush into drive gear (7) and apply a light coat of oil to bushings.
2. Apply a light coat of lubricating oil to drive support (17), thrust bearings (18 and 19), and thrust washer (20).
3. Install thrust bearing (18) onto drive support (17).
4. Install drive gear (7), flat side toward drive support (17).
5. Install thrust bearing (19) and thrust washer (20).
6. Install new lockwasher (15).
7. Install nut (16), with flat side down facing lockwasher, and torque nut to 50-60 lb.-ft. (68-81 N•m).
8. Measure clearance between thrust washer (20) and thrust bearing (19). Clearance must not be less than 0.005 in. (0.27 mm) or more than 0.012 in. (0.305 mm).

5-65. BLOWER DRIVE SUPPORT MAINTENANCE (Cont.)

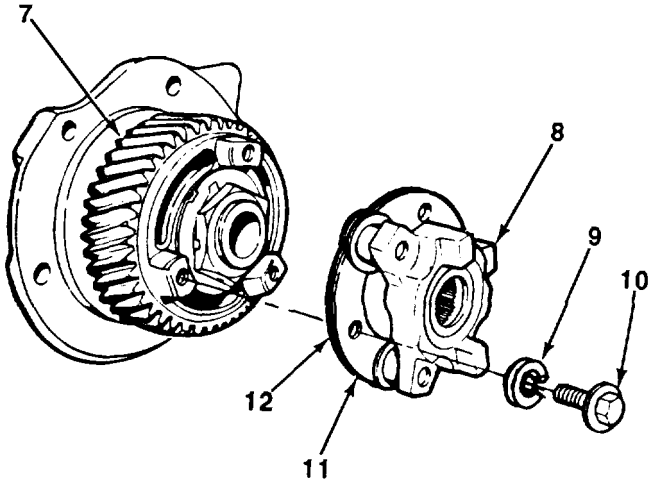
9. Bend tangs of lockwasher (15) up against flat side of nut (16).



10. Install plates (11 and 12) on hub (8) with three new lockwashers (13) and screws (14). Torque screws to 35-39 lb.-ft. (48-53 Nom).



11. Install hub (8) and plates (11 and 12) as an assembly on drive gear (7) using three new lockwashers (9) and screws (10). Torque screws to 35-39 lb.-ft. (48-53 N.•m).

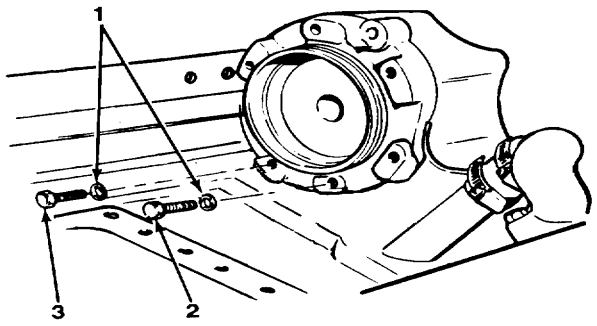


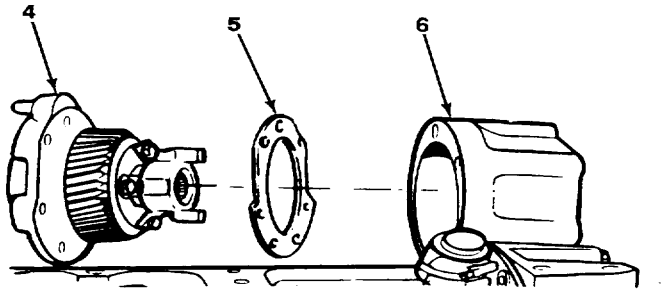
TA705112

5-65. BLOWER DRIVE SUPPORT MAINTENANCE (Cont.)

e. INSTALLATION

1. Apply a light coat of grease to both sides of new gasket (5).
2. Install gasket (5) and drive support assembly (4) on rear housing (6).
3. Install two new copper washers (1) and screws (2 and 3). Torque screws to 25-30 lb.-ft. (34-41 N•m).

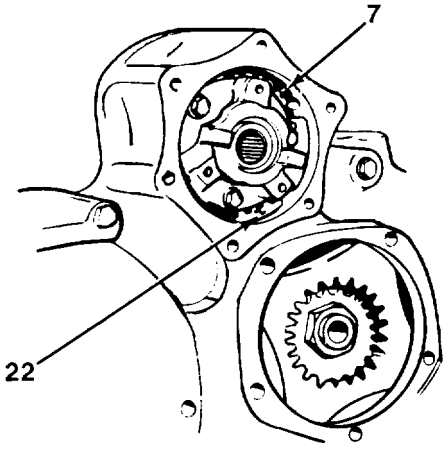




NOTE

If backlash cannot be checked at face of drive gear, check at hub.

4. Check backlash between drive gear (7) and camshaft gear (22). Gear backlash should not exceed 0.010 in. (0.254 mm).



TA705113

FOLLOW-ON TASKS:

- Install blower oil pipe and fitting (see paragraph 5-62).
- Install blower assembly (see paragraph 5-63).

5-66. LOAD SOLENOID MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation

Initial Setup:

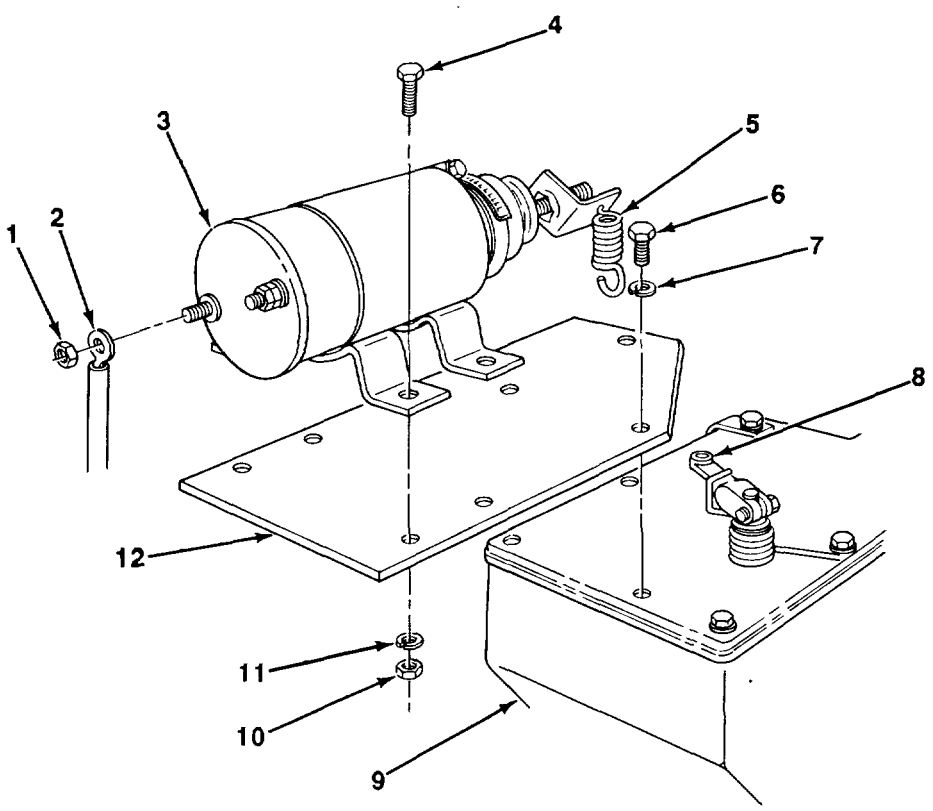
Equipment Conditions:
- Master battery switch in OFF position.

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Marker tags (Item 40, Appendix E)
- Seven lockwashers

a. REMOVAL

1. Remove two nuts (1). Tag and remove three wires (2) from load solenoid (3).
2. Disconnect spring (5) from lever (8).



TA705114

5-66. LOAD SOLENOID MAINTENANCE (Con't).

3. Remove four nuts (10), lockwashers (11), screws (4), and load solenoid (3) from bracket (12). Discard lockwashers.
4. Remove three screws (6), lockwashers (7), and bracket (12) from governor (9). Discard lockwashers.

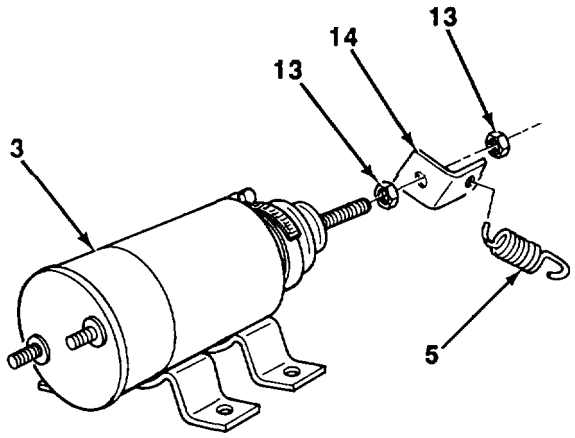
b. DISASSEMBLY

1. Remove spring (5) from bracket (14).

NOTE

Measure distance rear nut Is threaded on load solenoid to assist in Installing new load solenoid.

2. Remove two nuts (13) and bracket (14) from load solenoid (3).



c. ASSEMBLY

1. Install rear nut (13) on load solenoid (3) same distance noted in disassembly.
2. Install bracket (14) and second nut (13) on load solenoid (3).
3. Install spring (5) on bracket (14).

d. INSTALLATION

1. Install bracket (12) on governor (9) with three new lockwashers (7) and screws (6).
2. Install load solenoid (3) on bracket (12) with four screws (4), new lockwashers (11), and nuts (10).
3. Connect spring (5) to lever (8).
4. Install three wires (2) on load solenoid (3) with two nuts (1).

TA7051 15

5-66. LOAD SOLENOID MAINTENANCE (Con't).

e. ADJUSTMENT

NOTE

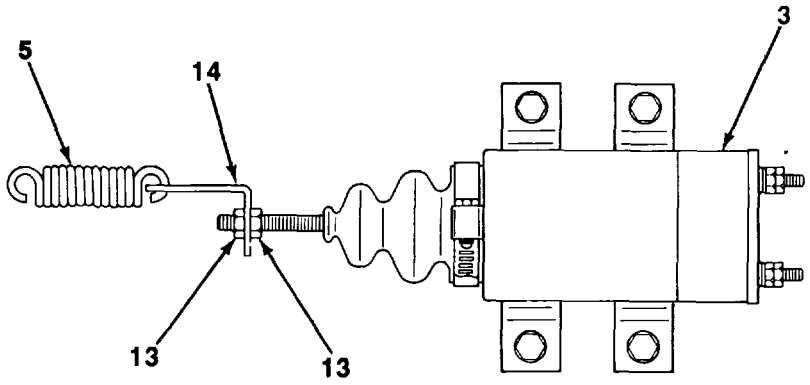
There should be slight tension on spring when bracket Is pulled toward load solenoid.

1. Pull bracket (14) toward load solenoid (3). If there is slight tension on spring (5), adjustment Is okay. If there is no tension, or spring Is pulling governor clevis toward load solenoid, continue with adjustment.

2. Loosen two nuts (13).

3. Slide bracket (14) toward or away from load solenoid (3) to increase or decrease spring (5) tension.

4. When slight tension is felt on spring (5), hold bracket (14) In place and tighten two nuts (13) against bracket.



TA705116

5-67. GOVERNOR COVER MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Assembly
d. Installation

Initial Setup:

Equipment Conditions:

- Load solenoid removed (see paragraph 5-66).

Tools/Test Equipment

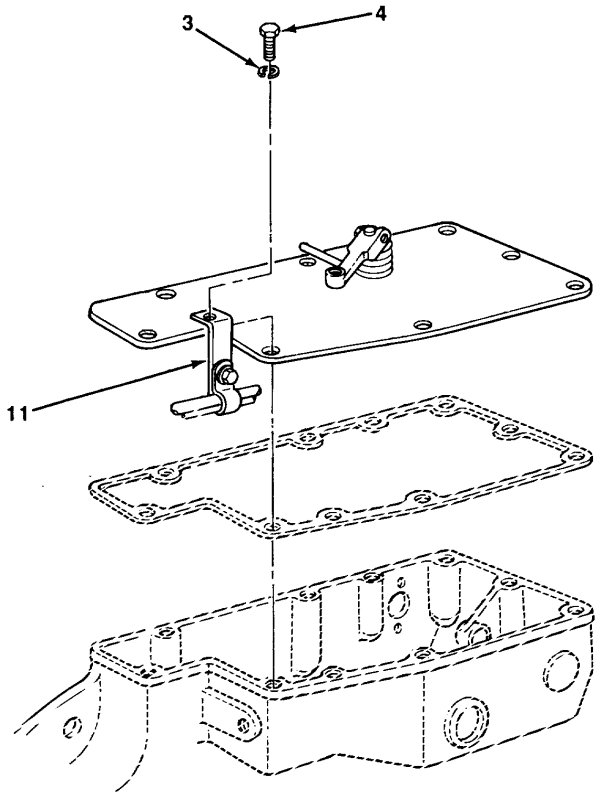
- General mechanic's tool kit

Materials/Parts:

- One gasket
- One preformed packing
- Six lockwashers

a. REMOVAL

1. Remove bolt (4) and lockwasher (3) and move bracket (11) aside. Discard lockwasher.

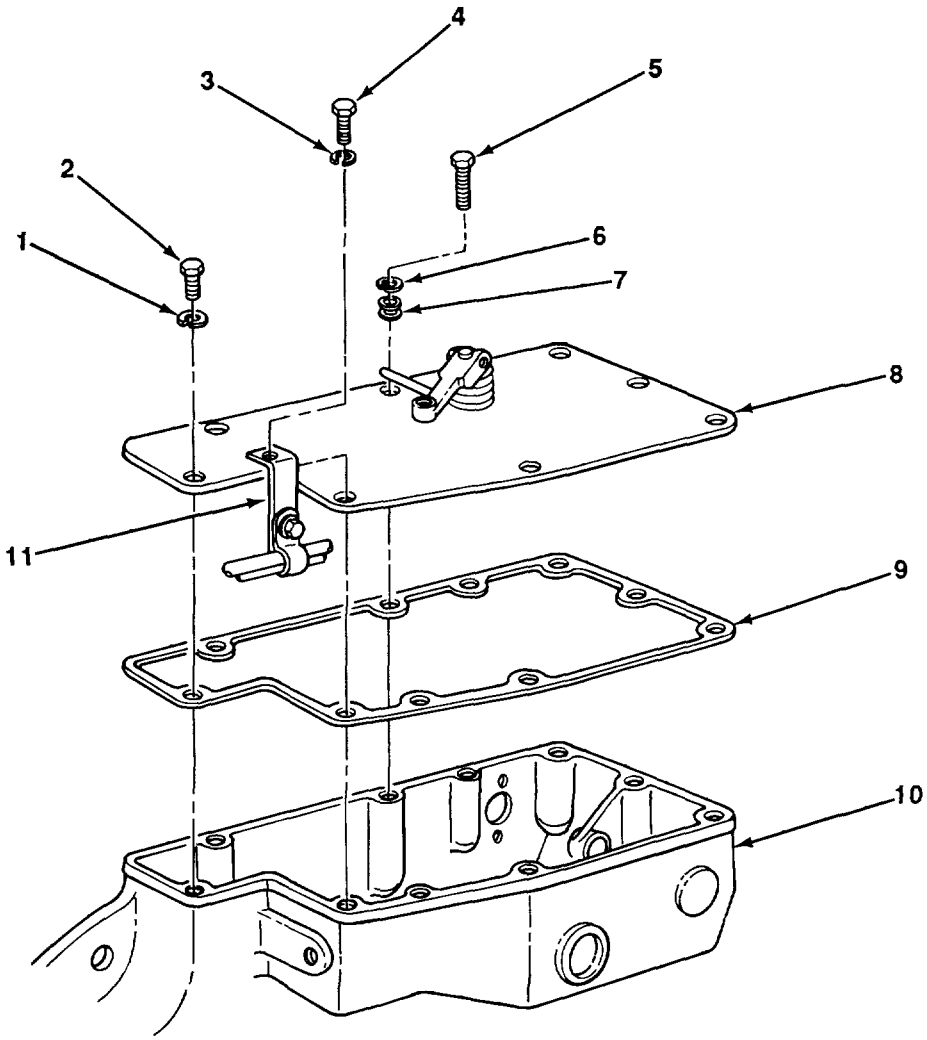


TA705117

5-67. GOVERNOR COVER MAINTENANCE (Con't).

2. Remove bolt (5), lockwasher (6), and spring retainer (7) from governor cover (8). Discard lockwasher.

3. Remove three bolts (2), lockwashers (1), governor cover (8), and gasket (9) from governor housing (10). Discard lockwashers and gasket.



TA705118

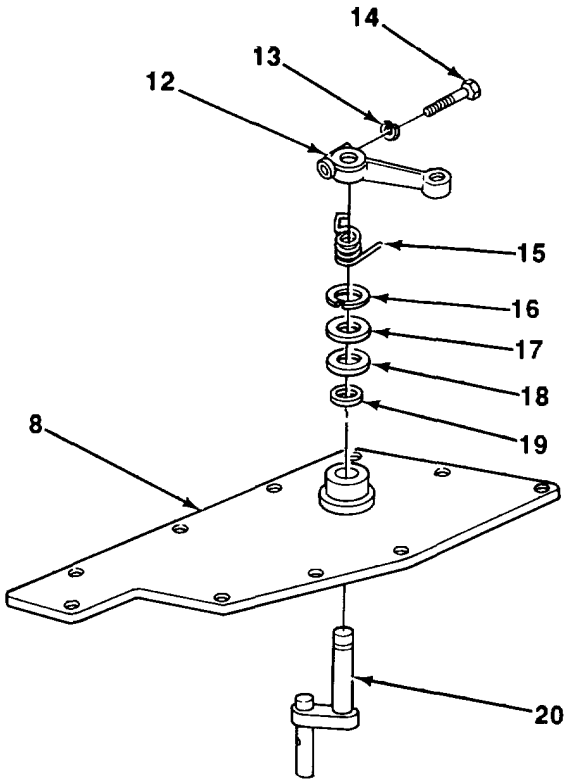
5-67. GOVERNOR COVER MAINTENANCE (Con't).

b. DISASSEMBLY

NOTE

Mark lever position on shaft assembly before disassembling.

1. Remove bolt (14), lockwasher (13), lever (12), and spring (15) from shaft assembly (20). Discard lockwasher.
2. Remove retaining ring (16), washer (17), washer (18), and preformed packing (19) from shaft assembly (20). Discard preformed packing.
3. Remove shaft assembly (20) from governor cover (8).



c. ASSEMBLY

1. Install shaft assembly (20) in governor cover (8) and install new preformed packing (19), washer (18), washer (17), and retaining ring (16).
2. Install spring (15) and lever (12) on shaft assembly (20) with new lockwasher (13) and bolt (14).

d. INSTALLATION

1. Position new gasket (9) and governor cover (8) on governor housing (10) and install three new lockwashers (1) and bolts (2).
2. Install spring retainer (7) in governor cover (8) with new lockwasher (6) and bolt (5).
3. Aline bracket (11) with hole in governor cover (8) and install new lockwasher (3) and bolt (4).

FOLLOW-ON TASKS:

- Install load solenoid (see paragraph 5-66).

TA705119

5-68. VARIABLE SPEED GOVERNOR SPRING HOUSING AND LINKAGE MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation

Initial Setup:

Equipment Conditions:

- Governor cover removed (see paragraph 5-67).

Tools/Test Equipment:

- General mechanic's tool kit

General Safety Instructions:

- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

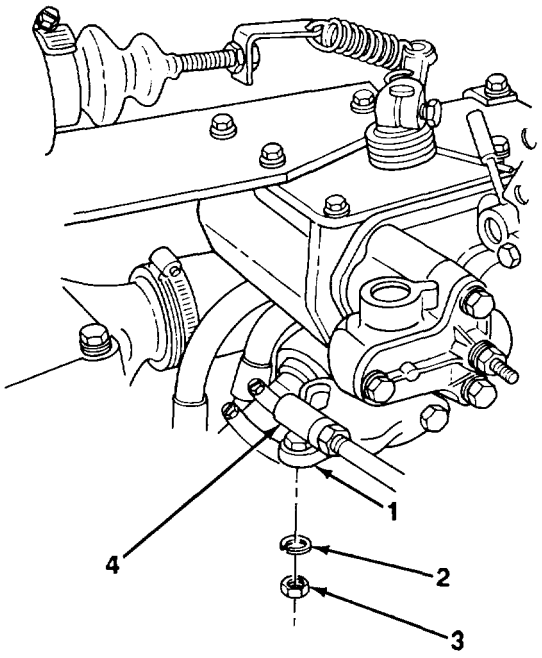
Materials/Parts:

- Dry cleaning solvent (Item 38, Appendix E)
- One expansion plug
- One locknut
- One seal
- Two bearings
- Two gaskets
- Five lockwashers

a. REMOVAL

1. Remove nut (3) and lockwasher (2) from each end of linkage (4). Discard lockwashers.

2. Remove linkage (4) from arm (1).

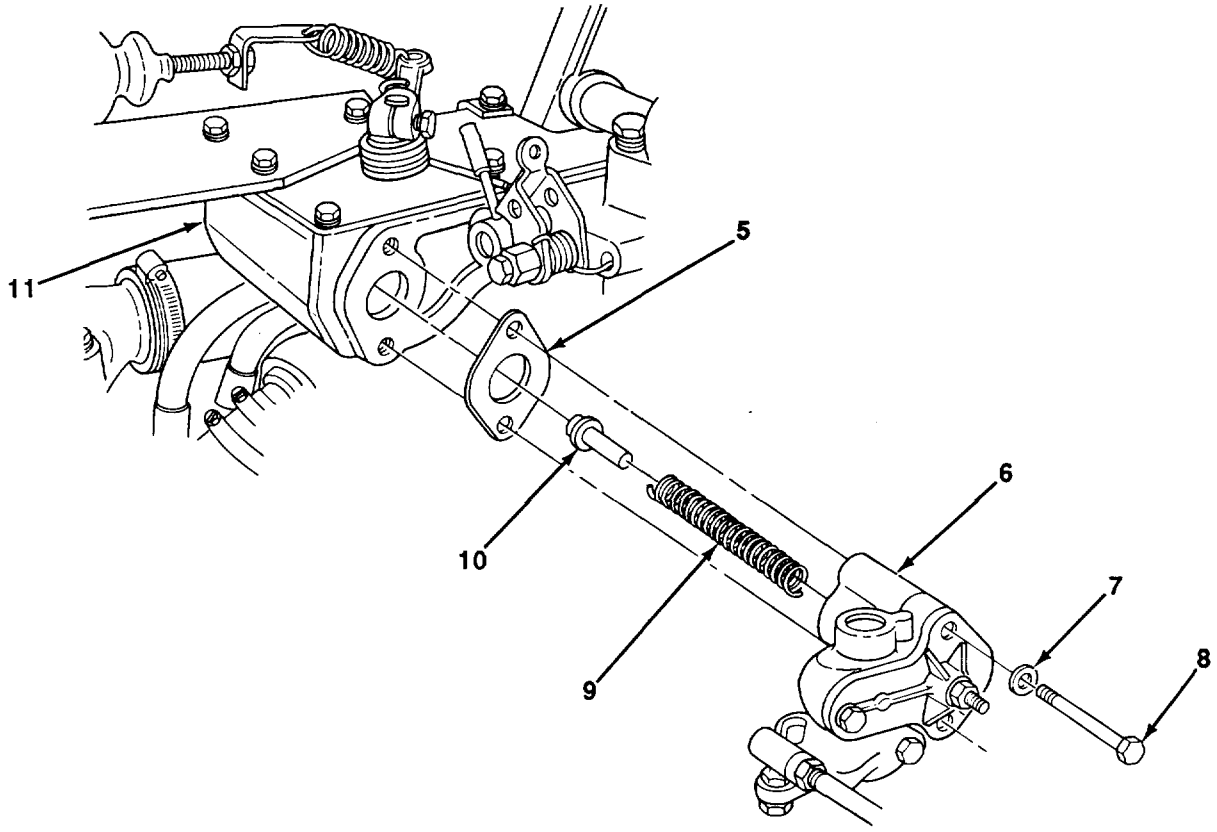


TA705120

5-68. VARIABLE SPEED GOVERNOR SPRING HOUSING AND LINKAGE MAINTENANCE (Cont.).

3. Remove two bolts (8), lockwashers (7), housing (6), spring (9), and gasket (5) from governor housing (11). Discard lockwashers and gasket.

4. Remove spring seat (10) from governor housing (11).



TA705121

5-68. VARIABLE SPEED GOVERNOR SPRING HOUSING AND LINKAGE MAINTENANCE (Cont.).

b. DISASSEMBLY

NOTE

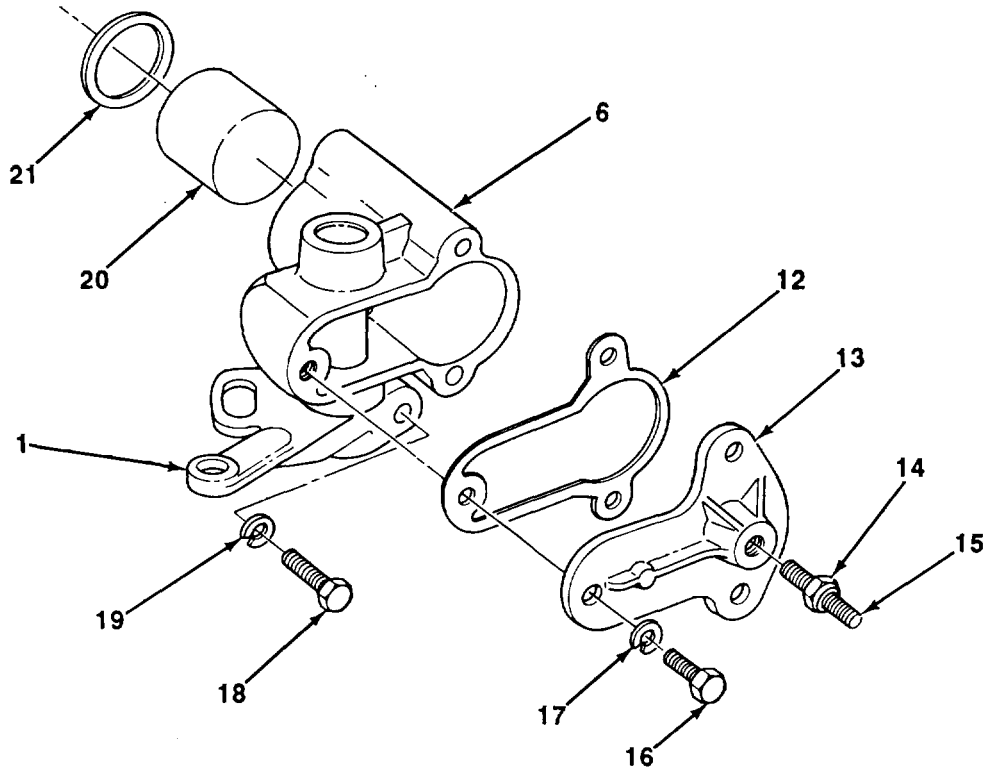
Note number of shims removed to assist in assembly.

1. Remove shims (21) and spring retainer (20) from housing (6).
2. Remove screw (18) and lockwasher (19). Remove arm (1) from housing (6). Discard lockwasher.

NOTE

Measure and note distance adjusting screw thread Is sticking out of locknut to assist in assembly.

3. Remove locknut (14) and adjusting screw (15). Discard locknut.
4. Remove screw (16), lockwasher (17), cover (13), and gasket (12) from housing (6). Discard lockwasher and gasket.



TA705122

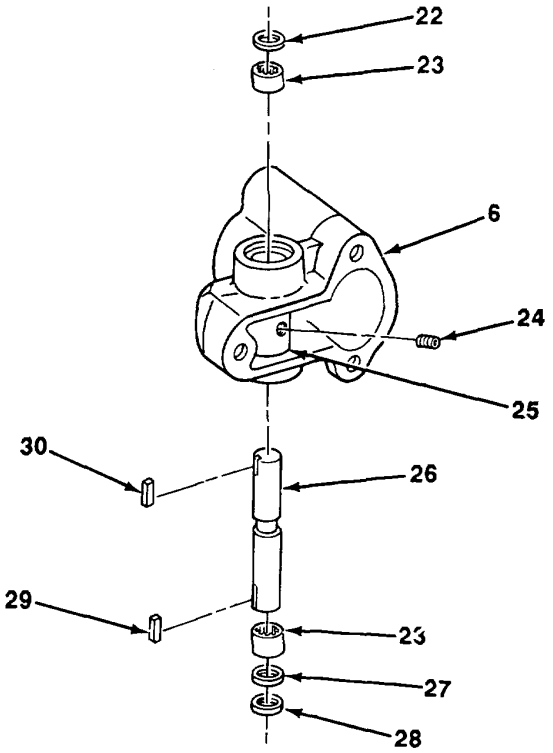
5-68. VARIABLE SPEED GOVERNOR SPRING HOUSING AND LINKAGE MAINTENANCE (Cont.).

5. Remove setscrew (24) from lever (25).
6. Remove key (29) and washer (28) from shaft (26).

NOTE

Bearings will be damaged when shaft Is removed. Both bearings must be replaced.

7. Remove expansion plug (22), shaft (26), and lever (25) from housing (6). Discard expansion plug.
8. Remove seal (27) and key (30) from shaft (26). Discard seal.
9. Remove and discard two bearings (23).



c. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean all metal parts with dry cleaning solvent.
2. Inspect parts for cracks, breaks, and damage.

TA705123

5-68. VARIABLE SPEED GOVERNOR SPRING HOUSING AND LINKAGE MAINTENANCE (Cont.).

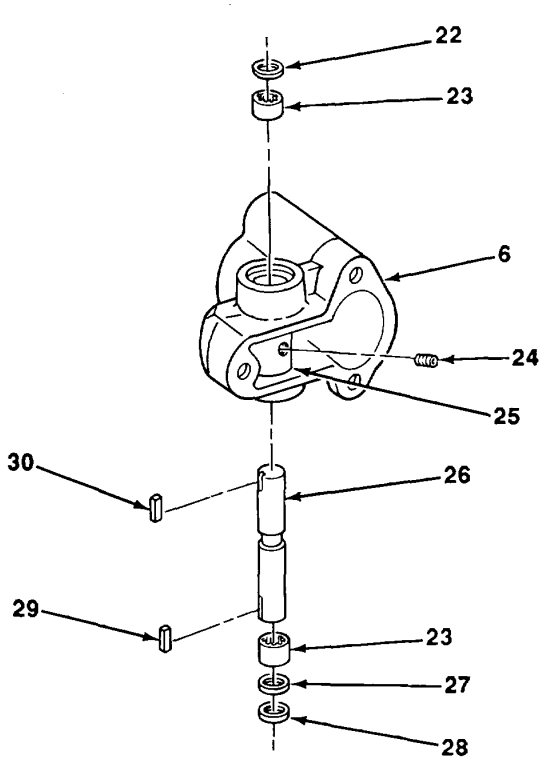
d. ASSEMBLY

1. Install new bearing (23) in side of housing (6).
2. Install key (30) on shaft (26).

NOTE

Ensure that shaft key Is alined with lever and shaft.

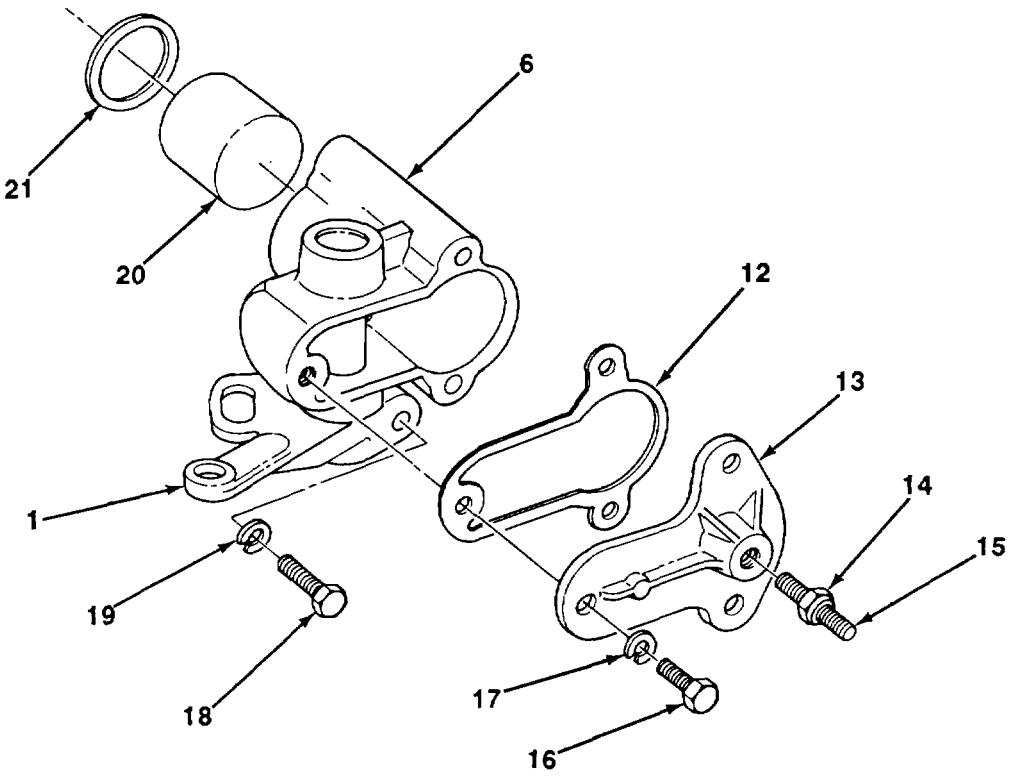
3. Position lever (25) in housing (6). Install shaft (26) in housing and lever through side of housing without bearing (23).
4. Install setscrew (24) in lever (25) contacting notched part of shaft (26).
5. Install new bearing (23) in housing (6).
6. Install new expansion plug (22) in housing (6).
7. Install new seal (27) washer (28), and key (29) on shaft (26).



TA705124

5-68. VARIABLE SPEED GOVERNOR SPRING HOUSING AND LINKAGE MAINTENANCE (Cont.).

8. Install new locknut (14) on adjusting screw (15) at same distance noted during disassembly.
9. Install adjusting screw (15) in cover (13). Tighten locknut.
10. Install new gasket (12) and cover (13) on housing (6) with new lockwasher (17) and screw (16).
11. Install arm (1) on housing (6) with new lockwasher (19) and screw (18).
12. Install shims (21) in spring retainer (20) and Install in housing (6).

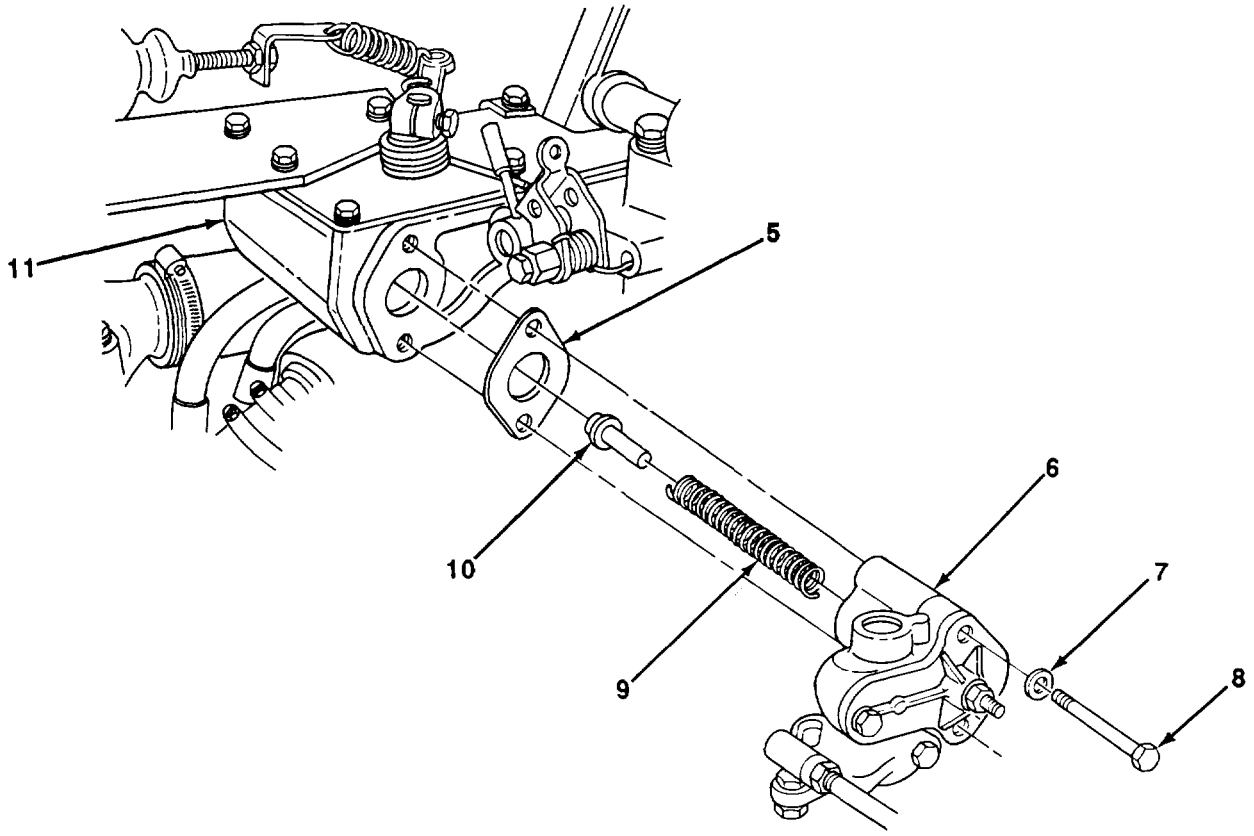


TA705125

5-68. VARIABLE SPEED GOVERNOR SPRING HOUSING AND LINKAGE MAINTENANCE (Cont.).

e. INSTALLATION I

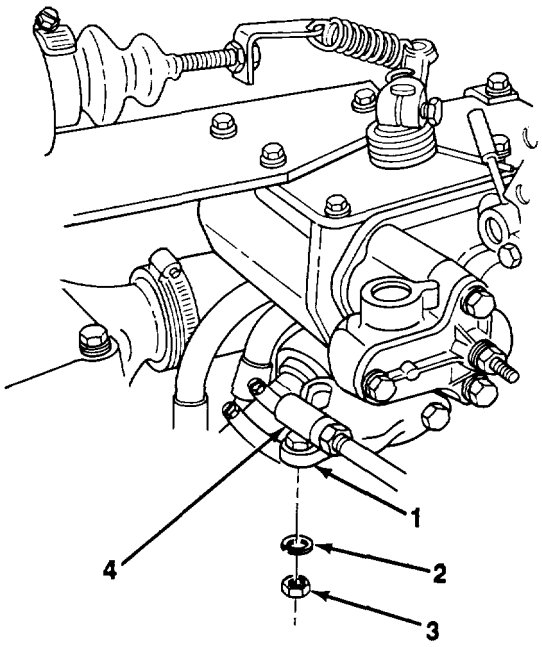
1. Install spring seat (10) in governor housing (11).
2. Install new gasket (5) spring (9), and housing (6) on governor housing (11) with two new lockwashers (7) and bolts (8).



TA705126

5-68. VARIABLE SPEED GOVERNOR SPRING HOUSING AND LINKAGE MAINTENANCE (Cont.).

3. Aline linkage (4) and install in arm (1) and lever on other end with two new lockwashers (2) and nuts (3).



FOLLOW-ON TASKS:

- Install governor cover (see paragraph 5-67).

TA705127

5-69. VARIABLE SPEED GOVERNOR HOUSING REPLACEMENT.

This Task Covers:

a. Removal b. Installation

Initial Setup:

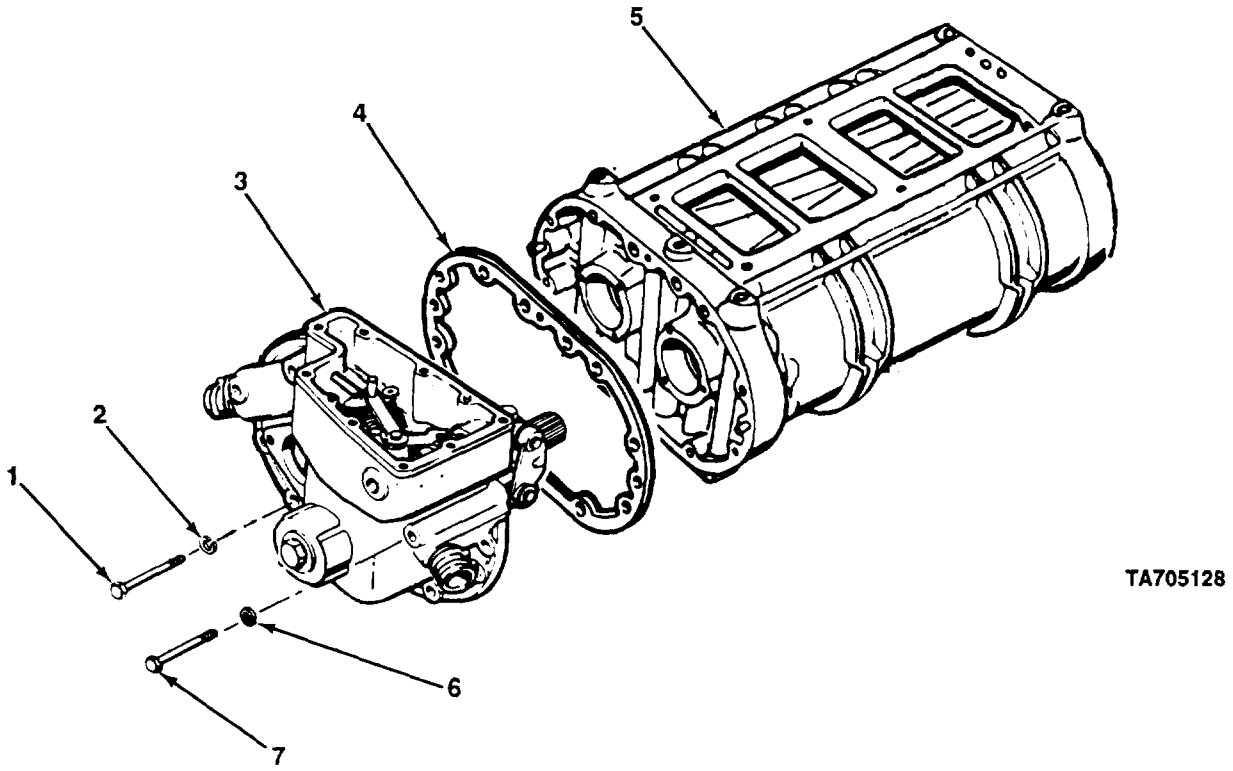
Equipment Conditions:
- Variable speed governor spring housing and linkage removed (see paragraph 5-68).
- Blower assembly removed (see paragraph 5-63)

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Grease (Item 22, Appendix E)
- One copper washer
- One gasket
- Eight lockwashers

a. REMOVAL

1. Remove bolt (7) and copper washer (6) from housing (3). Discard copper washer.
2. Remove eight bolts (1), lockwashers (2), housing (3), and gasket (4) from blower assembly (5). Discard lockwashers and gasket.



5-69. VARIABLE SPEED GOVERNOR HOUSING REPLACEMENT (Cont.).

b. INSTALLATION

1. Apply grease to face of blower assembly (5) and housing (3). Install new gasket (4) and housing on blower assembly with eight new lockwashers (2) and bolts (1).

2. Install new copper washer (6) and bolt (7) on housing (3).

FOLLOW-ON TASKS:

- Install blower assembly (see paragraph 5-63).
- Install variable speed governor spring housing and linkage (see paragraph 5-68).

5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR.

This Task Covers:

a. Disassembly
b. Cleaning and Inspection
c. Assembly

Initial Setup:

Equipment Conditions:
- Variable speed governor housing removed (see paragraph 5-69).

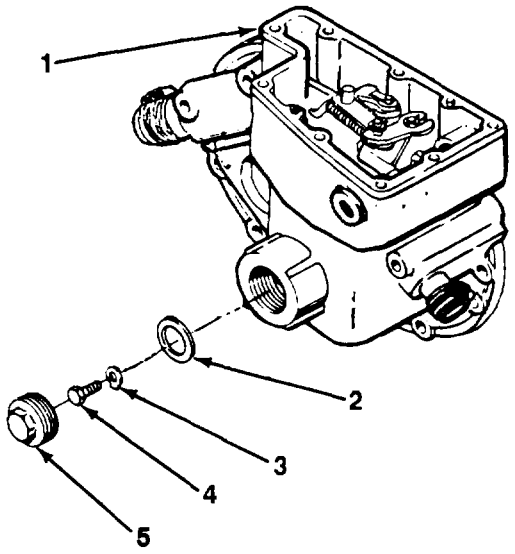
Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

General Safety Instructions:
- Dry cleaning solvent Is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- Grease (Item 22, Appendix E)
- Lubricating oil (Item 28, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- One gasket
- One plug
- Three lockwashers
- Three retaining clips

a. DISASSEMBLY

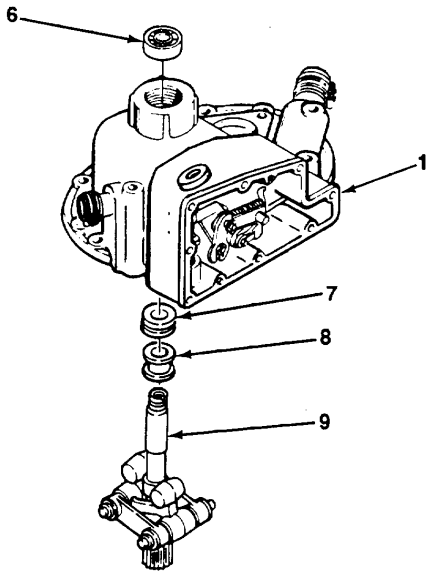
1. Place housing (1) in vise with soft jaws.
2. Remove cap (5) and gasket (2) from housing (1). Discard gasket.
3. Bend tang of lockwasher (3) away from screw (4).
4. Remove screw (4) and lockwasher (3) from housing (1). Discard lockwasher.
5. Remove housing (1) from vise.



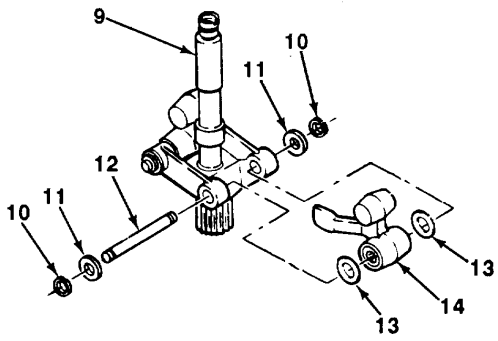
TA705129

5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Cont.).

6. Remove shaft and carrier (9) from housing (1) and bearing (6).
7. Remove thrust bearing (7) and riser (8) from shaft and carrier (9).
8. Remove bearing (6) from housing (1).



9. Remove four retaining rings (10) and washers (11) from two pins (12).
10. Remove two pins (12), four washers (13), and two weight (14) assemblies from shaft and carrier (9).



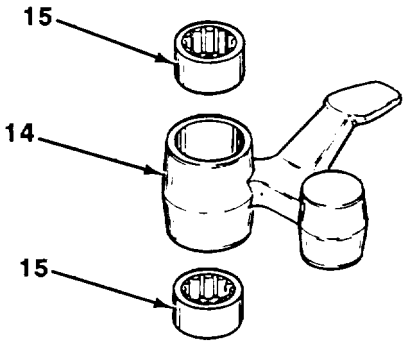
TA705130

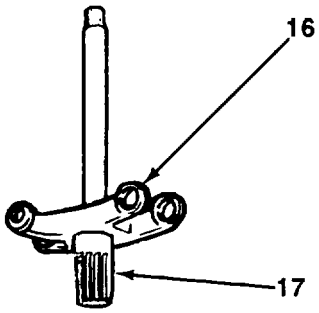
5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Cont.).

NOTE

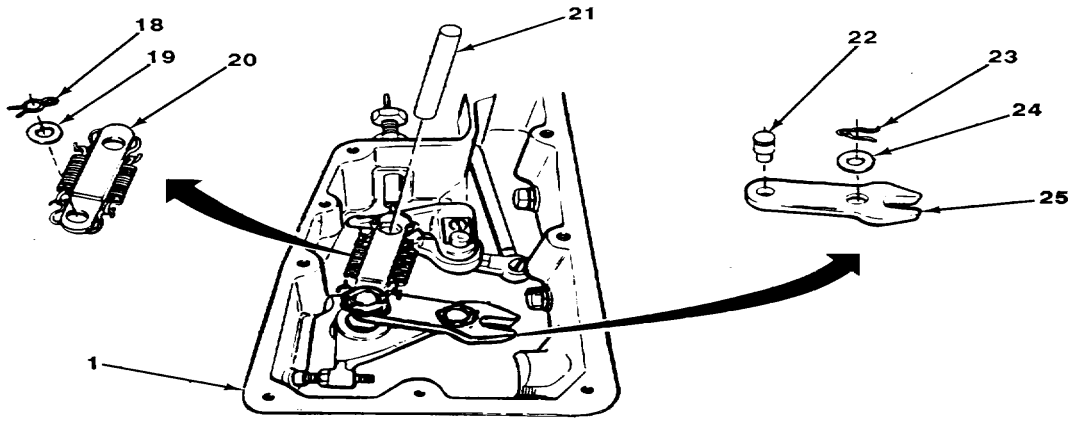
- **Remove bearings only if damaged and replacement is necessary.**
- **Bearings are removed from both weights in same manner.**

11. Remove two bearings (15) from weight (14).
12. Remove shaft (17) from carrier (16).





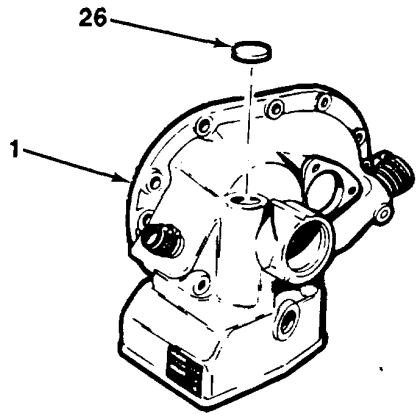
13. Remove two retaining clips (18) and washers (19) from connecting link (20). Discard retaining clips.
14. Remove connecting link (20) from housing (1).
15. Remove retaining clip (23), washer (24), and lever (25) from housing (1). Discard retaining clip.
16. Remove pin (21) from housing (1) and pin (22) from lever (25).



