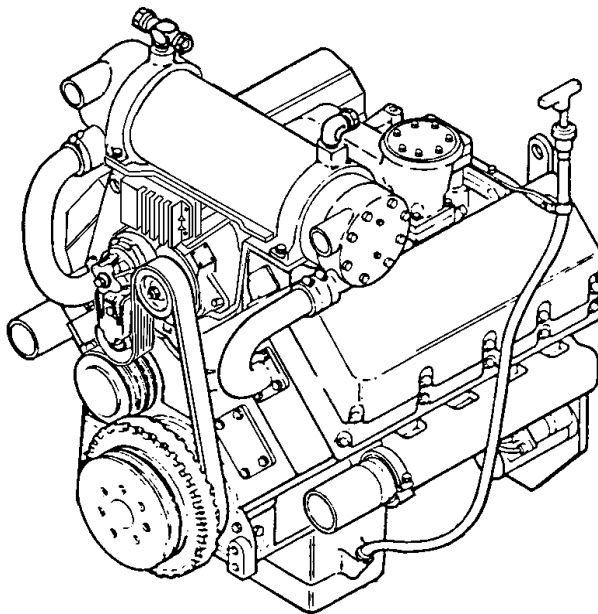


TM 5-2815-240-34&P*

TECHNICAL MANUAL

**DIRECT AND GENERAL SUPPORT
MAINTENANCE MANUAL (INCLUDING
REPAIR PARTS AND SPECIAL TOOLS LIST)**



**ENGINE, DIESEL, LIQUID COOLED
V-TYPE, EIGHT CYLINDER,
CUMMINS MODEL V903C W/CONTAINER
(NSN 2815-01-399-6801)**

*This manual supersedes TM 5-2815-240-34&P dated August 1989 and all related changes.

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

HEADQUARTERS, DEPARTMENT OF THE ARMY

This copy is a reprint which includes current pages from Changes 1, 2 and 3.

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APRIL 1991

Change 3

SUMMARY OF WARNINGS AND FIRST AID

For artificial respiration and first aid, see FM 21-11.

WARNING

This list summarizes critical WARNINGS in this manual. They are repeated here to emphasize their importance. Study these WARNINGS carefully; they can save your life and the lives of soldiers you work with.

- Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present. Severe injury or death may result. If injured, seek medical attention immediately.
- Drycleaning solvent is flammable and will not be used near open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to do this may result in damage to equipment or injury to personnel.
- Trichlorethane solvent vapors can be fatal. High concentration of vapors are anesthetic and dangerous to life. Eye irritation and dizziness are signs of inadequate ventilation and dangerous concentration. Use only with adequate ventilation. Avoid prolonged or repeated contact with skin. Do not use in the presence of open flame or sparks.
- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.
- Parts may slip and cause eye injury or blindness. Always wear goggles when using power tools or working with parts under pressure.
- Chemicals used in this task can burn or poison you. Wear goggles, rubber gloves, and apron. Do task in well-ventilated room.
- Sharp edges can cut hands. Use rags or brush to lubricate.
- Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.
- Ring gear will be hot enough to burn you on contact. Use heat-resistant gloves when you handle hot ring gear.
- Parts could fall and injure you. Use helper or lifting sling to move heavy parts.
- Engine may come loose from stand and injure you. Make sure screws are secure before removing sling.
- Plug is under tension by compressed spring. Protect eyes while removing/installing.
- Electrical shock can cause serious injuries. Do not remove or install starter motor unless vehicle MASTER switch is OFF.
- Exhaust manifold can cause serious burns. Do not remove starter motor unless manifold is cool.
- Wear gloves when removing engine oil cooler. There may be sharp edges causing injury to personnel.
- Keep hands, feet, and tools away from fan belt and alternator/water pump belts while adjusting alternator.
- Always support alternator core and shaft assembly during removal. Failure to comply may result in severe injury to person or damage to equipment.

CHANGE**NO. 3****DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)****ENGINE, DIESEL, LIQUID COOLED V-TYPE,
EIGHT CYLINDER, CUMMINS MODEL V903C W/CONTAINER****(NSN 2815-01-399-6801)**

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CHANGE

NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 3 January 1997

**DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)**

**ENGINE, DIESEL, LIQUID COOLED V-TYPE,
EIGHT CYLINDER, CUMMINS MODEL V903C W/CONTAINER**

**W/60 AMPERE ALTERNATOR
(NSN 2815-01-351-6549)**

**W/200 AMPERE ALTERNATOR
(NSN 2815-01-399-6801)**

Current as of: *20 June 1996*

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Remove pages	Insert pages	Remove pages	Insert pages
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Figure 1 through Figure 4	Figure 1 through Figure 4	Blank DA 2028-2s	Blank DA 2028-2s
4-1 and Figure 5	4-1 through 4C-1 and Figure 5	Cover and a	Cover and a

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NO. 1

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Washington D.C., 4 November 1993

**DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)**

**ENGINE, DIESEL: LIQUID-COOLED V-TYPE,
EIGHT CYLINDER, CUMMINS MODEL V903C**

(NSN 2815-01-225-8385)

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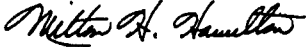
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LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: The portion of text or illustration effected by the updates is indicated by a vertical line in the outer margin of the page. Updates to wiring diagrams are indicated by shaded areas.

Dates of issue for original and updated pages/work packages are:

Original ..0 ..17 APR 91
 Change ..1 ..04 NOV 93
 Change ..2 ..03 JAN 97
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**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 30 AND
 TOTAL NUMBER OF PAGES IS 410 CONSISTING OF THE FOLLOWING:**

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**DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)**

**ENGINE, DIESEL, LIQUID COOLED V-TYPE,
EIGHT CYLINDER, CUMMINS MODEL V903C W/CONTAINER**

(NSN 2815-01-399-6801)

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028-2 (Recommended Changes to Equipment Technical Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeprs.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the ADPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax, or email your letter, DA Form 2028, or DA Form 2028-2 direct to: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-AC-NML, Rock Island, IL 61299-7630. The email address is amsta-ac-nml@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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This manual contains a table of contents, list of tasks, appendices, and alphabetical index.

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*This manual supersedes TM 5-2815-240-34&P dated August 1989 and all related changes.

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HOW TO USE THIS MANUAL

Before starting a task, read **HOW TO USE THIS MANUAL** and **CHAPTER 2, GENERAL ENGINE MAINTENANCE**.

WHAT'S IN THE MANUAL – FRONT TO BACK

SUMMARY OF WARNINGS AND FIRST AID lists the warnings and first aid information in this manual. These warnings contain additional information that could prevent injury or death of personnel. The maintenance task may have a shorter version of these warnings.

TABLE OF CONTENTS lists the chapters, sections, and appendices in this manual. It also lists the pages where chapters, sections, and appendices can be found.

CHAPTER 1 covers general information and gives a quick review of major engine components and features.

CHAPTER 2 indicates general maintenance instructions and location of engine repair parts and special tools. This chapter tells how to install the engine on the maintenance stand.

CHAPTER 3 contains maintenance tasks authorized to be performed by the Direct and General Support levels.

APPENDIX A lists references such as technical manuals and other publications to be used by personnel.

APPENDIX B contains repair parts and special tools list.

APPENDIX C lists expendable/durable supplies and materials used to maintain or repair the engine.

APPENDIX D lists the repair specifications for the cylinder head.

ALPHABETICAL INDEX lists major engine parts that would be repaired or replaced at the DS or GS level. Each entry in the index includes the task page number.

DA Form 2028-2 is used to report errors found in this manual.

USING YOUR MANUAL ON THE JOB

Like any tool, the best way to learn about this manual is to practice using it. Knowing how to use this manual will save both time and energy.

Where do you start?

Entry to a maintenance task in this manual may come from observation, troubleshooting, or the Army Oil Analysis Program (AOAP). The problem will help identify the item that needs repair or replacement.

How do you fix the problem? – A Quick Overview

1. Find the correct maintenance task in this manual. To do this, pick a key word from the item to be replaced or repaired. Look up this word in the ALPHABETICAL INDEX located at the back of this manual to locate the page number of the task.
2. Turn to the task and read it carefully before starting. Pay attention to warnings and cautions. Get the equipment, supplies, and any other personnel needed. If a task requires part replacement, refer to the Repair Parts and Special Tools List (RPSTL), Appendix B.
3. Start with step A in the task and do each step in order. In some referenced tasks, one or more steps may have been completed. If so, proceed to the next step. When the last step is done, the problem will be corrected.

Finding and Reading the Task

Example: Oil is leaking from under the engine camshaft cover. If the metal camshaft cover is not damaged, the gasket will need to be replaced. Find the task (CAMSHAFT COVER REMOVAL AND INSTALLATION) page number in the ALPHABETICAL INDEX at the back of this manual.

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Cylinder Head Removal and Installation	3-186
Cylinder Head Repair	3-202
Valves Adjustment	3-233
Valve Train Repair	3-236

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

SCOPE

Type of Manual:

Direct Support and General Support Maintenance.

Model Number and Equipment Name:

V903C Engine.

Purpose of Equipment:

Propulsion engine for M9 Armored Combat Earthmover (ACE).

MAINTENANCE FORMS, RECORDS, AND REPORTS

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

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

When the tactical situation requires that Army materiel be abandoned, refer to TM 750-244-6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use, for procedures on destruction of the vehicle.

PREPARATION FOR STORAGE OR SHIPMENT

Refer to p. 3-2 for instructions on storage and shipment of the engine.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)

If your engine needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on a SF 368 (Quality Deficiency Report). Mail it to:

Commander
U.S. Army Tank-automotive and Armaments Command
Attn: AMSTA-TR-E/MPA
Warren, MI 48397-5000

Section II. EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT DESCRIPTION

CHARACTERISTICS

- Provides primary power for the M9 Armored Combat Earthmover.

CAPABILITIES AND FEATURES

- V-8 engine has fuel injection and liquid cooling systems.
- Four-cycle operation uses compression ignition.
- Filtered-fuel system has fuel pump and governor.
- Engine working parts are pressure lubricated.
- Centrifugal pump circulates engine coolant.

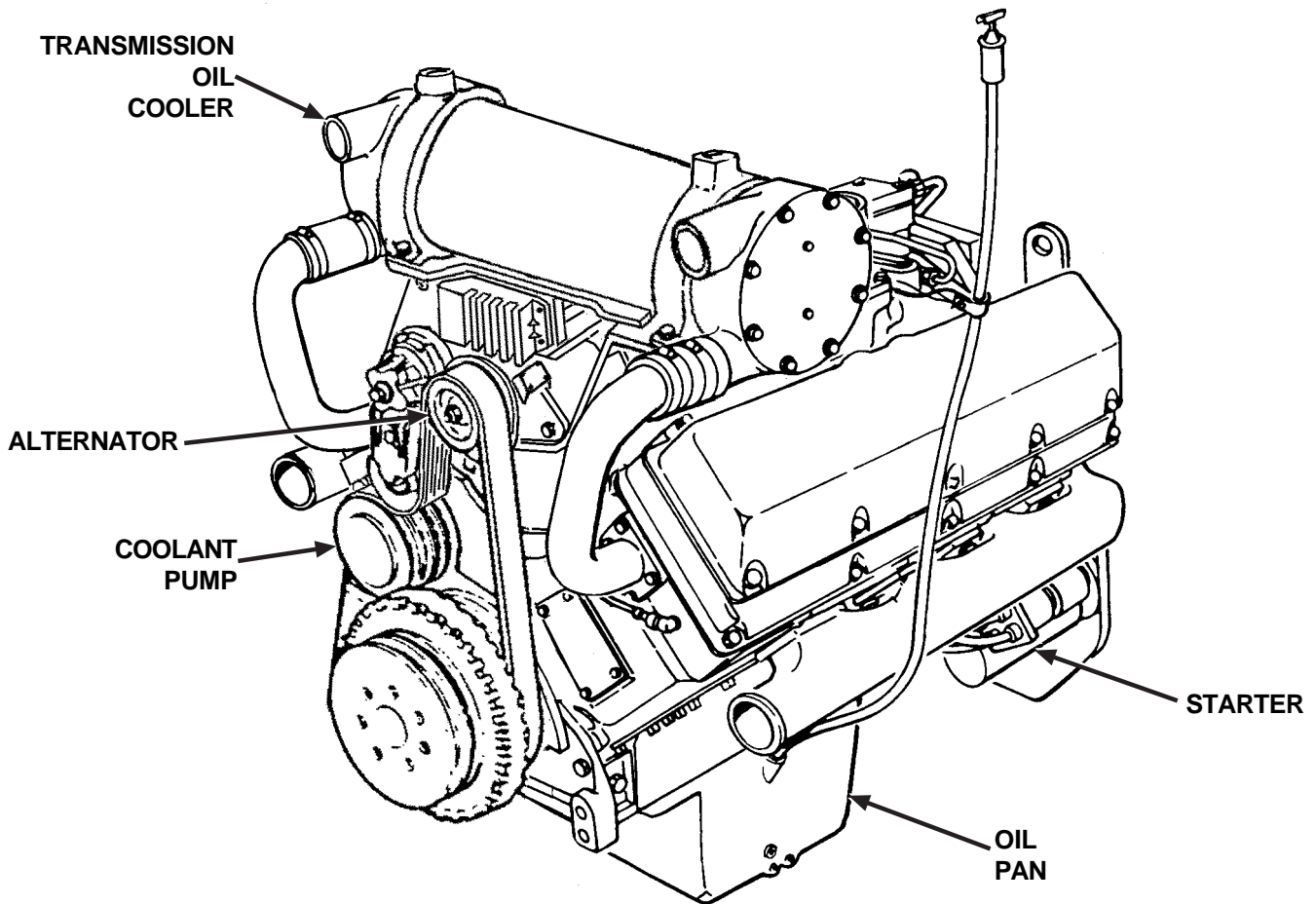
EQUIPMENT DATA

Manufacturer	Cummins Engine Co. Inc.
Model	V903C
Type	four-cycle, valve-in-head, compression ignition
Rotation	right hand (clockwise) facing vibration damper
Dimensions:	
Length	55-1/4 in. (140.3 cm)
Width	40 in. (101.6 cm)
Height	49 in. (124.5 cm)
Weight (dry)	2,450 lb (1,112 kg)
Horsepower (@ 2600 rpm)	295
Compression ratio (nominal)	15.5:1
Cylinder:	
Type	wet-type, replaceable sleeve
Number	8
Arrangement	V type
Firing order	1R, 5L, 4R, 8L, 6L, 3R, 7L, 2R
Bore	5-1/2 in. (14 cm)
Stroke	4-3/4 in. (12 cm)
Displacement	903 cubic in. (14.8 L)
Number of rings	3 (2 compression, 1 oil)

Crankshaft:
Type counterweight
Number of counterweights 4
Number of main bearings 5

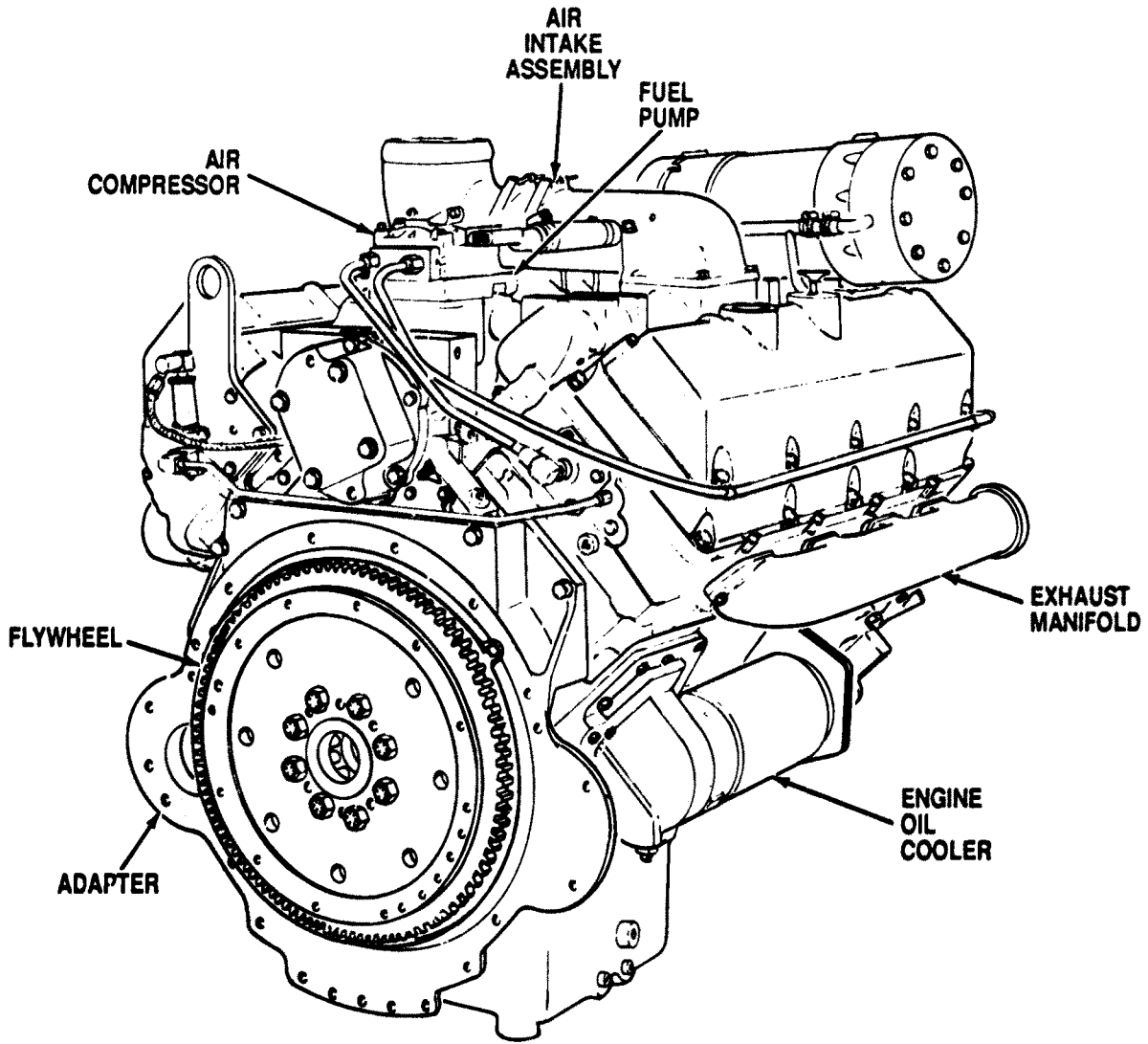
Starter:
Manufacturer Prestolite
Part Number 94134

LOCATION OF MAJOR COMPONENTS



Cummins Diesel Engine, Model V903C – Left Front View

LOCATION OF MAJOR COMPONENTS – Continued



Cummins Diesel Engine, Model V903C – Right Rear View

CHAPTER 2

GENERAL ENGINE MAINTENANCE

Section I. REPAIR PARTS, SPECIAL TOOLS, AND SUPPORT EQUIPMENT

COMMON TOOLS AND EQUIPMENT

Standard and commonly used tools and equipment which are used on the V903C engine are authorized for issue by Tables of Allowance (TA) and Tables of Organization and Equipment (TO&E).

SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

See **Appendix B** for lists and illustrations of special tools and support equipment needed to maintain the engine.

REPAIR PARTS

Repair parts are listed and illustrated in **Appendix B**. This is your authority for ordering replacements.

Section II. SERVICE UPON RECEIPT

INSPECTION

Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 364, Report of Discrepancy (ROD).

EQUIPMENT CHECK

Inspect for any damage done to engine during its removal from the vehicle. Refer to **TM 5-2350-262-34** for engine removal procedures.

Upon receipt of engine, ensure that all components are present and that no engine subassemblies have been removed. Refer to **TM 5-2350-262-34** for engine dress after removal.

If the engine has been transferred to you from another DS/GS maintenance facility, check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA Pam 738-750.

PREPARING THE ENGINE FOR MAINTENANCE

Before starting a task, install the engine on a maintenance stand. See task: MOUNTING ENGINE ON MAINTENANCE STAND (p 2-7).

Section III. GENERAL MAINTENANCE INSTRUCTIONS

OVERVIEW

This section contains general maintenance instructions for the engine. Also included are procedures for installation of the engine on the maintenance stand, and removal of the engine from the maintenance stand. Tasks contained in this section are shown below.

- Cleaning (p 2-2).
- Inspection (p 2-3).
- Repair (p 2-4).
- Repair Standards (p 2-6.1).
- Mounting Engine on Maintenance Stand (p 2-7).

CLEANING

- a. **GENERAL.** Procedures for cleaning will be the same for most engine components. General cleaning procedures are detailed in steps b through g below. Special cleaning procedures are covered in the task relating to the specific component.
- b. **CLEANING INSTRUCTIONS.** Care is needed in all cleaning procedures. Dirt in the engine could damage components and cause malfunctions. When you perform any cleaning procedure, do the following:
 - (1) Inspect all air and fluid openings, lines, and hoses. Make sure they are capped.
 - (2) Clean all parts before inspection, after repair, and before assembly.
 - (3) After cleaning, cover or wrap parts to protect from dirt.
- c. **CASTINGS.**

WARNING

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to comply may result in damage to equipment or injury to personnel.
- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

- (1) Clean inner and outer casting surfaces with drycleaning solvent (Item 25, Appendix C). Dry with compressed air.
- (2) Remove sludge and gum deposits with a stiff brush.
- (3) Blow out all tapped holes with compressed air.

d. *OIL PASSAGES.*

- (1) Make sure all oil passages are free of obstructions.
- (2) Clean passages with brass wire probes to break up any sludge or gum deposits.

WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to comply may result in damage to equipment or injury to personnel.

- (3) Flush passages with drycleaning solvent (**Item 25, Appendix C**).

e. *OIL SEALS, ELECTRICAL CABLES, AND FLEXIBLE HOSES.***CAUTION**

Cleaning solvent causes leather, rubber, and synthetic materials to become brittle. Do not use cleaning solvent to clean seals, cables, and flexible hoses.

Clean seals, cables, and flexible hoses with alkaline soap (**Item 24, Appendix C**) and water.

- f. *BALL BEARINGS.* Bearings require special cleaning techniques. See TM 9-214 for cleaning and maintenance procedures for ball bearings.
- g. *INSERTS.*

WARNING

Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles. Failure to comply may result in severe injury to personnel.

Blow out insert holes with compressed air.

INSPECTION

- a. *GENERAL.* Procedures for inspection will be the same for most engine components. General inspection procedures are detailed in steps b through i below. Special inspection procedures are covered in the task relating to the specific component.
- b. *CASTINGS.*
 - (1) Use magnetic particle inspection equipment to check ferrous castings for cracks. Use a magnifying glass and a strong light to check nonferrous castings for cracks. Check areas next to studs, threaded inserts, sharp corners, and fillets.

- (2) Inspect machined surfaces for nicks, burrs, and raised metal. Mark damaged areas for repair.
 - (3) Use a straightedge to check all mounting flanges on housings and supports for warpage. Inspect mating flanges for discoloration, which could indicate oil leakage.
 - (4) Inspect all pipe plug and tapped openings for damaged or stripped threads.
- c. **BALL BEARINGS.** Inspect bearings. See TM 9-214 for inspection procedures for ball bearings.
 - d. **STUDS.** Inspect all studs for stripped or damaged threads, bent or loose condition, and signs of stretching.
 - e. **GEARS.** Use magnetic particle inspection equipment to check all gears for cracks.
 - f. **BUSHINGS AND BUSHING-TYPE BEARINGS.**
 - (1) Check all bushings and bushing-type bearings for secure fit in casting. Check for discoloration which could indicate overheating.
 - (2) Check for dirt in oil holes and in bushing-type bearings. Oil holes and grooves must be clean and not damaged.
 - g. **OIL SEALS.**
 - (1) Inspect feather edge of oil seals for tears, fraying, hardening, and cracking.
 - (2) Replace metal-encased oil seals when inspection indicates damage or oil leakage.
 - h. **PIPE PLUGS.** Inspect pipe plugs for signs of leakage. Replace damaged pipe plugs.
 - i. **INSERTS.**
 - (1) Inspect inserts for cracks and stripped or damaged threads.
 - (2) Check inserts for loose fit.

REPAIR

- a. **GENERAL.** Procedures for repair will be the same for most engine components. General repair procedures are detailed in steps b through i. Special repair procedures are covered in the task relating to the specific component. After repair, clean all parts thoroughly to keep metal chips or abrasives out of the engine's working parts. Engines must have the lubrication system primed before and after operation. The following section contains instructions for priming the lubrication system of the engine before operation.

a.1. *PRIMING LUBRICATION SYSTEM.***CAUTION**

Oil lubrication system must be primed before operating new or rebuilt engines. Never operate engine below "L" (low) mark or above "H" (high) mark on the dipstick. Do not overfill crankcase. Before operating engine, make sure Unit Maintenance services the vehicle in accordance with instructions in TM 5-2350-262-20-1 and TM 5-2350-262-10.

- (1) Fill crankcase to "L" mark on dipstick.
- (2) Remove pipe plug from boss in filter head.
- (3) Connect external pump line from supply of clean oil to boss in filter head.
- (4) A minimum pressure of 30 psi (207 kPa) must be reached.
- (5) Use starter to rotate engine for 15 seconds, keeping oil pressure to a minimum 15 psi (103 kPa).
- (6) Start and idle engine (TM 52350-262-10) five to ten seconds.
- (7) Stop engine (TM 52350-262-10) and remove external pump line. Install pipe plug on boss in filter head.
- (8) Fill crankcase to "H" mark on dipstick.
- (9) Remove pipe plug from left side of oil pan.
- (10) Add oil until it flows from pipe plug hole.
- (11) Install pipe plug on oil pan.
- (12) Check oil level on dipstick. "H" mark must be at oil level shown. If necessary, remark dipstick to new oil level by scribing new "H" and "L" marks on dipstick.

b. *CASTINGS.*

- (1) Replace all cracked castings.

WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to comply may result in damage to equipment or injury to personnel.

- (2) Repair minor damage to machined surfaces with abrasive cloth (Item 7, Appendix C) dipped in drycleaning solvent (Item 25, Appendix C).
- (3) Repair minor surface warpage by working surface across a sheet of abrasive cloth (Item 7, Appendix C) on a surface plate. Replace warped castings which would impair assembly or operation.
- (4) Repair damaged pipe or screw threads with correct tap.

- c. **BALL BEARINGS.** See TM 9-214 for inspection and maintenance procedures for ball bearings.
- d. **STUDS.** Replace all bent or loose studs, or studs which show signs of stretching. Repair minor thread damage with a standard thread chaser.
 - (1) **Removal.** Back out studs slowly with stud extractor to avoid heating and possible seizure. If studs are broken too short to use an extractor, drill and extract studs with a suitable remover. A short stud may be removed by welding a nut to the stud and removing the stud with a wrench.
 - (2) **Replacement.**
 - (a) Apply a light coat of antiseize compound (Item 2, Appendix C) to the stud before installation.
 - (b) Only standard studs are supplied for repair parts. If a threaded hole is damaged beyond repair, drill and tap the hole. Install a threaded insert in the tapped hole.
- e. **GEARS.**
 - (1) Replace gears that have worn, pitted, or galled teeth.

WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to comply may result in damage to equipment or injury to personnel.

- (2) Remove sharp burrs from gear teeth with abrasive cloth (Item 7, Appendix C) dipped in drycleaning solvent (Item 25, Appendix C).
- f. **BUSHINGS AND BUSHING-TYPE BEARINGS.** Replace bushings and bushing-type bearings if they are loose, discolored due to overheating, or scored. When you replace bushings and bushing-type bearings, check nearby parts for damage or unusual wear.
 - (1) **Removal.** Press out bushing or bushing-type bearings with a suitable arbor press or with special tools provided.
 - (2) **Installation.** Aline bushing or bushing-type bearings in casting or retaining cage. Press bushing or bushing-type bearings into place with a suitable arbor press or with special tools provided. Clean repaired parts before assembly or installation.

- g. **OIL SEALS.** Oil seals must be replaced when thin feather edge is damaged or when seal material is brittle.
- (1) *Removal.* Press damaged oil seal from casting. Be careful not to damage bore.
 - (2) *Repair.*

WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to comply may result in damage to equipment or injury to personnel.

When oil seal bore is damaged so an oil-tight seal is impossible, replace casting or adapter. Remove slight nicks, burrs, and scratches with abrasive cloth (Item 7, Appendix C) dipped in drycleaning solvent Item 25, Appendix C).

- (3) *Installation.* Install new oil seal in casting bore or adapter using suitable oil seal replacement tool.
- h. **INSERTS.** Replace an insert when threads are stripped, cracked, or loose.
- (1) *Removal.* Drill and remove damaged insert from casting.
 - (2) *Installation.* Install new insert using suitable replacement tool.

REPAIR STANDARDS

Repair standards are included in the task where needed. The minimum and key clearances for new and repaired parts are included. Limits which indicate when a part should be replaced are included. These clearances and limits will allow maximum service with minimum replacement. Normally, parts not worn beyond dimensions given in task step will be approved for service.

MOUNTING ENGINE ON MAINTENANCE STAND

This task covers:

- a. Installation
- b. Removal

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance Supplemental No. 1, Less Power

Lifting Device

Special Tools:

Engine Sling	5120-01-222-7932
Maintenance Stand	4910-00-977-7506
Adapter Plate	4910-01-128-2681

Parts:

Lockwasher (11)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairers (2) 63H10

Reference:

TM 52350-262-34
 TM 52350-262-20-2

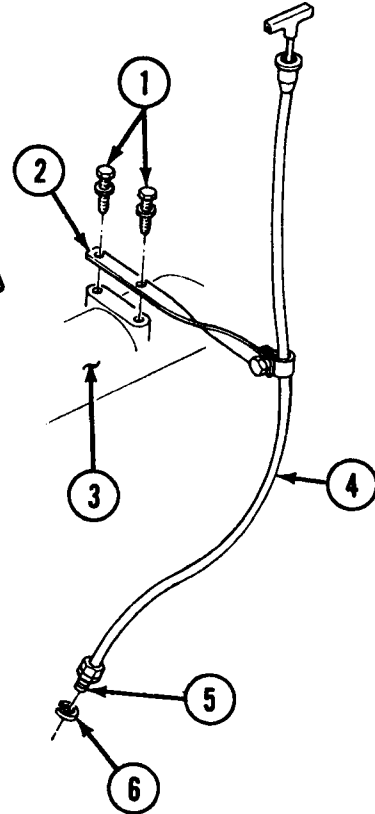
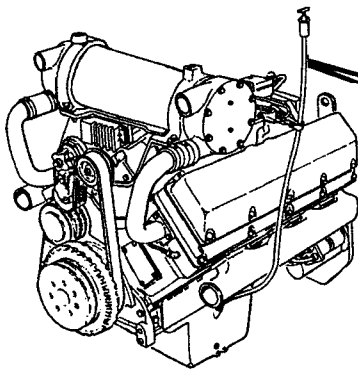
Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 52350-262-20-2	Starter Removed
TM 52350-262-34	Engine Removed
Page 3-3	Engine Removed From Shipping/ Storage Container
Page 3-76	Left Exhaust Manifold Removed
Page 3-104	Left Water Header Cover and Gasket Removed

General Safety Instructions:

WARNING

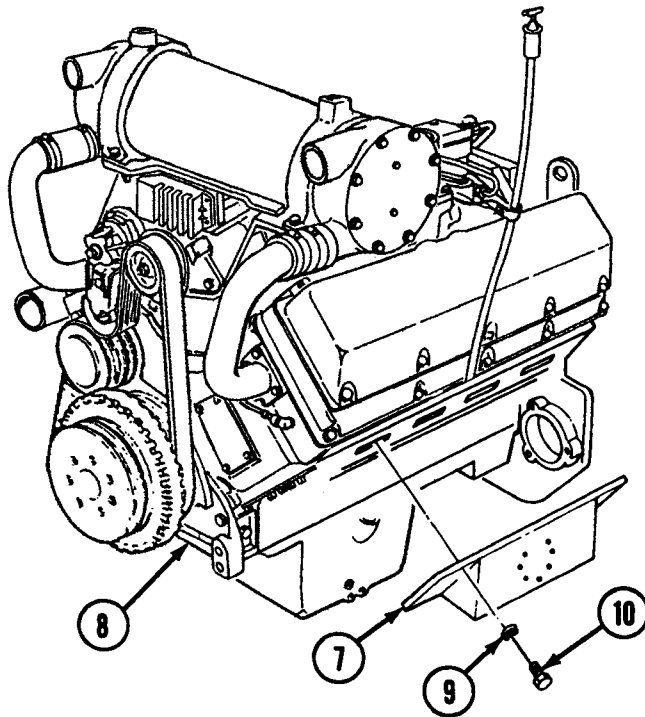
- Personnel must stand clear during lifting operations.
- Engine may come loose from stand. Make sure screws are secure before removing sling.



INSTALLATION

- A** Remove two screw and washer assemblies (1) securing oil level indicator support (2) to intake manifold (3).
- B** Disconnect oil level indicator assembly (4) from adapter (5). Remove adapter (5) from oil pan.
- C** Remove lockwasher (6) from adapter (5). Discard lockwasher (6).

- D** Aline holes in adapter plate (7) with water header cover holes in engine (8).
- E** Install adapter plate (7) on engine (8) with four lockwashers (9) and screws (10).



- F Connect sling hooks to lifting eyes (11) on engine (8).

WARNING

Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- G Lift engine (8) and position engine near stand (12). Have helper guide you.

WARNING

Engine may come loose from stand and injure you. Make sure screws are secure before removing sling. Failure to comply can result in severe injury.

- H Install engine (8) and adapter plate (7) on stand (12) with six lockwashers (13) and screws (14).

- I Disconnect sling hooks from lifting eyes (11) on engine (8).

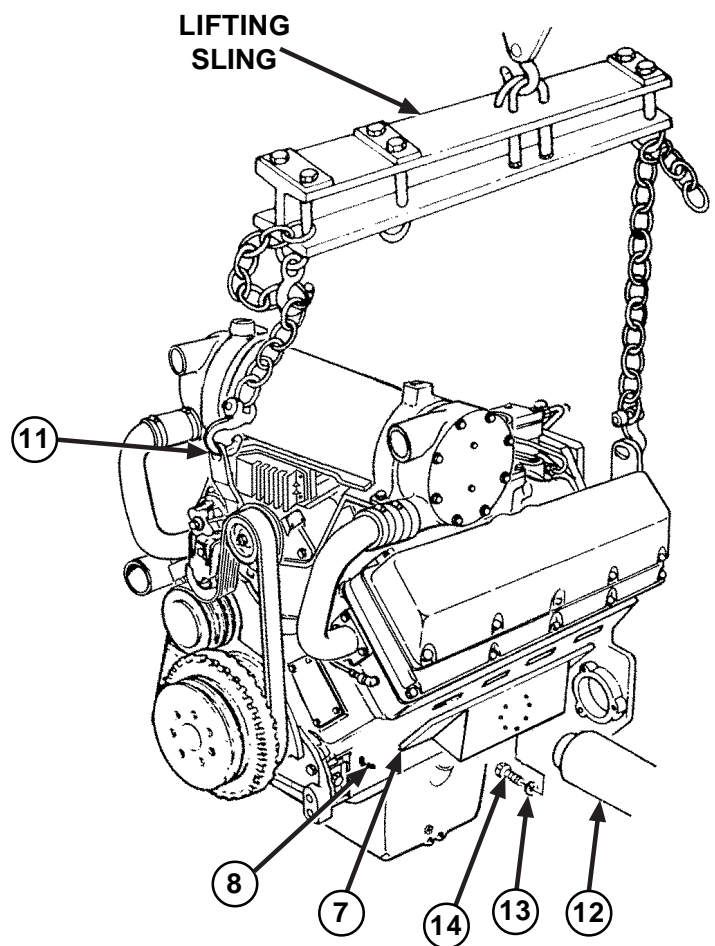
REMOVAL

- A Connect sling hooks to lifting eyes (11) on engine (8).
- B Apply enough lift with lifting sling to support weight of engine (8).
- C Remove six screws (14) and lockwashers (13) that secure engine (8) and adapter plate (7) to stand (12). Discard lockwashers (13).

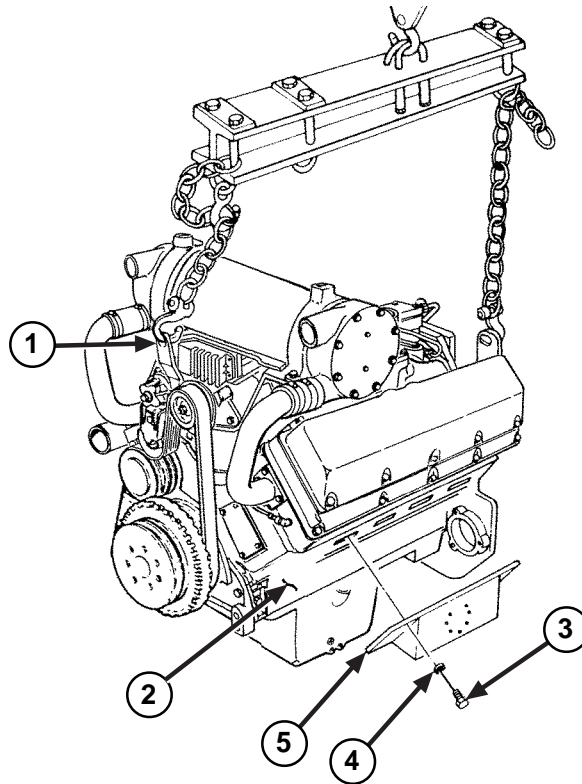
WARNING

Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

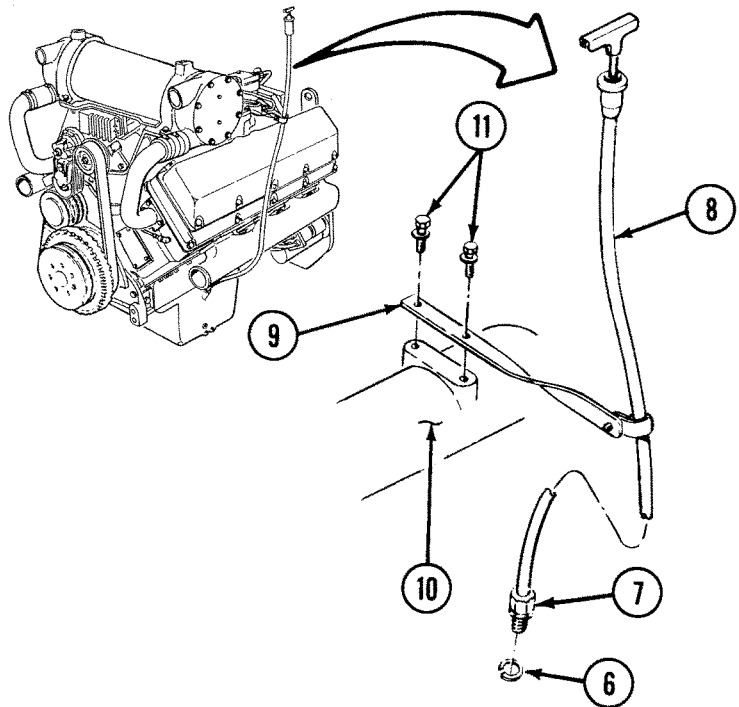
- D Lift engine (8) clear of stand (12). Have helper guide you.



- E Block engine on stands and disconnect sling hooks from lifting eyes (1) on engine (2).
- F Remove four screws (3) and lockwashers (4) that secure adapter plate (5) to engine (2). Discard lockwashers (4).



- G Install lockwasher (6) on adapter (7) and connect adapter (7) and oil level indicator assembly (8) to oil pan. Do not tighten adapter (7).
- H Install oil level indicator assembly (8) and support (9) on intake manifold (10) with two screw and washer assemblies (11).
- I Tighten adapter (7) and oil level indicator assembly (8).



FOLLOW-ON TASKS:

- Install left water header cover and gasket (p 3-97).
- Install left exhaust manifold (p 3-60).
- Install starter (TM 5-2350-262-20-2).
- Install engine (TM 5-2350-262-34).

CHAPTER 3

ENGINE MAINTENANCE INSTRUCTIONS

GROUP AU, POWERTRAIN INSTALLATION

TASK	PAGE
Air Compressor Removal and Installation	3-30
Air Compressor Repair	3-34
Air Intake Assembly Removal and Installation	3-54
DELETED	
DELETED	
Alternator Testing and Repair	3-9.1
Camshaft Cover Removal and Installation	3-175
Camshaft Removal and Installation	3-178
DELETED	
Coolant Pump Repair	3-103
Crankcase Rear Seal Removal and Installation	3-171
Crankshaft Removal and Installation	3-117
Cylinder Head Remoal and Installation	3-186
Cylinder Head Repair	3-202
Engine Oil Cooler Removal, Repair, and Installation	3-75
Engine Removal and Installation in Shipping/Storage Container	3-2
Engine Shipping/Storage Container Disassembly and Assembly	3-7
Exhaust Manifolds Removal and Installation	3-59
Flywheel Removal and Installation	3-126
Flywheel Ring Gear Removal and Installation	3-129
Fuel Drain Tube and Check Valve Removal and Installation	3-14
Fuel Injectors Adjustment	3-17
Fuel Injectors Removal and Installation	3-22
Fuel Pump Removal and Installation	3-27
Fuel Supply Tube and Check Valve Removal and Installation	3-11
Intake Manifolds Removal and Installation	3-57
Liners, Pistons, Rings, and Rod Bearings Removal and Installation	3-137
Oil Pan Removal and Installation	3-88
Oil Pump Removal and Installation	3-63
Oil Pump Repair	3-68
Rocker Covers Removal and Installation	3-184
Starter Repair	3-10
Transmission Adapter Removal and Installation	3-131
Transmission Clutch Disk Removal and Installation	3-124
DELETED	
Valves Adjustment	3-233
Valve Train Removal	3-236
Vibration Damper/Crankcase Front Cover and Seal Removal and Installation	3-112
Water Header Cover and Gasket Removal and Installation, Left Side	3-96
Water Header Cover and Gasket Removal and Installation, Right Side	3-98

ENGINE REMOVAL AND INSTALLATION IN SHIPPING/ STORAGE CONTAINER

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

Lifting Device and Suitable Chain

Special Tools:

Lifting Sling 5120-01-222-7932

Materials:

Desiccant Item 10
Appendix C

Parts:

Locknut (22)

Lockwasher (20)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer (2) 63H10

Reference:

TM 5-2350-262-10
TM 5-2350-262-34

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Engine Crankcase Drained
TM 5-2350-262-34	Engine Wiring Harness Removed
TM 5-2350-262-34	Engine Removed from Transfer Case

General Safety Instructions:

WARNING

Personnel must stand clear during lifting operations.

REMOVAL

Note

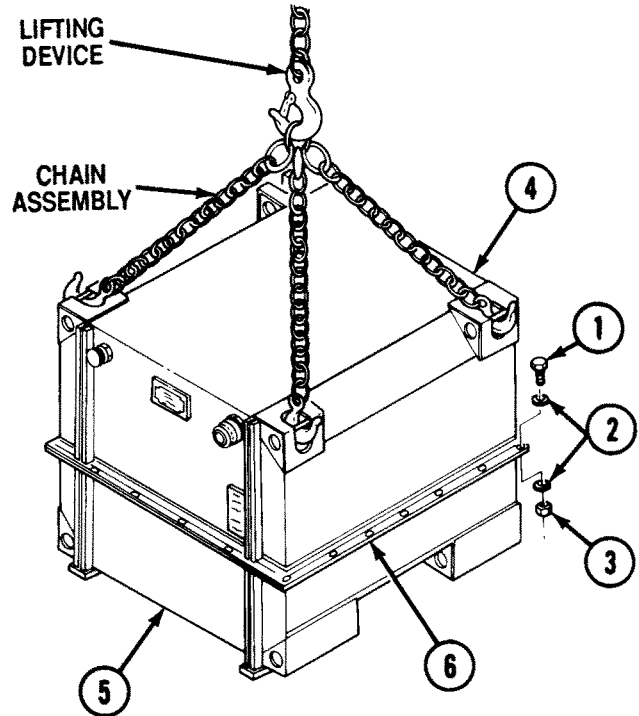
Release pressure from container prior to removing hardware.

- A** Remove twenty-two screws (1), forty-four washers (2), and twenty-two locknuts (3) securing upper half of engine container (4) to lower half of engine container (5). Discard locknuts (3).

WARNING

Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- B** Attach two chain assemblies to upper half of container (4) and attach chain assemblies to lifting device. Lift upper half of container (4) up and move container (4) out of the way. Remove gasket (6) only if damaged.

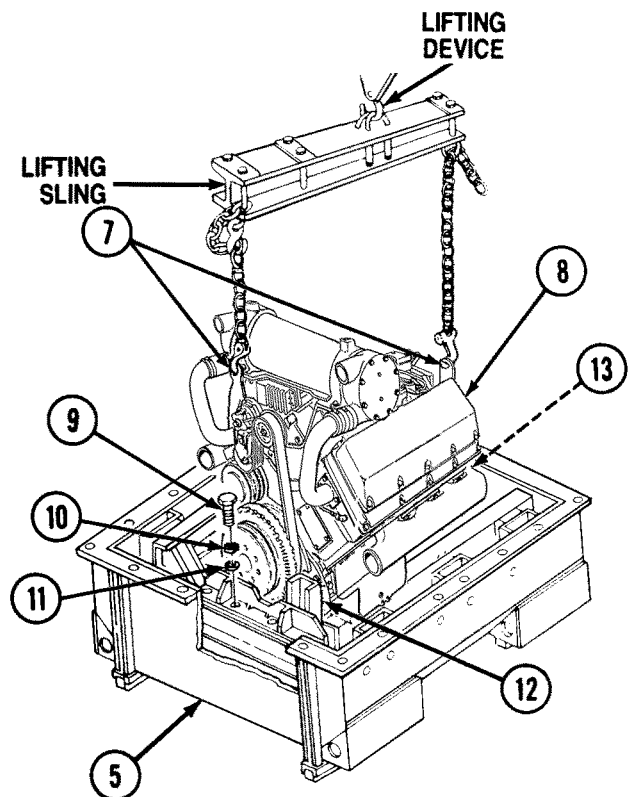


- C** Attach lifting sling to two lifting eyes (7) on engine (8) and to lifting device. Raise lifting device to support weight of engine (8).
- D** Remove six screws (9), lockwashers (10), and washers (11) securing front bracket (12) and rear bracket (13) to lower half of container (5). Discard lockwashers (10).

WARNING

Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

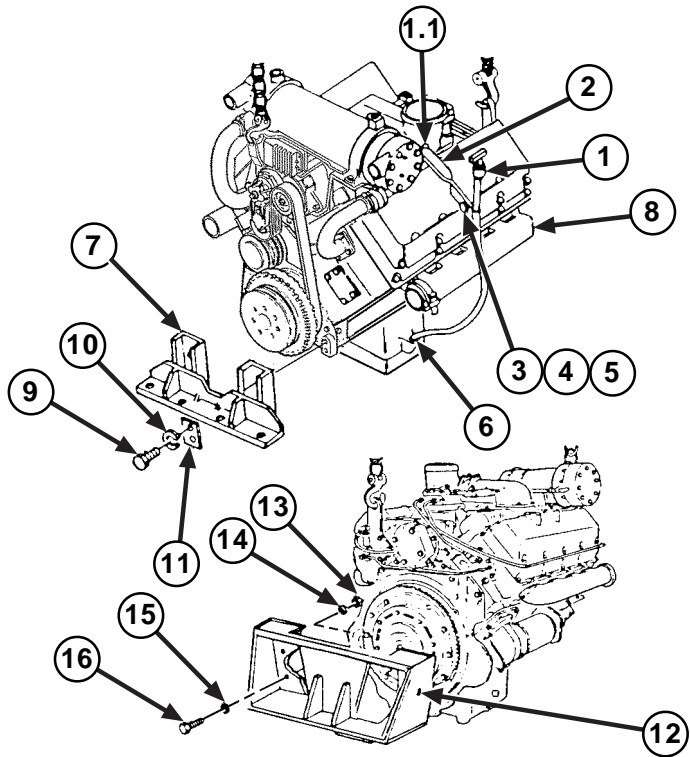
- E** Raise engine (8) up and out of lower half of container (5).



F Remove oil level indicator assembly (1) from intake manifold (1.1). Straighten oil level indicator assembly (1) and attach to support (2) with clamp (3), nut (4), and screw (5). Tighten adapter (6) and oil level indicator assembly (1).

G Remove front bracket (7) from engine (8) by removing four screws (9), lockwashers (10), and two spacers (11). Discard lockwashers (10) and store front bracket (7), screws (9), and spacers (11) with engine shipping/storage container.

H Remove rear bracket (12) by removing ten nuts (13), lockwashers (14), washers (15), and screws (16). Discard lockwashers (14) and store rear bracket (12), nuts (13), washers (15), and screws (16) with engine shipping/storage container.



INSTALLATION

WARNING

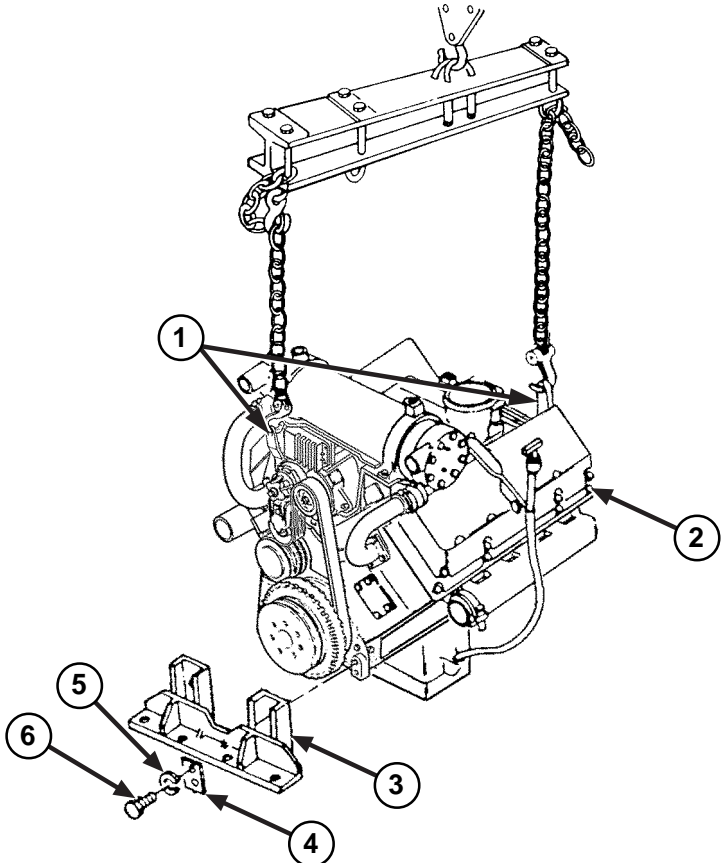
Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

Note

- To install engine in shipping/storage container, refer to decal on engine container.
- Front bracket, spacers, and screws are stored with engine shipping/storage container.

A Attach lifting sling to two lifting eyes (1) on engine (2) and to lifting device. Raise lifting device to support weight of engine (2).

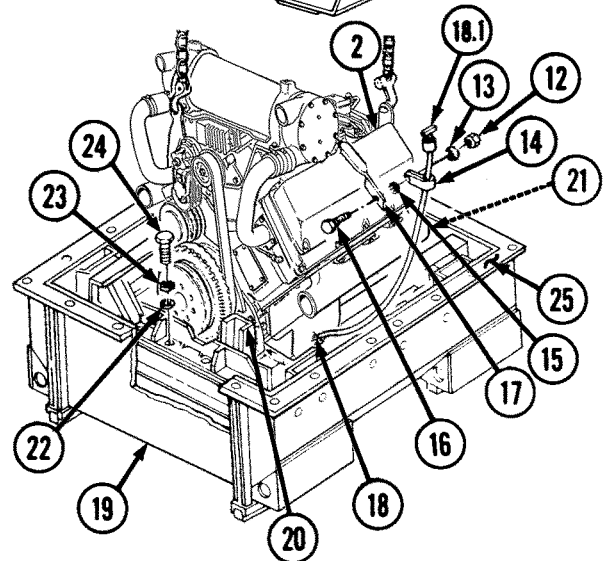
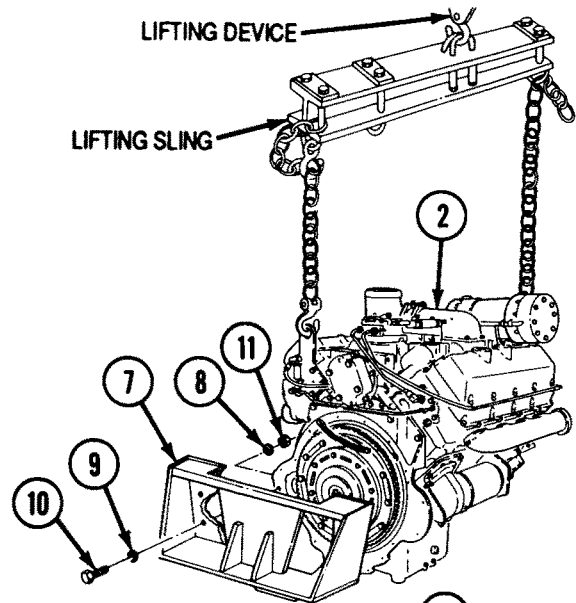
B Install front bracket (3) on engine (2) with two spacers (4), four lockwashers (5), and screws (6). Tighten screws (6) to 212-234 lb-ft (287-317 N-m).



Note

Rear bracket, washers, screws, and nuts are stored with engine shipping/storage containers.

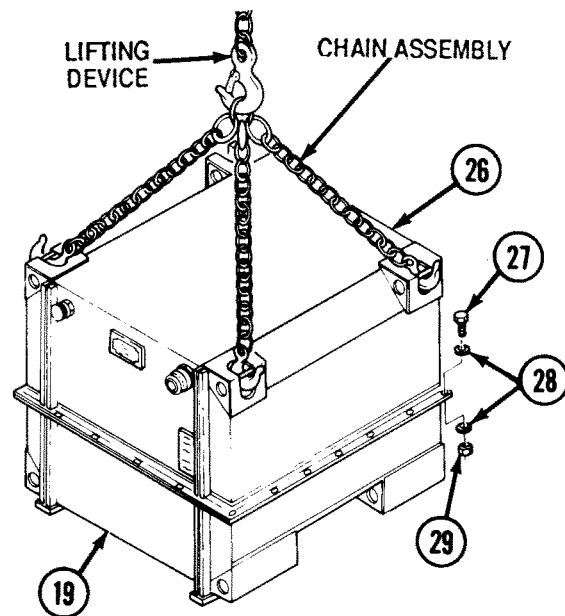
- C** Install rear bracket (7) on engine (2) with ten washers (8), lockwashers (9), screws (10), and nuts (11). Tighten screws (10) to 45-50 lb-ft (61-68 N-m).
- D** Remove nut (12), lockwasher (13), clamp (14), washer (15), and screw (16) from support (17).
- E** Loosen adapter (18) and lay oil level indicator assembly (18.1) flat along exhaust manifold.
- F** Place 144 units of desiccant (MIL-D-3464) into desiccant basket in container (19).
- G** Install engine (2) in lower half of engine container (19) by securing brackets (20) and (21) with six washers (22), lockwashers (23), and screws (24). Tighten screws (24) to 212-234 lb-ft (287-317 N-m).
- H** If removed, install gasket (25) on lower half of container (19).



WARNING

Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- I** Attach two chain assemblies to upper half of engine container (26) and attach chain assemblies to lifting device. Lift upper half of container (26) and place on top of lower half of container (19).
- J** Secure upper half of container (26) to lower half of container (19) with twenty-two screws (27), forty-four washers (28), and twenty-two locknuts (29). Tighten locknuts (29) to 54-59 lb-ft (73-80 N-m).



ENGINE SHIPPING/STORAGE CONTAINER DISASSEMBLY AND ASSEMBLY

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

Equipment Condition:

Reference

Page 3-3

Condition Description

Engine Removed
from Shipping/
Storage Container

Materials:

Drycleaning Solvent	Item 25 Appendix C
------------------------	-----------------------

General Safety Instructions:

Parts:

Locknut (56)

Lockwasher (48)

Parts Reference:

Appendix B

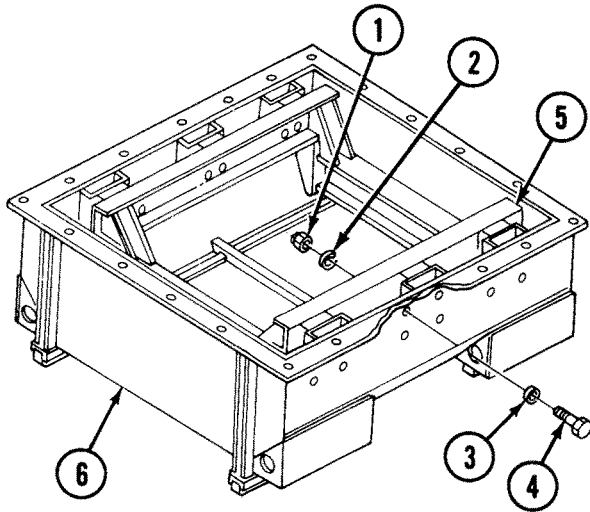
Personnel Required:

Track Vehicle Repairer (2) 63H10

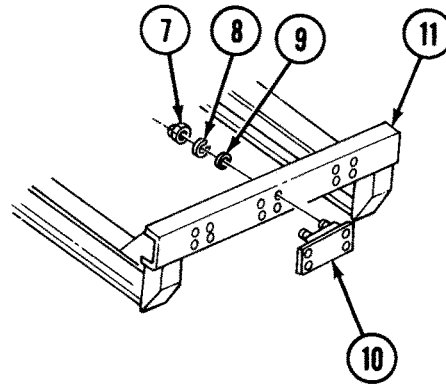
WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas.

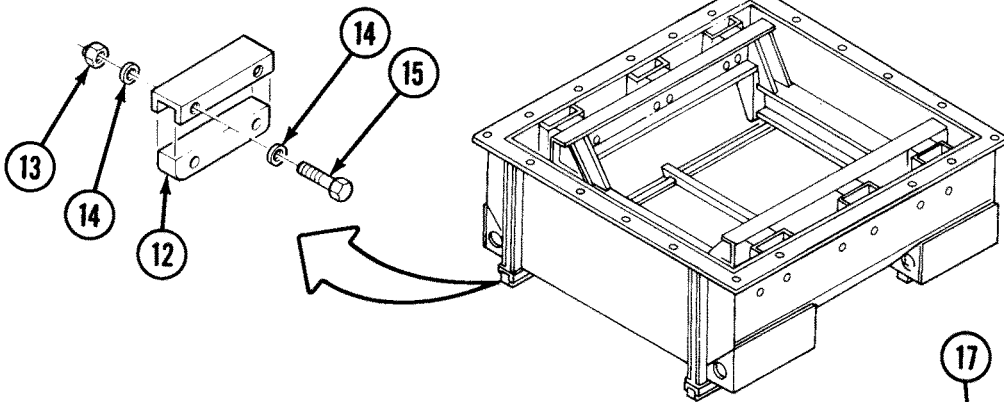
REMOVAL



A Remove twenty-four locknuts (1), lockwashers (2), washers (3), screws (4), and frame (5) from lower half of container (6). Discard locknuts (1) and lockwashers (2).

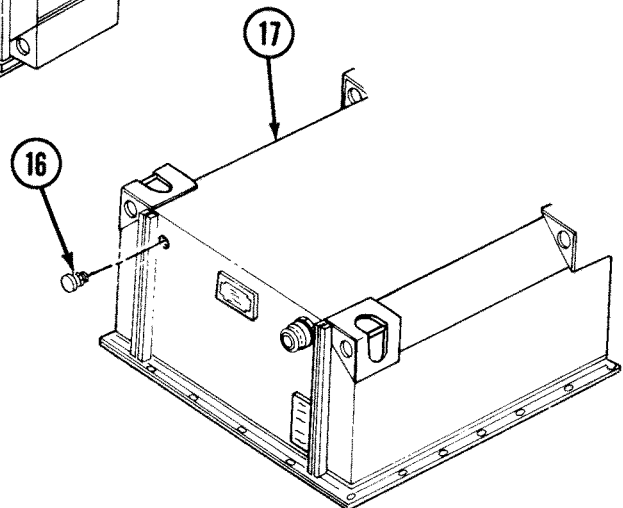


B Remove twenty-four locknuts (7), lockwashers (8), washers (9), and six mounts (10) from frame (11). Discard locknuts (7) and lockwashers (8).

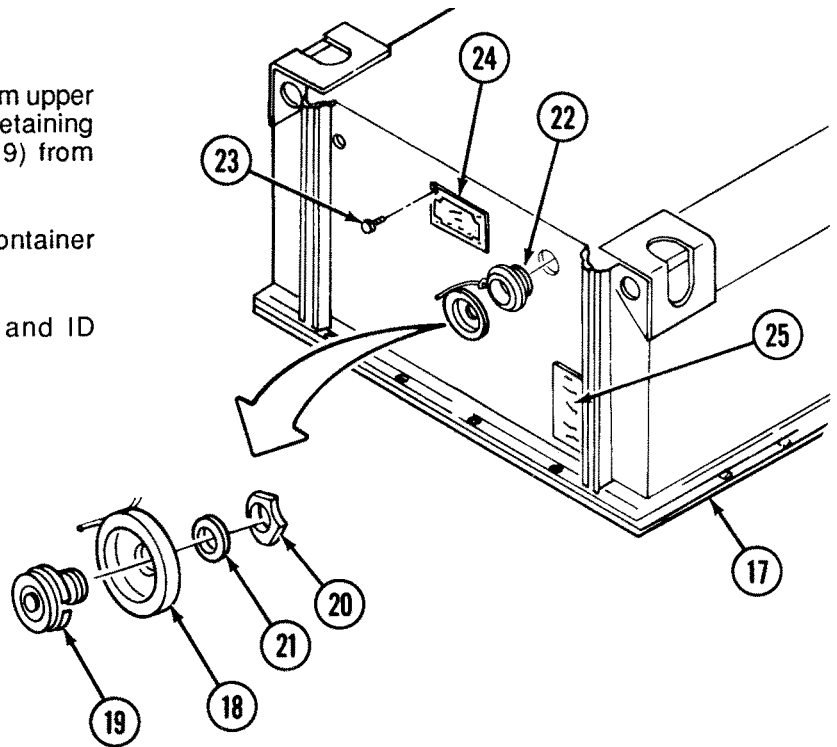


C Remove four runners (12) by removing eight locknuts (13), sixteen washers (14), and eight screws (15). Discard locknuts (13).

D Remove humidity indicator (16) from upper half of container (17).



- E** Remove cover (18) and valve (19) from upper half of container (17) and remove retaining nut (20), washer (21), and valve (19) from cover (18).
- F** Remove access cover (22) from container (17).
- G** Remove four drive screws (23) and ID plate (24) from container (17).
- H** If damaged, scrape off decal (25).



INSTALLATION

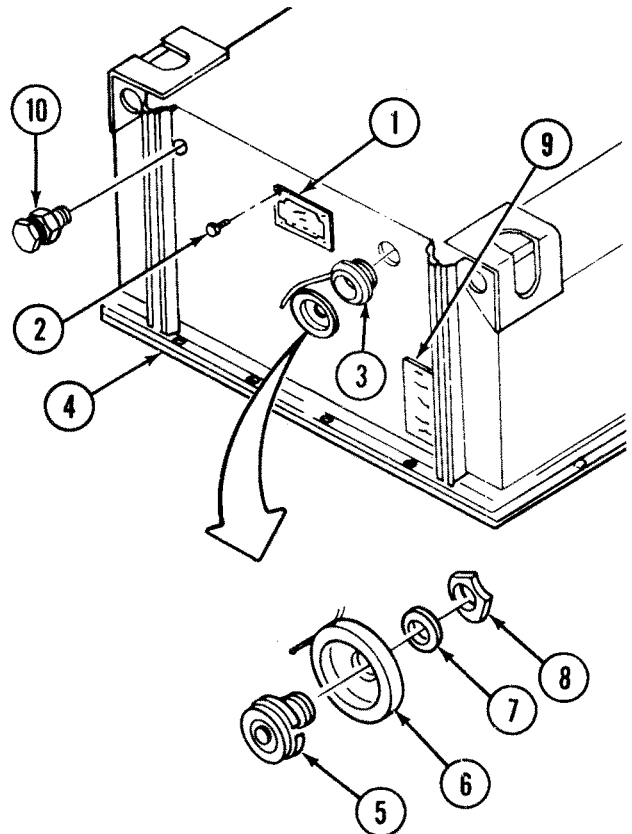
WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated places. Failure to comply may result in damage to equipment or injury to personnel.

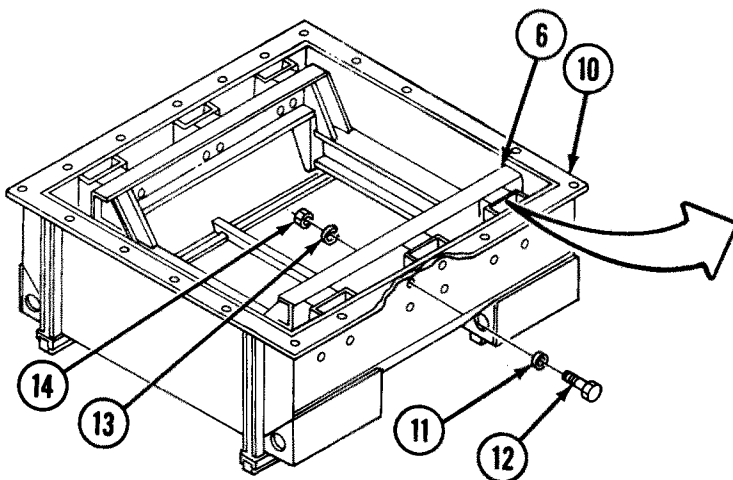
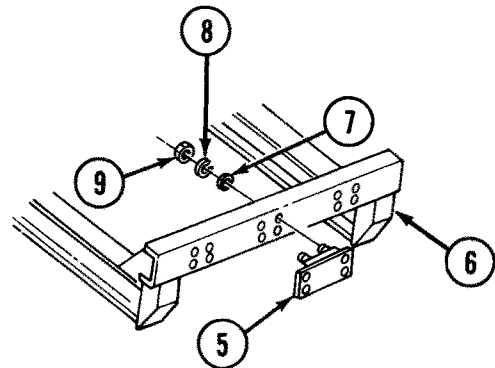
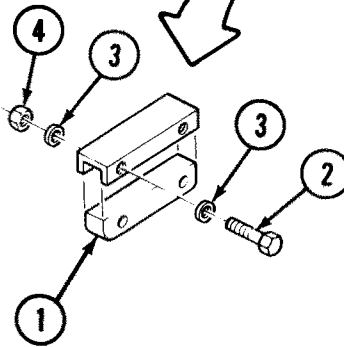
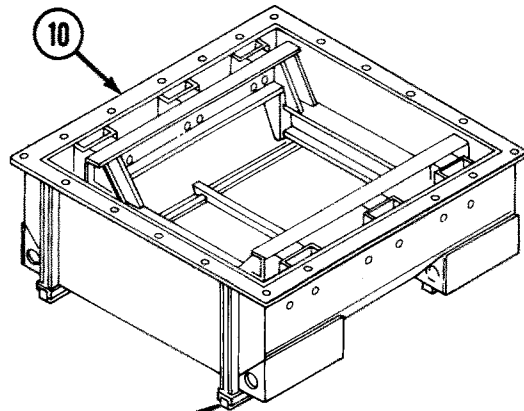
- A** Install ID plate (1) with four drive screws (2).
- B** Install access cover (3) in upper half of container (4).
- C** Install valve (5) in cover (6) and secure with washer (7) and retaining nut (8). Attach cover (6) to cover (3).

Note

- Perform step D only if decal was removed.
 - Clean decal mounting area with dry-cleaning solvent.
- D** Separate decal (9) from backing sheet and apply decal (9) to upper half of container (4) below valve (5).
 - E** Install humidity indicator (10) in upper half of container (4).



- F** Install four runners (1) with eight screws (2), sixteen washers (3), and eight locknuts (4).
- G** Install six mounts (5) on frame (6) with twenty-four washers (7), lockwashers (8), and locknuts (9).
- H** Install frame (6) in lower half of container (10) and secure with twenty-four washers (11), screws (12), lockwashers (13), and locknuts (14). Tighten locknuts (9) and (14) to 61-66 lb-ft (83-89 N-m).



ALTERNATOR TESTING AND REPAIR

This task covers:

- a. Alternator Output Testing
- b. Disassembly
- c. Static Testing
- d. Cleaning
- e. Assembly

INITIAL SETUP

Tools:

4910-00-754-0654 Shop Equipment, Automotive Maintenance and Repair, Organizational Maintenance, Common No. 1, Less Power

5180-00-177-7033 Tool Kit, General Mechanic's: Automotive

Test Equipment:

Multimeter

Test Stand 4910-01-417-1870

Materials:

Sealant Item 23.2
Appendix C

Sealing Compound Item 23.1
Appendix C

Parts:

Locknut (31)

Lockwasher (3)

Parts Reference:

Appendix B

Personnel Required:

Two Fuel and Electrical Repairers 63G10

Reference:

TM 5-2350-262-20-2

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Alternator Removed

General Safety Instructions:

WARNING

Always support alternator core and shaft assembly while lifting.

ALTERNATOR OUTPUT TESTING

- A** Mount pivot arm of 500-amp test stand on high-speed side and install mounting flange adapter on pivot arm. Connect pulley drive shaft to high-speed head, and install pulley drive shaft on mounting flange adapter.
- B** Mount alternator and starter/alternator mounting bracket on 500-amp test stand. Connect V-belt from 500-amp test stand pulley to alternator pulley. Adjust belt tension.
- C** Connect cable from alternator ground terminal to 500-amp test stand G- terminal. Connect cable from alternator B+ terminal to 500-amp test stand G+ terminal. Connect cable from alternator regulator IGN to 500-amp test stand F terminal.
- D** Fabricate a jumper wire with a ring terminal at both ends. Connect jumper wire on 500-amp test stand from IGN SWITCH terminal to F-B terminal.

Note

- Figures 1 and 2 illustrate connecting the alternator to the 500-amp test stand.
- Prior to operation of test stand, ensure all switches and controls are in initial positions as referenced in Operator and Maintenance Manual, TM 9-4910-663-12 (UMC Model GSAR-500), or Operator and Maintenance Manual, TM 9-4910-485-12 (Sun Model AGT-99A).

E Set 500-amp test stand as follows:	<u>Model GSAR-500</u>	<u>Model AGT-99A</u>
• DC ammeter load and starter selector	X10	500 amp
• DC ammeter field and battery charge selector	X1	5 amp
• Field circuit switch	Regulator	Regulator
• DC voltmeter circuit selector	RECT/GEN	RECT/GEN

- F** Turn 500-amp test stand master power switch and master load switch to ON and battery switch to 24 VDC. Green lamp on 500-amp test stand must illuminate.

Note

- When tachometer reaches 3000 rpm, green lamp should go off, indicating proper charging from alternator.
- Normal voltage range is 26-30 VDC. High amperage is 10 percent over the rated alternator output of 182 amps (@ 5000 rpm).

- G** Perform no-load test. Increase alternator speed to 5000 rpm; record results. Refer to table 1 (p 3-9.4) for diagnosis.
- H** Perform full-load test. Ensure all load switches are in ON position on 500-amp test stand, and increase alternator speed to 5000 rpm. Set load to 182 amps/min.; record results. Refer to table 2 (p 3-9.4) for diagnosis.

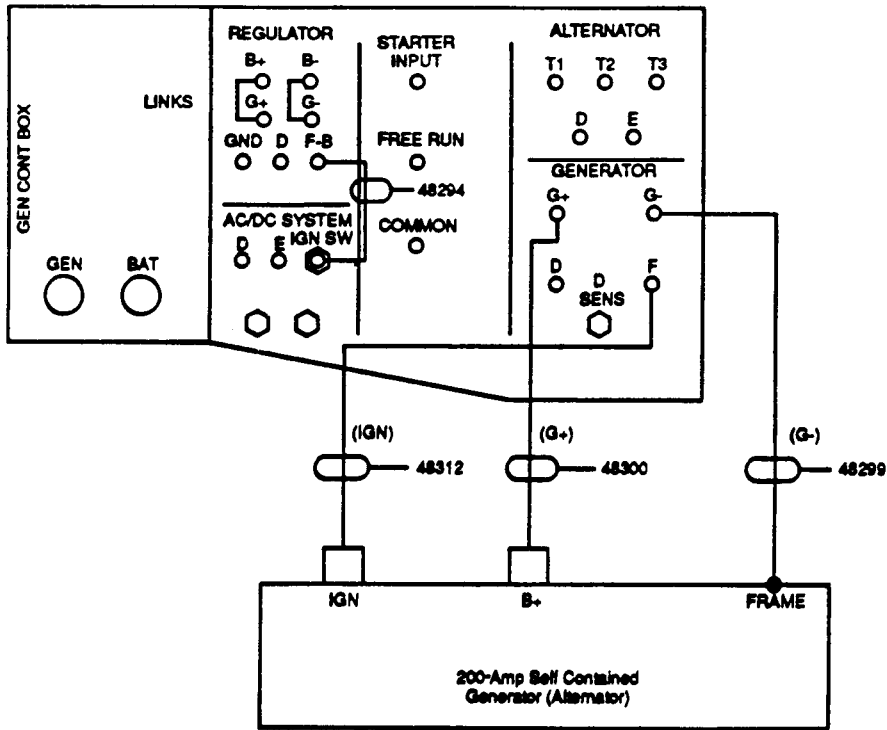


Figure 1

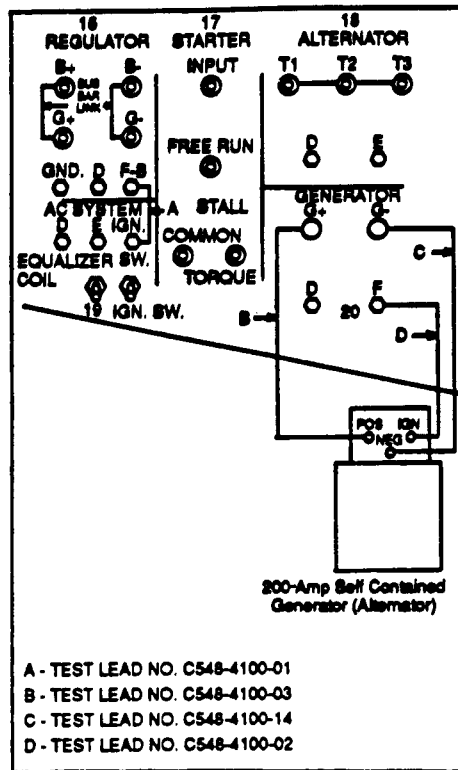


Figure 2

AMPS	VOLTS	DIAGNOSIS
161-200	21-25	Test bench battery is discharged (or defective). Allow to charge (or replace).
161-200	26-30	Give time to stabilize while monitoring VOLTS. If VOLTS rise above normal range (26-30 volts), regulator and/or tube assembly must be replaced. If AMPS fall, charging system is OK.
161-200	31-35	STOP TEST. Regulator and/or tube assembly must be replaced. Refer to Static Testing (p 3-9.7).
80-119	21-25	Alternator and/or regulator must be repaired or replaced. Refer to table 3.
80-119	26-30	Regulator OK. Refer to table 2.
80-119	31-35	STOP TEST. Bench malfunction or wiring error.

Table 1. No Load Test.

AMPS	VOLTS	DIAGNOSIS
161-200	21-25	Test bench battery is discharged (or defective). Allow to charge (or replace).
161-200	26-30	Charging system OK.
161-200	31-35	STOP TEST. Regulator and/or tube assembly must be replaced. Refer to Static Testing (p 3-9.7).
80-119	21-25	Alternator and/or regulator must be replaced. Refer to table 3.
80-119	26-30	Increase load.
80-119	31-35	STOP TEST. Test bench malfunction or wiring error.

Table 2. Full Load Test.

Note

Perform this test only when instructed from tables 1 and 2.

- I Perform regulator bypass test. Prepare alternator as in full load test.

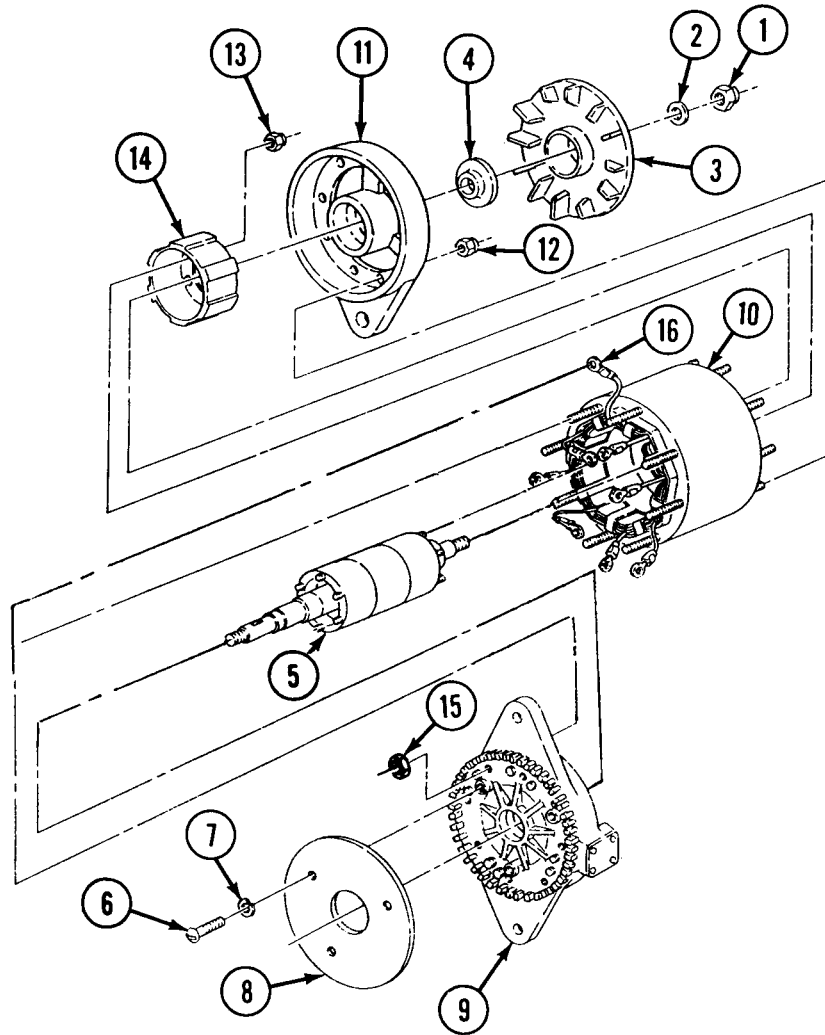
Note

Use jumper wire rated for 15 amps.

- J Disconnect alternator connector from regulator. With alternator spinning, use jumper wire and short pin A of connector to ground momentarily. Record results.
- K Amperage should rise within 10 percent of rated output with jumper wire connected, and fall with jumper disconnected. Refer to table 3 for diagnosis.
- L Turn test stand master power switch and load switch to OFF.
- M Disconnect jumper wires from terminals on test stand and alternator.
- N Remove V-belt from test stand pulley and alternator pulley. Remove alternator from test stand.

CONNECT	DISCONNECT	DIAGNOSIS
AMPS RISE	AMPS FALL	Alternator OK. Replace regulator only if low AMPS (80-119)/low VOLTS (21-25) are indicated in table 1 and/or table 2.
NO CHANGE	NO CHANGE	Alternator must be repaired. Refer to Static Testing (p 3-9.7).

Table 3. Regulator Bypass Test.



DISASSEMBLY

Note

Complete alternator disassembly is not required for static testing.

- A** Remove locknut (1), washer (2), fan (3), and bearing bushing (4) from core and shaft assembly (5). Discard locknut (1).
- B** Remove three screws (6), lockwashers (7), and plate cover (8) from front housing (9). Discard lockwashers (7).
- C** Scribe alinement marks on front housing (9), stator shell (10), and end housing (11).
- D** Remove nine locknuts (12) securing end housing (11) to stator shell (10). Discard locknuts (12).

- E** Using puller, remove end housing (11) from stator shell (10).

Note

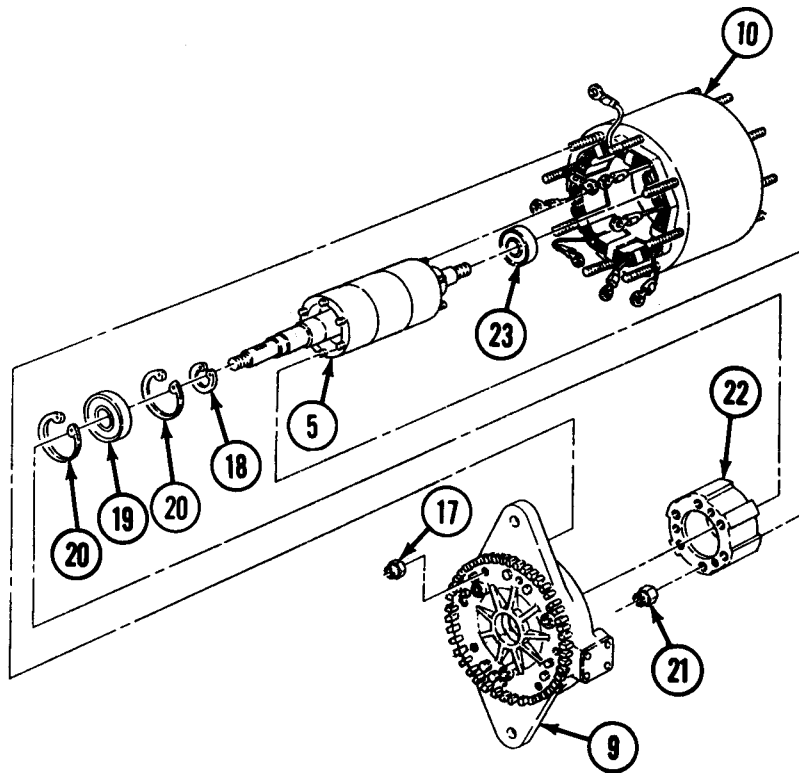
Using three 10-32 x 2-in. long machine screws as jacks in threaded holes on end plate of rear rotor, gradually tighten screws to remove rear rotor from core and shaft assembly.

- F** Remove six locknuts (13) and rear rotor (14) from core and shaft assembly (5). Discard locknuts (13).

Note

Prior to removal, tag leads for installation.

- G** Remove eight nuts (15) securing eight leads (16) to diodes in front housing (9) and disconnect leads (16).



- H** Remove nine locknuts (17) securing front housing (9) to stator shell (10). Discard locknuts (17).
- I** Remove front housing (9) from stator shell (10) by tapping lightly with a soft-faced mallet.
- J** Remove shaft retaining ring (18) from core and shaft assembly (5).

WARNING

Always support alternator core and shaft assembly during removal. Failure to comply may result in severe injury to personnel or damage to equipment.

- K** Using press, remove core and shaft assembly (5) from front bearing (19) and front housing (9).

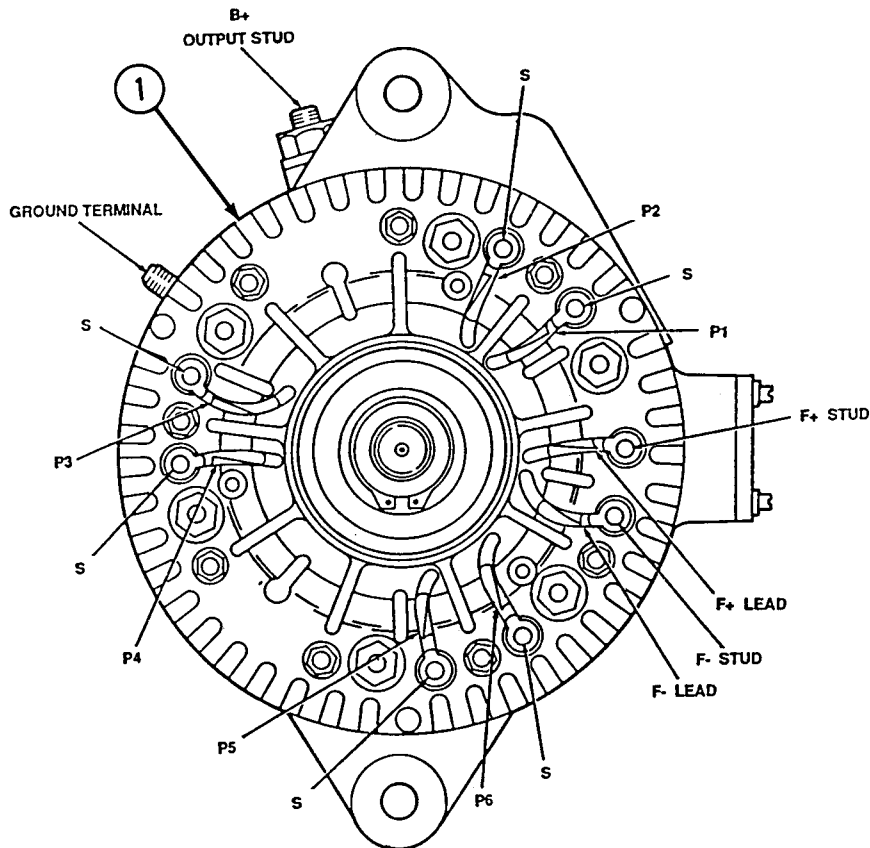
- L** Remove front and rear retaining rings (20) from front housing (9).
- M** Using press, remove front bearing (19) from front housing (9).

Note

Using three 10-32 x 2-in. long machine screws as jacks in threaded holes on end plate of front rotor, gradually tighten screws to remove front rotor from core and shaft assembly.

- N** Remove six locknuts (21) and front rotor (22) from core and shaft assembly (5). Discard locknuts (21).
- O** Using press, remove rear bearing (23) from core and shaft assembly (5).

STATIC TESTING

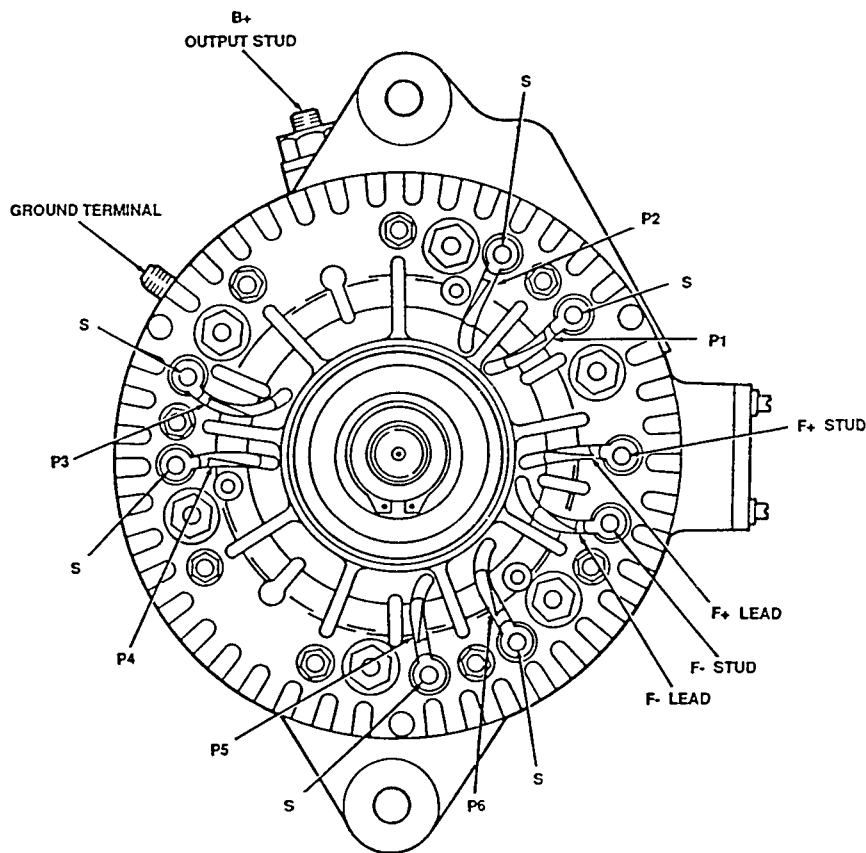


Note

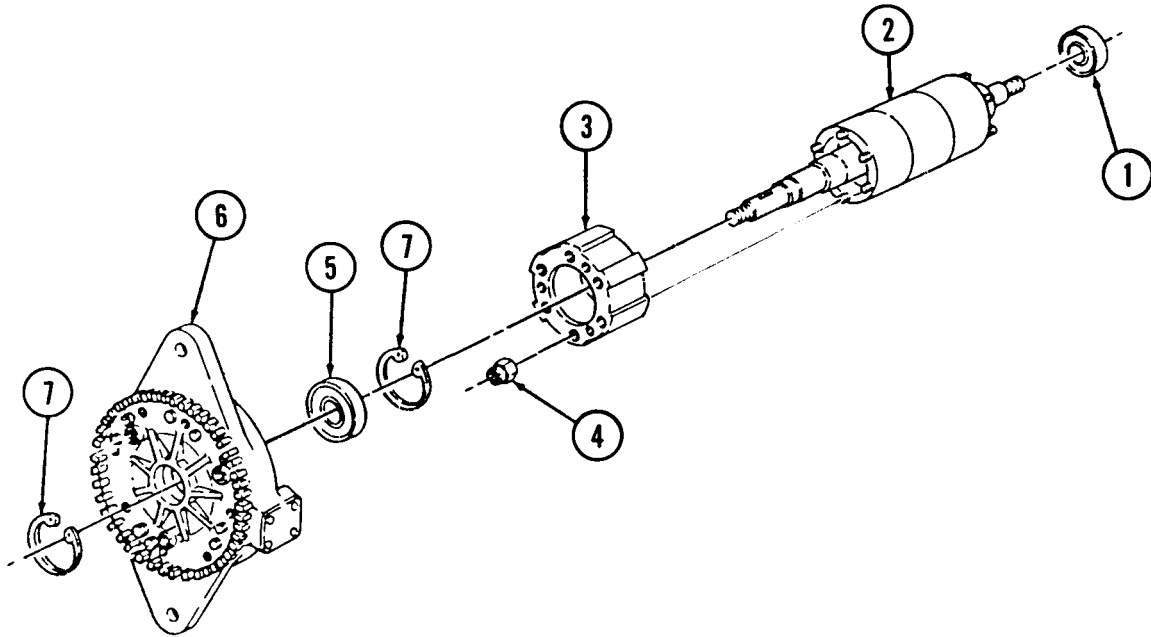
- Refer to disassembly for component removal, if necessary.
- Perform stator test. Remove six nuts and phase leads from diodes in front housing.

- A** Set multimeter to XI scale and zero multimeter.
- B** Connect multimeter leads between each successive pair of stator phase leads P1 - P2, P2 - P3, and P1 - P3. Multimeter should read less than 1 ohm. If multimeter reads infinity (∞), the stator is open; replace alternator.
- C** Set multimeter to X10 scale and zero multimeter.
- D** Connect multimeter leads between each phase lead, P1, P2, and P3 and the ground terminal on outside of front housing (1). Multimeter should read infinity (∞). If multimeter reads zero, the stator is grounded; replace alternator.

- E** Repeat step D to check phase leads P4, P5, and P6.
- F** Perform field coil test. Remove two nuts and field coil leads (F+, F-) from diodes in front housing (1).
- G** Set multimeter to XI scale and zero multimeter.
- H** Connect multimeter leads to the two field leads and measure the resistance. Multimeter should read less than 3 ohms. If multimeter reads more than 3 ohms, the field coil is open; replace alternator.



- I** Set multimeter to X10K scale and zero multimeter.
- J** Perform positive diode test. Set multimeter to X100 scale and zero multimeter.
- K** Connect one multimeter lead to the B+ output stud and the other lead to each of the six diode terminals S. Multimeter should read nearly alike for all six; either less than 600 ohms or infinity (∞). Reverse multimeter leads. Multimeter should read nearly alike for all six diode terminals, but opposite the first set of readings. If readings are not opposite, the diode rectifier assembly is open. Replace alternator.
- L** Perform negative diode test. Set multimeter to X100 scale and zero multimeter.
- M** Connect one multimeter lead to the ground terminal and the other lead to each of the six diode terminals S. Multimeter should read nearly alike for all six diode terminals; either less than 600 ohms or infinity (∞). Reverse multimeter leads. Multimeter should read nearly alike for all six diode terminals, but opposite the first set of readings. If readings are not opposite, the diode rectifier assembly is open. Replace alternator.



CLEANING

Clean all alternator components (p 2-2).

ASSEMBLY

WARNING

Always support alternator core and shaft assembly during installation. Failure to comply may result in severe injury to personnel or damage to equipment.

- A** Using press, install rear bearing (1) on core and shaft assembly (2).
- B** Install front rotor (3) on core and shaft assembly (2).

Note

Apply sealing compound to studs on core and shaft assembly prior to installation.

- C** Install core and shaft assembly (2) on front rotor (3) with six locknuts (4). Tighten locknuts (4) to 45 lb-in. (5 N-m).
- D** Using press, install front bearing (5) in front housing (6).
- E** Install front and rear retaining rings (7) on front housing (6).
- F** Using press, install front bearing (5) and front housing (6) on core and shaft assembly (2).

G Install shaft retaining ring (8) on core and shaft assembly (2).

H Insert core and shaft assembly (2) and front housing (6) into stator shell (9).

Note

Align scribe marks on front housing and stator shell.

I Feed eight leads (10) from stator shell (9) through front housing (6).

Note

Apply sealing compound to studs on stator shell.

J Install front housing (6) on stator shell (9) with nine locknuts (11). Tighten locknuts (11) to 18 lb-in. (2 N-m).

K Secure leads (10) to diodes on front housing (6) with eight nuts (12).

Note

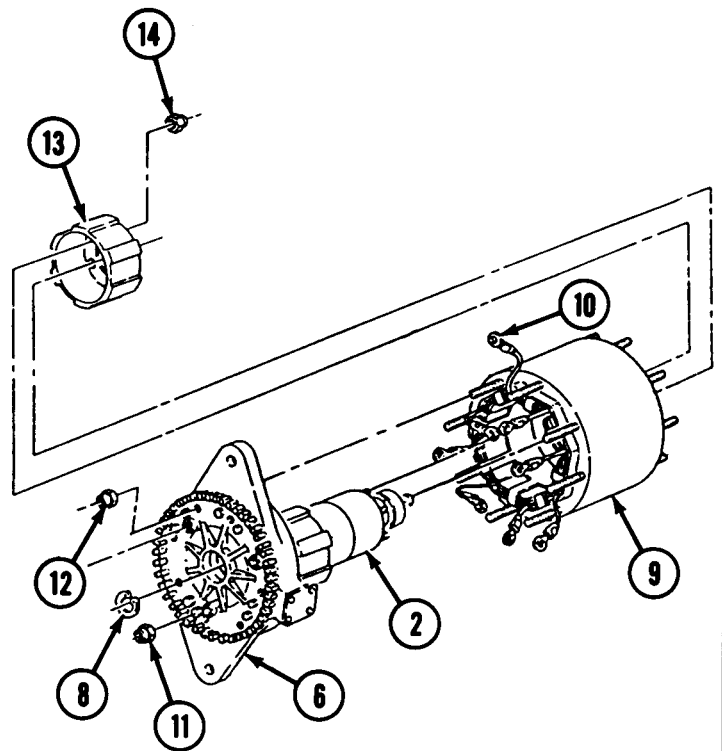
Apply thin coat of sealant on leads and diodes on front housing.

L Install rear rotor (13) on core and shaft assembly (2).

Note

Apply sealing compound to studs on core and shaft assembly.

M Center studs of core and shaft assembly (2) in the center of slots on rear rotor (13) and secure core and shaft assembly (2) with six locknuts (14). Tighten locknuts (14) to 45 lb-in. (5 N-m).



N Install end housing (15) on core and shaft assembly (2) and rear bearing (16). Tap lightly with a soft-faced mallet.

Note

Apply sealing compound to studs on stator shell.

O Install end housing (15) on stator shell (9) with nine locknuts (17). Tighten locknuts (17) to 18 lb-in. (2 N-m).

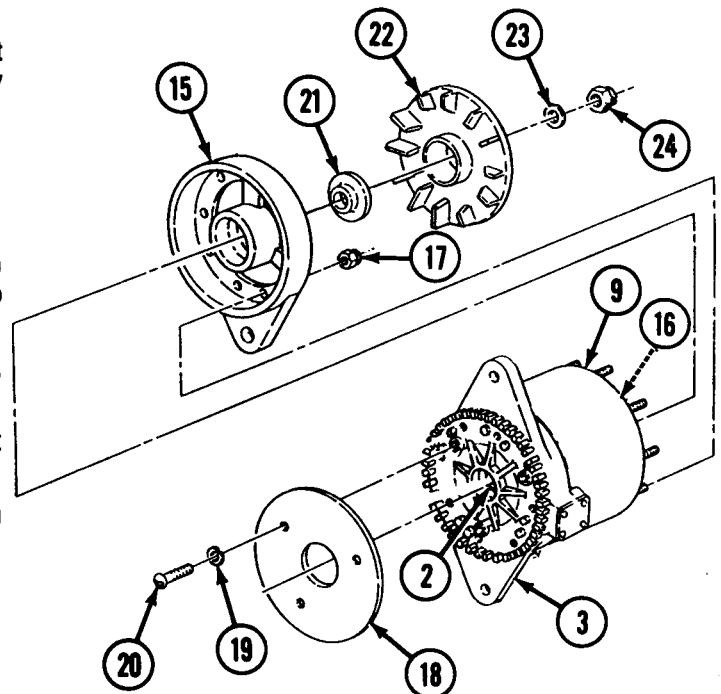
P Install cover plate (18), three lockwashers (19), and screws (20) on front housing (6).

Q Install bearing bushing (21) on core and shaft assembly (2).

R Install fan (22), washer (23), and locknut (24) on core and shaft assembly (2). Tighten locknut (24) to 50 lb-ft (68 N-m).

FOLLOW-ON TASK:

Install alternator (TM 5-2350-262-20-2).



STARTER REPAIR

This task covers:

Repair

INITIAL SETUP

Reference:

TM 5-2350-262-20-2

TM 9-2920-225-34

TM 9-2920-248-35

Equipment Condition:

Reference

TM 5-2350-262-20-2

Condition
Description

Starter Removed

REPAIR

Refer to the technical manual listed below for the repair of the starter:

Prestolite – TM 9-2920-248-35

FUEL SUPPLY TUBE AND CHECK VALVE REMOVAL AND INSTALLATION

This task covers:

- a. Removal
 - b. Installation
-

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair: Field
Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Materials:

Sealing Compound Item 22
Appendix C

Parts:

Lockwasher

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

Equipment Condition:

Reference

Page 2-8

Condition
Description

Engine in Vehicle

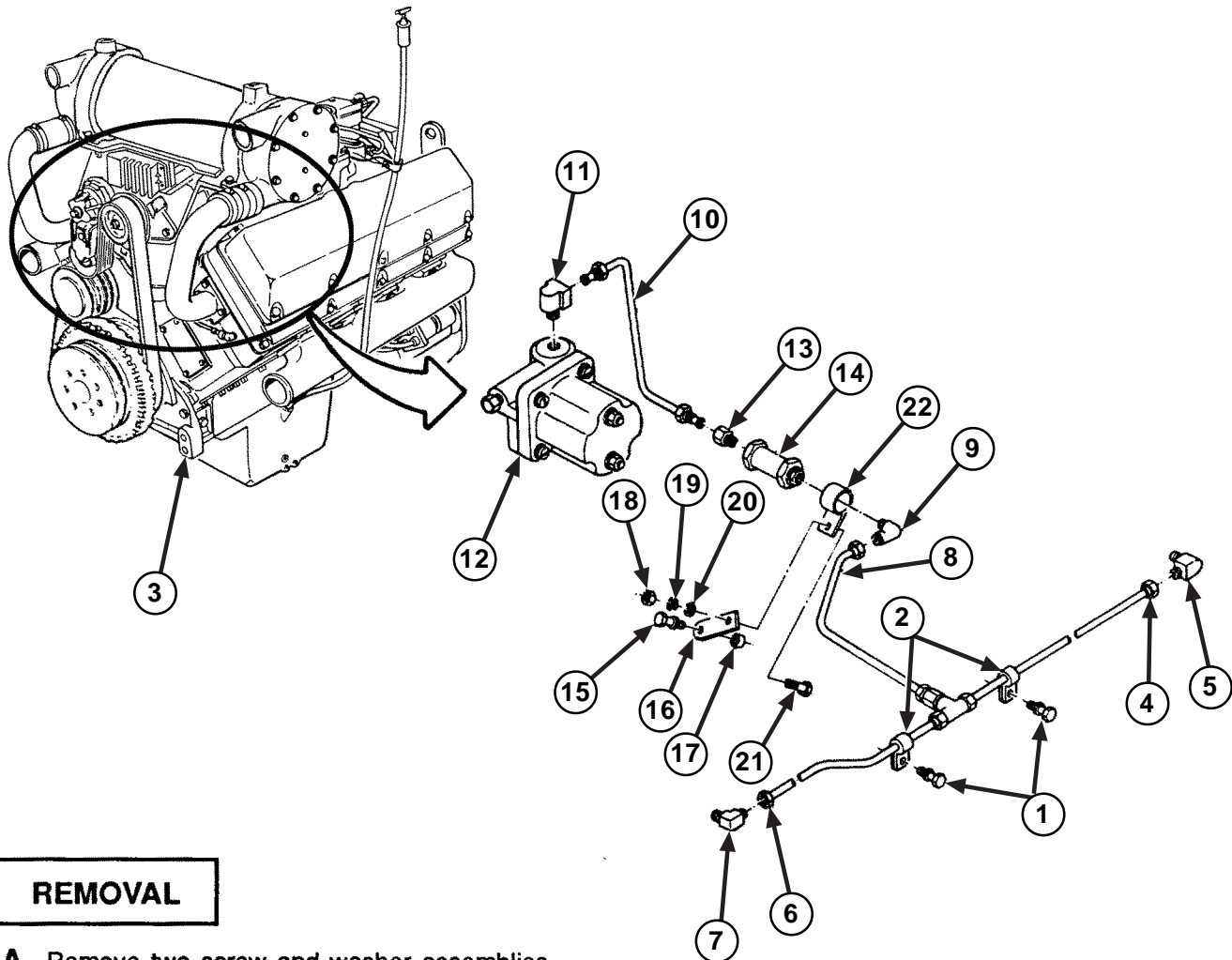
or

Engine Mounted
on Stand

General Safety Instructions:

WARNING

Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present.



VIEW ROTATED 90 DEGREES

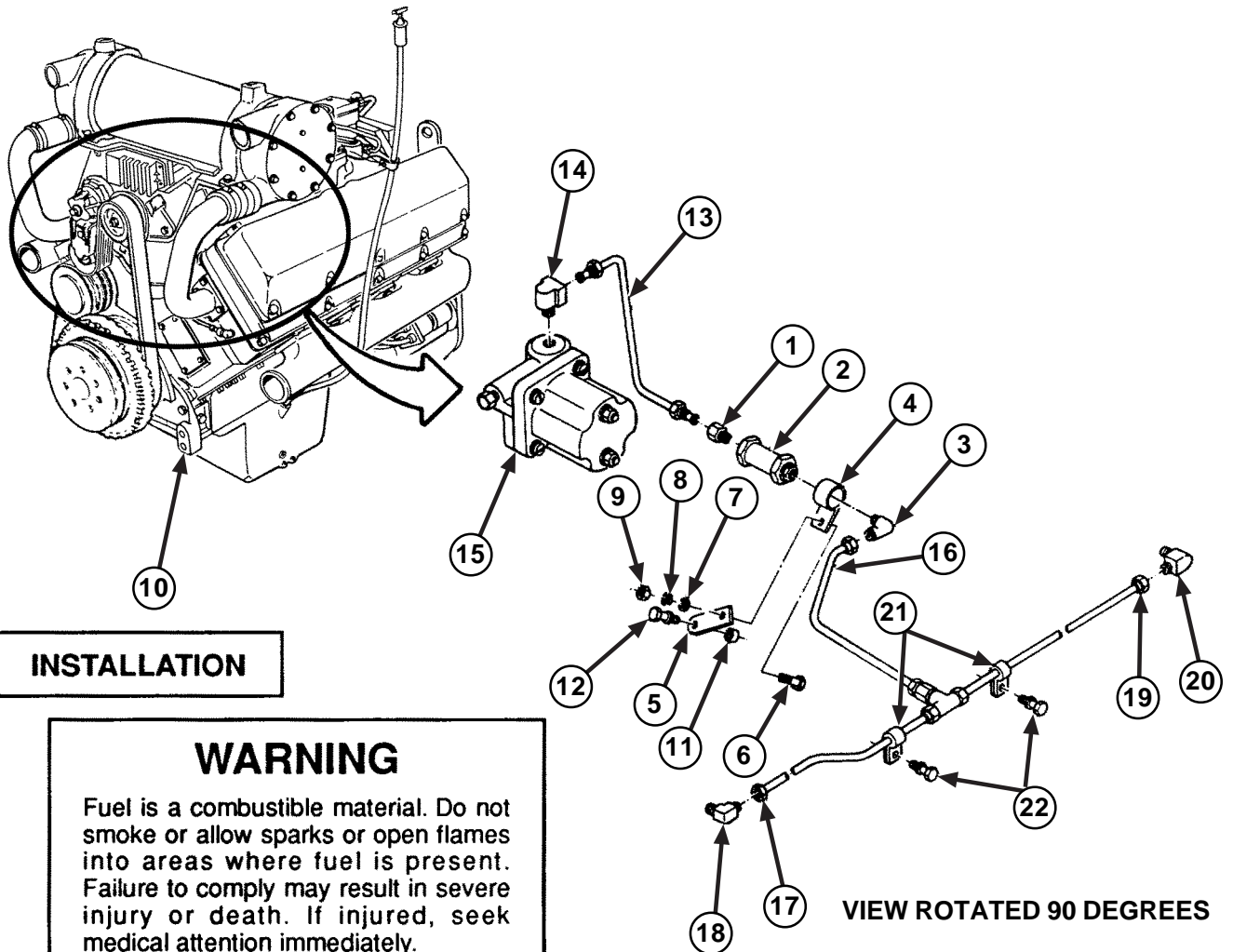
REMOVAL

- A** Remove two screw and washer assemblies (1) securing tubing clamps (2) to engine (3).
- B** Disconnect fitting (4) from elbow (5) in left cylinder head.
- C** Disconnect fitting (6) from elbow (7) in right cylinder head.
- D** Disconnect tube assembly (8) from elbow (9) and withdraw tube assembly (8) from front of engine (3).

WARNING

Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present. Failure to comply may result in severe injury or death. If injured, seek medical attention immediately.

- E** Disconnect tube assembly (10) from elbow (11) in fuel shutdown valve (12) and from adapter (13) in fuel supply check valve (14). Remove tube assembly (10).
- F** Remove screw and washer assembly (15) from bracket (16) and engine (3), taking care not to lose spacer (17), and lift off fuel supply check valve (14).
- G** Remove nut (18), lockwasher (19), flat washer (20), bracket (16), screw (21), and clamp (22) from fuel supply check valve (14). Discard lockwasher (19).
- H** Remove elbow (9) and adapter (13) from fuel supply check valve (14).



INSTALLATION

WARNING
 Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present. Failure to comply may result in severe injury or death. If injured, seek medical attention immediately.

Note

Apply pipe sealant to threads of all fittings before installation.

Note

Be sure arrow on fuel supply check valve points in direction of fuel flow from fuel tank to engine.

- A** Install adapter (1) in fuel supply check valve (2).
- B** Install elbow (3) in fuel supply check valve (2).
- C** Install clamp (4) on fuel supply check valve (2).
- D** Secure bracket (5) to clamp (4) with screw (6), flat washer (7), lockwasher (8), and nut (9).
- E** Secure bracket (5) and clamp (4) to engine (10) with spacer (11) and screw and washer assembly (12).

- F** Connect tube assembly (13) to elbow (14) in fuel shutdown valve (15) and to adapter (1) in fuel supply check valve (2).
- G** Connect tube assembly (16) to elbow (3) in fuel supply check valve (2).
- H** Connect fitting (17) to elbow (18) in right cylinder head.
- I** Connect fitting (19) to elbow (20) in left cylinder head.
- J** Secure tubing clamps (21) to engine (10) with two screw and washer assemblies (22).

FUEL DRAIN TUBE AND CHECK VALVE REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Materials:

Sealing Compound Item 22
Appendix C

Parts:

Lockwasher

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

Equipment Condition:

Reference

Page 2-8

Condition
Description

Engine in Vehicle

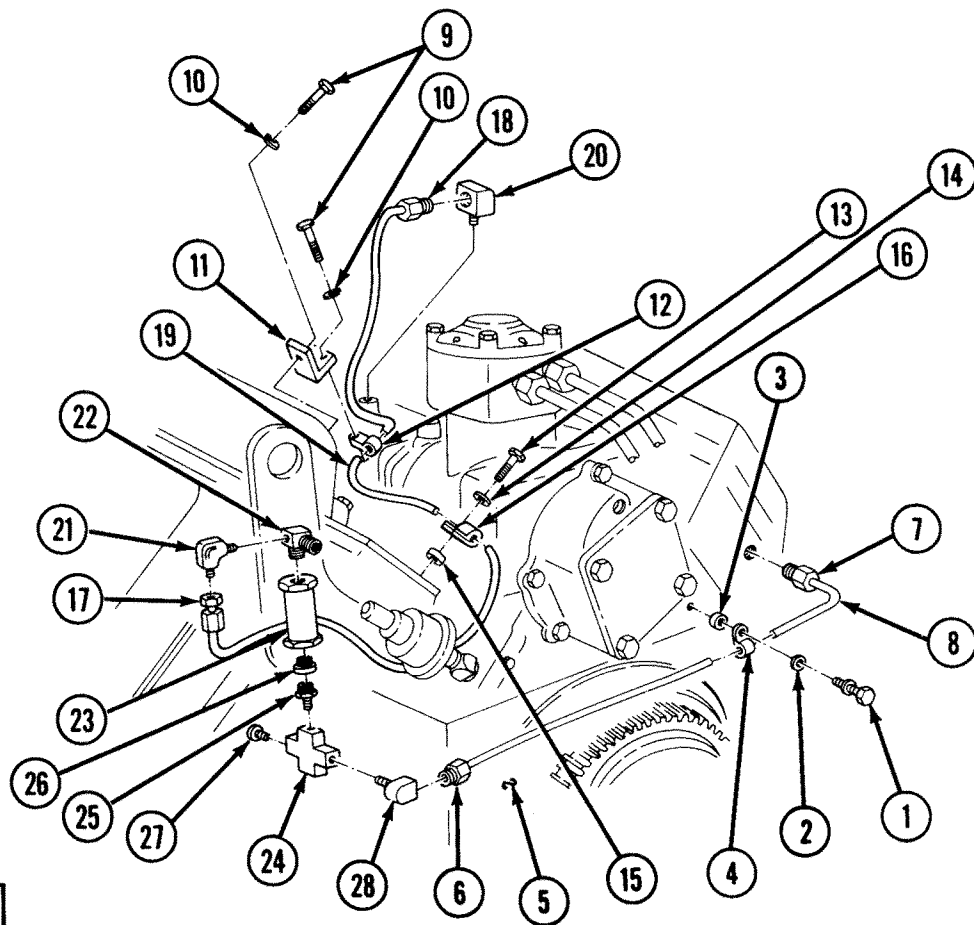
or

Engine Mounted
on Stand

General Safety Instructions:

WARNING

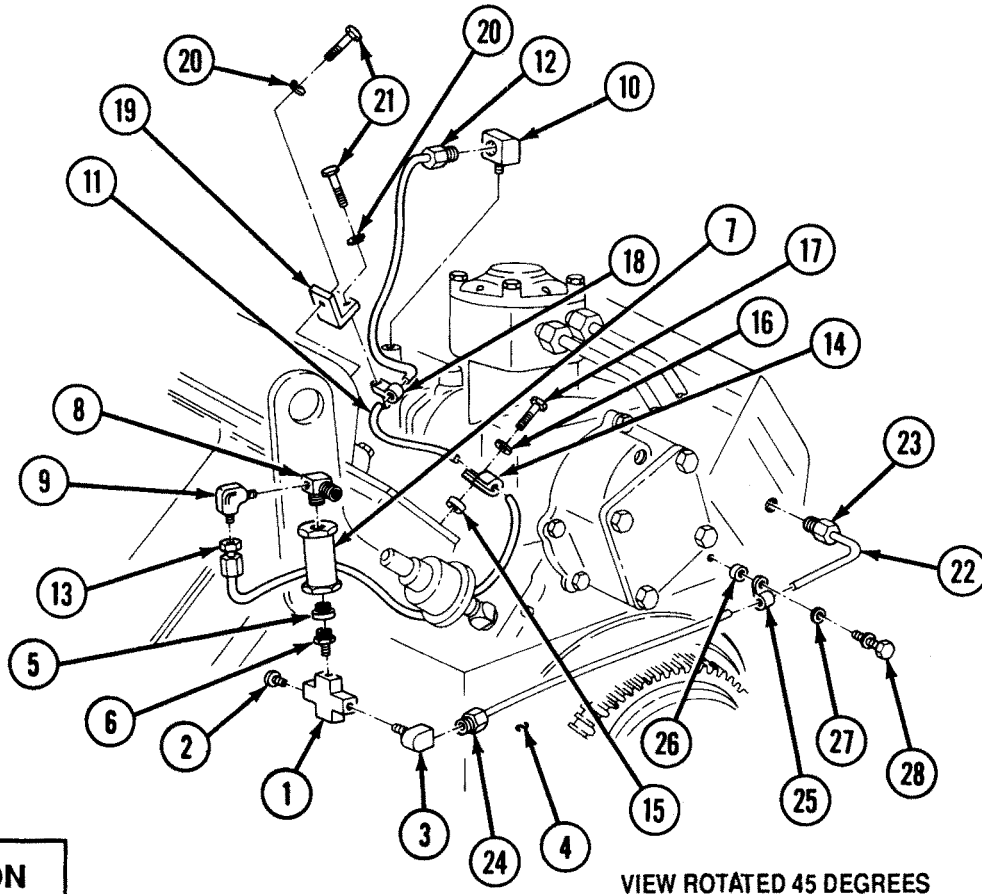
Fuel is a combustible material. Do not
smoke or allow sparks or open flames
into areas where fuel is present.



REMOVAL

WARNING
 Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present. Failure to comply may result in severe injury or death. If injured, seek medical attention immediately.

- A** Remove screw and washer assembly (1), washer (2), and spacer (3) securing clamp (4) to engine (5).
- B** Disconnect nuts (6) and (7) at each end of tube (8) and remove tube (8).
- C** Remove two screws (9), lockwashers (10), bracket (11), and clamp (12) from engine (5). Discard lockwashers (10).
- D** Remove screw (13), washer (14), and spacer (15) securing clamp (16) to engine (5).
- E** Disconnect nuts (17) and (18) at each end of hose assembly (19) and remove hose assembly (19).
- F** Remove elbow (20) from engine (5).
- G** Remove elbows (21) and (22) from fuel supply check valve (23).
- H** Remove fuel supply check valve (23) from cross (24).
- I** Remove reducer (25) and nipple (26) from cross (24).
- J** Remove cross (24), nipple (27), and elbow (28) from engine (5).



INSTALLATION

WARNING
 Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present. Failure to comply may result in severe injury or death. If injured, seek medical attention immediately.

Note

Apply pipe sealant to threads of all fittings before installation.

- A** Install cross (1), nipple (2), and elbow (3) in engine (4).
- B** Install nipple (5) and reducer (6) on cross (1).

Note

Be sure arrow of fuel supply check valve points in direction of fuel flow from engine to fuel tank.

- C** Install fuel supply check valve (7) on cross (1).
- D** Install elbows (8) and (9) on fuel supply check valve (7).
- E** Install elbow (10) on engine (4).
- F** Install hose assembly (11) and secure with two nuts (12) and (13).
- G** Secure clamp (14) to engine (4) with spacer (15), washer (16), and screw (17).
- H** Install clamp (18) and bracket (19) to engine (4) with two lockwashers (20) and screws (21).
- I** Install tube (22) and secure with two nuts (23) and (24).
- J** Secure clamp (25) to engine (4) with spacer (26), washer (27) and screw and washer assembly (28).

FUEL INJECTORS ADJUSTMENT

This task covers:

Adjustment

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

4940-00-287-4894 Shop Equipment, General Purpose Repair

Special Tools:

Adapter, Socket Wrench 5120-00-240-8702

Injector Adjusting Kit 4910-00-548-7984

Wrench Set Crowfoot 5705566

Dial Indicator 5210-00-277-8840

Personnel Required:

Track Vehicle Repairer 63H10

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
	Engine in Vehicle
	or
Page 2-8	Engine Mounted on Stand
Page 3-185	Rocker Covers Removed

General Safety Instructions:

WARNING

Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present.

ADJUSTMENT

WARNING

Fuel is a combustible material. Do not smoke or allow open flames or sparks into areas where fuel is present. Severe injury or death may result. If injured, seek medical attention immediately.

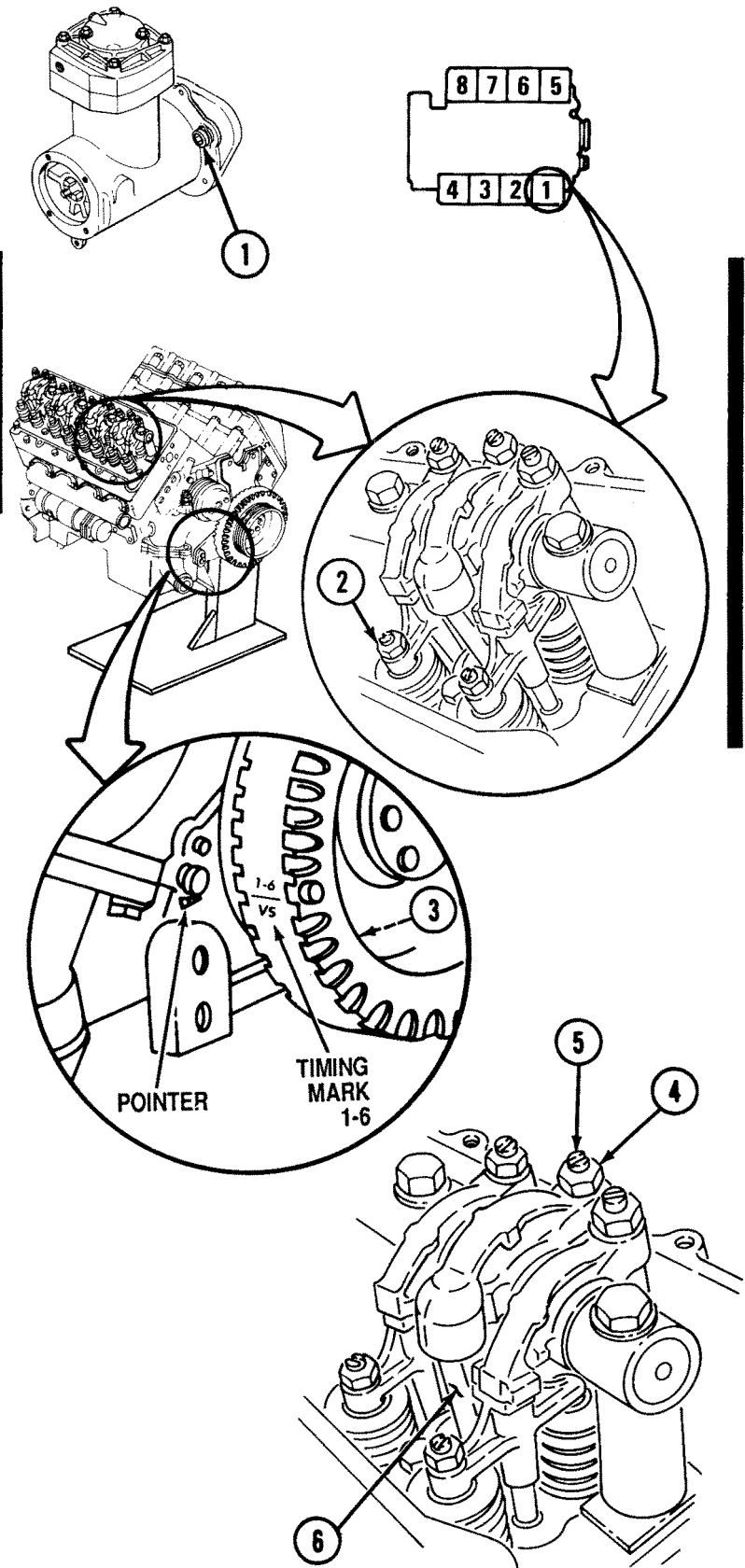
Note

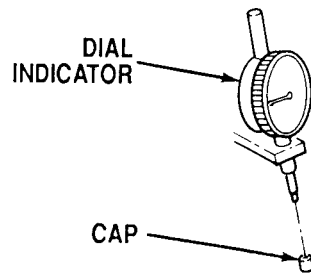
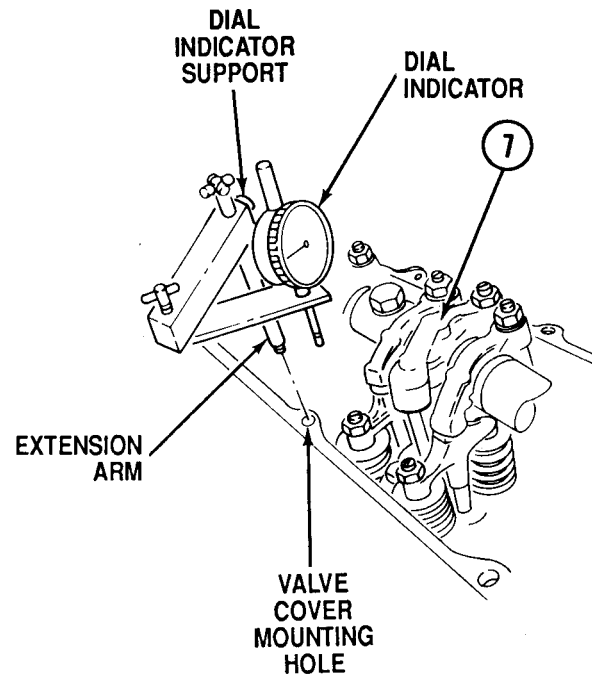
- Fuel injectors are adjusted in the same order as cylinder firing order. Order of adjustment is 1, 5, 4, 8, 6, 3, 7, and 2.
- Fuel injector adjustment is the same on all cylinders. Steps A through Q explain adjustment of cylinder No. 1 fuel injector.
- To adjust fuel injectors for cylinder Nos. 5, 4, 8, 6, 3, 7, and 2, turn vibration damper to applicable timing marks.

- Cyl. No. 5 (mark 3-5)
- Cyl. No. 4 (mark 4-7)
- Cyl. No. 8 (mark 2-8)
- Cyl. No. 6 (mark 1-6)
- Cyl. No. 3 (mark 3-5)
- Cyl. No. 7 (mark 4-7)
- Cyl. No. 2 (mark 2-8)

Follow steps A through Q, inserting cylinder No. where applicable.

- A** Using a socket on air compressor barring shaft (1), turn engine clockwise until timing mark 1-6 aligns with pointer. Number 1 intake and exhaust valves (2) must be closed. If not, turn crankshaft (3) one more revolution and align timing mark with pointer.
- B** Loosen locknut (4).
- C** Turn adjustment screw (5) to right until plunger (6) is completely depressed.
- D** Turn adjustment screw (5) to left 1/2 turn, and then turn back to right. Plunger (6) should be completely depressed again.

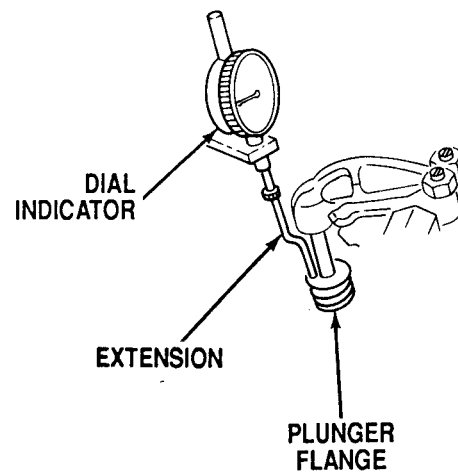


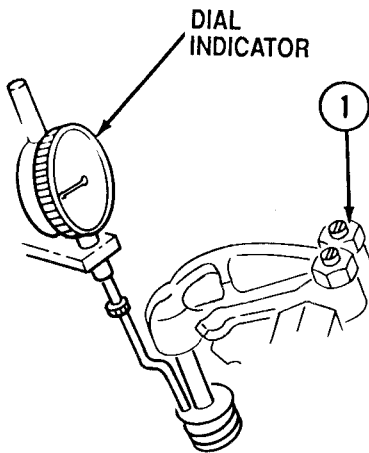


Note

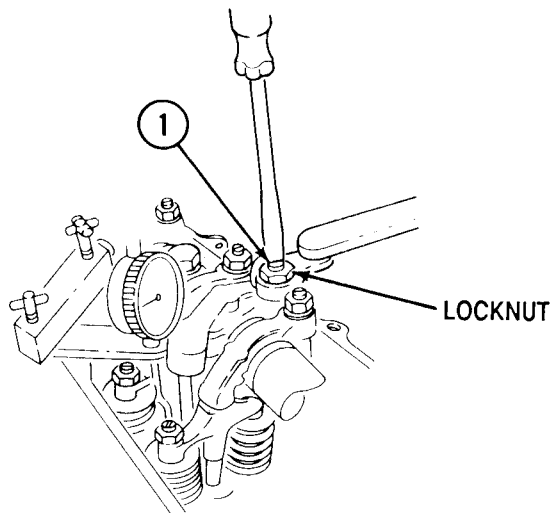
When in position, dial indicator should be as close to rocker arm as possible, but not touching.

- E** Screw extension arm of dial indicator in valve cover mounting hole nearest to rocker arm (7).
- F** Unscrew cap from dial indicator.
- G** Screw extension on dial indicator. Set extension against plunger flange. Tighten dial indicator support to lock in position.
- H** Set dial indicator to zero.

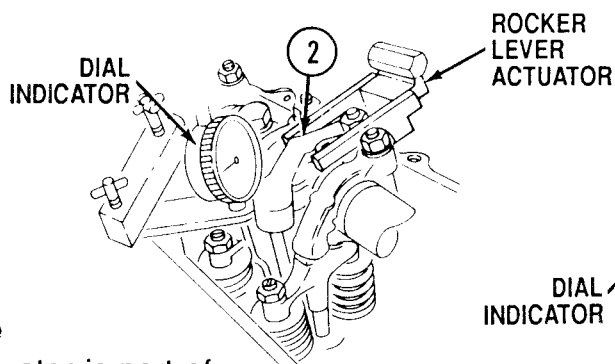




- I** Turn adjustment screw (1) to left until dial indicator shows correct adjustment of 0.187 ± 0.001 in. (4.75 ± 0.03 mm).

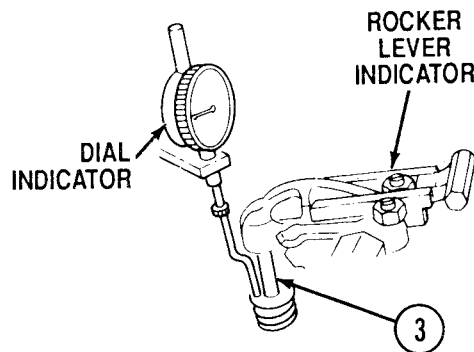


- J** Hold adjustment screw (1) with screwdriver.
- K** Tighten locknut to 40-50 lb-ft (54-68 N·m). Use torque wrench, female to male adapter, and crowfoot.



Note

Rocker lever actuator is part of injector adjusting kit.

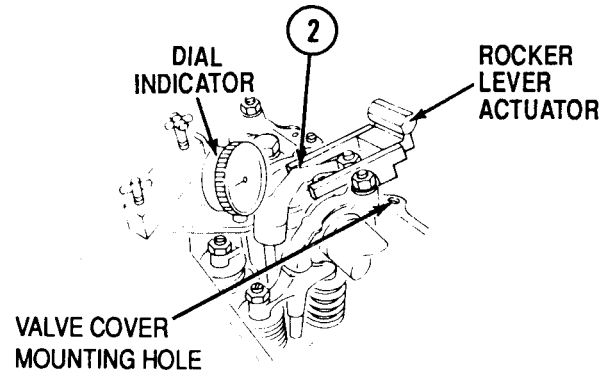


- L** Recheck zero by placing rocker lever acuator on rocker arm (2). Pull rocker lever actuator down to depress plunger (3).
- M** Slowly release rocker lever actuator while checking adjustment on dial indicator.
- N** Repeat check of fuel injector setting several times for accuracy. Reading should stay at 0.186-0.188 in. (4.75-4.77 mm).

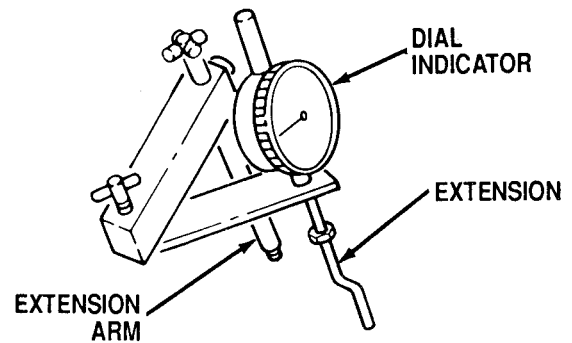
- O** If readings are not constant, repeat steps B through D and I through N.

Note

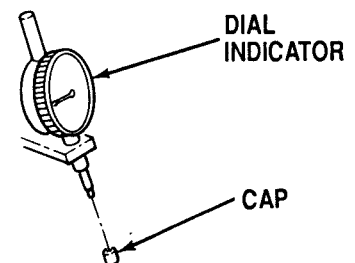
Valves can be adjusted at this point (p 3-233).



- P** Remove rocker lever actuator from rocker arm (2).
- Q** Remove dial indicator from valve cover mounting hole.



- R** Remove extension arm from dial indicator.
- S** Remove extension from dial indicator.
- T** Install cap on dial indicator.
- U** Place dial indicator and accessories in case.



FOLLOW-ON TASK:
Install rocker arm covers (p 3-184).

FUEL INJECTORS REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Cleaning
- c. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

Special Tools:

Fuel Injector Tool 5120-00-116-7604

Injector Adjusting Kit 4910-00-548-7984

Materials:

Engine Oil, Item 16
30-Weight Appendix C

Parts:

Packing (3)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
	Engine in Vehicle
	or
Page 2-7	Engine Mounted on Stand
Page 3-184	Rocker Covers Removed

General Safety Instructions:

WARNING

- Fuel is a combustible material. Do not smoke or allow open flames or sparks into areas where fuel is present.
- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas.

REMOVAL

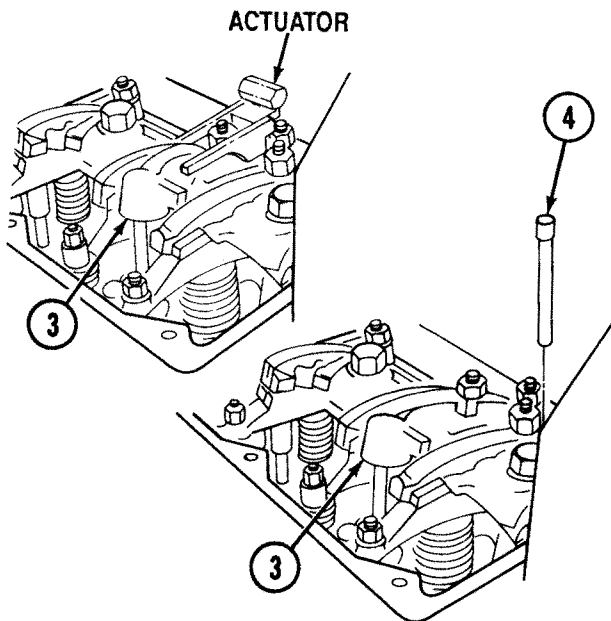
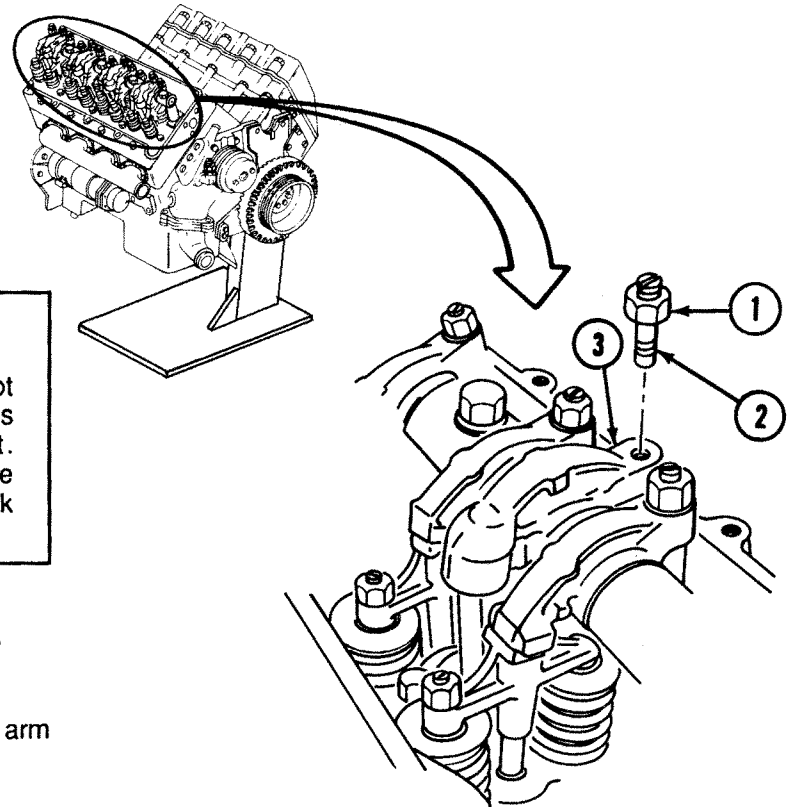
WARNING

Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present. Failure to comply may result in severe injury or death. If injured, seek medical attention immediately.

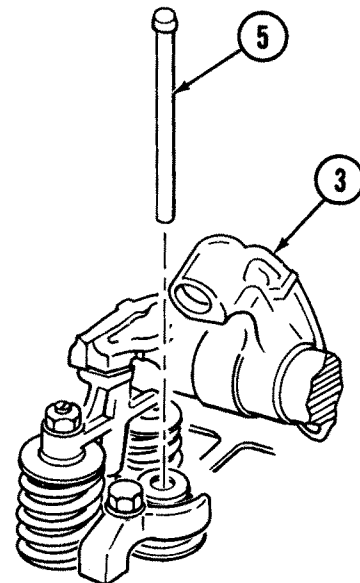
Note

Remove all eight fuel injectors the same way.

- A** Loosen jamnut (1) on screw (2) on rocker arm (3).
- B** Remove screw (2) from rocker arm (3).



- C** Install actuator on rocker arm (3).
- D** Pull actuator down, and move push rod (4) away from work area.
- E** Remove actuator from rocker arm (3).



- F** Lift rocker arm (3) and remove link (5).

