DEPARTMENT OF THE ARMY TECHNICAL MANUAL

U.S. MARINE CORPS TECHNICAL MANUAL

TM 5-2805-213-14
TM 2805-14/4

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL FOR

ENGINE, GASOLINE: 14 HP (MILITARY STANDARD MODEL A042), FSN 2805-017-8680

This reprint includes all changes in effect at the time of publication; change 1.

DEPARTMENT OF THE ARMY • U.S. MARINE CORPS

JULY 1969

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MARINE CORPS TECHNICAL MANUAL

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CHANGE
No. 1

HEADQUARTERS, DEPARTMENTS OF THE
ARMY AND MARINE CORPS
WASHINGTON, D.C., 5 October 1984

Operator, Organizational, Direct Support
And General Support Maintenance Manual

ENGINE, GASOLINE: 14 HP (MILITARY
STANDARD MODEL A042), FSN 2805-017-8680

TM 5-2805-213-14/TM 2805-14/4 18 July 1969, is changed as follows:

Throughout this manual all reference to TM 38-750 Army Equipment Record Procedures is changed to DA PAM 738-750, The Army Maintenance Management System (TAMMS).

Throughout this manual delete all reference to "TM 9-2320-213- series manual.

Page 4, paragraph 1-3. line 6 (Commanding General, U.S. Army Mobility Equipment Command, ATTN: AMSME-MPP, is changed to read U.S. Army Troop Support Command, DRSTR-MPS, 4300 Goodfellow Blvd., St. Louis, MO 63120).

Page 11, change paragraph 3-6 to read as follows:

"3-6. Operator's/Organizational Maintenance Checks and Services."

Tables 3-1 and 3-2 list the preventive checks and services which must be performed by the operator/organizational in the intervals and sequence indicated".

Page 11. Add tables 3-1 and 3-2 after paragraph 3-6.

Page 14. Change Table 3-1. Troubleshooting to read, "Table 3-3 Troubleshooting."

Throughout Chapter 3 change reference to Table 3-1 to read "Table 3-3."

Table 3-1. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES

INTERVAL B-BEFORE OPERATION			
B	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
		NOTE Perform lubrication prior to or in conjunction with before PMCS. Refer to L05-2805-213-12. Keep the engine free of dirt and oil on all external surfaces. Make sure that unit is properly sheltered at all times and cooling shrouds are installed and not damaged.	
●	Engine	Make the following walk around checks:	
		a. Inspect engine for evidence of leakage (oil or fuel) on, around, or under engine. Check for loose, damaged, or missing hardware and parts.	Class III oil leaks or any fuel leakage found.
		b. Inspect cooling fan assembly for leaves, debris, and obstructions on the fan guard.	Fan belt is missing or broken.
		NOTE During starting and operation check for unusual noise, rough-running, lack of power or excessive smoke that may indicate a defective or failed component.	

Table 3-2. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

INTERVAL S-SEMIANNUAL (500 HOURS)				
ITEM NO.	S	ITEM TO BE INSPECTED	PROCEDURES CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	EQUIPMENT IS NOT READY/ AVAILABLE IF:
			NOTE Perform operator/crew PMCS and lubrication prior to or in conjunction with organizational PMCS.	
1	●	Spark plug and cable	a. Inspect spark plugs for cracked insulation and burned electrodes. Clean and set spark plug gaps at .030 ± .002 inch. Insure gaskets are on the plugs before installation. Replace plugs if defective. Torque plugs to 275 to 300 lb-in. b. Replace cable leads which are frayed or broken. Clean and tighten lead connections.	
2	●	Magneto	Inspect contact assemblies for pitted or burned points. Clean and set contact points at .015 inch. Replace defective parts.	
3	●	Fan Belt	Inspect for worn, cracked, frayed, broken or deteriorated fan belt.	

TM 5-2805-213-14
TM 2805-14/4
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By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
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The Adjutant General

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MARINE CORPS
TECHNICAL MANUAL
No. 2805–14/4

DEPARTMENT OF THE ARMY
AND
HEADQUARTERS, U.S. MARINE CORPS
WASHINGTON, D. C., *18 July 1969*

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

ENGINE, GASOLINE: 14 HP (MILITARY STANDARD MODEL AO42), FSN 2805–017–8680

* This manual supersedes TM 5–2805–213–14/TM 2805–14/4, 21 June 1965.

ILLUSTRATIONS

ILLUSTRATIONS—Continued

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope
This manual contains instructions for the use of the operating, organizational, direct support, and general support personnel that maintain the Engines, Models AO42-KM and AO42-V, as allocated by the Maintenance Allocation Chart.

1-2. Administrative Storage
Refer to TM 740-90-1 for administrative storage procedures and to the applicable end item manual for additional operating and maintenance instructions.

1-3. Reporting of Equipment Publication Improvements.
The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to the Commanding General, U.S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Blvd., St. Louis, Mo 63120.

1-4. Destruction of the Engines
For demolition instructions that apply to the engines, refer to the applicable end item technical manual.

1-5. Equipment Serviceability Criteria
Refer to TM 9-2320-213-ESC for the equipment serviceability criteria applicable to the engines.

1-6. Forms and Records
DA forms and procedures used for equipment maintenance will be only those prescribed by TM 38-750, Army Equipment Record Procedures.

Section II. DESCRIPTION AND DATA

1-7. Description
The Model AO42 engines, (fig. 1-1, 1-2, 1-3, and 1-4), have been modified for use in a light weapons carrier. They are of the gasoline fueled, air-cooled, 4-cycle, 2-cylinder, valve-in-head, horizontally opposed-type. The engines are designed to provide satisfactory performance in temperate, arctic, tropical, and desert environments. Their design life is a minimum of 1,500 hours at rated load and speed without major overhaul. The electrical components of the engines are fully radio interference suppressed. The carburetor, governor, and magneto are mounted near the top of the engines. The oil filter and recoil starter are mounted on the flywheel housing.

1-8. Identification and Tabulated Data
a. Identification. The engine is provided with one identification plate, located on the top of the shroud. The information on plate is contained in tabulated data, *b* below.

b. Tabulated Data.

(1) *Engine identification plate.*

Ord serial No.
Ord Part No. ---------- 10919400 2805-017-8680
Contract No.
Model No. ---------- AO-42
Rated rpm (revolutions per minute). ---------- 3600
Full advance ---------- 18° BTC (Before Top Center)
Rotation ---------- Clockwise viewed antiflywheel end.

(2) *Engine accessories.*

(*a*) *Magneto.*

Ordnance No. ---------- 10941241

(*b*) *Carburetor.*

Ordnance No. ---------- 10941242

(*c*) *Fuel pump.*

U.S. Army Engineer Research and Development Laboratory No. 13206E0830

(*d*) *Fuel filter.*

Ordnance No. ---------- 7044864

(*e*) *Governor.*

Ordnance No. ---------- 10941164

(3) *Nut and bolt torque data.*

Oil drain plug	140–160 in.-lb (inch pounds)
Spark plugs	275–300 in.-lb
Exhaust manifold-to-cylinder head nuts.	50–60 in.-lb
Intake manifold-to-cylinder head nuts.	70–80 in.-lb

(4) *Adjustment data.*

Spark plug gap	0.028 to 0.030 inch
Magneto contacts gap	0.015 to 0.017 inch

(5) *Dimensions and weight.*

Length	32 inches
Width	23 inches
Height	17 inches
Weight	155 pounds

(6) *Capacities.*

Crankcase (w/filter)	2½ quarts

1–9. Differences in Models

This manual covers the Military Standard Engine, Model AO42–KM, serial number range KM–1 through KM–004706 and Model AO42–V, serial number range V–001 and up. The model AO42–V differs from the model AO42–KM in the design of crankcase breather inlet at the carburetor and in provision for an electric hourmeter. These differences are shown in the applicable maintenance paragraph.

CHAPTER 2
INSTALLATION AND OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

2-1. Inspecting and Servicing the Equipment

a. Inspect the identification plate for positive identification of the engine.

b. Make a thorough inspection for any damage that may have occurred during shipment.

c. Check the equipment against the packing list. Make certain that all items are accounted for and are in serviceable condition.

d. Inspect the components for loose mounting and connections, and for missing bolts, nuts, and screws.

e. Follow the instructions in the current lubrication order and carefully lubricate the engine. Be sure that all lubrication points are serviced.

f. Bar the engine at the flywheel and make certain all moving parts are free.

2-2. Installation of Separately Packed Components

The engine hourmeter is shipped with the Military Standard engine, but is mounted on the end item that uses the engine. For mounting or installation instructions, refer to the applicable end item maintenance manual.

Section II. ENGINE CONTROLS AND OPERATION OF EQUIPMENT

2-3. General

This section references the controls, instruments, and operation so that the operator, crew, or organizational maintenance personnel may locate proper information concerning the various controls and instruments for the proper operation of the engine.

2-4. Control and Instruments

For specific instructions and identification of the controls and instruments, refer to the end item technical manual, TM 9-2320-213-10.

2-5. Operation of Equipment

For specific operating instructions, refer to the end item technical manual, TM 9-2320-213-10.

2-6. Operating Fuels

a. Temperatures above 0° F. Use grade 91A automotive gasoline (FSN 9130-160-1817) to operate the engine in temperatures above 0° F.

b. Temperatures consistently below 32° F. For operation of the engine in temperatures that are consistently below 32° F., use grade 91C automotive gasoline (FSN 9130-160-8131).

CHAPTER 3
OPERATOR'S AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S AND ORGANIZATIONAL MAINTENANCE REPAIR PARTS, TOOLS, AND EQUIPMENT

3–1. Tools and Equipment

No basic issue tools or equipment are supplied for use with the engine nor are special tools or equipment required by the operator or organizational maintenance personnel to perform organizational maintenance.

3–2. Organizational Maintenance Repair Parts

Organizational maintenance repair parts are listed and illustrated in TM 5–2805–213–24P.

Section II. LUBRICATION

3–3. General Lubrication Information

a. This section contains lubrication instructions that are supplemental to, but not specifically covered in the lubrication order.

b. For the current lubrication order, refer to DA PAM 310–4.

3–4. Detailed Lubrication Information

a. General. Keep all lubricants in closed containers and store in a clean, dry place away from external heat. Allow no dirt, dust, or other foreign material of any kind to mix with the lubricants. Keep all lubrication equipment clean and ready for use.

b. Cleaning. Keep all external parts not requiring lubrication free of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubrication to prevent the accumulation of foreign matter.

c. Operation Immediately After Lubrication. Operate the engine immediately after lubrication. Inspect connections that might show oil leakage. If the crankcase oil has been changed, operate the engine for 5 minutes before checking the oil level. Add oil, if necessary.

d. Oil Filter Service. Refer to figure 3–1 and service the oil filter.

Section III. PREVENTIVE MAINTENANCE SERVICES

3–5. General

To insure that the Model AO42 Engine is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. Defects discovered during operation of the unit will be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation that would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded, together with the corrective action taken, on DA Form 2402 (Equipment Inspection and Maintenance Worksheet) at the earliest possible opportunity.

3–6. Preventive Maintenance and Services

For the applicable preventive maintenance checks and services refer to the TM 9–2320–213 series technical manual.

Section IV. OPERATOR'S MAINTENANCE

3–7. General

In addition to the services prescribed in section III of this chapter the operator will perform the following maintenance on the engine.

3–8. Fuel Filter Servicing

Refer to figure 3–2 and service the engine fuel filter.

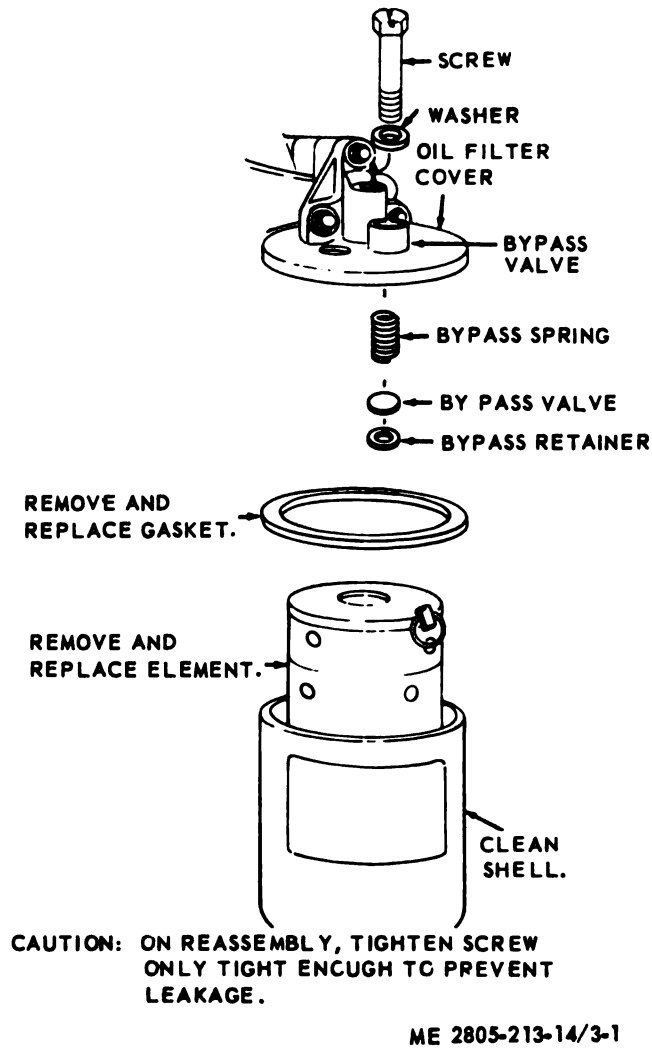


Figure 3-1. Oil filter servicing.