TA705131

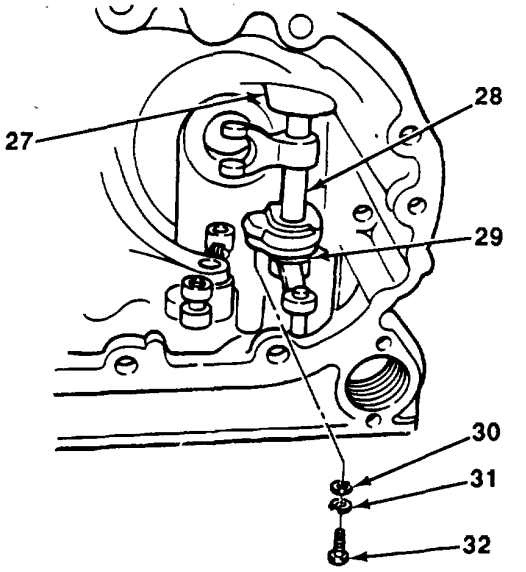
5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Con't).

17. Remove plug (26) from housing (1). Discard plug.



18. Remove screw (32), lockwasher (31), and washer (30) from upper bearing (29). Discard lockwasher.

19. Remove shaft (28) with spacer from lower bearing (27).



TA705132

5-70. VARIABLE SPEED GOVERNOR HOUSING RE

20. Support fork (33) with wrench (34) and press spacer (36) from fork.

21. Remove fork (33) and wrench (34).

22. Remove spacer (36), shaft (28), upper bearing (29), and lever assembly (35) from housing (1).

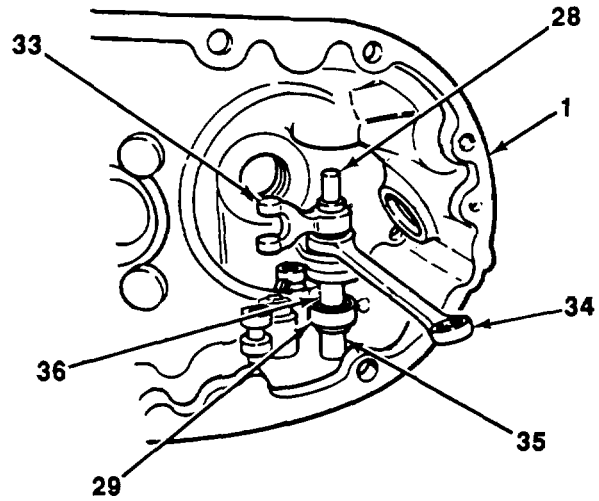
23. Press shaft (28) from upper bearing (29) and lever (38).

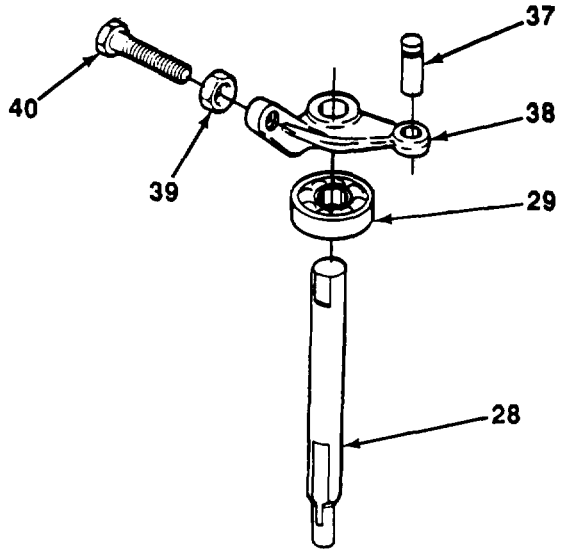
NOTE

Measure and note length of adjusting screw for assembly.

24. Loosen nut (39) and remove adjusting screw (40) from lever (38).

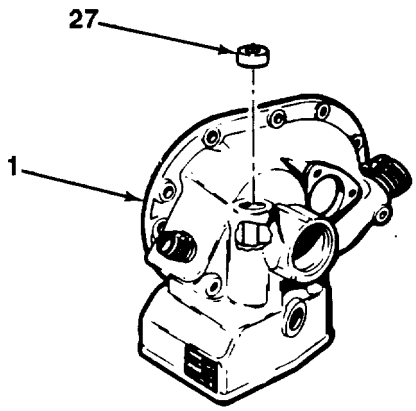
25. Remove pin (37) from lever (38).





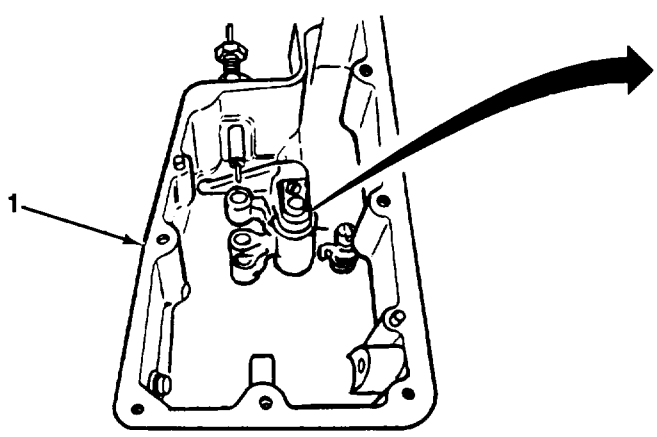
5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Con't).

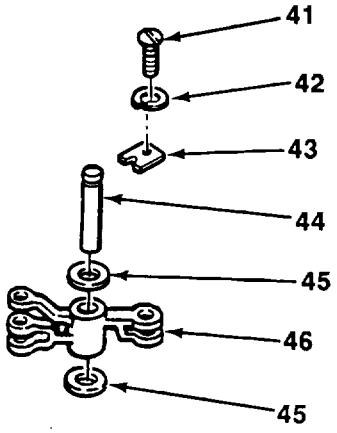
26. Remove lower bearing (27) from housing (1).



27. Remove screw (41), lockwasher (42), and retaining clip (43). Discard lockwasher.

28. Remove pin (44), lever assembly (46), and two washers (45).

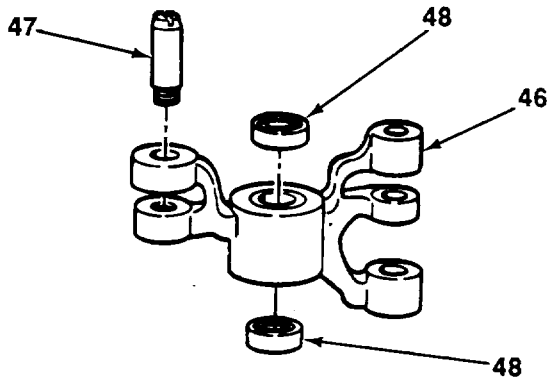


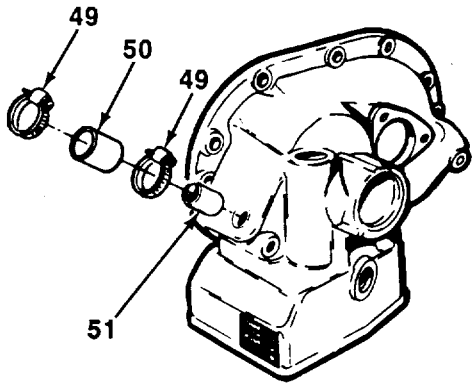


5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Con't).

NOTE
Replace pin and bearings only if damaged.

29. Remove pin (47) from lever assembly (46).
30. Remove two bearings (48) from lever assembly (46).
31. Remove four clamps (49) and two hoses (50) from tubes (51).
32. Remove two tubes (51) from housing (1).





b. CLEANING AND INSPECTION I

1. Scrape old sealing compound from parts.

WARNING
Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (380C-590C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

2. Clean all metal parts with dry cleaning solvent.

WARNING
Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

3. Dry metal parts, except bearings, with compressed air. Allow bearings to air dry.
4. Inspect housing for cracks, warpage, and damaged threads.

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5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Con't).

5. Inspect mechanical parts for nicks and burrs.

6. Replace all damaged parts.

c. ASSEMBLY

1. Install two tubes (51) in housing (1).

2. Install two hoses (50) on tubes (51) with four clamps (49).

NOTE
Install bearings flush with lever assembly.

3. If removed, lubricate bearings (48) with grease and install bearings in lever assembly (46) with numbered side up.

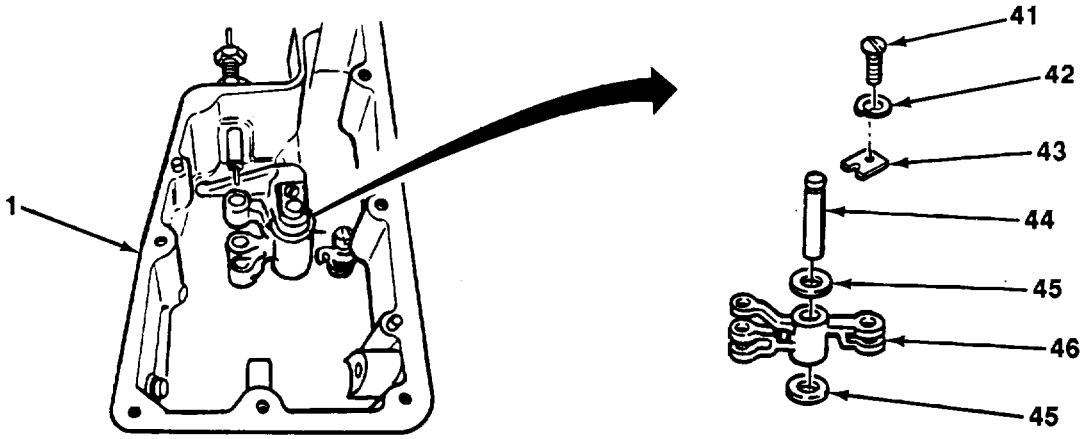
4. If removed, install pin (47) in lever assembly (46).

5. Position lever assembly (46) in housing (1).

6. Install one washer (45) on each side of lever assembly (46).

7. Install pin (44), with slot up, through both washers (45) and lever assembly (46).

8. Install retaining clip (43) with new lockwasher (42) and screw (41).



5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Con't)

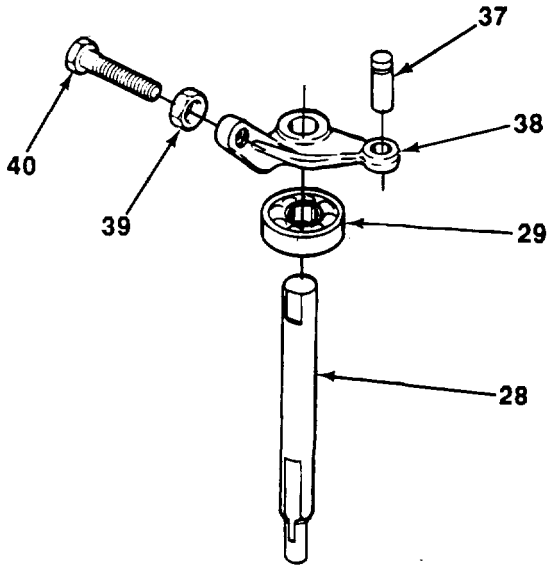
9. Install adjusting screw (40) and nut (39) in lever (38).

10. Tighten nut (39) so length of adjusting screw (40) is same as noted In subparagraph a, step 24.

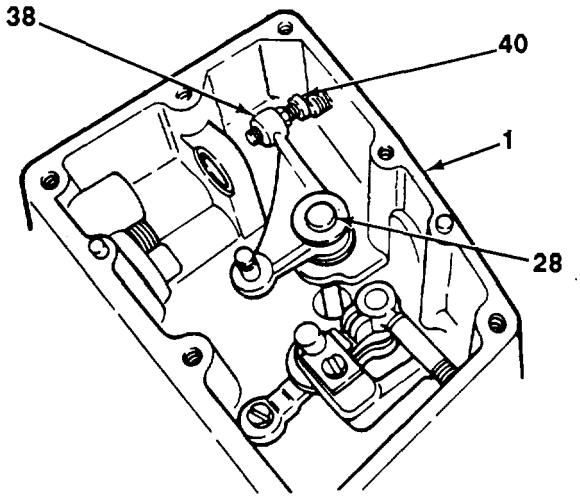
11. Install pin (37) in lever (38).

12. Install upper bearing (29), with open side of bearing facing up, on shaft (28).

13. Install lever (38) on shaft (28) until flush with top of shaft.



14. Install shaft (28) and position lever (38) so adjusting screw (40) makes contact with housing (1).



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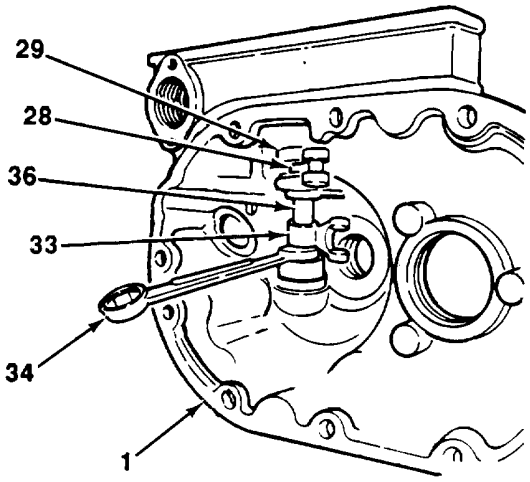
5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Con't).

NOTE
Flat of shaft is Installed on flat In fork.

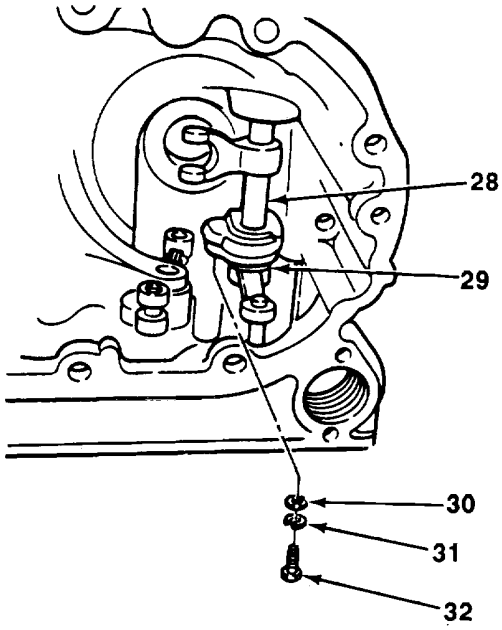
15. Install shaft (28) in spacer (36) and position fork (33) with finished cam surface of fork fingers facing rear of housing (1).

16. Place wrench (34) between housing (1) and fork (33). Press shaft (28) until spacer (36) does not move up or down.

17. Seat upper bearing (29).

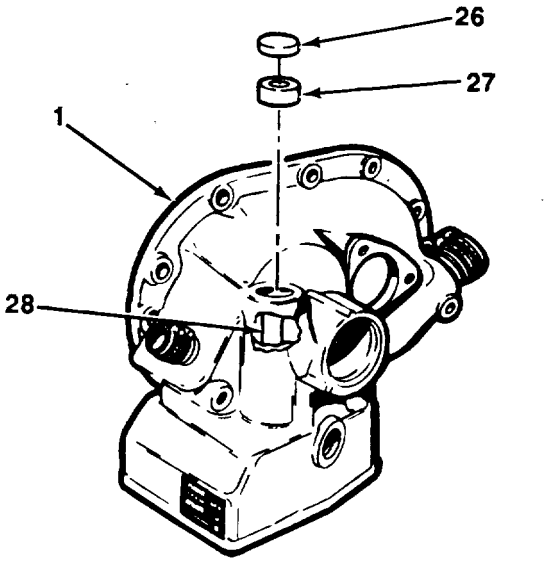


18. Install screw (32), new lockwasher (31), and washer (30) to secure upper bearing (29).

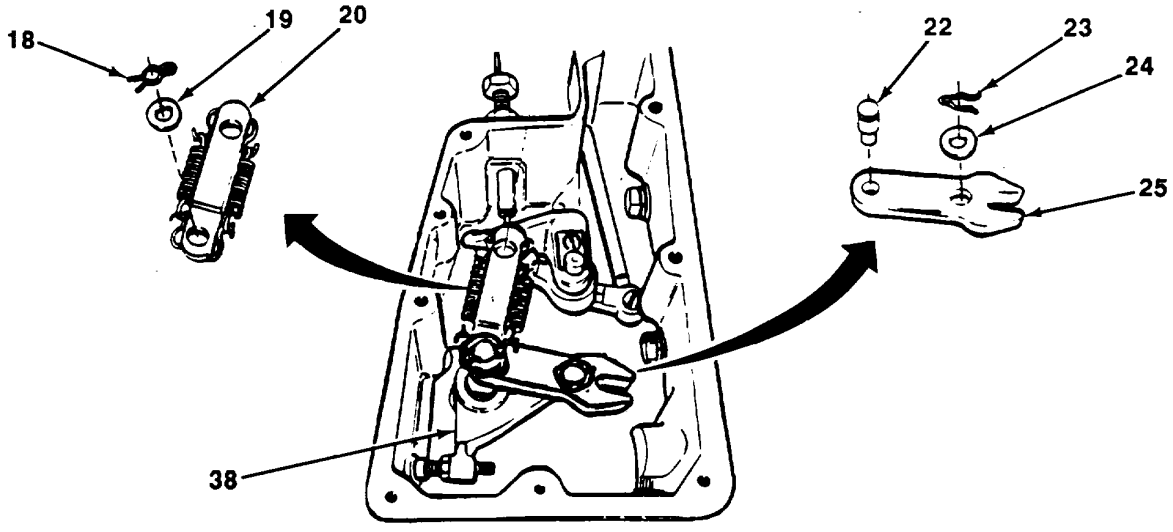


5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Con't)

19. Lubricate Inside of lower bearing (27) with grease and outside with lubricating oil.
20. Insert lower bearing (27), closed side up, into housing (1) and over shaft (28).
21. Install lower bearing (27) on shaft (28) until it seats on shoulder of housing (1).
22. Apply small amount of sealing compound to edge of new plug (26).
23. Install plug (26), cupped side up, in housing (1).



24. Install pin (22) in lever (25).
25. Install lever (25) on lever (38) with washer (24) and new retaining clip (23).
26. Install short end of connecting link (20) on lever (38) with washer (19) and new retaining clip (18).

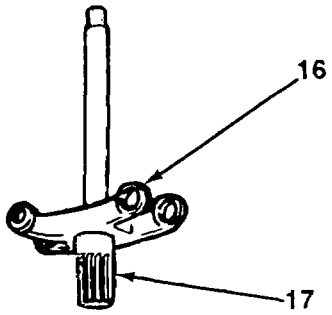


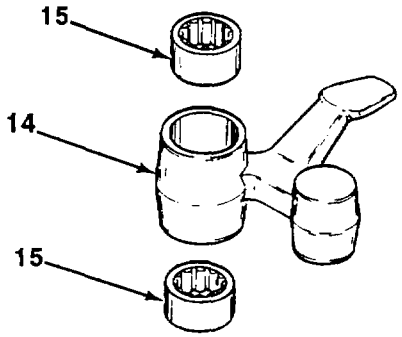
5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Con't).

27. Install shaft (17) in carrier (16).

28. If removed, install two bearings (15) in weight (14).

29. Repeat step 28 for other weight (14).

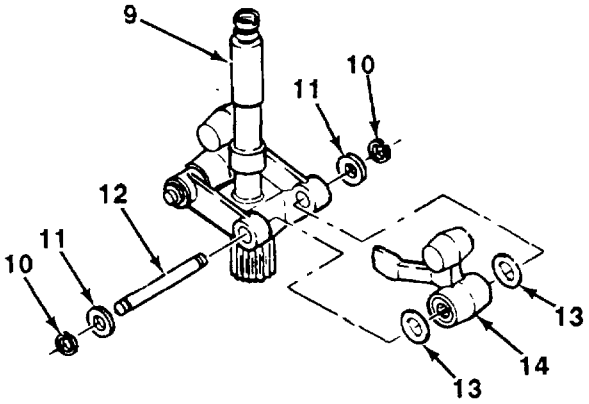




30. Position two weight (14) assemblies and four washers (13) in shaft and carrier (9)

31. Install two pins (12) through four washers (13) and two weight (14) assemblies.

32. Install four washers (11) and retaining rings (10) on two pins (12).



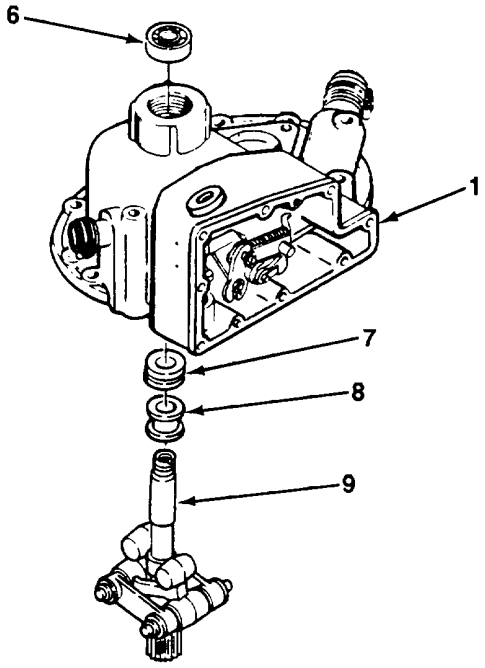
5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Con't).

33. Install bearing (6) in housing (1).

34. Install riser (8) on shaft and carrier (9).

35. Install thrust bearing (7), smaller inside diameter first, against riser (8).

36. Install shaft and carrier (9), riser (8), and thrust bearing (7) in housing (1).



5-70. VARIABLE SPEED GOVERNOR HOUSING REPAIR (Con't).

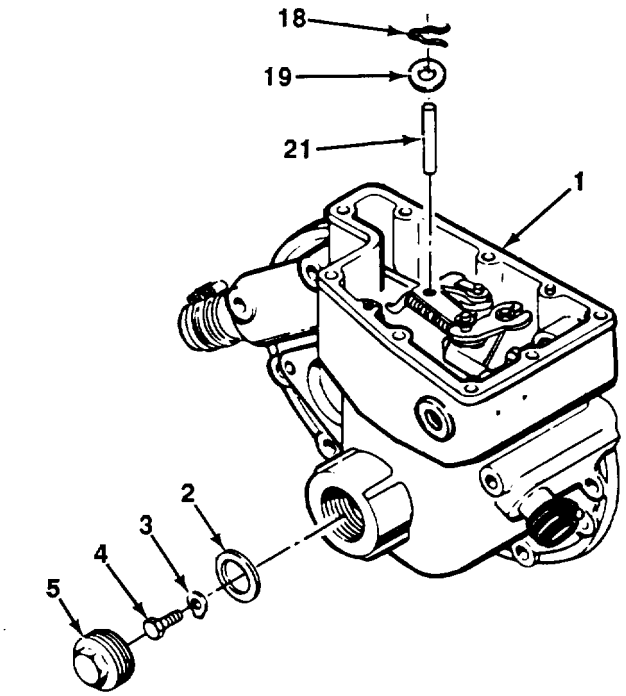
37. Install new lockwasher (3), with tab facing housing (1), and screw (4) in housing.
38. Torque screw (4) to 20 lb.-ft. (27 Nom) and bend tang on lockwasher (3) against screw.
39. Install new gasket (2) in housing (1).

CAUTION
Apply only a small amount of sealing compound to cap. Excess sealing compound could cause damage to bearing.

40. Apply a small amount of sealing compound to threads of cap (5) and install cap in housing (1).
41. Torque cap (5) to 45 lb.-ft. (61 Nem).
42. Install pin (21) in housing (1).
43. Install washer (19) and new retaining clip (18) on pin (21).

FOLLOW-ON TASKS:

- Install variable speed governor housing (see paragraph 5



Section V. COOLING SYSTEM MAINTENANCE

5-71. ENGINE RADIATOR MAINTENANCE.

This Task Covers:

a. Removal
b. Repair
c. Installation

Initial Setup:

Equipment Conditions:

- Lower radiator hose disconnected (see paragraph 4-50).
- Upper radiator hoses disconnected (see paragraph 4-49).
- Center roof panel removed (see paragraph 5-85)
- Side roof panels removed (see paragraph 5-82).

Materials/Parts:

- Six lockwashers

Tools/Test Equipment:

- General mechanic's tool kit
- General mechanic'

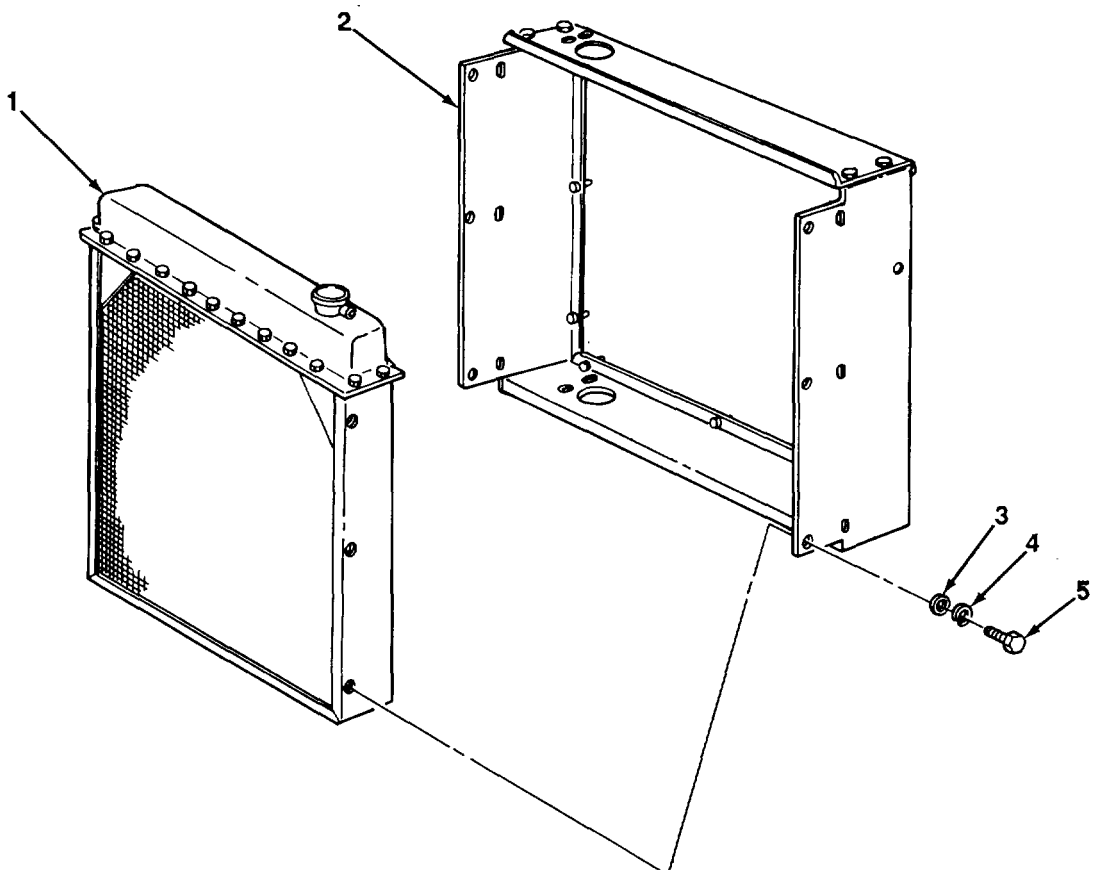
References:

- TM 750-254

5-71. ENGINE RADIATOR MAINTENANCE (Con't).

a. REMOVAL

1. Remove six bolts (5), lockwashers (4), and washers (3) from shroud (2) and radiator (1). Discard lockwashers.
2. Using suitable lifting device, remove radiator (1) from shroud (2).



b. REPAIR

Repair engine radiator in accordance with TM 750-254.

c. INSTALLATION

1. Using suitable lifting device, aline radiator (1) with shroud (2).
2. Install six bolts (5), new lockwashers (4), and washers (3).

FOLLOW-ON TASKS:

- Connect upper radiator hoses (see paragraph 4-49).
- Connect lower radiator hose (see paragraph 4-50).
- Install side roof panels (see paragraph 5-82).
- Install center roof panel (see paragraph 5-85).

5-72. WATER PUMP MAINTENANCE.

This Task Covers:

a. Removal
b. Disassembly
c. Cleaning and Inspection
d. Assembly
e. Installation

Initial Setup:

Equipment Conditions:
- Fan removed (see paragraph 4-47)

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

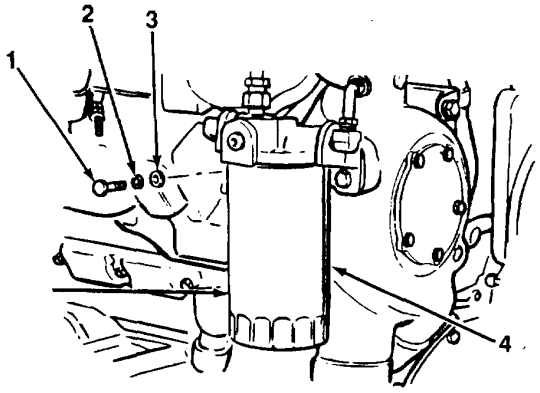
Personnel Required: Two

Materials/Parts:
- Sealing compound (Item 14, Appendix E)
- Grease (Item 22, Appendix E)
- Lubricating oil (Item 28, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- One 5/16 in. -18 UNC x 2 in. screw
- One repair kit
- Five lockwashers

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

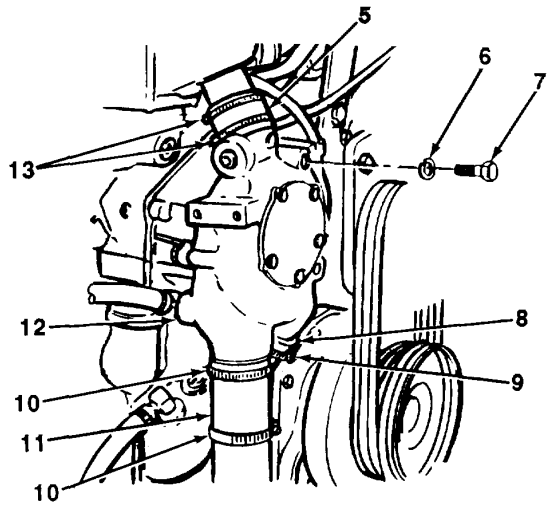
a. REMOVAL

1. Remove two screws (1), lockwashers (2), washers (3), and move secondary fuel filter (4) out of way. Discard lockwashers.



5-72. WATER PUMP MAINTENANCE (Con't).

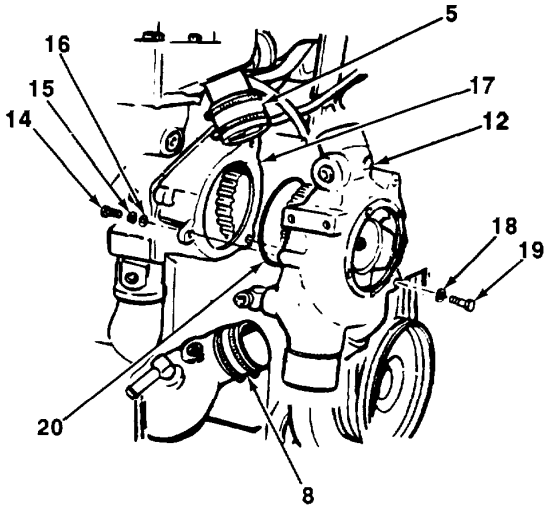
2. Loosen two clamps (13) and slide hose (5) up off water pump (12).
3. Loosen two clamps (10) and slide hose (11) down off water pump (12).
4. Loosen two clamps (9) and slide hose (8) down off water pump (12).
5. Remove screw (7) and lockwasher (6). Discard lockwasher.



6. Remove screw (19) and lockwasher (18). Discard lockwasher.
7. Remove screw (14), lockwasher (15), and washer (16). Discard lockwasher.

NOTE
Performed packing may stick to balance cover.

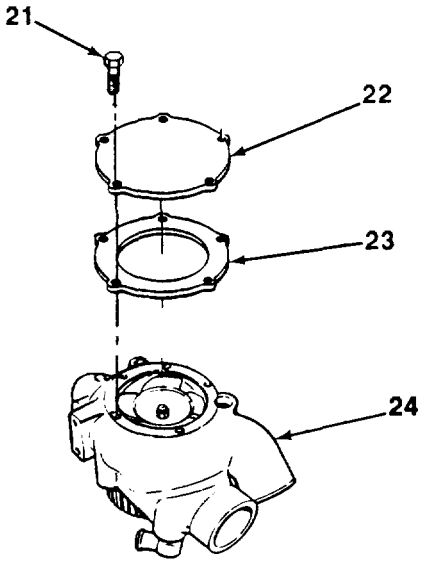
8. Remove water pump (12) and performed packing (20) from balance cover (17).
9. Remove performed packing (20) from water pump (12). Discard performed packing.

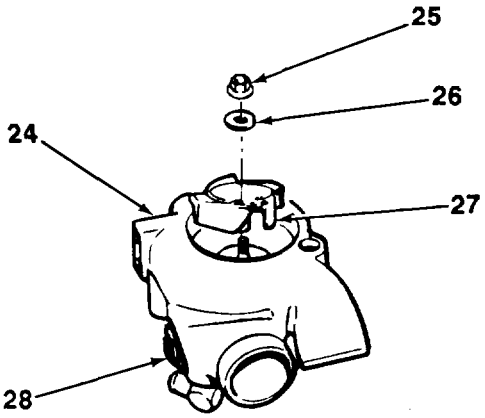


5-72. WATER PUMP MAINTENANCE (Con't).

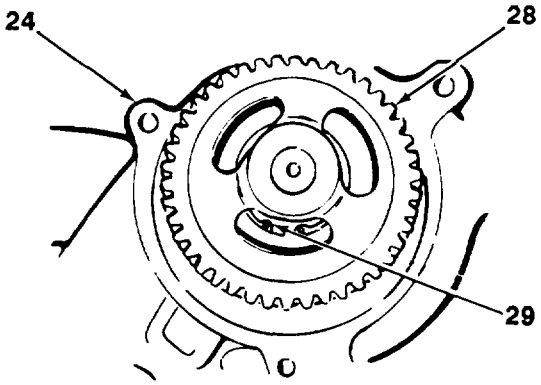
b. DISASSEMBLY

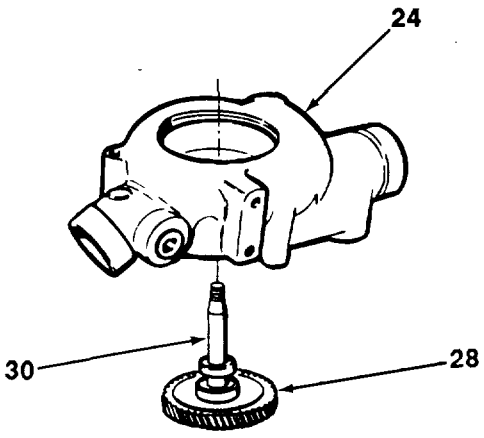
1. Remove five screws (21), cover (22), and gasket (23) from housing (24). Discard gasket.
2. Hold gear (28) and remove locknut (25), washer (26), and Impeller (27) from housing (24). Discard locknut and impeller.





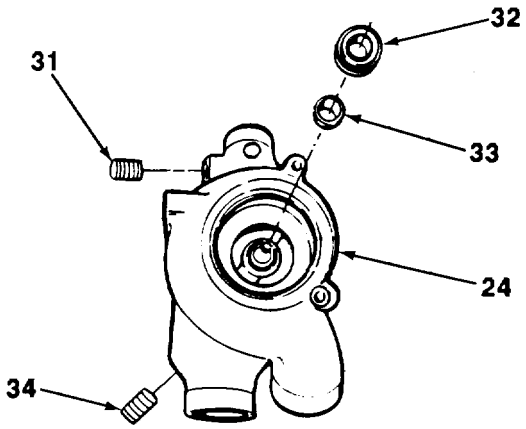
3. Turn gear (28) until ends of retaining ring (29) are showing.
4. Move retaining ring (29) out of groove In housing (24).
5. Remove gear (28) and shaft (30) from housing (24). Discard gear and shaft with assembled parts.





5-72. WATER PUMP MAINTENANCE (Con't)

6. Remove water seal (32), seal (33), plug (31), and plug (34) from housing (24). Discard seal and water seal.



c. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38OC-590C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

1. Clean all metal parts with dry cleaning solvent.

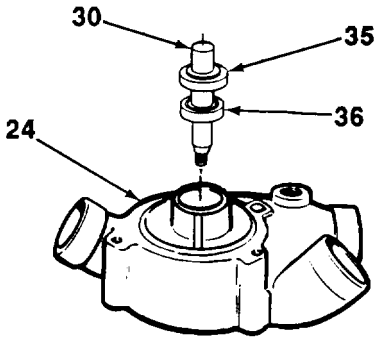
2. Inspect passages In housing for obstructions (mineral deposits), cracks, and damage. Clear obstructions (mineral deposits) as necessary. Replace housing if damaged.

TA705147

5-72. WATER PUMP MAINTENANCE (Con't).

d. ASSEMBLY

1. Lubricate two new bearings (35 and 36) with light coat of lubricating oil.



NOTE
Bearings are Installed so numbered side of bearings face each other.

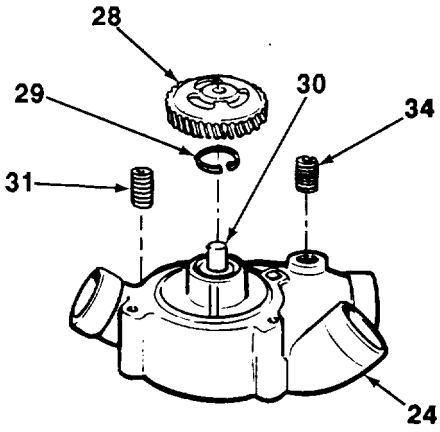
2. Install small bearing (36) on threaded end of new shaft (30).

3. Install large bearing (35) on other end of new shaft (30).

CAUTION
Ensure that shaft and bearings are Installed straight Into housing. Damage to housing or bearings may occur If bearings are not straight.

4. Install shaft (30) and bearings (35 and 36) into housing (24) by pressing on bearing (35).

5. Install new retaining ring (29) in groove housing (24).



CAUTION
Ensure that gear Is Installed straight on shaft or gear may be damaged.

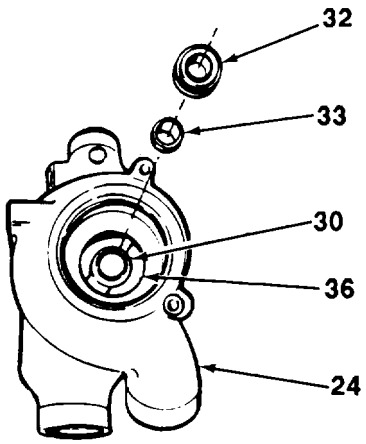
6. Install new gear (28) on shaft (30).

7. Apply small amount of sealing compound to threads of plugs (31 and 34) and install in housing (24).

5-72. WATER PUMP MAINTENANCE (Con't).

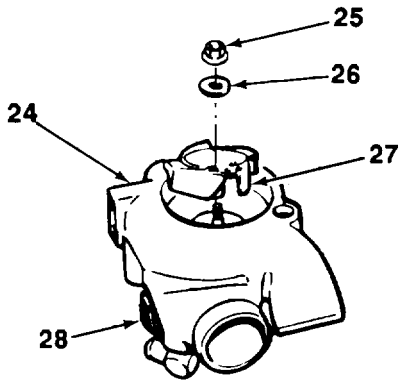
8. Apply lubricating oil to shaft (30) and install new seal (33) with lip toward bearing (36).

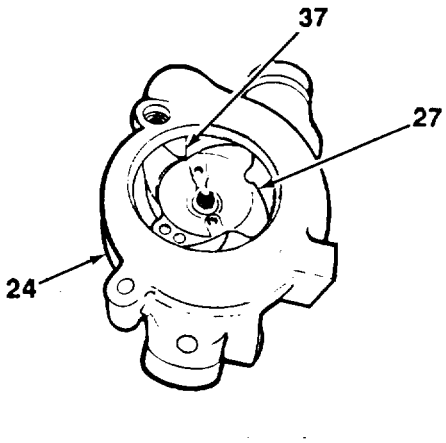
9. Apply sealing compound to outer diameter of new water seal (32) and install in housing (24).



10. While holding gear (28), install new Impeller (27), washer (26), and new locknut (25). Torque locknut to 50 lb.-ft. ,68 Nom).

11. Place 0.015 in. (0.381 mm) feeler gage between Impeller (27) and comer (37) of housing (24) and turn impeller to check Impeller blade clearance with housing.

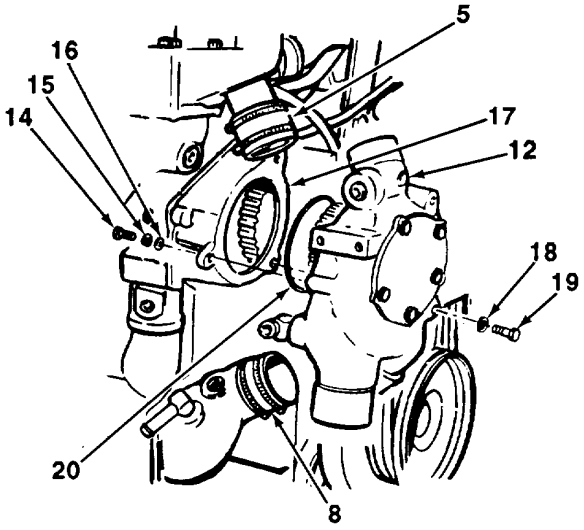




5-72. WATER PUMP MAINTENANCE (Con't).

e. INSTALLATION

1. Install new performed packing (20) on water pump (12) and Install water pump on balance cover (17) and hoses (5 and 8).
2. Install new lockwasher (18) and screw (19).
3. Install washer (16), new lockwasher (15), and screw (14).

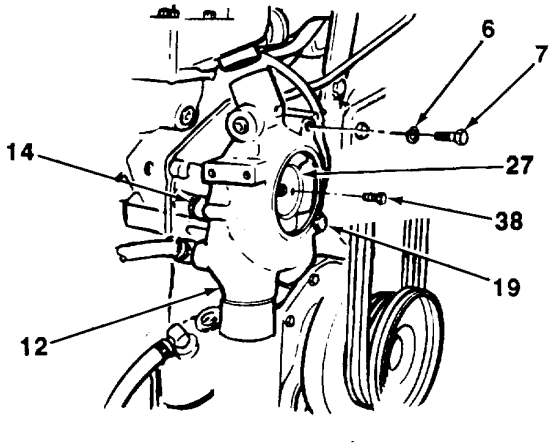


4. Install new lockwasher (6) and screw (7).
5. Install one Y6 in. -18 UNC x 2 in. screw (38) into impeller (27).

NOTE

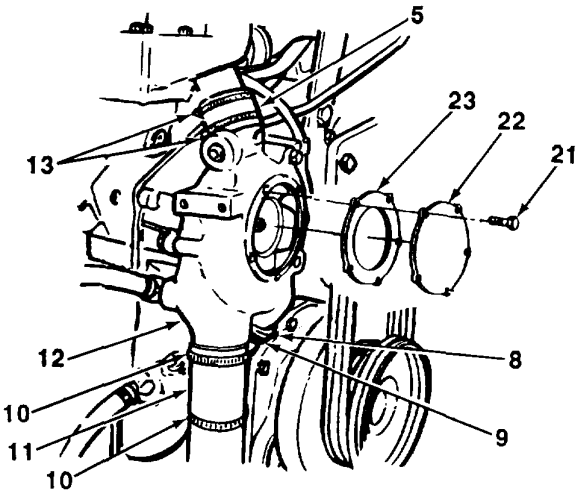
Limits for gear backlash are 0.001-0.006 In. (0.025-0.152 mm). If backlash cannot be corrected, replace water pump.

6. Place plunger of dial indicator against screw (38). Move impeller (27) and read backlash.
7. If backlash does not read 0.001-0.006 in. (0.-0.152 mm), loosen screws (19 and 14) and pivot water pump (12) to obtain proper backlash.
8. Torque screws (19 and 14) to 25 lb.-ft. (34 Nom).
9. Remove screw (38).
10. Torque screws (7, 14, and 19) to 45-50 lb.-ft. (61-68 Nom).

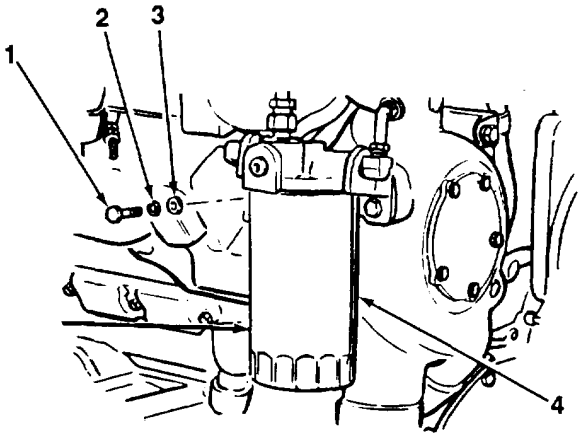


5-72. WATER PUMP MAINTENANCE (Con't).

11. Coat new gasket (23) with grease and install gasket and cover (22) on water pump (12) with five screws (21).
12. Install hoses (5, 8, and 11) on water pump (12).
13. Position and tighten clamps (9, 10, and 13).



14. Aline secondary fuel filter (4) and install with two washers (3), new lockwashers (2), and screws (1).



FOLLOW-ON TASKS:

- Install fan (see paragraph 4-47).

Section VI. ELECTRICAL SYSTEM MAINTENANCE

5-73. ALTERNATOR TESTING AND REPAIR.

This Task Covers:

a. Field Current Draw Test
b. Alternator Output Test
c. Disassembly
d. Cleaning and Inspection
e. Component Test
f. Assembly

Initial Setup:

Equipment Conditions:
- Alternator removed (see paragraph 4-51)

Tools/Test Equipment:
- Automotive and electrical system shop set

References:
- TM 9-214

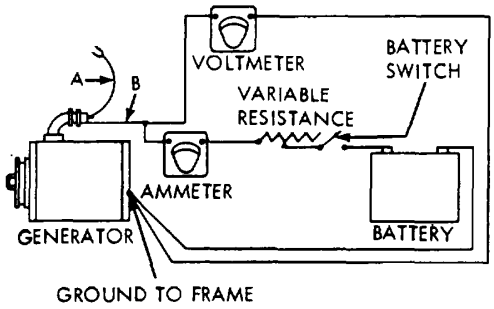
Materials/Parts:
- Abrasive cloth (Item 10, Appendix E)
- Grease (Item 22, Appendix E)
- Rags (Item 35, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- Masking tape (Item 43, Appendix E)
- Insulating varnish (Item 44, Appendix E)

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

5-73. ALTERNATOR TESTING AND REPAIR (Con't).

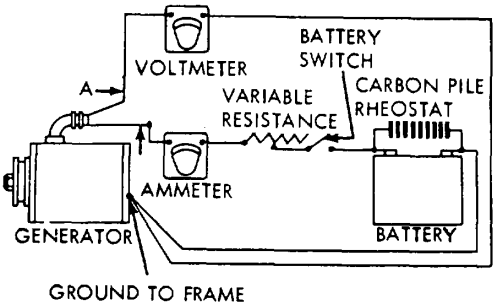
a. FIELD CURRENT DRAW TEST

1. Position alternator In test stand as illustrated.
2. Adjust variable resistance until voltage is 24 volts.
3. Read field current draw. Reading must be 24.0-28.5 volts and 0.85-0.89 amps. If field current draw is not within limits, repair alternator.



b. ALTERNATOR OUTPUT TEST

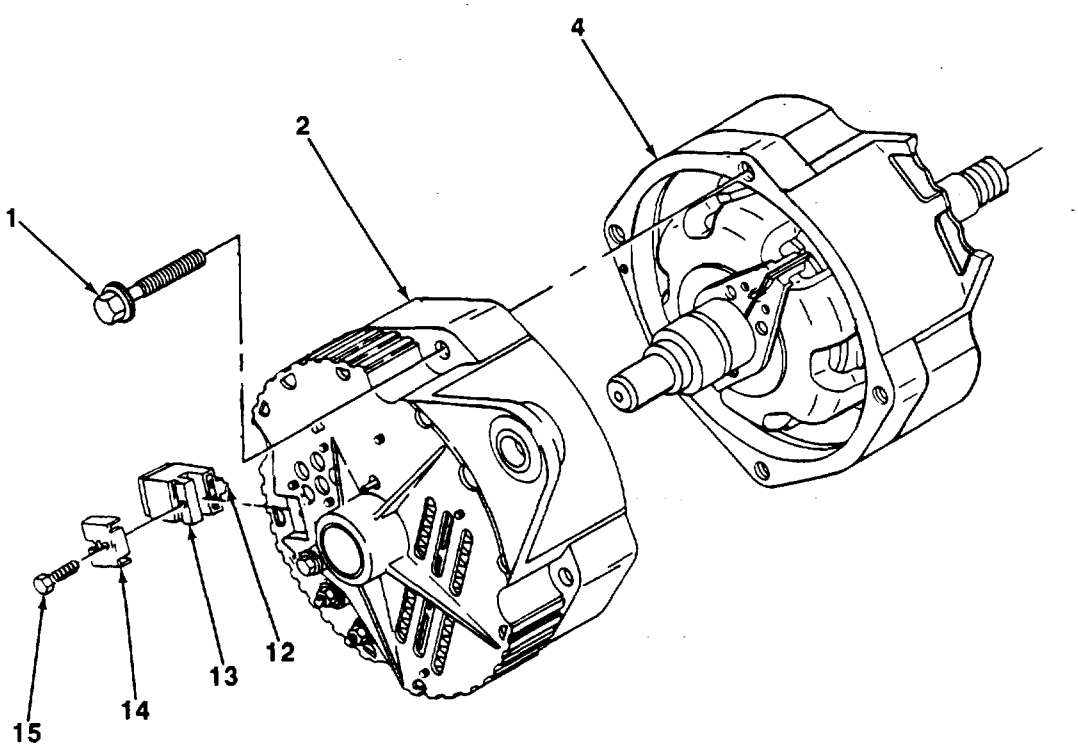
1. Position alternator in test stand as illustrated.
2. Connect alternator to test stand driving motor.
3. Start motor to drive alternator In clockwise rotation as viewed from drive end.
4. Close battery switch and adjust carbon pile rheostat until voltage Is 24.0-28.5 volts.
5. Slowly increase speed to 1950 rpm. Current output should be 28.5 volts and 18 amps. If current output is not as specified, repair alternator.



5-73. ALTERNATOR TESTING AND REPAIR (Con't).

c. DISASSEMBLY

1. Remove capscrew (15) and retainer bracket (14) from connector body (13).
2. Push in on lock tab (12) and remove connector body (13) from slip ring end frame (2).
3. Remove four screws (1) from slip ring end frame (2).
4. Remove slip ring end frame (2) from drive end frame (4).
5. If bearing will not be replaced, place a piece of masking tape over drive end frame (4) bearing to prevent entry of dirt and foreign material.