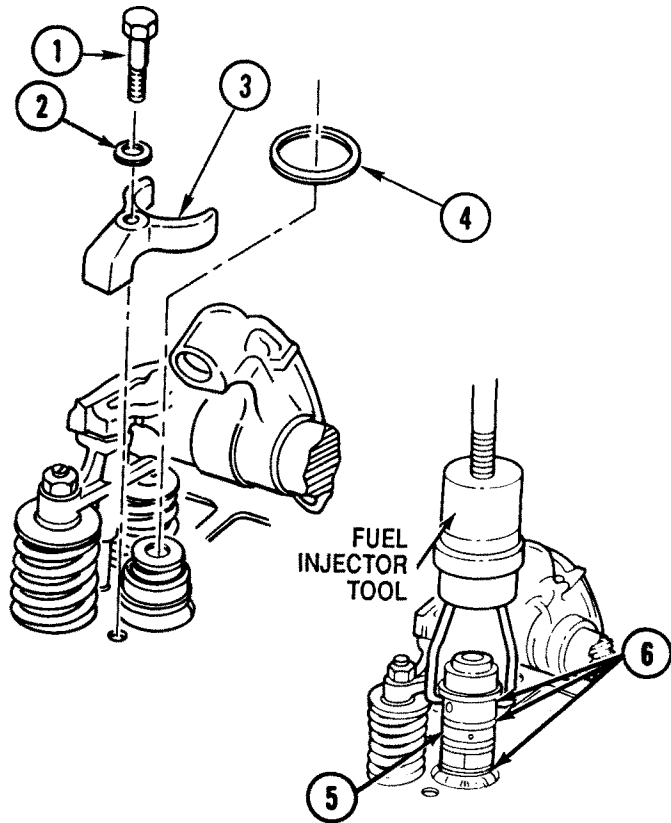
CAUTION

To prevent damage to new fuel injector, do not use old fuel injector parts with new fuel injector. Keep new fuel injector parts together.

- G** Remove screw (1), washer (2), clamp (3), and spacer (4).
- H** Using fuel injector tool, pull tool up to remove fuel injector (5).
- H.1** Remove three packings (6) from fuel injector (5).
- I** Repeat steps A through H.1 for remaining fuel injectors.

CLEANING

Follow general cleaning instructions (p 2-2).



INSTALLATION

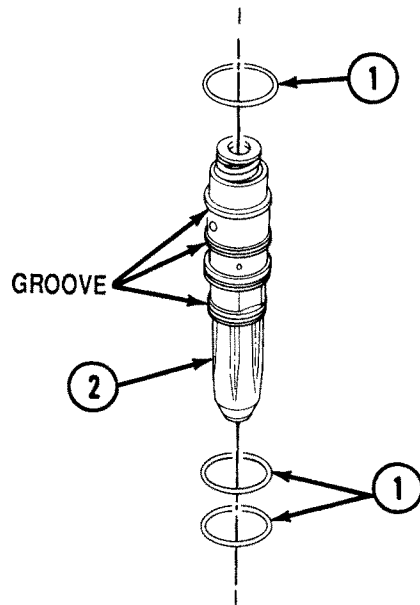
CAUTION

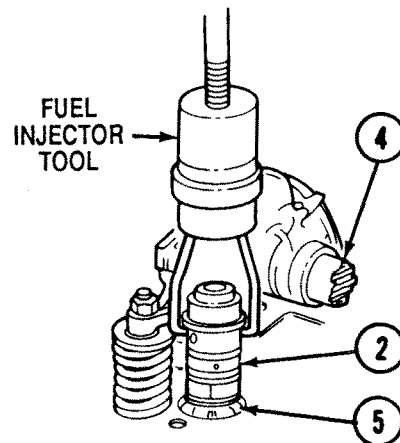
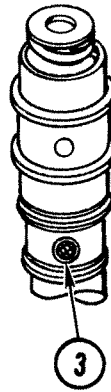
Do not stretch packings. Parts could be damaged.

Note

Install all eight fuel injectors the same way.

- A** Apply clean 30-weight engine oil to three packings (1).
- B** Install three packings (1) in grooves on fuel injector (2).





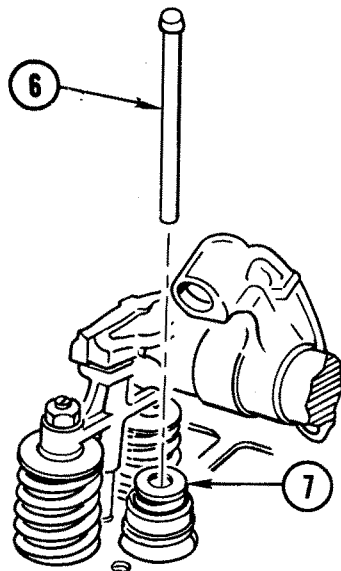
C Aline fuel injector (2) so filter screen (3) is toward rocker arm shaft (4).

D Place fuel injector (2) in cylinder head (5).

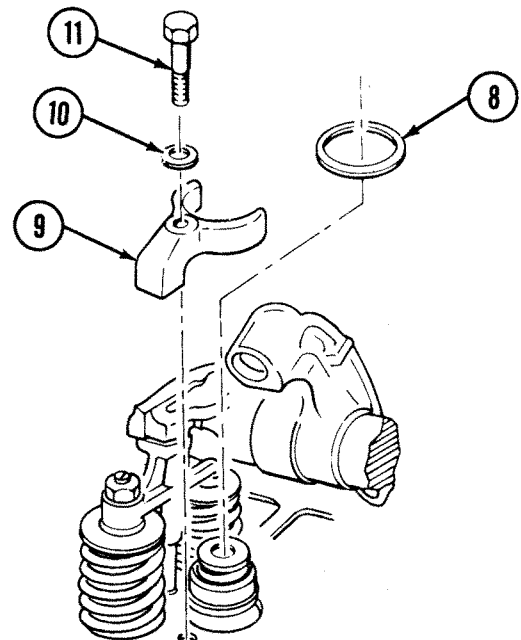
Note

You will hear and feel a sharp snap when fuel injector is properly seated.

E Seat fuel injector (2) with fuel injector tool.

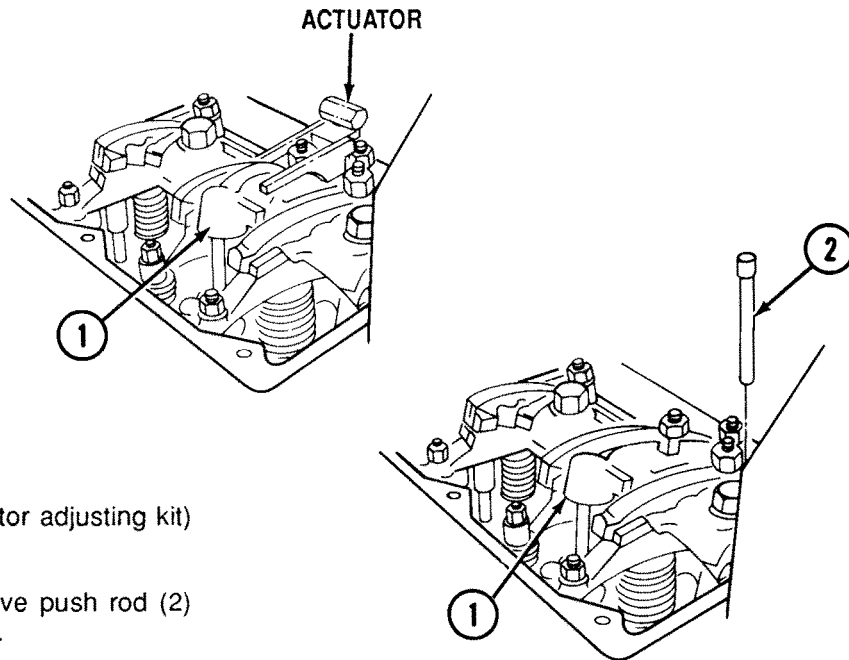


F Install link (6) in center of plunger (7).



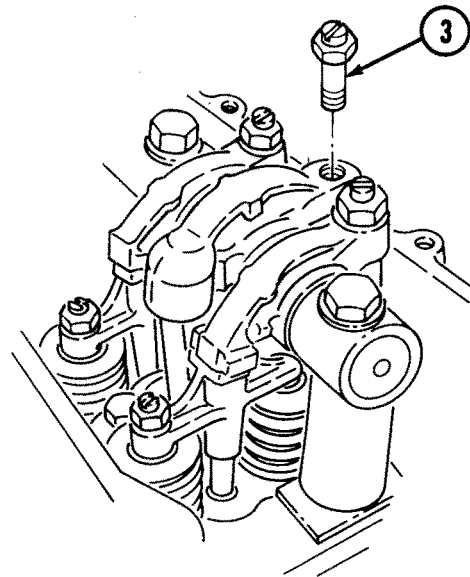
G Install spacer (8), clamp (9), washer (10), and screw (11).

H Tighten screw (11) to 30-35 lb-ft (41-47 N-m).



- I Install actuator (part of injector adjusting kit) on rocker arm (1).
- J Pull actuator down, and move push rod (2) under rocker arm (1) contact.
- K Release and remove actuator from rocker arm (1).

- L Install and tighten screw (3) until it contacts push rod socket.
- M Repeat steps A through L for remaining fuel injectors.



FOLLOW-ON TASKS:

- Adjust eight fuel injectors (p 3-18).
- Install rocker covers (p 3-185).

FUEL PUMP REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

5180-00-177-7033 Tool Kit, General
Mechanic's; Automotive

Materials:

Sealing Compound Item 22
Appendix C

Parts:

Lockwasher
Packing
Gasket
Coupling Spider

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

Reference:

TM 5-2350-262-20-1
TM 5-2350-262-20-2

Equipment Condition:

Reference

TM 5-2350-262-20-1

TM 5-2350-262-20-1

TM 5-2350-262-20-2

Page 3-55

Page 2-8

Condition
Description

Tachometer Sender
and Adapter
Removed

Accelerator Linkage
Removed

Fuel Shutdown
Removed

Air Intake Assembly
Removed

Engine in Vehicle

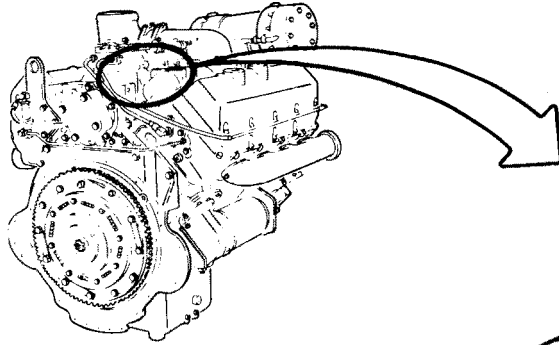
or

Engine Mounted
on Stand

General Safety Instructions:

WARNING

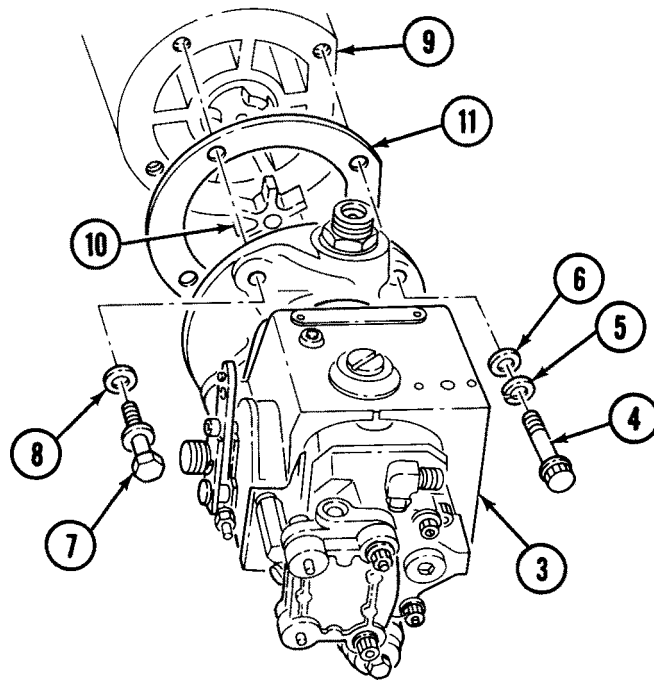
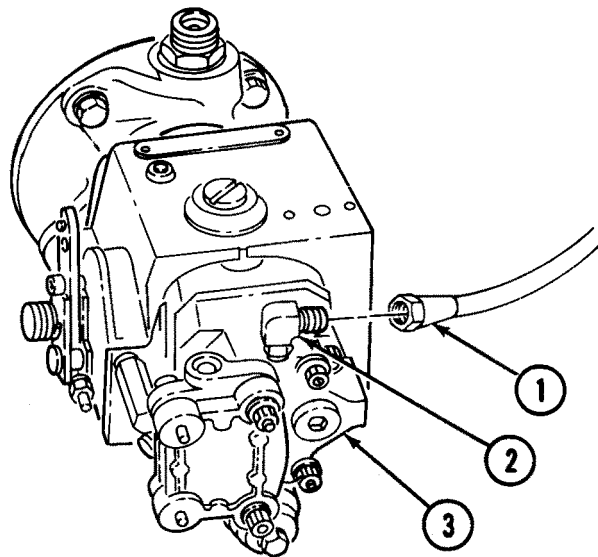
Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present.



REMOVAL

WARNING
 Fuel is a combustible material. Do not smoke or allow sparks or open flames into areas where fuel is present. Failure to comply may result in severe injury or death. If injured, seek medical attention immediately.

- A** Disconnect hose fitting (1) from elbow (2) on fuel pump (3).
- B** Remove 12-point screw (4), lockwasher (5), and flat washer (6) from top right side of fuel pump (3). Discard lockwasher (5).
- C** Remove three screw and washer assemblies (7) and washers (8) from fuel pump (3) and air compressor (9).
- D** Remove fuel pump (3) from air compressor (9).
- E** Remove and discard coupling spider (10).
- F** Remove and discard gasket (11)



INSTALLATION

- A** Install coupling spider (1) on fuel pump (2).

Note

Make sure surfaces are clean before installing gasket.

- B** Install gasket (3) on air compressor (4).
- C** Aline fuel pump (2) on air compressor (4).
- D** Install washer (5), lockwasher (6), and 12-point screw (7) in top right mounting hole. Tighten screw (7).
- E** Install three washers (8) and screw and washer assemblies (9). Tighten screws (9).

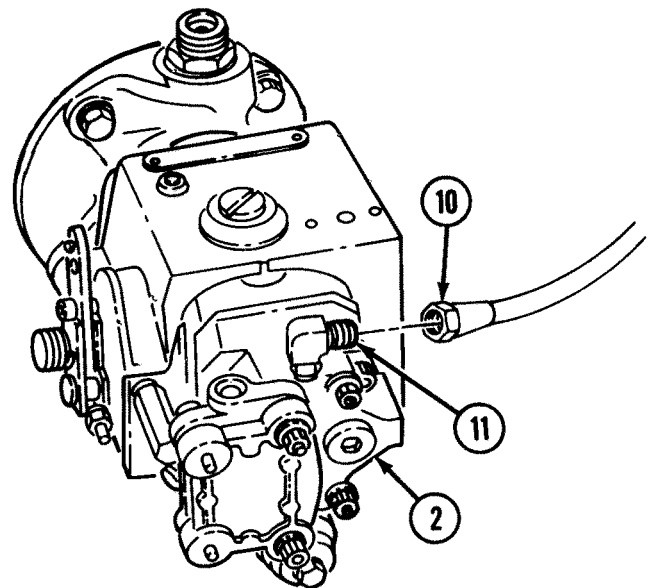
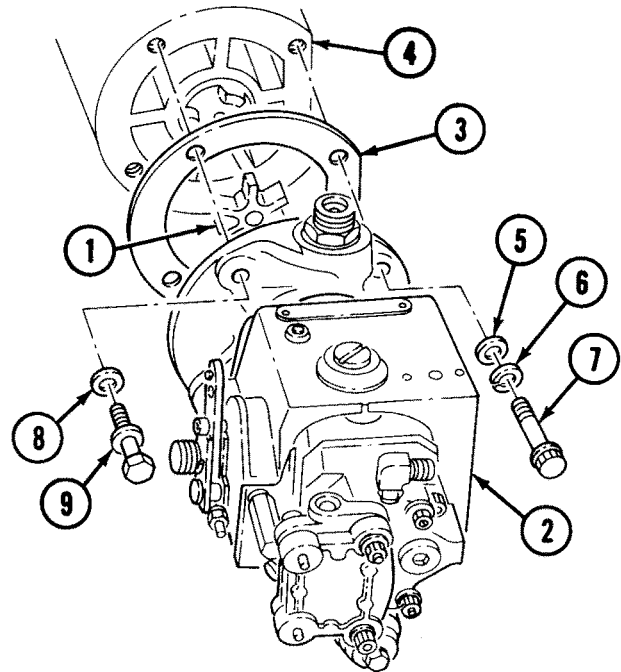
Note

Apply pipe sealant to threads of all fittings before installation.

- F** Connect hose fitting (10) to elbow (11) on fuel pump (2).

FOLLOW-ON TASKS:

- Install air intake assembly (p 3-56).
- Install tachometer sender (TM 5-2350-262-20-1).
- Install accelerator linkage (TM 5-2350-262-20-1).
- Install fuel shutdown valve (TM 5-2350-262-20-2).



AIR COMPRESSOR REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

Personnel Required:

Track Vehicle Repairer 63H10

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
	Engine in Vehicle
	or
Page 2-8	Engine Mounted on Stand

Materials:

Engine Oil, 30-Weight	Item 16 Appendix C
-----------------------	------------------------------

Sealing Compound	Item 22 Appendix C
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Page 2-8	Engine Mounted on Stand
Page 3-55	Air Intake Assembly Removed
Page 3-28	Fuel Pump Removed

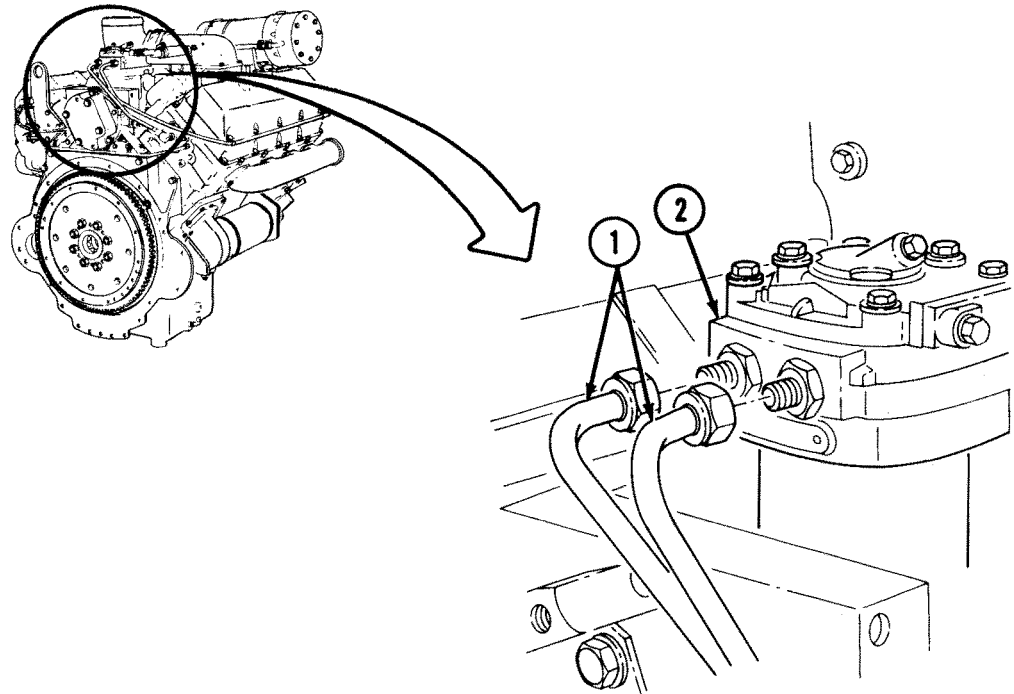
Parts:

Gasket (2)

Lockwasher (2)

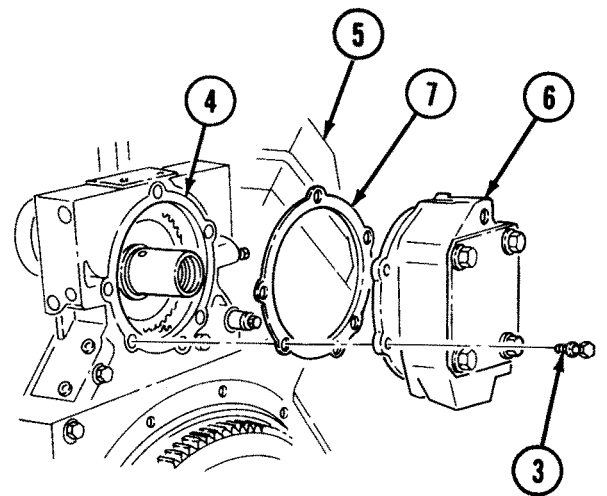
Parts Reference:

Appendix B



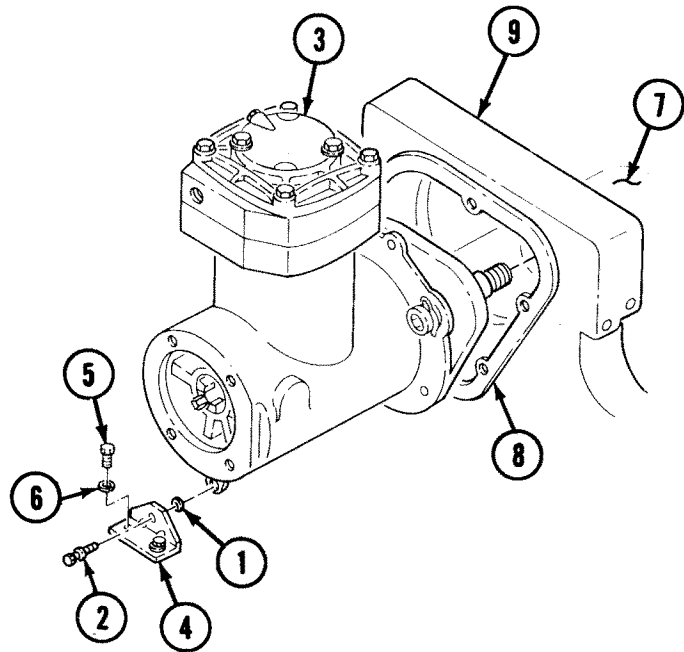
REMOVAL

- A** Disconnect two coolant tubes (1) from air compressor (2).



- B** Remove five screw and washer assemblies (3) securing rear support assembly (4) to engine (5).
- C** Remove rear support (6) and gasket (7) from engine (5). Discard gasket (7).

- D** Remove spacer (1) and screw and washer assembly (2) securing compressor (3) to bracket (4), taking care not to lose spacer (1).
- E** Remove two screws (5), lockwashers (6), and bracket (4) from engine (7). Discard lockwashers (6).
- F** Lift compressor (3) from engine (7).
- G** Remove gasket (8) from rear cover (9). Discard gasket (8).



INSTALLATION

Note

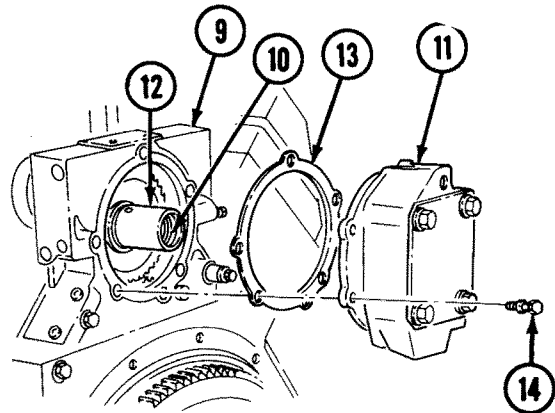
Make sure surfaces are clean before installing gasket.

- A** Install gasket (8) on rear cover (9).
- B** Install air compressor (3) in rear cover (9).
- C** Install bracket (4) on engine (7) with two lockwashers (6) and screws (5).
- D** Secure air compressor (3) to bracket (4) with screw and washer assembly (2) and spacer (1).

Note

Make sure surfaces are clean before installing gasket.

- E** Lubricate bushing (10) in bearing support (11) and compressor shaft (12) with light coat of clean 30-weight engine oil.
- F** Install gasket (13) and bearing support (11) on rear cover (9) with six screw and washer assemblies (14).
- G** Tighten screw and washer assemblies (14) to 30-35 lb-ft (41-47 N·m).



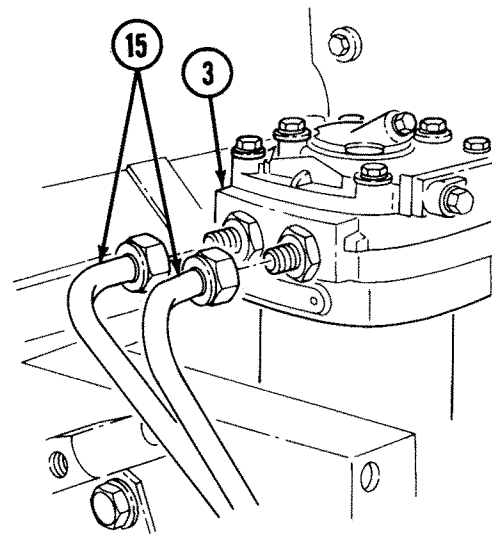
Note

Apply pipe sealant to threads of all fittings before installation.

- H** Connect two coolant lines (15) to air compressor (3).

FOLLOW-ON TASKS:

- Install fuel pump (p 3-29).
- Install air intake assembly (p 3-56).



AIR COMPRESSOR REPAIR

This task covers:

- a. Disassembly
- b. Cleaning
- c. Inspection
- d. Assembly

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

4940-00-287-4894 Shop Equipment, General Purpose Repair

Special Tools:

Inside Micrometer	5210-00-567-9545
Telescoping Gage	5210-01-241-5011
Mandrel	5120-01-164-3265

Materials:

Lapping and Grinding Compound, 900GR	Item 15 Appendix C
Engine Oil, 30-Weight	Item 16 Appendix C
Prussian Blue Paste	Item 19 Appendix C
Drycleaning Solvent	Item 25 Appendix C

Parts Reference:

Appendix B

Parts:

Lockwasher (8)
Gasket (4)
Compression Ring (2)
Packing (4)
Oil Ring (2)
Seal
Retaining Ring (2)

Personnel Required:

Track Vehicle Repairer 63H10

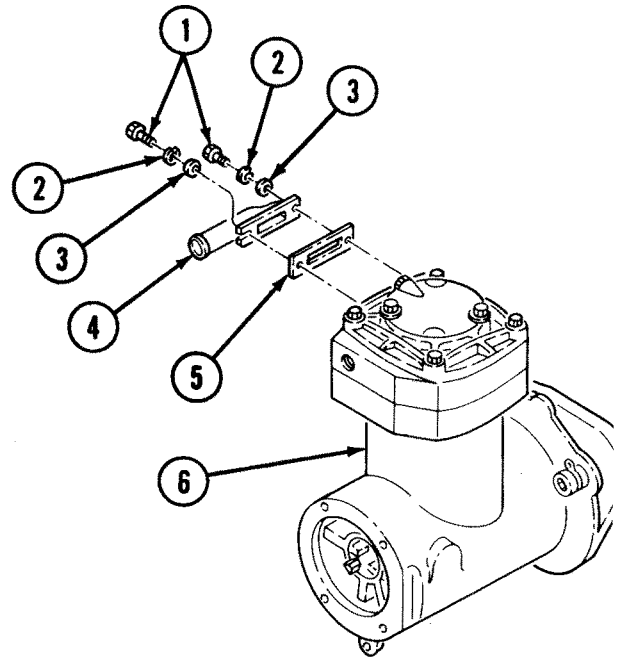
Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 3-31	Air Compressor Removed

General Safety Instructions:

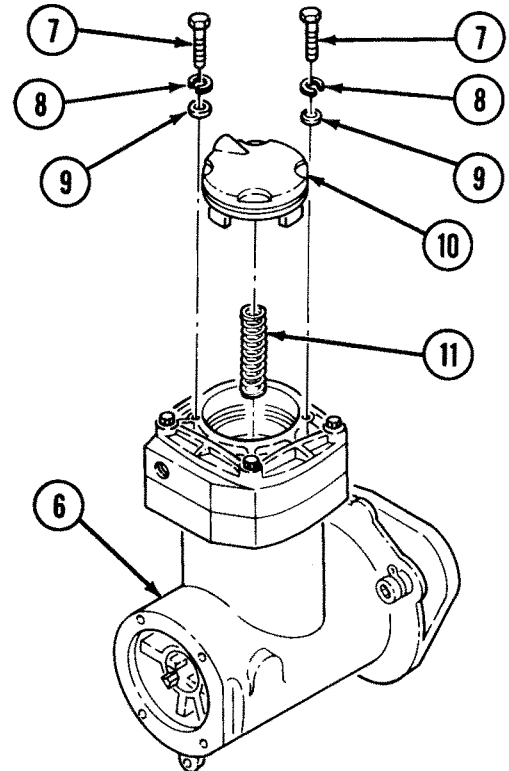
WARNING

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas.
- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.



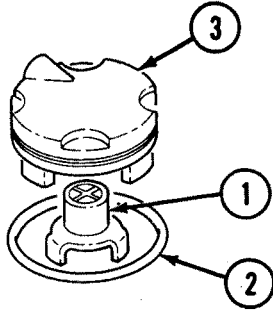
DISASSEMBLY

- A** Remove two screws (1), lockwashers (2), flat washers (3), elbow (4), and gasket (5) from air compressor (6). Discard gasket (5) and lockwashers (2).

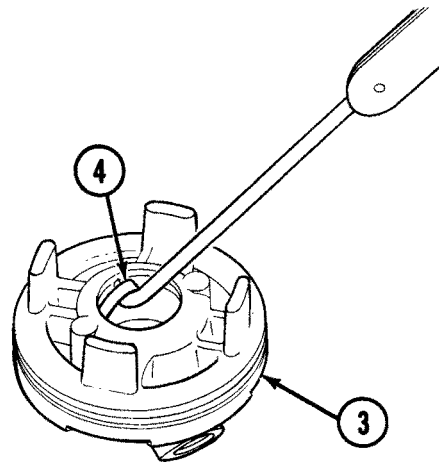


- B** Remove two screws (7), lockwashers (8), and flat washers (9) securing unloader valve assembly (10) to air compressor (6). Discard lockwashers (8).

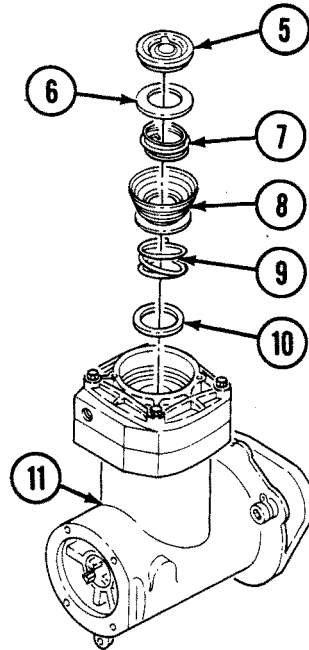
- C** Remove unloader valve assembly (10) and unloader cap spring (11) from air compressor (6).



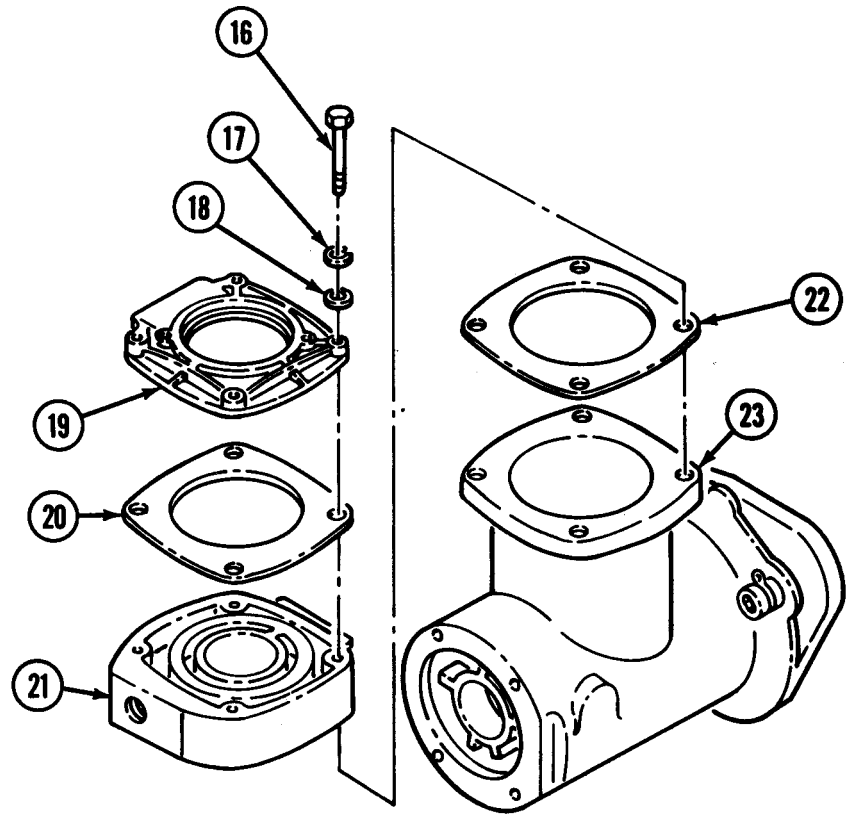
D Remove unloader cap (1) and preformed packing (2) from unloader body (3). Discard packing (2).



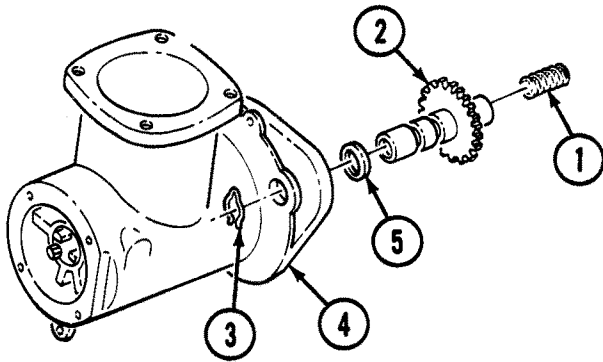
E Remove unloader cap seal (4) from unloader body (3). Discard seal (4).



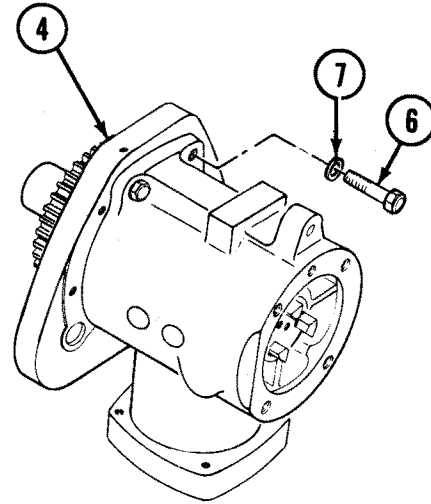
F Remove intake valve seat (5), intake valve (6), intake valve spring (7), exhaust valve assembly (8), exhaust valve spring (9), and wear plate (10) from air compressor (11).



- G** Remove small preformed packing (12), exhaust valve (13), and large preformed packing (14) from exhaust valve seat (15). Discard packings (12) and (14).
- H** Remove four screws (16), lockwashers (17), and flat washers (18) from cylinder head cover (19). Discard lockwashers (17).
- I** Remove cylinder head cover (19), cover gasket (20), cylinder head (21), and cylinder head gasket (22) from crankcase (23). Discard gaskets (20) and (22).

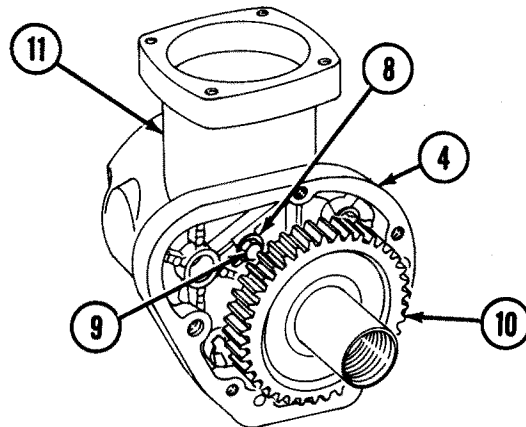


- J** Remove barring spring (1) from barring gear assembly (2) by twisting spring (1) in a clockwise direction while pulling out on spring (1).
- K** Remove retaining ring (3) and barring gear assembly (2) from retaining plate assembly (4).
- L** Remove preformed packing (5) from barring gear assembly (2). Discard packing (5).

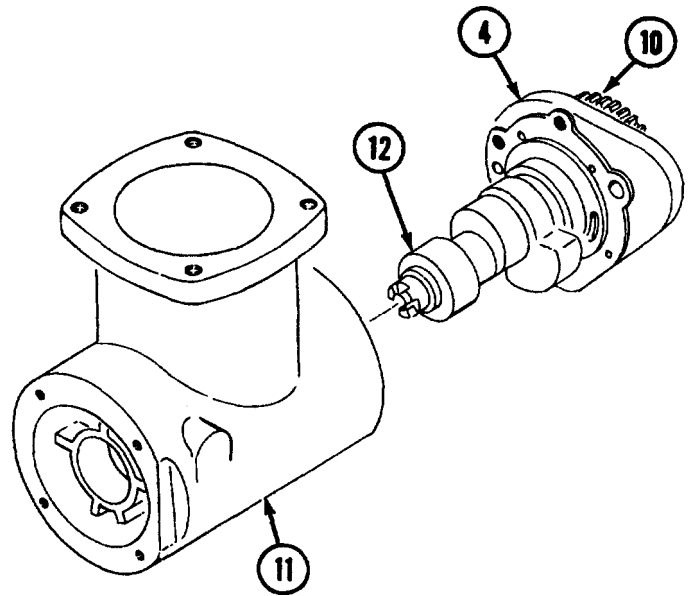


- M** Remove two screws (6) and washers (7) from retaining plate assembly (4).

- N** Bend tabs of two lockplates (8) away from heads of four screws (9).
- O** Loosen four screws (9) until screw heads contact compressor drive gear (10).
- P** Alternately loosen two opposite screws (9) until retaining plate (4) is loose.
- Q** Pull retaining plate (4) out until retaining plate contacts heads of screws (9).
- R** Continue backing out screws (9) until screws are out of crankcase (11).

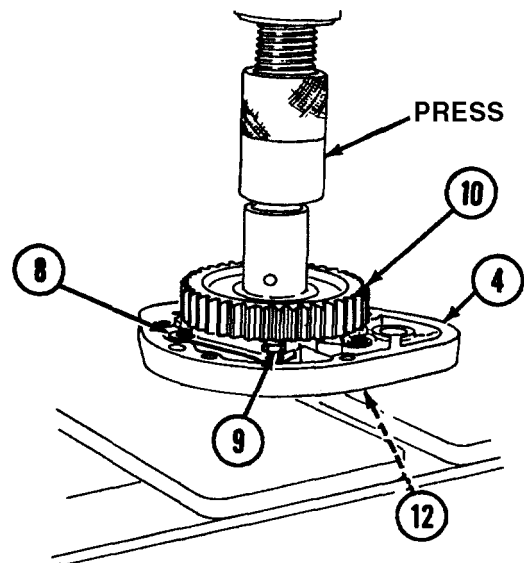


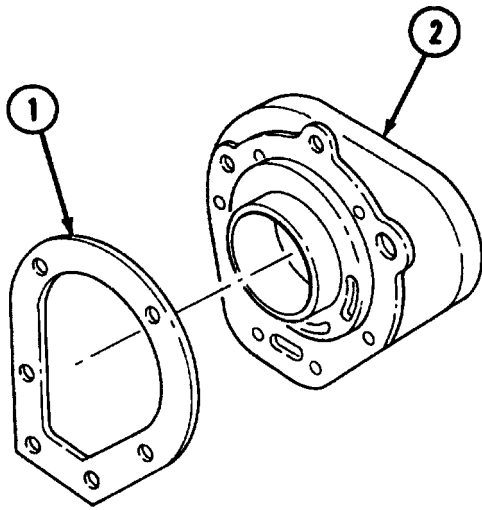
CAUTION
 Remove crankshaft assembly from crankcase very carefully so as not to damage bearings.



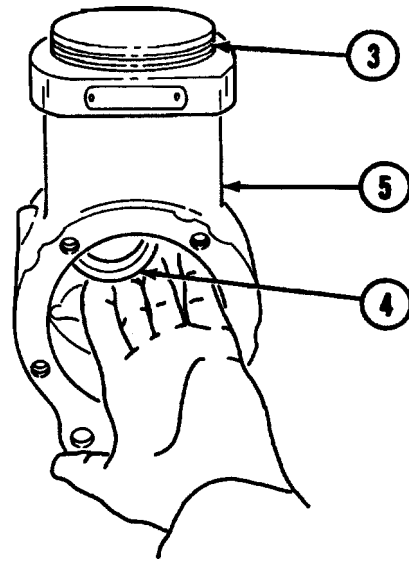
- S** Carefully withdraw crankshaft assembly (12) with retaining plate (4) and compressor drive gear (10) attached, from crankcase (11).

- T** Place crankshaft assembly (12), with compressor drive gear (10) and retaining plate (4) attached, in press with compressor drive gear (10) up.
- U** Ensure that crankshaft assembly (12) is supported evenly by all four screws (9) and that heads of all four screws (9) are in contact with compressor drive gear (10).
- V** While supporting crankshaft assembly (12) from below, press crankshaft assembly (12) from compressor drive gear (10) and withdraw crankshaft assembly (12) from retaining plate (4).
- W** Remove four screws (9) and two lockplates (8).





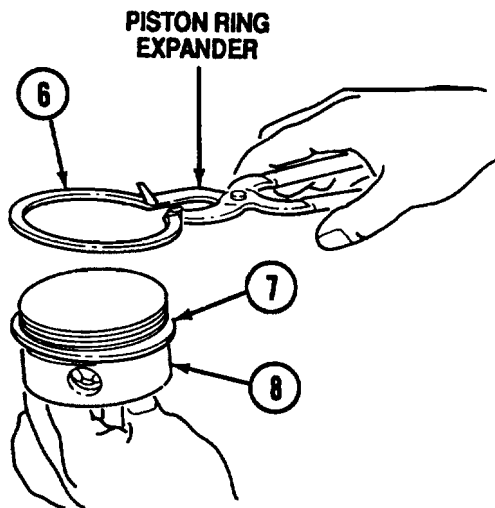
X Remove gasket (1) from retaining plate (2). Discard gasket (1).



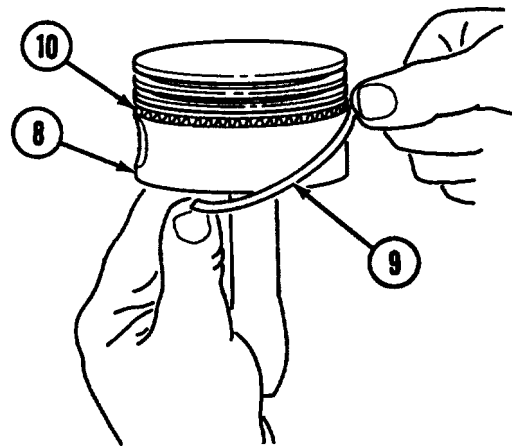
Note

Check bore for ridge. Remove if necessary to take out piston.

Y Remove piston assembly (3) with connecting rod assembly (4) from crankcase (5) by pushing up on bottom of connecting rod (4).



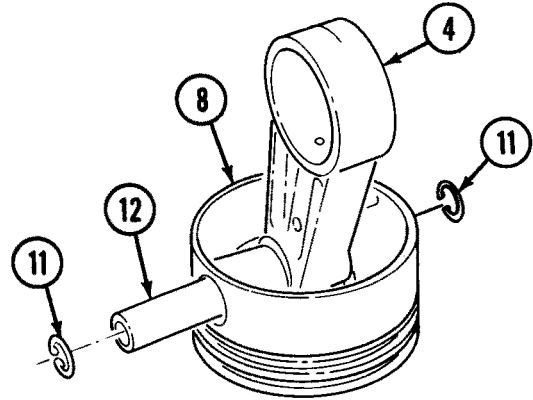
Z Using piston ring expander, remove upper compression ring (7) from piston (8). Discard rings (6) and (7).



CAUTION

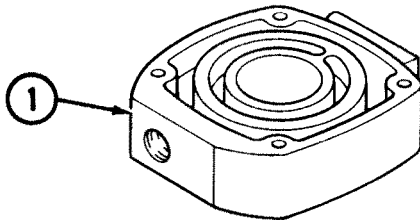
Use care when removing oil rings from piston. Piston is easily scratched and scored.

AA Remove two oil rings (9) and oil ring expander (10) by carefully spiraling rings from piston (8). Discard rings (9).



AB Remove two retaining rings (11), piston pin (12), and piston (8) from connecting rod (4). Discard retaining rings (11).

CLEANING



WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to do this may result in injury to personnel and damage to equipment.

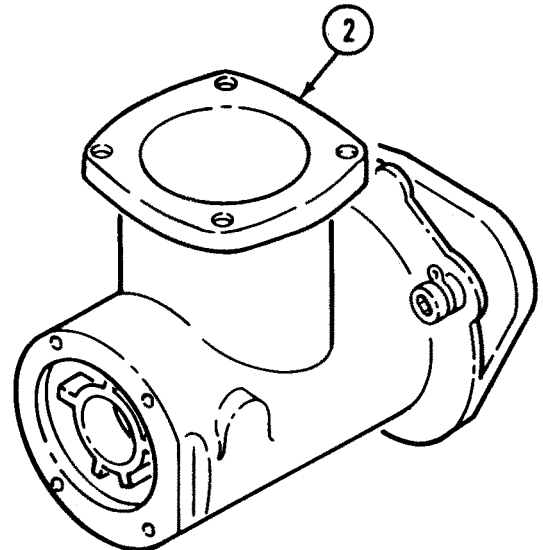
A Soak cylinder head (1) in cleaning solvent.

CAUTION

Do not use screwdriver or similar sharp tool to clean carbon and scale from cylinder head. This may damage sealing surfaces.

B Remove all carbon from cylinder head (1) valve cavities.

C Remove all rust and scale from cylinder head (1) coolant cavities.

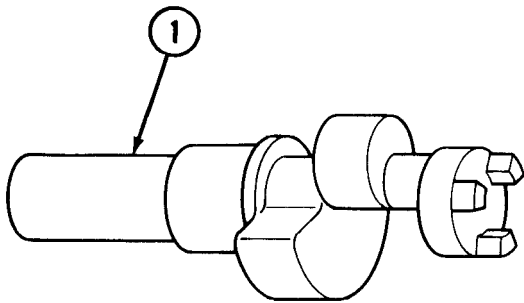


D Clean carbon from top of cylinder bore in crankcase (2).

WARNING

Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

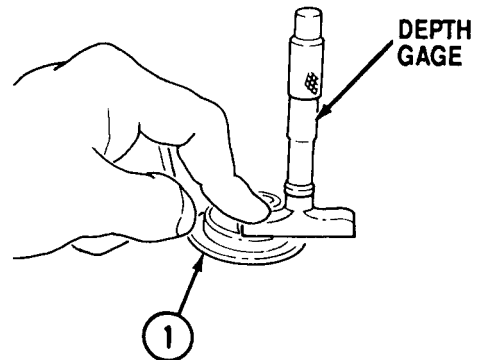
E Blow loose dirt from cavities with compressed air.



WARNING

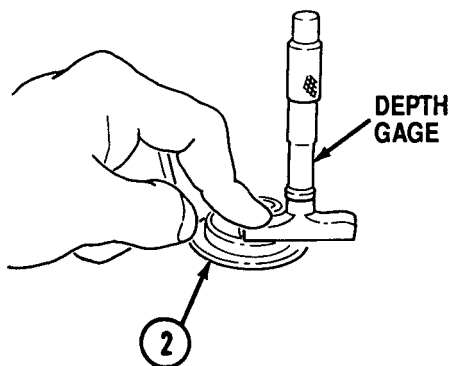
Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to do this may result in injury to personnel and damage to equipment.

- F** Clean crankshaft (1) with solvent.
- G** Follow general cleaning instructions (p 2-2).

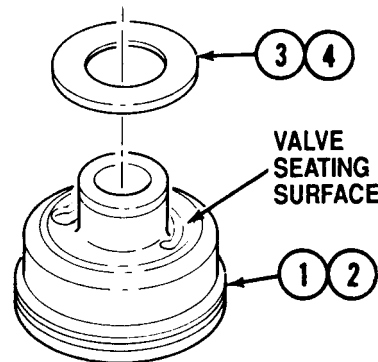


INSPECTION

- A** Measure height of intake valve seat (1) with depth gage. If height is less than 0.27 in. (6.858 mm), discard intake valve seat (1).

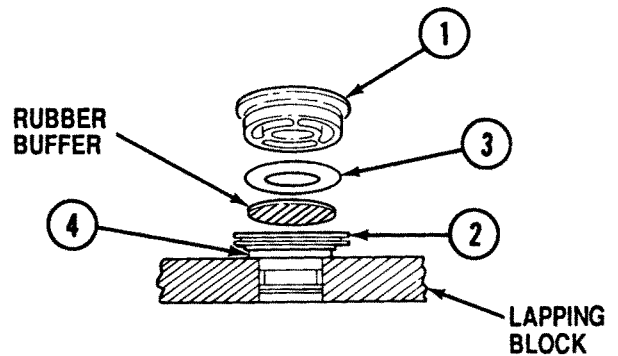


- B** Measure height of exhaust valve seat (2) with depth gage. If height is less than 0.485 in. (12.319 mm), discard exhaust valve seat (2).



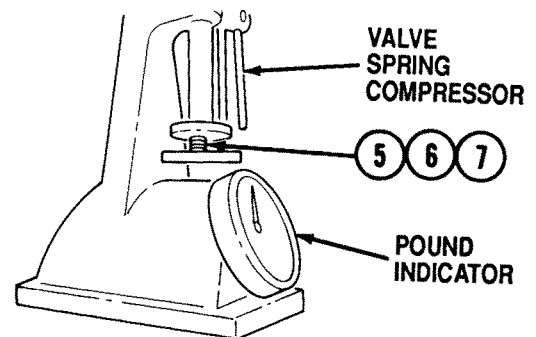
- C** Apply prussian blue dye to seating surfaces of intake valve seat (1) and exhaust valve seat (2). Allow dye to dry.
- D** Press intake valve (3) or exhaust valve (4) against seating surface of corresponding valve seat (1) or (2). Blue dye should transfer to valve (3) or (4) evenly. Gaps in dye indicate lapping is required.
- E** If lapping is not required, go to step N. If lapping is required, perform steps F through M.

- F** Apply lapping compound to exhaust valve (4) and place valve on exhaust valve seat (2).
- G** Insert exhaust valve seat (2) and exhaust valve (4) in lapping block.
- H** Using hand lapper and rubber suction cup, lap exhaust valve (4) until good seat is acquired. Valve (4) must be flat within 0.001 in. (0.0254 mm).
- I** Remove exhaust valve seat (2) and exhaust valve (4) from lapping block. Clean lapping compound from all components, and reinsert exhaust valve seat (2) and exhaust valve (4) in lapping block.
- J** Install soft rubber buffer on top of exhaust valve seat (2).
- K** Apply lapping compound to intake valve (3) and place intake valve (3) on rubber buffer.

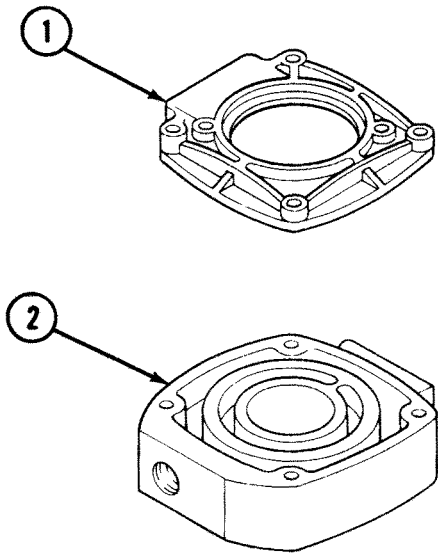


- L** Place intake valve seat (1) on intake valve (3) and lap until a good seat is acquired. Valve (3) must be flat within 0.001 in. (0.0254 mm).
- M** Remove intake valve (3), exhaust valve (4), and corresponding valve seats (1) and (2) from lapping block. Clean lapping compound from all components.

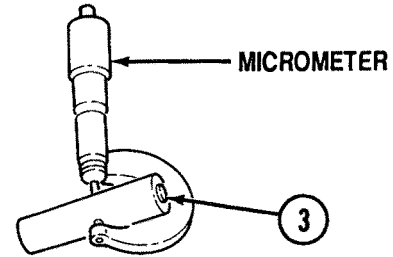
- N** Place unloader cap spring (5) on valve spring compressor and measure free length of spring (5). If measurement is not 1.60-1.70 in. (40.64-43.18 mm), replace spring (5).
- O** Compress unloader cap spring (5) to 0.98 in. (24.89 mm). If pound indicator does not read 32.00-38.00 lb (14.5-17.2 kg), replace spring (5).
- P** Place intake valve spring (6) on valve spring compressor and measure free length of spring (6). If measurement is not 0.45-0.55 in. (11.43-13.97 mm), replace spring (6).
- Q** Compress intake valve spring (6) to 0.280 in. (7.11 mm). If pound indicator does not read 0.65-1.10 lb (0.2951-0.4994 kg), replace spring (6).



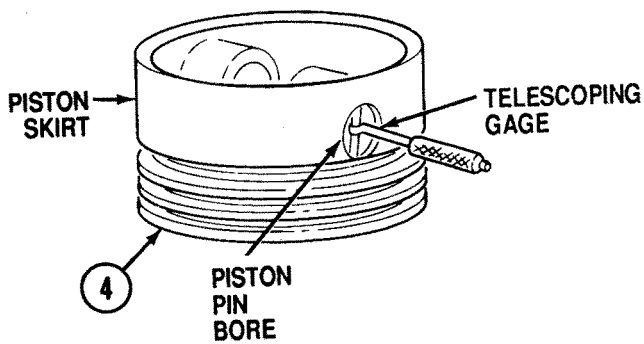
- R** Place exhaust valve spring (7) on valve spring compressor and measure free length of spring (7). If measurement is not 0.65-0.70 in. (16.51-17.78 mm), replace spring (7).
- S** Compress exhaust valve spring (7) to 0.280 in. (7.11 mm). If pound indicator does not read 8.5-10.4 lb (3.859-4.722 kg), replace spring (7).



T Check cylinder head cover (1) and cylinder head (2) for visible cracks, breaks, or mutilations. Replace if damaged.

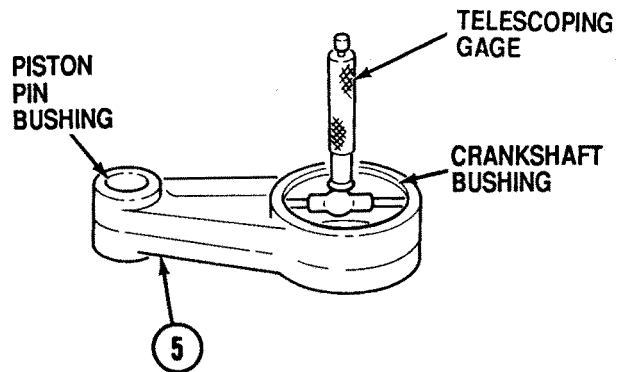


U Measure diameter of piston pin (3) with micrometer. If measurement is less than 0.6872 in. (17.4548 mm), replace piston pin (3).



V Visually inspect piston skirt for scratches and scoring. If piston skirt is scratched or scored, replace piston (4).

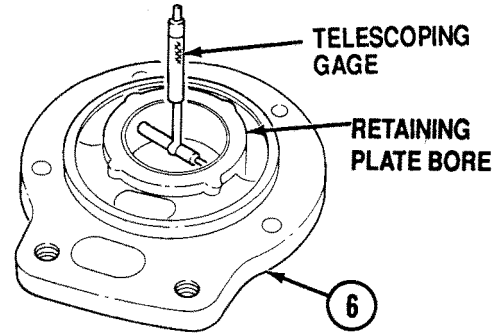
W Measure diameter of piston pin bore with telescoping gage. If measurement is more than 0.6885 in. (17.4879 mm), replace piston (4).



X Measure crankshaft bushing in connecting rod (5) with telescoping gage. If measurement is more than 1.9395 in. (49.2633 mm), replace connecting rod (5).

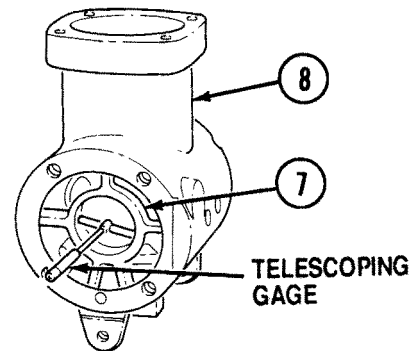
Y Measure piston pin bushing in connecting rod (5). If measurement is more than 0.689 in. (17.501 mm), replace connecting rod (5).

Z Visually inspect retaining plate (6) for scratches, scoring, and unusual wear patterns. Replace retaining plate (6) if sealing surfaces are scratched or scored or if thrust flange shows unusual wear pattern.



AA Measure diameter of retaining plate bore with telescoping gage. If measurement is more than 1.7555 in. (44.5897 mm), replace retaining plate (6).

AB Measure diameter of bushing (7) in crankcase (8) with telescoping gage. If measurement is more than 1.878 in. (47.701 mm), bushing (7) must be replaced. If bushing (7) is good, go to step AE.



AC Press bushing (7) from crankcase (8) using mandrel. Discard bushing (7).

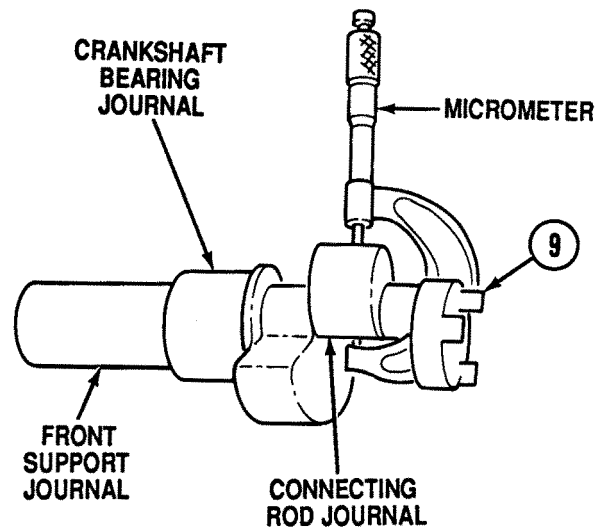
AD Press new bushing (7) into crankcase (8) using mandrel.

AE Visually inspect crankshaft (9). Replace crankshaft (9) if scratched or scored.

AF Measure diameter of connecting rod journal on crankshaft (9) with micrometer. If measurement is less than 1.871 in. (47.523 mm), replace crankshaft (9).

AG Measure diameter of crankshaft bearing journal with micrometer. If measurement is less than 1.9330 in. (49.0982 mm), replace crankshaft (9).

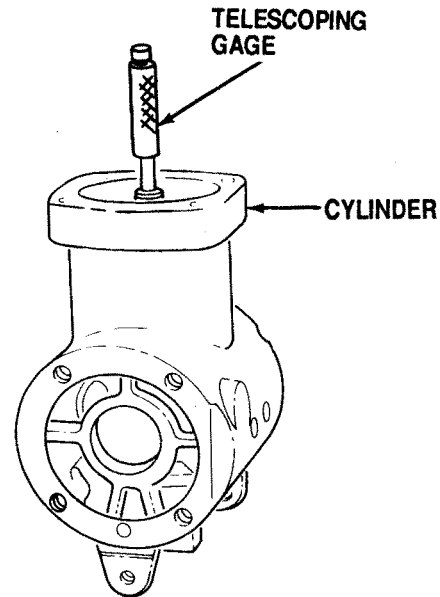
AH Measure diameter of front support journal with micrometer. If measurement is less than 1.7465 in. (44.3611 mm), replace crankshaft (9).



AI Visually inspect cylinder wall for scoring. If scored, perform steps AL through AN. If not, go to step AJ.

AJ Measure cylinder for out-of-roundness with telescoping gage. If out-of-roundness exceeds 0.0015 in. (0.0381 mm), perform steps AL through AN. If not, go to step AK.

AK Measure cylinder diameter with telescoping gage. If measurement is less than 3.6285 in. (92.1639 mm) perform steps AL through AN. If not, see note below.



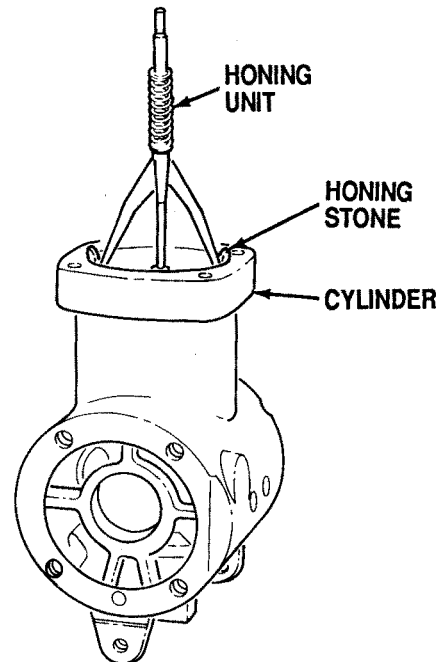
AL Install 150-grit honing stones on honing unit.

AM Lubricate honing stones with light coating of engine oil.

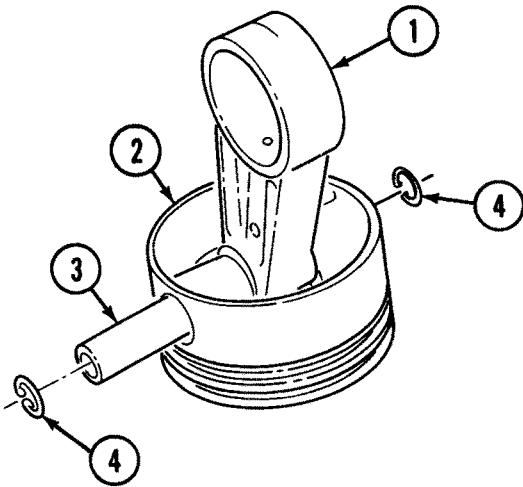
AN Spin honing stones inside cylinder until cylinder can accommodate 0.010, 0.020, or 0.030 in. (0.254, 0.508, or 0.762 mm) oversize pistons and rings.

Note

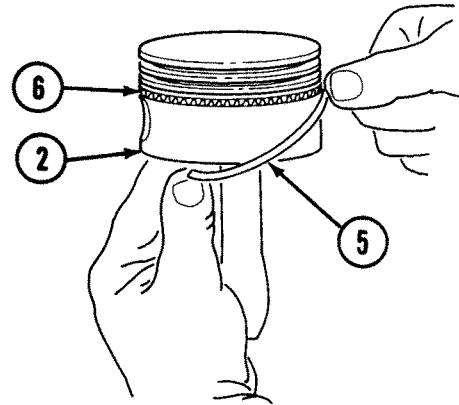
If cylinder was not honed, use glazing breaker to remove varnish deposits on cylinder wall before installing piston.



ASSEMBLY



- A** Install connecting rod (1) in piston (2). Align piston pin hole in connecting rod (1) with piston pin hole in piston (2).
- B** Join connecting rod (1) to piston (2) with piston pin (3) and secure with two retaining rings (4).



CAUTION
Use care when installing oil rings on piston. Piston can be easily scratched or scored.

Note

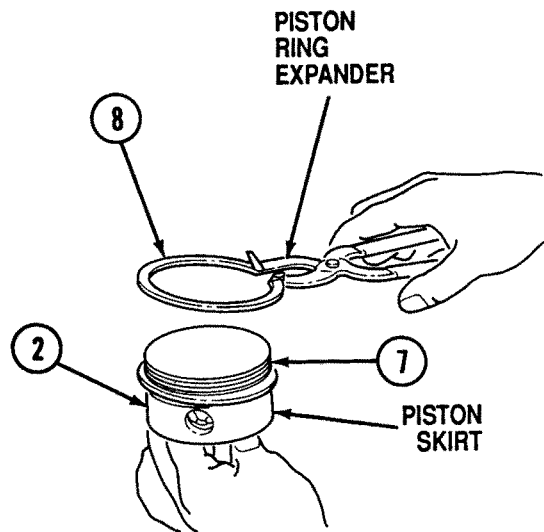
Make sure ring grooves are clean before installing ring.

- C** Install two oil rings (5) and oil ring expander (6) by carefully spiraling them onto piston (2).

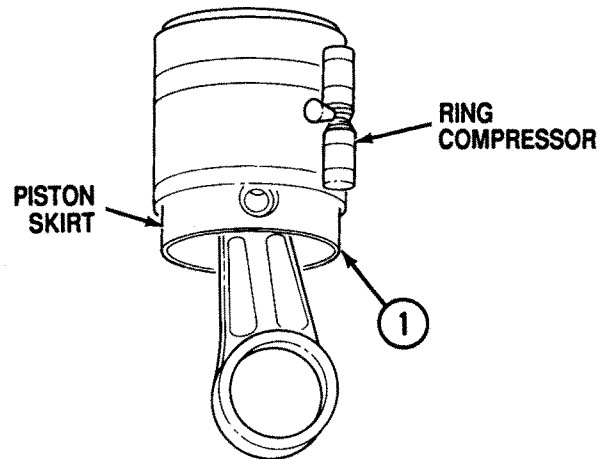
Note

Top side of compression rings are marked with word TOP.

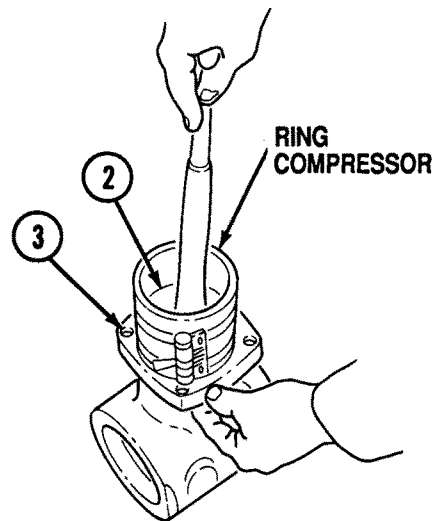
- D** Install lower compression ring (7) and upper compression ring (8) on piston (2) using piston ring expander. Ensure that top side of rings are up.
- E** Turn compression rings (7) and (8) until gaps in rings are approximately 180 degrees apart.
- F** Lubricate all piston rings and piston skirt with light coat of engine oil.



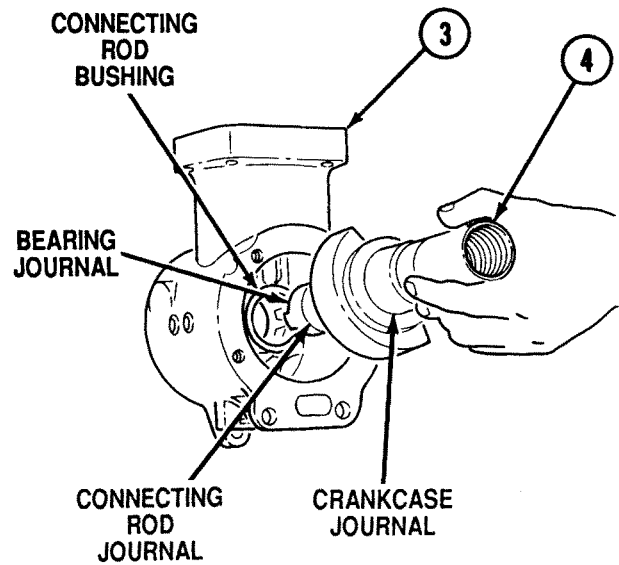
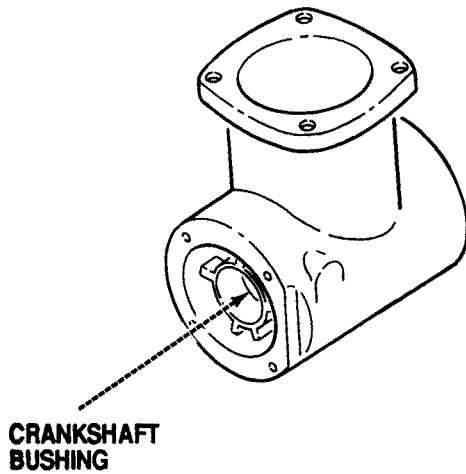
- G** Install ring compressor on piston (1) and tighten ring compressor until ring compressor is snug to piston skirt.



-
- H** Lubricate cylinder wall with light coat of engine oil.
- I** Insert piston assembly (2) with connecting rod into crankcase (3).
- J** Tap on top of ring compressor until ring compressor is tight to crankcase (3).
- K** Gently tap top of piston assembly (2) with wooden object, such as hammer handle, until piston assembly (2) is completely in crankcase (3) and ring compressor falls free.



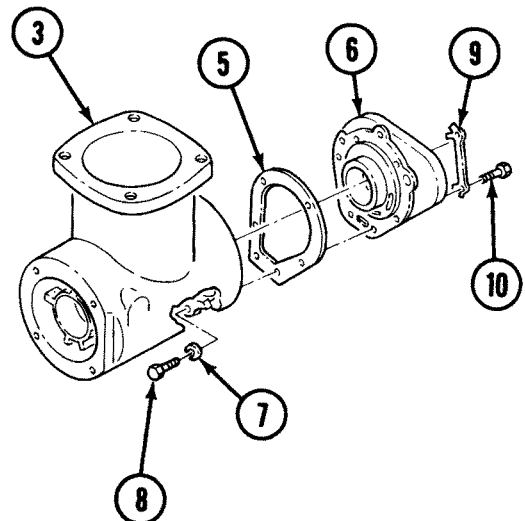
- L** Apply light coat of engine oil to connecting rod bushing, crankshaft bushing, and bearing journals on crankshaft (4).
- M** Insert crankshaft (4) into crankcase (3) so that connecting rod journal is in connecting rod bushing and crankcase journal is in crankshaft bushing.

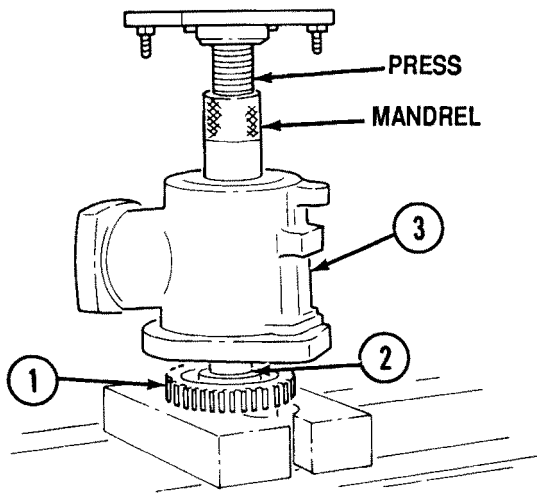


Note

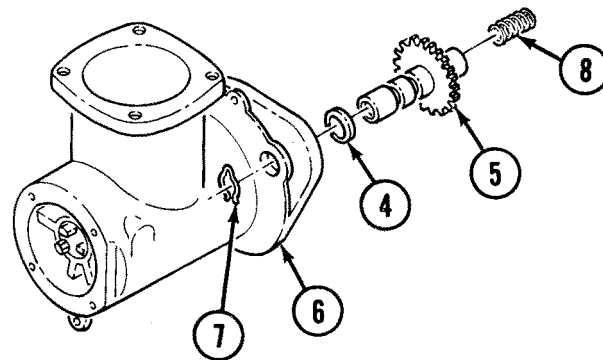
Make sure surfaces are clean before installing gasket.

- N** Install gasket (5) and retaining plate (6) on crankcase (3). Align screw holes in crankcase (3), gasket (5), and retaining plate (6).
- O** Install two washers (7) and screws (8) on crankcase (3).
- P** Install two lockplates (9) and four screws (10) on retaining plate (6).
- Q** Tighten six screws (8) and (10) alternately to final torque of 15-17 lb-ft (20-23 N-m).
- R** Bend tabs of two lockplates (9) against heads of four screws (10).





- S** Start compressor drive gear (1) on end of crankshaft (2).
- T** Place crankcase assembly (3) in press with compressor drive gear (1) down. Have supports under drive gear.
- U** Press against coupling end of crankshaft and press crankshaft into compressor drive gear (1). Use mandrel.

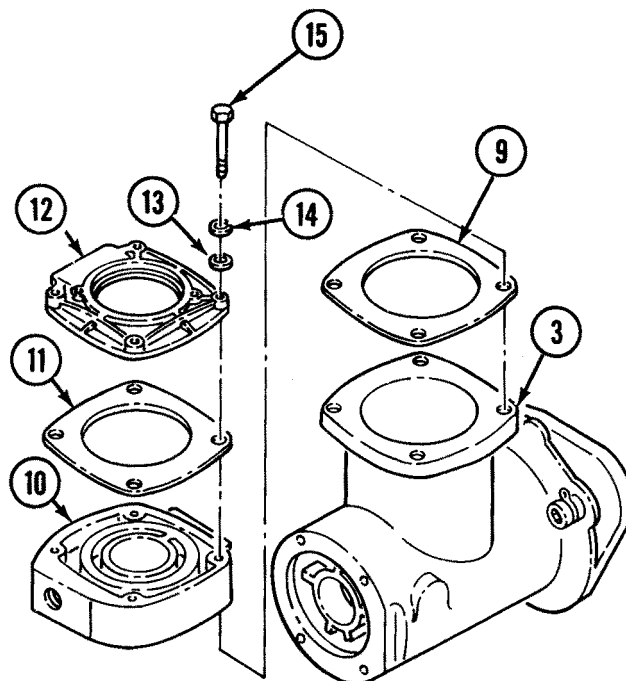


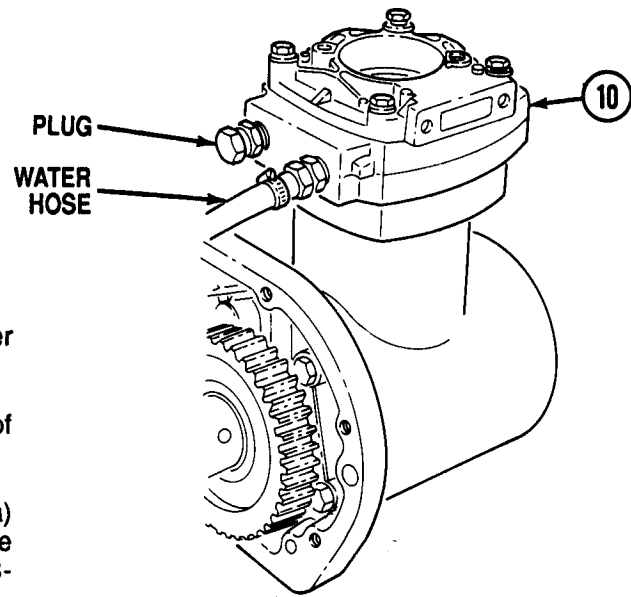
- V** Install preformed packing (4) on barring gear assembly (5).
- W** Install barring gear assembly (5) in retaining plate assembly (6) and secure with retaining ring (7).
- X** Install barring spring (8) in barring gear assembly (5) by twisting spring in clockwise direction while pushing on spring.

Note

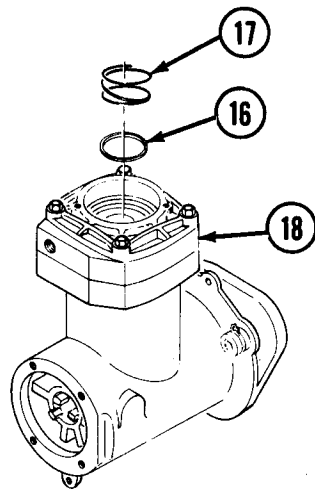
Make sure surfaces are clean before installing gasket.

- Y** Install cylinder head gasket (9), cylinder head (10), cylinder head cover gasket (11), and cylinder head cover (12) on crankcase (3).
- Z** Install four flat washers (13), lockwashers (14), and screws (15).
- AA** Tighten screws (15) alternately to final torque of 15-17 lb-ft (20-23 N-m).

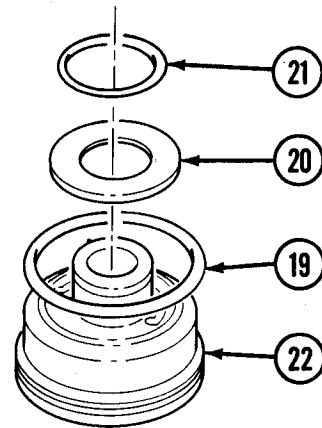




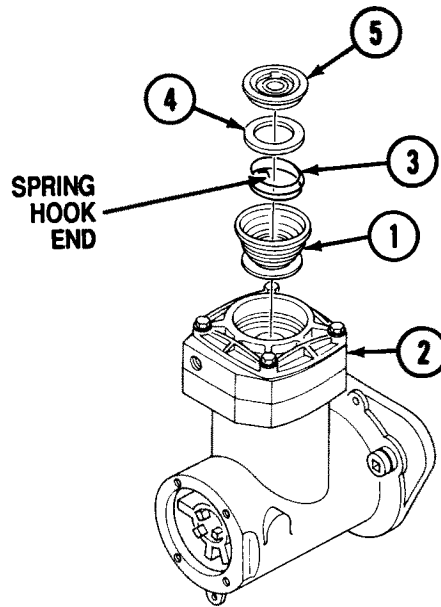
- AB** Install plug in coolant outlet port of cylinder head (10).
- AC** Connect water hose to coolant inlet port of cylinder head (10).
- AD** Apply water under 20-30 psi (138-207 kPa) pressure to cylinder head (10). Make sure water is regulated to only 20-30 psi (138-207 kPa).
- AE** Check for leaks. Replace any leaking component.
- AF** Shut off water and remove hose and plug from cylinder head (10).



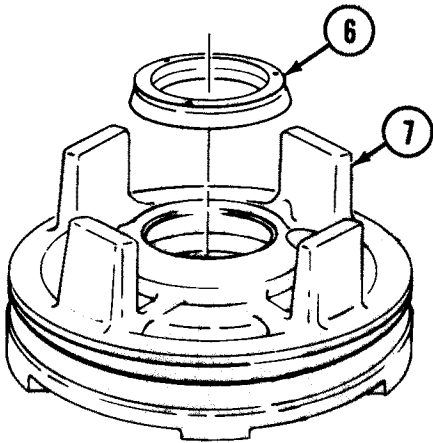
- AG** Install wear plate (16) and exhaust valve spring (17) in air compressor (18).



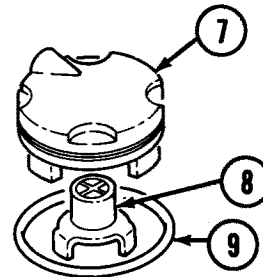
- AH** Install large preformed packing (19), exhaust valve (20), and small preformed packing (21) on exhaust valve seat (22). Ensure that lapped side of exhaust valve (20) is toward seating surface of exhaust valve seat (22).



- AI** Install exhaust valve assembly (1) in air compressor (2).
- AJ** Install intake valve spring (3) in air compressor (2). Ensure that intake valve spring (3) is installed with hook and at bottom.
- AK** Install intake valve (4) in compressor (2). Ensure that lapped side of valve is up.
- AL** Install intake valve seat (5) in air compressor (2).



- AM** Install unloader cap seal (6) in unloader body (7).



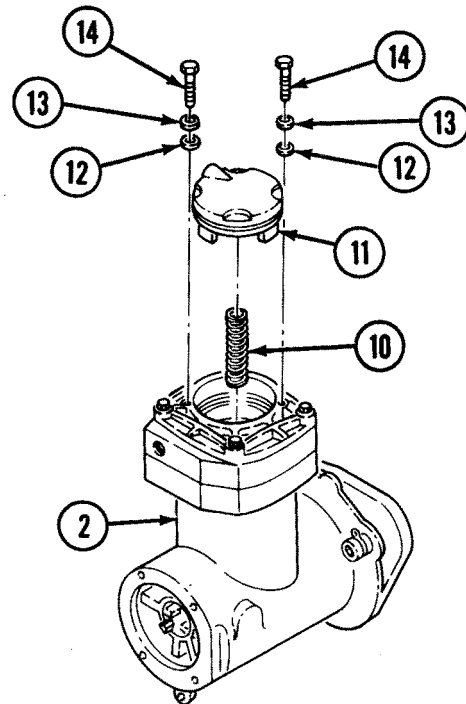
- AN** Install unloader cap (8) and preformed packing (9) in unloader body (7).

Note

Aline screws on unloader valve with elbow.

AO Install unloader cap spring (10) and unloader valve assembly (11) in air compressor (2) with two flat washers (12), lockwashers (13), and screws (14).

AP Tighten two screws (14) alternately to a final torque of 8-10 lb-ft (11-14 N·m).

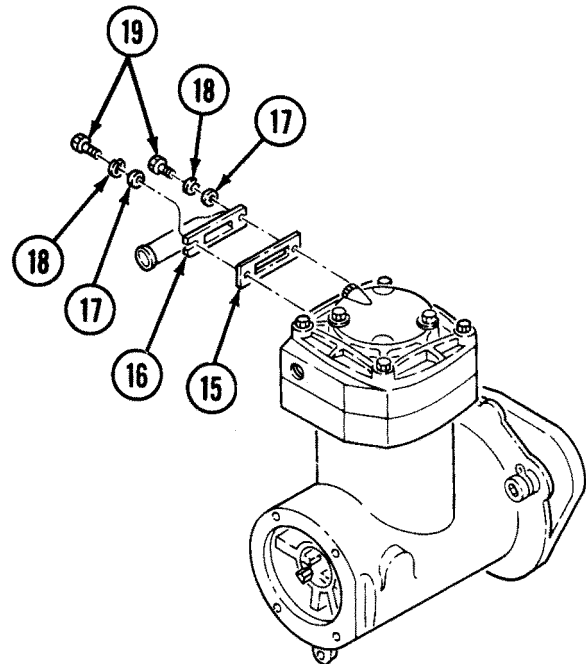


Note

Make sure surfaces are clean before installing gasket.

AQ Install gasket (15) and elbow (16) with two washers (17), lockwashers (18), and screws (19).

AR Tighten two screws (19) alternately to a final torque of 8-10 lb-ft (11-14 N·m).



FOLLOW-ON TASK:
Install air compressor (p 3-32).

AIR INTAKE ASSEMBLY REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Parts:

Gasket (2)
Lockwasher (8)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

Equipment Condition:

Reference

Page 2-8

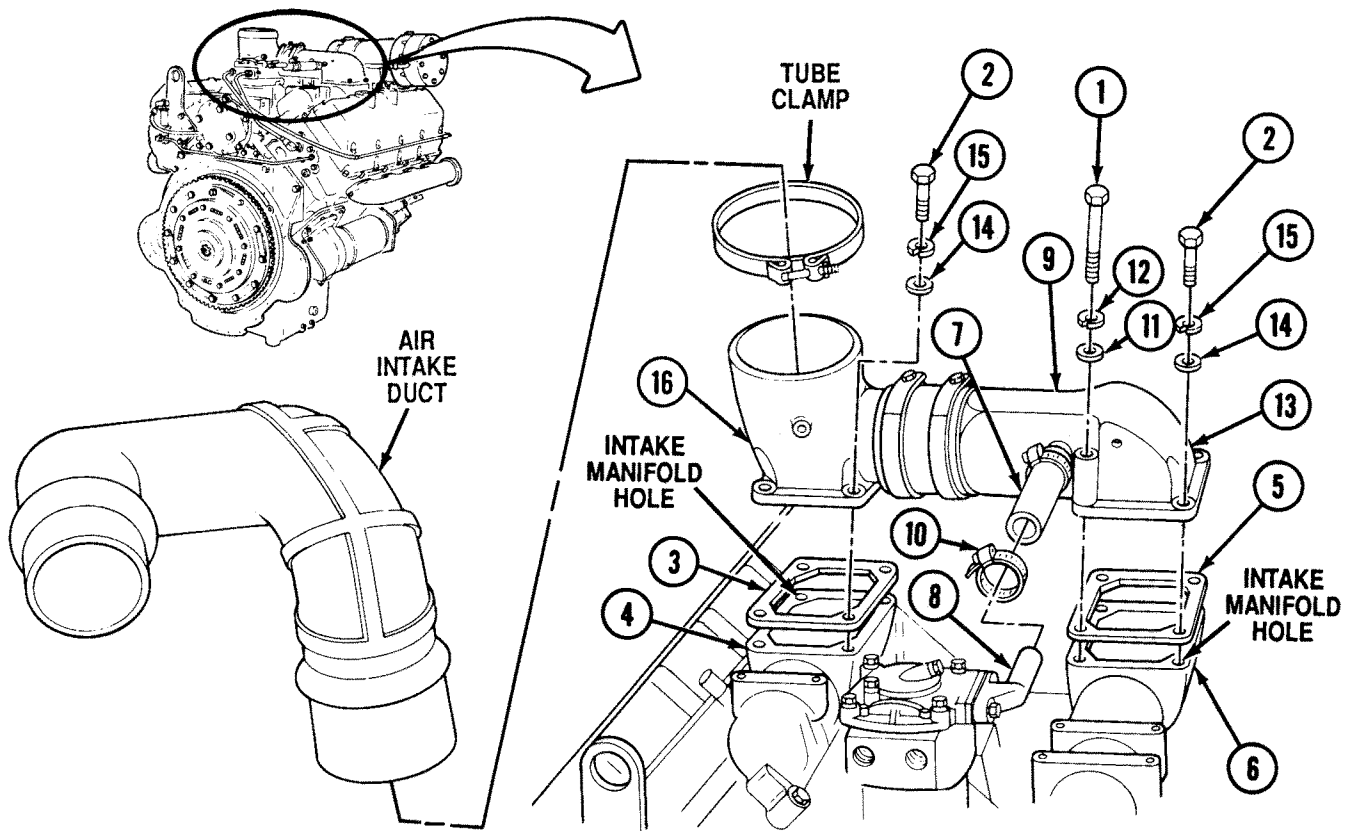
Condition
Description

Engine in Vehicle

or

Engine Mounted
on Stand

INSTALLATION



A Remove attaching screws (1) and (2) from intake manifold.

Note

Make sure surfaces are clean before installing gasket.

B Install gasket (3) on left intake manifold (4).

C Install gasket (5) on right intake manifold (6).

D Install air compressor intake hose (7) and clamp (10) over air compressor elbow (8), and set air intake assembly (9) on intake manifolds (4) and (6).

E Tighten hose clamp (10).

F Install flat washer (11), lockwasher (12), and long screw (1) in screw hole in connector (13) nearest air compressor intake hose (7).

G Install three flat washers (14), lockwashers (15), and short screws (2) in connector (13).

H Install four flat washers (14), lockwashers (15), and short screws (2) in connector (16).

I Tighten eight screws (1) and (2) to 25-30 lb-ft (34-41 N·m).

J If engine is in vehicle, connect air intake duct to connector (16) and tighten tube clamp.

INTAKE MANIFOLDS REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

Parts:

Lockwasher (16)

Gasket

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

Reference:

TM 5-2350-262-10

TM 5-2350-262-20-2

Equipment Condition:

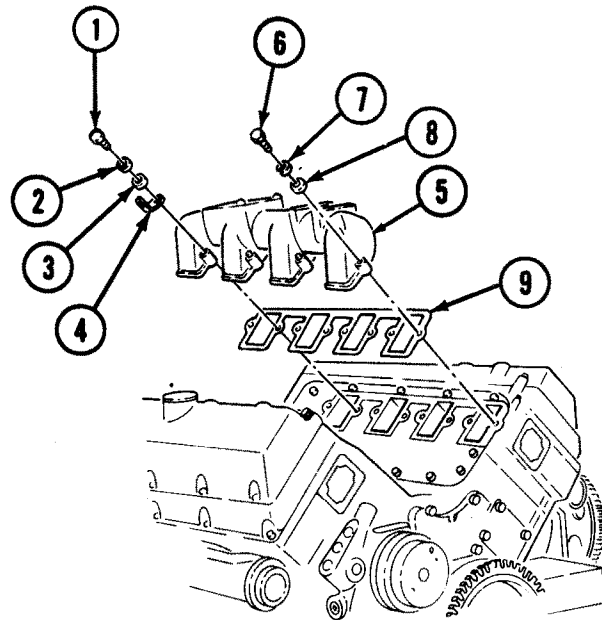
<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Transmission Oil Cooler Removed
TM 5-2350-262-20-2	Alternator Removed
Page 2-7	Engine Mounted on Stand or in Vehicle
Page 3-54	Air Intake Assembly Removed

REMOVAL

Note

Left and right intake manifolds are removed and installed basically the same way. This procedure covers the left intake manifold.

- A** Remove screw (1), lockwasher (2), flat washer (3), and fuel return line mounting bracket (4) from intake manifold (5). Discard lockwasher (2).
- B** Remove seven screws (6), lockwashers (7), flat washers (8), intake manifold (5), and gasket (9). Discard lockwashers (7) and gasket (9).



INSTALLATION

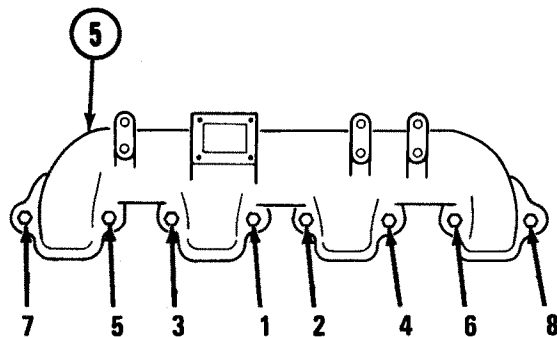
Note

Make sure surfaces are clean before installing gasket.

- A** Install gasket (9) and intake manifold (5).
- B** Install seven flat washers (8), lockwashers (7), and screws (6).
- C** Install fuel return line bracket (4) on manifold (5) with flat washer (3), lockwasher (2), and screw (1).
- D** Tighten eight screws (1) to 25-30 lb-ft (34-41 N·m). Tighten screws in this order: 1 through 8 (see diagram).

FOLLOW-ON TASKS:

- Install alternator (TM 5-2350-262-20-2).
- Install transmission oil cooler (TM 5-2350-262-20-2).
- Install air intake assembly (p 3-54).



TORQUE SEQUENCE

EXHAUST MANIFOLDS REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Parts:

Gasket (4)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

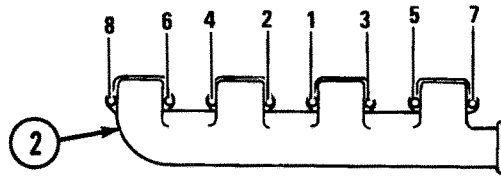
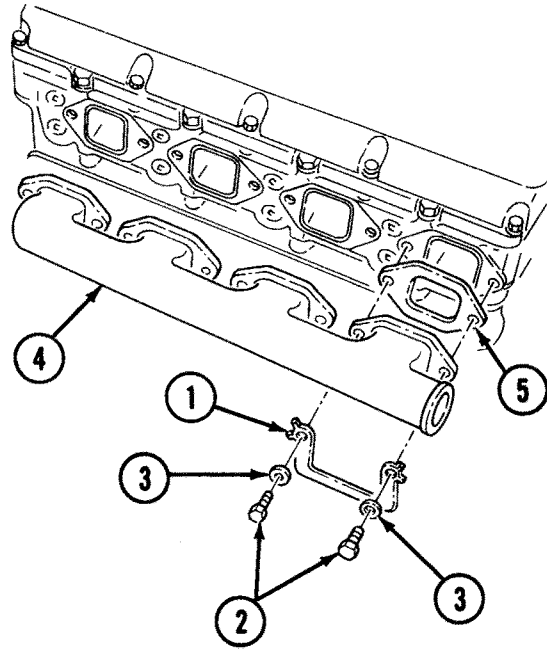
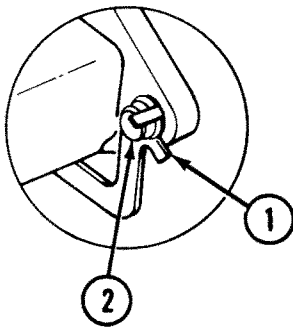
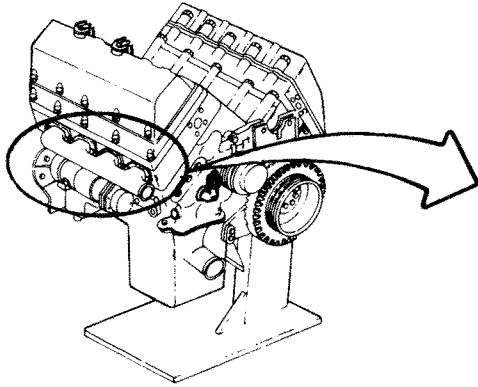
Equipment Condition:

Reference

Page 2-8

Condition
Description

Engine Mounted
on Stand (Right
Side Only)



TORQUE SEQUENCE

REMOVAL

Note

Left and right exhaust manifolds are removed and installed the same way, except the left is removed and installed off the maintenance stand.

- A** Bend tabs on four lockplates (1) away from screw heads (2).
- B** Remove eight screws (2), washers (3), and four lockplates (1).
- C** Remove manifold (4) and four gaskets (5). Discard gaskets (5).

- Make sure surfaces are clean before installing gaskets.
- Gaskets must be installed with side marked OUTER facing manifold.
- Install two outside gaskets first.

INSTALLATION

Note

- Helper may be needed to aid in aligning manifold on block.

- A** Install four gaskets (5) and manifold (4).
- B** Install four lockplates (1), eight washers (3), and screws (2).
- C** Tighten eight screws (2) to 45-50 lb-ft (61-68 N·m) in 15 lb-ft (20 N·m) increments in this order: 1 through 8 (see diagram).
- D** Bend one tab of each lockplate (1) against flat side of head of each screw (2).

OIL PUMP REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Personnel Required:

Track Vehicle Repairer 63H10

Equipment Condition:

Reference

Page 3-88

Condition
Description

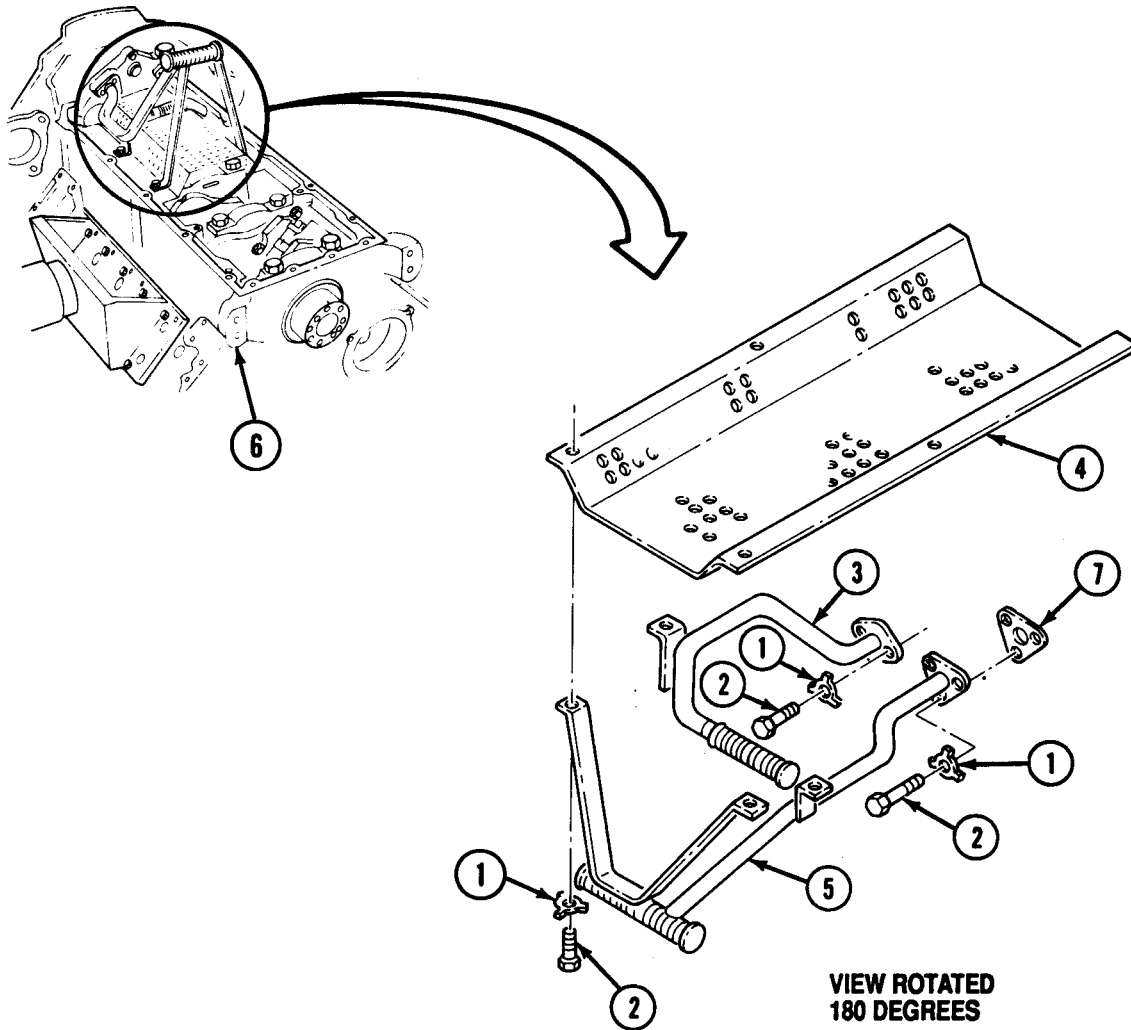
Oil Pan Removed

Parts:

Gasket

Parts Reference:

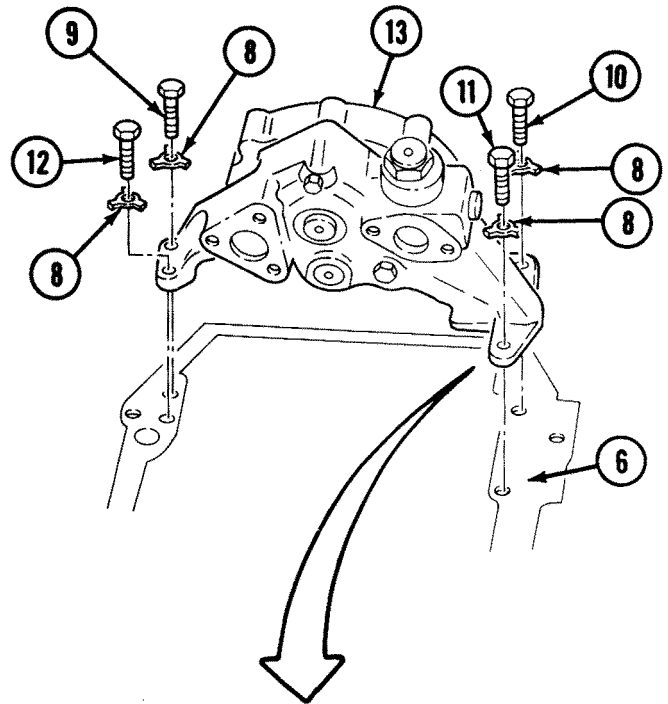
Appendix B



REMOVAL

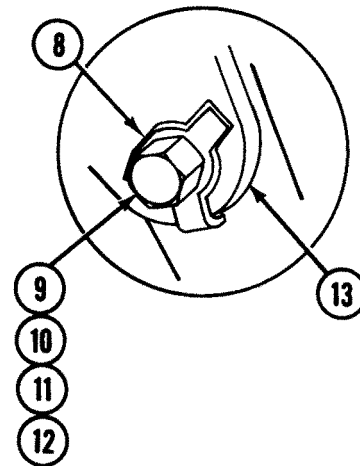
- A** Bend lockplate tabs (1) away from nine screws (2).
- B** Remove short oil tube (3), baffle plate (4), and long oil tube (5), in sequence, by removing nine screws (2) and lockplates (1) from engine (6).
- C** Remove and discard gasket (7) from long oil tube (5).

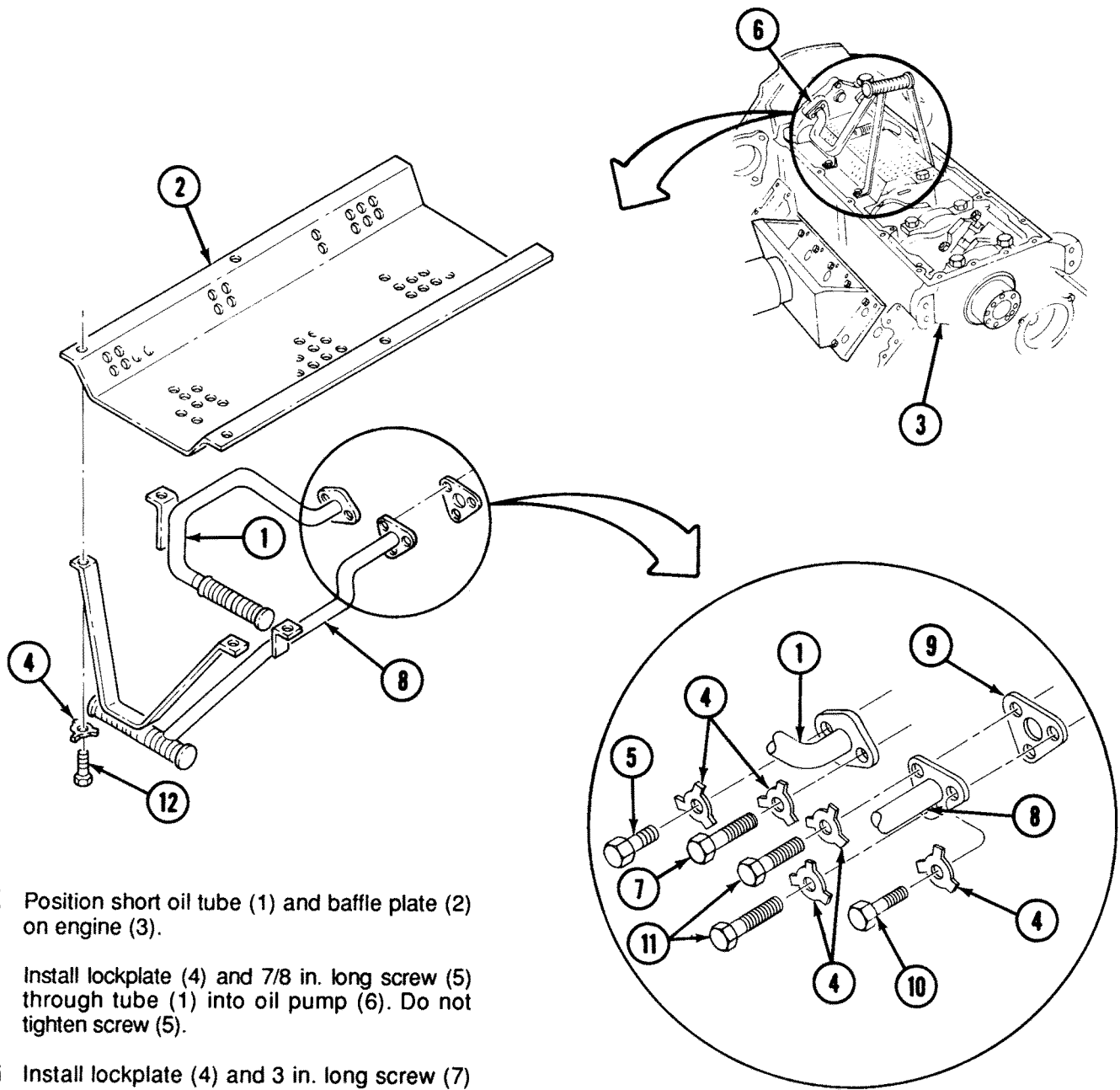
- D** Bend tabs on four lockplates (8) away from four screws (9), (10), (11), and (12).
- E** Remove two screws (9) and (12) and lockplates (8) from oil pump (13).
- F** Remove two screws (10) and (11), lockplates (8), and oil pump (13).



INSTALLATION

- A** Install two lockplates (8), one 1 in. long screw (9), one 1-1/4-in. long screw (10), and oil pump (13) to engine (6).
- B** Install two lockplates (8), one 1-1/4-in. long screw (11), and one 1-1/2 in. long screw (12) on other side of oil pump (13).
- C** Tighten all four screws (9), (10), (11), and (12) to 30-35 lb-ft (41-47 N-m).
- D** Bend one tab of each lockplate (8) against head of screws (9), (10), (11), and (12). Bend a second tab of each lockplate (8) against a flat surface on oil pump (13).





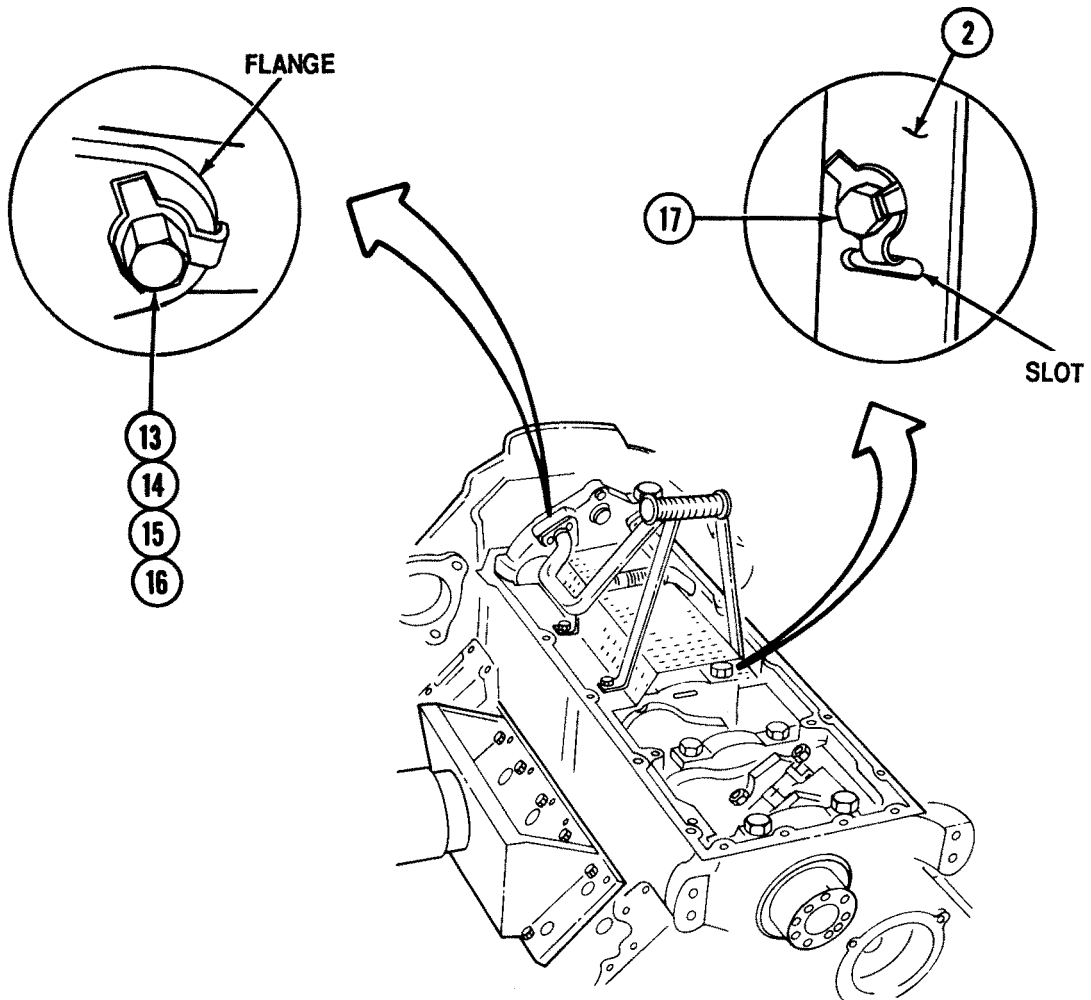
- E** Position short oil tube (1) and baffle plate (2) on engine (3).
- F** Install lockplate (4) and 7/8 in. long screw (5) through tube (1) into oil pump (6). Do not tighten screw (5).
- G** Install lockplate (4) and 3 in. long screw (7) through tube (1) into oil pump (6). Do not tighten screw (7).

Note

Make sure surfaces are clean before installing gasket.

- H** Position long oil tube (8) on engine (3). Position gasket (9) between tube (8) and oil pump (6).
- I** Install lockplate (4) and 1 in. long screw (10) through tube (8) into oil pump (6). Do not tighten screw (10).

- J** Install two lockplates (4) and 3 in. long screws (11) through tube (8) into oil pump (6). Do not tighten screws (11).
- K** Install four lockplates (4) and screws (12) through long and short oil tubes (1) and (8) into engine (3).
- L** Tighten nine screws (5), (7), (10), (11), and (12) to 17 lb-ft (23 N.m).



M On four screws (13), (14), (15), and (16), bend one tab toward screw head and one tab toward flange.

N On four screws (17), bend one tab toward screw through slot in baffle plate (2).

FOLLOW-ON TASK:
Install oil pan (p 3-90).

OIL PUMP REPAIR

This task covers:

- a. Disassembly
 - b. Cleaning
 - c. Inspection
 - d. Repair
 - e. Assembly
-

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Special Tools:

Spacer	5340-00-951-0775
Mandrel	4910-01-149-1302
Dial Indicator	5210-00-277-8840

Materials:

Engine Oil, 30-Weight	Item 16 Appendix C
Drycleaning Solvent	Item 25 Appendix C

Parts:

Gasket

Parts Reference:

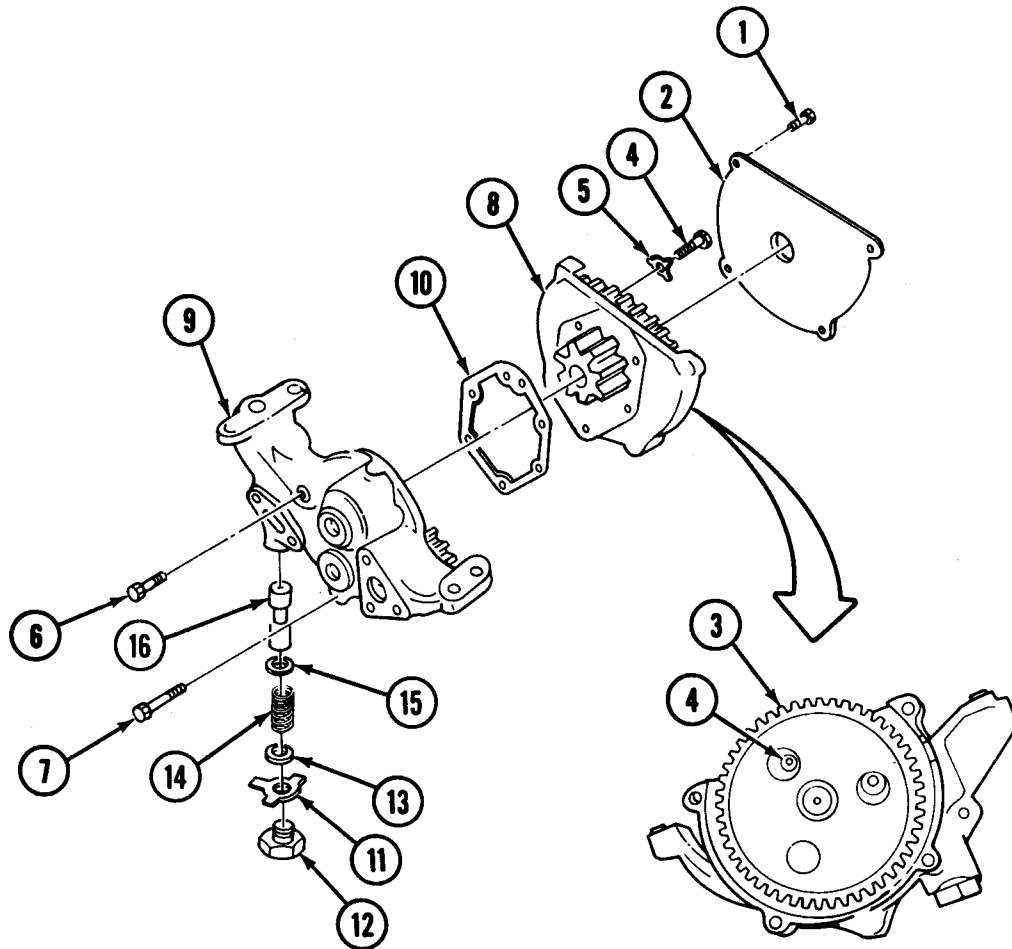
Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

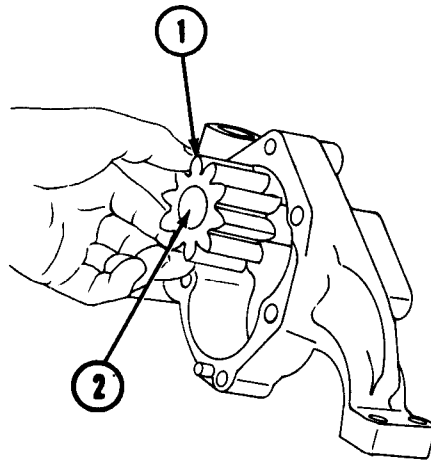
Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 3-64	Oil Pump Removed

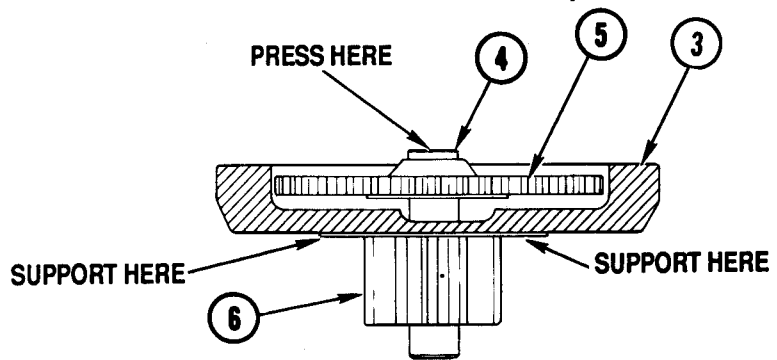


DISASSEMBLY

- A** Remove four screws (1) and cover (2).
- B** Turn main drive gear (3) until screw (4) is visible.
- C** Bend tab of lockplate (5) and remove screw (4) and lockplate (5).
- D** Remove two long screws (6) and (7) and separate pump cover (8) from body (9).
- E** Remove and discard gasket (10).
- F** Bend tab of lockplate (11) and remove valve cap (12), spacer (13), spring (14), washer (15), and plunger (16) from body (9).

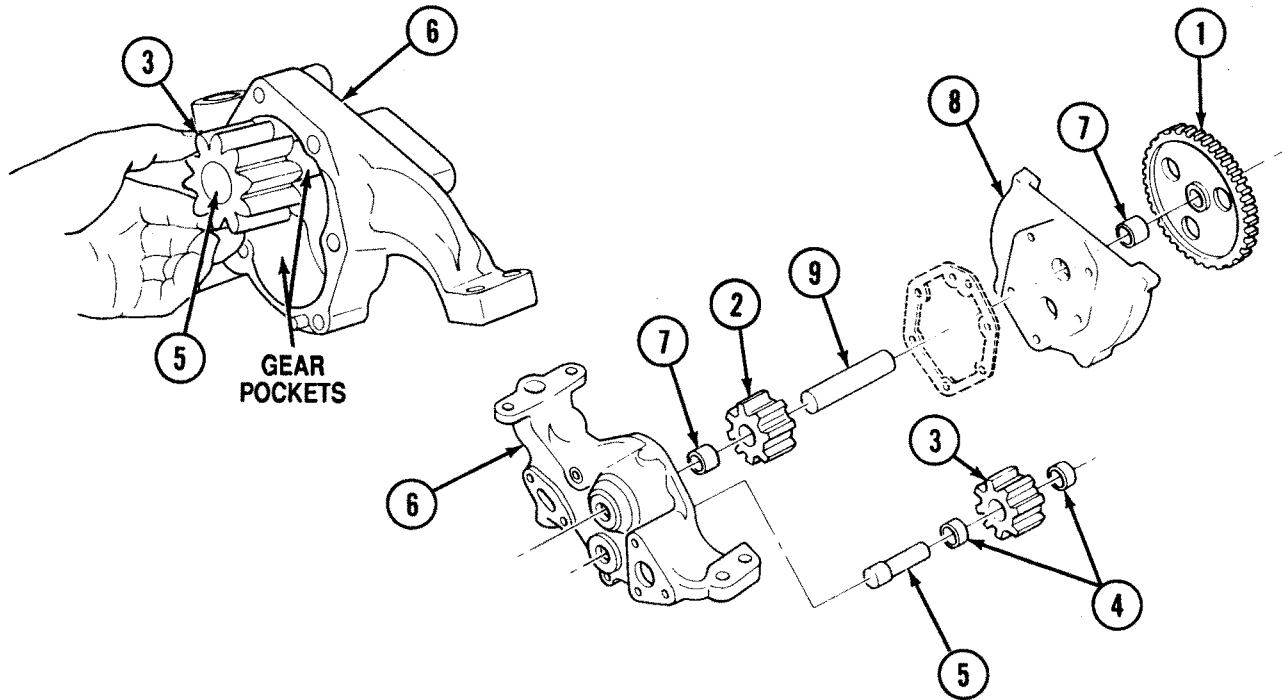


G Remove idler gear (1) from idler shaft (2).



H Support pump cover (3) in V-blocks on a press. Press driveshaft (4) through main drive gear (5) and cover (3).

I Remove drive gear (6) from driveshaft (4).



CLEANING

Follow general cleaning instructions (p 2-2).

INSPECTION

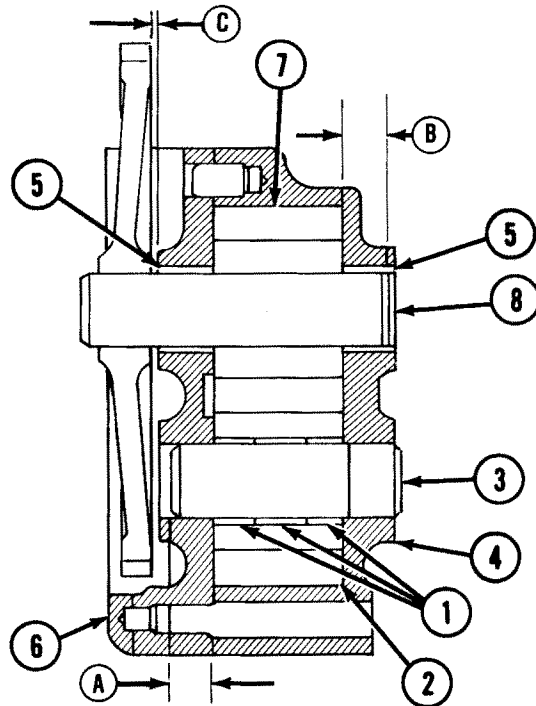
- A** Inspect main drive gear (1), drive gear (2), and idler gear (3). Replace gears if teeth are chipped, cracked, scored, eroded, or show excessive wear.
- B** Measure bushings (4) in idler gear (3). Replace bushings (4) if inside diameter is worn larger than 0.8785 (22.314 mm).
- C** Inspect idler shaft (5) in pump body (6). Replace shaft (5) if it is scored or worn smaller than 0.875 in. (22.23 mm) outside diameter.
- D** Measure bushings (7) in body (6) and cover (8). Replace bushings (7) if they are worn larger than 0.8787 in. (22.319 mm) inside diameter.
- E** Inspect driveshaft (9). Replace shaft (9) if it is rough or worn smaller than 0.874 in. (22.20 mm) outside diameter.
- F** Check gear pockets in body (6). If surfaces are damaged, worn excessively, or eroded, replace body (6).

REPAIR

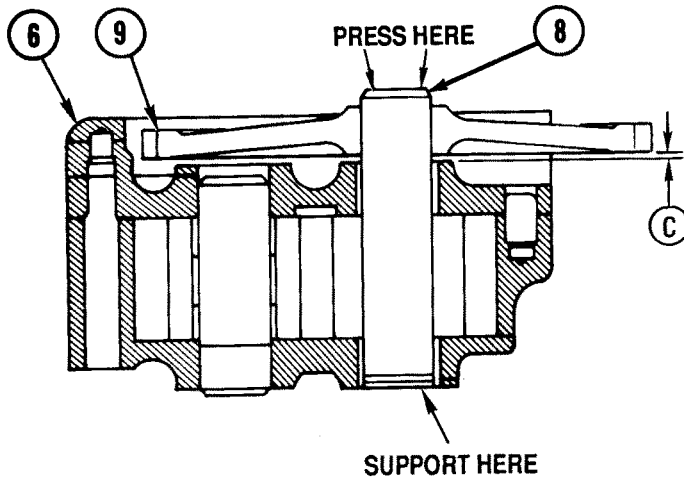
- A** If bushings (1) in idler gear (2) are unacceptable, remove and press new bushings (1) in gear (2) to 0.005-0.015 in. (0.13-0.38 mm) below the surface from each end of gear.
- B** If idler shaft (3) is worn beyond limits, support pump body (4) around outside area of idler shaft (3) and press idler shaft (3) from body (4).
- C** If bushings (5) in body (4) or cover (6) are unacceptable, remove and press new bushings (5) flush to 0.020 in. (0.51 mm) below outside surface of body (4) or cover (6).

ASSEMBLY

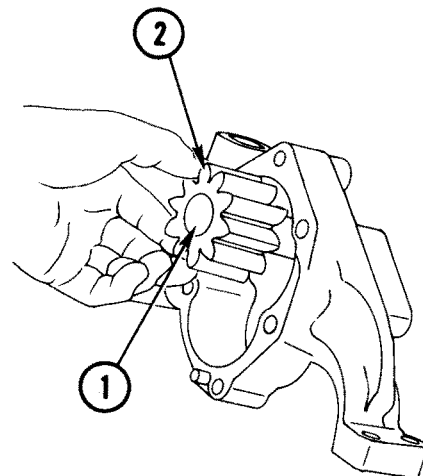
- A** If idler shaft (3) was removed, press new idler shaft (3) into position in pump body (4). Use spacer to obtain 0.430-0.460 in. (10.92-11.68 mm) (A) shaft protrusion above mounting face of pump body (4).
- B** If drive gear (7) was removed from drive-shaft (8), press driveshaft (8) into drive gear (7). Use mandrel to maintain 0.540-0.570 in. (13.72-14.48 mm) (B) shaft protrusion from end of drive gear (7).
- C** Coat driveshaft (8) and bushing (5) in pump cover (6) with clean 30-weight engine oil. Slide driveshaft (8) through cover (6).



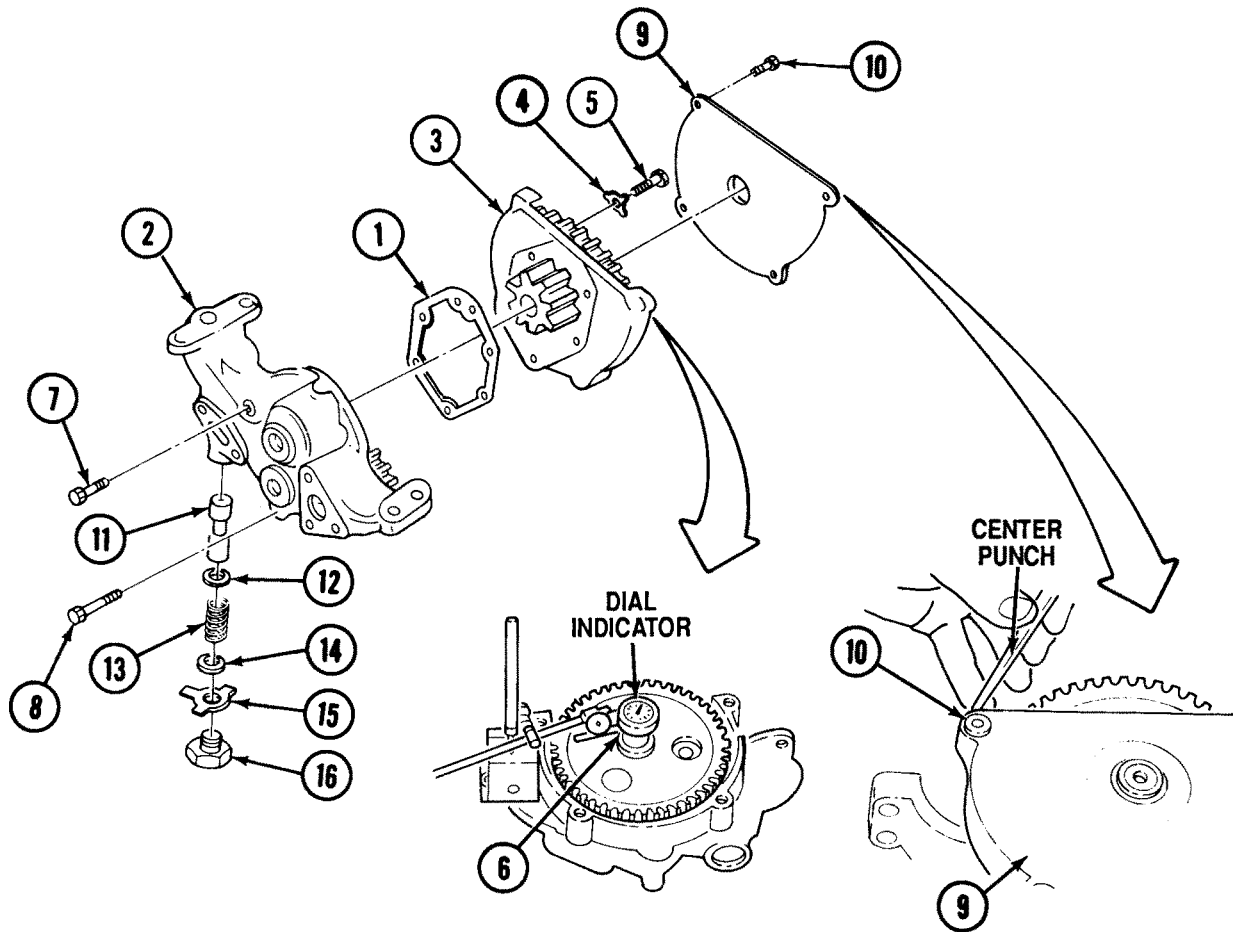
- A** 0.430/0.460 in. (10.92/11.68 mm)
- B** 0.540/0.570 in. (13.72/14.48 mm)
- C** 0.030/0.060 in. (0.76/1.52 mm)



- D** Put assembly on a press, supporting only driveshaft (8). Press main drive gear (9) on driveshaft (8) to maintain 0.030-0.060 in. (0.76-1.52 mm) (C) clearance between main drive gear (9) and surface of pump cover (6). This can be done by placing proper thickness of feeler gage between main drive gear (9) and pump cover (6), then pressing main drive gear (9) until it contacts feeler gage.



- E** Coat bushings (1) in idler gear (2) and idler shaft (3) with clean engine oil. Slide idler gear (2) on idler shaft (3).



Note

Make sure surfaces are clean before installing gasket.

- F** Install gasket (1) on pump body (2).
- G** Install pump cover (3) on pump body (2).
- H** Install lockplate (4) and screw (5). Tighten screw (5) to 30-35 lb-ft (41-47 N·m).
- I** With dial indicator set up as shown, check driveshaft (6) end clearance. End clearance must be 0.0035-0.0075 in. (0.089-0.191 mm). If end clearance is within limits, bend tab of lockplate (4) against screw (5). If end clearance is not within limits, repeat steps A through H.
- J** Install long screws (7) and (8) through pump body (2) into pump cover (3). Tighten screws (7) and (8) to 30-35 lb-ft (41-47 N·m).
- K** Install drive gear cover plate (9) and secure with four screws (10). Tighten screws (10) to 5-8 lb-ft (7-11 N·m). Stake screws (10) with center punch to hold screws.
- L** Lubricate plunger (11) and install in pump body (2).
- M** Install washer (12), spring (13), spacer (14), lockplate (15), and valve cap (16). Tighten valve cap (16) to 60-70 lb-ft (81-95 N·m).
- N** Bend tab on lockplate (15) to secure valve cap (16).

FOLLOW-ON TASK:
Install oil pump (p 3-65).

ENGINE OIL COOLER REMOVAL, REPAIR, AND INSTALLATION

This task covers:

- a. Removal
- b. Disassembly
- c. Cleaning
- d. Assembly
- e. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

Reference:

- TM 5-2350-262-10
- TM 5-2350-262-20-1
- TM 5-2350-262-20-2

Troubleshooting Reference:

- TM 5-2350-262-20-1

Equipment Condition:

Special Tools:

Wrench Set, Open End 5705565

Materials:

Caps and Plugs	Item 4 Appendix C
Sealing Compound	Item 8 Appendix C
Engine Oil, 30-Weight	Item 16 Appendix C
Drycleaning Solvent	Item 25 Appendix C
Trichloroethylene	Item 27 Appendix C

Reference

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-10	Engine Oil Drained
TM 5-2350-262-20-2	Radiator Removed
TM 5-2350-262-20-1	Ejector Cylinder Removed
TM 5-2350-262-20-1	Hull Access Plate Removed
TM 5-2350-262-20-2	Engine Oil Cooler Bypass Tube Removed

General Safety Instructions:

WARNING

- Wear gloves when removing engine oil cooler.
- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas.
- Trichlorethane solvent vapors can be fatal. High concentration of vapors are anesthetic and dangerous to life. Eye irritation and dizziness are signs of inadequate ventilation and dangerous concentration. Avoid prolonged or repeated contact with skin. Do not use near sparks or open flames.
- Plug is under tension by compressed spring. Protect eyes while removing and/or installing.

Parts:

Spring
Lockwasher
Packing (7)
Gasket (4)
Oil Cooler Element

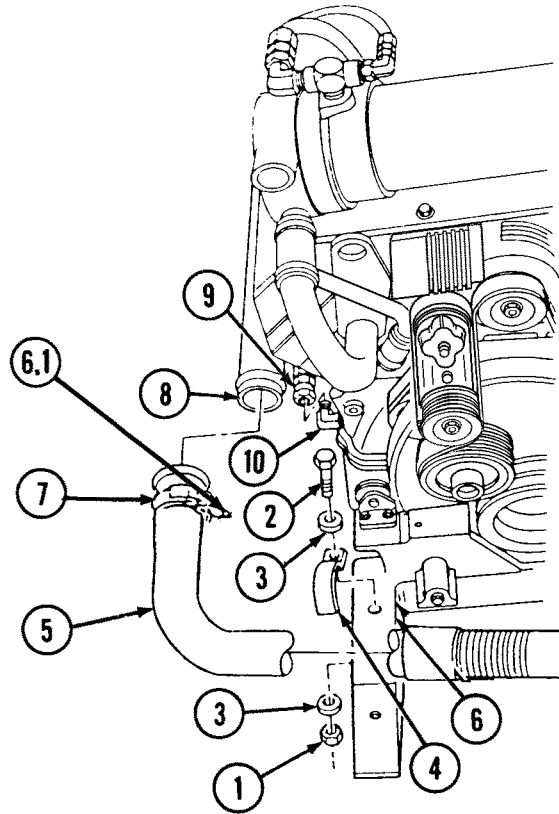
Parts Reference:

Appendix B

Personnel Required:

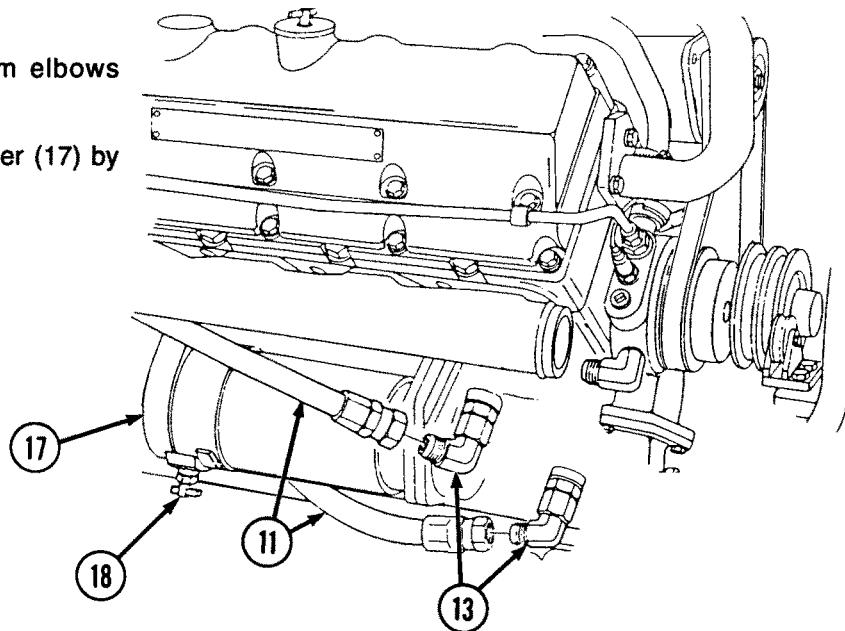
Track Vehicle Repairers 63H10 (2)

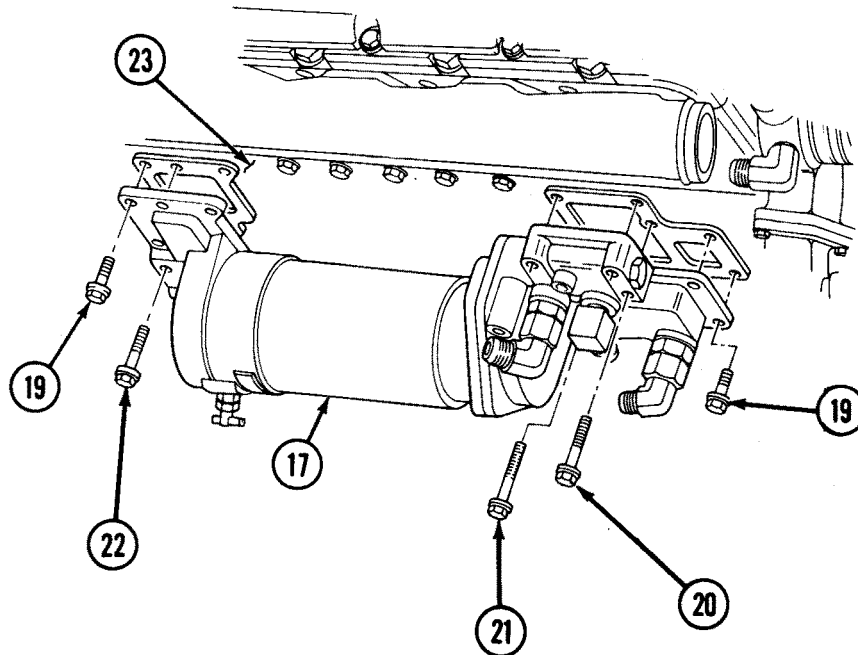
REMOVAL



- A** Remove nut (1), screw (2), two washers (3), and retaining strap (4) securing exhaust tube (5) to engine accessory bracket (6).
- B** Loosen nut (6.1) on clamp (7) securing exhaust tube (5) to exhaust manifold (8). Move exhaust tube (5) out of the way.
- C** Disconnect heater hose (9) from elbow (10).

- D** Disconnect two hoses (11) from elbows (13).
- E** Drain coolant from engine oil cooler (17) by opening draincock (18).





Note

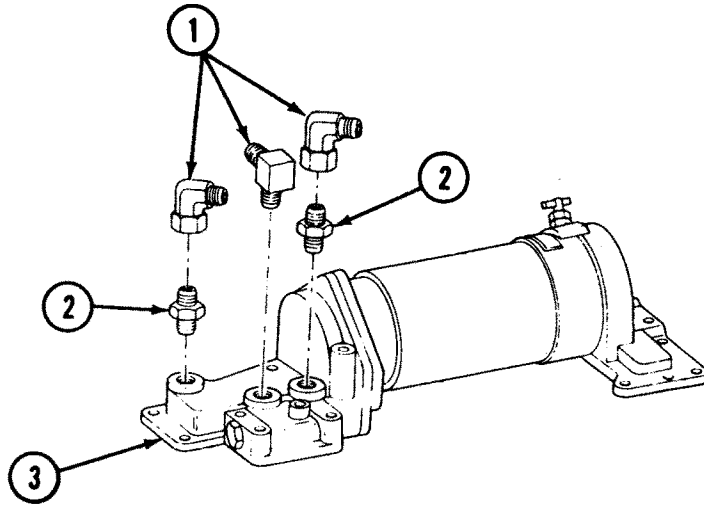
Note location of hose clamps on hoses before removing screws.