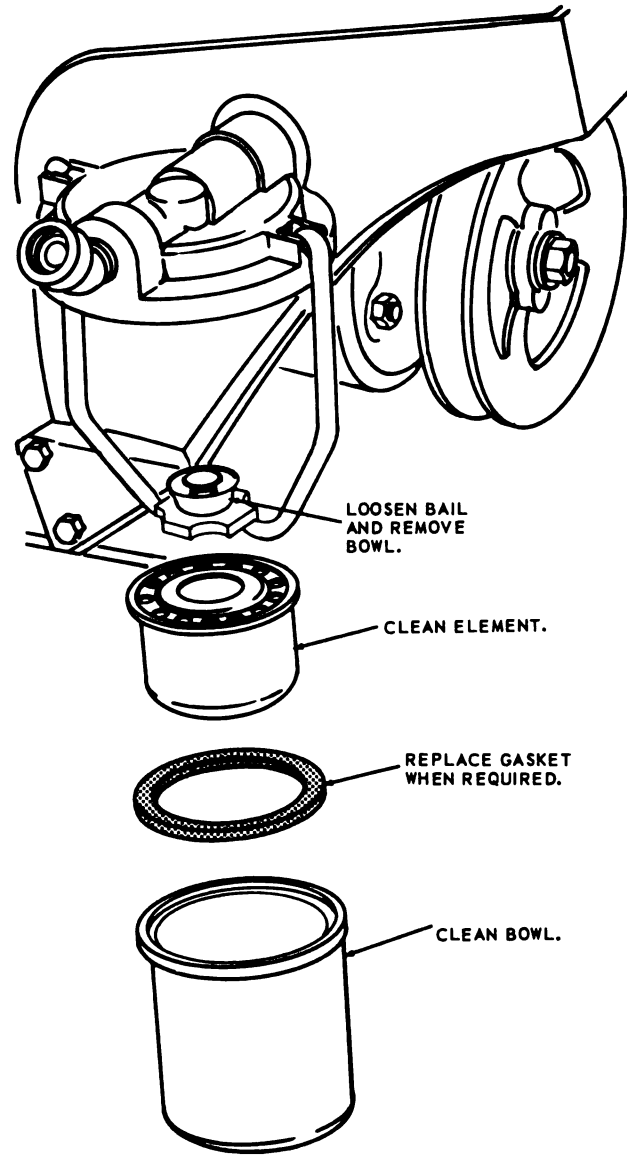


Figure 6. Fuel filter servicing.

Figure 3–2. Fuel filter servicing.

Section V. TROUBLESHOOTING

3-9. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the engine and its components. Malfunctions that may occur are listed in tabular form. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable causes.

3-10. Troubleshooting

For troubleshooting information that is applicable to organizational maintenance, refer to table 3-1.

Table 3-1. Troubleshooting

Malfunction	Probable cause	Corrective action
1. Engine fails to start	a. No fuel or improper fuel	a. Fill with proper fuel. Refer to paragraph 2-6.
	b. Magneto contacts improperly adjusted or defective.	b. Adjust or replace contacts or replace a defective magneto (para 3-23).
	c. Spark plugs dirty, improperly adjusted, or defective.	c. Clean, adjust, or replace spark plugs (para 3-24).
	d. Fuel filter clogged	d. Service fuel filter (para 3-8).
	e. Carburetor improperly adjusted or defective.	e. Adjust or replace carburetor (para 3-19).
	f. Magneto defective	f. Replace magneto (para 3-23).
2. Engine starts but fails to continue running	a. Fuel improper or supply exhausted	a. Fill tank with proper fuel. Refer to paragraph 2-6.
	b. Magneto contacts improperly adjusted or defective.	b. Adjust or replace contacts (para 3-23).
	c. Fuel filter clogged	c. Clean fuel filter (para 3-8).
	d. Carburetor improperly adjusted	d. Adjust or replace carburetor (para 3-19).
3. Engine misses or runs erratically	a. Spark plugs dirty, improperly adjusted, or defective.	a. Clean, adjust, or replace spark plugs (para 3-24).
	b. Carburetor improperly adjusted or defective.	b. Adjust or replace carburetor (para 3-19).
	c. Fuel filter clogged or defective	c. Clean or replace filter (para 3-8, 3-16).
	d. Magneto contacts improperly adjusted or defective.	d. Adjust or replace contacts or replace magneto (para 3-23).
	e. Magneto capacitor defective	e. Replace capacitor (para 3-23).
	f. Spark plug cables defective	f. Replace cables (para 3-24).
	g. Fuel pump defective	g. Replace fuel pump (para 3-17).
4. Engine surges	a. Fuel supply low	a. Provide proper fuel supply. Refer to paragraph 2-6 per grade.
	b. Carburetor improperly adjusted or defective.	b. Adjust or replace carburetor (para 3-19).
	c. Governor improperly adjusted or defective.	c. Adjust or replace governor (para 3-21).
5. Engine overheats	a. Air supply to engine restricted	a. Remove restriction.
	b. Engine shrouds dirty or deformed	b. Clean dirty shrouds, replace deformed shrouds (para 3-37, 3-38, 3-39).
	c. Magneto improperly timed	c. Time magneto (para 3-23).
	d. Carburetor improperly adjusted or defective.	d. Adjust or replace carburetor (para 3-19).
	e. Engine overloaded	e. Reduce load.
6. Engine lacks power	a. Engine misses or runs erratically	a. Refer to paragraph 3, above.
	b. Fuel improper	b. Provide proper fuel. Refer to paragraph 2-6 for proper grade.
	c. Fuel filter clogged	c. Service filter (para 3-8).
	d. Carburetor improperly adjusted or defective.	d. Adjust or replace carburetor (para 3-19).
	e. Magneto improperly timed	e. Time magneto (para 3-23).

Table 3-1. Troubleshooting—Continued

Malfunction	Probable cause	Corrective action
7. Engine oil consumption excessive	a. Engine overheats	a. Clean dirty shrouds and fins.
	b. Oil grade improper	b. Service engine with proper grade of oil. Refer to current lubrication order.
8. Engine exhaust smokey	a. Crankcase overfilled	a. Drain crankcase to proper level. Refer to current lubrication order.
	b. Carburetor improperly adjusted or defective.	b. Adjust or replace carburetor (para 3-19).

Section VI. RADIO INTERFERENCE SUPPRESSION

3-11. General Methods Used to Attain Proper Suppression

Essentially, suppression is attained by providing a low resistance path to ground for the stray currents. The methods used include shielding the ignition and high frequency wires, grounding the frame with bonding straps, and using capacitors and resistors. For general information on radio interference suppression, refer to TM 11-483.

3-12. Replacement of Suppression Components

a. General. Replace radio interference suppression components with components of the same size, type, and rating. Insure good metal-to-metal contact of components by using internal-external toothed lockwashers.

b. Spark Plugs. For spark plug replacement instructions, refer to paragraph 3-24.

c. Spark Plug Cables. For spark plug cable replacement instructions, refer to paragraph 3-24.

Section VII. FUEL, OIL, AND CRANKCASE BREATHER LINES, TUBING, FITTINGS, SHUTOFF VALVES, AND CHECK VALUES

3-13. General

This section provides maintenance instructions on the various fittings, fitting-type valves, and tubing that are used on the engine. All accessible lines and fittings are within the maintenance scope of the organizational maintenance level.

3-14. Fuel, Oil, and Crankcase Breather Lines, Tubing, Fittings, Shutoff Valves, and Check Valves

The fuel, oil, and crankcase breather lines used on the engine consist of steel or aluminum tubing and the necessary fittings. Inspect lines and tubing for cracks and breaks. Replace defective lines with those of the same size, length, shape, and material. Loosen the fittings at the ends of the line and remove the defective component. When either loosening or tightening a compound fitting assembly, hold the primary adapter with a wrench while the nut is being loosened, so that the fittings or line will not be damaged. Replace any damaged fittings. Test the finished installation of lines and fittings to make certain that they do not leak.

Section VIII. FUEL SYSTEM

3-15. General

The fuel system of the Model AO42 Engines consist of an air cleaner adapter, fuel filter, fuel pump, carburetor, governor, intake manifold, and elbows, and the appropriate fuel lines and fittings. Carburetion is controlled by the operator through the governor and throttle control rod. The fuel system components comprise a balanced and fully adjustable system that is designed to limit the engine to a maximum speed of 3,850 revolutions per minute (at no load—3,600 rpm with load).

3-16. Fuel Filter

a. Removal (Model AO42-KM). Refer to figure 3-3 and remove the fuel filter.

b. Removal (Model AO42-V). Refer to figure 3-4 and remove the fuel filter.

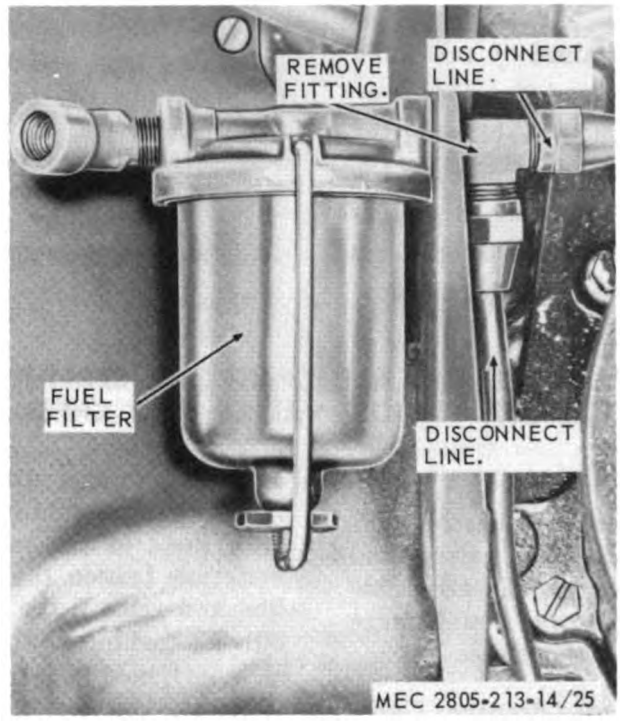


Figure 3–3. Fuel filter, removal and installation (Model AO42–KM).

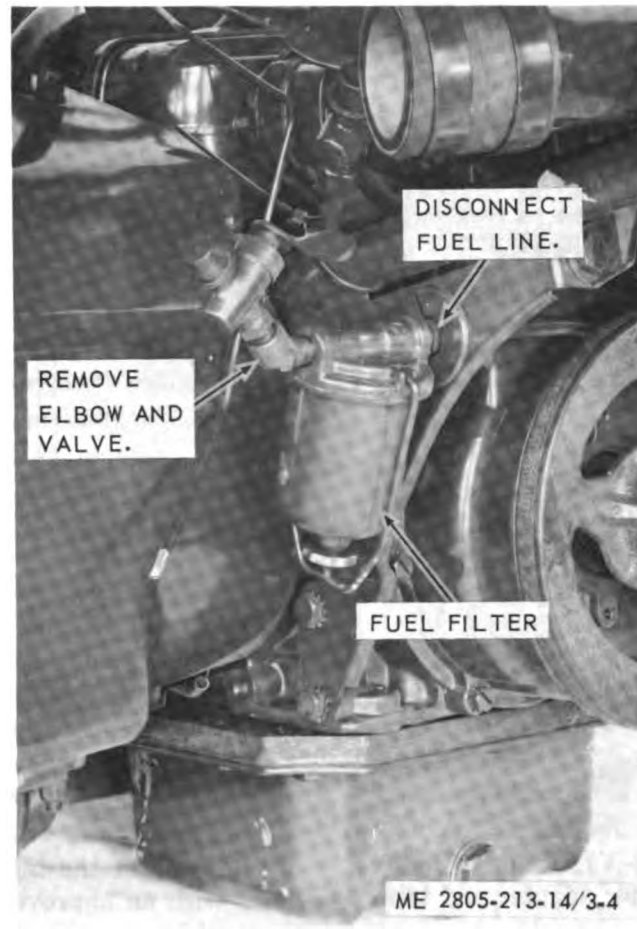


Figure 3–4. Fuel filter, removal and installation (Model AO42–V).

c. Cleaning, and Inspection.

(1) Clean the fuel filter and component parts with an approved cleaning solvent and dry thoroughly.

(2) Inspect the fuel filter for cracks, breaks, and other damage. Replace a defective fuel filter.

d. Installation. (Model AO42-V). Refer to figure 3-4 and install the fuel filter.

e. Installation. (Model AO42-KM). Refer to figure 3-3 and install the fuel filter.

3-17. Fuel Pump

a. Removal.

(1) Remove the carburetor (para 3-19).

(2) Remove the fan assembly (para 3-36).

(3) Remove the left front shroud (para 3-38).

(4) Refer to figure 3-5 and remove the fuel pump.

b. Cleaning and Inspection.

(1) Clean the external surface of the fuel pump with an approved cleaning solvent and dry thoroughly.

(2) Inspect the fuel pump for any cracks, breaks, and other damage. Replace a damaged or defective fuel pump.

c. Installation.

(1) Refer to figure 3-5 and install the fuel pump.

(2) Install the left front shroud (para 3-38).

(3) Install the fan assembly (para 3-36).

(4) Install the carburetor (para 3-19).

3-18. Air Cleaner Adapter and Tube

a. Removal. (Model AO42-KM). Refer to figure 3-6 and remove the air cleaner adapter and tube.

b. Removal. (Model AO42-V). Refer to figure 3-7 and remove the air cleaner adapter and tube.

c. Cleaning and Inspection.

(1) Clean the air cleaner adapter and tube with an approved cleaning solvent and dry thoroughly.

(2) Inspect the air cleaner adapter and tube for cracks, breaks, and other damage.

(3) Inspect the mounting hardware for damage. Replace any defective part.

d. Installation. (Model AO42-V). Refer to figure 3-7 and install the air cleaner adapter and tube.

e. Installation. (Model AO42-KM). Refer to figure 3-6 and install the air cleaner adapater and tube.

3-19. Carburetor

a. Removal. Refer to figure 3-8 and remove the carburetor.

b. Cleaning and Inspection.

(1) Clean the carburetor with an approved cleaning solvent and dry thoroughly.

(2) Inspect the carburetor for leakage, cracks, breaks, and other damage.

(3) Turn the throttle shaft and inspect the carburetor body for excessive wear.

(4) Remove the carburetor bowl and clean with an approved cleaning solvent and dry thoroughly. Reinstall the bowl, using a new gasket.

(5) Replace a damaged or defective carburetor.

c. Installation. Refer to figure 3-8 and install the carburetor.

d. Adjustment. Refer to figure 3-9 and adjust the carburetor.

3-20. Intake Manifold, Elbows, and Hoses

a. Removal (Model AO42-KM).

(1) Remove the top, left and rear shrouds (para 3-37, 3-38).

(2) Remove the bypass tubes (para 3-27).

(3) Refer to figure 3-10. and remove the intake manifold, elbows, and hoses.

b. Removal (Model AO42-V).

(1) Remove the top, left rear, and right rear shrouds (para 3-37, 3-38).

(2) Remove the bypass tubes (para 3-27).

(3) Refer to figure 3-11 and remove the intake manifold, elbows, and hoses.

c. Cleaning and Inspection.

(1) Clean the intake manifold, elbows, and hoses with an approved cleaning solvent and dry thoroughly.

(2) Inpect the intake manifold, elbows, and hoses for cracks, breaks, and other damage.

(3) Inspect the mounting hardware for damaged threads and other defects.

(4) Replace damaged or defective parts.

d. Installation (Model AO42-V).

(1) Refer to figure 3-11 and install the intake manifold, elbows, and hoses.

(2) Install the bypass tubes (para 3-27).

(3) Install top, left rear, and right rear shrouds (para 3-37, 3-38).