5-73. ALTERNATOR TESTING AND REPAIR (Con't).

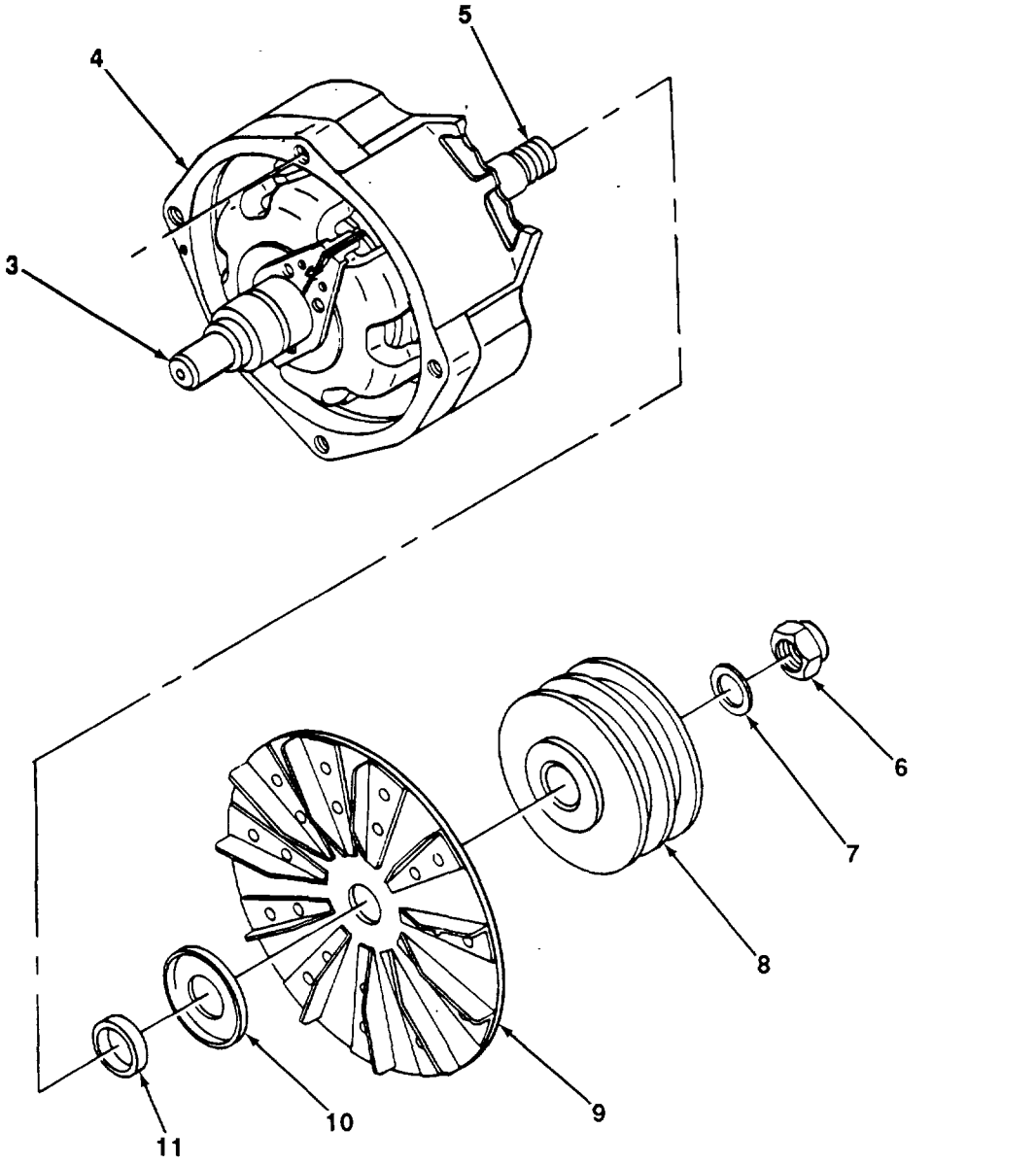
CAUTION

Rotor assembly should not be secured in vise at slip rings on shaft. Failure to follow this caution may result In damage to slip rings or shaft.

6. Place rotor assembly (3) in soft-jawed vise. Remove nut (6), washer (7), groove pulley (8), fan (9), dust shield (10), and collar (11) from rotor shaft (5).

7. Remove rotor assembly (3) from soft-jawed vise.

8. Gently tap threaded end of rotor shaft (5) and remove rotor assembly (3) from drive end frame (4).



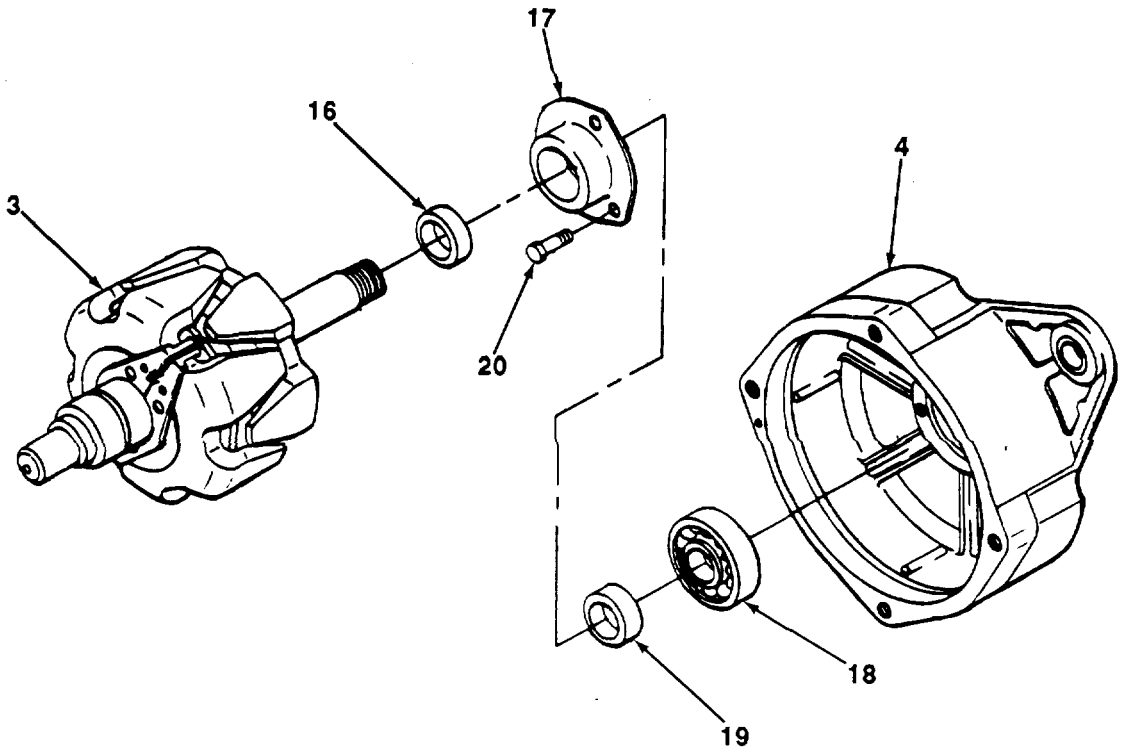
TA705154

5-73. ALTERNATOR TESTING AND REPAIR (Con't).

9. Remove collar (16) from rotor assembly (3).

NOTE
Perform steps 10 through 12 only If bearing must be replaced.

10. Remove three screws (20) and retainer (17) from drive end frame (4).
11. Remove felt seal (19) from retainer (17). Discard felt seal.
12. Remove bearing (18) from drive end frame (4).



5-73. ALTERNATOR TESTING AND REPAIR (Con't).

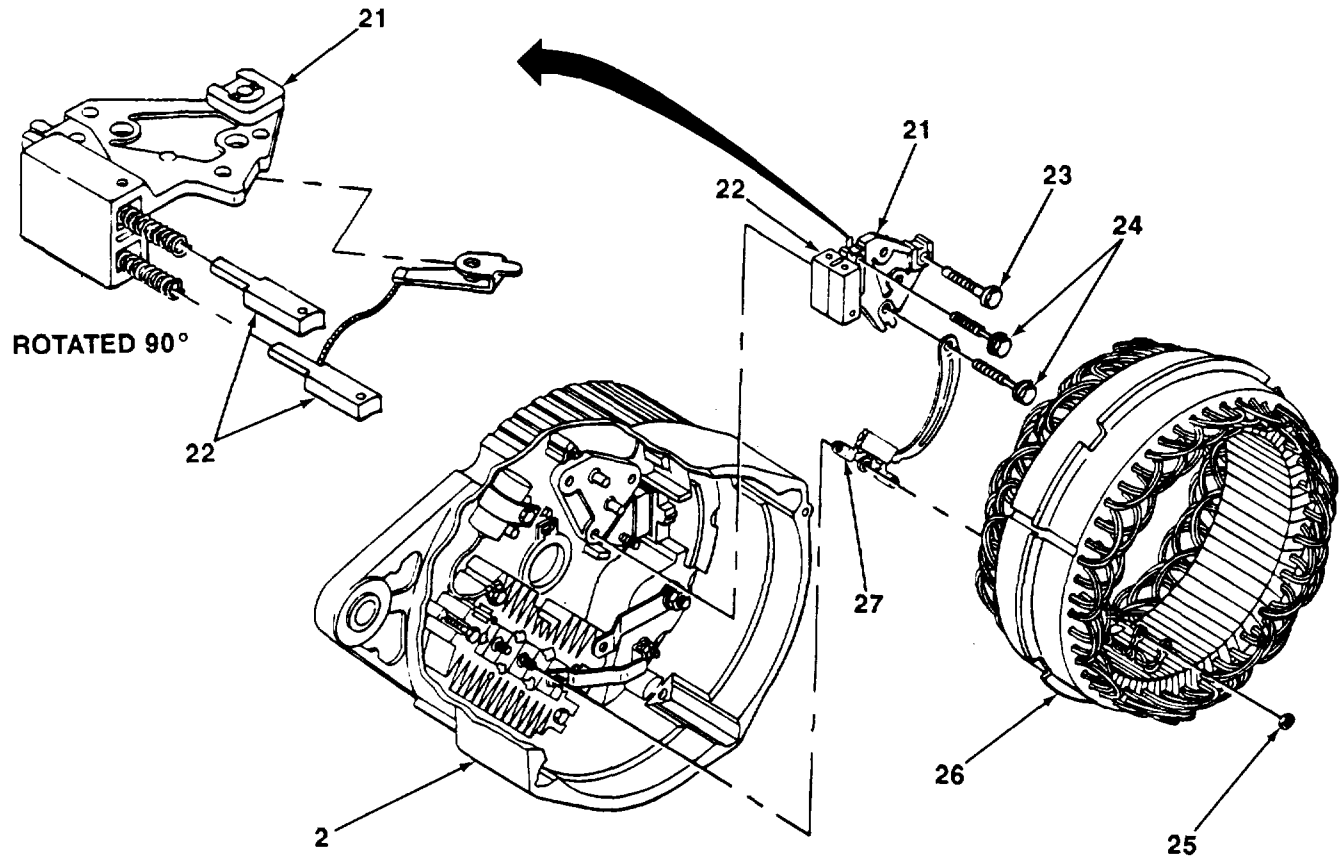
CAUTION

Engine stator should be handled with caution to avoid damage to coils. Failure to follow this caution may result In shorted engine stator and low alternator output.

13. Remove three nuts (25) and engine stator (26) from slip ring end frame (2).

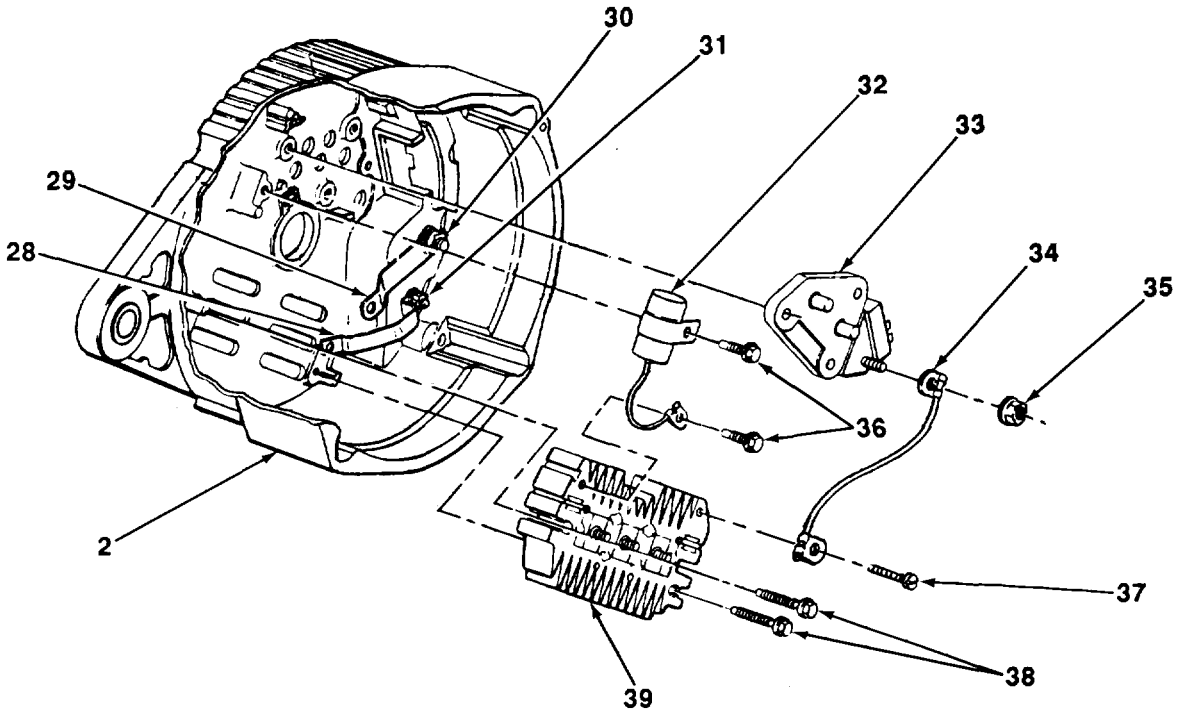
14. Remove two capscrew and insulator assemblies (24) and capscrew and washer assembly (23) from electrical brush holder assembly (21).

15. Remove semiconductor (27), electrical brush holder assembly (21), and brushes (22) from slip ring end frame (2).



5-73. ALTERNATOR TESTING AND REPAIR (Con't).

16. Remove two capscrews (36) and fixed capacitor (32) from slip ring end frame (2).
17. Remove capscrew (37), nut (35), and electrical lead (34) from slip ring end frame (2).
18. Remove alternator regulator (33) from slip ring end frame (2).
19. Loosen, but do not remove nuts (30 and 31) from connectors (28 and 29).
20. Remove two capscrews (38) and rectifier bridge (39) from slip ring end frame (2).



5-73. ALTERNATOR TESTING AND REPAIR (Con't).

21. Remove nut (30), connector (29), and Insulator (41) from terminal assembly (40).

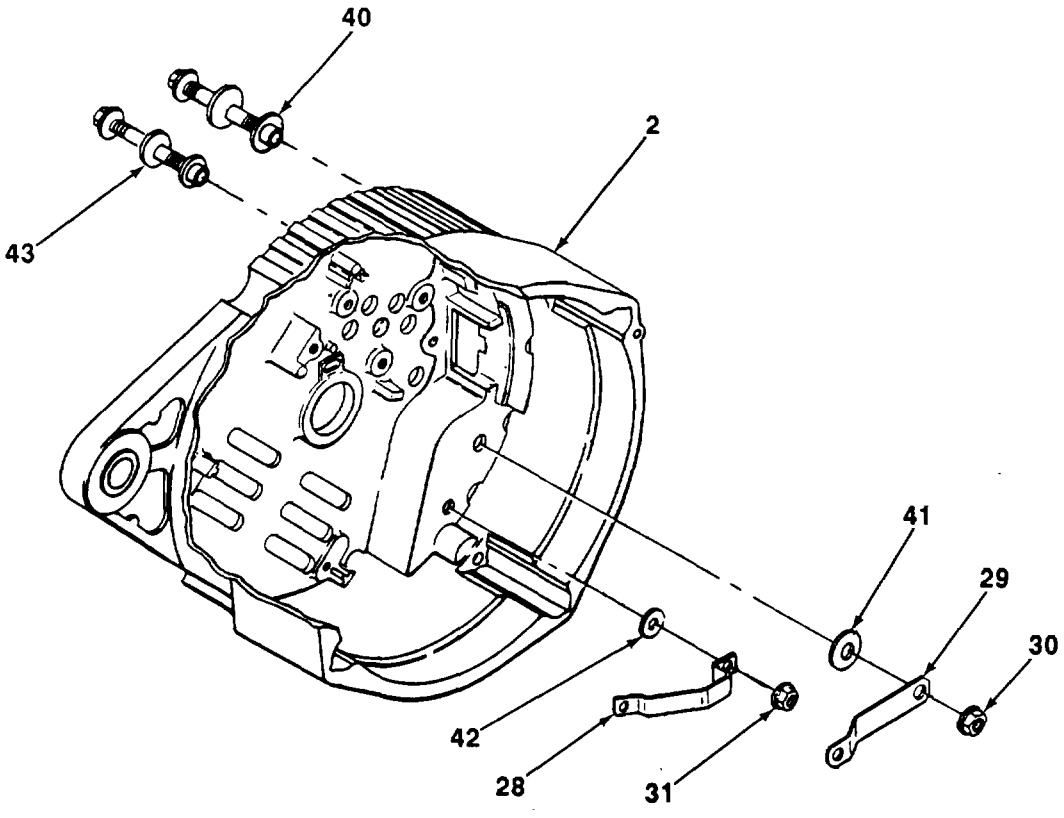
NOTE
Terminal assembly comes out in one piece. DO NOT take apart.

22. Remove terminal assembly (40) from slip ring end frame (2).

23. Remove nut (31), connector (28), and insulator (42) from terminal assembly (43).

NOTE
Terminal assembly comes out In one piece. DO NOT take apart.

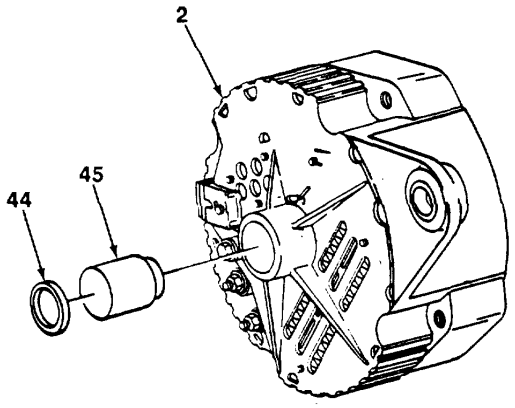
24. Remove terminal assembly (43) from slip ring end frame (2).



TA705158

5-73. ALTERNATOR TESTING AND REPAIR (Con't).

25. If damaged, remove and discard roller bearing and plug assembly (45) and seal (44) from slip ring end frame (2).



d. CLEANING AND INSPECTION

WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

1. Clean all electrical parts with a clean rag and compressed air to clear away loose particles.

WARNING

Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 1000F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

2. Clean all metal parts with dry cleaning solvent. Dry with clean rags.

3. Inspect electrical brush holder assembly for damage. Replace electrical brush holder assembly if damaged or If brushes are worn to a length of X in. (9.53 mm) or less. If brushes are to be reused, clean with soft dry cloth.

4. Inspect two capscrew and insulator assemblies for damage and missing insulators. Replace if insulators are damaged or missing.

5. Inspect slip ring end frame roller bearing and plug assembly for damage In accordance with TM 9-214. Inspect bearing for Inside diameter of 0.9839-0.9843 in. (24.9911-25.0012 mm) and outside diameter of 2.4404-2.4409 in. (6.19862-6.19989 cm). Replace bearing if damaged, or if grease supply is used up, or if measurements are not within specified limits.

TA705159

5-73. ALTERNATOR TESTING AND REPAIR (Con't).

6. Inspect rotor assembly slip rings for scoring, wear, and pitting.

   (a) If slip rings are dirty, clean with 400 grit or finer abrasive cloth. Spin rotor assembly and hold abrasive cloth against slip rings until clean.
   (b) If scored, worn, or pitted, turn slip rings in lathe and remove only enough material to make slip rings smooth and round. Finish with 400 grit or finer abrasive cloth. Clear away all dust.

7. Inspect slip ring end of rotor shaft for overheating and scoring. If there are signs of overheating or scoring, replace slip ring end frame bearing and rotor assembly.

8. Inspect drive end frame bearing for damage in accordance with TM 9-214. Inspect felt seal in retainer for damage. If drive end frame bearing or felt seal is damaged, replace both bearing and felt seal.

9. Inspect engine stator and rotor assembly winding for burned insulation. Burned insulation appears as a dark or blackened wiring. A strong burned odor will be apparent. Replace engine stator or rotor assembly if either looks burned.

10. Inspect engine stator terminal connector for corrosion and breaks. If corroded or broken, replace engine stator.

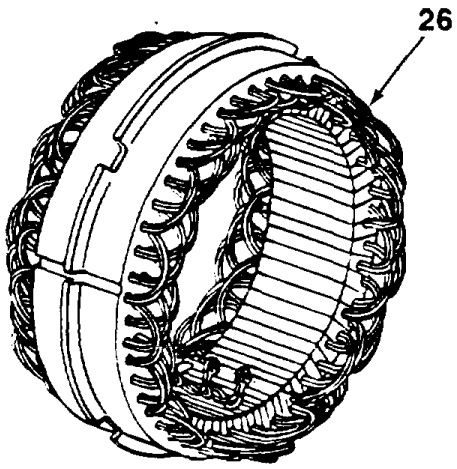
11. Inspect windings on engine stator for chipped insulation. Repair engine stator insulation with insulating varnish if possible. Replace engine stator if insulation cannot be repaired with insulating varnish.

e. COMPONENT TEST

1. Using test light or ohmmeter, check continuity between each engine stator lead terminal with scale of 200 ohms or less. If there is no continuity, replace engine stator.

2. Using test light or ohmmeter, check continuity between each engine stator lead and engine stator (26) frame. If continuity Is not infinite, replace engine stator.

3. Connect voltmeter and fast charger to 12-volt battery.



TA705160

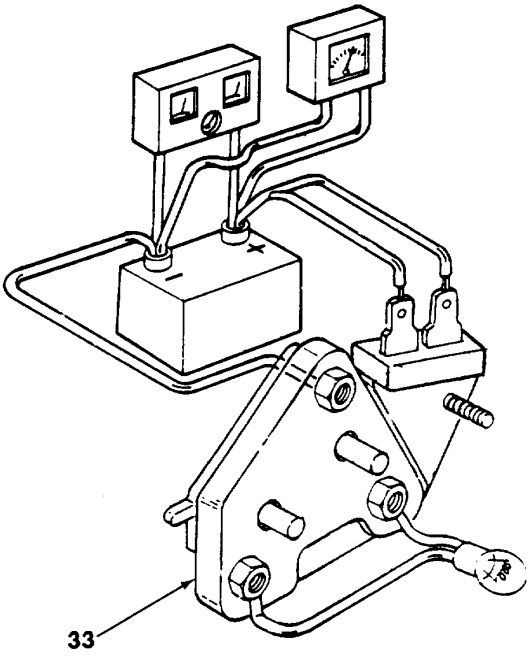
5-73. ALTERNATOR TESTING AND REPAIR (Con't).

4. Connect alternator regulator (33) and test lamp as shown.

5. Observe battery polarity. Test lamp should be on.

6. Turn on fast charger and slowly Increase charge rate. Observe voltmeter. Test lamp should go out at alternator regulator (33) setting. Alternator regulator setting should be a minimum of 27.8 volts and a maximum of 28.2 volts

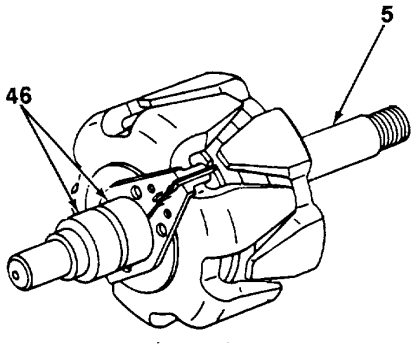
7. Remove test lamp and disconnect voltmeter and fast charger.



8. Using self-powered test light or ohmmeter, check for continuity between slip rings (46). If continuity Is not present, replace rotor assembly.

9. Using self-powered test light or ohmmeter, check for continuity between each slip ring (46) and rotor shaft (5). If there is continuity, replace rotor assembly.

10. Check for rotor assembly short circuits and extreme resistance by connecting a battery and ammeter in series with edges of two slip rings (46). Ammeter reading at 70^0F (21 °C) should be 4.5-5.0 amps. If ammeter reading is not within specification, replace rotor assembly.



TA705161

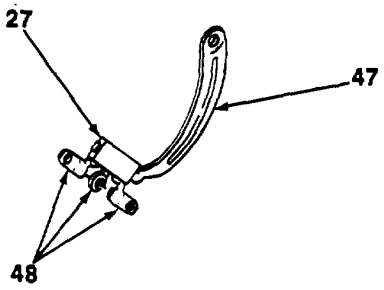
5-73. ALTERNATOR TESTING AND REPAIR (Con't).

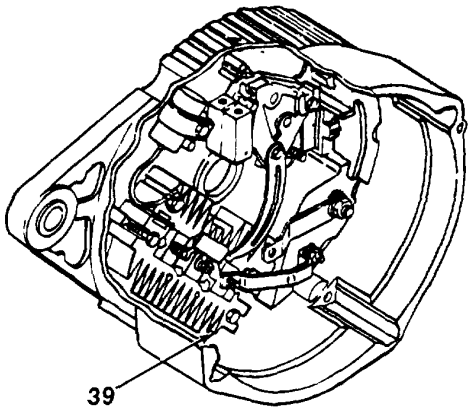
11. Connect ohmmeter, with a 1j-volt cell, to single connector (47) and to one of three connectors (48) on semiconductor (27). Set ohmmeter to lowest range scale. Observe reading. Reverse ohmmeter leads to same two connectors. In one direction, reading should be infinite. In other direction, reading should be finite.

12. Place rectifier bridge (39) on nonconductive work surface. Slightly separate six tabs at three diode terminals for testing. Connect an ohmmeter to negative heat sink and to each of three terminals on negative (-) heat sink side. Record readings. Reverse connectors. One test should give infinite readings and other test should give finite readings.

13. Check three terminals on positive (+) heat sink side in same manner. One test should give infinite readings and other test should give finite readings.

14. If any reading does not meet specifications, replace rectifier bridge (39).





F. ASSEMBLY

NOTE

Perform steps 1 through 5 only if items were removed.

1. Fill roller bearing and plug assembly (45) end with grease and install in slip ring end frame (2).

2. Install seal (44) In slip ring end frame (2).

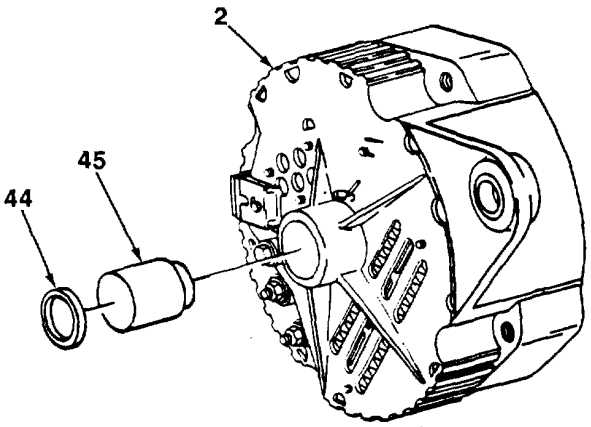
3. Install bearing (18), sealed side down, in drive end frame (4) until seated.

4. Position felt seal (19) in retainer (17).

5. Fill remaining space in retainer (17) with grease and install retainer on drive end frame (4) with three screws (20).

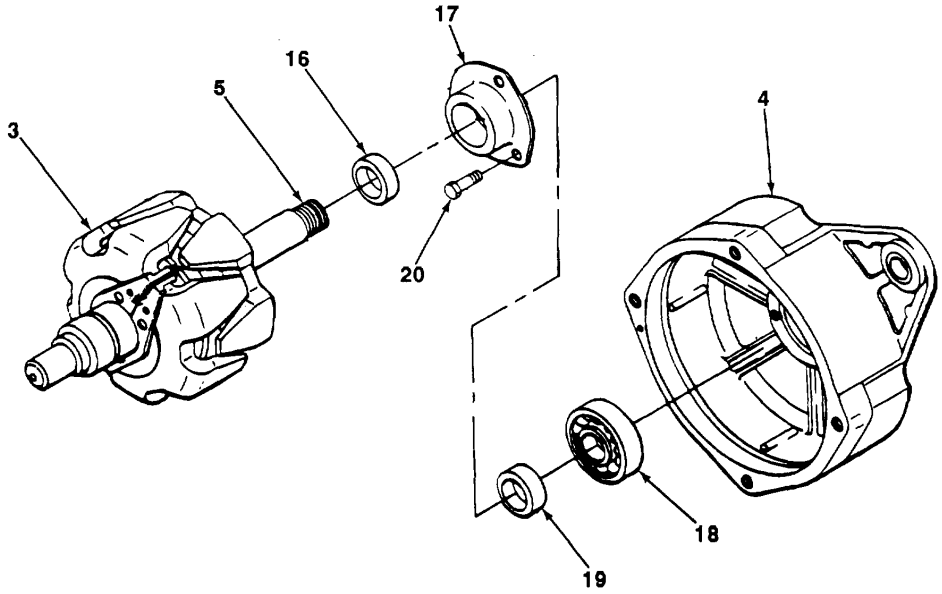
6. Install collar (16) on rotor shaft (5).

7. Install drive end frame (4) on rotor assembly (3).

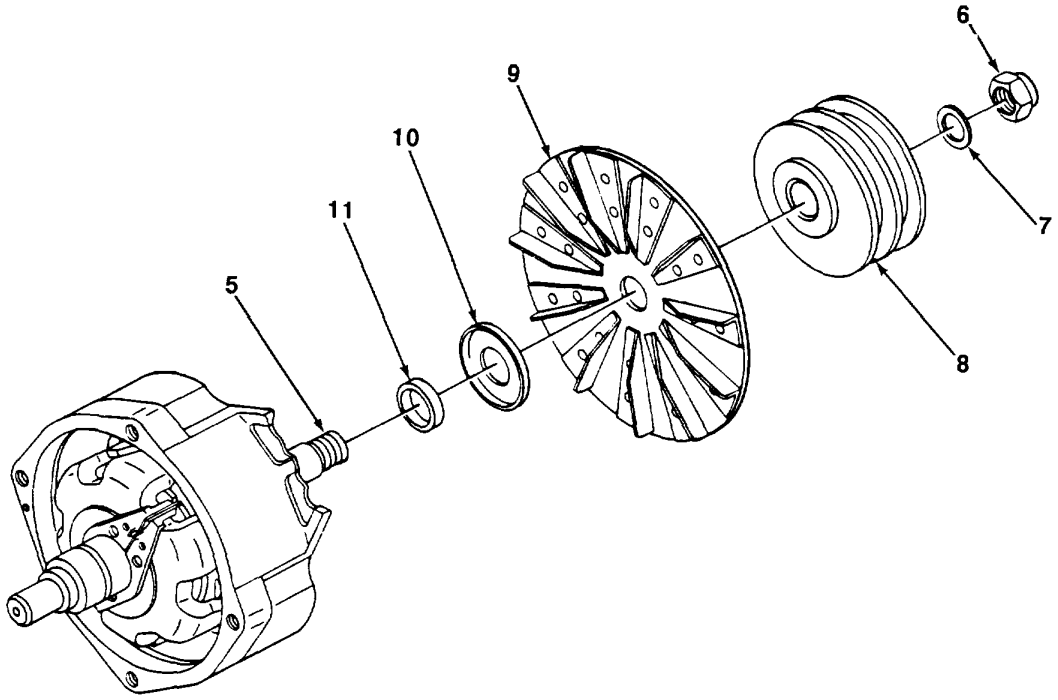


TA705162

5-73. ALTERNATOR TESTING AND REPAIR (Con't).



8. Install collar (11), dust shield (10), fan (9), and groove pulley (8) on rotor shaft (5) with washer (7) and nut (6). Torque nut to 70-80 lb.-ft. (95-108 N•m).



TA705163

5-73. ALTERNATOR TESTING AND REPAIR (Con't).

9. Install rectifier bridge (39) on slip ring end frame (2) with two capscrews (38).

10. Install fixed capacitor (32) on slip ring end frame (2) with two capscrews (36).

11. Position terminal assembly (40) on slip ring end frame (2).

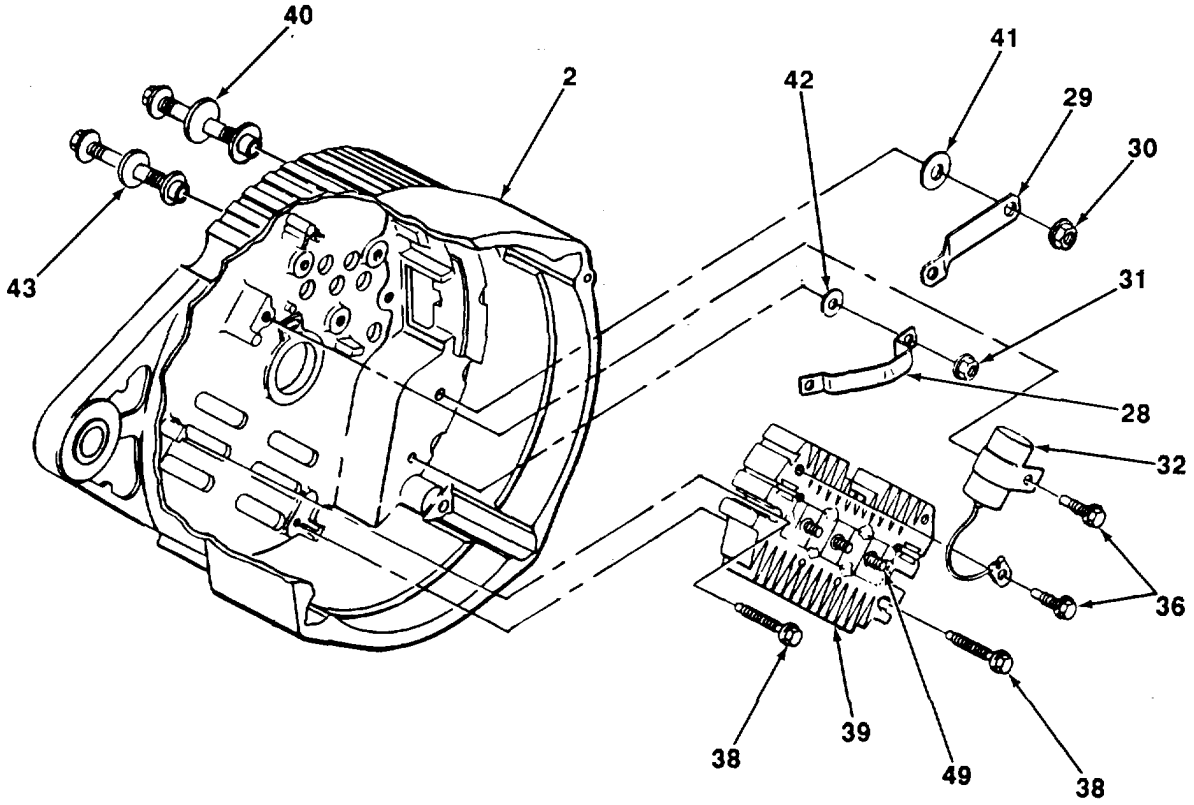
12. Install insulator (41) and connector (29) on terminal assembly (40) with nut (30). Do not tighten nut.

13. Position terminal assembly (43) on slip ring end frame (2).

14. Position insulator (42) and connector (28) on terminal assembly (43).

15. Position end of connector (28) on rectifier bridge screw (49).

16. Install nut (31) on terminal assembly (43).



TA705164

5-73. ALTERNATOR TESTING AND REPAIR (Con't).

17. Position alternator regulator (33) on slip ring end frame (2).

18. Position brushes (22) and springs (54) in electrical brush holder assembly (21).

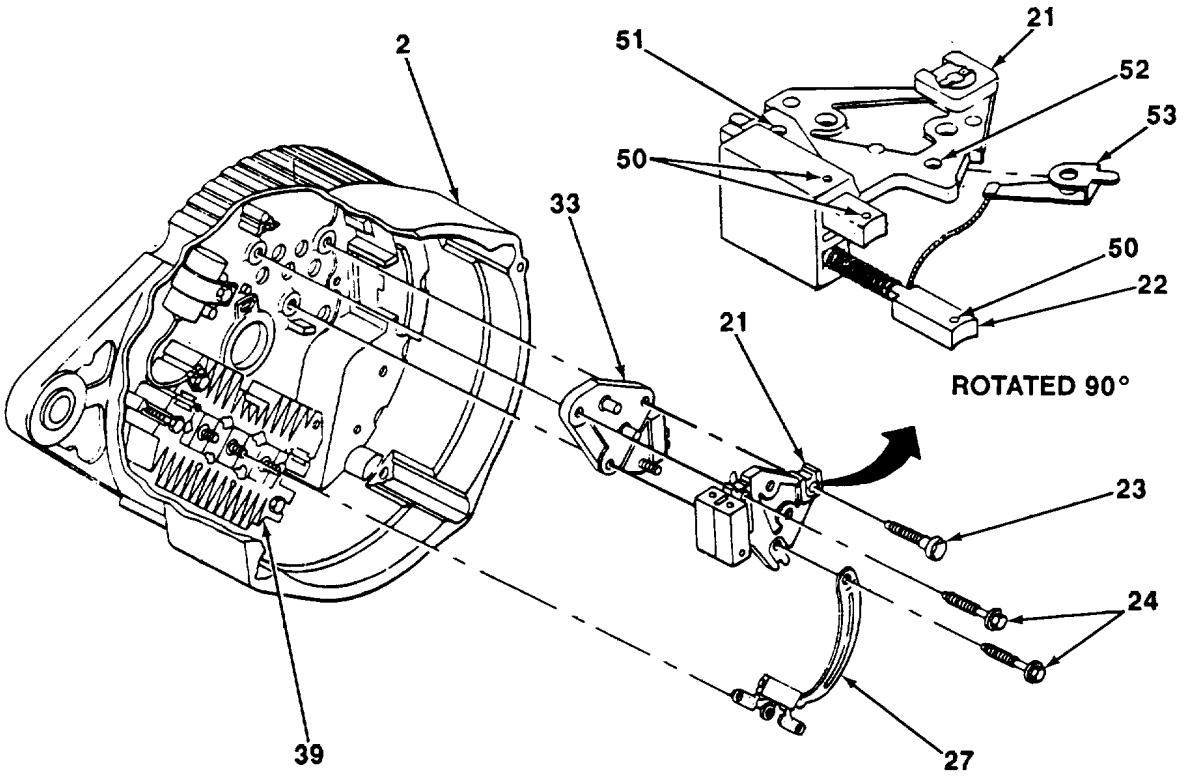
19. Push brushes (22) into electrical brush holder assembly (21) and hold by positioning small, stiff wire through holes (50) in brushes.

20. Aline brush clips (53) with holes (51 and 52).

21. Position electrical brush holder assembly (21) on alternator regulator (33).

22. Position semiconductor (27) on rectifier bridge (39).

23. Install capscrew and washer assembly (23) and two capscrew and insulator assemblies (24) on electrical brush holder assembly (21).



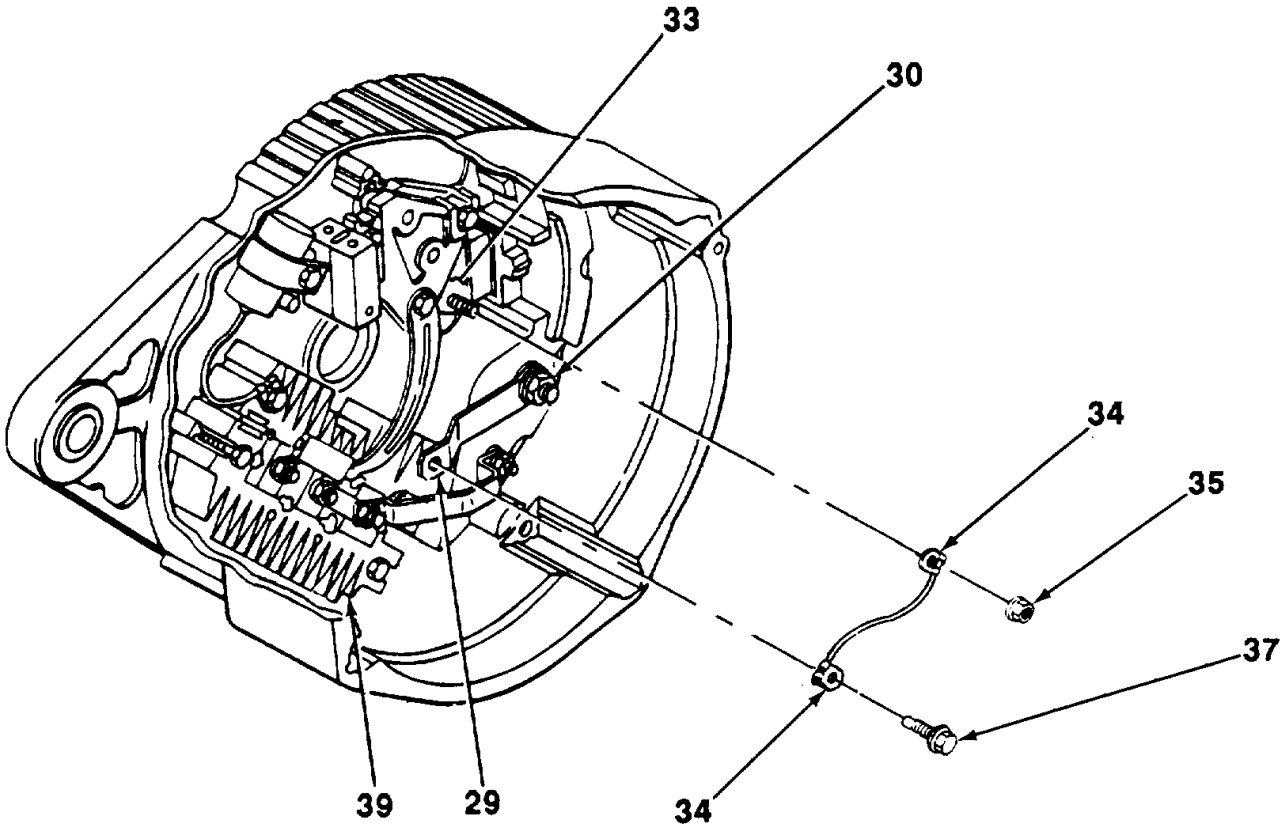
TA705165

5-73. ALTERNATOR TESTING AND REPAIR (Con't).

24. Install connector (29) and electrical lead (34) on rectifier bridge (39) with capscrew (37).

25. Tighten nut (30).

26. Install electrical lead (34) on alternator regulator (33) with nut (35).



TA705166

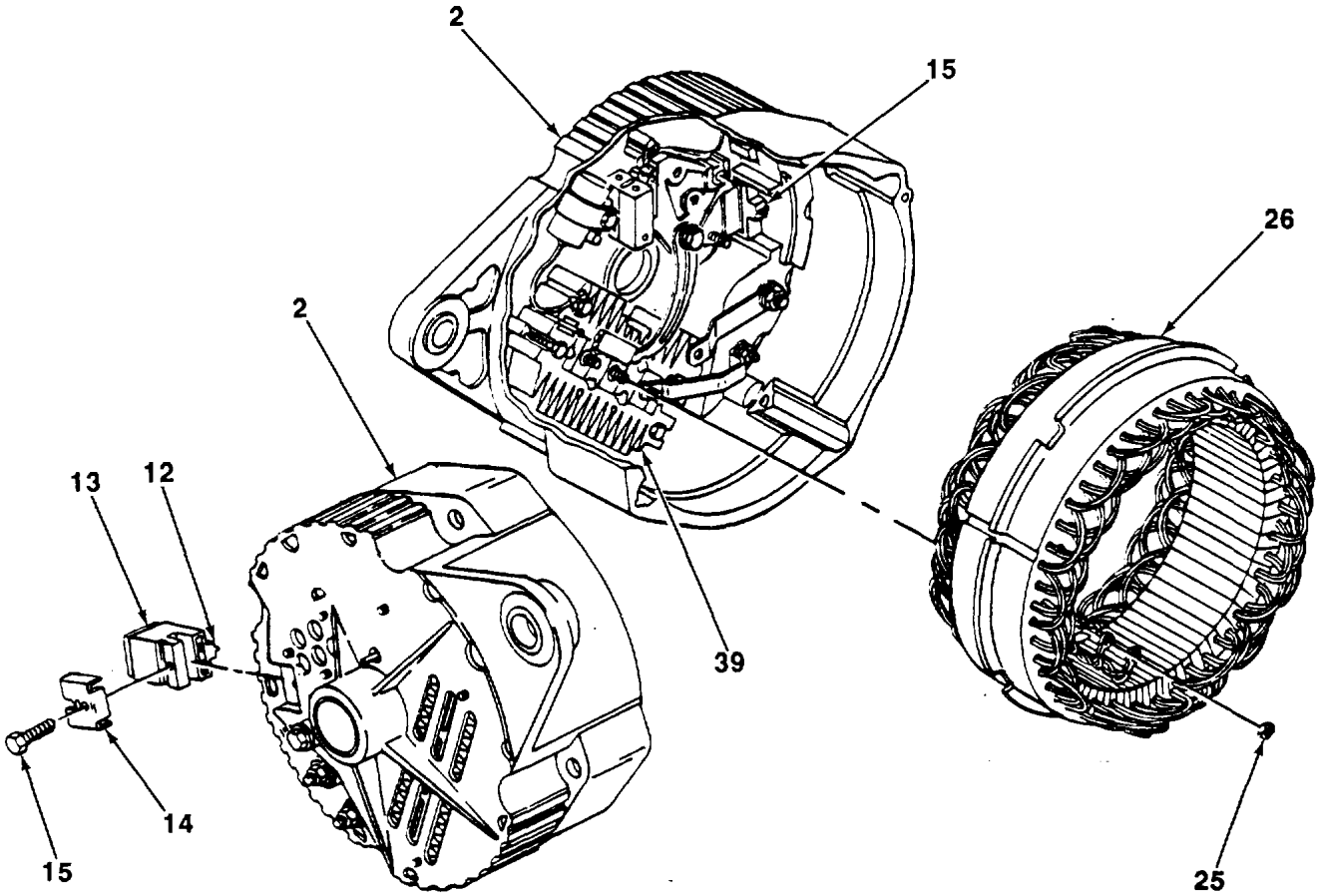
5-73. ALTERNATOR TESTING AND REPAIR (Con't).

27. Install connector body (13) on slip ring end frame (2). Ensure that lock tab (12) engages on slip ring end frame.

28. Install retainer bracket (14) on connector body (13) with capscrew (15).

29. Position engine stator (26) on slip ring end frame (2) with three engine stator leads on rectifier bridge (39).

30. Install three nuts (25) on engine stator (26) and rectifier bridge (39).



TA705167

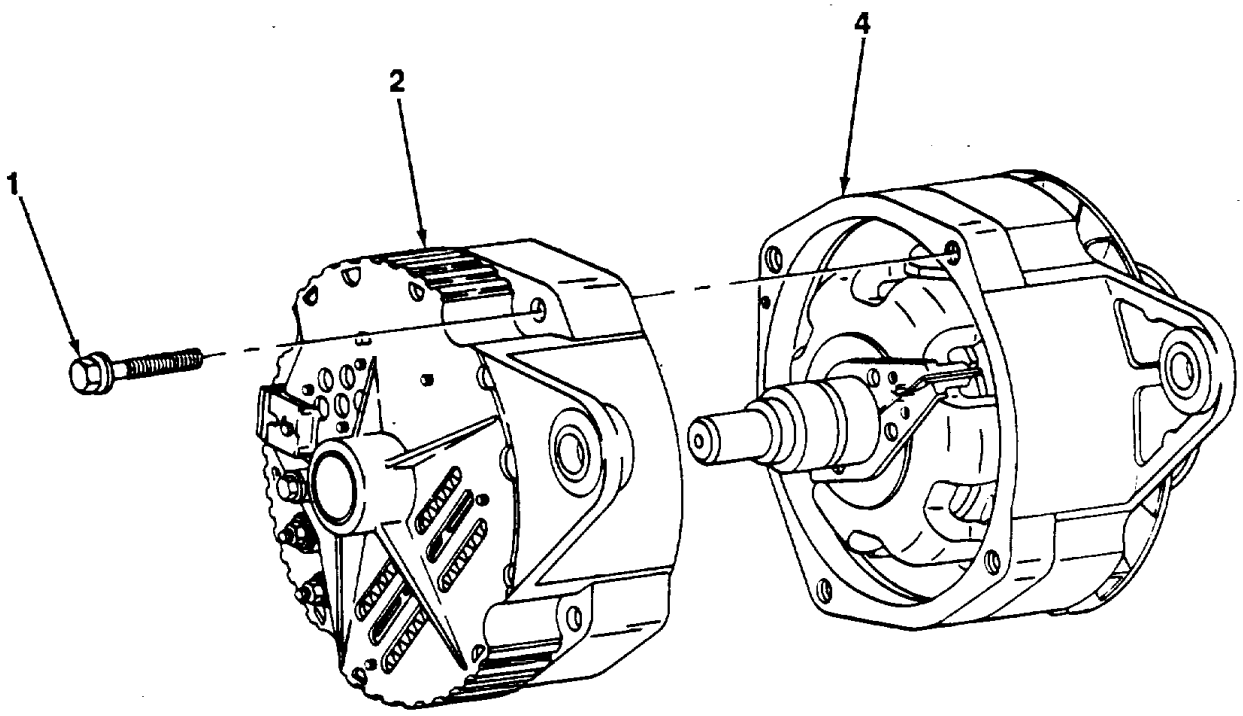
5-73. ALTERNATOR TESTING AND REPAIR (Con't).

CAUTION

DO NOT force end frames together. With parts properly alined, end frames should slide together smoothly.

31. Install slip ring end frame (2) to drive end frame (4) with four screws (1).

32. Remove wire to release brushes against slip ring.



FOLLOW-ON TASKS:

- Install alternator (see paragraph 4-51).

TA705168

5-74. ENGINE STARTER TESTING.

This Task Covers:

a. Continuity Test
b. No Load Test
c. Lock Torque Test

Initial Setup:

Equipment Conditions:
- Engine starter removed (see paragraph 4-53).