- F** Remove seven 1-1/2 in. screw and washer assemblies (19) from engine oil cooler (17).
- G** Remove three 3 in. screw and washer assemblies (20) from engine oil cooler (17).
- G.1** Remove one 3-1/4 in. screw and washer assembly (21) from engine oil cooler (17).

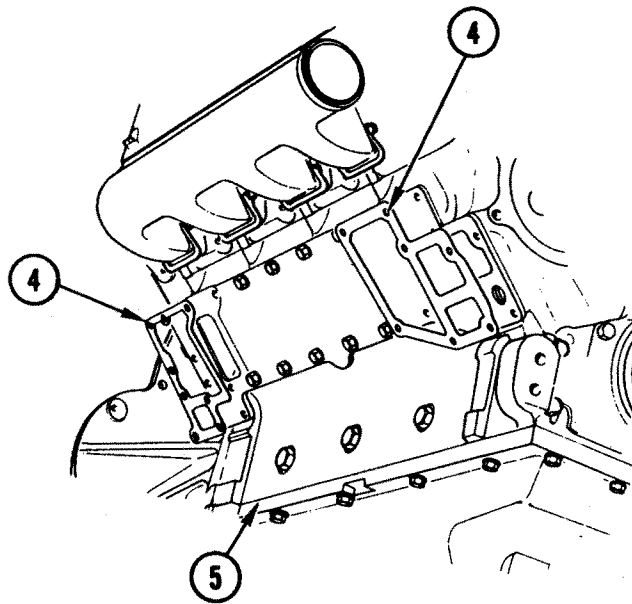
WARNING

Wear gloves when removing oil cooler. Sharp edges may cause injury to personnel.

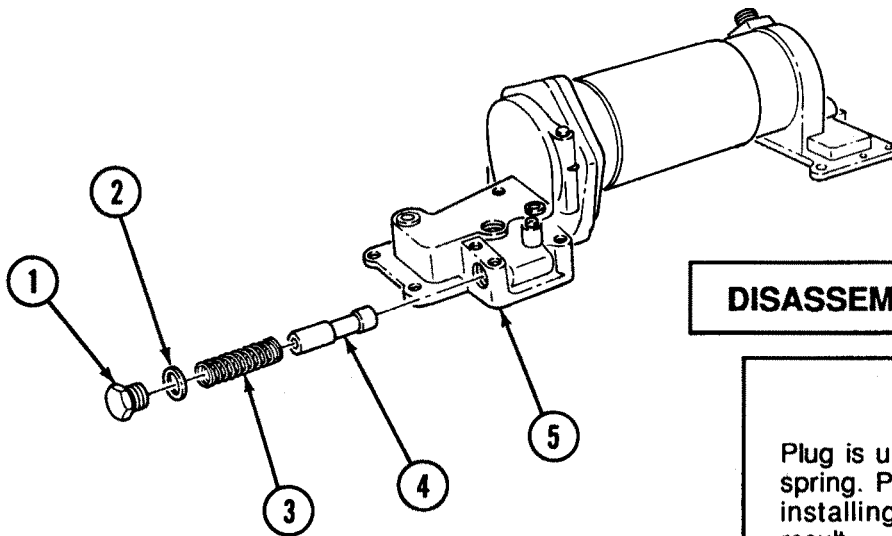
- G.2** Remove four 2-1/4 in. screw and washer assemblies (22) from engine oil cooler (17).
- H** Support engine oil cooler (17) and pry engine oil cooler (17) from engine (23). With helper, guide engine oil cooler (17) out of vehicle.



I Remove three elbows (1) and two adapters (2) from oil cooler (3).



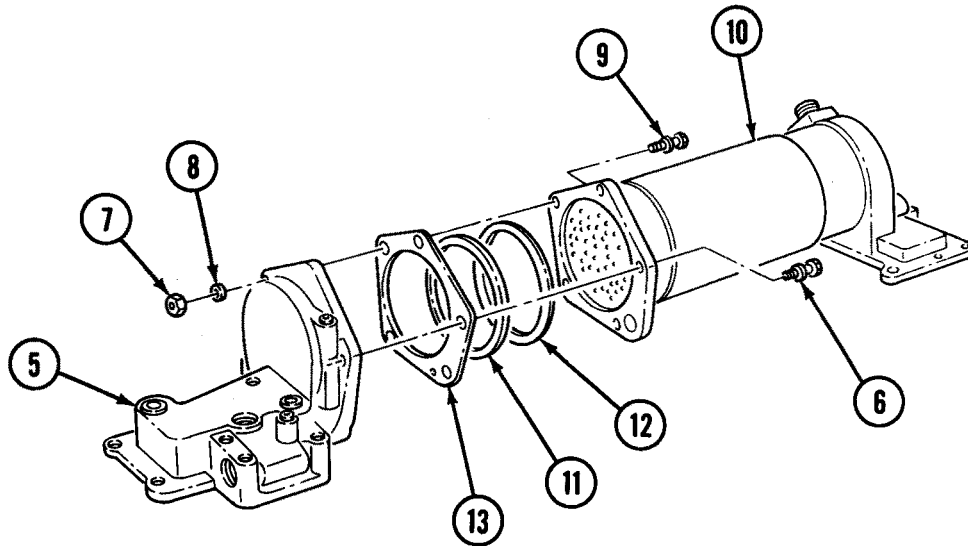
J Remove two gaskets (4) from engine (5). Discard gaskets (4).



DISASSEMBLY

WARNING
 Plug is under tension by compressed spring. Protect eyes while removing/ installing. Injury to personnel may result.

- A** Remove plug (1), gasket (2), spring (3), and plunger (4) from engine oil cooler cover (5). Discard gasket (2) and spring (3).

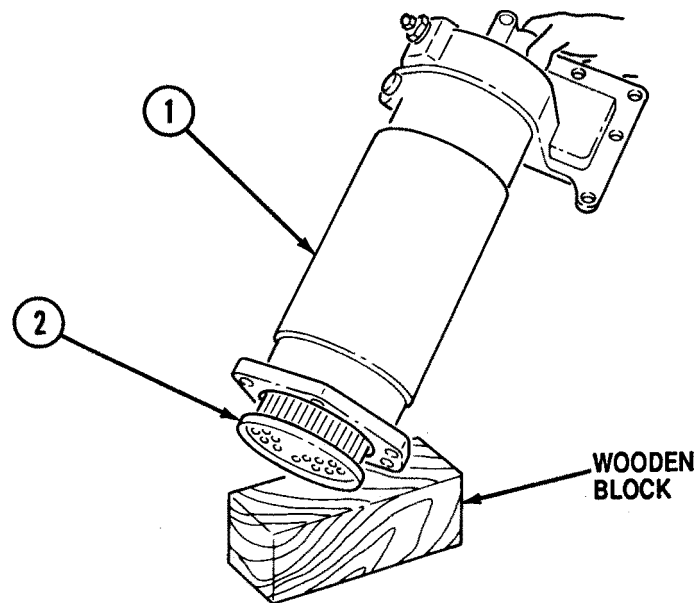


- B** Remove four screw and washer assemblies (6) from oil cooler cover (5).

- C** Remove nut (7), lockwasher (8), and screw and washer assembly (9) securing cover (5) to engine oil cooler (10). Discard lockwasher (8).

- D** Remove cover (5), retaining ring (11), and gasket (13) from engine oil cooler (10). Discard gasket (13).

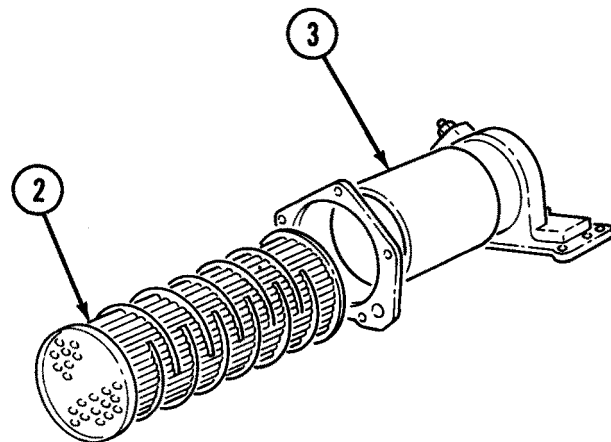
- E** Remove preformed packing (12) from engine oil cooler (10). Discard packing (12).



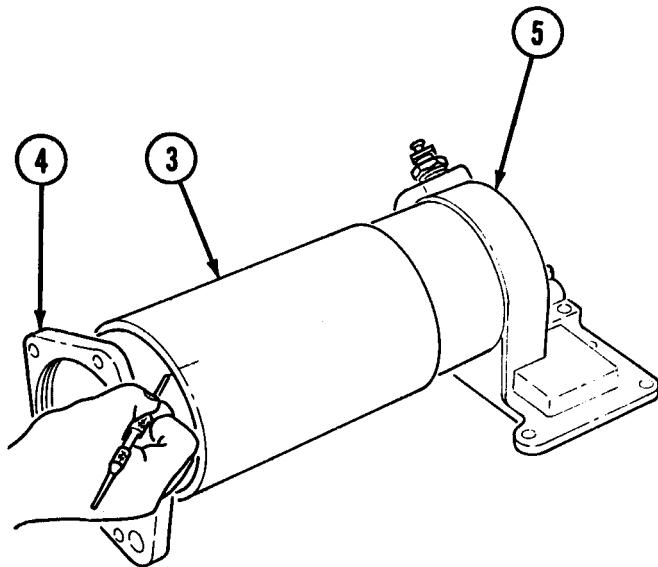
F Tap end of oil cooler (1) on wooden block until element (2) falls free.

CAUTION

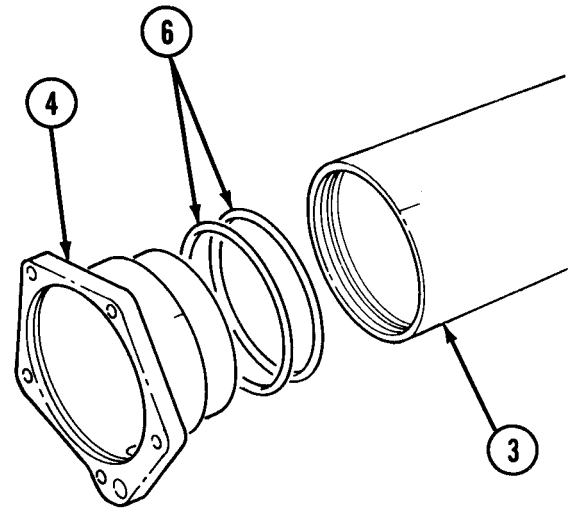
Element must not be reused after an engine failure in which metal particles were circulated through the lubricating system. Reusing element could cause another engine failure.



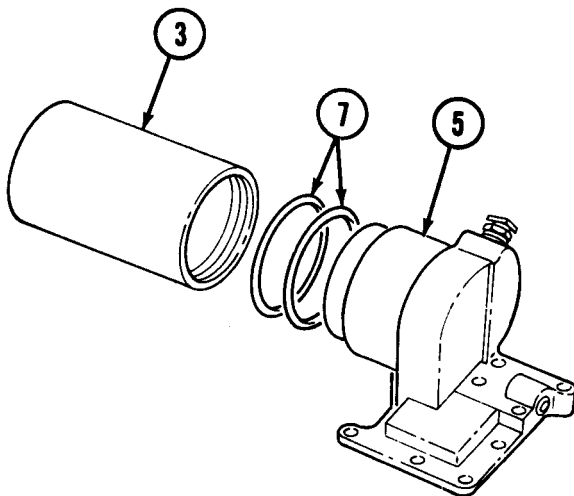
G Withdraw element (2) from oil cooler sleeve (3). If engine failure has caused metal particles to circulate through the lubricating system, replace oil cooler element (2).



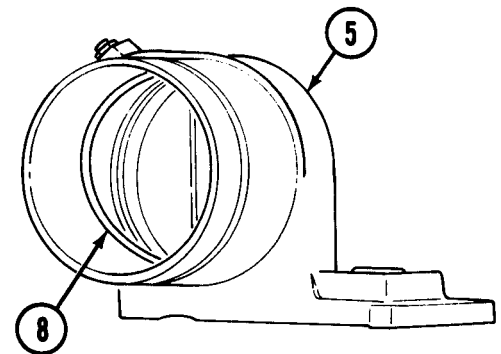
H Scribe an indexing line on adapter (4), both ends of sleeve (3), and housing (5).



- I** Using wooden or leather-faced hammer, drive adapter (4) from oil cooler sleeve (3).
- J** Remove two preformed packings (6) from oil cooler sleeve (3). Discard packings (6).



- K** Using wooden or leather-faced hammer, drive housing (5) from sleeve (3).
- L** Remove two preformed packings (7) from sleeve (3). Discard packings (7).



- M** Remove preformed packing (8) from housing (5). Discard packing (8).

CLEANING

WARNING

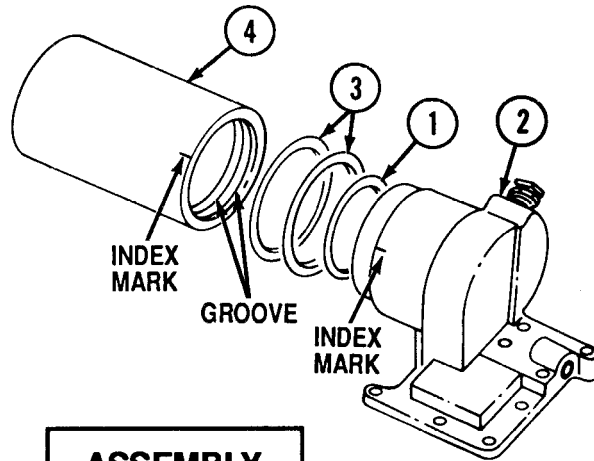
Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to do this may result in injury to personnel or damage to equipment.

- A** Thoroughly clean cover, adapter, sleeve, and housing with solvent.

WARNING

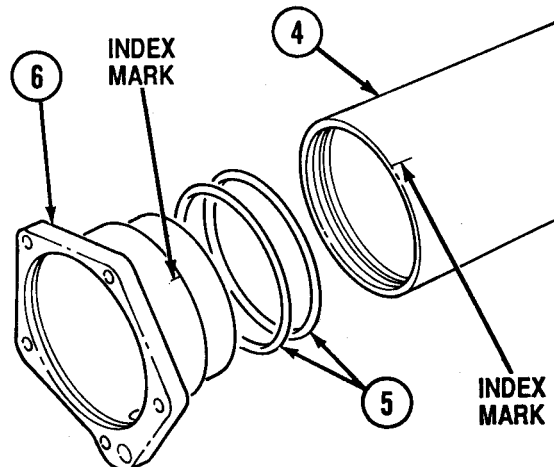
Trichlorethane solvent vapors can be fatal. High concentration of vapors are anesthetic and dangerous to life. Eye irritation and dizziness are signs of inadequate ventilation and dangerous concentration. Use only with adequate ventilation. Avoid prolonged or repeated contact with skin. Do not use in the presence of open flame or sparks.

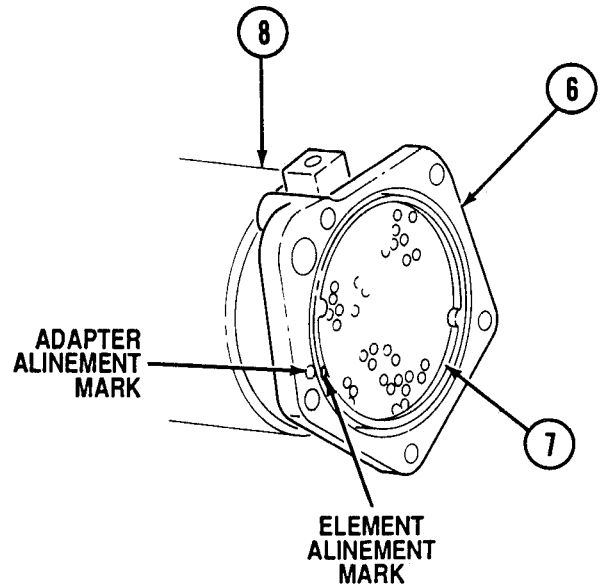
- B** Immerse element in trichlorethane or other approved cleaning agent. Allow element to stand several minutes in cleaning agent.
- C** Use hand-held suction cups or motor-driven pump to force cleaning agent through element tubes.
- D** After cleaning element, flush tubes with clean 30-weight engine oil.



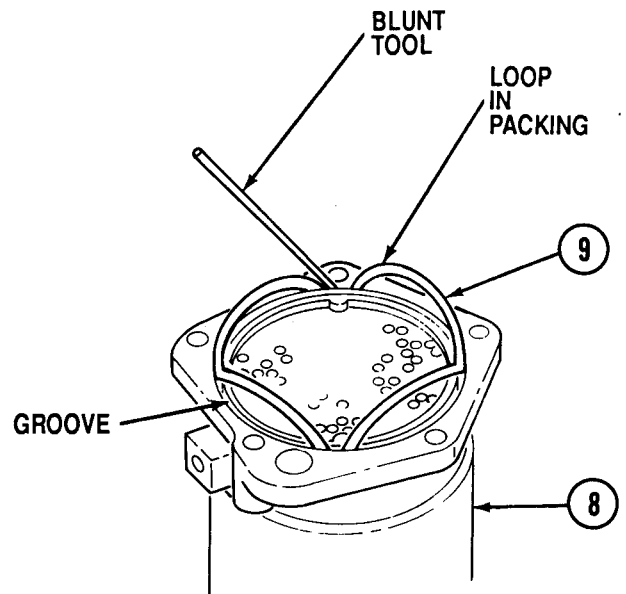
ASSEMBLY

- A** Install preformed packing (1) in housing (2).
- B** Install two preformed packings (3) in grooves of sleeve (4).
- C** Aline index mark on sleeve (4) with index mark on housing (2).
- D** Using wooden or leather-faced hammer, drive housing (2) into sleeve (4). Ensure that sleeve (4) is tight to shoulder on housing (2).
- E** Install two preformed packings (5) in oil cooler sleeve (4).
- F** Aline index mark on adapter (6) with index mark on sleeve (4).
- G** Using wooden or leather-faced hammer, drive adapter (6) into sleeve (4). Ensure that end of sleeve (4) is tight to shoulder on adapter (6).

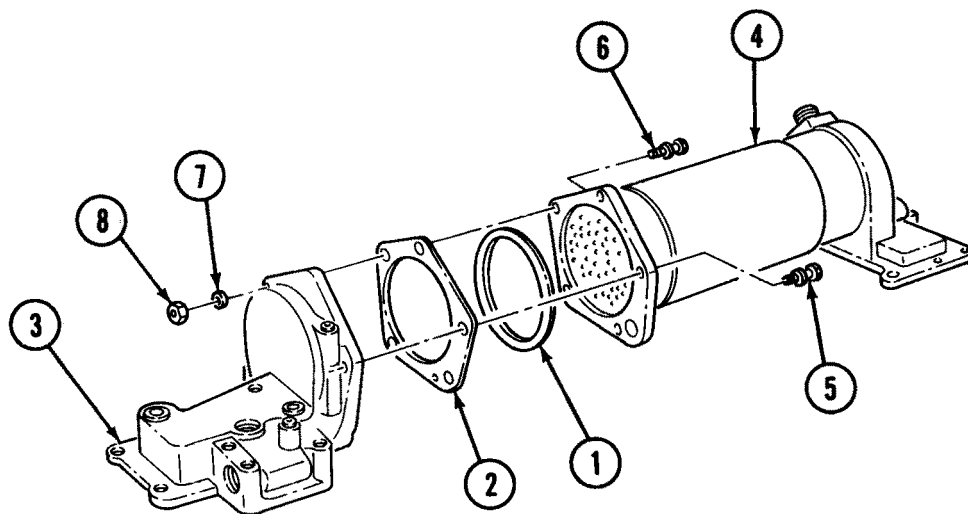




- H** Insert oil cooler element (7) into engine oil cooler (8).
- I** Rotate element (7) until alinement mark on element aligns with alinement mark on adapter (6).
- J** Press element (7) into oil cooler (8) until element seats in preformed packing.



- K** Place preformed packing (9) on end of engine oil cooler (8).
- L** With blunt tool, press packing (9) into groove in oil cooler (8) at two points directly opposite each other so as to form two loops in packing (9).
- M** With blunt tool, press center of each loop of preformed packing (9) into groove in oil cooler (8). Continue this process until all of packing (9) is seated in oil cooler (8) groove.



Note

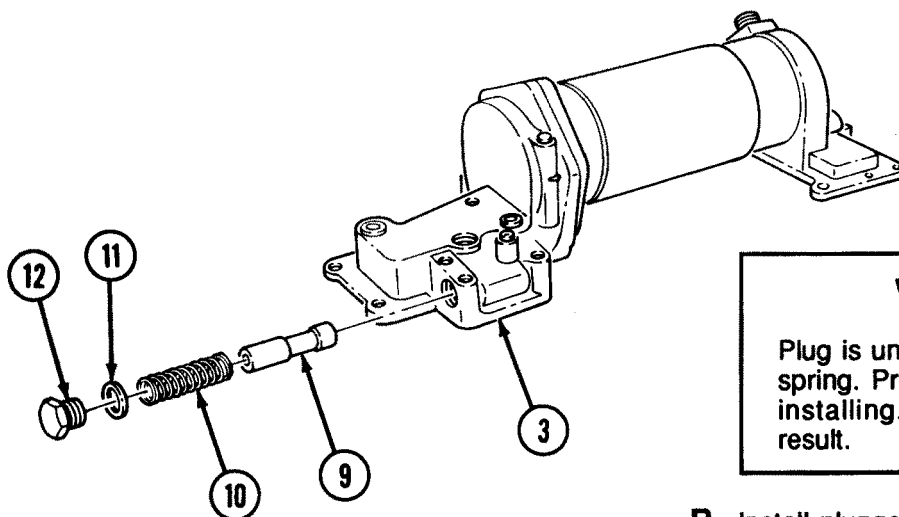
Make sure surfaces are clean before installing gasket.

N Install gasket (2), retainer ring (1), and cover (3) on oil cooler (4). Align screw holes in cover (3), gasket (2), and oil cooler (4).

O Install four screw and washer assemblies (5).

P Install screw (6), washer (7), and nut (8).

Q Tighten screws (5) and (6) alternately to final torque of 35-40 lb-ft (47-54 N-m).



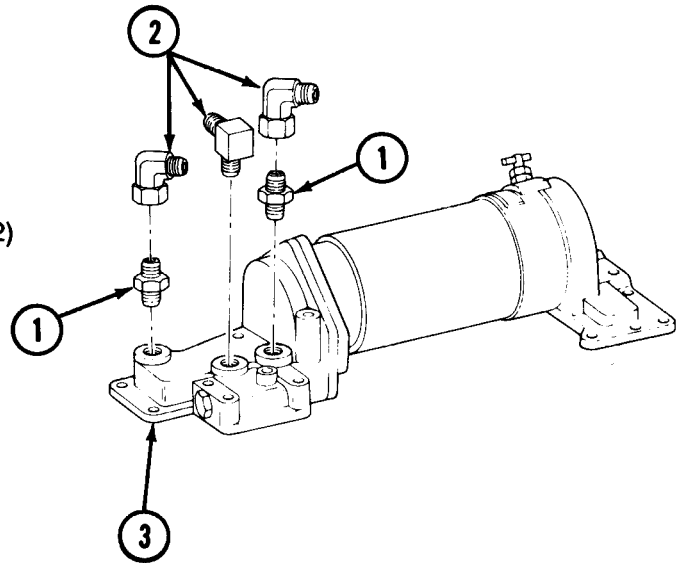
WARNING

Plug is under tension by compressed spring. Protect eyes while removing/installing. Injury to personnel may result.

R Install plunger (9), spring (10), gasket (11), and plug (12) in engine oil cooler cover (3).

INSTALLATION

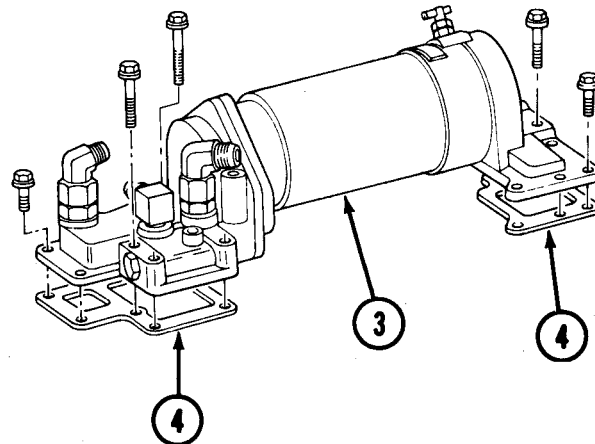
- A** Install two adapters (1) and three elbows (2) on engine oil cooler (3).

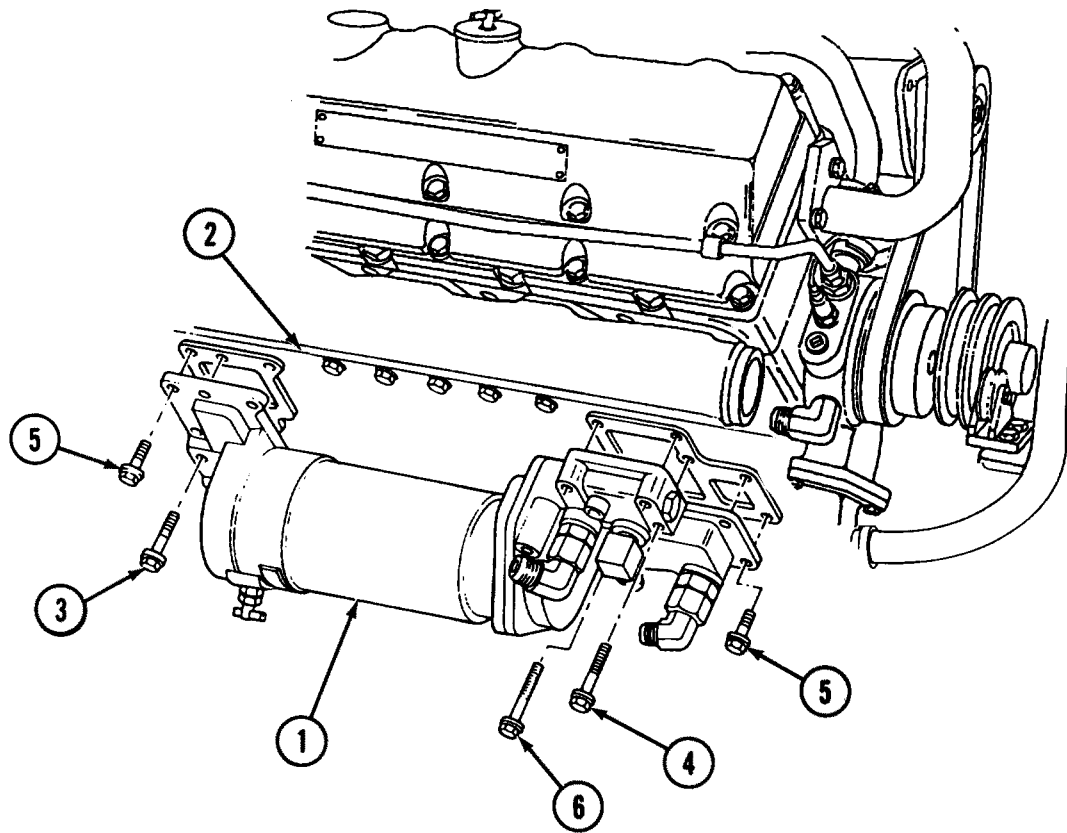


Note

- Make sure surfaces are clean before installing gasket.
- Apply sealing compound lightly to gasket corners only.

- B** Install gaskets (4) on engine oil cooler (3).
Align with screw holes.

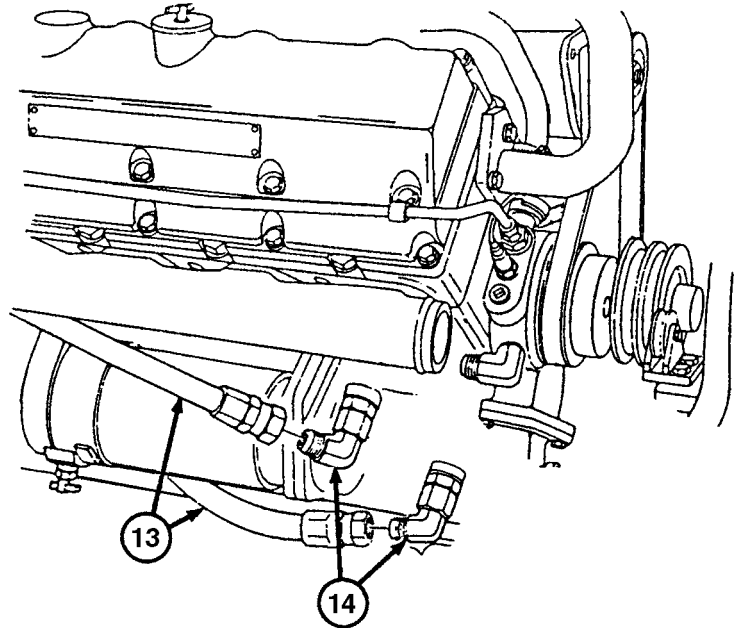




Note

Aline engine oil cooler by inserting screws in holes.

- C With helper, guide engine oil cooler (1) into place on engine (2).
- D Install four 2-1/4 in. screw and washer assemblies (3) in engine oil cooler (1). Tighten screws (3) finger tight.
- E Install three 3 in. screw and washer assemblies (4) in engine oil cooler (1). Tighten screws (4) finger tight.
- F Install seven 1-1/2 in. screw and washer assemblies (5) and one 3-1/4 in. screw and washer assembly (6) in engine oil cooler (1).
- G Tighten all screws to 30-35 lb-ft (41-47 N.m).



H Deleted.

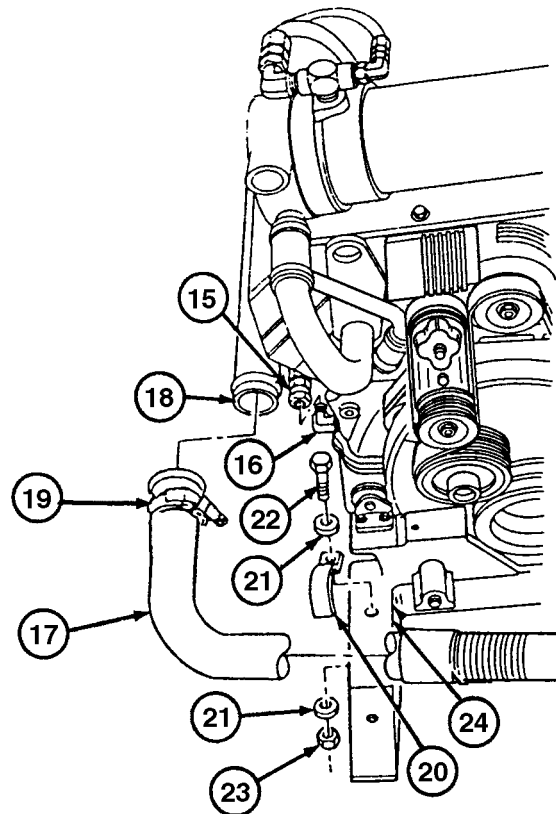
H.1 Deleted.

I Connect hoses (13) to elbows (14).

J Connect heater hose (15) to elbow (16).

K Install exhaust tube (17) on exhaust manifold (18) with clamp (19).

L Install retaining strap (20), washer (21), screw (22), washer (21), and nut (23) and secure exhaust tube (17) to engine accessory bracket (24).



FOLLOW-ON TASKS:

- Install engine oil cooler bypass tube (TM 5-2350-262-20-2).
- Install hull access plate (TM 5-2350-262-20-1).
- Install ejector cylinder (TM 5-2350-262-20-1).
- Install radiator (TM 5-2350-262-20-1).
- Service engine oil (TM 5-2350-262-10).

OIL PAN REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Cleaning
- c. Inspection
- d. Repair
- e. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Materials:

Engine Oil, 30-Weight	Item 16 Appendix C
Sealing Compound	Item 22 Appendix C

Parts:

Gasket

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

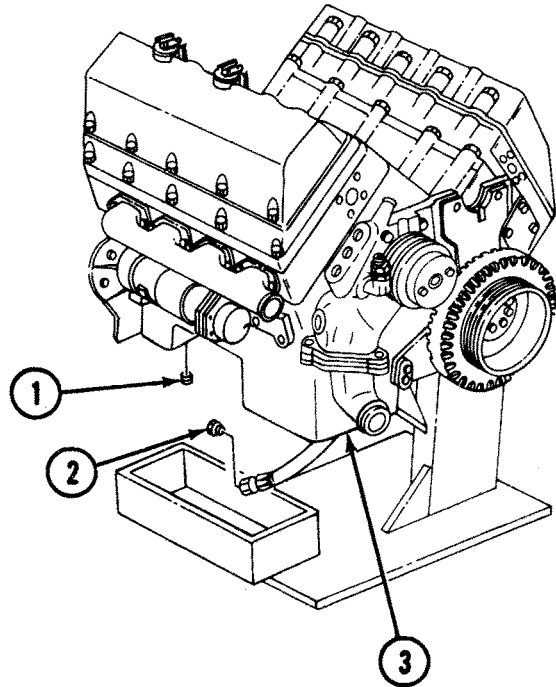
Equipment Condition:

Reference

Page 2-8

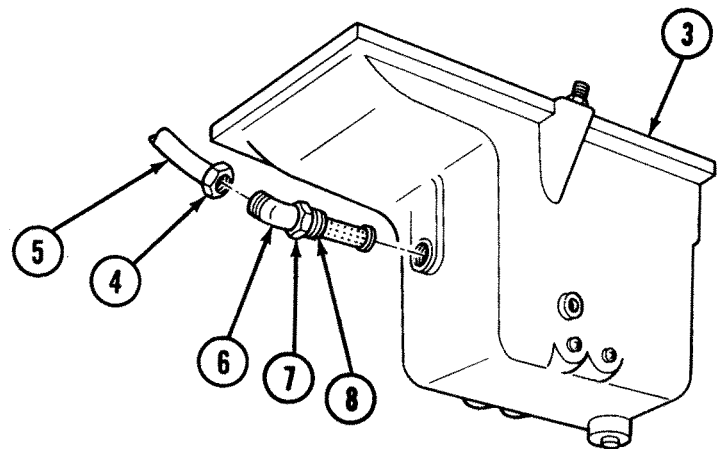
Condition
Description

Engine Mounted
on Stand



REMOVAL

- A** Place suitable container under drain plugs (1) and (2).
- B** Remove drain plugs (1) and (2) from oil pan (3). Drain oil from oil pan (3).



- C** Loosen nut (4) on engine oil cooler bypass tube (5), and disconnect tube (5) from tube elbow (6) on oil pan (3).
- D** Loosen locknut (7) and remove tube elbow (6) from oil pan (3). Check preformed packing (8) for serviceability and replace as necessary.

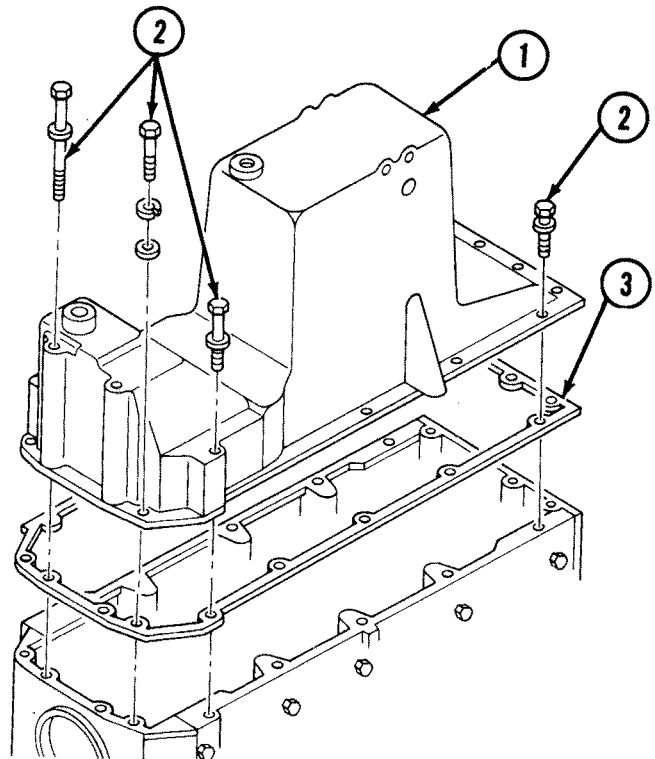
E Invert engine so pan (1) is facing up.

Note

Some screws holding pan to engine are different lengths, and some have screw and washer assemblies, while others have separate lockwashers. Tag location of each type and size to ensure correct installation.

F Remove eighteen screws (2) and pan (1).

G Remove gasket (3).



CLEANING

Follow general cleaning instructions (p 2-2).

INSPECTION

Inspect oil pan for damage.

REPAIR

Repair oil pan by straightening, welding, and/or soldering.

INSTALLATION

Note

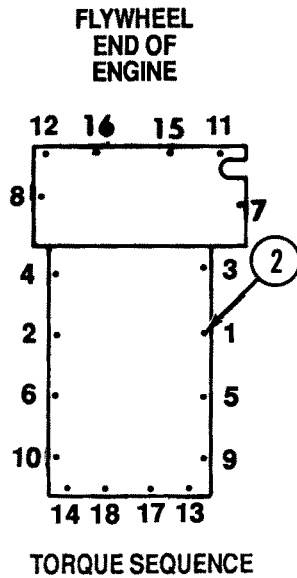
Make sure surfaces are clean before installing gasket.

A Install gasket (3) and pan (1).

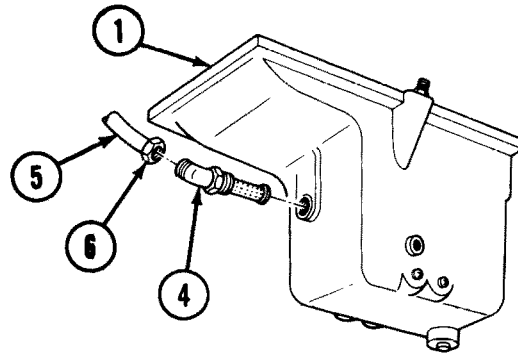
Note

Make sure screws are installed in correct holes.

B Install eighteen screws (2).



C Tighten eighteen screws (2) to 25-30 lb-ft (34-41 N-m). Tighten screws in this order: 1 through 18 (see diagram).



D Turn engine so pan (1) is facing down.

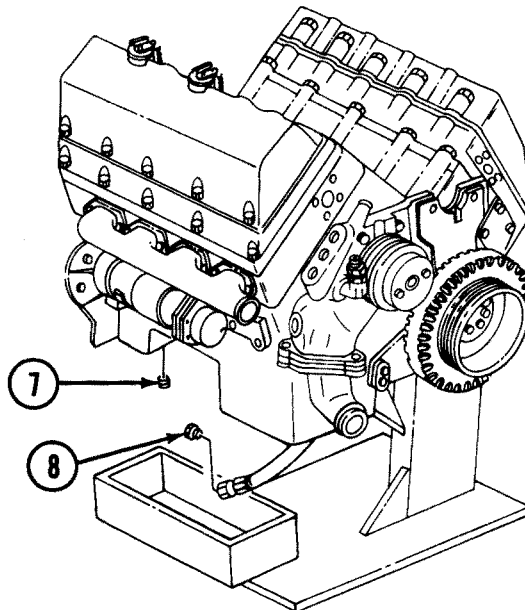
Note

- Apply pipe sealant to threads of all fittings before installation.
- If removed, lubricate new preformed packing with clean 30-weight engine oil before installing.

E Install tube elbow (4) in oil pan (1).

F Connect engine oil cooler bypass tube (5) to elbow (4) and secure with nut (6).

G Tighten locknut (6) on tube elbow (4).



H Install drain plugs (7) and (8).

LEFT WATER HEADER COVER AND GASKET REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

Reference:

TM 5-2350-262-20-2
TM 5-2350-262-34

Parts:

Gasket

Parts Reference:

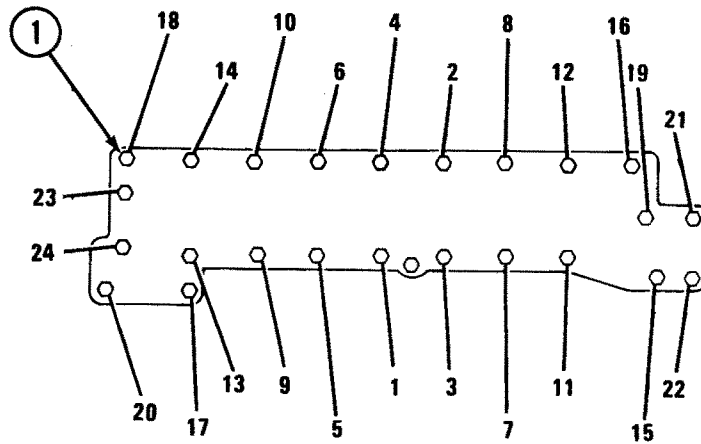
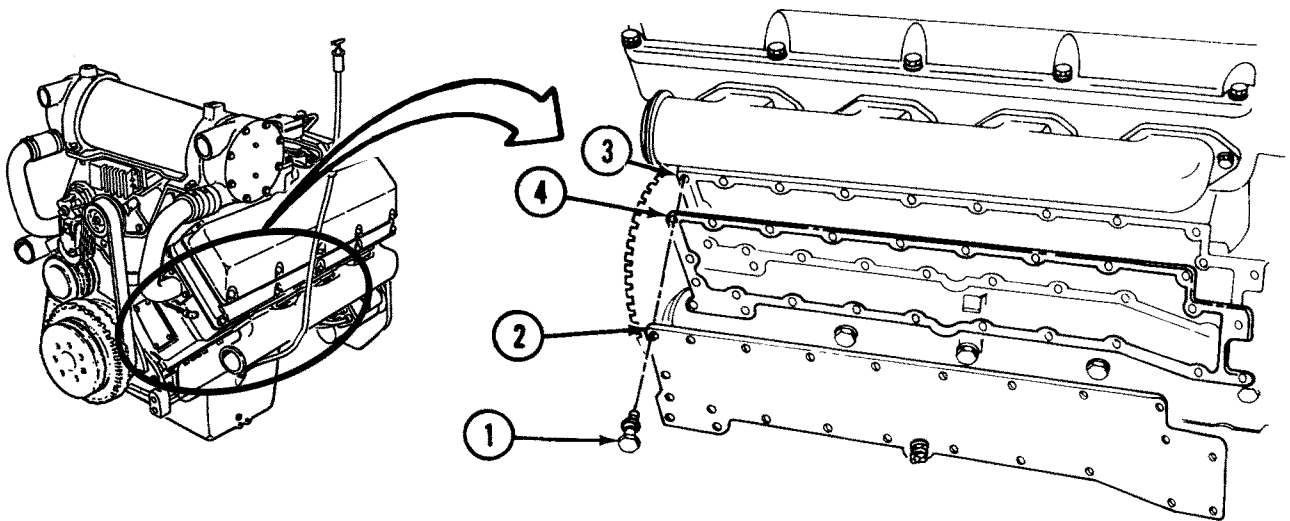
Appendix B

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Starter Removed
TM 5-2350-262-34	Engine Removed

Personnel Required:

Track Vehicle Repairer 63H10



TORQUE SEQUENCE

REMOVAL

- A** Remove twenty-four screw and washer assemblies (1) and cover (2) from engine (3).
- B** Remove gasket (4) from cover (2). Discard gasket (4).

INSTALLATION

Note

Make sure surfaces are clean before installing gasket.

- A** Install gasket (4) and cover (2) on engine (3).
- B** Install twenty-four screw and washer assemblies (1) and secure cover (2) to engine (3).
- C** Tighten twenty-four screw and washer assemblies (1) to 30-35 lb-ft (41-47 N-m) in this order: 1 through 24 (see diagram).

FOLLOW-ON TASKS:

- Install starter (TM 5-2350-262-20-2).
- Install engine (TM 5-2350-262-34).

RIGHT WATER HEADER COVER AND GASKET REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Parts:

Gasket
Lockwasher (9)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

Reference:

TM 5-2350-262-34

Equipment Condition:

Reference

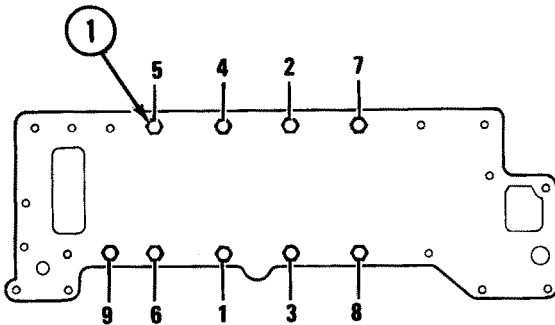
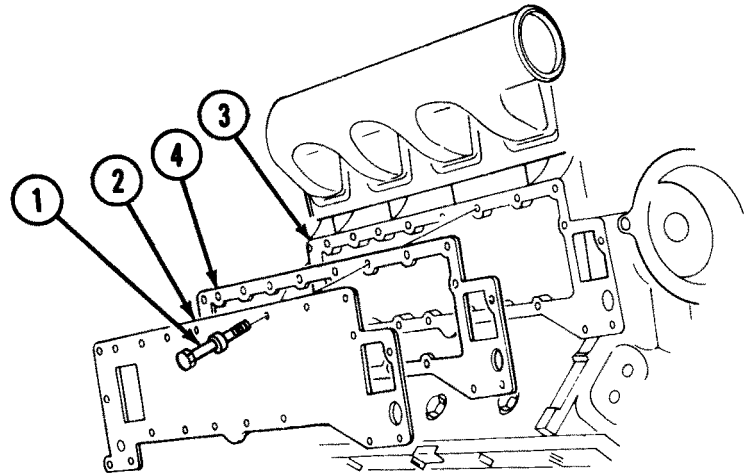
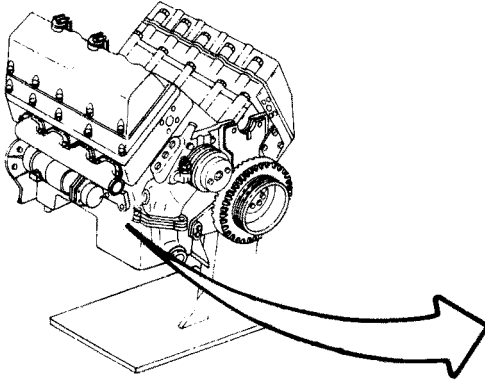
TM 5-2350-262-34

Page 3-76

Condition
Description

Engine Removed

Engine Oil Cooler
Removed



TORQUE SEQUENCE

REMOVAL

- A** Remove nine screw and washer assemblies (1) and cover (2) from engine (3).
- B** Remove gasket (4) from cover (2). Discard gasket (4).

INSTALLATION

Note

Make sure surfaces are clean before installing gasket.

- A** Install gasket (4) and cover (2) on engine (3).
- B** Install nine screw and washer assemblies (1) and secure cover (2) to engine (3).
- C** Tighten nine screw and washer assemblies (1) to 30-35 lb-ft (41-47 N-m) in this order: 1 through 9 (see diagram).

FOLLOW-ON TASKS:

- Install engine oil cooler (p 3-85).
- Install engine (TM 5-2350-262-34).

COOLANT PUMP REPAIR

This task covers:

- a. Disassembly
- b. Cleaning
- c. Inspection
- d. Assembly

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

Special Tools:

Mechanical Puller	5120-00-499-1489
Bearing Mandrel	4910-01-097-6986
Seal Driver	5120-01-128-2671
Bearing Driver	5120-01-128-2782
Seal Driver	5120-01-217-8264
Oil Seal Replacer	5120-01-187-0384
Governor Weight Puller	5120-00-999-1504

Parts:

- Bearing (2)
- Seal (2)
- Packing

Parts Reference:

Appendix B

Materials:

Engine Oil, 30-Weight	Item 16 Appendix C
Sealing Compound	Item 22 Appendix C
Sealing Compound	Item 23 Appendix C
Grease, Water Pump	Item 13 Appendix C

Personnel Required:

Track Vehicle Repairer 63H10

Reference:

- TM 5-2350-262-20-2
- TM 9-214

Equipment Condition:

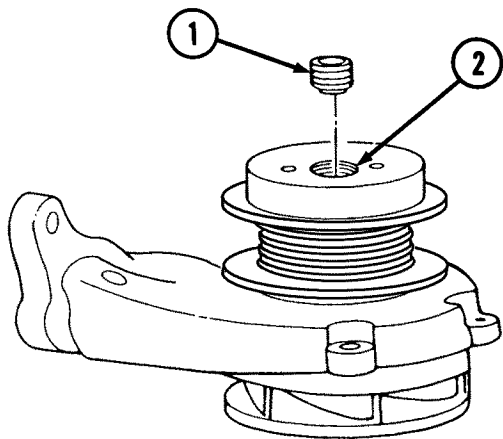
<u>Reference</u>	<u>Condition Description</u>
TM 5-2350-262-20-2	Coolant Pump Removed

General Safety Instructions:

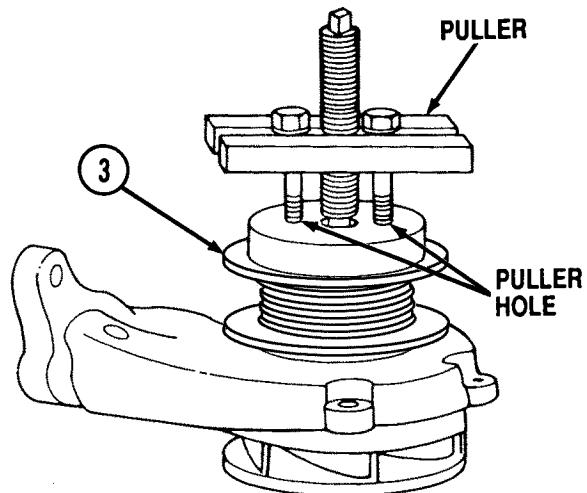
WARNING

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas.
- Compressed air can injure you and others. Do not aim air at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

DISASSEMBLY

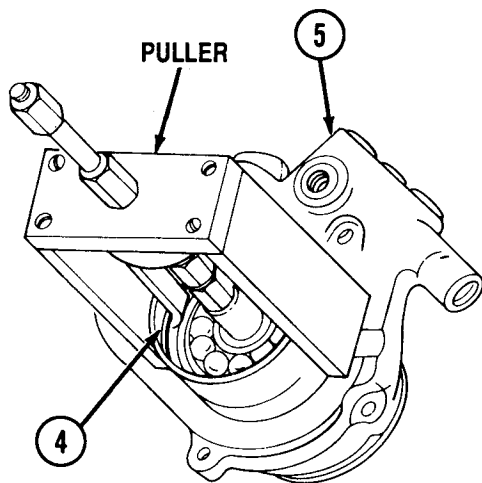


A Unscrew and remove plug (1) from end of shaft (2).



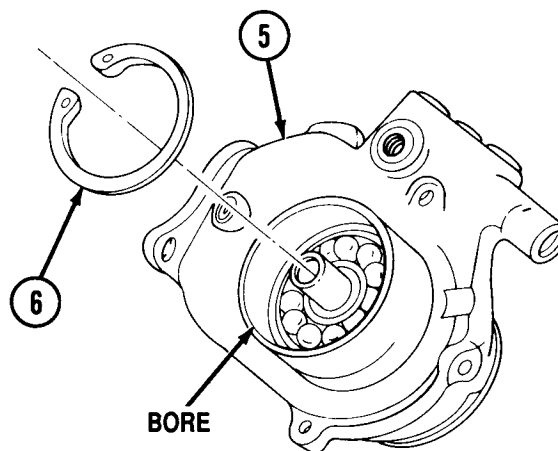
B Attach mechanical puller to two puller holes in pulley (3).

C Remove pulley (3) from shaft using mechanical puller.

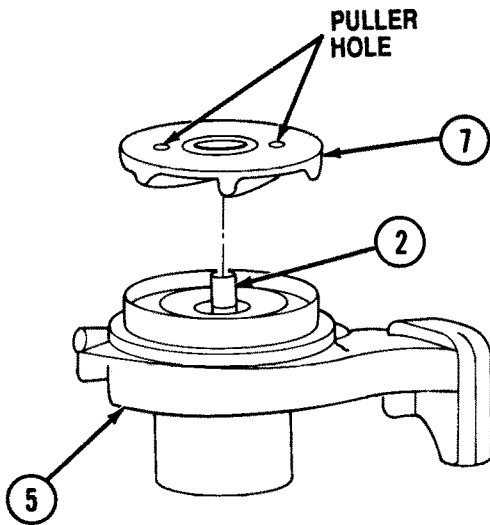


D Reverse jaws on governor weight puller and engage seal (4).

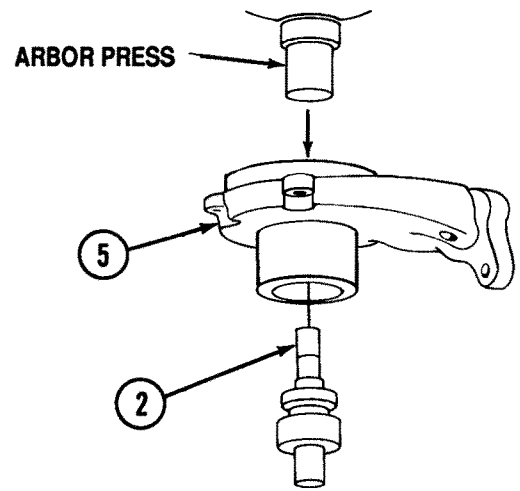
E Remove seal (4) from bore of housing (5) using governor weight puller. Discard seal (4).



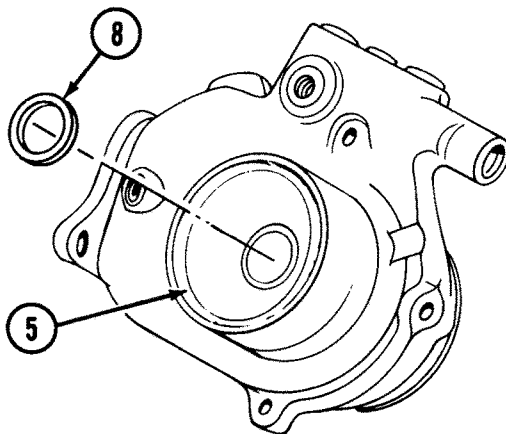
F Using retaining ring pliers, remove retaining ring (6) from bore of housing (5).



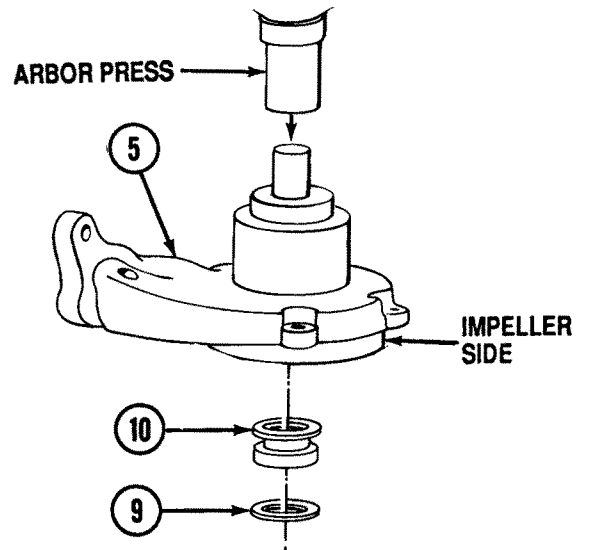
- G** Place housing (5) with impeller (7) facing up on workbench.
- H** Attach mechanical pulier to two puller holes in impeller (7).
- I** Remove impeller (7) from shaft (2) using mechanical puller.



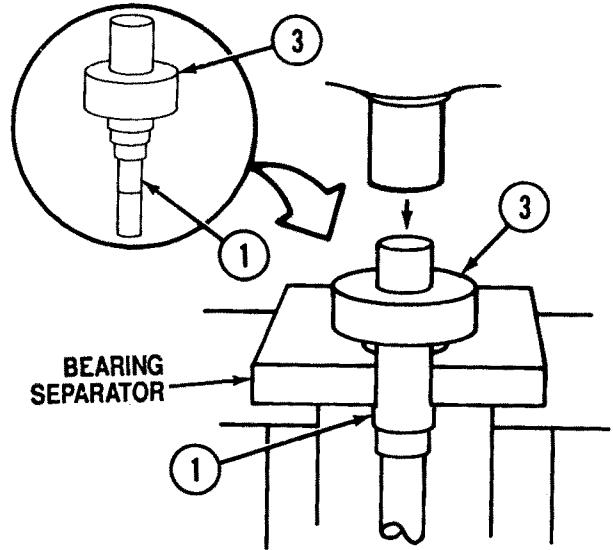
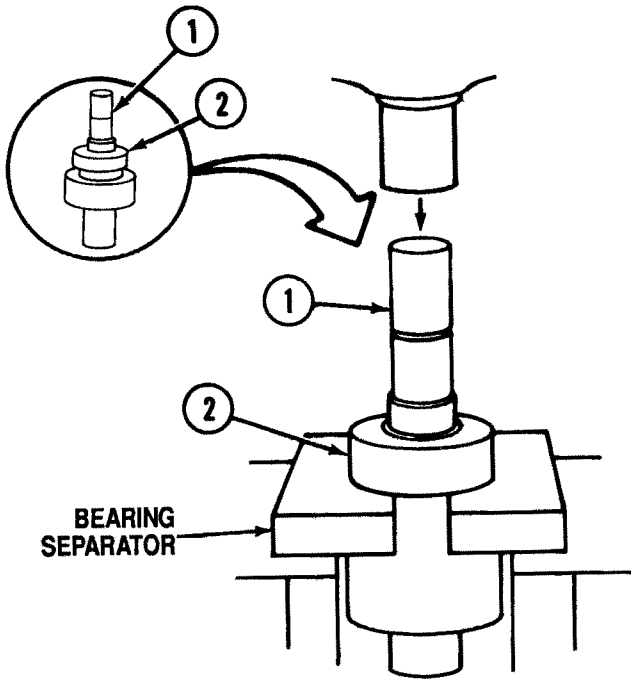
- J** Place housing (5) on arbor press with small end of shaft (2) facing up.
- K** Press shaft (2), with two bearings attached, from housing (5).



- L** Pull seal (8) from recess in bore housing (5). Discard seal (8).



- M** Place housing (5) with impeller side down on arbor press.
- N** Press seat (9) and packing (10) from bore. Discard packing (10).
- O** Remove housing (5) from arbor press.



P Support shaft (1) with small end facing up on arbor press. Use bearing separator.

Q Press shaft (1) from small bearing (2).

R Support shaft (1) with large end facing up on arbor press. Use bearing separator.

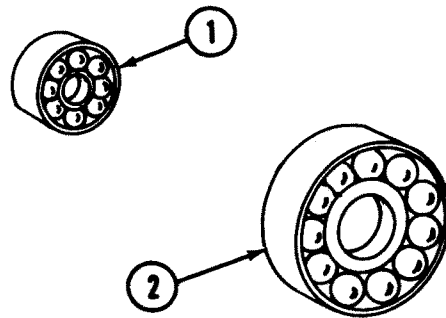
S Press shaft (1) from large bearing (3).

CLEANING

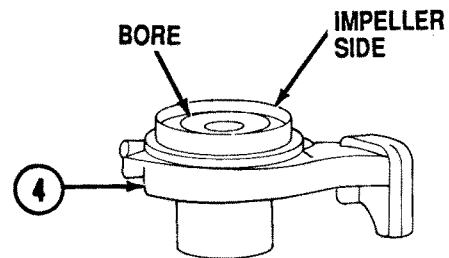
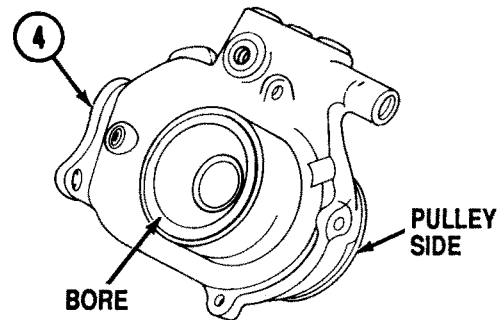
Follow general cleaning instructions (p 2-2).

INSPECTION

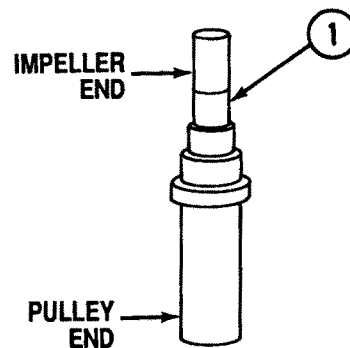
A Inspect two bearings (2) and (3). See TM 9-214. Replace if damaged.



- B** Check housing (4) for cracks, chips, and gouges. Replace pump if housing is damaged.
- C** Take two measurements, 90 degrees apart, of diameter of bore in pulley side of housing (4). Use telescoping gage. If either measurement is more than 2.8431 in. (72.215 mm), replace pump.
- D** Take two measurements, 90 degrees apart, of diameter of bore in impeller side of housing (4). Use telescoping gage. If either measurement is more than 2.0557 in. (52.215 mm), replace pump.

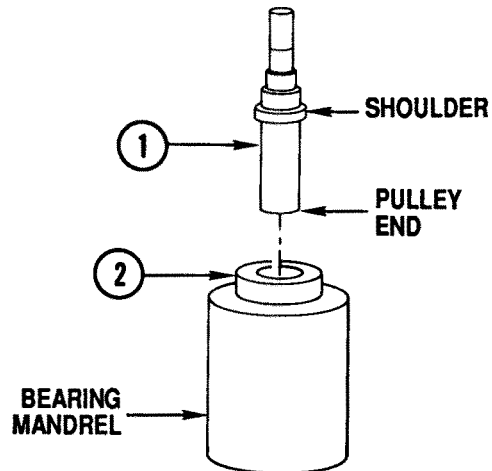


- E** Take two measurements, 90 degrees apart, of diameter of impeller end of shaft (1). Use 0-1 in. outside micrometer. If either measurement is less than 0.6262 in. (15.905 mm), replace shaft (1).
- F** Take two measurements, 90 degrees apart, of diameter of pulley end of shaft (1). Use 1-2 in. outside micrometer. If either measurement is less than 1.181 in. (29.997 mm), replace shaft (1).

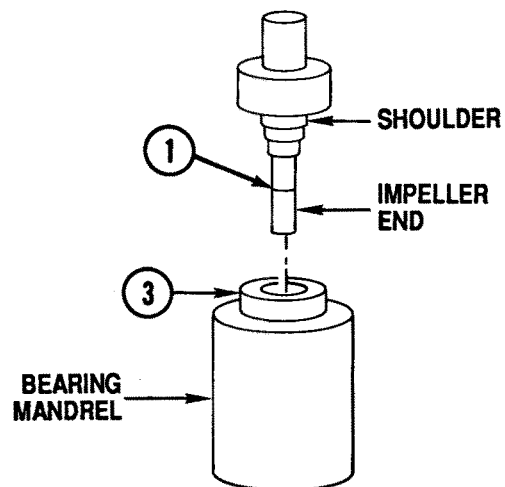


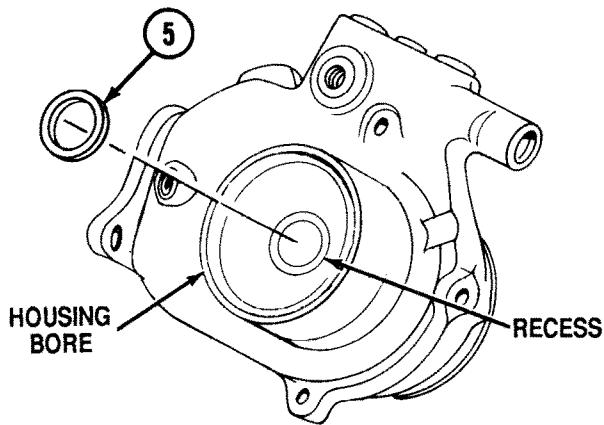
ASSEMBLY

- A** Apply thin coat of clean 30-weight engine oil to pulley end of shaft (1).
- B** Place bearing mandrel on arbor press with large bearing (2) on top.
- C** Insert pulley end of shaft (1) into large bearing (2). Aline and press shaft (1) until shoulder of shaft (1) seats against large bearing (2).



- D** Apply thin coat of clean 30-weight engine oil to impeller end of shaft (1).
- E** Place bearing mandrel on arbor press with small bearing (3) on top.
- F** Insert impeller end of shaft (1) into small bearing (3). Aline and press shaft (1) until shoulder of shaft (1) seats against small bearing (3).



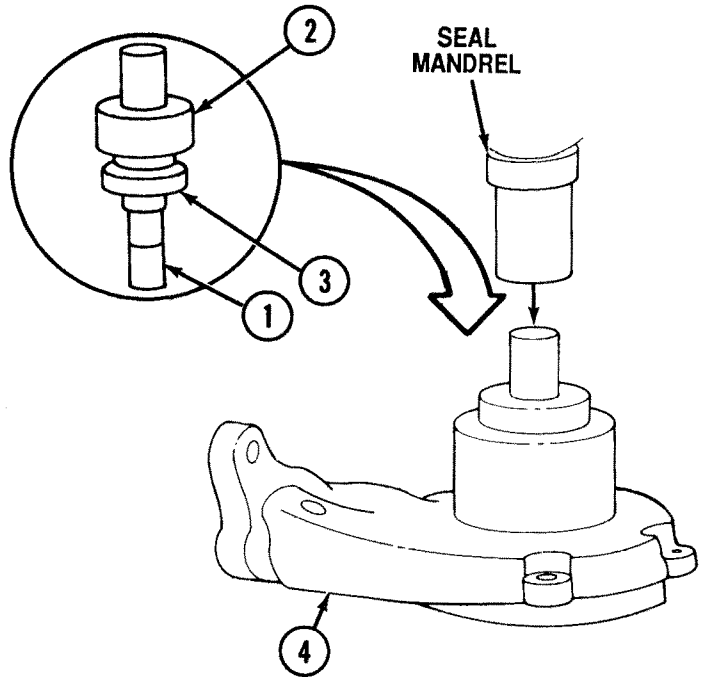


G Place housing (4) with impeller side down on arbor press.

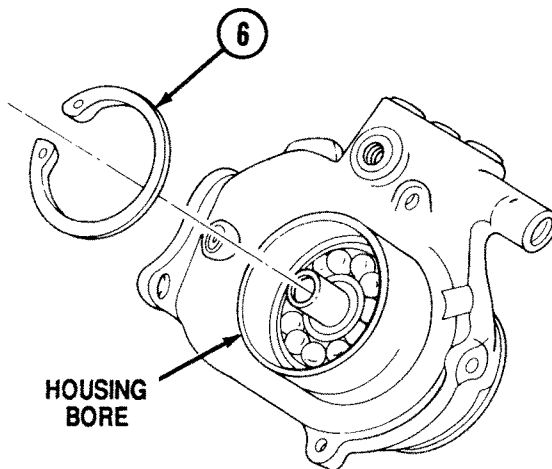
H Apply sealing compound to outer races of two bearings (2) and (3).

I Place seal (5) in recess at bottom of housing bore.

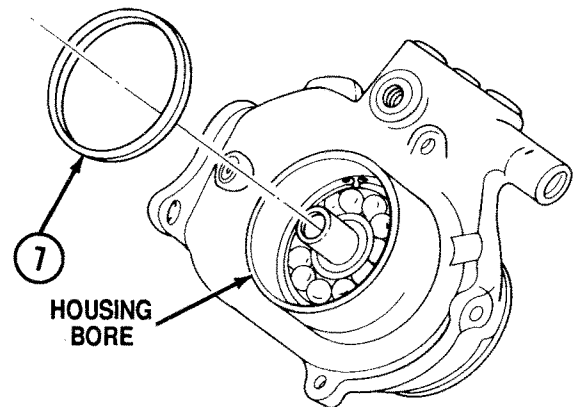
I.1 Using seal driver, press seal (5) into housing bore until firmly seated.



J Insert shaft (1), with small bearing (3) down, into housing bore. Press shaft (1) down until firmly seated. Use oil seal replacer and arbor press.

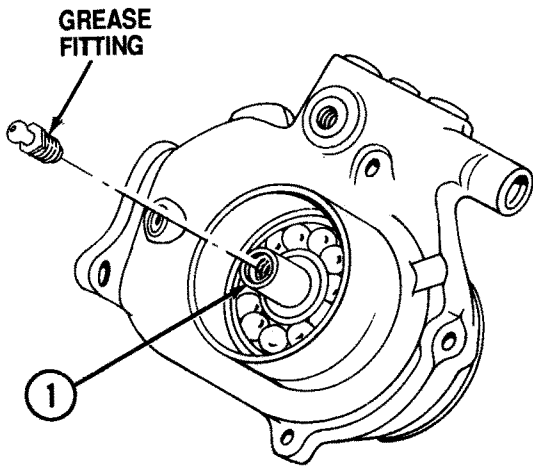


K Install retaining ring (6) in recess in housing bore. Use retaining ring pliers.

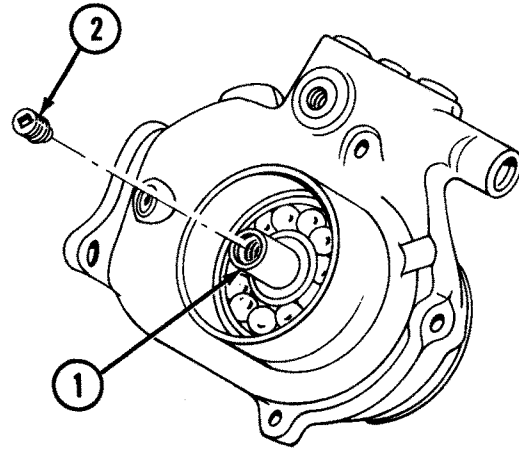


L Place seal (7) in housing bore.

M Press seal (7) down until flush with top edge of housing bore. Use seal driver and arbor press.



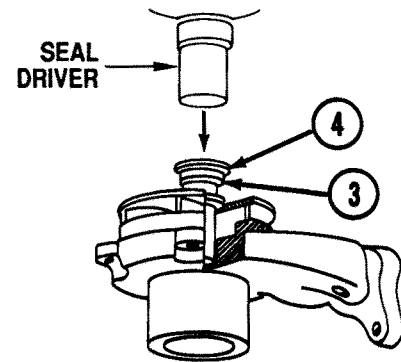
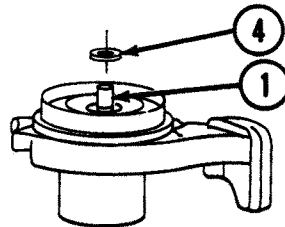
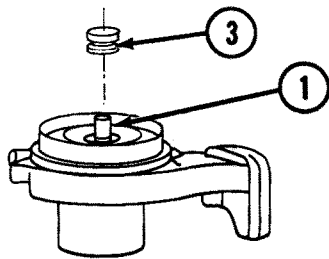
- N** Install clean grease fitting in pulley end of shaft (1).
- O** Fill pump with water pump grease until upper cavity is full. Remove grease fitting.



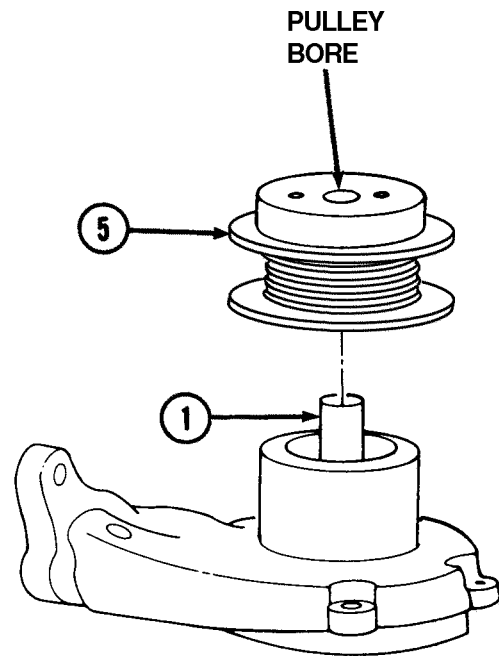
Note

Apply pipe sealant to threads of all fittings before installation.

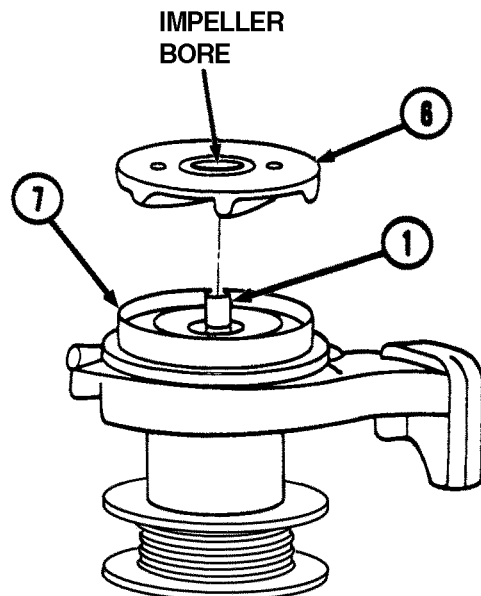
- P** Install plug (2) in pulley end of shaft (1). Tighten plug (2).



- Q** Place pump with impeller end up on arbor press.
- R** Apply pipe sealant to brass case on new packing (3). Place packing (3) with brass side up on impeller end of shaft (1), and push down to housing bore.
- S** Place seat (4) with ceramic side down over shaft (1) and on top of packing (3).
- T** Press packing (3) and seat (4) into housing bore. Use arbor press and seal driver.



- U** Place pump with impeller side down on arbor press.
- V** Apply sealing compound to pulley bore.
- W** Place pulley (5) on shaft (1). Press pulley down on shaft (1) until flush with end of shaft (1).



- X** Place pump with pulley side down on arbor press.
- Y** Apply sealing compound to impeller bore. Place impeller (6) with vane side down on shaft (1).
- Z** Using arbor press, press impeller (6) onto shaft (1). Using thickness gage, leave clearance of 0.020-0.040 in. (0.508-1.016 mm) between impeller vanes and housing (7).

FOLLOW-ON TASK:
Install coolant pump (TM 5-2350-262-20-20).

VIBRATION DAMPER/CRANKCASE FRONT COVER AND SEAL REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

Special Tools:

Oil Seal Puller/Installer 5120-01-128-2867

Materials:

Engine Oil, 30-Weight Item 16 Appendix C

Parts:

Gasket

Seal

Lockwasher (13)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

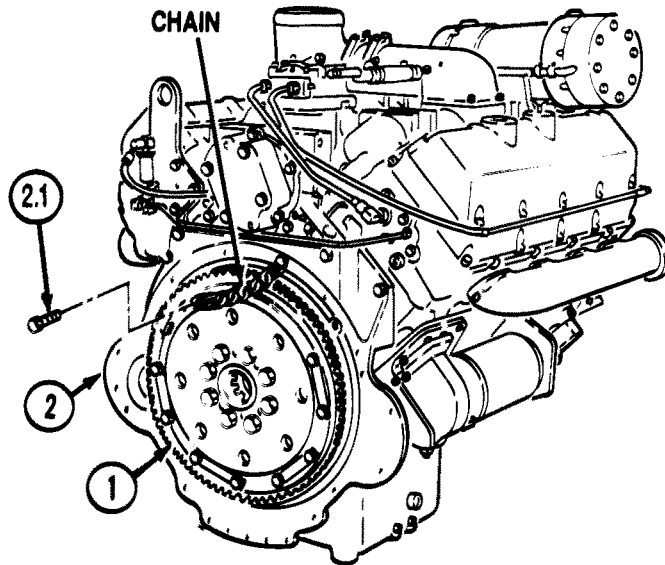
Reference:

TM 5-2350-262-20-2

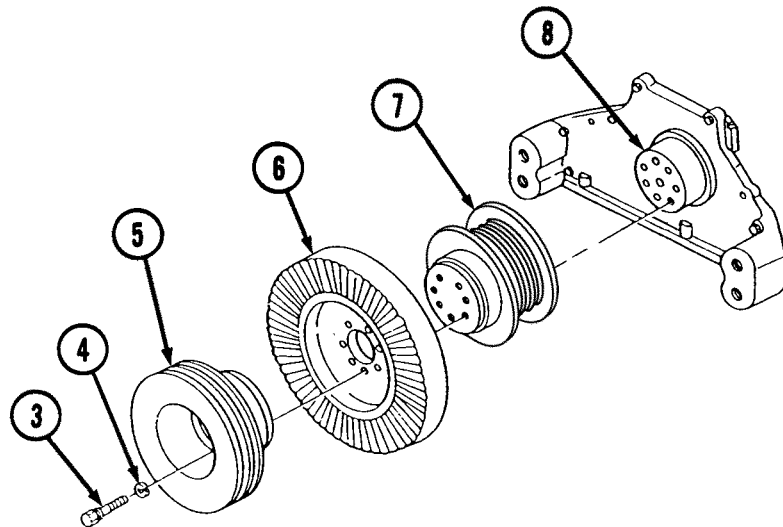
Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 2-8	Engine Mounted on Stand
Page 3-89	Engine Oil Pan Removed
TM 5-2350-262-20-2	Alternator and Coolant Pump Belts Removed
TM 5-2350-262-20-2	Coolant Pump Removed
TM 5-2350-262-20-2	Fan Belt Removed

REMOVAL



A Install chain on flywheel (1) and adapter (2) using two screws (2.1) to prevent engine from turning.



B Remove seven screws (3), lockwashers (4), sheave (5), and vibration damper (6) from pulley (7). Discard lockwashers (4).

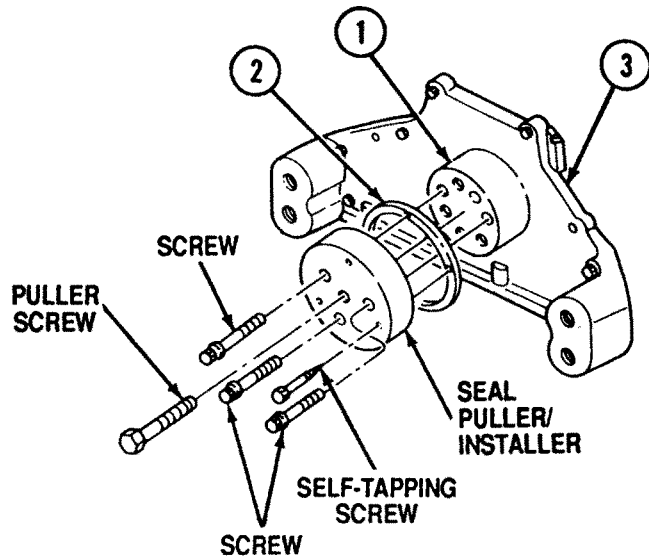
C Using prybar, remove pulley (7) from crankshaft (8).

- D** Place seal puller/installer on end of crankshaft (1) with screw holes aligned.
- E** Install three screws. Tighten screws.
- F** Thread puller screw into center hole.

Note

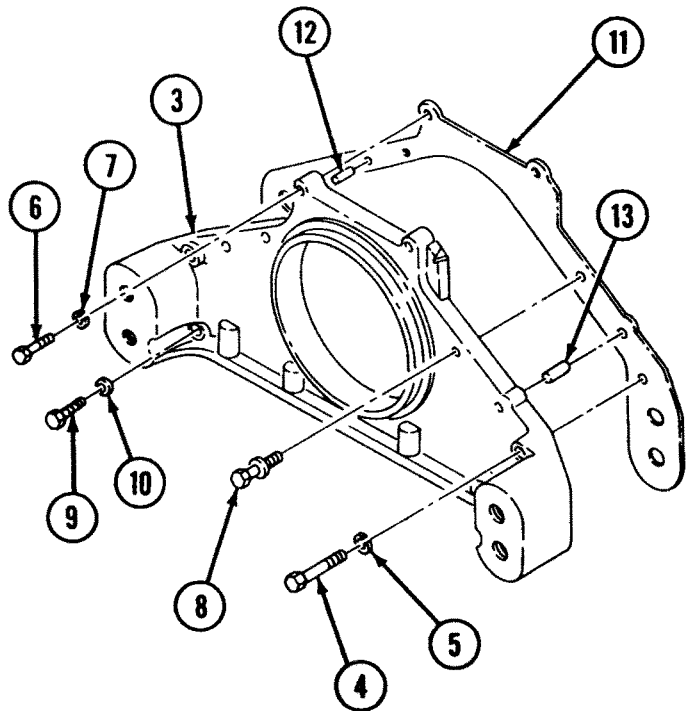
Seal puller/installer must be firmly attached to end of crankshaft so that self-tapping screws can penetrate seal.

- G** Thread three self-tapping screws through puller/installer and into seal (2). Leave 1/2 in. of threads exposed.
- H** Remove three screws installed in step E.
- I** Tighten puller screw until seal (2) is pulled out of cover (3).

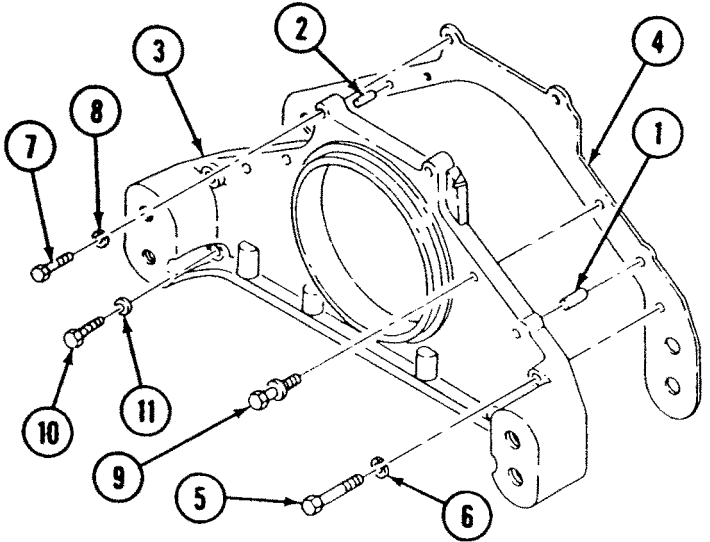
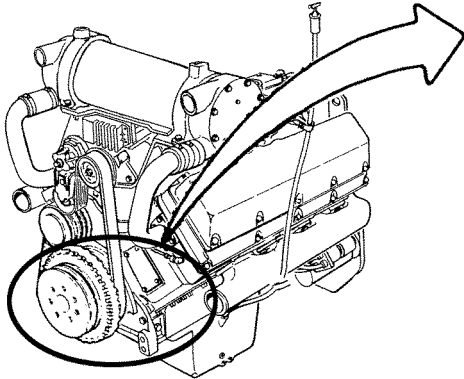


- J** Remove three self-tapping screws.
- K** Remove puller screw and puller.
- L** Discard seal (2).

- M** Remove two screws (4) and lockwashers (5) from cover (3). Discard lockwashers (5).
- N** Remove two screws (6) and lockwashers (7) from cover (3). Discard lockwashers (7).
- O** Remove two screw and washer assemblies (8) from cover (3).
- P** Remove two screws (9) and lockwashers (10) from cover (3). Discard lockwashers (10).
- Q** Remove cover (3), gasket (11), pin (12), and dowel (13). Discard gasket (11).



INSTALLATION



A Install dowel (1) and pin (2) in cover (3).

Note

Make sure surfaces are clean before installing gasket.

B Install gasket (4) on cover (3).

C Install two screws (5) and lockwashers (6) on cover (3).

D Install two screws (7) and lockwashers (8).

E Install two screw and washer assemblies (9).

F Install two screws (10) and lockwashers (11).

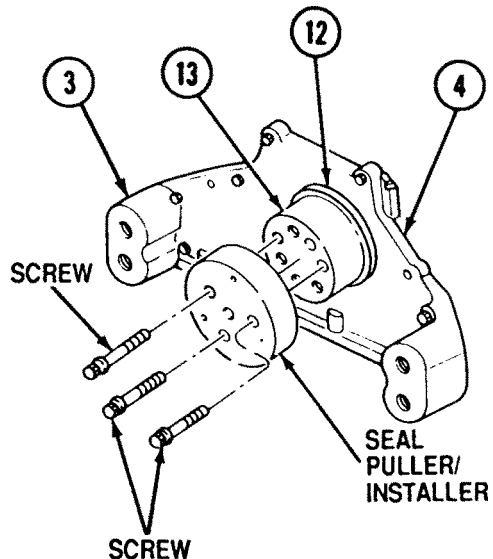
G Tighten all screws to 180-200 lb-ft (244-271 N-m).

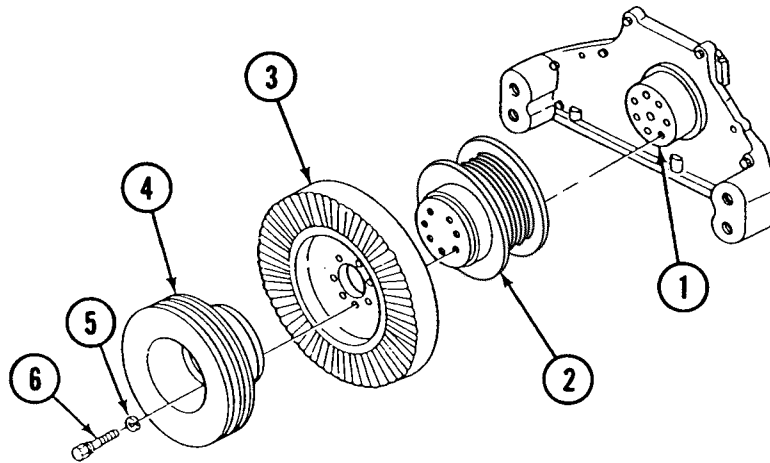
H Slide seal (12) over crankshaft (13) with lips of seal facing cover (3). Make sure crankshaft (13) and seal (12) are free of oil.

I Place seal puller/installer on end of crankshaft (13) with screw holes aligned.

J Install three screws on cover (3). Tighten screws evenly until puller/installer bottoms out.

K Remove three screws and puller/installer from crankshaft (13).





L Apply light coat of clean engine oil to crankshaft (1).

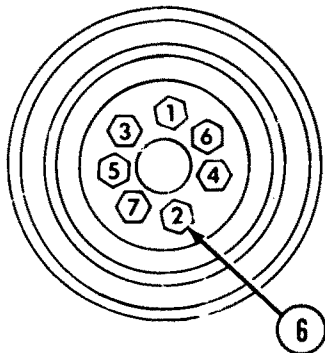
Note

Holes will only align in one position.

M Place pulley (2) on crankshaft (1) with screw holes aligned.

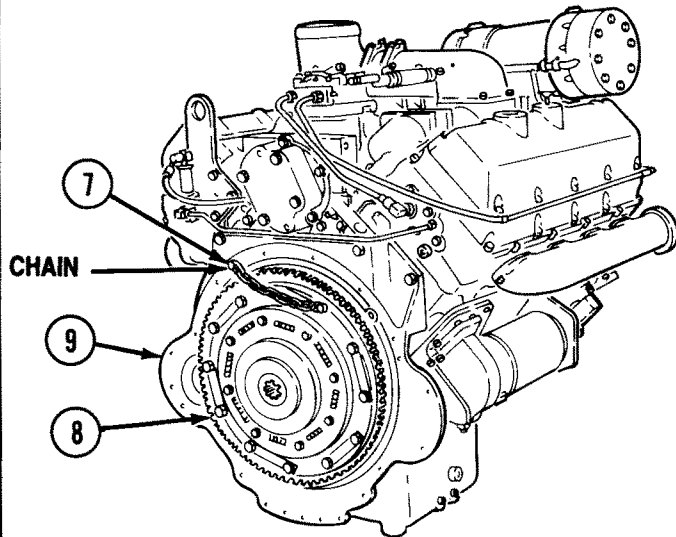
N Place vibration damper (3) and sheave (4) against pulley (2) on end of crankshaft (1) with screw holes aligned.

O Install seven lockwashers (5) and screws (6). Tighten screws (6).



TORQUE SEQUENCE

P Tighten seven screws (6) to 200-205 lb-ft (271-278 N-m). Tighten screws in this order: 1 through 7 (see diagram).



Q Remove two screws (7) and chain from flywheel (8) and adapter (9). Install screws (7) on flywheel (8). Tighten screws (7) to 26-31 lb-ft (35-42 N-m).

FOLLOW-ON TASKS:

- Install fan belt (TM 5-2350-262-20-2).
- Install coolant pump (TM 5-2350-262-20-2).
- Install alternator and coolant pump belts (TM 5-2350-262-20-2).
- Install engine oil pan (p 3-89).
- Remove engine from maintenance stand (p 2-9).

CRANKSHAFT REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

Lifting Device

Special Tools:

Dial Indicator 5210-00-277-8840

Materials:

Oil, 30-Weight Item 16
Appendix C

Parts:

- Thrust Bearing (4)
- Lower Bearing Shell (5)
- Upper Bearing Shell (5)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

Equipment Condition:

Reference

Page 3-76

Page 3-64

Page 3-187

Page 3-179

Page 3-138

Condition Description

Engine Oil Cooler Removed

Oil Pump Removed

Cylinder Heads Removed

Camshaft Removed

Pistons and Connecting Rods Removed

General Safety Instructions:

WARNING

Personnel must stand clear during lifting operations.

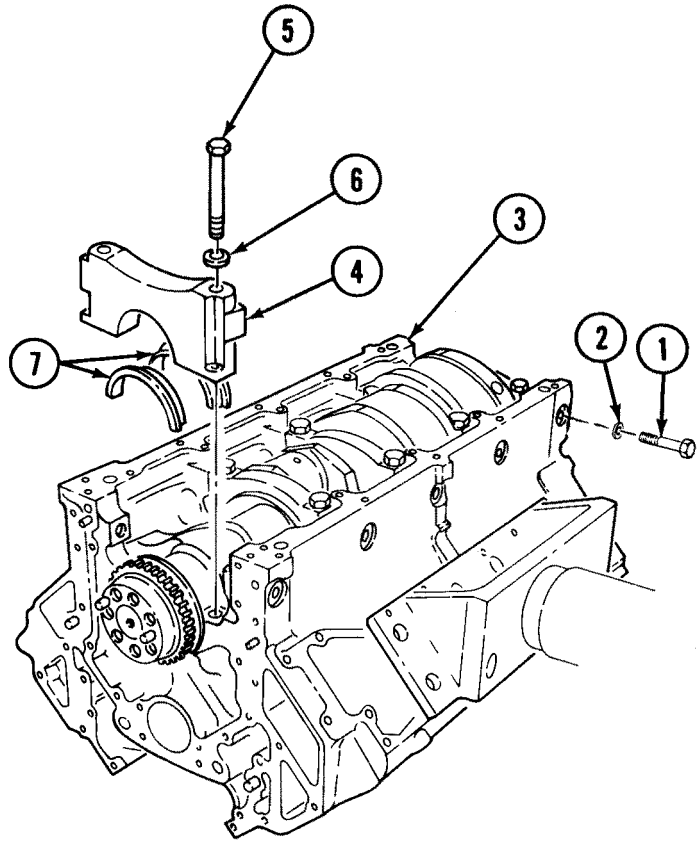
REMOVAL

- A** Remove five screws (1) and washers (2) on each side of engine block (3) that secure bearing caps (4) to sides of engine block (3).
- B** Remove two screws (5) and washers (6) from each bearing cap (4).

CAUTION

Bearing caps are not interchangeable. Ensure each bearing cap is installed in same location from which it was removed, or damage to engine will result.

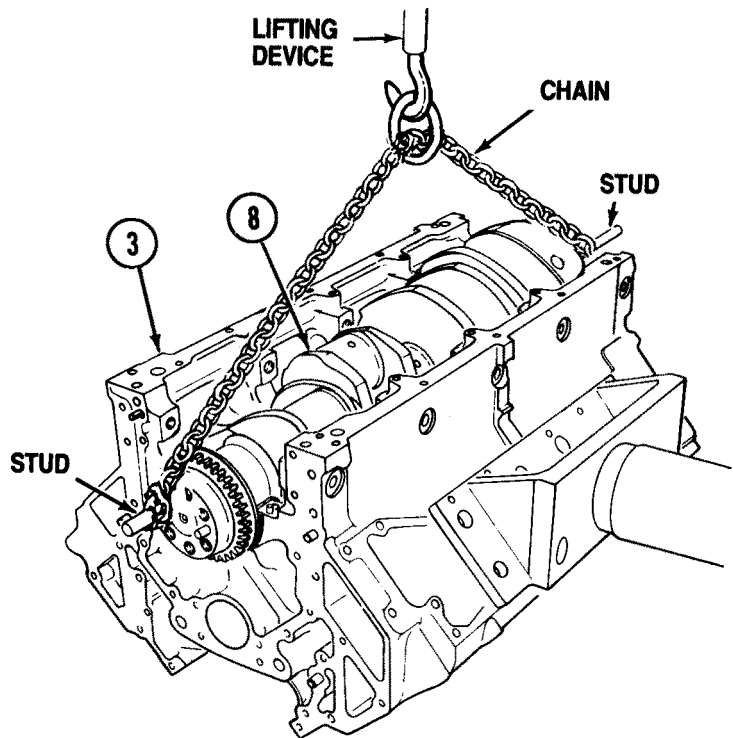
- C** Mark each bearing cap (4) so that it will be reinstalled in the same location.
- D** Remove rear main bearing cap (4) and four thrust bearings (7) from engine block (3). Top thrust bearings can be rolled out from engine block. Discard thrust bearings (7).
- E** Remove four remaining main bearing caps (4) from engine block (3).

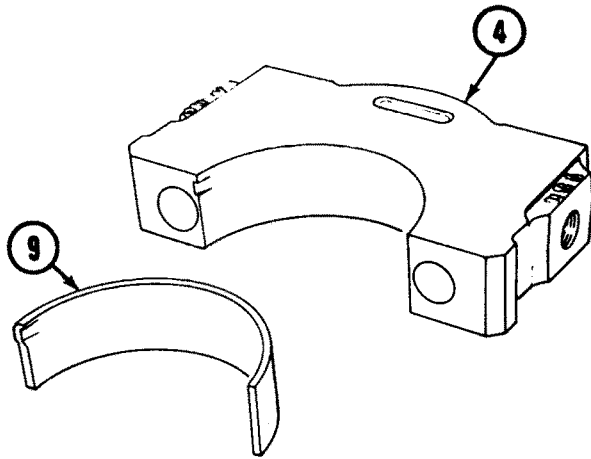


WARNING

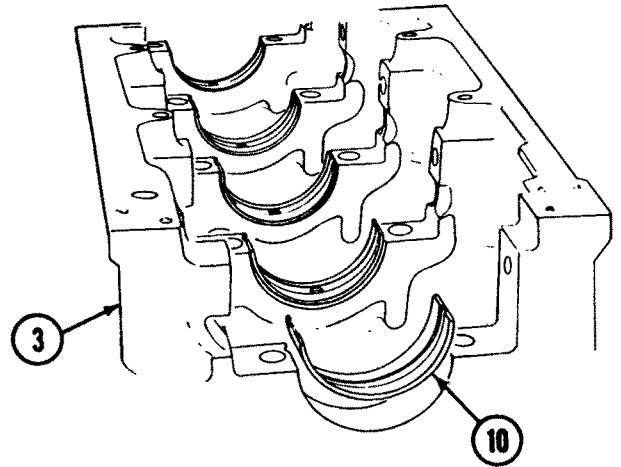
Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- F** Install stud in each end of crankshaft (8) so chain can be installed.
- G** Install chain on studs.
- H** Using lifting device, lift crankshaft (8) from engine block (3).





I Remove lower bearing shell (9) from each of five main bearing caps (4). Discard bearing shells (9).



J Remove five upper bearing shells (10) from engine block (3). Discard bearing shells (10).

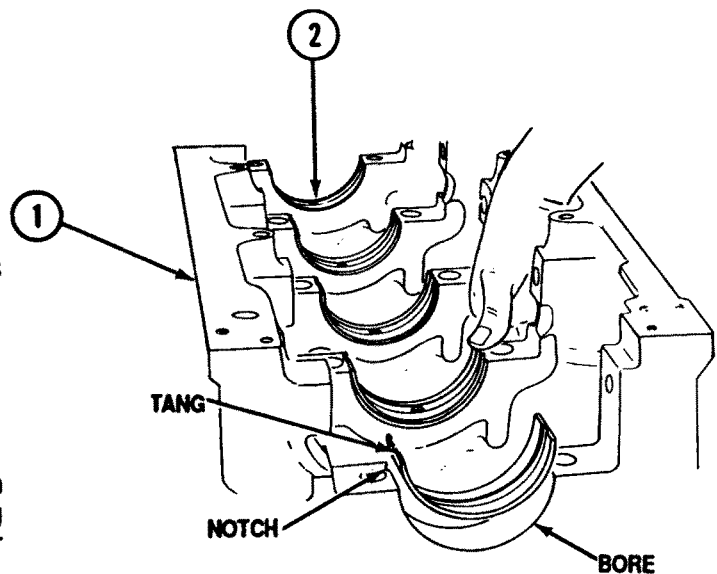
INSTALLATION

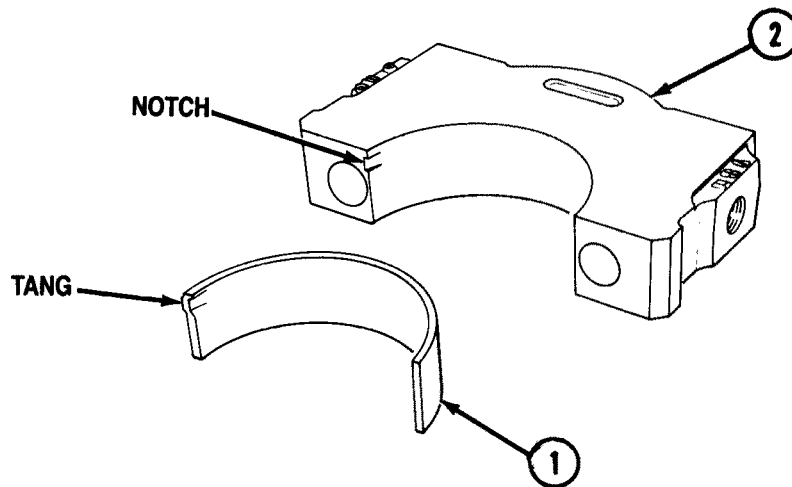
A Ensure that bore of engine block (1) is clean.

Note

Upper bearing shells have oil holes and are grooved.

B Install five new upper bearing shells (2) in bore of engine block (1). Ensure that tang on bearing shell is in notch of cylinder block, and then push shell into position.



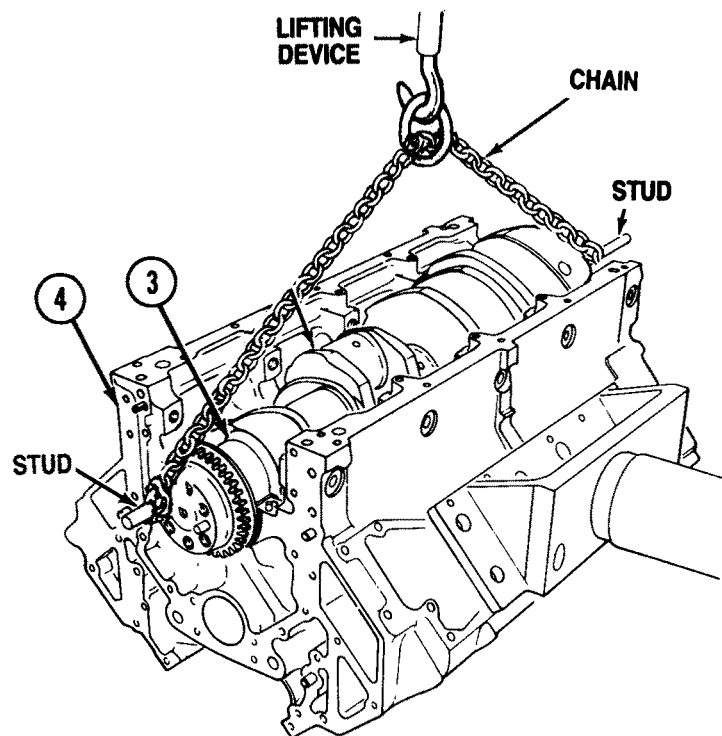


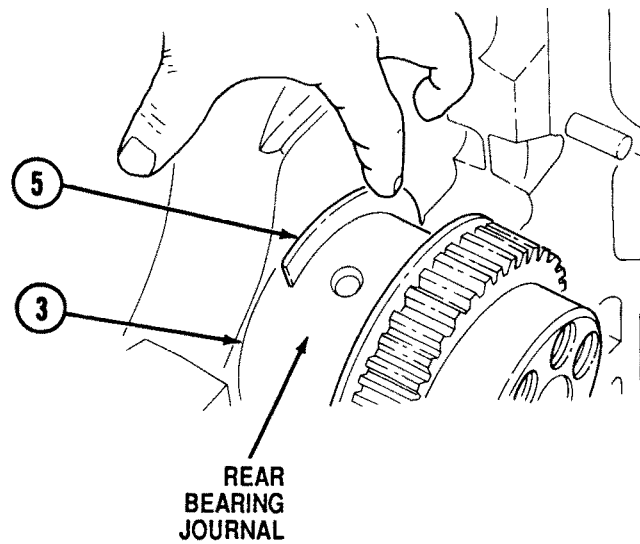
- C** Install new lower bearing shell (1) in each of five main bearing caps (2). Ensure that tang of bearing shells is in notch of bearing cap.

WARNING

Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- D** Install stud in each end of crankshaft (3) and install chain on studs.
- E** Coat all bearing surfaces with clean 30-weight engine oil.
- F** Using suitable lifting device, install crankshaft (3) in engine block (4).
- G** Remove chain and studs installed in step D.





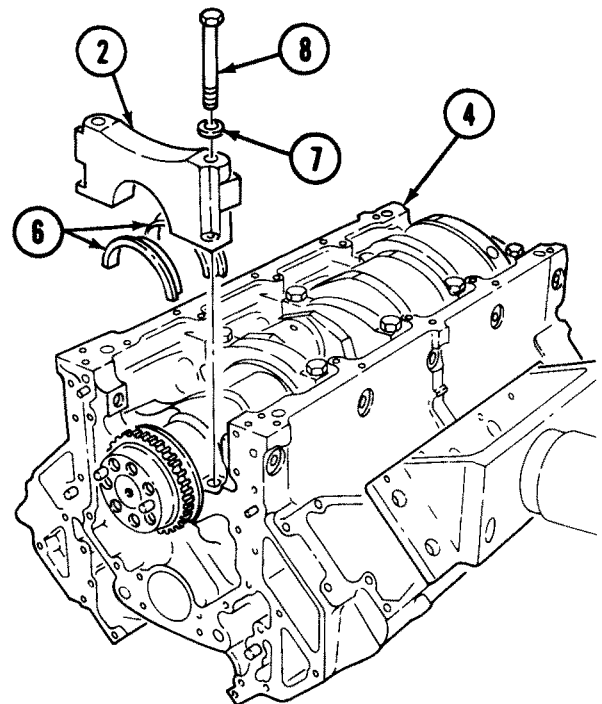
- H** Lubricate two new upper thrust bearings (5) with clean 30-weight oil.
- I** Roll new upper thrust bearing (5) into position on each side of rear bearing journal. Ensure that grooved side of thrust bearing is against crankshaft (3).

- J** Install new lower thrust bearing (6) on dowel pin on each side of rear main bearing cap (2).

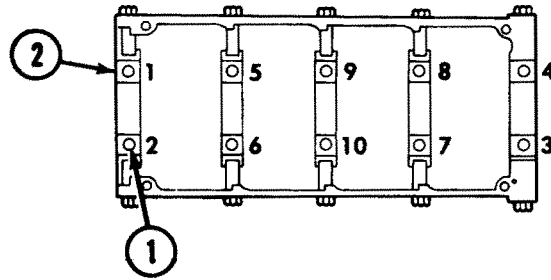
CAUTION

Bearing caps are not interchangeable. Ensure each bearing cap is installed in same location from which it was removed or damage to engine will result.

- K** Install rear main bearing cap (2) on engine block (4).
- L** Install four remaining main bearing caps (2) on engine block (4) in same location from which removed.
- M** Install two washers (7) and screws (8), with lubricated threads, in each bearing cap (2). Lubricate screw threads with clean 30-weight oil.



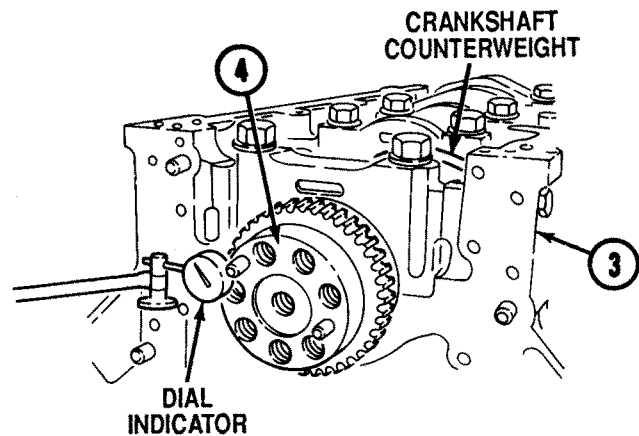
N Tighten ten screws (1) in five bearing caps (2) in this order: 1 through 10 (see diagram). Follow the steps below to tighten each screw:



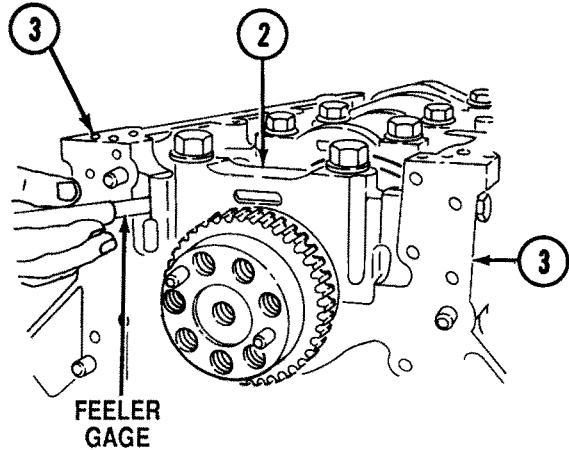
TORQUE SEQUENCE

- Step 1: Tighten to 50 lb-ft (68 N·m).
- Step 2: Tighten to 140-170 lb-ft (190-231 N·m).
- Step 3: Tighten to 300-320 lb-ft (407-434 N·m).
- Step 4: Loosen all screws.
- Step 5: Tighten to 50 lb-ft (68 N·m).
- Step 6: Tighten to 140-170 lb-ft (190-231 N·m).
- Step 7: Tighten to 300-320 lb-ft (407-434 N·m).

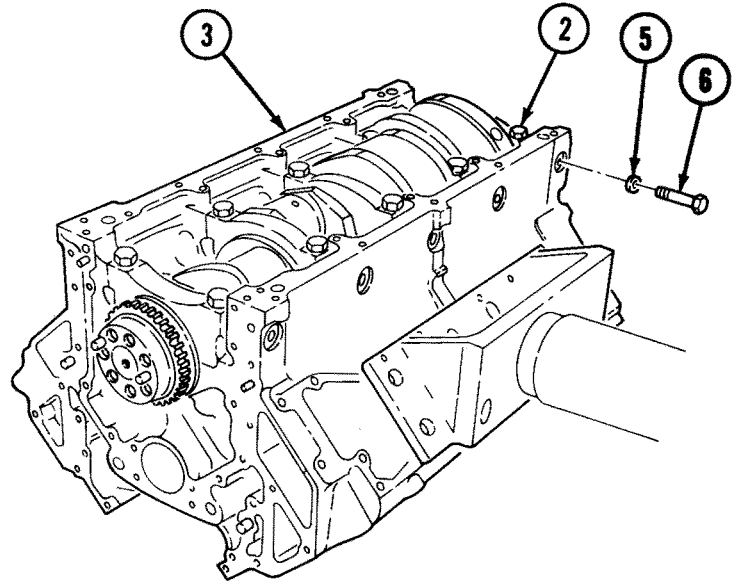
- O** Attach dial indicator to engine block (3) with contact point of gage on face of crankshaft (4).
- P** Use small prybar between crankshaft counterweight and engine block (3) and move crankshaft (4) to rear as far as possible.
- Q** Set dial indicator to zero.
- R** Move crankshaft (4) forward as far as possible. If reading on dial indicator is more than 0.022 in. (0.56 mm), new or oversized thrust bearings must be installed as described in steps H through K.
- S** Rotate crankshaft (4) to check that it rotates freely. If crankshaft (4) does not rotate freely, repeat steps N through R.



T Use feeler gage to check distance between main bearing cap (2) and engine block (3). Distance must be 0.0015-0.0035 in. (0.038-0.089 mm). Check each side of each bearing cap.



U Lubricate screw threads with clean 30-weight oil. Install five washers (5) and screws (6) in each side of engine block (3) to secure bearing caps (2) to engine block (3).

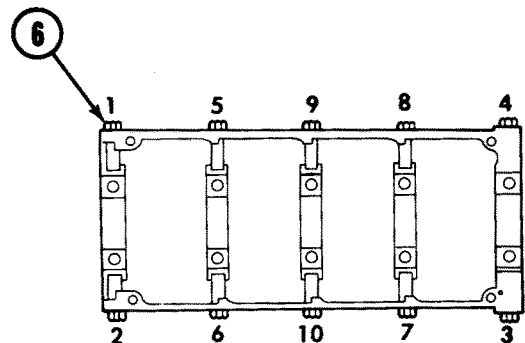


V Tighten screws (6) to 140-150 lb-ft (190-203 N·m) in this order: 1 through 10 (see diagram). Follow the steps below to tighten screws (6):

- Step 1: Tighten to 25 lb-ft (34 N·m).
- Step 2: Tighten to 70-75 lb-ft (95-102 N·m).
- Step 3: Tighten to 140-150 lb-ft (190-203 N·m).

FOLLOW-ON TASKS:

- Install pistons and connecting rods (p 3-167).
- Install camshaft (p 3-181).
- Install cylinder heads (p 3-194).
- Install oil pump (p 3-65).
- Install engine oil cooler (p 3-85).



TORQUE SEQUENCE

TRANSMISSION CLUTCH DISK REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Parts:

Screw (12)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

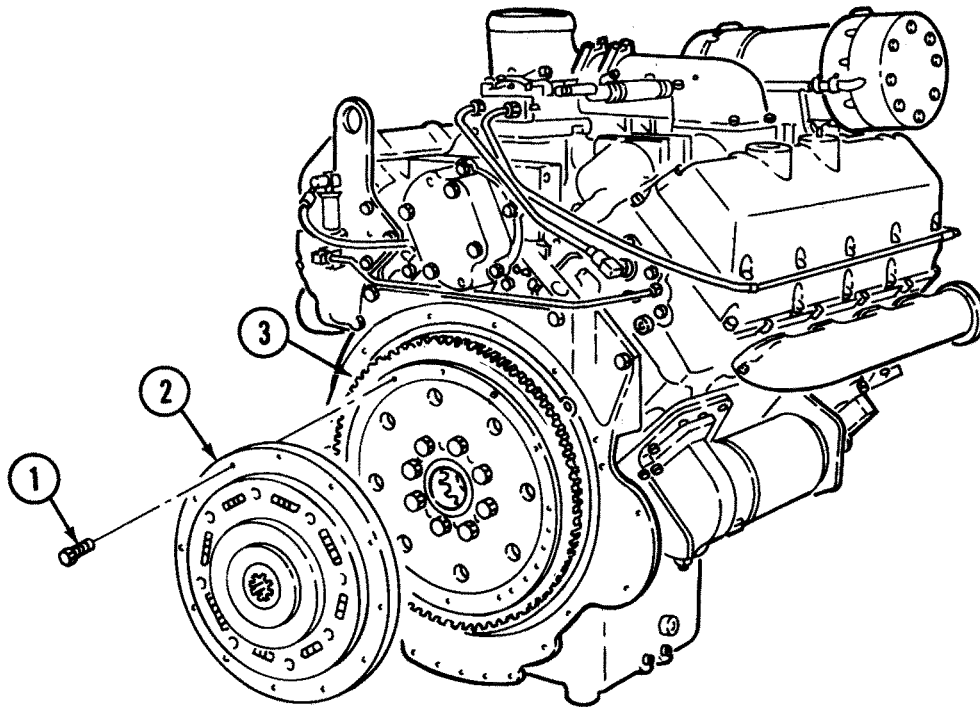
Equipment Condition:

Reference

Page 2-8

Condition
Description

Engine Mounted
on Stand



REMOVAL

- A** Remove twelve screws (1).
- B** Remove transmission clutch disk (2) from flywheel (3).

INSTALLATION

- A** Install transmission clutch disk (2) on flywheel (3).
- B** Install twelve screws (1).
- C** Tighten twelve screws (1) to 26-31 lb-ft (35-42 N·m).

FLYWHEEL REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Materials:

Chalk Item 6
 Appendix C

Parts Reference:

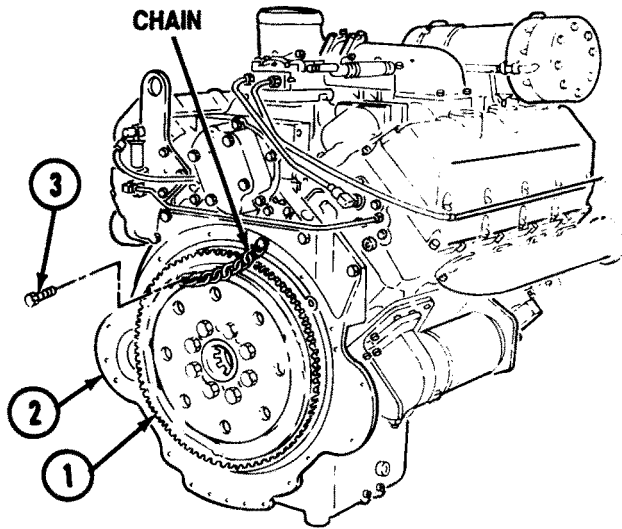
Appendix B

Personnel Required:

Track Vehicle Repairer (2) 63H10

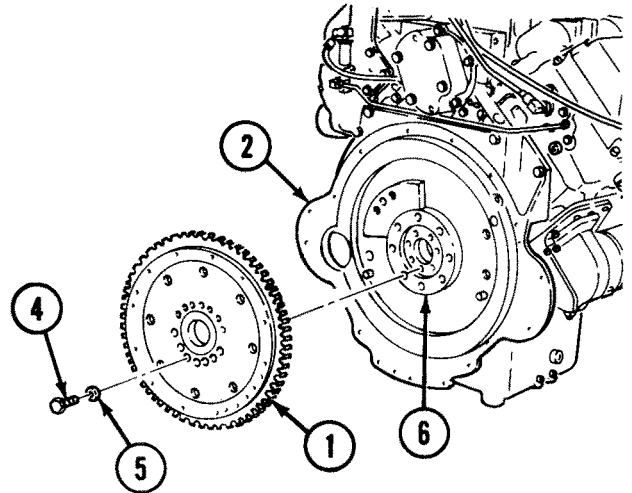
Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 3-125	Transmission Clutch Disk Removed



REMOVAL

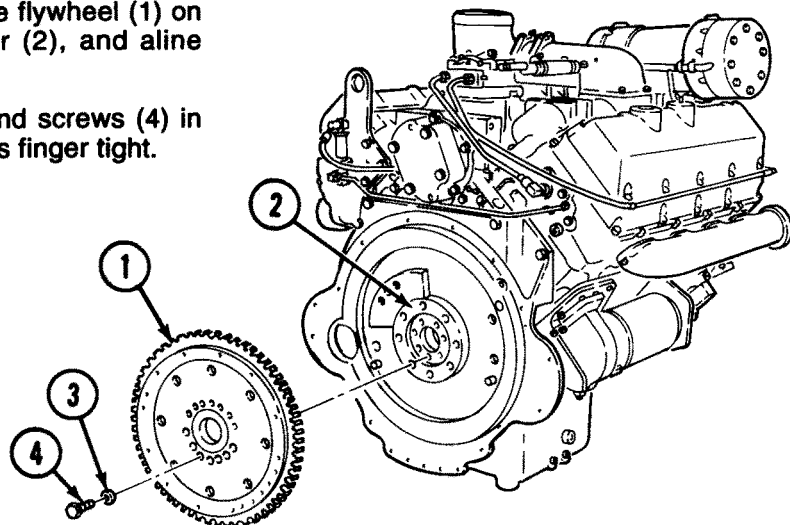
- A** Prevent flywheel (1) from turning by installing chain between flywheel (1) and flywheel housing (2) using two screws (3) retained during transmission clutch disk removal.
- B** Loosen eight screws (4) and washers (5) from flywheel (1).

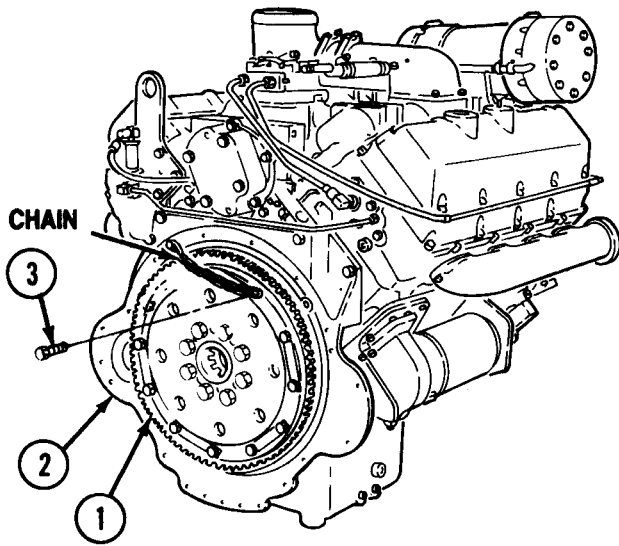


- C** Remove eight screws (4) and washers (5).
- D** Remove chain and two screws (3) from flywheel (1) and flywheel housing (2).
- E** With helper assisting, pull flywheel (1) from end of crankshaft adapter (6).

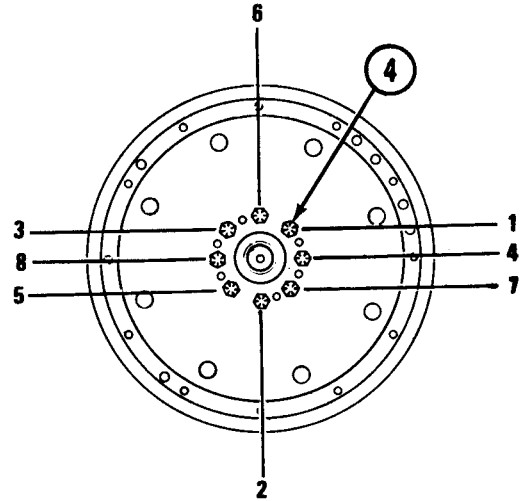
INSTALLATION

- A** With helper assisting, place flywheel (1) on end of crankshaft adapter (2), and align screw holes.
- B** Install eight washers (3) and screws (4) in flywheel (1). Tighten screws finger tight.





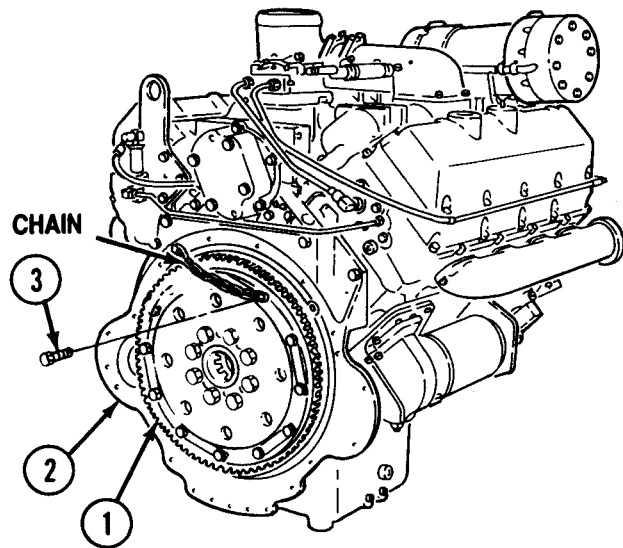
C Prevent flywheel (1) from turning by installing chain between flywheel (1) and flywheel housing (2) using two screws (3) retained during transmission clutch disk removal.



- D** Mark screw no. 1 with chalk for reference.
- E** Tighten eight screws (4) to 50-60 lb-ft (68-81 N-m) in this order: 1 through 8 (see diagram).
- F** Apply final torque of 180-200 lb-ft (244-271 N-m) to eight screws (4) in sequence.

G Remove chain and two screws (3) from flywheel (1) and flywheel housing (2).

FOLLOW-ON TASK:
Install transmission clutch disk (p 3-125).



FLYWHEEL RING GEAR REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

Materials:

Temperature Indicating Compound	Item 26 Appendix C
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Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer (2) 63H10

Equipment Condition:

Reference

Page 3-127

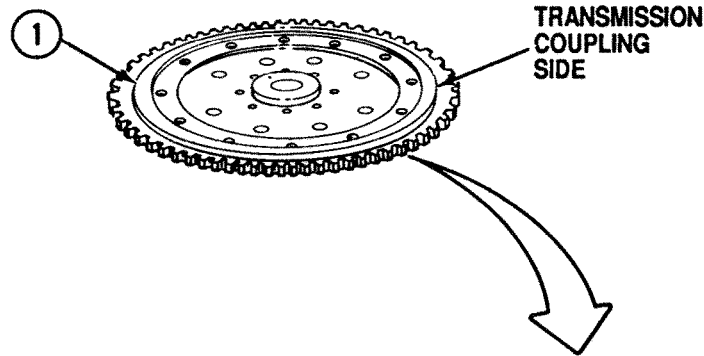
Condition Description

Flywheel Removed from Engine

General Safety Instructions:

WARNING

Ring gear will be hot enough to burn you on contact. Use heat resistant gloves when you handle hot ring gear.

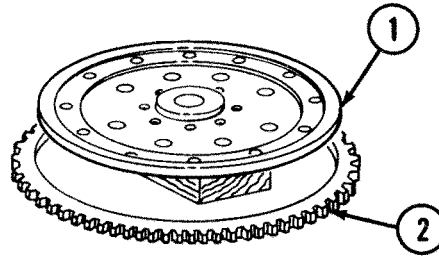


REMOVAL

- A** With helper assisting, block flywheel (1) with transmission coupling side up.

CAUTION

When you drive ring gear from flywheel, strike ring gear evenly to prevent cracking.



- B** Using ball-peen hammer, strike ring gear (2) evenly around top until ring gear (2) falls off.
- C** With helper assisting, lift flywheel (1), and remove ring gear (2).

INSTALLATION

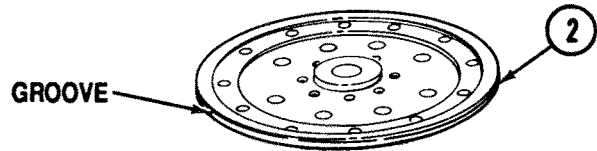
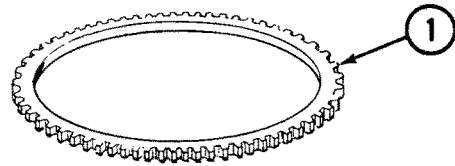
- A** Apply temperature indicating compound every few inches on outer edge of new ring gear (1).

WARNING

Ring gear will be hot enough to burn you on contact. Use heat resistant gloves when you handle hot ring gear.

CAUTION

Do not overheat ring gear or metal will soften. If available, use heat controlled oven to heat ring gear. If oven is not available, heat inside diameter of ring gear with torch.



- B** Using acetylene torch, and with helper assisting, heat ring gear (1) until temperature indicating compound turns to liquid at 500° F (260° C).
- C** Using ball-peen hammer, and with helper assisting, place heated ring gear (1) on groove of engine surface side of flywheel (2). Drive ring gear (1) down until firmly seated.

FOLLOW-ON TASK:
Install flywheel (p 3-127).

TRANSMISSION ADAPTER REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

Special Tools:

Mechanical Puller 5120-00-499-1489

Parts:

- Seal
- Packing (11)
- Lockwasher (15)
- Screw (7)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer (2) 63H10

Equipment Condition:

Reference

Page 2-7

Page 3-128

Condition Description

Engine Mounted on Stand

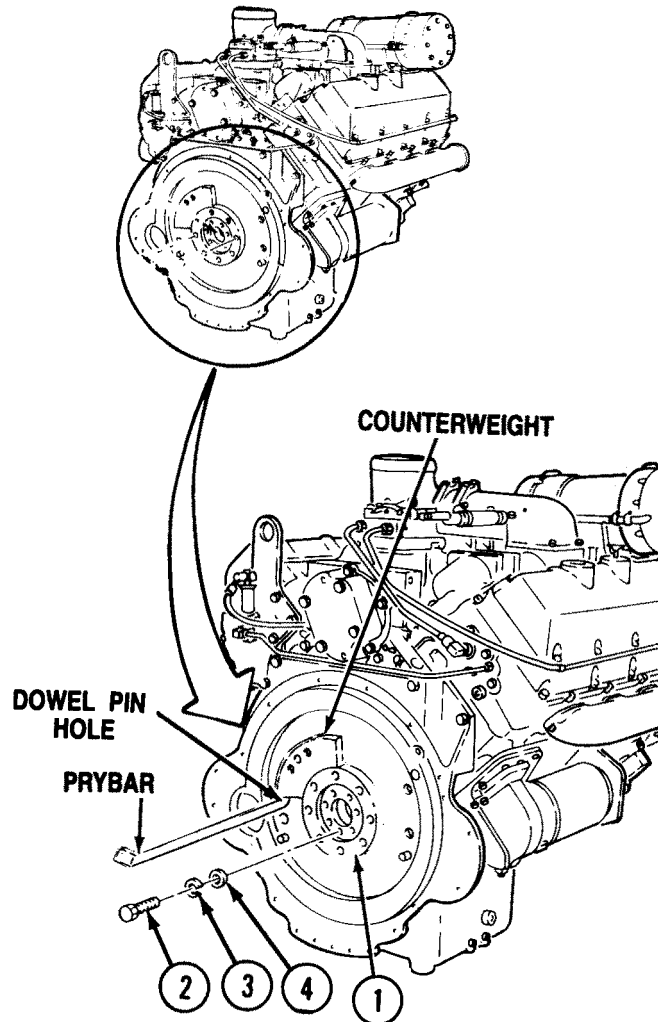
Flywheel Removed

General Safety Instructions:

WARNING

Personnel must stand clear during lifting operations.

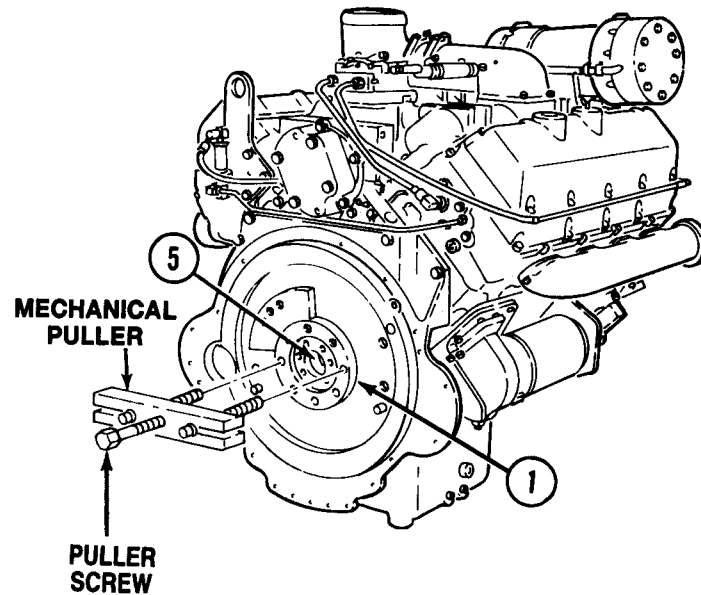
REMOVAL



WARNING

Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

- A** Insert prybar in left dowel pin hole. Turn crankshaft adapter (1) until counterweight rests against top of prybar. Crankshaft will automatically turn to contact prybar as bolts are turned.
- B** Remove seven screws (2), lockwashers (3), and washers (4) from crankshaft adapter (1). Discard screws (2), lockwashers (3), and washers (4).
- C** Deleted.



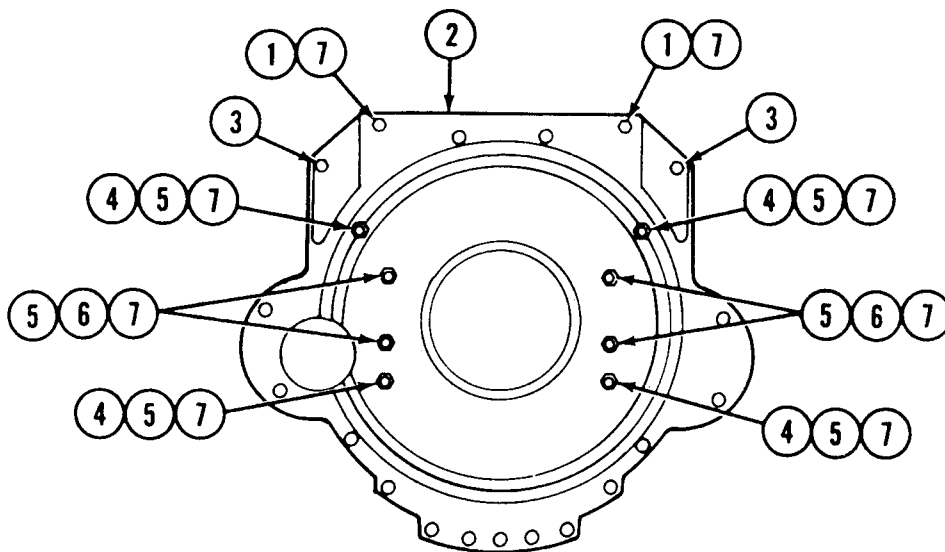
WARNING

Personnel must stand clear during lifting operations. A swinging or shifting load may cause injury to personnel.

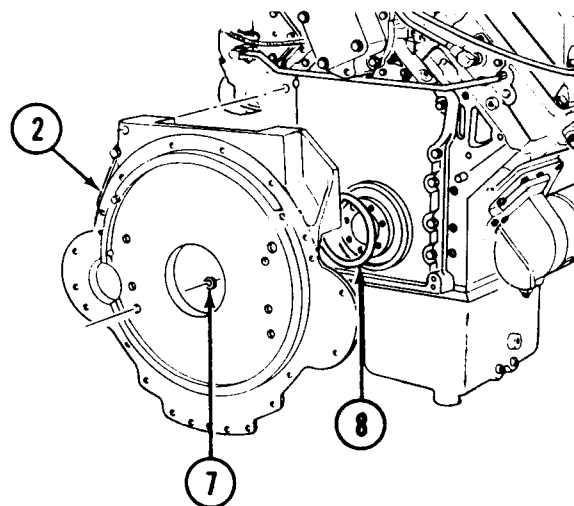
CAUTION

Crankshaft adapter must be pulled straight out from crankshaft to avoid damage to parts.

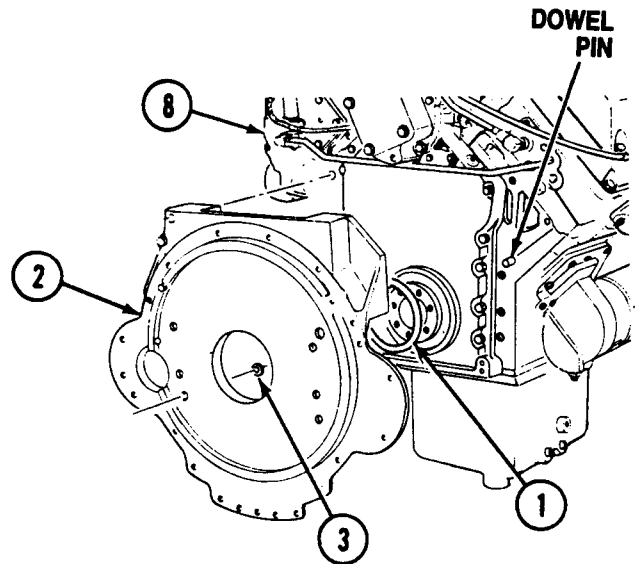
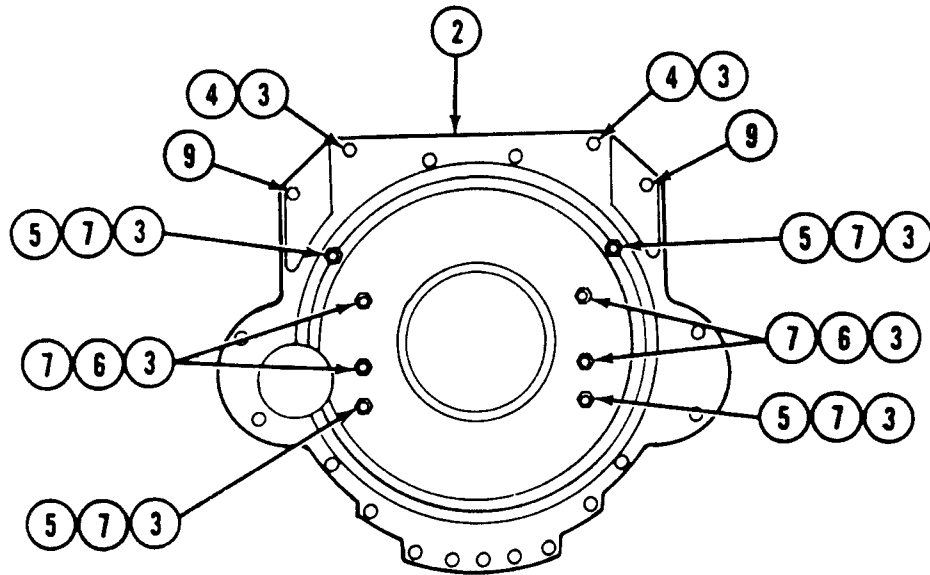
- D** Attach mechanical puller to crankshaft adapter (1).
- E** Tighten puller by turning puller screw until crankshaft adapter (1) loosens. Have helper support crankshaft adapter (1).
- F** Remove crankshaft adapter (1) from crankshaft (5).
- G** Remove mechanical puller from crankshaft adapter (1).



- H** Remove two long screw and washer assemblies (1) from transmission adapter (2).
- I** Remove two short screw and washer assemblies (3) from transmission adapter (2).
- J** Remove four screws (4) and lockwashers (5) from transmission adapter (2). Discard lockwashers (5).
- K** Remove four socket-head screws (6) and lockwashers (5) from transmission adapter (2). Discard lockwashers (5).
- L** Tap transmission adapter (2) with plastic hammer. Have helper support adapter while removing it from engine.
- M** Remove and discard ten packings (7) from engine side of transmission adapter (2).
- N** Remove and discard preformed packing (8).