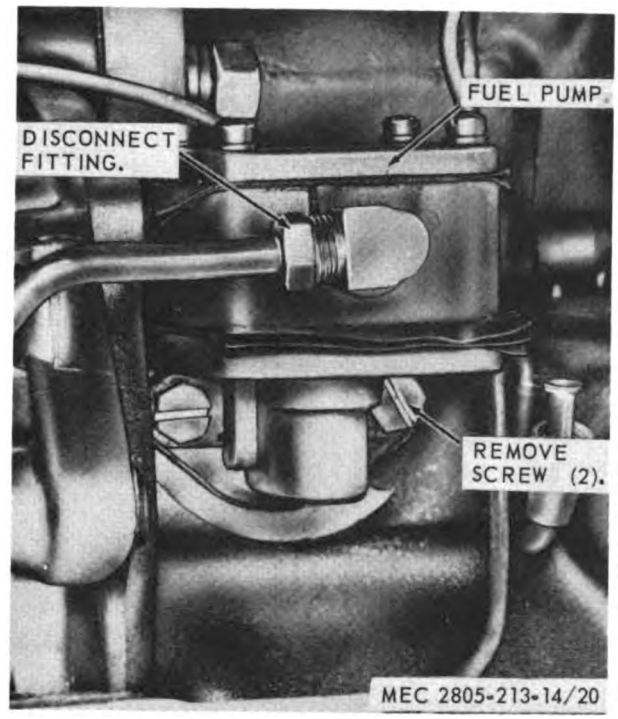


Figure 3–5. Fuel pump, removal and installation.

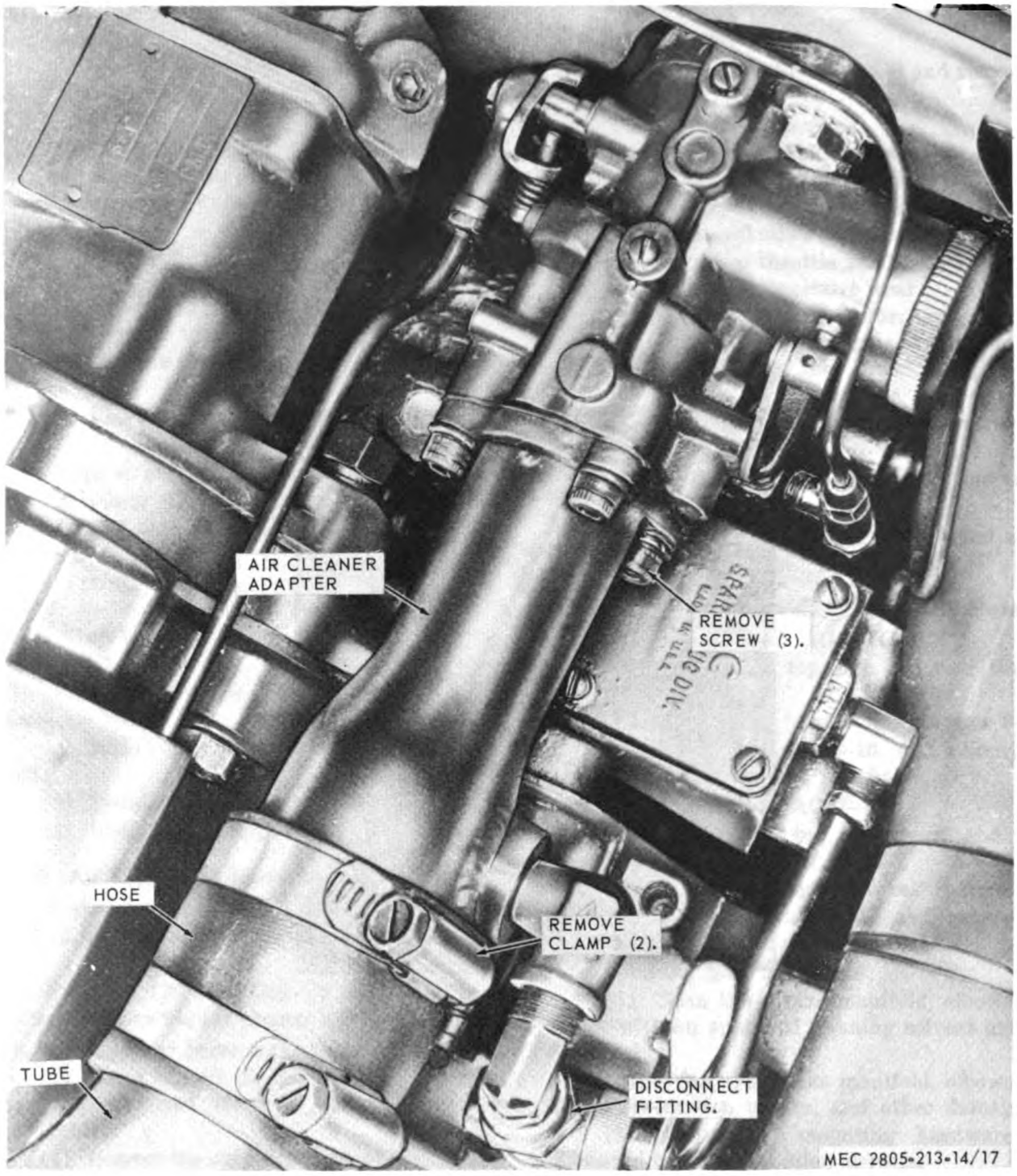


Figure 3–6. Air cleaner adapter and tube, removal and installation (Model AO42–KM).

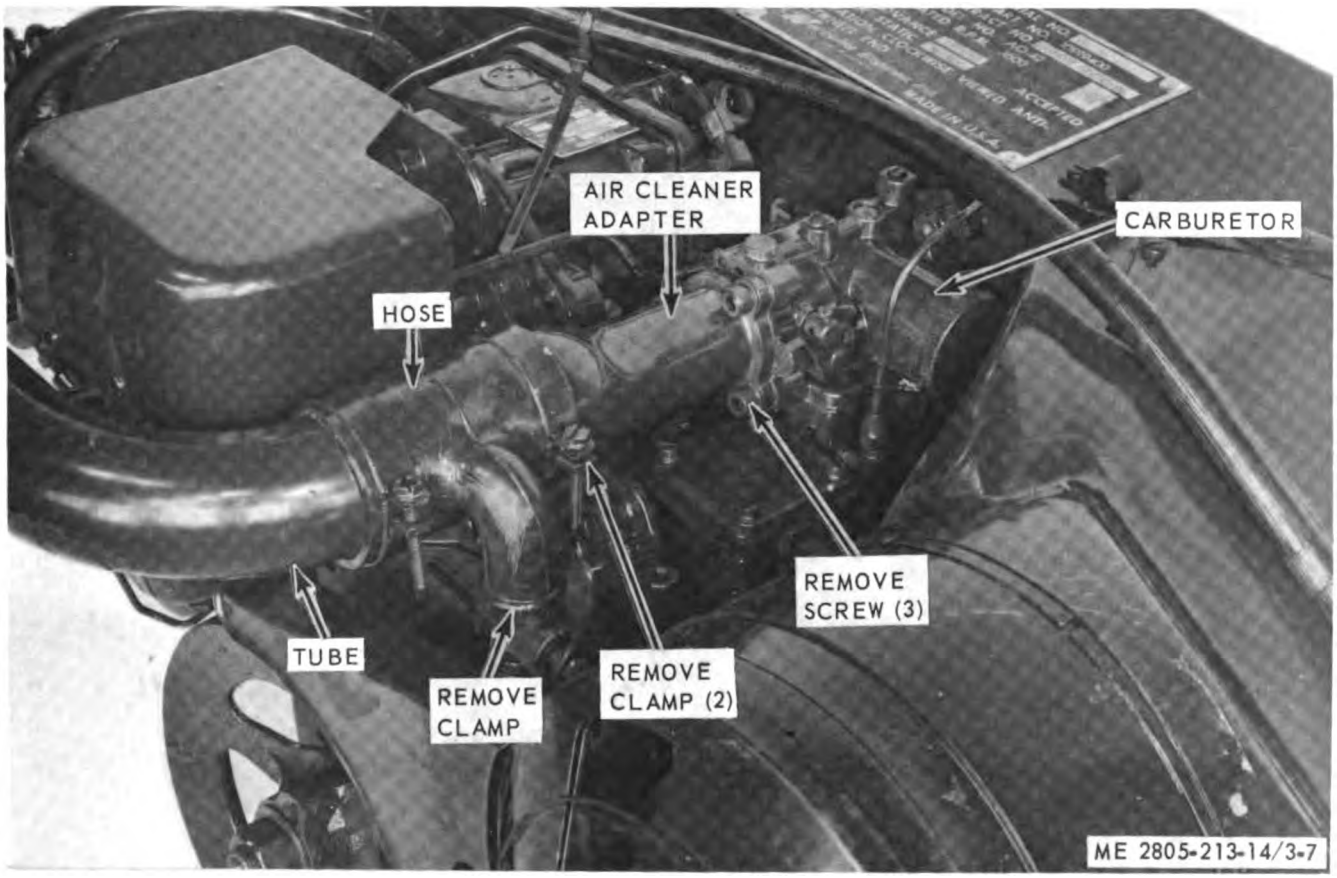


Figure 3–7. Air cleaner adapter and tube, removal and installation (Model AO42–V).

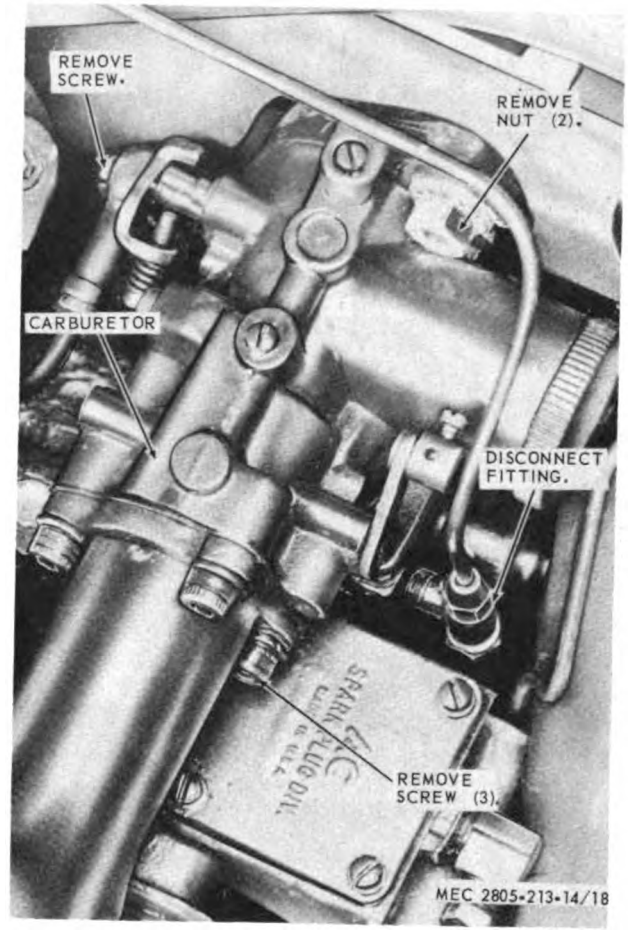
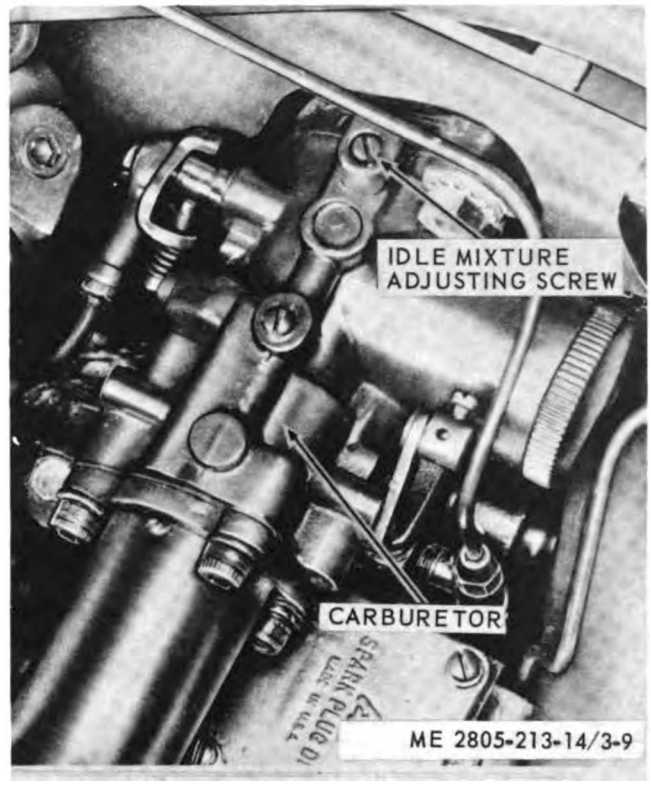


Figure 3–8. Carburetor, removal and installation.



STEP 1. TURN IDLE MIXTURE ADJUSTING SCREW CLOCKWISE UNTIL SCREW IS SEATED. BACK SCREW OFF ONE AND ONE-HALF TO TWO TURNS.

STEP 2. START ENGINE AND OPERATE UNTIL NORMAL OPERATING TEMPERATURE IS REACHED.

STEP 3. PLACE GOVERNOR IN IDLE POSITION. TURN IDLE MIXTURE ADJUSTING SCREW CLOCKWISE UNTIL ENGINE BEGINS TO FALTER AND TURN COUNTERCLOCKWISE UNTIL ENGINE IDLES SMOOTHLY.

Figure 3–9. Carburetor adjustment.