Tools/Test Equipment:
- Automotive fuel and electrical system shop set
- Alternator and starter automotive generator test stand

Materials/Parts:
- Rags (Item 35, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- Two gaskets

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only In a well-ventilated area.

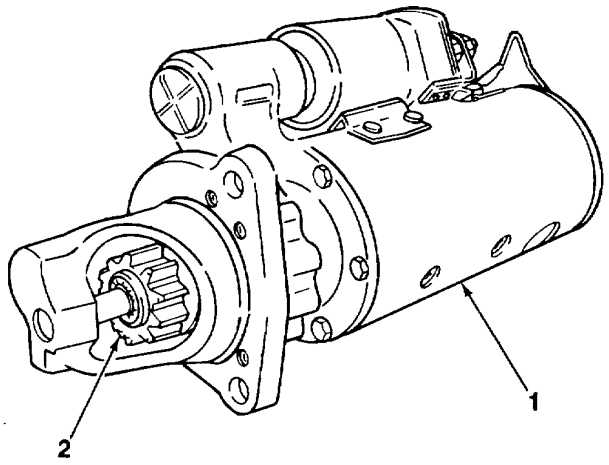
a. CONTINUITY TEST

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

1. Clean outside of engine starter (1) with dry cleaning solvent and clean rag.

2. Check that pinion (2) will rotate In one direction and slip in other direction. If not, repair engine starter (see paragraph 575).



TA705169

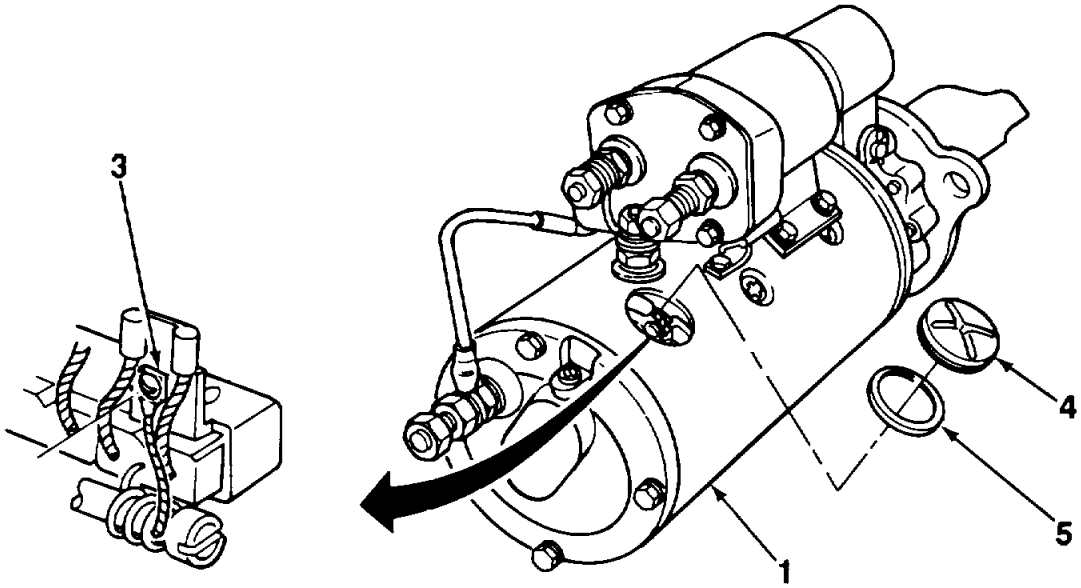
5-74. ENGINE STARTER TESTING (Con't).

3. Remove two inspection plugs (4) and gaskets (5) from engine starter (1). Discard gaskets.

4. Inspect two inspection plugs (4) for damage. Replace if damaged.

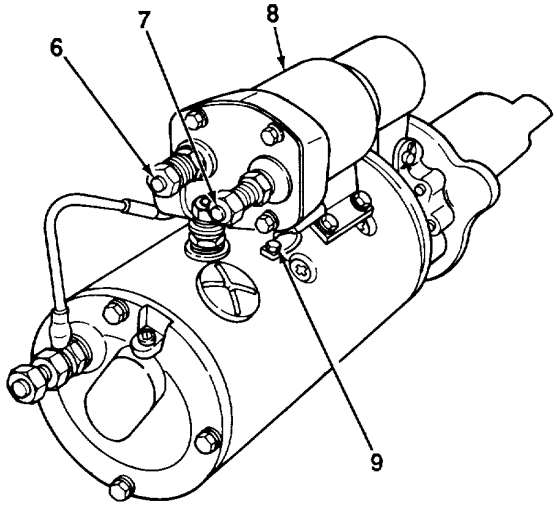
5. Set multimeter to RX1 scale and check continuity between two field leads (3). If multimeter reads 10 ohms or more, repair engine starter (see paragraph 5-75).

6. Set multimeter to RX10,000 scale. Check continuity between each field lead (3) and engine starter (1). If multimeter reads anything except infinity, repair engine starter (see paragraph 5-75).



7. Set multimeter to RX1 scale. Check continuity between terminal (7) and terminal (9). If multimeter reads more than 10 ohms, replace engine starter solenoid (see paragraph 5-77).

8. Set multimeter to RX10,000 scale. Check resistance between terminal (9) and solenoid (8). Check continuity between terminal (6) and solenoid. Check resistance between terminal (7) and solenoid. If multimeter reads anything except infinity for any of the three checks, replace engine starter solenoid (see paragraph 5-77).



TA705170

5-74. ENGINE STARTER TESTING (Con't).

b. NO LOAD TEST

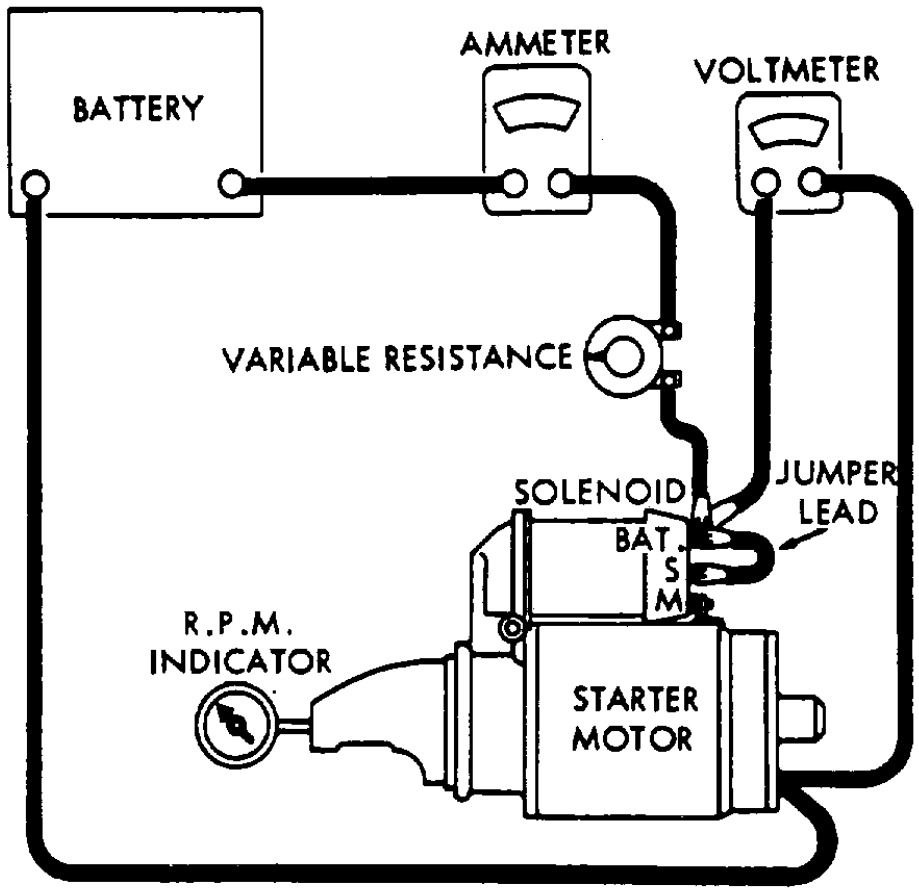
1. Position engine starter in test stand as illustrated.

CAUTION

Never operate engine starter more than 30 seconds at a time. Allow engine starter to cool for at least two minutes between cycles. Excessive cranking will cause engine starter to overheat resulting in serious damage to engine starter.

2. Connect jumper lead from solenoid battery terminal to solenoid switch terminal. Check rotation speed. Adjust variable resistance to obtain 22 volts. Minimum speed should be 7000 rpm. If starter speed is not as specified, repair engine starter (see paragraph 5-75).

3. Check current draw on ammeter. Maximum current draw should be 90 amps. If current draw is not as specified, repair engine starter (see paragraph 5-75).



TA705171

5-74. ENGINE STARTER TESTING (Con't).

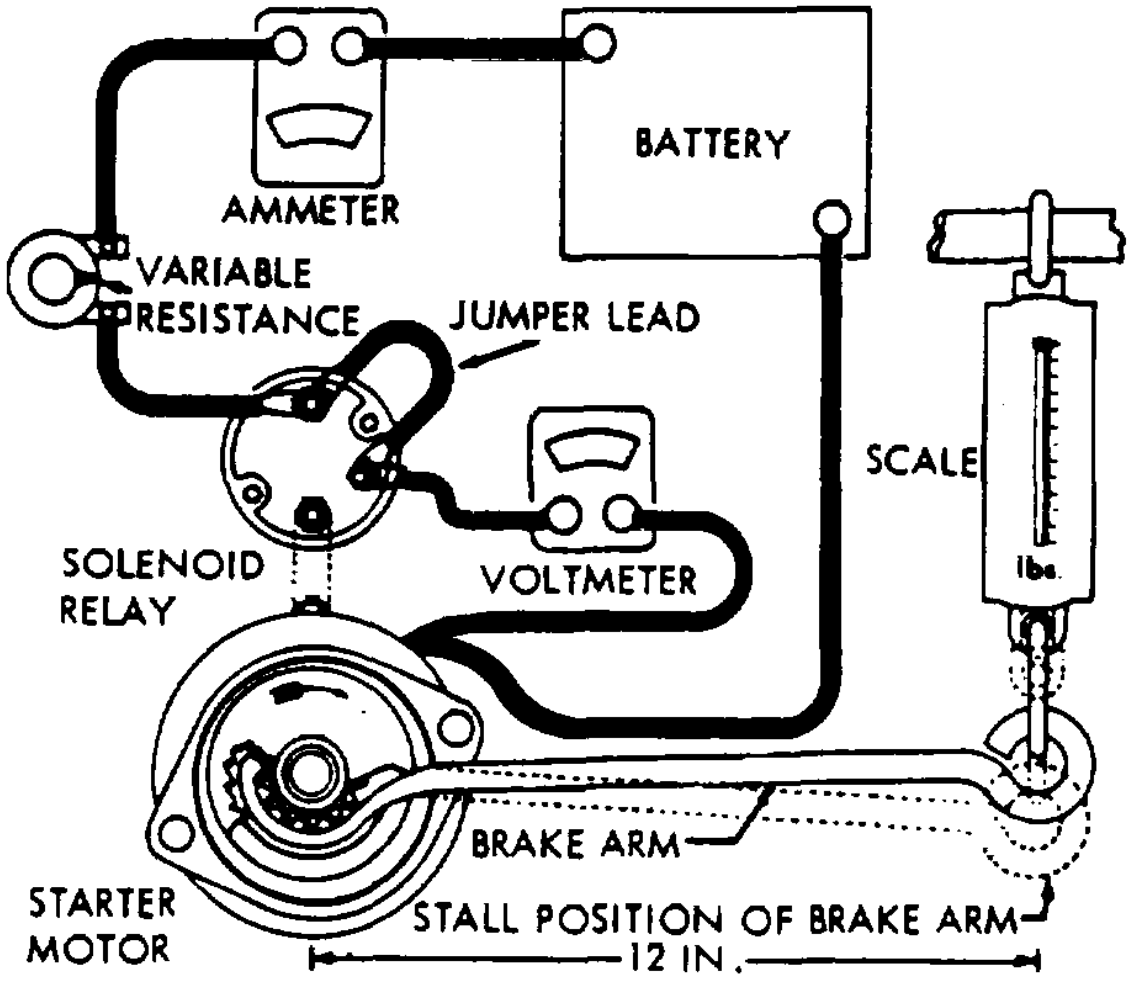
c. LOCK TORQUE TEST

1. Position engine starter in test stand as Illustrated. Engine starter should be securely mounted and brake arm hooked to starter gear.

CAUTION

Ensure that brake arm does not slip off starter gear during test when current Is applied. Failure to follow this caution could cause damage to equipment.

2. Lock torque test is 32 lb.-ft. (43 Nom) at 500 amps at approximately 3 volts. If measurements are not met, repair engine starter (see paragraph 5-75).



TA705172

FOLLOW-ON TASKS:

- Install engine starter (see paragraph 4-53).

5-75. ENGINE STARTER REPAIR.

This Task Covers:

a. Disassembly
b. Cleaning and Inspection
c. Assembly

Initial Setup:

Equipment Conditions:
- Engine starter removed (see paragraph 4-53).
- Engine starter solenoid removed (see paragraph 5-77).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set
- Automotive fuel and electrical system shop set
- One retaining ring

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.
- Compressed air used for cleaning purposes should never exceed 30 psi (207 kPa).

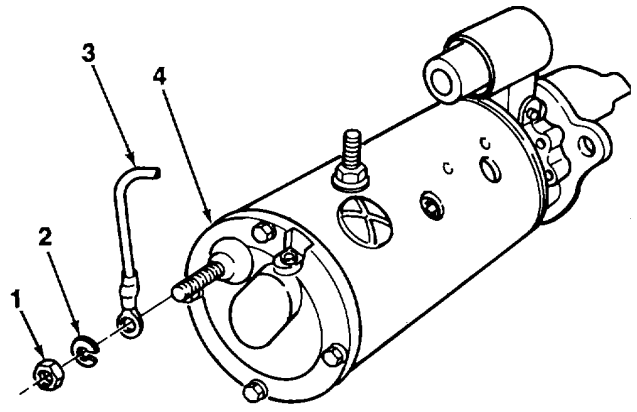
Materials/Parts:
- Adhesive (Item 1, Appendix E)
- Abrasive cloth (Item 9, Appendix E)
- Lubricating oil (Item 28, Appendix E)
- Rags (Item 35, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- One locknut
- One oil seal
- Three gaskets
- Three wicks
- Five preformed packings
- Eleven lockwashers

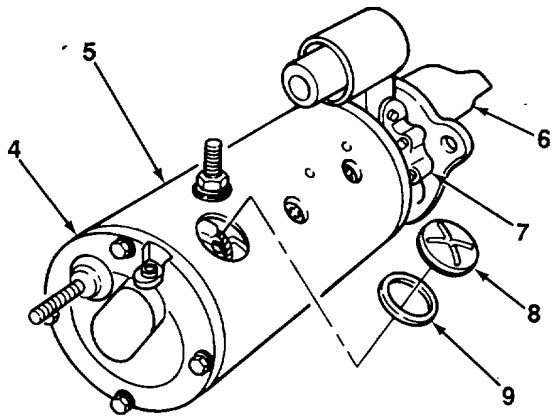
a. DISASSEMBLY

1. Remove nut (1), lockwasher (2), and electrical lead (3) from end cap (4). Discard lockwasher.

2. Mark end cap (4), field frame (5), lever housing (7), and drive housing (6).

3. Remove two Inspection plugs (8) and gaskets (9) from field frame (5). Discard gaskets.

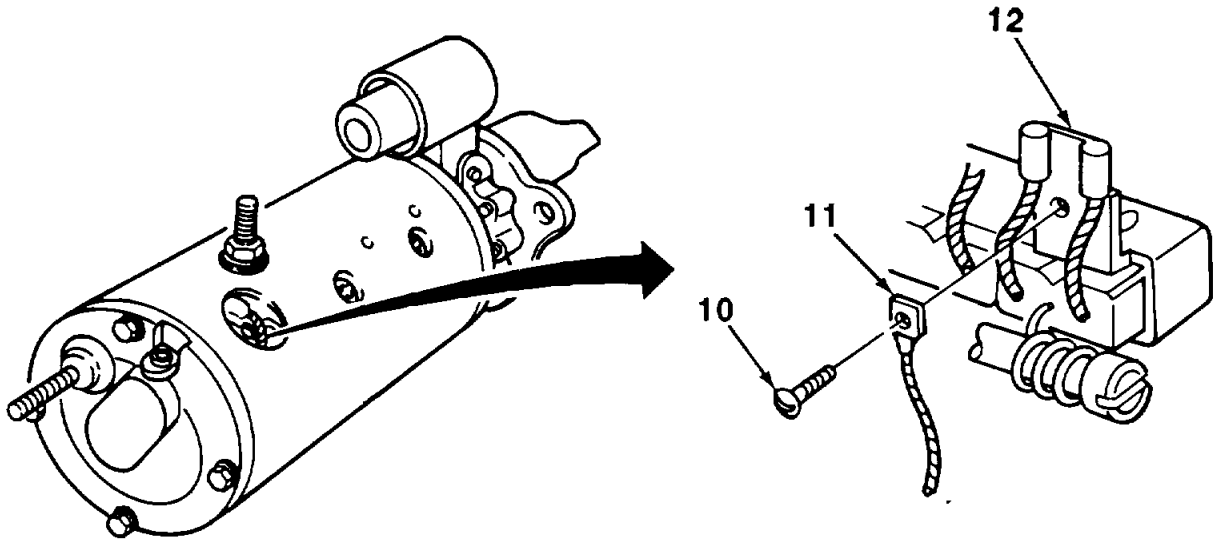




TA705173

5-75. ENGINE STARTER REPAIR (Con't).

4. Remove two screws (10) and field leads (11) from brush holders (12).

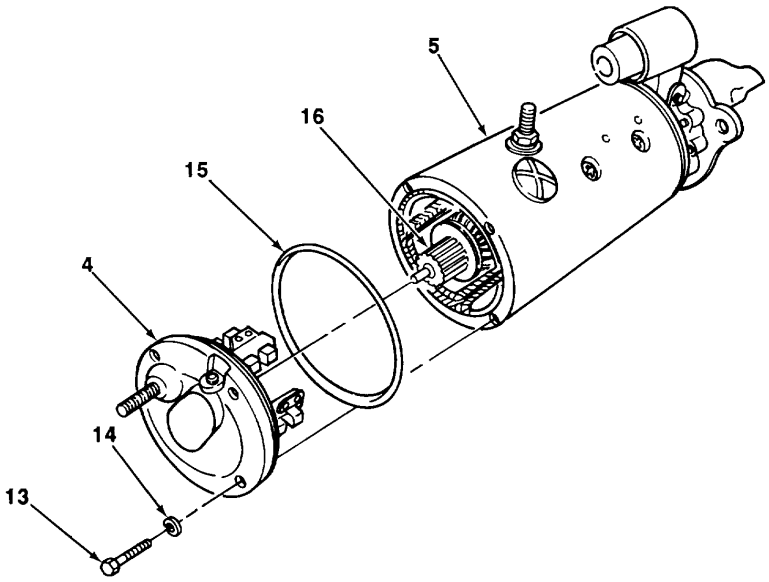


NOTE

Armature may stay with end cap or In field frame.

5. Remove four bolts (13), lockwashers (14), end cap (4), and preformed packing (15) from field frame (5). Discard lockwashers and preformed packing.

6. Remove armature (16).



TA705174

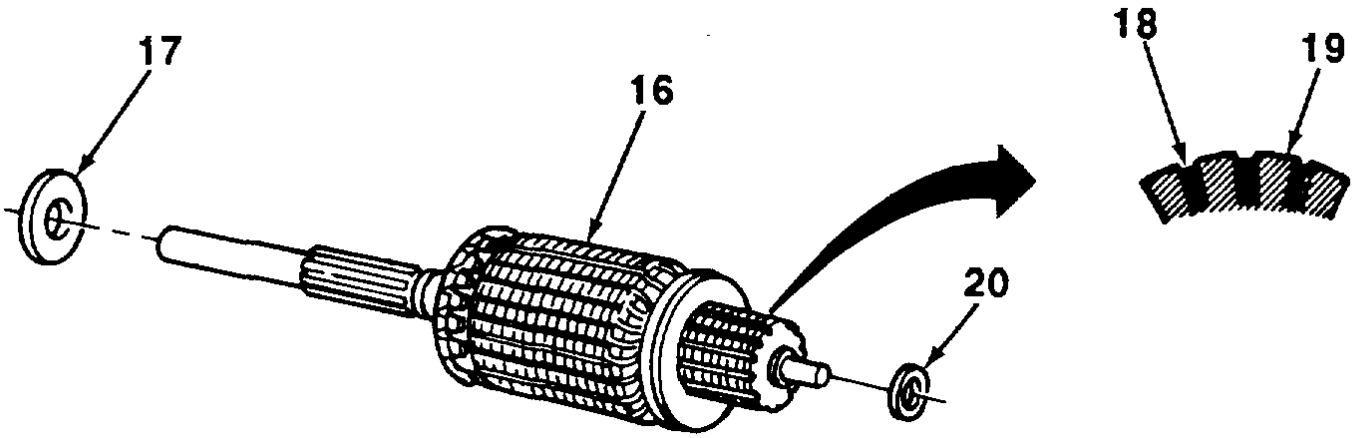
5-75. ENGINE STARTER REPAIR (Con't).

7. Remove washer (20) and thrust washer (17) from armature (16).

WARNING

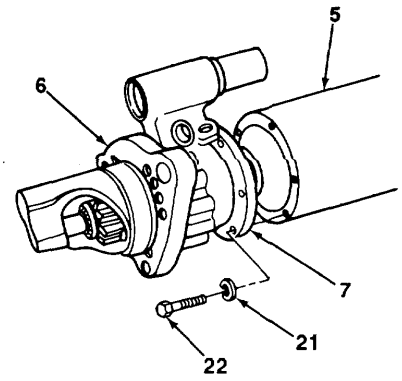
Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

8. Cut commutator (19) as required on lathe. When cutting commutator, cut no more than 0.005 in. (0.127 mm) at a time to remove scoring, pits, burrs, or to return commutator to round. Then make final cut of 0.002 in. (0.051 mm). Undercut mica (18) A2 in. (0.79 mm) wide. Clear off all loose copper and mica particles with compressed air.



9. Polish commutator (19) with abrasive cloth.

10. Remove five bolts (22), lockwashers (21), lever housing (7), and drive housing (6) from field frame (5). Discard lockwashers.



TA705175

5-75. ENGINE STARTER REPAIR (Con't).

NOTE

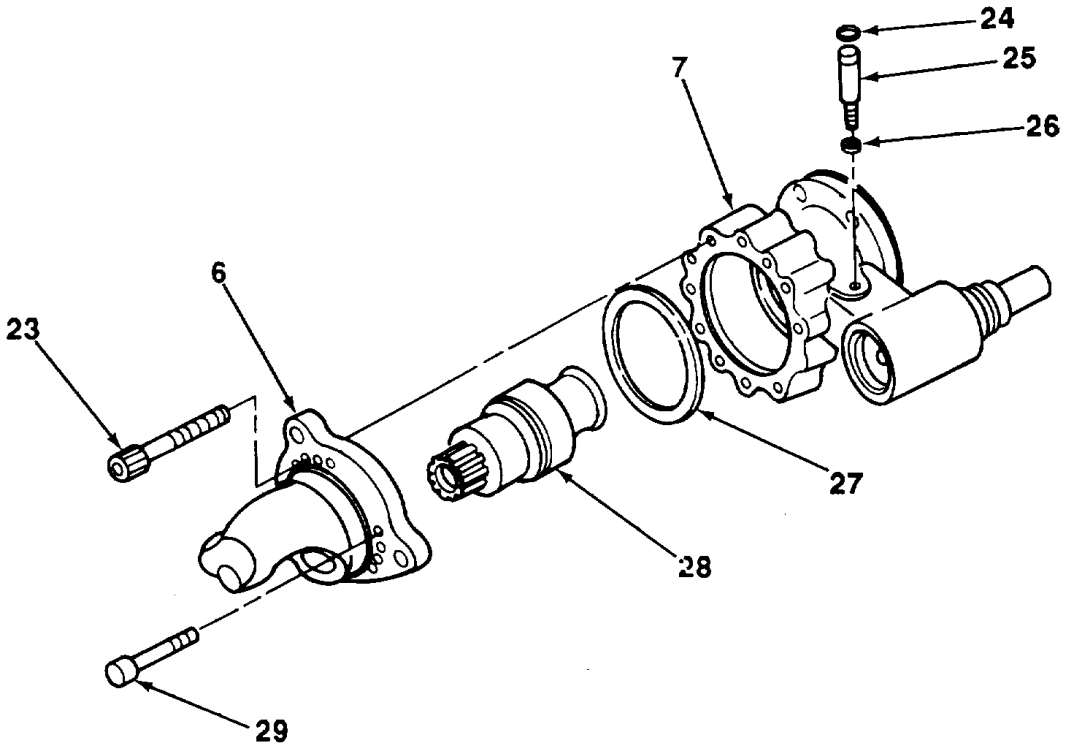
Note location of short bolts for assembly.

11. Remove three long bolts (23), three short bolts (29), and drive housing (6) from lever housing (7).

12. Remove starter drive (28) and preformed packing (27) from lever housing (7). Discard preformed packing.

13. Remove shaft (25) from lever housing (7).

14. Remove large preformed packing (24) and small preformed packing (26) from shaft (25). Discard preformed packings.

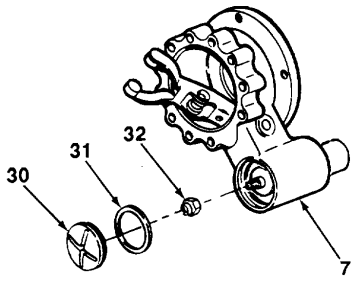


15. Remove Inspection plug (30) and gasket (31) from lever housing (7). Discard gasket.

NOTE

Note number of turns when removing locknut to assist in assembly.

16. Remove locknut (32) from lever housing (7). Discard locknut.

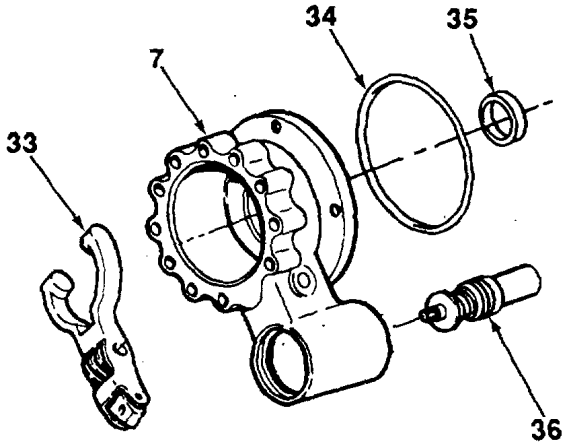


TA705176

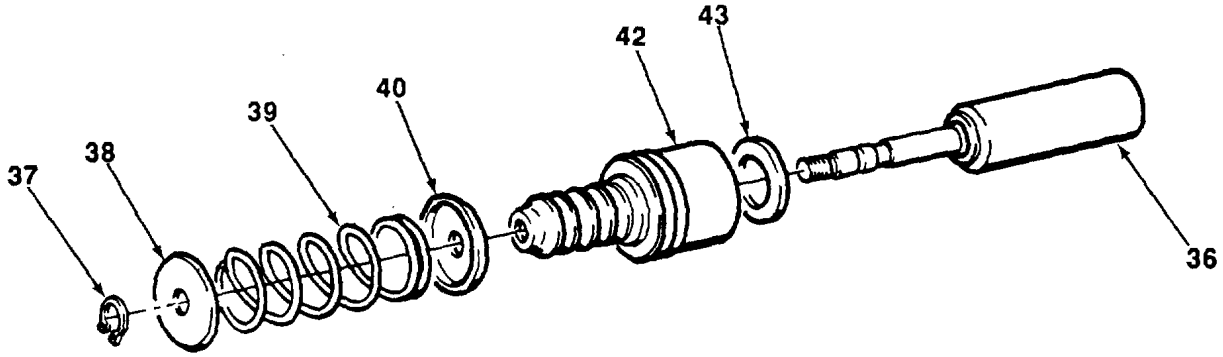
5-75. ENGINE STARTER REPAIR (Con't).

17. Remove plunger (36) and shift lever (33) from lever housing (7).

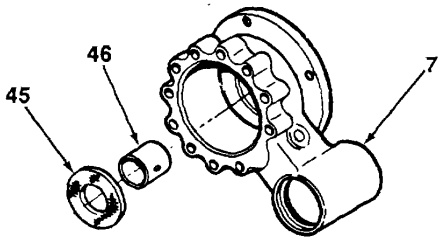
18. Remove and discard preformed packing (34) and oil seal (35) from lever housing (7).



19. Remove retaining ring (37) from plunger (36). Discard retaining ring.
20. Remove retainer (38), spring (39), retainer (40), and boot (42) from plunger (36).
21. Remove washer (43) from boot (42).



22. If damaged, remove washer (45) and bushing (46) from lever housing (7).



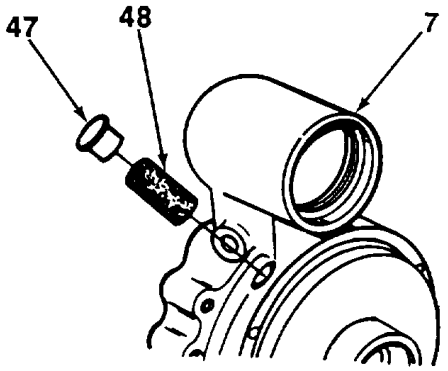
TA705177

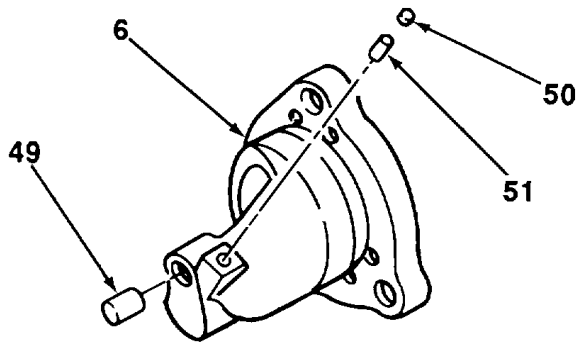
5-75. ENGINE STARTER REPAIR (Con't).

23. Remove cap (47) and wick (48) from lever housing (7). Discard wick.

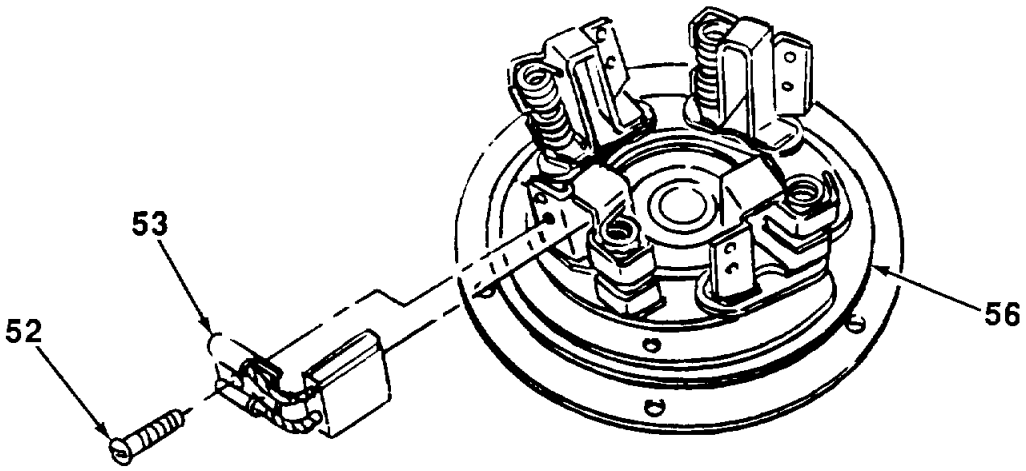
24. Remove cap (50) and wick (51) from drive housing (6). Discard wick.

25. If damaged, remove bushing (49) from drive housing (6).





26. Remove eight screws (52) and brushes (53) from brush holder assembly (56).

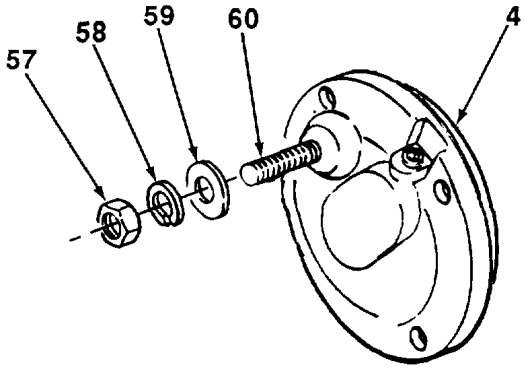


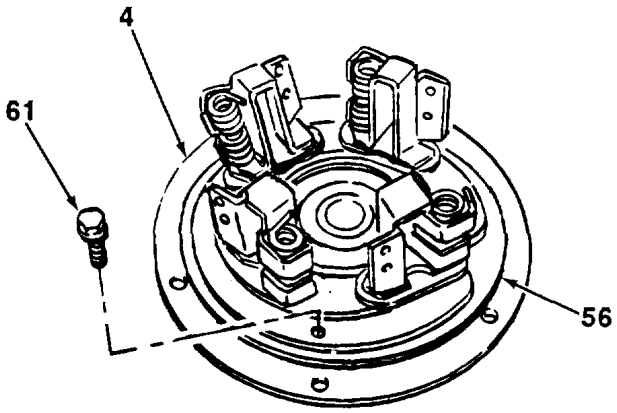
TA705178

5-75. ENGINE STARTER REPAIR (Con't).

27. Remove nut (57), lockwasher (58), and flatwasher (59) from ground terminal (60) on end cap (4). Discard lockwasher.

28. Remove three screws (61) from brush holder assembly (56) and end cap (4).

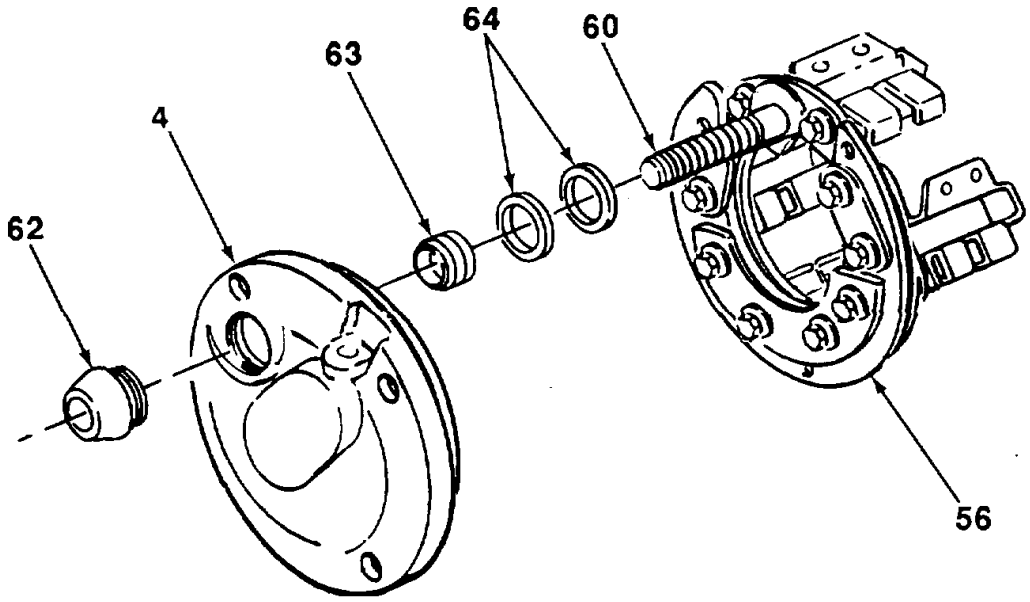




29. Remove insulator (62) from end cap (4).

30. Remove end cap (4) from brush holder assembly (56).

31. Remove rubber bushing (63) and two insulating washers (64) from ground terminal (60).

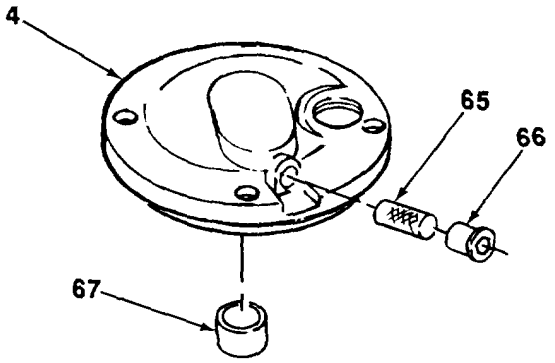


TA705179

5-75. ENGINE STARTER REPAIR (Con't).

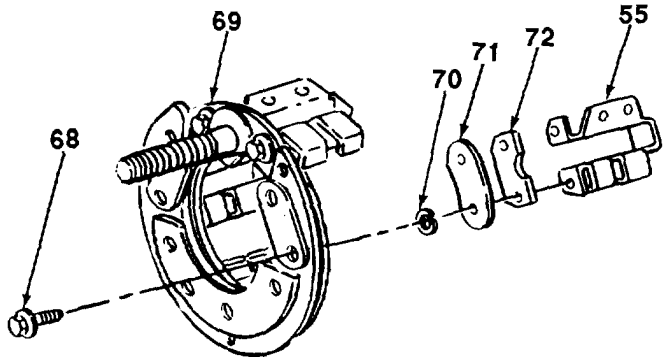
32. Remove cap (66) and wick (65) from end cap (4). Discard wick.

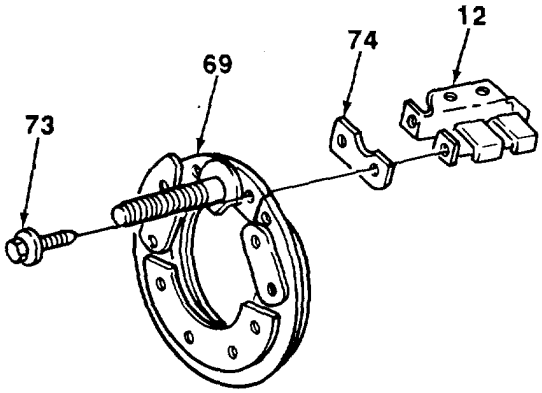
33. If damaged, remove bushing (67) from end cap (4).



34. Remove four screws (68), two brush holders (55), plates (72), plate insulators (71), and four insulators (70) from plate assembly (69).

35. Remove four screws (73), two brush holders (12), and plates (74) from plate assembly (69).



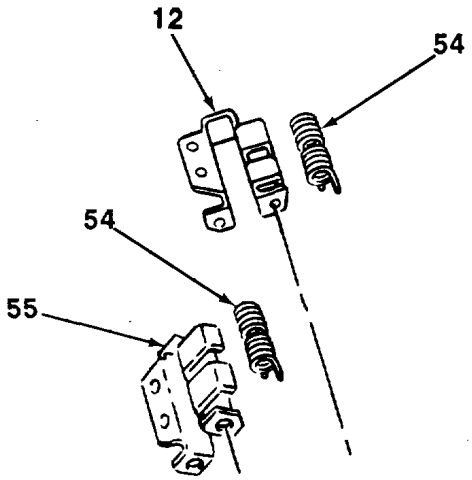


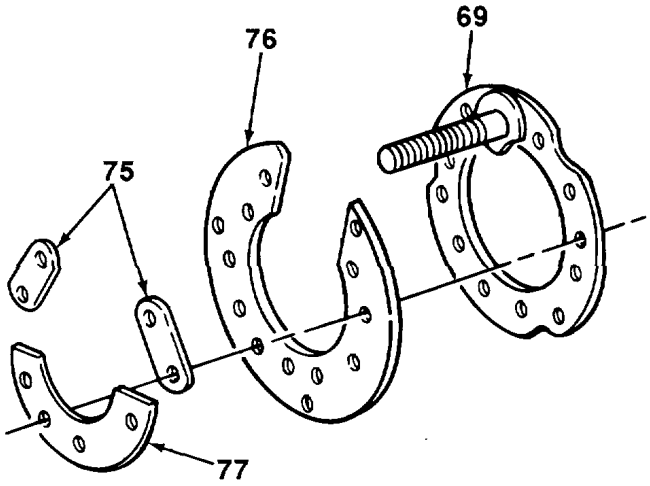
TA705180

5-75. ENGINE STARTER REPAIR (Con't).

36. Remove eight springs (54) from brush holders (12 and 55).

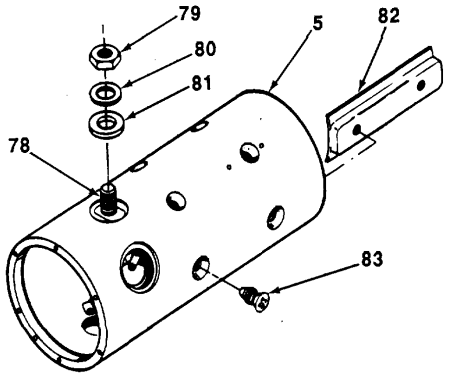
37. Remove two support plates (75), connector plate (77), and disc Insulator (76) from plate assembly (69).





38. Remove nut (79), washer (80), and insulator (81) from terminal stud (78).

39. Remove eight screws (83) and four pole shoes (82) from field frame (5).

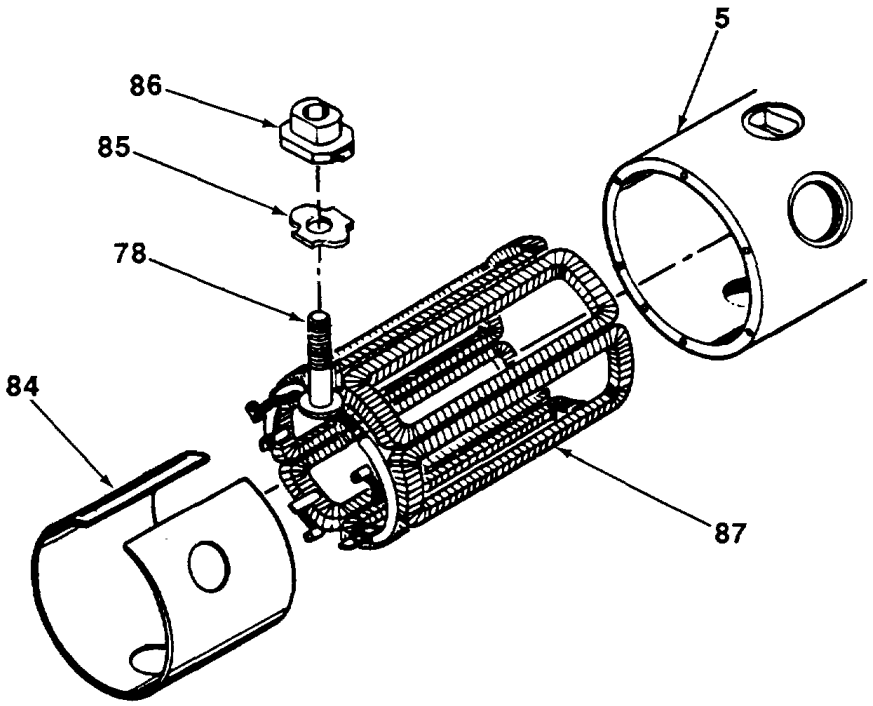


TA705181

5-75. ENGINE STARTER REPAIR (Con't).

40. Remove field coil (87) and plate insulator (84) from field frame (5).

41. Remove insulator bushing (86) and plate (85) from terminal stud (78).



b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-138^{0}F (38^{0}C-59^{0}C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

1. Clean all metal parts, except armature, field coil, and starter drive, with dry cleaning solvent.

2. Clean starter drive with clean dry cloth.

3. Inspect field frame for cracks, breaks, and other obvious damage.

4. Inspect armature shaft for rough surfaces and damaged splines.

5. Inspect commutator contact surface for rough surface, pits, scoring, bums, hard carbon, oil coat, and out-of-round. Commutator diameter, when new, is 2.3125-2.3250 in. (58.7375-59.0550 mm). Commutator diameter may not be less than 2.0 in. (50.8 mm) when returned to service. Commutator may not be more than 0.002 in. (0.051 mm) out-of-round.

TA705182

5-75. ENGINE STARTER REPAIR (Con't).

6. Check length of brushes. If length is less than 0.5 in. (12.7 mm), replace brushes.

7. Inspect brush springs for distortion.

8. Inspect splines and gear teeth on starter drive for damage.

9. Check bushings for damage and wear. If inside diameter of bushings is more than 0.005 in. (0.127 mm) larger than armature shaft diameter, replace bushings.

10. Replace unserviceable parts.

c. ASSEMBLY

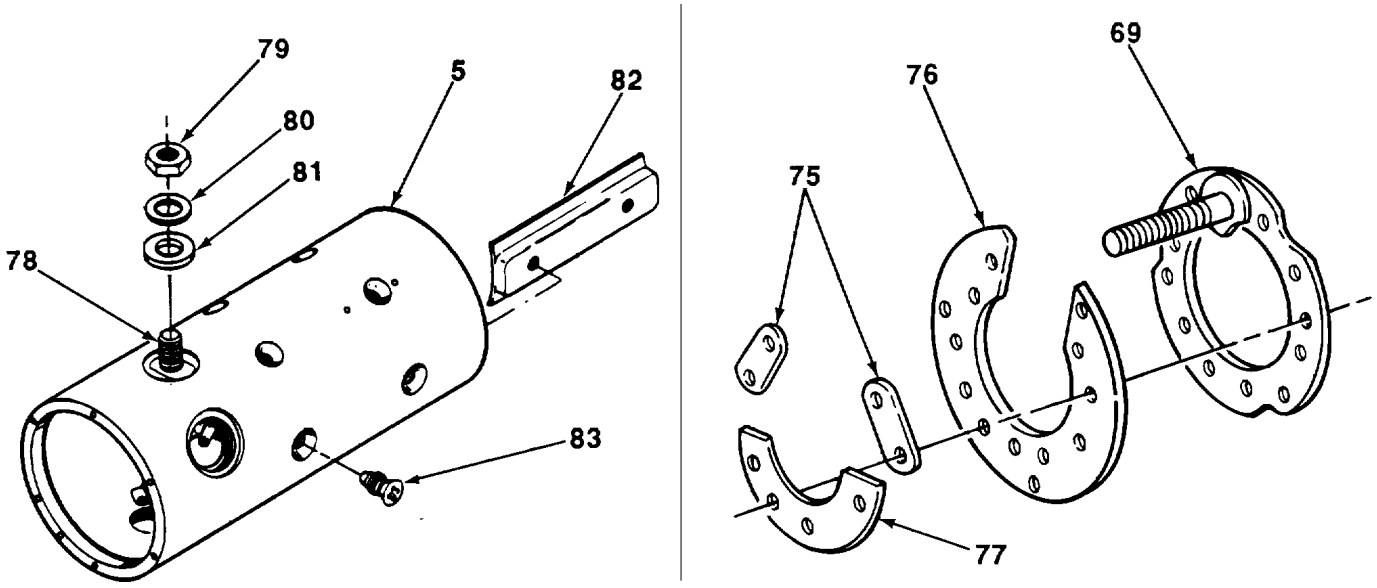
1. Install insulator bushing (86) and plate (85) on terminal stud (78).

2. Install plate insulator (84) and field coil (87) on field frame (5).

3. Install four pole shoes (82) on field frame (5) with eight screws (83).

4. Install insulator (81), washer (80), and nut (79) on terminal stud (78).

5. Position disc insulator (76), connector plate (77), and two support plates (75) on plate assembly (69).

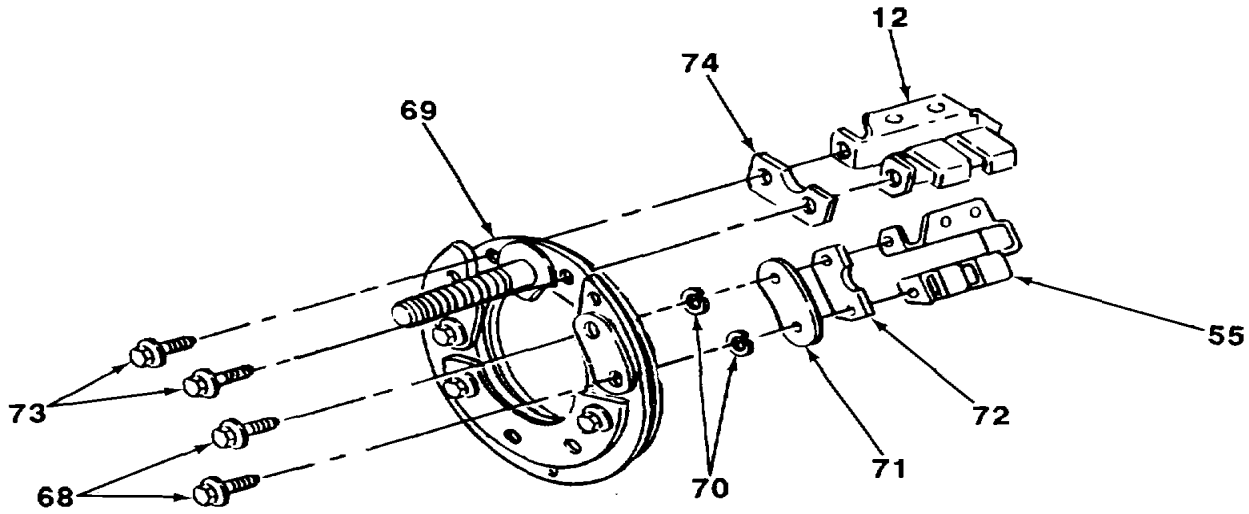


TA705183

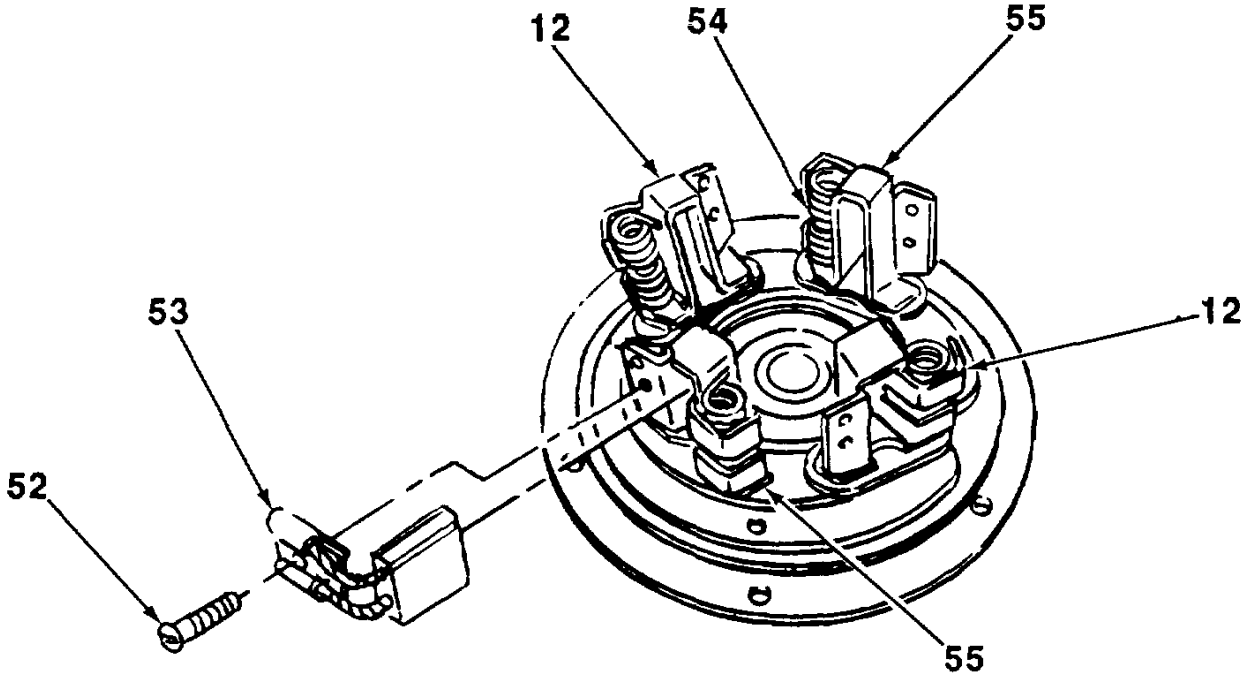
5-75. ENGINE STARTER REPAIR (Con't).