INSTALLATION



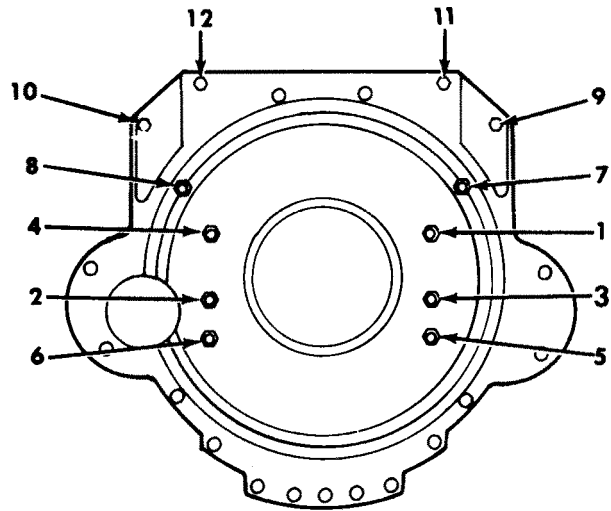
- A** Install preformed packing (1) in transmission adapter (2).
- B** Install ten packings (3) on engine side of transmission adapter (2).

CAUTION

Make sure screws go through transmission adapter and packings without dislodging packings, or damage to engine will result.

- C** Install two long screw and washer assemblies (4), four screws (5), four socket-head screws (6), and eight lockwashers (7) through transmission adapter (2) and packing (3).

- D** Install transmission adapter (2) on engine (8) using dowel pins as guides. Have helper hold transmission adapter (2) in place.
- E** Install two short screw and washer assemblies (9) through transmission adapter (2).



TORQUE SEQUENCE

F Tighten all twelve transmission adapter screws to 50-55 lb-ft (68-75 N·m). Tighten screws in this order: 1 through 12 (see diagram).

G Place crankshaft adapter (1) on two dowel pins in crankshaft (2).

H Using seven screws (3), lockwashers (4), and washers (5), gradually pull crankshaft adapter (1) onto end of crankshaft (2).

I Deleted.

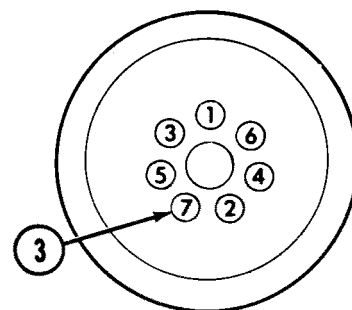
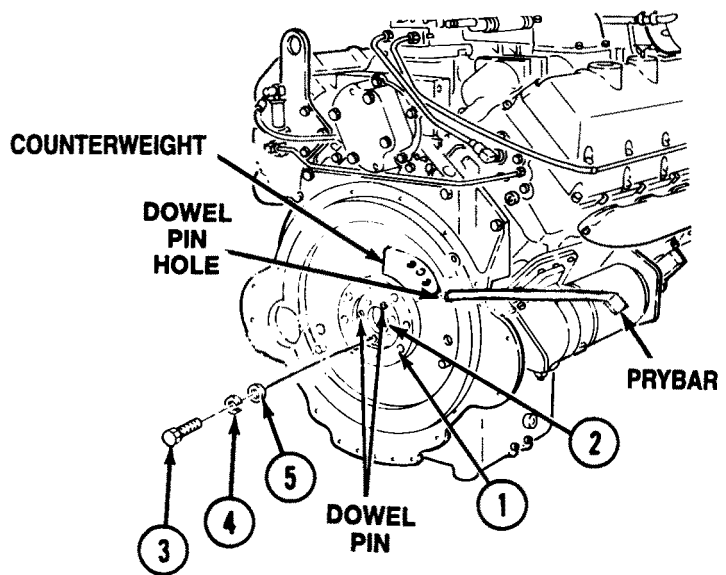
J Insert prybar in right dowel pin hole. Turn crankshaft adapter (1) until counterweight rests against prybar.

K Mark screw no. 1.

L Tighten seven screws (3) in steps of 75 lb-ft (102 N·m) to final torque of 350-380 lb-ft (475-515 N·m). Tighten screws (3) in this order: 1 through 7 (see diagram). Have helper hold torque wrench in place during last tightening step.

M Deleted.

FOLLOW-ON TASK:
Install flywheel (p 3-127).



TORQUE SEQUENCE

LINERS, PISTONS, RINGS, AND ROD BEARINGS REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Cleaning/Inspection
- c. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

4940-00-287-4894 Shop Equipment,
General Purpose Repair

Special Tools:

Cylinder Driver	5120-00-999-1206
Cylinder Liner Clamp	5120-00-104-1816
Micrometer, Inside	5210-00-567-9545
Connecting Rod Checking Fixture	4910-00-972-7507
Connecting Rod Locating Mandrel	3460-00-999-1259

Materials:

Plastic Protective Caps	Item 3 Appendix C
Carbon Removing Compound	Item 5 Appendix C
Inspection Penetrant Remover	Item 14 Appendix C
Engine Oil, 30-Weight	Item 16 Appendix C
Wiping Rag	Item 20 Appendix C
Drycleaning Solvent	Item 25 Appendix C

Parts:

Lockplate (16)
Packing (16)
Seal (8)
Ring (16)
Oil Ring (8)
Snapping (16)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer (2) 63H10

Reference:

TM 5-2350-262-20-2

Equipment Condition:

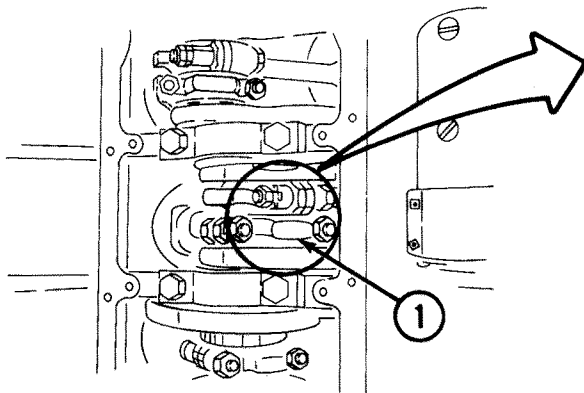
<u>Reference</u>	<u>Condition Description</u>
Page 3-187	Cylinder Heads Removed
Page 3-64	Oil Pump Removed
Page 2-8	Engine Mounted on Stand

General Safety Instructions:

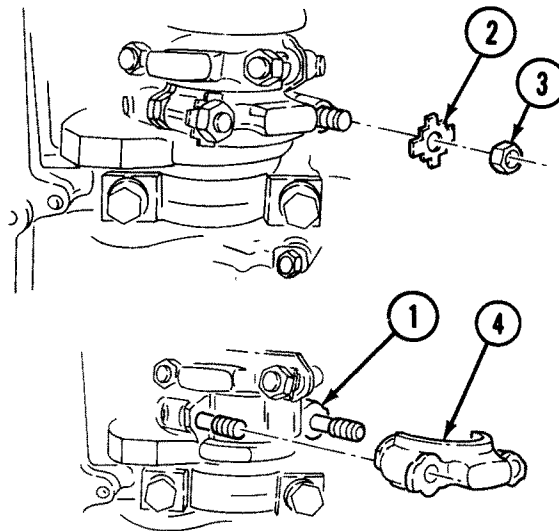
WARNING

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to comply may result in damage to equipment or injury to personnel.
- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

REMOVAL



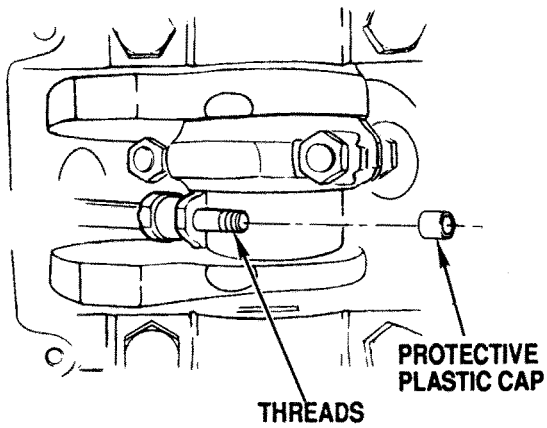
- A** Turn crankshaft until rod (1) that will be removed is in bottom center position.
- B** Bend tabs on two lockplates (2) away from two nuts (3).
- C** Remove two nuts (3) and lockplates (2) from rod bearing cap (4) and rod (1). Discard lockplates (2).



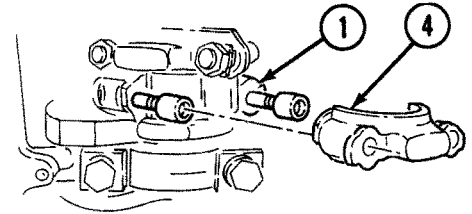
Note

Rod bearing cap may be loosened by tapping on rod bearing cap or ends of rods with plastic hammer.

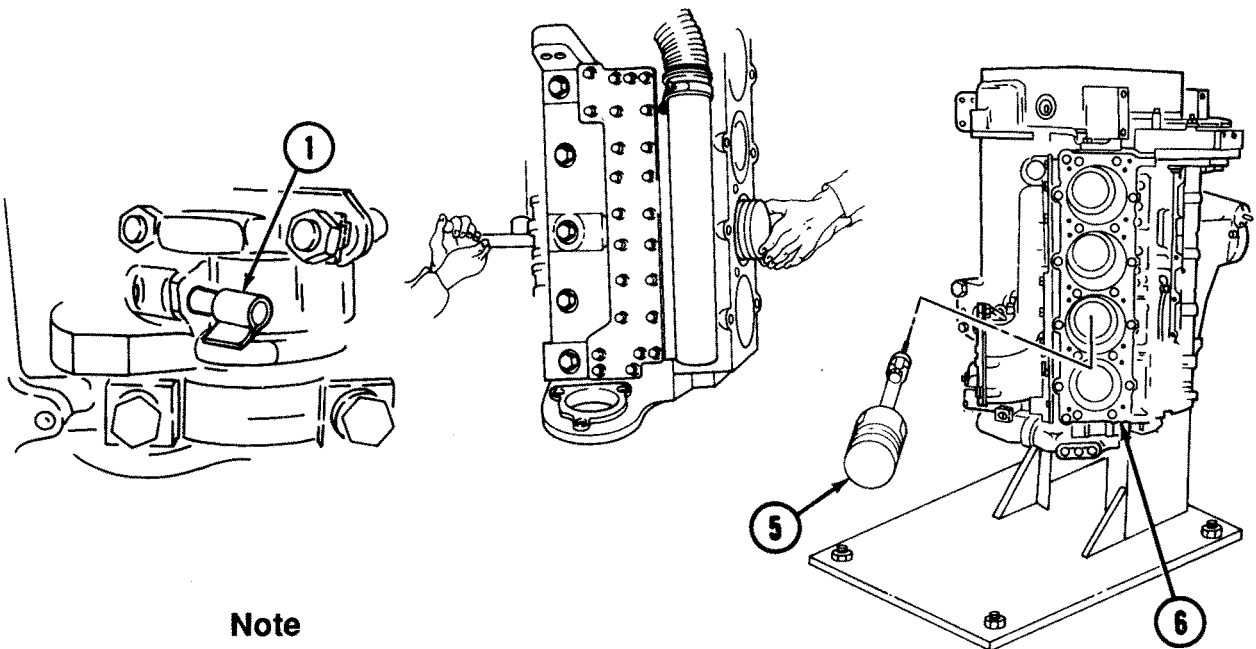
- D** Remove rod bearing cap (4) from rod (1).



E Place protective plastic caps on rod bolt threads.



F Mark rod bearing cap (4) to match rod (1).

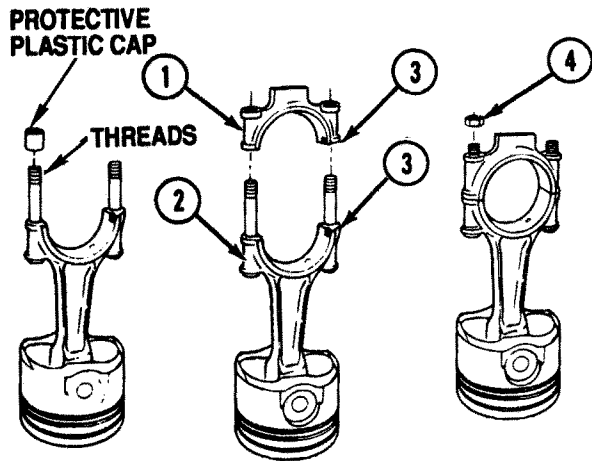


Note

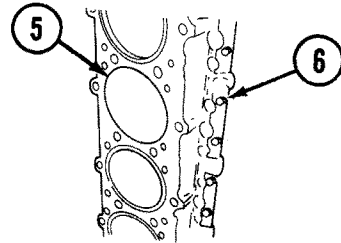
Use ridge reamer to remove carbon build-up from cylinder liners.

G Tap bottom end of rod (1) with a wooden handle or brass punch.

H Tap piston and rod assembly (5) out through top of block (6). Have helper remove piston and rod assembly (5).



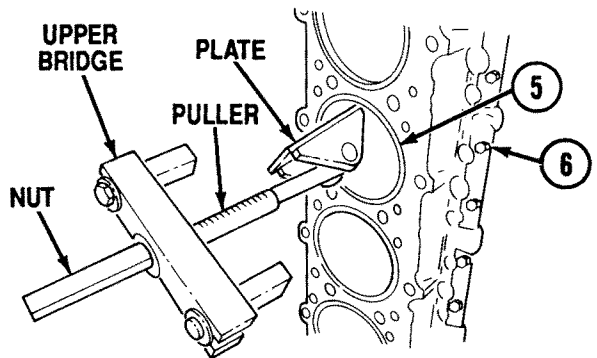
- I** Remove protective plastic caps from rod bolt threads.
- J** Place rod bearing cap (1) on rod (2) with tang (3) slots on same side.
- K** Install two nuts (4) on rod (2). Hand tighten nuts.



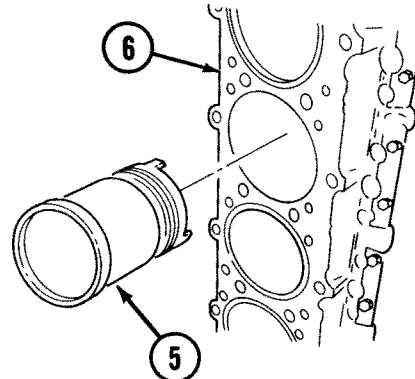
- L** Remove seven remaining pistons using same procedure (steps A through K).
- M** Visually check mating surface of liner (5) to engine block (6) for water leaks by checking for stains or rust. Mark any leak area for later inspection.

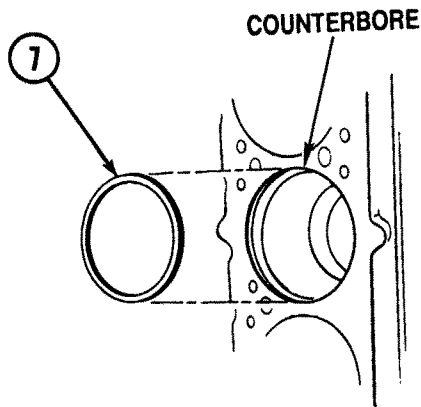
CAUTION

Do not fit lower puller plate against tabs on bottom of cylinder liner. Damage may result.

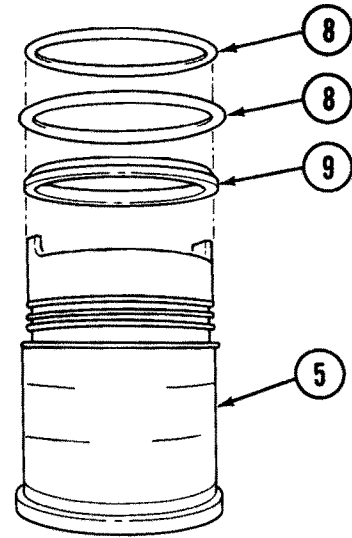


- N** Install cylinder liner puller in liner with lower puller plate at bottom of liner. Position upper bridge across top of engine block (6).
- O** Tighten nut against upper bridge to loosen liner (5).
- P** Remove liner puller from loosened liner (5).
- Q** Remove liner (5) from engine block (6) by hand.





R Remove shims (7) from counterbore, if installed. Retain shims (7).



S Remove two preformed packings (8) and crevice seal (9) from liner (5). Discard preformed packings (8) and crevice seal (9).

CLEANING/INSPECTION

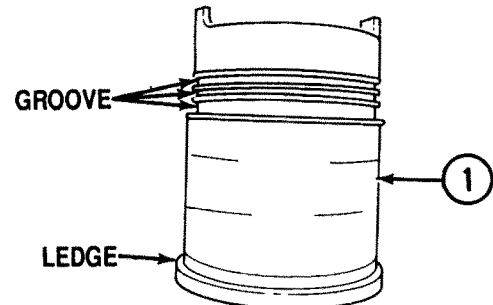
Follow general cleaning instructions (p 2-2).

WARNING

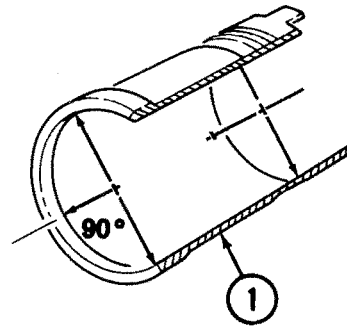
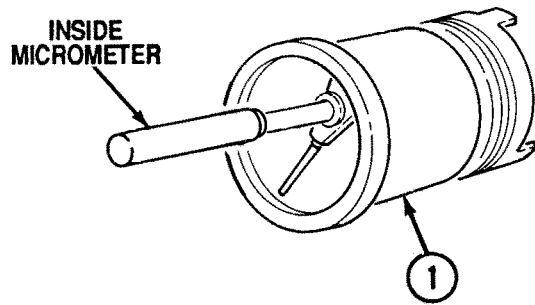
- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to comply may result in injury to personnel or damage to equipment.
- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

CAUTION

The oil lubrication system must be primed after repair and before operating engine. Never operate engine below "L" mark or above "H" mark. Do not overfill crankcase. Failure to comply may result in damage to equipment.

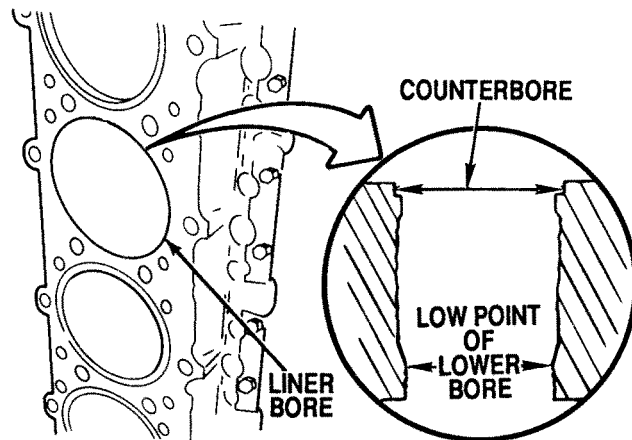


- A** Clean liner (1) with solvent and wiping rag. Dry with compressed air.
- B** Clean liner (1) second time with hot soapy water and wiping rag.
- C** Dry liner (1) with compressed air.
- D** Apply dye penetrant to all inner and outer surfaces of liner (1).
- E** Carefully check area of preformed packing and seal grooves and underside of top shouldered ledge for cracks.
- F** Replace liner (1) that is cracked or scored.
- G** Replace liner (1) that has pits or corrosion marks deeper than 0.0625 in. (1.5875 mm). Use depth gage.



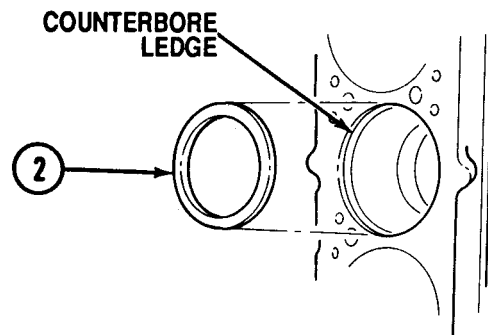
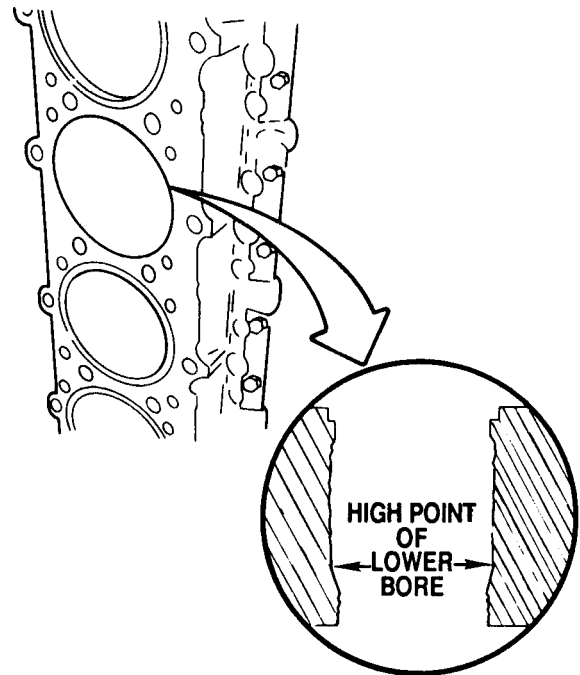
- H** Wipe inside of liner (1) with clean wiping rag.
- I** Using inside micrometer, measure inside diameter of liner (1). Take two measurements, 90 degrees apart, at four depths. If any measurement is more than 5.505 in. (139.827 mm), discard old liner.

- J** Coat liner bore with clean 30-weight engine oil, and let stand for 10 to 15 minutes.
- K** Wipe engine oil and black residue out of bore with clean wiping rag.
- L** Coat liner bore with engine oil, and let stand until completion of next step.
- M** Measure inside diameter of liner counterbore. Take two measurements, 90 degrees apart, using cylinder gage. If any measurement is more than 6.5015 in. (165.1381 mm), engine block is bad. Tag engine block for repair or replacement.



- N** Using inside micrometer, take at least two measurements, 90 degrees apart, at lowest point in lower bore. Record measurements. If any measurement is more than 6.109 in. (155.169 mm), tag engine block for repair.

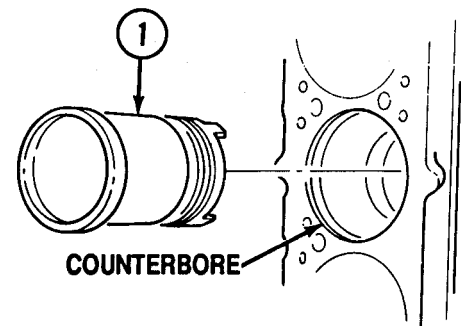
- Take at least two measurements, 90 degrees apart, at highest point in lower bore. Record measurements. Use inside micrometer. Subtract low point measures in step N from high point measures. If differences between the two sets of measurements are less than 0.002 in. (0.051 mm) or more than 0.006 in. (0.152 mm), tag engine block for repair.



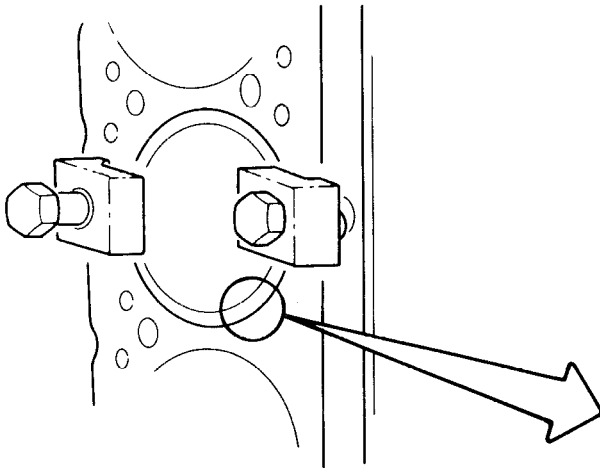
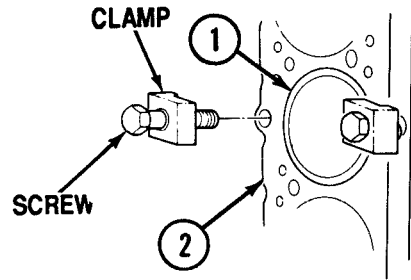
Note

To perform protrusion check, counterbore must be clean and shims must be installed (if required) on counterbore ledge. Liner is installed without preformed packing or crevice seal.

- P** Install shims (2) on counterbore ledge if required.
- Q** Install liner (1) in engine block counterbore by hand.

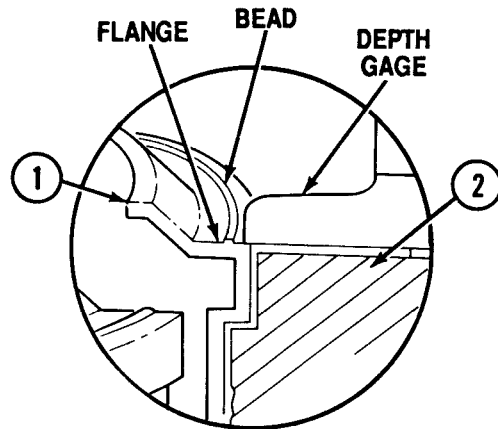


- R** Install two cylinder clamps on edge of installed liner (1). Install clamps with curved ledge against top of engine block (2).
- S** Tighten two screws on two cylinder liner clamps. Tighten screws to 50 lb-ft (68 N-m).



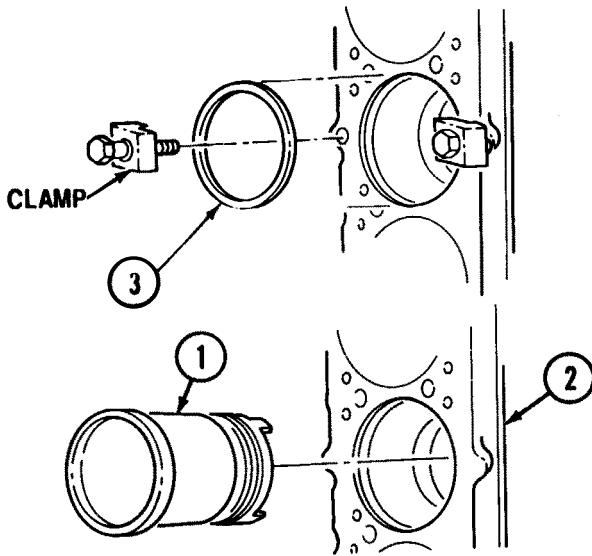
CAUTION

Do not use engine block if the liners are tilted more than 0.001 in. (0.025 mm) inside the block. Do not use engine block if different liners protrude different amounts. Protrusion of different liners can vary by no more than 0.002 in. (0.0508 mm). Damage to engine will result.



- T** Measure distance from upper edge of liner (1) to engine block (2). Record measurement. Use depth gage.
- U** Measure distance from upper edge of liner (1) to cylinder liner flange outside of bead. Record measurement. Use depth gage.
- V** Subtract step U measurement from step T measurement to find difference. Repeat steps T through V until four measurements, 90 degrees apart, are obtained. If any single difference is less than 0.003 in. (0.076 mm) or more than 0.0065 in. (0.1651 mm), add or remove shims as required to obtain above dimensions. If dimensions cannot be met, liner counterbore inside engine block may be bad. Tag engine block for repair.

- W** Compare line-to-engine block measures taken around outside of liner.
- X** If measurement differences for a single liner (side-to-side) are more than 0.001 in. (0.025 mm), tag engine block for repair of liner counterbore. Stop task.
- Y** Measure protrusion of all liners on one bank of engine. Compare measurements. If measurements vary more than 0.002 in. (0.0508 mm), tag engine block for repair of liner counterbores. Stop task.
- Z** Remove liner (1) after checks are complete.



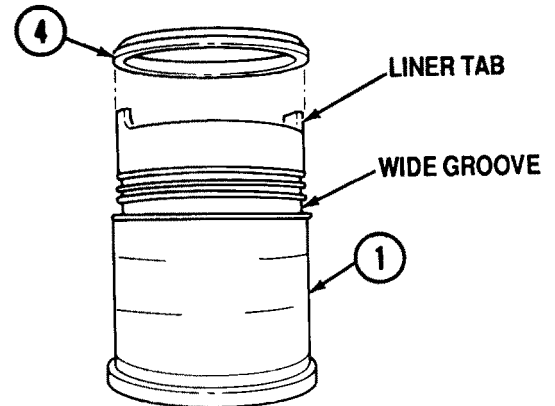
AA Remove two cylinder liner clamps from engine block (2).

AB Remove liner (1) from engine block (2).

Note

Tag cylinder liner for installation.

AC Remove shims (3) if installed.



CAUTION

Do not stretch crevice seal to install. Stretched crevice seal will cause water leaks in engine.

AD Apply clean 30-weight engine oil to new crevice seal (4).

AE Install crevice seal (4) in wide groove on liner (1). Slanted part of seal (4) points toward liner tabs.

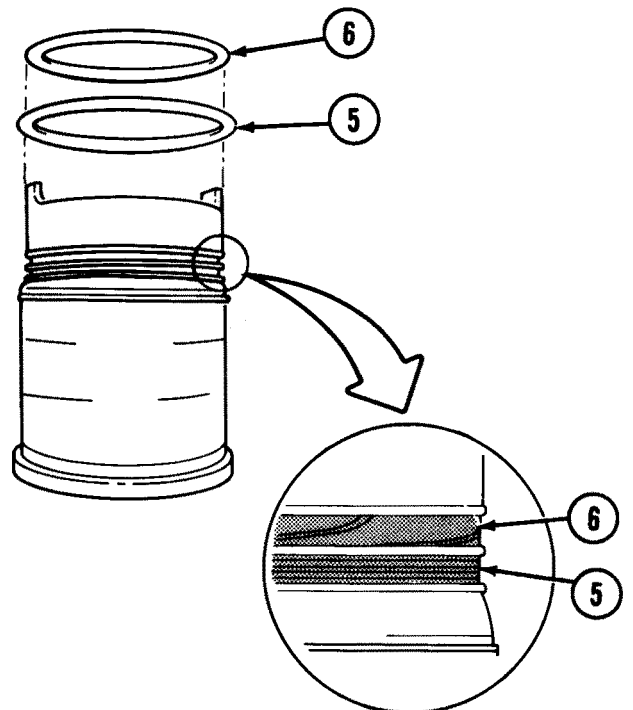
CAUTION

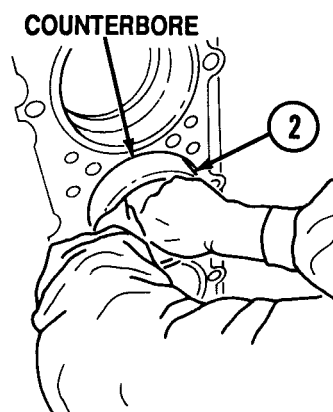
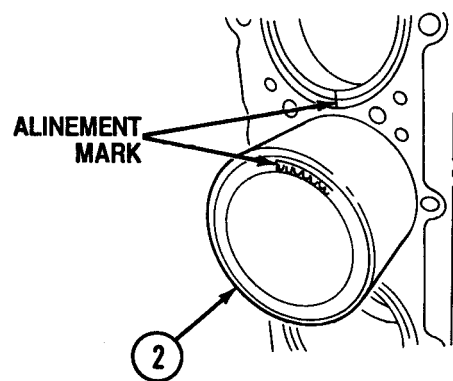
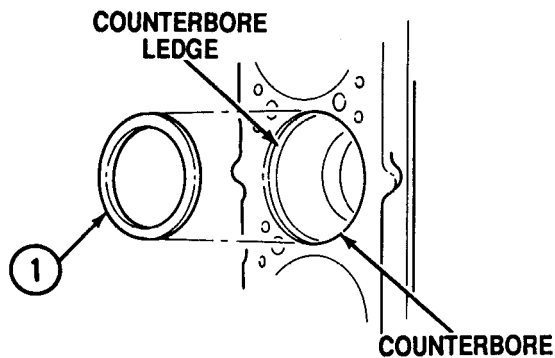
Do not twist packing when installing. Twisted packings will cause inaccurate measurements.

AF Apply clean 30-weight engine oil to preformed packings (5) and (6).

AG Install black preformed packing (5) in groove.

AH Install red preformed packing (6) in groove.





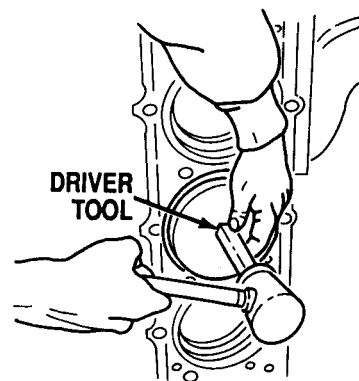
CAUTION

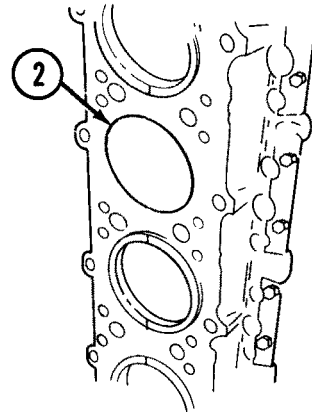
If alinement marks are not alined, crankshaft throws will hit liner tabs and damage to crankshaft and liner will result.

Note

If shims were removed from counterbore when liner was removed, shims must be installed before liner is installed.

- AI** Install shims (1) (if required) on counterbore ledge.
- AJ** Install liner (2) in liner counterbore with alinement marks in line. Number near alinement mark on liner shall face toward front of engine.
- AK** Snap liner (2) into liner counterbore using heels of hands. Drive liner firmly into liner bore with series of light taps. Use cylinder driver and hammer.



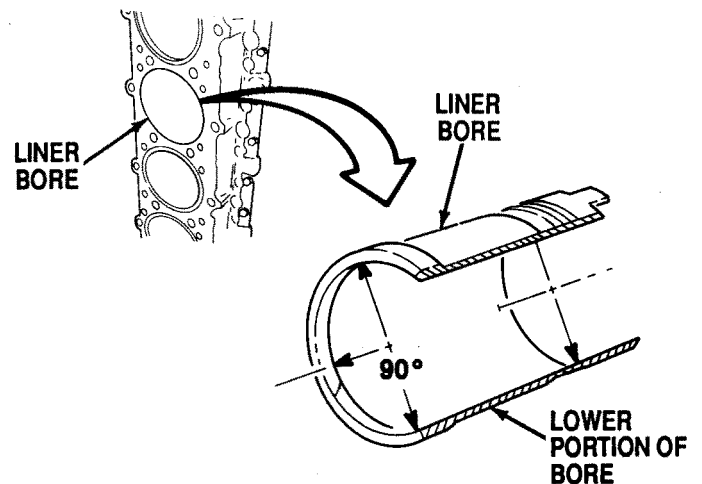


AL Check alignment marks for variations of all four liners (2) on bank of engine. If alignment marks vary more than 0.625 in. (15.875 mm), stop task. Tag engine block to have liners installed again.

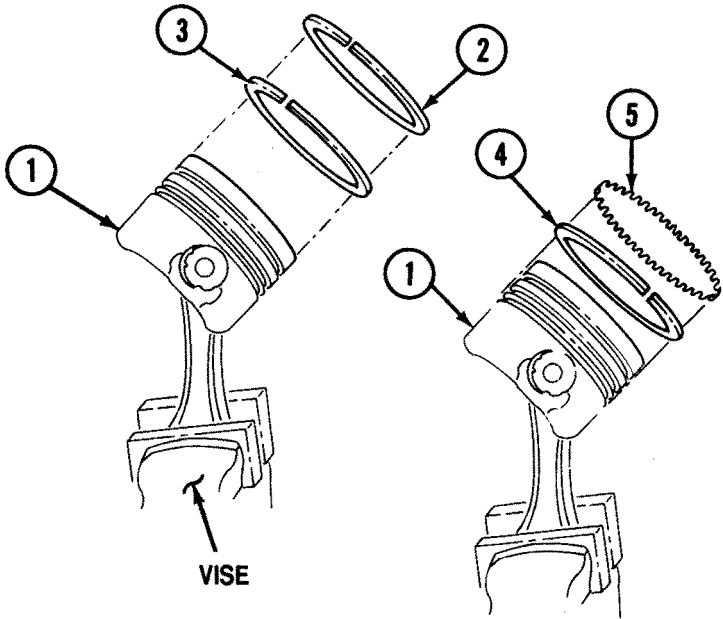
Note

Eccentricity in lower piston travel areas can be caused if preformed packings and/or seal are pulled out of grooves during installation of liner.

AM Measure liner bore as described in step I. Measure in lower portion and upper one-inch of bore. If eccentricity in lower piston travel area is more than 0.002 in. (0.051 mm), remove liner and check packing and seal. If eccentricity in upper one-inch is more than 0.003 in. (0.076 mm), remove liner. Check for contact points between inside of engine block and liner. If points of contact are found, stop task until condition is corrected. Tag engine block for repair of counterbores.



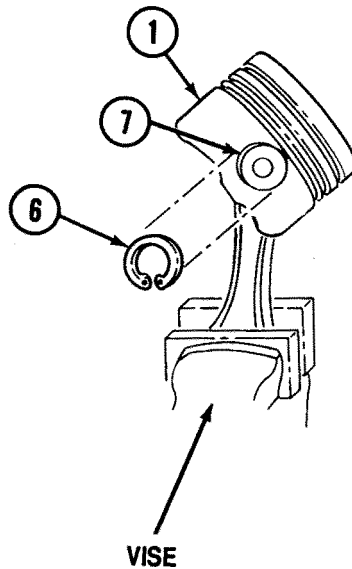
CAUTION
Rod assembly can be damaged if vise is too tight.

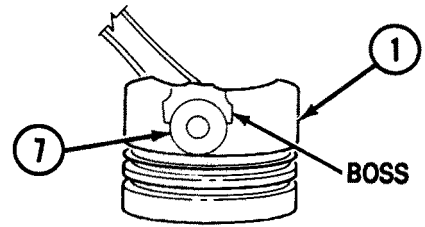


AN Place piston and rod assembly (1) in vise with padded jaws.

AO Remove two rings (2) and (3) and two-piece oil control ring (4) and (5) from piston and rod assembly (1). Use piston ring expander. Discard all rings.

AP Remove two snaprings (6) holding pin (7) in piston and rod assembly (1). Use snapping pliers. Discard snaprings (6).





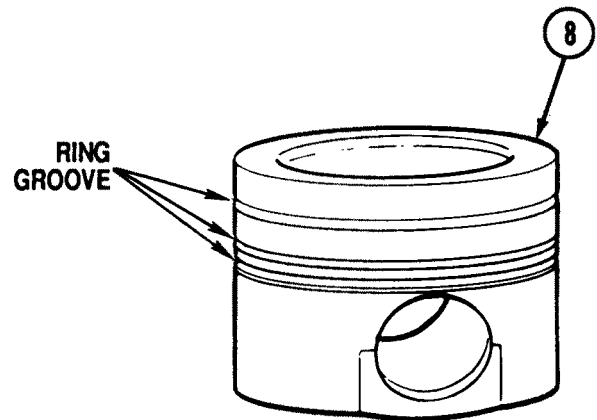
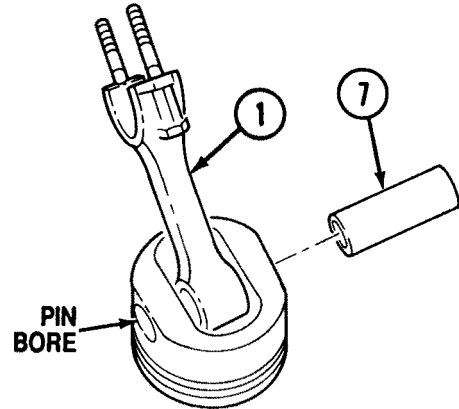
AQ Mark pin (7) and pin boss on piston rod assembly (1) to identify side for later installation.

AR Heat piston and rod assembly (1) in oven or hot water until pin (7) can be moved inside pin bore.

Note

If pins sticks in pin bore, let assembly cool and reheat to higher temperature.

AS Tap pin (7) lightly past snapping groove. Remove pin. Use hammer and brass punch.



CAUTION

Do not damage top of piston or ring grooves when scraping carbon from piston.

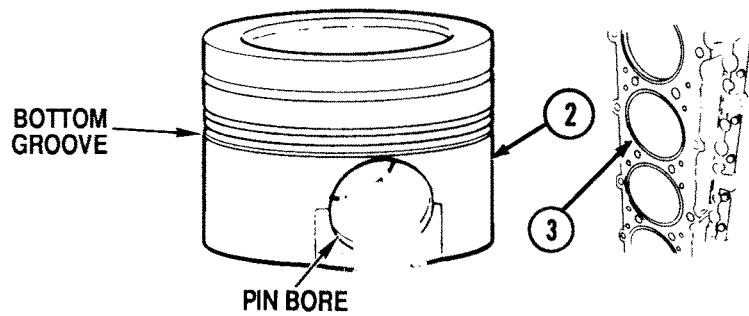
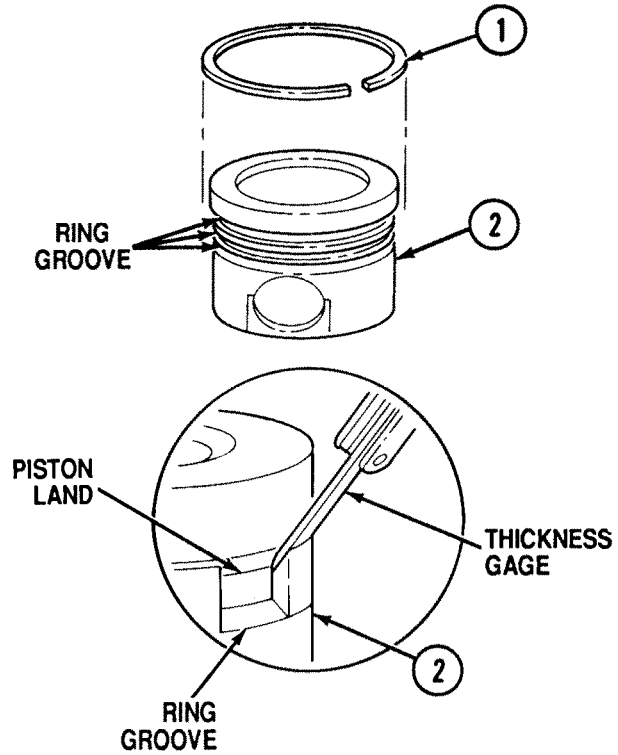
AT Remove carbon from top of piston (8) and three ring grooves. Use carbon scraper and carbon removing compound.

Note

Bottom ring grooves wear less than top ring groove. If top ring groove is measured and is good, bottom grooves need a visual inspection only. Top ring groove is good with 0.006 in. (0.1524 mm) clearance or less between ring and groove.

AU Install top ring (1) in top ring groove. Hold ring in groove and measure between ring and piston land. Use thickness gage and piston ring expander. Discard piston (2) if more than 0.006 in. (0.1524 mm) gage can be inserted between ring (1) and piston land.

AV Inspect two bottom grooves for pits and corrosion. Discard piston (2) if bottom grooves are damaged.



Note

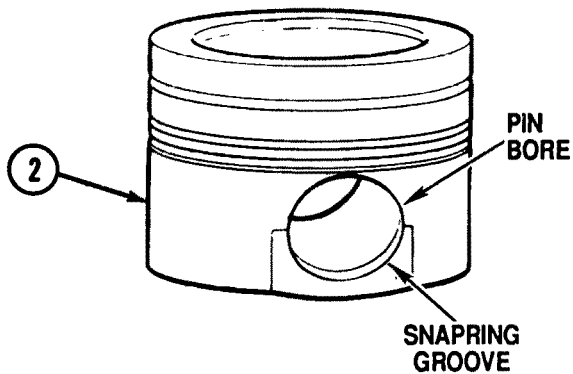
Temperature should be 70°-90° F (21°-32° C) when piston diameter is measured.

AW Measure piston (2) 90 degrees from pin bore at two different places below bottom groove. Use 5-6 in. outside micrometer. If any single measurement is more than 5.490 in. (139.446 mm) or less than 5.485 in. (139.319 mm), replace with new piston assembly.

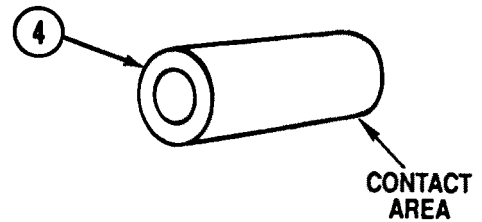
AX Measure and record inside diameter of installed liner (3). Use cylinder gage.

AY Measure and record diameter of piston (2) to be installed in later steps. Use 5-6 in. outside micrometer.

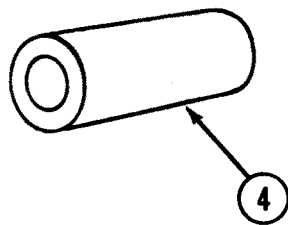
AZ Subtract diameter of piston (2) from inside diameter of liner (3). If difference between the two is more than 0.017 in. (0.4318 mm), replace piston and/or liner. Use new and old parts which provide a piston-to-liner clearance between 0.0095 in. (0.241 mm) and 0.017 in. (0.4318 mm).



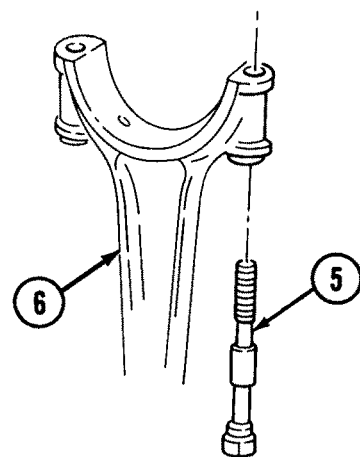
BA Make two measurements, 90 degrees apart, inboard of each snapping groove in pin bore. Replace piston (2) if any measurement is more than 1.750 in. (44.45 mm). Use small bore gage.



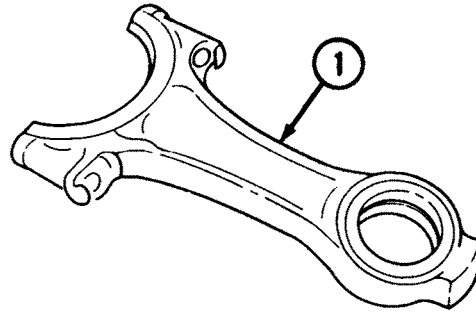
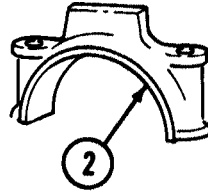
BB Make two measurements, 90 degrees apart, on contact area at each end of pin (4). Record measurements. Use 1-2 in. outside micrometers. If measurements are less than 1.748 in. (44.399 mm), replace piston assembly.



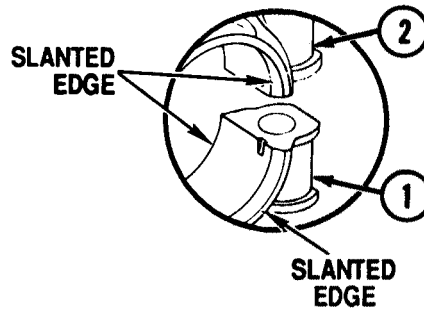
BC Compare measurements of pin (4) taken in step BB with each other. Subtract smaller measures from larger measures. Replace piston if any two measurements are more than 0.001 in. (0.025 mm) different from each other.



BD Remove two bolts (5) from rod (6).



- BE** Check rod (1) and rod bearing cap (2) for cracks using dye penetrant.
- BF** If any crack is found in rod (1) or rod bearing cap (2), replace with new rod assembly.
- BG** Clean parts after dye penetrant check.



CAUTION

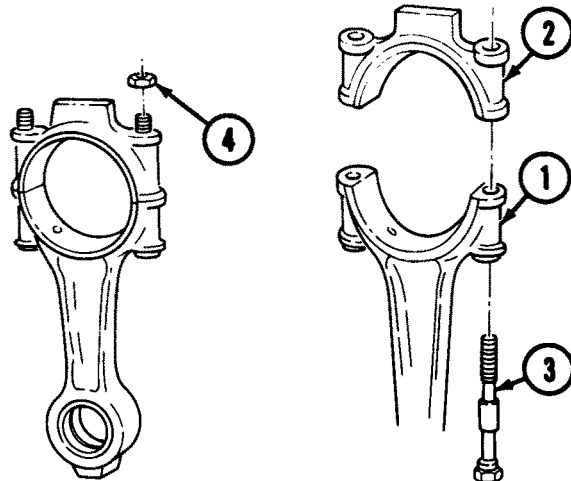
Rod must be clamped correctly in vise using padded jaws. Failure to do so may result in twisting when nuts are torqued against rod cap.

- BH** Install two bolts (3) and rod bearing cap (2) with slanted edges of rod (1) and rod bearing cap (2) aligned.

Note

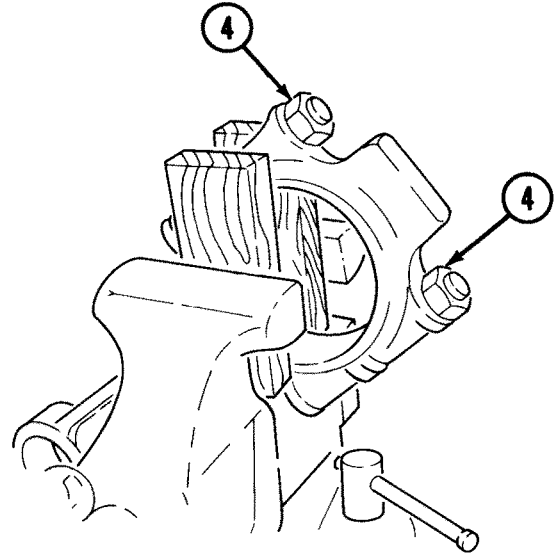
Do not install lockplates at this time.

- BI** Install two nuts (4) on two bolts (3). Hand tighten nuts.
- BJ** Clamp rod assembly in vise.



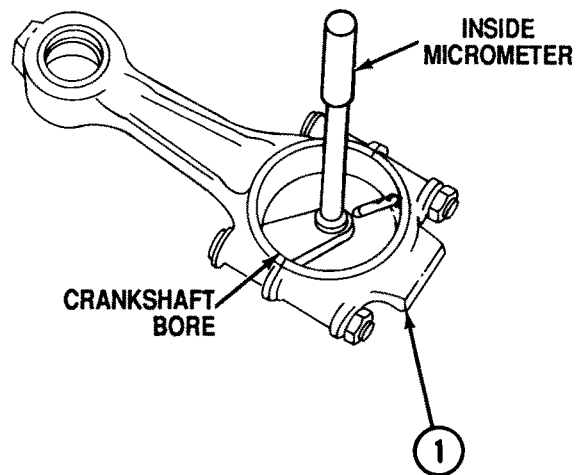
BK Tighten two nuts (4) to 95-110 lb-ft (129-149 N·m). Follow these steps below to tighten nuts:

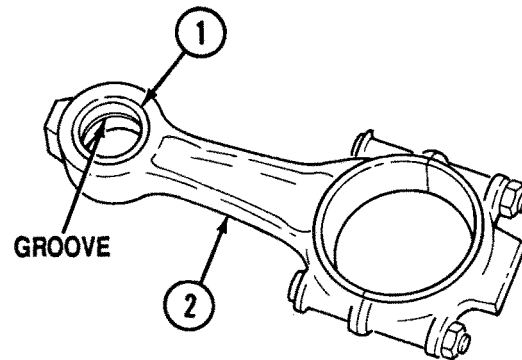
- Step 1: Tighten to 50-60 lb-ft (68-81 N·m).
- Step 2: Tighten to 90-100 lb-ft (122-136 N·m).
- Step 3: Loosen two nuts (4) to finger tightness. Do not use torque wrench to loosen nuts.
- Step 4: Tighten to 30-40 lb-ft (41-54 N·m).
- Step 5: Tighten to 60-70 lb-ft (81-95 N·m).
- Step 6: Tighten to 95-110 lb-ft (129-149 N·m).



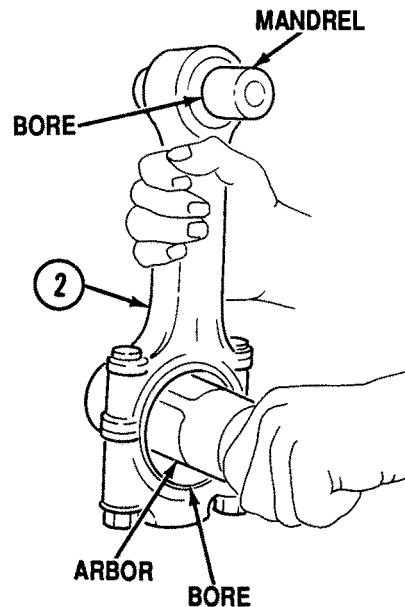
BL Remove rod assembly from vise.

BM Using inside micrometer, measure inside diameter of crankshaft bore on rod (1). Take two measurements at two depths, 90 degrees apart. If any single measurement is more than 3.3168 in. (84.2467 mm), replace with new rod assembly (1). If difference between any two measurements is more than 0.002 in. (0.051 mm), replace with new rod assembly (1).





BN Using a dial bore gage, measure inside diameter of piston pin bushing (1) on both sides of oil supply groove. Take two measurements, 90 degrees apart, on each side of groove. If any single measurement is more than 1.7525 in. (44.5135 mm) or less than 1.7510 in. (44.4754 mm), replace with new rod assembly (2).



Note

Perform steps BO through BS using a new rod assembly to determine calibration readings that will be used when checking used rod assembly.

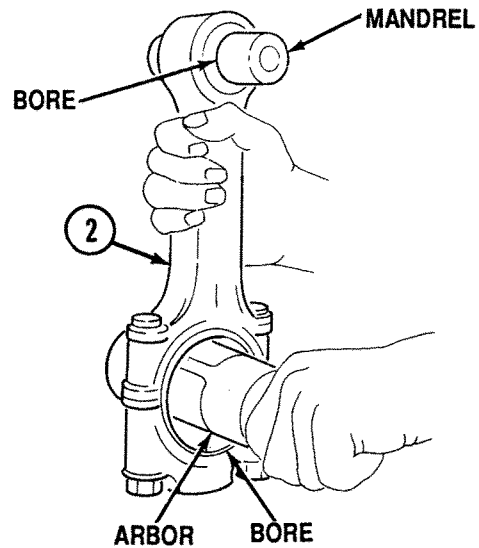
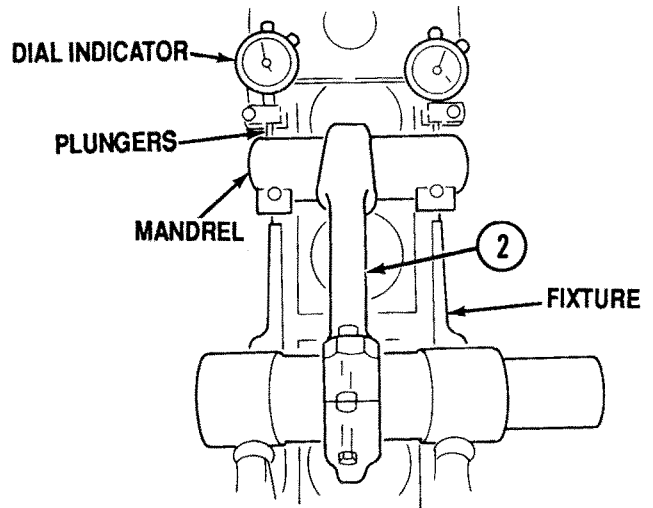
BO Insert connecting rod locating mandrel in piston bore of rod assembly (2).

BP Insert expanding arbor in crankshaft bore with locating pin facing down. Tighten arbor.

BQ Install rod assembly (2) on connecting rod checking fixture assembly. Use connecting rod checking fixture to measure rod.

BR Set plungers on two dial indicators to touch mandrel. Adjust dial indicators to read zero.

BS Turn rod assembly (2) 180 degrees. Reset plungers of two dial indicators to touch pin mandrel. Record dial indicator readings. Adjust dial indicators to read between zero and these readings. This is the calibration reading to be used when checking used rod assembly.



Note

Steps BT through CM are used to check used rod assemblies.

BT Insert connecting rod locating mandrel in piston bore of rod assembly (2).

BU Insert expanding arbor in crankshaft bore with locating pin facing down. Tighten arbor.

BV Install rod assembly (1) on connecting rod checking fixture assembly. Using connecting rod checking fixture to measure rod.

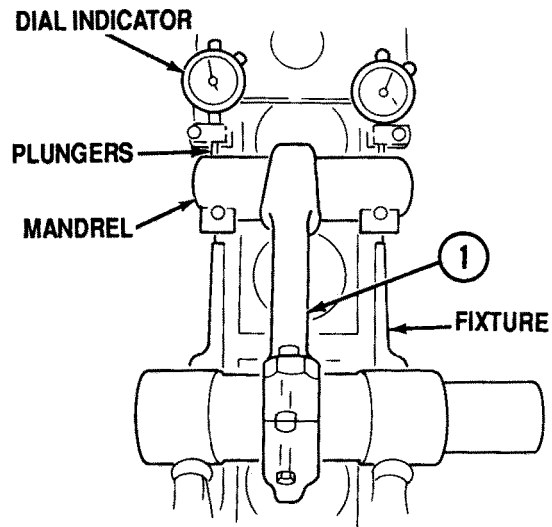
BW Set plungers on two dial indicators to touch mandrel. Record dial indicator readings. Mark readings as D1 and D2.

BX Turn rod assembly (1) 180 degrees. Reset plungers of two dial indicators to touch mandrel. Record dial indicator readings. Mark readings as D3 and D4.

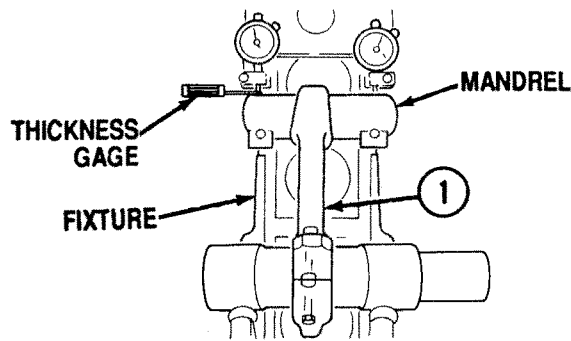
BY Add D1 and D2 readings, then divide by 2 to get average. Do same with D3 and D4 readings.

$$\frac{D1 + D2}{2} = \frac{D3 + D4}{2} =$$

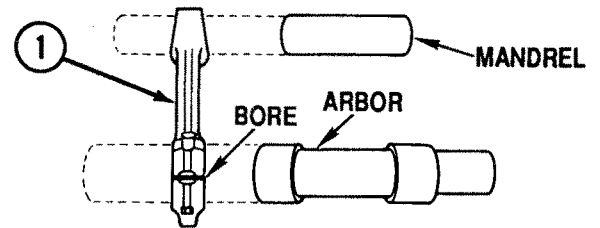
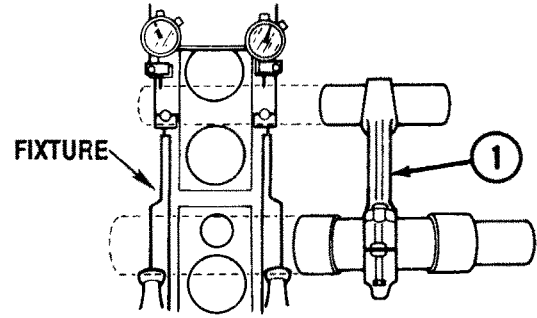
BZ Check average readings with calibration readings taken in step BS. If no average reading is more than 0.001 in. (0.0254 mm) from calibration reading, keep rod assembly. If average reading is more than 0.001 in. (0.0254 mm), replace with new rod assembly.



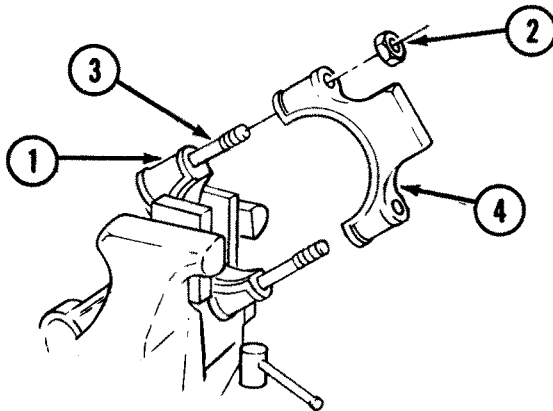
CA Use same dial indicator readings as in steps BV through BZ. Add readings for each dial indicator (shop calibration reading plus reading on each dial indicator). Use absolute values of readings. Do not consider whether any of readings were positive (+) or negative (-). If reading is more than 0.004 in. (0.1016 mm), replace with new rod assembly (1).



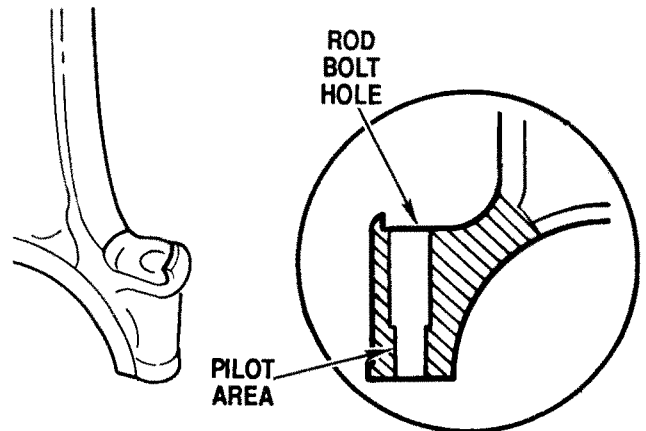
- CB** Hold rod (1) against fixture.
- CC** Insert thickness gage between mandrel and measurement surface on fixture. Insert thickness gage at both ends of mandrel. There should be zero clearance at one end of mandrel.
- CD** Measure clearance between measurement surface and free end of mandrel. If clearance is more than 0.010 in. (0.25 mm), replace with new rod assembly (1).



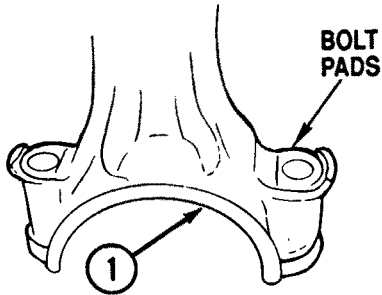
- CE** Remove mandrel from rod assembly (1).
- CF** Loosen expanding arbor, and remove arbor from crankshaft bore of rod assembly (1).



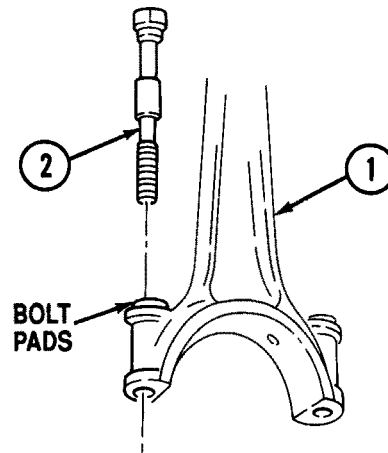
- CG** Secure rod (1) in vise with padded jaws.
- CH** Remove two nuts (2), bolts (3), and rod bearing cap (4) from rod (1).
- CI** Remove rod (1) from vise.



- CJ** Insert small bore gage in pilot area of each rod bolt hole. Take two measurements, 90 degrees apart, in each bolt hole. If any single measurement is more than 0.5645 in. (14.338 mm), replace with new rod assembly.

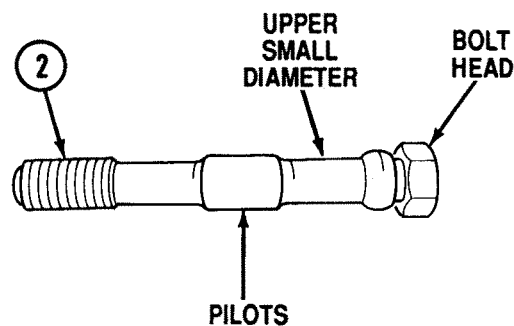


CK Inspect two bolt pads on rod (1) for bends and chips. If bends or chips are found, replace rod assembly.



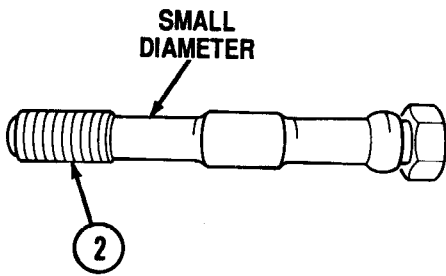
CL Install bolts (2) in rod (1). Tap bolt heads flat on two bolt pads.

CM Check fit of two bolts (2) to two bolt pads. If bolts fit securely, do next step. If bolts or rod (1) cause misfit, replace bolts or rod as needed to get secure fit.

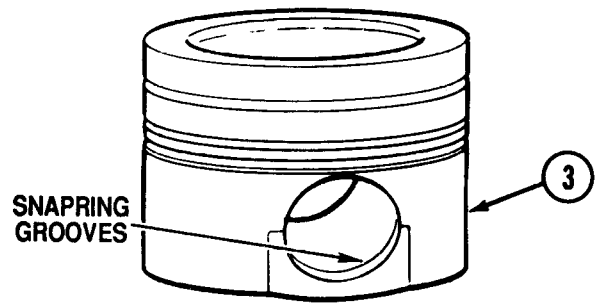


CN Measure outside diameter of pilots on two bolts (2). Take two measurements, 90 degrees apart. Use 0-1 in. outside micrometer. If any single measurement is less than 0.5637 in. (14.318 mm), replace with new bolt (2).

CO Measure upper small diameter of bolt (2) nearest to bolt head. Take two measurements, 90 degrees apart. Use 0-1 in. outside micrometer. If any single measurement is less than 0.478 in. (12.14 mm), replace with new rod bolt (2).



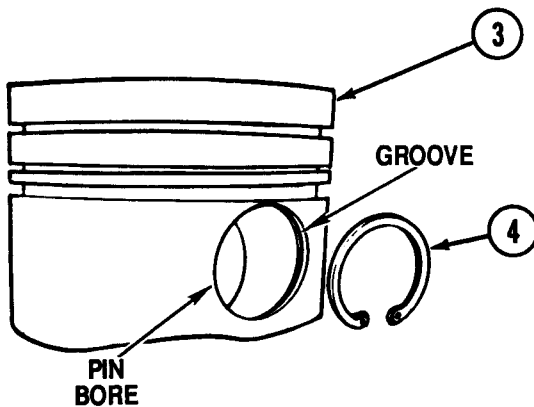
CP Measure lower small diameter on bolt (2) between pilot and threads. Take two measurements, 90 degrees apart. Use outside micrometer. If any single measurement is less than 0.478 in. (12.14 mm), replace with new bolt (2).



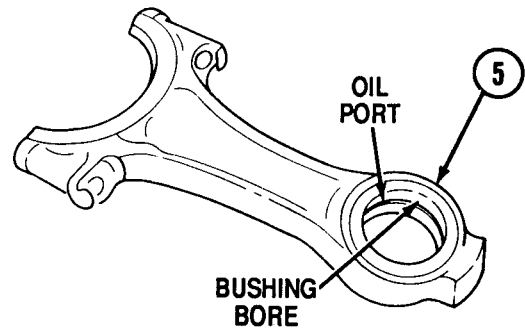
CAUTION

Do not scrape or polish in pin bore inside snapping grooves. A marred machine surface can cause piston to fail.

CQ Clean outer edge of two snapping grooves in pin bore of piston (3).



CR Install snapping (4) in groove on pin bore of piston (3). Use snapping pliers.



WARNING

Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

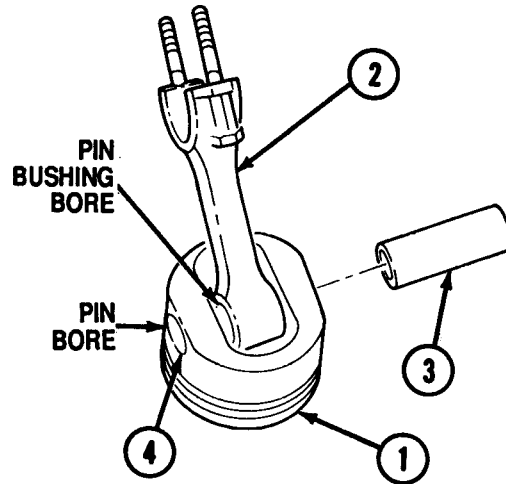
CS Clean oil port on piston pin bushing (5) using compressed air. Lubricate bore with 30-weight engine oil.

CAUTION

Do not use mandrel or punch to install piston pin. Damage to pin may result.

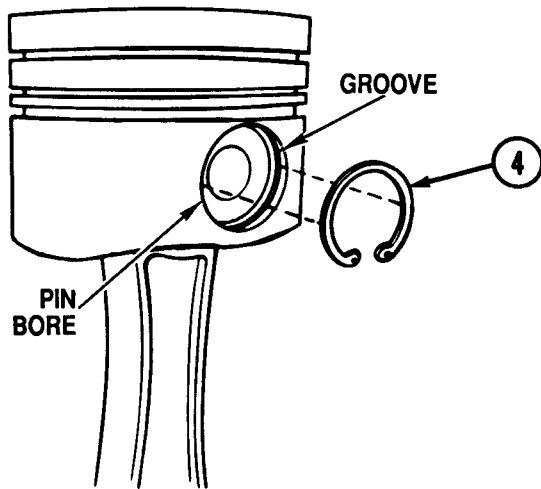
Note

Marks on pin, piston, and rod should be aligned in same position as removed.

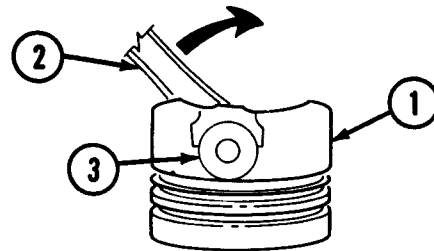


- CT** Heat piston (1) in oven to expand pin bore and position piston (1) over end of rod (2).
- CU** Aline pin bore with pin bushing bore on rod (2) and insert pin (3) in piston pin bore on side opposite snapping (4).

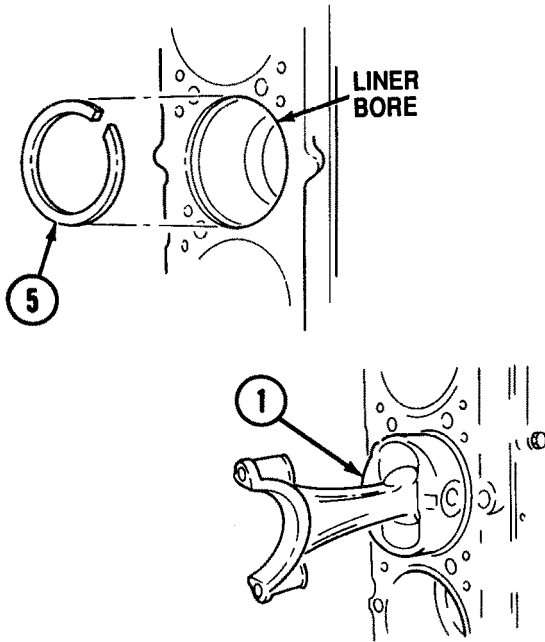
- CV** Press pin (3) through piston pin bore until set against snapping (4). If pin (3) does not enter piston pin bore, check for dirt and grit. Reheat piston (1) and install pin.



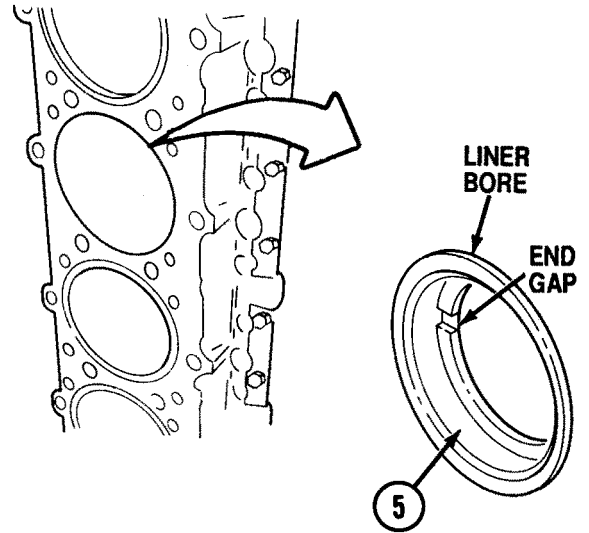
- CW** Install second snapping (4) in groove on piston pin bore. Use snapping pliers.



- CX** Rock piston (1) on rod (2), then slide rod back and forth on piston pin (3). If any resistance is met, take apart piston and rod assembly. Check parts for dirt and grit, clean if necessary, and reassemble parts.



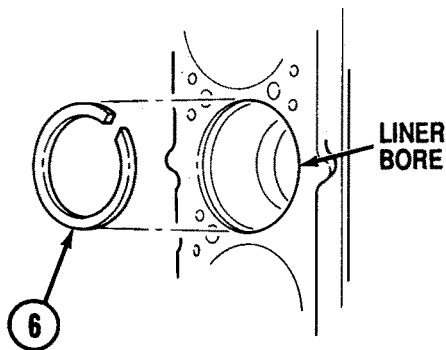
- CY** Squeeze and insert top piston ring (5) into liner bore by hand.
- CZ** Square ring (5) in liner bore using top of piston (1).



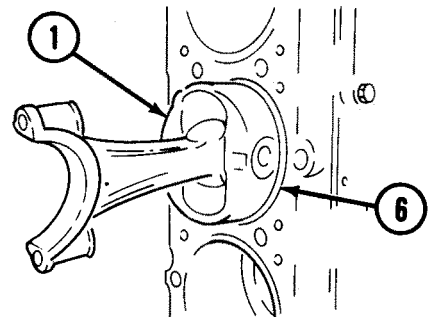
Note

Do not file ends of piston rings.

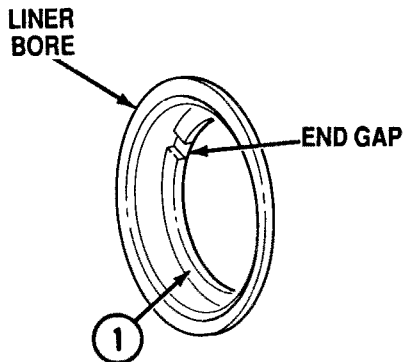
- DA** Measure end gap of new top ring (5). If measurement is less than 0.017 in. (0.43 mm) or more than 0.027 in. (0.69 mm), replace with another new ring (5).
- DB** Remove ring (5) from liner bore.



- DC** Squeeze and insert second ring (6) in liner bore.

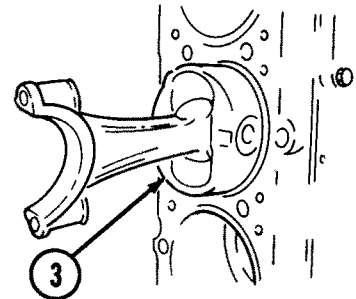
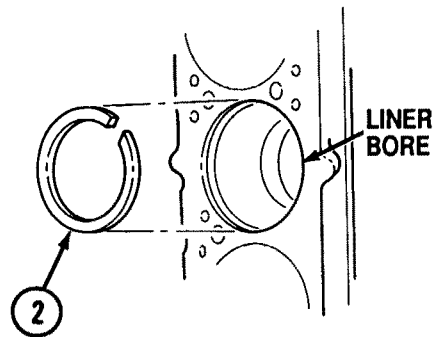


- DD** Square ring (6) in liner bore using top of piston (1).



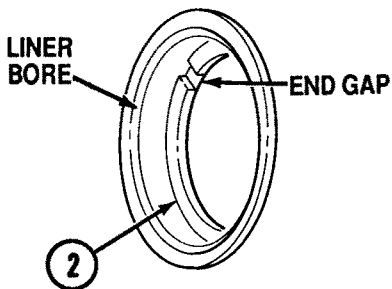
DE Measure end gap of new second ring (1). Use thickness gage. If measurement is less than 0.013 in. (0.33 mm) or more than 0.023 in. (0.58 mm), replace with another new ring (1).

DF Remove ring (1) from cylinder liner bore.



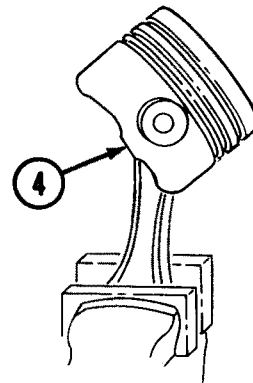
DG Squeeze and insert new expander ring (2) in liner bore.

DH Square ring (2) in liner bore using top of piston (3).

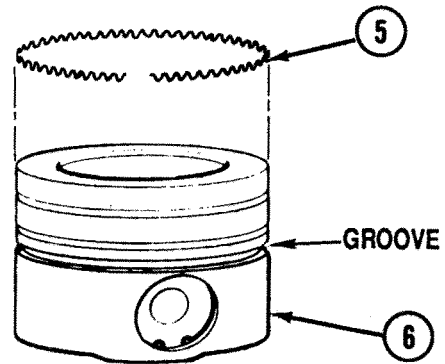


DI Measure end gap of expander ring (2). Use thickness gage. If measurement is less than 0.010 in. (0.25 mm) or more than 0.025 in. (0.64 mm), replace with another new ring (2).

DJ Remove ring (2) from liner bore.



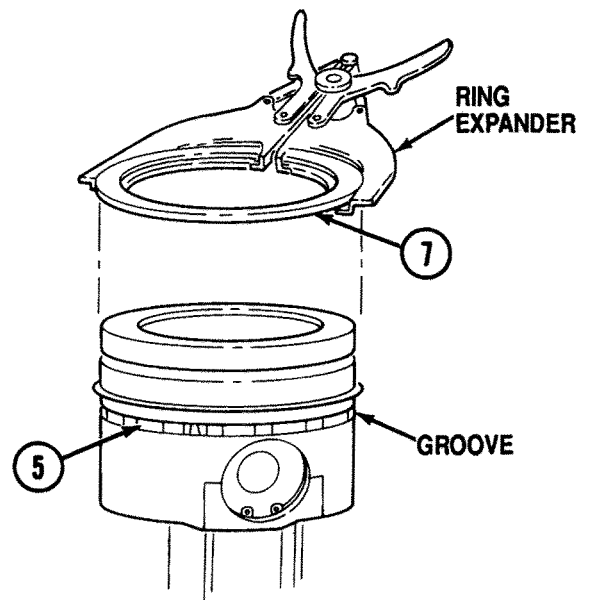
DK Clamp piston and rod assembly (4) in vise with padded jaws.



Note

Ends of expander ring of oil control ring and oil control ring must not overlap.

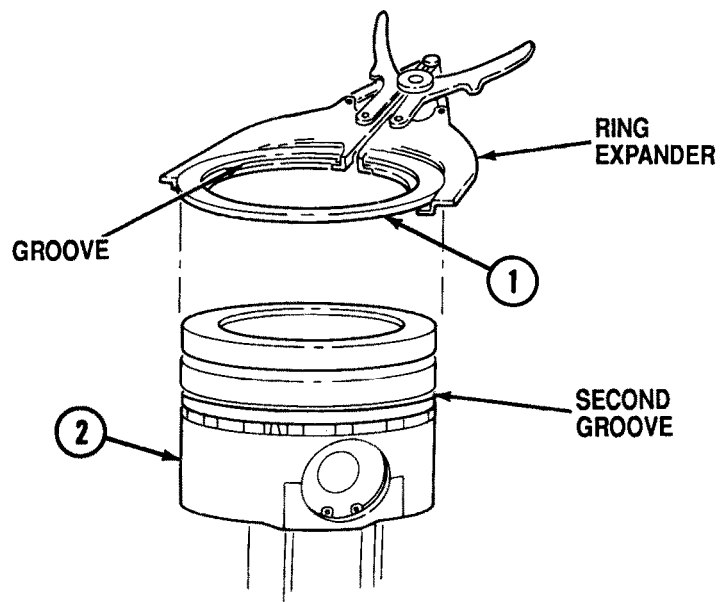
DL Install expander ring (5) of new oil control ring in bottom groove of piston (6).



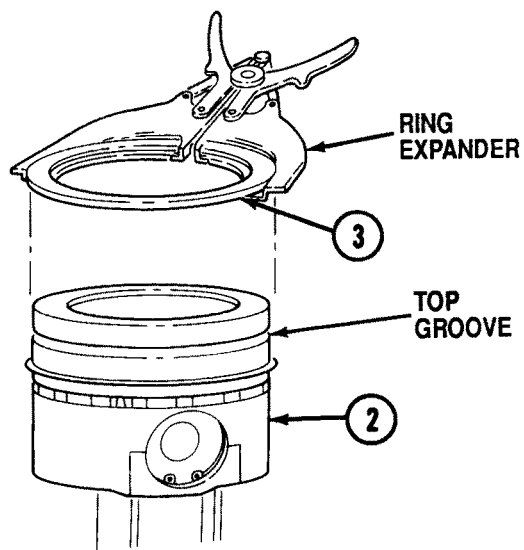
CAUTION

Do not expand rings more than needed to get around outer surface of piston. A ring that is expanded too much may fail during engine operation.

DM Using piston ring expander, hold expander ring (5) in groove and install oil control ring (7) over expander ring.

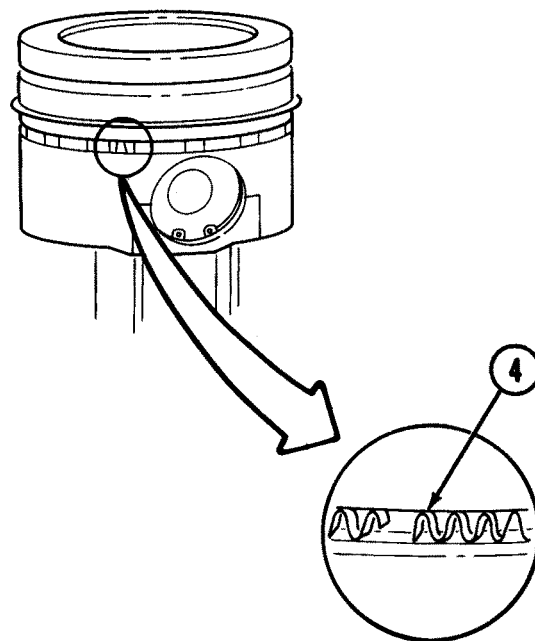


DN Using piston ring expander, turn new ring (1) so groove faces up and install ring in second groove on piston (2).

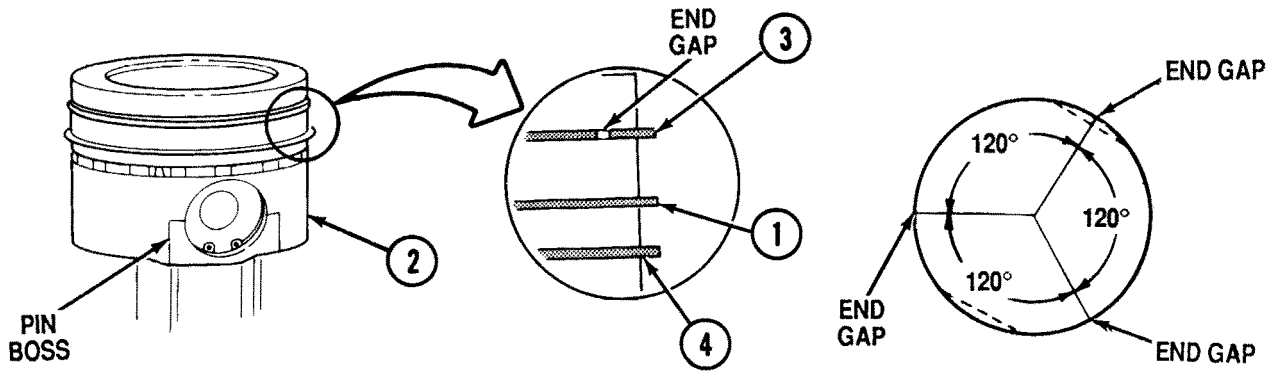


DO Turn ring (3) so TOP mark faces up.

DP Using piston ring expander, install ring (3) in top groove on piston (2).



DQ Check oil control ring (4) to see if ends overlap. If ends overlap, correct by hand.



CAUTION

Ring gaps must not be aligned vertically or compression loss could result.

DR Position end gap of oil control ring (4) on piston (2) away from pin boss.

DS Position end gap of second ring (1) on piston (2) 120 degrees away from end gap on oil control ring (4).

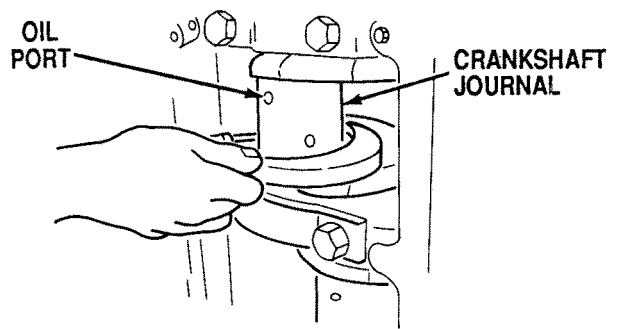
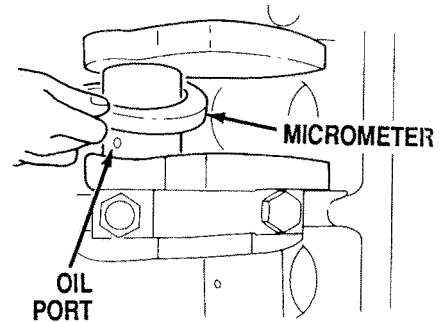
DT Position end gap of top ring (3) on piston (2) 120 degrees from end gap of second ring (1).

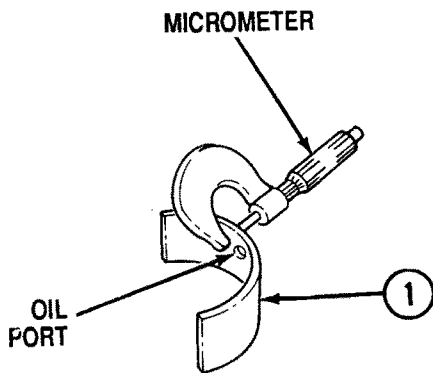
DU Remove piston and rod assembly from vise, and place on workbench.

DV Using 3-4 in. (76.2-101.6 mm) outside micrometer, measure outside diameter of crankshaft journal.

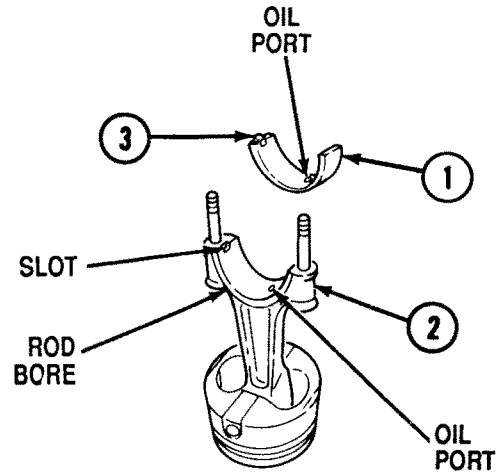
- (1) Take two measurements, one on each side of oil port.
- (2) Turn engine so crankshaft is turned enough to use micrometer 90 degrees from first two measurements.
- (3) Take two more measurements, 90 degrees from the first two measurements, one on each side of oil port.

DW If any single measurement is less than 3.122 in. (79.298 mm), stop task and tag engine for repair.



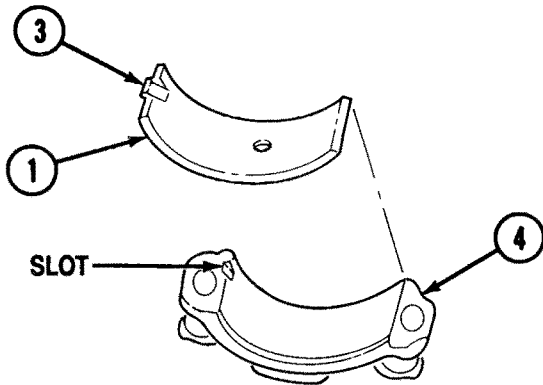


DX Using ball end micrometer, measure thickness of two bearing shells (1). Take two measurements on each side of oil port on each shell. If any measurement on either bearing shell (1) is less than 0.09425 in. (2.39395 mm), replace both bearing shells.



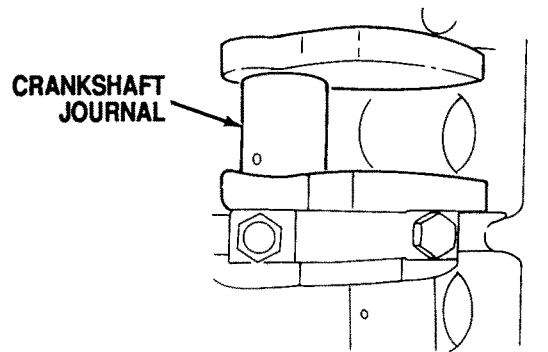
DY Align bearing shell (1) on rod bore. Aline oil port in shell with oil port in rod (2). Aline tang (3) on shell with slot on rod.

DZ Press bearing shell (1) in bore using thumbs.



EA Aligntang (3) of bearing shell (1) with slot on rod bearing cap (4).

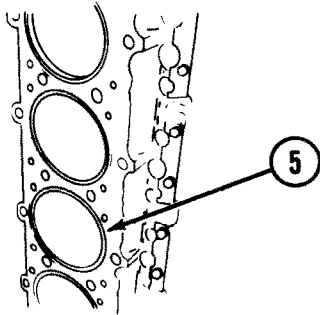
EB Press bearing shell (1) in rod bearing cap (4) using thumbs.



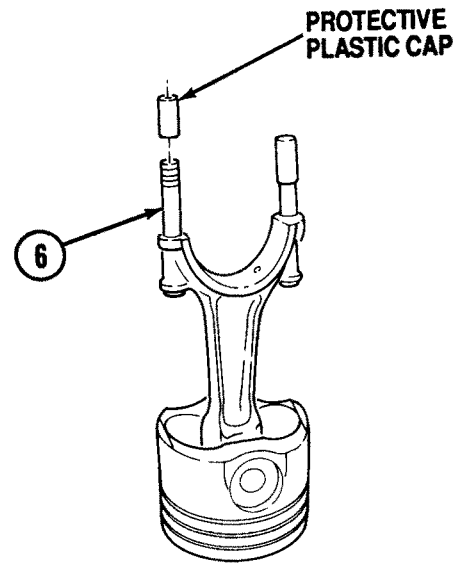
EC Turn crankshaft so that crankshaft journal is at bottom center position.

ED Wipe crankshaft journal clean with rag.

EE Lubricate crankshaft journal with clean 30-weight engine oil.

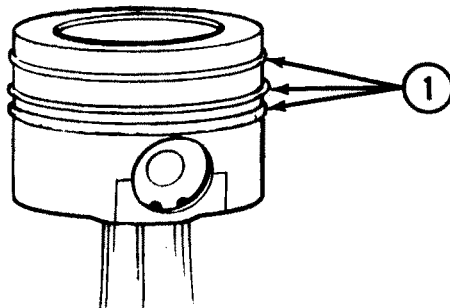


- EF** Wipe liner (5) clean with rag.
- EG** Apply clean 30-weight engine oil to inner surface of liner (5).



- EH** Place protective plastic caps on two bolts (6).

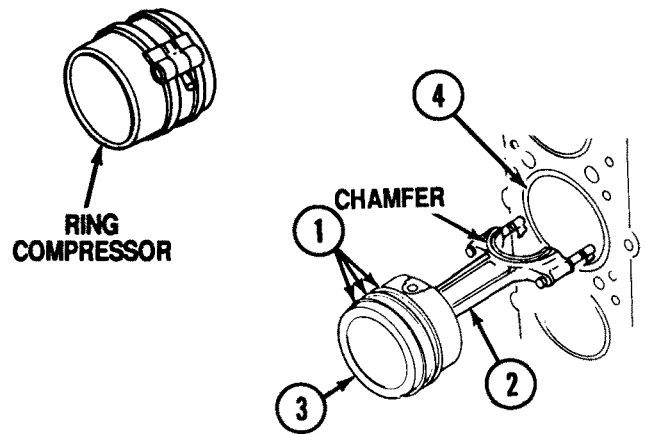
INSTALLATION



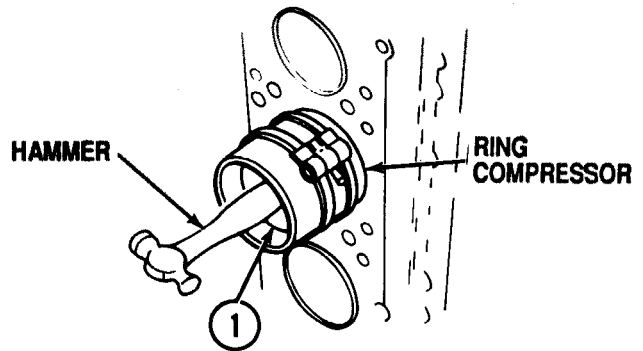
Note

Helper is required to keep rods off crankshaft.

- A** Apply clean 30-weight engine oil to three rings (1) and ring grooves.



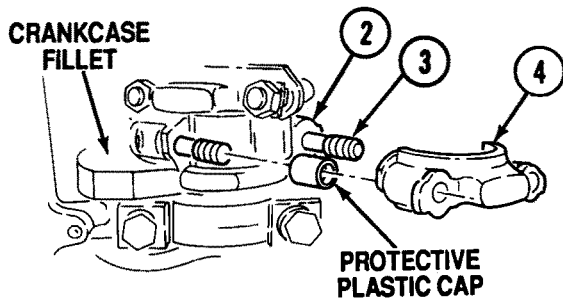
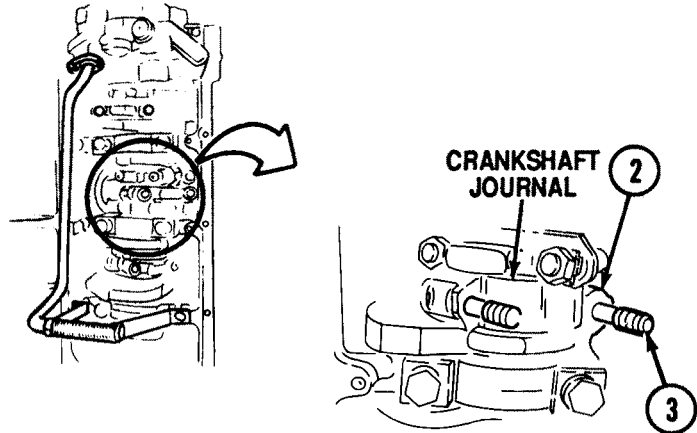
- B** Apply clean 30-weight engine oil to ring compressor.
- C** Place ring compressor over three piston rings (1).
- D** Align chamfer on rod (2) with crankshaft fillet.
- E** Insert piston and rod assembly (3) in liner (4).



Note

- Match piston and rod numbers with correct cylinder holes.
- Check that rings are not pulled out of ring grooves while piston is tapped through ring compressor.

- F** Lightly tap piston (1) through ring compressor using wooden block or wooden hammer handle.
- G** Guide rod (2) on crankshaft journal. Hold two bolts (3) to pull rod on journal.
- H** Tap piston (1) until rod (2) is secure against crankshaft journal.

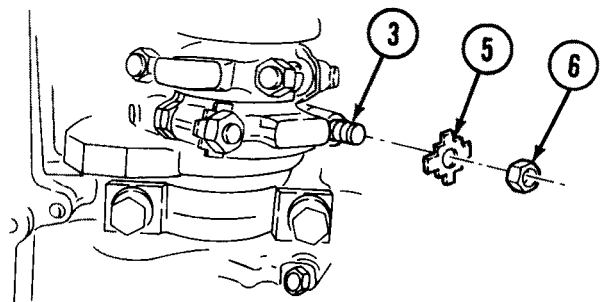


- I** Remove protective plastic caps from two bolts (3).
- J** Align rod bearing cap (4) with side toward crankcase fillet.
- K** Check that rod bearing cap (4) and rod (2) have tangs on same side.

Note

When bearing cap is tapped against rod, use only a plastic-tipped hammer.

- L** Press or tap rod bearing cap (4) over two bolts (3), and against rod (2).



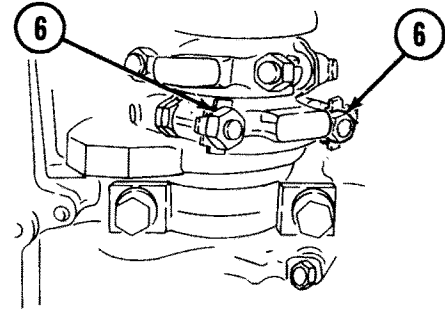
Note

Install lock tabs with bent ends facing toward crankshaft.

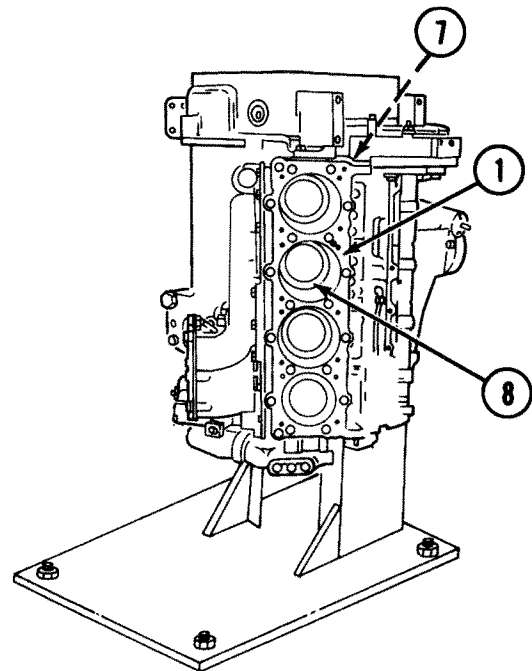
- M** Apply engine oil to tabs of new lockplates (5).
- N** Install two lockplates (5) on two bolts (3).
- O** Install two nuts (6) on two bolts (3) with flat side against two lockplates (5). Tighten nuts (6) finger tight.

P Using torque wrench, tighten two nuts (6) to 95-110 lb-ft (129-149 N·m). Follow these steps below to tighten nuts:

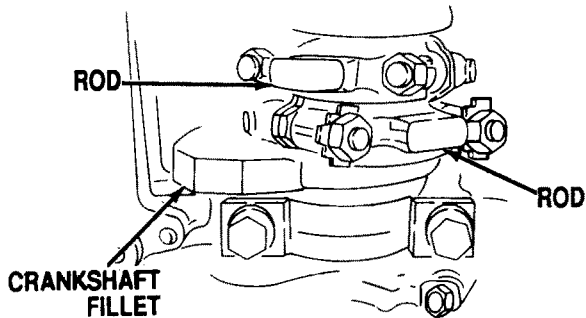
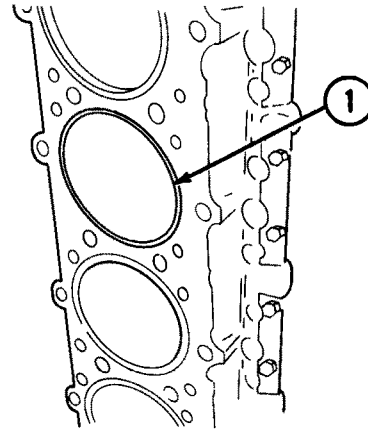
- Step 1: Tighten to 55-60 lb-ft (75-81 N·m).
- Step 2: Tighten to 90-100 lb-ft (122-136 N·m).
- Step 3: Loosen two nuts (6) to finger tightness. Do not use torque wrench to loosen nuts.
- Step 4: Tighten to 30-40 lb-ft (41-54 N·m).
- Step 5: Tighten to 60-70 lb-ft (81-95 N·m).
- Step 6: Tighten to 95-110 lb-ft (129-149 N·m).



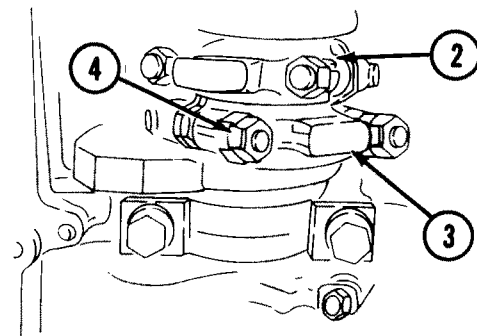
- Q** Turn crankshaft (7) one complete turn.
- R** If resistance is found, check bearing surfaces for defects.
- S** If bearing surfaces are not defective, check rings.
- T** Turn crankshaft (7) so that piston (1) is at bottom center in liner (8).



- U** Check liner (1) for scoring and polishing. If no scoring or polishing is found, go to step X.
- V** If scoring or polishing is found on liner (1), remove piston and rod assembly. Check piston rings for defects or breaks. Check for overlap on expander ring under bottom piston ring.
- W** Install piston and rod assembly.
- X** Turn engine one complete turn, and check liner (1) again for scoring and polishing. If no scoring or polishing is found on liner (1), go to next step. If scoring or polishing is found, tag engine for repair.



- Y** Using thickness gage, press rods apart against crankshaft fillet. Measure clearance between rods. If clearance is more than 0.005 in. (0.13 mm) and less than 0.022 in. (0.56 mm), clearance is correct. Go to next step. If clearance is less than 0.005 in. (0.13 mm) or more than 0.022 in. (0.56 mm), clearance is not correct. Tag engine for repair.



- Z** Bend one tab of each lockplate (2) against rod bearing cap (3).
- AB** Bend one of remaining tabs of each lockplate (2) against flat side of nut (4).

FOLLOW-ON TASKS:

- Install oil pump (p 3-65).
- Install cylinder heads (p 3-194).
- Remove engine from stand (p 2-9).

CRANKCASE REAR SEAL REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer (2) 63H10

Equipment Condition:

Special Tools:

Mechanical Puller	5120-00-499-1489
Oil Seal Installer	3375818

Reference

Page 2-8

Page 3-127

Condition
Description

Engine Mounted
on Stand

Flywheel Removed

Materials:

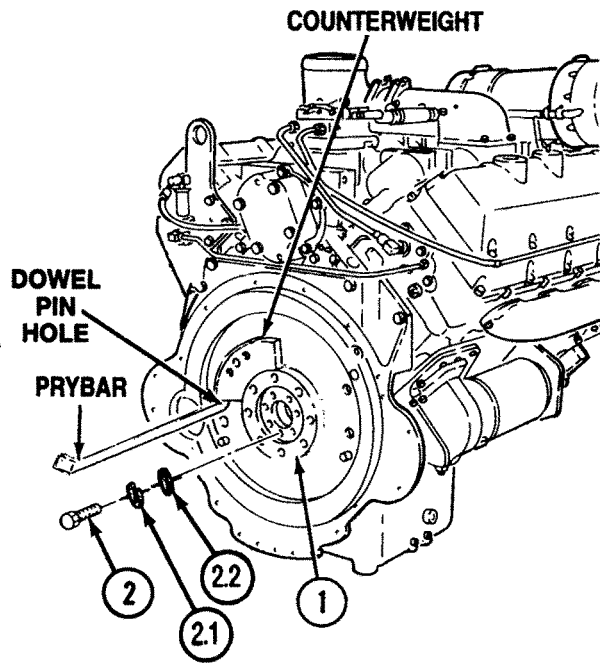
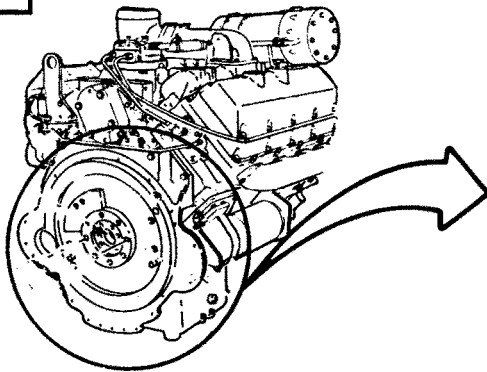
Chalk	Item 6 Appendix C
-------	----------------------

Parts:

Seal

Lockwashers (7)

REMOVAL



A Insert prybar in left dowel pin hole and turn crankshaft adapter (1) until counterweight rests against top of prybar.

B Remove seven screws (2), lockwashers (2.1), and washers (2.2) from crankshaft adapter (1). Discard seven lockwashers (2.1).

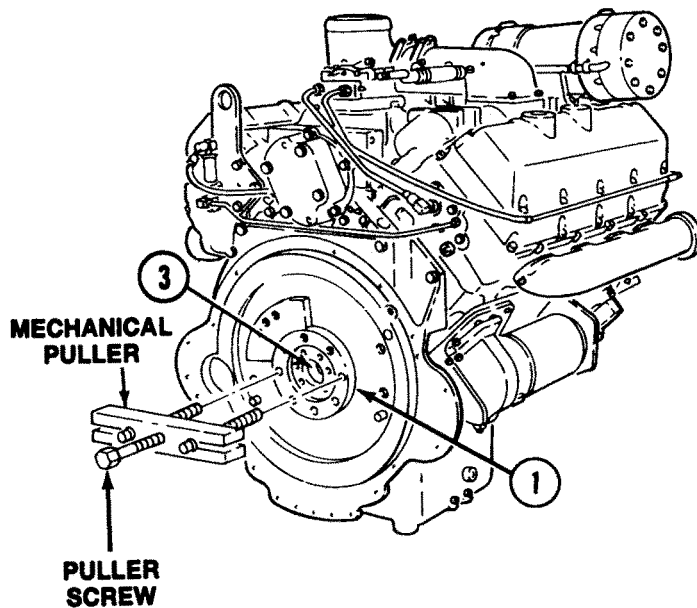
C Deleted.

D Attach mechanical puller to crankshaft adapter (1).

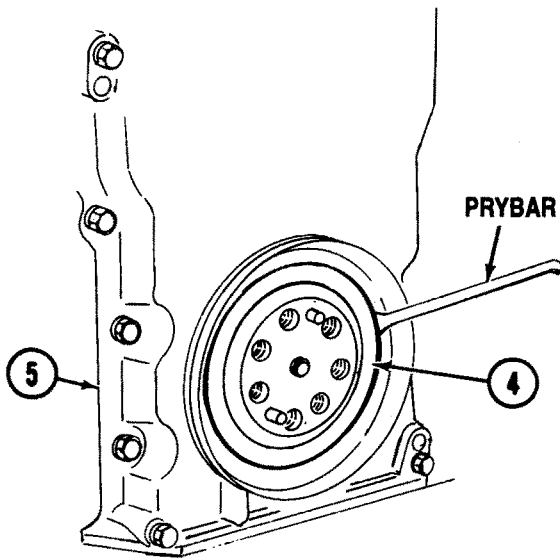
E Tighten puller by turning puller screw until crankshaft adapter (1) loosens. Have helper support crankshaft adapter (1).

F Remove crankshaft adapter (1) from crankshaft (3).

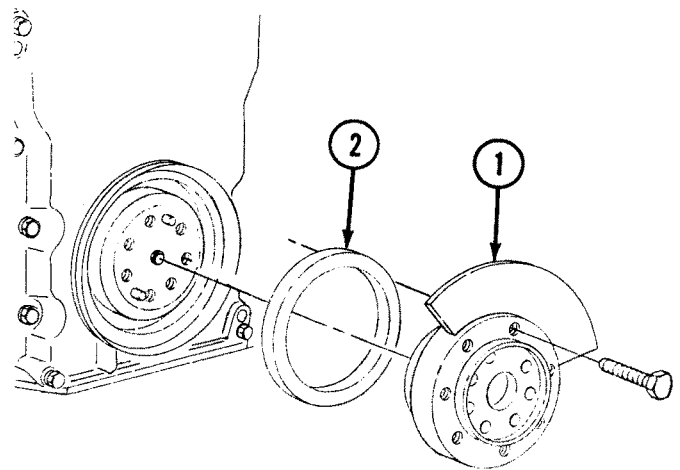
G Remove mechanical puller from crankshaft adapter (1).



INSTALLATION



H Using prybar, pry crankcase rear seal (4) from rear cover (5). Discard seal (4).



A Install four capscrews on crankshaft adapter (1). Ensure that heads of all capscrews are tight to crankshaft adapter (1).

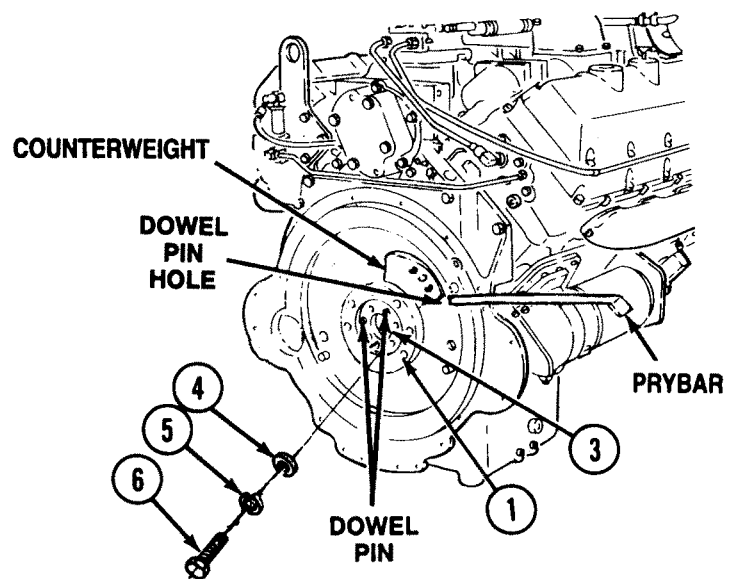
B Install oil seal (2) on crankshaft adapter (1). Ensure that oil seal (2) is in contact with all four capscrews.

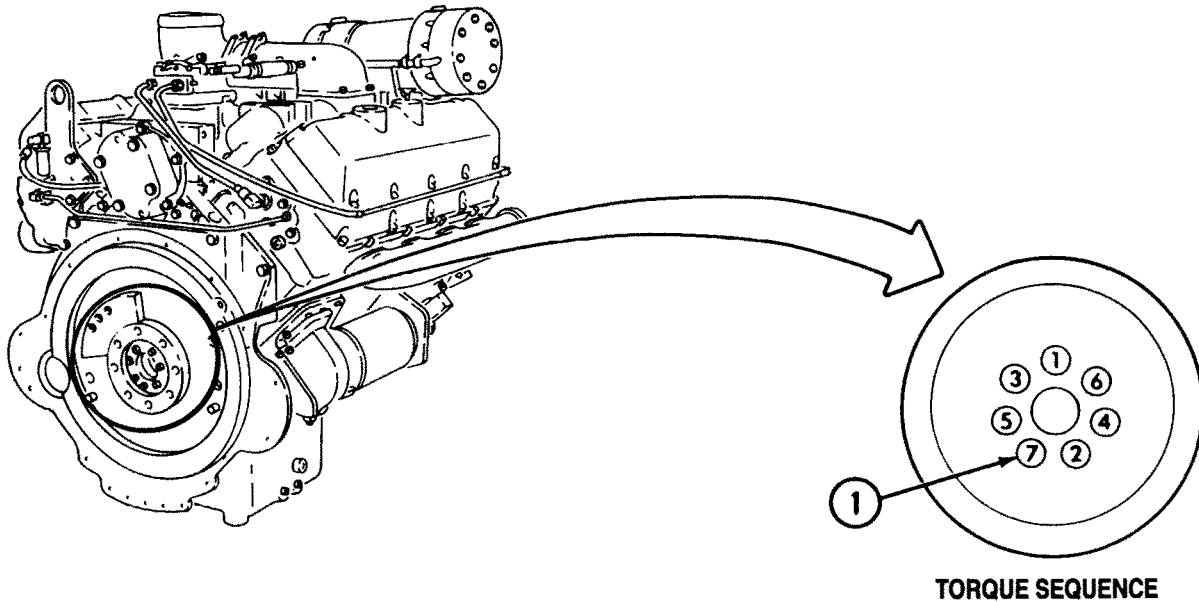
C Place crankshaft adapter (1) and oil seal (2) on crankshaft dowel pins.

D Tap crankshaft adapter (1) onto crankshaft (3) with wooden or leather-faced hammer.

E Install seven washers (4), lockwashers (5), and screws (6) in crankshaft adapter (1).

F Insert prybar in right dowel pin hole. Turn crankshaft adapter (1) until counterweight rests against prybar.





G Mark screw no. 1.

Note

Have helper hold torque wrench in place during last torque step.

H Tighten seven screws (1) in steps of 75 lb-ft (102 N·m) to final torque of 350-370 lb-ft (475-502 N·m). Tighten screws in this order: 1 through 7 (see diagram).

I Remove prybar from dowel pin hole.

J Remove four capscrews installed in step A.

FOLLOW-ON TASK:
Install flywheel (p 3-127).

CAMSHAFT COVER REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Cleaning
- c. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Parts:

Gasket
Copper Washer (4)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

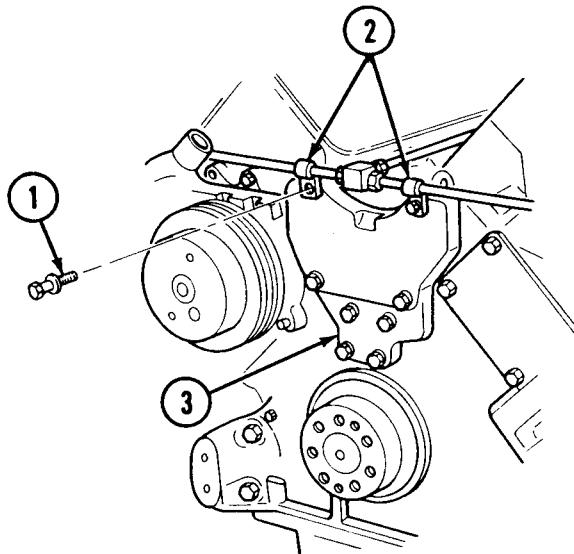
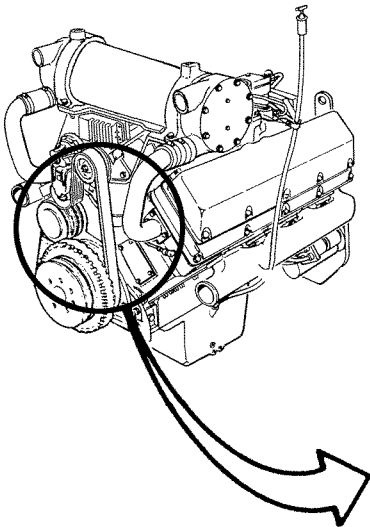
Equipment Condition:

Reference

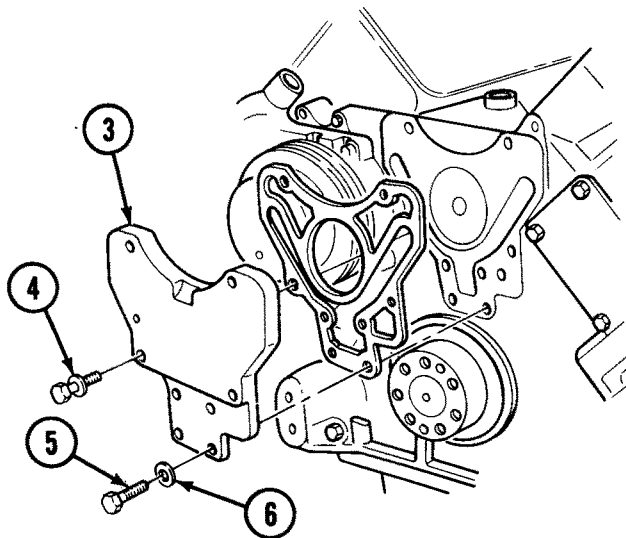
Page 3-113

Condition
Description

Vibration Damper
Removed

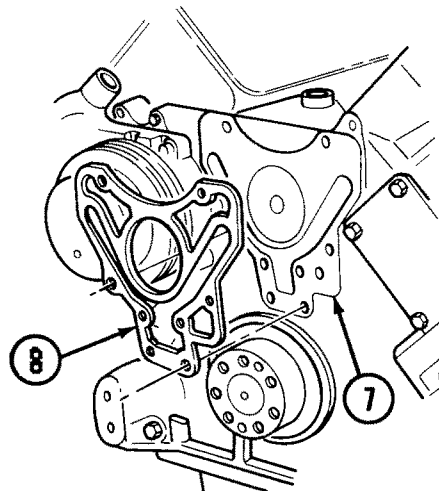


Remove two screw assembled washers (1) securing tubing clamps (2) to camshaft cover (3). Turn tubing clamps (2) out of the way.



Remove two screw assembled washers (4) from camshaft cover (3).

Remove four screws (5) and copper washers (6) from camshaft cover (3). Pry loose and remove cover (3) from engine (7). Discard copper washers (6).



Remove gasket (8) from engine (7). Discard gasket (8).

CLEANING

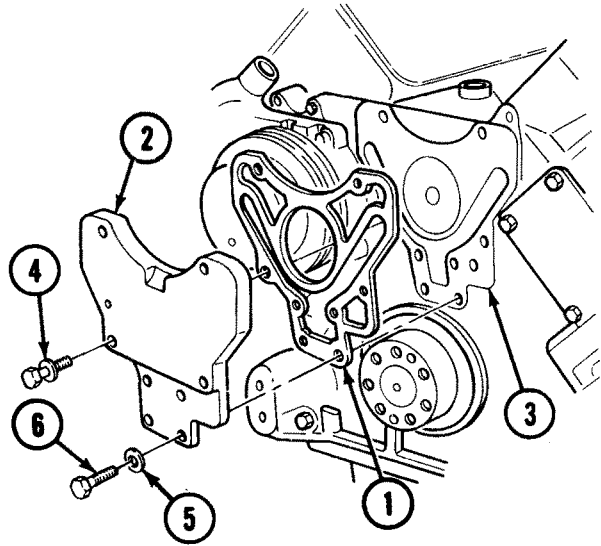
Follow general cleaning instructions (p 2-2).

INSTALLATION

Note

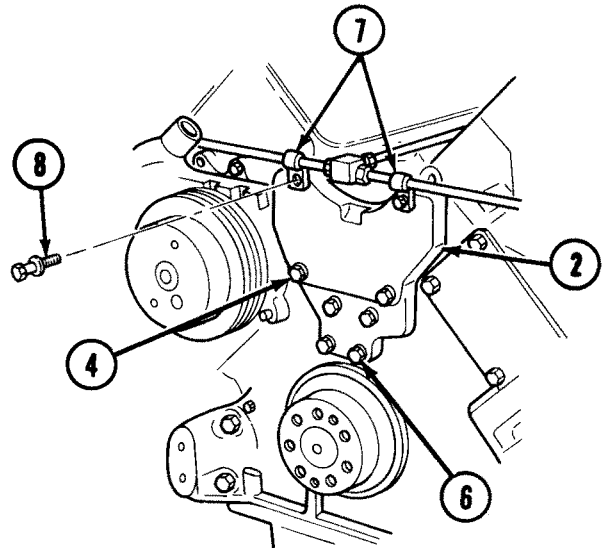
Make sure surfaces are clean before installing gasket.

- A** Aline gasket (1) on cover (2).
- B** Install cover (2) on engine (3) with two screw and washer assemblies (4), four copper washers (5), and screws (6).



- C** Aline two tubing clamps (7) and secure to camshaft cover (2) with two screw and washer assemblies (8). Tighten screw and washer assemblies (4) and (8) and screw (6) to 30-35 lb-ft (41-47 N-m).

FOLLOW-ON TASK:
Install vibration damper (p 3-115).



CAMSHAFT REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Cleaning
- c. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

4940-00-287-4894 Shop Equipment, General Purpose Repair, Semitrailer Mounted

Special Tools:

Camshaft Bushing Driver 4910-01-142-7387

Materials:

Drycleaning Solvent Item 25
Appendix C

Parts:

- Gasket
- Bushing (5)
- Lockwasher (4)

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 3-176	Camshaft Cover Removed
Page 3-31	Air Compressor Removed
Page 3-132	Transmission Adapter Removed
Page 3-187	Cylinder Heads Removed
Page 3-89	Oil Pan Removed
Page 3-172	Crankcase Rear Seal Removed

General Safety Instructions:

WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas.

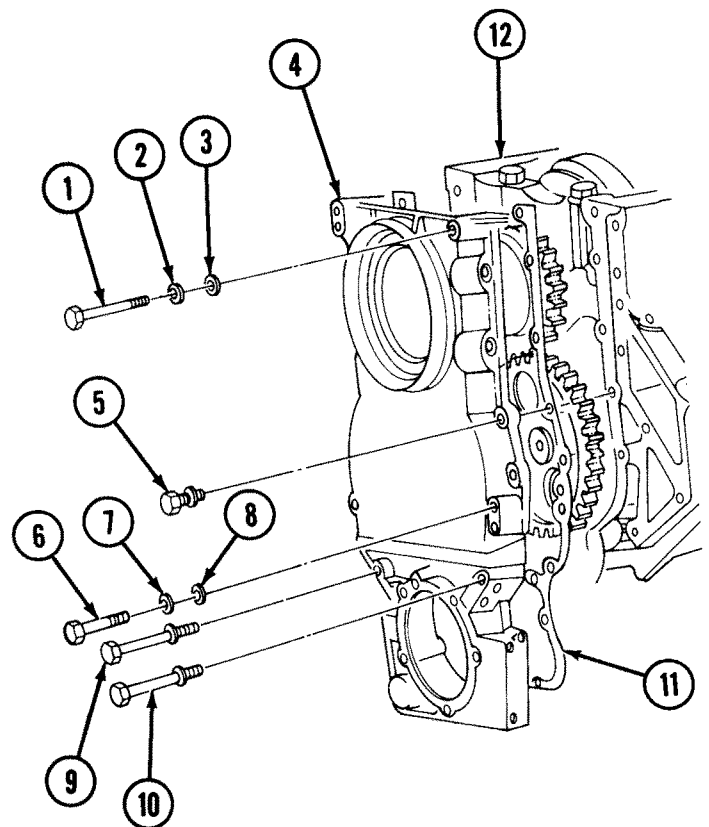
REMOVAL

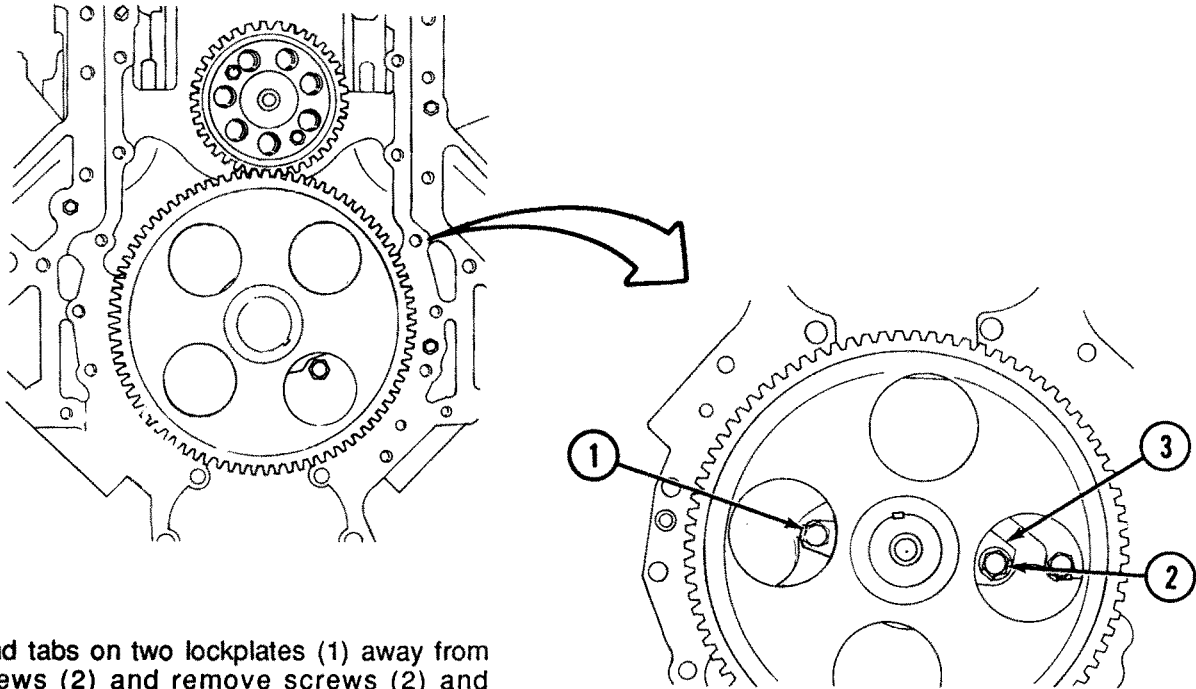
- A** Remove two $3/8$ x 3 in. (9.53 mm x 76.2 mm) screws (1), lockwashers (2), and flat washers (3) from cover (4). Discard lockwashers (2).
- B** Remove eight $3/8$ x 1- $3/8$ in. (9.53 mm x 34.93 mm) screw and washer assemblies (5) from cover (4).
- C** Remove two $3/8$ x 2- $1/2$ in. (9.53 mm x 63.5 mm) screws (6), lockwashers (7), and flat washers (8) from cover (4). Discard lockwashers (7).
- D** Remove $3/8$ x 3- $3/4$ in. (9.53 mm x 95.25 mm) screw and washer assembly (9) from cover (4).

Note

Note screw removal for left and right side of cover.

- E** Remove $3/8$ x 3- $1/4$ in. (9.53 mm x 82.55 mm) screw and washer assembly (10) from cover (4).
- F** Remove cover (4) and gasket (11) from engine block (12). Discard gasket (11).





- G** Bend tabs on two lockplates (1) away from screws (2) and remove screws (2) and lockplates (1) from camshaft thrust plate (3).

CAUTION

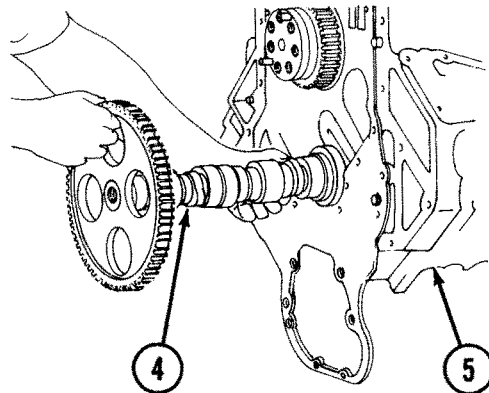
Be careful not to damage bearing surfaces while removing camshaft. Failure to comply will result in damage to equipment.

- H** Carefully withdraw camshaft (4) from engine block (5).
- I** Drive five camshaft bushings from engine block (5) with camshaft bushing driver. Discard bushings.

WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to comply may result in injury to personnel or damage to equipment.

CLEANING



Note

Follow general cleaning instructions (p 2-2).

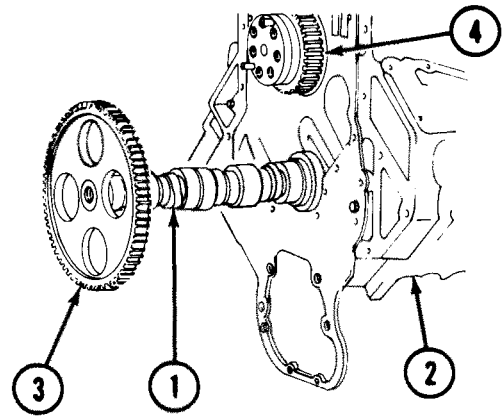
Use drycleaning solvent to clean camshaft bushing bores and ensure that oil passages in engine block are clean.

INSTALLATION

CAUTION

Front and rear camshaft bushings must be installed so that notches are toward outside of engine block. Oil holes in all camshaft bushings must align with oil holes in main bearing bore. Damage to engine will result.

- A** Put new camshaft bushing on camshaft bushing driver and position bushing so oil hole will be aligned with oil passage in main bearing bore.
- B** Drive bushing into camshaft bushing bore until oil hole in bushing aligns with oil passage in main bearing bore.
- C** Repeat step A and B until all five camshaft bushings are installed. Ensure that notches in front and rear bushings are toward outside of engine block.

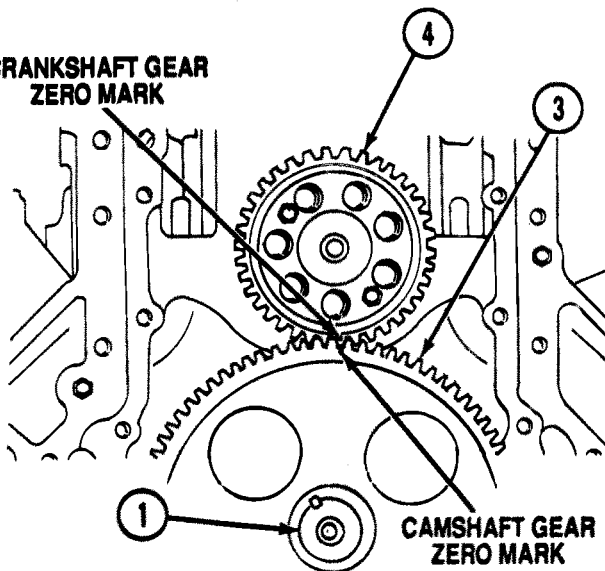


CAUTION

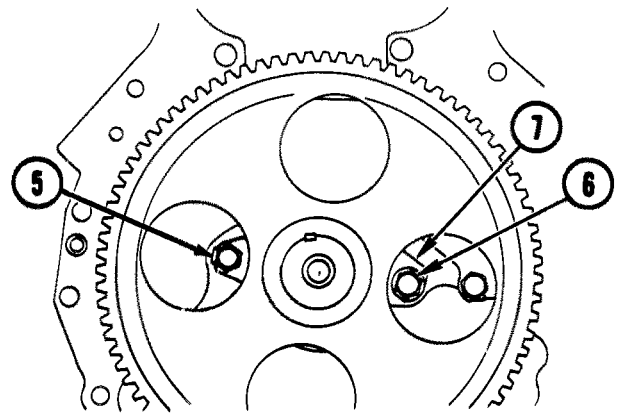
Be careful while installing camshaft. Camshaft and bushings are easily damaged.

- D** Carefully insert camshaft (1) into engine block (2) until camshaft gear (3) and crankshaft gear (4) are not quite touching.

CRANKSHAFT GEAR ZERO MARK



- E** Rotate camshaft assembly to align zero mark on camshaft gear (3) with zero mark on crankshaft gear (4), then push camshaft (1) completely onto the block.

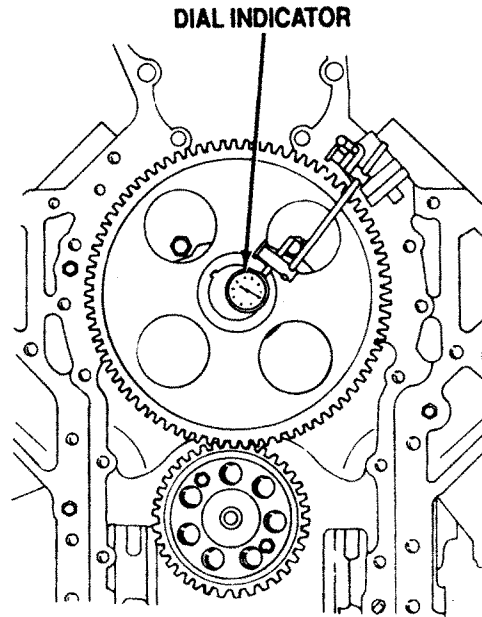


- F** Install two lockplates (5) and screws (6) on camshaft thrust plate (7).
- G** Tighten two screws (6) to 30-32 lb-ft (41-43 N·m).

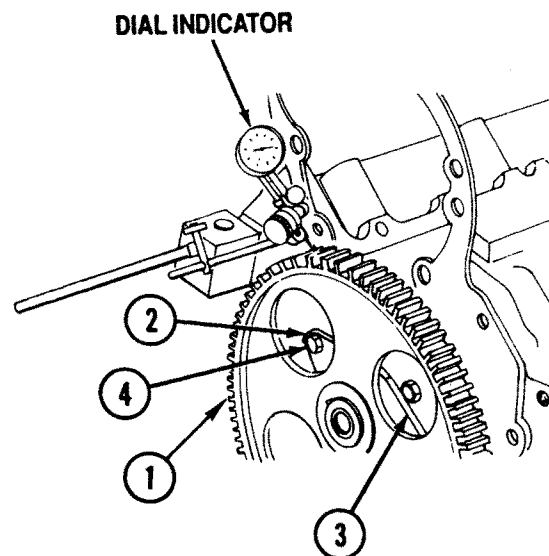
Note

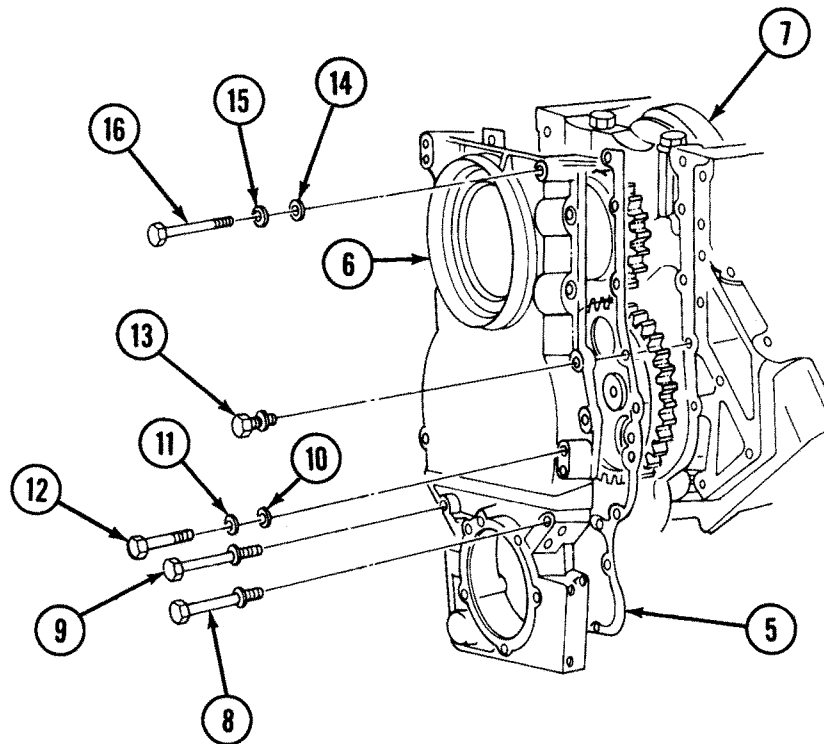
Engine block must not be upside down when measuring camshaft end clearance and gear backlash.

- H** Attach dial indicator to engine block with contact point of gage on end of camshaft.
- I** Push camshaft to rear of engine and set dial indicator gage to zero.
- J** Move camshaft to front of engine. If reading on indicator is less than 0.07 in. (0.178 mm) or more than 0.011 in. (0.279 mm), remove camshaft and replace thrust plate.



- K** Rotate camshaft in either direction until camshaft gear teeth contact crankshaft gear teeth.
- L** Move dial indicator gage contact point to any tooth of camshaft gear (1).
- M** Set dial indicator gage to zero.
- N** Rotate camshaft in opposite direction until camshaft gear teeth contact crankshaft gear teeth. Dial indicator reading should be 0.004-0.0105 in. (0.102-0.267 mm). If reading is not within tolerance, replace camshaft gear.
- O** Bend one tab of each lockplate (2) over edge of thrust plate (3) and one tab of each lockplate against heads of two screws (4).





Note

Make sure surfaces are clean before installing gasket.

- P** Place gasket (5) and rear cover (6) on engine block (7) dowel pins.
- Q** Install $3/8 \times 3-1/4$ in. (9.53 mm x 82.6 mm) screw and washer assembly (8) in cover (6).
- R** Install $3/8 \times 3-3/4$ in. (9.53 mm x 95.3 mm) screw and washer assembly (9) in cover (6).
- S** Install two flat washers (10), lockwashers (11), and $3/8 \times 2-1/2$ in. (9.53 mm x 63.5 mm) screws (12) in cover (6).
- T** Install eight $3/8 \times 1-3/8$ in. (9.53 mm x 34.93 mm) screw and washer assemblies (13) in cover (6).
- U** Install two flat washers (14), lockwashers (15), and $3/8 \times 3$ in. (9.53 mm x 76.2 mm) screws (16) in cover (6).
- V** Tighten all screws to 30-35 lb-ft (41-47 N·m).