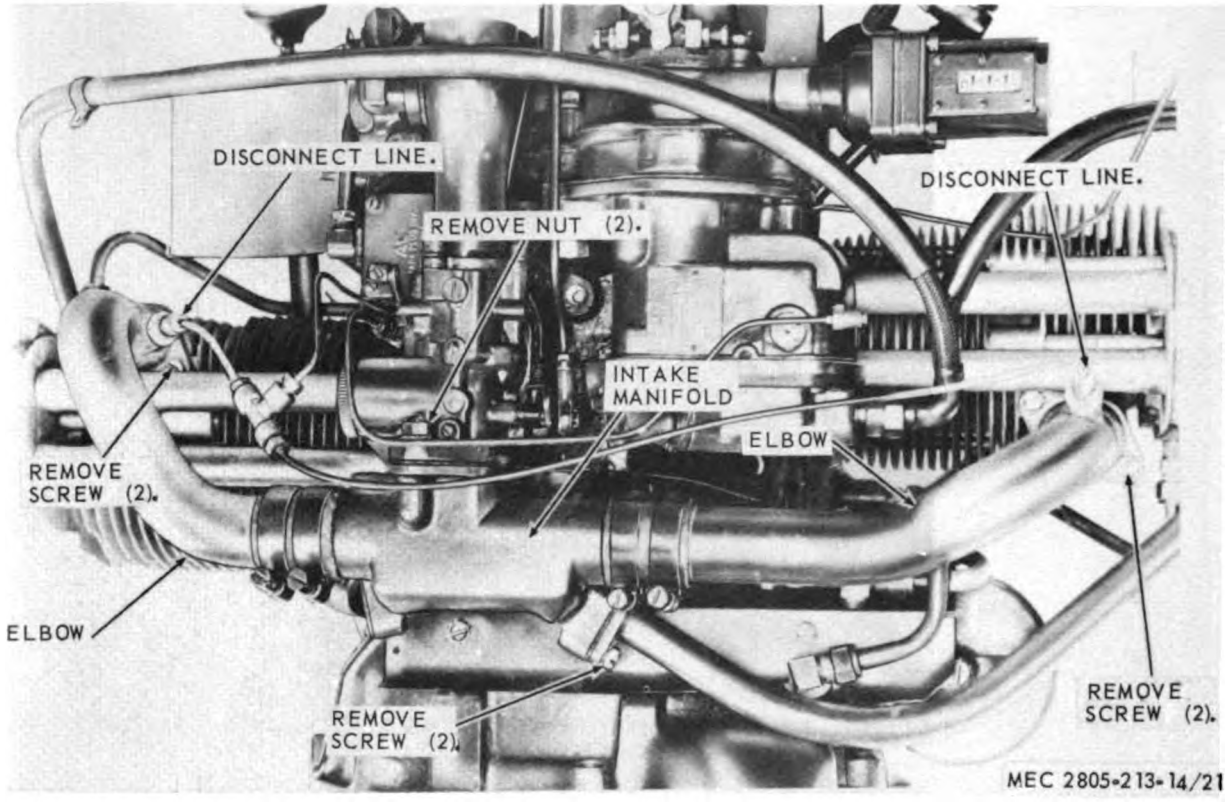


Figure 3–10. Intake manifold, elbows, and hoses, removal and installation (Model AO42–KM).

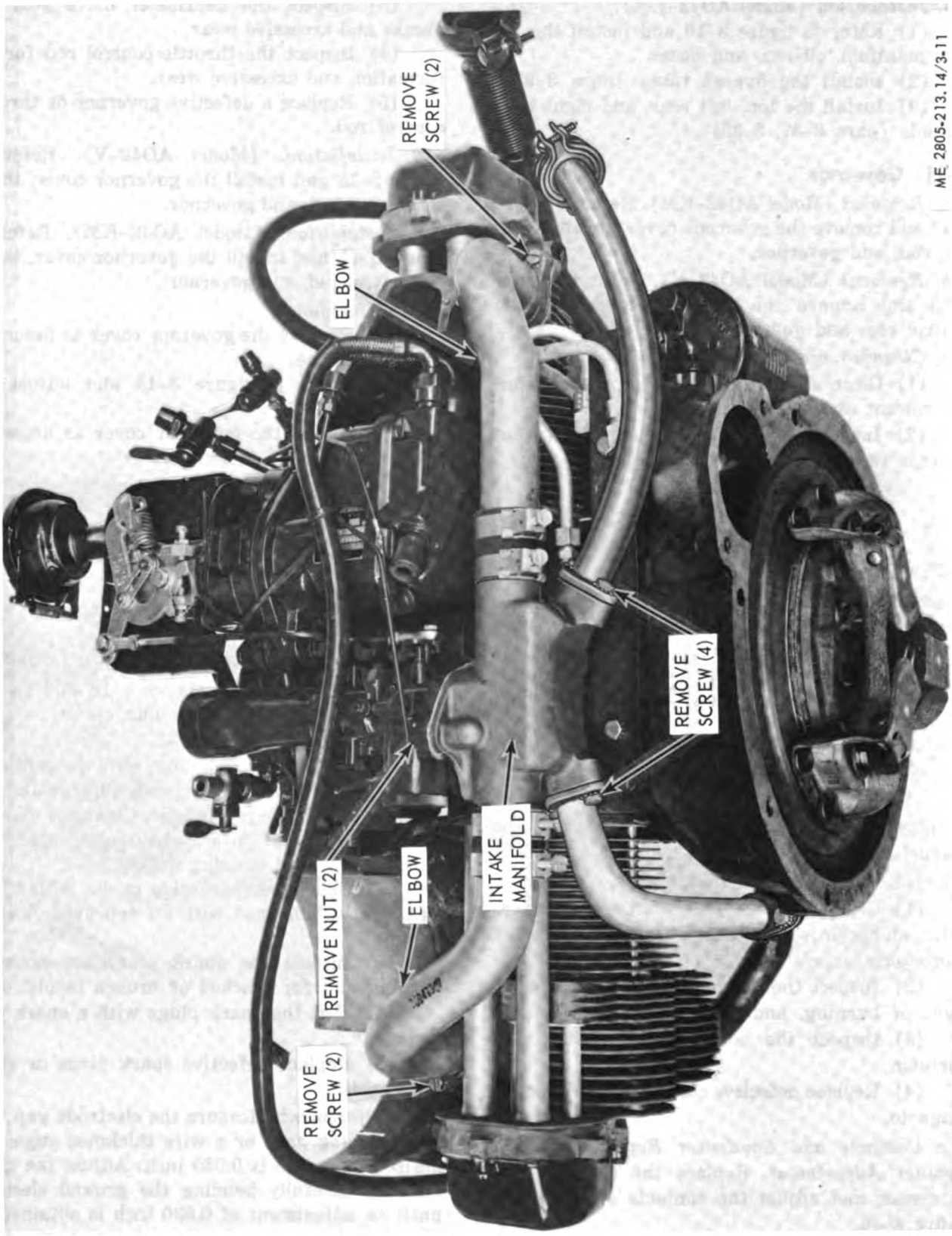


Figure 3-11. Intake manifold, elbows, and hoses, removal and installation (Model AO42-V).

e. Installation (Model AO42-KM).

(1) Refer to figure 3-10 and install the intake manifold, elbows, and hoses.

(2) Install the bypass tubes (para 3-27).

(3) Install the top, left rear, and right rear shrouds (para 3-37, 3-38).

3-21. Governor

a. Removal (Model AO42-KM). Refer to figure 3-12 and remove the governor cover, throttle control rod, and governor.

b. Removal (Model AO42-V). Refer to figure 3-13 and remove the governor cover, throttle control rod, and governor.

c. Cleaning and Inspection.

(1) Clean all parts with an approved cleaning solvent and dry thoroughly.

(2) Inspect the governor housing and components for cracks, breaks, and other damage.

(3) Inspect the hourmeter drive gear for breaks and excessive wear.

(4) Inspect the throttle control rod for deformation and excessive wear.

(5) Replace a defective governor or throttle control rod.

d. Installation. (Model AO42-V). Refer to figure 3-13 and install the governor cover, throttle control rod, and governor.

e. Instalaltion. (Model AO42-KM). Refer to figure 3-12 and install the governor cover, throttle control rod, and governor.

f. Adjustment.

(1) Remove the governor cover as described in *a* or *b*, above.

(2) Refer to figure 3-14 and adjust the governor.

(3) Install the governor cover as described in *d* or *e*, above.

Section IX. IGNITION SYSTEM

3-22. General

The model AO42 engine is provided with a radio-suppressed type magneto, shielded leads, and shielded-type spark plugs. The magneto is equipped with an impulse coupling to provide easy starting characteristics to the engine.

3-23. Magneto

a. Removal.

(1) Remove the governor (para 3-21).

(2) Refer to figure 3-15 and remove the magneto.

b. Cleaning and Inspection.

(1) Clean the magneto exterior surfaces with an approved cleaning solvent and dry thoroughly.

(2) Inspect the magneto for cracks, breaks, signs of burning, and other damage.

(3) Inspect the contacts for pitting and burning.

(4) Replace defective contacts or a defective magneto.

c. Contacts and Condenser Replacement and Contact Adjustment. Replace the contacts and condenser and adjust the contacts as shown by figure 3-16.

d. Installation.

(1) Time the engine and magneto by positioning as shown by the figure 3-17.

(2) Refer to figure 3-15 and complete the magneto installation.

(3) Install the governor (para 3-21).

3-24. Spark Plugs and Spark Plug Cables

a. Removal. Refer to figure 3-18 and remove the spark plugs and spark plug cables.

b. Cleaning and Inspection.

(1) Clean the spark plugs with a compressed air spark plug cleaner. Remove all abrasive material with dry compressed air. Clean the exterior of the spark plugs with a cloth barely dampened with an approved cleaning solvent.

(2) Clean the spark plug cables with a soft, clean cloth dampened with an approved cleaning solvent.

(3) Inspect the spark plugs for excessive burning and for cracked or broken insulation.

(4) Test the spark plugs with a spark plug tester.

(5) Replace defective spark plugs or spark plug cables.

c. Adjustment. Measure the electrode gap with a spark plug gage or a wire thickness gage. The desired clearance is 0.030 inch. Adjust the clearance by carefully bending the ground electrode until an adjustment of 0.030 inch is obtained.

Caution: **Do not bend the center electrode.**

d. Installation. Refer to figure 3-18 and install the spark plugs and spark plug cables.

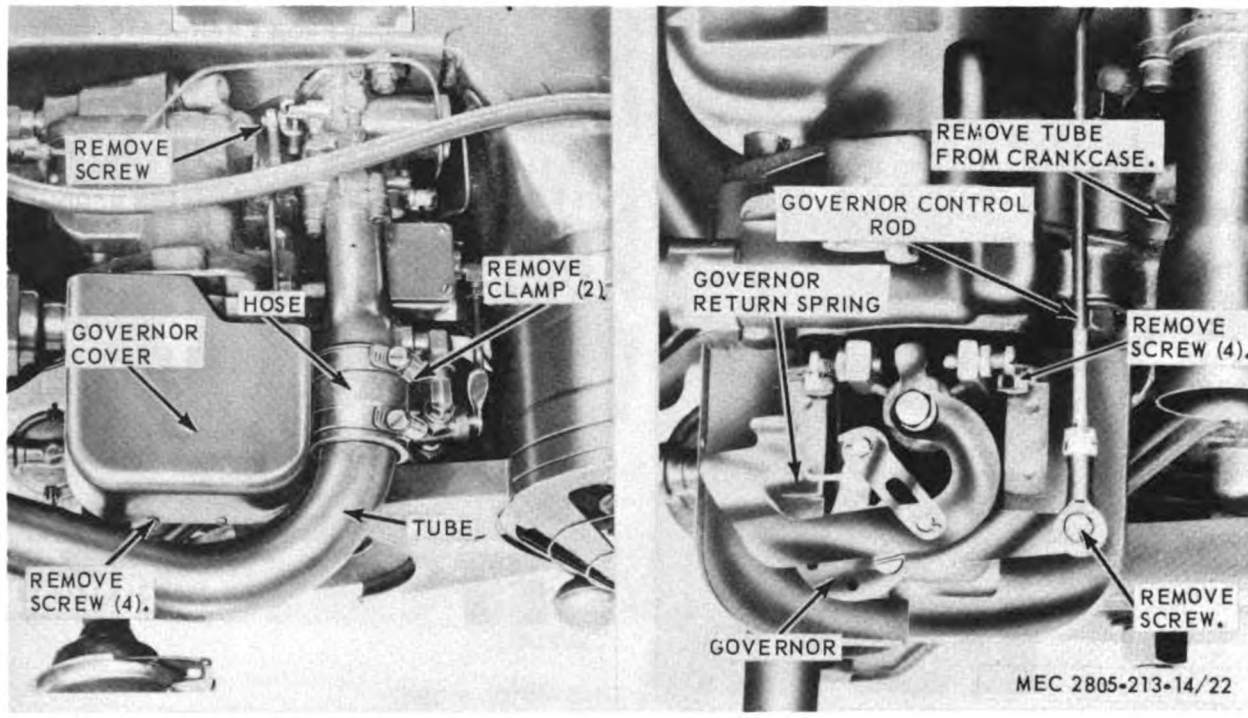


Figure 3–12. Governor cover, throttle control rod, and governor, removal and installation (Model AO42–KM).

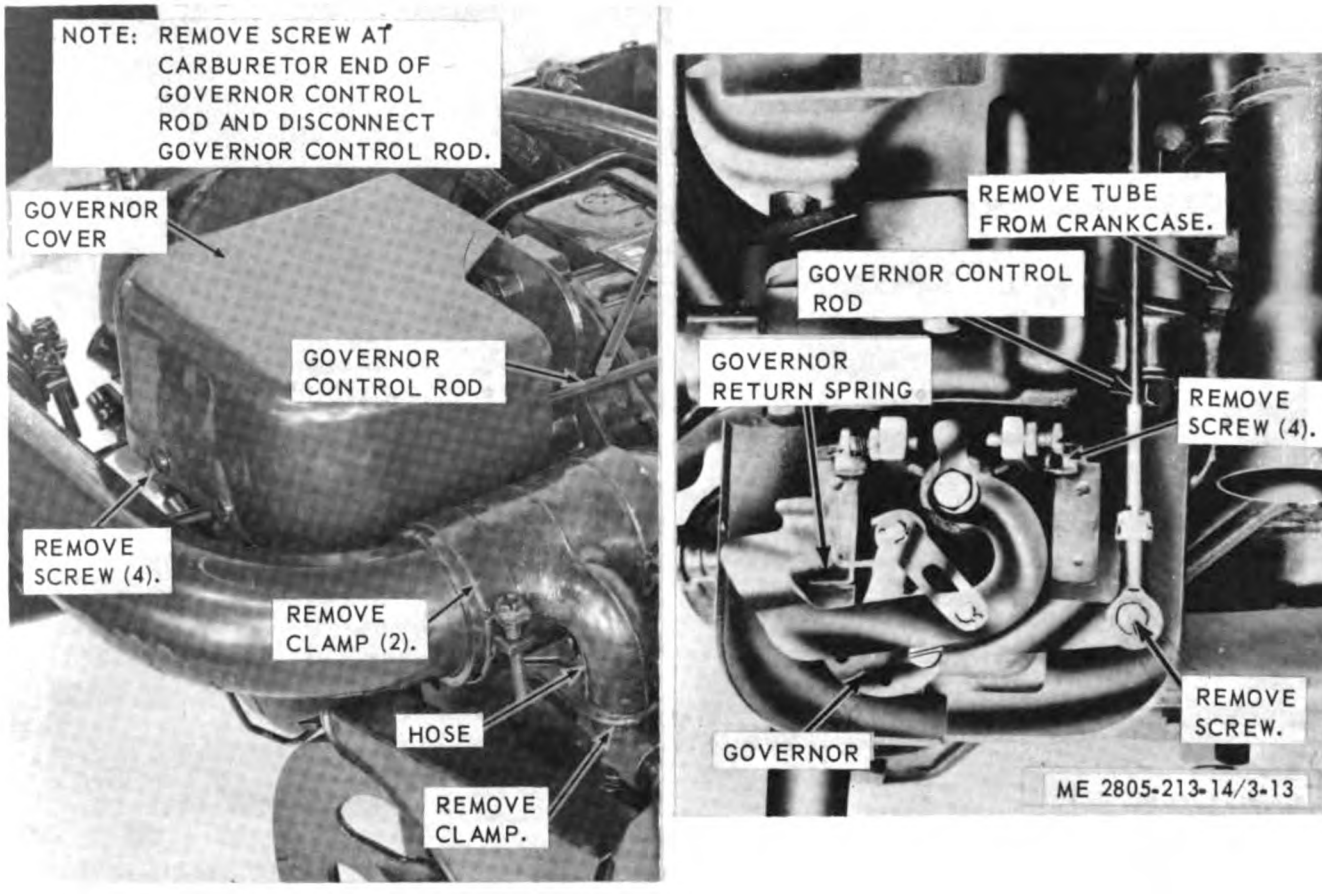
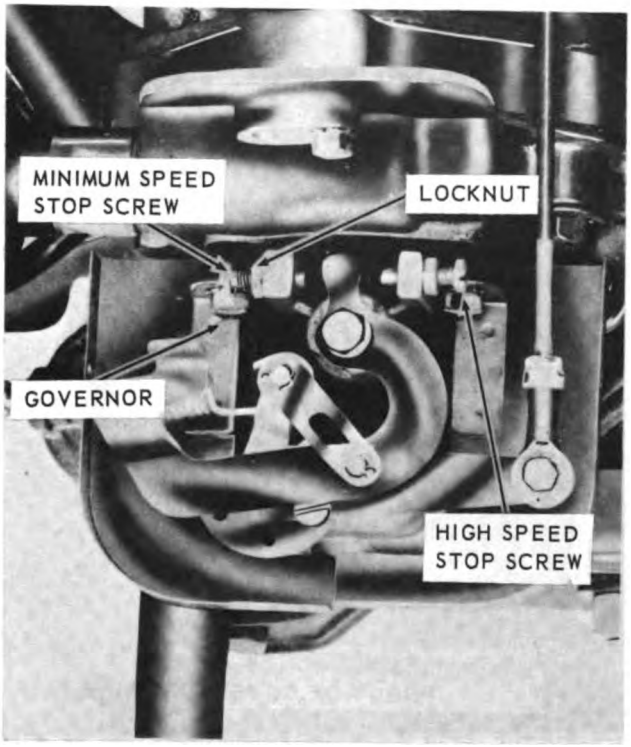