6. Install four insulators (70), two plate insulators (71), plates (72), and brush holders (55) on plate assembly (69) with four screws (68).

7. Install two plates (74) and brush holders (12) on plate assembly (69) with four screws (73).



8. Position eight springs (54) and install eight brushes (53) on four brush holders (12 and 55) with eight screws (52).

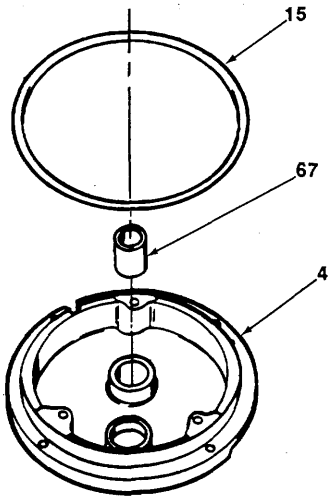


TA705184

5-75. ENGINE STARTER REPAIR (Con't).

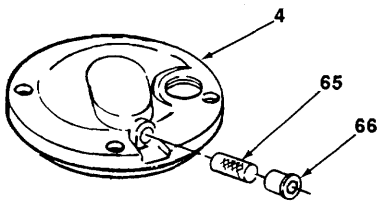
9. If removed, install bushing (67) in end cap (bushing is flush with top of bore.

10. Install new preformed packing (15) on end Cap (4).



11. Soak new wick (65) with lubricating oil and install wick in end cap (4).

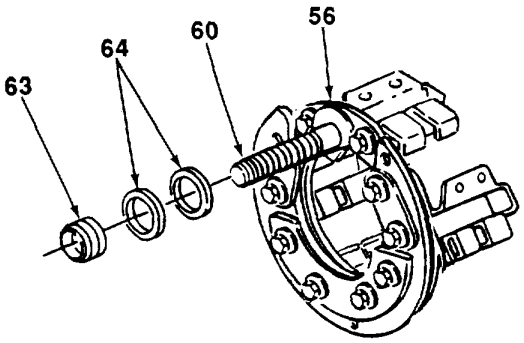
12. Install cap (66) in end cap (4).



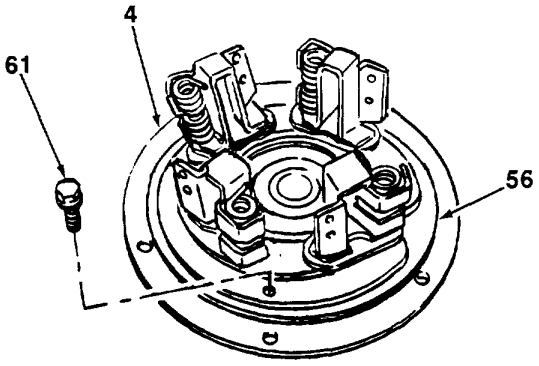
TA705185

5-75. ENGINE STARTER REPAIR (Con't).

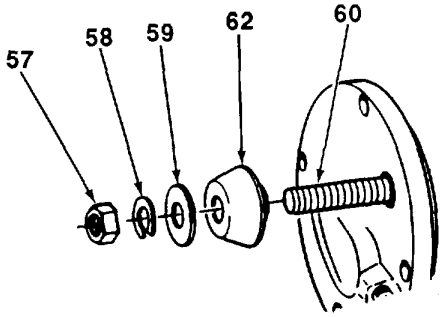
13. Install two insulating washers (64) and rubber bushing (63) on ground terminal (60) of brush holder assembly (56).



14. Install brush holder assembly (56) on end cap (4) with three screws (61).



15. Install insulator (62), flatwasher (59), new lockwasher (58), and nut (57) on ground terminal (60).

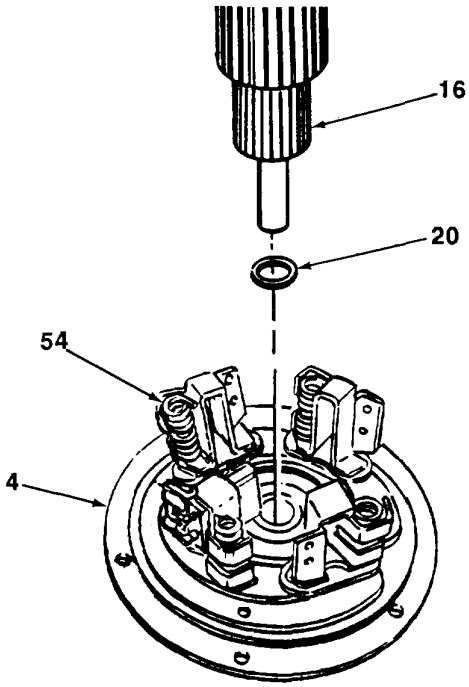


TA705816

5-75. ENGINE STARTER REPAIR (Con't).

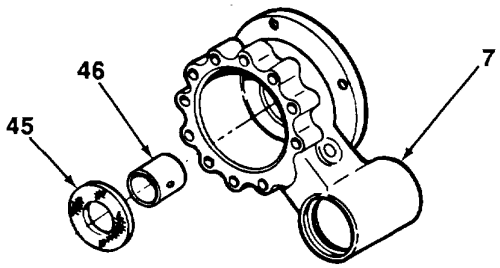
16. Install washer (20) on armature (16).

17. Hold eight springs (54) and position armature (16) on end cap (4).



18. If removed, aline hole in bushing (46) with hole in bushing boss and press bushing into lever housing (7).

19. If removed, apply adhesive to washer (45) and install in lever housing (7).

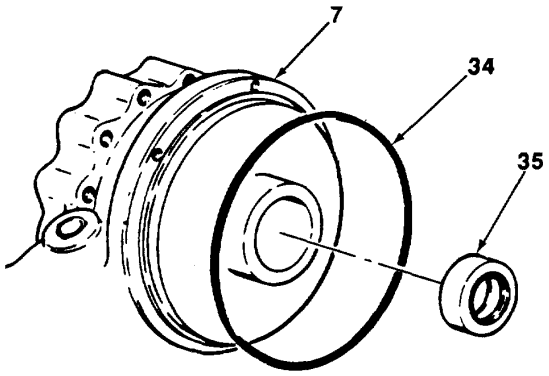


TA705187

5-75. ENGINE STARTER REPAIR (Con't).

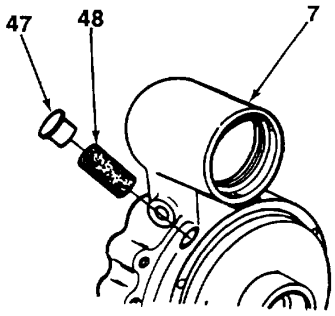
20. Install new oil seal (35) in lever housing (7).

21. Install new preformed packing (34) on lever housing (7).



22. Soak new wick (48) with lubricating oil and install in lever housing (7).

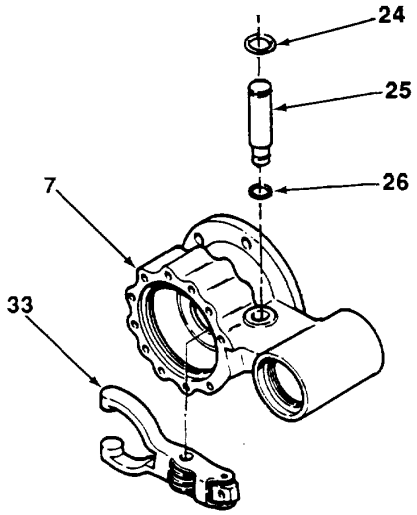
23. Install cap (47) in lever housing (7).



24. Install new small preformed packing (26) and new large preformed packing (24) on shaft (25).

25. Position shift lever (33) in lever housing (7).

26. Install shaft (25) through shift lever (33).



TA705188

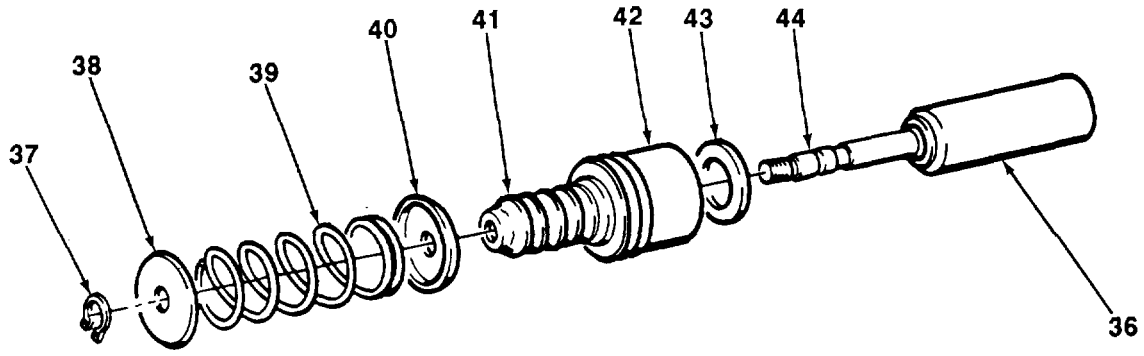
TA705188

5-75. ENGINE STARTER REPAIR (Con't).

27. Install washer (43) on boot (42).

28. Install boot (42) on plunger (36). Push boot down so collar (41) on boot fits in groove (44).

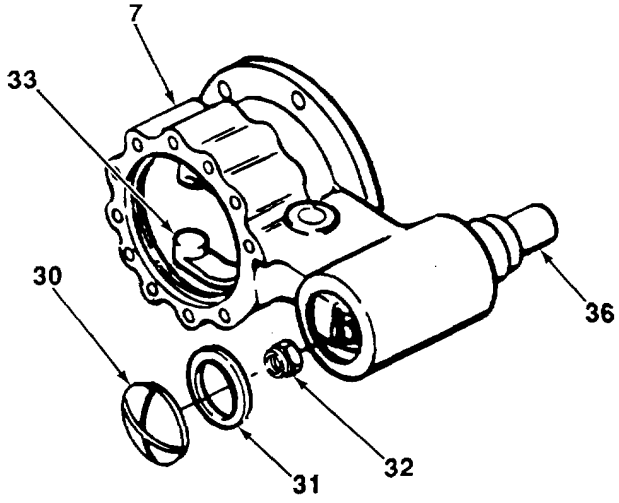
29. Install retainer (40), spring (39), and retainer (38) on plunger (36) with new retaining ring (37).

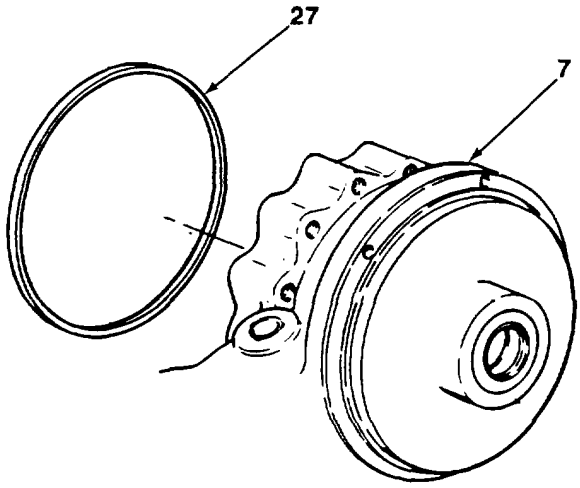


30. Install plunger (36) through shift lever (33). Install new locknut (32) with same number of turns noted in disassembly.

31. Install new gasket (31) and inspection plug (30) on lever housing (7).

32. Install new preformed packing (27) on lever housing (7).



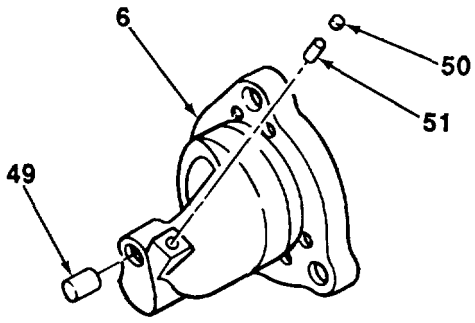


TA705189

5-75. ENGINE STARTER REPAIR (Con't).

33. If removed, install bushing (49) in drive housing (6).

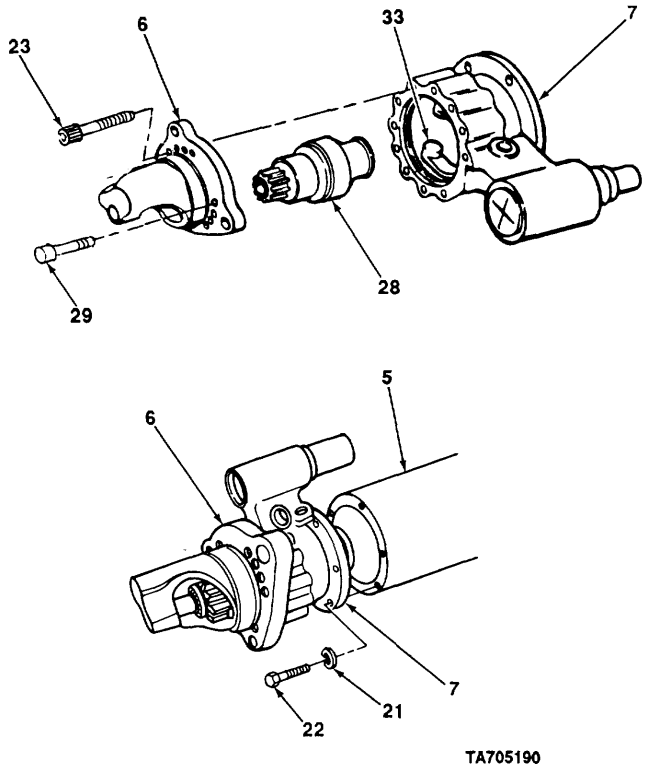
34. Soak new wick (51) with lubricating oil and install wick and cap (50) in drive housing (6).



35. Install starter drive (28) in shift lever (33) in lever housing (7).

36. Aline marks and install drive housing (6) on lever housing (7) with three long bolts (23) and three short bolts (29). Torque screws to 15 lb.-ft. (20 N•m).

37. Aline marks and install lever housing (7) on field frame (5) with five new lockwashers (21) and bolts (22).

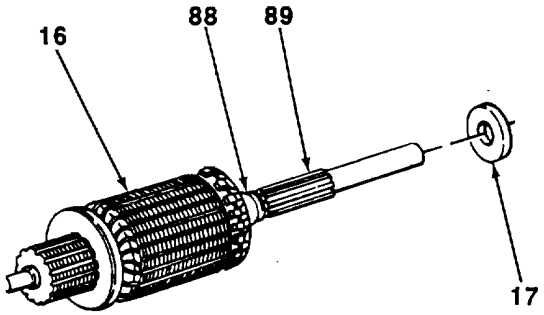


TA705190

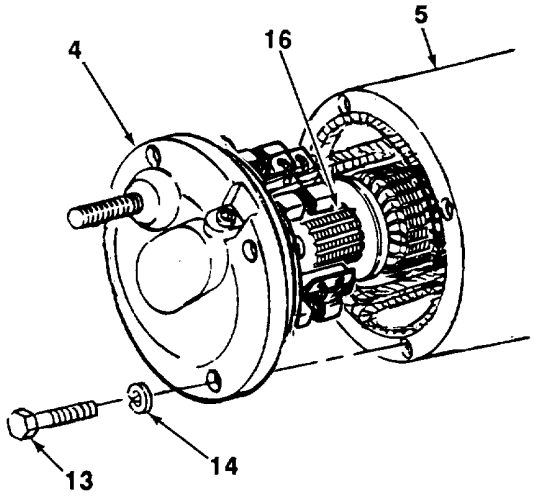
5-75. ENGINE STARTER REPAIR (Con't).

38. Coat splines (89) of armature (16) with light film of lubricating oil.

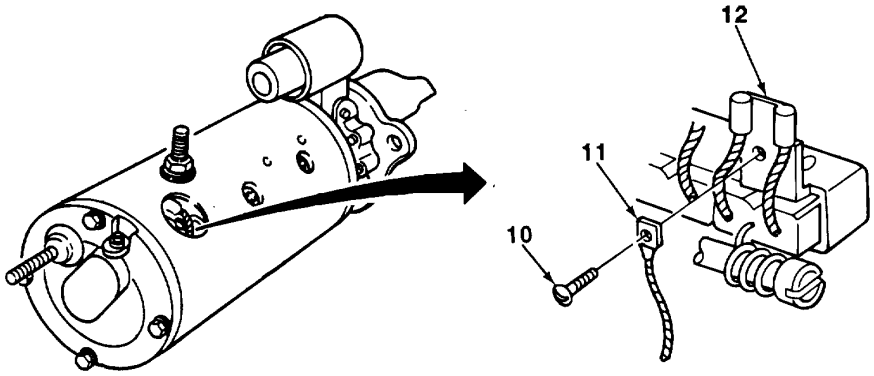
39. Install thrust washer (17) on long end of armature shaft (88).



40. Aline marks and install armature (16) and end cap (4) on field frame (5) with four new lockwashers (14) and bolts (13).



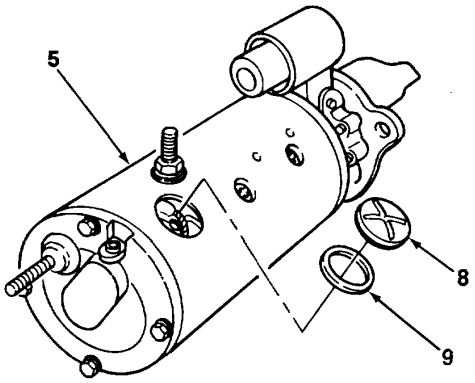
41. Install two field leads (11) on brush holders (12) with two screws (10).



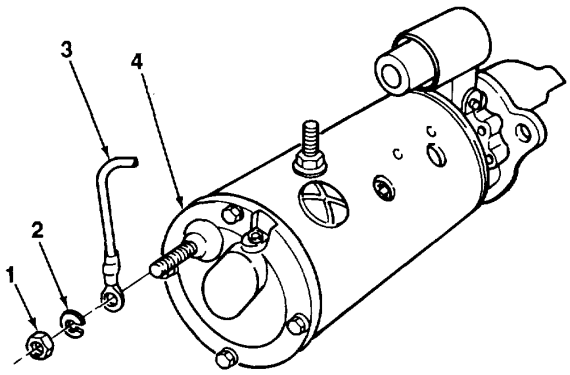
TA705191

5-75. ENGINE STARTER REPAIR (Con't).

42. Install two new gaskets (9) and inspection plugs (8) on field frame (5).



43. Install electrical lead (3) on end cap (4) with new lockwasher (2) and nut (1).



FOLLOW-ON TASKS:

- Install engine starter solenoid (see paragraph 5-77).
- Perform engine starter end play adjustment (see paragraph 5-76)

TA705192

5-76. ENGINE STARTER END PLAY ADJUSTMENT.

This Task Covers: Adjustment

Initial Setup:

Equipment Conditions:
- Engine starter removed (see paragraph 4-53).

Tools/Test Equipment:
- Automotive fuel and electrical system repair tool kit
- Power supply unit

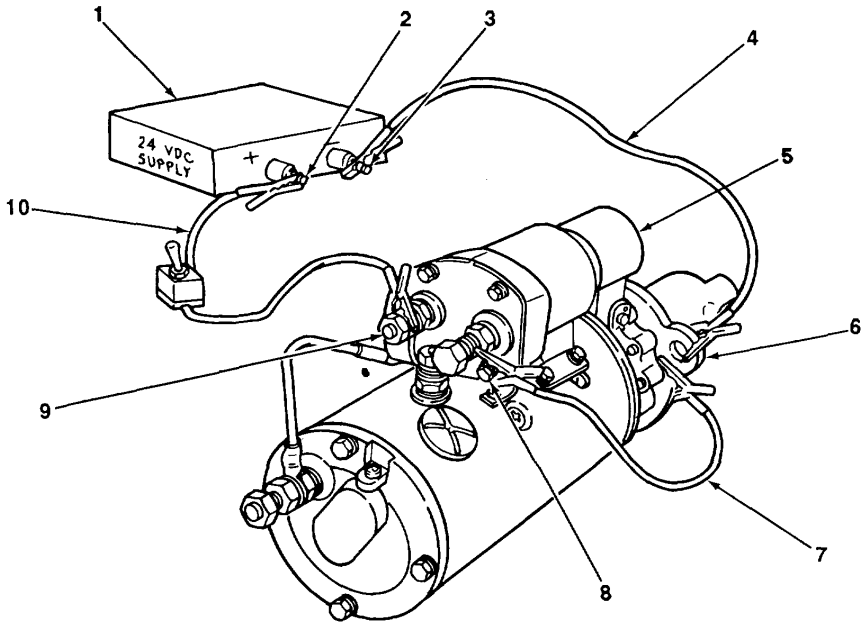
Materials/Parts:
- One gasket

ADJUSTMENT

1. Connect one end of cable (10) to positive (+) terminal (2) of power supply (1). Connect other end of cable to SW terminal (9) of starter solenoid (5).

2. Connect one end of cable (4) to negative (-) terminal (3) of power supply (1). Connect other end of cable to housing (6).

3. Connect one end of cable (7) to terminal (8) of starter solenoid (5). Connect other end of cable to housing (6).



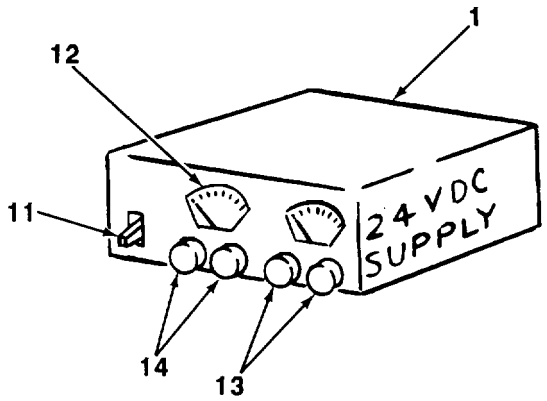
TA705193

5-76. ENGINE STARTER END PLAY ADJUSTMENT (C

4. Set line switch (11) on power supply (1) to ON position.

5. Turn two current knobs (13) clockwise 3/4 turn.

6. Turn two voltage knobs (14) clockwise until volts Indicator (12) shows 24 volts.



CAUTION

DO NOT hold switch longer than 30 seconds. Hold switch Just long enough to drive clutch motor pinion gear against starter housing collar. Failure to follow this caution will result In damage to starter solenoid.

7. Set switch (21) to ON position until starter solenoid (5) pushes clutch motor pinion gear (18) against collar (19).

8. Push clutch motor pinion gear (18) away from collar (19) and check clearance using feeler gage between pinion gear and collar. Clearance should be 0.030-0.040 in. (0.762-1.016 mm). If clearance Is not within range, perform step 9 to adjust end play. If clearance is within range, perform step 13.

9. Remove Inspection plug (16) and gasket (15) from engine starter (20). Discard gasket.

10. Set switch (21) to ON position until starter solenoid (5) pushes clutch motor pinion gear (18) against collar (19).

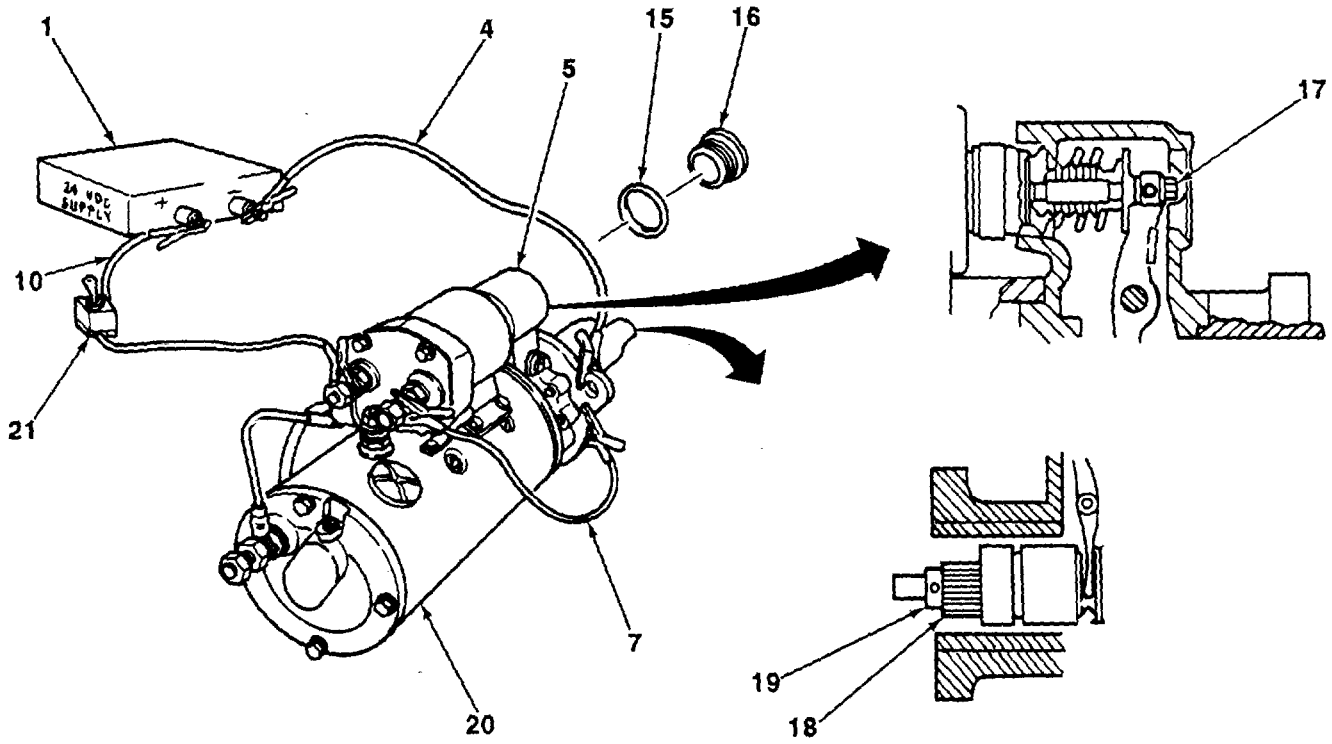
11. Place 0.035 in. (0.889 mm) feeler gage between clutch motor pinion gear (18) and collar (19) and turn shift lever locknut (17) to point where feeler gage Just slips out. Set switch (21) to OFF position and turn off power supply (1). If end play will not adjust, perform steps 12 and 13 and replace engine starter (20).

12. Install new gasket (15) and inspection plug (16) on engine starter (20).

13. Remove cables (4, 7, and 10) from power supply (1) and engine starter (20).

TA705194

5-76. ENGINE STARTER END PLAY ADJUSTMENT (Con't).



FOLLOW-ON TASKS:

- Test engine starter (see paragraph 5-74).

TA705195

5-77. ENGINE STARTER SOLENOID REPLACEMENT.

This Task Covers:
a. Removal b. Installation

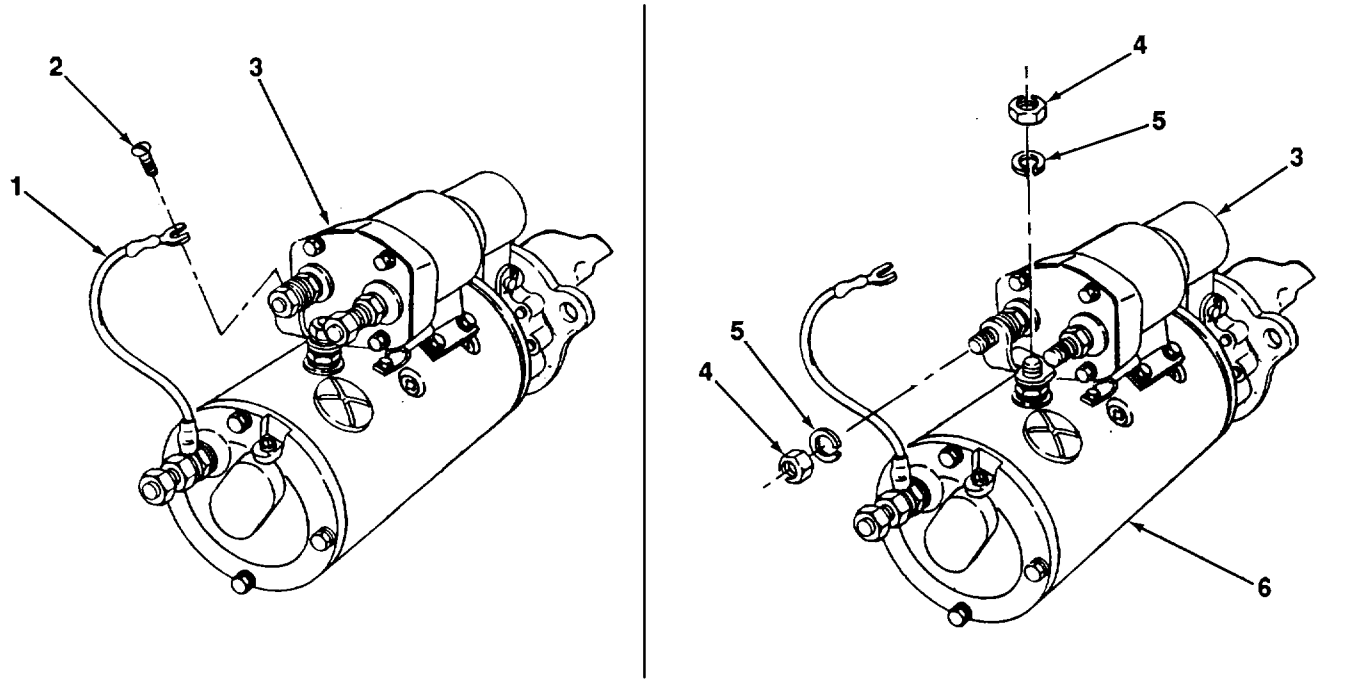
Initial Setup:
Equipment Conditions:
- Battery cables disconnected (see paragraph 4-60).

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Two lockwashers

a. REMOVAL

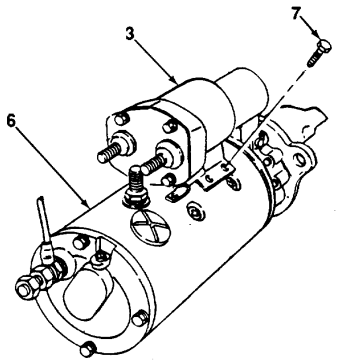
1. Remove screw (2) and electrical lead (1) from starter solenoid (3).
2. Remove two nuts (4) and lockwashers (5) from starter solenoid (3) and engine starter (6). Discard lockwashers.



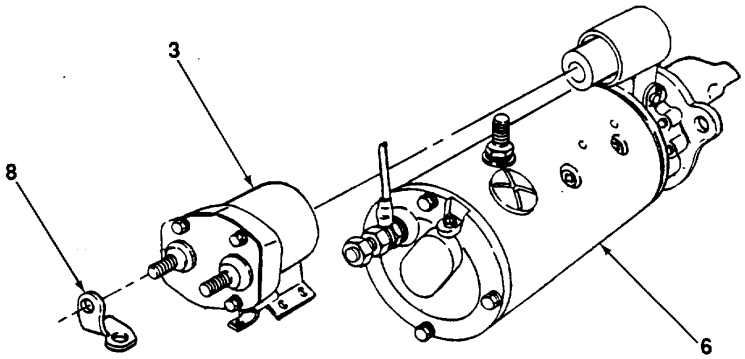
TA705196

5-76. ENGINE STARTER SOLENOID REPLACEMENT (Con't).

3. Remove four screws (7) from starter solenoid (3) TM 5-4310-451-14 and engine starter (6).



4. Remove terminal connector (8) and starter solenoid (3) from engine starter (6).



b. INSTALLATION

1. Position starter solenoid (3) and terminal connector (8) on engine starter (6).
2. Install four screws (7) on starter solenoid (3) and engine starter (6).
3. Install two new lockwashers (5) and nuts (4) on starter solenoid (3) and engine starter (6).
4. Install electrical lead (1) on starter solenoid (3) with screw (2).

TA705197

FOLLOW-ON TASKS:

- Lubricate engine starter (see Lubrication Instructions, Chapter 3, Section 1).
- Connect battery cables (see paragraph 4-60).

Section VII. BRAKEDRUM AND TIRE MAINTENANCE

5-78. BRAKEDRUM REPAIR.

This Task Covers:

a. Inspection b. Repair

Initial Setup:

Equipment Conditions:
- Hub and brakedrum removed (see paragraph 4-69).

Tools/Test Equipment:
- Field automotive shop set

General Safety Instructions:
- DO NOT use a dry brush or compressed air to clean brake assembly or brake components.
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

a. INSPECTION

WARNING

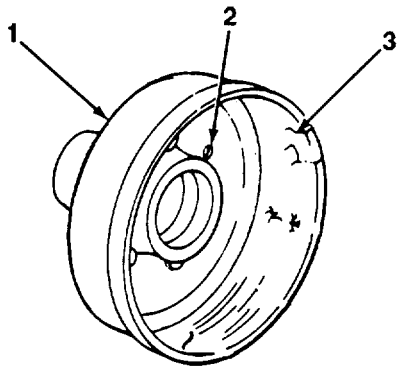
- **DO NOT handle brakeshoes, brakedrums, or other brake components unless area has been properly cleaned. There may be asbestos dust on these components which can be dangerous If you touch It or breathe It. Wear an approved filter mask and gloves. Never use compressed air or a dry brush to clean brake components. Dust may be removed using an Industrial-type vacuum cleaner. Clean dust or mud away from brake components with water and a wet, soft brush or cloth. Failure to follow this warning may result In serious Illness or death to personnel.**

- **Dry cleaning solvent, P-D-680, Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-59°C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.**

1. Clean all parts with dry cleaning solvent. Allow to dry.

5-78. BRAKEDRUM REPAIR (Con't).

2. Inspect stud holes (2) for cracks (3). Discard brakedrum (1) if cracks are present.



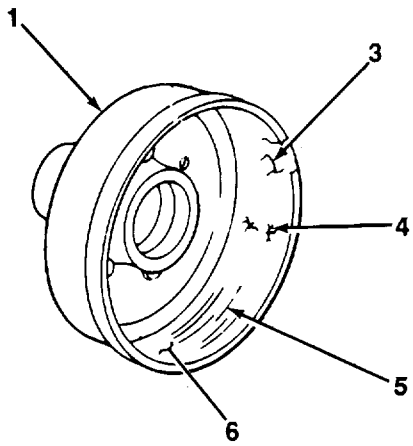
WARNING

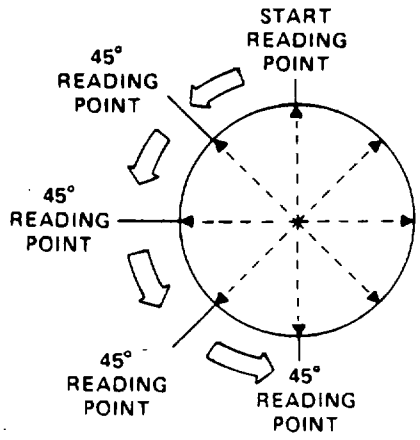
DO NOT use brakedrum that exceeds maximum wear specifications. Failure to follow this warning may result In brake failure and serious Injury or death.

3. Inspect braking surface (6) for cracks (3), heat checking (4), and scoring (5). Reface braking surface if damaged (see subparagraph b).

4. Inspect braking surface (6) for out-of-round at 45° intervals. Out-of-round should not exceed 0.015 in. (0.381 mm). If out-of-round exceeds 0.015 in. (0.381 mm), reface braking surface (see subparagraph b).

5. Measure Inside diameter of brakedrum (1). Discard brakedrum if inside diameter exceeds 15.23 in. (38.68 cm).





TA705198

5-78. BRAKEDRUM REPAIR (Con't).

b. REPAIR

WARNING

DO NOT use brakedrum that exceeds maximum wear specifications. Failure to follow this warning may result In brake failure and serious injury or death.

1. Reface braking surface (6) with brakedrum lathe, removing a maximum of 0.01 in. (0.25 mm) per cut.
2. Discard brakedrum (1) if inside diameter exceeds 15.23 in. (38.68 cm) after repair.

FOLLOW-ON TASKS:

- Install hub and brakedrum (see paragraph 4-69).

5-79. TIRE REPAIR.

Refer to TM 9-2610-200-14 for Instructions on tire repair.

Section VIII. FRAME MAINTENANCE

5-80. FRAME ASSEMBLY REPLACEMENT.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools/Test Equipment:

- Field automotive shop set

a. REMOVAL

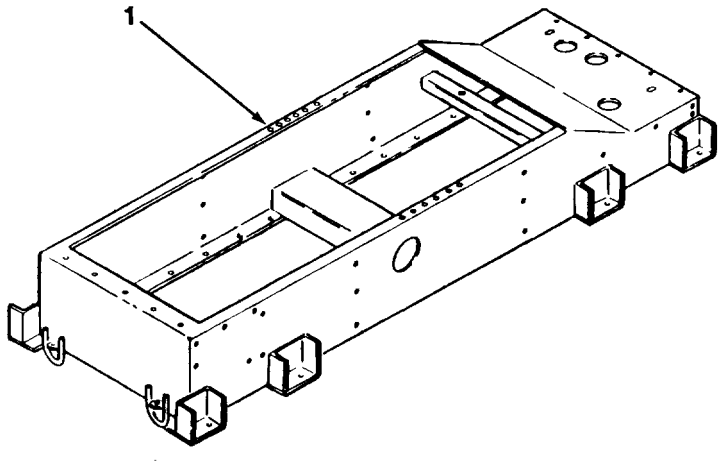
1. Remove engine and air compressor (see paragraph 5-15).
2. Remove air compressor oil cooler (see paragraph 5-105).
3. Remove right and left side fenders (see paragraphs 5-92 and 5-93).
4. Remove oil separator (see paragraph 5-102).
5. Remove rear frame (see paragraph 5-88).
6. Remove oil separator and fuel tank support (see paragraph 5-99).
7. Remove handbrake lever and cable (see paragraph 4-64 and 4-65).
8. Remove rear axle (see paragraph 4-63).
9. Remove front axle (see paragraph 4-62).
10. Remove springs (see paragraph 4-75).

5-80. FRAME ASSEMBLY REPLACEMENT (Con't).

11. Discard frame assembly (1).

b. INSTALLATION I

1. Position new frame assembly (1) on suitable supports.
2. Install springs (see paragraph 4-75).
3. Install front axle (see paragraph 4-62).
4. Install rear axle (see paragraph 4-63).
5. Install handbrake lever and cable (see paragraph 4-64 and 4-65).
6. Install oil separator and fuel tank support (see paragraph 5-99).
7. Install rear frame (see paragraph 5-88).
8. Install oil separator (see paragraph 5-102).
9. Install right and left side fenders (see paragraphs 5-92 and 5-93).
10. Install air compressor oil cooler (see paragraph 5-105).
11. Install engine and air compressor (see paragraph 5-15).



5-81. FRAME REPAIR.

Refer to TB 9-2300-247-40 for Instructions on frame repair.

TA705199

Section IX. BODY MAINTENANCE

5-82. SIDE ROOF PANELS REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Top center roof panel removed (see paragraph 5-85).
- Fiberglass removed (see paragraph 5-95).

Tools/Test Equipment:

- General mechanic's tool kit

Personnel Required: Two

5-82. SIDE ROOF PANELS REPLACEMENT (Con't).

a. REMOVAL

NOTE

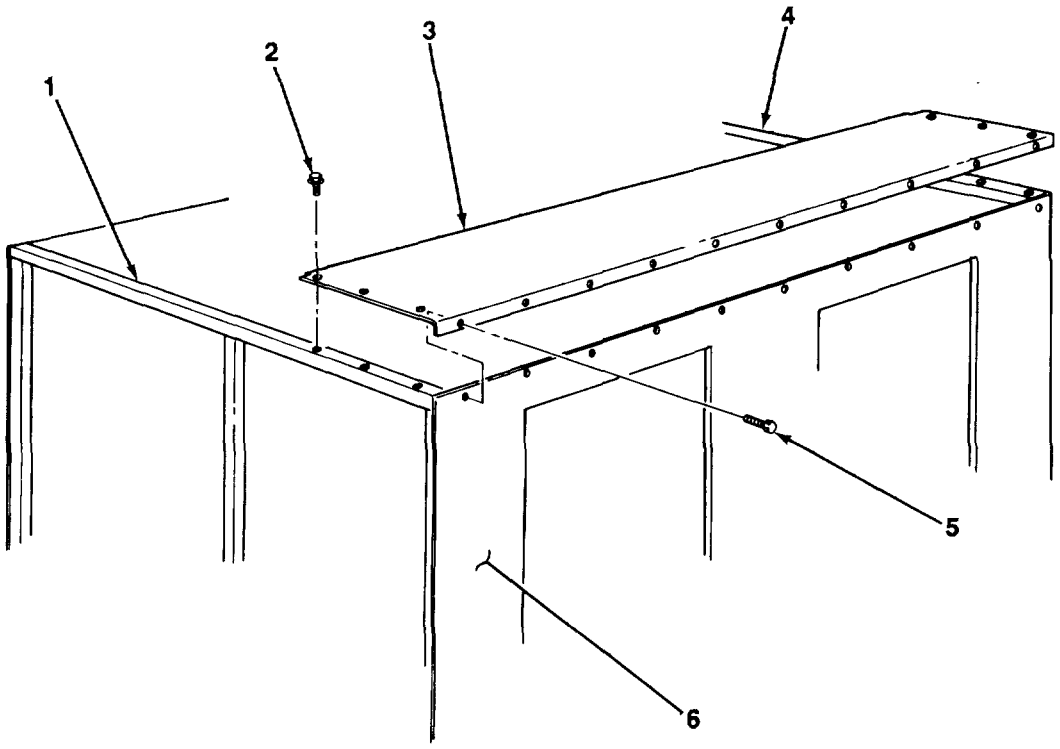
Both side roof panels are removed same way. This procedure covers one panel.

1. Remove ten screws (5) from side roof panel (3) and side housing (6).
2. Remove six screws (2) from side roof panel (3), frame (1), and rear housing (4).

CAUTION

Side roof panel, when unsupported, Is flexible. Use care when lifting panel to avoid damage.

3. Remove side roof panel (3).



TA705200

5-82. SIDE ROOF PANELS REPLACEMENT (Con't).

b. INSTALLATION

CAUTION

Side roof panel, when unsupported, is flexible. Use care when lifting panel to avoid damage.

NOTE

Both side roof panels are Installed same way. This procedure covers one panel.

1. Position side roof panel (3) on side housing (6), frame (1), and rear housing (4).
2. Install six screws (2) on side roof panel (3), frame (1), and rear housing (4).
3. Install ten screws (5) on side roof panel (3) and side housing (6).

FOLLOW-ON TASKS:

- Install fiberglass (see paragraph 5-95).
- Install center roof panel (see paragraph 585).

5-83. SERVICE VALVE BOX REPLACEMENT.

This Task Covers:
a. Removal b. Installation

Initial Setup:
Equipment Conditions:
- Air discharge valve removed (see paragraph 4-99).
- Fiberglass removed (see paragraph 5-95).

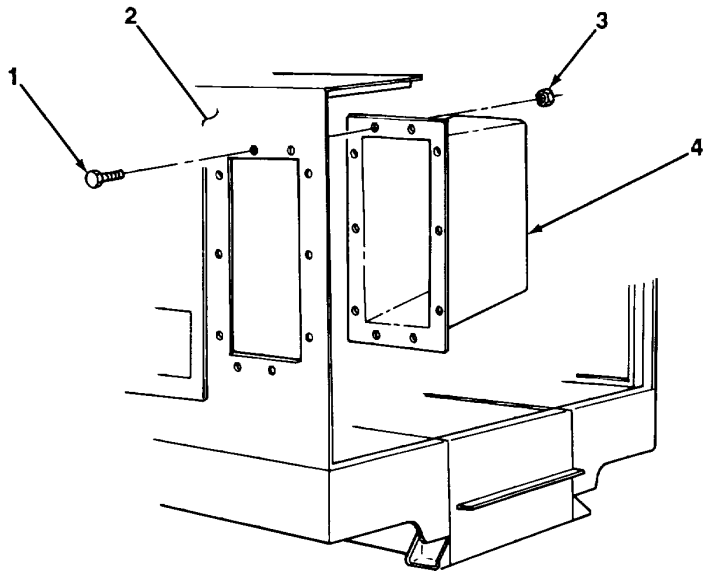
Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Ten locknuts

Personnel Required: Two

a. REMOVAL

Remove ten locknuts (3), screws (1), and service valve box (4) from body (2). Discard locknuts.



b. INSTALLATION

Install service valve box (4) on body (2) with ten screws (1) and new locknuts (3).

FOLLOW-ON TASKS:
- Install air discharge valve (see paragraph 4-99).
- Install fiberglass (see paragraph 5-95).

TA705201

5-84. LIFT BAIL COVER REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

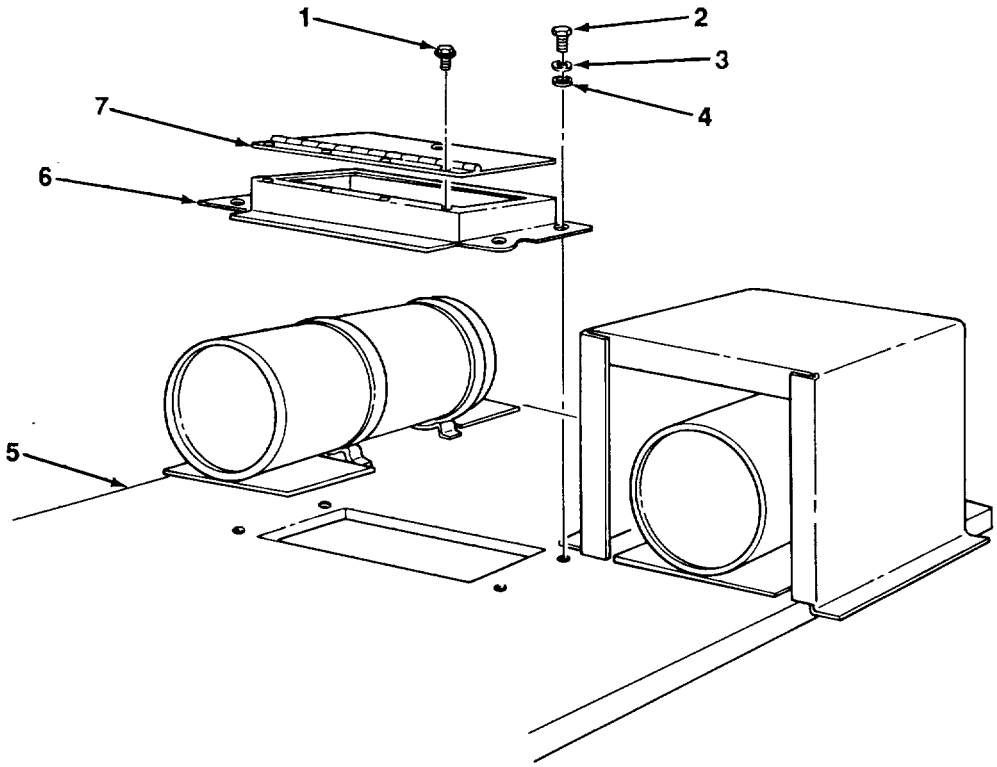
Initial Setup:
Equipment Conditions:
- Master battery switch in OFF position.

Materials/Parts:
- Four lockwashers

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

1. Remove four screws (1) and cover (7) from base (6).
2. Remove four screws (2), lockwashers (3), washers (4), and base (6) from hood (5). Discard lockwashers.



b. INSTALLATION

1. Install base (6) on hood (5) with four washers (4), new lockwashers (3), and screws (2).
2. Install cover (7) on base (6) with four screws (1).

TA705202

5-85. CENTER ROOF PANEL REPLACEMENT.