FOLLOW-ON TASKS:

- Install rear crankcase seal (p 3-173).
- Install transmission adapter (p 3-135).
- Install oil pan (p 3-90).
- Install air compressor (p 3-32).
- Install camshaft cover (p 3-177).
- Install cylinder heads (p 3-194).

ROCKER COVERS REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Cleaning
- c. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

Parts:

Gasket

Parts Reference:

Appendix B

Personnel Required:

Track Vehicle Repairer 63H10

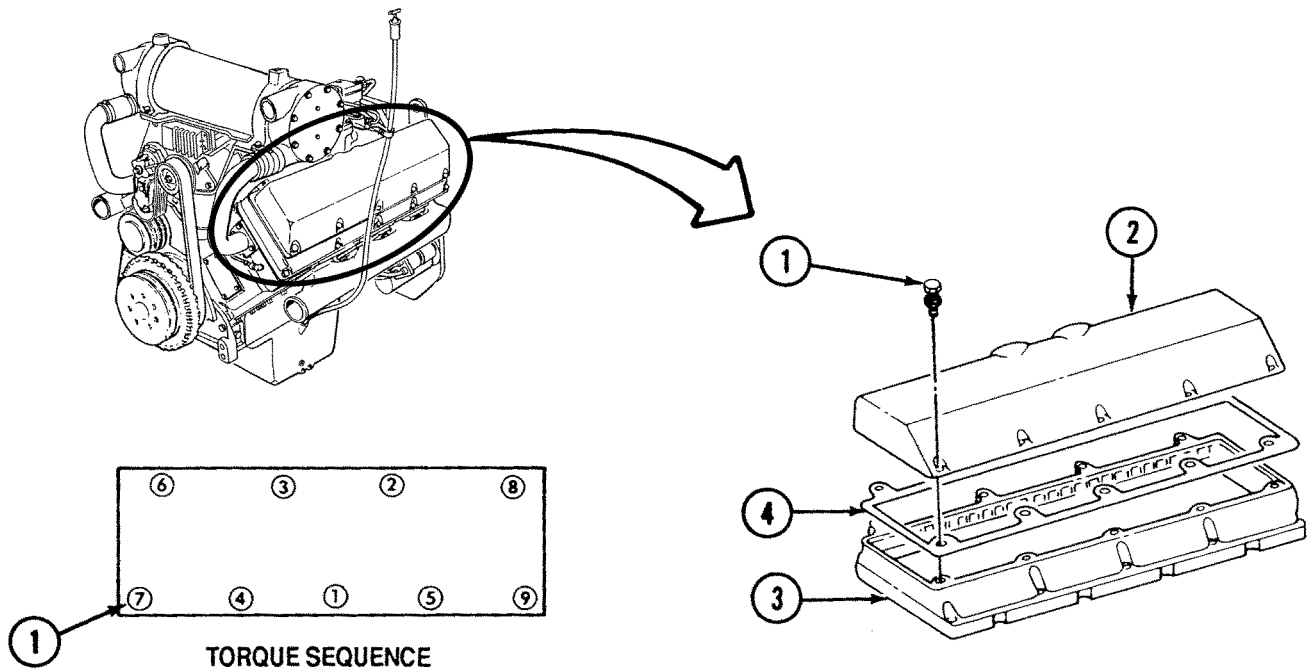
Equipment Condition:

Reference

Page 2-8

Condition
Description

Engine Mounted
on Stand



REMOVAL

Note

Both rocker covers and gaskets are removed the same way. The left side is shown here.

- A** Remove nine screw and washer assemblies (1) and cover (2) from housing (3).
- B** Remove gasket (4) from housing (3). Discard gasket (4).

CLEANING

Follow general cleaning instructions (p 2-2).

INSTALLATION

Note

- Both rocker covers and gaskets are installed the same way. The left side is shown here.
- Make sure surfaces are clean before installing gasket.

- A** Install gasket (4) on housing (3).

Note

Two sizes of screws secure cover. Five short screw and washer assemblies are installed on side away from center of engine.

- B** Install cover (2) on housing (3) with nine screw and washer assemblies (1). Tighten screw and washer assemblies finger tight.
- C** Tighten nine screw and washer assemblies (1) to 18-20 lb-ft (24-27 N·m) in this order: 1 through 9 (see diagram).

CYLINDER HEAD REMOVAL AND INSTALLATION

This task covers:

- a. Removal
- b. Cleaning
- c. Installation

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

Lifting Device

Special Tools:

Cylinder Head Lifting Fixture 4910-00-977-7489

Injector Removal/ Insertion Tool 5120-00-116-7604

Materials:

Engine Oil, 30-Weight Item 16
Appendix C

Parts Reference:

Appendix B

Parts:

Gasket (3)

Packing (12)

Personnel Required:

Track Vehicle Repairer 63H10

Reference:

TM 5-2350-262-20-2

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 2-8	Engine Mounted on Stand
Page 3-15	Fuel Drain Tube and Check Valve Removed
TM 5-2350-262-20-2	Transmission Oil Cooler Removed
TM 5-2350-262-20-2	Alternator Removed
Page 3-12	Fuel Supply Tube and Check Valve Removed

Equipment Condition:

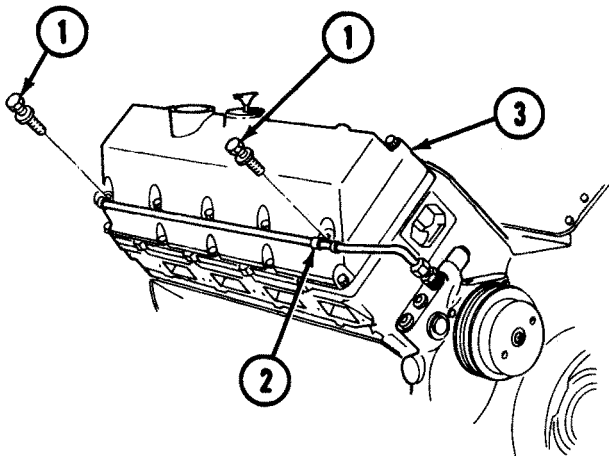
<u>Reference</u>	<u>Condition Description</u>
Page 3-55	Air Intake Assembly Removed
Page 3-58	Intake Manifolds Removed
Page 3-60	Right Exhaust Manifold Removed

General Safety Instructions:

WARNING

- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.
- Secure sling before removing screws. Cylinder head can fall.

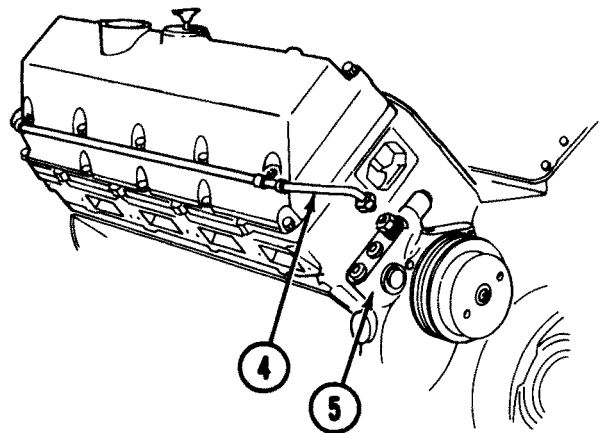
REMOVAL



Note

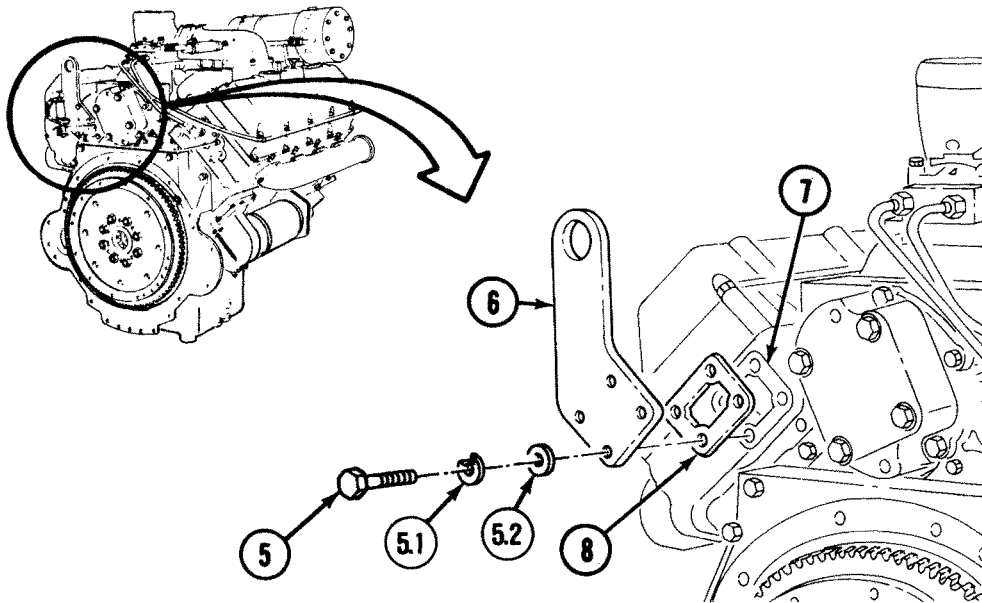
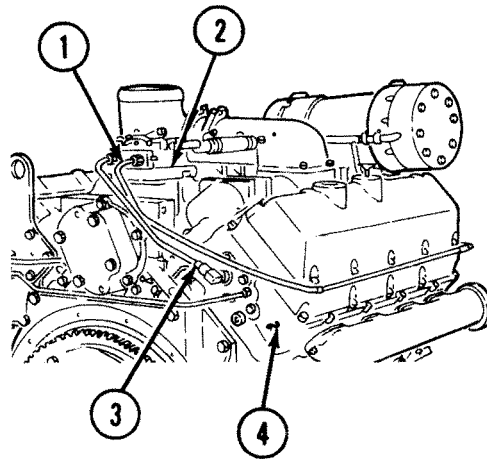
Steps A through E pertain to right side only.

- A** Remove two screw and washer assemblies (1) securing tubing clamps (2) to valve cover (3).



- B** Disconnect air compressor coolant line (4) from water pump (5).

- C** Disconnect air compressor coolant line (1) from air compressor (2), and remove coolant line (1).
- D** Disconnect air compressor coolant line (3) from air compressor (2).
- E** Disconnect air compressor coolant line (3) from right cylinder head (4) and remove coolant line (3).



Note

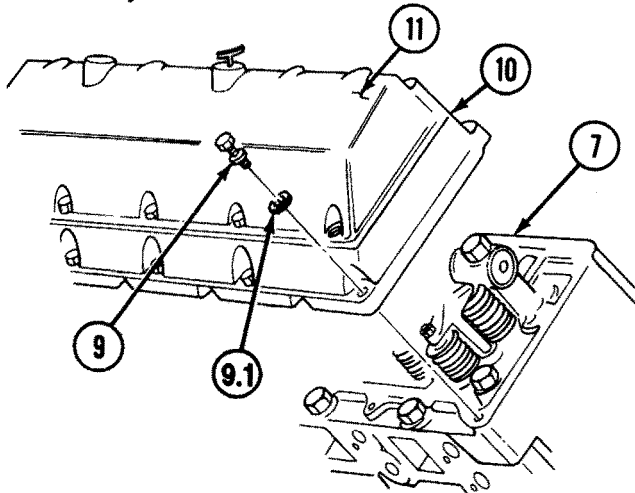
Steps F and G pertain to left side only.

- F** Remove four screws (5), lockwashers (5.1), washers (5.2), and bracket (6) from cylinder head (7). Discard lockwashers (5.1).

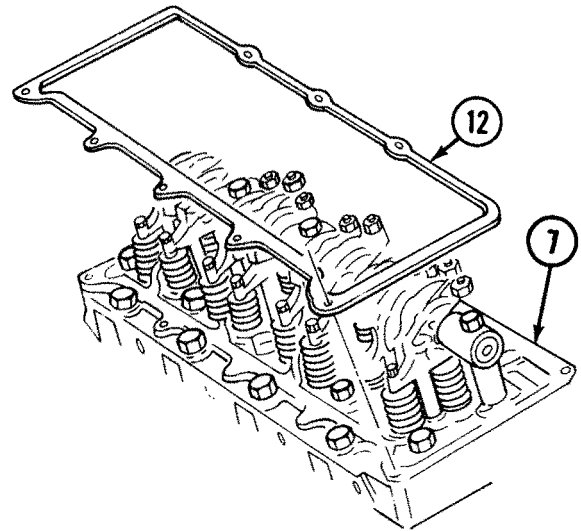
- G** Remove and discard gasket (8).

Note

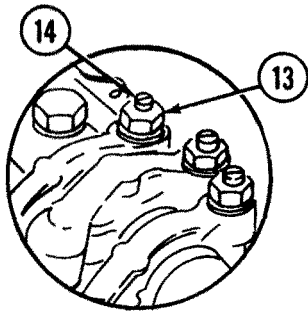
Right and left cylinder heads are removed the same way. This procedure illustrates the right cylinder head.



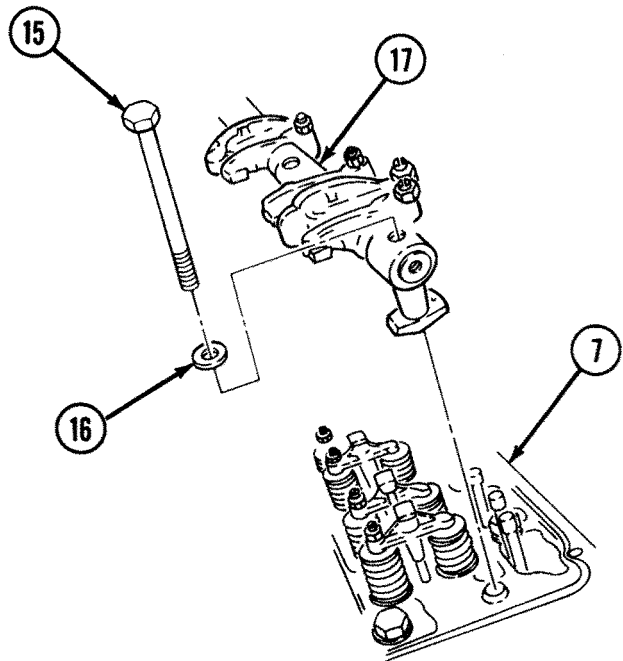
- H** Remove ten screw and washer assemblies (9) and washers (9.1) from right rocker housing (10).
- I** Remove right rocker housing (10) with cover (11) from cylinder head (7).

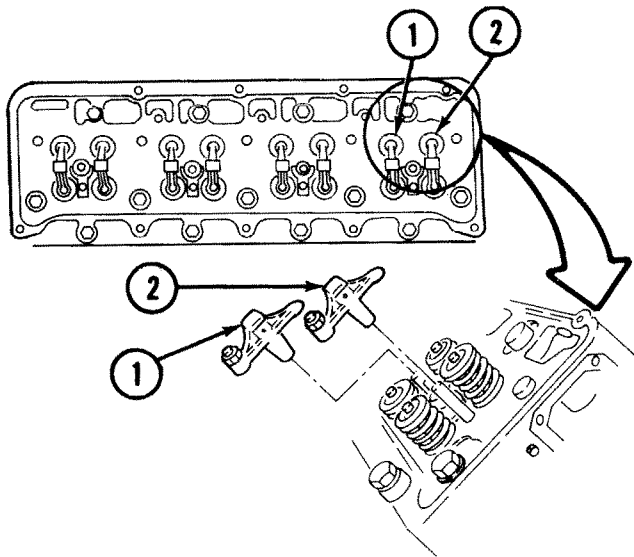


- J** Remove rocker housing gasket (12) from cylinder head (7). Discard rocker housing gasket (12).



- K** Loosen twelve locknuts (13) on twelve screws (14).
- L** Loosen screws (14) approximately one turn.
- M** Remove five screws (15) and washers (16) from rocker arm assembly (17).
- N** Remove rocker arm assembly (17) from cylinder head (7).

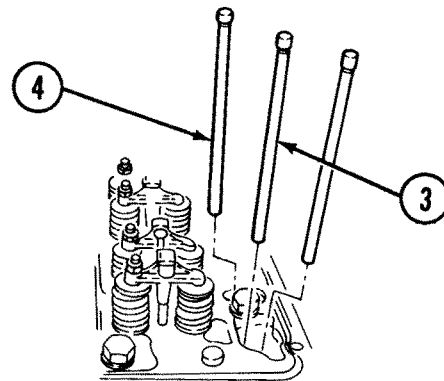




Note

Each crosshead has its own wear pattern. Tag each crosshead as it is removed so it can be installed later in the same place.

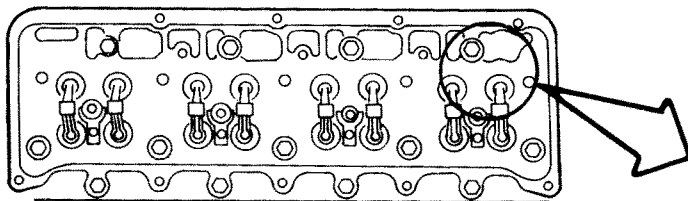
- O** Remove four intake valve crossheads (1) and exhaust valve crossheads (2).



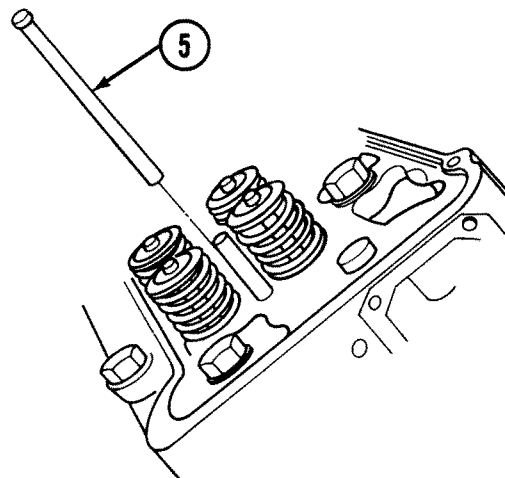
Note

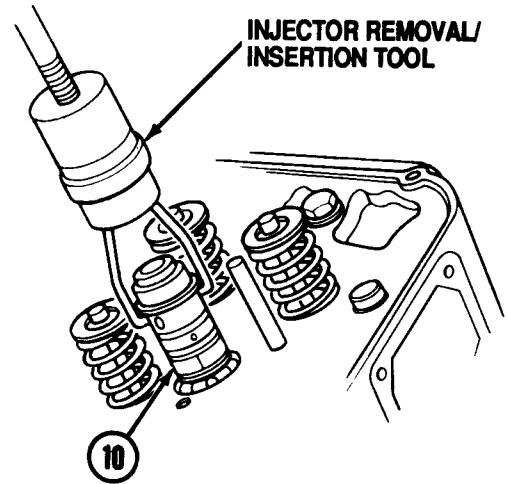
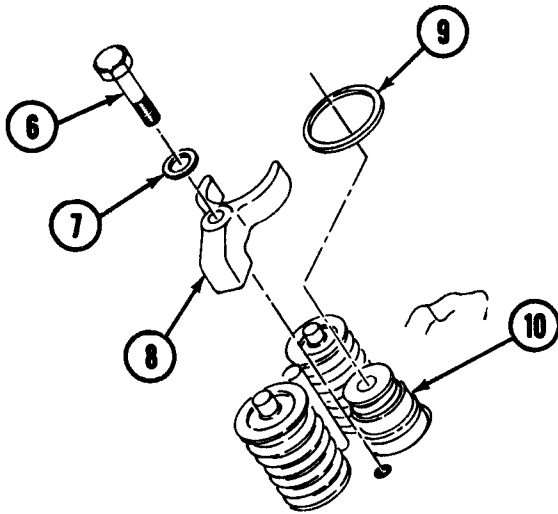
Each pushrod has its own wear pattern. Tag each pushrod as it is removed so it can be installed later in the same place.

- P** Remove four injector pushrods (3) and eight valve pushrods (4).



- Q** Remove four fuel injector links (5).





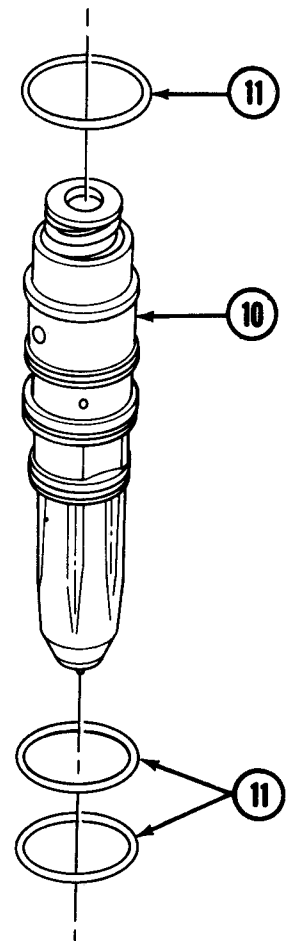
CAUTION

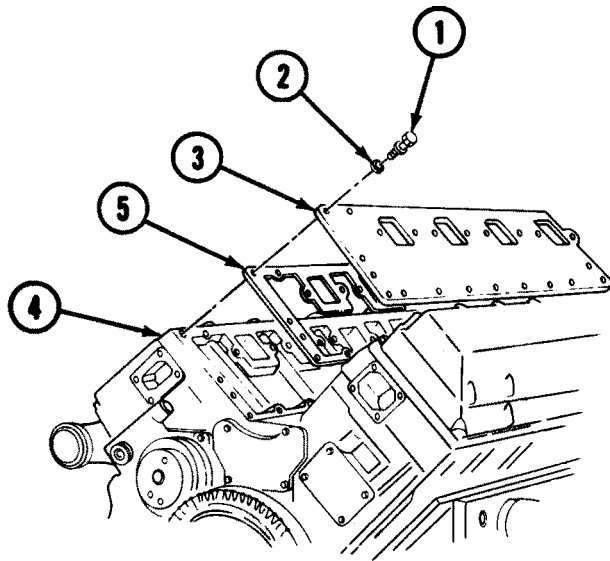
Do not allow injector spray tip to contact any hard surface. Damage can result.

Note

Each fuel injector has its own wear pattern. Tag each fuel injector as it is removed so it can be installed later in the same place.

- R** Remove screw (6), washer (7), hanger (8), and spacer (9).
- S** Attach injector removal/insertion tool to fuel injector (10). Pull up to remove fuel injector (10).
- T** Remove three fuel injector packings (11) from fuel injector (10). Discard packings (11).
- U** Repeat steps R, S, and T until four fuel injectors (10) are removed.



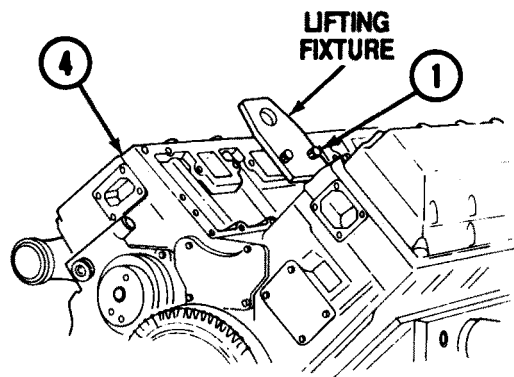


V Remove thirteen screw and washer assemblies (1), washers (2), and pushrod cover (3) from cylinder head (4).

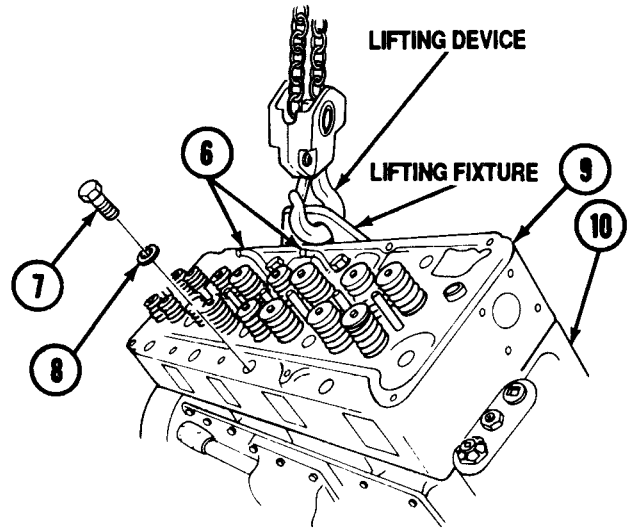
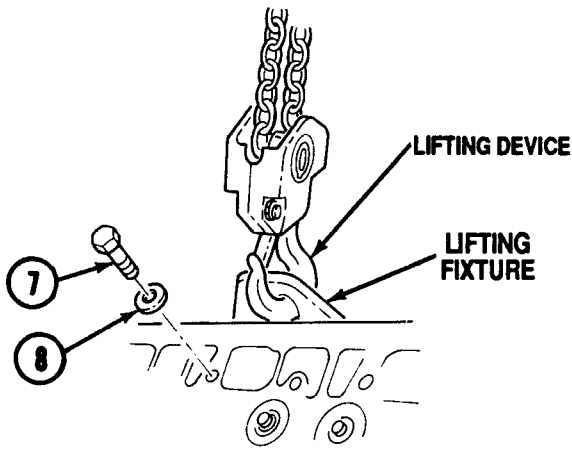
W Remove gasket (5). Discard gasket (5).

Note

If lifting fixture is not available, the cylinder head may be lifted by using a chain. In this method, a short section of chain is connected with bolts between two center intake ports on cylinder head.



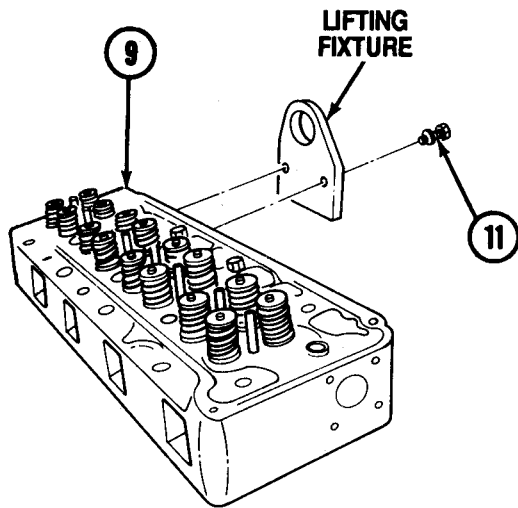
X Attach lifting fixture between two center intake ports on cylinder head (4). Use two screw and washer assemblies (1) from pushrod cover (3).



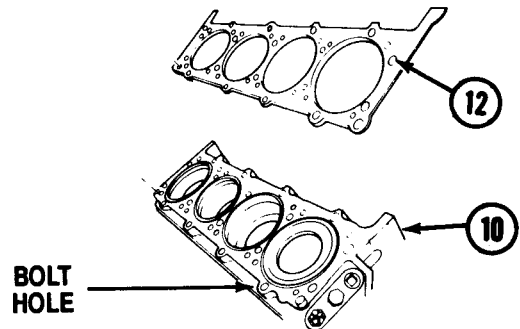
WARNING
 Cylinder head can fall and injure you.
 Secure sling before removing screws.

- Y** Attach lifting device to lifting fixture. Take up slack in cable.
- Z** Remove breather tubes (6).

- AA** Remove thirteen screws (7) and washers (8).
- AB** Lift cylinder head (9) from engine block (10) and place cylinder head (9) on flat surface.
- AC** Remove lifting device from lifting fixture.



- AD** Remove two screw and washer assemblies (11) and lifting fixture from cylinder head (9).



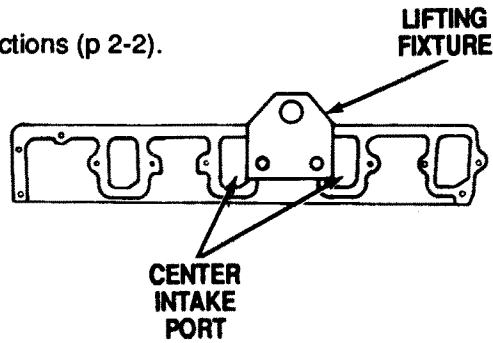
- AE** Remove cylinder head gasket (12) from engine block (10). Discard gasket (12).

WARNING
 Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

- AF** Clean engine block (10). Blow out bolt holes with low-pressure compressed air.

CLEANING

Follow general cleaning instructions (p 2-2).

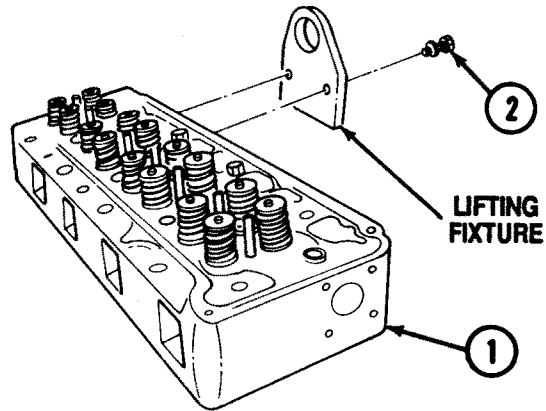


INSTALLATION

Note

If lifting fixture is not available, the cylinder head may be lifted by using a chain. In this method, a short section of chain is connected with bolts between two center intake ports on cylinder head.

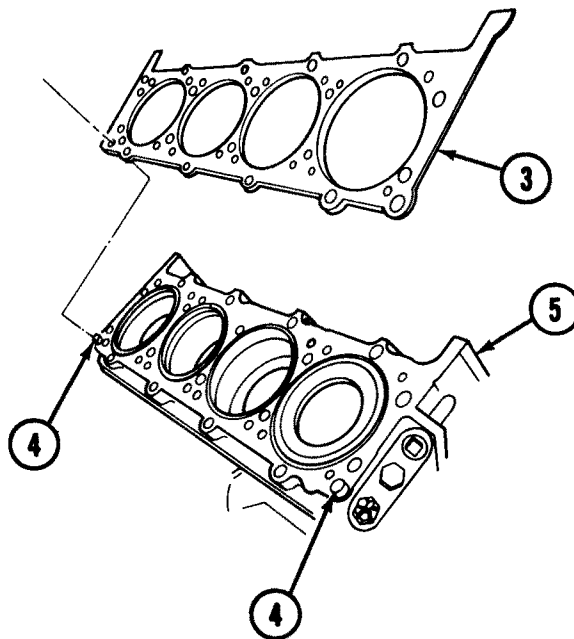
- A** Attach lifting fixture between two center intake ports on new cylinder head (1). Use two screw and washer assemblies (2) from push-rod cover.



Note

Make sure surfaces are clean before installing gasket.

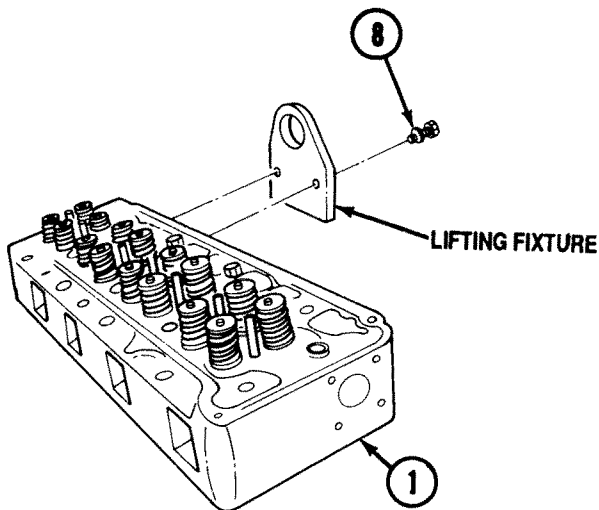
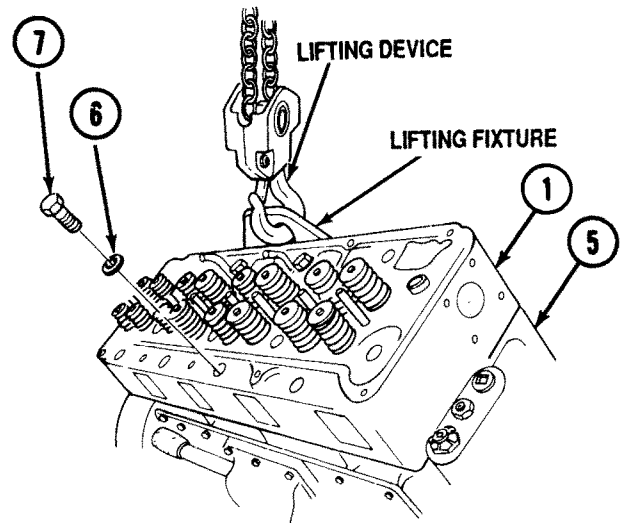
- B** Aline cylinder head gasket (3) over dowels (4) on engine block (5). Make sure the word TOP faces up.



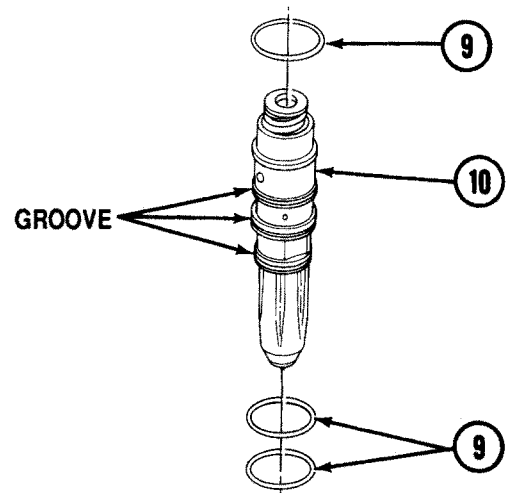
WARNING

Secure sling before removing screws. Cylinder head can fall and cause severe injury to personnel and/or damage to equipment.

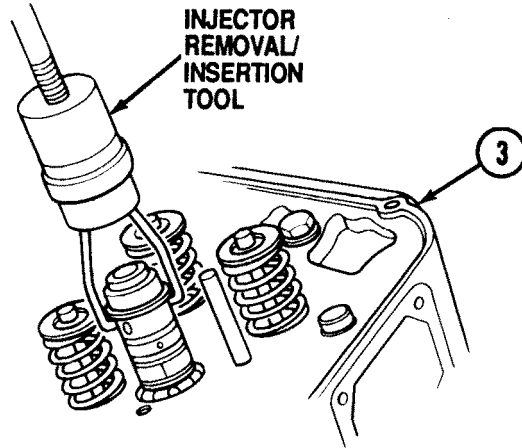
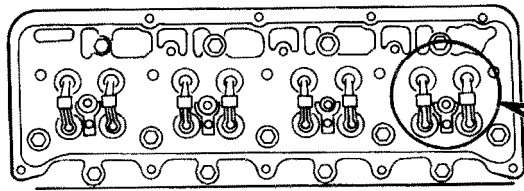
- C** Attach lifting device to lifting fixture. Take up slack in cable.
- D** Lift cylinder head (1) onto engine block (5).
- E** Apply clean 30-weight engine oil to thirteen washers (6) and screws (7).
- F** Install thirteen washers (6) and screws (7) in cylinder head (1). Tighten screws finger tight.
- G** Remove lifting device from lifting fixture.



- H** Remove two screw and washer assemblies (8) and lifting fixture from cylinder head (1).



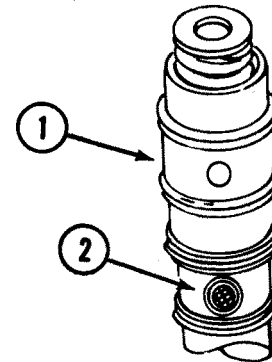
- I** Apply clean 30-weight engine oil to three new fuel injector packings (9).
- J** Install three fuel injector packings (9) in three grooves in fuel injector (10).
- K** Repeat steps I and J until fuel injector packings (9) are installed on four fuel injectors (10).



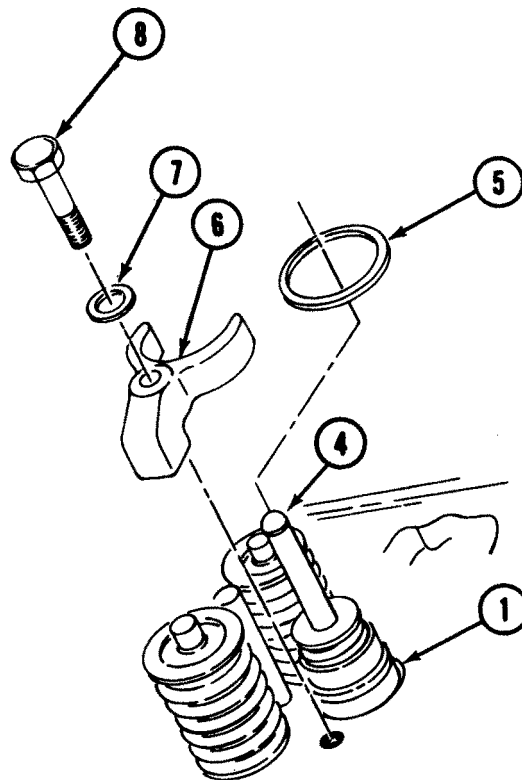
Note

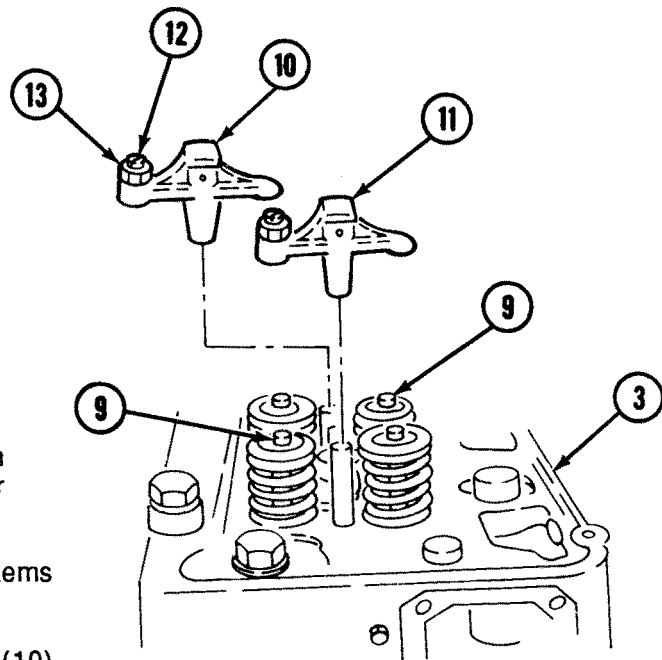
Fuel injectors must be installed in their original positions to fit wear patterns.

- L** Aline fuel injector (1) so filter screen (2) faces center of engine vee. Insert fuel injector (1) into cylinder head (3).
- M** Seat fuel injector (1) in cylinder head (3) with injector removal/insertion tool. You will hear and feel a sharp snap when fuel injector (1) is fully seated.
- N** Repeat steps L and M until four fuel injectors (1) are seated in cylinder head (3).



- O** Insert one fuel injector link (4) into each of four fuel injectors (1).
- P** Install spacer (5) on fuel injector (1).
- Q** Install hanger (6) with washer (7) and screw (8).
- R** Tighten screw (8) to 30-35 lb-ft (41-47 N·m).
- S** Repeat steps P, Q, and R until spacers (5) and hangers (6) are installed on four fuel injectors (1).

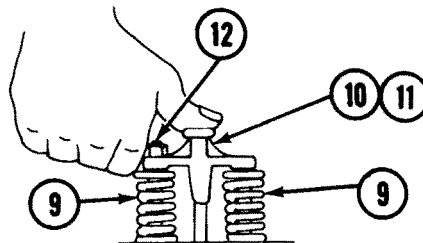




Note

Crossheads must be installed in their original position to fit wear patterns.

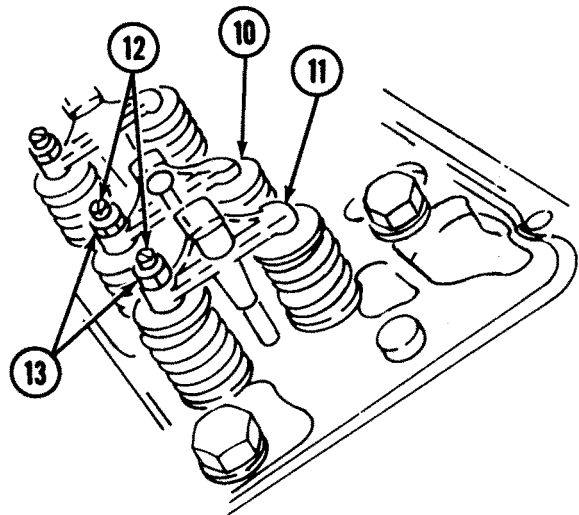
- T** Apply clean 30-weight engine oil to stems of sixteen valves (9).
- U** Install four intake valve crossheads (10) and exhaust valve crossheads (11) on cylinder head (3). Position screws (12) and nuts (13) toward outside of engine.

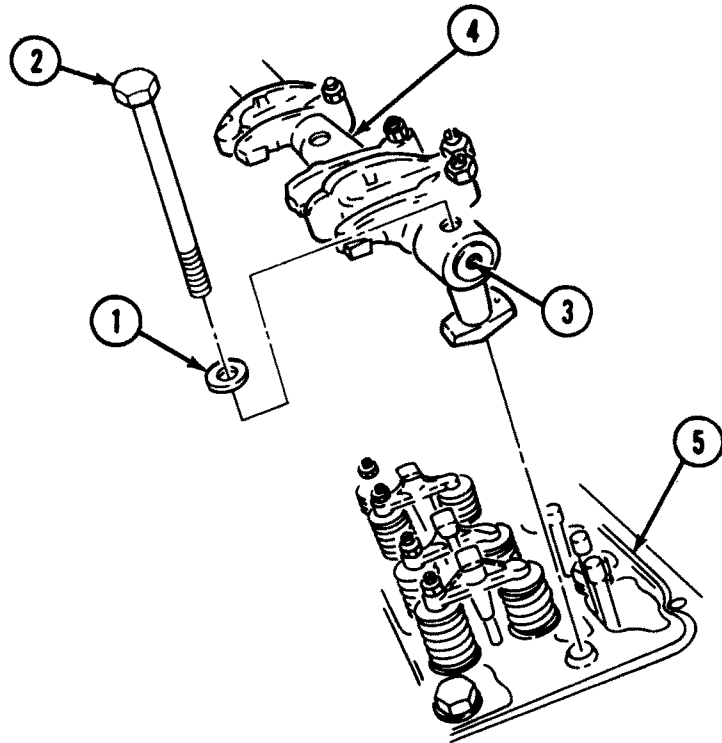


Note

Adjust four intake valve crossheads and exhaust valve crossheads by performing steps V through Y for each crosshead.

- V** Hold crosshead (10) or (11) firmly down on stem of two mating valves (9).
- W** Turn screw (12) down until crosshead (10) or (11) touches stem of valve (9).
- X** Hold screw (12) to prevent turning, and tighten nut (13).
- Y** Hold screw (12) and tighten nut (13) to 25-30 lb-ft (34-41 N-m).





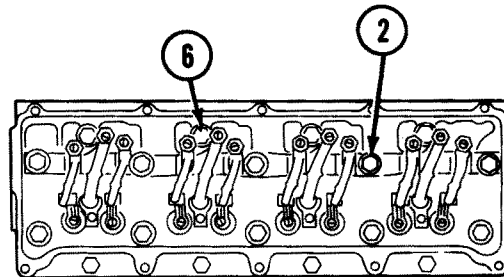
Note

Screws that secure rocker arm assembly also help secure cylinder head.

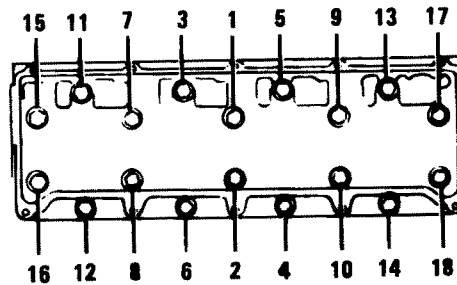
- Z** Apply clean 30-weight engine oil to five washers (1) and screws (2).
- AA** Insert five washers (1) and screws (2) into rocker arm shaft (3).
- AB** Place rocker arm assembly (4) on cylinder head (5).

Note

Screws must be tightened in the order shown. It is easier to follow tightening order if screws are marked first. Pushrods may have to be loosened and moved to the side in order to tighten screws.



- AC** Tighten thirteen screws (6) and five screws (2) in this order: 1 through 18 (see diagram). Follow the steps below to tighten screws:



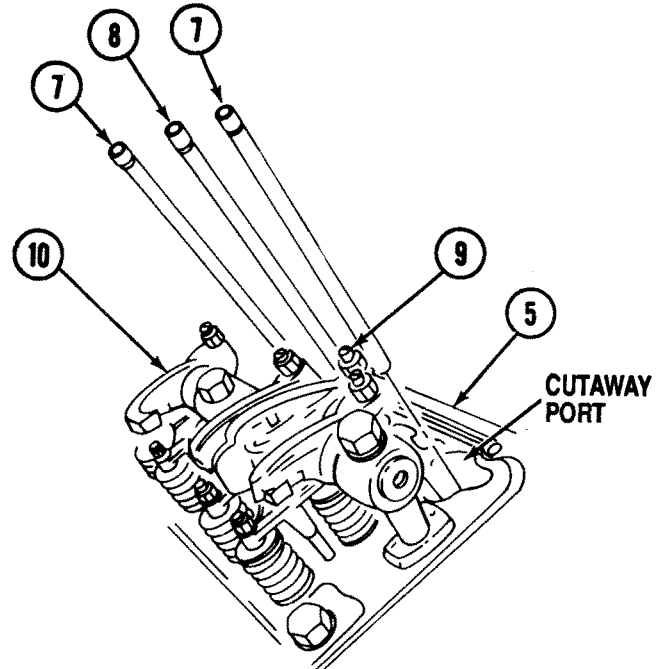
TORQUE SEQUENCE

- Step 1: 50-80 lb-ft (68-108 N.m).
- Step 2: 115-135 lb-ft (156-183 N.m).
- Step 3: 175-185 lb-ft (237-251 N.m).
- Step 4: 220-240 lb-ft (298-325 N.m).
- Step 5: 280-300 lb-ft (380-407 N.m).

Note

Pushrods must be installed in their original positions to fit wear patterns.

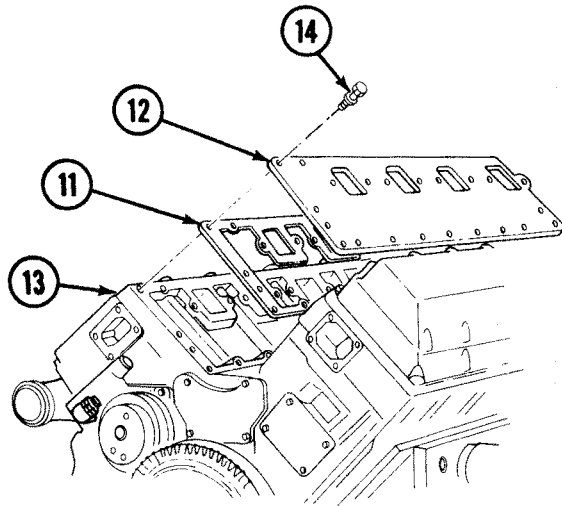
- AD** Insert one set of three pushrods (7), (8), and (7) in each of four cutaway ports of cylinder head (5). Insert each set in the following order: valve pushrod (7), injector pushrod (8), and valve pushrod (7).
- AE** Back twelve adjusting screws (9) out of rocker arms (10) until eight pushrods (7) and four pushrods (8) fit under end of screws (9). Turn screws (9) until they fit into sockets of pushrods (7) and (8).
- AF** Adjust fuel injector clearances (p 3-18).
- AG** Adjust intake and exhaust valve clearances (p 3-18).

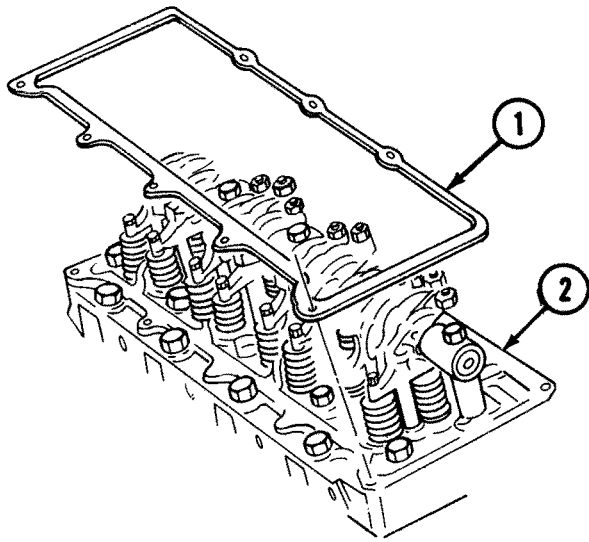


Note

Make sure surfaces are clean before installing gasket.

- AH** Place gasket (11) and pushrod cover (12) on engine (13).
- AI** Install thirteen screw and washer assemblies (14) on engine (13). Tighten screw and washer assemblies (14).

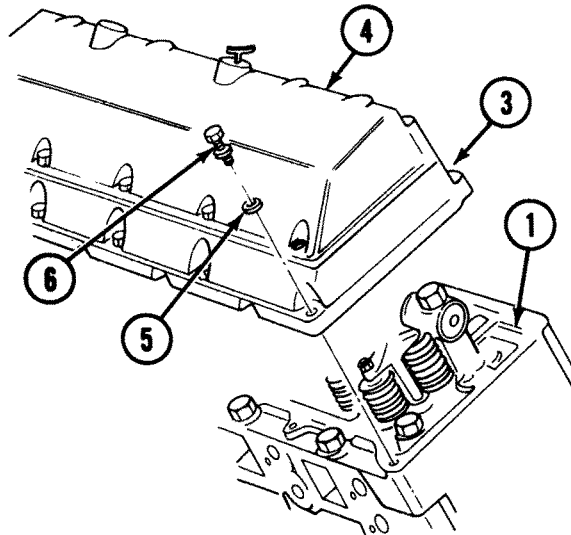




Note

Make sure surfaces are clean before installing gasket.

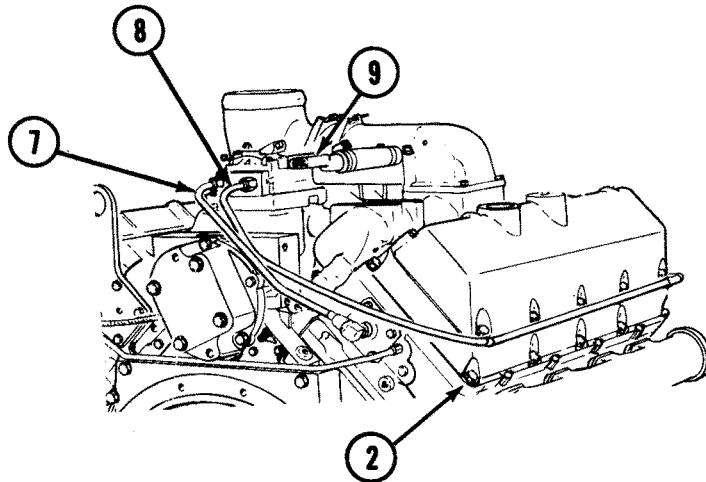
AJ Place gasket (1) on cylinder head (2) with screw holes aligned.



AK Place right rocker housing (3) with cover (4) on gasket (1) with screw holes aligned.

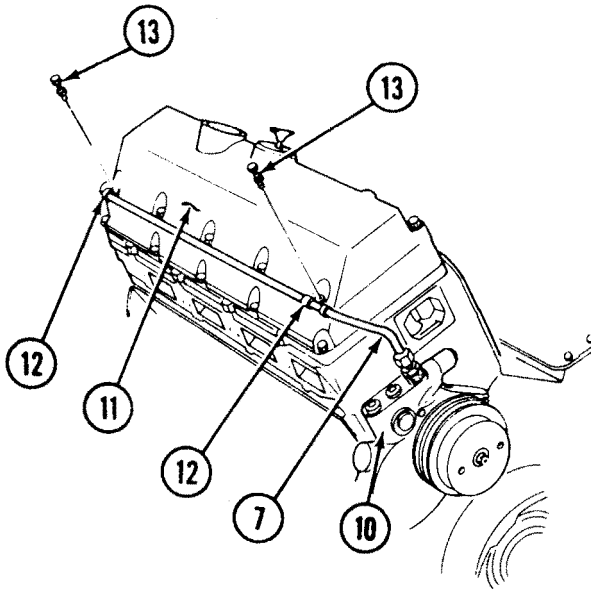
AL Install ten washers (5) and screw and washer assemblies (6).

AM Tighten screws (6) to 30-35 lb-ft (41-47 N·m).



AN Connect air compressor coolant line (7) to cylinder head (2).

AO Connect two coolant lines (7) and (8) to air compressor (9).

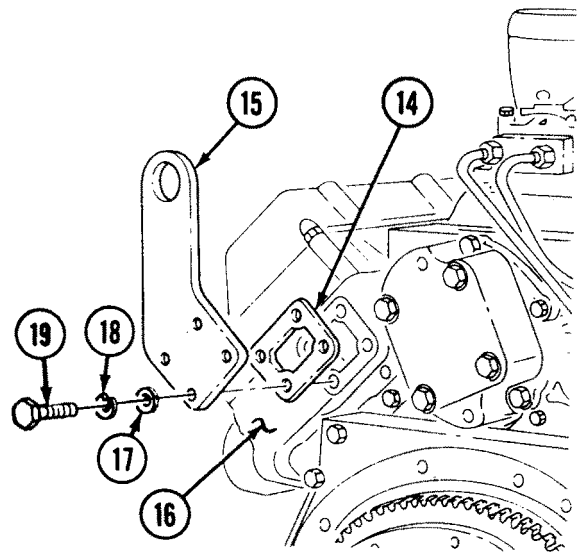


Note

Steps AP and AQ pertain to right side only.

AP Connect air compressor coolant line (7) to water pump (10).

AQ Secure air compressor coolant line (7) to valve cover (11) with two tubing clamps (12), and screw and washer assemblies (13).



Note

Step AR pertains to left side only.

AR Install gasket (14) and bracket (15) on cylinder head (16) with four washers (17), lockwashers (18), and screws (19). Tighten screws (19) to 39-44 lb-ft (53-60 N.m)

FOLLOW-ON TASKS:

- Install right exhaust manifold (p 3-60).
- Install intake manifolds (p 3-58).
- Install fuel supply tube and check valve (p 3-13).
- Install air intake assembly (p 3-56).
- Install alternator (TM 5-2350-262-20-2).
- Install transmission oil cooler (TM 5-2350-262-20-2).
- Install transmission oil cooler hoses (TM 5-2350-262-20-2).
- Install fuel drain tube and check valve (p 3-16).

CYLINDER HEAD REPAIR

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

4910-00-754-0707 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 2

4940-00-287-4894 Shop Equipment,
General Purpose Repair

Special Tools:

Eccentrimeter	5210-01-171-3910
Valve Extractor	4910-00-150-5848
Crosshead Guide Spacer	5120-01-128-2684
Valve Seat Extractor	5120-01-128-2679
Counterbalance Cutter Set	5133-00-999-1208
Valve Guide Driver	4910-00-150-5843
Driver Assembly	4910-00-150-5844
Valve Insert Kit	4910-00-345-3708
Valve Guide Arbor Set	3460-00-999-1173
Injector Sleeve Extractor	5120-00-113-5271

Special Tools (Continued):

Injector Sleeve Holding Tool	5120-00-104-1795
Injector Sleeve Expander	3441-00-922-6699
Injector Sleeve Cutter	4910-00-981-3105
Fuel Passage Cleaning Brush	7920-00-168-3244
Injector Sleeve Driver	5120-00-981-3108
Vacuum Tester	4910-01-128-2691
Valve Head Checking Tool	4910-01-128-2689
Dial Indicator	5210-00-277-8840
Protrusion Gage	5210-01-157-3091
Hand Reamer	5110-01-141-6140
Magnetic Crack Detector	5120-01-128-2676
Plate, Surface	5220-00-293-3556

Materials:

Chalk	Item 6 Appendix C
Abrasive Cloth	Item 7 Appendix C
Cutting Oil	Item 9 Appendix C
Emery Cloth, 120-Grit	Item 11 Appendix C
General Purpose Grease	Item 13 Appendix C
Inspection Penetrant Remover	Item 14 Appendix C
Engine Oil, 30-Weight	Item 16 Appendix C
Prussian Blue Paste	Item 19 Appendix C
Drycleaning Solvent	Item 25 Appendix C

Parts:

- Seal (8)
- Sleeve
- Packing

Parts Reference:

Appendix B

Personnel Required:

- Track Vehicle Repairer (2) 63H10
- Machinist 44E20

Reference:

- FM 9-24
- TM 9-4910-473-10

Equipment Condition:

<u>Reference</u>	<u>Condition Description</u>
Page 3-187	Cylinder Head Removed

General Safety Instructions:

WARNING

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas.
- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.
- Valve springs under compression can slip from tool and injure you. Always wear goggles when working with parts under pressure.
- Carbon particles or bits of wire thrown off by wire wheel may cause eye injury or blindness. Always wear goggles when operating power tools. If foreign material gets in eye, seek medical attention immediately.

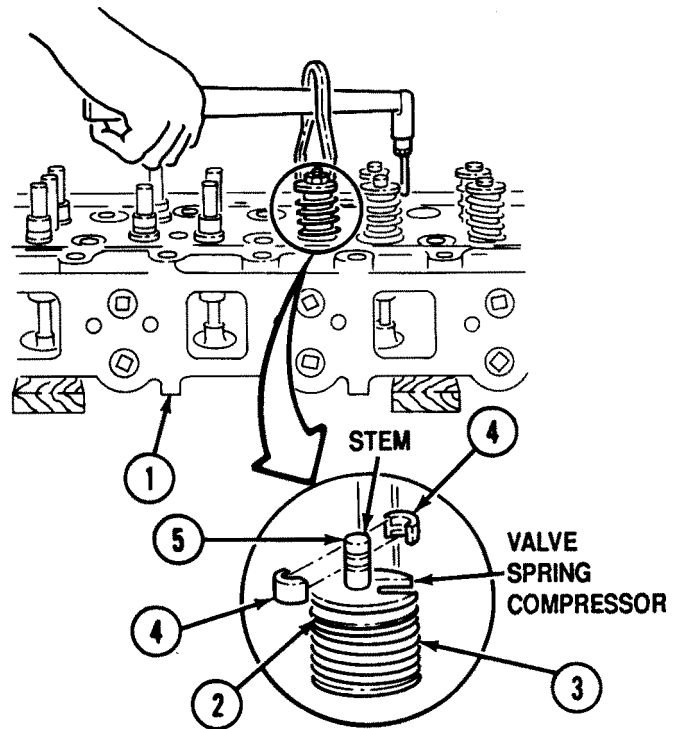
- A** Place cylinder head (1), exhaust manifold mating surface down, on wood blocks.

WARNING

Valve springs under compression can slip from tool and injure you. Always wear goggles when working with parts under pressure.

Note

- Tag each part as removed for later installation in the same place.
 - It may be necessary to tap handle of valve spring compressor with mallet to free locks from valve stem.
- B** Using valve spring compressor, press down retainer ring (2) on spring (3) until two locks (4) can be removed.
- C** Remove two locks (4) from valve stem (5).
- D** Remove valve spring compressor from cylinder head (1).

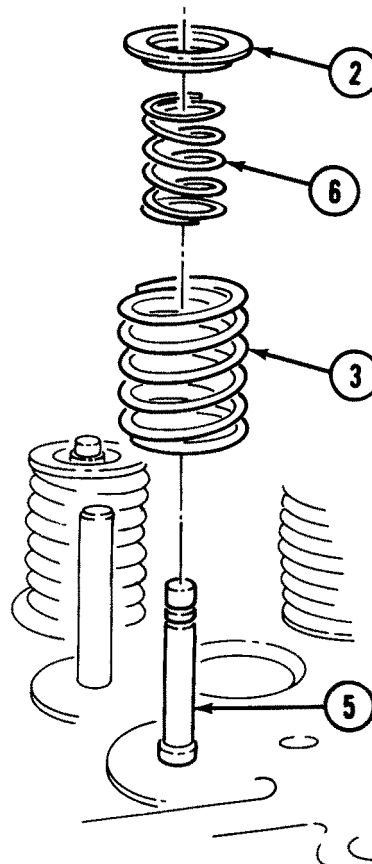


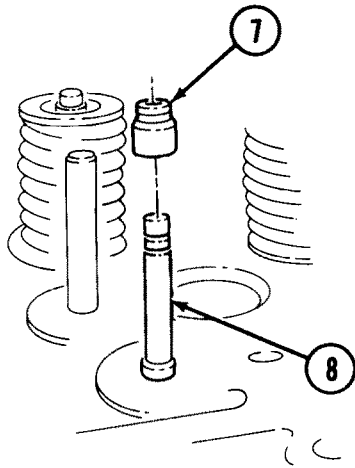
- E** Repeat steps B through D until locks are removed from remaining fifteen valve stems.

Note

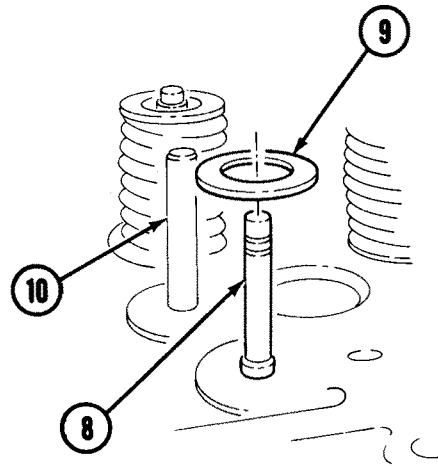
Tag each part as removed for later installation in the same place.

- F** Remove retainer ring (2) from each of sixteen large springs (3).
- G** Remove large spring (3) and small spring (6) from each of sixteen valve stems (5).

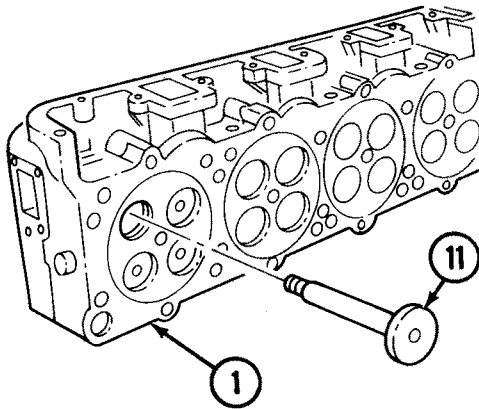




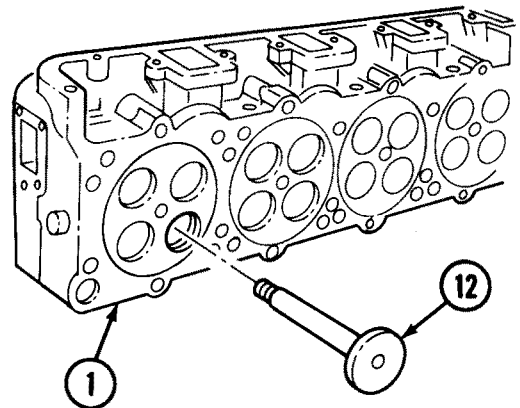
H Remove seal (7) from each of eight intake valve stems (8). Discard seals (7).



I Remove wear plate (9) from each of eight intake valve stems (8) and eight exhaust valve stems (10).



J Remove eight exhaust valves (11) from cylinder head (1).

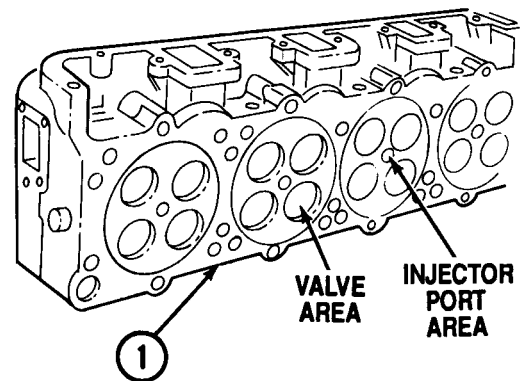


K Remove eight intake valves (12) from cylinder head (1).

WARNING

- Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to comply may result in damage to equipment or injury to personnel.
- Compressed air can injure you and others. Do not aim compressed air hoses at anyone. Do not use more pressure than 30 psi (207 kPa). Always wear goggles.

- L** Clean all fuel and exhaust passages in cylinder head (1). Use cleaning solvent and fuel passage cleaning brush.
- M** Remove dirt and grit from passages in cylinder head (1). Use compressed air.



Note

If following inspection shows cylinder head must be replaced, new injector sleeves must be installed in new cylinder head.

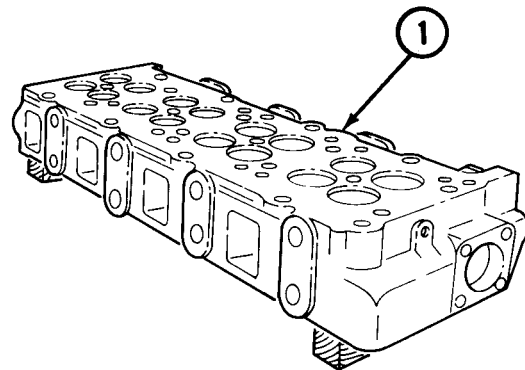
- N** Using magnetic crack detector, inspect cylinder head (1) for cracks in sixteen valve areas and four injector port areas.

- O** Place cylinder head (1), compression side up, on wood blocks.
- P** Scrape any carbon deposits and any remaining gasket material from compression side of cylinder head (1). Sand with emery cloth.

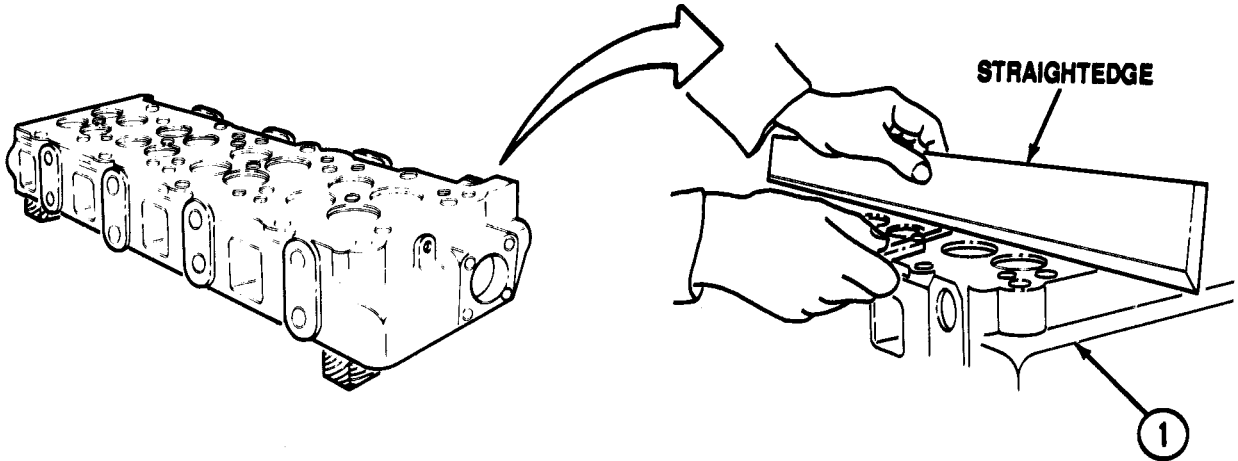
WARNING

Drycleaning solvent is flammable and will not be used near sparks or open flames. A fire extinguisher will be kept nearby when solvent is used. Use only in well-ventilated areas. Failure to comply may result in damage to equipment or injury to personnel.

- Q** Using cleaning solvent, clean compression side of cylinder head (1). Dry with wiping rag.



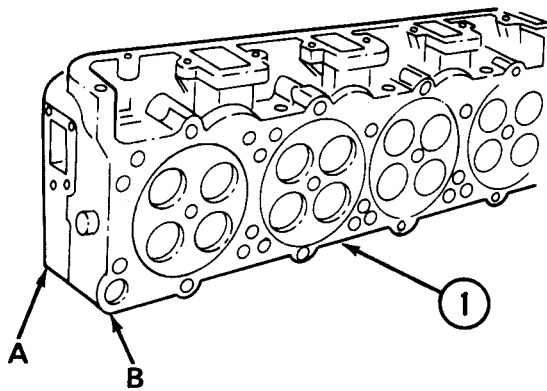
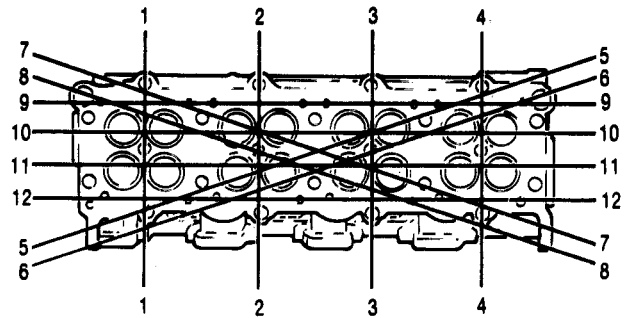
- R** Inspect cylinder head (1) for rust, burned areas, and pitting. Mark damaged areas using chalk.



S Hold straightedge on compression side of cylinder head (1) at position 10-10.

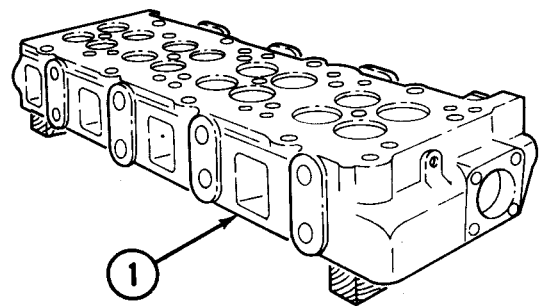
T Measure depth of all gaps between straightedge and cylinder head (1). If any 1-in. wide gap is deeper than 0.003 in. (0.0762 mm), or any gap less than 1-in. wide is deeper than 0.004 in. (0.1016 mm), tag cylinder head (1) for resurfacing.

U Repeat steps S and T for remaining eleven positions.



V Measure height of cylinder head (1) between two points (A, B) as shown. Use 4-5 in. outside micrometer. If measurement is less than 4.465 in. (113.41 mm), replace cylinder head.

W Inspect cylinder head (1) for cracks. Use dye penetrant kit. If cracks are found, replace cylinder head (1).

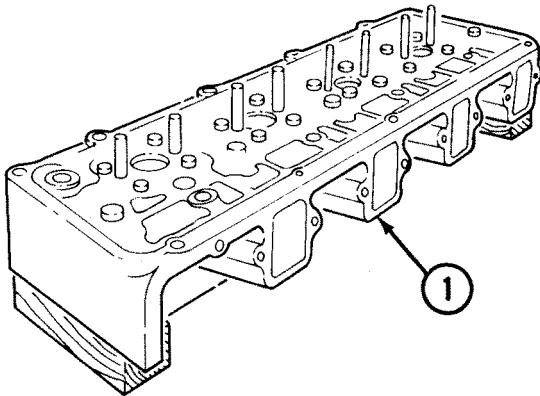
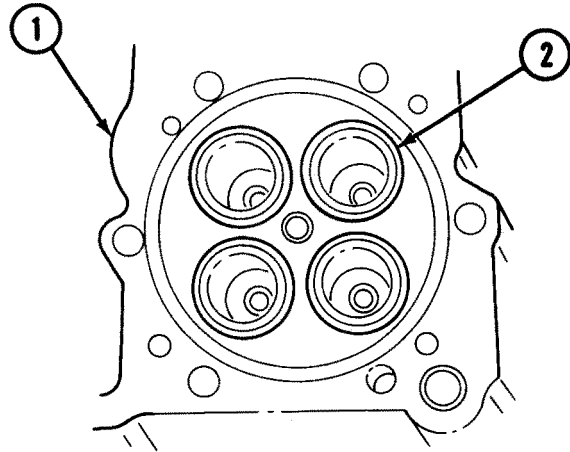


X Place cylinder head (1), compression side up, on wood blocks.

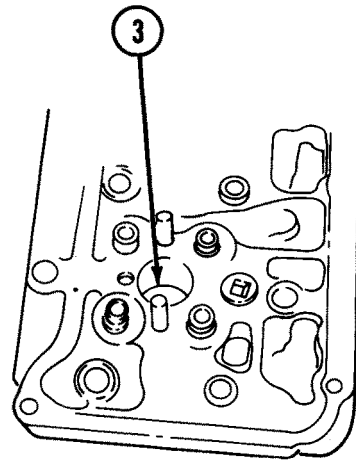
Note

In the following test, a slight looseness found only by tapping when cylinder head is cold and covered with a film of oil is acceptable.

- Y** Tap cylinder head (1) lightly around sixteen valve seat inserts (2). Use plastic-faced hammer.
- Z** While tapping, look for any loose valve seat inserts (2), and mark for replacement. Use chalk.
- AA** Tag cylinder head (1) to replace marked valve seat inserts (2).



- AB** Place cylinder head (1), compression side down, on wood blocks.



- AC** Inspect all injector sleeves (3) for scratches on cup seat area.
- AD** If scratches are found, mark scratched injector sleeves (3) for replacement.

AE Apply prussian blue dye to lowest chamfer, just above the tip, on body of serviceable fuel injector (4).

Note

Fuel injector can be installed without plunger.

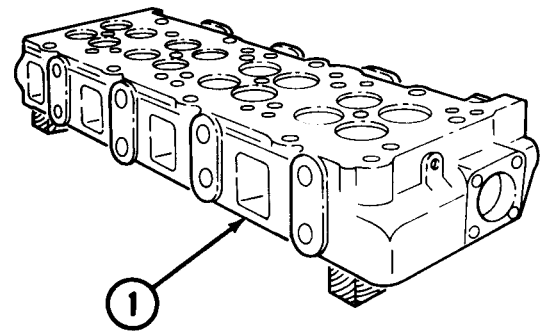
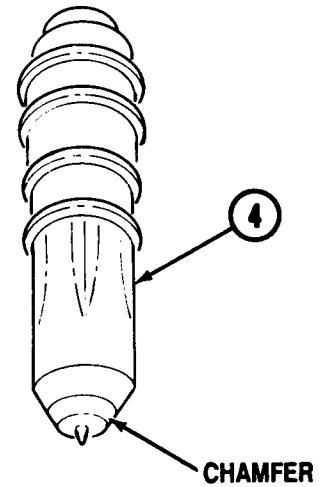
AF Install serviceable fuel injector (4) in cylinder head (1) (p 3-22).

AG Remove serviceable fuel injector (4) from cylinder head (1) (p 3-22).

AH Measure width of contact surface area of dye pattern. Use vernier caliper. If contact area is uniform and at least 0.060 in. (1.52 mm) wide, injector sleeve is good. Go to next step. If contact area is not uniform, or less than 0.060 in. (1.52 mm) wide, mark injector sleeve for replacement.

AI Install serviceable fuel injector (4) in cylinder head (1) (p 3-22).

AJ Place cylinder head (1), compression side up, on wood blocks.

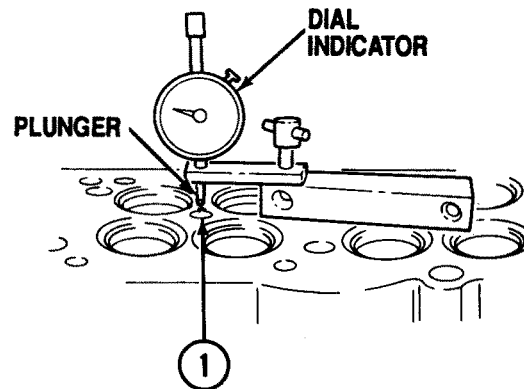
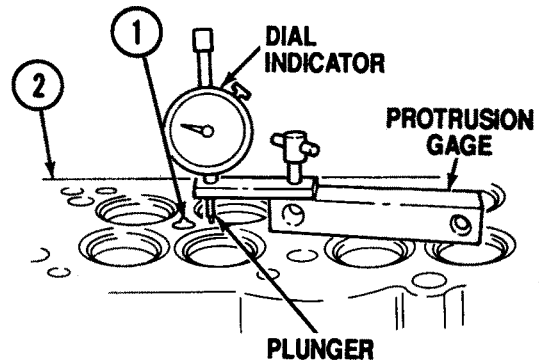


AK Set up protrusion gage on flat area of cylinder head (2) near injector tip (1). Set dial indicator to zero.

AL Set plunger of dial indicator on injector tip (1).

AM If dial indicator reads 0.090-0.105 in. (2.29-2.67 mm) for all injector tips, protrusions are good. Go to next step. If dial indicator reads outside limits with serviceable fuel injector, mark injector sleeve for replacement.

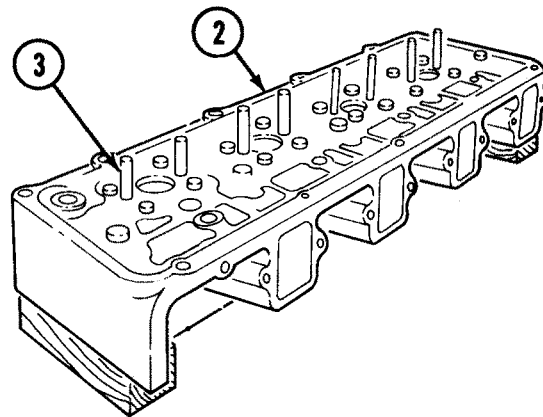
AN Remove protrusion gage.



AO Place cylinder head (2), compression side down, on wood blocks.

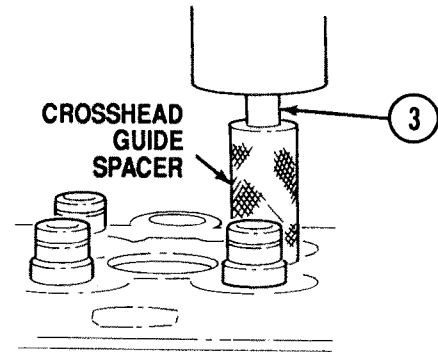
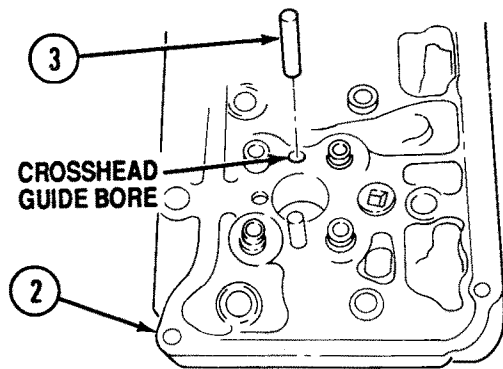
AP Measure diameter of eight crosshead guides (3). Take two measurements 90 degrees apart at two different heights on each crosshead guide. Use 0-1 in. outside micrometer. If any measurement is less than 0.4322 in. (10.978 mm) or more than 0.4335 in. (11.011 mm), mark crosshead guide (3) for replacement. Use chalk.

AQ Check angle of eight crosshead guides (3). Check each crosshead guide at two points 90 degrees apart. Use combination square. If any crosshead guide (3) is not at right angles to cylinder head (2), mark guide for replacement. Use chalk.



AR Measure height of eight crosshead guides (3). Use vernier caliper. If any crosshead guide measures less than 1.86 in. (47.24 mm) or more than 1.88 in. (47.75 mm), mark guide for replacement. Use chalk.

AS Remove crosshead guides (3) marked for replacement. Use valve extractor.



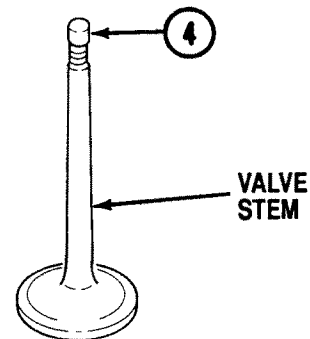
- AT** Place cylinder head (2), compression side down, on arbor press.
- AU** Insert crosshead guide (3) into crosshead guide bore in cylinder head (2).
- AV** Put crosshead guide spacer around crosshead guide (3).

- AW** Press down on crosshead guide (3) until arbor press bottoms against crosshead guide spacer.
- AX** Repeat steps AT through AW for remaining new crosshead guides.

WARNING

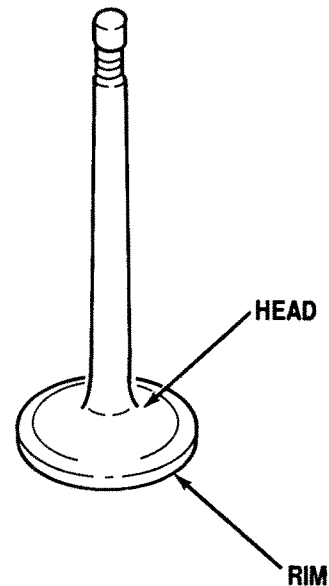
Carbon particles or bits of wire thrown off by wire wheel may cause eye injury or blindness. Always wear goggles when operating bench grinder. If foreign material gets in eye, seek medical attention immediately.

- AY** Using scraper, remove heavy carbon deposits from sixteen valves (4).
- AZ** Using bench grinder with wire wheel, remove any remaining carbon deposits from sixteen valves (4).
- BA** Using buffing wheel and crocus cloth, polish sixteen valves (4).
- BB** Inspect sixteen valves (4) for cupping, chipping, and pitting. Replace any damaged valves.



- BC** Using prussian blue paste penetrant kit, inspect sixteen valves (4) for cracks. Replace cracked valves (4).
- BD** Using 0-1 in. outside micrometer, measure diameter of valve stem on sixteen valves (4). Take two measurements, 90 degrees apart, at four points along each stem. If any measurement on valve stem is less than 0.449 in. (11.404 mm), replace valve.

BE Measure rim thickness of sixteen valve heads. Make four measurements, 90 degrees apart, on each valve head. Use 0-1 in. outside micrometer. If any measurement on valve head is less than 0.114 in. (2.895 mm), replace valve.



BF Place valve stem in V-blocks of valve head checking tool.

BG Slide valve until underside of head touches ledge on checking tool. Make sure valve stem touches both V-blocks.

BH Place protrusion gage on checking tool as shown.

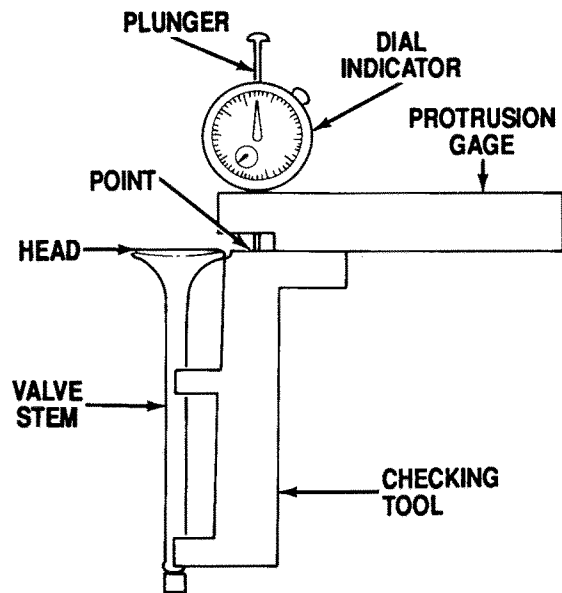
BI Press down on plunger until point of indicator stem touches checking tool. Set dial indicator to zero.

BJ Release plunger, and move gage block until point of indicator stem touches valve head.

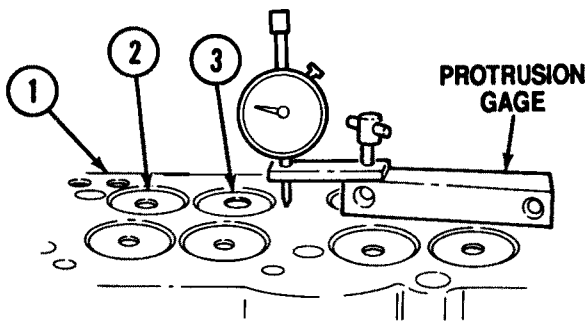
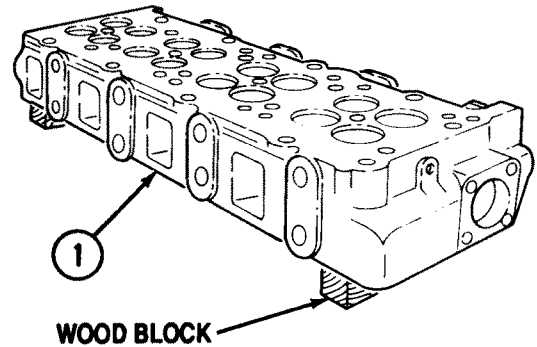
BK Press down on plunger until point of indicator stem touches valve head.

BL If dial indicator reads below zero, replace valve.

BM Repeat steps BF through BL for remaining fifteen valves.

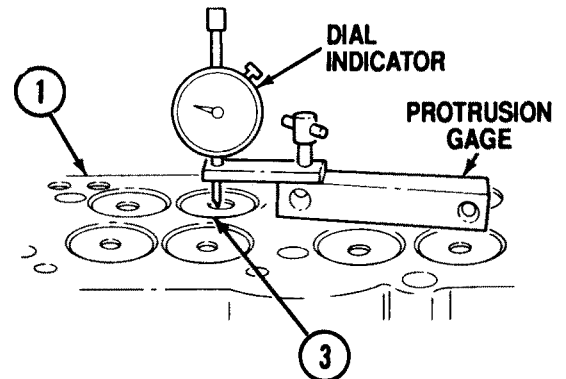


BN Place cylinder head (1), compression side up, on wood blocks.



BO Insert eight tagged exhaust valves (2) and intake valves (3) in proper locations in cylinder head (1).

BP Measure recesses of eight exhaust valves (2). Use protrusion gage with dial indicator zeroed on cylinder head (1). If recess of any exhaust valve is less than 0.052 in. (1.32 mm) or more than 0.072 in. (1.83 mm), mark valve seat insert for replacement. Use chalk.



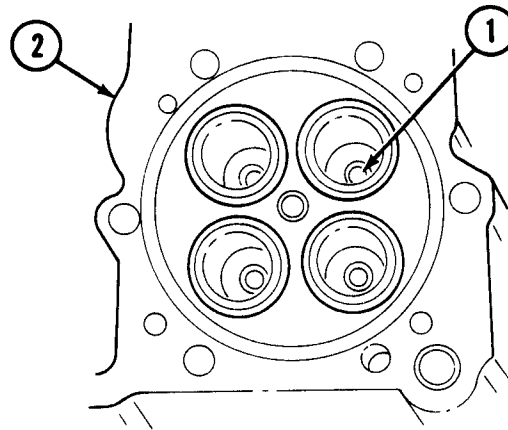
BQ Measure recesses of eight intake valves (3). Use protrusion gage with dial indicator zeroed on cylinder head (1). If recess of any intake valve (3) is less than 0.005 in. (0.13 mm) or more than 0.025 in. (0.64 mm), mark valve seat insert for replacement. Use chalk.

BR Remove eight exhaust valves (2) and intake valves (3) from cylinder head (1). Tag each valve for later installation in same place.

BS Measure inside diameter of sixteen valve guides (1). Take two measurements 90 degrees apart, at two or more depths. Use small bore gage. If any measurement is more than 0.4547 in. (11.549 mm), mark valve guide (1) for replacement. Use chalk.

BT Insert punch from compression side of cylinder head (2), and drive out valve guide (1). Use brass punch and hammer.

BU Repeat step BT for each marked valve guide (1).

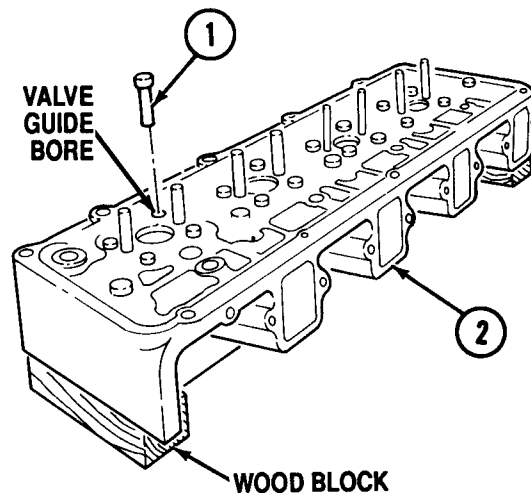


BV Place cylinder head (2), compression side down, on arbor press.

BW Insert valve guide (1) into valve guide bore.

BX Press valve guide (1) into cylinder head (2). Use arbor press and valve guide driver.

BY Repeat steps BW and BX for each new valve guide (1).



BZ Place cylinder head (2), compression side up, on wood blocks.

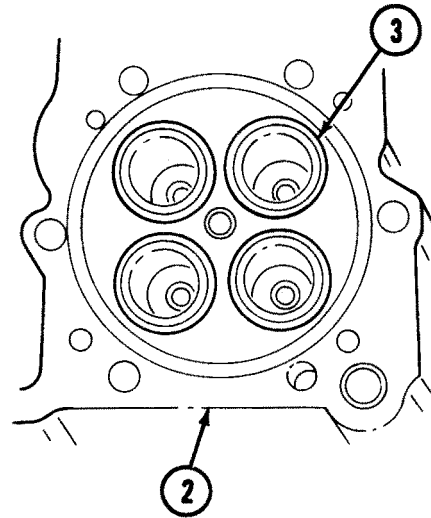
CA Remove valve seat inserts (3) from cylinder head (2). Use valve seat extractors and valve insert kit.

CAUTION

Failure to measure valve seat inserts before machining the cylinder head or installing valve seat inserts may result in damage to cylinder head.

CB Measure valve seat insert counterbore. Use vernier caliper.

CC Refer to valve seat insert data (Appendix D). Select next standard oversize valve seat insert.



CD Insert valve guide arbor into valve guide (1).

CE Slide counterbalance cutter set down over valve guide arbor, and position over threaded hole in cylinder head (2).

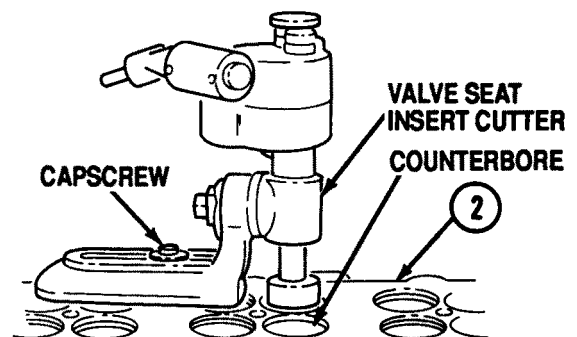
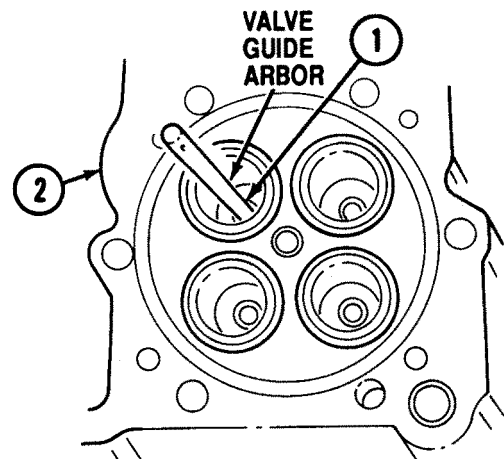
CF Attach counterbalance cutter set to cylinder head (2) with capscrew in threaded hole in cylinder head.

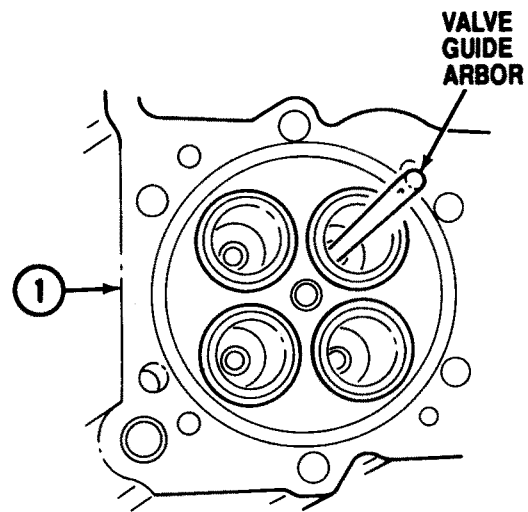
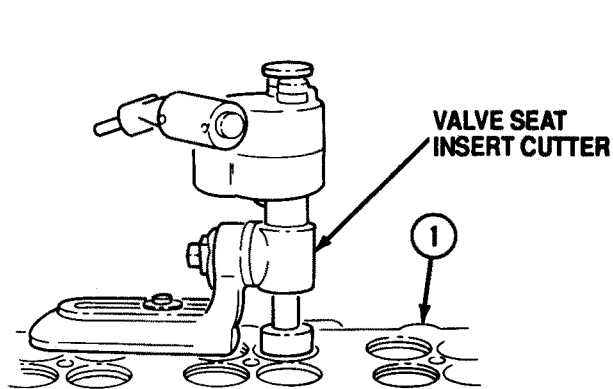
CG Refer to valve seat insert data (Appendix D) for counterbore diameter required for valve seat insert selected.

CH Cut valve seat insert counterbore 0.006-0.010 in. (0.15-0.25 mm) deeper than insert thickness.

CI Allow cutter to dwell upon reaching correct depth to ensure flat seating surface.

CJ Repeat steps BZ through CI for each new valve seat insert.





CK Remove counterbalance cutter set and valve guide arbor from cylinder head (1).

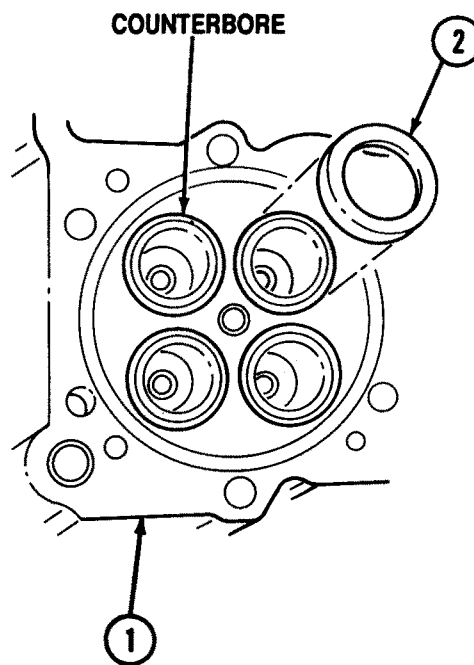
CAUTION

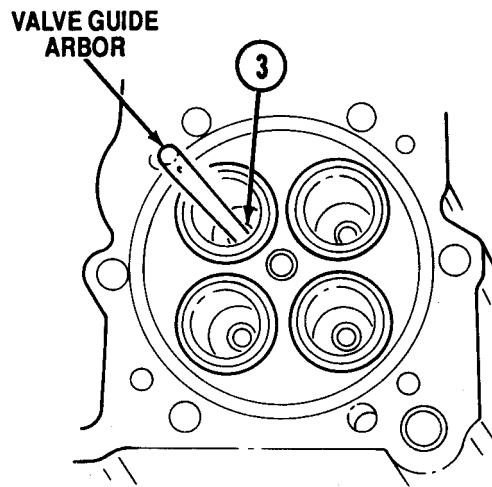
Over-swagging around valve seat insert can crack cylinder head.

Note

A 1/4 in. (0.635 cm) pin punch may be used if insert staking tool is not available.

- CL** Install new valve seat insert (2) in valve seat insert counterbore. Use valve insert kit.
- CM** Stake valve seat insert (2) in valve seat insert counterbore. Use valve guide driver over shaft of driver assembly.
- CN** Repeat steps CL and CM for each new valve seat insert (2).
- CO** Remove valve guide driver and driver assembly from cylinder head (1).

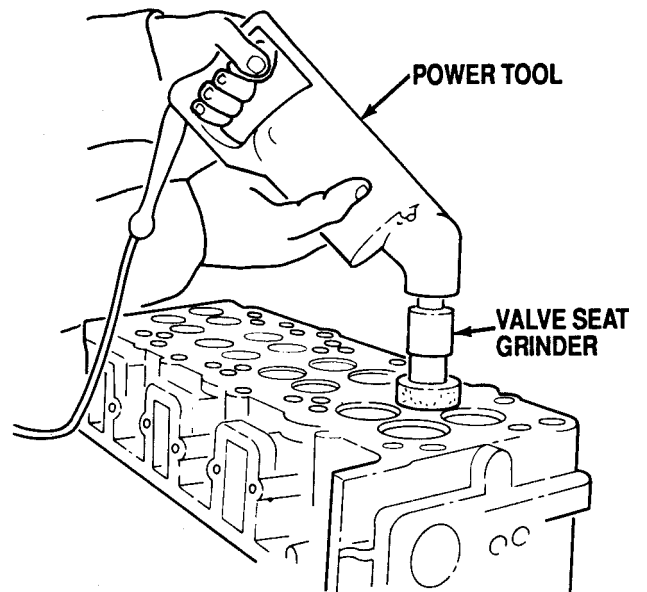


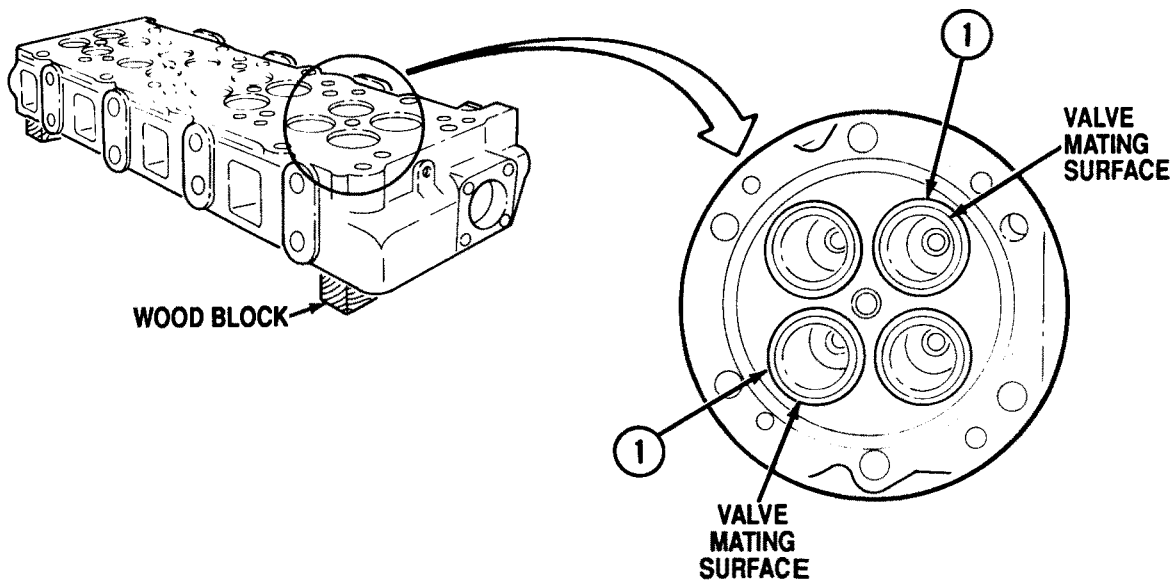


Note

Cutting stone for grinding valve seat insert must have 30-degree cutting angle.

- CP** Insert valve guide arbor into valve guide (3).
- CQ** Place valve seat grinder with 30-degree cutting stone on valve guide arbor.
- CR** Connect power tool to valve seat grinder.



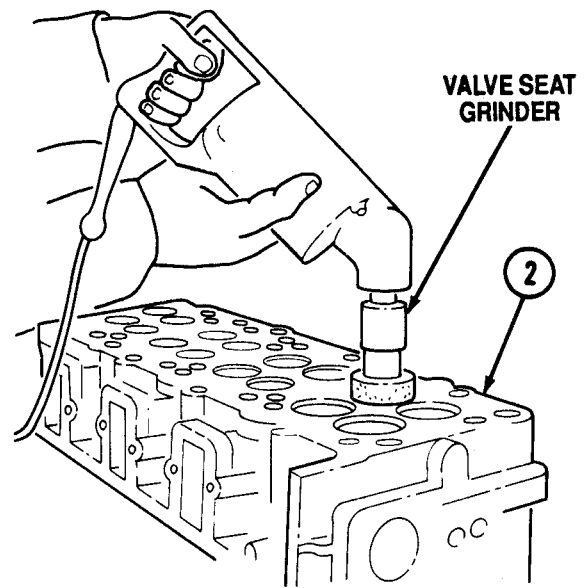
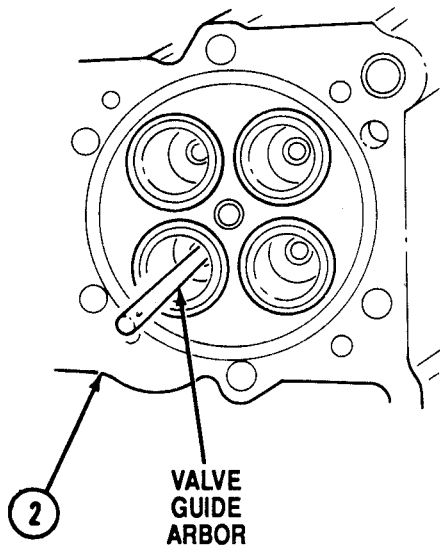


CAUTION

Allowing full weight of valve seat grinder to bear on valve seat insert while grinding can damage insert.

- CS** Grind sixteen valve seat inserts (1) until valve mating surfaces have uniform, shiny appearance.
- CT** Measure width of valve mating surface of eight intake valve seat inserts (1). Make four measurements, 90 degrees apart, of each insert. Use vernier caliper. If any measurement on an intake valve seat insert (1) is less than 0.112 in. (2.84 mm), continue to grind that insert until width is at least 0.112 in. (2.84 mm). If width is more than 0.125 in. (3.18 mm), go to step DH.

- CU** Measure width of valve mating surface of eight exhaust valve seat inserts. Make four measurements, 90 degrees apart, of each insert. Use vernier caliper. If any measurement on an exhaust valve seat insert (1) is less than 0.060 in. (1.52 mm), continue to grind that insert until width is at least 0.060 in. (1.52 mm). If width is more than 0.125 in. (3.18 mm), go to next step.
- CV** Replace 30-degree cutting stone on valve seat grinder with 0-degree cutting stone.
- CW** Grind and measure in alternate steps, until valve mating surface on intake valve seat insert (1) measures 0.112-0.125 in. (2.84-3.18 mm).
- CX** Grind and measure, in alternate steps, until valve mating surface on exhaust valve seat insert (1) measures 0.060-0.125 in. (1.52-3.18 mm).



CY Remove valve seat grinder and valve guide arbor from cylinder head (2).

CZ Remove valve seat grinder and valve guide arbor from cylinder head (2).

DA Install eccentricmeter on valve guide arbor.

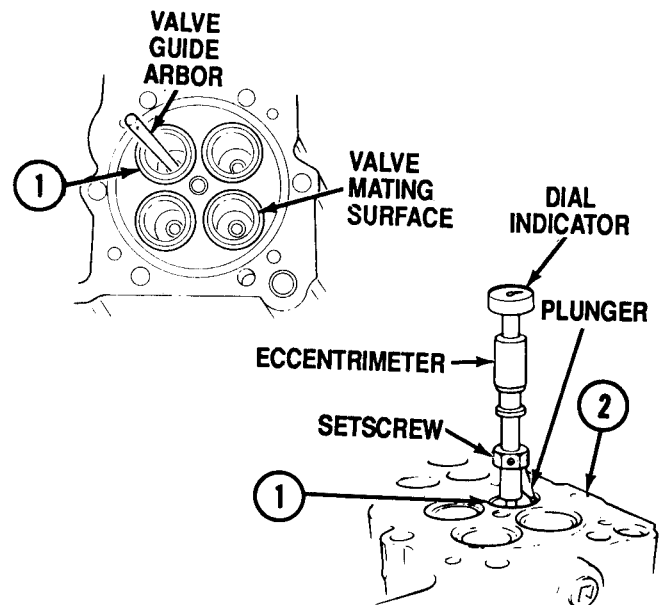
DB Set plunger on valve mating surface of valve seat insert (1). Tighten setscrew to secure dial indicator.

DC Set dial indicator to zero.

DD Rotate plunger of dial indicator around valve mating surface of valve seat insert (1).

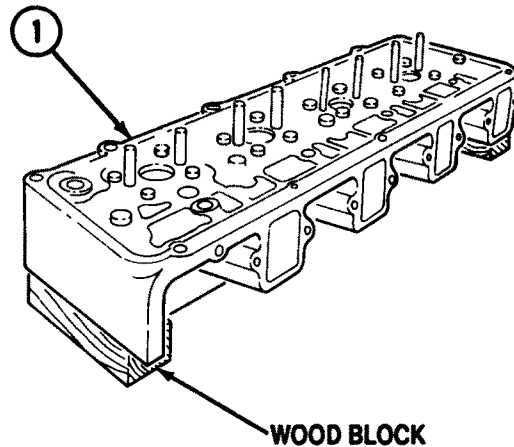
DE If dial indicator reads 0.002 in. (0.051 mm) or less, valve seat insert (1) is good. Go to step DI.

DF If dial indicator reads more than 0.002 in. (0.051 mm), mark valve seat insert (1) for replacement.



DG Remove eccentricmeter and valve guide arbor from cylinder head (2).

DH Repeat steps CZ through DG for remaining fifteen valve seat inserts (1).



DI Place cylinder head (1), compression side down, on wood blocks.

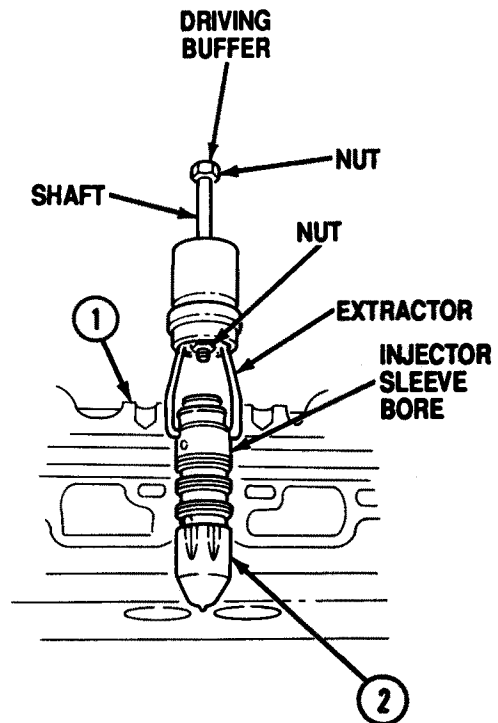
DJ Put injector sleeve extractor over injector sleeve bore. Allow forming collar teeth to rest on injector sleeve (2). Back two nuts off length of shaft.

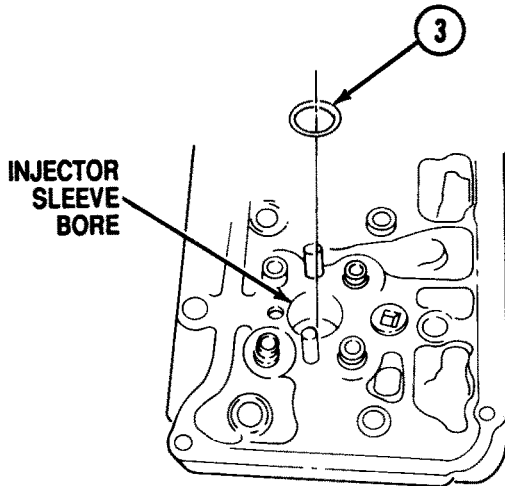
DK Put driving buffer over injector sleeve extractor. Drive unit down until forming collar bottoms. Remove driving buffer. Tighten top nut.

DL Screw down nut until injector sleeve (2) is free. Remove injector sleeve (2) and injector sleeve extractor from cylinder head (1).

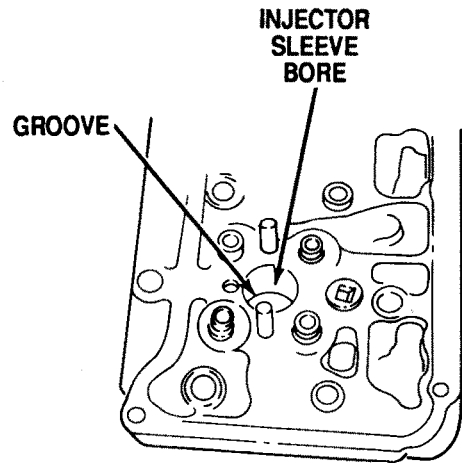
DM Hold injector sleeve extractor firmly. Back off lower nut. Back top nut off entire length of shaft.

DN Tap lower end of injector sleeve (2) to loosen. Turn injector sleeve (2) 60 degrees to remove from extractor. Discard injector sleeve (2).

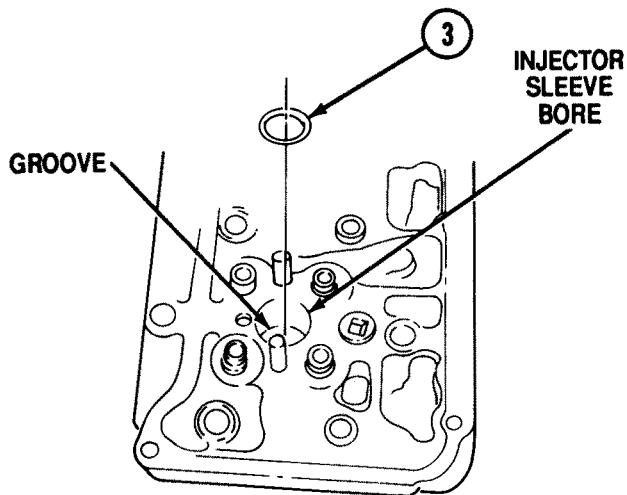




DO Remove preformed packing (3) from injector sleeve bore. Discard packing (3).

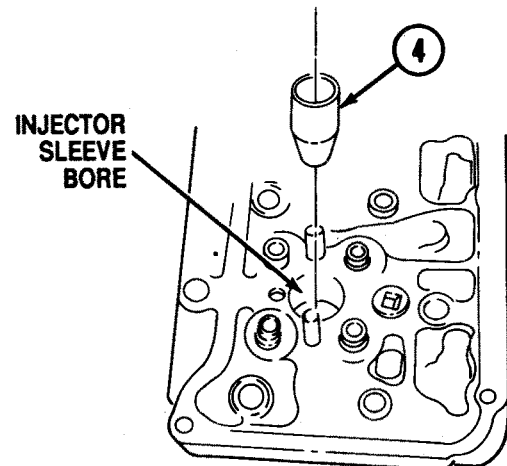


DP Clean preformed packing groove in injector sleeve bore. Use wire brush.



DQ Apply clean 30-weight engine oil to new preformed packing (3).

DR Install new preformed packing (3) in groove of injector sleeve bore.



DS Press new injector sleeve (4) into injector sleeve bore until it bottoms. Use injector sleeve driver. Do not use hammer.

DT Remove injector sleeve driver.

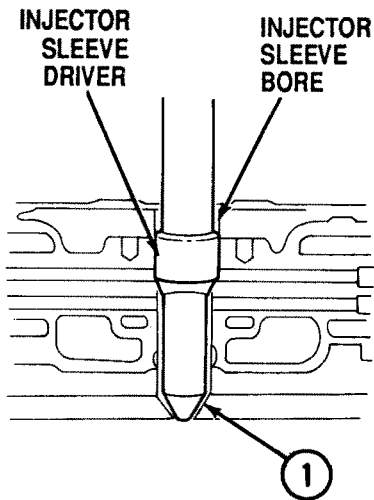
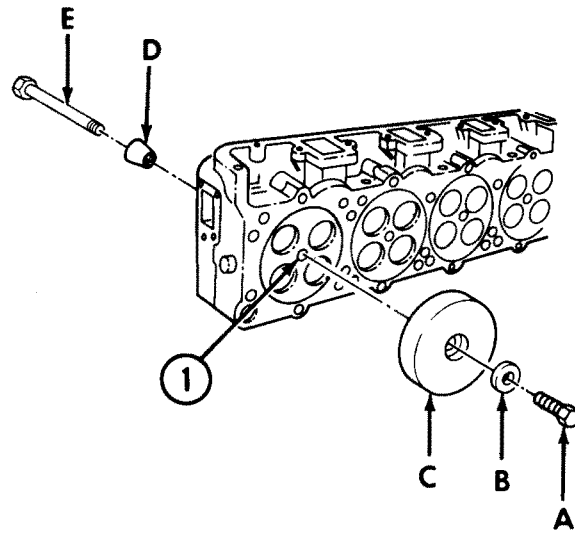
Note

- Injector holding tool consists of components (A) through (E).
- Screw (E) is used only to install plug (D).

DU Install injector sleeve holding tool (A) through (E) through hole in new injector sleeve (1).

DV Tighten screw (A) to 35-40 lb-ft (47-54 N.m).

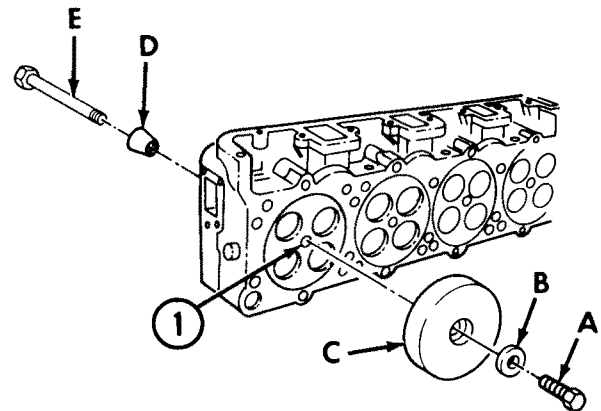
DW Remove screw (E) from plug (D).



DX Insert injector sleeve driver into injector sleeve bore.

DY Strike injector sleeve driver two medium blows to seat new injector sleeve (1). Use hammer.

DZ Remove injector sleeve driver.



EA Retighten screw (A) to 35-40 lb-ft (47-54 N.m) to properly seat new injector sleeve (1).

Note

Screw (E) is used to remove plug (D).

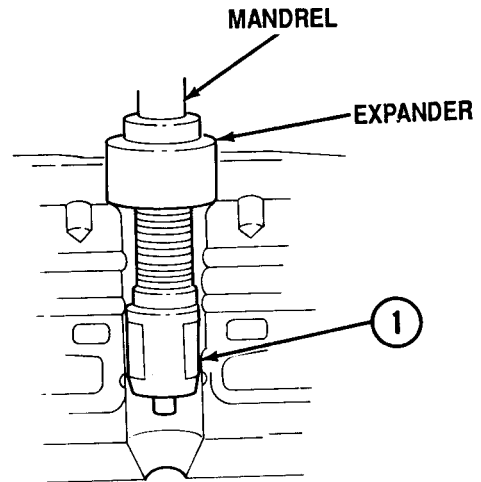
EB Install screw (E) into plug (D).

EC Remove injector sleeve holding tool (A) through (E) from new injector sleeve (1).

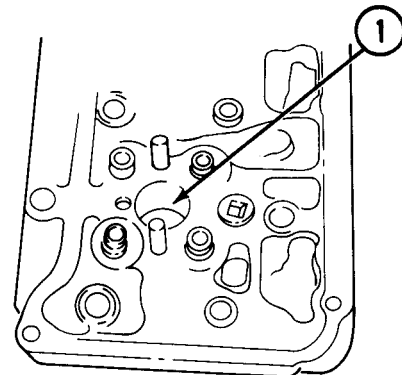
CAUTION

Over-rolling of the injector sleeve will cause deformation of the sleeve in packing groove in sleeve bore.

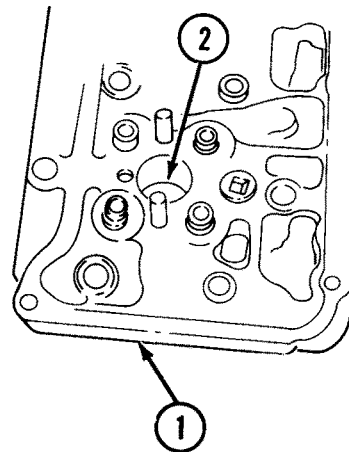
- ED** Install injector sleeve expander through hole in new injector sleeve (1).
- EE** Tighten mandrel of expander to 6 lb-in. (8 N·m).
- EF** Remove expander from injector sleeve (1).



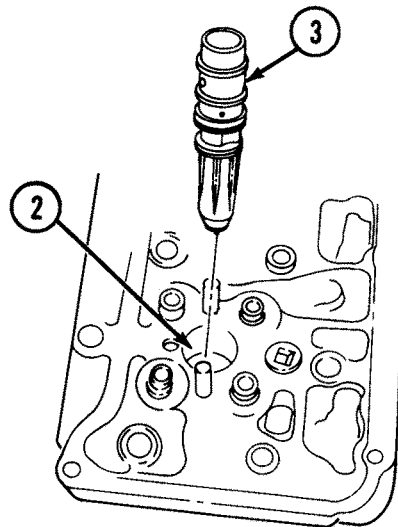
- EG** Install serviceable fuel injector in new injector sleeve (1) (p 3-24).
- EH** Measure injector tip protrusion. See steps AK through AN. If injector tip protrusion is less than 0.090-0.105 in. (2.286-2.667 mm), seat of new injector sleeve must be cut down. Depth of cut will equal the difference between measured and required tip protrusions.
- EI** Remove serviceable fuel injector from new injector sleeve (1) (p 3-23).

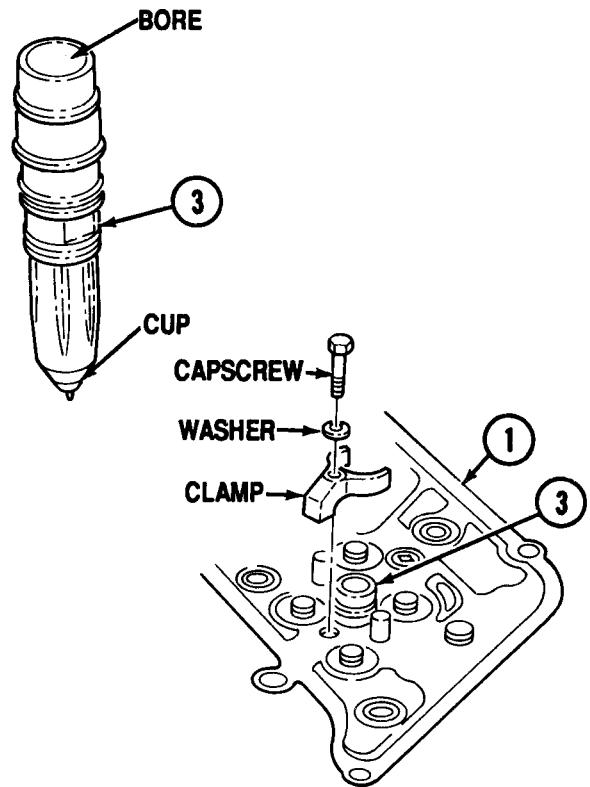


- EJ** Move cylinder head (1) to drill press.
- EK** Using injector sleeve cutter in drill press with pilot, cut seat of new injector sleeve (2) by amount determined in steps EG through EI. Provide solid stream of cutting oil to allow cutter to cut cleanly.
- EL** Return cylinder head (1) to workbench with compression side down on wood blocks.



- EM** Apply prussian blue paste all around seat of new injector sleeve (2).
- EN** Install serviceable fuel injector (3) in new injector sleeve (2) (p 3-24).
- EO** Remove serviceable fuel injector (3) from new injector sleeve (p 3-23).
- EP** Using vernier caliper, measure and ensure that injector blue dye band on fuel injector (3) measures at least 0.060 in. (1.52 mm).
- EQ** If contact area is not uniform, or less than 0.060 in. (1.52 mm) wide, replace injector sleeve (2).

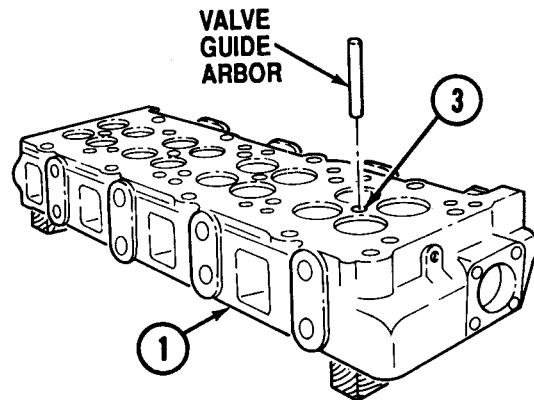




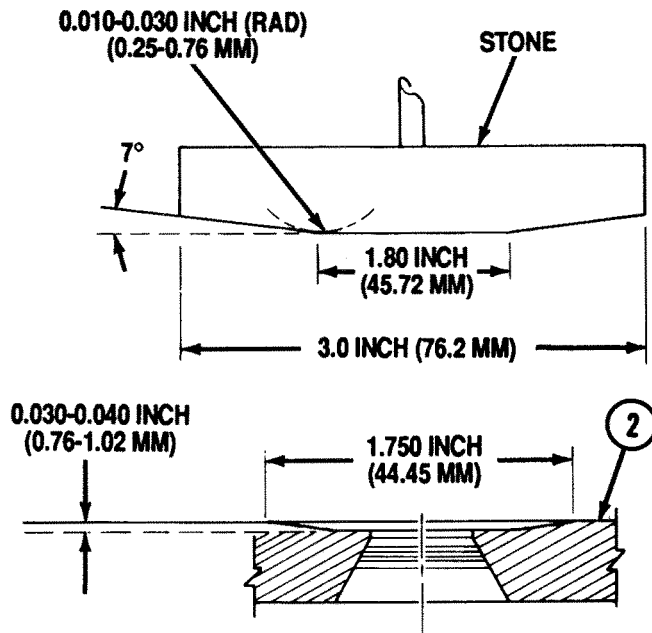
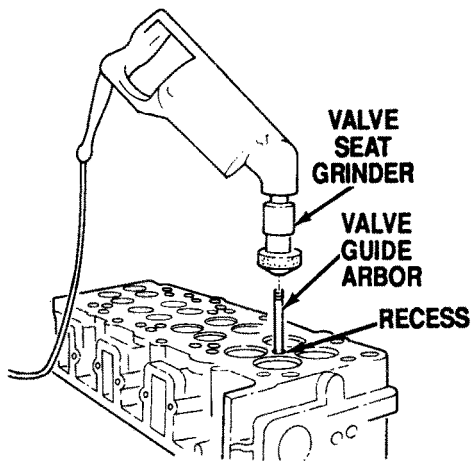
Note

Discarded injector must be used as a tool, not a new injector.

- ER** Drill through bore and cup of discarded fuel injector (3). Use drill press and 11/32 in. bit.
- ES** Install discarded fuel injector (3) in cylinder head (1) with clamp, washer, and screw.
- ET** Ream discarded fuel injector bore to 0.375 in. (9.525 mm). Use hand reamer.



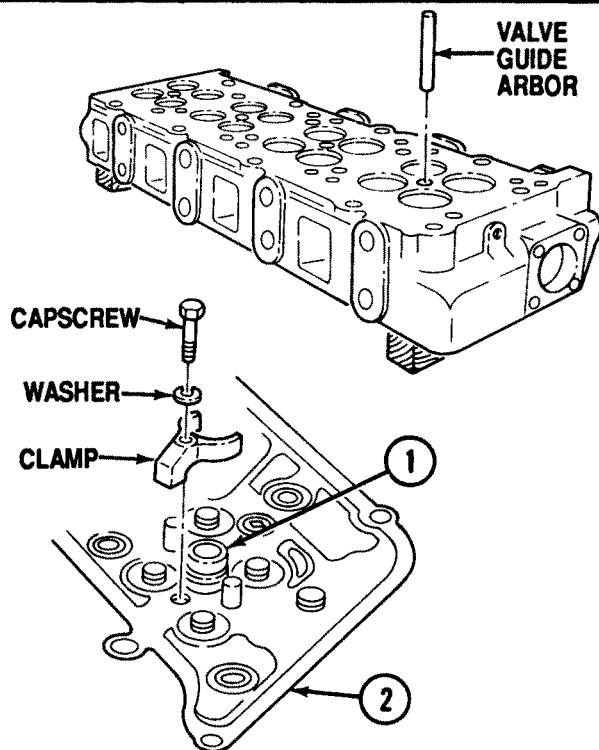
- EU** Place cylinder head (1), compression side up, on wood blocks.
- EV** Insert correct valve guide arbor into reamed bore of discarded fuel injector (3).



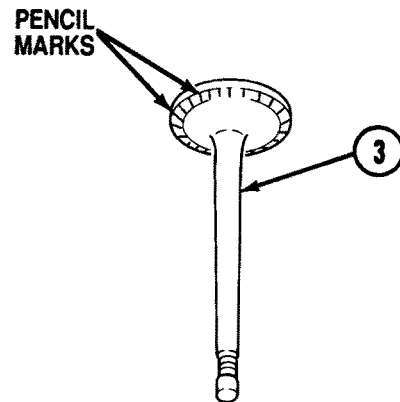
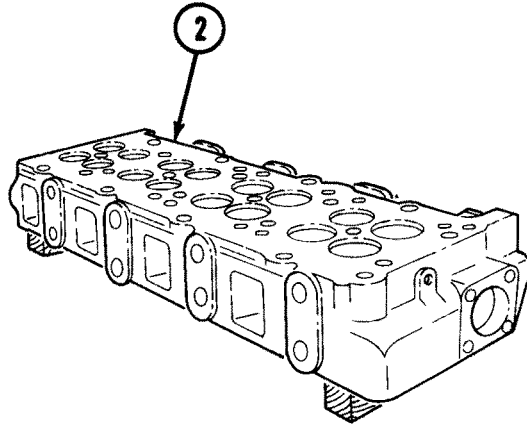
- EW** Install a 3 in. (76.2 mm) stone, dressed as shown, on valve seat grinder.
- EX** Place valve seat grinder on valve guide arbor.
- EY** Grind recess to depth of 0.030-0.040 in. (0.76-1.02 mm). Measure depth with protrusion gage and dial indicator.

- EZ** Measure diameter of recess. Use vernier caliper. If diameter is less than 1.750 in. (44.45 mm), redress stone and grind recess until specifications are met.

- FA** Remove valve guide arbor from discarded fuel injector (1).
- FB** Place cylinder head (2), compression side down, on wood blocks.
- FC** Remove screw, washer, and clamp from cylinder head (2).
- FD** Remove discarded fuel injector (1) from cylinder head (2).
- FE** Repeat steps EU through FD for three remaining injector recesses. Use discarded fuel injector already bored and reamed.
- FF** Set up valve facing machine to grind 29-degree cut on mating surfaces of sixteen valves. See TM 9-4910-473-10.
- FG** Grind mating surfaces of eight intake and exhaust valves. See TM 9-4910-473-10.



- FH** Measure head thickness of sixteen valves. See step BE.



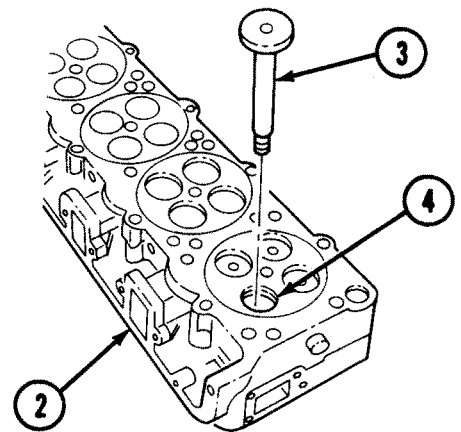
FI Place cylinder head (2), compression side up, on wood blocks.

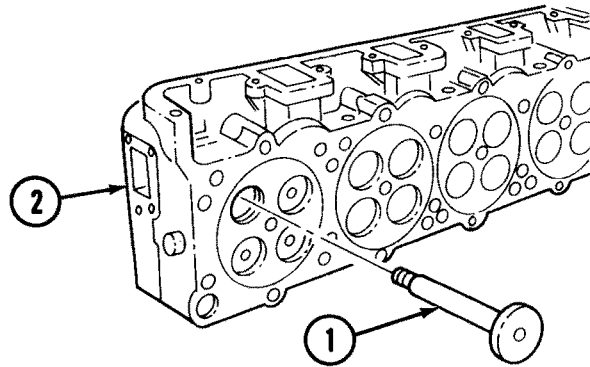
FJ Using pencil, mark mating surface of valve (3) as shown.

FK Insert valve (3) in correct location in cylinder head (2). Rotate valve (3) on valve seat insert (4) 10 degrees. Remove valve (3) from cylinder head (2).

FL Valve (3) is seating properly when pencil marks on mating surfaces are broken.

FM If pencil marks on mating surface of valve (3) are not broken, valve is not seating properly. Tools need dressing or machine is not properly adjusted. Make needed corrections and repeat steps FF through FL for improperly seated valves.





Note

Perform steps FN.1 through FN.13. Valve seats correctly ground with precision equipment will not require lapping to make an air-tight seal with valves. A small amount of lapping is permitted, if necessary, in order to pass valve seating test with vacuum tester.

FN Insert sixteen valves (1) in cylinder head (2).

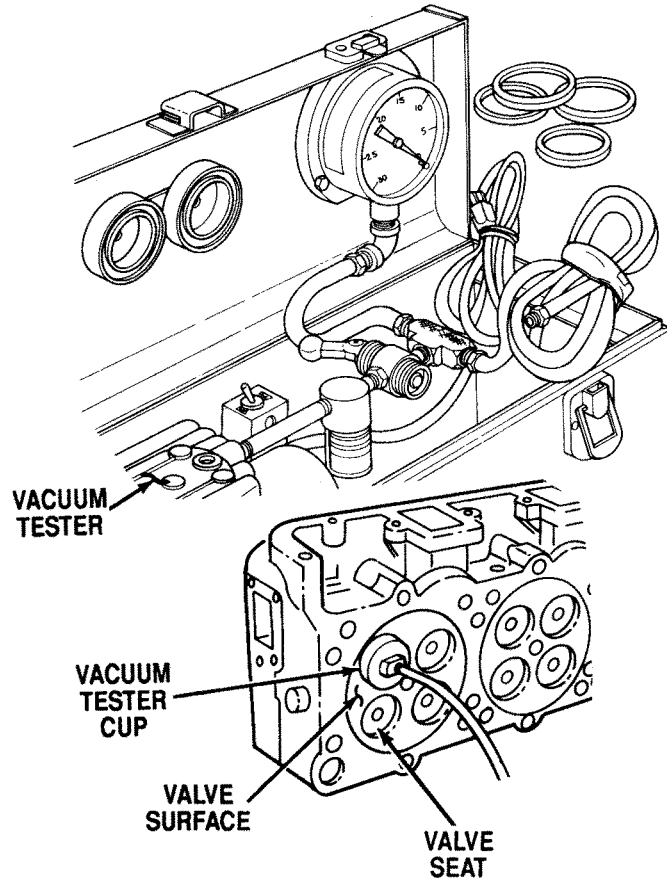
FN.1 Use vacuum tester ST-1257 (vacuum cup size six), to test air tightness of each valve.

CAUTION

Never vacuum test valves with injectors installed. Failure to comply may result in damage to injectors.

Note

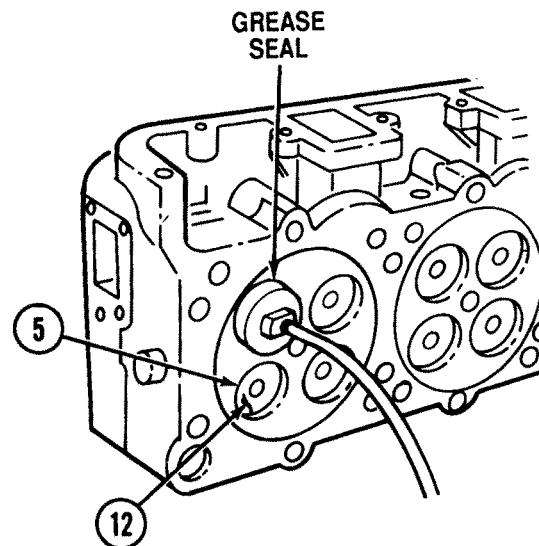
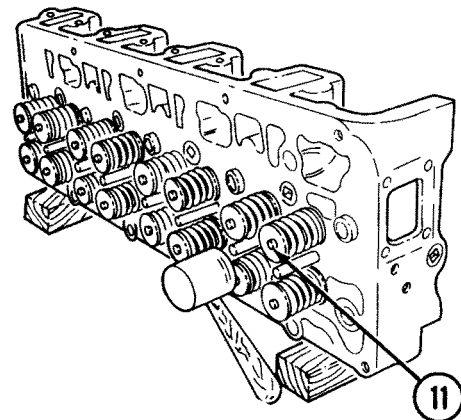
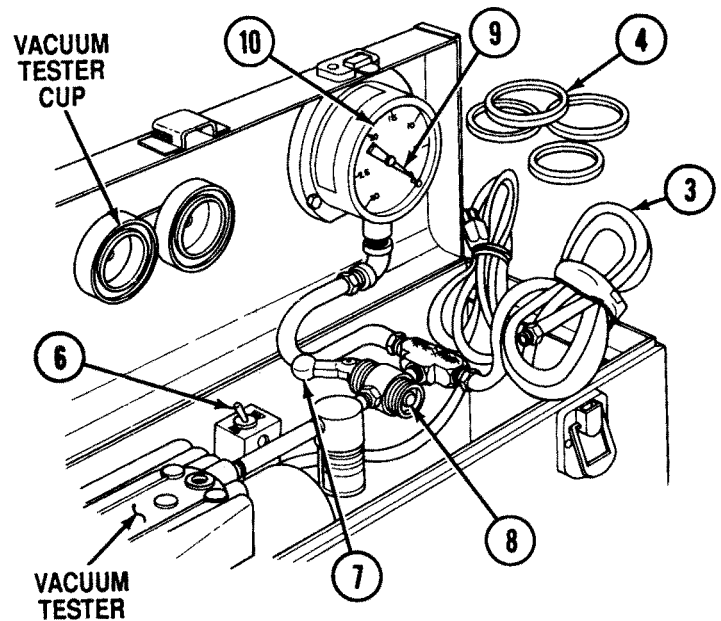
Valves and seats must be dry and clean. O-ring on cup must seat on surface of head surrounding valve. Apply grease to valve surface for better seal.



WARNING

Valve springs under compression can slip from tool and injure you. Always wear goggles when working with parts under pressure.

- FN.2** Screw vacuum tester cup on hose (3) and insert O-rings (4) into tester cup.
 - FN.3** Fit tester cup over valve head (5).
 - FN.4** Turn vacuum tester switch (6) on. Turn shut-off valve (7) to OPEN position.
 - FN.5** Leave shut-off valve (7) open on vacuum pump (8) until gage reads between 18 to 25 in. (46 to 64 cm).
 - FN.6** Start timing when gage hand (9) reaches 18 in. (46 cm).
 - FN.7** Stop timing when gage hand (9) reaches 8 in. (20 cm) on dial (10). If time elapsed is less than 10 seconds, valve (5) is not seating properly.
- Note**
- Perform steps FW through GC if valve seat is not seating properly.
- FN.8** Tap stem end (11) with soft mallet and test again.
 - FN.9** Check for leaking connections in tester.
 - FN.10** Operate pump against window glass. Check for fall of gage hand (9), which indicates loose connection.
 - FN.11** Ensure valve (5) and valve seat (12) are clean and free of debris.
 - FN.12** If necessary, regrind valve (5) and valve seat (12).
 - FN.13** Apply grease seal. Inspect for break in grease seal indicating air leakage.