Figure 3-13. Governor cover, throttle control rod, and governor, removal and installation (Model AO42-V).



STEP 1. LOOSEN LOCKNUT AND TURN HIGH SPEED STOP SCREW CLOCKWISE FOUR TURNS TO PREVENT ENGINE OVERSPEED.

STEP 2. START ENGINE AND ALLOW TO WARM 30 MINUTES.

STEP 3. TURN HIGH SPEED STOP SCREW CLOCKWISE TO OBTAIN ENGINE SPEED OF 3850 RPM. TIGHTEN LOCKNUT.

STEP 4. DISENGAGE LOAD AND CHECK ENGINE SPEED WITH A SPEED INDICATOR. IF ENGINE SPEED DOES NOT EXCEED 3850 RPM NO FURTHER ADJUSTMENT IS NECESSARY.

STEP 5. IF CORRECT ENGINE SPEED CANNOT BE OBTAINED, REPLACE THE GOVERNOR.

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Figure 3-14. Governor adjustment.

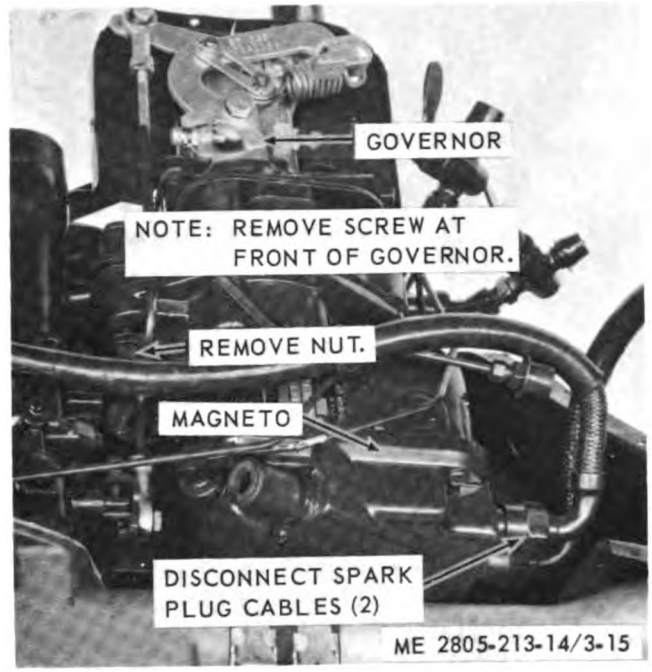
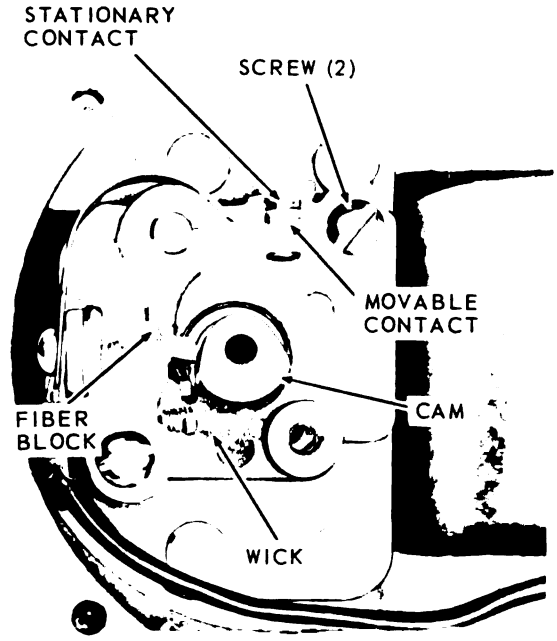


Figure 3-15. Magneto, removal and installation.



STEP 1. REMOVE MAGNETO (PARA 3-23).

STEP 2. REMOVE SCREW (4) AND REMOVE MAGNETO END CAP AND GASKET FROM MAGNETO.

STEP 3. TURN CAM UNTIL FIBER BLOCK IS AT HIGHEST POINT IN CAM.

STEP 4. LOOSEN SCREW (2) AND INSERT 0.015-INCH THICKNESS GAGE BETWEEN STATIONARY CONTACT AND MOVABLE CONTACT.

STEP 5. MOVE STATIONARY CONTACT TO OBTAIN SLIDING FIT BETWEEN GAGE AND CONTACTS.

STEP 6. TIGHTEN SCREW (2).

STEP 7. CHECK CLEARANCE AND READJUST IF NECESSARY.

STEP 8. POSITION GASKET AND MAGNETO END CAP ON MAGNETO AND SECURE WITH SCREW (4).

STEP 9. INSTALL MAGNETO (PARA 3-23).

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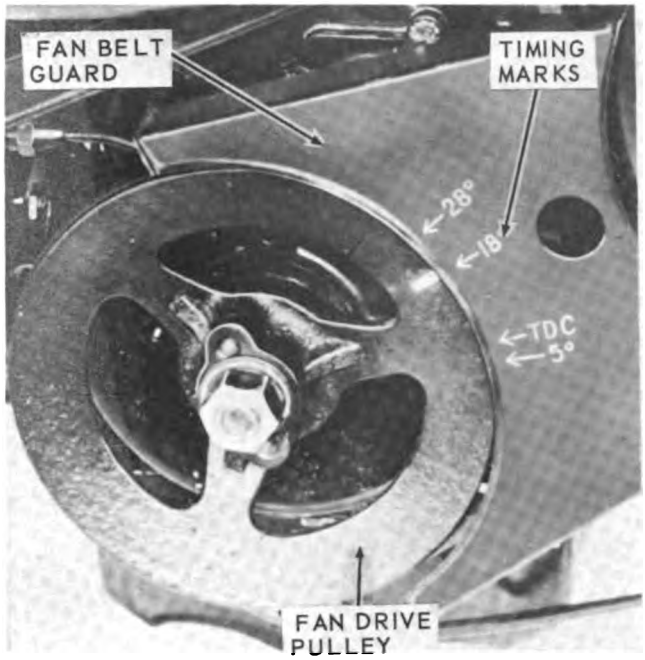
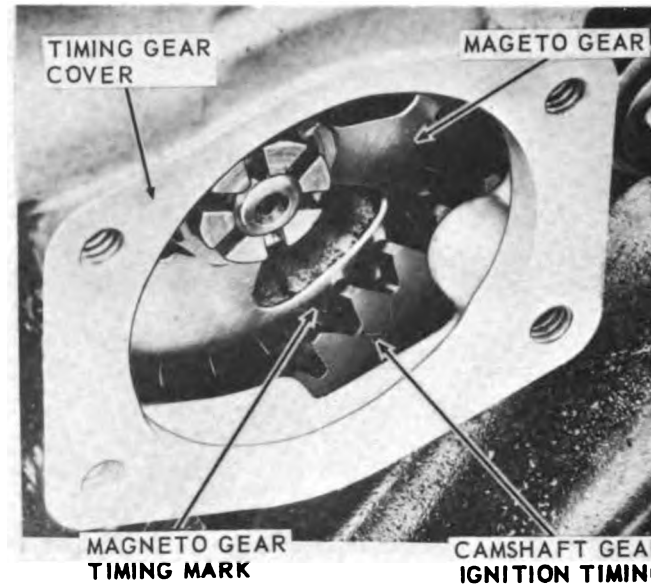
Figure 3-16. Contacts and condenser replacement and contact adjustment.





STEP 1. REMOVE SPARK PLUG NO. 1 OR LEFT FRONT CYLINDER.

STEP 2. INSERT THUMB IN SPARK PLUG HOLE AND TURN FAN DRIVE PULLEY UNTIL AIR ESCAPING BY THUMB INDICATES NO 1 CYLINDER IS ON COMPRESSION STROKE, CONTINUE TO TURN PULLEY UNTIL TOP DEAD CENTER TIMING MARK ALINES WITH FAN DRIVE PULLEY MARK.

STEP 3. WITH MARKS ALINED AS DESCRIBED IN STEP 2, TURN FAN DRIVE PULLEY UNTIL CAMSHAFT GEAR IGNITION TIMING MARK APPEARS IN OPENING IN TIMING GEAR COVER.

STEP 4. HOLD NO. 1 SPARK PLUG CABLE ONE-EIGHT OF AN INCH FROM MAGNETO CASE AND TURN MAGNETO GEAR CLOCKWISE UNTIL MAGNETO IMPULSES AND SPARK OCCURS BETWEEN CABLE AND MAGNETO.

STEP 5. IMPULSE MAGNETO TWO ADDITIONAL TIMES.

STEP 6. TURN MAGNETO GEAR CLOCKWISE SLIGHTLY AND POSITION MAGNETO GEAR TIMING MARK IN ALIGNMENT WITH CAMSHAFT GEAR IGNITION TIMING MARK.

NOTE: FOR MODEL A042-KM ENGINES WITH SERIAL NUMBERS LOWER THAN KM003275, TURN MAGNETO GEAR COUNTERCLOCKWISE AND POSITION MAGNETO GEAR TIMING MARK TWO TEETH FROM CAMSHAFT GEAR TIMING MARK.

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Figure 3-17. Magneto timing.

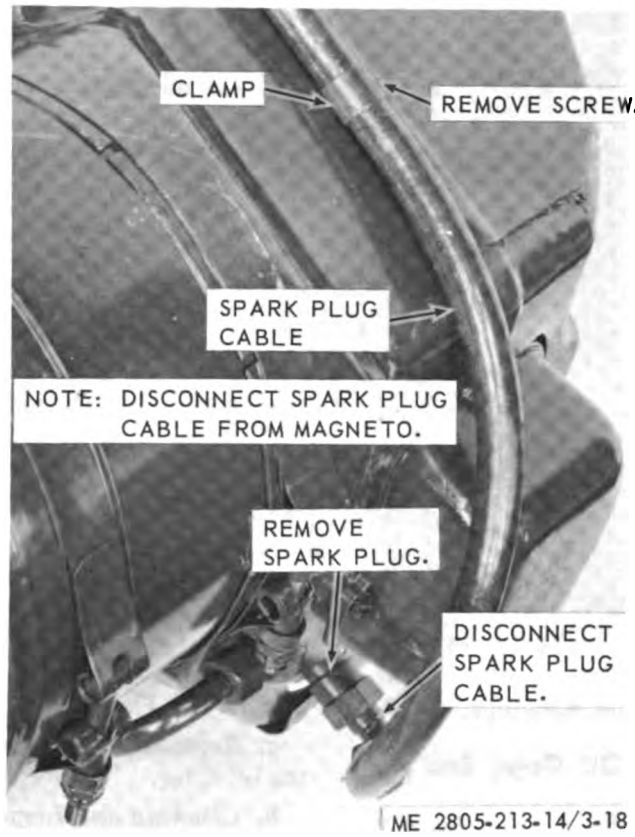


Figure 3–18. Spark plugs and spark plug cables, removal and installation.

Section X. EXHAUST SYSTEM

3–25. General

The one-piece exhaust manifold, fabricated from corrosion-resistant steel, collects the exhaust gases from both cylinders and conducts them to the right side of the engine. Two bypass tubes connect the exhaust manifold to the intake manifold. A small portion of the exhaust gases is diverted through these tubes and serves to preheat the fuel-air mixture in the intake manifold.

3–26. Exhaust Manifold

a. Removal. (Model AO42–KM). Refer to figure 3–19 and remove the exhaust manifold.

b. Removal. (Model AO42–V). Refer to figure 3–20 and remove the exhaust manifold.

c. Cleaning and Inspection.

(1) Clean all parts with an approved cleaning solvent and dry thoroughly.

(2) Inspect the manifold for cracks, breaks, corrosion, and other defects. Replace a defective exhaust manifold.

d. Installation. (Model AO42–V). Refer to figure 3–20 and instal the exhaust manifold.

e. Installation. (Model AO42–KM). Refer to figure 3–19 and install the exhaust manifold.

3–27. Bypass Tubes

a. Removal. (Model AO42–KM). Refer to figure 3–21 and remove the bypass tubes.

b. Removal. (Model AO42–V). Refer to figure 3–22 and remove the bypass tubes.

c. Cleaning and Inspection.

(1) Clean all parts with an approved cleaning solvent and dry thoroughly.

(2) Inspect for cracks, breaks, corrosion, and other defects.

(3) Inspect the mounting hardware for cracks, breaks, damaged threads, and other defects. Replace a damaged, defective, or missing part.

d. Installation. (Model AO42–V). Refer to figure 3–22 and install the bypass tubes.

e. Installation. (Model AO42–KM). Refer to figure 3–21 and install the bypass tubes.