This Task Covers:

a. Removal b. Installation

Initial Setup:

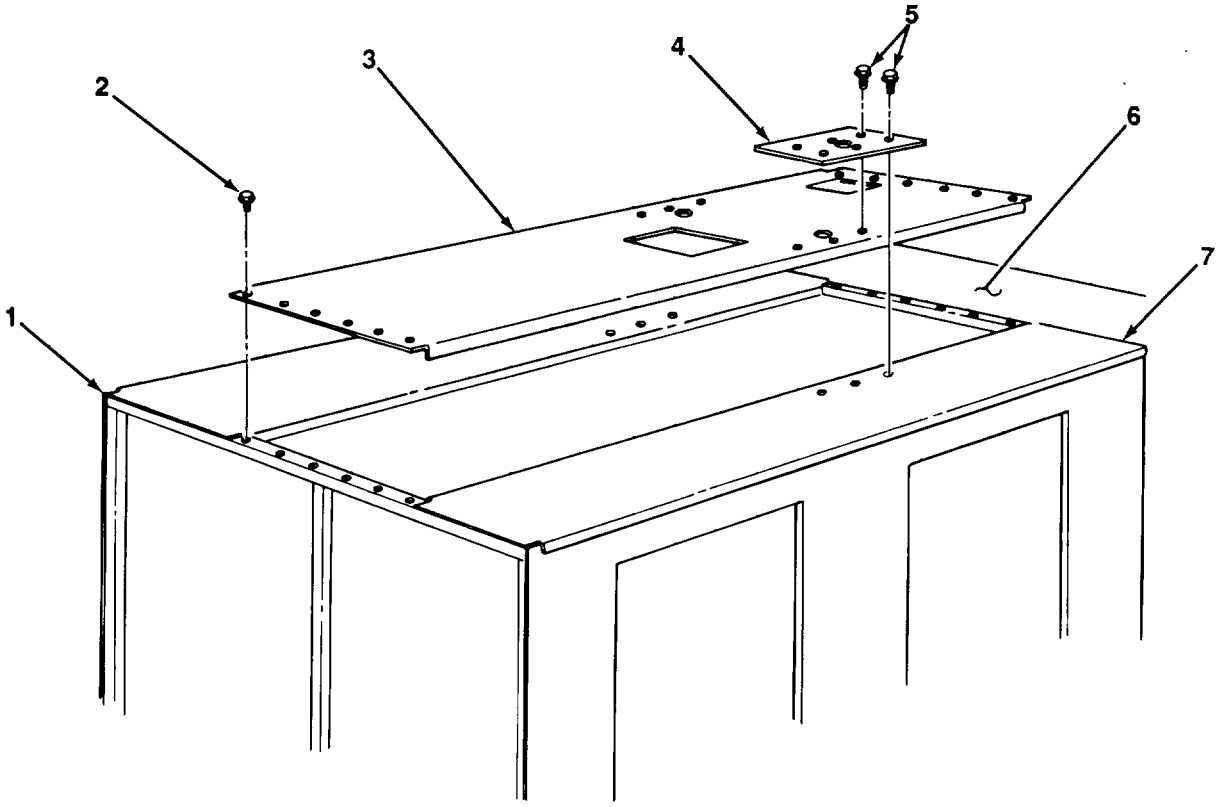
Equipment Conditions:
- Mufflers removed (see paragraph 4-42).
- Radiator fill cover removed (see paragraph 4-85).
- Lift bail cover removed (see paragraph 5-84).
- Air cleaner supports removed (see paragraph 4-86).
- Fiberglass removed (see paragraph 5-95).

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set
- Suitable lifting device

Personnel Required: Two

a. REMOVAL

1. Attach suitable lifting device to center roof panel (3).
2. Remove 24 screws (5) and four support panels (4) from center roof panel (3) and two side roof panels (7).
3. Remove 12 screws (2) from center roof panel (3), frame (1), and rear housing (6).



TA705203

5-85. CENTER ROOF PANEL REPLACEMENT (Con't).

WARNING

Use extreme caution when handling heavy parts. Lifting device Is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

CAUTION

Center roof panel, when unsupported, Is flexible. Use care when lifting panel to avoid damage.

4. Using suitable lifting device, remove center roof panel (3).

5. Remove lifting device from center roof panel (3).

b. INSTALLATION

WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

CAUTION

Center roof panel, when unsupported, Is flexible. Use care when lifting panel to avoid damage.

1. Attach suitable lifting device to center roof panel (3) and lift panel into position on two side roof panels (7), frame (1), and rear housing (6).

2. Install 12 screws (2) on center roof panel (3), frame (1), and rear housing (6).

3. Install four support panels (4) on center roof panel (3) and two side roof panels (7) with 24 screws (5).

FOLLOW-ON TASKS:

- Install fiberglass (see paragraph 5-95)
- Install air cleaner supports (see paragraph 4-86).
- Install lift bail cover (see paragraph 5-84).
- Install radiator fill cover (see paragraph 4-85).
- Install mufflers (see paragraph 4-42).

5-86. FRONT FRAME REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:
Equipment Conditions:
- Front doors removed (see paragraph 5-87).

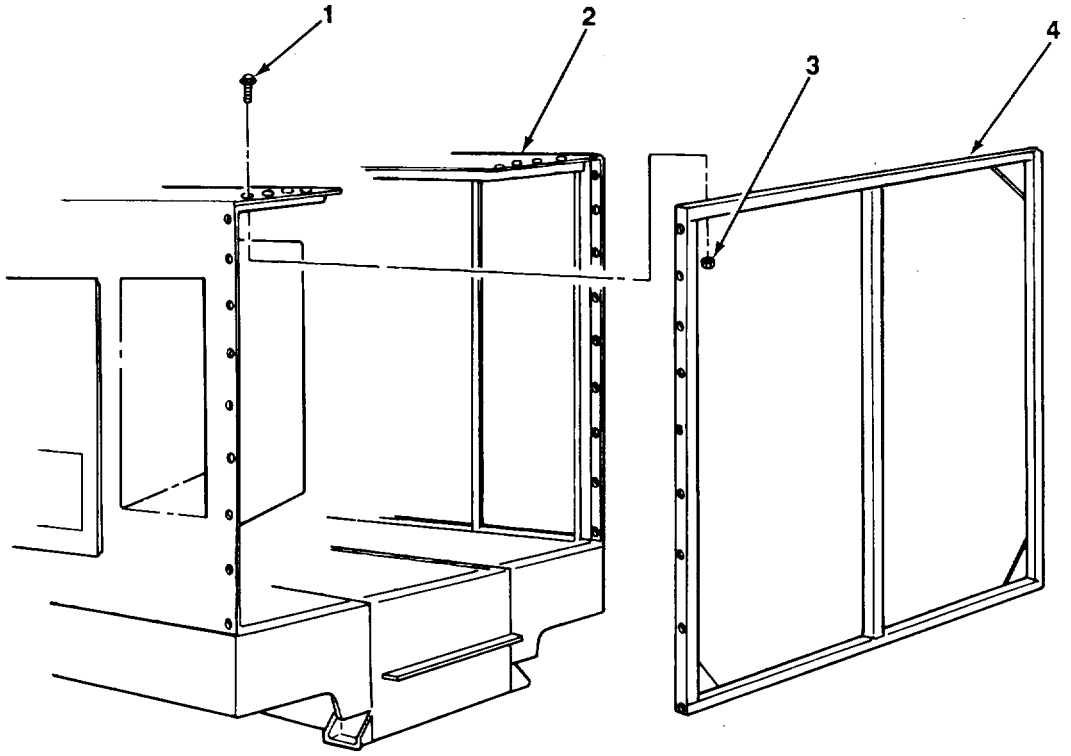
Tools/Test Equipment:
General mechanic's tool kit

Materials/Parts:
- Nineteen locknuts

Personnel Required: Two

a. REMOVAL

1. Remove 19 screws (1) and locknuts (3) from front frame (4) and body (2). Discard locknuts.
2. Remove front frame (4) from body (2).



b. INSTALLATION

Position front frame (4) on body (2) and install 19 screws (1) and new locknuts (3).

FOLLOW-ON TASKS:
- Install front doors (see paragraph 5-87).

TA705204

5-87. FRONT DOOR REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:
Equipment Conditions:
- Fiberglass removed (see paragraph 5-95).

Tools/Test Equipment:
Personnel Required: Two
- General mechanic's tool kit
- Suitable lifting device

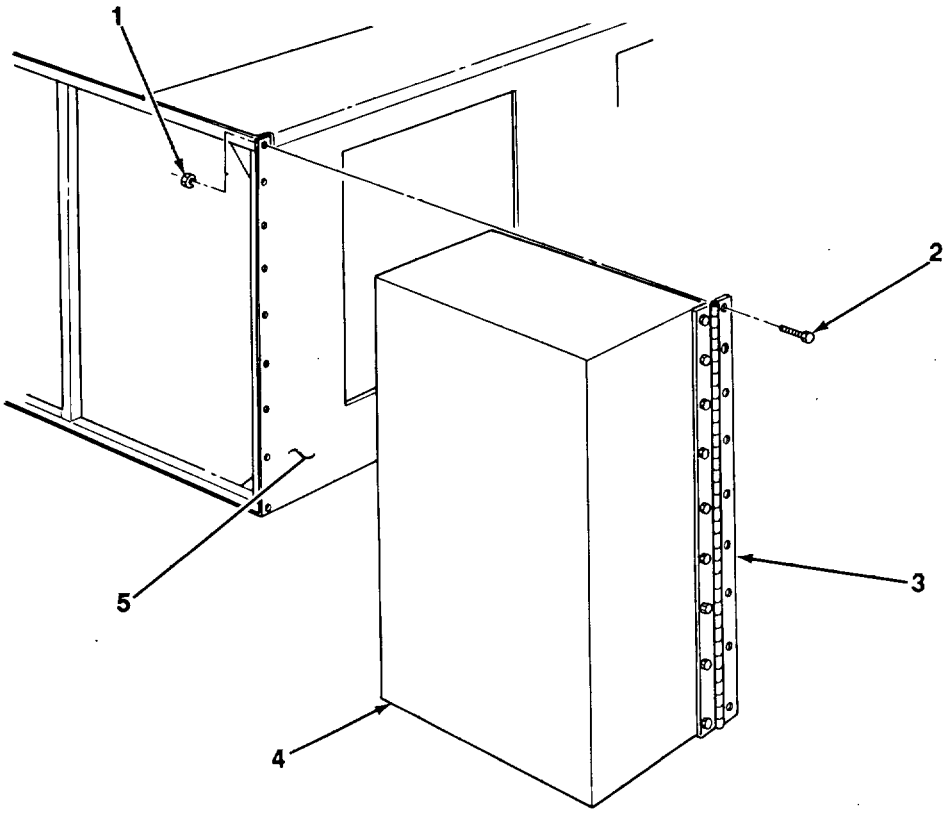
Materials/Parts:
- Fifteen locknuts

a. REMOVAL

WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

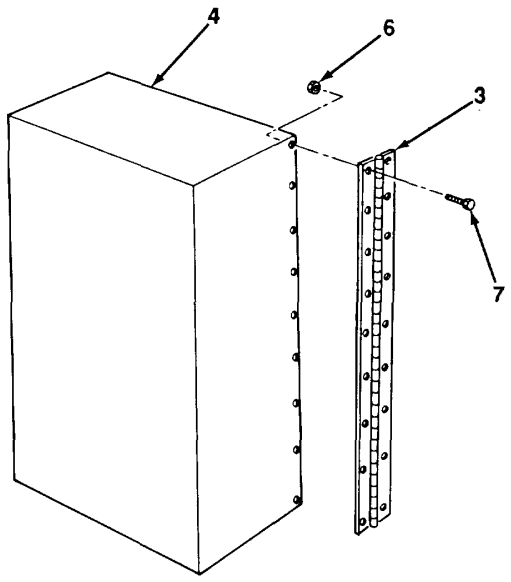
1. Remove nine screws (2), locknuts (1), and door (4) with hinge (3) from side panel (5). Discard locknuts.



TA705205

5-87. FRONT DOOR REPLACEMENT (Con't).

2. Remove six locknuts (6), screws (7), and hinge (3) from door (4). Discard locknuts.



b. INSTALLATION

1. Install hinge (3) on door (4) with six screws (7) and new locknuts (6).

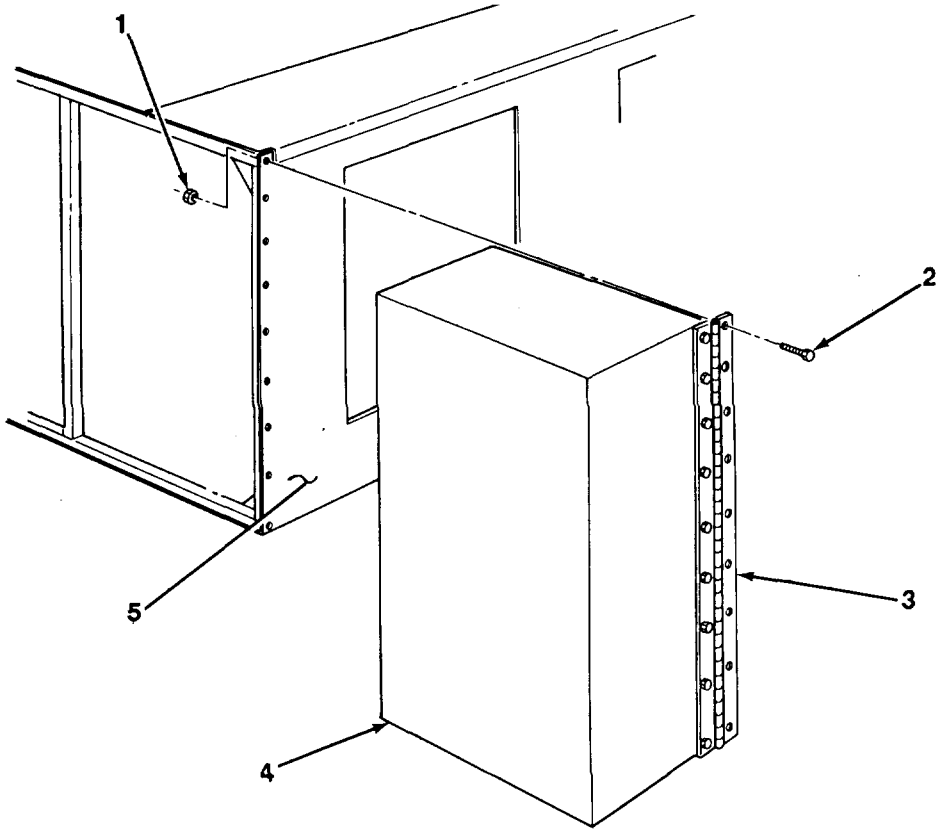
WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious Injury or death to personnel.

2. Install door (4) with hinge (3) on side panel (5) with nine screws (2) and new locknuts (1).

TA705206

5-87. FRONT DOOR REPLACEMENT (Con't).



FOLLOW-ON TASKS

- Install fiberglass (see paragraph 5-95).

TA705207

5-88. REAR FRAME REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Bumper removed (see paragraph 5-96).
- Rear fender-to-frame panels removed (see paragraph 5-89).
- Fiberglass removed (see paragraph 5-95).

Materials/Parts:

- Seventeen locknuts

Tools/Test Equipment:

- General mechanic's tool kit

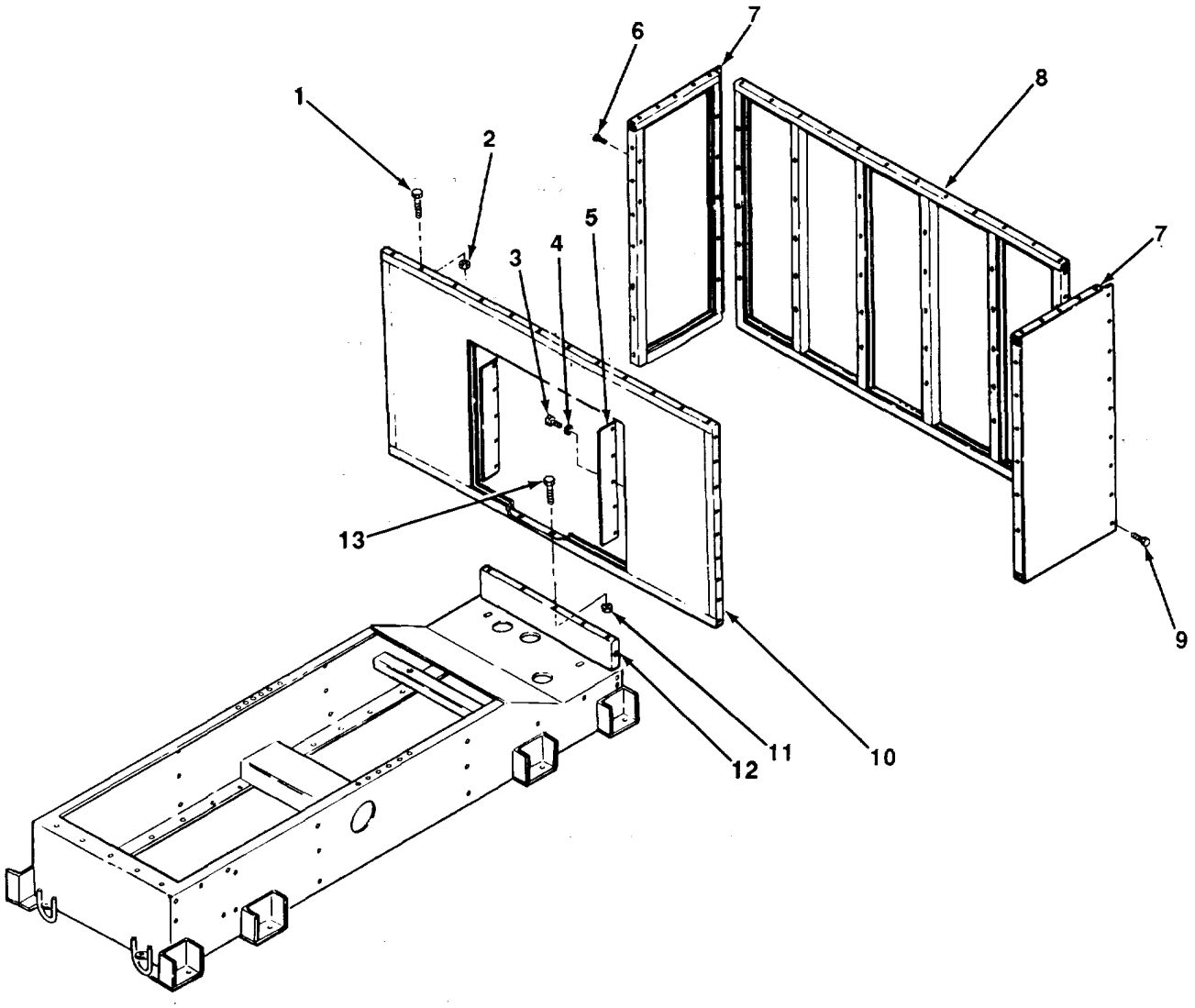
a. REMOVAL

1. Remove 18 screws (9) and air duct panel (8) from two side duct panels (7).
2. Remove 12 screws (6) and two side duct panels (7) from rear frame (10).
3. Remove ten screws (3), washers (4), and two rubber baffles (5) from rear frame (10).
4. Remove 12 screws (1) and locknuts (2) from roof panels. Discard locknuts.
5. Remove five locknuts (11), screws (13), and rear frame (10) from lower rear frame and housing (12). Discard locknuts.

b. INSTALLATION

1. Position rear frame (10) on lower rear frame and housing (12) and install five screws (13) and new locknuts (11).
2. Install 12 new locknuts (2) and screws (1) into roof panels.
3. Install two rubber baffles (5) on rear frame (10) with ten washers (4) and screws (3).
4. Install two side duct panels (7) on rear frame (10) with 12 screws (6).
5. Install air duct panel (8) on two side duct panels (7) with 18 screws (9).

5-88. REAR FRAME REPLACEMENT (Con't).



FOLLOW-ON TASKS:

- Install fiberglass (see paragraph 5-95).
- Install rear fender-to-frame panels (see paragraph 5-89).
- Install bumper (see paragraph 5-96).

TA705208

5-89. FENDER-TO-FRAME PANELS REPLACEMENT.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Equipment Conditions:
- Right side fender removed (right side fender-to-frame panels replacement only)(see paragraph 5-93).
- Left side fender removed (left side fender-to-frame panels replacement only)(see paragraph 5-92).

Tools/Test Equipment:
- General mechanic's tool kit

Materials/Parts:
- Six locknuts

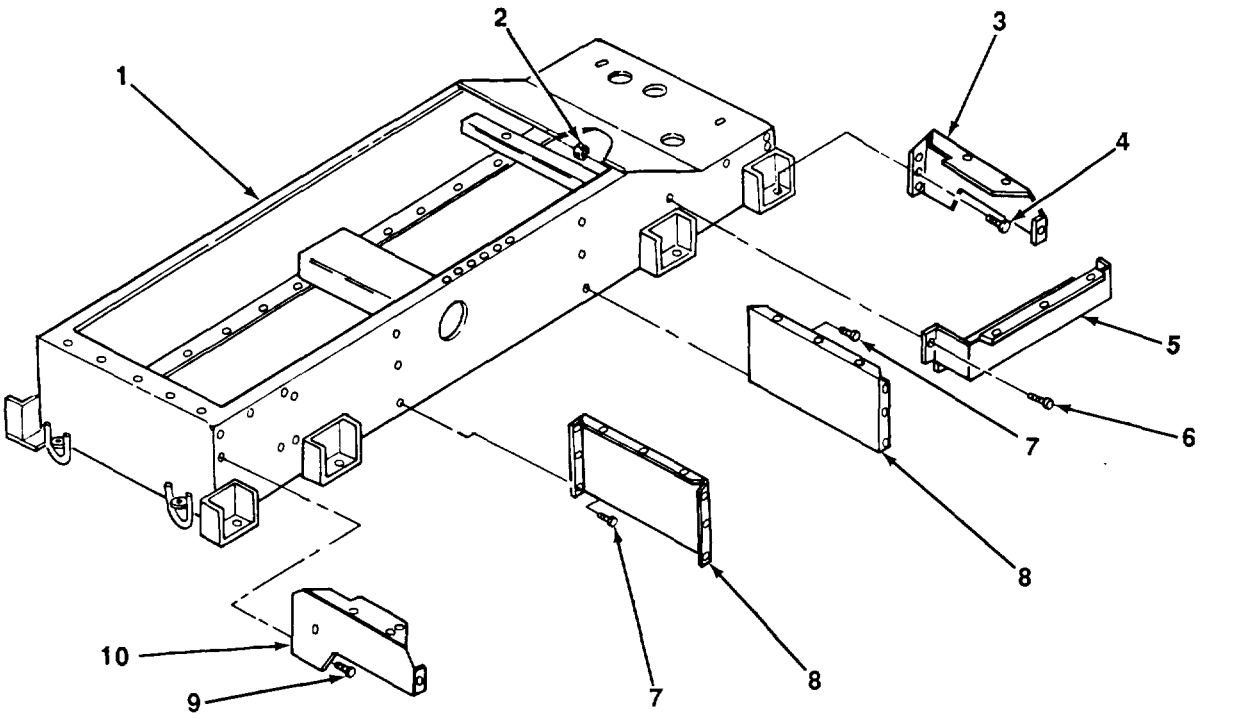
Personnel Required: Two

a. REMOVAL

NOTE

Right and left side fender-to-frame panels are removed same way. This procedure covers left side panels.

1. Remove three screws (4) and front fender-to-frame panel (3) from frame (1).
2. Remove six screws (7) and two middle fender-to-frame panels (8) from frame (1).
3. Remove six screws (6) and locknuts (2) and remove two fender panels (5). Discard locknuts.
4. Remove three screws (9) and rear fender-to-frame panel (10) from frame (1).



5-89. FENDER-TO-FRAME PANELS REPLACEMENT (Con't).

b. INSTALLATION

NOTE

Right and left side fender-to-frame panels are installed in same way. This procedure covers left side panels.

1. Install rear fender-to-frame panel (10) on frame (1) with three screws (9).
2. Install two middle fender-to-frame panels (8) on frame (1) with six screws (7).
3. Install two fender panels (5) with six new locknuts (2) and screws (6).
4. Install front fender-to-frame panel (3) on frame (1) with three screws (4).

FOLLOW-ON TASKS:

- Install left side fender (left side fender-to-frame panels replacement only)(see paragraph 5-92).
- Install right side fender (right side fender-to-frame panels replacement only) (see paragraph 5-93).

5-90. RIGHT SIDE PANEL HOUSING REPLACEMENT.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Installation

Initial Setup:

Equipment Conditions:
Hinged doors removed (see paragraph 4-83)
Service valve box removed (see paragraph 5-83).
Fiberglass removed (see paragraph 5-95).
Side roof panel removed (see paragraph 5-82)
Front door removed (see paragraph 587)

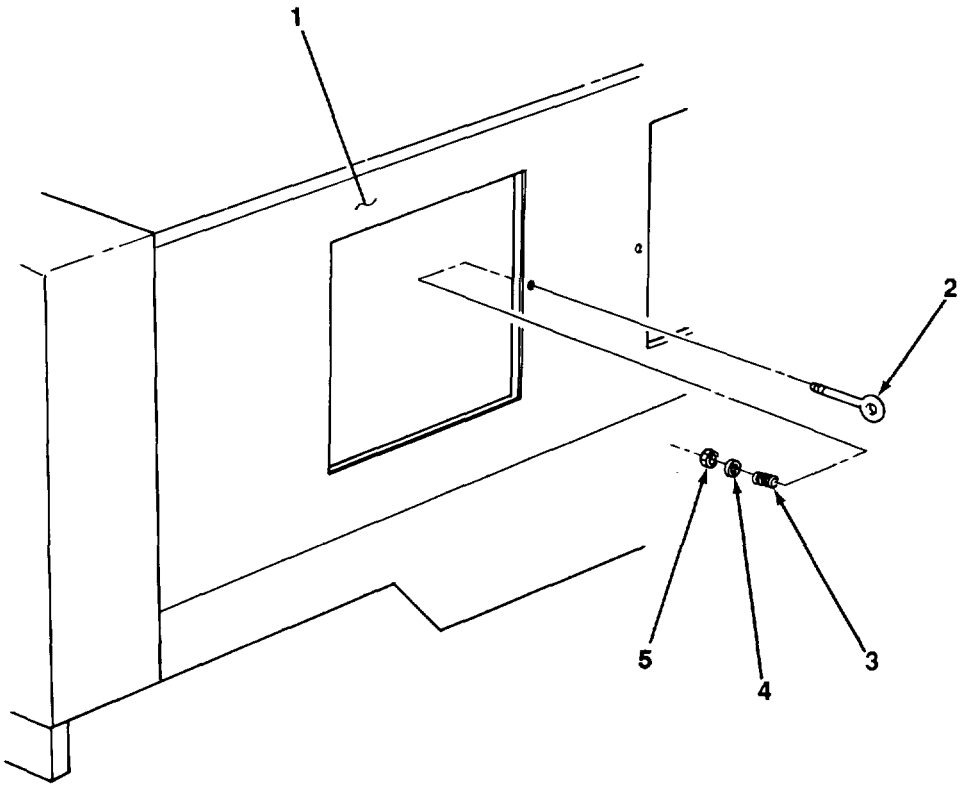
Materials/Parts:
Sealant (Item 36, Appendix E)

Tools/test Equipment
General mechanic's tool kit
Field automotive shop set

Personnel Required: Two

a. REMOVAL

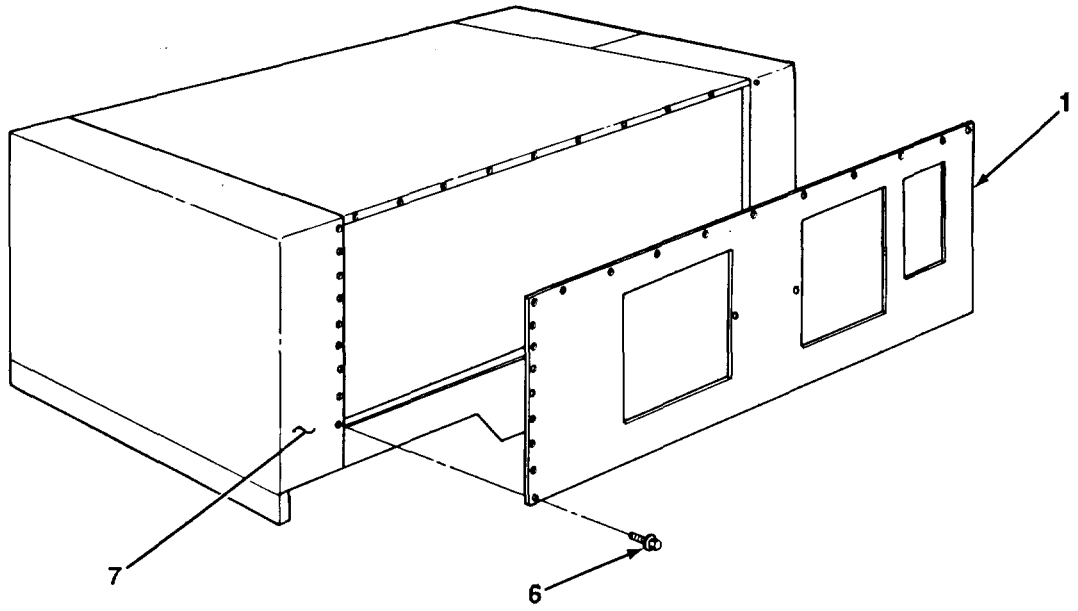
1. Remove nut (5), washer (4), spring (3), and latch (2) from panel (1).



TA705210

5-90. RIGHT SIDE PANEL HOUSING REPLACEMENT (Con't).

2. Have assistant support panel (1) and remove nine screws (6) from panel and body (7).
3. Break sealant between bottom of panel (1) and fender.
4. Remove panel (1) from body (7).



b. CLEANING AND INSPECTION

1. Clean all sealant from top side of fender.
2. Ensure that bottom edge of new side panel is clean.

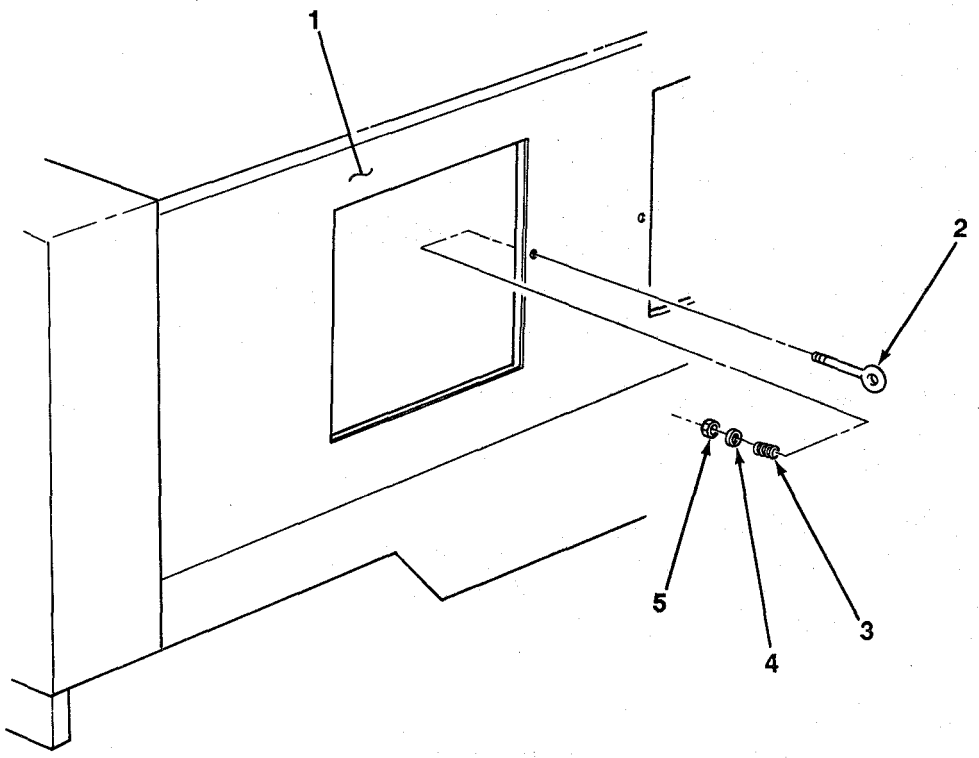
c. INSTALLATION

1. Apply bead of sealant to fender where panel (1) will be mounted.
2. Position panel (1) on body (7).
3. Install nine screws (6) on panel (1) and body (7).

TA705211

5-90. RIGHT SIDE PANEL HOUSING REPLACEMENT (Con't).

4. Position latch (2) through panel (1) and install spring (3), washer (4), and nut (5). Tighten nut until 3 to 4 threads are showing on bottom of latch.



FOLLOW-ON TASKS:

- Install front door (see paragraph 5-87).
- Install side roof panel (see paragraph 5-82).
- Install fiberglass (see paragraph 5-95).
- Install service valve box (see paragraph 5-83).
- Install hinged doors (see paragraph 4-83).

TA705212

5-91. LEFT SIDE PANEL HOUSING REPLACEMENT.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Installation

Initial Setup:

Equipment Conditions:

- Side roof panel removed (see paragraph 5-82)
- Front door removed (see paragraph 5-87).
- Hinged doors removed (see paragraph 4-83)
- Fiberglass removed (see paragraph 5-95).

Materials/Parts:

- Sealant (Item 36, Appendix E)

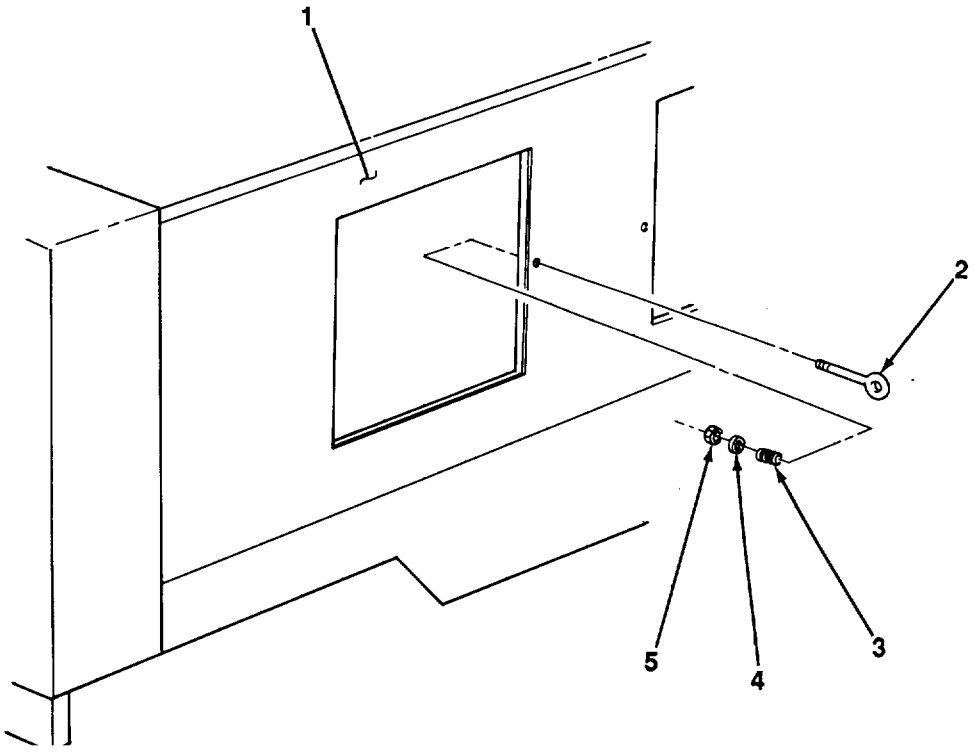
Personnel Required: Two

Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set

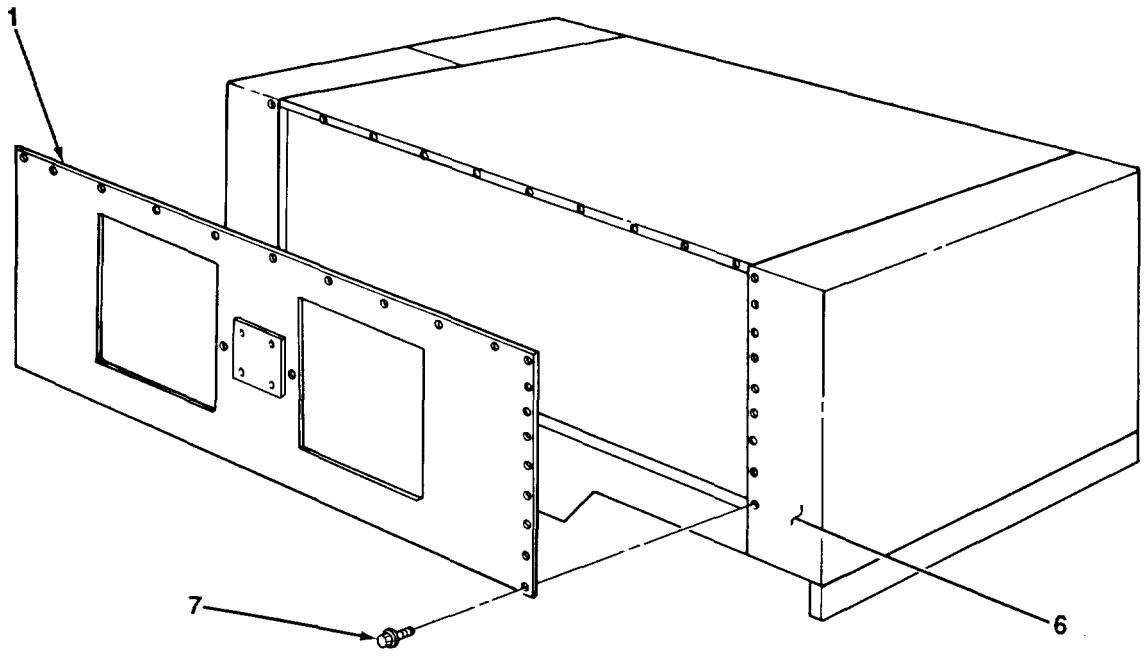
a. REMOVAL

1. Remove nut (5), washer (4), spring (3), and latch (2) from panel (1).



5-91. LEFT SIDE PANEL HOUSING REPLACEMENT (Con't).

2. Have assistant support panel (1) and remove nine screws (7) from panel and body (6).
3. Break sealant between bottom of panel (1) and fender.
4. Remove panel (1) from body (6) and place on suitable support.



b. CLEANING AND INSPECTION

1. Clean all sealant from top side of fender.
2. Ensure that bottom edge of new side panel is clean.

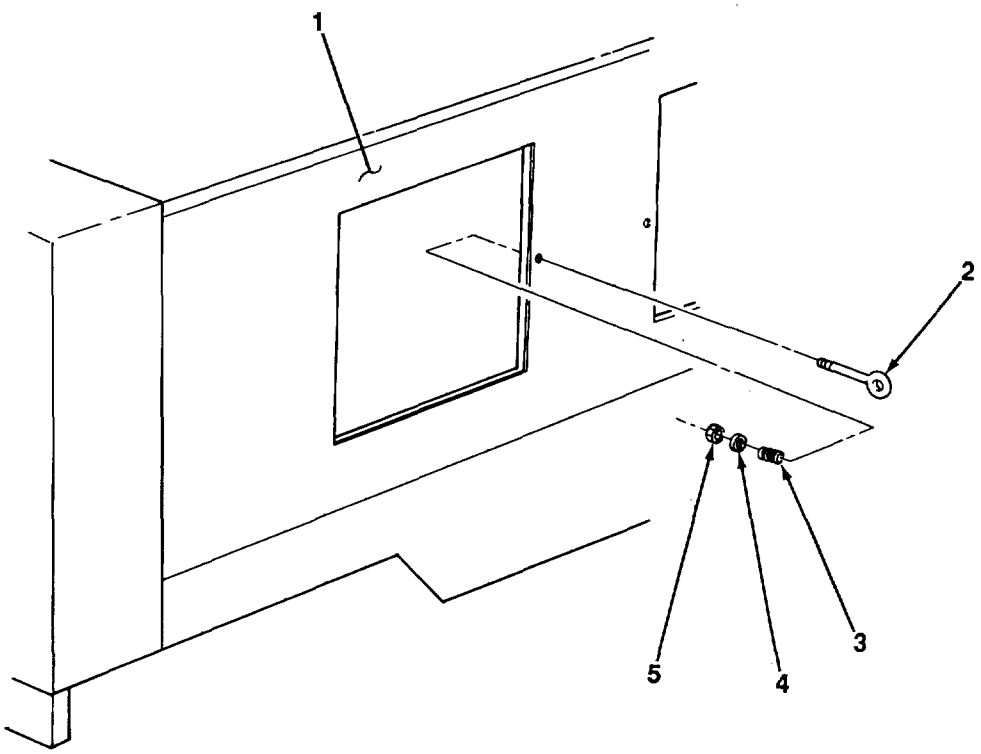
c. INSTALLATION

1. Apply bead of sealant to fender where panel (1) will be mounted.
2. Position panel (1) on body (6).
3. Install nine screws (7) on panel (1) and body (6).

TA705214

5-91. LEFT SIDE PANEL HOUSING REPLACEMENT (Con't).

4. Position latch (2) through panel (1) and install spring (3), washer (4), and nut (5). Tighten nut until 3 to 4 threads are showing on bottom of latch.



FOLLOW-ON TASKS:

- Install front door (see paragraph 5-87).
- Install side roof panel (see paragraph 5-82).
- Install fiberglass (see paragraph 5-95).
- Install hinged doors (see paragraph 4-83).

TA705215

5-92. LEFT SIDE FENDER REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Left side housing panel removed (see paragraph 591).
- Storage batteries removed (see paragraph 4-60)
- Front doors removed (see paragraph 5-87).
- Front frame removed (see paragraph 5-86).

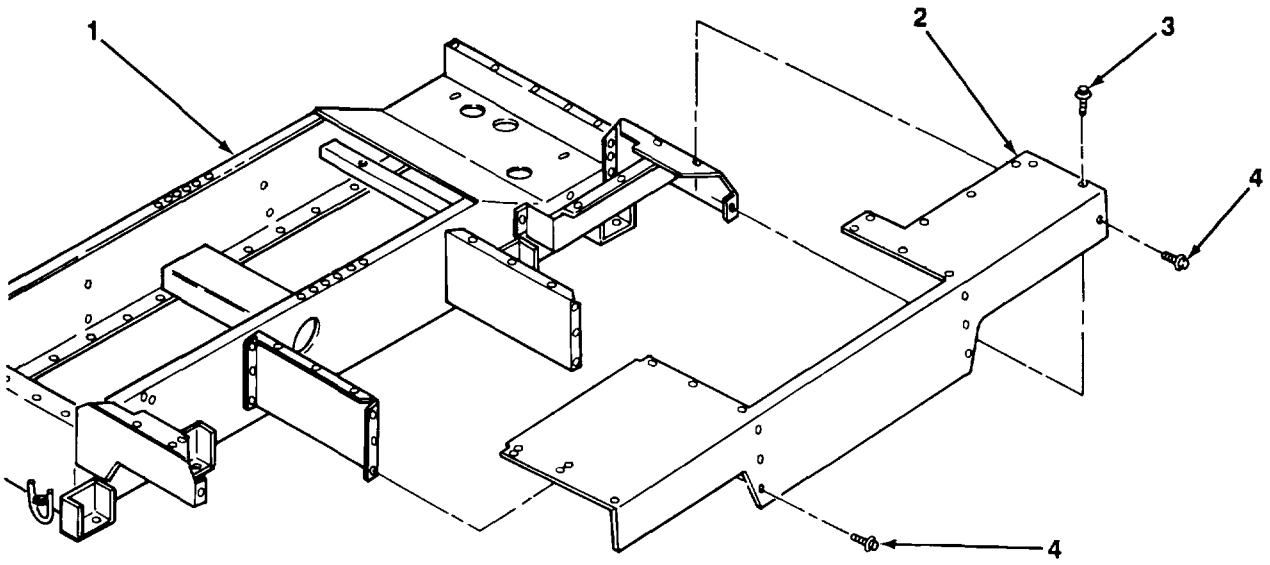
Tools/Test Equipment:

- General mechanic's tool kit

Personnel Required: Two

a. REMOVAL

1. Remove 13 screws (4) from fender (2) and frame (1).
2. Remove 15 screws (3) from fender (2) and frame (1).
3. Remove fender (2) from frame (1).



TA705216

5-92. LEFT SIDE FENDER REPLACEMENT (Con't).

b. INSTALLATION

1. Position fender (2) on frame (1).
2. Install 15 screws (3) on fender (2) and frame (1).
3. Install 13 screws (4) on fender (2) and frame (1).

FOLLOW-ON TASKS:

- Install front frame (see paragraph 5-86).
- Install front doors (see paragraph 5-87).
- Install storage batteries (see paragraph 4-60).
- Install left side housing panel (see paragraph 5-91).

5-93. RIGHT SIDE FENDER REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Right side housing panel removed (see paragraph 5-90).
- Storage batteries removed (see paragraph 4-60)
- Air compressor main oil filter removed (see paragraph 4-93).
- Oil separator safety relief valve removed (see paragraph 4-96).
- Front frame removed (see paragraph 5-86).
- Instrument panel removed (see paragraph 4-59).

Tools/Test Equipment:

- General mechanic's tool kit

Personnel Required: Two

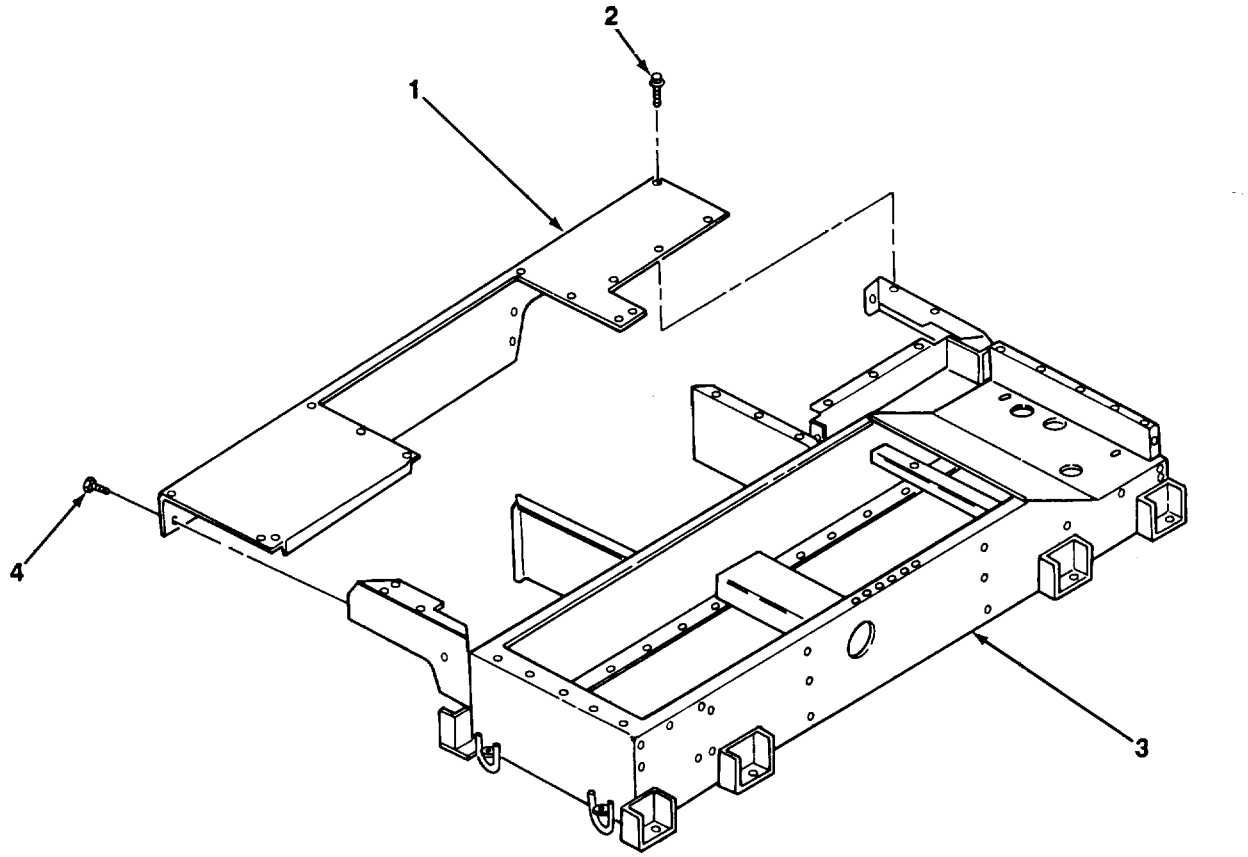
a. REMOVAL

1. Remove 13 screws (4) from fender (1) and frame (3).
2. Remove 13 screws (2) from fender (1) and frame (3).
3. Remove fender (1) from frame (3). Place fender on suitable supports.

b. INSTALLATION

1. Position fender (1) on frame (3).
2. Install 13 screws (2) on fender (1) and frame (3).
3. Install 13 screws (4) on fender (1) and frame (3).

5-93. RIGHT SIDE FENDER REPLACEMENT (Con't).



FOLLOW-ON TASKS:

- Install instrument panel (see paragraph 4-59).
- Install front frame (see paragraph 5-86).
- Install oil separator safety relief valve (see paragraph 4-96).
- Install air compressor main oil filter (see paragraph 4-93).
- Install storage batteries (see paragraph 4-60).
- Install right side housing panel (see paragraph 5-90).

TA705217

5-94. OIL SEPARATOR BOTTOM COVER REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Oil separator drain valve removed (see paragraph 4-94).
- Oil separator and fuel tank supports removed (see paragraph 599).

Tools/Test Equipment:

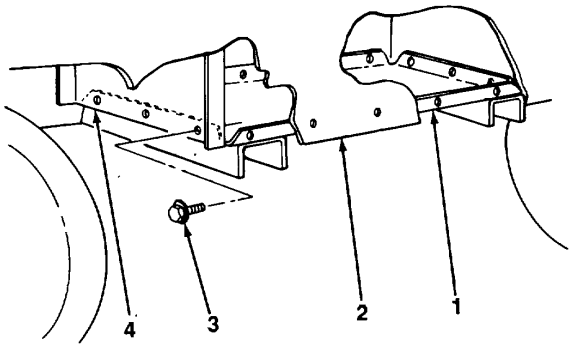
- General mechanic's tool kit

a. REMOVAL

Remove 16 screws (3) and oil separator bottom cover (1) from two fender panels (4) and body (2).

b. INSTALLATION

Install oil separator bottom cover (2) on two fender panels (4) and body (2) with 16 screws (3).



TA705218

FOLLOW-ON TASKS:

- Install oil separator drain valve (see paragraph 4-94).
- Install oil separator and fuel tank supports (see paragraph 5-99).

5-95. FIBERGLASS PANELS REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:
- Master battery switch in OFF position

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

NOTE

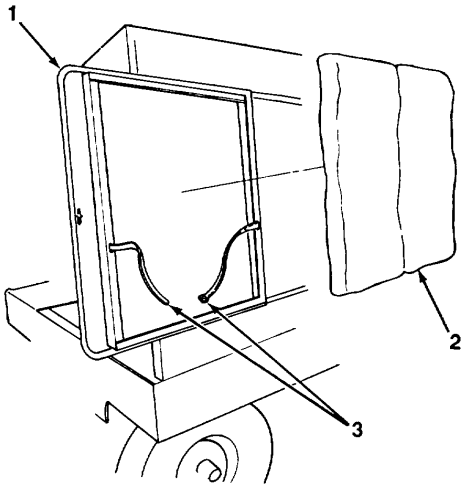
All fiberglass panels are removed same way except quantity of straps and seals may vary. Hinged door fiberglass panel is shown.

1. Remove strap (3) from door (1).

WARNING

When working with fiberglass, wear dust mask, goggles, and gloves. Fiberglass dust can be harmful to your health.

2. Remove and discard fiberglass panel (2) from door (1).



b. INSTALLATION

WARNING

When working with fiberglass, wear dust mask, goggles, and gloves. Fiberglass dust can be harmful to your health.

NOTE

All fiberglass panels are removed same way except quantity of straps and seals may vary. Hinged door fiberglass panel is shown.