WARNING

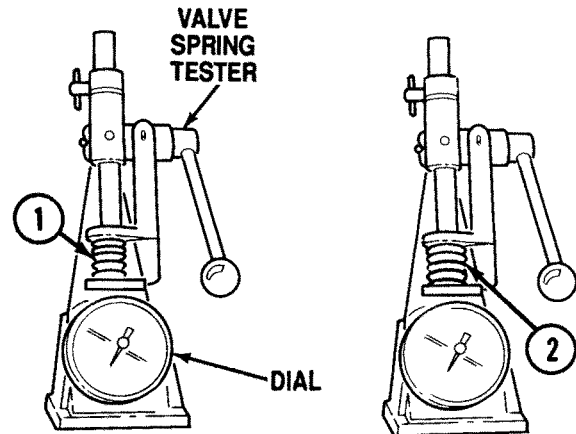
Valve springs under compression can slip from tool and injure you. Always wear goggles when working with parts under pressure.

- FO** Place small valve spring (1) on valve spring tester.
- FP** Compress small valve spring (1) to 1.237 in. (31.420 mm), and read dial on valve spring tester. If dial shows less than 75 lb (34.0 kg), replace small valve spring.
- FQ** Repeat steps FO and FP for fifteen other small valve springs (1).

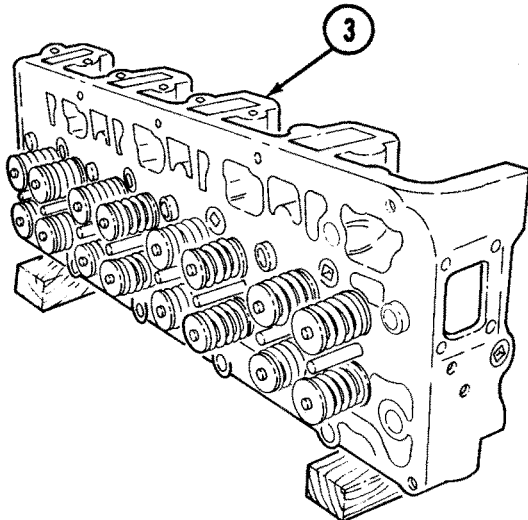
WARNING

Valve springs under compression can slip from tool and injure you. Always wear goggles when working with parts under pressure.

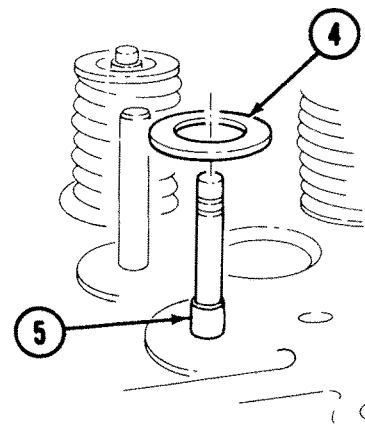
- FR** Place large valve spring (2) on valve spring tester.



- FS** Compress large valve spring (2) to 1.287 in. (32.690 mm), and read dial on valve spring tester. If dial shows less than 120 lbs (54.4 kg), replace large valve spring (2).
- FT** Repeat steps FR and FS for fifteen other large valve springs (2).



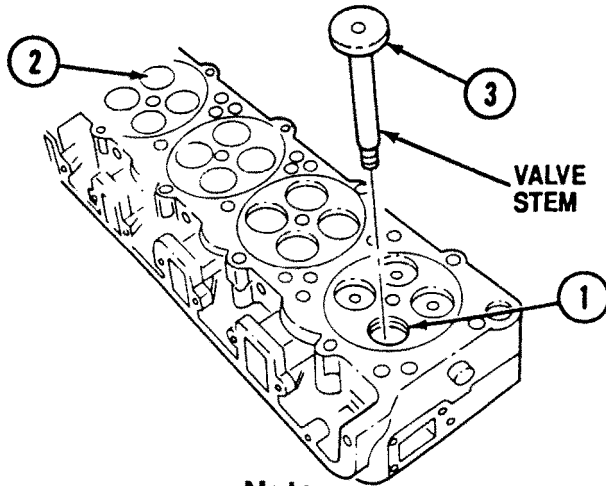
- FU** Place cylinder head (3), exhaust manifold mating surface down, on wood blocks.



Note

When cylinder head has been resurfaced, and valve seat insert has been refaced, one additional wear plate can be used at each valve guide. Wear plates cannot be used to compensate for spring tension loss.

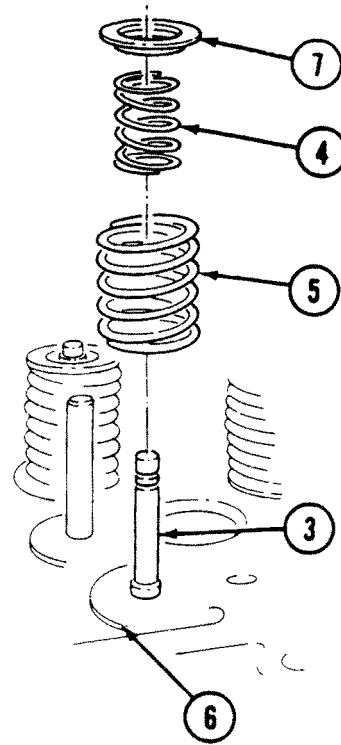
- FV** Install wear plate (4) on each of eight exhaust valve guides (5).



Note

Exhaust valves must be installed in same valve guides from which removed.

- FW** Dip valve stem in clean 30-weight engine oil.
- FX** Insert valve stem in valve guide (1) from compression side of cylinder head (2).
- FY** Repeat steps FW and FX for other seven exhaust valves (3).

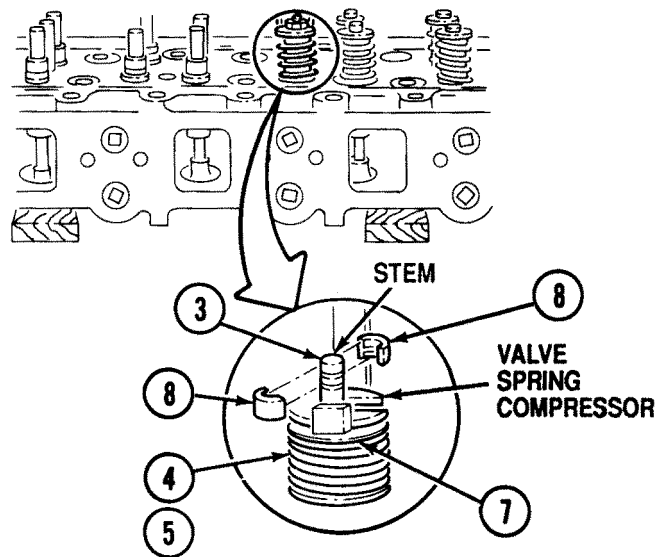


- FZ** Place small valve spring (4) and large valve spring (5) on each wear plate (6) and exhaust valve (3). Install retainer (7) on springs (4), (5), and each of eight exhaust valves (3).

WARNING

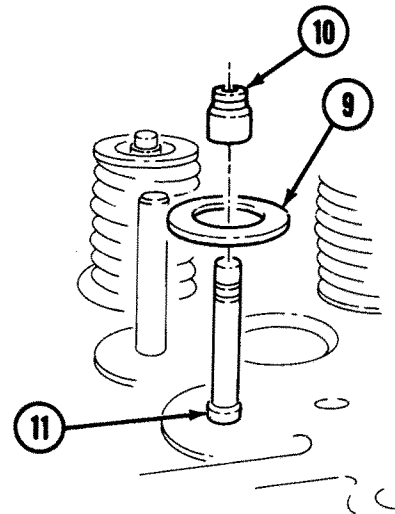
Valve springs under compression can slip from tool and injure you. Always wear goggles when working with parts under pressure.

- GA** Using valve spring compressor, compress valve springs (4) and (5).
- GB** Install two locks (8) on valve stem. Slowly release springs (4) and (5) until retainer (7) holds locks (8) in place.
- GC** Using plastic-faced hammer, tap retainer (7) lightly to seal locks (8).
- GD** Repeat steps GA through GC for other seven exhaust valves (3).



Note

When cylinder head has been resurfaced, and valve and valve seat insert has been refaced, one additional wear plate can be used at each valve guide. Wear plates cannot be used to compensate for spring tension loss.

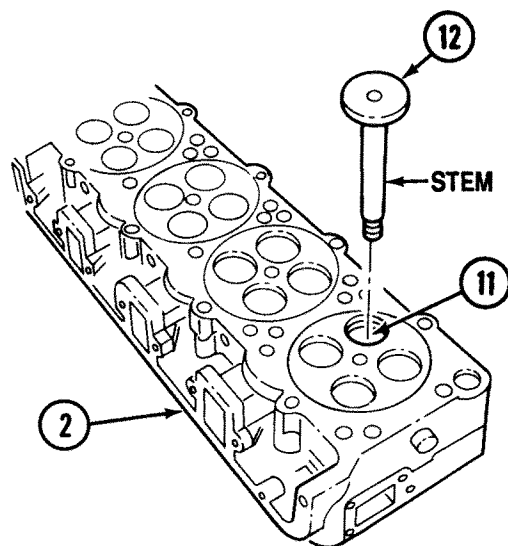


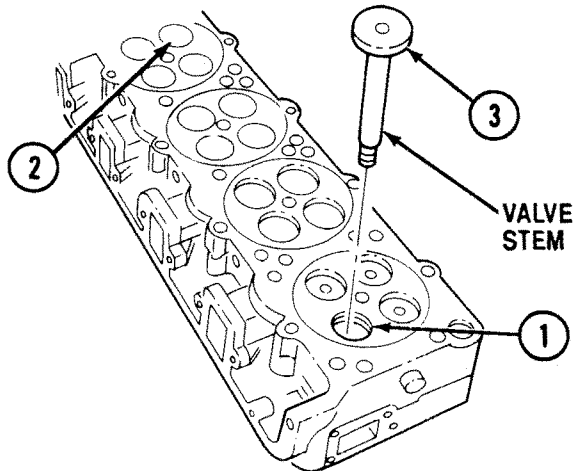
- GE** Install wear plate (9) and new oil seal (10) on each of eight intake valve guides (11).

Note

Intake valves must be installed in same valve guides from which removed.

- GF** Dip valve stem of intake valve (12) in clean 30-weight engine oil.
- GG** Insert valve stem in valve guide (11) from compression side of cylinder head (2).
- GH** Repeat steps GF and GG for other seven intake valves (12).

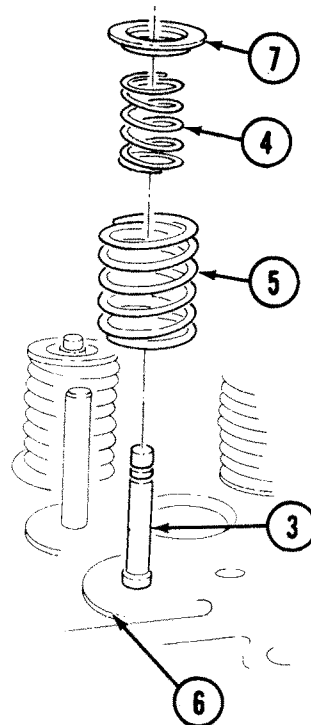




Note

Exhaust valves must be installed in same valve guides from which removed.

- GH.1** Dip valve stem in clean 30-weight engine oil.
- GH.2** Insert valve stem in valve guide (1) from compression side of cylinder head (2).
- GH.3** Repeat steps GH.1 and GH.2 for other seven exhaust valves (3).



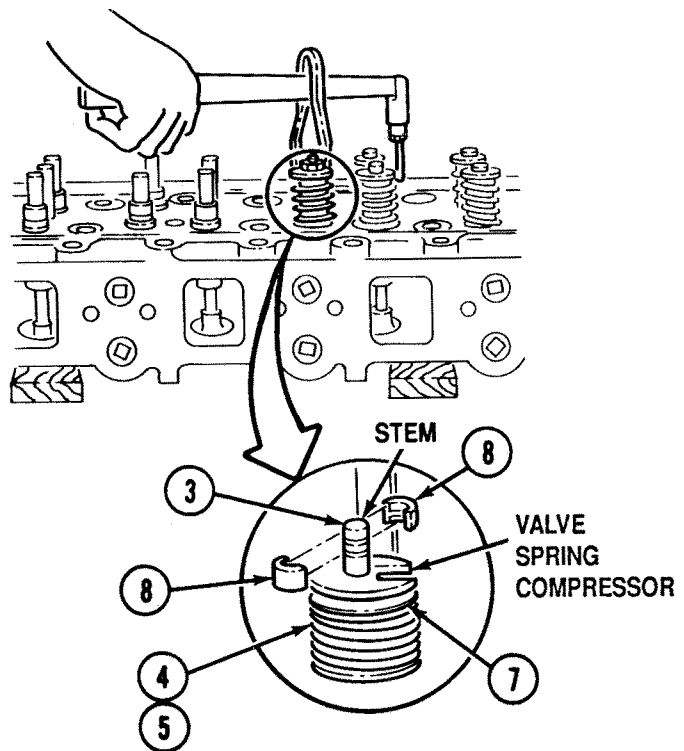
- GI** Place small valve spring (4) and large valve spring (5) on each wear plate (6) and exhaust valve (3). Install retainer (7) on springs (4), (5), and each of eight exhaust valves (3).

WARNING

Valve springs under compression can slip from tool and injure you. Always wear goggles when working with parts under pressure.

- GJ** Using valve spring compressor, compress valve springs (4) and (5).
- GK** Install two locks (8) on valve stem. Slowly release springs (4) and (5) until retainer (7) holds locks (8) in place.
- GL** Using plastic-faced hammer, tap retainer (7) lightly to seal locks (8).
- GM** Repeat steps GJ through GL for other seven exhaust valves (3).

FOLLOW-ON TASK:
Install cylinder head (p 3-194).



VALVES ADJUSTMENT

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment,
Automotive Maintenance and Repair:
Field Maintenance, Supplemental No. 1,
Less Power

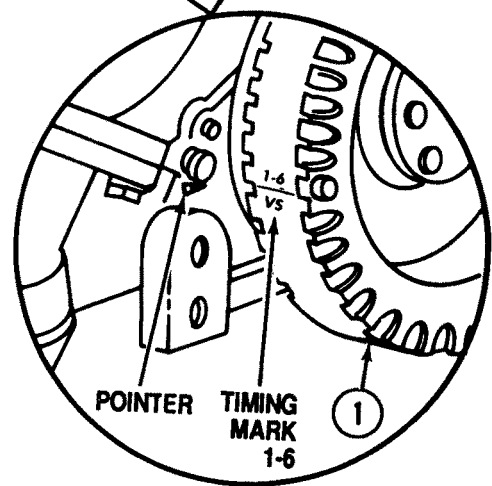
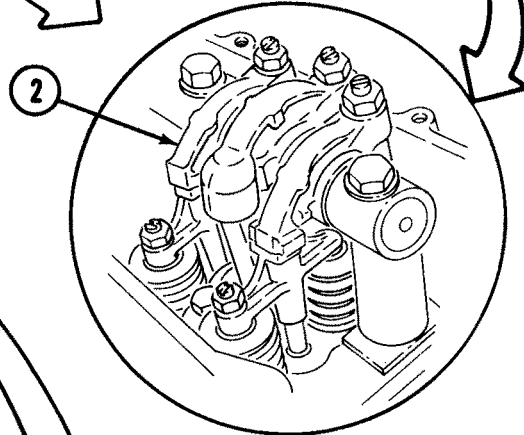
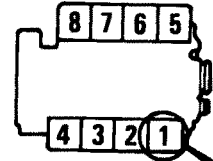
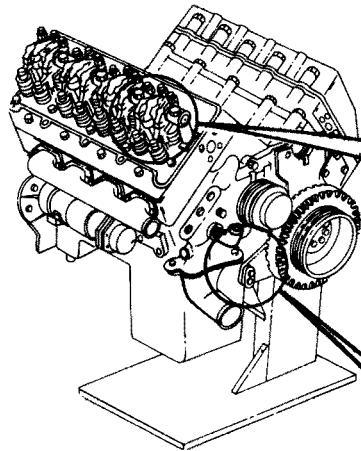
Equipment Condition:Reference**Page 2-8****Page 3-184**Condition
DescriptionEngine Mounted
on StandRocker Covers
RemovedSpecial Tools:

Adapter Socket Wrench	5120-00-240-8702
--------------------------	------------------

Wrench Set Crowfoot	5705566
------------------------	---------

Personnel Required:

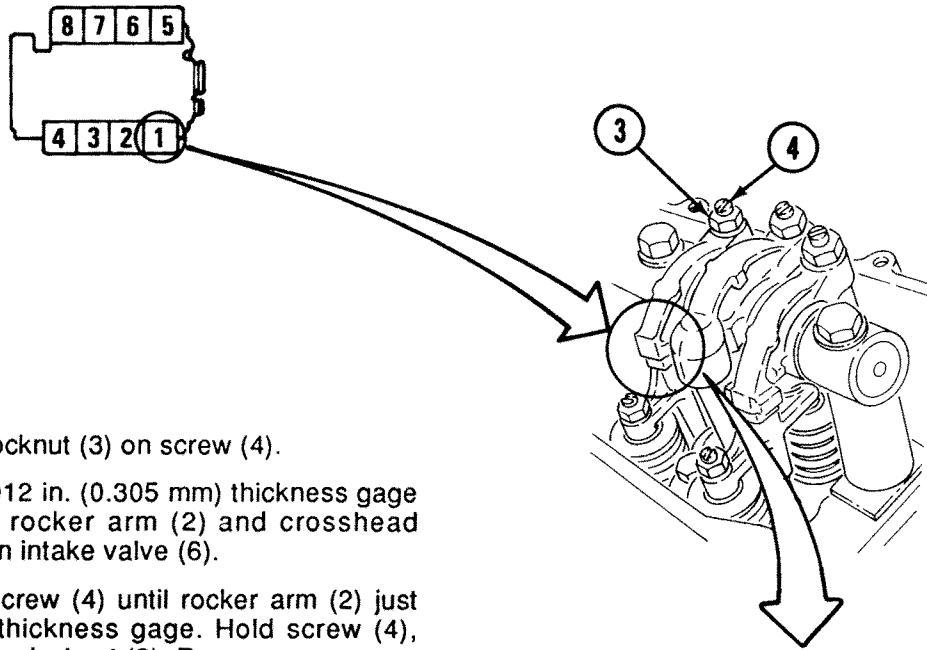
Track Vehicle Repairer 63H10



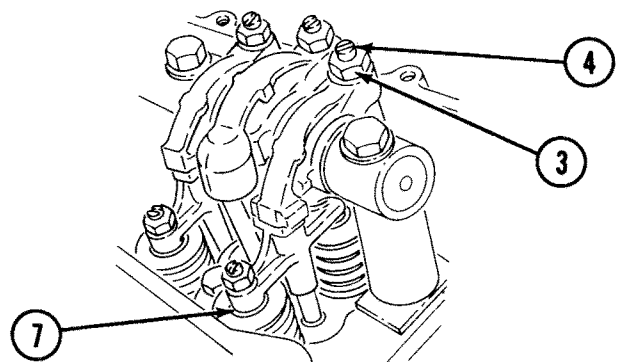
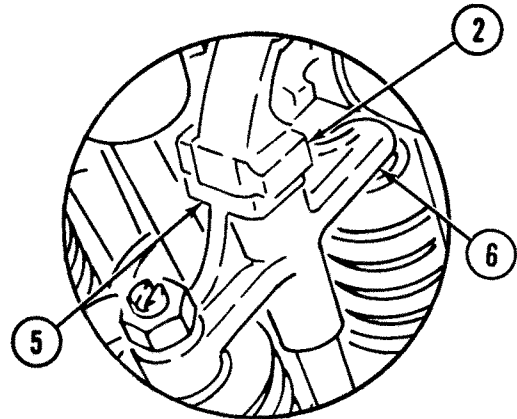
Note

- Valves are adjusted in the same order as cylinder firing order. Order of adjustment is 1, 5, 4, 8, 6, 3, 7, and 2.
- Valve adjustment is the same for all cylinders. Steps A through K explain adjustment of cylinder No. 1 valves.
- To adjust valves for cylinder Nos. 5, 4, 8, 6, 3, 7, and 2, turn vibration damper to applicable timing marks:
 - Cyl. No. 5 (mark 3-5)
 - Cyl. No. 4 (mark 4-7)
 - Cyl. No. 8 (mark 2-8)
 - Cyl. No. 6 (mark 1-6)
 - Cyl. No. 3 (mark 3-5)
 - Cyl. No. 7 (mark 4-7)
 - Cyl. No. 2 (mark 2-8)
 and follow steps A through K, inserting cylinder No. where applicable.

- A** Using the air compressor barring shaft, turn vibration damper (1) to right until timing mark 1-6 aligns with pointer located at 9 o'clock position.
- B** Move cylinder no. 1 rocker arms (2) from side to side. Rocker arms will move freely when cylinder is in correct position to adjust valve clearance.
- C** If rocker arms (2) do not move freely, repeat steps A and B. In step A, turn vibration damper (1) one full turn.



- D** Loosen locknut (3) on screw (4).
- E** Insert 0.012 in. (0.305 mm) thickness gage between rocker arm (2) and crosshead pad (5) on intake valve (6).
- F** Tighten screw (4) until rocker arm (2) just touches thickness gage. Hold screw (4), and tighten locknut (3). Remove gage.
- G** Tighten locknut (3) to 40-45 lb-ft (54-61 N·m). Use torque wrench, adapter, and crowfoot. Hold screw (4) while tightening locknut (3).
- H** Check intake valve (6) clearance. If clearance changed during tightening, repeat steps D through G.
- I** Repeat steps D through G using 0.025 in. (0.635 mm) thickness gage to adjust clearance on cylinder No. 1 exhaust valve (7).
- J** Tighten locknut (3) to 40-45 lb-ft (54-61 N·m). Use torque wrench, adapter, and crowfoot. Hold screw (4) while tightening locknut (3).
- K** Check exhaust valve (7) clearance. If clearance changed during torquing, repeat steps I and J.



FOLLOW-ON TASK:
Install rocker covers (p 3-184).

VALVE TRAIN REPAIR

This task covers:

- | | |
|----------------|---------------|
| a. Disassembly | c. Inspection |
| b. Cleaning | d. Assembly |
-

INITIAL SETUP

Tools:

4910-00-754-0705 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Basic Less Power

4910-00-754-0706 Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1, Less Power

4940-00-287-4894 Shop Equipment, General Purpose Repair, Semitrailer Mounted

Special Tools:

Fillet Gage, 7/16	5210-00-273-9867
V-Blocks	3460-00-913-8526
Plate Surface	5220-00-293-3556

Materials:

Inspection Penetrant Remover	Item 14 Appendix C
Engine Oil, 30-Weight	Item 16 Appendix C
Prussian Blue Paste	Item 19 Appendix C
Wiping Rag	Item 20 Appendix C

Parts:

Lockwasher (12)
Gasket (2)
Expansion Plug (2)

Parts Reference:

Appendix B

Personnel Required:

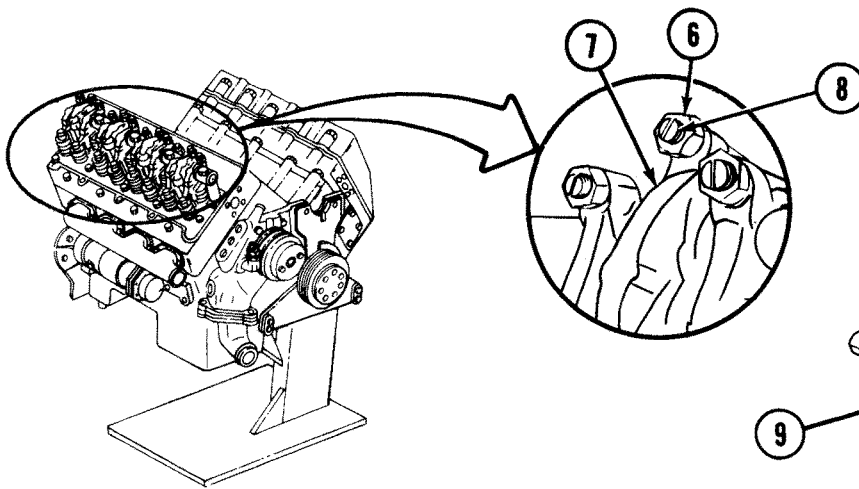
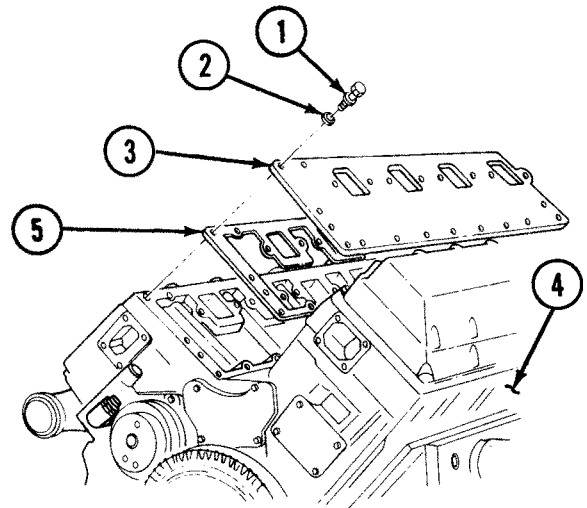
Track Vehicle Repairer (2) 63H10

Equipment Condition:

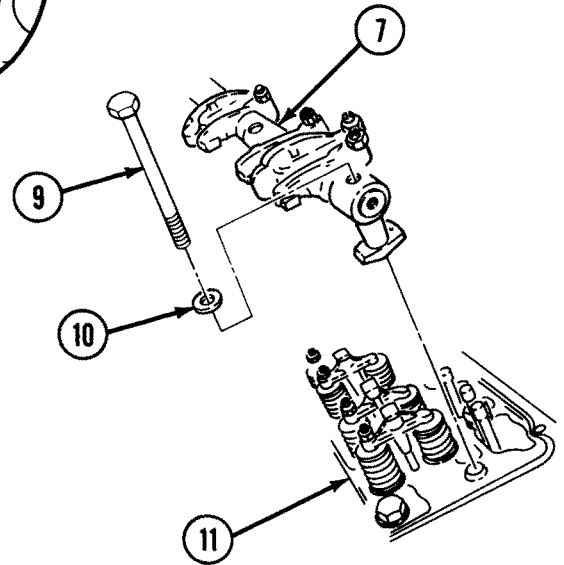
<u>Reference</u>	<u>Condition Description</u>
Page 3-185	Rocker Covers Removed
Page 3-58	Intake Manifold Removed
Page 3-12	Fuel Supply Tube and Check Valve Removed
Page 3-15	Fuel Drain Tube and Check Valve Removed

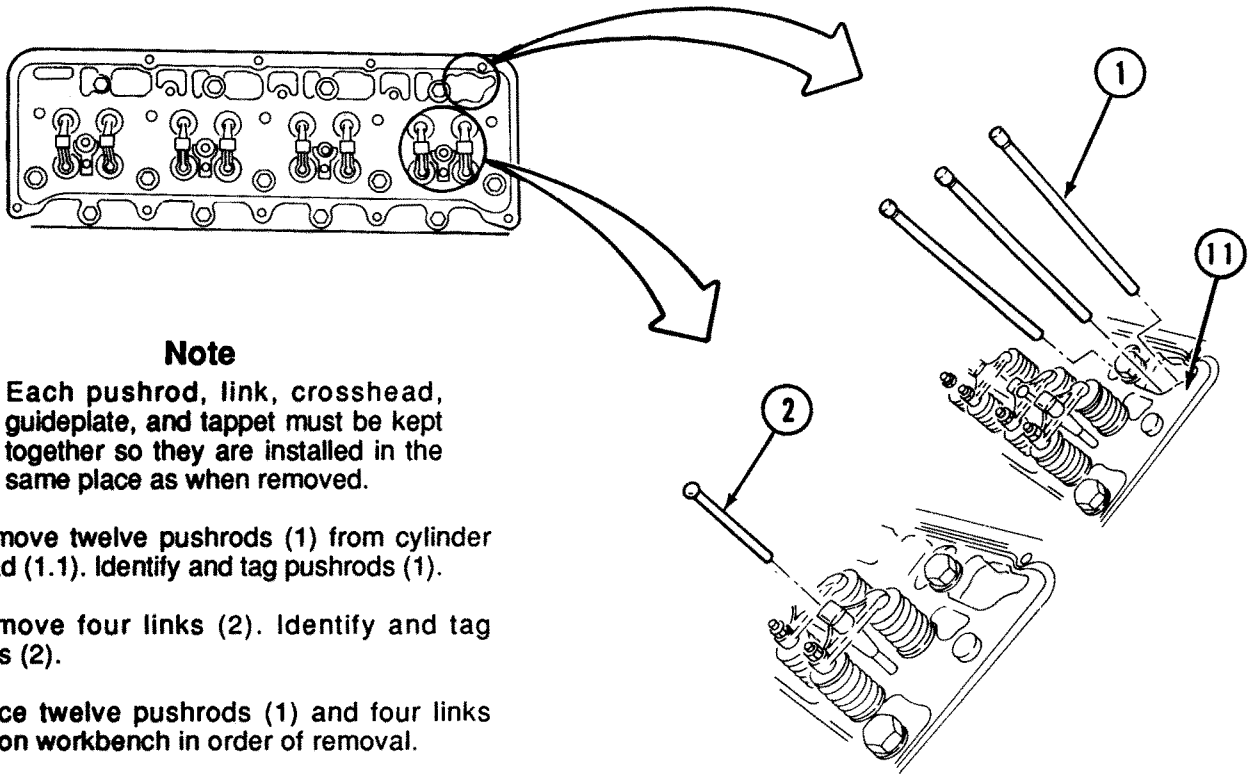
DISASSEMBLY

- A** Remove twelve screw and washer assemblies (1), lockwashers (2), and pushrod cover (3) from engine (4). Discard lockwashers (2).
- B** Remove gasket (5) from engine (4). Discard gasket (5).



- C** Loosen twelve locknuts (6) from rocker assembly (7).
- D** Loosen screws (8) from rocker assembly (7).
- E** Remove five screws (9), washers (10), and rocker assembly (7) as a unit from cylinder head (11).

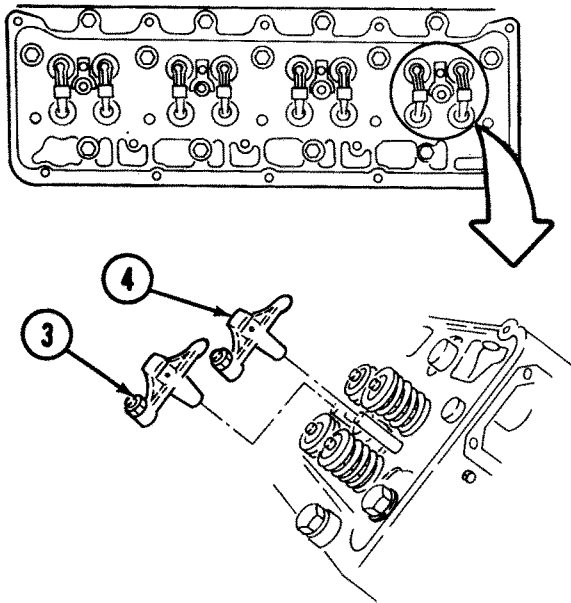




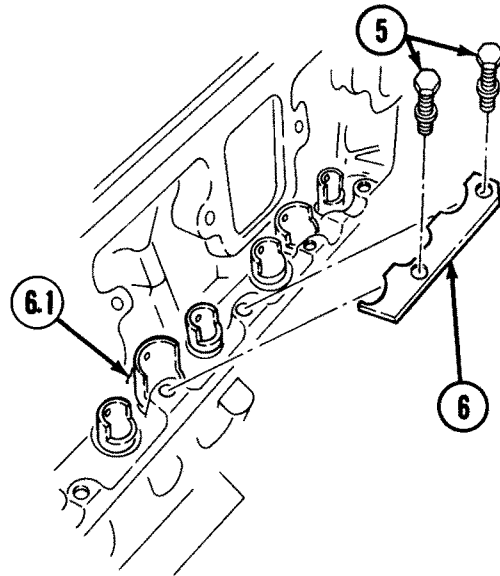
Note

Each pushrod, link, crosshead, guideplate, and tappet must be kept together so they are installed in the same place as when removed.

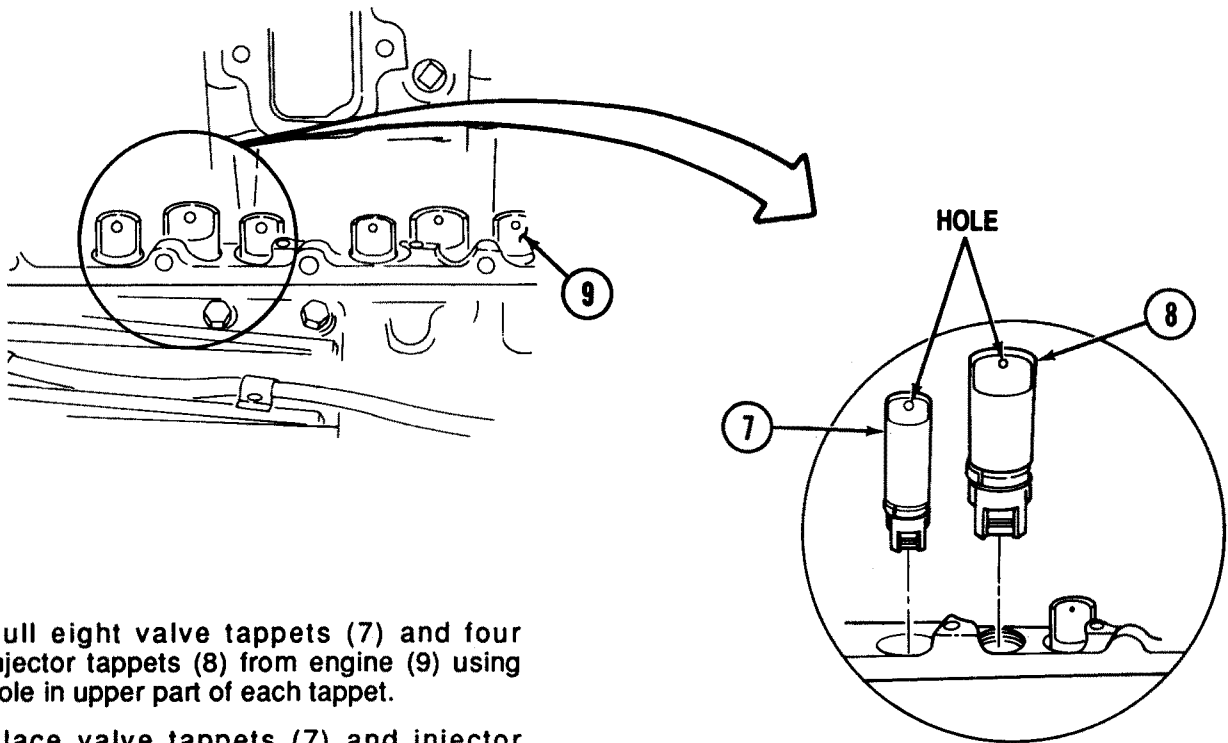
- F** Remove twelve pushrods (1) from cylinder head (1.1). Identify and tag pushrods (1).
- G** Remove four links (2). Identify and tag links (2).
- H** Place twelve pushrods (1) and four links (2) on workbench in order of removal.



- I** Loosen eight locknuts (3) on eight crossheads (4).
- J** Remove eight crossheads (4), and place on workbench in order of removal. Identify and tag crossheads (4).



- K** Remove eight screw and washer assemblies (5) that secure four guideplates (6) to engine (6.1).
- L** Lift four guideplates (6) and place on workbench in order of removal. Identify and tag guideplates.

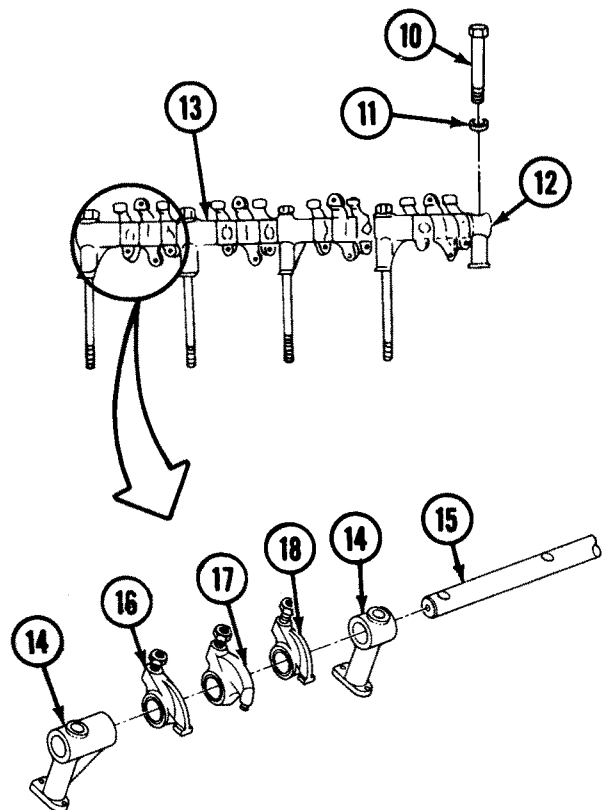


- M** Pull eight valve tappets (7) and four injector tappets (8) from engine (9) using hole in upper part of each tappet.
- N** Place valve tappets (7) and injector tappets (8) on workbench in order of removal. Identify and tag tappets.

Note

The front end of the rocker shaft is marked with an arrow and the word TOP. The front support is marked with an arrow and the words ALINE WITH SHAFT MARK. The front support is the last part to be removed from the shaft.

- O** Remove five screws (10) and washers (11) from five supports (12).
- P** Place rocker assembly (13) on workbench.
- Q** Remove support (14) from rear end of shaft (15).
- R** Remove intake rocker arm (16), injector rocker arm (17), exhaust rocker arm (18) and next support (14) from shaft (15). Continue in this order to remove all remaining parts from shaft.
- S** Put shaft (15) aside. Tag all parts by number, front to rear.

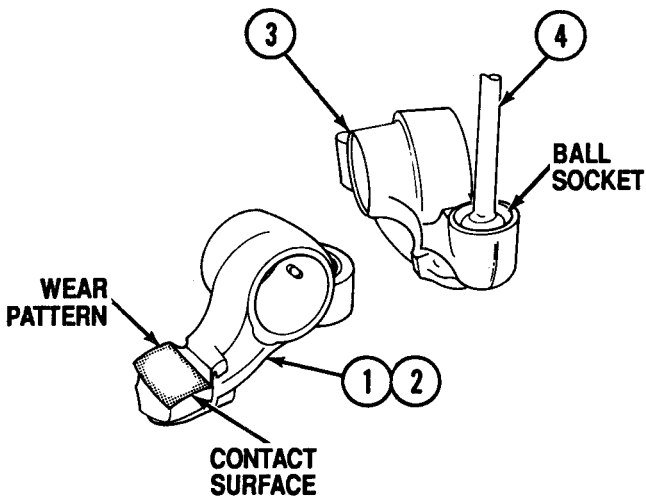
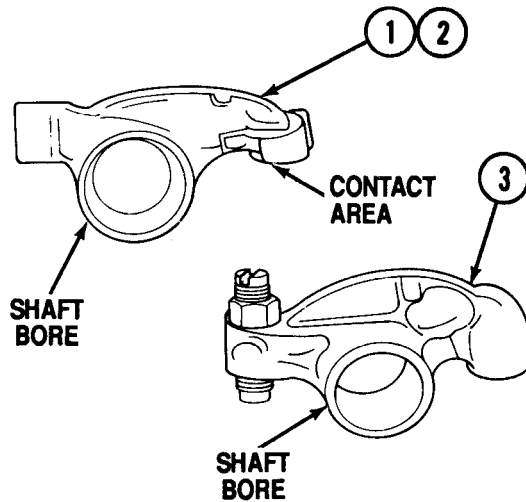


CLEANING

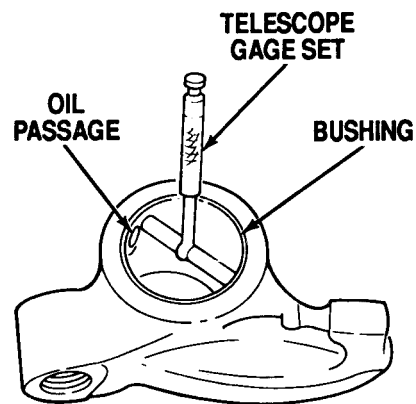
Follow general cleaning instructions (p 2-2).

INSPECTION

- A** Inspect valve rocker arms (1) and (2) and injector rocker arms (3). Check for cracks.
- B** Inspect shaft bore areas. Check for pitting.
- C** Inspect contact area on valve rocker arms (1) and (2). Check for pitting.



- D** Inspect contact surface of valve rocker arms (1) and (2). Check for grooving, chipping, and incorrect wear pattern. If you find wedge wear pattern or other fault, replace valve rocker arm.
- E** Check injector rocker arms (3) for wear pattern in ball socket. Use prussian blue dye and matching fuel injector link (4). Contact must be 80 percent of the surface area.

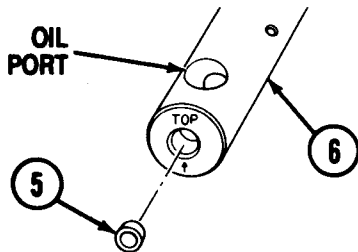
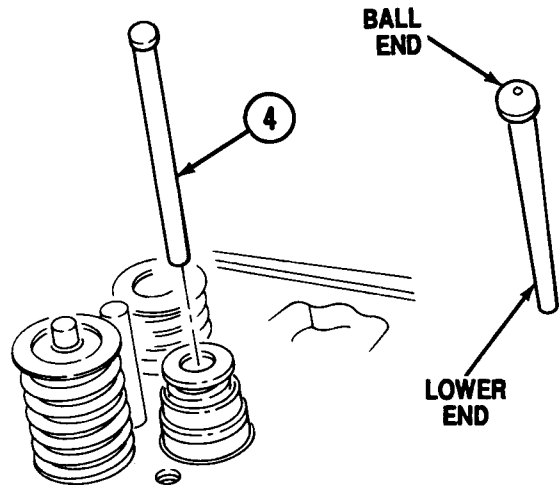


Note

Bushing of replacement rocker arm should measure 1.1875-1.1905 in. (30.163-30.239 mm).

- F** Measure bore of bushings at two points, 90 degrees apart. Use telescope gage set. If either measurement is greater than 1.1915 in. (30.239 mm), replace rocker arm.
- G** Check oil passage for clogging. Clean as needed.

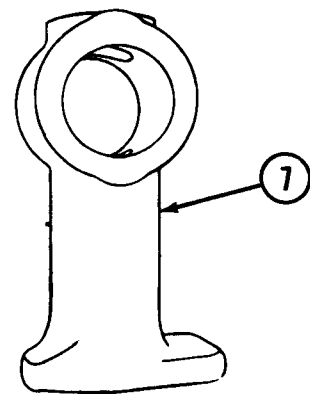
- H** Apply prussian blue dye to ball ends on links (4). Rotate links (4) in same injector from which removed. Check for wear.
- I** Apply prussian blue dye to lower ends of links (4). Rotate links in same plunger from which removed. Check for wear.
- J** If dye does not stay on 80 percent of contact area, replace link (4). Tag bad injector to be replaced later.



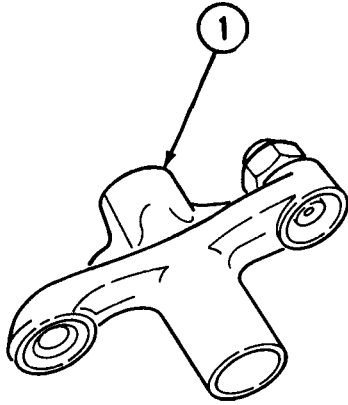
Note

Replacement shaft must measure 1.1865-1.1874 in. (30.1117-30.1371 mm).

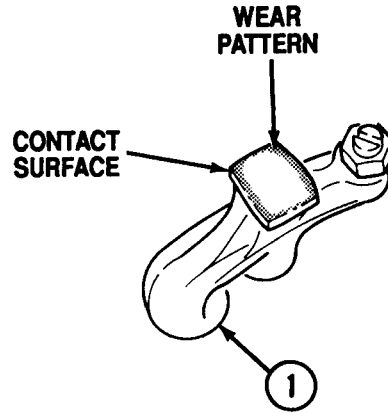
- K** Remove two expansion plugs (5) from shaft (6). Discard expansion plugs (5).
- L** Inspect shaft (6) for scoring, wear, and roundness at rocker arm bushing contact surfaces.
- M** Measure diameter of shaft (6) at rocker arm bushing contact surfaces. Use outside micrometer. If measurement is less than 1.1845 in. (30.1 mm), replace shaft.
- N** Check oil ports for dirt and clogging. Clean as needed.



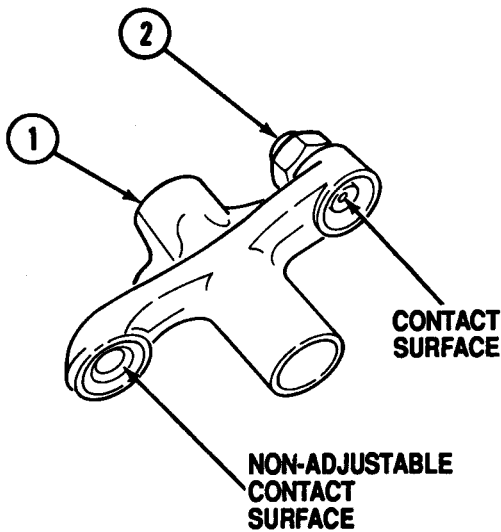
- O** Inspect supports (7) for cracks. Replace bad supports.



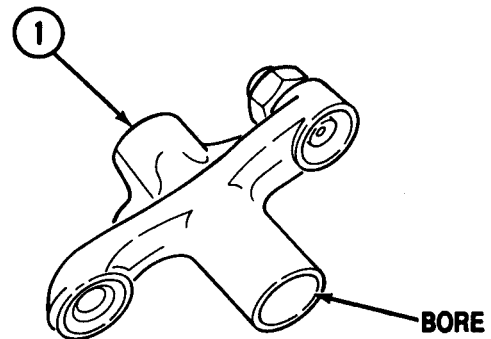
P Inspect crossheads (1) for casting failure and cracks. Replace bad crossheads.



Q Inspect contact surface of crossheads (1) for wear pattern, scoring, and chipping. Correct wear pattern is rectangular in shape and slight in depth. Replace crossheads (1) if wear pattern is incorrect.

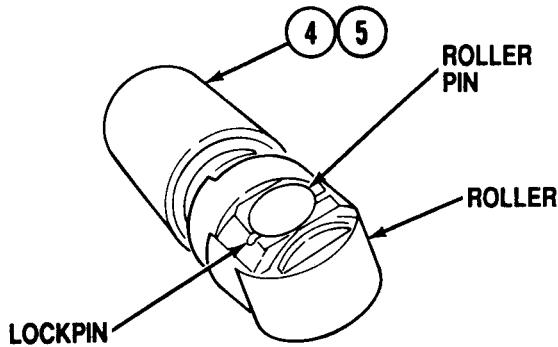
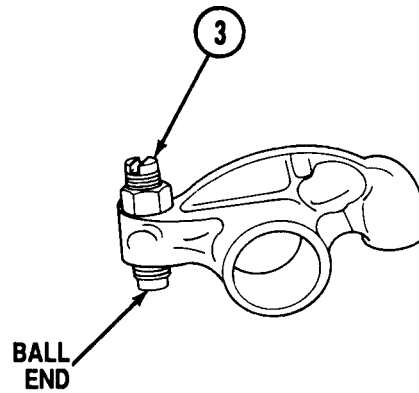


R Inspect valve stem contact surfaces for uneven wear or chipping. If non-adjustable valve stem contact surface is worn, replace crosshead (1). If contact surface shows uneven wear, replace screw (2).



S Take two measurements inside bore at different depths, and 90 degrees apart. Use telescope gage set. If either measurement is greater than 0.44 in. (11.18 mm), replace crosshead (1).

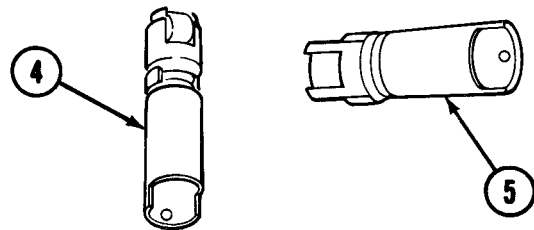
T Measure ball end of twelve rocker arm screws (3). Use fillet gage. If ball end measures less than 0.25 in. (6.35 mm), replace rocker arm.



U Check roller on valve and injector tappets (4) and (5) for chipping and scoring. If roller is bad, replace tappet (4) or (5).

V Check roller pin for tightness and centering. If roller pin is bad, replace tappet (4) or (5).

W Check for security of lockpin at roller pin end. If faulty, replace tappet (4) or (5).

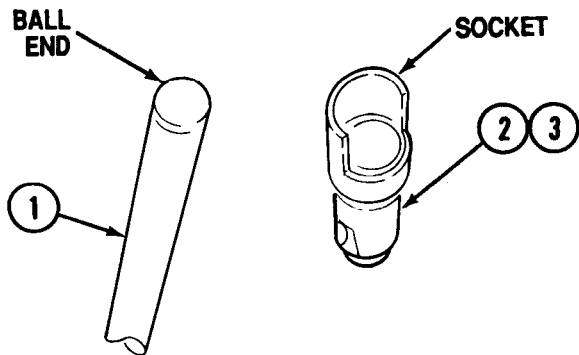


X Measure outside diameter of valve tappets (4). On each tappet, take two measurements, 90 degrees apart. Use outside micrometer. If either measurement is less than 1.0965 in. (27.851 mm), replace valve tappet.

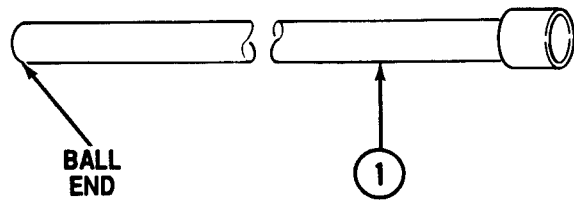
Note

Spring clip on injector tappet to be replaced may be used on new tappet.

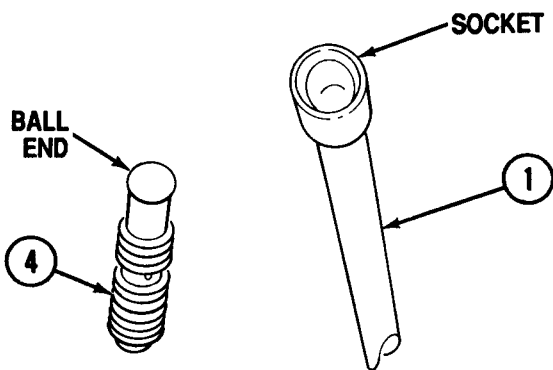
Y Measure outside diameter of injector tappet (5). Take two measurements, 90 degrees apart. Use outside micrometer. If either measurement is less than 1.3965 in. (35.471 mm), replace injector tappet (5).



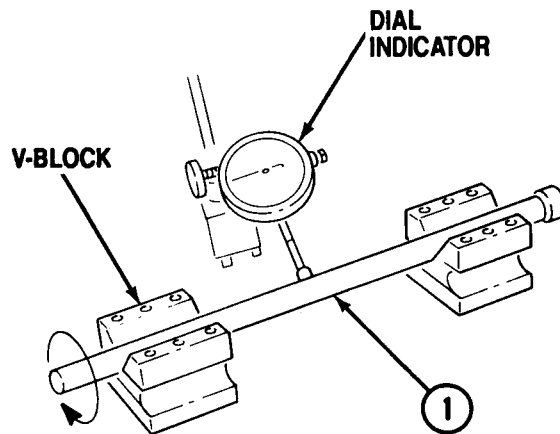
- Z** Apply prussian blue dye to ball end of pushrod (1) and socket on each tappet (2) and (3). Use same pushrod that was installed in socket.
- AA** Rotate ball end of pushrod (1) in socket of tappet (2) or (3). Check mating surfaces for contact.
- AB** If dye does not stay on 80 percent of contact area, replace pushrod (1) and valve tappet (2) or injector tappet (3) as unit.



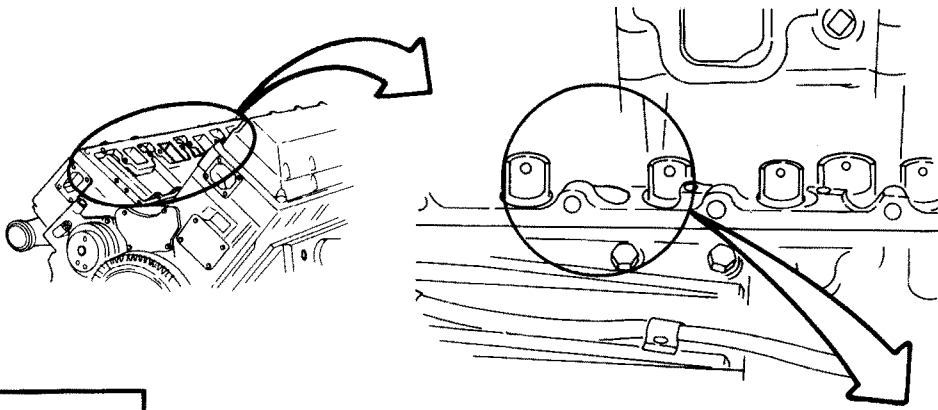
- AC** Inspect ball end of pushrods (1) for eccentricity or flatness. Use fillet gage.
- AD** Inspect ball end of pushrods (1) for nicks and cavities.
- AE** If you find bad wear patterns, nicks, or cavities, replace pushrod (1) and valve tappet (2) or injector tappet (3) as unit.



- AF** Apply prussian blue dye to socket end of pushrod (1) and ball end of screw (4).
- AG** Rotate screw (4) of pushrod (1). Check mating surfaces for contact.
- AH** If dye does not stay on 80 percent of contact area, replace pushrod (1) and rocker arm as unit.

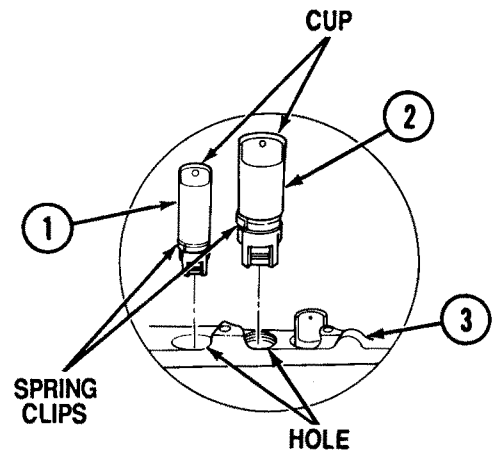


- AI** Place pushrod (1) in V-blocks.
- AJ** Inspect pushrod (1) for bend. Use dial indicator. If bend is more than 0.025 in. (0.635 mm), replace pushrod (1) and rocker arm as unit.

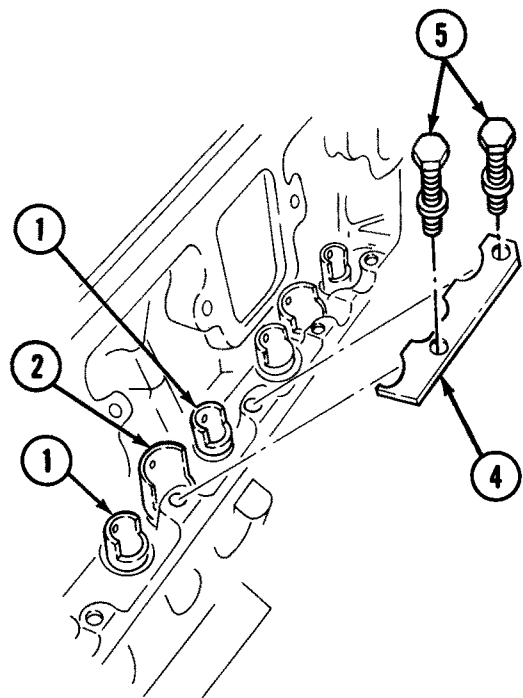


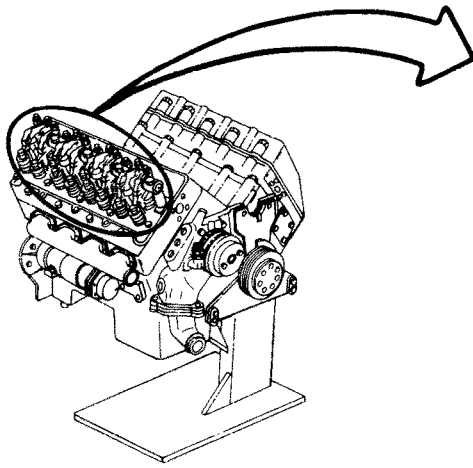
ASSEMBLY

- A** Apply clean 30-weight engine oil to eight valve tappets (1) and four injector tappets (2).
- B** Hold spring clips in groove and insert valve tappets (1) and injector tappets (2) in holes of engine block (3).
- C** Aline closed side of cup on valve tappets (1) and injector tappets (2) toward outside of engine block (3).
- D** Press valve tappets (1) and injector tappets (2) down until they touch camshaft.



- E** Place four guideplates (4) with cutout side facing valve tappets (1) and injector tappets (2).
- F** Install four guideplates (4) with eight screw and washer assemblies (5). Do not tighten screw and washer assemblies (5).
- G** Aline guideplates (4) with 0.010 in. (0.254 mm) clearance from valve tappet (1) at each end. Tighten eight screw and washer assemblies (5).

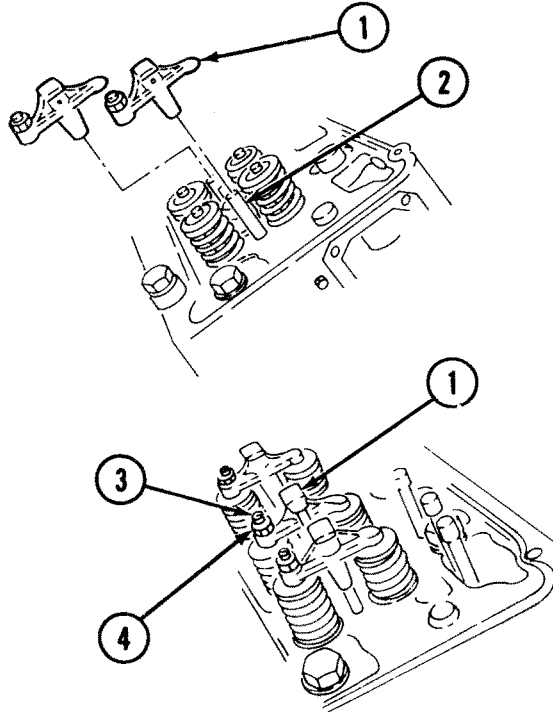




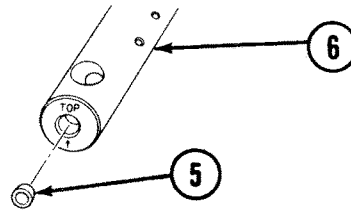
Note

Press crossheads against valve stems when adjusting clearance.

- H** Slide eight crossheads (1) onto eight guides (2).
- I** Turn screws (3) on eight crossheads (1) for zero clearance. Tighten locknuts (4).



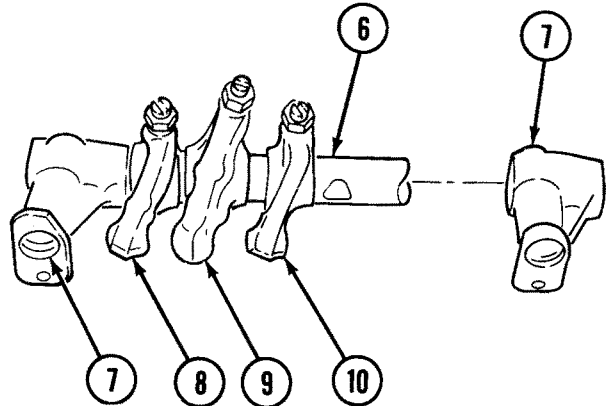
- J** Install two expansion plugs (5) in shaft (6).



CAUTION

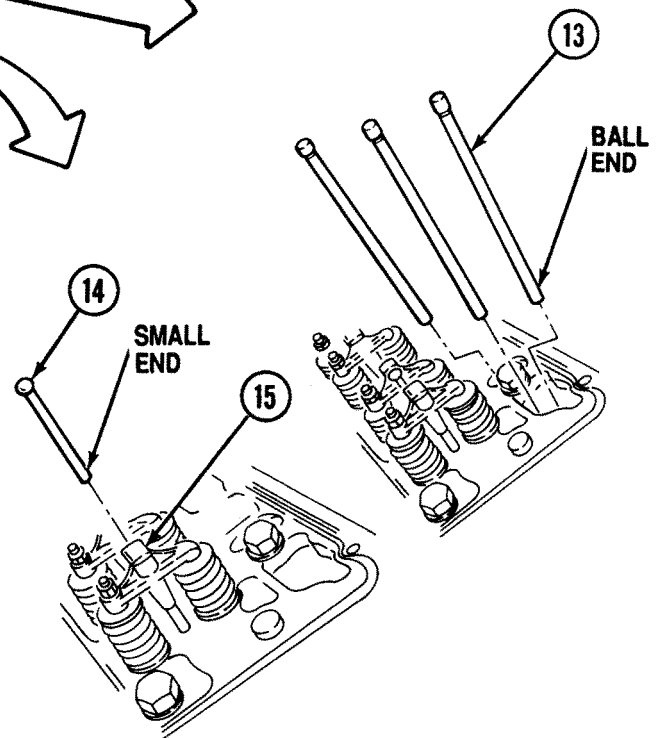
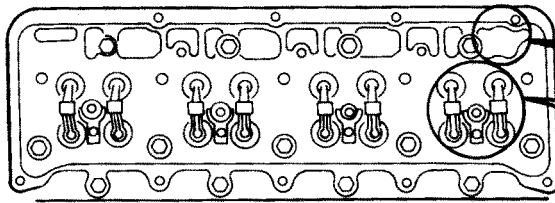
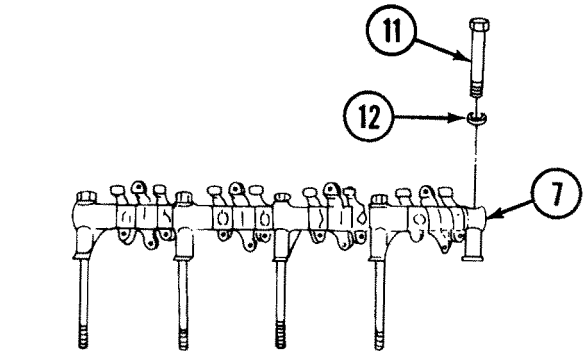
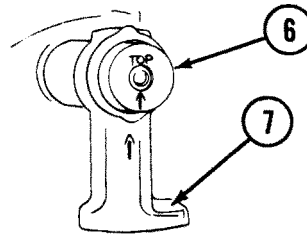
All parts must be installed in the same places they were in before removal. Failure to do so will result in excessive wear and engine damage. During removal, parts were slid off the rear of the shaft. During installation, parts are slid onto the front of the shaft and back to their original places.

- K** Apply clean 30-weight engine oil to entire shaft (6).
- L** Identify rear end of shaft (6). Install rear support (7) on rear end of shaft.

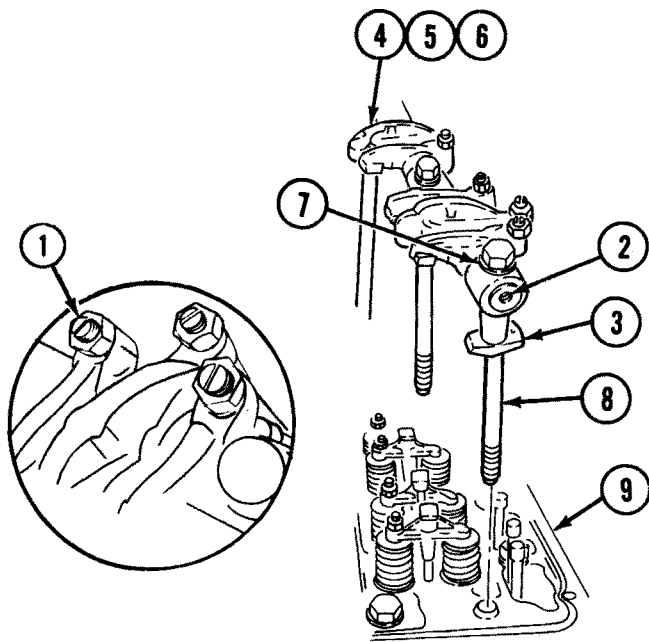


- M** Install following parts on front of shaft (6), and slide to rear: intake rocker arm (8), injector rocker arm (9), exhaust rocker arm (10), and support (7). Continue in this order to install all remaining parts on shaft.

- N** Rotate shaft (6) in supports (7) until arrow on front support (7) aligns with arrow on shaft.
- O** Insert five screws (11) with five washers (12) through five supports (7) and shaft (6).

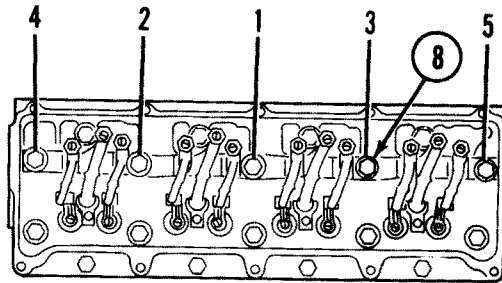


- P** Apply clean 30-weight engine oil to ball end of twelve pushrods (13).
- Q** Insert twelve pushrods (13), ball end first. Rotate pushrods (13) to check for correct seating.
- R** Apply clean 30-weight engine oil to small end of four links (14).
- S** Insert small end of four links (14) into four plungers (15). Rotate links to check for correct seating.



T Turn back twelve screws (1), and check shaft (2) for correct placement of supports (3) and rocker arms (4), (5), and (6).

U Having helper assist, aline and install five washers (7) and screws (8), by hand, into cylinder head (9).



V Tighten five screws (8) in this order: 1 through 5. Follow the steps below to tighten screws:

Step 1: 50-80 lb-ft (68-108 N·m).

Step 2: 115-135 lb-ft (156-183 N·m).

Step 3: 175-185 lb-ft (237-251 N·m).

Step 4: 220-240 lb-ft (298-325 N·m).

Step 5: 280-300 lb-ft (380-407 N·m).

W Adjust fuel injector clearances (p 3-17).

X Adjust intake and exhaust valve clearances (p 3-233).

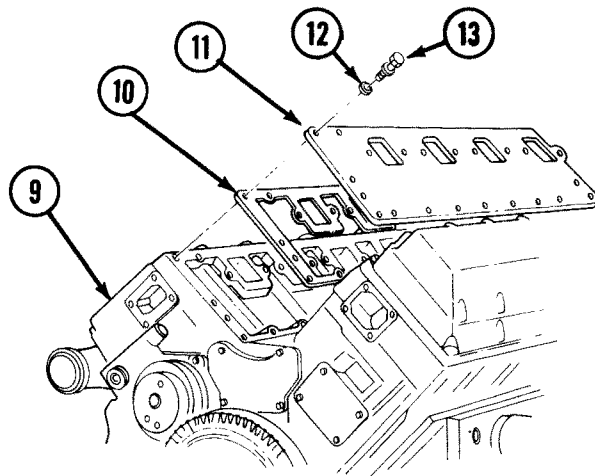
Note

Make sure surfaces are clean before installing gasket.

Y Install gasket (10) and pushrod cover (11) on cylinder head (9).

Z Install twelve lockwashers (12) and screw and washer assemblies (13) into cylinder head (9). Do not install screw and washer assemblies (13) in screw hole where fuel line clamps will be attached.

AA Tighten twelve screw and washer assemblies (13), from center outward, to 17-19 lb-ft (23-26 N·m).



FOLLOW-ON TASKS:

- Install fuel supply tube and check valve (p 3-13).
- Install fuel drain tube and check valve (p 3-16).
- Install rocker covers (p 3-185).
- Install intake manifold (p 3-58).

APPENDIX A REFERENCES

A-1. SCOPE

This appendix lists publications referenced in this manual which apply to maintaining the Cummins Diesel Engine, Model V903C.

A-2. ARMY REGULATIONS

Report of Transportation Discrepancies in Shipments	AR 55-38
DA Supplement to DOD 5200.1-R "Information Security Program Regulation"	AR 380-5
Dictionary of United States Army Terms.	AR 310-5
Authorized Abbreviations and Brevity Codes	AR 310-50
Accident Reporting and Records	AR 385-40
Fire Prevention and Protection	AR 420-90
Packing of Army Materiel Equipment for Shipping and Storage.	AR 746-1

A-3. DEPARTMENT OF THE ARMY PAMPHLETS

Consolidated Index of Army Publications and Forms	DA Pam 25-30
The Army Maintenance Management System (TAMMS)	DA Pam 738-750

A-4. FIELD MANUALS

Fundamentals of Machine Tools.	FM 9-24
First Aid for Soldiers	FM 21-11
Operation and Maintenance of Army Materiel in Extreme Cold Weather (0° to -65°F)	FM 9-207

A-5. MAINTENANCE FORMS AND RECORDS

Accident Identification Card	DA Form 518
Recommended Changes to DA Publications	DA Form 2028
Recommended Changes to Equipment Technical Manuals.	DA Form 2028-2
Equipment Inspection and Maintenance Worksheet	DA Form 2404
Maintenance Request	DD 2407
Quality Deficiency Report	SF 368

A-6. TECHNICAL BULLETINS

Solder and Soldering.	TB SIG-22
Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling System.	TB 750-651
Calibration and Repair Requirement for the Maintenance of Army Material	TB 43-180
Preventive Maintenance Checks and Services: Test Set, Armature TS-965/U.	TB 11-6625-636-12/1

A-7. TECHNICAL MANUALS

Inspection, Care, and Maintenance of Antifriction Bearings TM 9-214
 Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel TM 9-247
 Operator's Manual for M9 Armored Combat Earthmover TM 5-2350-262-10
 Hand receipt manual covering end item/components of end item (COEI), basic
 issue item (BII), and additional authorized list (AAL) for armored combat
 earthmover (ACE), M9 TM 5-2350-262-10-HR
 Unit Maintenance Manual for M9 Armored Combat Earthmover. TM 5-2350-262-20-1
 TM 5-2350-262-20-2
 TM 5-2350-262-20-3
 Organizational, Direct Support, and General Support Maintenance Repair Parts
 and Special Tools List. TM 5-2350-262-24P
 Direct support and general support maintenance manual for armored combat
 earthmover (ACE), M9 TM 5-2350-262-34
 DELETED
 Prestolite (Starter) DS/GS and Depot Maintenance Manual (Including Repair Parts) TM 9-2920-248-35
 Operator's Manual: Grinding Machine, Valve Face TM 9-4910-473-10
 Operator and Organizational Maintenance Manual (Including Repair Parts and
 Special Tools Lists): Test Stand, Automotive Generator, Alternator, and Starter. TM 9-4910-485-12
 Operator's and Organizational Maintenance Manual for Test Stand, Automotive
 Generator, Alternator, Starter, and Associated Equipment TM 9-4910-663-12
 Operator's, Organizational, Direct Support, General Support, and Depot
 Maintenance Manual: Multimeter TS-352B/U TM 11-6625-366-15
 Administrative Storage of Equipment TM 740-90-1

A-8. OTHER PUBLICATIONS

Expendable/Durable Items (Except Medical, Class V, Repair Parts, and
 Heraldic Items) CTA 50-970

APPENDIX B

REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

B-1. SCOPE.

This RPSTL lists and authorizes spares and repair parts, special tools, special Test, Measurement and Diagnostic Equipment (TMDE), and other special support equipment required for performance of Unit, Direct Support, and General Support maintenance of the Cumming V903C Engine (including depot maintenance spares and repair parts). It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the Source, Maintenance and Recoverability (SMR) codes.

B-2. GENERAL.

In addition to the Introduction Work Package, this RPSTL is divided into the following work packages:

- a. *Repair Parts List Work Package.*** Work packages containing lists of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. These work packages also include parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Sending units, brackets, filters, and bolts shall be listed with the component they mount on. Bulk materials are listed by item name in FIG. BULK at the end of the work packages. Repair parts kits are listed separately in their own functional group and work package. Repair parts for reparable special tools are also listed in a separate work package. Items listed are shown on the associated illustrations.
- b. *Special Tools List Work Package.*** Work packages containing lists of special tools, special TMDE, and special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in the DESCRIPTION AND USABLE ON CODE (UOC) column). Tools that are components of common tool sets and/or Class VII are not listed.
- c. *Cross Reference Indexes Work Package.*** There are two cross-reference indexes work packages in this RPSTL: The National Stock Number (NSN) Index work package and the Part Number (P/N) Index work package. The NSN Index work package refers you to the figure and item number. The P/N Index work package refers you to the figure and item number.

B-3. EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE.

- a. *Item No. [Column (1)].*** Indicates the number used to identify items called out in the illustration.

B-3. EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE (Continued).

b. SMR Code [Column (2)]. The SMR code is a 5-position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instruction, as shown in the following breakout:

<u>Source Code</u>	<u>Maintenance Code</u>	<u>Recoverability Code</u>
<u>xx</u>	<u>xx</u>	<u> x</u>
1st two positions: How to get an item.	3rd position: Who can install, replace, or use the item.	4th position: Who can do complete repair* on the item.
		5th position: Who determines disposition action on unserviceable items.

* complete repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "repair" function in a use/user environment in order to restore serviceability to a failed item.

c. Source Code. The source code tells you how you get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follow:

<u>Source Code</u>	<u>Application/Explanation</u>
PA PB PC PD PE PF PG	Stock items; use the applicable NSN to requisition/request items with these source codes. They are authorized to the level indicated by the code entered in the 3rd position of the SMR code.

NOTE

Items coded PC are subject to deterioration.

KD KF KB	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance level indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.
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MO-Made at unit level MF-Made at DS level MH-Made at GS level ML-Made at SRA MD-Made at depot	Items with these codes are not to be requisitioned/requested individually. They must be made from bulk material which is identified by the P/N in the DESCRIPTION AND UOC column and listed in the bulk material group work package of the RPSTL. If the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at higher level, order the item from the higher level of maintenance.
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B-3. EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE (Continued).
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AO-Assembled by unit/AVUM level AF-Assembled by DS/AVUM level AH-Assembled by GS level AL-Assembled by SRA AD-Assembled by depot	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.
XA	Do not requisition an "XA" coded item. Order the next higher assembly (refer to NOTE below).
XB	If an item is not available from salvage, order it using the CAGE Code and P/N.
XC	Installation drawings, diagrams, instruction sheets, field services drawings; identified by manufacturer's P/N.
XD	Item is not stocked. Order an XD-coded item through normal supply channels using the CAGE Code and P/N given, if no NSN is available.

NOTE

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes except for those items source coded "XA".

- d. Maintenance Code.** Maintenance codes tell you the level(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:
- (1) **THIRD POSITION.** The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to the following levels of maintenance:

B-3. EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE (Continued).
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Maintenance Code	<u>Application/Explanation</u>
-----------------------------	---------------------------------------

C	Crew or operator maintenance done within unit maintenance.
O	Unit level maintenance can remove, replace, and use the item.
F	Direct support maintenance can remove, replace, and use the item.
H	General support maintenance can remove, replace, and use the item.
D	Depot level can remove, replace, and use the item.

- (2) **FOURTH POSITION.** The maintenance code entered in the fourth position tells you whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (perform all authorized repair functions).

NOTE

Some limited repair may be done on the item at a lower level of maintenance if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.

Maintenance Code	<u>Application/Explanation</u>
-----------------------------	---------------------------------------

O	Unit is the lowest level that can do complete repair of the item.
F	Direct support is the lowest level that can do complete repair of the item.
H	General support is the lowest level that can do complete repair of the item.
D	Depot is the lowest level that can do complete repair of the item.
L	Reparable item. Repair restricted to designated Specialized Repair Activity.
Z	Nonreparable. No repair is authorized.
B	No repair is authorized. No parts or special tools are authorized for maintenance of "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

B-3. EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE (Continued).

- e. **Recoverability Code.** Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is shown in the fifth position of the SMR code as follows:

Recoverability

<u>Code</u>	<u>Application/Explanation</u>
Z	Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the third position of the SMR code.
O	Reparable item. When uneconomically repairable, condemn and dispose of the item at the unit level.
F	Reparable item. When uneconomically repairable, condemn and dispose of the item at the direct support level.
H	Reparable item. When uneconomically repairable, condemn and dispose of the item at the general support level.
D	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.
L	Reparable item. Condemnation and disposal not authorized below Specialized Repair Activity (SRA).
A	Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

- f. **NSN [Column (3)].** The NSN for the item is listed in this column.
- g. **CAGEC [Column (4)].** The Commercial and Government Entity Code (CAGEC) is a five-digit code which is used to identify the manufacturer, distributor, or Government agency/activity that supplies the item.
- h. **Part Number [Column (5)].** Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE

When you use an NSN to requisition an item, the item you receive may have a different P/N from the number listed.

- i. **Description and Usable on Code (UOC) [Column (6)].** This column includes the following information:
- (1) The federal item name, and when required, a minimum description to identify the item.
 - (2) P/Ns of bulk materials are referenced in this column in the line entry to be manufactured or fabricated.

B-3. EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGE (Continued).

- (3) Hardness Critical Item (HCI). A support item that provides the equipment with special protection from electromagnetic pulse (EMP) damage during a nuclear attack.
- (4) The statement END OF FIGURE appears just below the last item description in column (6) for a given figure in both the repair parts list and special tools list work packages.

j. QTY [Column (7)]. The QTY (quantity per figure) column indicates the quantity of the item used in the breakout shown on the illustration/figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column instead of a quantity indicates that the quantity is variable and quantity may change from application to application.

B-4. EXPLANATION OF CROSS-REFERENCE INDEXES WORK PACKAGE FORMAT AND COLUMNS.

a. National Stock Number (NSN) Index Work Package.

- (1) STOCK NUMBER COLUMN. This column lists the NSN in National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN.

NSN
 (e.g., 5385-01-574-1476)
 NIIN

When using this column to locate an item, ignore the first four digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

- (2) FIG. COLUMN. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in the repair parts list and special tools list work packages.
- (3) ITEM COLUMN. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

b. Part Number (P/N) Index Work Package. P/Ns in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9, and each following letter or digit in like order).

- (1) PART NUMBER COLUMN. Indicates the P/N assigned to the item.
- (2) FIG. COLUMN. This column lists the number of the figure where the item is identified/located in the repair parts list and special tools list work packages.
- (3) ITEM COLUMN. The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

B-5. SPECIAL INFORMATION.

- a. Detailed manufacturing instructions for items source coded to be manufactured or fabricated are found in TM 5-2350-262-20-2 and TM 5-2350-262-34 maintenance manuals. Bulk materials required to manufacture items are listed in the Bulk Materials List in this manual.
- b. Detailed assembly instructions for items source coded to be assembled are found in TM 5-2350-262-20-2 and TM 5-2350-262-34 maintenance manuals. Assembly components are listed immediately following the item to be assembled.
- c. Repair parts kits and gasket sets appear as the last entries in the repair parts listing for the figures in which their parts are listed as repair parts.

Note

“P” source coded items with missing National stock numbers are items which are not recorded in the Army Master Data File (AMDF) and cannot be requisitioned from the supply system. When these NSNs are broadcast in the AMDF, they will be provided by a change to the manual. If justified, these items may be requisitioned on an exception basis using the part number and CAGEC listed in this RPSTL.

- d. The publications pertaining to the Armored Combat Earthmover (ACE), M9 vehicle and its components are listed in Appendix A.

B-6. HOW TO LOCATE REPAIR PARTS.

a. *When NSNs or P/Ns Are Not Known:*

- (1) Using the table of contents, determine the assembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and lists are divided into the same groups.
- (2) Find the figure covering the functional group or the subfunctional group to which the item belongs.
- (3) Identify the item on the figure and note the number(s).
- (4) Look in the repair parts list work packages for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

b. *When NSN Is Known:*

- (1) If you have the NSN, look in the STOCK NUMBER column of the NSN index work package. The NSN is arranged in NIIN sequence. Note the figure and item number next to the NSN.
- (2) Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

c. *When P/N Is Known:*

- (1) If you have the P/N and not the NSN, look in the PART NUMBER column of the P/N index work package. Identify the figure and item number.
- (2) Look up the item on the figure in the applicable repair parts list work package. Verify that the item is the one you are looking for.

B-7. ABBREVIATIONS.

The abbreviations used in this appendix are common in trade practice and MIL-STD-12, Military Standard Abbreviations for use on Drawings, and in Specifications, Standards and Technical Documents.

Abbreviation	Explanation	Abbreviation	Explanation
AAL	Additional Authorization List	MS	Military Standard
AC	Alternating Current	MTG	Mounting
ACE	Armored Combat Earthmover	NIIN	National Item Identification Number
ADPTR	Adapter	NO	Number
AMDF	Army Master Data File	NOM	Nominal
AR	As Repaired	NPN	No Part Number
ASSY	Assembly	NSN	National Stock Number
BLK	Black	OD	Outside Diameter
BII	Basic Issue Items	ORG	Organizational
BOI	Basis of Issue	OVE	On-Vehicle Equipment
BRG	Bearing	OVS	Oversize
CAGEC	Contractor and Government Entity Code	P/N	Part Number
CKT BKR	Circuit Breaker	PG	Package
CL	Class	PSI	Pounds per Square Inch
COIE	Components of End Item	QTY	Quantity
CONN	Connector	R	Reverse
CTSK	Countersunk	RBR	Rubber
DEG	Degree	RD	Round
DIA	Diameter	RH	Right Hand
DS	Direct Support	RLF	Relief
EA	Each	RLR	Roller
ELEC	Electrical	RND	Round
EXT	External	RPSTL	Repair Parts and Special Tools List
F	Forward	SAE	Society of Automotive Engineers
FIG	Figure	SCH	Socket head
FIL	Fillister	SKT	Socket
FILH	Fillister Head	SLTD	Slotted
FL	Flat	SLVG	Sleeving
FLH	Flat Head	SMR	Source, Maintenance, and Recoverability
FT	Foot	SP	Speed
GA	Gage	SPEC	Specification
GND	Ground	SQ	Square
GR	Grade	STD	Standard
GS	General Support	STE/ICE	Simplified Test Equipment for Internal Combustion Engines
H	High	STL	Steel
HD	Head	STR	Straight
HD	Hundred	SYN	Synthetic
HDLS	Headless	THD	Thread
HEX	Hexagon	THK	Thick
HEX HD	Hexagon Head	TM	Technical Manual
ID	Inside Diameter	TMDE	Test, Measurement, and Diagnostic Equipment
ILLUS	Illustration	TRH	Truss Head
IN	Inch	TRK	Track
INC	Incorporated	U/M	Unit of Measure
INTL	Internal	UN	Unified
L	Low	V	Variable
LB	Pound	V	Volt
LG	Length	VDC	Direct-Current Volts
LH	Left Hand	WG	Wire Gage
LKWR	Lock Wire	WP	Water Pump
LUB	Lubricate	WSHR	Washer
LVL	Level	XMSN	Transmission
MACH	Machine	YD	Yard
MFD	Manufactured		
MIL	Military		

1- 2 and 3

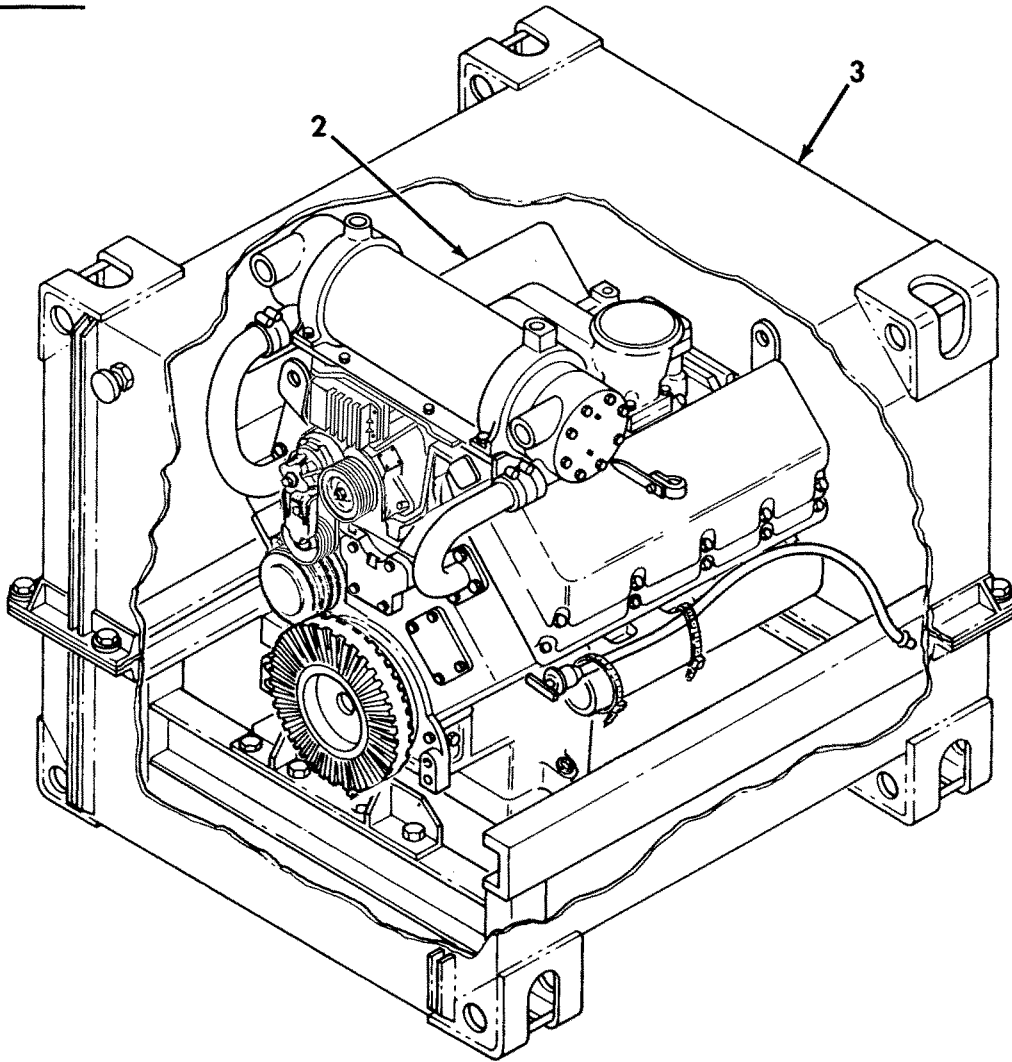


Figure 1. Engine and Shipping Container.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
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GROUP AUA2: POWERTRAIN INSTALLATION
 FIG. 1 ENGINE AND SHIPPING
 CONTAINER

* 1	PAFDD	2815013996801	19207	57K1880	ENGINE ASSEMBLY,W/C.....	1
* 2	XAFHD		19207	12412167	.ENGINE,DIESEL DRESSED.....	1
3	PFFDD	8145013991902	19207	12412049	.SHIPPING AND STORAG SEE FIG.2 FOR PARTS BREAKDOWN.....	1

END OF FIGURE

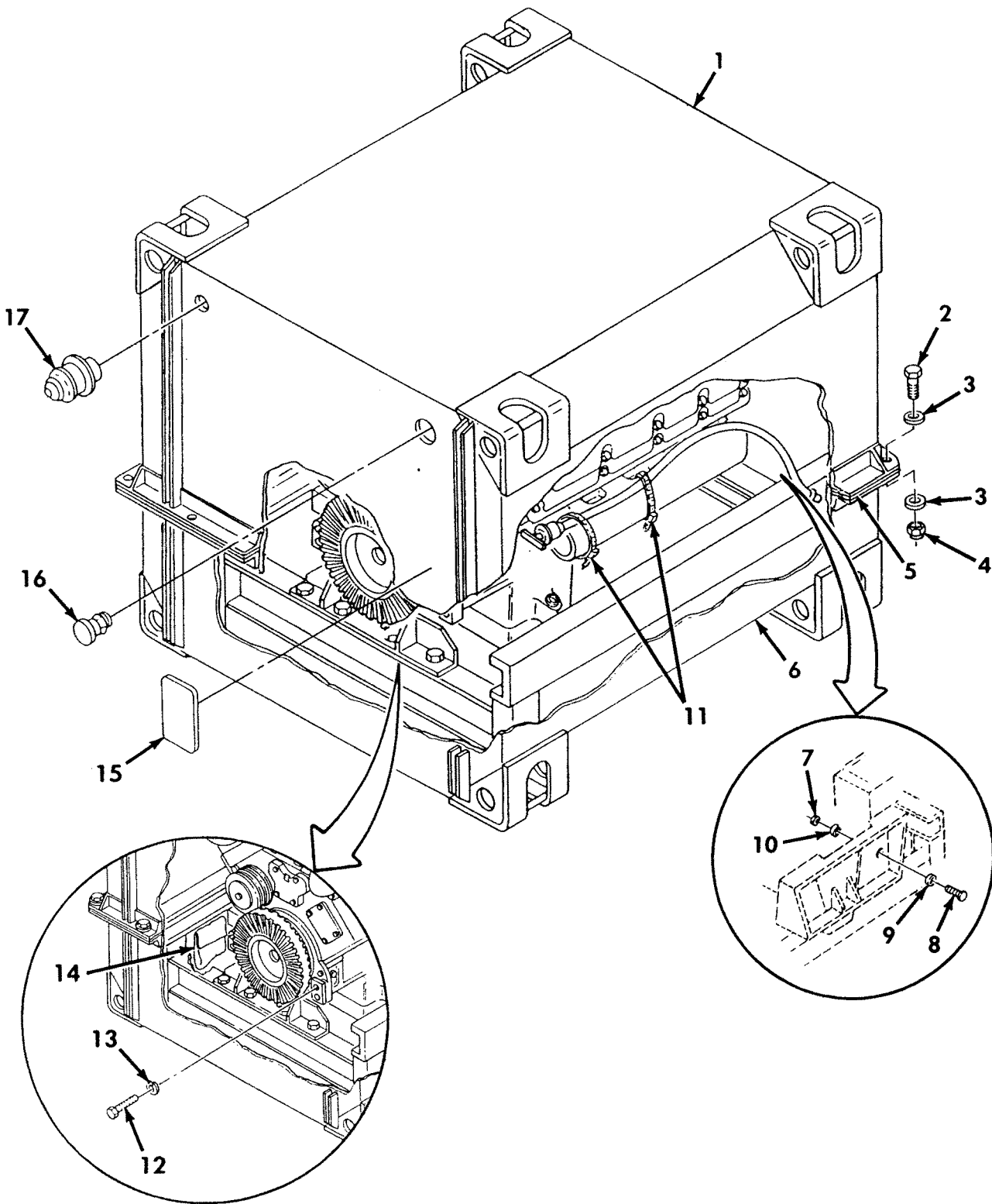


Figure 2. Engine Shipping Container Assembly.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 2 ENGINE SHIPPING CONTAINER						
ASSEMBLY						
* 1	PAODD	2815013853635	19207	12386698	CONTAINER,ENGINE,UP UPPER HALF.....	1
* 2	PAOZZ	5305000712070	80204	B1821BH050C175N	SCREW,CAP,HEXAGON H.....	30
* 3	PAOZZ	5310008095998	96906	MS27183-18	WASHER,FLAT.....	60
* 4	PAOZZ	5310007680318	96906	MS51967-14	NUT,PLAIN,HEXAGON.....	30
* 5	PAOZZ	5330013812011	19207	12386702	GASKET.....	1
* 6	PAODD	2815013853683	19207	12386697	CONTAINER,ENGINE,LO LOWER HALF.....	1
7	PAFZZ	5310008808189	96906	MS51967-11	NUT,PLAIN,HEXAGON.....	10
8	PAFZZ	5305000429477	96906	MS90725-91	SCREW,CAP,HEXAGON H.....	10
9	PAFZZ	5310008094085	96906	MS27183-16	WASHER,FLAT.....	10
10	PAFZZ	5310002090965	96906	MS35338-47	WASHER,LOCK.....	10
* 11	PAOZZ	5975012055379	96906	MS3367-7	STRAP,TIEDOWN,ELECT.....	2
12	PAFZZ	5306012784014	80205	NAS632-6	BOLT,SHEAR.....	4
13	PAFZZ	5310005503714	96906	MS35333-47	WASHER,LOCK.....	4
* 14	PAOZZ	8105004773716	19207	10890481	BAG,MAIL.....	1
* 15	PAOZZ		19207	12412073	DECAL,ADHESIVE ASSEMBLY	1
					INSTRUCTION.....	
16	PAFZZ	6685006181822	19207	10906697	INDICATOR,HUMIDITY,.....	1
* 17	PFDZZ	4820010052994	01347	330-10-10R	VALVE,PRESSURE EQUA.....	1

END OF FIGURE

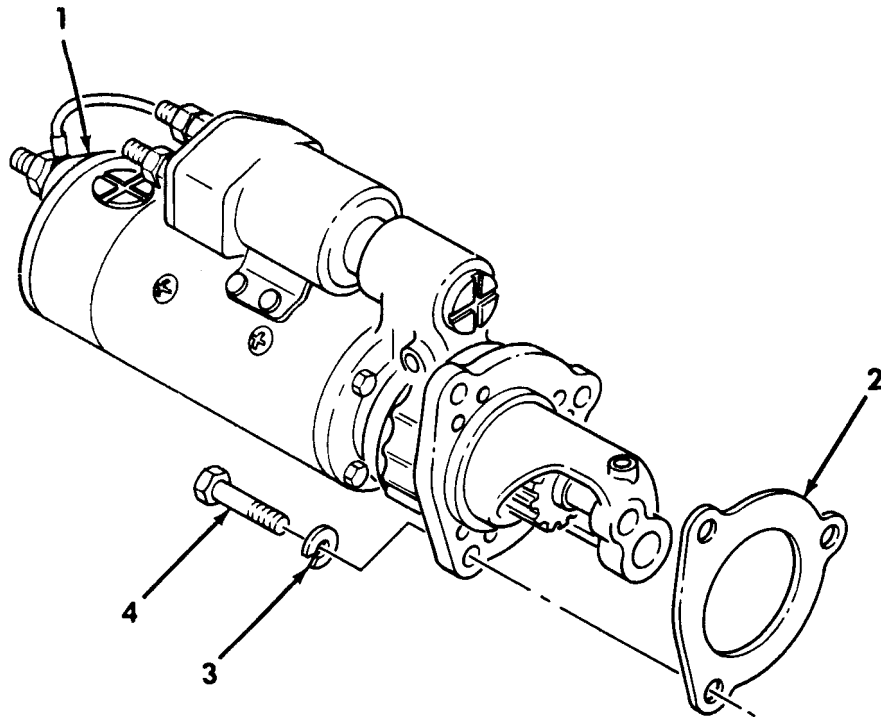


Figure 3. Starter and Mounting Parts.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION FIG. 3 STARTER AND MOUNTING PARTS						
1	PAOFF	2920011513762	35510	94134	STARTER,ENGINE,ELEC HEAVY DUTY, 24 VOLT SEE TM 9-2920-248-35 (PRESTOLITE).....	1
2	PAOZZ	5330008609153	19207	10889926	GASKET PART OF KIT P/N 3801539.....	1
3	PAOZZ	5310009370453	96906	MS35338-145	WASHER,LOCK.....	3
4	PAOZZ	5305012713248	81349	M24240/3-21014	SCREW,MACHINE.....	3

END OF FIGURE

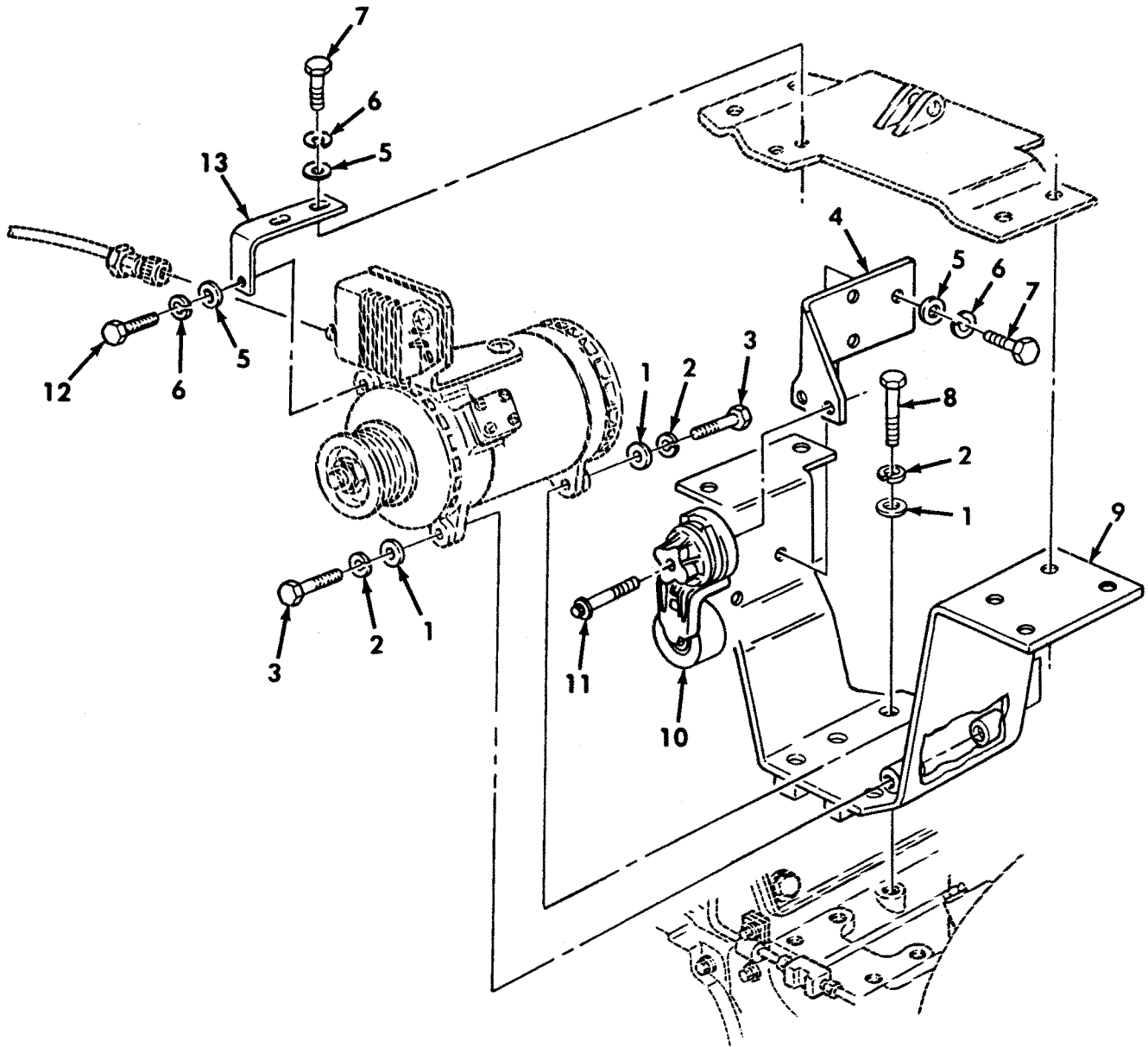


Figure 4. Alternator, Brackets, and Related Parts.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 4 200 AMP ALTERNATOR, BRACKETS						
AND RELATED PARTS						
1	PAOZZ	5310008094085	96906	MS27183-16	WASHER, FLAT.....	8
2	PAOZZ	5310002090965	96906	MS35338-47	WASHER, LOCK.....	8
3	PAOZZ	5305000712056	80204	B1821BH044C175N	SCREW, CAP, HEXAGON H.....	2
4	PFOZZ	5340014434102	15434	3086458	BRACKET, ANGLE.....	1
5	PAOZZ	5310000806004	96906	MS27183-14	WASHER, FLAT.....	6
6	PAOZZ	5310006379541	96906	MS35338-46	WASHER, LOCK.....	6
7	PAOZZ	5305000680510	80204	B1821BH038C100N	SCREW, CAP, HEXAGON H.....	5
* 8	PAOZZ	5305007098531	72741	175-325	SCREW, CAP, HEXAGON H.....	6
9	PAOZZ	5340013760872	19207	12379514	BRACKET, MOUNTING.....	1
* 10	PAOZZ	3020013412477	15434	3934818	PULLEY, FLAT.....	1
11	PAOZZ	5306014435546	15434	3081348	BOLT, MACHINE.....	1
12	PAOZZ	5305000680511	80204	B1821BH038C125N	SCREW, CAP, HEXAGON H.....	1
13	PFOZZ	5340013611208	19207	12379509	BRACKET, ANGLE.....	1

END OF FIGURE

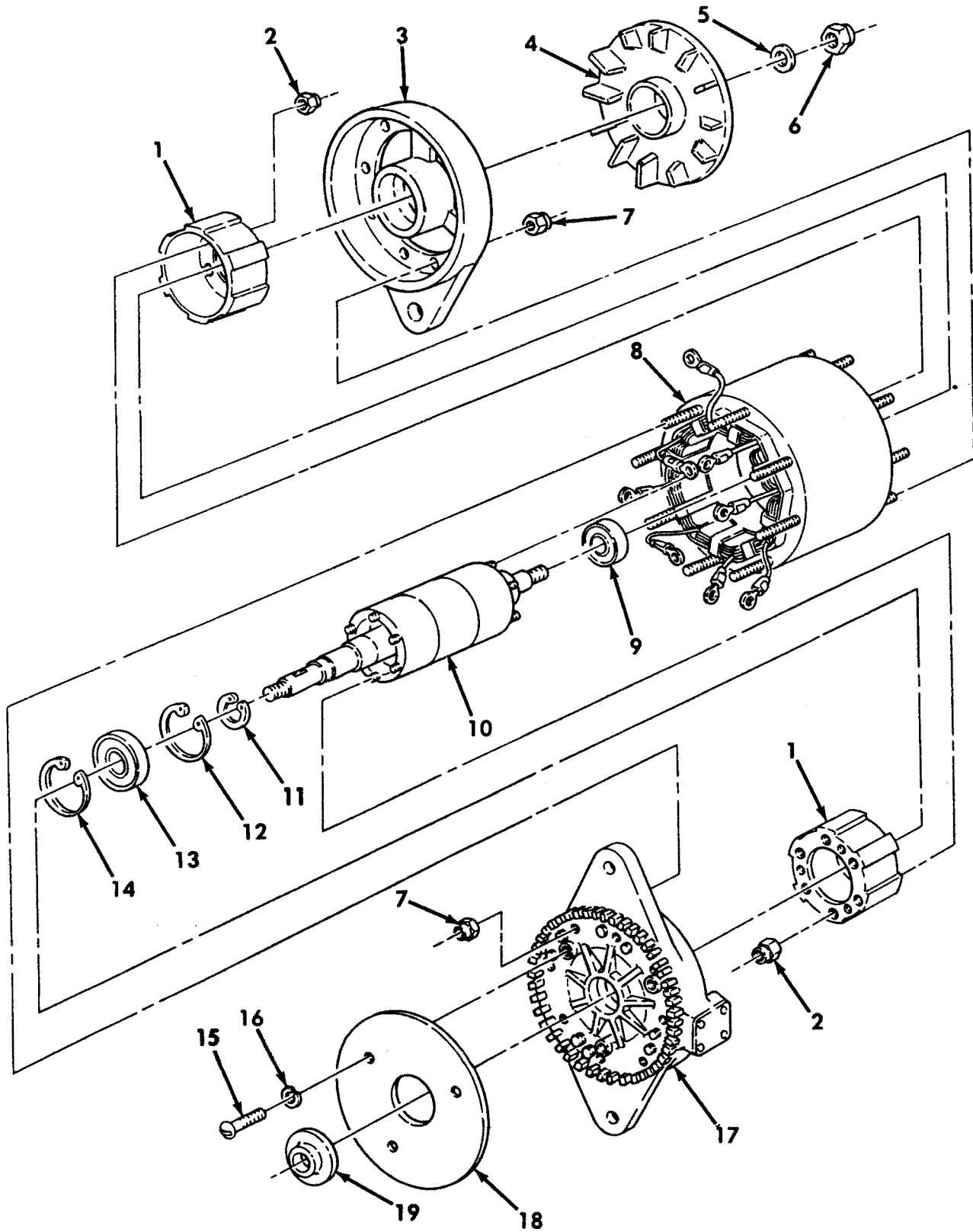


Figure 5. Alternator Assembly.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 5 ALTERNATOR ASSEMBLY						
1	PFFZZ	2920013635173	76761	N7312	ROTOR ASSEMBLY.....	2
2	PAFZZ	5310012250701	76761	N9098	NUT.....	9
3	XBFZZ		76761	N9452	HOUSING, END.....	1
4	PFFZZ	6115013495320	76761	N7309	IMPELLER, FAN, CENTRI.....	1
5	PAFZZ	5310010506565	76761	N9063	WASHER, FLAT.....	1
6	PAFZZ	5310000443340	19207	8712289	NUT, SELF-LOCKING, HE.....	1
7	PAFZZ	5310011651312	76761	N9099	NUT, SELF-LOCKING, EX.....	18
8	XAFZZ		76761	N7346	SHELL AND STATOR.....	1
9	PAFZZ	3110013484867	76761	N9385	BEARING, BALL, ANNULA.....	1
10	XBFZZ		76761	N7347	CORE/SHAFT ASSEMBLY.....	1
11	PAFZZ	5325011367662	76761	N9260	RING, RETAINING.....	1
12	PAFZZ	5325010324222	76761	N9008	RING, RETAINING.....	1
13	PAFZZ	3110010374661	76761	N9010	BEARING, BALL, ANNULA.....	1
14	PAFZZ	5325010342757	76761	N9009	RING, RETAINING.....	1
15	PAFZZ	5305010324165	76761	N9005	SCREW, MACHINE.....	3
16	PAFZZ	5310011364888	76761	N9265	WASHER, LOCK.....	3
17	XBFZZ		76761	N7348	HOUSING, FRONT.....	1
18	PFFZZ	5999013480302	76761	N9318	PLATE, ELECTRICAL SH.....	1
19	PAFZZ	3120013483364	76761	N9417	BUSHING, SLEEVE.....	1

END OF FIGURE

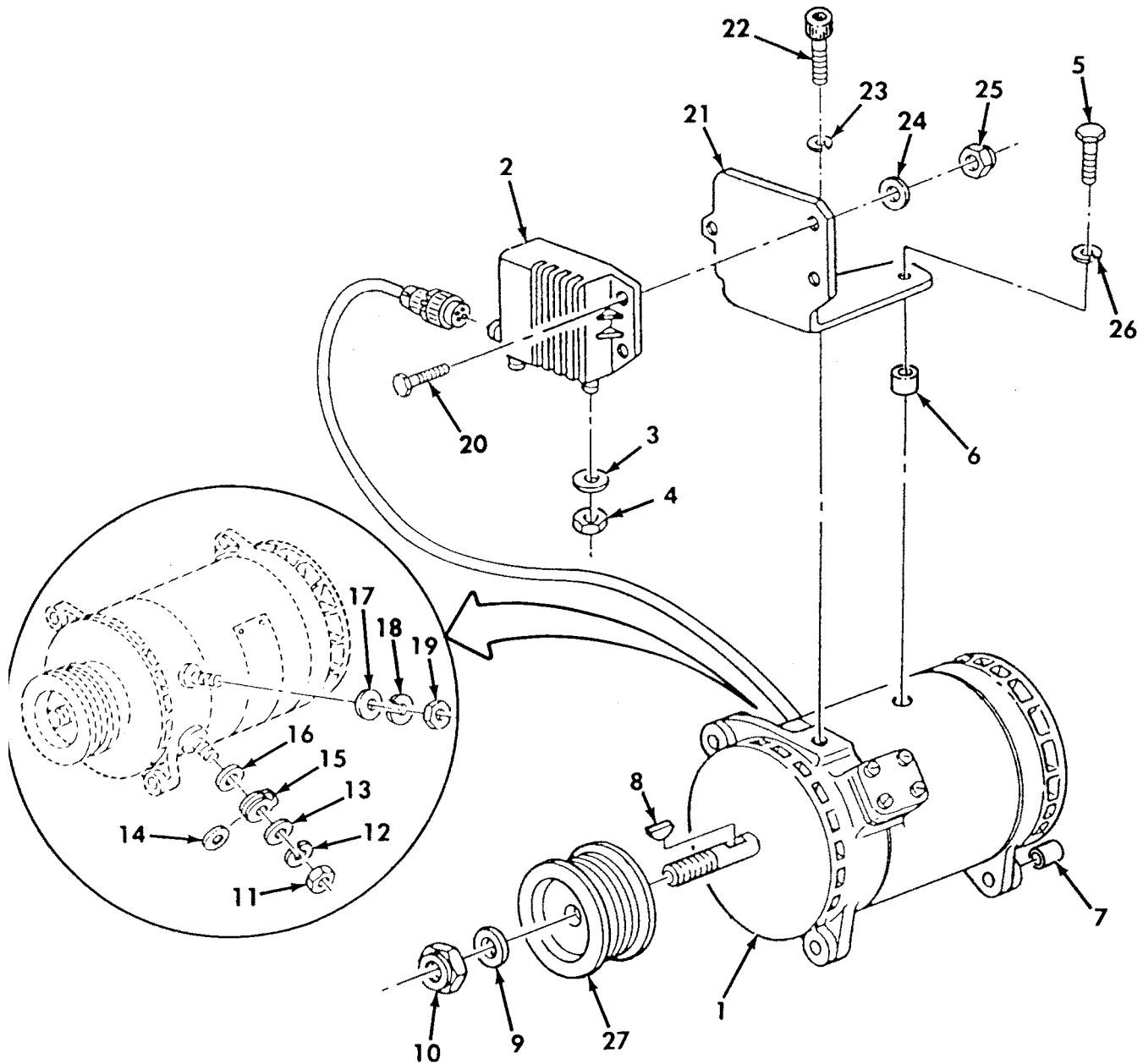
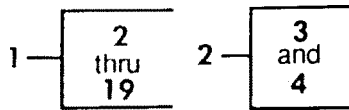


Figure 6. Alternator and Related Parts.

REPAIR PARTS LIST WORK PACKAGE

C03 TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 6 ALTERNATOR AND RELATED PARTS						
* 1	PAOFF	2920014209968	19207	12447109	GENERATOR,ENGINE AC DUAL VOLTAGE...	1
* 2	PAOZZ	2920014159497	76761	N3117	.REGULATOR,ENGINE GE DUAL VOLTAGE.....	1
* 3	PAOZZ	5310010428391	13499	500-1114-003	.WASHER,FLAT PART OF P/N N3117.....	1
* 4	PAOZZ	5310013488398	76761	N9410	.NUT,PLAIN,OCTAGON PART OF P/N N3117.....	1
5	PAOZZ	5306013488310	76761	N9457	.BOLT,MACHINE.....	1
6	PAOZZ	5365013486971	76761	N9460	.SPACER,SLEEVE.....	1
7	PAOZZ	3120014136106	19207	12342711	.BUSHING,SLEEVE.....	1
8	PAOZZ	5315000124553	96906	MS35756-17	.KEY,WOODRUFF.....	1
9	PAOZZ	5310007720442	19207	7720442	.WASHER,FLAT.....	1
10	PAOZZ	5310004190876	96906	MS21245-L12	.NUT,SELF-LOCKING,HE.....	1
11	PAOZZ	5310013488314	76761	N9453	.NUT,PLAIN,HEXAGON.....	1
12	PAOZZ	5310013488392	76761	N9461	.WASHER,LOCK.....	1
13	PAOZZ	5310012321361	76761	N9331	.WASHER,FLAT.....	1
14	PAOZZ	5970013505646	76761	N9420	.INSULATOR,WASHER.....	1
15	PAOZZ	5920013480303	76761	N9414	.FUSE LINK,ELECTRICA.....	1
16	PAOZZ	5310013488386	76761	N9408	.WASHER,FLAT.....	1
17	PAOZZ	5310013488385	76761	N9455	.WASHER,FLAT.....	1
18	PAOZZ	5310010460186	76761	N9015	.WASHER,LOCK.....	1
19	PAOZZ	5310013488313	76761	N9426	.NUT,PLAIN,HEXAGON.....	1
20	PAOZZ	5305009931848	96906	MS35207-265	SCREW,MACHINE.....	3
21	PAOZZ	5340013611204	19207	12379510	BRACKET,ANGLE.....	1
22	PAOZZ	5305014435538	15434	3096231	SCREW,MACHINE.....	2
23	PAOZZ	5310005967691	96906	MS35335-32	WASHER,LOCK.....	2
24	PAOZZ	5310008098546	96906	MS27183-8	WASHER,FLAT.....	3
25	PAOZZ	5310008775797	96906	MS21044-N3	NUT,SELF-LOCKING,HE.....	3
26	PAOZZ	5310008216269	96906	MS35334-19	WASHER,LOCK.....	1
27	PAOZZ	3020013623577	19207	12379511	PULLEY,GROOVE.....	1

END OF FIGURE

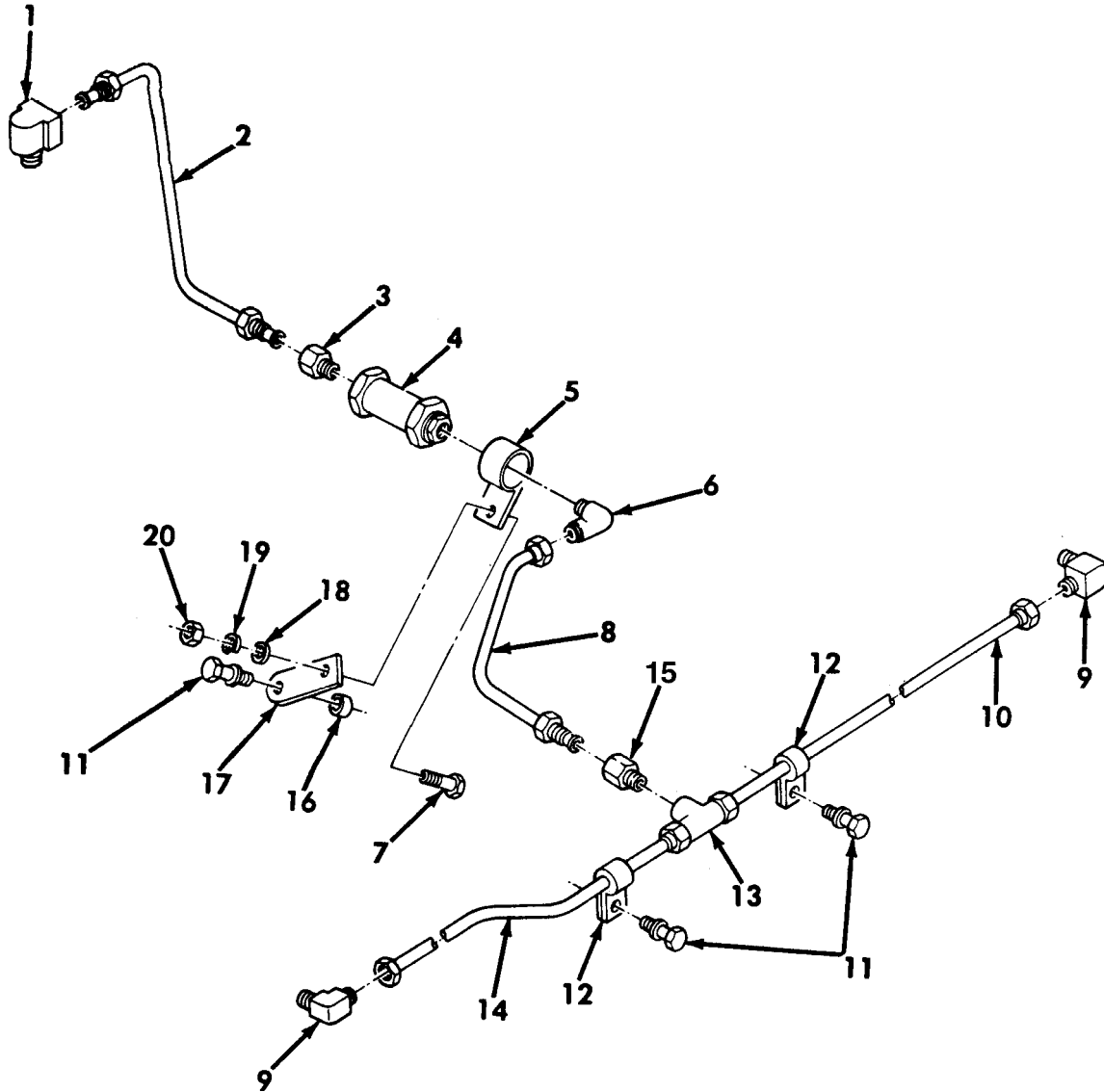


Figure 7. Fuel Supply Lines and Fittings.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM	SMR			PART		
NO	CODE	NSN	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES(UOC)	QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 7 FUEL SUPPLY LINES AND						
FITTINGS						
1	PAFZZ	4730010542667	15434	185347	ELBOW,PIPE TO TUBE.....	1
2	PAFZZ	4710011875271	15434	3020868	TUBE ASSEMBLY,METAL.....	1
3	PAFZZ	4730011463040	15434	3018889	ADAPTER,STRAIGHT,PI.....	1
4	PAFZZ	4820011101170	15434	185505	VALVE,CHECK.....	1
5	PAFZZ	5340000877486	15434	107460	CLAMP,LOOP.....	1
6	PAFZZ	4730006473207	96906	MS51504A4	ELBOW,PIPE TO TUBE.....	1
7	PAFZZ	5305010291193	15434	S117	SCREW.....	1
8	PAFZZ	4710011961554	15434	3043404	TUBE ASSEMBLY,METAL.....	1
9	PAFZZ	4730011516316	15434	S1004-1	ELBOW,TUBE.....	2
* 10	PAFZZ	4710011961555	15434	304340200	TUBE ASSEMBLY,METAL.....	1
11	PAFZZ	5305010729021	15434	3011716	SCREW,ASSEMBLED WAS.....	3
12	PAFZZ	5340007194601	15434	70467	CLAMP,LOOP.....	2
13	PAFZZ	4730005425906	96906	MS51510A4	TEE,TUBE.....	1
14	PAFZZ	4710011967704	15434	3043400	TUBE ASSEMBLY,METAL.....	1
* 15	PAFZZ	4730011888255	15434	S0096400	REDUCER,PIPE.....	1
16	PAFZZ	5365002031281	15434	114850	SPACER,SPECIAL.....	1
17	PAFZZ	5342008583507	15434	147135	BRACKET,TUBE SUPPOR.....	1
18	PAFZZ	5310000806004	96906	MS27183-14	WASHER,FLAT.....	1
19	PAFZZ	5310002617340	15434	S604	WASHER,LOCK.....	1
20	PAFZZ	5310005218595	15434	S223	NUT HEXAGON.....	1
21	PAFZZ	4730011269606	15434	S929B	REDUCER BODY,TUBE.....	1

END OF FIGURE

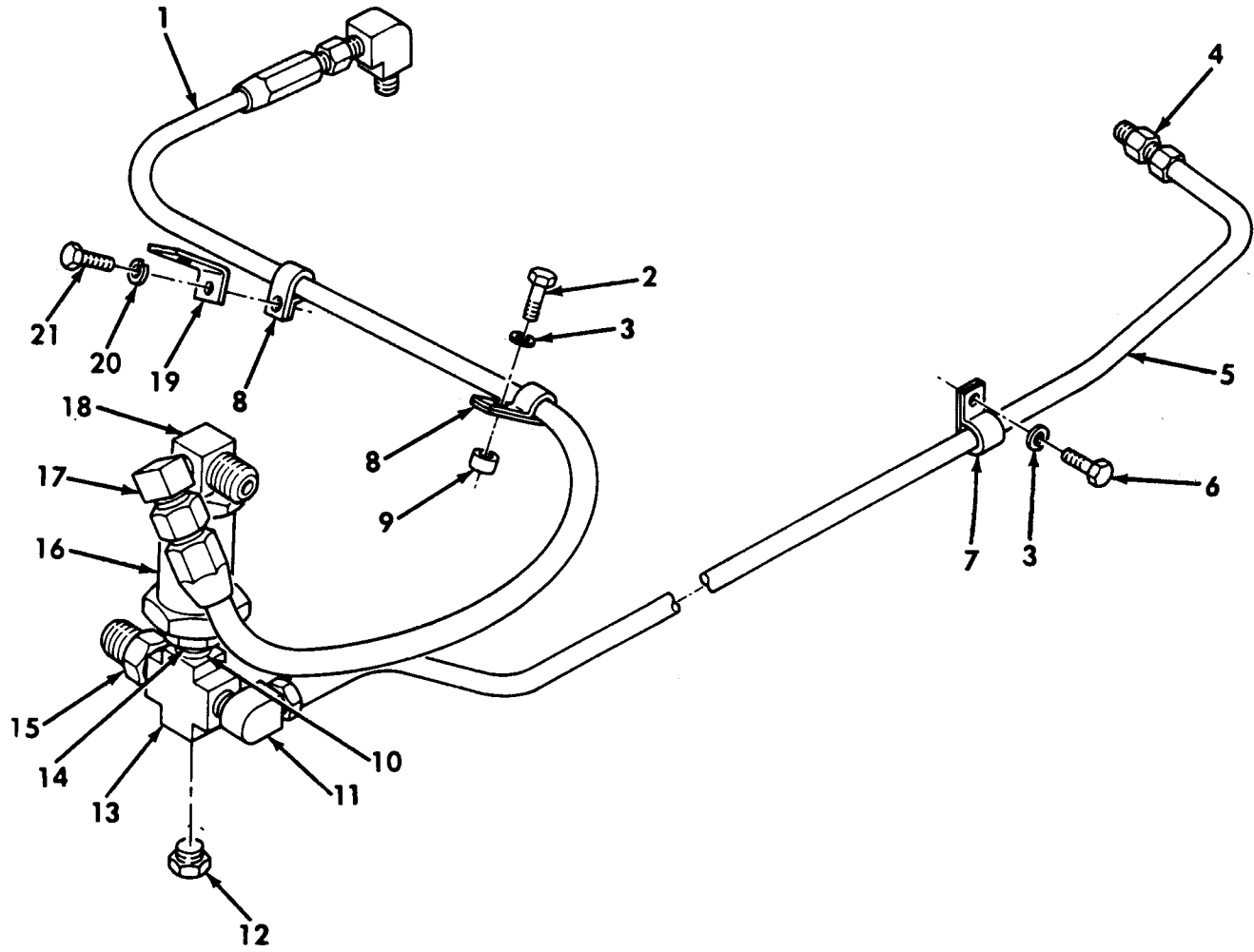


Figure 8. Fuel Drain Lines and Fittings.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 8 FUEL DRAIN LINES AND						
FITTINGS						
1	PAFZZ	4720011860555	15434	AK0402900SS	HOSE ASSEMBLY,METAL.....	1
* 2	PAFZZ	5306002258499	96906	MS90725-34	BOLT,MACHINE.....	1
3	PAFZZ	5310000806004	96906	MS27183-14	WASHER,FLAT.....	2
4	PAFZZ	4710010895904	15434	148376	TUBE,METALLIC.....	1
5	PAFZZ	4710011883294	15434	185814	TUBE ASSEMBLY,METAL.....	1
6	PAFZZ	5305010867036	15434	3010597	SCREW.....	1
7	PAFZZ	5340007194601	15434	180372	CLAMP,LOOP.....	1
8	PAFZZ	5340004003449	15434	108722	CLAMP,LOOP.....	2
9	PAFZZ	5365011858591	15434	63090	SPACER,SLEEVE.....	1
* 10	PAFZZ	4730011888255	15434	S0096400	REDUCER,PIPE.....	1
11	PAFZZ	4730011428524	15434	68139	ELBOW,PIPE TO TUBE.....	1
12	PAFZZ	4730009541281	15434	3008466	PLUG,PIPE.....	1
13	PAFZZ	4730012175719	01276	2080-4B	CROSS,PIPE.....	1
* 14	PAFZZ	4730011892093	15434	S00094600	NIPPLE,PIPE.....	1
15	PAFZZ	4730010323699	15434	3013147	NIPPLE,PIPE.....	1
16	PAFZZ	4820004710049	15434	178079	VALVE,CHECK.....	1
17	PAFZZ	4730010542667	15434	185347	ELBOW,PIPE TO TUBE.....	1
18	PAFZZ	4730007624161	15434	203071	ELBOW,PIPE TO TUBE.....	1
19	PFFZZ	5342011288707	15434	68190	BRACKET.....	1
20	PAFZZ	5310002617340	15434	S604	WASHER,LOCK.....	1
21	PAFZZ	5305010291193	15434	S117	SCREW.....	1

END OF FIGURE

1
2
thru
13

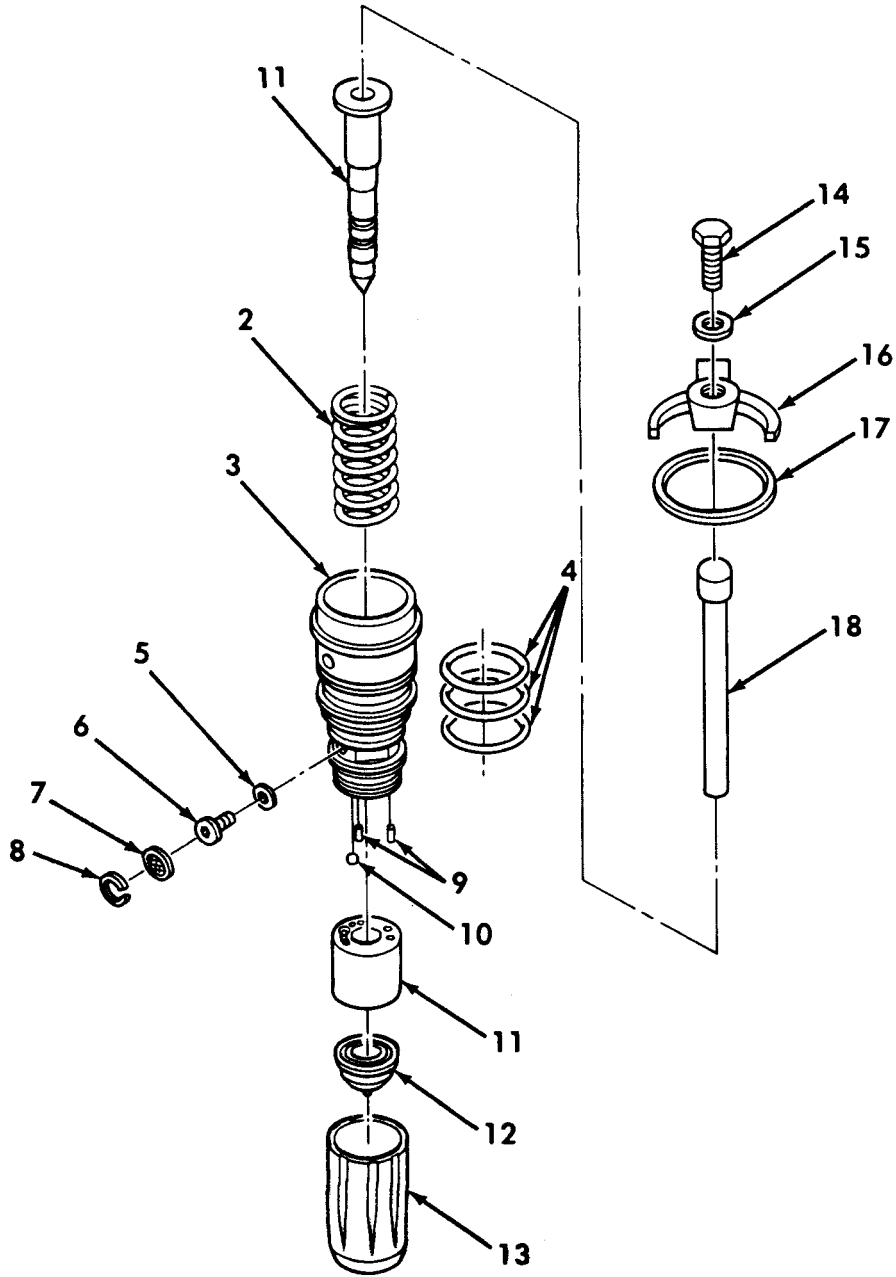


Figure 9. Fuel Injectors.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 9 FUEL INJECTORS						
* 1	PAFDD	2910013461255	15434	3054197	NOZZLE,FUEL INJECTI.....	8
* 2	PADZZ	5360001320245	15434	166009	.SPRING,HELICAL,COMP.....	1
* 3	XADZZ	2910011056457	15434	185139	.ADAPTER,INJECTOR.....	1
* 4	PADZZ	5330001320276	15434	193736	.GASKET.....	3
* 5	PADZZ	5330001320247	15434	173086	.GASKET.....	1
* 6	PFDZZ	4730011872566	15434	163067	.RESTRICTOR,FLUID FL .018.....	V
* 6	PFDZZ	4730011872567	15434	163068	.RESTRICTOR,FLUID FL .019.....	V
* 6	PFDZZ	4730004047777	15434	163069	.RESTRICTOR,FLUID FL .020 STD.....	V
* 6	PFDZZ	4730011411588	15434	177289	.RESTRICTOR,FLUID FL .021.....	V
* 6	PFDZZ	4730011894781	15434	163071	.RESTRICTOR,FLUID FL .022.....	V
* 7	PADZZ	4730010772016	15434	3008706	.STRAINER ELEMENT,SE.....	1
* 8	PADZZ	5365008151137	15434	174299	.RING,RETAINING.....	1
* 9	PFDZZ	5315010796506	15434	203426	.PIN,SPRING.....	2
* 10	PADZZ	4820010709710	15434	167157	.BALL,CHECK.....	1
* 11	XBDZZ		15434	3042417	.BODY AND PLUNGER AS.....	1
* 12	PADZZ	2910011881271	15434	3003929	.CUP,FUEL INJECTOR.....	1
* 13	PFDZZ	5342010794678	15434	185138	.RETAINER,CUP.....	1
14	PAFZZ	5305007829489	80204	B1821BH038C200N	SCREW,CAP,HEXAGON H.....	8
15	PAFZZ	5310011124305	15434	203518	WASHER,FLAT.....	8
16	PFFZZ	5340011124294	15434	180098	HANGER,PIPE.....	8
17	PAFZZ	5310010662942	15434	180626	WASHER,LOCK.....	8
* 18	PAFZZ	2910011103576	15434	19191700	LINK,INJECTOR,PLUNG.....	8

END OF FIGURE

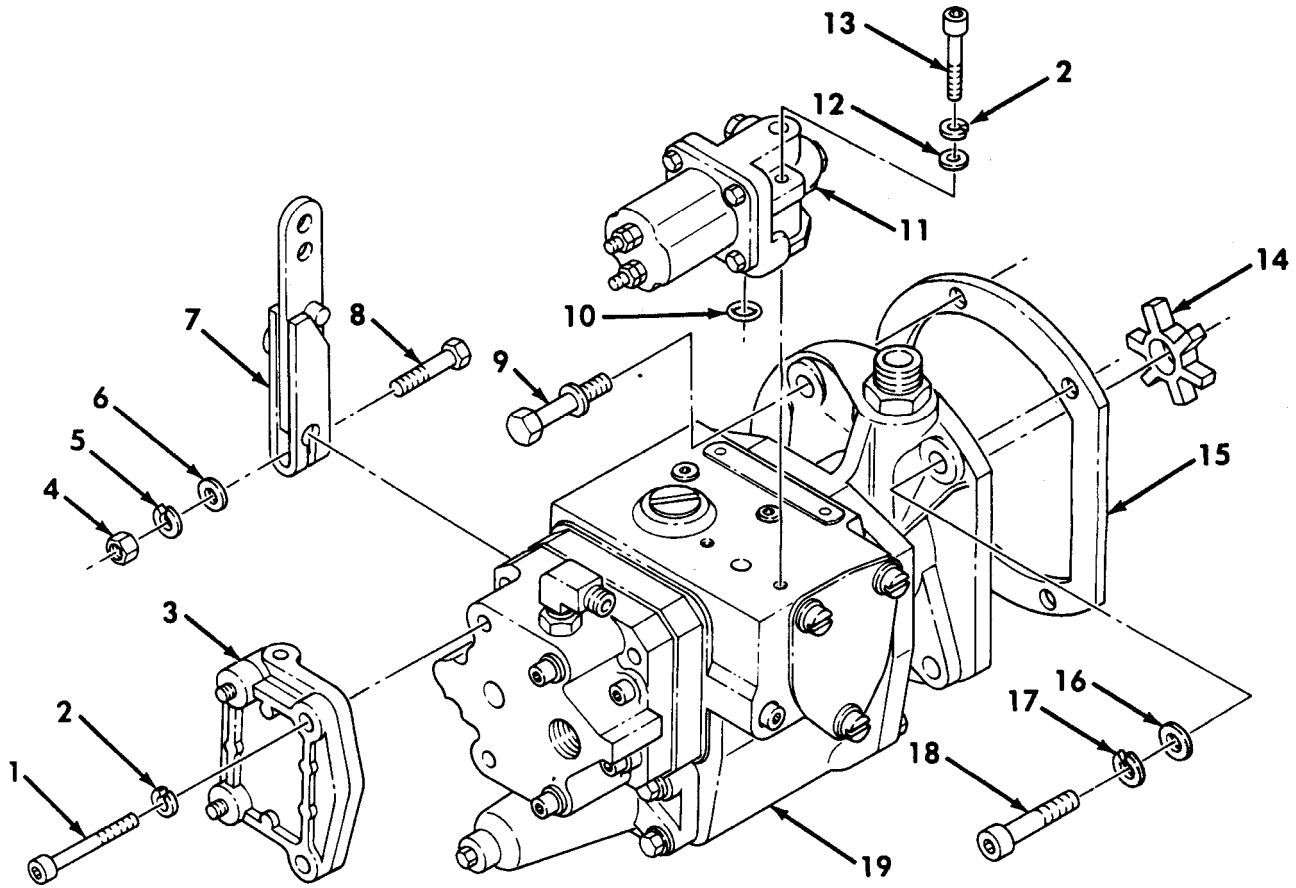


Figure 10. Fuel Pump, Shutdown Valve, Damper, and Mounting Parts.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1)	(2)	(3)	(4)	(5)	(6)	(7)	
ITEM	SMR			PART			
NO	CODE	NSN	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES(UOC)	QTY	
GROUP AUA2: POWERTRAIN INSTALLATION							
FIG. 10 FUEL PUMP, SHUTDOWN VALVE, DAMPER, AND MOUNTING PARTS							
1	PADZZ	5305002072715	15434	S174C	SCREW,CAP, SOCKET HE.....	2	
*	2	PAOZZ	5310004841718	15434	181466	WASHER, LOCK.....	4
3	PADZZ	6685008287126	15434	BM76340	DAMPENER, FLUID PRES.....	1	
4	PAFZZ	5310009717989	96906	MS35691-5	NUT, PLAIN, HEXAGON.....	1	
5	PAFZZ	5310001596209	96906	MS122032	WASHER, LOCK.....	1	
6	PAFZZ	5310001411795	88044	AN960-416	WASHER, FLAT.....	1	
*	7	PAFZZ	3040004497397	15434	3024165	LEVER, REMOTE CONTRO.....	1
8	PAFZZ	5305004933959	15434	S159B	SCREW, CAP, HEXAGON H.....	1	
9	PAFZZ	5305011294384	15434	3015282	SCREW, CAP, HEXAGON H.....	3	
*	10	PAOZZ	5330012916537	12361	3903927	PACKING, PREFORMED.....	1
*	11	PAOZZ	4810011874925	15434	3035362	VALVE, SOLENOID.....	1
12	PAOZZ	5310002622986	15434	67684	WASHER, FLAT.....	2	
13	PAOZZ	5305005098106	15434	S189C	SCREW, CAP, SOCKET HE.....	2	
14	PAFZZ	3010005078347	15434	3046200	INSERT, FLEXIBLE COU.....	1	
15	PAFZZ	5330012625118	15434	3048341	GASKET PART OF KIT P/N 3010242, PART OF KIT P/N 3801539.....	1	
16	PAFZZ	5310011124307	15434	69324	WASHER, FLAT.....	4	
17	PAFZZ	5310002090965	96906	MS35338-47	WASHER, LOCK.....	1	
18	PAFZZ	5305011131179	15434	206326	SCREW, CAP, HEXAGON H.....	1	
*	19	PAFDD	2815011799056	15434	3021948-3999	FUEL PUMP ASSEMBLY SEE FIGURES 11 THRU 14 FOR PARTS BREAKDOWN.....	1