Section XI. LUBRICATION SYSTEM

3–28. General

The internal components of the engine are lubricated by a full-pressure-type lubrication system. The level of the oil in the engine is shown by oil gage rod. Oil is drawn from the oil pan by the oil pump, forced through the oil filter tubes to the full-flow-type oil filter and then routed to the moving components. All excess oil from the rocker arms at each cylinder is returned to the engine crankcase through the pushrod housings.

3–29. Oil Filler Tube and Oil Gage Rod

a. Removal.

(1) Remove the fuel filter (para 3–16).

(2) Refer to figure 3–23 and remove the oil filler tube and oil gage rod.

b. Disassembly. Refer to figure 3–24 and disassemble the oil filler tube.

c. Cleaning and Inspection.

(1) Clean the oil filler tube and oil gage rod in an approved cleaning solvent and dry thoroughly.

(2) Inspect the oil filler tube for cracks, breaks, and other damage.

(3) Inspect the oil gage rod for illegible markings, deformation, and other damage.

(4) Replace all defective parts.

d. Reassembly. Refer to figure 3–24 and reassemble the oil filler tube and oil gage rod.

e. Installation.

(1) Refer to figure 3–23 and install the oil filler tube and oil gage rod.

(2) Install the fuel filter (para 3–16).

3–30. Oil Filter

a. Removal. Refer to figure 3–25 and remove the oil filter.

b. Cleaning and Inspection.

(1) Clean the oil filter and component parts with an approved cleaning solvent and dry thoroughly.

(2) Clean the bypass valve and check for obstructions.

(3) Inspect the oil filter for cracks, breaks, and other damage.

(4) Inspect the mounting hardware for damaged threads.

(5) Replace all damaged or missing parts.

c. Installation. Refer to figure 3–25 and install the oil filter.

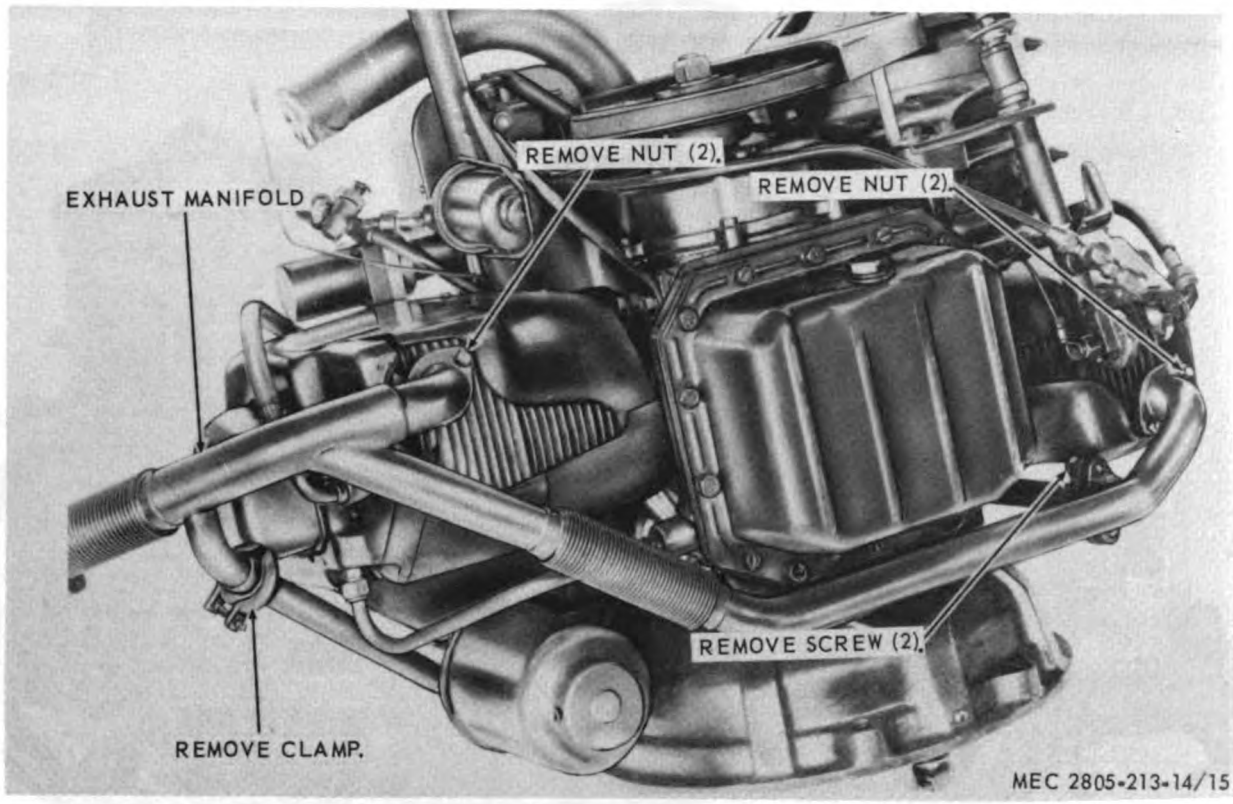


Figure 3-19. Exhaust manifold, removal and installation (Model AO42-KM).

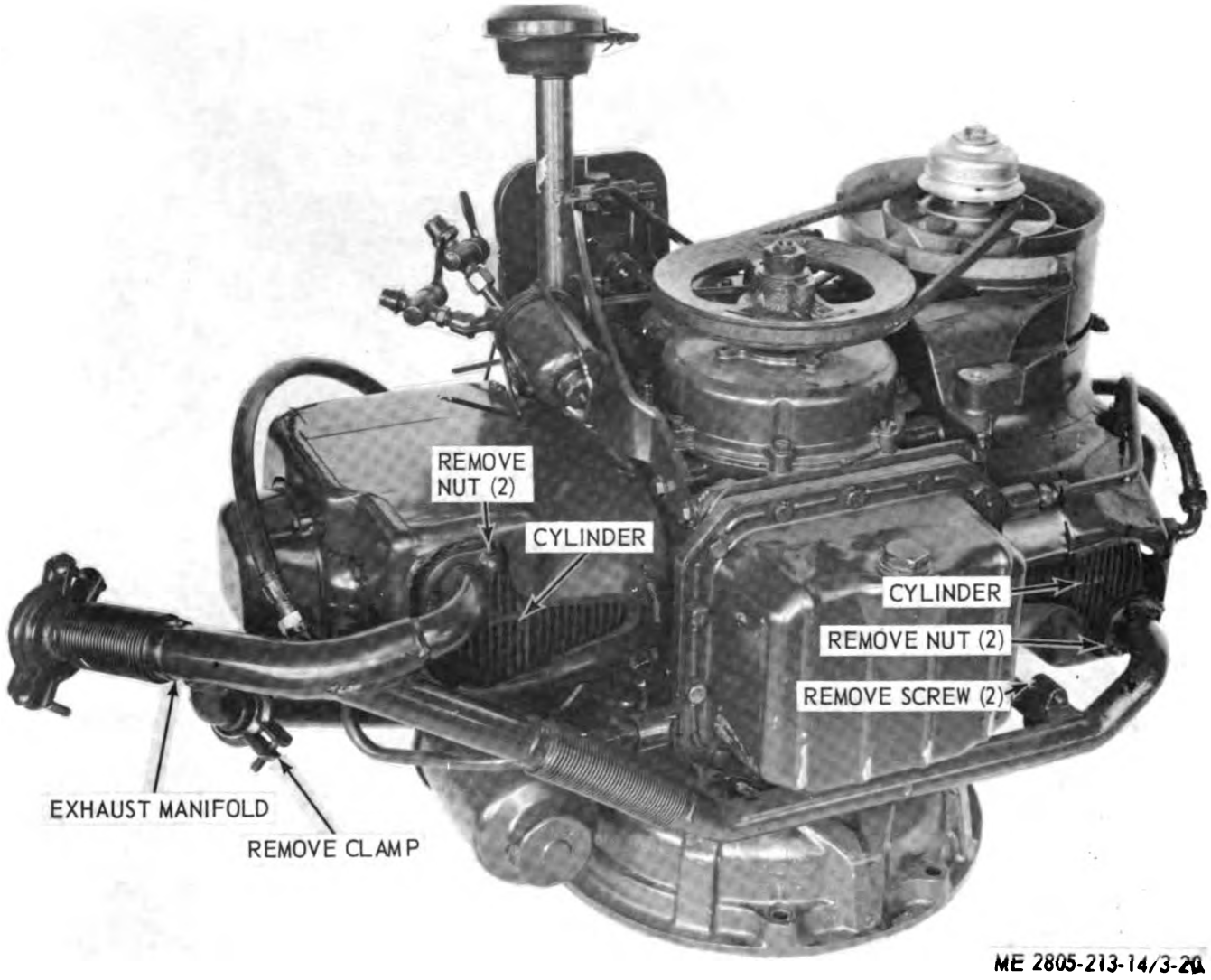


Figure 3–20. Exhaust manifold, removal and installation (Model AO42–V).

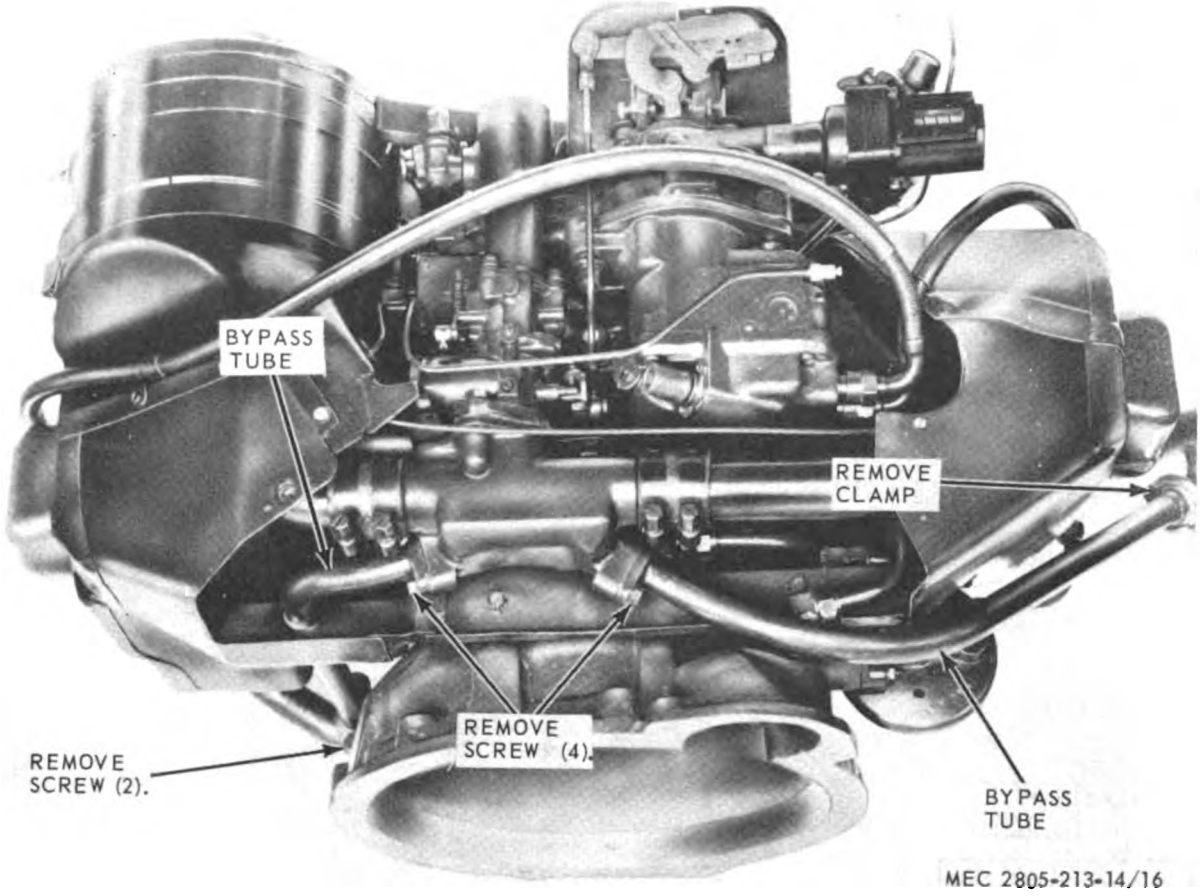


Figure 3–21. Bypass tubes, removal and installation (Model AO42–KM).