1. Install fiberglass panel (2) in door (1).
2. Install strap (3) on door (1).

TA705219

5-96. BUMPER REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:
- Handbrake lever removed from bumper (see paragraph 4-64)

Materials/Parts:
- Five locknuts
- Eight lockwashers

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set
- Suitable lifting device

Personnel Required: Two

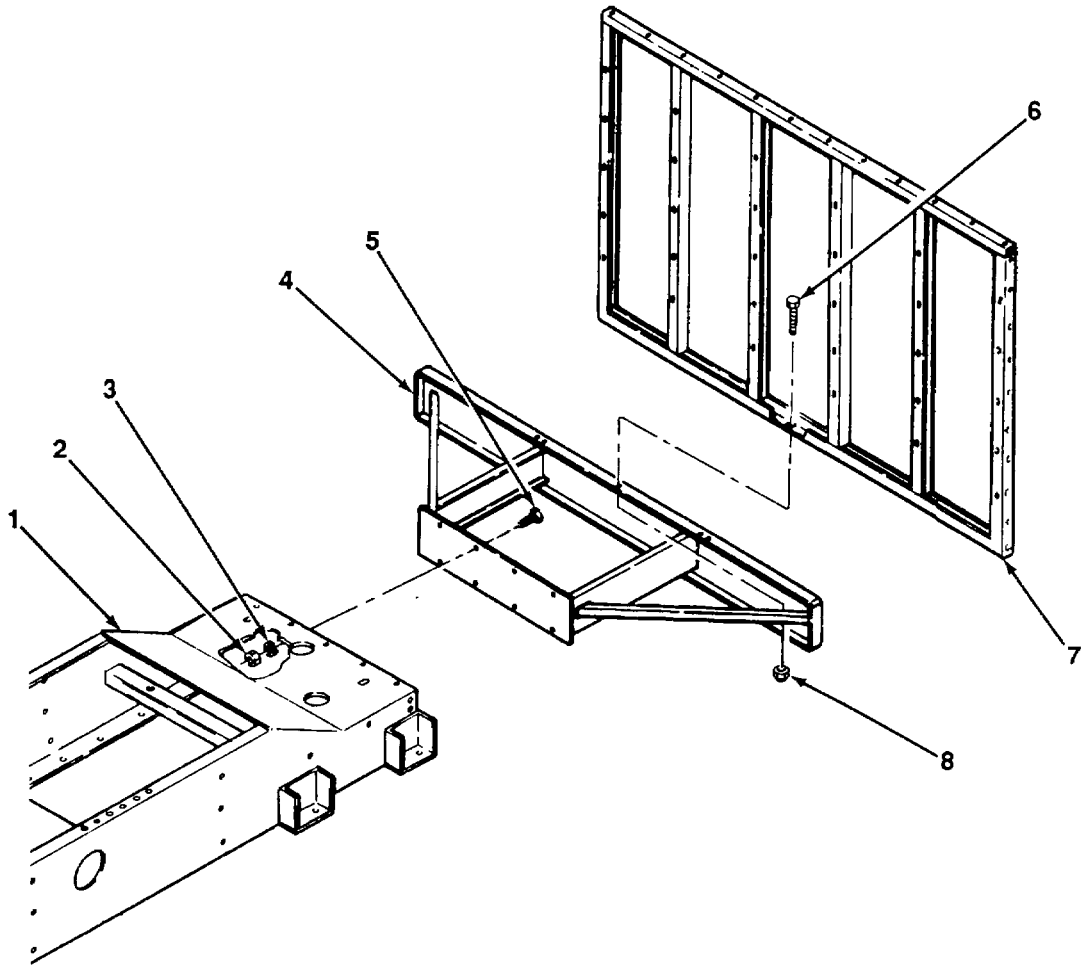
a. REMOVAL

1. Attach suitable lifting device to bumper (4).
2. Remove eight nuts (2), lockwashers (3), and bolts (5) from bumper (4) and frame (1). Discard lockwashers.
3. Lower bumper (4) and remove from under frame (1).
4. Remove five locknuts (8) and bolts (6) from bumper (4) and bracket (7). Discard locknuts.

b. INSTALLATION

1. Install five bolts (6) and new locknuts (8) on bumper (4) and bracket (7).
2. Place bumper (4) under frame (1) and raise into position with suitable lifting device.
3. Install eight bolts (5), new lockwashers (3), and nuts (2) on bumper (4) and frame (1).
4. Remove lifting device from bumper (4).

5-96. BUMPER REPLACEMENT (Con't).



FOLLOW-ON TASKS:

- Install handbrake lever on bumper (see paragraph 4-64).

TA705220

5-97. LIFT BAIL REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:
- Center roof panel removed (see paragraph 5-85).

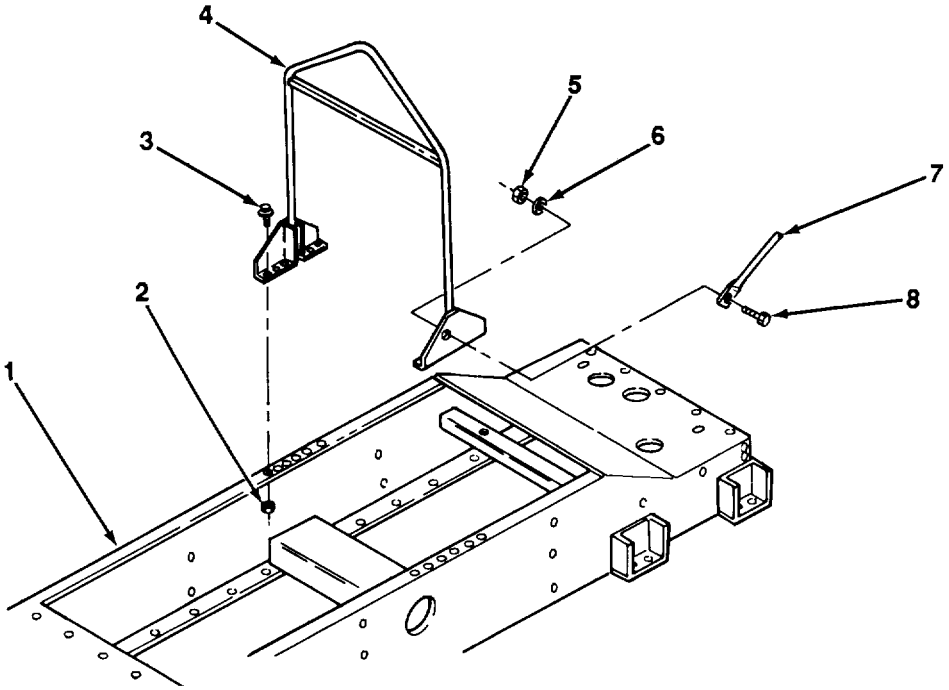
Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set
- Suitable lifting device

Materials/Parts:
- Twelve capscrews
- Twelve locknuts

Personnel Required: Two

a. REMOVAL

1. Attach a suitable lifting device to lift bail (4).
2. Remove two bolts (8), washers (6), and nuts (5) and disconnect two radiator supports (7) from lift bail (4).
3. Remove 12 locknuts (2) and capscrews (3) from lift bail (4) and frame (1). Discard capscrews and locknuts.
4. Using lifting device, remove lift bail (4) from frame (1).
5. Remove lifting device from lift bail (4).



5-97. LIFT BAIL REPLACEMENT (Con't).

b. INSTALLATION

1. Attach suitable lifting device to lift bail (4).
2. Using suitable lifting device, position lift bail (4) on frame (1).
3. Loosely install 12 new capscrews (3) and new locknuts (2) on lift bail (4) and frame (1).
4. Connect two radiator supports (7) to lift bail (4) with two nuts (5), washers (6), and bolts (8).
5. Tighten 12 locknuts (2).
6. Remove lifting device from lift bail (4).

FOLLOW-ON TASKS:

- Install center roof panel (see paragraph 5-85).

5-98. FAN SUPPORT REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:

Equipment Conditions:
- Fan hub removed (see paragraph 4-48)

Materials/Parts:
- Four lockwashers

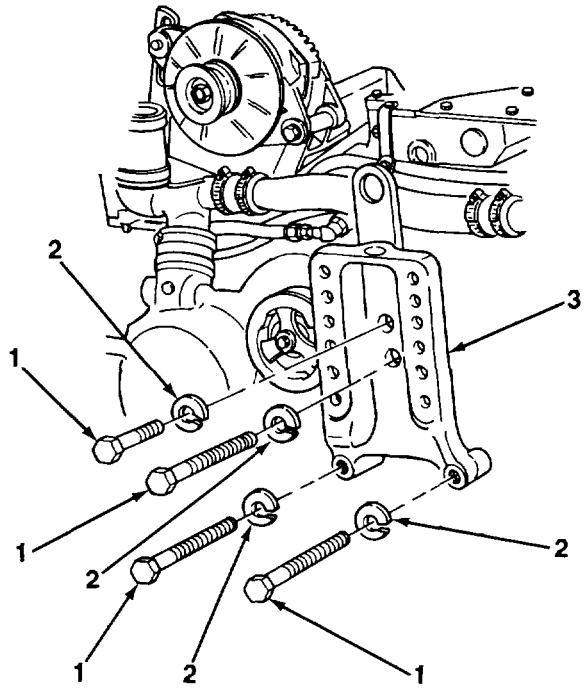
Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

Remove four bolts (1), lockwashers (2), and fan support (3) from engine. Discard lockwashers.

b. INSTALLATION

Install fan support (3) on engine with four new lockwashers (2) and bolts (1).



TA705222

FOLLOW-ON TASKS:
- Install fan hub (see paragraph 4-48).

5-99. OIL SEPARATOR AND FUEL TANK SUPPORT REPLACEMENT.

This Task Covers:
a. Removal
b. Installation

Initial Setup:

Equipment Conditions:
- Master battery switch in OFF position
- Fender-to-frame panels at front of rear tire and rear of front tire removed (see paragraph 5-89)

Materials/Parts:
- Six lockwashers

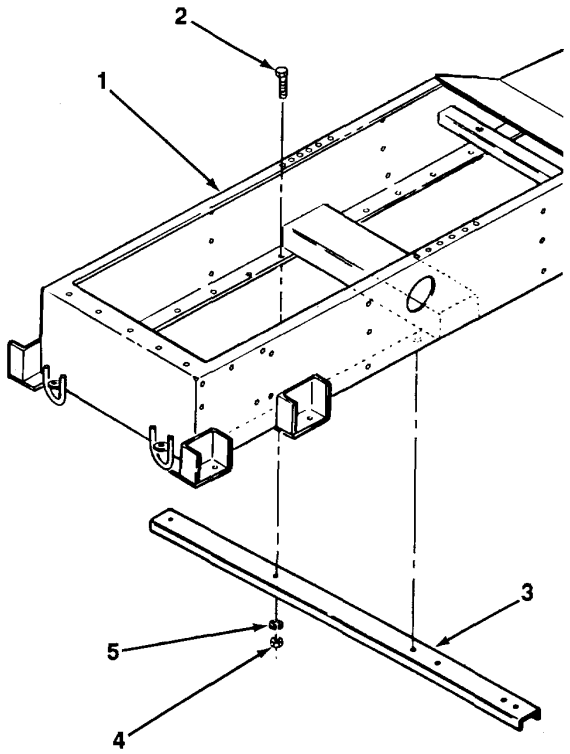
Personnel Required: Two

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

NOTE
Both oil separator and fuel tank supports are removed same way. This procedure covers one support.

1. Place suitable supports under fuel tank.
2. Support top of oil separator to lift bail.
3. Have assistant support oil separator and fuel tank support (3) and remove six nuts (4), lockwashers (5), and bolts (2) from support and frame (1). Discard lockwashers.
4. Remove oil separator and fuel tank support (3) from under frame (1).



b. INSTALLATION

NOTE
Both oil separator and fuel tank supports are installed same way. This procedure covers one support.

1. Position oil separator and fuel tank support (3) under frame (1).
2. Install six bolts (2), new lockwashers (5), and nuts (4) on oil separator and fuel tank support (3) and frame (1).
3. Remove supports from under fuel tank and from top of oil separator.

FOLLOW-ON TASKS
- Install fender-to-frame panels at front of rear tire and rear of front tire (see paragraph 5-89).

TA705223

Section X. AIR COMPRESSOR ASSEMBLY MAINTENANCE

5-100. AIR COMPRESSOR ASSEMBLY REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:
- Engine and air compressor removed (see paragraph 5-15).

Materials/Parts:
- Thirty-two lockwashers

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set
- Suitable lifting device

Personnel Required: Two

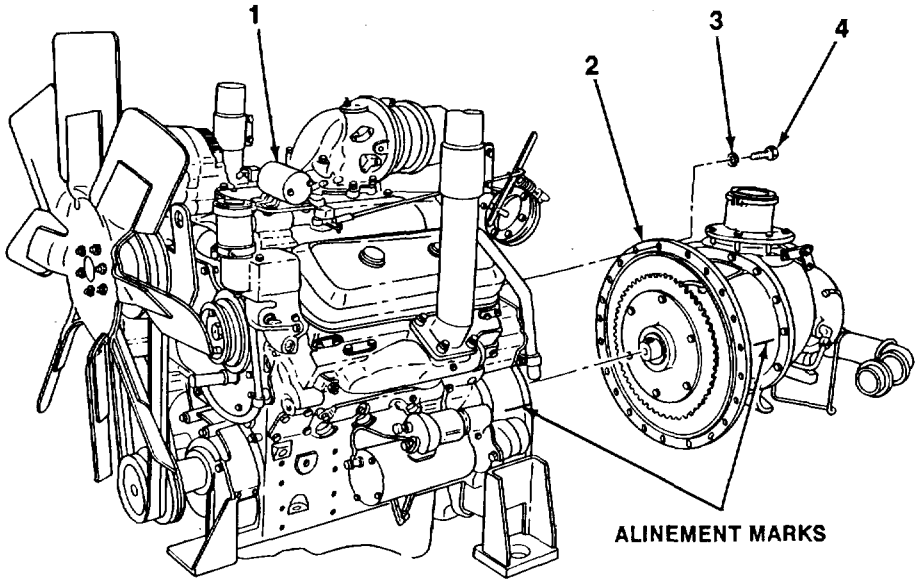
5-100. AIR COMPRESSOR ASSEMBLY REPLACEMENT (Con't).

a. REMOVAL

CAUTION

Ensure that engine is suitably supported before removing air compressor assembly. Engine and air compressor assembly may be damaged.

1. Make alignment marks on air compressor assembly (2) and engine (1).
2. Attach suitable lifting device to air compressor assembly (2). Remove slack from lifting sling.



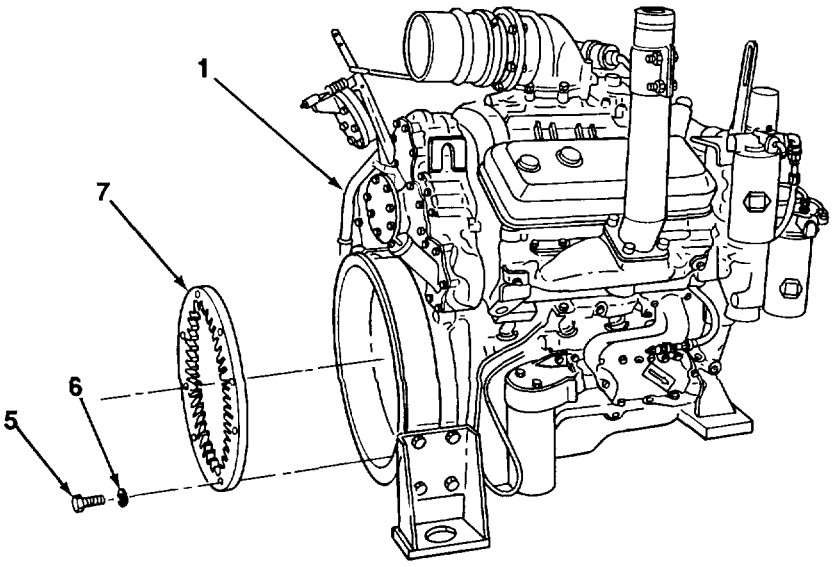
WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious injury or death to personnel.

3. Remove 24 bolts (4) and lockwashers (3) from air compressor assembly (2) and engine (1). Discard lockwashers.
4. Remove air compressor assembly (2) from engine (1) and place on suitable support.
5. Remove lifting device from air compressor assembly (2).
6. Remove eight bolts (5), lockwashers (6), and drive ring (7) from engine (1). Discard lockwashers.

TA705224

5-100. AIR COMPRESSOR ASSEMBLY REPLACEMENT (Con't).



b. INSTALLATION

1. Install drive ring (7) on engine (1) with eight new lockwashers (6) and bolts (5).

2. Attach suitable lifting device to air compressor assembly (2).

WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious injury or death to personnel.

3. Position air compressor assembly (2) on engine (1) aligning marks.

NOTE

When installing bolts and lockwashers, install at 3 o'clock and 9 o'clock positions first, then install remaining hardware. Install 24 new lockwashers (3) and bolts (4) on air compressor assembly (2) and engine (1).

FOLLOW-ON TASKS

- Install engine and air compressor (see paragraph 5-15).

TA705225 4

5-101. AIR COMPRESSOR ASSEMBLY REPAIR.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Installation

Initial Setup:

Equipment Conditions:
- Air compressor assembly removed (see paragraph 5-100)

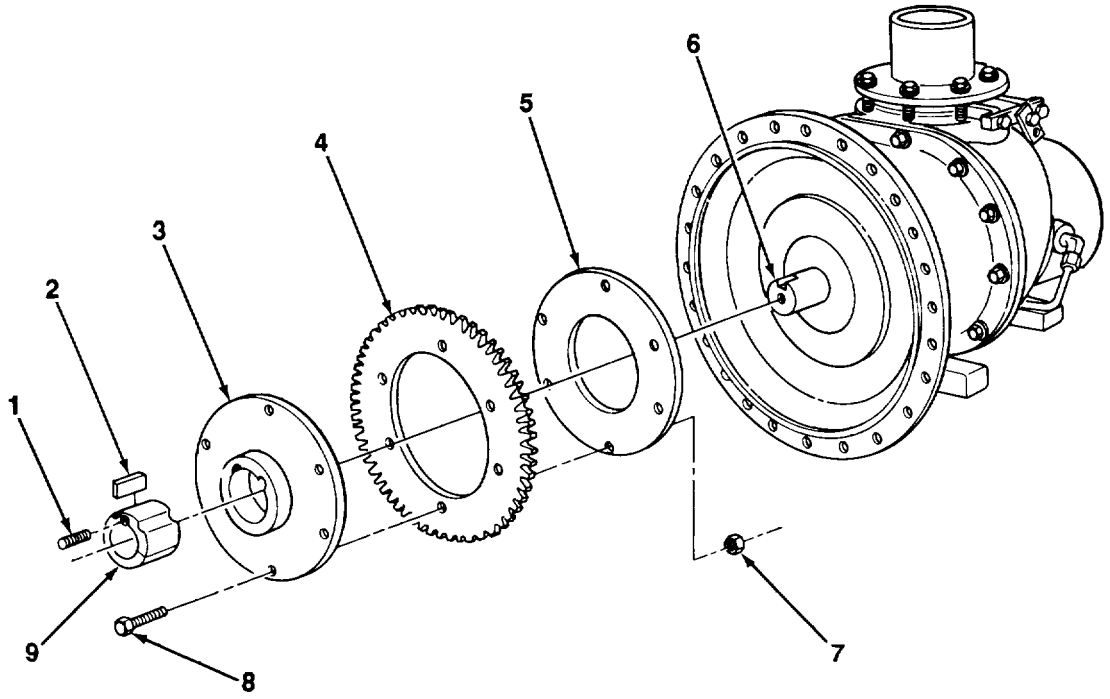
Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Lubricating oil (Item 28, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- Six locknuts

General Safety Instructions:
- Dry cleaning solvent is flammable and must not be used near open flame. Use only in a well-ventilated area.

a. DISASSEMBLY

1. Remove two setscrews (1) from wedgelock (9) and hub (3).
2. Evenly pry plate (5), gear (4), and hub (3) off air compressor shaft (6). Wedgelock (9) and key (2) will also come off.
3. Remove six locknuts (7) and bolts (8) from hub (3), gear (4), and plate (5). Discard locknuts.
4. Separate plate (5) and hub (3) from gear (4).



5-101. AIR COMPRESSOR ASSEMBLY REPAIR (Con't).

b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100iF-1380F (380C-590C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

1. Clean parts with dry cleaning solvent. Allow to dry.
2. Inspect parts for damage. Replace damaged parts.

c. INSTALLATION

1. Install six bolts (8) and new locknuts (7) on hub (3), gear (4), and plate (5).
2. Install plate (5), gear (4), and hub (3) on air compressor shaft (6).

NOTE
It may be necessary to tap wedgelock on air compressor shaft.

3. Install wedgerock (9) and key (2) on air compressor shaft (6).
4. Aline holes in hub (3), gear (4), and plate (5) and aline two threaded holes in wedgelock (9) and hub.
5. Apply lubricating oil to threads of two setscrews (1) and install setscrews in two threaded holes in wedgelock (9) and hub (3). Torque setscrews to 35-37 lb.-ft. (48-50 N•m).

FOLLOW-ON TASKS:

- Install air compressor assembly (see paragraph 5-100).

5-102. OIL SEPARATOR REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

Equipment Conditions:

- Right side roof panel removed (see paragraph 5-82)
- Center roof panel removed (see paragraph 5-85)
- Minimum pressure valve removed (see paragraph 5-104)
- Safety relief valve removed (see paragraph 4-88)
- Thermal valve removed (see paragraph 4-89)
- Oil separator oil level gage removed (see paragraph 4-91).
- Oil separator drain valve removed (see paragraph 4-94).
- Oil separator oil fill tube removed (see paragraph 4-92).
- Oil separator element removed (see paragraph 4-90).

Materials/Parts:

- Sealing compound (Item 14, Appendix E)
- Six lockwashers

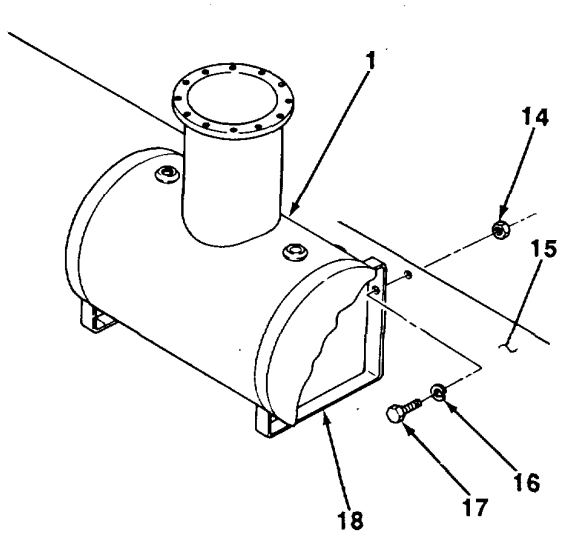
Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set
- Suitable lifting device

Personnel Required: Two

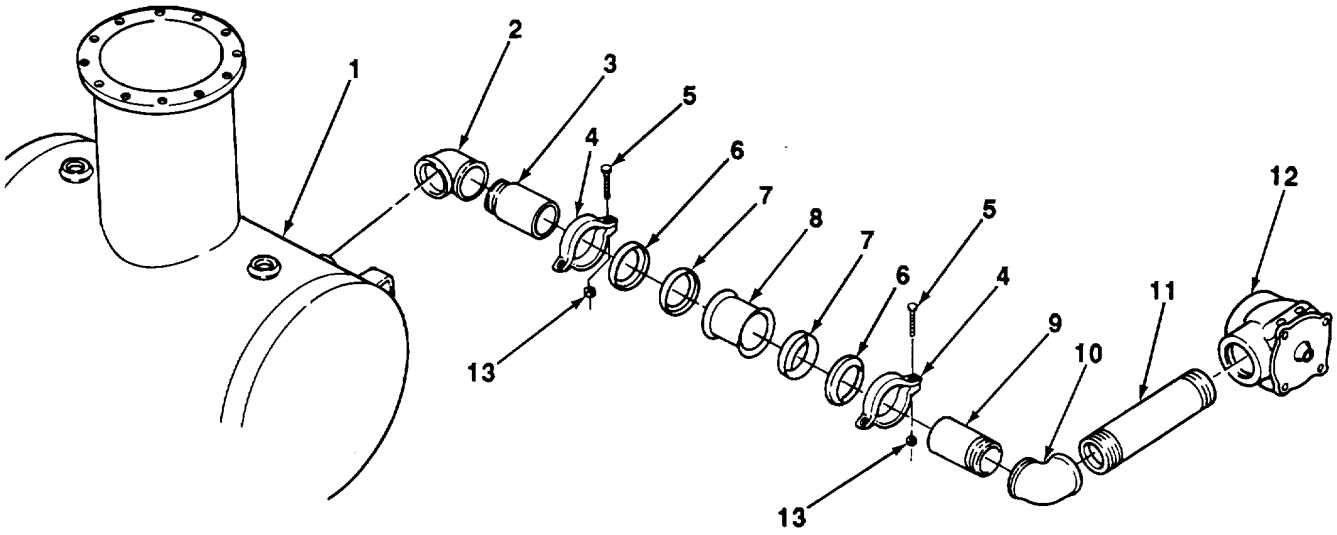
a. REMOVAL

1. Remove two nuts (13), screws (5), and clamps (4) from coupling (8).
2. Remove two couplers (6) and coupling (8) from nipples (3 and 9). If damaged, remove two gaskets (7) from couplers (6).
3. Remove nipple (9), elbow (10), and nipple (11) from dish
4. Remove nipple (3) and elbow (2) from oil separator (1).
5. Attach suitable lifting device to oil separator (1).
6. Remove two nuts (14), screws (17), and lockwashers (16) from two brackets (18) and frame (15). Discard lockwashers.
7. Remove four screws, lockwashers, and nuts holding oil separator to oil separator and fuel tank support (see paragraph 4-86). Discard lockwashers.



TA705227

5-102. OIL SEPARATOR REPLACEMENT (Con't).



WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious injury or death to personnel.

8. Remove oil separator (1) from frame (15) and place on suitable supports.

9. Remove lifting device from oil separator (1).

b. INSTALLATION

1. Attach suitable lifting device to oil separator (1).

WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious injury or death to personnel.

2. Lift oil separator (1) and position in frame (15).

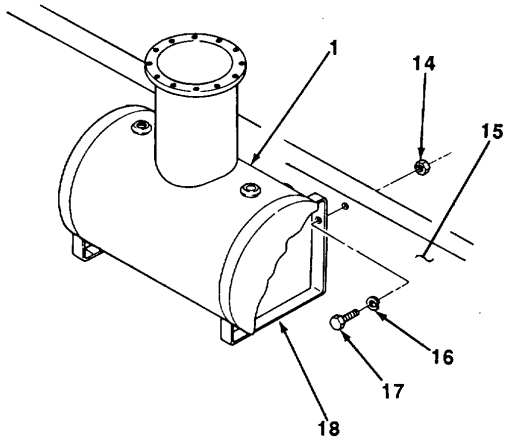
TA705228

5-102. OIL SEPARATOR REPLACEMENT (Con't)

3. Install two new lockwashers (16), screws (17), and nuts (14) on two brackets (18) and frame (15).

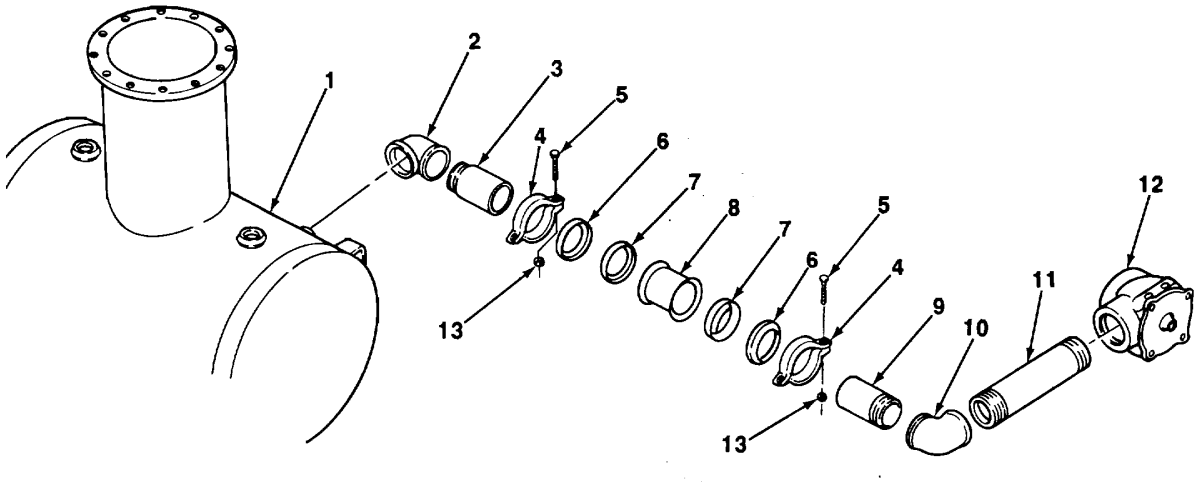
4. Install four nuts, new lockwashers and screws holding oil separator to oil separator and fuel tank supports (see paragraph 4-86).

5. Remove lifting device from oil separator (1).



6. Apply sealing compound to threads of oil separator (1) and nipple (3) and install elbow (2) and nipple on oil separator.

7. Apply sealing compound to threads of nipple (11) and install nipple and elbow (10) on discharge valve (12).



TA705229

5-102. OIL SEPARATOR REPLACEMENT (Con't).

8. Apply sealing compound to threads of nipple (9) and install nipple on elbow (10).
9. If removed, install two new gaskets (7) on couplers (6).
10. Position two couplers (6) and coupling (8) on nipples (3 and 9).
11. Install two clamps (4) on couplers (6) with two screws (5) and nuts (13).

FOLLOW-ON TASKS:

- Install oil separator element (see paragraph 4-90).
- Install oil separator oil fill tube (see paragraph 4-92).
- Install oil separator drain valve (see paragraph 4-94).
- Install oil separator oil level gage (see paragraph 4-91).
- Install thermal valve (see paragraph 4-89).
- Install safety relief valve (see paragraph 4-88).
- Install minimum pressure valve (see paragraph 5-104).
- Install center roof panel (see paragraph 5-85).
- Install right side roof panel (see paragraph 5-82).

5-103. CHECK VALVE REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

Initial Setup:

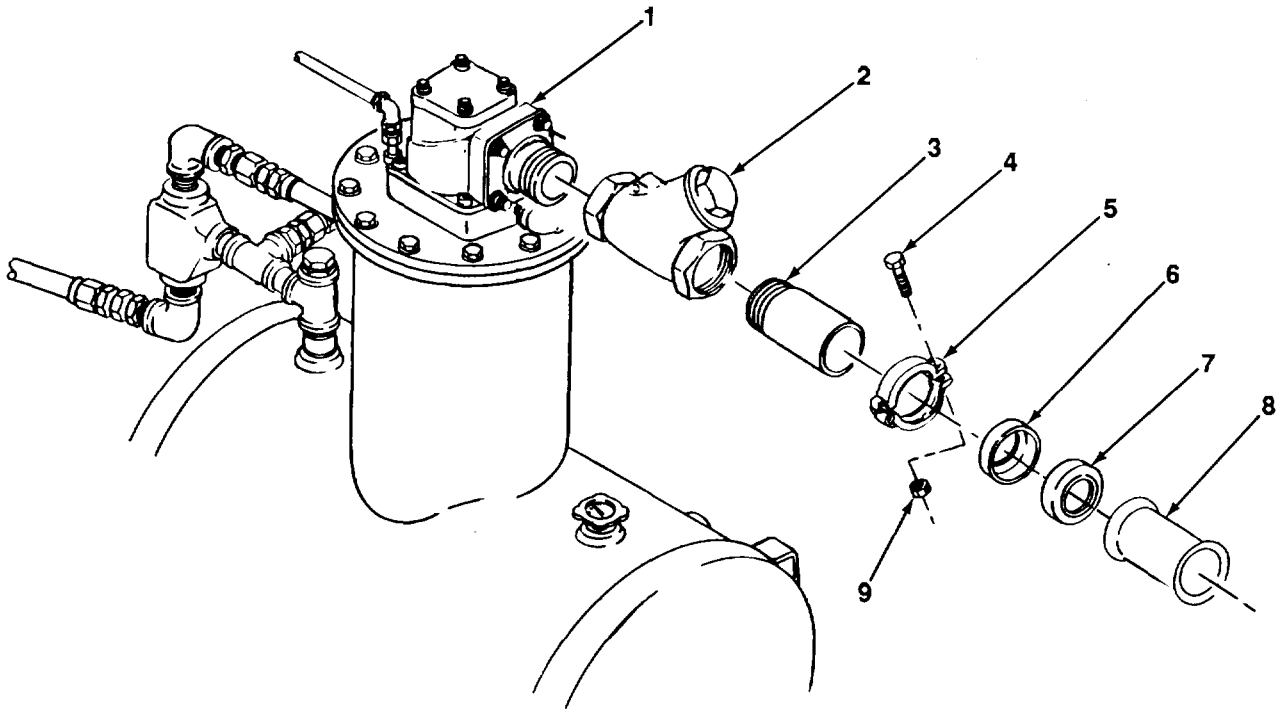
Equipment Conditions:
- System pressure relieved.

Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set

Materials/Parts:
- Antiseizing tape (Item 41, Appendix E)
- One gasket
- Four lockwashers

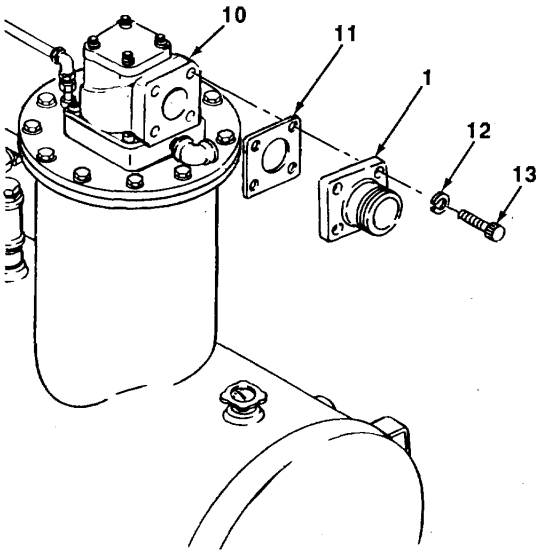
a. REMOVAL

1. Remove nut (9), bolt (4), and coupler (5) from nipple (3) and coupling (8).
2. Remove nipple (3) and check valve (2) from flange (1).
3. If damaged, remove and discard seal (6) and coupling ring (7) from nipple (3) and (8).



5-103. CHECK VALVE REPLACEMENT (Con't).

4. Remove four screws (13), lockwashers (12), flange (1), and gasket (11) from minimum pressure valve (10). Discard lockwashers and gasket.



b. INSTALLATION

1. Install new gasket (11) and flange (1) on minimum pressure valve (10) with four new lockwashers (12) and screws (13).

2. Apply antiseizing tape to threads of flange (1) and nipple (3), and install check valve (2) and nipple on flange.

3. If removed, install new coupling ring (7) and seal (6) on nipple (3) and coupling (8).

4. Install coupler (5) on nipple (3) and coupling (8) with bolt (4) and nut (9).

TA705231

5-104. MINIMUM PRESSURE VALVE REPLACEMENT.

This Task Covers:

a. Removal
b. Cleaning and Inspection
c. Installation

Initial Setup:

Equipment Conditions:
- System pressure relieved.

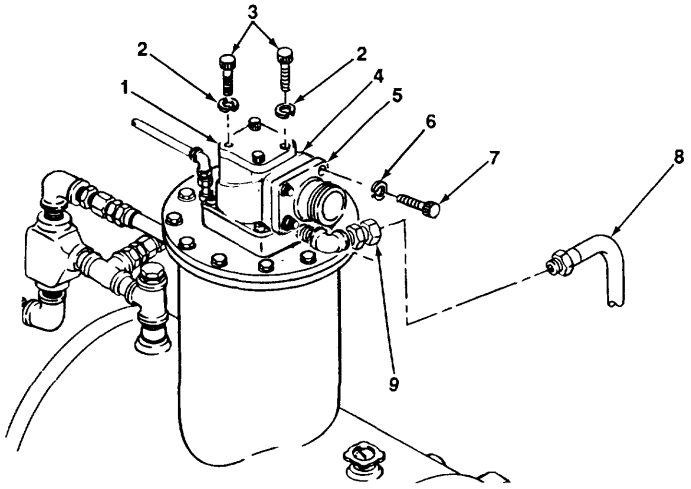
Tools/Test Equipment:
- General mechanic's tool kit
- Field automotive shop set
- Two nuts (Figure F-9, Appendix F)
- Two threaded rods (Figure F-9, Appendix F)

General Safety Instructions:
- Dry cleaning solvent Is flammable and must not be used near open flame. Use only in a well-ventilated area.

Materials/Parts:
- Adhesive (Item 1, Appendix E)
- Sealing compound (item 14, Appendix E)
- Grease (Item 22, Appendix E)
- Sealant (Item 36, Appendix E)
- Dry cleaning solvent (Item 38, Appendix E)
- One seal ring
- Two gaskets
- Three preformed packings
- Eight lockwashers

a. REMOVAL

1. Remove hose (8) from adapter (9).
2. Remove four bolts (7) and lockwashers (6) from flange (5) and housing (4). Discard lockwashers.
3. Remove two capscrews (3) and lockwashers (2) from opposite corners of cover (1). Discard lockwashers.



TA705232

5-104. MINIMUM PRESSURE VALVE REPLACEMENT (Con't).

4. Install two threaded rods (12) and nuts (13) on cover (1). Tighten nuts to secure cover.

5. Remove two capscrews (10) and lockwashers (11) from cover (1). Discard lockwashers.

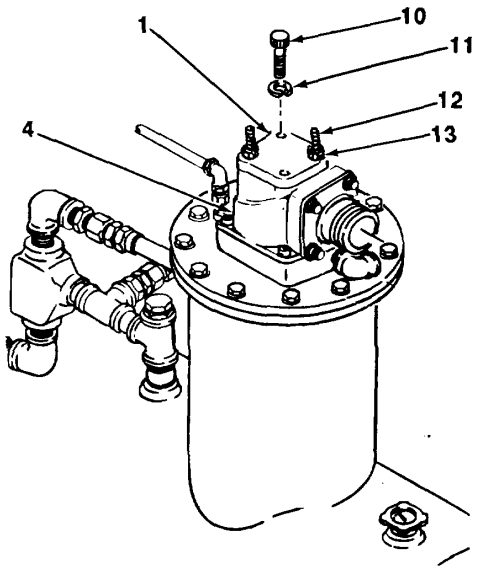
WARNING

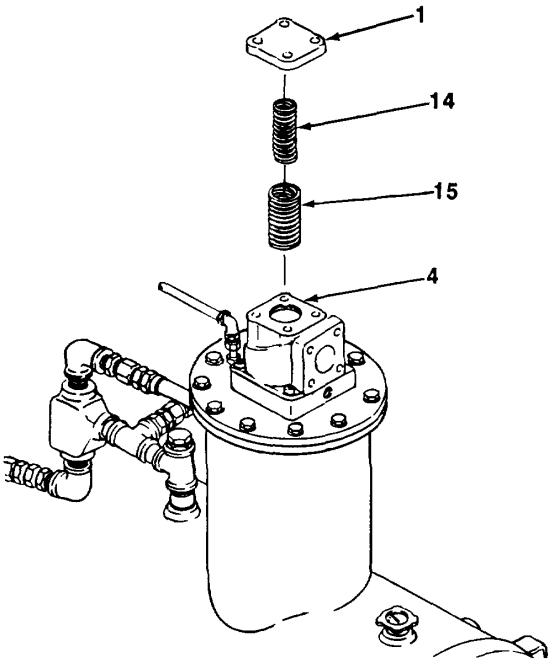
Minimum pressure valve cover is under spring tension. Use care when releasing pressure on cover. Cover may spring up and cause Injury to personnel.

6. Remove two nuts (13) slowly and evenly.

7. Remove two threaded rods (12) from cap (1).

8. Remove cover (1), Inner spring (14), and outer spring (15) from housing (4).





TA 705233

5-104. MINIMUM PRESSURE VALVE REPLACEMENT

9. Remove four bolts (16) from housing (4).

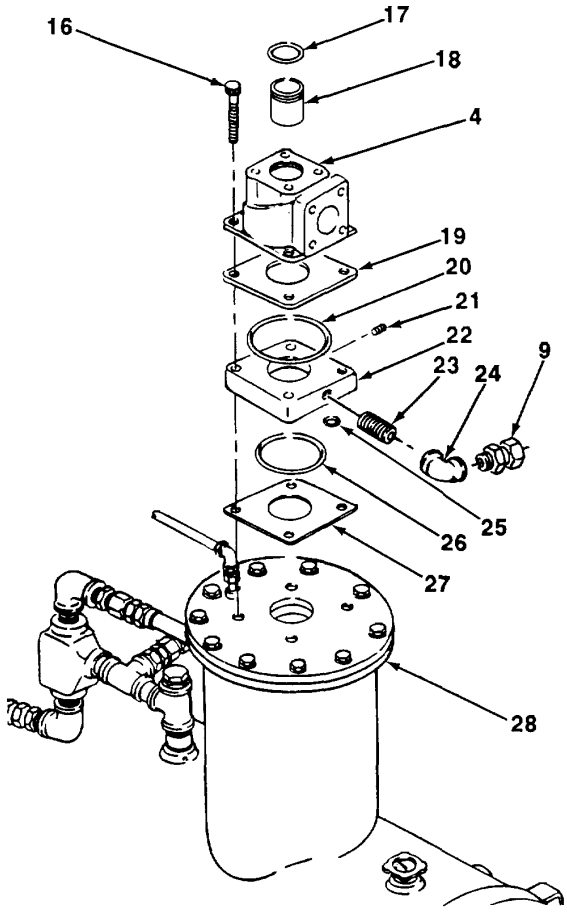
10. Remove piston (18) from housing (4).

11. Remove seal ring (17) from piston (18). Discard seal ring.

12. Remove housing (4), gasket (19), preformed packing (20), adapter (22), preformed packing (26), and gasket (27) from oil separator (28). Discard preformed packings and gaskets.

13. Remove preformed packing (25) and pipe plug (21) from adapter (22). Discard preformed packing.

14. Remove adapter (9), elbow (24), and nipple (23) from adapter (22).



b. CLEANING AND INSPECTION

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-138°F (38°C-590°C). If you become dizzy while using cleaning solvent, immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

1. Clean parts with dry cleaning solvent. Allow to dry.

2. Inspect piston for wear and damage. Replace if worn or damaged.

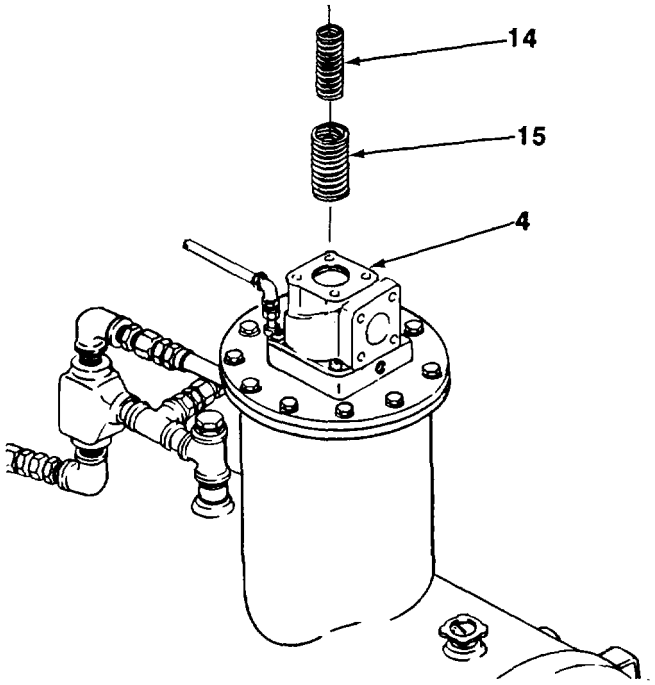
3. Inspect all parts for damage. Replace damaged parts.

TA705234

5-104. MINIMUM PRESSURE VALVE REPLACEMENT (Con't).

c. INSTALLATION

1. Apply sealing compound to threads of nipple (23) and adapter (9) and install nipple, elbow (24), and adapter on adapter (22).
2. Install pipe plug (21) and new preformed packing (25) in adapter (22).
3. Position new gasket (27), new preformed packing (26), adapter (22), new preformed packing (20), new gasket (19), and housing (4) on oil separator (28).
4. Apply adhesive to four bolts (16) and install bolts in housing (4).
5. Install new seal ring (17) on piston (18).
6. Coat piston (18) and seal ring (17) with grease and install piston in housing (4).
7. Position outer spring (15) and inner spring (14) in housing (4).



TA705235

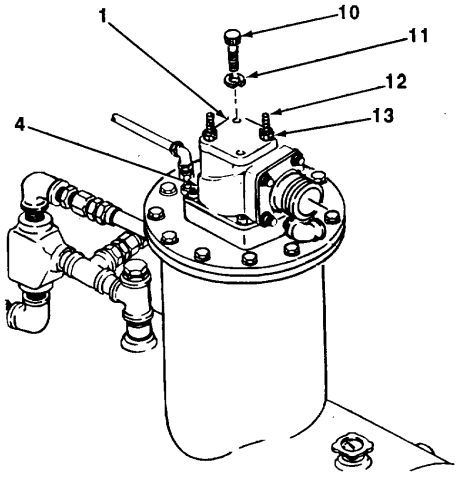
5-104. MINIMUM PRESSURE VALVE REPLACEMENT (Con't).

8. Install two threaded rods (12) in opposite comers of housing (4).

9. Position cover (1) on threaded rods (12) and install two nuts (13) evenly.

10. Install two new lockwashers (11) and capscrews (10) on cover (1) and housing (4).

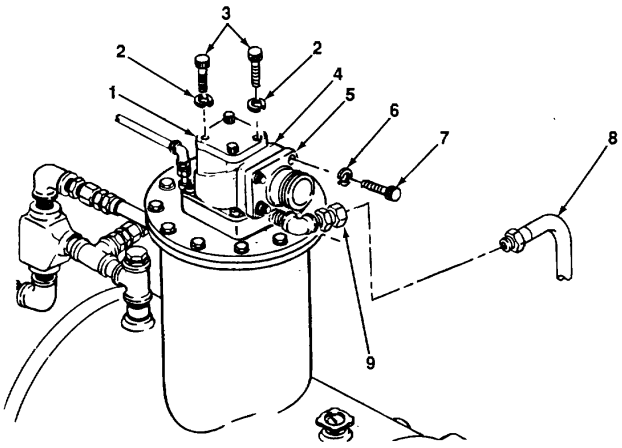
11. Remove two nuts (13) and threaded rods (12) from cover (1) and housing (4).



12. Install two new lockwashers (2) and capscrews (3) on cover (1) and housing (4).

13. Install four new lockwashers (6) and bolts (7) on flange (5) and housing (4).

14. Apply sealing compound to threads of hose (8) and install hose on adapter (9).



TA705236

FOLLOW-ON TASKS:

- Start air compressor (see paragraph 2-10) and check hose for leaks.

5-105. AIR COMPRESSOR OIL COOLER MAINTENANCE.

This Task Covers:

a. Removal
b. Repair
c. Installation

Initial Setup:

Equipment Conditions:
- Radiator removed (see paragraph 5-71).
- Oil cooler thermal valve exit port-to-oil cooler hose disconnected (see paragraph 4-100).
- Oil cooler-to-thermal valve inlet port hose disconnected (see paragraph 4-100).

Materials/Parts:
- Sealing compound (Item 14, Appendix E)

References:
- TM 750-254

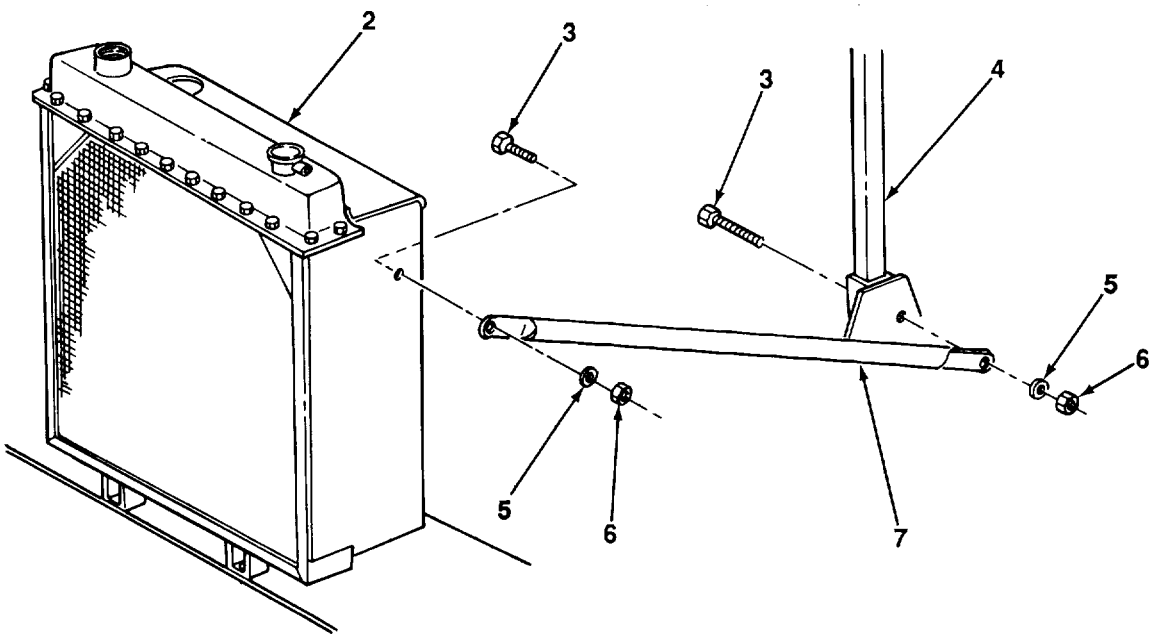
Tools/Test Equipment:

- General mechanic's tool kit
- Field automotive shop set
- Suitable lifting device

Personnel Required: Two

a. REMOVAL

1. Remove four nuts (6), washers (5), two screws (3), and radiator supports (7) from shroud (2) and lift bail (4).



TA705237

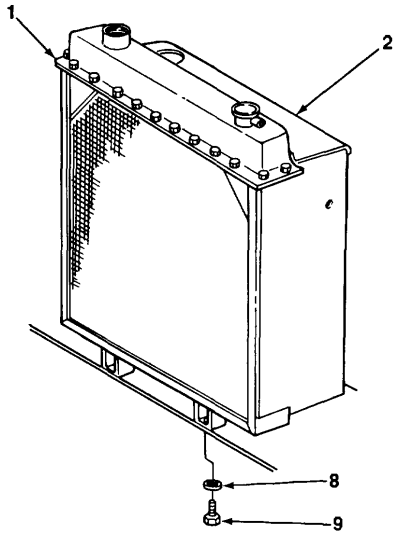
5-105. AIR COMPRESSOR OIL COOLER MAINTENANCE (Con't).