END OF FIGURE

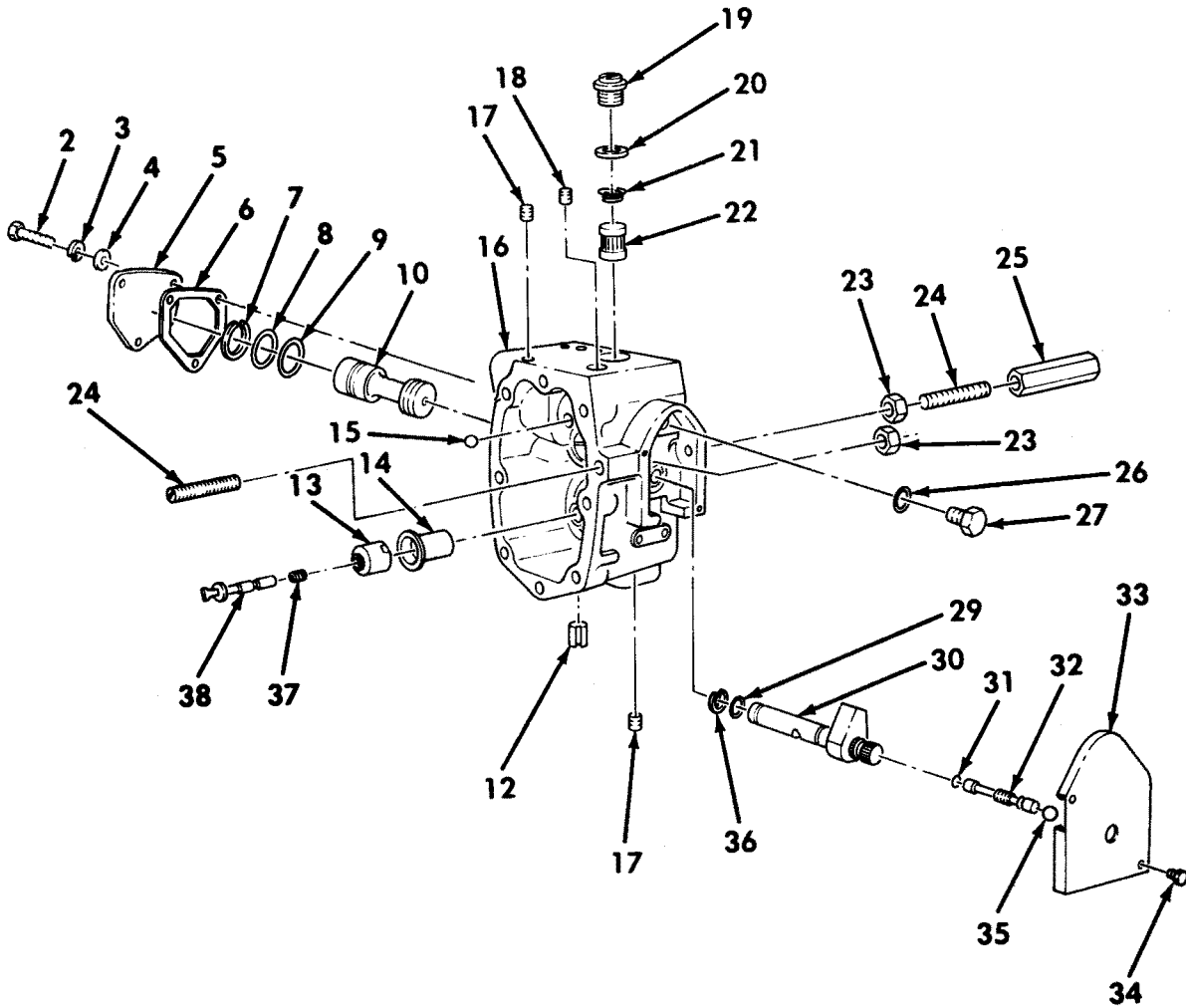
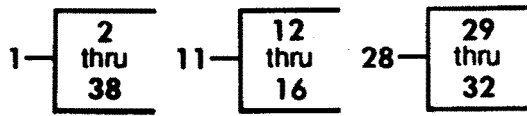


Figure 11. Fuel Pump Housing

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION FIG. 11 FUEL PUMP HOUSING						
* 1	PFDZZ	2910011877008	15434	3012259	HOUSING,FUEL PUMP.....	1
* 2	PADZZ	5305009881724	96906	MS35206-280	SCREW,MACHINE PART OF P/N 3012259..	3
* 3	PADZZ	5310001596209	96906	MS122032	WASHER,LOCK PART OF P/N 3012259....	3
* 4	PADZZ	5310001411795	88044	AN960-416	WASHER,FLAT PART OF P/N 3012259....	2
* 5	PFDZZ	4320010985102	15434	300490400	COVER,HYDRAULIC,PUM PART OF P/N 3012259.....	1
* 6	PADZZ	5330011438210	15434	3028064	GASKET PART OF P/N 3012259.....	1
* 7	PADZZ	5325008072636	96906	MS16625-1100	RING,RETAINING PART OF P/N 3012259.	1
* 8	KDDZZ	5331013252622	15434	3042542	O-RING PART OF P/N 3012259, PART OF KIT P/N 3010242.....	1
* 9	KDDZZ	5330002977275	15434	70775	PACKING,PREFORMED PART OF P/N 3012259 PART OF KIT P/N 3010242.....	1
* 10	PADZZ	4730010785690	15434	3000438	PLUG,PIPE PART OF P/N 3012259.....	1
* 11	PFDDD	2910011414328	15434	3039367	HOUSING,FUEL PUMP PART OF P/N 3012259.....	1
* 12	PADZZ	5342004005178	15434	163733	.CLIP,GOVERNOR BARRE.....	1
* 13	PADZZ		15434	3058559	.BEARING,SLEEVE.....	1
* 14	PADZZ	2910011873633	15434	3036970	.HOUSING,SPRING PACK.....	1
* 15	PADZZ	2910011414028	15434	21413900	.BALL,PLUG BRASS.....	2
* 16	XADZZ		15434	3013690	.HOUSING,FUEL PUMP.....	1
* 17	PFDZZ	4730011243762	15434	3025460	PLUG,PIPE PART OF P/N 3012259.....	4
* 18	PADZZ	5365011601832	15434	112076	PLUG,FUEL OUTLET PART OF P/N 3012259.....	1
* 19	PADZZ	5365005073271	15434	157088	PLUG,MACHINE THREAD PART OF P/N 3012259.....	1
* 20	KDDZZ	5330009619470	15434	154088	SEAL CAP PART OF KIT P/N 3010242...	1
* 21	PADZZ	5360005974570	15434	70700	SPRING,HELICAL,COMP PART OF 3012259.....	1
* 22	PADZZ	2910007908736	15434	14648300	FILTER ELEMENT,FLUI PART OF P/N 3012259.....	1
* 23	PADZZ	5310009717989	96906	MS35691-5	NUT,PLAIN,HEXAGON PART OF P/N 3012259.....	2
* 24	PADZZ	5305000635043	88044	AN565F428H24	SETSCREW PART OF P/N 3012259.....	2
* 25	PADZZ	5340007164975	15434	110058	POST,ELECTRICAL-MEC PART OF P/N 3012259.....	1
* 26	KDDZZ	5331009703461	15434	68061A	O-RING PART OF P/N 3012259, PART OF KIT P/N 3010242.....	1
* 27	PADZZ	4730010784703	15434	3004293	PLUG,TUBE FITTING,T PART OF P/N 3012259.....	1
* 28	PADZZ	2910010803149	15434	AR41010	SHAFT ASSEMBLY,THRO PART OF P/N 3012259.....	1
* 29	KDDZZ	5331000819289	15434	100478	O-RING PART OF P/N 3012259, PART OF KIT P/N 3010242.....	1
* 30	PFDZZ	3040012414696	15434	3046680	SHAFT,SHOULDERED PART OF P/N 3012259.....	1
* 31	KDDZZ	5331010728983	15434	213768	O-RING PART OF P/N 3012259, PART OF KIT P/N 3010242.....	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM NO	SMR CODE	NSN	CAGEC	PART NUMBER	DESCRIPTION AND USABLE ON CODES(UOC)	QTY
* 32	PADZZ	5305010728826	15434	3076040	SCREW PART OF P/N 3012259.....	1
* 33	PFDZZ	4320010985115	15434	3000446	COVER, HYDRAULIC, PUM PART OF P/N 3012259.....	1
* 34	PADZZ	5305008046318	15434	S2286	SCREW PART OF P/N 3012259.....	2
* 35	PADZZ	3110010798190	15434	213769	BALL, BEARING PART OF P/N 3012259...	1
* 36	PADZZ	5325002562846	96906	MS16632-1050	RING, RETAINING PART OF P/N 3012259.	1
* 37	PFDZZ	5360011867500	15434	3002047	SPRING, HELICAL, COMP PART OF P/N 3012259.....	1
* 38	PFDZZ	5342011451549	15434	3010810	PLUNGER PART OF P/N 3012259.....	1

END OF FIGURE

2 —

3 thru 25

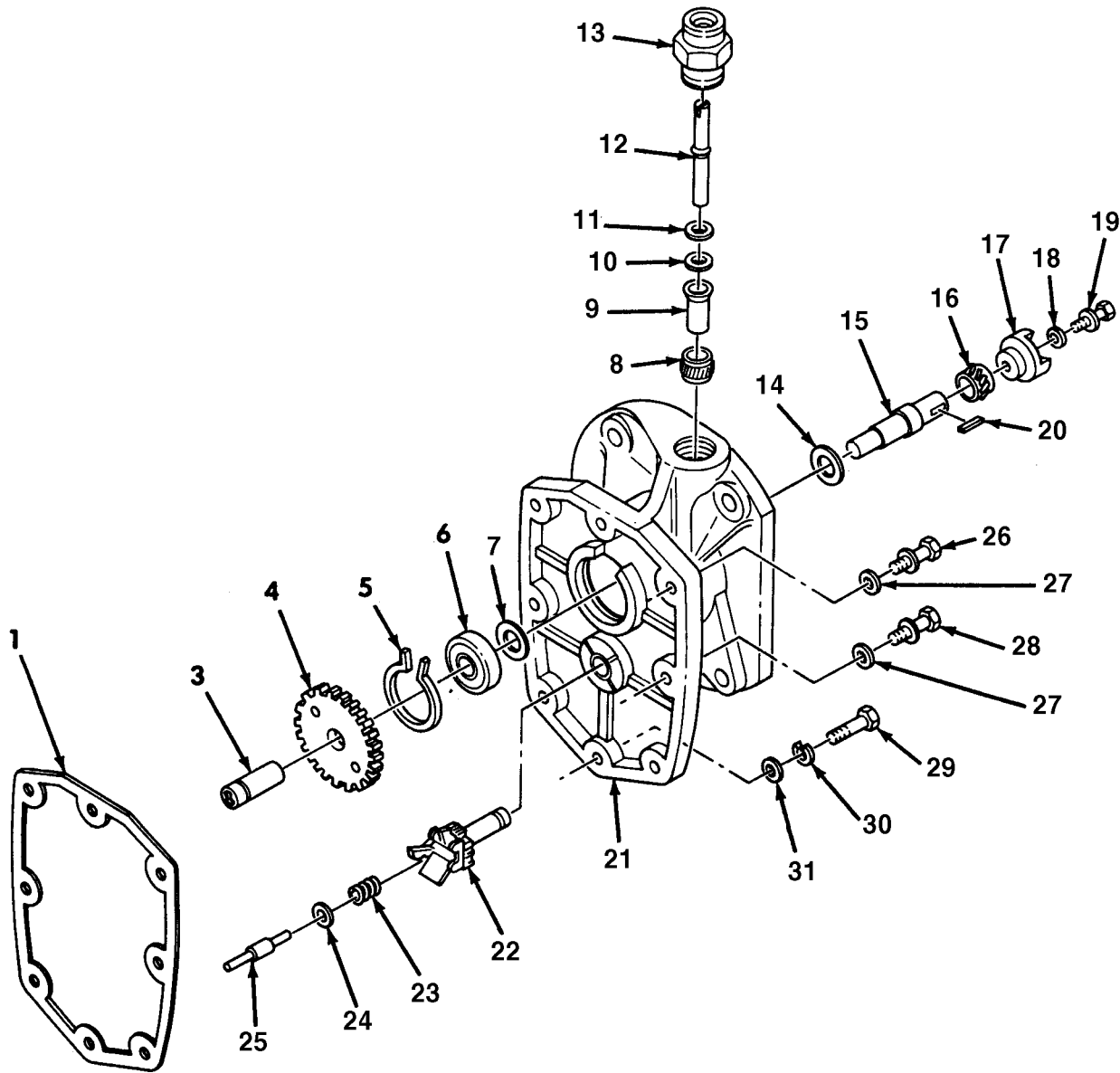


Figure 12. Fuel Pump Cover and Governor.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 12 FUEL PUMP COVER AND						
GOVERNOR						
* 1	KDDZZ	5330005064866	15434	100764	GASKET PART OF KIT P/N 3010242.....	1
* 2	PFDZZ	2990011472210	15434	3030268	MAINSHAFT,COVER END.....	1
* 3	PFDZZ	3010010885727	15434	212639	.COUPLING,SHAFT,RIGI PART OF P/N 3030268.....	1
* 4	PADZZ	3020010709003	15434	21260500	.GEAR,SPUR PART OF P/N 3030268.....	1
* 5	PADZZ	5325010810662	15434	212604	.RING,RETAINING PART OF P/N 3030268	1
* 6	PADZZ	3110005165289	15434	S16052	.BEARING,BALL,ANNULA PART OF P/N 3030268.....	1
* 7	PADZZ	5330014080887	15434	3803615	.SEAL,PLAIN PART OF P/N 3030268....	1
* 8	PADZZ	3020011610232	15434	21691100	.GEAR,HELICAL PART OF P/N 3030268.....	1
* 9	PADZZ	3120010872539	15434	212609	.BEARING,SLEEVE PART OF P/N 3030268	1
* 10	PADZZ	5365011263334	15434	3004724	.SPACER PART OF P/N 3030268.....	1
* 11	KDDZZ	5330010728828	15434	212603	.SEAL PART OF P/N 3030268 PART OF KIT P/N 3010242.....	1
* 12	PADZZ	3040010852871	15434	212607	.SHAFT,TACHOMETER DR PART OF P/N 3030268.....	1
* 13	PFDZZ	2910010867715	15434	3002110	.HOUSING,DRIVE ASSEM PART OF P/N 3030268.....	1
* 14	KDDZZ	5330010728829	15434	3045173	.SEAL,OIL PART OF P/N 3030268 PART OF KIT P/N 3010242.....	1
* 15	PADZZ	3040010709004	15434	212601	.SHAFT,SHOULDERED PART OF P/N 3030268.....	1
* 16	PADZZ	3020010707980	15434	21690600	.GEAR,DRIVE,TACHOMET PART OF P/N 3030268.....	1
* 17	PFDZZ	3010010801529	15434	212613	.COUPLING HALF,SHAFT PART OF P/N 3030268.....	1
* 18	PADZZ	5310008093078	15434	146160	.WASHER,FLAT PART OF P/N 3030268...	1
* 19	PADZZ	5306011198870	15434	3022589	.BOLT,MACHINE PART OF P/N 3030268..	1
* 20	PADZZ	5315010870534	15434	212668	.KEY,MACHINE PART OF P/N 3030268...	1
* 21	PFDZZ	2910011414337	15434	3803676	.HOUSING,FUEL PUMP PART OF P/N 3030268.....	1
* 22	PADZZ	2990011435489	15434	3024989	.WEIGHT AND CARRIER PART OF P/N 3030268.....	1
* 23	PADZZ	5360000818487	15434	143847	.SPRING,HELICAL,COMP PART OF P/N 3030268.....	1
* 24	PADZZ	5310007278353	15434	144179	.WASHER,FLAT PART OF P/N 3030268...	V 1
* 25	PFDZZ	5315000820448	15434	144178	.PIN,SHOULDER,HEADLE PART OF P/N 3030268.....	1
* 26	PADZZ	5305011261128	15434	3017052	SCREW,CAP,HEXAGON H.....	1
* 27	PADZZ	5310001411795	88044	AN960-416	WASHER,FLAT.....	6
* 28	PADZZ	5305011129110	15434	3017051	SCREW,CAP,HEXAGON H.....	5
* 29	PADZZ	5305001610902	15434	118226	SCREW.....	1
* 30	PADZZ	5310004841718	15434	181466	WASHER,LOCK.....	1
* 31	PADZZ	5310000145850	96906	MS27183-42	WASHER,FLAT.....	1

END OF FIGURE

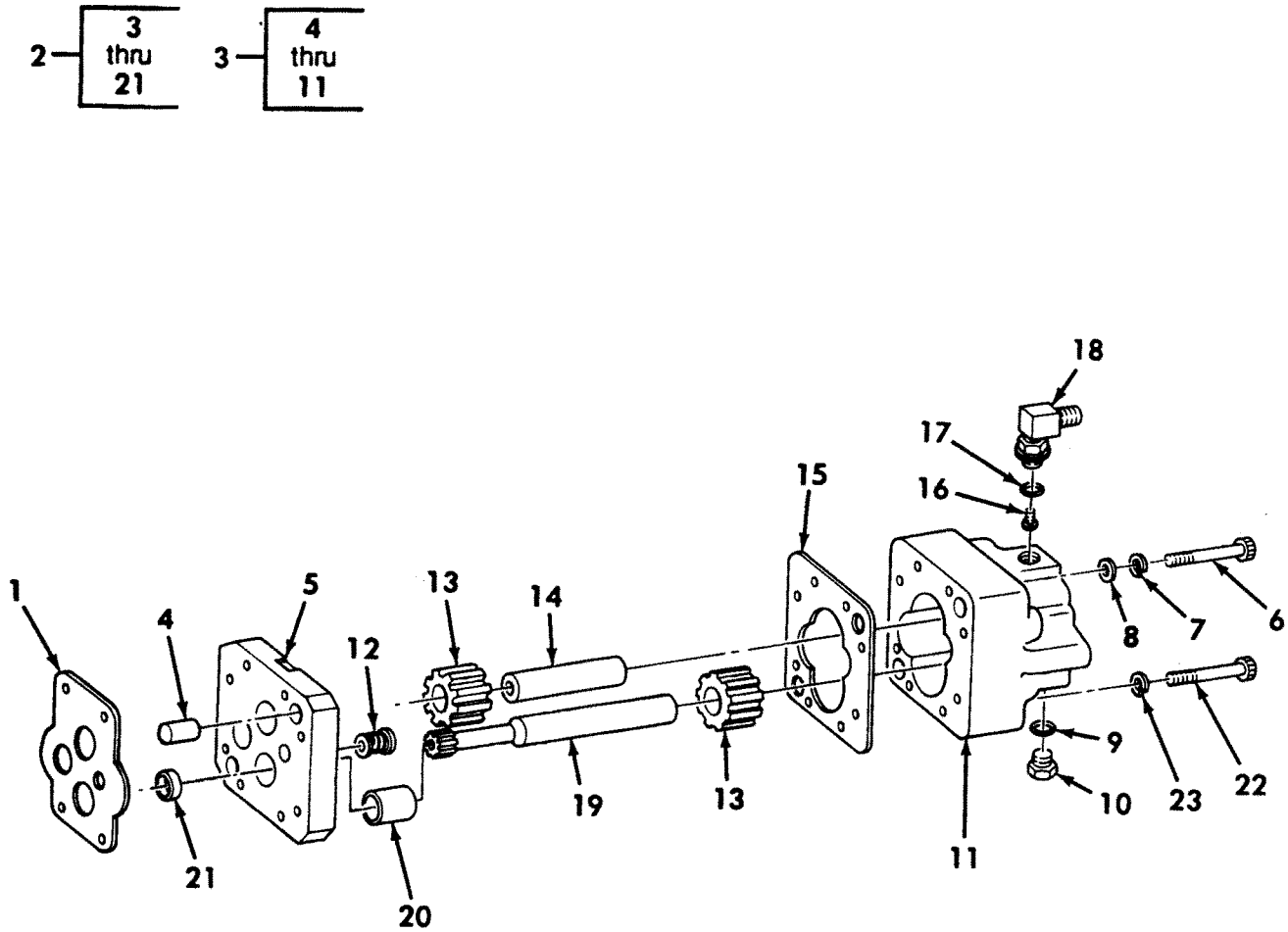


Figure 13. Fuel Pump Gear Pump.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 13 FUEL PUMP GEAR PUMP						
* 1	PADZZ	5330011368569	15434	3069017	GASKET PART OF KIT P/N 3010242.....	1
* 2	PADDD	2910013451126	15434	3034244	PUMP,FUEL,METERING.....	1
* 3	XADZZ		15434	3033726	.COVER AND HOUSING,G.....	1
* 4	PADZZ	5315000141244	15434	64816A	.PIN,STRAIGHT,HEADLE PART OF P/N 3033726.....	2
* 5	XADZZ		15434	3033723	..HOUSING,FUEL PUMP PART OF P/N 3033726.....	1
* 6	PFDZZ	5306004850790	15434	70790	.BOLT,MACHINE PART OF P/N 3033726..	2
* 7	PFDZZ	5310004841718	15434	181466	.WASHER,LOCK PART OF P/N 3033726...	2
* 8	PADZZ	5310001411795	88044	AN960-416	.WASHER,FLAT PART OF P/N 3033726...	2
* 9	PADZZ	5331011904362	15434	3034412	.O-RING PART OF P/N 3033726.....	1
* 10	XBDZZ	4730004035385	15434	3033742	.PLUG,PIPE PART OF P/N 3033726.....	1
* 11	XADZZ		15434	3033729	.HOUSING,FUEL PUMP PART OF P/N 3033726.....	1
* 12	PADZZ	4820012422579	15434	3050624	.VALVE,REGULATING,FL.....	1
* 13	PADZZ	3020007023882	15434	11936300	.GEAR,SPUR.....	2
* 14	PFDZZ	3040009333012	15434	17586400	.IDLER,SHAFT.....	1
* 15	KDDZZ	5330005673463	15434	110855	.GASKET PART OF KIT P/N 3010242.....	1
* 16	PFDZZ	5340013226029	15434	3045005	.PLUG,VENT.....	1
* 17	PADZZ	5331011904362	15434	3034412	.O-RING.....	1
* 18	PADZZ	4820011647002	15434	3033740	.VALVE,CHECK.....	1
* 19	PFDZZ	3040005674354	15434	10021500	.SHAFT,SHOULDERED.....	1
* 20	PADZZ	3120012159157	15434	3033724	.BEARING,SLEEVE.....	4
* 21	PADZZ	3120011858586	15434	3033719	.BUSHING,SLEEVE.....	1
22	PADZZ	5306004850790	15434	70790	.BOLT,MACHINE.....	4
23	PADZZ	5310004841718	15434	181466	.WASHER,LOCK.....	4

END OF FIGURE

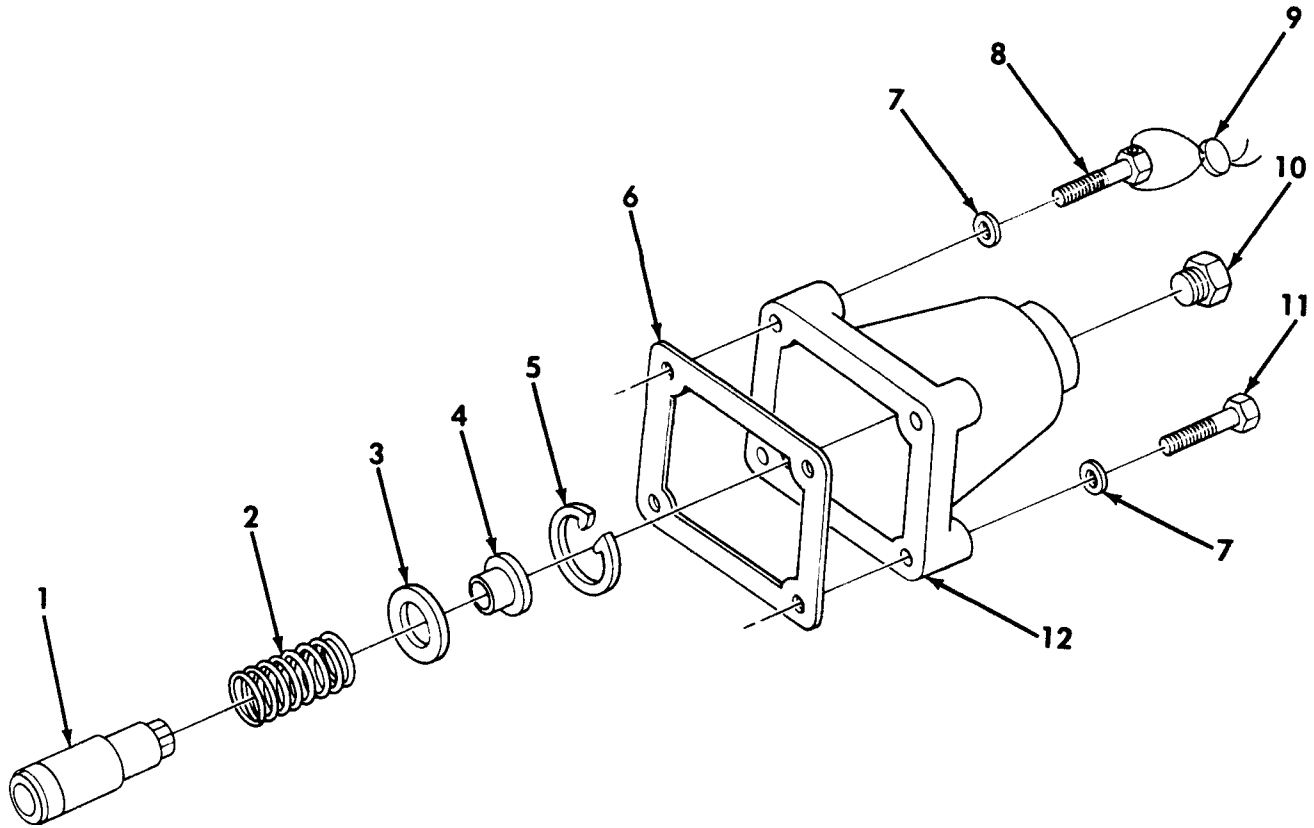


Figure 14. Fuel Pump Governor Spring Pack.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 14 FUEL PUMP GOVERNOR SPRING						
PACK						
* 1	PFDZZ	2910008032631	15434	BM70796	SPRING GUIDE,ASSEMB.....	1
* 2	PADZZ	5360011612303	15434	143252	SPRING.....	1
* 3	PFDZZ	5365005073261	15434	70717A	SHIM .010 INCH.....	V
* 3	PFDZZ	5365005073262	15434	70717B	SHIM .005 INCH.....	V
* 3	PFDZZ	5365004624504	15434	189800	SHIM .007 INCH.....	V
* 3	PFDZZ	5365005073260	15434	70717	SPACER,RING .020 INCH.....	V
* 4	PFDZZ	5340008981497	15434	70713	SEAT,HELICAL COMPRE.....	1
* 5	PFDZZ	5325008072636	96906	MS16625-1100	RING,RETAINING.....	1
* 6	PADZZ	5330005621176	15434	70705	GASKET PART OF KIT P/N 3010242.....	1
* 7	PADZZ	5310001411795	88044	AN960-416	WASHER,FLAT.....	4
* 8	PADZZ	5305011261128	15434	3017052	SCREW,CAP,HEXAGON H.....	1
* 9	KDDZZ	5330010728830	15434	3003156	SEAL,SPECIAL PART OF KIT P/N 3010242	1
* 10	PFDZZ	5342011436046	15434	3025459	PLUG,COVER.....	1
* 11	PADZZ	5305011129110	15434	3017051	SCREW,CAP,HEXAGON H.....	3
* 12	PFDZZ	2910008583522	15434	44678	COVER,SPRING PACK.....	1

END OF FIGURE

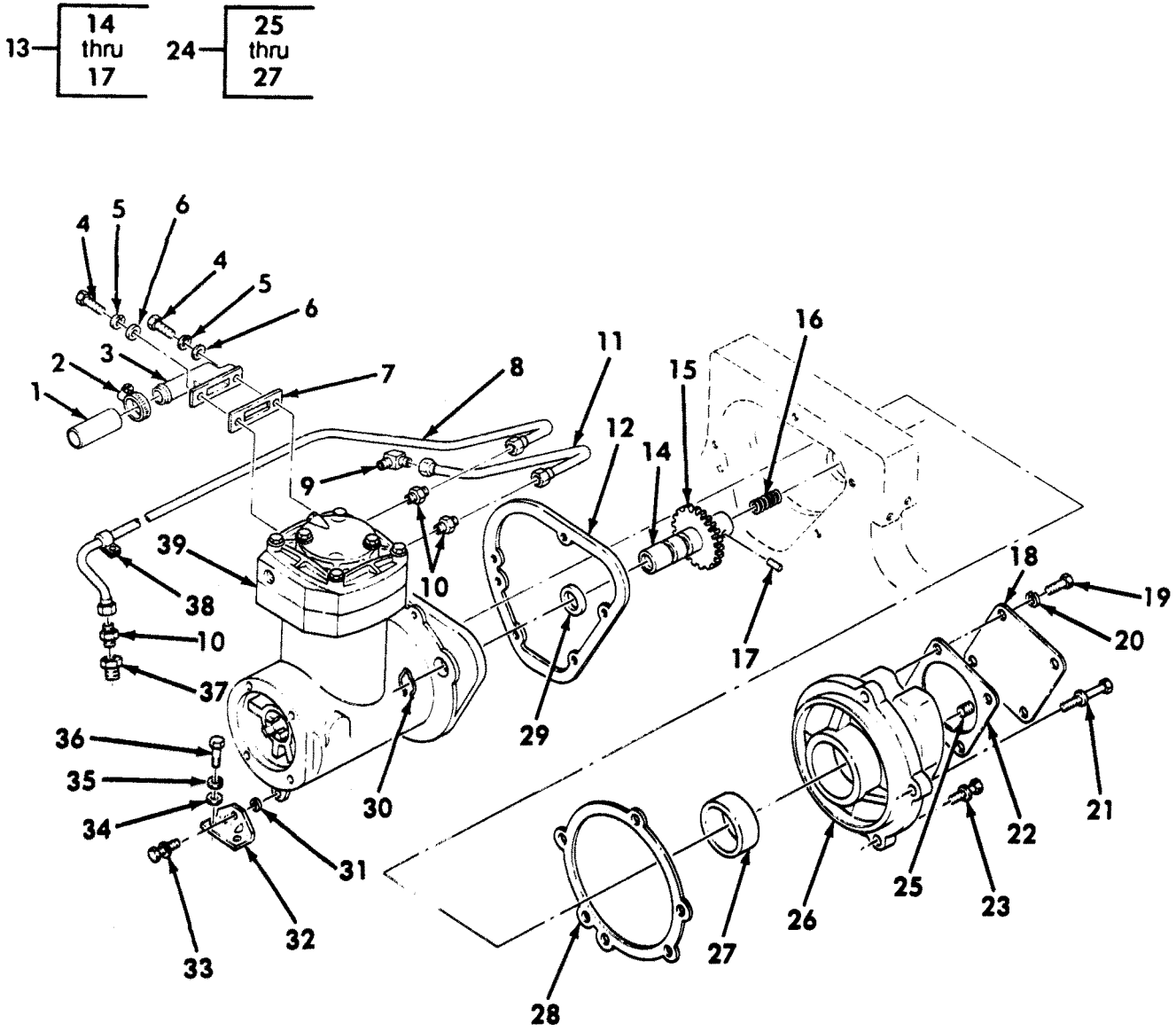


Figure 15. Air Compressor and Related Parts.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 15 AIR COMPRESSOR AND RELATED PARTS						
* 1	PFFZZ	4720004019299	96906	MS521301A206R	HOSE, NONMETALLIC.....	1
2	PAFZZ	4730005558263	15434	43828-A	CLAMP, HOSE.....	2
3	PFFZZ	4730010600947	15434	196281	ELBOW, FLANGE TO HOS.....	1
4	PAFZZ	5305002264831	80204	B1821BH031C150N	SCREW, CAP, HEXAGON H.....	2
5	PAFZZ	5310004079566	96906	MS35338-45	WASHER, LOCK.....	2
6	PAFZZ	5310005626558	15434	S626	WASHER, FLAT.....	2
7	PAFZZ	5330011810630	15434	3201386	GASKET.....	1
8	PAFZZ	4710011883295	15434	213991	TUBE ASSEMBLY, METAL.....	1
* 9	PAFZZ	4730003744282	15434	S00100500A	ELBOW, PIPE TO TUBE.....	1
10	PFFZZ	4730003652690	15434	S1002A	ADAPTER, STRAIGHT, TU.....	3
11	PAFZZ	4710011891836	15434	213990	TUBE ASSEMBLY, METAL.....	1
12	PAFZZ	5330011117404	15434	169992	GASKET.....	1
13	PAFFF	3010010922240	15434	3011234	GEAR SUBASSEMBLY, SP BARRING MECHANISM.....	1
14	XAFZZ		15434	3007628	. SHAFT, STRAIGHT.....	1
15	XAFZZ		15434	202645	. GEAR, SPUR.....	1
16	PFFZZ	5360011283940	15434	169835	. SPRING, HELICAL, COMP.....	1
17	PFFZZ	5315011443322	15434	198721	. PIN, GROOVED, HEADLES.....	1
18	PFFZZ	5340011867189	15434	204069	COVER, ACCESS.....	1
19	PAFZZ	5305010605961	15434	S169	SCREW, CAP, HEXAGON H.....	4
20	PAFZZ	5310012001318	15434	S608	WASHER, LOCK.....	4
21	PAFZZ	5305011430476	15434	3012478	SCREW.....	5
22	PAFZZ	5330011867713	15434	204489	GASKET.....	1
23	PAFZZ	5305011652345	15434	3012477	SCREW, ASSEMBLED WAS	1
24	PFFZZ	2815011860876	15434	AR10336	SUPPORT, COMPRESSOR.....	1
25	PAFZZ	5365004042934	15434	S965E	. PLUG, MACHINE THREAD.....	1
26	XAFZZ		15434	211089	. SUPPORT.....	1
27	PAFZZ	3120011454032	15434	211120	. BEARING, SLEEVE.....	1
28	PAFZZ	5330010602988	15434	169843	GASKET PART OF KIT P/N 3801539.....	1
* 29	PAFZZ	5330012916537	12361	3903927	PACKING, PREFORMED BEARING SHAFT....	1
30	PAFZZ	5340011426940	15434	213872	CLIP, RETAINING BEARING MECHANISM...	1
31	PFFZZ	5365011858592	15434	68368B	SPACER, SLEEVE.....	1
32	PFFZZ	5340011867172	15434	190839	BRACKET, ANGLE.....	1
33	PAFZZ	5305010729021	15434	3011716	SCREW, ASSEMBLED WAS	1
34	PAFZZ	5310000806004	96906	MS27183-14	WASHER, FLAT.....	2
35	PAFZZ	5310002617340	15434	S604	WASHER, LOCK.....	2
36	PAFZZ	5305010102362	96906	MS18154-59	SCREW, CAP, HEXAGON H.....	2
37	PAFZZ	4730002026663	81348	WW-P-471BDQBUEC	BUSHING, PIPE.....	1
38	PAFZZ	5340002861868	15434	68152	CLAMP, LOOP.....	2
* 39	PAFHH	2530011940115	15434	3018532	COMPRESSOR, RECIPROC SEE FIG 16 FOR PARTS BREAKDOWN.....	1

END OF FIGURE

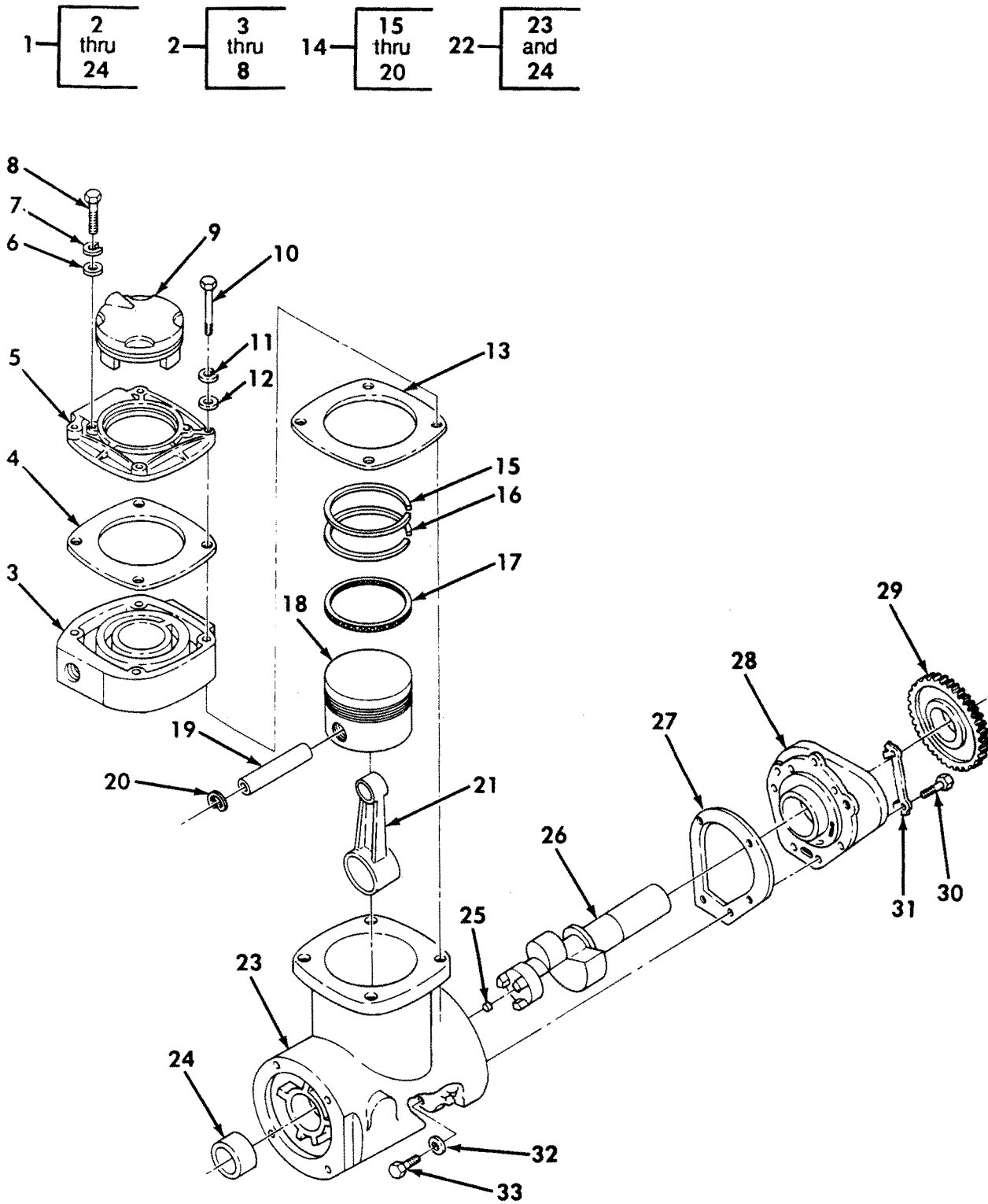


Figure 16. Air Compressor Assembly.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 16 AIR COMPRESSOR ASSEMBLY						
* 1	PAHHH	2530011830651	15434	3018491	HOUSING,AIR COMPRES.....	1
* 2	PFFFF	2530006031506	15434	3029803	.HEAD ASSEMBLY,AIR V.....	1
* 3	PAHZZ	4310011461097	15434	218793	..CYLINDER HEAD,COMPR.....	1
* 4	PAHZZ	5330001317072	15434	3047159	..GASKET.....	1
* 5	PFHZZ	4310011465921	15434	153964	..COVER,AIR COMPRESSO.....	1
* 6	PAHZZ	5310001867403	15434	109557	..WASHER,FLAT.....	2
* 7	PAHZZ	5310004079566	96906	MS35338-45	..WASHER,LOCK.....	2
* 8	PAHZZ	5305004264184	15434	S-115	..SCREW,CAP,HEXAGON H.....	2
* 9	PAHZZ	2530001344620	15434	AR4154	.DISCHARGE ASSEMBLY.....	1
* 10	PAHZZ	5306011581154	80204	B1821BH031C275D	.BOLT,MACHINE.....	4
* 11	PAHZZ	5310004079566	96906	MS35338-45	.WASHER,LOCK.....	4
* 12	PAHZZ	5310005626558	15434	S626	.WASHER,FLAT.....	4
* 13	PAHZZ	5330008527347	15434	154018	.GASKET.....	1
* 14	PFHZZ	4310012715103	15434	3045670	.PISTON,COMPRESSOR.....	1
* 15	PFHZZ	4310010795245	15434	650330	.RING,PISTON PART OF P/N 3045670	1
					PART OF KIT P/N AR73350.....	
* 16	PAHZZ	4310011971882	15434	187350	.RING,PISTON PART OF P/N 3045670	1
					PART OF KIT P/N AR73350.....	
* 17	PAHZZ	2815010793290	15434	180810	.RING,PISTON PART OF P/N 3045670	1
					PART OF KIT P/N AR73350.....	
* 18	PAHZZ	4310012715103	15434	3045670	.PISTON,COMPRESSOR PART OF P/N	1
					3045670.....	
* 19	PAHZZ	4310009037174	15434	119810	.PIN,PISTON PART OF P/N 3045670....	1
* 20	PAHZZ	5325009229101	15434	119859	.RING,RETAINING PART OF P/N 3045670	2
* 21	PFHZZ	2815003697846	15434	3558655	.CONNECTING ROD,PIST.....	1
* 22	PFHZZ	4310010793319	15434	AR13114	.HOUSING,AIR COMPRES.....	1
* 23	PDHZZ	4310010793319	15434	3558653	.HOUSING,AIR COMPRES PART OF P/N	1
					AR13114.....	
* 24	PAHZZ	3120010164883	15434	147610	.BEARING,SLEEVE PART OF P/N AR13114	1
* 25	PFHZZ	5365004042934	15434	S965E	PLUG,MACHINE THREAD.....	1
* 26	PAHZZ	4310013485414	15434	3029808	CRANKSHAFT,COMPRESS.....	1
* 27	PAHZZ	5330001299389	15434	176027	GASKET.....	1
* 28	PFHZZ	3040011898404	15434	215761	PLATE,RETAINING,SHA.....	1
* 29	PAHZZ	3020011382034	15434	21108300	GEAR,SPUR.....	1
* 30	PAHZZ	5305006882111	80204	B1821BH038C138N	SCREW,CAP,HEXAGON H.....	4
* 31	PAHZZ	5342011939039	15434	176059	LOCKPLATE.....	2
* 32	PAHZZ	5310000806004	96906	MS27183-14	WASHER,FLAT.....	2
* 33	PAHZZ	5305011957896	15434	164881	SCREW,CAP,HEXAGON H.....	2

END OF FIGURE

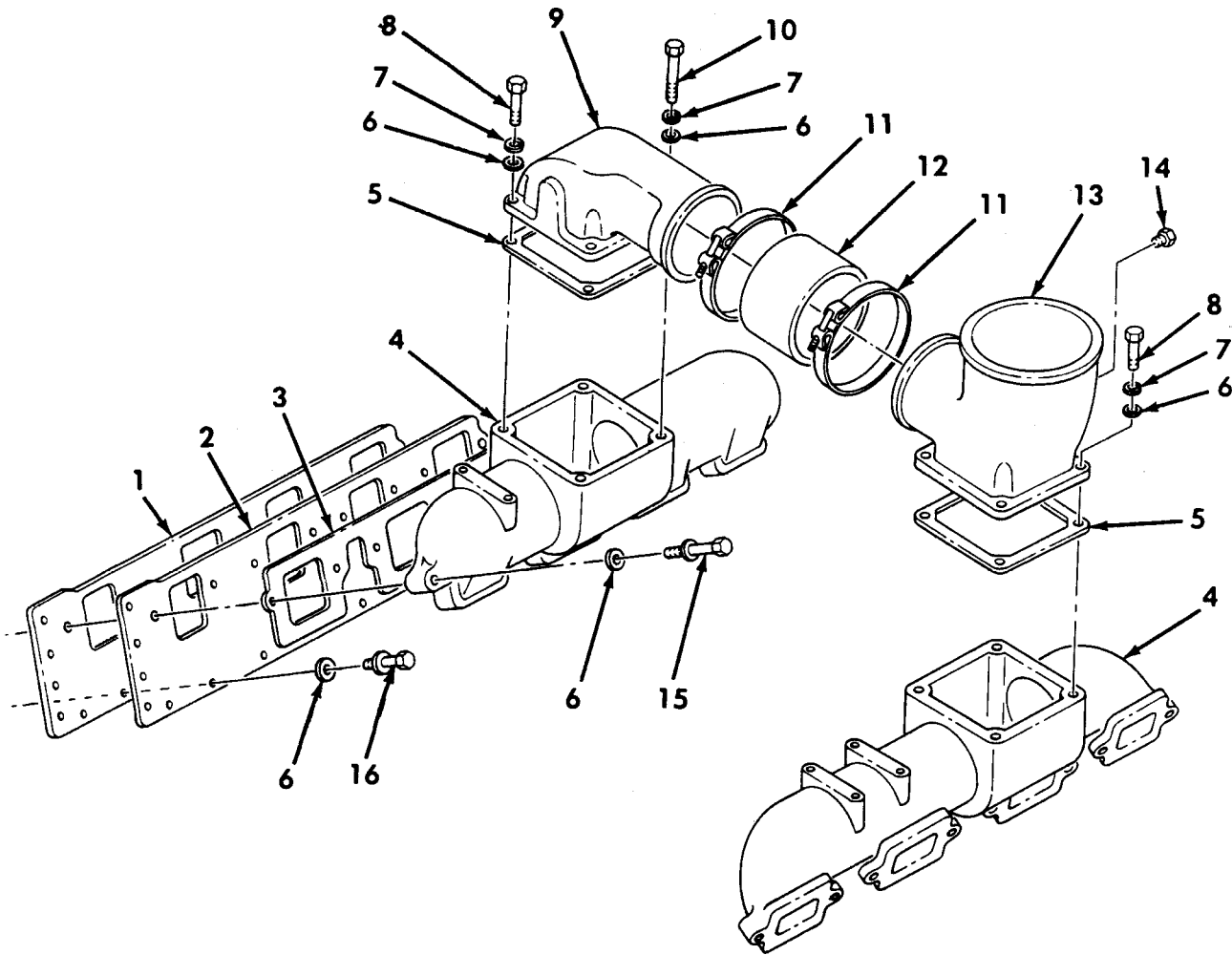


Figure 17. Intake Manifolds.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 17 INTAKE MANIFOLDS						
1	PAFZZ	5330009944410	15434	151707	GASKET PART OF KIT P/N 3013497 PART OF KIT P/N 3801539.....	2
* 2	PFFZZ	2815000847796	15434	15422600	COVER,PUSH TUBE.....	2
3	PAFZZ	5330009944411	15434	154396	GASKET PART OF KIT P/N 3013497 PART OF KIT P/N 3801539.....	2
* 4	PFFZZ	2815011875233	15434	300676900	MANIFOLD,INTAKE.....	2
5	PAFZZ	5330009092489	15434	156348	GASKET.....	2
6	PAFZZ	5310000806004	96906	MS27183-14	WASHER,FLAT.....	50
7	PAFZZ	5310002617340	15434	S604	WASHER,LOCK.....	8
8	PAFZZ	5305006882111	80204	B1821BH038C138N	SCREW,CAP,HEXAGON H.....	7
9	PFFZZ	2815011869475	15434	167266	CONNECTOR,AIR INTAK.....	1
10	PAFZZ	5305004264142	15434	S105	SCREW,CAP,HEXAGON H.....	1
11	PAFZZ	4730003599487	66295	C72P	CLAMP,HOSE.....	2
12	PFFZZ	4720011860570	15434	64015	HOSE,NONMETALLIC.....	1
* 13	PFFZZ	2815014248735	15434	168807	BREATHER.....	1
14	PAFZZ	4730009541281	15434	3008466	PLUG,PIPE.....	2
15	PAFZZ	5305011430475	15434	3012475	SCREW.....	16
16	PAFZZ	5305011294215	15434	3015283	SCREW,CAPTIVE ASSY.....	26

END OF FIGURE

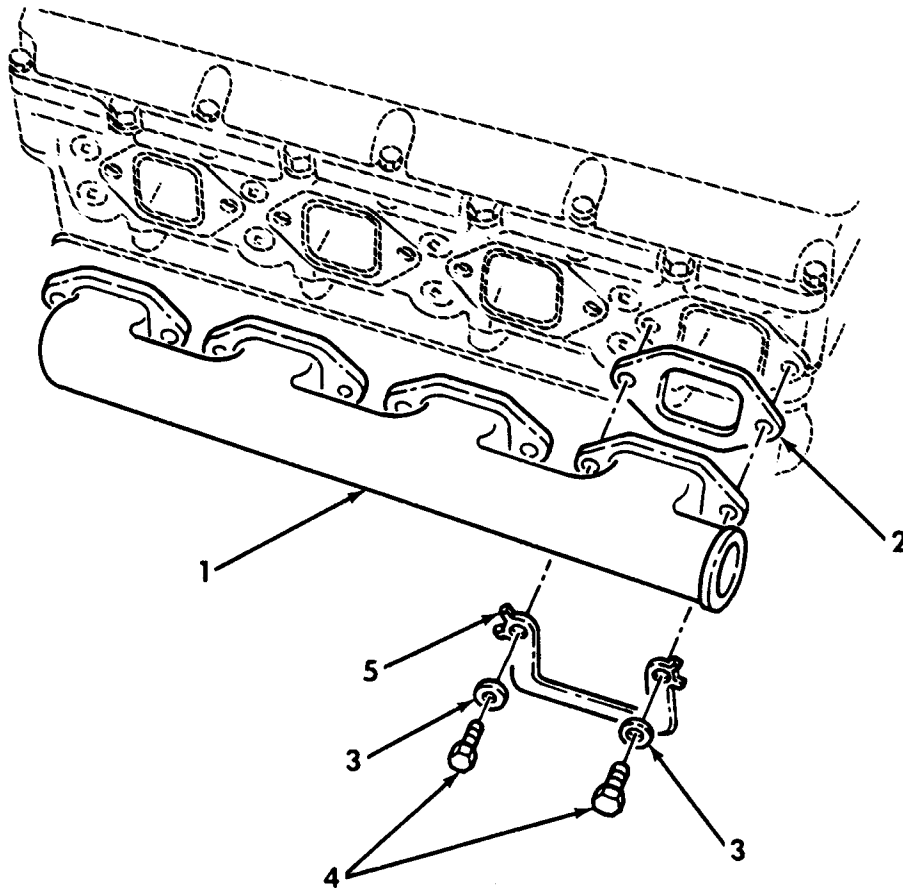


Figure 18. Exhaust Manifolds.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 18 EXHAUST MAINFOLDS						
* 1	PAFZZ	2815011926978	15434	18329800	MANIFOLD,EXHAUST LEFT.....	1
* 1	PAFZZ	2815011866084	15434	18329900	MANIFOLD,EXHAUST RIGHT.....	1
2	PAFZZ	5330011438207	15434	3028665	GASKET PART OF KIT P/N 3013497, PART OF KIT P/N 3801539.....	8
3	PAFZZ	3120010796527	15434	109594	BEARING,SLEEVE.....	16
4	PAFZZ	5305004630428	15434	185804	SCREW,CAP,HEXAGON H.....	16
5	PAFZZ	2815011091197	15434	195712	LOCKING PLATE,MANIF PART OF KIT P/N 3801539.....	8

END OF FIGURE

8-9

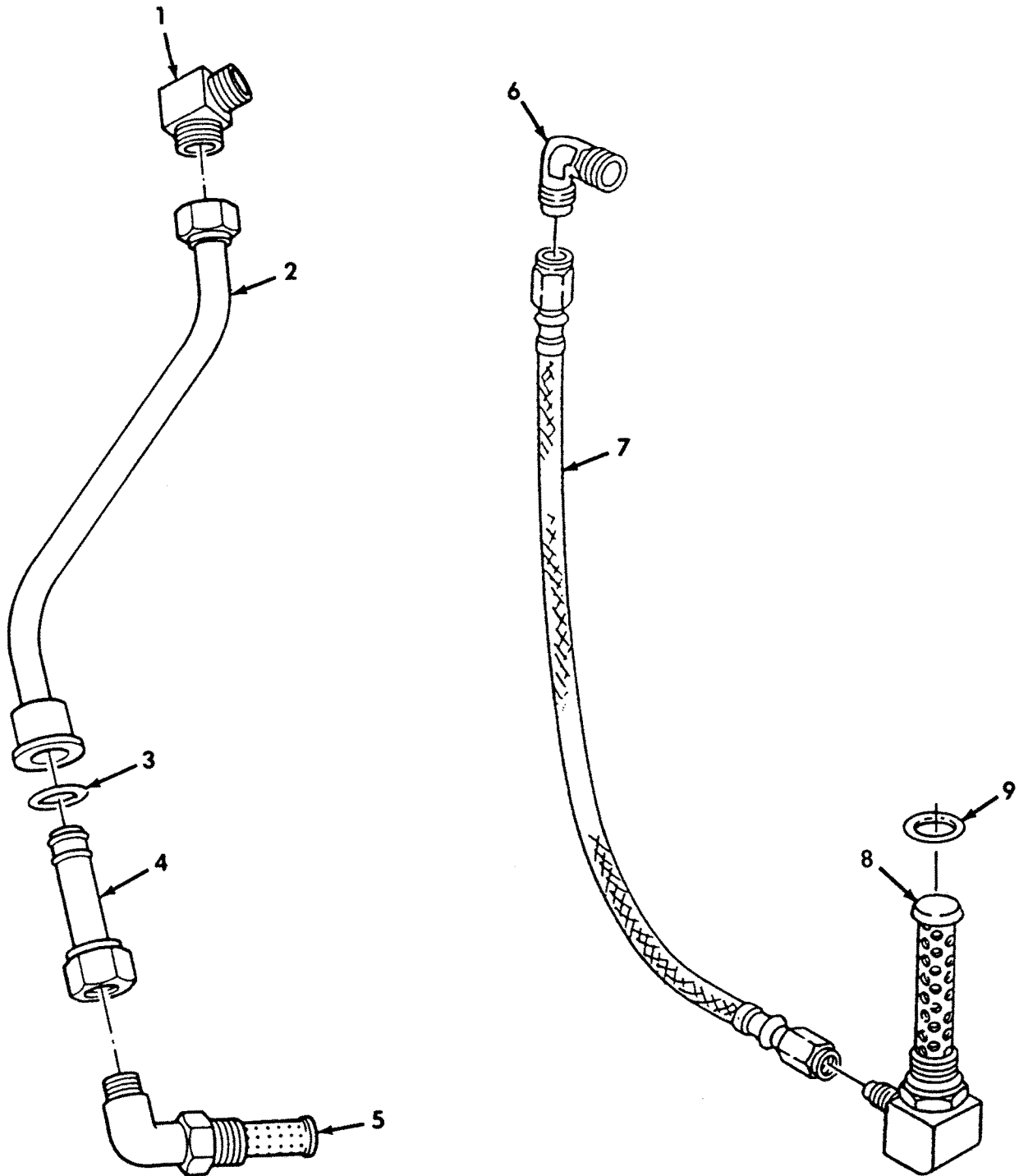


Figure 19. Engine External Oil Lines.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1)	(2)	(3)	(4)	(5)	(6)	(7)
ITEM	SMR			PART		
NO	CODE	NSN	CAGEC	NUMBER	DESCRIPTION AND USABLE ON CODES(UOC)	QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 19 ENGINE EXTERNAL OIL LINES						
1	PFOZZ	4730011420192	15434	183649	ELBOW,PIPE TO TUBE.....	1
2	PAOZZ	4710012285834	15434	3045140	TUBE ASSEMBLY,METAL.....	1
* 3	PAOZZ	5331012202384	15434	3038058	O-RING.....	1
4	PAOZZ	4710012285835	15434	3038055	TUBE ASSEMBLY,METAL.....	1
5	PAOZZ	4730011865991	15434	216354	ELBOW,TUBE.....	1
6	PFOZZ	4730014117520	15434	107118	ELBOW,PIPE TO TUBE.....	1
* 7	PAOZZ	4720014131355	15434	AK10016SS	HOSE,NONMETALLIC.....	1
* 8	PAOZZ	4730014117540	15434	3081048	ELBOW,TUBE.....	1
* 9	PAOZZ	5331012202384	15434	3038058	O-RING PART OF P/N 3081048.....	1

END OF FIGURE

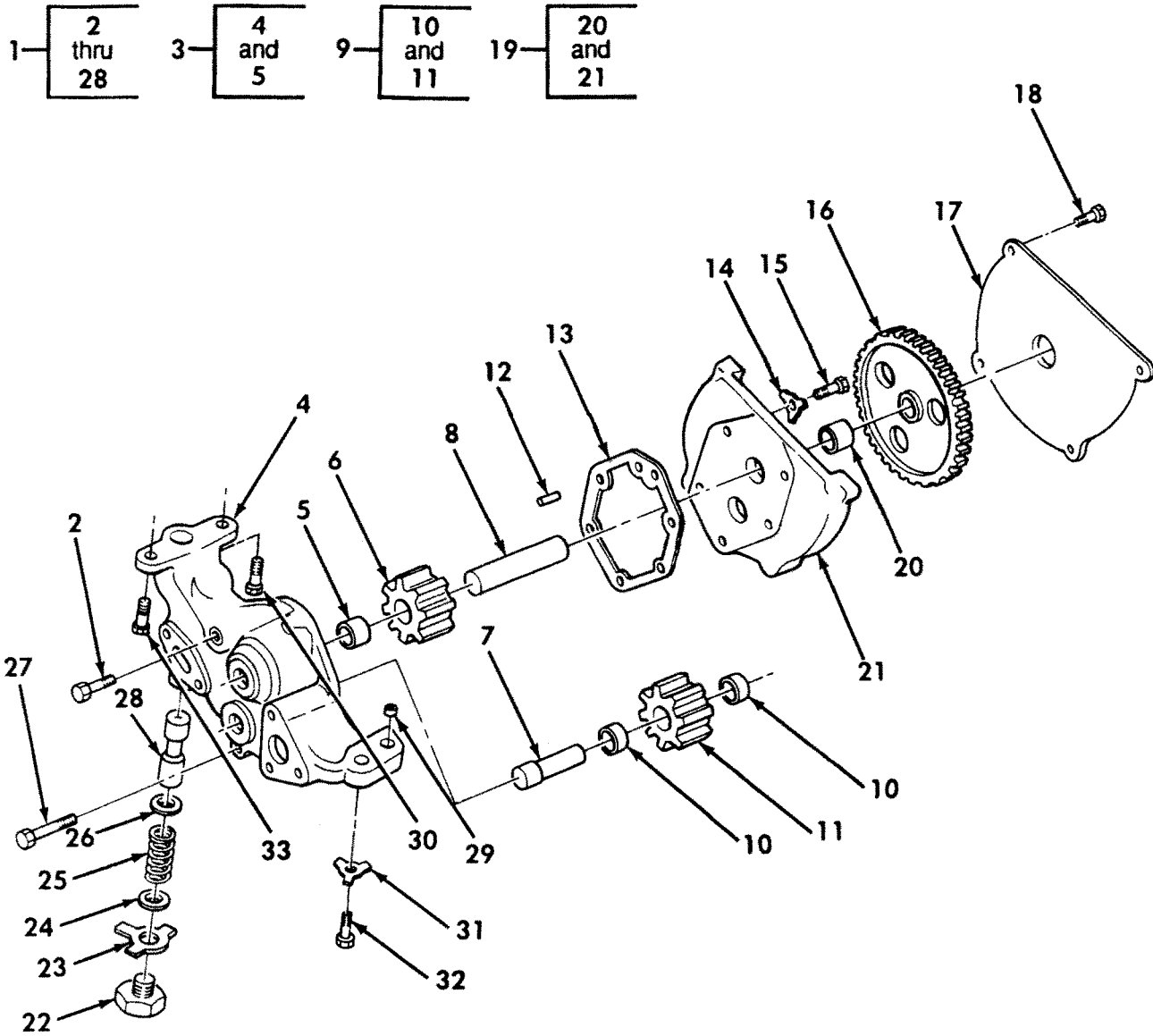


Figure 20. Oil Pump.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 20 OIL PUMP						
1	PAFHH	4320012018032	15434	3022723	PUMP, ROTARY.....	1
2	PAHZZ	5305006388920	80204	B1821BH038C225N	.SCREW,CAP,HEXAGON H.....	1
* 3	XDHHH		15434	3022561	.HOUSING,OIL PUMP.....	1
4	XAHZZ		15434	3009916	..BODY,PUMP.....	1
5	PAHZZ	3120005660480	15434	68365	..BUSHING,SLEEVE.....	1
6	PAHZZ	3020006827710	15434	3049540	.GEAR,SPUR.....	1
7	PFHZZ	3040010662968	15434	143406	.SHAFT,SHOULDERED.....	1
8	PFHZZ	3040000868384	15434	143405	.SHAFT,STRAIGHT.....	1
* 9	PFHHH	3020010887916	15434	BM5312000	.GEAR,HELICAL.....	1
10	PAHZZ	3120005660480	15434	68365	..BUSHING,SLEEVE.....	2
11	XAHZZ		15434	43864	..GEAR,LUB PUMP.....	1
12	PFHZZ	5315004752576	15434	70760	.PIN,STRAIGHT,HEADLE.....	1
13	PAHZZ	5330011334507	15434	180795	.GASKET PART OF KIT P/N 3801539.....	1
14	PAHZZ	2815003539395	15434	68908	.LOCK PLATE,LUBRICAT.....	6
15	PAHZZ	5305012310612	15434	S141	.SCREW,CAP,HEXAGON H.....	1
16	PAHZZ	3020000820461	15434	149151	.GEAR,SPUR.....	1
* 17	XDHZZ		15434	151033	.COVER,ACCESS.....	1
18	PAHZZ	5305007766884	15434	114463	.SCREW,CAP,SOCKET HE.....	4
* 19	PAHHH	2990011389155	15434	BM98341	.COVER,OIL PUMP.....	1
20	PAHZZ	3120005660480	15434	68365	..BUSHING,SLEEVE.....	1
21	XAHZZ		15434	180796	..COVER,LUBE PUMP.....	1
22	PFHZZ	4820011389474	15434	162653	.CAP,VALVE.....	1
* 23	PAHZZ	5310011389156	15434	208161	.WASHER,FLAT.....	1
24	PAHZZ	5365011389413	15434	66112B	.SPACER,PLATE.....	1
25	PAHZZ	5360010384659	15434	211939	.SPRING,HELICAL,COMP.....	1
26	PAHZZ	5310011124305	15434	203518	.WASHER,FLAT.....	1
27	PAHZZ	5305001775552	15434	S126	.SCREW,CAP,HEXAGON H.....	1
28	PAHZZ	2815007911453	15434	127558	.PLUNGER,OIL PUMP RE.....	1
29	PFFZZ	3120011117418	15434	3002993	BUSHING,SLEEVE.....	2
* 30	PAFZZ	5305009422196	80204	B182BH038C100D	SCREW,CAP,HEXAGON.....	1
31	PAFZZ	2940004596558	15434	175282	PLATE,LOCK.....	4
32	PAFZZ	5306011128681	80204	B1821BH038C125L	BOLT,MACHINE.....	2
33	PAFZZ	5305007252317	80204	B1821BH038C150N	SCREW,CAP,HEXAGON H.....	1

END OF FIGURE

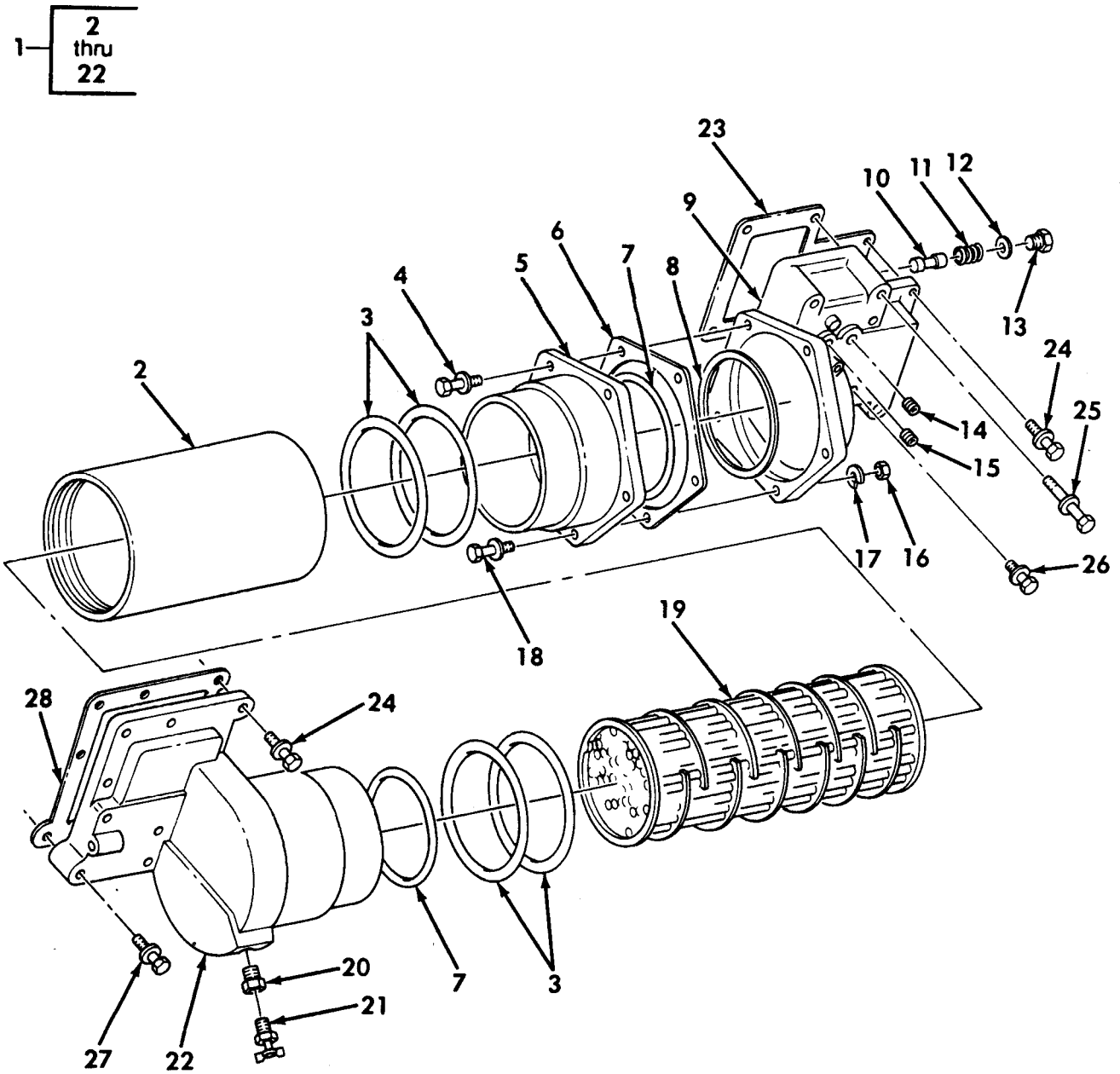


Figure 21. Oil Cooler.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 21 OIL COOLER						
1	PAFFF	2930011858273	15434	AR13024	COOLER,LUBRICATING.....	1
*	2	PFFZZ	2815011849649	15434 300045000	.SLEEVE,BODY,OIL COO.....	1
*	3	PAFZZ	5331010554542	15434 3019115	.O-RING.....	4
	4	PAFZZ	5305010886019	15434 3010596	.SCREW,ASSEMBLED WAS.....	4
*	5	PFFZZ	2815011846603	15434 300014100	.ADAPTER,COOLER SUPP.....	1
	6	PAFZZ	5330011386353	15434 179309	.GASKET.....	1
	7	PAFZZ	5330010866197	15434 3007713	.PACKING,PREFORMED.....	2
	8	PAFZZ	2930004370567	15434 142616	.RETAINER,OIL COOLER.....	1
	9	PFFZZ	5340011858631	15434 214188	.COVER,ACCESS.....	1
	10	PAFZZ	2815007911453	15434 127558	.PLUNGER,OIL PUMP RE.....	1
	11	PAFZZ	5360006645343	15434 68274	.SPRING,HELICAL,COMP.....	1
	12	PAFZZ	5330005995463	15434 S3050	.GASKET.....	1
*	13	PAFZZ	4730013093321	15434 3060882	.PLUG,TUBE FITTING,T.....	1
	14	PFFZZ	4730011060202	15434 3008469	.PLUG,PIPE.....	3
	15	PFFZZ	4730000113175	15434 3025458	.PLUG,PIPE.....	2
	16	PAFZZ	5310005218595	15434 S223	.NUT HEXAGON.....	1
	17	PAFZZ	5310002617340	15434 S604	.WASHER,LOCK.....	1
	18	PAFZZ	5305011430475	15434 3012475	.SCREW.....	1
	19	PAFZZ	2940010280606	15434 186348	.ELEMENT CORE,OIL CO.....	1
	20	PFFZZ	4730002026668	81348 WW-P-471BDQBUEB	.BUSHING,PIPE.....	1
	21	PAFZZ	4820012636410	79470 145	.COCK,DRAIN.....	1
*	22	PFFZZ	2815011849648	15434 300014200	.HOUSING,END OIL COO.....	1
	23	PAFZZ	5330011386357	15434 196887	GASKET.....	1
	24	PAFZZ	5305011124312	15434 3012472	SCREW,CAP,HEXAGON H.....	7
	25	PAFZZ	5305011867394	15434 3012474	SCREW.....	3
	26	PAFZZ	5305011652345	15434 3012477	SCREW,ASSEMBLED WAS.....	1
	27	PAFZZ	5305011430475	15434 3012475	SCREW.....	4
	28	PAFZZ	5330011475234	15434 179308	GASKET.....	1

END OF FIGURE

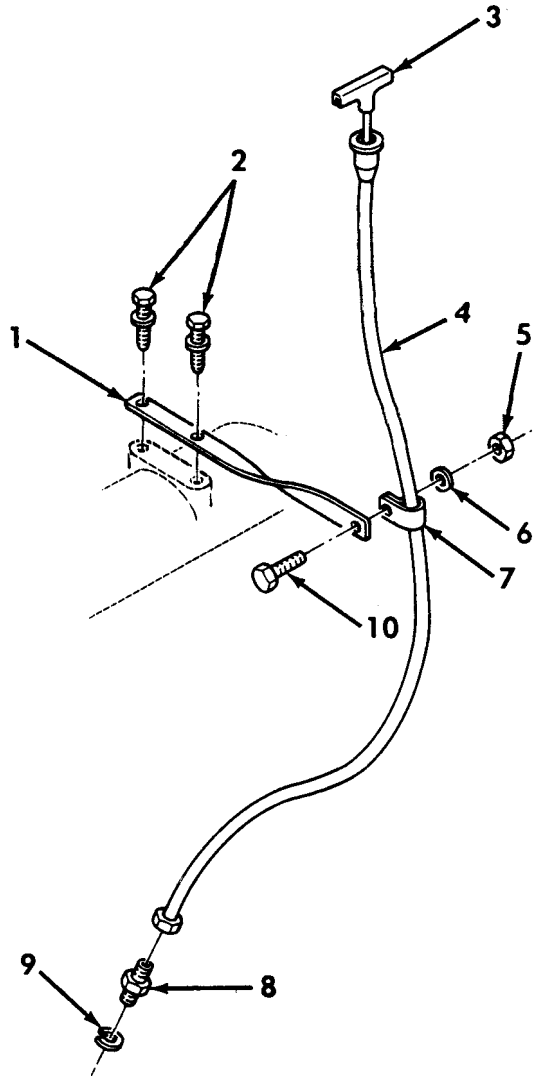


Figure 22. Oil Level Indicator.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 22 OIL LEVEL INDICATOR						
1	PFOZZ	2815011846604	15434	3041946	SUPPORT,TUBE,OIL LE.....	1
2	PAOZZ	5305010858197	15434	3010595	SCREW,MACHINE.....	2
3	PFOZZ	6680011834399	15434	3041949	GAGE ROD-CAP,LIQUID.....	1
4	PFOZZ	4710011844035	15434	3041945	TUBE,BENT,METALLIC.....	1
5	PAOZZ	5310005218595	15434	S223	NUT HEXAGON.....	1
6	PAOZZ	5310000806004	96906	MS27183-14	WASHER,FLAT.....	1
7	PAOZZ	5340011858623	15434	68152B	CLIP,SPRING TENSION.....	1
* 8	PAOZZ	4730004926040	30780	MS51843-6P	ADAPTER,STRAIGHT,TU.....	1
9	PAOZZ	5310002617340	15434	S604	WASHER,LOCK.....	1
10	PAOZZ	5305010102362	96906	MS18154-59	SCREW,CAP,HEXAGON H.....	1

END OF FIGURE

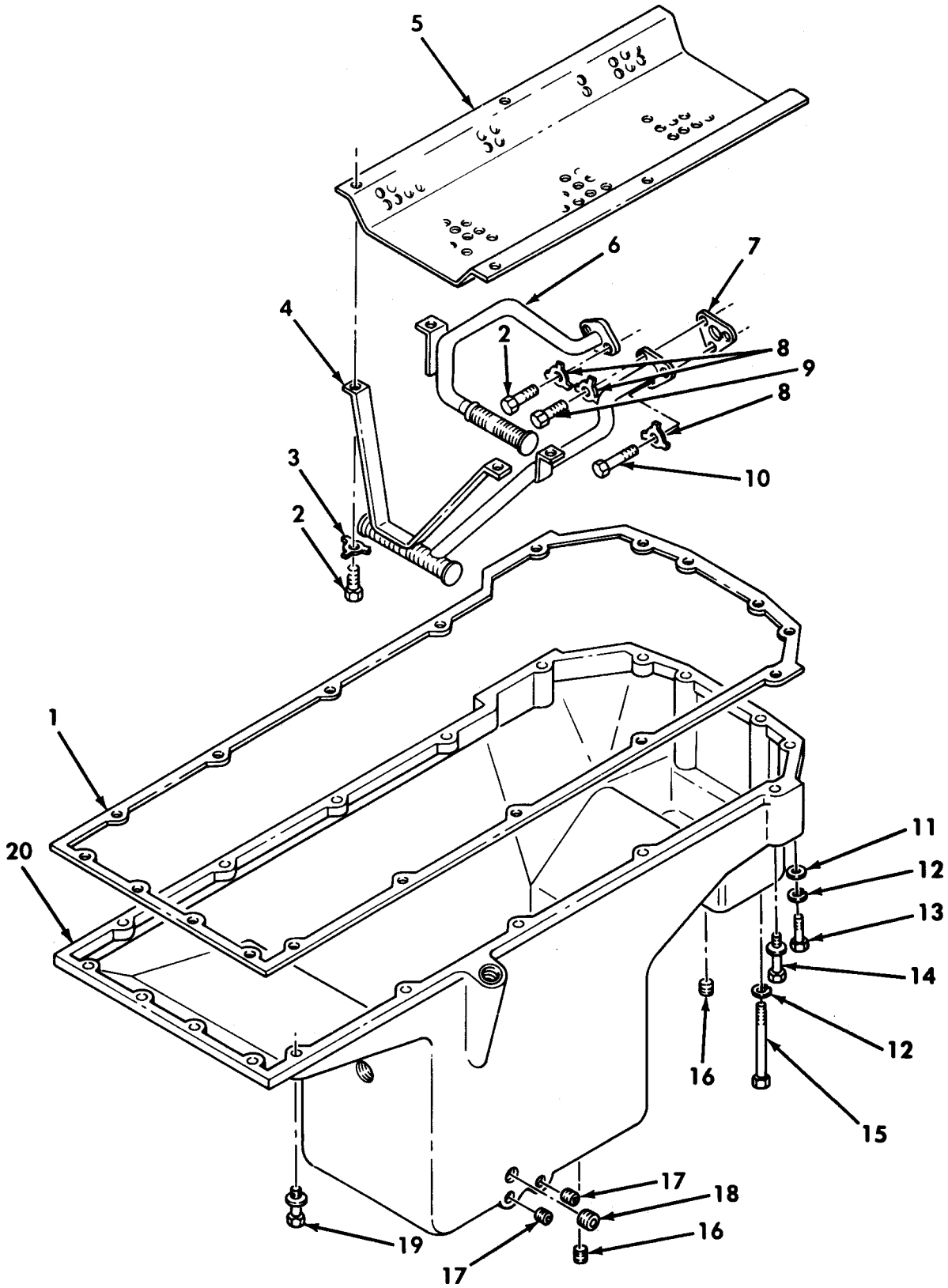


Figure 23. Oil Pan.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 23 OIL PAN						
1	PAFZZ	5330010604424	15434	196949	GASKET PART OF KIT P/N 3801539.....	1
2	PAFZZ	5305010102362	96906	MS18154-59	SCREW,CAP,HEXAGON H.....	6
3	PAFZZ	2815004068936	15434	109319	LOCK PLATE.....	4
4	PFFZZ	4710012300322	15434	213379	TUBE ASSEMBLY,METAL.....	1
* 5	PFFZZ	2815011860875	15434	300233600	BAFFLE,OIL PAN.....	1
* 6	PAFZZ	4710011937563	15434	AR0397300	TUBE ASSEMBLY,METAL.....	1
7	PAFZZ	5330013047794	15434	3063668	GASKET PART OF KIT P/N 3801539.....	2
8	PAFZZ	2815003539395	15434	68908	LOCK PLATE,LUBRICAT.....	5
9	PFFZZ	5305010291193	15434	S117	SCREW.....	2
10	PAFZZ	5305000914010	15434	S102D	SCREW,CAP,HEXAGON H.....	1
11	PAFZZ	5310005626558	15434	S626	WASHER,FLAT.....	4
12	PAFZZ	5310004079566	96906	MS35338-45	WASHER,LOCK.....	4
13	PAFZZ	5305011923334	15434	S119	SCREW,CAP,HEXAGON H.....	2
14	PAFZZ	5305011652345	15434	3012477	SCREW,ASSEMBLED WAS.....	2
15	PAFZZ	5306007215887	15434	69470	BOLT,MACHINE.....	2
16	PAOZZ	5365011858521	15434	69066	PLUG,MACHINE THREAD.....	2
17	PAFZZ	4730011615115	15434	3013786	PLUG,PIPE.....	4
18	PAOZZ	5342011436045	15434	3008470	PLUG.....	2
19	PAFZZ	5305010729021	15434	3011716	SCREW,ASSEMBLED WAS.....	12
* 20	PAFZZ	2815011901083	15434	301403800	OIL PAN.....	1

END OF FIGURE

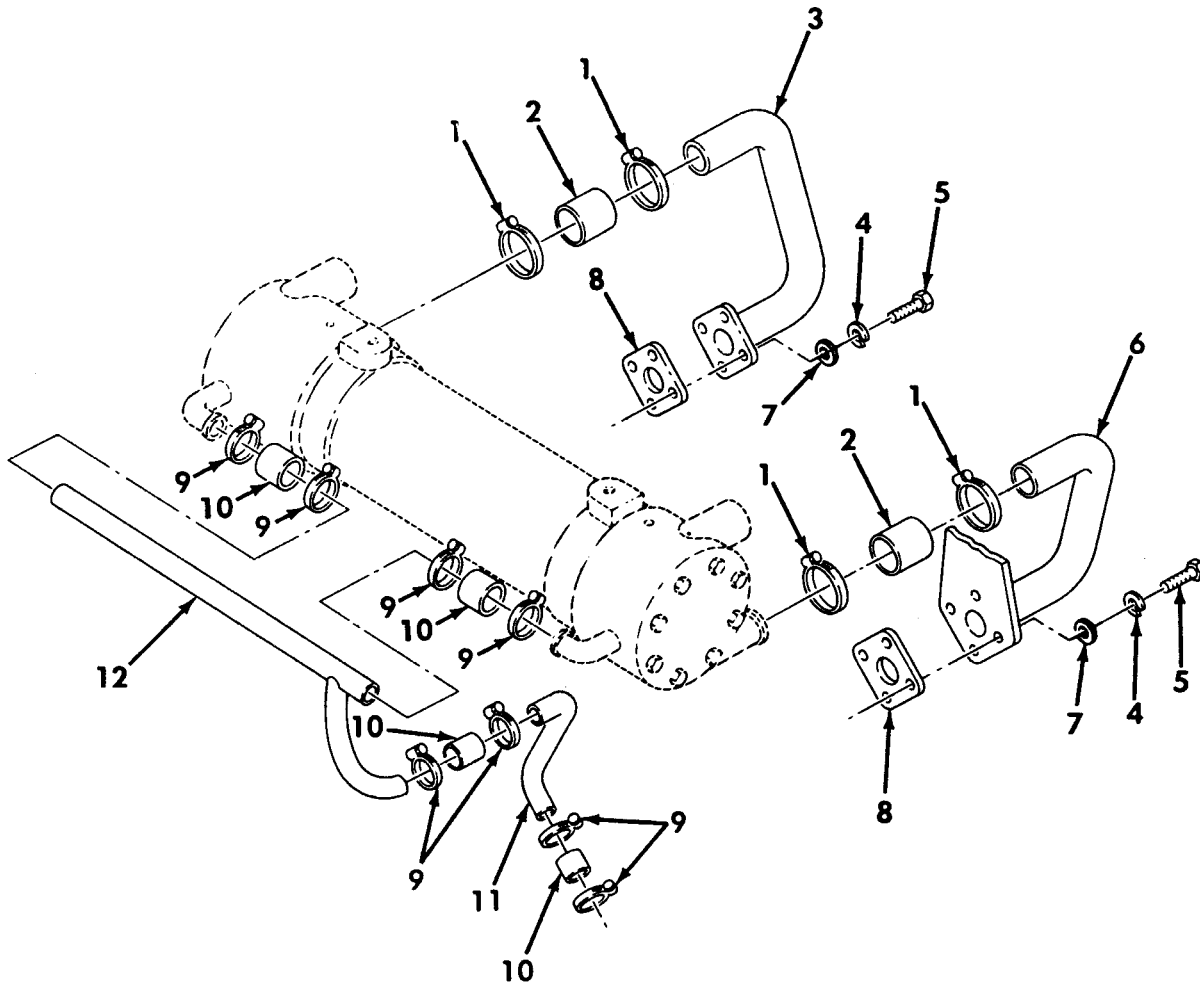


Figure 24. Engine Coolant Hoses and Clamps.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION FIG. 24 ENGINE COOLANT HOSE AND CLAMPS						
* 1	PAOZZ	4730009098627	01276	FF9311-36	CLAMP,HOSE.....	4
* 2	MOOZZ		81349	M62217/1-36-4	HOSE,NONMETALLIC MAKE FROM HOSE, NONMETALLIC, P/N A52546-IN BULK, 4 INCHES LONG.....	2
3	PFOZZ	4710012624995	15434	3047104	TUBE ASSEMBLY,METAL.....	1
4	PAOZZ	5310006379541	96906	MS35338-46	WASHER,LOCK.....	8
5	PAOZZ	5305006882111	80204	B1821BH038C138N	SCREW,CAP,HEXAGON H.....	8
6	PFOZZ	4710012624996	15434	3047103	TUBE ASSEMBLY,METAL.....	1
7	PAOZZ	5310001344169	15434	63842	WASHER,FLAT.....	8
8	PAOZZ	5330011867541	15434	189566	GASKET.....	2
9	PAOZZ	4730009083194	96906	MS35842-11	CLAMP,HOSE.....	8
* 10	MOOZZ		58536	A52546-IF BULK	HOSE,NONMETALLIC MAKE FROM HOSE, NONMETALLIC, P/N A52546-IF BULK, 4 INCHES LONG.....	4
11	PFOZZ	4710012625000	15434	3047106	TUBE,BENT,METALLIC.....	1
12	PFOZZ	4710012624999	15434	3047105	TUBE,BENT,METALLIC.....	1

END OF FIGURE

1 — 2
thru
16

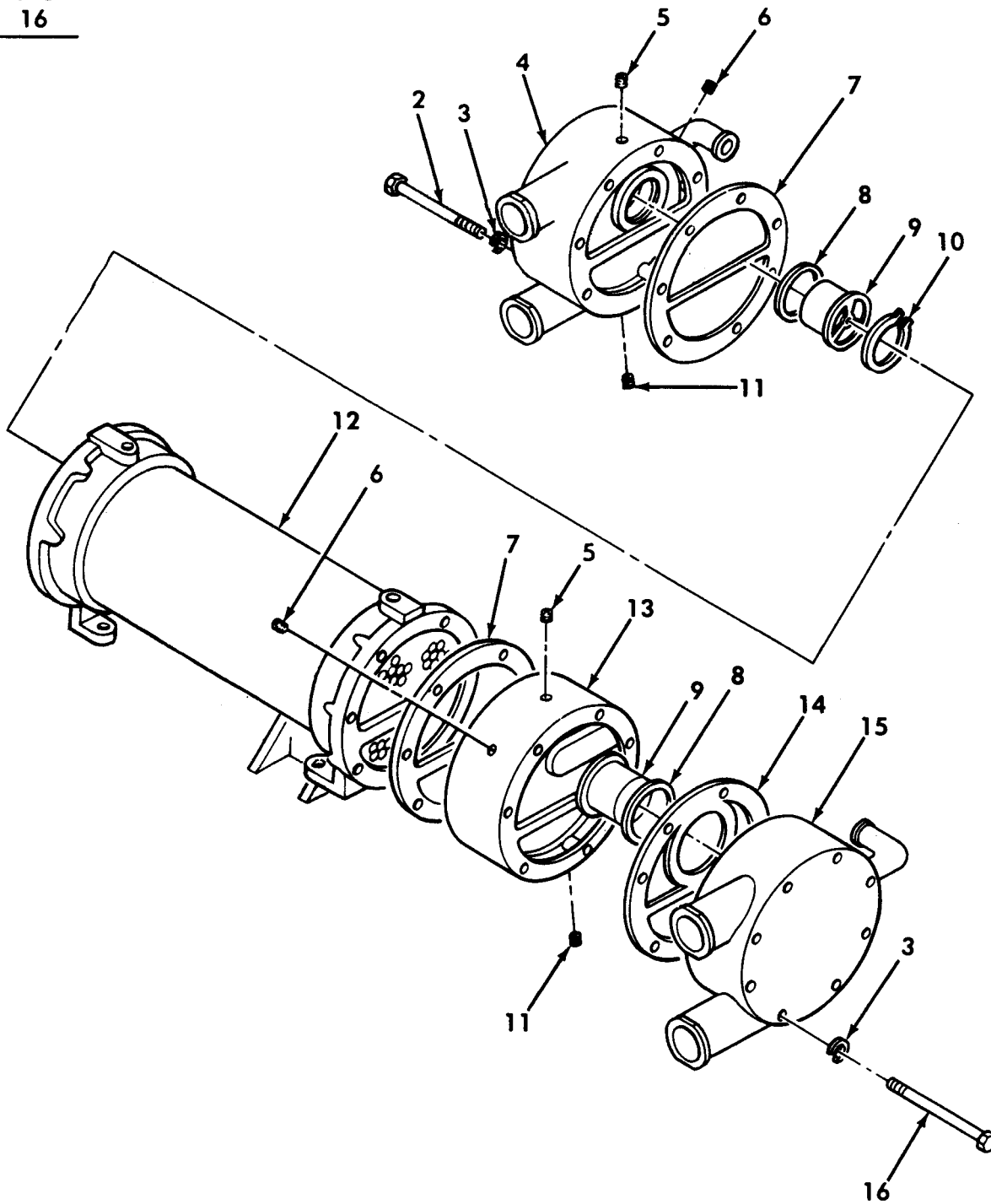


Figure 25. Transmission Oil Cooler with Engine Coolant Thermostats.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 25 TRANSMISSION OIL COOLER						
WITH ENGINE COOLANT THERMOSTATS						
* 1	PAOOO	2930012293431	15434	3043100	COOLER, LUBRICATING.....	1
2	PAOZZ	5305001658157	72582	450517	.SCREW, CAP, HEXAGON H.....	8
3	PAOZZ	5310002617340	15434	S604	.WASHER, LOCK.....	16
4	PAOZZ	2930011883220	15434	200749	.HOUSING, THERMOSTAT RIGHT BANK.....	1
5	PAOZZ	4730011603579	15434	S-910-B	.PLUG, PIPE.....	2
6	PAOZZ	4730008018186	15434	S915A	.PLUG, PIPE.....	2
7	PAOZZ	5330008869105	15434	107713	.GASKET.....	2
8	PAOZZ	5330008645422	15434	186780	.SEAL, THERMO.....	2
9	PAOZZ	6685011410907	15434	201737	.THERMOSTAT, FLOW CON.....	2
10	PAOZZ	5325011124302	15434	200757	.RING, RETAINING.....	1
11	PAOZZ	4730011284598	15434	67622	.PLUG, PIPE.....	2
12	PAOZZ	2935011883275	15434	3043099	.COOLER, LUBRICATING.....	1
13	PAOZZ	5340011858633	15434	200751	.COVER, ACCESS.....	1
14	PAOZZ	5330011867542	15434	200756	.GASKET.....	1
15	PAOZZ	2930011883219	15434	200748	.HOUSING, THERMOSTAT LEFT BANK.....	1
16	PAOZZ	5305005098103	15434	S170A	.SCREW, CAP, HEXAGON H.....	8

END OF FIGURE

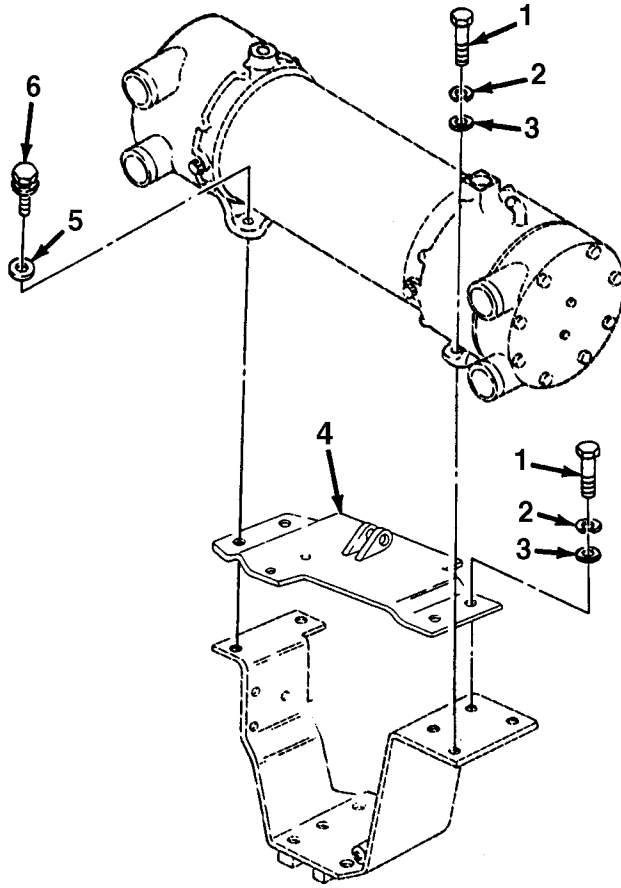


Figure 26. Transmission Oil Cooler, Mounting Bracket, and Related Parts.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 26 TRANSMISSION OIL COOLER,						
MOUNTING BRACKET, AND RELATED						
PARTS						
* 1	PAOZZ	5305000711787	80204	B1821BH044C113N	SCREW,CAP,HEXAGON H.....	4
* 2	PAOZZ	5310002090965	96906	MS35338-47	WASHER,LOCK.....	4
* 3	PAOZZ	5310008094085	96906	MS27183-16	WASHER,FLAT.....	4
* 4	PFOZZ	5340013760873	19207	12379515	BRACKET,MOUNTING.....	1
* 5	PAOZZ	5310011124306	15434	203760	WASHER,FLAT.....	2
* 6	PAOZZ	5306014393254	15434	206402	SCREW,CAP HEXAGON.....	2

END OF FIGURE

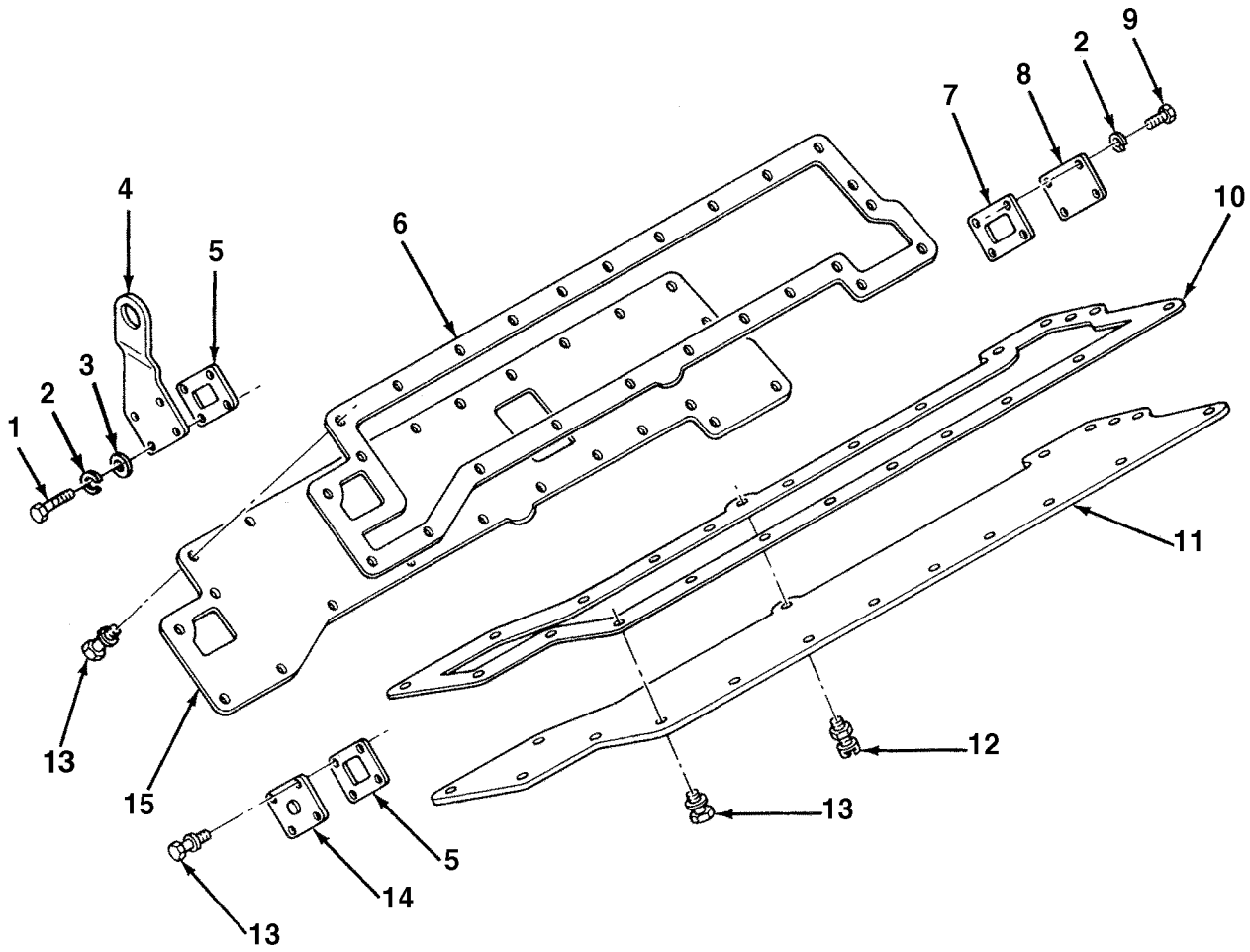


Figure 27. Water Headers.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 27 WATER HEADERS						
1	PAHZZ	5305000680511	80204	B1821BH038C125N	SCREW,CAP,HEXAGON H.....	4
* 2	PAHZZ	5310002617340	15434	S604	WASHER,LOCK.....	8
* 3	PAHZZ	5310001344169	15434	63842	WASHER,FLAT.....	4
* 4	PFHZZ	2540011892162	15434	189568	BRACKET,TOW HOOK.....	1
* 5	PAHZZ	5330010602986	15434	180381	GASKET PART OF KIT P/N 3013497 PART OF KIT P/N 3801539.....	2
* 6	PAHZZ	5330011132202	15434	179306	GASKET PART OF KIT P/N 3801539.....	1
* 7	PAHZZ	5330011117405	15434	182459	GASKET PART OF KIT P/N 3801539.....	1
* 8	PFHZZ	5340011867187	15434	151249	COVER,ACCESS.....	1
* 9	PAHZZ	5305009422196	80204	B1821BH038C100D	SCREW,CAP,HEXAGON H.....	4
* 10	PAHZZ	5330011132203	15434	179427	GASKET PART OF KIT P/N 3801539.....	1
* 11	PFHZZ	5340011858632	15434	3002194	COVER,ACCESS LEFT BANK.....	1
* 12	PAHZZ	4820012146905	09505	322-E	COCK,DRAIN.....	1
* 13	PAHZZ	5305010858197	15434	3010595	SCREW,MACHINE.....	38
* 14	PFHZZ	5340011867188	15434	187437	COVER,ACCESS.....	1
* 15	PFHZZ	2815011472207	15434	3014211	PLATE,WATER HEADDUC RIGHT BANK.....	1

END OF FIGURE

2—
3
thru
15

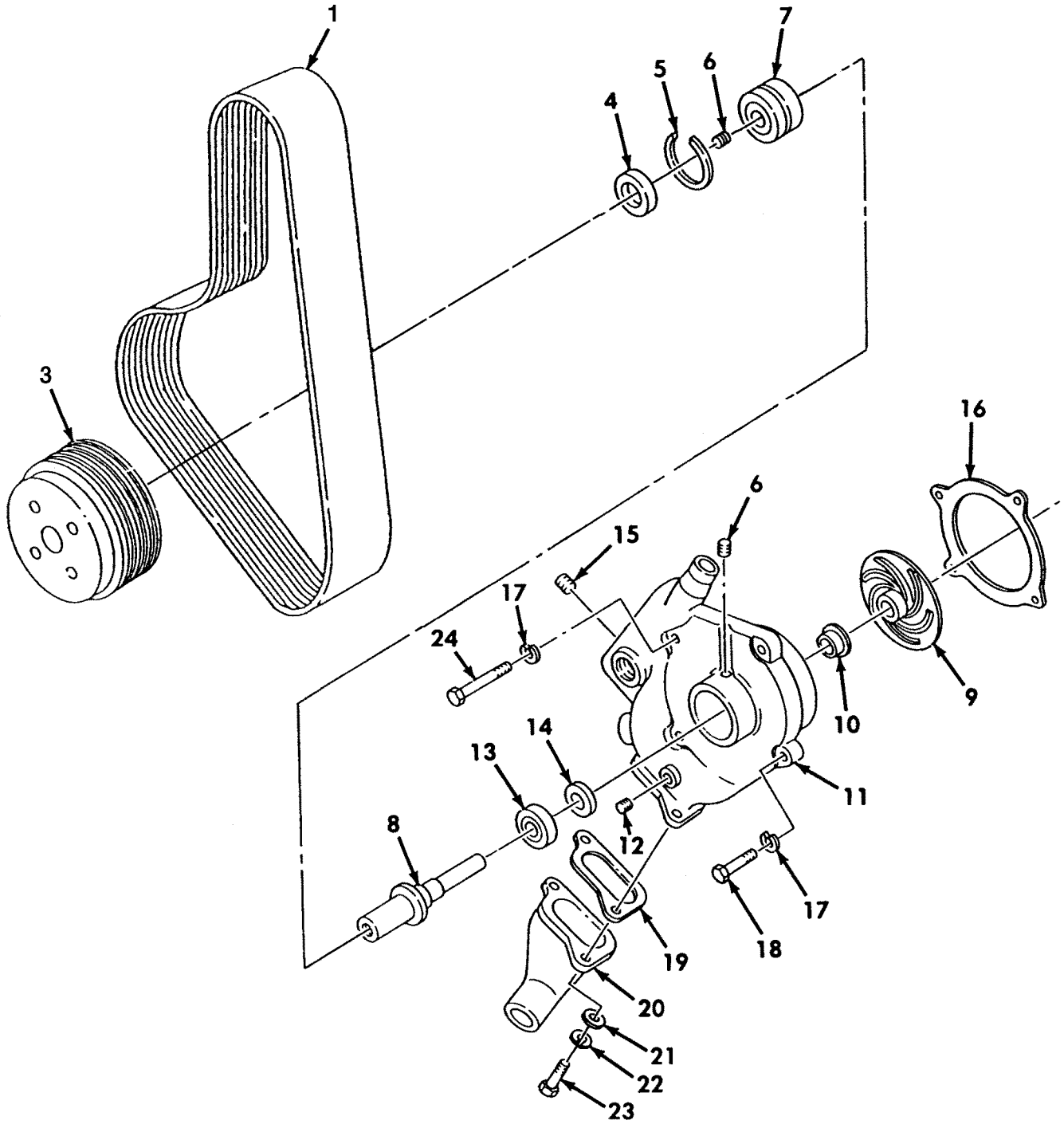


Figure 28. Coolant Pump and Belts.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 28 COOLANT PUMP AND BELTS						
* 1	PAOZZ	3030012915838	81300	615K8	BELT, FLAT.....	1
* 2	PAOFF	2930014436993	15434	3086457	PUMP, COOLING SYSTEM.....	1
* 3	PFFZZ	3020014566283	15434	3086431	.PULLEY, GROOVE.....	1
4	PAFZZ	5330011121527	15434	3039000	.SEAL, PLAIN ENCASED.....	1
* 5	PAFZZ	2815010672327	15434	7018300	.RING, PISTON.....	1
6	PAFZZ	5365007166580	15434	68606	.PLUG, MACHINE THREAD.....	2
7	PAFZZ	3110001564699	15434	S16067	.BEARING, BALL, ANNULA.....	1
* 8	PFFZZ	3040011101209	15434	305416000	.SHAFT, SHOULDERED.....	1
* 9	PFFZZ	2930011099946	15434	300248300	.IMPELLER, PUMP, CENTR.....	1
10	PAFZZ	5330000050407	15434	3071085	.PACKING WITH RETAIN.....	1
11	XAFZZ		15434	196960	.BODY.....	1
12	PAFZZ	4730000189566	15434	S911B	.PLUG, PIPE.....	1
13	PAFZZ	3110005545243	15434	S16002	.BEARING, BALL, ANNULA.....	1
* 14	PAFZZ	5330013267442	15434	3038999	.SEAL, PLAIN.....	1
* 15	PAFZZ	4730011997780	15434	300215800	.PLUG, PIPE.....	1
16	PAOZZ	5330011132200	15434	189582	GASKET PART OF KIT P/N 3801539.....	1
17	PAOZZ	5310002617340	15434	S604	WASHER, LOCK.....	4
18	PAOZZ	5306010291191	15434	199919	BOLT, MACHINE.....	2
19	PAOZZ	5330012457595	15343	3068575	GASKET.....	1
20	PAOZZ	4730013438430	19207	12332596	ELBOW, FLANGE TO HOS.....	1
21	PAOZZ	5310008094085	96906	MS27183-16	WASHER, FLAT.....	2
22	PAOZZ	5310002090965	96906	MS35338-47	WASHER, LOCK.....	2
23	PAOZZ	5305000711786	80204	B1821BH044C100N	SCREW, CAP, HEXAGON H.....	2
24	PAOZZ	5306001636585	15434	172640	BOLT, MACHINE.....	2

END OF FIGURE

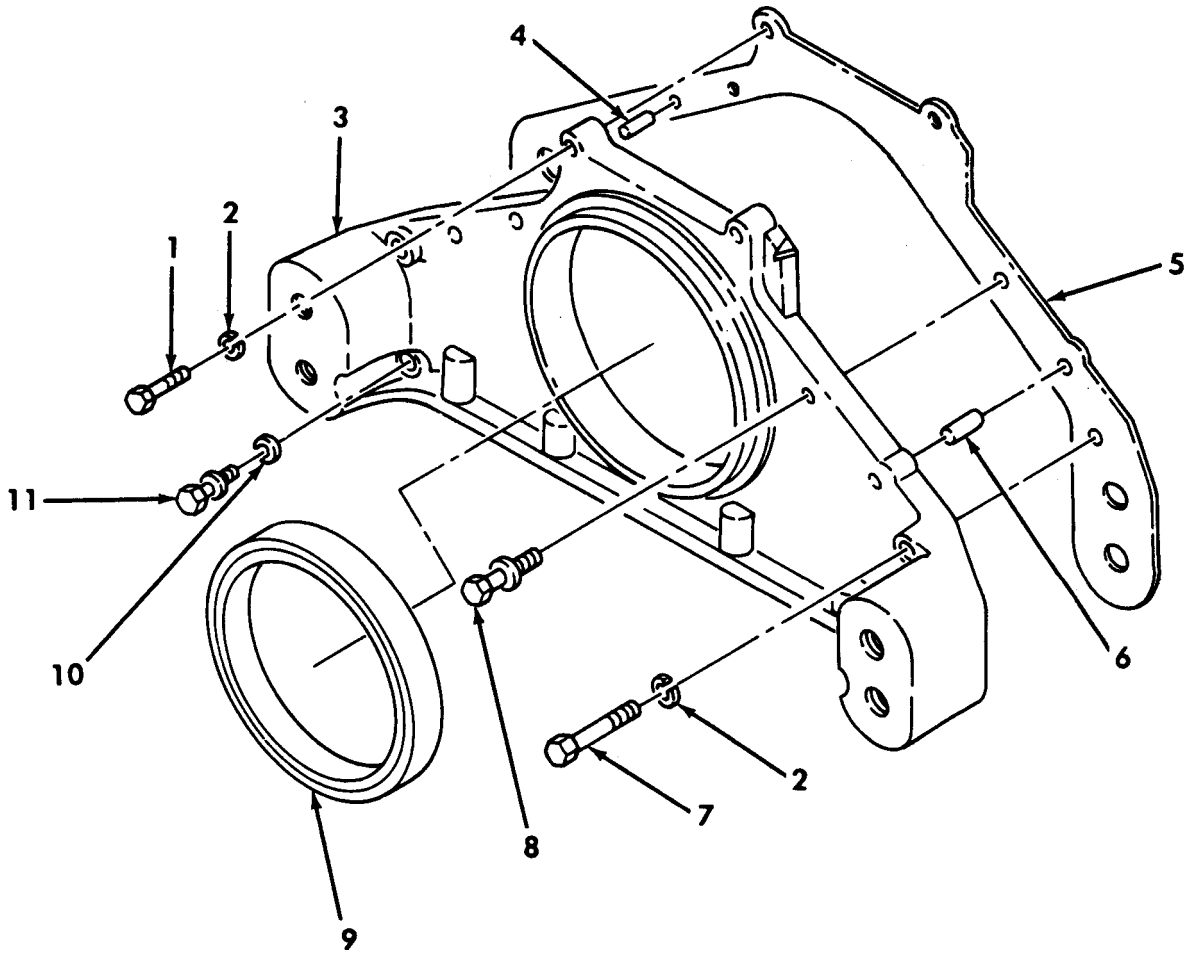


Figure 29. Front Cover.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 29 FRONT COVER						
1	PAHZZ	5305000711788	80204	B1821BH044C125N	SCREW,CAP,HEXAGON H.....	2
2	PAHZZ	5310002090965	96906	MS35338-47	WASHER,LOCK.....	2
3	PFHZZ	2815012419151	15434	3052213	COVER,FRONT.....	1
4	PAHZZ	5315001043637	15434	69562	PIN,STRAIGHT,HEADLE.....	1
5	PAHZZ	5330011132199	15434	213512	GASKET PART OF KIT P/N 3801539.....	1
6	PAHZZ	5315007194598	15434	68568	PIN,STRAIGHT,HEADED.....	1
7	PAHZZ	5305007576361	15434	S113	SCREW,CAP,HEXAGON H.....	2
8	PAHZZ	5305011146386	15434	3012483	SCREW,CAP,HEXAGON H.....	2
9	PAHZZ	5330011652287	15434	3020184	SEAL,PLAIN ENCASED PART OF KIT P/N 3801539.....	1
10	PAHZZ	5310012001318	15434	S608	WASHER,LOCK.....	2
11	PAHZZ	5305010728818	15434	3012471	SCREW.....	2

END OF FIGURE

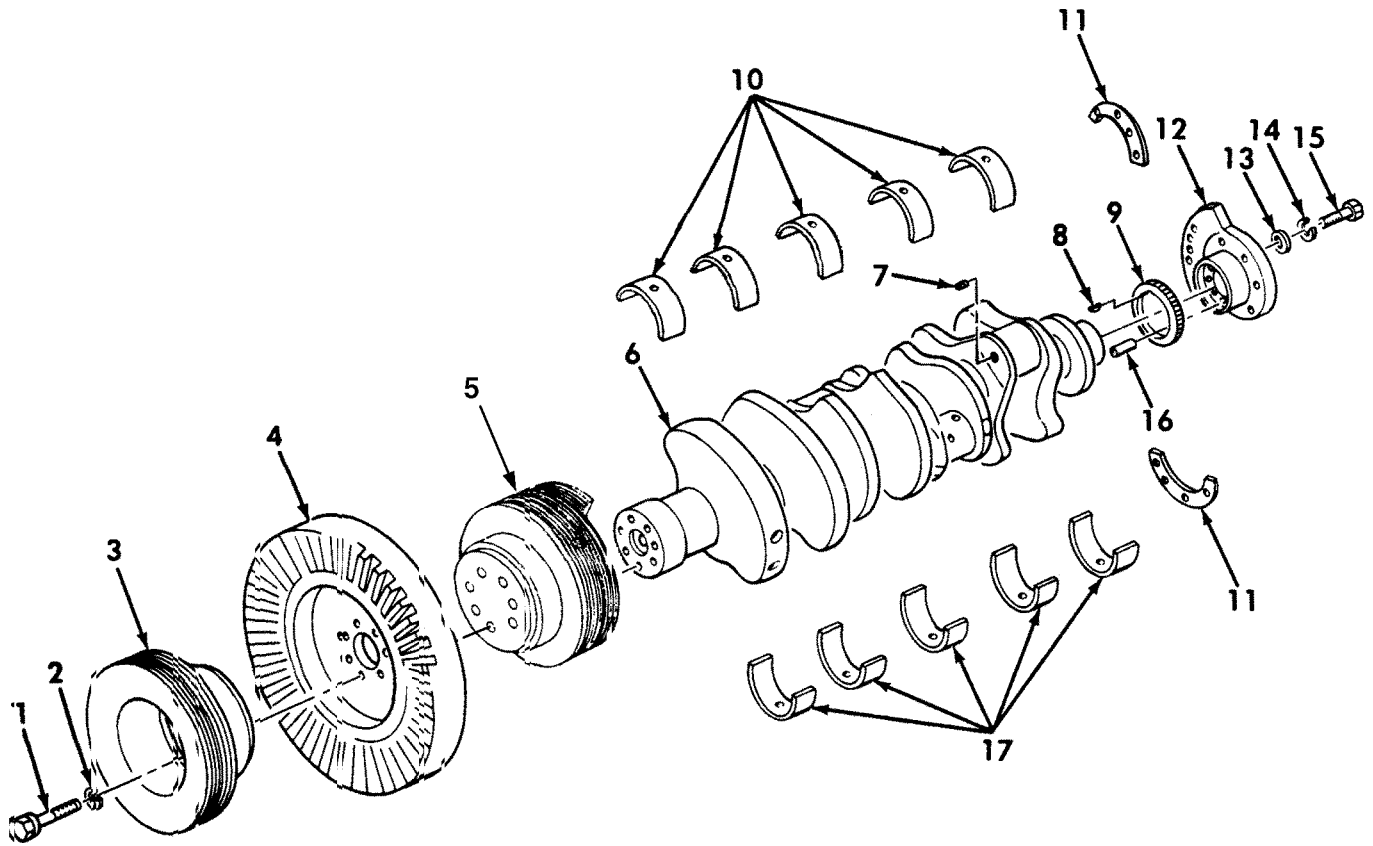


Figure 30. Crankshaft.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY	
GROUP AUA2: POWERTRAIN INSTALLATION FIG. 30 CRANKSHAFT							
1	PAOZZ	5306014401444	15434	193792	BOLT,MACHINE.....	7	
2	PAOZZ	5310008206653	15434	S603	WASHER,LOCK.....	7	
3	PAOZZ	3020012428095	19207	12357256	PULLEY,GROOVE.....	1	
4	PAOZZ	2815011272339	15434	195327	DAMPENER,VIBRATION,.....	1	
*	5	PAOZZ	3020014337092	19207	12379513	PULLEY,GROOVE.....	1
6	PAHDD	2815011085384	15434	214940	CRANKSHAFT,ENGINE.....	1	
7	PAHZZ	4730000189566	15434	S911B	PLUG,PIPE.....	4	
8	PAHZZ	5315000624395	15434	144131	KEY,WOODRUFF.....	1	
9	PAHZZ	3020010400167	15434	17946400	GEAR,SPUR.....	1	
* 10	PAHZZ	3120010605967	15434	AR03640	BEARING SET,SLEEVE STD PART OF KIT P/N AR03640.....	5	
* 10	PAHZZ	3120011222498	15434	AR03641	BEARING SET,SLEEVE .010 OVS PART OF KIT P/N AR03641.....	5	
* 10	PAHZZ	3120011222499	15434	AR03642	BEARING SET,SLEEVE .020 OVS PART OF KIT P/N AR03642.....	5	
* 10	KFHZZ		15434	193663	BEARING,MAIN .030 OVS PART OF KIT P/N AR03643.....	5	
* 11	PFHZZ	3120011524261	15434	AR03643	BEARING SET,SLEEVE STD PART OF KIT P/N AR03640, PART OF KIT P/N AR03641, PART OF KIT P/N AR03642, PART OF KIT P/N AR03643.....	4	
* 12	PAHZZ	2990011289635	15434	21563300	ADAPTER,FLYWHEEL HO.....	1	
13	PAHZZ	5310005626557	15434	S622	WASHER,FLAT.....	7	
14	PAHZZ	5310002090965	96906	MS35338-47	WASHER,LOCK.....	7	
15	PAHZZ	5306011124277	15434	183122	BOLT,MACHINE.....	7	
16	PAHZZ	5315001043637	15434	69562	PIN,STRAIGHT,HEADLE.....	2	
* 17	PAHZZ	3120010605967	15434	AR03640	BEARING SET,SLEEVE STD PART OF KIT P/N AR03640.....	5	
* 17	PAHZZ	3120011222498	15434	AR03641	BEARING SET,SLEEVE .010 OVS PART OF KIT P/N AR03641.....	5	
* 17	PAHZZ	3120011222499	15434	AR03642	BEARING SET,SLEEVE .020 OVS PART OF KIT P/N AR03642.....	5	
17	KFHZZ		15434	193673	BEARING,MAIN .030 OVS PART OF KIT P/N AR03643.....	5	

END OF FIGURE

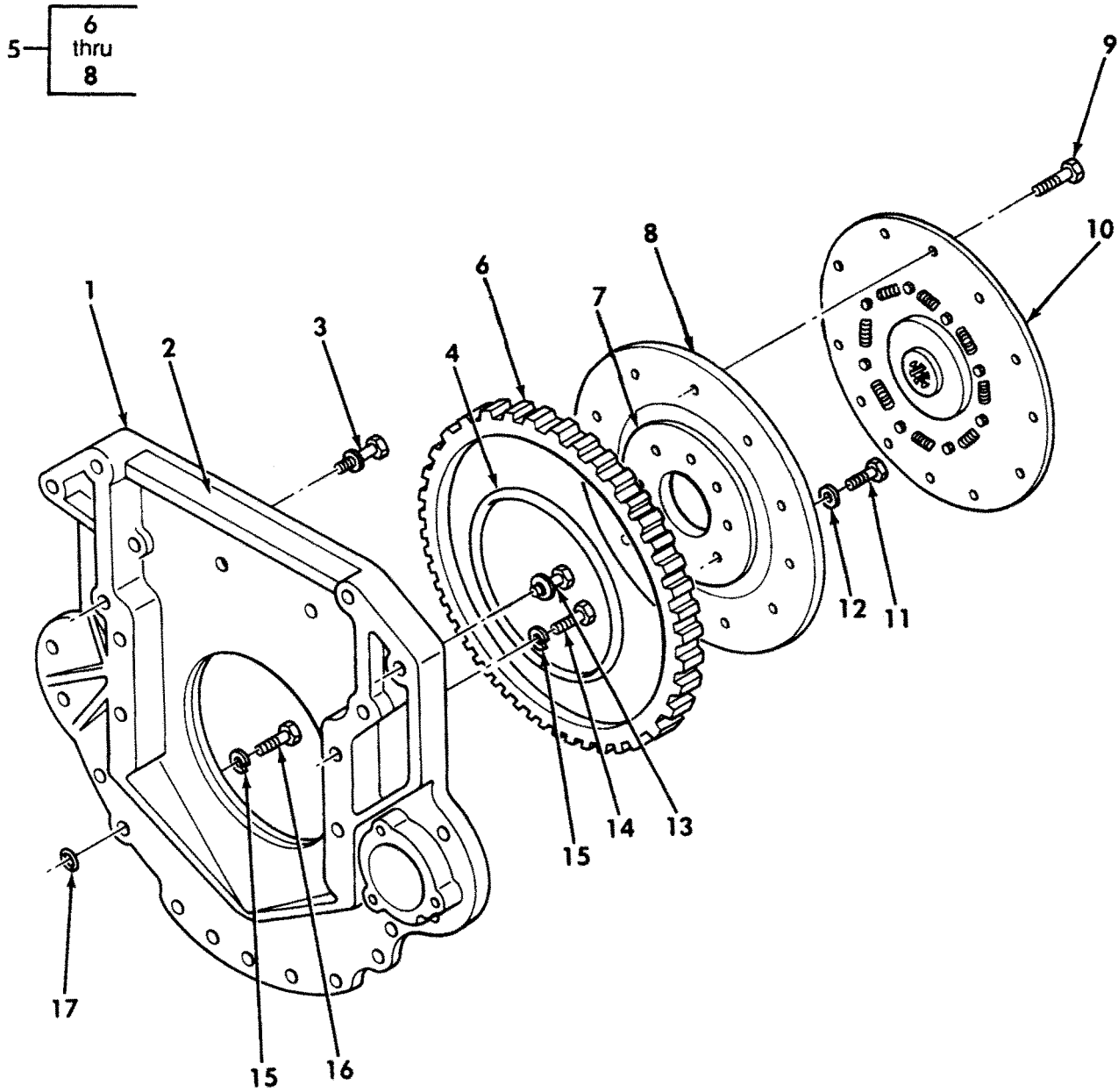


Figure 31. Flywheel and Damper.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 31 FLYWHEEL AND DAMPER						
* 1	PAFZZ	3040011913861	15434	21337800	HOUSING,MECHANICAL.....	1
* 2	PAFZZ	9320011094736	15434	179301	RUBBER STRIP.....	1
* 3	PAFZZ	5305011478732	15434	3012481	SCREW,CAP,HEXAGON H.....	2
* 4	PAFZZ	5330011439201	15434	200731	PACKING,PREFORMED.....	1
* 5	PAFFF	2815011877164	15434	303931100	FLYWHEEL,ENGINE.....	1
* 6	PAFZZ	3020005285053	15434	4797	.GEAR,SPUR.....	1
* 7	PAFZZ	3120011119323	15434	3015176	.BUSHING,SLEEVE.....	1
* 8	XAFZZ		15434	3011269	.FLYWHEEL.....	1
9	PAFZZ	5305007215492	80204	B1821BH038C063N	SCREW,CAP,HEXAGON H.....	12
* 10	PAFZZ	2520012319279	75958	105-10116	PLATE,DAMPER,TRANSM.....	1
* 11	PAFZZ	5305007959336	15434	204165	SCREW,CAP.....	8
12	PAFZZ	5310001344171	15434	200861	WASHER,FLAT.....	10
* 13	PAFZZ	5305011130535	15434	108708	SCREW,CAP,HEXAGON H.....	2
* 14	PAFZZ	5305011867647	15434	3003267	SCREW,CAP,SOCKET HE.....	4
* 15	PAFZZ	5310002090965	96906	MS35338-47	WASHER,LOCK.....	8
* 16	PAFZZ	5305000695582	96906	MS90725-98	SCREW,CAP,HEXAGON H.....	4
17	PAFZZ	5330002502169	15434	193501	PACKING,PREFORMED.....	10

END OF FIGURE

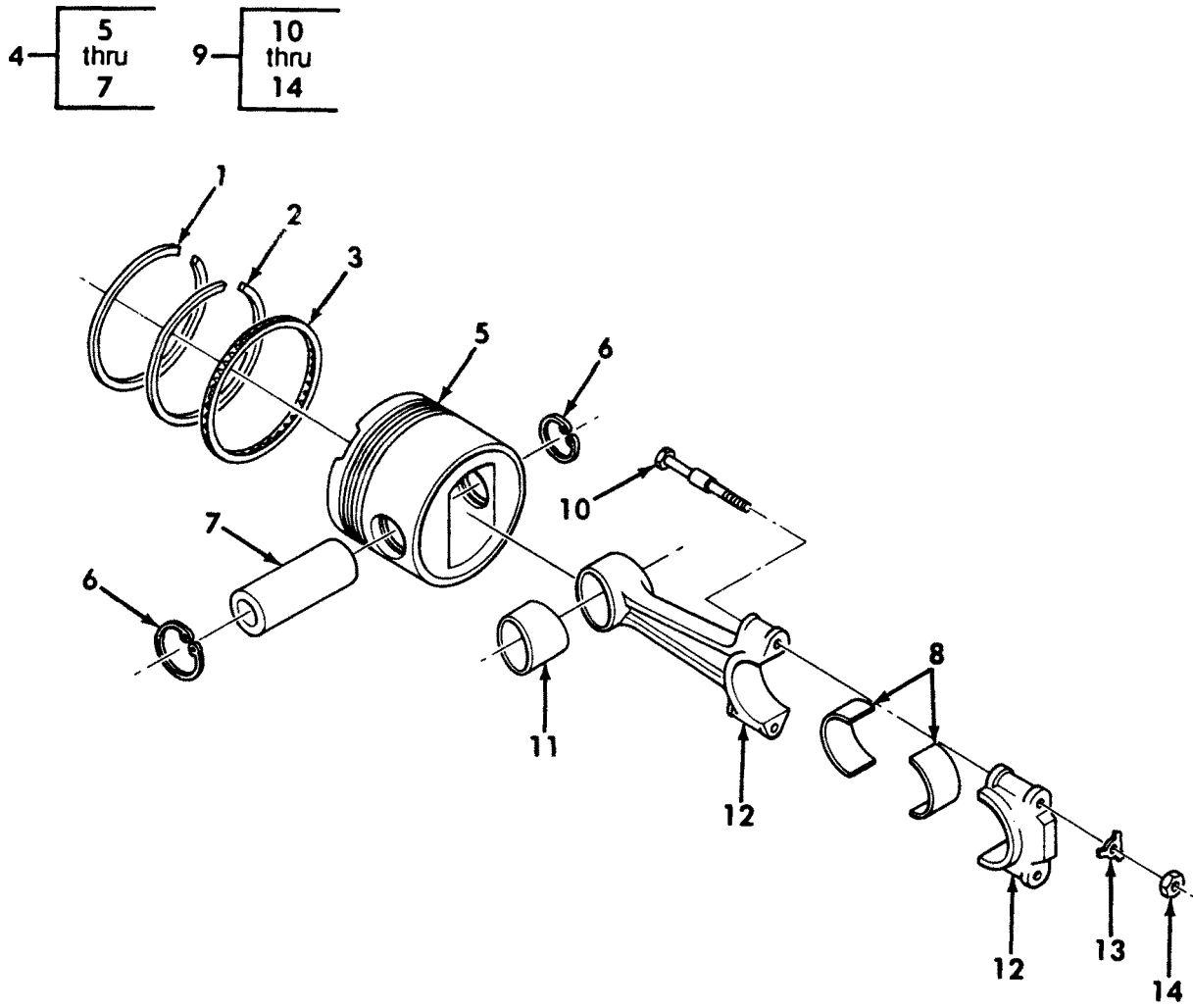


Figure 32. *Pistons and Connecting Rods.*

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 32 PISTONS AND CONNECTING RODS						
* 1	PAHZZ	2815011434140	15434	218025	RING,PISTON PART OF KIT P/N AR11930.	
* 2	PAHZZ	2815011455547	15434	216983	RING,PISTON PART OF KIT P/N AR11930.	1
* 3	KFHZZ		15434	3064398	RING,OIL,PISTON PART OF KIT P/N AR11930.....	1
4	PFHZZ	2815011872541	15434	3019287	PISTON,INTERNAL COM.....	8
* 5	PAHZZ		15434	3037413	PISTON,REACTION CYL PART OF P/N 3019287.....	1
* 6	PAHZZ	5325000624372	15434	155267	RING,RETAINING PART OF P/N 3019287.	2
* 7	PFHZZ	2815011272590	15434	21539000	PIN,PISTON PART OF P/N 3019287.....	1
8	PFHZZ	3120011224768	15434	189771	BEARING,SLEEVE .010.....	V
8	PFHZZ	3120011220861	15434	189772	BEARING HALF,SLEEVE .020.....	V
* 9	PFHZZ	2815011094778	15434	3073579	CONNECTING ROD,PIST.....	8
* 10	PAHZZ	5306009092491	15434	3071471	BOLT,EXTERNALLY REL PART OF P/N 3073579.....	2
* 11	PFHZZ	3120008151412	15434	189763	BUSHING,PISTON PIN PART OF P/N 3073579.....	1
* 12	XAHZZ		15434	189761	ROD PART OF P/N 3073579.....	1
* 13	PAHZZ	5310000629566	15434	139950	WASHER,KEY PART OF P/N 3073579.....	2
* 14	PAHZZ	5310000626632	15434	139438	NUT,PLAIN,HEXAGON PART OF P/N 3073579.....	2

END OF FIGURE

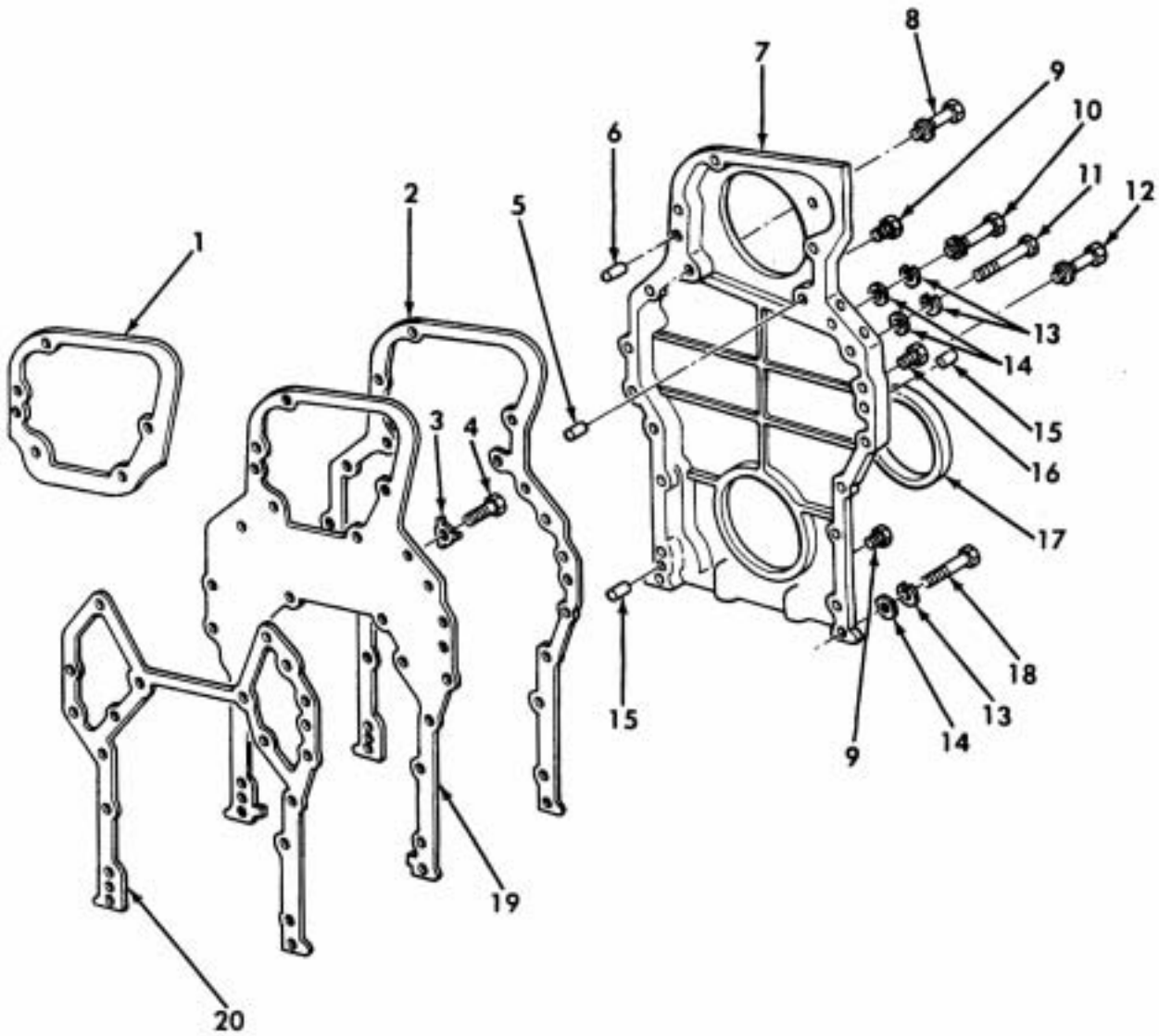


Figure 33. Rear Cover.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 33 REAR COVER						
1	PAHZZ	5330011117404	15434	169992	GASKET.....	1
* 2	PAHZZ	5330010975851	15434	3084245	GASKET PART OF KIT P/N 3801539.....	1
3	PAHZZ	2815003539395	15434	68908	LOCK PLATE,LUBRICAT.....	4
4	PAHZZ	5305010102362	96906	MS18154-59	SCREW,CAP,HEXAGON H.....	4
5	PAHZZ	3120011117419	15434	170833	BUSHING,SLEEVE.....	1
6	PAHZZ	5315001043637	15434	69562	PIN,STRAIGHT,HEADLE.....	1
* 7	PFHZZ	3040011698387	15434	3160999	HOUSING,MECHANICAL.....	1
8	PAHZZ	5305010867036	15434	3010597	SCREW.....	2
9	PAHZZ	4730009541281	15434	3008466	PLUG,PIPE.....	2
10	PAHZZ	5305011652345	15434	3012477	SCREW,ASSEMBLED WAS.....	1
11	PAHZZ	5305001775552	15434	S126	SCREW,CAP,HEXAGON H.....	2
12	PAHZZ	5305010729021	15434	3011716	SCREW,ASSEMBLED WAS.....	8
13	PAHZZ	5310002617340	15434	S604	WASHER,LOCK.....	4
14	PAHZZ	5310000806004	96906	MS27183-14	WASHER,FLAT.....	7
15	PAHZZ	5315008150530	15434	102957	DOWEL,HOUSING.....	2
16	PAHZZ	4730011060202	15434	3008469	PLUG,PIPE.....	1
17	PAHZZ	5330011117389	15434	3002356	SEAL,PLAIN ENCASED.....	1
18	PAHZZ	5305000914010	15434	S102D	SCREW,CAP,HEXAGON H.....	2
19	PFHZZ	5340011096662	15434	179298	COVER,ACCESS.....	1
20	PAHZZ	5330011175876	15434	179297	GASKET PART OF KIT P/N 3801539.....	1

END OF FIGURE

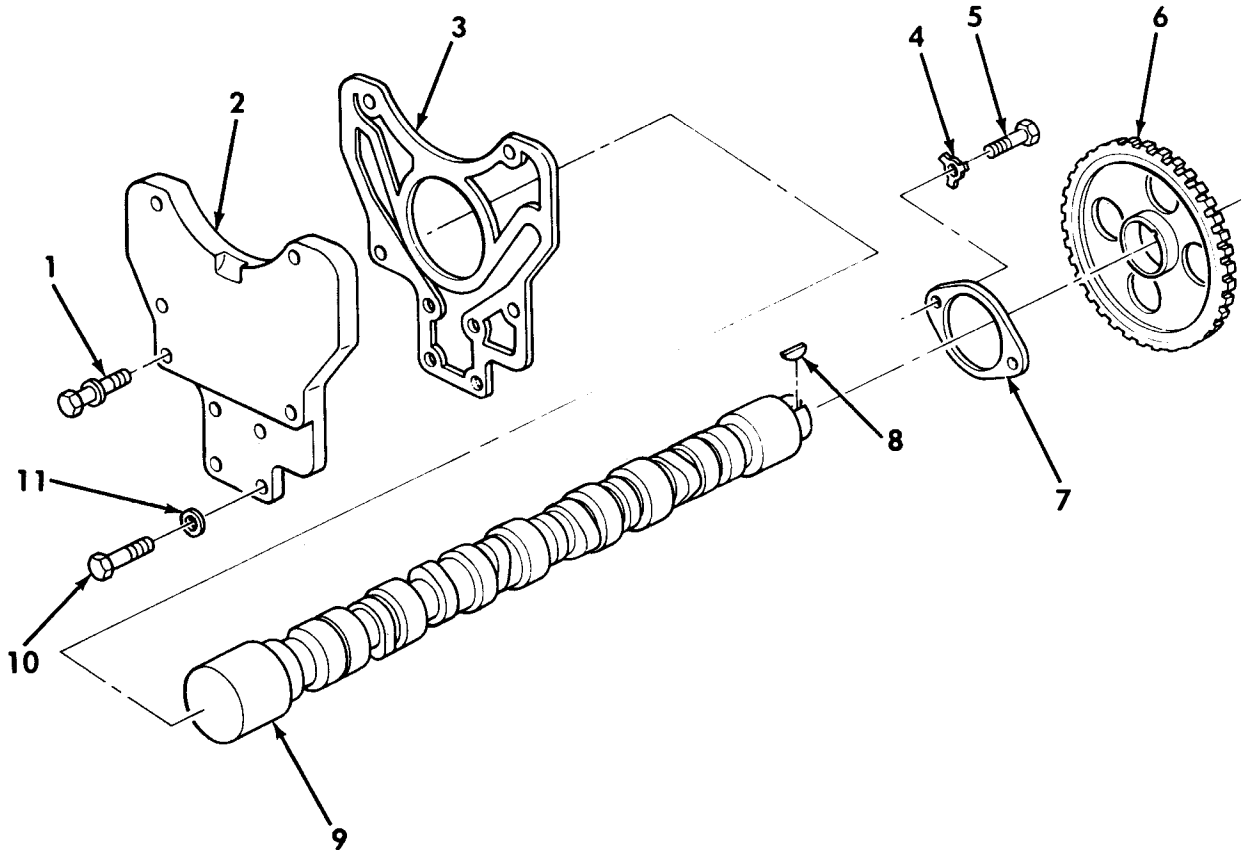


Figure 34. Camshaft.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 34 CAMSHAFT						
1	PAHZZ	5305010729021	15434	3011716	SCREW,ASSEMBLED WAS.....	4
2	PFHZZ	2815011091774	15434	193919	COVER,CAMSHAFT.....	1
3	PAHZZ	5330011127772	15434	189545	GASKET PART OF KIT P/N 3801539.....	1
4	PAHZZ	2940004596558	15434	175282	PLATE,LOCK.....	2
5	PAHZZ	5305010102362	96906	MS18154-59	SCREW,CAP,HEXAGON H.....	2
* 6	PAHZZ	3020010949350	15434	17946300	GEAR CAMSHAFT.....	1
7	PAHZZ	3040009092481	15434	169747	BRACKET,EYE,ROTATIN.....	1
8	PAHZZ	5315006165501	96906	MS35756-20	KEY,WOODRUFF.....	1
9	PAHZZ	2815011924586	15434	3005822	CAMSHAFT,ENGINE.....	1
10	PAHZZ	5305005432419	15434	S172B	SCREW,CAP,HEXAGON H.....	4
11	PAHZZ	5310006843463	96906	MS51092-1	WASHER,FLAT.....	4