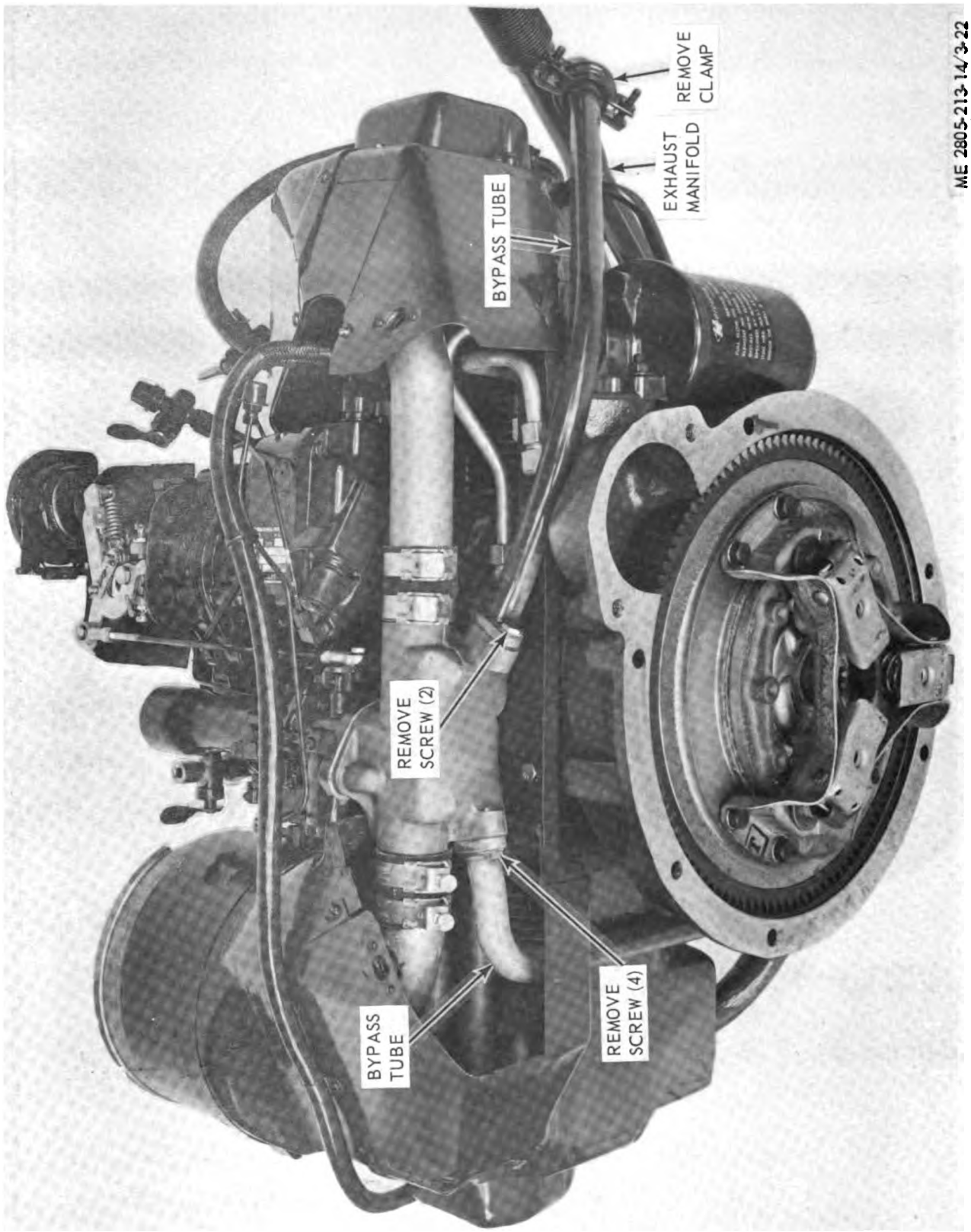
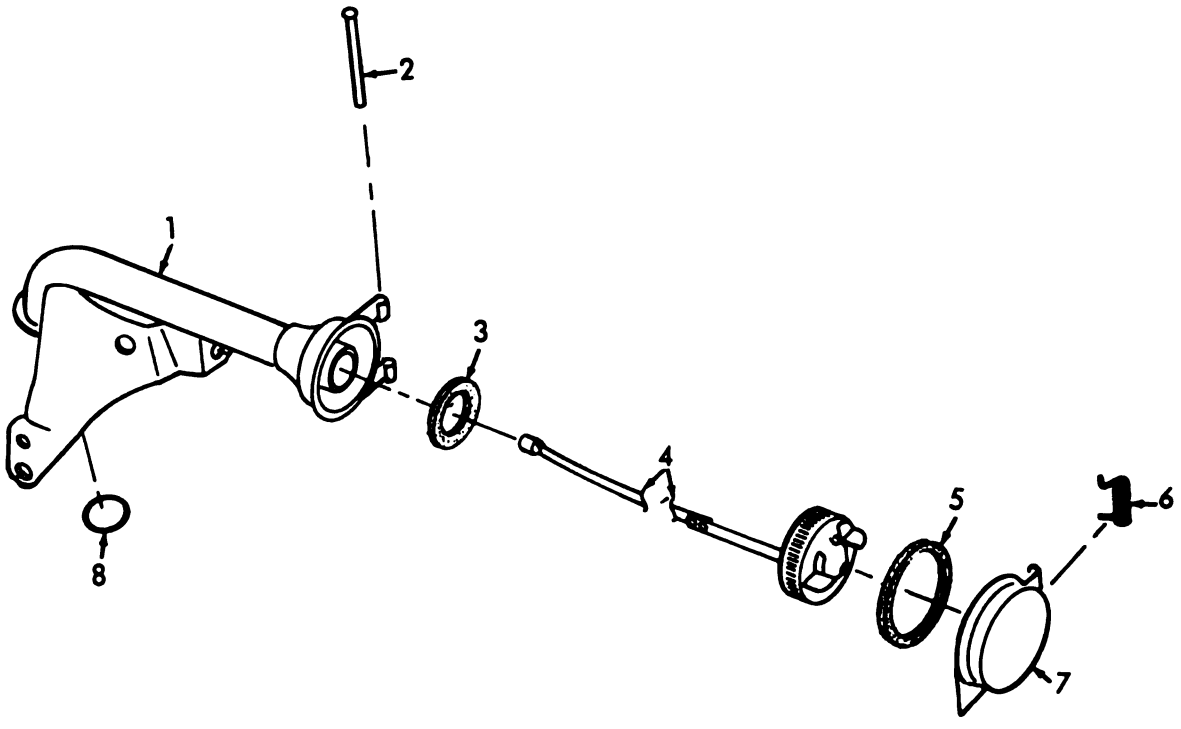


Figure 3–22. Bypass tubes, removal and installation (Model AO42–V).

Figure 3–23. Oil filler tubes and oil gage rod, removal and installation.



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1 Tube assembly
2 Pin
3 Gasket
4 Cap and rod
5 Gasket
6 Spring
7 Cover assembly
8 O-ring

Figure 3-24. Oil filler tube and oil gage rod, disassembly and reassembly.

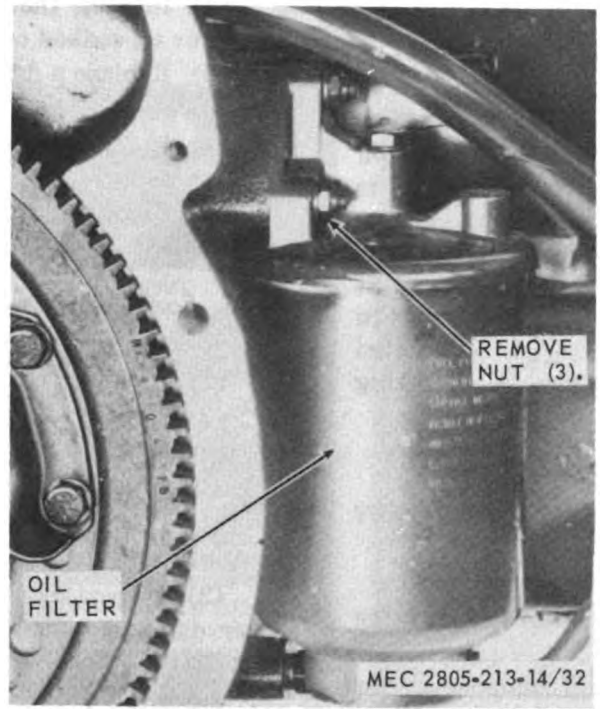


Figure 3–25. Oil filter, removal and installation.

3-31. Air Breather Cover and Crankcase Breather Reeds

a. Removal.

(1) Remove the fan belt guard (para 3-33).

(2) Refer to figure 3-26 and air breather cover and crankcase breather reeds.

b. Cleaning and Inspection.

(1) Clean the cover, reeds, and support, with an approved cleaning solvent and dry thoroughly.

(2) Clean the seating area inside the timing gear cover with a cloth that has been dampened with an approved cleaning solvent. Do not allow excessive cleaning solvent to enter the interior of the engine.

(3) Inspect the reeds for splits, excessive wear and deformation.

(4) Inspect the cover and support for cracks, breaks and other damage.

(5) Replace all defective parts.

c. Installation.

(1) Refer to figure 3-26 and install the air breather cover and crankcase breather reeds.

(2) Install the fan belt guard (para 3-33).

Section XII. COOLING SYSTEM

3-32. General

The model AO42 engine is cooled by air that is forced over the engine surfaces by a fan that is mounted on the upper left side of the engine. The fan is belt driven by a pulley that is mounted on the front of the crankshaft. The fan guard is equipped with an adjustable louver that permits the operator to increase or decrease the air flow in order to allow the engine to be maintained at the proper temperature under wide variations in ambient temperatures. The cooling air is directed over the surfaces of the engine by close fitting shrouds.

3-33. Fan Belt Guard and Fan Guard

a. Removal. Refer to figure 3-27 and remove the fan belt guard and fan guard.

b. Cleaning and Inspection.

(1) Clean all parts in an approved cleaning solvent and dry thoroughly.

(2) Inspect the guards and components for cracks, breaks, and other damage.

(3) Inspect the mounting hardware for damaged threads.

(4) Replace all damaged or missing parts.

c. Installation. Refer to figure 3-27 and install the fan belt guard and fan guard.

3-34. Fan Belt

a. Removal.

(1) Remove the fan belt guard and fan guard (para 3-33).

(2) Refer to figure 3-28 and remove the fan belt.

b. Cleaning and Inspection.

(1) Clean the fan belt with a clean, dry cloth.

(2) Inspect the belt for cracks and for frayed or oil soaked condition.

(3) Replace a defective belt.

c. Installation.

(1) Refer to figure 3-28 and install the fan belt.

(2) Install the fan belt guard and fan guard (para 3-33).

3-35. Fan Drive Pulley

a. Removal.

(1) Remove the fan belt (para 3-34).

(2) Refer to figure 3-29 and remove the fan drive pulley.

b. Cleaning and Inspection.

(1) Clean the fan drive pulley and nut with an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, breaks, and other damage.

(3) Replace defective parts.

c. Installation.

(1) Refer to figure 3-29 and install the fan drive pulley.

(2) Install the fan belt.

3-36. Fan Assembly

a. Removal.

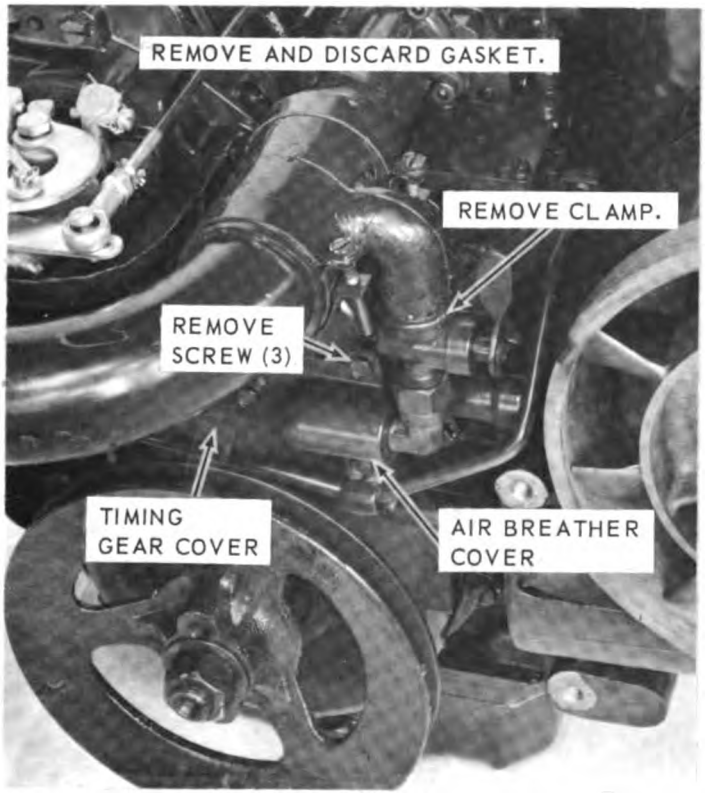
(1) Remove the fan belt (para 3-34).

(2) Refer to figure 3-30 and remove the fan assembly.

b. Disassembly. Refer to figure 3-31 and disassemble the fan assembly.

c. Cleaning and Inspection.

(1) Clean the fan assembly and components with an approved cleaning solvent and dry thoroughly.



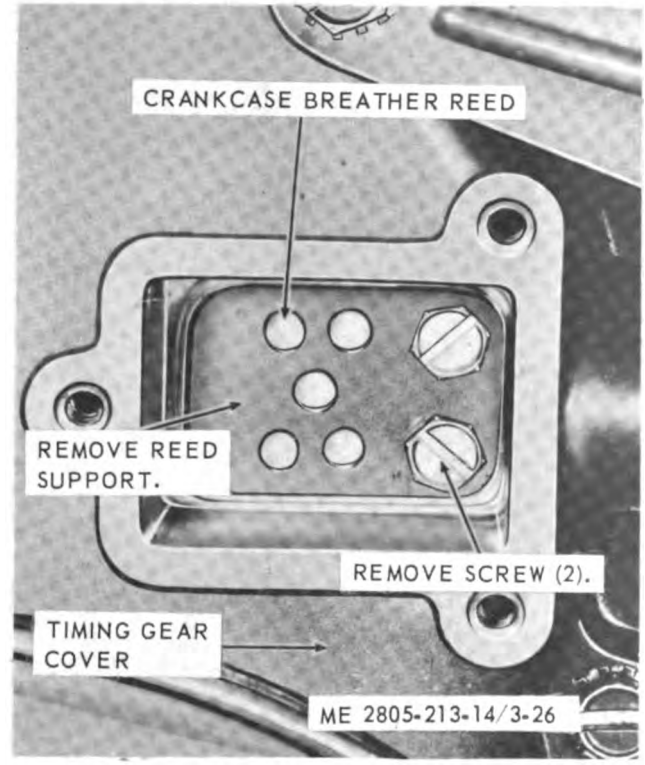


Figure 3–26. Air breather cover and crankcase breather reeds, removal and installation.

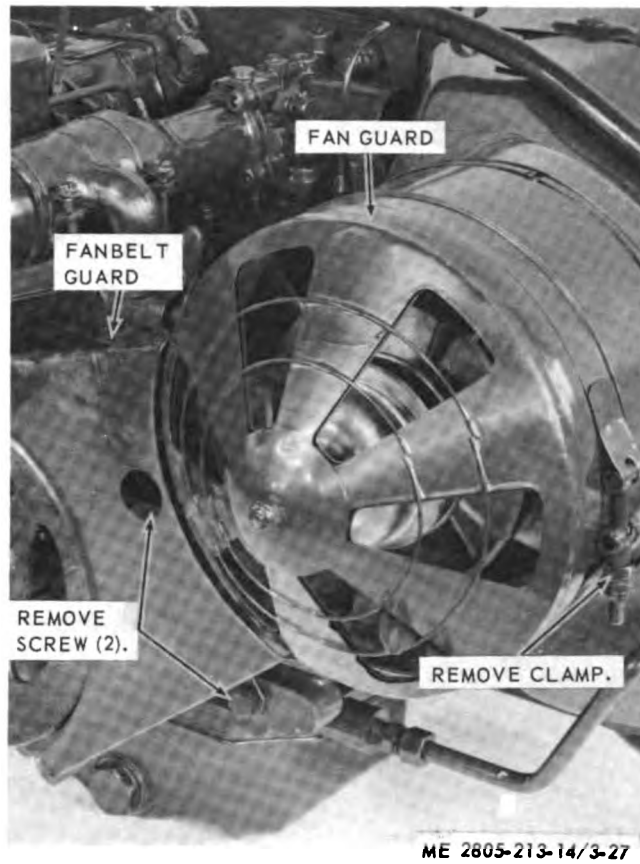


Figure 3–27. Fan belt guard and fan guard, removal and installation.