WARNING

Use extreme caution when handling heavy parts. Lifting device is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious injury or death to personnel.

2. Using suitable lifting device, support oil cooler (1) and remove two screws (9) and washers (8).

3. Remove oil cooler (1) and shroud (2) from air compressor unit.



4. Remove tee (19) from pipe (14).

5. Remove pipe (14) from elbow (13).

6. Remove elbow (13) from nipple (12).

7. Remove nipple (12) from elbow (11).

8. Remove elbow (11) from nipple (10).

9. Remove nipple (10) from oil cooler (1).

10. Remove tee (17) from pipe (16).

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5-105. AIR COMPRESSOR OIL COOLER MAINTENANCE (Con't)

11. Remove pipe (16) from oil cooler (1).

12. Remove six screws (15) and oil cooler (1) from shroud (2).

13. If damaged, remove one pipe plug (18) each from two tees (17 and 19).

b. REPAIR

Repair oil cooler in accordance with TM 750-254.

c. INSTALLATION

1. If removed, install one pipe plug (18) each in two tees (17 and 19).

2. Install oil cooler (1) in shroud (2) with six screws (15).

NOTE

Apply sealing compound to threads of all parts before installation.

3. Install pipe (16) in oil cooler (1).

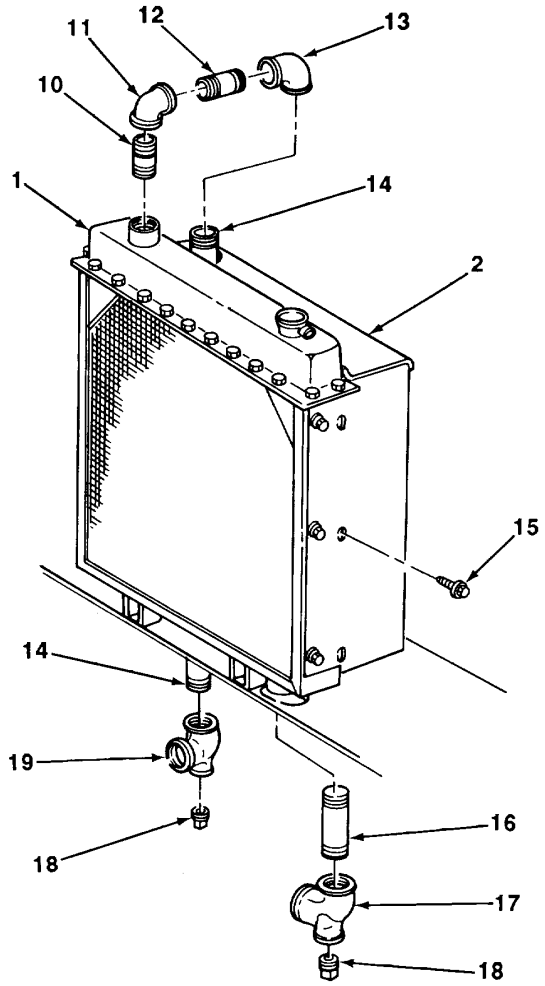
4. Install tee (17) on pipe (16).

5. Install nipple (10) In oil cooler (1).

6. Install elbow (11), nipple (12), and elbow (13) on nipple (10).

7. Install pipe (14) through shroud (2) and into elbow (13).

8. Install tee (19) on pipe (14).



WARNING

Use extreme caution when handling heavy parts. Lifting device Is required when parts weigh over 50 lb (23 kg) for a single person lift, over 100 lb (45 kg) for a two person lift, and over 150 lb (68 kg) for a three or more person lift. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may cause serious injury or death to personnel.

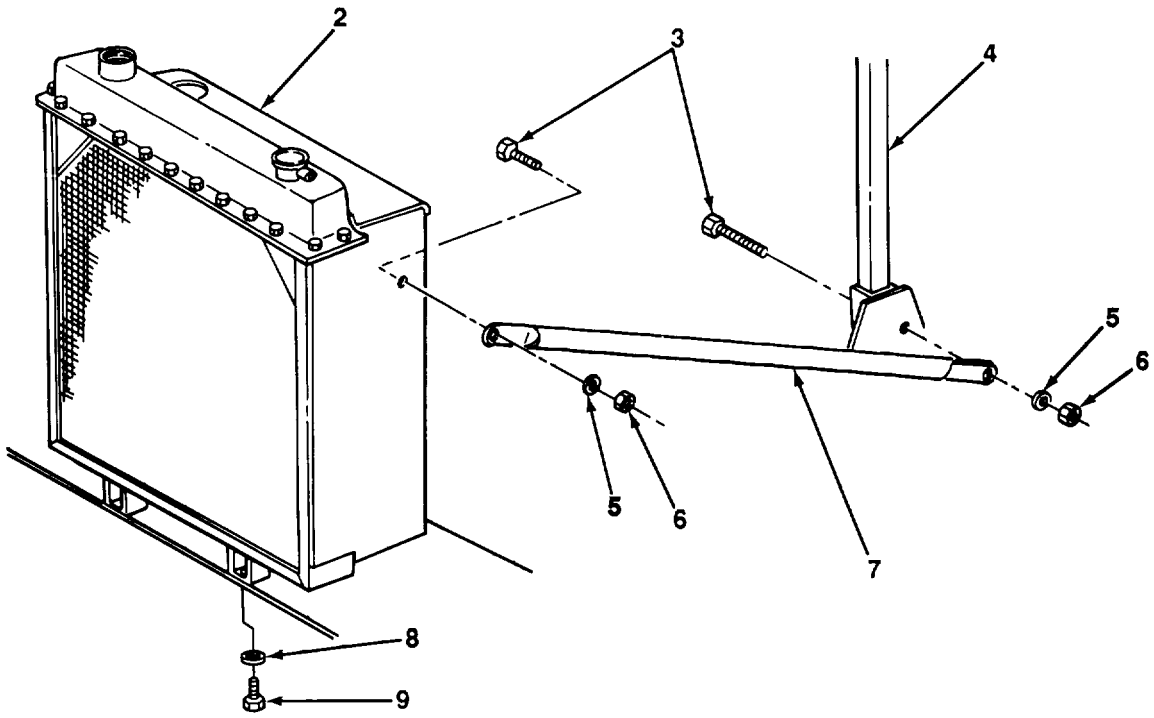
9. Using suitable lifting device, position oil cooler (1) and shroud (2) in air compressor unit.

TA705239

5-105. AIR COMPRESSOR OIL COOLER MAINTENANCE (Con't).

10. Install two screws (9) and washers (8).

11. Install two radiator supports (7) on shroud (2) and lift bail (4) using two screws (3), four washers (5), and nuts (6).



FOLLOW-ON TASKS:

- Install radiator (see paragraph 5-71).
- Connect oil cooler-to-thermal valve inlet port hose (see paragraph 4-100).
- Connect oil cooler thermal valve exit port-to-oil cooler hose (see paragraph 4-100).

TA705240

5-106. FAN SHROUD REPLACEMENT.

This Task Covers:

a. Removal

b. Installation

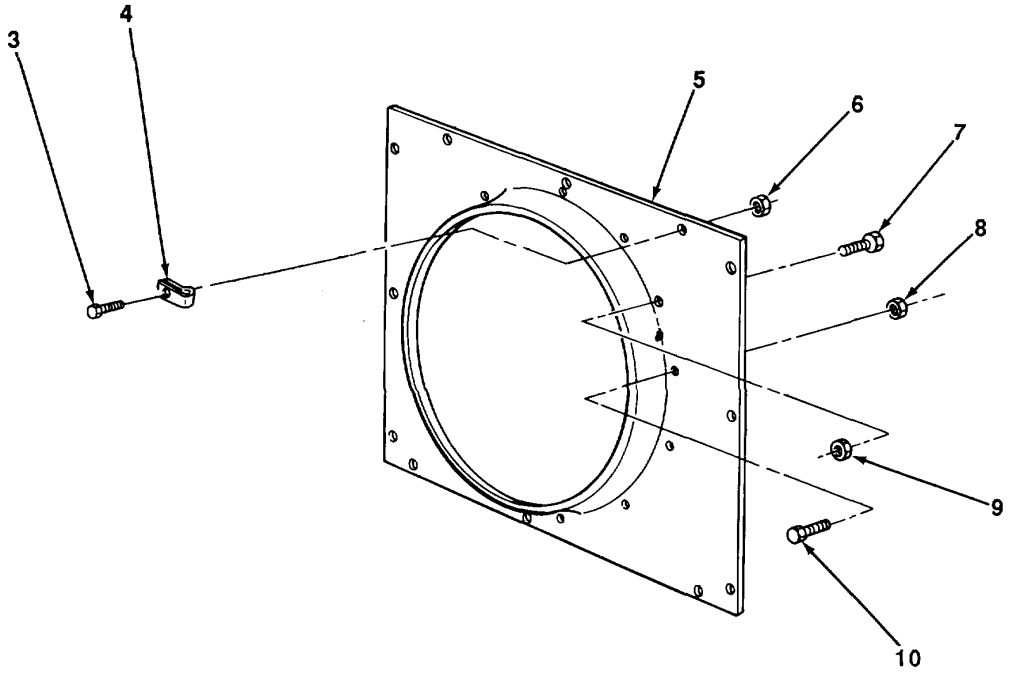
Initial Setup:

Equipment Conditions:
- Air compressor oil cooler removed (see paragraph 5-105).
- Coolant bottle bracket removed (see paragraph 4-44).
- Radiator removed (see paragraph 5-71).

Tools/Test Equipment:
- General mechanic's tool kit

a. REMOVAL

1. Remove 12 nuts (6) and venturi panel (5).
2. Remove 12 screws (3) and nut clips (4).
3. Remove eight nuts (8) and screws (10) from venturi panel (5).
4. Remove two nuts (9) and screws (7) from venturi panel (5).

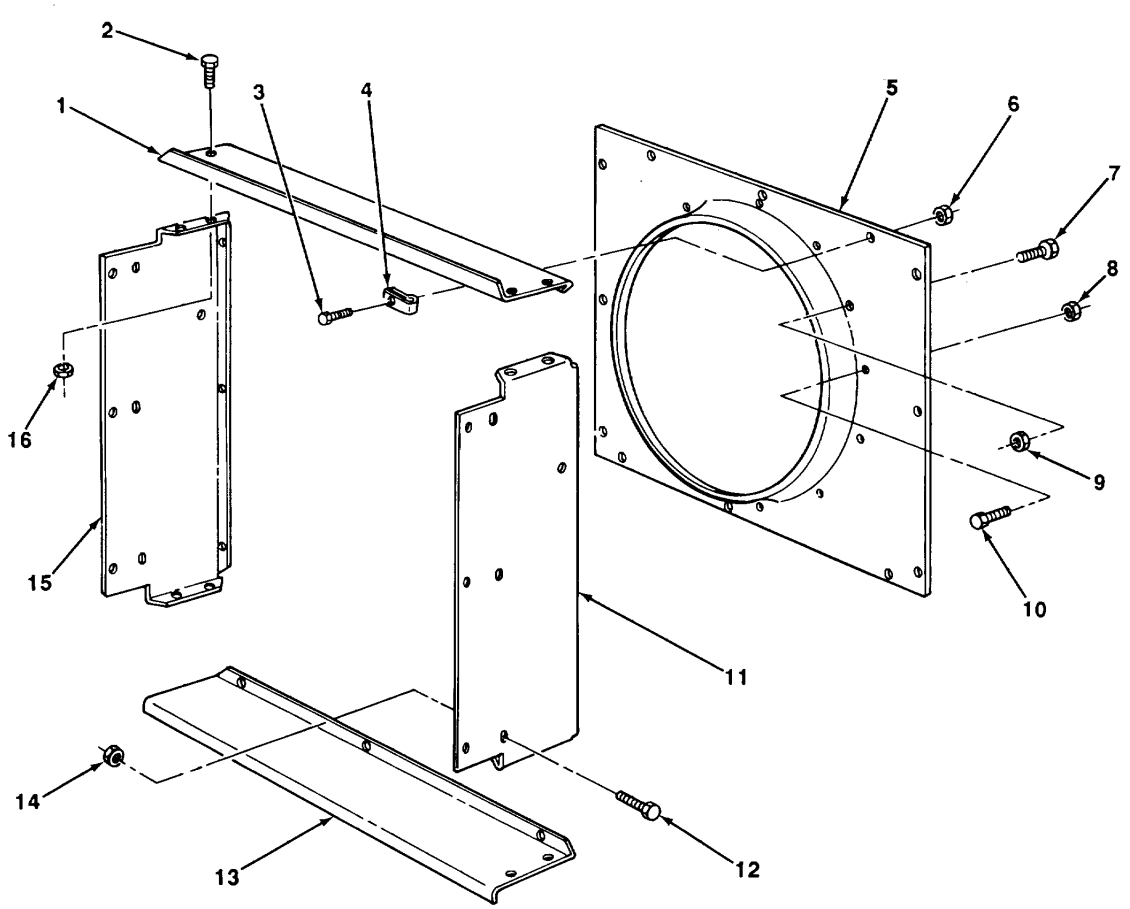


TA705241

5-106. FAN SHROUD REPLACEMENT (Con't).

5. Remove eight screws (2), nuts (16), top panel (1), left-hand panel (15), right-hand panel (11), and bottom panel (13).

6. Remove screw (12) and nut (14) from right-hand panel (11) and bottom panel (13).



TA705242

5-106. FAN SHROUD REPLACEMENT (Con't).

b. INSTALLATION

1. Install screw (12) and nut (14) in right-hand panel (11) and bottom panel (13).

2. Aline left-hand panel (15) and right-hand panel (11) with bottom panel (13) and top panel (1) and install eight screws (2) and nuts (16).

3. Install two screws (7) and nuts (9) in venturi panel (5).

4. Install eight screws (10) and nuts (8) in venturi panel (5).

5. Aline 12 nut clips (4) with holes and install screws (3) through nut clips.

6. Aline venturi panel (5) on 12 screws (3) and install nuts (6).

FOLLOW-ON TASKS:

- Install radiator (see paragraph 5-71).
- Install air compressor oil cooler (see paragraph 5-105).
- Install coolant bottle bracket (see paragraph 4-44).

APPENDIX A
REFERENCES

A-1. SCOPE.

This appendix lists all forms, field manuals, technical bulletins, technical manuals, and other publications referenced in this manual and which apply to the operation, Unit, Direct Support, and General Support Maintenance of the air compressor unit.

A-2. PUBLICATION INDEX.

DA Pam 25-30, *Consolidated Index of Army Publications and Blank Forms*, should be consulted frequently for latest changes or revisions and for new publications relating to materiel covered in this technical manual.

A-3. FORMS.

Refer to DA Pam 738-750, *The Army Maintenance Management System (TAMMS)*, for instructions on the use of maintenance forms.

Depreservation Guide for Vehicles and Equipment ..... DA Form 2258
Equipment Inspection and Maintenance Worksheet ..... DA Form 2404
Equipment Log Assembly (Records) ..... DA Form 2408
Maintenance Request Form ..... DA Form 2407
Preventive Maintenance Schedule and Record ..... DD Form 314
Processing and Deprocessing Record for Shipment, Storage, and Issue of Vehicles and Spare Engines ..... DD Form 1397
Product Quality Deficiency Report ..... SF Form 368
Recommended Changes to Equipment Technical Publications ..... DA Form 2028-2
Recommended Changes to Publications and Blank Forms ..... DA Form 2028
Report of Discrepancy (ROD) ..... SF Form 364

A-4. FIELD MANUALS.

Army Motor Transport Units and Operations ..... FM 55-30
Camouflage ..... FM 5-20
Desert Operations ..... FM 90-3
First Aid for Soldiers ..... FM 21-11
Manual for Wheeled Vehicle Driver ..... FM 21-305
NBC Contamination Avoidance ..... FM 3-3
NBC Decontamination ..... FM 3-5
NBC Protection ..... FM 3-4
Operation and Maintenance of Ordnance Material in Cold Weather (0°F to -65°F) ..... FM 9-207

A-5. TECHNICAL BULLETINS.

Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment, and Materials Handling Equipment ..... TB 43-0209
Elimination of Combustibles from Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks ..... TB 750-1047
Equipment Improvement Report and Maintenance Digest (U.S. Army Tank-Automotive Command) Tank-Automotive Equipment ..... TB 43-0001-39 Series

A-5. TECHNICAL BULLETINS (Con't).

Hand Portable Fire Extinguishers Approved for Army Users ..... TB 5-4200-200-10
Purging, Cleaning and Coating Interior Ferrous and Terne Sheet Vehicle Fuel Tanks ..... TB 43-0212
Tactical Wheeled Vehicles: Repair of Frames ..... TB 9-2300-247-40
Use of Antifreeze Solutions, Antifreeze Extender, Cleaning Compounds, and Test Kit in Engine Cooling Systems ..... TB 750-651

A-6. TECHNICAL MANUALS.

Cooling Systems: Tactical Vehicles ..... TM 750-254
Inspection, Care, and Maintenance of Antifriction Bearings ..... TM 9-214
Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel and Related Items Including Chemicals ..... TM 9-247
Operator's Manual for Welding Theory and Application ..... TM 9-237
Operator's, Unit, Direct Support, and General Support Maintenance Manual For Care, Maintenance, Repair, and Inspection of Pneumatic Tires and Inner Tubes ..... TM 9-2610-200-14
Operator's, Unit, Direct Support and General Support Repair Parts and Special Tools Lists for Compressor, Air, Rotary Screw, 750 CFM, 100 PSI, Wheel-Mounted Sullair Model 750 DP ..... TM 5-4310-451-24P
Operator's, Unit, Intermediate Direct Support and Intermediate General Support Maintenance Manual for Lead-Acid Storage Batteries ..... TM 9-6140-200-14
Painting Instructions for Army Materiel ..... TM 43-0139
Principles of Automotive Vehicles ..... TM 9-8000
Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use ..... TM 750-244-6
Railcar Loading Procedures ..... TM 55-601
Railway Operating and Safety Rules ..... TM 55-21
Storage and Materials Handling ..... TM 743-200-1

A-7. OTHER PUBLICATIONS.

Army Logistics Readiness and Sustainability ..... AR 700-138
Army Medical Department Expendable/Durable Items ..... CTA 8-100
Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items) ..... CTA 50-970

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL.

a. This section provides a general explanation of all maintenance and repair functions authorized at the' various maintenance levels.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS.

Maintenance functions will be limited to and defined as follows:

a. **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. **Service.** Operations required periodically to keep an item In proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. **Adjust.** To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. **Aline.** To adjust specified variable elements of an item to bring about optimum or desired performance.

f. **Calibrate.** To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the Instrument being compared.

g. **Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. **Replace.** To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the third position of the SMR code.

i. **Repair.** The application of maintenance services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. **Overhaul.** That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

B-2. MAINTENANCE FUNCTIONS (Con't).

k. **Rebuild.** Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II.

a. **Column 1, Group Number.** Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00."

b. **Column 2, Component/Assembly.** Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. **Column 3, Maintenance Function.** Column 3 lists the functions to be performed on the item listed in Column 2. (For a detailed explanation of these functions, refer to paragraph B-2.)

d. **Column 4, Maintenance Level.** Column 4 specifies, by the listing of a *work time* figure in the appropriate subcolumn(s), the level of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time In addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the Maintenance Allocation Chart. The symbol designations for the various maintenance levels are as follows:

C ..... Unit (Operator or Crew)
O ..... Unit (Organizational) Maintenance
F ..... Direct Support Maintenance
H ..... General Support Maintenance
D ..... Depot Maintenance

e. **Column 5, Tools and Equipment.** Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. **Column 6, Remarks.** This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.

a. **Column 1, Tool or Test Equipment Reference Code.** The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. **Column 2, Maintenance Level.** The lowest level of maintenance authorized to use the tool or test equipment.

c. **Column 3, Nomenclature.** Name or identification of the tool or test equipment.

d. **Column 4, National/NATO Stock Number.** The National or NATO Stock Number of the tool or test equipment.

e. **Column 5, Tool Number.** The manufacturer's part number.

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV.

a. **Column 1, Reference Code.** The code recorded in Column 6, Section II.

b. **Column 2, Remarks.** This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART (Con't)

(1)	(2)	(3)	(4) Maintenance Level					(5)	(6)
			UNIT		DS	GS	DEPOT		
Group Number	Component/Assembly	Maintenance Function	C	O	F	H	D	Tools and Equipment	Remarks
01	**ENGINE**								
0100	*Engine Assembly*								
	Engine	Inspect	0.2						
		Service	0.5	2.0				1, 2, 3	
		Replace			6.0			1, 6	
		Repair				48.0		1, 6, 8, 9	
0101	*Crankcase, Block, Cylinder Head*								
	Cylinder Head	Inspect			0.5				
		Replace			4.0			1, 6, 12	
		Repair			4.0			1, 6, 10, 11, 13, 14, 15	
	Cylinder Sleeve	Replace				7.2		1, 6	
0102	*Crankshaft*	Replace				17.0		1, 6	
		Repair				2.5		1, 6	
0103	*Flywheel Assembly*								
	Flywheel	Replace			5.2			1, 6	
0104	*Pistons and Connecting Rods*								
	Pistons, Rings, Pins, and Bushings	Replace				16.0		1, 6	
		Repair				6.0		1, 6	
	Connecting Rods	Replace				6.0		1, 6	
		Repair				1.0		1, 6	
0105	*Valves, Camshafts, and Timing System*								
	Valves, Exhaust	Adjust			2.0			1	
		Replace			12.0			1, 6	
		Repair			4.0			1, 6	

Section II. MAINTENANCE ALLOCATION CHART (Con't)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level UNIT C	UNIT O	DS F	GS H	DEPOT D	(5) Tools and Equipment	(6) Remarks
0105	*Valves, Camshafts, and Timing System (Con't)*								
	Camshaft	Inspect				0.5			
		Replace				1.5		1, 6, 16	
		Repair				1.0		1, 6	
	Rocker Arm Assembly and Valve Springs	Adjust			1.5			1	
		Replace			2.0			1, 6	
		Repair			2.0			1, 6	
0106	*Engine Lubrication System*								
	Oil Pump	Replace			2.0			1, 6	
		Repair			1.0			1, 6	
	Oil Pressure Regulator	Replace			0.5			1, 6	
		Repair			0.5			1, 6	
	Oil Filter Assembly	Replace		0.5				1	
		Repair		0.5				1	
0108	*Manifolds*								
	Manifolds, Intake and Exhaust	Inspect	0.2						
		Replace		1.5				1, 2, 3	
03	**FUEL SYSTEM**								
0301	*Carburetor Fuel Injector*	Test				0.5		6, 17, 18, 19	A
		Calibrate				0.5			
		Replace			1.0			1, 6	
0302	*Fuel Pumps*								
	Fuel Pump	Replace			2.0			1	
0304	*Air Cleaner*	Service	0.2						
		Replace		1.2				1	
0305	*Supercharger, Blower, Turbocharger, or Altitude Compensator*								
	Blower	Replace			2.0			1, 6	
		Repair				3.5		1, 6, 20	
	Air Inlet Housing	Replace			1.0			1	
		Repair			2.0			1, 6	

Section II. MAINTENANCE ALLOCATION CHART (Con't)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level UNIT C	UNIT O	DS F	GS H	DEPOT D	(5) Tools and Equipment	(6) Remarks
0306	*Tanks, Lines, Fittings, Headers*								
	Fuel Tank	Inspect	0.2	0.2					
		Replace		1.5				1, 2, 3	
0308	*Engine Speed Governor and Controls*								
	Governor Cover Assembly	Replace			0.5			1, 6	
		Repair			0.5			1, 6	
	Governor	Test		0.5					
		Adjust		1.0				1	
		Replace			2.0			1, 6	
		Repair			2.0			1, 6	
	Engine Control Assembly	Replace		0.5				1, 2, 3	
		Repair		0.5				1, 2, 3	
0309	*Fuel Filters*	Service		0.4				1	
		Replace		0.5				1	
		Repair		0.5				1	
0311	*Engine Starting Aids*								
	Engine Start Aid	Replace		1.0				1	
		Repair		1.0				1	
04	**EXHAUST SYSTEM**								
0401	*Muffler and Pipes*	Inspect	0.2						
		Replace		1.0				1	
05	**COOLING SYSTEM**								
0501	*Radiator, Evaporative Cooler, or Heat Exchanger*								
	Radiator	Inspect	0.2						
		Service	0.2	0.5				2	
		Test		0.5				2	
		Replace			4.0			1, 6	
		Repair			2.0			4, 5, 6	
0502	*Cowling, Deflectors, Air Ducts, Shrouds, Etc.*								
	Fan Shroud	Replace			1.5			1	

Section II. MAINTENANCE ALLOCATION CHART (Con't)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level UNIT C	UNIT O	DS F	GS H	DEPOT D	(5) Tools and Equipment	(6) Remarks
0503	*Water Manifold, Headers, Thermostats, and Housing Gasket*								
	Thermostat	Replace		0.5				1	
0504	*Water Pump*								
	Water Pump Assembly	Replace			1.0			1, 6	
		Repair			1.5			1, 6	
0505	*Fan Assembly*	Adjust		0.2				1	
		Replace		2.0				1, 2, 3	
		Repair		1.5				1, 2, 3	
06	**ELECTRICAL SYSTEM**								
0601	*Generator, Alternator*								
	Alternator	Replace		0.5				1	
		Repair			1.5			1, 7	
0603	*Starting Motor*	Replace		0.8				1	
		Repair			2.5			1, 7	
0607	*Instrument or Engine Control Panel*								
	Gages and Switches	Inspect	0.2						
		Test		0.5				2	
		Replace		0.5				1, 2	
	Wiring	Inspect	0.2						
		Replace		0.5				1	
		Repair		0.5				1, 2	
0610	*Sending Units and Warning Switches*								
	Safety Switch	Replace		0.2				1	
0612	*Batteries, Storage*	Service	0.2						
		Inspect	0.2						
		Test		0.5				2	
		Replace		0.5				1	
		Repair			0.5				B

Section II. MAINTENANCE ALLOCATION CHART (Con't)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level UNIT C	UNIT O	DS F	GS H	DEPOT D	(5) Tools and Equipment	(6) Remarks
10	**FRONT AXLE**								
1000	*Front Axle Assembly*								
	Front Axle	Service		0.5				2	
		Replace		1.0				1, 2, 3	
		Repair		1.5				1, 2, 3	
1004	*Steering and Leaning Wheel Mechanism*								
	Spindle	Replace		0.8				1, 2	
11	**REAR AXLE**								
1100	*Rear Axle Assembly*	Service		0.5					
		Replace		0.5				1, 2, 3	
		Repair		1.5				1, 2, 3	
12	**BRAKES**								
1201	*Handbrakes*	Adjust	0.2	0.5				1	
		Replace		1.0				1, 2, 3	
		Repair		1.5				1, 2, 3	
13	**WHEELS AND TRACKS**								
1311	*Wheel Assembly*	Inspect	0.2						
		Replace		1.5				1, 2, 3	
		Repair		1.0				1, 2, 3	
1313	*Tires, Tubes, Tire Chains*								
	Tires and Tubes	Replace		0.3				1	
		Repair			0.5				
14	**STEERING**								
1401	*Mechanical Steering Gear Assembly*								
	Tie-rod Assembly	Adjust		0.3				1	
		Replace		0.5				1, 2	
		Repair		0.5				1, 2	

Section II. MAINTENANCE ALLOCATION CHART (Con't)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level UNIT C	UNIT O	DS F	GS H	DEPOT D	(5) Tools and Equipment	(6) Remarks
15	**FRAME, TOWING ATTACHMENTS, DRAWBARS, AND ARTICULATION SYSTEMS**								
1501	*Frame Assembly*								
	Frame	Replace				2.0		1, 6	
		Repair				3.0		1, 4, 5, 6	
16	**SPRINGS AND SHOCK ABSORBERS**								
1601	*Springs*	Replace		1.0				1, 2, 3	
18	**BODY, CAB, HOOD, AND HULL**								
1801	*Body, Cab, Hood, and Hull Assemblies*								
	Canopy	Inspect		0.2					
		Replace		2.0	8.0			1, 2, 6	
		Repair			3.5			1, 4, 5, 6	
1812	*Special Purpose Bodies*								
	Panels	Replace			5.0			1	
22	**BODY, CHASSIS, AND HULL ACCESSORY ITEMS**								
2210	*Data Plates and Instruction Holders*								
	Data Plates	Replace		0.2				1	
47	**GAGES (NONELECTRICAL), WEIGHING AND MEASURING DEVICES**								
4701	*Instruments*								
	Tachometer Drive	Replace		0.3					
4702	*Gages, Mountings, Lines, and Fittings*								
	Engine Water Temperature Gage	Replace		0.5				1	

Section II. MAINTENANCE ALLOCATION CHART (Con't)

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level UNIT C	UNIT O	DS F	GS H	DEPOT D	(5) Tools and Equipment	(6) Remarks
4702	*Gages, Mountings, Lines, and Fittings (Con't)*								
	Tachometer	Replace		0.5				1	
	Air Pressure Gage	Replace		0.5				1	
	Air Compressor Discharge Temperature Gage	Replace		0.5				1	
	Engine Oil Pressure Gage	Replace		0.5				1	
50	**PNEUMATIC EQUIPMENT**								
5000	*Air Compressor Assembly*	Inspect	0.5	1.0					
		Service	0.5	0.5				2	
		Test		2.0					
		Replace			5.0			1, 6	
		Repair				19.0		1, 6	C
5006	*Lubrication System*								
	Oil Cooler	Replace			1.0			1, 6	
		Repair			2.0			1, 6	
	Oil Sump (Receiver)	Service		0.5					
		Replace			2.5			1, 6	
5007	*Compressor Drive*	Replace			2.0			1, 6	
5008	*Air Intakes*								
	Air Filter Assembly	Service	0.5						
		Replace		0.5				1, 2	
		Repair		0.5				1, 2	
5009	*Unloader System Components*								
	Unloader Valve Assembly	Replace		1.5				1, 2	
5010	*Compressor Cooling and Heating*	Service		0.5				1	
		Replace			1.0			1, 2	
		Repair				3.1			D
5015	*Air Discharge System*								
	Discharge Check Valve	Adjust		0.5					
		Replace			1.0			1, 6	
		Repair			1.5			1, 6	
	Lines and Fittings	Replace		1.0				1	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Tool or Test Equipment Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	O	Tool Kit, General Mechanic's, Automotive	5180-00-177-7033	
2	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 1, Less Power	4910-00-754-0654	
3	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 2, Less Power	4910-00-754-0650	
4	O	Tool Kit, Welder's	5180-00-754-0661	
5	F	Shop Equipment, Welding, Field Maintenance	4940-00-357-7260	
6	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic, Less Power	4910-00-754-0705	
7	F	Shop Equipment, Fuel and Electrical System Engine: Field Maintenance, Basic, Less Power	4910-00-754-0714	
8	H	Gage, Cylinder, Checking		J5347-01
9	H	Gage, Cylinder, Depth		J24898
10	H	Installer		J24357
11	H	Valve Seat Collet		J23479-13
12	H	Guide Stud		J24748-1
13	H	Reconditioning Set		J22525
14	H	Sled Gage		J22273
15	H	Injector Set		J25521
16	H	Plate Kit, Gear Bearing	5180-01-167-4205	2SK900
17	H	Rack Tester Kit		J22396
18	H	Injector Test Kit		J23010-A
19	H	Spray Tip Gage		J9462-02
20	H	Tool Kit, Blower and Governor	5180-00-936-4376	J6270-F

Section IV. REMARKS

(1) Reference Code	(2) Remarks
A	Tools also found in Tool Kit NSN 5180-01-144-0418.
B	Refer to TM 9-6140-200-14.
C	Repair limited to external components. Overhaul at manufacturer.
D	Refer to TM 750-254.

APPENDIX C
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

There currently are no Components of End Item and Basic Issue Items Lists assigned to the air compressor unit.

APPENDIX D
ADDITIONAL AUTHORIZATION LIST

There currently is no Additional Authorization List assigned to the air compressor unit.

APPENDIX E

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. SCOPE.

This appendix lists expendable/durable supplies and materials you will need to operate and maintain the air compressor unit. This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

E-2. EXPLANATION OF COLUMNS.

a. **Column (1) - Item Number.** This number Is assigned to the entry in the listing and is referenced in the "Initial Setup" of maintenance paragraphs or narrative instructions to identify the material needed (e.g., Dry cleaning solvent, Item 38, Appendix E).

b. **Column (2)- Level.** This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
0 - Unit (Organizational) Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

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 and, if required, a description to identify the item. The last line for each item Indicates the Commercial and Government Entity (CAGE) Code In parentheses followed by the part number, 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) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS.
1	0		ADHESIVE: General Purpose, Type II 1 (81348) MMM-A-1617	
		804000-664-4318	1 Pint Can	pt
2	F		ADHESIVE: Loctite, Minute Bond 312 (11862)1052369	
		8040-01-024-6991	50 Milliliter Bottle	ml
3	C		ANTIFREEZE: Arctic (81349) MIL-A-11755	
		6850-00-174-1806	55 Gallon Drum	gl
4	C		ANTIFREEZE: Ethylene Glycol, Inhibited, Heavy-duty, Single Package (81349) MIL-A-46153	
		6850-00-181-7929	1 Gallon Can	gl
		6850-00-181-7933	5 Gallon Can	gl
		6850-00-181-7940	55 Gallon Can	gl
5	F		BARRIER MATERIAL: Greaseproof, Waterproofed, Flexible (81349) MIL-B-121	
		8135-00-171-0930	100 Yard Roll	yd
6	F	1055-00-871-8468	BRUSH: Bore (18876)10648014	ea
7	0	7920-0-61-0038	BRUSH: Scrub (81348) H-B-1490	ea
8	0	7920-00-900-3577	BRUSH: Wire (17987) 15SS	ea
9	F		CLOTH: Abrasive (81348) P-C-451	
		5350-00-187-6294	50 Yard Roll	yd
10	0		CLOTH: Abrasive, Crocus (81348) P-C-458	
		5350-00-221-0872	50 Sheets	sh

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS.
11	F		COMPOUND: Carbon Removing (OAD61) CARB-N-R1D	
		6850-01-085-1423	13 Ounce Can	oz
12	F		COMPOUND: Corrosion Preventive (81349) MIL-C-62218	
		8030-00-221-1834	1 Gallon Can	gl
13	0		COMPOUND: Dishwashing, Hand (81348) P-D-410	
		7930-00-899-9534	5 Gallon Can	gl
14	0		COMPOUND: Sealing, Pipe, Anaerobic, with Teflon (05972) 592-31	
		8030-01-054-0740	50 Milliliter Tube	ml
15	F		COMPOUND: Silicon, Sealant, RTV (11862)1052734	
		8030-01-159-4844	8 Ounce Tube	oz
16	0		DETERGENT: General Purpose, Liquid (81349) MIL-D-16791	
		7930-00-282-9699	1 Gallon Can	gl
17	F		ELECTROLYTE: Sulfuric Acid (93568) 00420-0008	
		6810-00-249-9354	1 Gallon Container	gl
18	C		FUEL OIL, DIESEL: DF-A, Arctic (81 348) VV-F-800GRADEDFAAR	
		9140-00-286-5282	5 Gallon Can	gl
		9140-00-286-5284	55 Gallon Drum, 16 Gage	gl
		9140-00-286-5285	55 Gallon Drum, 18 Gage	gl

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS.
19	C		FUEL OIL, DIESEL: DF-1, Winter (81348) VV-F-800GRADEDF1VWI	
		9140-00-286-5287	5 Gallon Can	gl
		9140-00-286-5288	55 Gallon Drum, 16 Gage	gl
		9140-00-286-5289	55 Gallon Drum, 18 Gage	gl
20	C		FUEL OIL, DIESEL: DF-2, Regular (81348) VV-F-800GRADEDF2RE	
		914040-286-5295	5 Gallon Can	gl
		9140-00-286-5296	55 Gallon Drum, 16 Gage	gl
		9140-00-286-5297	55 Gallon Drum, 18 Gage	gl
21	F	5210-01-222-8068	GAGE: Plastic Adjustment (11862) 14061396	ea
22	0		GREASE: Automotive and Artillery (81349) MIL-G-10924	
		9150-00-935-1017	14 Ounce Cartridge	oz
		9150-00-190-0904	1.75 Pound Can	lb
		9150-00-190-0905	6.50 Pound Can	lb
		9150-00-190-0907	35 Pound Pail	lb
		9150-00-530-7369	120 Pound Drum	lb
23	F	5970-00-815-1295	INSULATION SLEEVING: Electrical (81349) M2305315-106-0	ft
24	F	4910-00-779-6851	OIL: Injector Test (33287) J-26400-5	qt
25	0		OIL: Lubricating, Engine (81349) MIL-L-21260	
		9150-00-111-0209	5 Gallon Can	gl
		9150-00-111-0210	55 Gallon Drum	gl
26	F		OIL: Lubricating, Gear, Multipurpose, GO 75W (81349) MIL-L-2105	
		9150-01-035-5390	1 Quart Can	qt
		9150-01-035-5391	5 Gallon Can	gl

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS.
27	F		OIL: Lubricating, Gear, Multipurpose, GO 80/90 (81349) MIL-L-2105	
		9150-01-035-5392	1 Quart Can	qt
		9150-01-035-5393	5 Gallon Can	gl
		9150-01-035-5394	55 Gallon Drum, 16 Gage	gl
28	0		OIL: Lubricating, General Purpose, PL-M (81349) MIL-L-3150	
		9150-00-231-2361	1 Quart Can	qt
29	F		OIL: Lubricating, General Purpose, Preservative, PL-S (81348) V-VL-800	
		9150-00-231-6689	1 Quart Can	qt
30	0		OIL: Lubricating, Internal Combustion Engine, Arctic, OEA (81349) MIL-L-46167	
		9150-00-402-4478	1 Quart Can	qt
		9150-00-402-2372	5 Gallon Can	gl
		9150-00-491-7197	55 Gallon Drum	gl
31	0		OIL: Lubricating, Internal Combustion Engine, Tactical Service, OEIHDO 10 (81349) MIL-L-2104	
		9150-00-189-6727	1 Quart Can	qt
		9150-00-186-6668	5 Gallon Can	gl
		9150-0-191-2772	55 Gallon Drum	gl
32	0		OIL: Lubricating, Internal Combustion Engine, Tactical Service, OE/HDO 15W/40 (81349) MIL-L-2104	
		9150-01-152-4117	1 Quart Can	qt
		9150-01-152-4118	5 Gallon Can	gl
		9150-01-152-4119	55 Gallon Drum	gl

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS.
33	0		OIL: Lubricating, Internal Combustion Engine, Tactical Service, OE/HDO 30 (81349) MIL-L-2104	
		9150-01-186-6681	1 Quart Can	qt
		9150-01-188-9858	5 Gallon Can	gl
		9150-01-189-6729	55 Gallon Drum	gl
34	F		OIL: Penetrating (81348) VV-P-216	
		9150-00-261-7899	1 Pint Can	Pt
35	C		RAG: Wiping, Cotton and Cotton-synthetic, White (58536) A-A-531	
		79200-0205-1711	50 Pound Bale	lb
36	F		SEALANT: Adhesive, Silicon Rubber, RTV Type I, Clear (80244) MIL-A-46106 TY1	
		8040-00-833-9563	5 Ounce Tube	oz
37	0		SOLDER: Lead Alloy (81348) QQ-S-571	
		3439-00-265-7102	1 Pound Spool/Roll	lb
38	C		SOLVENT: Dry Cleaning, Type II (81349) P-D-680	
		6850-00-110-4498	1 Pint Can	pt
		6850-00-664-5685	1 Quart Can	qt
		685000-281-1985	1 Gallon Can	gl
		6850-00-274-5421	5 Gallon Can	gl
		6850-00-285-8011	55 Gallon Drum	gl
39	0		STRAP: Tie-down, Electrical Components (96906) MS3367-1-9	
		5975-00-074-2072	Box of 100	ea

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION PART NO. AND FSCM	(5) UNIT OF MEAS.
40	0	9905-00-537-8954	TAG: Marker (81349) MIL-T-12755 50 each	ea
41	0	8030-00-067-7368	TAPE: Antiselzing, Y Inch Width (71643) TEMPRTH 54 Feet Long	ft
42	0	5640-00-103-2254	TAPE: Duct, 2 Inch Width (07124) C-519 60 Yard Roll	yd
43	F	7510-00-473-9513	TAPE: Pressure Sensitive Adhesive, Masking, Flat, 2 Inch Width (81348) MIL-T-23397 60 Yard Roll	yd
44	F	8010-00-298-3870	VARNISH: Oil, Insulating (81349) MIL-V-13811 1 Quart Can	qt

APPENDIX F
ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I. INTRODUCTION

F-1. SCOPE.

a. This appendix includes complete instructions for making items authorized to be manufactured or

b. A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

c. All bulk materials needed for manufacture of an item are listed by National Stock Number (NSN), part number, or specification number in the manufacturing instructions.

d. All dimensions given in Section II, Manufacturing Instructions, are in standard units.

Table F-1. Manufactured Items Part Number Cross-reference Index.

Part Number	Figure Title	Figure Number
	Minimum Pressure Valve Rod	F-9
FC184-06-24 in.	Engine Breather Hose	F-1
M3520-A20EO-4B-X	Air Compressor Oil Filter Lines	F-8
47829-1X	Sound Control Panel Straps	F-7
47829-32 in.	Sound Control Panel Straps	F-7
47829-34 in.	Sound Control Panel Straps	F-7
47829-38 in.	Sound Control Panel Straps	F-7
47829-42 in.	Sound Control Panel Straps	F-7
47829-55 in.	Sound Control Panel Straps	F-7
47829-57 in.	Sound Control Panel Straps	F-7
47829-100 in.	Sound Control Panel Straps	F-7
47829-140 in.	Sound Control Panel Straps	F-7
47829-192 in.	Sound Control Panel Straps	F-7
5199575-8.5 in.	Engine Fuel Lines	F-2
5199575-13 in.	Engine Fuel Lines	F-2

Table F-1. Manufactured Items Part Number Cross-reference Index (Con't).

Part Number	Figure Title	Figure Number
5199575-26 in	Engine Fuel Lines	F-2
5199575-33 in	Engine Fuel Lines	F-2
5199576-23 in	Engine Fuel Line	F-3
5199578-16 in	Engine Fuel Line	F-4
9439104-16 in	Radiator Hose	F-5
1324714-14 in	Radiator Tube	F-6

Section II. MANUFACTURING INSTRUCTIONS

1. Make from nonmetallic hose part number FC184-06 stock, NSN 4720-01-074-8373.
2. Cut to 24 In. long to make part number FC184-06-24 In.

Figure F-1. Engine Breather Hose.

1. Make from nonmetallic hose part number 5199575 stock, NSN 472000 485-7167.
2. Cut to proper length.

Part Number	Length
5199575-8.5 in.	8.5 in.
5199575-13 in.	13 in.
5199575-26 in.	26 in.
5199575-33 in.	33 in.

3. Assemble compression fittings as required according to Instructions in paragraph 5-11.

Figure F-2. Engine Fuel Lines.

Section II. MANUFACTURING INSTRUCTIONS (Con't)

1. Make from nonmetallic hose part number 5199576 stock, NSN 4720-00-485-7161.
2. Cut to 23 in. long to make part number 5199576-23 in.
3. Assemble compression fittings as required according to instructions in paragraph 5-11.

Figure F-3. Engine Fuel Line.

1. Make from nonmetallic hose assembly part number 5199578, NSN 4720-785-3756.
2. Cut to 16 in. long to make part number 5199578-16 in.
3. Assemble compression fittings as required according to instructions in paragraph 5-11.

Figure F-4. Engine Fuel Line.

1. Make from nonmetallic hose part number FC184-06 stock, NSN 4720-01-074-8373.
2. Cut to 16 In. long to make part number 9439104-16 in.

Figure F-5. Radiator Hose.

1. Make from metallic tube part number 1324714 stock, NSN 4710-00-420-4759.
2. Cut to 14 In. long to make part number 1324714-14 In.
3. Use old tube as a guide to bend new tube.

Figure F-6. Radiator Tube.

1. Make from strapping part number 47829 stock, NSN 5340-01-275-4992.
2. Cut to proper length.

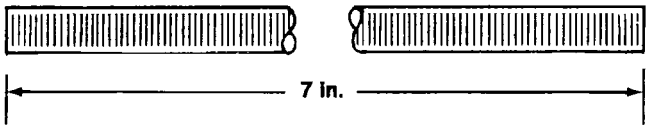
Part Number	Length
47829-1X	100 in.
47829-32 in.	32 in.
47829-34 In.	34 in.
47829-38 In.	38 in.
47829-42 in.	42 in.
47829-55 in.	55 in.
47829-57 In.	57 in.
47829-100 in.	100 in.
47829-140 in.	140 in.
47829-192 in.	192 in.

Figure F-7. Sound Control Panel Straps.

Section II. MANUFACTURING INSTRUCTIONS (Con't)

1. Make from metallic tube part number M3520A20EO-4B stock, NSN 4710-0200-0308.
2. Use old tubes as a guide to cut new tubes to create part number M3520-A20E0-4B-X.
3. Use old tubes as a guide to bend new tubes.

Figure 8. Air Compressor Oil Filter Lines.



1. Fabricate from steel rod, X in. diameter.
2. Cut to 7.0 in. long.
3. Thread rod 13 threads per inch.

4 Install nut, NSN 5310-00-768-0318, part number MS51967-14.

Figure 9. Minimum Pressure Valve Rod.

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APPENDIX G
TORQUE LIMITS

G-1. SCOPE.

This appendix lists standard torque values, as shown in Table G-1, and provides general information for applying torque. Special torque values and tightening sequences are indicated in the maintenance procedures for applicable components.

G-2. GENERAL.

a. Always use the torque values listed in Table G-1 when the maintenance procedure does not give a specific torque value.

b. Unless otherwise indicated, standard torque tolerance shall be ± 10%.

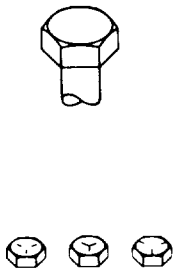
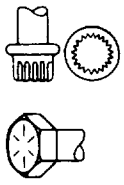
c. Torque values listed are based on clean, dry threads. Reduce torque by 10% when engine oil is used as a lubricant. Reduce torque by 20% if new plated capscrews are used.

d. Capscrews threaded into aluminum may require reductions in torque of 30% or more of Grade 5 capscrews torque. Capscrew threaded into aluminum must also attain two capscrew diameters of thread engagement.

CAUTION

If replacement capscrews are of higher grade than originally supplied, use torque specifications for the original. This will prevent equipment damage due to over torquing.

Table G-1. Torque Limits.

Current Usage	Much Used	Much Used	Used at Times	Used at Times
Quality of Material	Indeterminate	Minimum Commercial	Medium Commercial	Best Commercial
SAE Grade Number	1 or 2	5	6 or 7	8
Capscrew Head Markings Manufacturer's marks may vary These are all SAE Grade 5 (3 line)				
Capscrew Body Size Inches - Thread	Torque lb.-ft. (N•m)	Torque lb.-ft. (N•m)	Torque lb.-ft. (N•m)	Torque lb.-ft. (N•m)
1/4 - 20	5 (7)	8 (11)	10 (14)	12 (16)
1/4 - 28	6 (8)	10 (14)		14 (19)
5/16 - 18	11 (15)	17 (23)	19 (26)	24 (33)
5/16 - 24	13 (18)	19 (26)		27 (37)
3/8 - 16	18 (24)	31 (42)	34 (46)	44 (60)
3/8 - 24	20 (27)	35 (47)		49 (66)
7/16 - 14	28 (38)	49 (66)	55 (75)	70 (95)
7/16 - 20	30 (41)	55 (75)		78 (106)
1/2 - 13	39 (53)	75 (102)	85 (115)	105 (142)
1/2 - 20	41 (56)	85 (115)		120 (163)
9/16 - 12	51 (69)	110 (149)	120 (163)	155 (210)
9/16 - 18	55 (75)	120 (163)		170 (231)
5/8 - 11	83 (113)	150 (203)	167 (226)	210 (285)
5/8 - 18	95 (129)	170 (231)		240 (325)
3/4 - 10	105 (142)	270 (366)	280 (380)	375 (508)
3/4 - 16	115 (156)	295 (400)		420 (569)
7/8 - 9	160 (217)	395 (536)	440 (597)	605 (820)
7/8 - 14	175 (237)	435 (590)		675 (915)
1 - 8	235 (319)	590 (800)	660 (895)	910 (1234)
1 - 14	250 (339)	660 (895)		990 (1342)

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TEAR ALONG PERFORATED LINE

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches

1 Meter = 100 Centimeters = 1,000 Millimeters = 39.37 Inches

1 Kilometer = 1,000 Meters = 0.621 Miles

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches

1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet

1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches

1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces

1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

TEMPERATURE

5/9 (°F -32) = °C

212° Fahrenheit is equivalent to 100° Celsius

90° Fahrenheit is equivalent to 32.2° Celsius

32° Fahrenheit is equivalent to 0° Celsius

9/5 C° +32 = F°

WEIGHTS

1 Gram = 0.001 Kilograms = 1,000 Milligrams = 0.035 Ounces

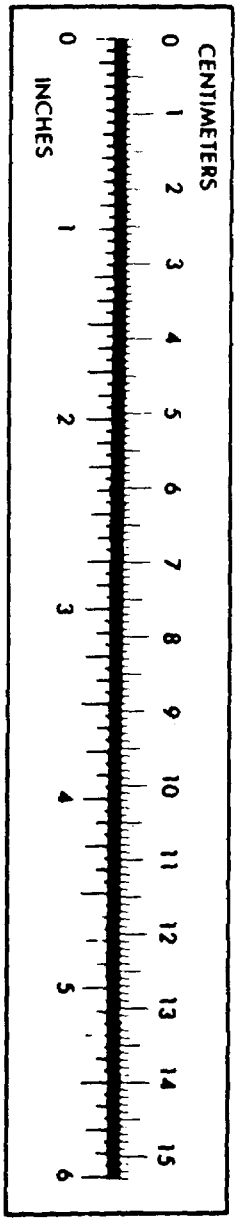
1 Kilogram = 1,000 Grams = 2.2 Lb.

1 Metric Ton = 1,000 Kilograms = 1 Megagram = 1.1 Short Tons

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds Per Square Inch	Kilopascals	6.895
Miles Per Gallon	Kilometers Per Liter	0.425
Miles Per Hour	Kilometers Per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds Per Square Inch	0.145
Kilometers Per Liter	Miles Per Gallon	2.354
Kilometers Per Hour	Miles Per Hour	0.621



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