END OF FIGURE

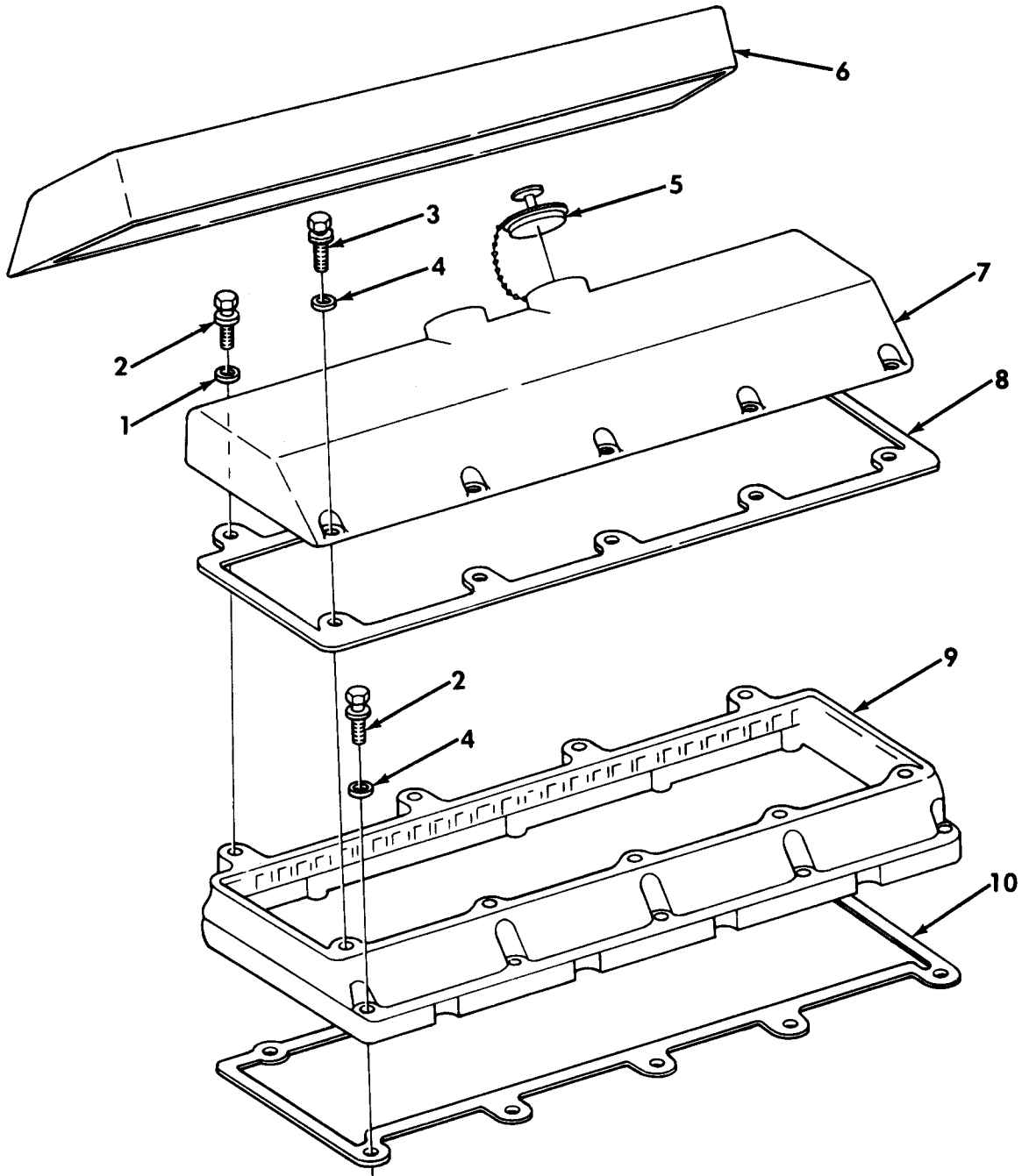


Figure 35. Cylinder Head Covers.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 35 CYLINDER HEAD COVERS						
1	PAOZZ	5310000806004	96906	MS27183-14	WASHER,FLAT.....	8
2	PAOZZ	5305011376706	15434	3012473	SCREW.....	28
3	PAOZZ	5305011294217	15434	3014766	CAPSCREW AND WASHER.....	10
4	PAOZZ	5310001344169	15434	63842	WASHER,FLAT.....	30
5	PAOZZ	2590011092075	15434	3005150	CAP,FILLER OPENING.....	1
* 6	PAOZZ	2815011883265	15434	3065413	COVER,ENGINE POPPET PLAIN.....	1
* 7	PAOZZ	2815011091318	15434	3074615	COVER,ENGINE POPPET WITH OIL FILL..	1
8	PAOZZ	5330011438208	15434	3028673	GASKET PART OF KIT P/N 3013497 PART OF KIT P/N 3801539.....	2
* 9	PAOZZ	3040010910485	15434	308834800	HOUSING,MECHANICAL.....	2
10	PAOZZ	5330011438209	15434	3026315	GASKET PART OF KIT P/N 3013497 PART OF KIT P/N 3801539.....	2

END OF FIGURE

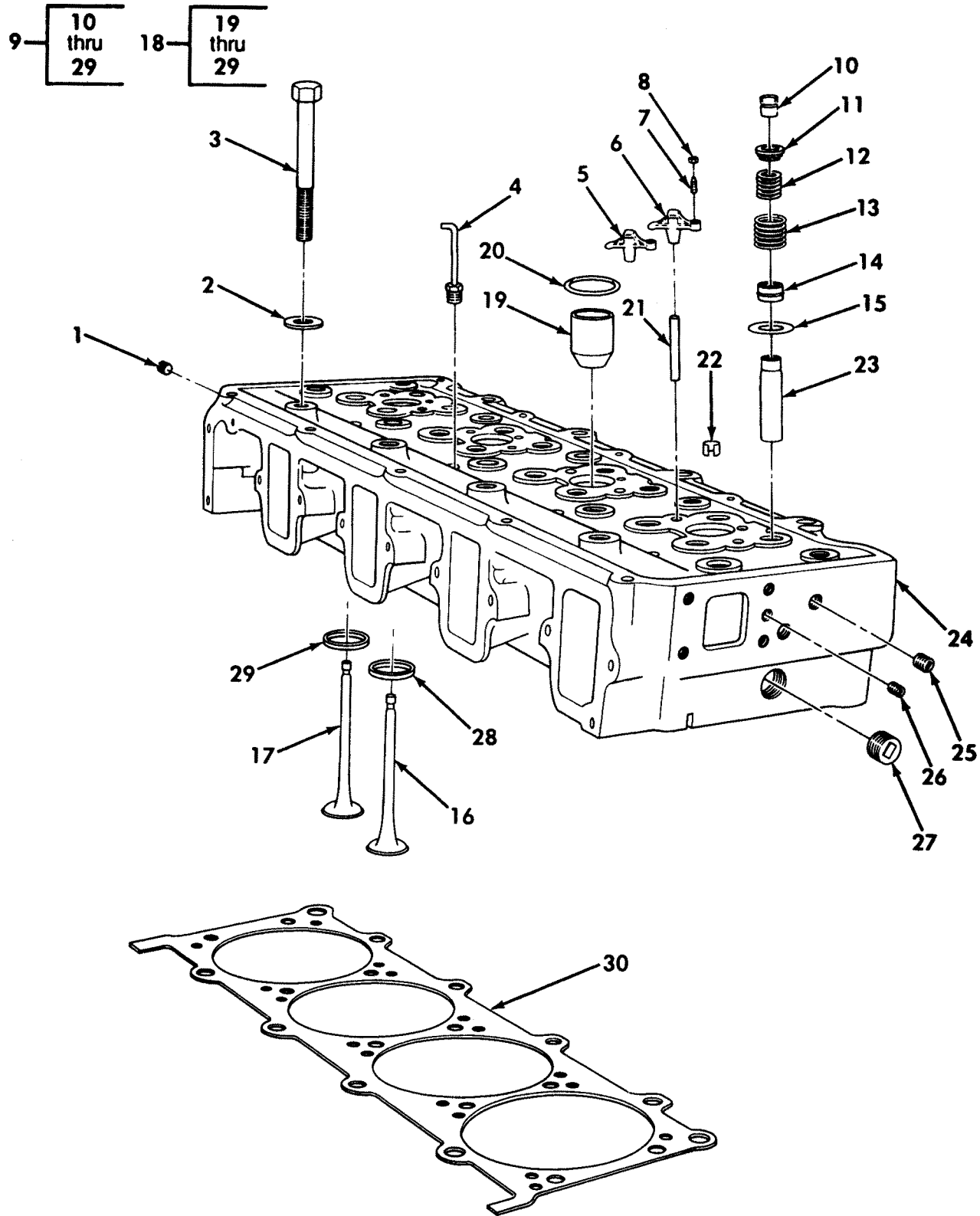


Figure 36. Cylinder Head, Valves, and Guides.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 36 CYLINDER HEAD, VALVES, AND GUIDES						
1	PAFZZ	4730000113175	15434	70295	PLUG, PIPE.....	4
*	2	PAFZZ	5310002858833	17576 538174	WASHER, FLAT.....	26
3	PAFZZ	5305010724270	15434	177734	SCREW.....	26
4	XBHZZ		15434	3043438	TUBE ASSEMBLY, METAL.....	4
5	PAFZZ	2815000857438	15434	215871	CROSSHEAD, EXHAUST V.....	8
6	PAFZZ	2815013217030	15434	AR45632	VALVE, CROSSHEAD.....	8
7	PAFZZ	5305000624378	15434	147389	SETSCREW.....	16
8	PAFZZ	5310004263990	15434	203131	NUT, CROSS HD.....	16
9	PAFDD	2815011085385	15434	AR11171	CYLINDER HEAD, DIESE.....	2
10	PAFZZ	5342011436048	15434	127554	. HALF-COLLET.....	32
11	PAFZZ	2815010662962	15434	146733	. GUIDE, VALVE STEM.....	16
12	PAFZZ	5360010678439	15434	146732	. SPRING, HELICAL, COMP.....	16
13	PAFZZ	5360010678438	15434	146731	. SPRING, HELICAL, COMP.....	16
14	PAFZZ	5330009944435	15434	156641	. SEAL, PLAIN.....	8
15	PAHZZ	5365011121545	15434	212504	. SHIM.....	16
16	PAFZZ	2815011093034	15434	216707	. VALVE, POPPET, ENGINE INTAKE.....	8
*	17	PAFZZ	2815009944437	31033 V1624X	. VALVE, POPPET, ENGINE EXHAUST.....	8
*	18	XAHHH	15434	AR11085	. CYLINDER HEAD, DIESE.....	1
19	PAHZZ	2910011460048	15434	3011934	. SLEEVE, COOLING, FUEL.....	4
*	20	PAHZZ	5331010724436	15434 3007759	. O-RING.....	4
21	PAHZZ	5315008665015	15434	123558	. PIN, STRAIGHT, HEADLE.....	8
22	PAHZZ	5365011121539	15434	178336	. BUSHING, TAPERED.....	5
23	PAHZZ	2815009813160	15434	138937	. GUIDE, VALVE STEM.....	16
24	XAHZZ		15434	180102	. HEAD, CYLINDER.....	1
25	PAHZZ	4730009541281	15434	3008466	. PLUG, PIPE.....	7
26	PAHZZ	4730011472223	15434	3008468	. PLUG, PIPE.....	1
27	PAHZZ	4730011060202	15434	3008469	. PLUG, PIPE.....	17
*	28	PAHZZ	2815011093056	15434 212217	. INSERT, ENGINE VALVE INTAKE.....	8
*	28	PAHZZ	2815001320240	15434 3014622	. INSERT, ENGINE VALVE INTAKE .010.. V	
28	PAHZZ	2815011271060	15434	3014623	. INSERT, VALVE SEAT INTAKE .020.... V	
*	28	PAHZZ	2815011273597	15434 3014624	. INSERT, ENGINE VALVE INTAKE .030.. V	
28	PAHZZ	2815011273598	15434	3014625	. INSERT, VALVE SEAT INTAKE .040.... V	
*	29	PAHZZ	2815010498966	15434 212940	. INSERT, ENGINE VALVE EXHAUST.....	8
*	29	PAHZZ	2815011267228	15434 216431	. INSERT, ENGINE VALVE EXHAUST .005. V	
29	PAHZZ	4820011268446	15434	216432	. SEAT, VALVE EXHAUST .010..... V	
29	PAHZZ	2815011269304	15434	216433	. INSERT, ENGINE VALVE EXHAUST .020. V	
29	PAHZZ	2815011271061	15434	216434	. INSERT, ENGINE VALVE EXHAUST .040. V	
*	30	PAFZZ	5330010529795	15434 212224	GASKET PART OF KIT P/N 3013497, PART OF KIT P/N 3801539.....	2

END OF FIGURE

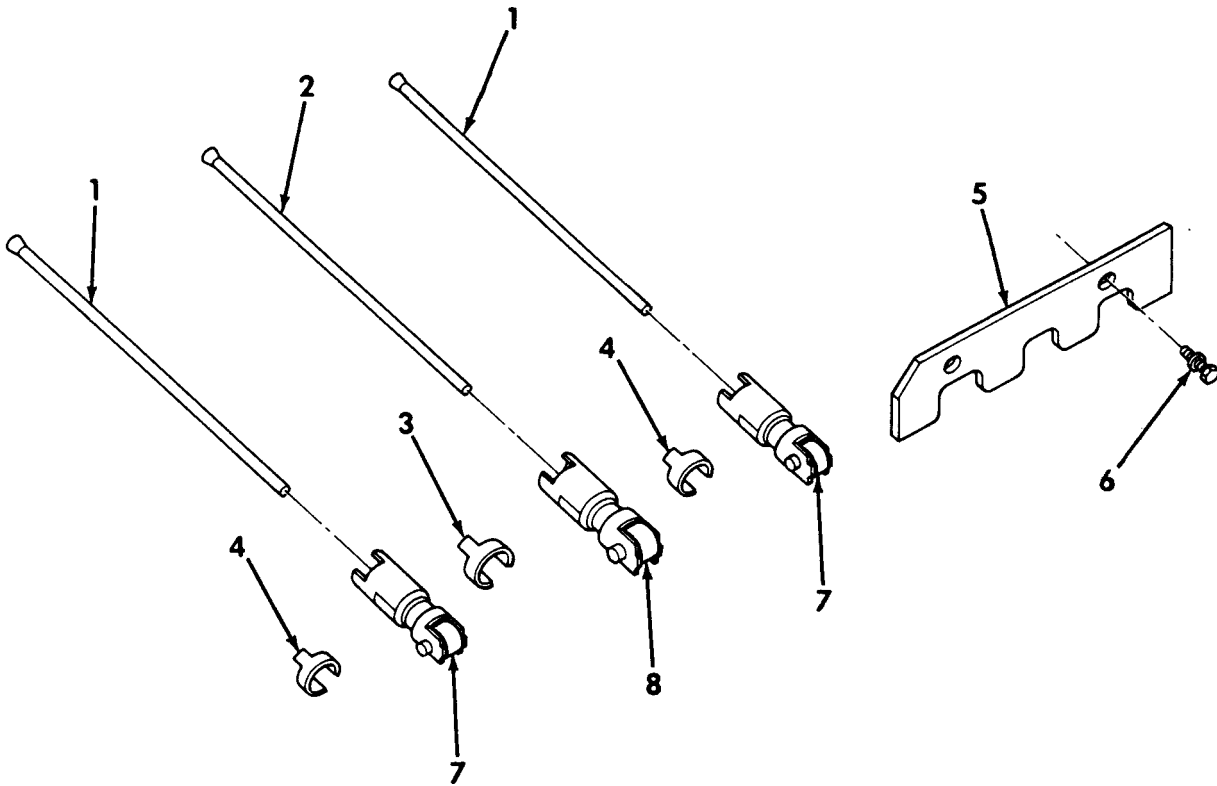


Figure 37. Push Rods and Tappets.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 37 PUSH RODS AND TAPPETS						
1	PAFZZ	2815001598678	15434	169351	PUSH ROD,ENGINE POP.....	16
2	PAFZZ	2815010958507	15434	3003602	PUSH ROD INJECTOR F.....	8
3	PAFZZ	5340000459876	15434	156439	CLIP,SPRING TENSION.....	8
4	PAFZZ	5360000459877	15434	156438	SPRING,CLIP.....	16
5	PFFZZ	2815009398084	15434	17108500	GUIDE PLATE,TAPPET.....	8
6	PAFZZ	5305011446233	15434	3021470	SCREW,CAP,HEXAGON H.....	16
7	PAFZZ	2815009398924	15434	181027	TAPPET,ENGINE POPPE.....	16
8	PAFZZ	2815009078954	15434	3004907	TAPPET,ENGINE POPPE.....	8

END OF FIGURE

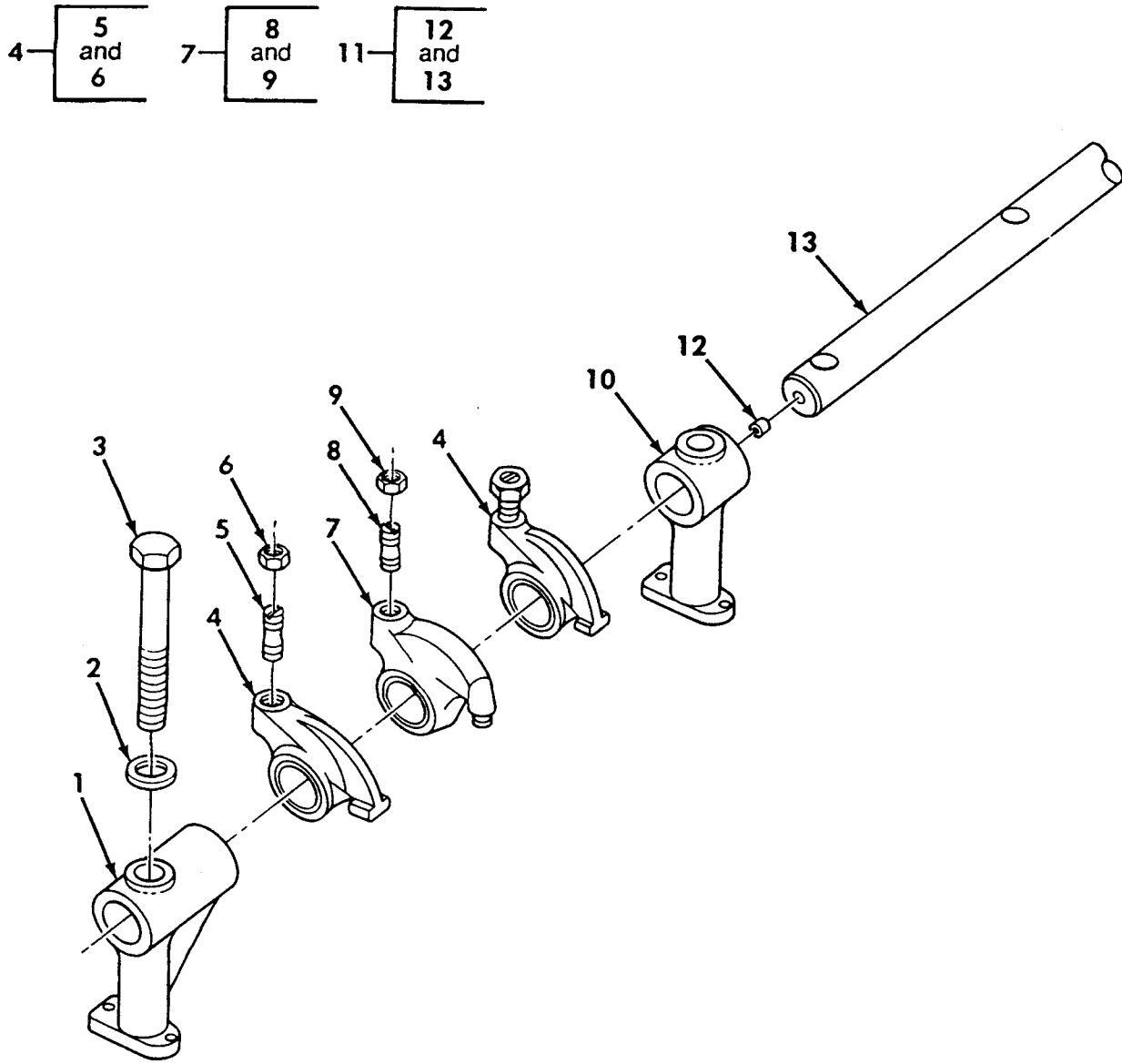


Figure 38. Rocker Levers.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 38 ROCKER LEVERS						
1	PFFZZ	2815011092560	15434	178334	SUPPORT, SHAFT, ROCKE.....	8
* 2	PAFZZ	5310002858833	17576	538174	WASHER, FLAT.....	10
3	PAFZZ	5305010362811	15434	214751	SCREW, CAP, HEXAGON H.....	10
4	PAFZZ	2815004903060	15434	AR12190	ROCKER ARM, ENGINE P.....	16
* 5	PAFZZ	5305009473437	15434	168306	SETSCREW PART OF P/N AR12190.....	1
* 6	PAFZZ	5310007320560	96906	MS51968-14	NUT, PLAIN, HEXAGON PART OF P/N AR12190.....	1
* 7	PAFZZ	2815011092558	15434	3006111	LEVER, ROCKER ARM IN.....	8
* 8	PAFZZ	5305009473437	15434	168306	SETSCREW PART OF P/N 3006111.....	1
* 9	PAFZZ	5310007320560	96906	MS51968-14	NUT, PLAIN, HEXAGON PART OF P/N 3006111.....	1
10	PFFZZ	3040011092559	15434	178335	BRACKET, EYE, ROTATIN.....	2
11	PAFFF	3040012285836	15434	AR9633	SHAFT, STRAIGHT.....	2
12	PAFZZ	5340011124280	15434	210036	. PLUG, EXPANSION.....	2
13	XAFZZ		15434	204482	. SHAFT, ROCKER.....	1

END OF FIGURE

7 —

8 thru 24

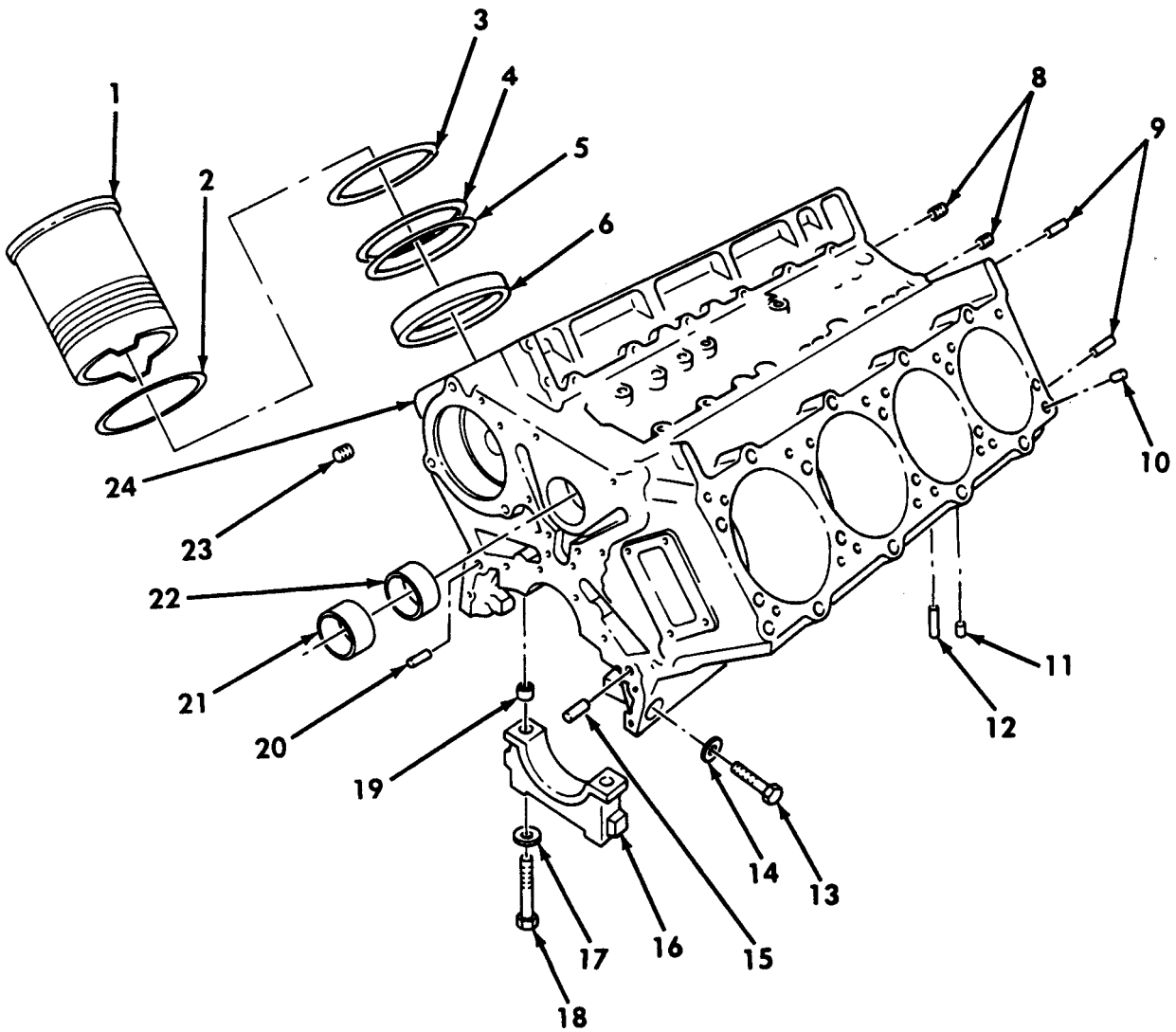


Figure 39. Cylinder Block.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 39 CYLINDER BLOCK						
1	PAHZZ	2815010662993	15434	AR8069	PARTS KIT,LINER,CYL.....	8
* 1	PFHZZ	2815011586848	15434	3376471	CYLINDER SLEEVE OVS.....	V
2	PFHZZ	5365000728371	15434	159098	SHIM .007.....	V
2	PFHZZ	5365000728372	15434	159099	SHIM .008.....	V
2	PFHZZ	5365000728373	15434	159100	SHIM .009.....	V
2	PFHZZ	5365010980506	15434	159101	SHIM .020.....	V
2	PFHZZ	5365000728374	15434	159102	SHIM,LINER .031.....	V
2	PFHZZ	5365010980505	15434	159103	SHIM .062.....	V
3	PAHZZ	5330010889312	15434	3044795	SEAL,PLAIN ENCASED PART OF KIT P/N 3801539.....	8
* 4	PAHZZ	5331008859427	15434	194115	O-RING PART OF KIT P/N 3801539.....	8
* 5	PAHZZ	5331000581767	15434	183049	O-RING PART OF KIT P/N 3801539.....	8
6	PFHZZ	5365011381794	15434	203253	BUSHING,LINER,BORE OVS.....	V
7	PAHHH	2815010970769	15434	AR10035	ENGINE BLOCK ASSEMB.....	1
* 8	PAHZZ	4730011306522	15434	302723200	.PLUG,PIPE.....	2
9	PAHZZ	5315008150530	15434	102957	.DOWEL,HOUSING.....	2
10	PAHZZ	5315000868293	15434	100973	.PIN,SPRING.....	4
11	PAHZZ	5315011858518	15434	3033895	.PIN,SPRING.....	2
12	PAHZZ	5315005329388	64104	B2568	.PIN,STRAIGHT,HEADLE.....	2
13	PAHZZ	5305010392211	15434	S133	.SCREW,CAP,HEXAGON H.....	10
14	PAHZZ	5310001097638	15434	S658	.WASHER,FLAT.....	10
15	PAHZZ	5315001043637	15434	69562	.PIN,STRAIGHT,HEADLE.....	1
15	PAHZZ	5315001584581	15434	68216	.PIN,STRAIGHT,HEADLE .0144 OVS.....	V
15	PAHZZ	5315001869208	15434	68216A	.PIN,STRAIGHT,HEADLE .0306 OVS.....	V
16	PAHZZ	3130011326423	15434	177385	.CAP,PILLOW BLOCK REAR.....	1
16	PAHZZ	3130011362166	15434	193654	.CAP,PILLOW BLOCK NO.1.....	1
16	PAHZZ	3130011362167	15434	193655	.CAP,PILLOW BLOCK NO.2.....	1
16	PAHZZ	3130011326422	15434	193656	.CAP,PILLOW BLOCK NO.3.....	1
16	PAHZZ	3130011372183	15434	193657	.CAP,PILLOW BLOCK NO.4.....	1
17	PAHZZ	5310000821882	15434	140218	.WASHER,FLAT.....	10
18	XBHZZ		15434	177376	.SCREW,CAP,HEXAGON H.....	10
19	PAHZZ	3120011116593	15434	164455	.BUSHING,SLEEVE.....	10
20	PAHZZ	5315007194598	15434	68568	.PIN,STRAIGHT,HEADED.....	1
21	PAHZZ	3120010605953	15434	200780	.BUSHING,SLEEVE.....	2
22	PAHZZ	3120010605954	15434	200790	.BUSHING,SLEEVE.....	3
23	PAHZZ	4730000113175	15434	70295	.PLUG,PIPE.....	4
24	XAHZZ		15434	213600	.BLOCK,CYLINDER.....	1

END OF FIGURE

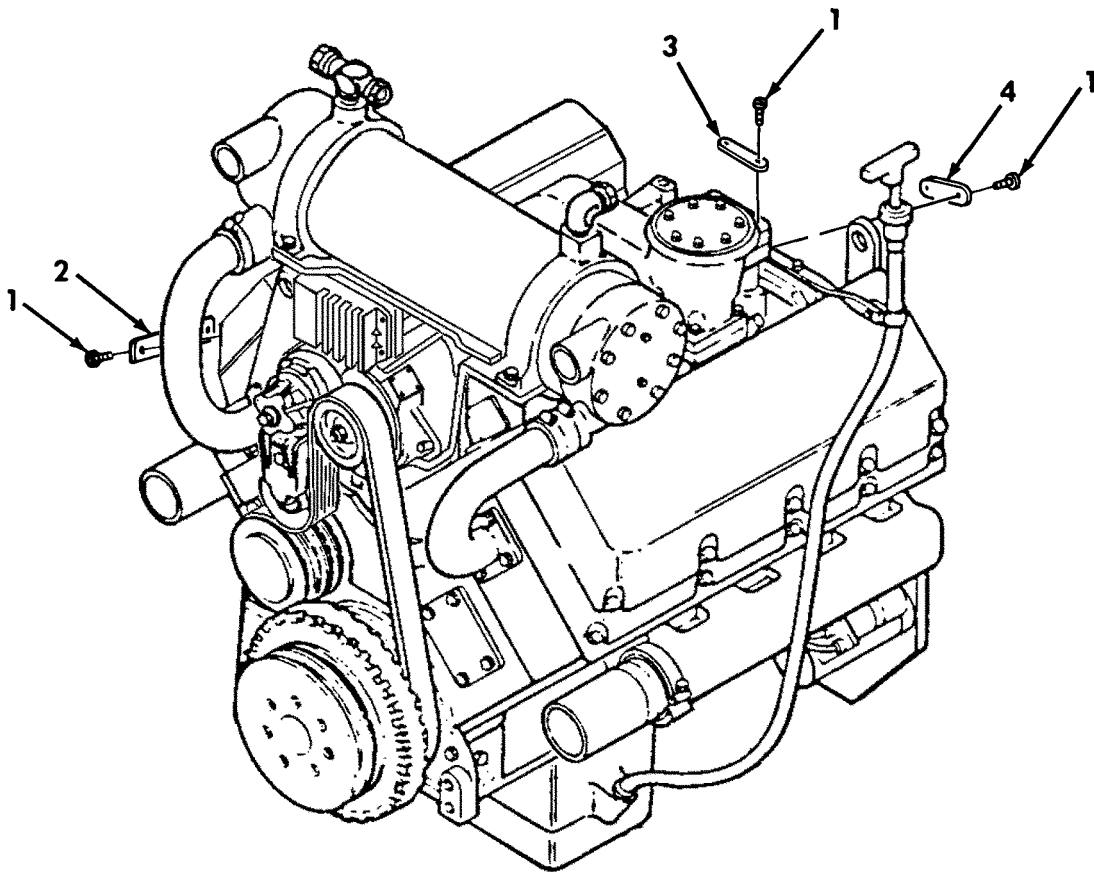


Figure 40. Engine Data Plates.

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AUA2: POWERTRAIN INSTALLATION						
FIG. 40 ENGINE DATA PLATES						
1	PAOZZ	5305008046318	15434	S2286	SCREW.....	8
2	PFOZZ	9905011374775	15434	3027295	PLATE, IDENTIFICATIO LEGEND.....	1
3	PFOZZ	9905007337622	15434	105375	PLATE, IDENTIFICATIO FUEL PUMP	1
					SERIAL NUMBER.....	
4	PFOZZ	9905004737260	15434	136403	PLATE, MARKING, BLANK.....	1

END OF FIGURE

TM 5-2815-240-34&P

C03

REPAIR PARTS LIST WORK PACKAGE

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
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GROUP A7: BULK ITEMS
FIG. BULK-1 BULK MATERIALS LIST
(NOT ILLUSTRATED)

1	PAOZZ	4720011229847	58536	A52546-IF BULK	HOSE, NONMETALLIC.....	V
2	PAOZZ	4720011200398	58536	A52546-IN BULK	HOSE, NONMETALLIC.....	V

END OF FIGURE

REPAIR PARTS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP BB2: REPAIR PARTS KITS						
FIG. KIT-1: REPAIR PARTS KITS						
(NOT ILLUSTRATED)						
* PAHZZ	3120010605967	15434	AR03640		BEARING SET,SLEEVE STD.....	V
					BEARING SET,SLEEVE (5) 30-10	
					BEARING SET,SLEEVE (5) 30-17	
					BEARING SET,SLEEVE (4) 30-11	
* PAHZZ	3120011222498	15434	AR03641		BEARING SET,SLEEVE .010 OVS.....	V
					BEARING SET,SLEEVE (4) 30-11	
					BEARING SET,SLEEVE (5) 30-10	
					BEARING SET,SLEEVE (5) 30-17	
* PAHZZ	3120011222499	15434	AR03642		BEARING SET,SLEEVE .010 OVS.....	V
					BEARING SET,SLEEVE (4) 30-11	
					BEARING SET,SLEEVE (5) 30-10	
					BEARING SET,SLEEVE (5) 30-17	
* PFHZZ	3120011524261	15434	AR03643		BEARING SET,SLEEVE .030 OVS.....	V
					BEARING SET,SLEEVE (4) 30-11	
					BEARING,MAIN (5) 30-10	
					BEARING,MAIN (5) 30-17	
* PAHZZ	2815009362232	15434	AR11930		RING SET,PISTON.....	8
					RING,OIL,PISTON (1) 32-3	
					RING,PISTON (1) 32-2	
					RING,PISTON (1) 32-1	
* PAHZZ	2815009132074	15434	AR73350		RING SET,PISTON.....	1
					RING,PISTON (1) 16-17	
					RING,PISTON (1) 16-16	
					RING,PISTON (1) 16-15	
* PADZZ	5330010750948	15434	3010242		GASKET SET.....	1
					GASKET (1) 10-15	
					GASKET (1) 14-6	
					GASKET (1) 13-1	
					GASKET (1) 13-15	
					GASKET (1) 12-1	
					O-RING (1) 11-8	
					O-RING (1) 11-26	
					O-RING (1) 11-29	
					O-RING (1) 11-31	
					PACKING,PREFORMED (1) 11-9	
					SEAL (1) 12-11	
					SEAL CAP (1) 11-20	
					SEAL,OIL (1) 12-14	
					SEAL,SPECIAL (1) 14-9	
* PAHZZ	5330010886751	15434	3013497		GASKET SET.....	1
					GASKET (2) 36-30	
					GASKET (8) 18-2	
					GASKET (2) 17-1	
					GASKET (2) 17-3	
					GASKET (2) 27-5	
					GASKET (2) 35-8	

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GASKET	(2) 35-8
					GASKET	(2) 35-10
*	PADZZ	5330011693180	15434	3801539	GASKET SET.....	1
					GASKET	(1) 29-5
					GASKET	(1) 33-20
					GASKET	(1) 33-2
					GASKET	(2) 36-30
					GASKET	(2) 35-8
					GASKET	(2) 35-10
					GASKET	(1) 34-3
					GASKET	(2) 23-7
					GASKET	(1) 23-1
					GASKET	(1) 20-13
					GASKET	(8) 18-2
					GASKET	(2) 17-1
					GASKET	(2) 17-3
					GASKET	(1) 10-15
					GASKET	(1) 27-6
					GASKET	(1) 27-10
					GASKET	(1) 27-7
					GASKET	(2) 27-5
					GASKET	(1) 28-16
					GASKET	(1) 15-28
					GASKET	(1) 3-2
					LOCKING PLATE,MANIF	(8) 18-5
					O-RING	(8) 39-5
					O-RING	(8) 39-4
					SEAL,PLAIN ENCASED	(1) 29-9
					SEAL,PLAIN ENCASED	(8) 39-3

END OF FIGURE

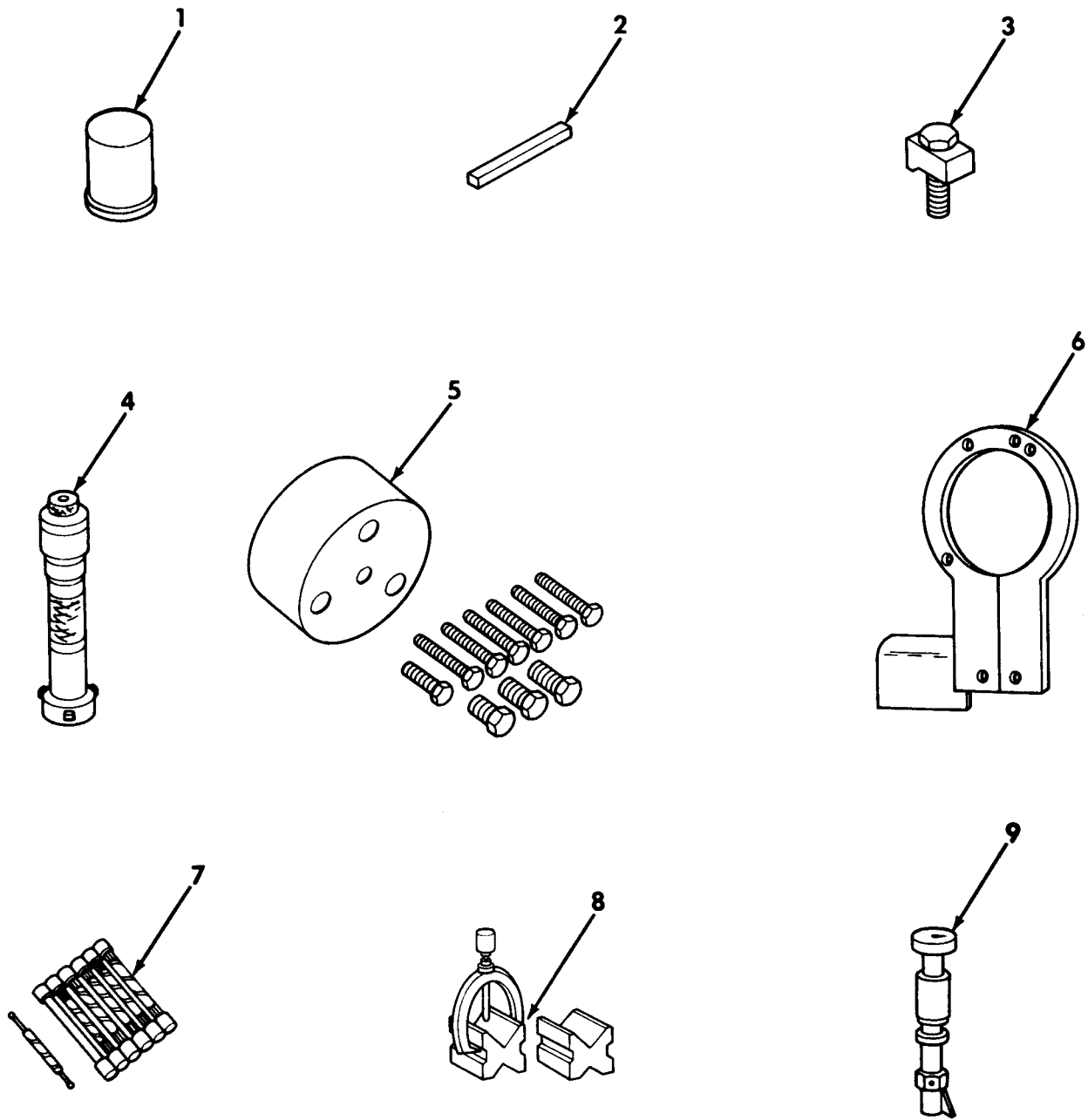


Figure 41. Special Tools - Direct Support/General Support (Sheet 1 of 5).

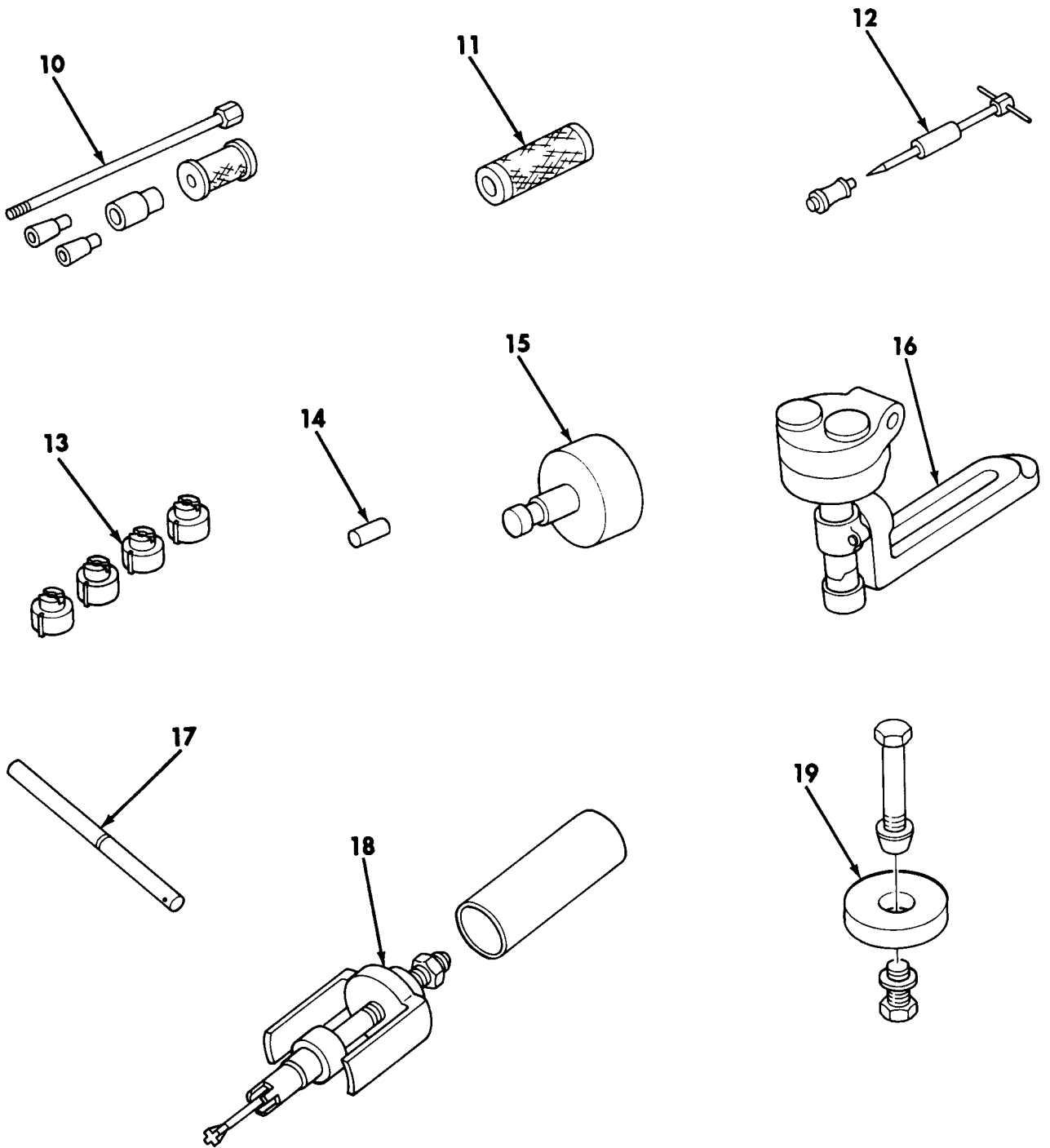


Figure 41. Special Tools - Direct Support/General Support (Sheet 2 of 5).



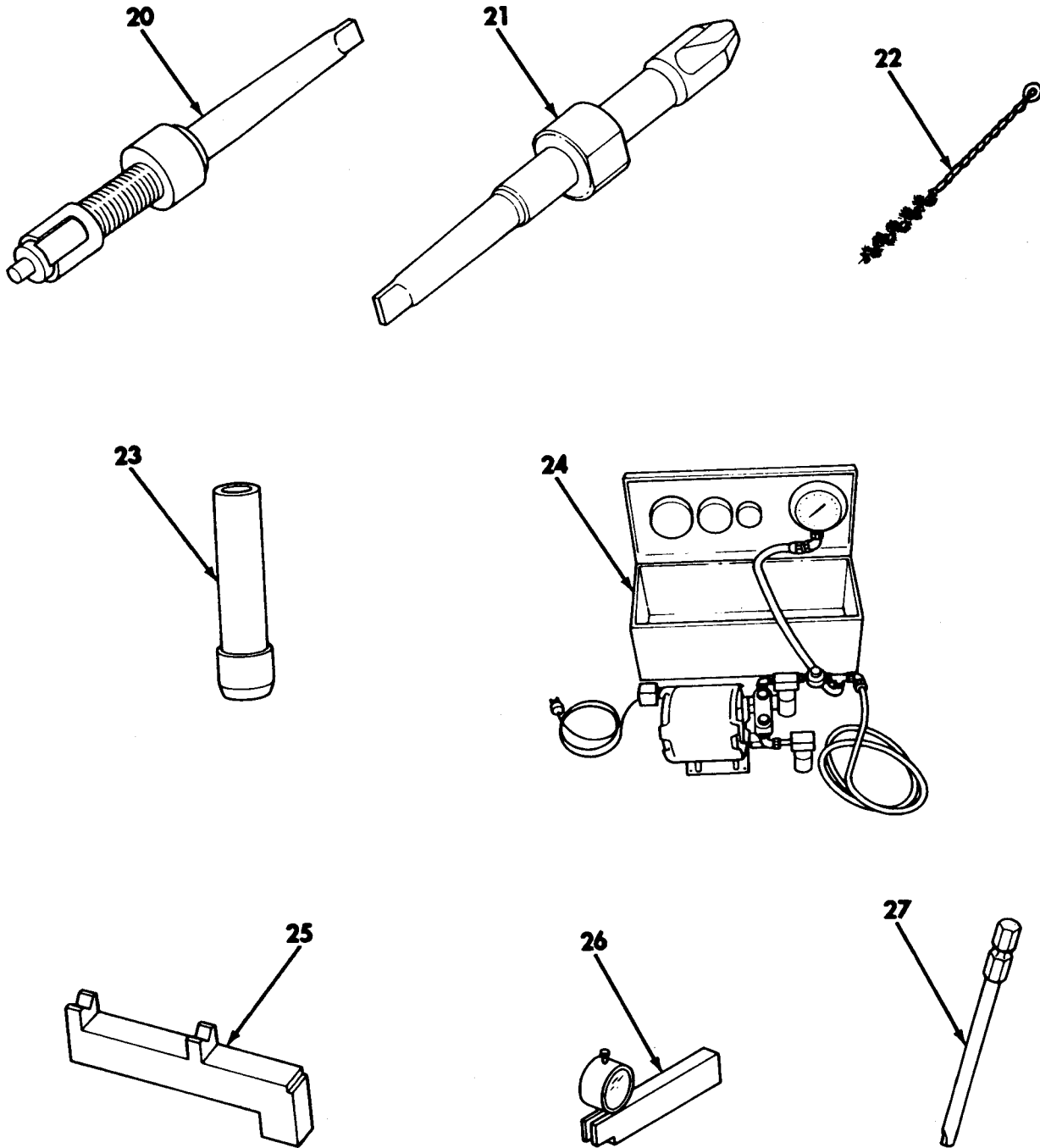


Figure 41. Special Tools - Direct Support/General Support (Sheet 3 of 5).

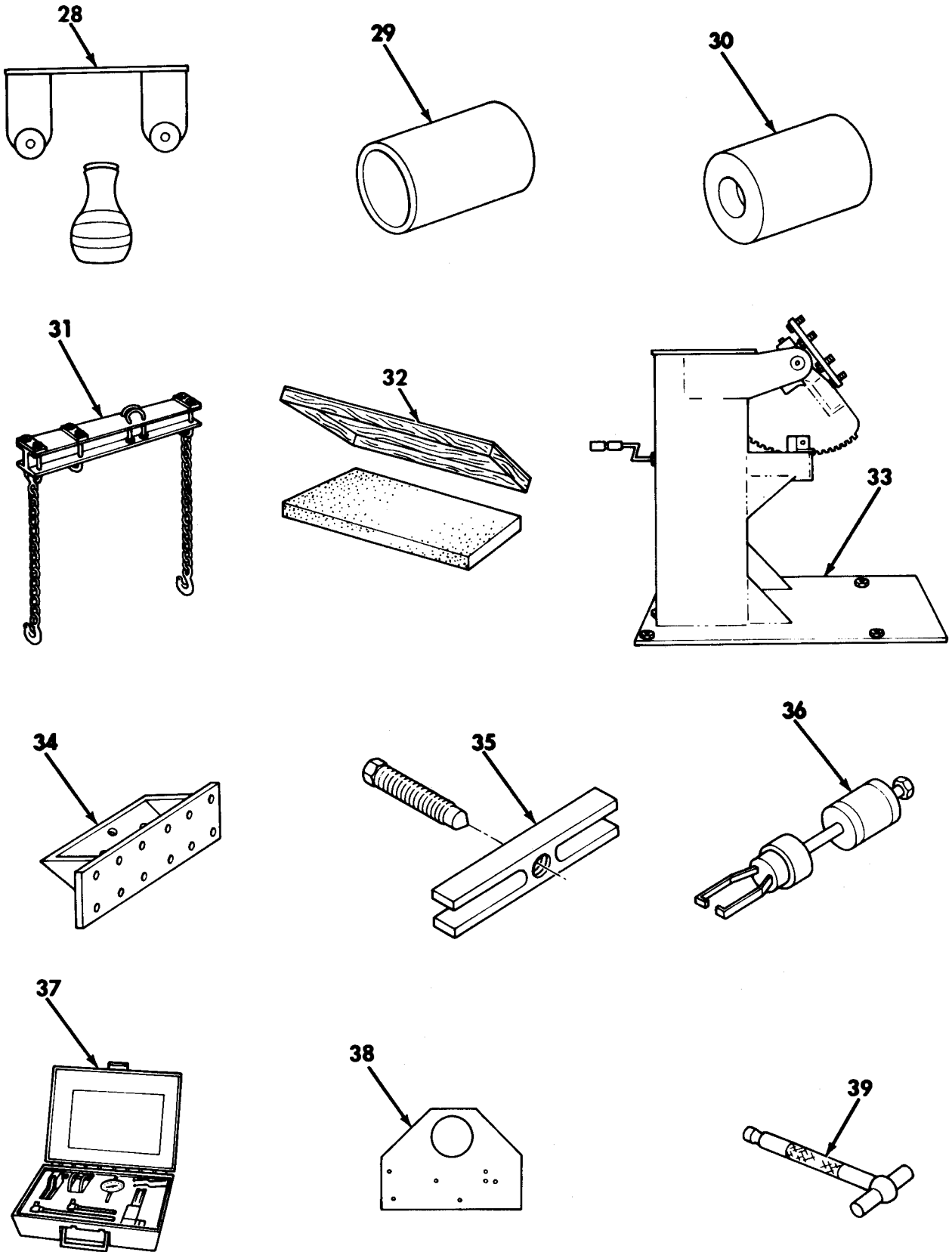


Figure 41. Special Tools - Direct Support/General Support (Sheet 4 of 5).



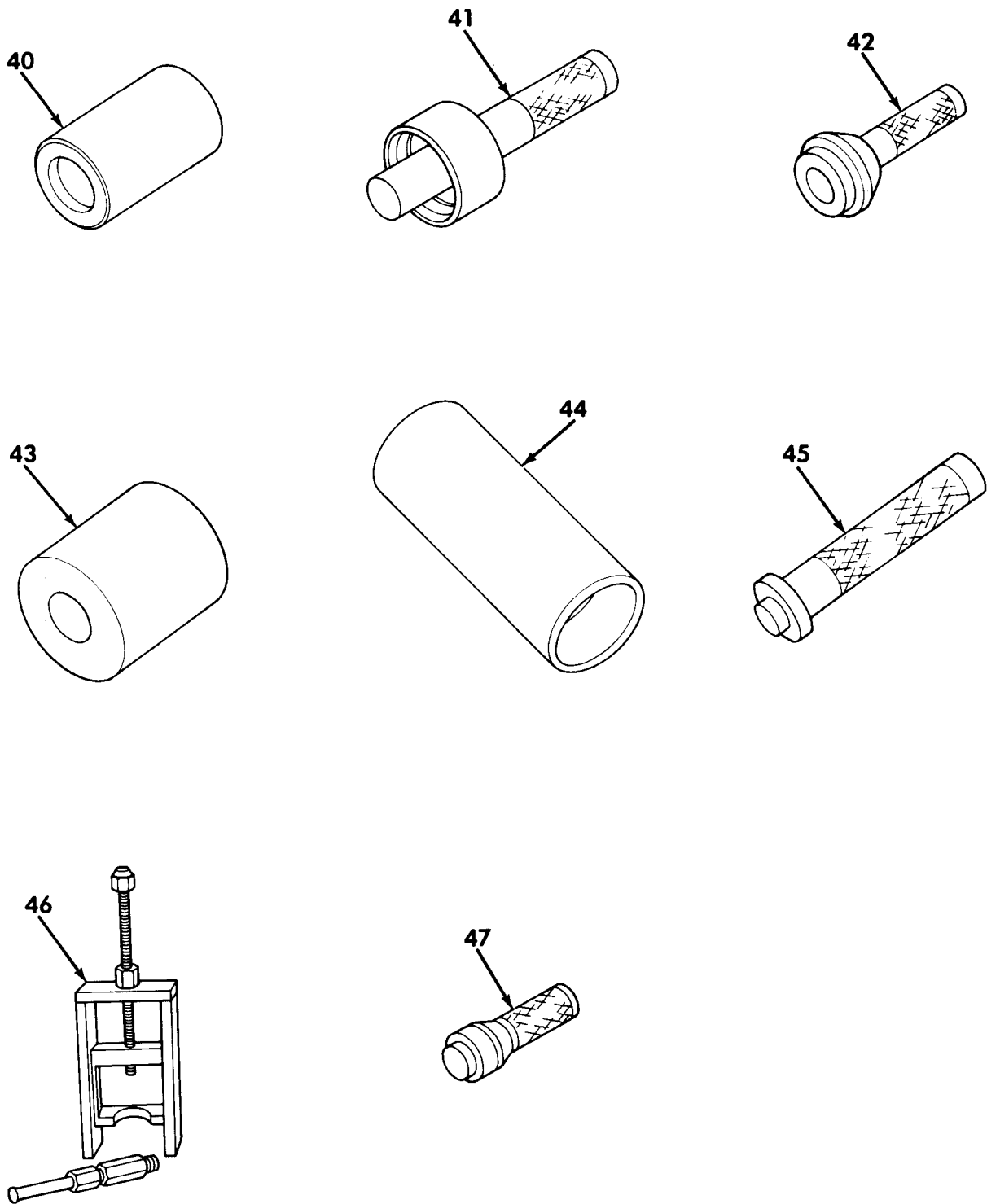


Figure 41. Special Tools - Direct Support/General Support (Sheet 5 of 5).

SPECIAL TOOLS LIST WORK PACKAGE

TM 5-2815-240-34&P

C03

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
GROUP AY: SUPPORT EQUIPMENT AND SPECIAL TOOLS						
FIG. 41 SPECIAL TOOLS - DIRECT SUPPORT/GENERAL SUPPORT						
1	PEHZZ	4910011427387	15434	3375861	BUSHING DRIVER PART OF KIT P/N 5705425.....	
2	PEHZZ	5120009991206	80244	999-1206	DRIVER,CYLINDER LIN PART OF KIT P/N 5705425.....	
* 3	PEHZZ	5120001041816	15434	3376669	CLAMP,CYLINDER LINE PART OF KIT P/N 5705425.....	
4	PEHZZ	5210005679545	09058	599-281-20	GAGE,MICROMETER,INT PART OF KIT P/N 5705425.....	
5	PEHZZ	5120011282867	15434	3375111	INSERTER AND REMOVE PART OF KIT P/N 5705425.....	
6	PEHZZ	4910009777505	15434	3375133	PLATE,MOUNTING,FUEL PART OF KIT P/N 5705425.....	
7	PEHZZ	5210002739867	80244	GGG-G-17 TY7CL1S TA	GAGE,FILLET AND RAD PART OF KIT P/N 5705425.....	
8	PEHZA	3460009138526	58536	A-A-51150TY2STAS Z1	V-BLOCK SET,MATCHED PART OF KIT P/N 5705425.....	
9	PEHZZ	5210011713910	15434	ST-685-4	ECCENTRIMETER PART OF KIT P/N 5705425.....	
10	PEHZZ	4910001505848	15434	ST1134	EXTRACTOR,VALVE PIN PART OF KIT P/N 5705425.....	
11	PEHZZ	5365011282684	15434	3375092	INSERTER AND REMOVE PART OF KIT P/N 5705425.....	
12	PEHZZ	5120011282679	15434	ST-1279	EXTRACTOR,VALVE,SEA PART OF KIT P/N 5705425.....	
13	PEHZZ	4910009991208	15434	ST662	CUTTER SET,COUNTERB PART OF KIT P/N 5705425.....	
14	PEHZZ	4910001505843	15434	ST1122	DRIVER,VALVE,INSERT PART OF KIT P/N 5705425.....	
15	PEHZZ	4910001505844	15434	ST1124	DRIVER,ASSEMBLY,INS PART OF KIT P/N 5705425.....	
16	PEHZZ	4910003453708	15434	ST-257	INSERT KIT,VALVE SE PART OF KIT P/N 5705425.....	
17	PEHZZ	3460009991173	15434	ST-663	ARBOR SET,VALVE GUI PART OF KIT P/N 5705425.....	
18	PEHZZ	5120001135271	87641	SWE6038	PULLER,MECHANICAL PART OF KIT P/N 5705425.....	
19	PEHZZ	5120001041795	15434	ST1179	HOLDING TOOL,INJECT PART OF KIT P/N 5705425.....	
20	PEHZZ	3441009226699	15434	ST880	EXPANDER,TUBE PART OF KIT P/N 5705425.....	
21	PEHZZ	4910009813105	15434	ST884	CUTTER,INJECTOR SLE PART OF KIT P/N 5705425.....	
22	PEHZZ	7920001683244	15434	ST876	BRUSH,FUEL PASSAGE PART OF KIT P/N 5705425.....	
23	PEHZZ	5120009813108	15434	ST-1227	DRIVER PART OF KIT P/N 5705425.....	
24	PEHZZ	4910011282691	15434	3824277	TESTER,VALVE VAC PART OF KIT P/N 5705425.....	

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
25	PEHZZ	4910011282689	15434	3823798	VALVE HEAD CHECK TO PART OF KIT P/N 5705425.....	
26	PEHZZ	5210011573091	15434	3376220	GAGE,DEPTH,DIAL IND PART OF KIT P/N 5705425.....	
27	PEHZZ	5110011416140	15434	ST-1188	REAMER,HAND PART OF KIT P/N 5705425.	
28	PEHZZ	6635011282676	15434	ST-1166	MAGNETIC INSPECTION PART OF KIT P/N 5705425.....	
29	PEHZZ	5365009510775	15434	ST722	SPACER,SLEEVE PART OF KIT P/N 5705425.....	
30	PEHZZ	4910011491302	15434	3377255	MANDREL,GEARSHAFT PART OF KIT P/N 5705425.....	
31	PEFZZ	5120012227932	19207	12379498	SLING,POWERPACK.....	
32	PEHZZ	5220002933556	19200	10539031-1	PLATE,SURFACE PART OF KIT P/N 5705425.....	
33	PEFZZ	4910008083372	33287	J29109	STAND,MAINTENANCE,A PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
34	PEFZZ	4910011282681	15434	ST1329	PLATE,ADAPTER,STAND PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
35	PEFZZ	5120004991489	55719	CJ83C	PULLER,MECHANICAL PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
36	PEFZZ	5120001167604	15434	3376872	PULLER,INJECTOR PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
37	PEFZZ	4910005487984	15434	3823610	ADJUSTMENT KIT,INJE PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
38	PEFZZ	4910009777489	15434	ST862	FIXTURE,LIFTING HEA PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
39	PEFZZ	5210012415011	57163	229A	GAGE,TELESCOPING 1/2 IN TO 1 IN PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
40	PEFZZ	4910010976986	15434	ST-658	MANDREL WATER PUMP PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
41	PEFZZ	4910010976988	15434	ST-1159	MANDREL,SEAL,SLEEVE PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
42	PEFZZ	5120011282671	15434	ST-1161	INSERTER,SEAL PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
43	PEFZZ	5120011282782	15434	3375318	INSERTER,BEARING AN PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
44	PEFZZ	5120012178264	15434	3376091	INSERTER,SEAL PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
45	PEFZZ	5120011870384	15434	3377269	INSERTER,SEAL PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
46	PEFZZ	5120009991504	15434	ST-709	PULLER,MECHANICAL PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
47	PEFZZ	5120011643265	15434	ST-1105	INSERTER AND REMOVE PART OF KIT P/N 5705425 PART OF KIT P/N 5705426.....	
*	ADHHH		19207	5705425	SPECIAL TOOL KIT,GS NOT ILLUSTRATED	
*	ADFFF	4940012258390	19207	5705426	SPECIAL TOOL KIT,DS NOT ILLUSTRATED	

END OF FIGURE

NATIONAL STOCK NUMBER INDEX					
STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5330-00-005-0407	28	10	5305-00-091-4010	23	10
4730-00-011-3175	21	15		33	18
	36	1	5120-00-104-1795	41	19
	39	23	5315-00-104-3637	29	4
5315-00-012-4553	6	8		30	16
5315-00-014-1244	13	4		33	6
5310-00-014-5850	12	31		39	15
5310-00-015-7139	141	20	5310-00-109-7638	39	14
4730-00-018-9566	28	12	5120-00-113-5271	41	18
	30	7	5120-00-116-7604	41	36
5305-00-042-9477	2	8	5330-00-129-9389	16	27
5310-00-044-3340	5	6	5330-00-131-7072	16	4
5340-00-045-9876	37	3	2815-00-132-0240	36	28
5360-00-045-9877	37	4	5360-00-132-0245	9	2
5331-00-058-1767	39	5	5330-00-132-0247	9	5
5325-00-062-4372	32	6	5330-00-132-0276	9	4
5305-00-062-4378	36	7	5310-00-134-4169	24	7
5315-00-062-4395	30	8		27	3
5310-00-062-6632	32	14		35	4
5310-00-062-9566	32	13	5310-00-134-4171	31	12
5305-00-063-5043	11	24	2530-00-134-4620	16	9
5305-00-068-0510	4	7	5310-00-141-1795	10	6
5305-00-068-0511	4	12		11	4
	27	1		12	27
5305-00-069-5582	31	16		13	8
5305-00-071-1786	28	23		14	7
5305-00-071-1787	26	1	4910-00-150-5843	41	14
5305-00-071-1788	29	1	4910-00-150-5844	41	15
5305-00-071-2056	4	3	4910-00-150-5848	41	10
5305-00-071-2070	2	2	3110-00-156-4699	28	7
5365-00-072-8371	39	2	5315-00-158-4581	39	15
5365-00-072-8372	39	2	5310-00-159-6209	10	5
5365-00-072-8373	39	2		11	3
5365-00-072-8374	39	2	2815-00-159-8678	37	1
5310-00-080-6004	4	5	5305-00-161-0902	12	29
	7	18	5306-00-163-6585	28	24
	8	3	5305-00-165-8157	25	2
	15	34	7920-00-168-3244	41	22
	16	32	5305-00-177-5552	20	27
	17	6		33	11
	22	6	5310-00-186-7403	16	6
	33	14	5315-00-186-9208	39	15
	35	1	4730-00-202-6663	15	37
5360-00-081-8487	12	23	4730-00-202-6668	21	20
5315-00-082-0448	12	25	5365-00-203-1281	7	16
3020-00-082-0461	20	16	5305-00-207-2715	10	1
5310-00-082-1882	39	17	5310-00-209-0965	2	10
2815-00-084-7796	17	2		4	2
2815-00-085-7438	36	5		10	17
5315-00-086-8293	39	10		26	2
3040-00-086-8384	20	8	5310-00-209-0965	28	22
5340-00-087-7486	7	5		29	2

STOCK NUMBER	NATIONAL STOCK NUMBER INDEX				
	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
	30	14	9905-00-473-7260	40	4
	31	15	5315-00-475-2576	20	12
5306-00-225-8499	8	2	8105-00-477-3716	2	14
5305-00-226-4831	15	4	5310-00-484-1718	10	2
5330-00-250-2169	31	17		12	30
5325-00-256-2846	11	36		13	7
5310-00-261-7340	7	19		13	23
	8	20	5306-00-485-0790	13	6
	15	35		13	22
	17	7	2815-00-490-3060	38	4
	21	17	4730-00-492-6040	22	8
	22	9	5305-00-493-3959	10	8
	25	3	5120-00-499-1489	41	35
	27	2	5365-00-507-3260	14	3
	28	17	5365-00-507-3261	14	3
	33	13	5365-00-507-3262	14	3
5310-00-262-2986	10	12	5365-00-507-3271	11	19
5210-00-273-9867	41	7	3010-00-507-8347	10	14
5310-00-285-8833	36	2	5305-00-509-8103	25	16
	38	2	5305-00-509-8106	10	13
5340-00-286-1868	15	38	3110-00-516-5289	12	6
5220-00-293-3556	41	32	5310-00-521-8595	7	20
4910-00-345-3708	41	16		21	16
2815-00-353-9395	20	14		22	5
	23	8	3020-00-528-5053	31	6
	33	3	5315-00-532-9388	39	12
4730-00-359-9487	17	11	4730-00-542-5906	7	13
4730-00-365-2690	15	10	5305-00-543-2419	34	10
2815-00-369-7846	16	21	4910-00-548-7984	41	37
4730-00-374-4282	15	9	5310-00-550-3714	2	13
5340-00-400-3449	8	8	3110-00-554-5243	28	13
5342-00-400-5178	11	12	4730-00-555-8263	15	2
4720-00-401-9299	15	1	5330-00-562-1176	14	6
5365-00-404-2934	15	25	5310-00-562-6557	30	13
	16	25	5310-00-562-6558	15	6
4730-00-404-7777	9	6		16	12
2815-00-406-8936	23	3		23	11
5310-00-407-9566	15	5	3120-00-566-0480	20	5
	16	7		20	10
	16	11		20	20
	23	12	3040-00-567-4354	13	19
5310-00-419-0876	6	10	5210-00-567-9545	41	4
5310-00-426-3990	36	8	5310-00-596-7691	6	23
5305-00-426-4142	17	10	5360-00-597-4570	11	21
5305-00-426-4184	16	8	5330-00-599-5463	21	12
2930-00-437-0567	21	8	2530-00-603-1506	16	2
3040-00-449-7397	10	7	5315-00-616-5501	34	8
2940-00-459-6558	20	31	6685-00-618-1822	2	16
2940-00-459-6558	34	4	5310-00-637-9541	4	6
5365-00-462-4504	14	3		24	4
5305-00-463-0428	18	4	5305-00-638-8920	20	2
4820-00-471-0049	8	16	4730-00-647-3207	7	6

NATIONAL STOCK NUMBER INDEX					
STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5360-00-664-5343	21	11	5330-00-852-7347	16	13
3020-00-682-7710	20	6	5342-00-858-3507	7	17
5310-00-684-3463	34	11	2910-00-858-3522	14	12
5305-00-688-2111	16	30	5330-00-860-9153	3	2
	17	8	5330-00-864-5422	25	8
	24	5	5315-00-866-5015	36	21
3020-00-702-3882	13	13	5310-00-877-5797	6	25
5305-00-709-8531	4	8	5310-00-880-8189	2	7
5340-00-716-4975	11	25	5331-00-885-9427	39	4
5365-00-716-6580	28	6	5330-00-886-9105	25	7
5315-00-719-4598	29	6	5340-00-898-1497	14	4
	39	20	2815-00-907-8954	37	8
5340-00-719-4601	7	12	4730-00-908-3194	24	9
	8	7	3040-00-909-2481	34	7
5305-00-721-5492	31	9	5330-00-909-2489	17	5
5306-00-721-5887	23	15	5306-00-909-2491	32	10
5305-00-725-2317	20	33	4730-00-909-8627	24	1
5310-00-727-8353	12	24	2815-00-913-2074	KIT	
5310-00-732-0560	38	6	3460-00-913-8526	41	8
	38	9	3441-00-922-6699	41	20
9905-00-733-7622	40	3	3040-00-933-3012	13	14
5305-00-757-6361	29	7	2815-00-936-2232	KIT	
4730-00-762-4161	8	18	5310-00-937-0453	3	3
5310-00-768-0318	2	4	2815-00-939-8084	37	5
5310-00-772-0442	6	9	2815-00-939-8924	37	7
5305-00-776-6884	20	18	5305-00-942-2196	20	30
5305-00-782-9489	9	14		27	9
2910-00-790-8736	11	22	5305-00-947-3437	38	5
2815-00-791-1453	20	28		38	8
	21	10	5365-00-951-0775	41	29
5305-00-795-9336	31	11	4730-00-954-1281	8	12
4730-00-801-8186	25	6		17	14
2910-00-803-2631	14	1		33	9
5305-00-804-6318	11	34		36	25
	40	1	5310-00-971-7989	10	4
5325-00-807-2636	11	7		11	23
	14	5	4910-00-977-7489	41	38
4910-00-808-3372	41	33	4910-00-977-7505	41	6
5310-00-809-3078	12	18	4910-00-981-3105	41	21
5310-00-809-4085	2	9	5120-00-981-3108	41	23
	4	1	2815-00-981-3160	36	23
	26	3	5305-00-988-1724	11	2
	28	21	5305-00-993-1848	6	20
5310-00-809-5998	2	3	5330-00-994-4410	17	1
5310-00-809-8546	6	24	5330-00-994-4411	17	3
5315-00-815-0530	33	15	5330-00-994-4435	36	14
	39	9	2815-00-994-4437	36	17
5325-00-815-1137	9	8	3460-00-999-1173	41	17
3120-00-815-1412	32	11	5120-00-999-1206	41	2
5310-00-820-6653	30	2	4910-00-999-1208	41	13
5310-00-821-6269	6	26	5120-00-999-1504	41	46
6685-00-828-7126	10	3	4820-01-005-2994	2	17

STOCK NUMBER	NATIONAL STOCK NUMBER INDEX			
	FIG.	ITEM	STOCK NUMBER	FIG. ITEM
5305-01-010-2362	15	36	5305-01-072-8826	11 32
	22	10	5305-01-072-9021	7 11
	23	2		15 33
	33	4		23 19
	34	5		33 12
3120-01-016-4883	16	24		34 1
2940-01-028-0606	21	19	5330-01-075-0948	KIT
5306-01-029-1191	28	18	4730-01-077-2016	9 7
5305-01-029-1193	7	7	4730-01-078-4703	11 27
	8	21	4730-01-078-5690	11 10
	23	9	4310-01-079-3319	16 22
4730-01-032-3699	8	15		16 23
5305-01-032-4165	5	15	5342-01-079-4678	9 13
5325-01-032-4222	5	12	5315-01-079-6506	9 9
5325-01-034-2757	5	14	3120-01-079-6527	18 3
5305-01-036-2811	38	3	3110-01-079-8190	11 35
3110-01-037-4661	5	13	3010-01-080-1529	12 17
5360-01-038-4659	20	25	2910-01-080-3149	11 28
5305-01-039-2211	39	13	5325-01-081-0662	12 5
3020-01-040-0167	30	9	3040-01-085-2871	12 12
5310-01-042-8391	6	3	5305-01-085-8197	22 2
5310-01-046-0186	6	18		27 13
2815-01-049-8966	36	29	5330-01-086-6197	21 7
5310-01-050-6565	5	5	5305-01-086-7036	8 6
5330-01-052-9795	36	30		33 8
4730-01-054-2667	7	1	2910-01-086-7715	12 13
	8	17	5315-01-087-0534	12 20
5331-01-055-4542	21	3	3120-01-087-2539	12 9
4730-01-060-0947	15	3	3010-01-088-5727	12 3
5330-01-060-2986	27	5	5305-01-088-6019	21 4
5330-01-060-2988	15	28	5330-01-088-6751	KIT
5330-01-060-4424	23	1	3020-01-088-7916	20 9
3120-01-060-5953	39	21	5330-01-088-9312	39 3
3120-01-060-5954	39	22	4710-01-089-5904	8 4
5305-01-060-5961	15	19	3040-01-091-0485	35 9
3120-01-060-5967	30	10	3010-01-092-2240	15 13
	30	17	3020-01-094-9350	34 6
	KIT		2815-01-095-8507	37 2
5310-01-066-2942	9	17	2815-01-097-0769	39 7
2815-01-066-2962	36	11	5330-01-097-5851	33 2
3040-01-066-2968	20	7	4910-01-097-6986	41 40
2815-01-066-2993	39	1	4910-01-097-6988	41 41
2815-01-067-2327	28	5	5365-01-098-0505	39 2
5360-01-067-8438	36	13	5365-01-098-0506	39 2
5360-01-067-8439	36	12	4320-01-098-5102	11 5
3020-01-070-7980	12	16	4320-01-098-5115	11 33
3020-01-070-9003	12	4	4730-01-106-0202	21 14
3040-01-070-9004	12	15		33 16
4820-01-070-9710	9	10		36 27
5305-01-072-4270	36	3	2815-01-108-5384	30 6
5331-01-072-4436	36	20	2815-01-108-5385	36 9
5305-01-072-8818	29	11	2815-01-109-1197	18 5

NATIONAL STOCK NUMBER INDEX					
STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
2815-01-109-1318	35	7		KIT	
2815-01-109-1774	34	2	3120-01-122-2499	30	10
2590-01-109-2075	35	5		30	17
2815-01-109-2558	38	7		KIT	
3040-01-109-2559	38	10	3120-01-122-4768	32	8
2815-01-109-2560	38	1	4720-01-122-9847	BULK	1
2815-01-109-3034	36	16	4730-01-124-3762	11	17
2815-01-109-3056	36	28	5305-01-126-1128	12	26
9320-01-109-4736	31	2		14	8
2815-01-109-4778	32	9	5365-01-126-3334	12	10
5340-01-109-6662	33	19	2815-01-126-7228	36	29
2930-01-109-9946	28	9	4820-01-126-8446	36	29
4820-01-110-1170	7	4	2815-01-126-9304	36	29
3040-01-110-1209	28	8	4730-01-126-9606	7	21
2910-01-110-3576	9	18	2815-01-127-1060	36	28
3120-01-111-6593	39	19	2815-01-127-1061	36	29
5330-01-111-7389	33	17	2815-01-127-2339	30	4
5330-01-111-7404	15	12	2815-01-127-2590	32	7
	33	1	2815-01-127-3597	36	28
5330-01-111-7405	27	7	2815-01-127-3598	36	28
3120-01-111-7418	20	29	5120-01-128-2671	41	42
3120-01-111-7419	33	5	6635-01-128-2676	41	28
3120-01-111-9323	31	7	5120-01-128-2679	41	12
5330-01-112-1527	28	4	4910-01-128-2681	41	34
5365-01-112-1539	36	22	5365-01-128-2684	41	11
5365-01-112-1545	36	15	4910-01-128-2691	41	24
5306-01-112-4277	30	15	5120-01-128-2782	41	43
5340-01-112-4280	38	12	5120-01-128-2867	41	5
5340-01-112-4294	9	16	5360-01-128-3940	15	16
5325-01-112-4302	25	10	4730-01-128-4598	25	11
5310-01-112-4305	9	15	5342-01-128-8707	8	19
	20	26	2990-01-128-9635	30	12
5310-01-112-4306	26	5	5305-01-129-4215	17	16
5310-01-112-4307	10	16	5305-01-129-4217	35	3
5305-01-112-4312	21	24	5305-01-129-4384	10	9
5330-01-112-7772	34	3	4730-01-130-6522	39	8
5306-01-112-8681	20	32	3130-01-132-6422	39	16
5305-01-112-9110	12	28	3130-01-132-6423	39	16
	14	11	5330-01-133-4507	20	13
5305-01-113-0535	31	13	3130-01-136-2166	39	16
5305-01-113-1179	10	18	3130-01-136-2167	39	16
5330-01-113-2199	29	5	5310-01-136-4888	5	16
5330-01-113-2200	28	16	5325-01-136-7662	5	11
5330-01-113-2202	27	6	5330-01-136-8569	13	1
5330-01-113-2203	27	10	3130-01-137-2183	39	16
5305-01-114-6386	29	8	9905-01-137-4775	40	2
5330-01-117-5876	33	20	5305-01-137-6706	35	2
5306-01-119-8870	12	19	5365-01-138-1794	39	6
4720-01-120-0398	BULK	2	3020-01-138-2034	16	29
3120-01-122-0861	32	8	5330-01-138-6353	21	6
3120-01-122-2498	30	10	5330-01-138-6357	21	23
	30	17	2990-01-138-9155	20	19

NATIONAL STOCK NUMBER INDEX					
STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5310-01-138-9156	20	23	4820-01-164-7002	13	18
5365-01-138-9413	20	24	5310-01-165-1312	5	7
4820-01-138-9474	20	22	5330-01-165-2287	29	9
6685-01-141-0907	25	9	5305-01-165-2345	15	23
4730-01-141-1588	9	6		21	26
2910-01-141-4028	11	15		23	14
2910-01-141-4328	11	11		33	10
2910-01-141-4337	12	21	5330-01-169-3180	KIT	
5110-01-141-6140	41	27	3040-01-169-8387	33	7
4730-01-142-0192	19	1	5210-01-171-3910	41	9
5340-01-142-6940	15	30	2815-01-179-9056	10	19
4910-01-142-7387	41	1	5330-01-181-0630	15	7
4730-01-142-8524	8	11	6680-01-183-4399	22	3
5305-01-143-0475	17	15	4710-01-184-4035	22	4
	21	18	2815-01-184-6603	21	5
	21	27	2815-01-184-6604	22	1
5305-01-143-0476	15	21	2815-01-184-9648	21	22
2990-01-143-5489	12	22	2815-01-184-9649	21	2
5342-01-143-6045	23	18	2930-01-185-8273	21	1
5342-01-143-6046	14	10	5315-01-185-8518	39	11
5342-01-143-6048	36	10	5365-01-185-8521	23	16
5330-01-143-8207	18	2	3120-01-185-8586	13	21
5330-01-143-8208	35	8	5365-01-185-8591	8	9
5330-01-143-8209	35	10	5365-01-185-8592	15	31
5330-01-143-8210	11	6	5340-01-185-8623	22	7
5330-01-143-9201	31	4	5340-01-185-8631	21	9
5315-01-144-3322	15	17	5340-01-185-8632	27	11
5305-01-144-6233	37	6	5340-01-185-8633	25	13
5342-01-145-1549	11	38	4720-01-186-0555	8	1
3120-01-145-4032	15	27	4720-01-186-0570	17	12
2910-01-146-0048	36	19	2815-01-186-0875	23	5
4730-01-146-3040	7	3	2815-01-186-0876	15	24
4310-01-146-5921	16	5	4730-01-186-5991	19	5
2815-01-147-2207	27	15	2815-01-186-6084	18	1
2990-01-147-2210	12	2	5340-01-186-7172	15	32
4730-01-147-2223	36	26	5340-01-186-7187	27	8
5330-01-147-5234	21	28	5340-01-186-7188	27	14
5305-01-147-8732	31	3	5340-01-186-7189	15	18
4910-01-149-1302	41	30	5305-01-186-7394	21	25
2920-01-151-3762	3	1	5360-01-186-7500	11	37
4730-01-151-6316	7	9	5330-01-186-7541	24	8
3120-01-152-4261	30	11	5330-01-186-7542	25	14
	KIT		5305-01-186-7647	31	14
5210-01-157-3091	41	26	5330-01-186-7713	15	22
5306-01-158-1154	16	10	2815-01-186-9475	17	9
2815-01-158-6848	39	1	5120-01-187-0384	41	45
5365-01-160-1832	11	18	2815-01-187-2541	32	4
4730-01-160-3579	25	5	4730-01-187-2566	9	6
3020-01-161-0232	12	8	4730-01-187-2567	9	6
5360-01-161-2303	14	2	2910-01-187-3633	11	14
4730-01-161-5115	23	17	4810-01-187-4925	10	11
5120-01-164-3265	41	47	2815-01-187-5233	17	4

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STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
4710-01-187-5271	7	2	3040-01-241-4696	11	30
2910-01-187-7008	11	1	5210-01-241-5011	41	39
2815-01-187-7164	31	5	2815-01-241-9151	29	3
2910-01-188-1271	9	12	4820-01-242-2579	13	12
2930-01-188-3219	25	15	3020-01-242-8095	30	3
2930-01-188-3220	25	4	5330-01-245-7595	28	19
2815-01-188-3265	35	6	4710-01-262-4995	24	3
2935-01-188-3275	25	12	4710-01-262-4996	24	6
4710-01-188-3294	8	5	4710-01-262-4999	24	12
4710-01-188-3295	15	8	4710-01-262-5000	24	11
4730-01-188-8255	7	15	5330-01-262-5118	10	15
	8	10	4820-01-263-6410	21	21
4710-01-189-1836	15	11	5305-01-271-3248	3	4
2540-01-189-2162	27	4	4310-01-271-5103	16	14
4730-01-189-4781	9	6	5306-01-278-4014	2	12
3040-01-189-8404	16	28	3030-01-291-5838	28	1
2815-01-190-1083	23	20	5330-01-291-6537	10	10
5331-01-190-4362	13	9		15	29
	13	17	5330-01-304-7794	23	7
3040-01-191-3861	31	1	4730-01-309-3321	21	13
5305-01-192-3334	23	13	2815-01-321-7030	36	6
2815-01-192-4586	34	9	5340-01-322-6029	13	16
2815-01-192-6978	18	1	5330-01-326-7442	28	14
4710-01-193-7563	23	6	3020-01-341-2477	4	10
5342-01-193-9039	16	31	4730-01-343-8430	28	20
2530-01-194-0115	15	39	2910-01-345-1126	13	2
5305-01-195-7896	16	33	5999-01-348-0302	5	18
4710-01-196-1554	7	8	5920-01-348-0303	6	15
4710-01-196-1555	7	10	3120-01-348-3364	5	19
4710-01-196-7704	7	14	3110-01-348-4867	5	9
4730-01-199-7780	28	15	4310-01-348-5414	16	26
5310-01-200-1318	15	20	5365-01-348-6971	6	6
	29	10	5306-01-348-8310	6	5
4320-01-201-8032	20	1	5310-01-348-8313	6	19
5975-01-205-5379	2	11	5310-01-348-8314	6	11
4820-01-214-6905	27	12	5310-01-348-8385	6	17
3120-01-215-9157	13	20	5310-01-348-8386	6	16
4730-01-217-5719	8	13	5310-01-348-8392	6	12
5120-01-217-8264	41	44	5310-01-348-8398	6	4
5331-01-220-2384	19	3	6115-01-349-5320	5	4
	19	9	5970-01-350-5646	6	14
5120-01-222-7932	41	31	5340-01-361-1204	6	21
5310-01-225-0701	5	2	5340-01-361-1208	4	13
4940-01-225-8390	41		3020-01-362-3577	6	27
4710-01-228-5834	19	2	2920-01-363-5173	5	1
4710-01-228-5835	19	4	5340-01-376-0872	4	9
3040-01-228-5836	38	11	5340-01-376-0873	26	4
2930-01-229-3431	25	1	5330-01-381-2011	2	5
4710-01-230-0322	23	4	2815-01-385-3635	2	1
5305-01-231-0612	20	15	2815-01-385-3683	2	6
2520-01-231-9279	31	10	8145-01-399-1902	1	3
5310-01-232-1361	6	13	2815-01-399-6801	1	1

STOCK NUMBER	NATIONAL STOCK NUMBER INDEX		STOCK NUMBER	FIG.	ITEM
	FIG.	ITEM			
5330-01-408-0887	12	7			
4730-01-411-7520	19	6			
4730-01-411-7540	19	8			
4720-01-413-1355	19	7			
3120-01-413-6106	6	7			
2920-01-415-9497	6	2			
2920-01-420-9968	6	1			
3020-01-433-7092	30	5			
5306-01-439-3254	26	6			
5306-01-440-1444	30	1			
5340-01-443-4102	4	4			
5305-01-443-5538	6	22			
5306-01-443-5546	4	11			
2930-01-443-6993	28	2			
3020-01-456-6283	28	3			

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	PART NUMBER	STOCK NUMBER		
58536	A-A-51150TY2STAS Z1	3460-00-913-8526	41	8
15434	AK0402900SS	4720-01-186-0555	8	1
15434	AK10016SS	4720-01-413-1355	19	7
88044	AN565F428H24	5305-00-063-5043	11	24
88044	AN960-416	5310-00-141-1795	10	6
			11	4
			12	27
			13	8
			14	7
15434	AR03640	3120-01-060-5967	30	10
			30	17
			KIT	
15434	AR03641	3120-01-122-2498	30	10
			30	17
			KIT	
15434	AR03642	3120-01-122-2499	30	10
			30	17
			KIT	
15434	AR03643	3120-01-152-4261	30	11
			KIT	
15434	AR0397300	4710-01-193-7563	23	6
15434	AR10035	2815-01-097-0769	39	7
15434	AR10336	2815-01-186-0876	15	24
15434	AR11085		36	18
15434	AR11171	2815-01-108-5385	36	9
15434	AR11930	2815-00-936-2232	KIT	
15434	AR12190	2815-00-490-3060	38	4
15434	AR13024	2930-01-185-8273	21	1
15434	AR13114	4310-01-079-3319	16	22
15434	AR41010	2910-01-080-3149	11	28
15434	AR4154	2530-00-134-4620	16	9
15434	AR45632	2815-01-321-7030	36	6
15434	AR73350	2815-00-913-2074	KIT	
15434	AR8069	2815-01-066-2993	39	1
15434	AR9633	3040-01-228-5836	38	11
58536	A52546-IF BULK	4720-01-122-9847	BULK	1
58536	A52546-IN BULK	4720-01-120-0398	BULK	2
15434	BM5312000	3020-01-088-7916	20	9
15434	BM70796	2910-00-803-2631	14	1
15434	BM76340	6685-00-828-7126	10	3
15434	BM98341	2990-01-138-9155	20	19
80204	B1821BH031C150N	5305-00-226-4831	15	4
80204	B1821BH031C275D	5306-01-158-1154	16	10
80204	B1821BH038C063N	5305-00-721-5492	31	9
80204	B1821BH038C100D	5305-00-942-2196	20	30
80204	B1821BH038C100N	5305-00-068-0510	4	7
80204	B1821BH038C125L	5306-01-112-8681	20	32
80204	B1821BH038C125N	5305-00-068-0511	4	12
			27	1
80204	B1821BH038C138N	5305-00-688-2111	16	30
80204	B1821BH038C138N	5305-00-688-2111	17	8

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
				24	5
80204	B1821BH038C150N		5305-00-725-2317	20	33
80204	B1821BH038C200N		5305-00-782-9489	9	14
80204	B1821BH038C225N		5305-00-638-8920	20	2
80204	B1821BH044C100N		5305-00-071-1786	28	23
80204	B1821BH044C113N		5305-00-071-1787	26	1
80204	B1821BH044C125N		5305-00-071-1788	29	1
80204	B1821BH044C175N		5305-00-071-2056	4	3
80204	B1821BH050C175N		5305-00-071-2070	2	2
64104	B2568		5315-00-532-9388	39	12
55719	CJ83C		5120-00-499-1489	41	35
66295	C72P		4730-00-359-9487	17	11
1276	FF9311-36		4730-00-909-8627	24	1
80244	GGG-G-17 TY7CL1S TA		5210-00-273-9867	41	7
33287	J29109		4910-00-808-3372	41	33
96906	MS122032		5310-00-159-6209	10	5
				11	3
96906	MS16625-1100		5325-00-807-2636	11	7
				14	5
96906	MS16632-1050		5325-00-256-2846	11	36
96906	MS18154-59		5305-01-010-2362	15	36
				22	10
				23	2
				33	4
				34	5
96906	MS21044-N3		5310-00-877-5797	6	25
96906	MS21245-L12		5310-00-419-0876	6	10
96906	MS27183-14		5310-00-080-6004	4	5
				7	18
				8	3
				15	34
				16	32
				17	6
				22	6
				33	14
				35	1
96906	MS27183-16		5310-00-809-4085	2	9
				4	1
				26	3
				28	21
96906	MS27183-18		5310-00-809-5998	2	3
96906	MS27183-42		5310-00-014-5850	12	31
96906	MS27183-8		5310-00-809-8546	6	24
96906	MS3367-7		5975-01-205-5379	2	11
96906	MS35206-280		5305-00-988-1724	11	2
96906	MS35207-265		5305-00-993-1848	6	20
96906	MS35333-47		5310-00-550-3714	2	13
96906	MS35334-19		5310-00-821-6269	6	26
96906	MS35335-32		5310-00-596-7691	6	23
96906	MS35338-145		5310-00-937-0453	3	3
96906	MS35338-45		5310-00-407-9566	15	5

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				16	7
				16	11
				23	12
96906	MS35338-46		5310-00-637-9541	4	6
				24	4
96906	MS35338-47		5310-00-209-0965	2	10
				4	2
				10	17
				26	2
				28	22
				29	2
				30	14
				31	15
96906	MS35691-5		5310-00-971-7989	10	4
				11	23
96906	MS35756-17		5315-00-012-4553	6	8
96906	MS35756-20		5315-00-616-5501	34	8
96906	MS35842-11		4730-00-908-3194	24	9
96906	MS51092-1		5310-00-684-3463	34	11
96906	MS51504A4		4730-00-647-3207	7	6
96906	MS51510A4		4730-00-542-5906	7	13
30780	MS51843-6P		4730-00-492-6040	22	8
96906	MS51967-11		5310-00-880-8189	2	7
96906	MS51967-14		5310-00-768-0318	2	4
96906	MS51968-14		5310-00-732-0560	38	6
				38	9
96906	MS521301A206R		4720-00-401-9299	15	1
96906	MS90725-34		5306-00-225-8499	8	2
96906	MS90725-91		5305-00-042-9477	2	8
96906	MS90725-98		5305-00-069-5582	31	16
81349	M24240/3-21014		5305-01-271-3248	3	4
81349	M62217/1-36-4			24	2
80205	NAS632-6		5306-01-278-4014	2	12
76761	N3117		2920-01-415-9497	6	2
76761	N7309		6115-01-349-5320	5	4
76761	N7312		2920-01-363-5173	5	1
76761	N7346			5	8
76761	N7347			5	10
76761	N7348			5	17
76761	N9005		5305-01-032-4165	5	15
76761	N9008		5325-01-032-4222	5	12
76761	N9009		5325-01-034-2757	5	14
76761	N9010		3110-01-037-4661	5	13
76761	N9015		5310-01-046-0186	6	18
76761	N9063		5310-01-050-6565	5	5
76761	N9098		5310-01-225-0701	5	2
76761	N9099		5310-01-165-1312	5	7
76761	N9260		5325-01-136-7662	5	11
76761	N9265		5310-01-136-4888	5	16
76761	N9318		5999-01-348-0302	5	18
76761	N9331		5310-01-232-1361	6	13
76761	N9385		3110-01-348-4867	5	9

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76761	N9408		5310-01-348-8386	6	16
76761	N9410		5310-01-348-8398	6	4
76761	N9414		5920-01-348-0303	6	15
76761	N9417		3120-01-348-3364	5	19
76761	N9420		5970-01-350-5646	6	14
76761	N9426		5310-01-348-8313	6	19
76761	N9452			5	3
76761	N9453		5310-01-348-8314	6	11
76761	N9455		5310-01-348-8385	6	17
76761	N9457		5306-01-348-8310	6	5
76761	N9460		5365-01-348-6971	6	6
76761	N9461		5310-01-348-8392	6	12
15434	S-115		5305-00-426-4184	16	8
15434	S-910-B		4730-01-160-3579	25	5
15434	ST-1105		5120-01-164-3265	41	47
15434	ST-1159		4910-01-097-6988	41	41
15434	ST-1161		5120-01-128-2671	41	42
15434	ST-1166		6635-01-128-2676	41	28
15434	ST-1188		5110-01-141-6140	41	27
15434	ST-1227		5120-00-981-3108	41	23
15434	ST-1279		5120-01-128-2679	41	12
15434	ST-257		4910-00-345-3708	41	16
15434	ST-658		4910-01-097-6986	41	40
15434	ST-663		3460-00-999-1173	41	17
15434	ST-685-4		5210-01-171-3910	41	9
15434	ST-709		5120-00-999-1504	41	46
15434	ST1122		4910-00-150-5843	41	14
15434	ST1124		4910-00-150-5844	41	15
15434	ST1134		4910-00-150-5848	41	10
15434	ST1179		5120-00-104-1795	41	19
15434	ST1329		4910-01-128-2681	41	34
15434	ST662		4910-00-999-1208	41	13
15434	ST722		5365-00-951-0775	41	29
15434	ST862		4910-00-977-7489	41	38
15434	ST876		7920-00-168-3244	41	22
15434	ST880		3441-00-922-6699	41	20
15434	ST884		4910-00-981-3105	41	21
87641	SWE6038		5120-00-113-5271	41	18
15434	S00094600			8	14
15434	S0096400		4730-01-188-8255	7	15
				8	10
15434	S00100500A		4730-00-374-4282	15	9
15434	S1002A		4730-00-365-2690	15	10
15434	S1004-1		4730-01-151-6316	7	9
15434	S102D		5305-00-091-4010	23	10
				33	18
15434	S105		5305-00-426-4142	17	10
15434	S113		5305-00-757-6361	29	7
15434	S117		5305-01-029-1193	7	7
				8	21
				23	9
15434	S119		5305-01-192-3334	23	13

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
15434	S126		5305-00-177-5552	20	27
				33	11
15434	S133		5305-01-039-2211	39	13
15434	S141		5305-01-231-0612	20	15
15434	S159B		5305-00-493-3959	10	8
15434	S16002		3110-00-554-5243	28	13
15434	S16052		3110-00-516-5289	12	6
15434	S16067		3110-00-156-4699	28	7
15434	S169		5305-01-060-5961	15	19
15434	S170A		5305-00-509-8103	25	16
15434	S172B		5305-00-543-2419	34	10
15434	S174C		5305-00-207-2715	10	1
15434	S189C		5305-00-509-8106	10	13
15434	S223		5310-00-521-8595	7	20
				21	16
				22	5
				11	34
				40	1
15434	S2286		5305-00-804-6318	21	12
15434	S3050		5330-00-599-5463	21	12
15434	S603		5310-00-820-6653	30	2
15434	S604		5310-00-261-7340	7	19
				8	20
				15	35
				17	7
				21	17
				22	9
				25	3
				27	2
15434	S608		5310-01-200-1318	15	20
				29	10
				30	13
				15	6
				16	12
				23	11
				39	14
15434	S622		5310-00-562-6557	30	13
15434	S626		5310-00-562-6558	15	6
				16	12
				23	11
15434	S658		5310-00-109-7638	39	14
15434	S911B		4730-00-018-9566	28	12
				30	7
				25	6
15434	S915A		4730-00-801-8186	25	6
15434	S929B		4730-01-126-9606	7	21
15434	S965E		5365-00-404-2934	15	25
				16	25
31033	V1624X		2815-00-994-4437	36	17
81348	WW-P-471BDQBUEB		4730-00-202-6668	21	20
81348	WW-P-471BDQBUEC		4730-00-202-6663	15	37
15434	10021500		3040-00-567-4354	13	19
15434	100478			11	29
15434	100764			12	1
15434	100973		5315-00-086-8293	39	10
15434	102957		5315-00-815-0530	33	15
				39	9

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
75958	105-10116		2520-01-231-9279	31	10
15434	105375		9905-00-733-7622	40	3
19200	10539031-1		5220-00-293-3556	41	32
15434	107118		4730-01-411-7520	19	6
15434	107460		5340-00-087-7486	7	5
15434	107713		5330-00-886-9105	25	7
15434	108708		5305-01-113-0535	31	13
15434	108722		5340-00-400-3449	8	8
19207	10889926		5330-00-860-9153	3	2
19207	10890481		8105-00-477-3716	2	14
19207	10906697		6685-00-618-1822	2	16
15434	109319		2815-00-406-8936	23	3
15434	109557		5310-00-186-7403	16	6
15434	109594		3120-01-079-6527	18	3
15434	110058		5340-00-716-4975	11	25
15434	110855			13	15
15434	112076		5365-01-160-1832	11	18
15434	114463		5305-00-776-6884	20	18
15434	114850		5365-00-203-1281	7	16
15434	118226		5305-00-161-0902	12	29
15434	11936300		3020-00-702-3882	13	13
15434	119810			16	19
15434	119859			16	20
19207	12332596		4730-01-343-8430	28	20
19207	12342711		3120-01-413-6106	6	7
15434	123558		5315-00-866-5015	36	21
19207	12357256		3020-01-242-8095	30	3
19207	12379498		5120-01-222-7932	41	31
19207	12379509		5340-01-361-1208	4	13
19207	12379510		5340-01-361-1204	6	21
19207	12379511		3020-01-362-3577	6	27
19207	12379513		3020-01-433-7092	30	5
19207	12379514		5340-01-376-0872	4	9
19207	12379515		5340-01-376-0873	26	4
19207	12386697		2815-01-385-3683	2	6
19207	12386698		2815-01-385-3635	2	1
19207	12386702		5330-01-381-2011	2	5
19207	12412049		8145-01-399-1902	1	3
19207	12412073			2	15
19207	12412167			1	2
19207	12447109		2920-01-420-9968	6	1
15434	127554		5342-01-143-6048	36	10
15434	127558		2815-00-791-1453	20	28
				21	10
15434	136403		9905-00-473-7260	40	4
15434	138937		2815-00-981-3160	36	23
15434	139438		5310-00-062-6632	32	14
15434	139950		5310-00-062-9566	32	13
15434	140218		5310-00-082-1882	39	17
15434	142616		2930-00-437-0567	21	8
15434	143252		5360-01-161-2303	14	2
15434	143405		3040-00-086-8384	20	8

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
15434	143406		3040-01-066-2968	20	7
15434	143847		5360-00-081-8487	12	23
15434	144131		5315-00-062-4395	30	8
15434	144178		5315-00-082-0448	12	25
15434	144179		5310-00-727-8353	12	24
79470	145		4820-01-263-6410	21	21
15434	146160		5310-00-809-3078	12	18
15434	14648300		2910-00-790-8736	11	22
15434	146731		5360-01-067-8438	36	13
15434	146732		5360-01-067-8439	36	12
15434	146733		2815-01-066-2962	36	11
15434	147135		5342-00-858-3507	7	17
15434	147389		5305-00-062-4378	36	7
15434	147610		3120-01-016-4883	16	24
15434	148376		4710-01-089-5904	8	4
15434	149151		3020-00-082-0461	20	16
15434	151033			20	17
15434	151249		5340-01-186-7187	27	8
15434	151707		5330-00-994-4410	17	1
15434	153964		4310-01-146-5921	16	5
15434	154018		5330-00-852-7347	16	13
15434	154088			11	20
15434	15422600		2815-00-084-7796	17	2
15434	154396		5330-00-994-4411	17	3
15434	155267		5325-00-062-4372	32	6
15434	156348		5330-00-909-2489	17	5
15434	156438		5360-00-045-9877	37	4
15434	156439		5340-00-045-9876	37	3
15434	156641		5330-00-994-4435	36	14
15434	157088		5365-00-507-3271	11	19
15434	159098		5365-00-072-8371	39	2
15434	159099		5365-00-072-8372	39	2
15434	159100		5365-00-072-8373	39	2
15434	159101		5365-01-098-0506	39	2
15434	159102		5365-00-072-8374	39	2
15434	159103		5365-01-098-0505	39	2
15434	162653		4820-01-138-9474	20	22
15434	163067		4730-01-187-2566	9	6
15434	163068		4730-01-187-2567	9	6
15434	163069		4730-00-404-7777	9	6
15434	163071		4730-01-189-4781	9	6
15434	163733		5342-00-400-5178	11	12
15434	164455		3120-01-111-6593	39	19
15434	164881		5305-01-195-7896	16	33
15434	166009		5360-00-132-0245	9	2
15434	167157		4820-01-070-9710	9	10
15434	167266		2815-01-186-9475	17	9
15434	168306		5305-00-947-3437	38	5
				38	8
15434	168807			17	13
15434	169351		2815-00-159-8678	37	1
15434	169747		3040-00-909-2481	34	7

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
15434	169835		5360-01-128-3940	15	16
15434	169843		5330-01-060-2988	15	28
15434	169992		5330-01-111-7404	15	12
				33	1
15434	170833		3120-01-111-7419	33	5
15434	17108500		2815-00-939-8084	37	5
15434	172640		5306-00-163-6585	28	24
15434	173086		5330-00-132-0247	9	5
15434	174299		5325-00-815-1137	9	8
72741	175-325		5305-00-709-8531	4	8
15434	175282		2940-00-459-6558	20	31
				34	4
15434	17586400		3040-00-933-3012	13	14
15434	176027		5330-00-129-9389	16	27
15434	176059		5342-01-193-9039	16	31
15434	177289		4730-01-141-1588	9	6
15434	177376			39	18
15434	177385		3130-01-132-6423	39	16
15434	177734		5305-01-072-4270	36	3
15434	178079		4820-00-471-0049	8	16
15434	178334		2815-01-109-2560	38	1
15434	178335		3040-01-109-2559	38	10
15434	178336		5365-01-112-1539	36	22
15434	179297		5330-01-117-5876	33	20
15434	179298		5340-01-109-6662	33	19
15434	179301		9320-01-109-4736	31	2
15434	179306		5330-01-113-2202	27	6
15434	179308		5330-01-147-5234	21	28
15434	179309		5330-01-138-6353	21	6
15434	179427		5330-01-113-2203	27	10
15434	17946300		3020-01-094-9350	34	6
15434	17946400		3020-01-040-0167	30	9
15434	180098		5340-01-112-4294	9	16
15434	180102			36	24
15434	180372		5340-00-719-4601	8	7
15434	180381		5330-01-060-2986	27	5
15434	180626		5310-01-066-2942	9	17
15434	180795		5330-01-133-4507	20	13
15434	180796			20	21
15434	180810			16	17
15434	181027		2815-00-939-8924	37	7
15434	181466		5310-00-484-1718	10	2
15434	181466		5310-00-484-1718	13	7
				13	23
15434	182459		5330-01-111-7405	27	7
15434	183049		5331-00-058-1767	39	5
15434	183122		5306-01-112-4277	30	15
15434	18329800		2815-01-192-6978	18	1
15434	18329900		2815-01-186-6084	18	1
15434	183649		4730-01-142-0192	19	1
15434	185138		5342-01-079-4678	9	13
15434	185139			9	3

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
15434	185347		4730-01-054-2667	7	1
				8	17
15434	185505		4820-01-110-1170	7	4
15434	185804		5305-00-463-0428	18	4
15434	185814		4710-01-188-3294	8	5
15434	186348		2940-01-028-0606	21	19
15434	186780		5330-00-864-5422	25	8
15434	187350			16	16
15434	187437		5340-01-186-7188	27	14
15434	189545		5330-01-112-7772	34	3
15434	189566		5330-01-186-7541	24	8
15434	189568		2540-01-189-2162	27	4
15434	189582		5330-01-113-2200	28	16
15434	189761			32	12
15434	189763		3120-00-815-1412	32	11
15434	189771		3120-01-122-4768	32	8
15434	189772		3120-01-122-0861	32	8
15434	189800		5365-00-462-4504	14	3
15434	190839		5340-01-186-7172	15	32
15434	19191700		2910-01-110-3576	9	18
15434	193501		5330-00-250-2169	31	17
15434	193654		3130-01-136-2166	39	16
15434	193655		3130-01-136-2167	39	16
15434	193656		3130-01-132-6422	39	16
15434	193657		3130-01-137-2183	39	16
15434	193663			30	10
15434	193673			30	17
15434	193736		5330-00-132-0276	9	4
15434	193792		5306-01-440-1444	30	1
15434	193919		2815-01-109-1774	34	2
15434	194115		5331-00-885-9427	39	4
15434	195327		2815-01-127-2339	30	4
15434	195712		2815-01-109-1197	18	5
15434	196281		4730-01-060-0947	15	3
15434	196887		5330-01-138-6357	21	23
15434	196949		5330-01-060-4424	23	1
15434	196960			28	11
15434	198721		5315-01-144-3322	15	17
15434	199919		5306-01-029-1191	28	18
15434	200731		5330-01-143-9201	31	4
15434	200748		2930-01-188-3219	25	15
15434	200749		2930-01-188-3220	25	4
15434	200751		5340-01-185-8633	25	13
15434	200756		5330-01-186-7542	25	14
15434	200757		5325-01-112-4302	25	10
15434	200780		3120-01-060-5953	39	21
15434	200790		3120-01-060-5954	39	22
15434	200861		5310-00-134-4171	31	12
15434	201737		6685-01-141-0907	25	9
15434	202645			15	15
15434	203071		4730-00-762-4161	8	18
15434	203131		5310-00-426-3990	36	8

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
15434	203253		5365-01-138-1794	39	6
15434	203426		5315-01-079-6506	9	9
15434	203518		5310-01-112-4305	9	15
				20	26
15434	203760		5310-01-112-4306	26	5
15434	204069		5340-01-186-7189	15	18
15434	204165		5305-00-795-9336	31	11
15434	204482			38	13
15434	204489		5330-01-186-7713	15	22
15434	206326		5305-01-113-1179	10	18
15434	206402		5306-01-439-3254	26	6
1276	2080-4B		4730-01-217-5719	8	13
15434	208161		5310-01-138-9156	20	23
15434	210036		5340-01-112-4280	38	12
15434	21108300		3020-01-138-2034	16	29
15434	211089			15	26
15434	211120		3120-01-145-4032	15	27
15434	211939		5360-01-038-4659	20	25
15434	212217		2815-01-109-3056	36	28
15434	212224		5330-01-052-9795	36	30
15434	212504		5365-01-112-1545	36	15
15434	212601		3040-01-070-9004	12	15
15434	212603			12	11
15434	212604		5325-01-081-0662	12	5
15434	21260500		3020-01-070-9003	12	4
15434	212607		3040-01-085-2871	12	12
15434	212609		3120-01-087-2539	12	9
15434	212613		3010-01-080-1529	12	17
15434	212639		3010-01-088-5727	12	3
15434	212668		5315-01-087-0534	12	20
15434	212940		2815-01-049-8966	36	29
15434	21337800		3040-01-191-3861	31	1
15434	213379		4710-01-230-0322	23	4
15434	213512		5330-01-113-2199	29	5
15434	213600			39	24
15434	213768			11	31
15434	213769		3110-01-079-8190	11	35
15434	213872		5340-01-142-6940	15	30
15434	213990		4710-01-189-1836	15	11
15434	213991		4710-01-188-3295	15	8
15434	21413900		2910-01-141-4028	11	15
15434	214188		5340-01-185-8631	21	9
15434	214751		5305-01-036-2811	38	3
15434	214940		2815-01-108-5384	30	6
15434	21539000		2815-01-127-2590	32	7
15434	21563300		2990-01-128-9635	30	12
15434	215761		3040-01-189-8404	16	28
15434	215871		2815-00-085-7438	36	5
15434	216354		4730-01-186-5991	19	5
15434	216431		2815-01-126-7228	36	29
15434	216432		4820-01-126-8446	36	29
15434	216433		2815-01-126-9304	36	29

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
15434	216434		2815-01-127-1061	36	29
15434	216707		2815-01-109-3034	36	16
15434	21690600		3020-01-070-7980	12	16
15434	21691100		3020-01-161-0232	12	8
15434	216983			32	2
15434	218025			32	1
15434	218793			16	3
57163	229A		5210-01-241-5011	41	39
15434	300014100		2815-01-184-6603	21	5
15434	300014200		2815-01-184-9648	21	22
15434	3000438		4730-01-078-5690	11	10
15434	3000446		4320-01-098-5115	11	33
15434	300045000		2815-01-184-9649	21	2
15434	3002047		5360-01-186-7500	11	37
15434	3002110		2910-01-086-7715	12	13
15434	300215800		4730-01-199-7780	28	15
15434	3002194		5340-01-185-8632	27	11
15434	300233600		2815-01-186-0875	23	5
15434	3002356		5330-01-111-7389	33	17
15434	300248300		2930-01-109-9946	28	9
15434	3002993		3120-01-111-7418	20	29
15434	3003156			14	9
15434	3003267		5305-01-186-7647	31	14
15434	3003602		2815-01-095-8507	37	2
15434	3003929		2910-01-188-1271	9	12
15434	3004293		4730-01-078-4703	11	27
15434	3004724		5365-01-126-3334	12	10
15434	300490400		4320-01-098-5102	11	5
15434	3004907		2815-00-907-8954	37	8
15434	3005150		2590-01-109-2075	35	5
15434	3005822		2815-01-192-4586	34	9
15434	3006111		2815-01-109-2558	38	7
15434	300676900		2815-01-187-5233	17	4
15434	3007628			15	14
15434	3007713		5330-01-086-6197	21	7
15434	3007759		5331-01-072-4436	36	20
15434	3008466		4730-00-954-1281	8	12
				17	14
				33	9
				36	25
15434	3008468		4730-01-147-2223	36	26
15434	3008469		4730-01-106-0202	21	14
				33	16
				36	27
15434	3008470		5342-01-143-6045	23	18
15434	3008706		4730-01-077-2016	9	7
15434	3009916			20	4
15434	3010242		5330-01-075-0948	KIT	
15434	3010595		5305-01-085-8197	22	2
				27	13
15434	3010596		5305-01-088-6019	21	4
15434	3010597		5305-01-086-7036	8	6

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			STOCK NUMBER		
				33	8
15434	3010810		5342-01-145-1549	11	38
15434	3011234		3010-01-092-2240	15	13
15434	3011269			31	8
15434	3011716		5305-01-072-9021	7	11
				15	33
				23	19
				33	12
				34	1
15434	3011934		2910-01-146-0048	36	19
15434	3012259		2910-01-187-7008	11	1
15434	3012471		5305-01-072-8818	29	11
15434	3012472		5305-01-112-4312	21	24
15434	3012473		5305-01-137-6706	35	2
15434	3012474		5305-01-186-7394	21	25
15434	3012475		5305-01-143-0475	17	15
				21	18
				21	27
15434	3012477		5305-01-165-2345	15	23
				21	26
				23	14
				33	10
15434	3012478		5305-01-143-0476	15	21
15434	3012481		5305-01-147-8732	31	3
15434	3012483		5305-01-114-6386	29	8
15434	3013147		4730-01-032-3699	8	15
15434	3013497		5330-01-088-6751	KIT	
15434	3013690			11	16
15434	3013786		4730-01-161-5115	23	17
15434	301403800		2815-01-190-1083	23	20
15434	3014211		2815-01-147-2207	27	15
15434	3014622		2815-00-132-0240	36	28
15434	3014623		2815-01-127-1060	36	28
15434	3014624		2815-01-127-3597	36	28
15434	3014625		2815-01-127-3598	36	28
15434	3014766		5305-01-129-4217	35	3
15434	3015176		3120-01-111-9323	31	7
15434	3015282		5305-01-129-4384	10	9
15434	3015283		5305-01-129-4215	17	16
15434	3017051		5305-01-112-9110	12	28
				14	11
15434	3017052		5305-01-126-1128	12	26
				14	8
15434	3018491			16	1
15434	3018532		2530-01-194-0115	15	39
15434	3018889		4730-01-146-3040	7	3
15434	3019115		5331-01-055-4542	21	3
15434	3019287		2815-01-187-2541	32	4
15434	3020184		5330-01-165-2287	29	9
15434	3020868		4710-01-187-5271	7	2
15434	3021470		5305-01-144-6233	37	6
15434	3021948-3999		2815-01-179-9056	10	19

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15434	3022561			20	3
15434	3022589		5306-01-119-8870	12	19
15434	3022723		4320-01-201-8032	20	1
15434	3024165		3040-00-449-7397	10	7
15434	3024989		2990-01-143-5489	12	22
15434	3025458		4730-00-011-3175	21	15
15434	3025459		5342-01-143-6046	14	10
15434	3025460		4730-01-124-3762	11	17
15434	3026315		5330-01-143-8209	35	10
15434	302723200		4730-01-130-6522	39	8
15434	3027295		9905-01-137-4775	40	2
15434	3028064		5330-01-143-8210	11	6
15434	3028665		5330-01-143-8207	18	2
15434	3028673		5330-01-143-8208	35	8
15434	3029803		2530-00-603-1506	16	2
15434	3029808		4310-01-348-5414	16	26
15434	3030268		2990-01-147-2210	12	2
15434	3033719		3120-01-185-8586	13	21
15434	3033723			13	5
15434	3033724		3120-01-215-9157	13	20
15434	3033726			13	3
15434	3033729			13	11
15434	3033740		4820-01-164-7002	13	18
15434	3033742			13	10
15434	3033895		5315-01-185-8518	39	11
15434	3034244		2910-01-345-1126	13	2
15434	3034412		5331-01-190-4362	13	9
				13	17
15434	3035362		4810-01-187-4925	10	11
15434	3036970		2910-01-187-3633	11	14
15434	3037413			32	5
15434	3038055		4710-01-228-5835	19	4
15434	3038058		5331-01-220-2384	19	3
				19	9
15434	3038999		5330-01-326-7442	28	14
15434	3039000		5330-01-112-1527	28	4
15434	303931100		2815-01-187-7164	31	5
15434	3039367		2910-01-141-4328	11	11
15434	3041945		4710-01-184-4035	22	4
15434	3041946		2815-01-184-6604	22	1
15434	3041949		6680-01-183-4399	22	3
15434	3042417			9	11
15434	3042542			11	8
15434	3043099		2935-01-188-3275	25	12
15434	3043100		2930-01-229-3431	25	1
15434	3043400		4710-01-196-7704	7	14
15434	304340200		4710-01-196-1555	7	10
15434	3043404		4710-01-196-1554	7	8
15434	3043438			36	4
15434	3044795		5330-01-088-9312	39	3
15434	3045005		5340-01-322-6029	13	16
15434	3045140		4710-01-228-5834	19	2

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
15434	3045173			12	14
15434	3045670		4310-01-271-5103	16	14
				16	18
15434	3046200		3010-00-507-8347	10	14
15434	3046680		3040-01-241-4696	11	30
15434	3047103		4710-01-262-4996	24	6
15434	3047104		4710-01-262-4995	24	3
15434	3047105		4710-01-262-4999	24	12
15434	3047106		4710-01-262-5000	24	11
15434	3047159		5330-00-131-7072	16	4
15434	3048341		5330-01-262-5118	10	15
15434	3049540		3020-00-682-7710	20	6
15434	3050624		4820-01-242-2579	13	12
15434	3052213		2815-01-241-9151	29	3
15434	305416000		3040-01-110-1209	28	8
15434	3054197			9	1
15434	3058559			11	13
15434	3060882		4730-01-309-3321	21	13
15434	3063668		5330-01-304-7794	23	7
15434	3064398			32	3
15434	3065413		2815-01-188-3265	35	6
15343	3068575		5330-01-245-7595	28	19
15434	3069017		5330-01-136-8569	13	1
15434	3071085		5330-00-005-0407	28	10
15434	3071471		5306-00-909-2491	32	10
15434	3073579		2815-01-109-4778	32	9
15434	3074615		2815-01-109-1318	35	7
15434	3076040		5305-01-072-8826	11	32
15434	3081048		4730-01-411-7540	19	8
15434	3081348		5306-01-443-5546	4	11
15434	3084245		5330-01-097-5851	33	2
15434	3086431		3020-01-456-6283	28	3
15434	3086457		2930-01-443-6993	28	2
15434	3086458		5340-01-443-4102	4	4
15434	308834800		3040-01-091-0485	35	9
15434	3096231		5305-01-443-5538	6	22
15434	3160999		3040-01-169-8387	33	7
15434	3201386		5330-01-181-0630	15	7
09505	322-E		4820-01-214-6905	27	12
01347	330-10-10R		4820-01-005-2994	2	17
15434	3375092		5365-01-128-2684	41	11
15434	3375111		5120-01-128-2867	41	5
15434	3375133		4910-00-977-7505	41	6
15434	3375318		5120-01-128-2782	41	43
15434	3375861		4910-01-142-7387	41	1
15434	3376091		5120-01-217-8264	41	44
15434	3376220		5210-01-157-3091	41	26
15434	3376471		2815-01-158-6848	39	1
15434	3376669			41	3
15434	3376872		5120-00-116-7604	41	36
15434	3377255		4910-01-149-1302	41	30
15434	3377269		5120-01-187-0384	41	45

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
15434	3558653		4310-01-079-3319	16	23
15434	3558655		2815-00-369-7846	16	21
15434	3801539		5330-01-169-3180	KIT	
15434	3803615		5330-01-408-0887	12	7
15434	3803676		2910-01-141-4337	12	21
15434	3823610		4910-00-548-7984	41	37
15434	3823798			41	25
15434	3824277		4910-01-128-2691	41	24
12361	3903927		5330-01-291-6537	10	10
				15	29
15434	3934818		3020-01-341-2477	4	10
15434	43828-A		4730-00-555-8263	15	2
15434	43864			20	11
15434	44678		2910-00-858-3522	14	12
72582	450517		5305-00-165-8157	25	2
15434	4797		3020-00-528-5053	31	6
13499	500-1114-003		5310-01-042-8391	6	3
17576	538174		5310-00-285-8833	36	2
				38	2
19207	57K1880		2815-01-399-6801	1	1
19207	5705425			41	
19207	5705426		4940-01-225-8390	41	
9058	599-281-20		5210-00-567-9545	41	4
81300	615K8		3030-01-291-5838	28	1
15434	63090		5365-01-185-8591	8	9
15434	63842		5310-00-134-4169	24	7
				27	3
				35	4
15434	64015		4720-01-186-0570	17	12
15434	64816A		5315-00-014-1244	13	4
15434	650330			16	15
15434	66112B		5365-01-138-9413	20	24
15434	67622		4730-01-128-4598	25	11
15434	67684		5310-00-262-2986	10	12
15434	68061A			11	26
15434	68139		4730-01-142-8524	8	11
15434	68152		5340-00-286-1868	15	38
15434	68152B		5340-01-185-8623	22	7
15434	68190		5342-01-128-8707	8	19
15434	68216		5315-00-158-4581	39	15
15434	68216A		5315-00-186-9208	39	15
15434	68274		5360-00-664-5343	21	11
15434	68365		3120-00-566-0480	20	5
				20	10
				20	20
15434	68368B		5365-01-185-8592	15	31
15434	68568		5315-00-719-4598	29	6
				39	20
15434	68606		5365-00-716-6580	28	6
15434	68908		2815-00-353-9395	20	14
				23	8
				33	3

CAGEC	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
15434	69066		5365-01-185-8521	23	16
15434	69324		5310-01-112-4307	10	16
15434	69470		5306-00-721-5887	23	15
15434	69562		5315-00-104-3637	29	4
				30	16
				33	6
				39	15
15434	7018300		2815-01-067-2327	28	5
15434	70295		4730-00-011-3175	36	1
				39	23
15434	70467		5340-00-719-4601	7	12
15434	70700		5360-00-597-4570	11	21
15434	70705		5330-00-562-1176	14	6
15434	70713		5340-00-898-1497	14	4
15434	70717		5365-00-507-3260	14	3
15434	70717A		5365-00-507-3261	14	3
15434	70717B		5365-00-507-3262	14	3
15434	70760		5315-00-475-2576	20	12
15434	70775			11	9
15434	70790		5306-00-485-0790	13	6
				13	22
19207	7720442		5310-00-772-0442	6	9
19207	8712289		5310-00-044-3340	5	6
35510	94134		2920-01-151-3762	3	1
80244	999-1206		5120-00-999-1206	41	2

APPENDIX C

DIRECT AND GENERAL SUPPORT MAINTENANCE EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

C-1. SCOPE

This appendix lists expendable/durable supplies and materials you will need to maintain the Cummins Diesel Engine, Model V903C. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

C-2. EXPLANATION OF COLUMNS

- a. *Column 1, Item Number.* This number is assigned to the entry in the listing. It is referenced in the Materials/Parts section of the task to identify the material (e.g., Cleaning solvent [Item 25, Appendix C]).
- b. *Column 2, Level.* This column identifies the lowest level of maintenance below that requires the listed item.

F — Direct Support Maintenance
H — General Support Maintenance

- c. *Column 3, National Stock Number.* This is the National Stock Number (NSN) assigned to the item; use it to order the item.
- d. *Column 4, Description.* This column indicates the Federal item name and the part number in parentheses followed by the Federal Supply Code for Manufacturer (FSCM).
- e. *Column 5, Unit of Measure (U/M).* This column indicates the measure used in performing the actual maintenance function. This measure is expressed by an alphabetical abbreviation (e.g., EA, IN, PR). If the unit of measure differs from the unit of issue, order the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	F	8040-00-941-9984	ADHESIVE (66195) 917252CI	TU
2	F	8030-00-597-5367	ANTISEIZE COMPOUND (73165) 51008	LB
3	H	5340-01-085-4234	CAP - PLUG, PROTECTIVE DUST AND MOISTURE SEAL (81349) MS501	EA
4	O	5340-00-324-9158	CAPS AND PLUGS: CAP, PROTECTIVE DUST (96906) MS90376-8Y 0.413 ID, 0.438 OD	EA
		5340-00-208-1989	(96906) MS90376-8R 0.480 ID, 0.540 OD	EA
		5340-00-449-4491	(96906) MS90736-10Y 0.530 ID, 0.595 OD	EA
		5340-00-211-8188	(96906) MS90376-1 OR 0.605 ID, 0.665 OD	EA
		5340-00-213-8881	(96906) MS90376-12R 0.720 ID, 0.775 OD	EA
		5340-00-481-8934	CAP, PROTECTIVE DUST (96906) MS90376-14Y 0.785 ID, 0.845 OD	EA
		5340-00-493-5835	(96906) MS90376-14R 0.850 ID, 0.905 OD	EA
		5340-00-496-5832	(96906) MS90376-16Y 0.893 ID, 0.963 OD	EA
		5340-00-200-5904	(96906) MS903761 6R 0.973 ID, 1.035 OD	EA
		5340-00-171-2436	(96906) MS90376-18Y 1.078 ID, 1.085 OD	EA
		5340-00-193-0783	(96906) MS90376-18R 1.093 ID, 1.155 OD	EA
		5340-00-051-0029	(96906) MS90376-20Y 1.150 ID, 1.215 OD	EA
		5340-00-213-8893	(96906) MS90376-20R 1.231 ID, 1.301 OD	EA
		5340-00-191-4898	(96906) MS90376-24Y 1.390 ID, 1.460 OD	EA
		5340-00-889-8677	(96906) MS90376-24R 1.463 ID, 1.533 OD	EA

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST — Cont'd

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
4	0	5340-00-804-1228	CAPS AND PLUGS — CONTINUED PLUG, PROTECTIVE DUST (81349) M5501/1-5 0.500-20-THD. 0.438 DIA.	EA
		5340-00-292-3292	(81349)M5501/1-6 0.5625-18 THD. 0.500 DIA	EA
		5340-00-828-8802	PLUG, PROTECTIVE DUST (81349) M5501/1-8 0.750-I 6 THD. 0.675 DIA.	EA
		5340-00-804-1245	(81349) M5501/1-16 1.3125-12 THD. 1.219 DIA.	EA
		5340-00-804-1236	(81349) M5501/2-4 0.4375-20 THD. 0.660 DIA.	EA
		5340-00-804-1243	(81349) MWW2-6 0.5625-I 8 THD. 0.800 DIA.	EA
		5340-00-804-1241	(81349)M5501/2-8 0.750-I 6 THD. 1 .00 DIA.	EA
		5340-01-138-2169	(81349) M5501/2-12 1.0625-I 2 THD. 1.28 DIA.	EA
		5340-00-604-1222	(61349)MI%OIM-16 1.3125I2 THD. 1.53 DIA.	EA
		5340-01-120-9526	(81349) M5501/2-24 1.875-I 2 THD. 2.23 DIA.	EA
5	H	6860-00-281-3044	CARBON REMOVING COMPOUND (81348) PCIII	GAL.
6	F	7510-00-164-8893	CHALK	GR
7	F	5350-00-221-0872	CLOTH, ABRASIVE (81346) P-C-458	SH
8	0	8030-00-252-3391	COMPOUND: SEALING, WITH BRUSH (81349) MIL-S-45160 11 OUNCE TUBE	oz
9	H	9150-00-076-1567	CUTTING OIL (29700) KUTWELMO	GAL.
10	F	6850-00-264-6572	DESICCANT, ACTIVATE (19203) 8790670-I	EA
11	H	5350-00-584-4654	EMERY CLOTH, 120 GRIT P-C-I 673	EA
12	F	9150-00-276-9213	GREASE, AIRCRAFT (81349) MIL-G-81322	CN
13	0	9150-00-857-9079	GREASE, GENERAL PURPOSE (73219) 130-AA	QT

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST — Cont'd

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
14	H	6850-00-782-2740	INSPECTION PENETRANT REMOVER (81349) MIL-I-25135	EA
15	H	5350-00-927-3867	LAPPING AND GRINDING COMPOUND (87742) 30-900A	JR
16	F	9150-00-186-6681	LUBRICATING OIL, ENGINE (81349) (MIL-L-2104) 30 WEIGHT	QT
17	H	9150-01-152-4117	OIL, 40 WEIGHT	QT
18	H	9150-00-250-0926	PETROLATUM, TECHNICAL (82146) 14PI	CN
19	H	8010-00-652-3626	PRUSSIAN BLUE PASTE, BEARING SURFACE (56232) 100674	oz
20	F	7920-00-205-1711	RAG, WIPING (58536) AA531	LB
21	F	6030-00-180-6222	SEALING COMPOUND (36378) 1005629-001	EA
22	F	8030-01-054-0740	SEALING COMPOUND, PIPE SEALANT W/TEFLON (05972) 59231	EA
23	F	8030-00-247-2524	SEALING COMPOUND (81349) MIL-S-45180	oz
23.1	F	8030-01-025-1692	SEALING COMPOUND: THREAD LOCKING, MEDIUM STRENGTH (80244) MIL-S-46163, TYPE II GRADE N 250 CC BOTTLE	cc
23.2	O	6850-01-159-4844	SEALANT: SILICONE, RN (11862) 1052734 8-1/2 OUNCE TUBE	oz
24	F	7930-00-253-0779	SOAP, SCRUBBING ALKALINE (58536) A-A-44	LB
25	F	6850-00-331-3350	SOLVENT, DRYCLEANING (SD-3) (81348) P-D-680	GAL.
26	H	6685-00-261-4859	TEMPERATURE INDICATING COMPOUND (84032) TEMPSTILK625F	EA
27	H	6810-00-292-9625	TRICHLORETHANE O-T-620	QT
28	H	9505-00-293-4208	WIRE, NONELECTRICAL (00624)	FT

APPENDIX D

CYLINDER HEAD REPAIR SPECIFICATIONS

Section I. INTRODUCTION

This appendix lists the repair specifications for the cylinder head on the Cummins Diesel Engine, Model V903C.

Section II. REPAIR SPECIFICATIONS FOR CYLINDER HEAD

CYLINDER HEAD REPAIR SPECIFICATIONS

CYLINDER HEAD SPECIFICATIONS — Inch (millimeter)			
MEASUREMENT	WORN LIMIT	NEW MINIMUM	NEW MAXIMUM
Valves, Guides, and Springs			
Valve Guide Bore	0.4545 (11.544)	0.4525 (11.494)	0.4532 (11.511)
Valve Guide Height		0.695 (17.65)	0.710 (18.03)
Valve Protrusion Intake		-0.005 (-0.13)	-0.025 (-0.64)
Valve Protrusion Exhaust		-0.052 (-1.32)	-0.072 (-1.83)
Valve Stem O.D.	0.449 (11.40)	0.450 (11.43)	0.451 (11.46)
Head Height	4.465 (113.41)	4.495 (114.17)	4.505 (114.43)
Crossheads and Guide			
Crosshead Guide O.D.	0.4322 (10.978)	0.433 (11.00)	0.4335 (11.011)
		1.860 (47.24)	1.880 (47.75)
Crosshead Guide Protrusion		1.860 (47.24)	1.880 (47.75)
Crosshead Bore Depth	1.80 (45.72)		
Crosshead Bore I.D.	0.440 (11.18)	0.434 (11.02)	0.436 (11.07)
Crosshead to Spring Retainer Clearance		0.025 (0.64)	
Injector Tip Protrusion		0.090 (2.29)	0.105 (2.67)

VALVE SEAT INSERT DATA - Inch (millimeter)

CAUTION
 Before machining the head or installing the insert
 in the head, measure the insert.

INSERT PART NO.	ST CUTTER	OVERSIZE DIAMETER	THICKNESS	INSERT OUTSIDE DIAMETER	CYLINDER HEAD INSIDE DIAMETER	INSERT THICKNESS	COUNTERBORE DEPTH IN HEAD
216434	ST-662-4	0.040 (1.02)	Std.	2.0425/2.0435 (51.880/51.905)	2.0395/2.0405 (51.803/51.829)	0.230/0.235 (5.84/5.97)	0.437/0.442 (11.10/11.23)
216433	ST-662-2	0.020 (0.51)	Std.	2.0225/2.0235 (51.372/51.397)	2.0195/2.0205 (51.295/51.321)	0.230/0.235 (5.84/5.97)	0.437/0.442 (11.10/11.23)
216432	ST-662-1	0.010 (0.25)	Std.	2.0125/2.0135 (51.118/51.143)	2.0095/2.0105 (51.041/51.067)	0.230/0.235 (5.84/5.97)	0.437/0.442 (11.10/11.23)
216431	ST-662	0.005 (0.13)	Std.	2.0075/2.0085 (50.991/51.016)	2.0045/2.0055 (50.914/50.940)	0.230/0.235 (5.84/5.97)	0.437/0.442 (11.10/11.23)
212940	ST-662	Std.	Std.	2.0025/2.0035 (50.864/50.889)	1.9995/2.0005 (50.787/50.813)	0.232/0.237 (5.89/6.02)	0.437/0.442 (11.10/11.23)
127934	ST-662-4	0.040 (1.02)	0.015 (0.38)	2.0425/2.0435 (50.880/51.905)	2.0395/2.0405 (51.803/51.829)	0.292/0.297 (7.42/7.54)	0.452/0.457 (11.48/11.61)
127933	ST-662-3	0.030 (0.76)	0.010 (0.25)	2.0325/2.0335 (51.626/51.561)	2.0295/2.0305 (51.549/51.575)	0.287/0.292 (7.29/7.42)	0.447/0.452 (11.35/11.48)
127932	ST-662-2	0.020 (0.51)	0.005 (0.13)	2.0225/2.0235 (51.372/51.397)	2.0195/2.0205 (51.295/51.321)	0.282/0.287 (7.16/7.29)	0.442/0.477 (11.23/12.12)
127931	ST-662-1	0.010 (0.25)	Std.	2.0125/2.0135 (51.118/51.143)	2.0095/2.0105 (51.041/51.067)	0.277/0.282 (7.04/7.16)	0.437/0.442 (11.10/11.23)
127935	ST-662	0.005 (0.13)	Std.	2.0075/2.0085 (50.991/51.016)	2.0045/2.0055 (50.914/50.940)	0.277/0.282 (7.04/7.16)	0.437/0.442 (11.10/11.23)
127930	ST-662	Std.		2.0025/2.0035 (50.864/50.889)	1.9995/2.0005 (50.787/50.813)	0.277/0.282 (7.04/7.16)	0.437/0.442 (11.10/11.23)

VALVE SPRING DATA - Inch (millimeter), Pound (kilogram)

VALVE SPRING PART NO.	APPROXIMATE FREE LENGTH	NO. COILS	WIRE DIAMETER	ASSEMBLED WEIGHT	WORKING HEIGHT	POUNDS REQUIRED TO COMPRESS		
						NEW MINIMUM	NEW MAXIMUM	WORN LIMIT
146731 (Outer)	2.350 (59.69)	6.5	0.177 (4.50)	1.752 (44.50)	1.287 (32.69)	124 (56.2)	136 (61.7)	120 (54.4)
146732 (Inner)	2.090 (53.09)	7.75	0.142 (3.61)	1.702 (43.23)	1.237 (31.42)	80 (36.3)	90 (40.8)	75 (34.0)

APPENDIX E FABRICATED TOOLS

INTRODUCTION

DELETED



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2-4	C		
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Reference for ball bearing inspection reads TM 9-247. The correct reference should read TM 9-214.

REMOVAL Step A states to "remove" tabs on four lockplates. This should be changed to "bend" tabs on four lockplates.

Engine oil unit measurement is listed in ounces (oz). The correct unit measurement should be listed in quarts (qt).

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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

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

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1,000 Milliliters = 33.82 Fluid Ounces

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

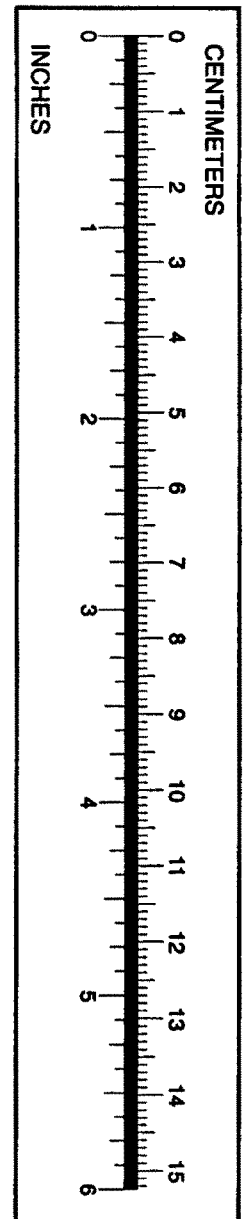
1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches
 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

TEMPERATURE

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 212° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 $9/5 ^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

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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