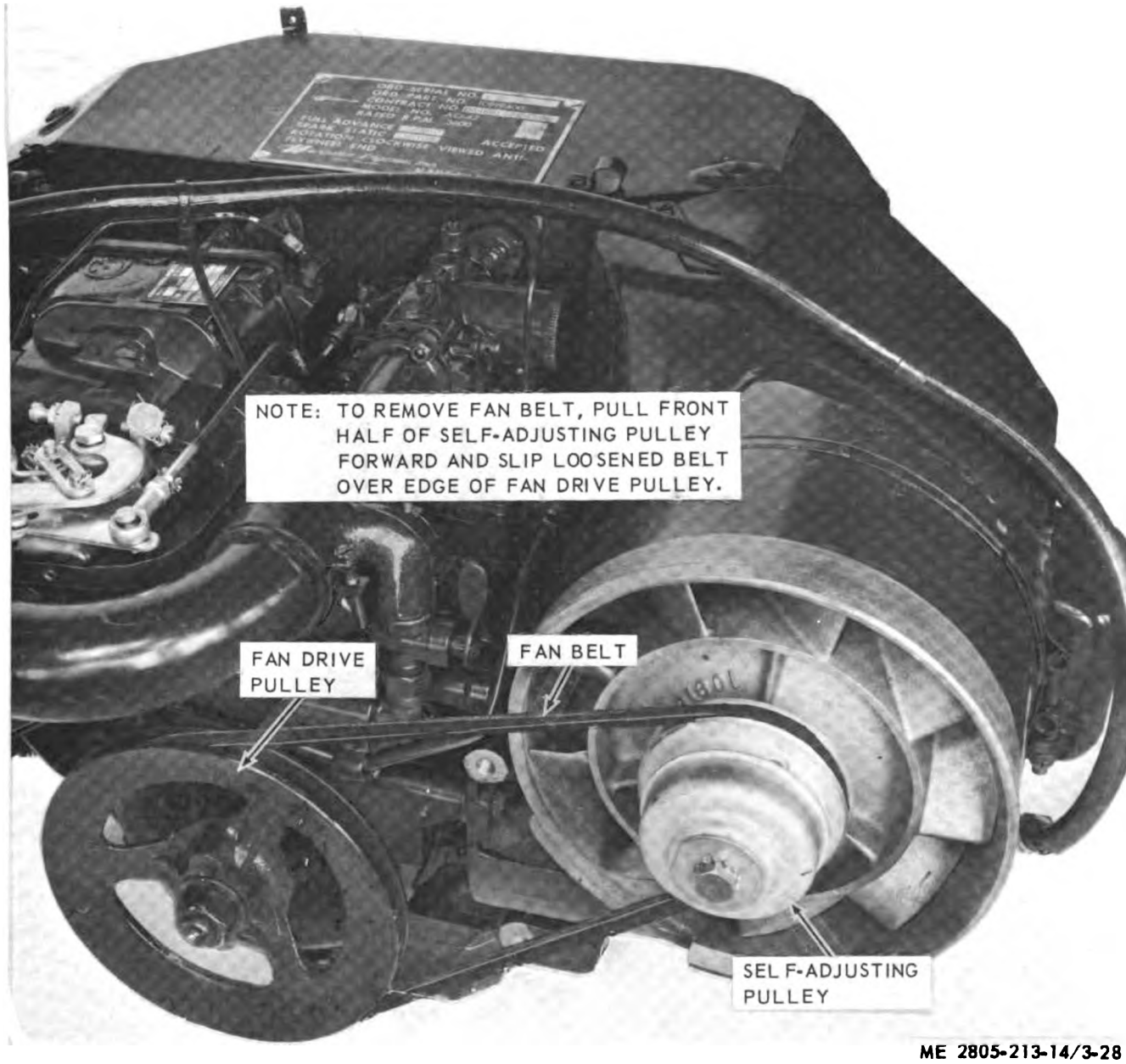


Figure 3–28. Fan belt, removal and installation.

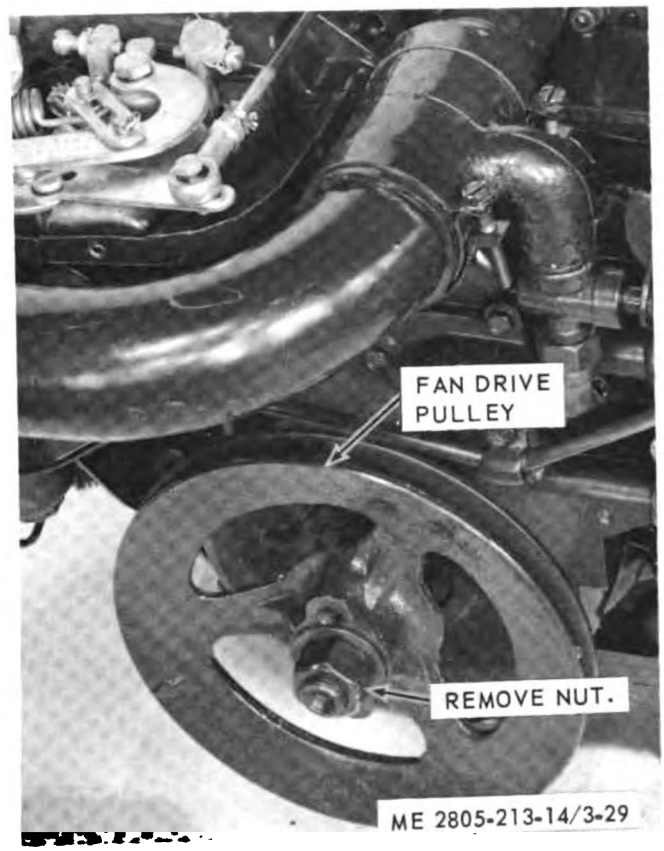
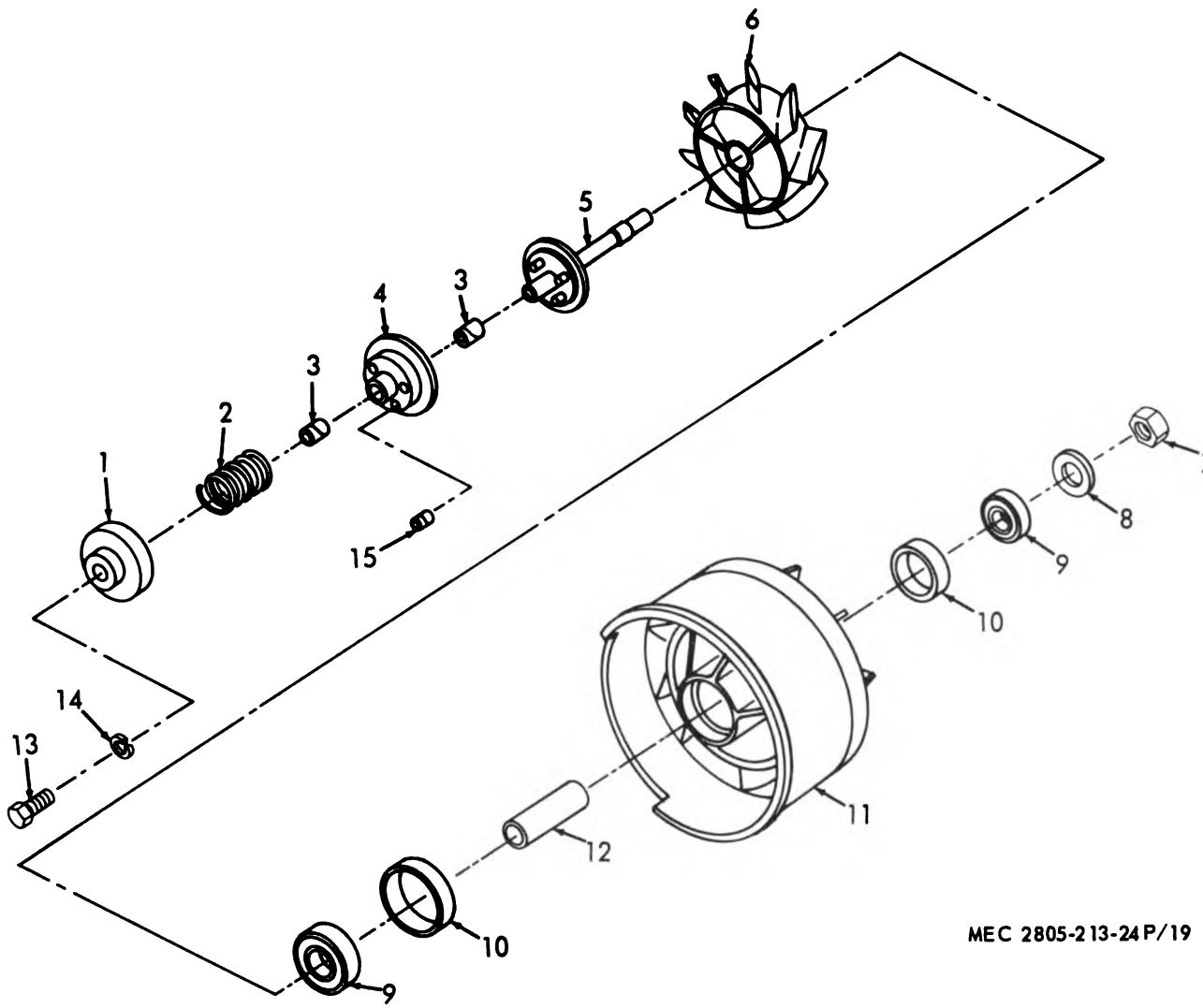


Figure 3–29. Fan drive pulley, removal and installation.

Figure 3–30. Fan assembly, removal and installation.



1 Retainer
2 Spring
3 Bearing (2 rqr)
4 Pulley
5 Shaft
6 Fan assembly
7 Nut, self-locking ¾–16
8 Washer, flat
9 Bearing, bolt (2 rqr)
10 Insert, bearing (2 rqr)
11 Housing
12 Spacer
13 Screw, ¼–20 (3 rqr)
14 Washer, lock
15 Bearing (4 rqr)

Figure 3–31. Fan assembly, disassembly, and reassembly.

(2) Inspect the fan, fan housing, and components for cracks, breaks, and other damage.

(3) Inspect the bearings for cracks, breaks, excessive wear, and other damage.

(4) Replace a damaged or defective part.

d. Reassembly. Refer to figure 3-31 and reassemble the fan assembly.

e. Installation.

(1) Refer to figure 3-30 and install the fan assembly.

(2) Install the fan belt (para 3-34).

3-37. Top Shroud

a. Removal. Refer to figure 3-32 and remove the top shroud.

b. Cleaning and Inspection.

(1) Clean the top shroud with an approved cleaning solvent and dry thoroughly.

(2) Inspect the top shroud and the fasteners for breaks, cracks, and other damage.

(3) Replace a defective shroud.

c. Installation. Refer to figure 3-32 and install the top shroud.

3-38. Left Front, Left Rear, Right Front, and Right Rear Shrouds

a. Removal.

(1) Remove the top shroud (para 3-37).

(2) Remove the fan (para 3-36).

(3) Refer to figure 3-33 and remove the left front, left rear, right front, and right rear shrouds.

b. Cleaning and Inspection.

(1) Clean all parts with an approved cleaning solvent and dry thoroughly.

(2) Inspect all parts for cracks, breaks, and other damage.

(3) Replace all defective parts.

c. Installation.

(1) Refer to figure 3-33 and install the left front, left rear, right front, and right rear shrouds.

(2) Install the fan (para 3-36).

(3) Install the top shroud (para 3-37).

3-39. Flywheel Housing Shroud

a. Removal.

(1) Remove the left front, left rear, right front, and right rear shrouds (para 3-38).

(2) Remove the intake manifold and elbows para 3-20).

(3) Refer to figure 3-34 and remove the flywheel housing shroud.

b. Cleaning and Inspection.

(1) Clean the flywheel housing shroud with an approved cleaning solvent and dry thoroughly.

(2) Inspect the flywheel housing shroud and mounting screws for cracks, breaks, deformation, and other damage.

(3) Replace a defective flywheel housing shroud.

c. Installation.

(1) Refer to figure 3-34 and install the flywheel housing shroud.

(2) Install the intake manifold and elbows (para 3-20).

(3) Install the left front, left rear, right front, and right rear shrouds (para 3-38).

Section XIII. ROCKER ARM COVERS

3-40. General

The rocker arms at each cylinder are enclosed by a sheet steel cover that may be removed when maintenance on the rocker arms is required.

3-41. Rocker Arm Covers

a. Removal. Refer to figure 3-35 and remove the rocker arm covers.

b. Cleaning and Inspection.

(1) Clean the rocker arm covers with an approved cleaning solvent and dry thoroughly.

(2) Carefully wipe the gaskets clean with a soft dry cloth.

(3) Inspect the rocker arm covers for dents, cracks, breaks, and other damage.

(4) Inspect the gaskets for excessive compression and for breaks.

(5) Replace defective parts.

c. Installation. Refer to figure 3-35 and install the rocker arm covers.

Section XIV. RECOIL STARTER

3–42. General

The Model AO42 engine is equipped with a manually operated recoil type starter. When the starter is operated, the starter pinion engages the engine flywheel.

3–43. Recoil Starter

a. Removal. Refer to figure 3–36 and remove the recoil starter.

b. Cleaning and Inspection.

(1) Clean the starter exterior surfaces with an approved cleaning solvent and dry thoroughly.

(2) Inspect the recoil starter for cracks, breaks, and other damage.

(3) Replace a defective recoil starter.

c. Installation. Refer to figure 3–36 and install the recoil starter.

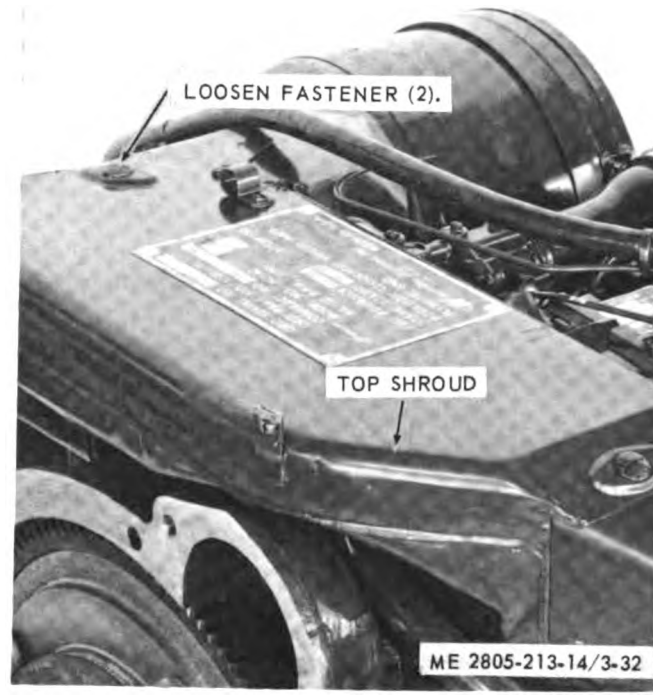
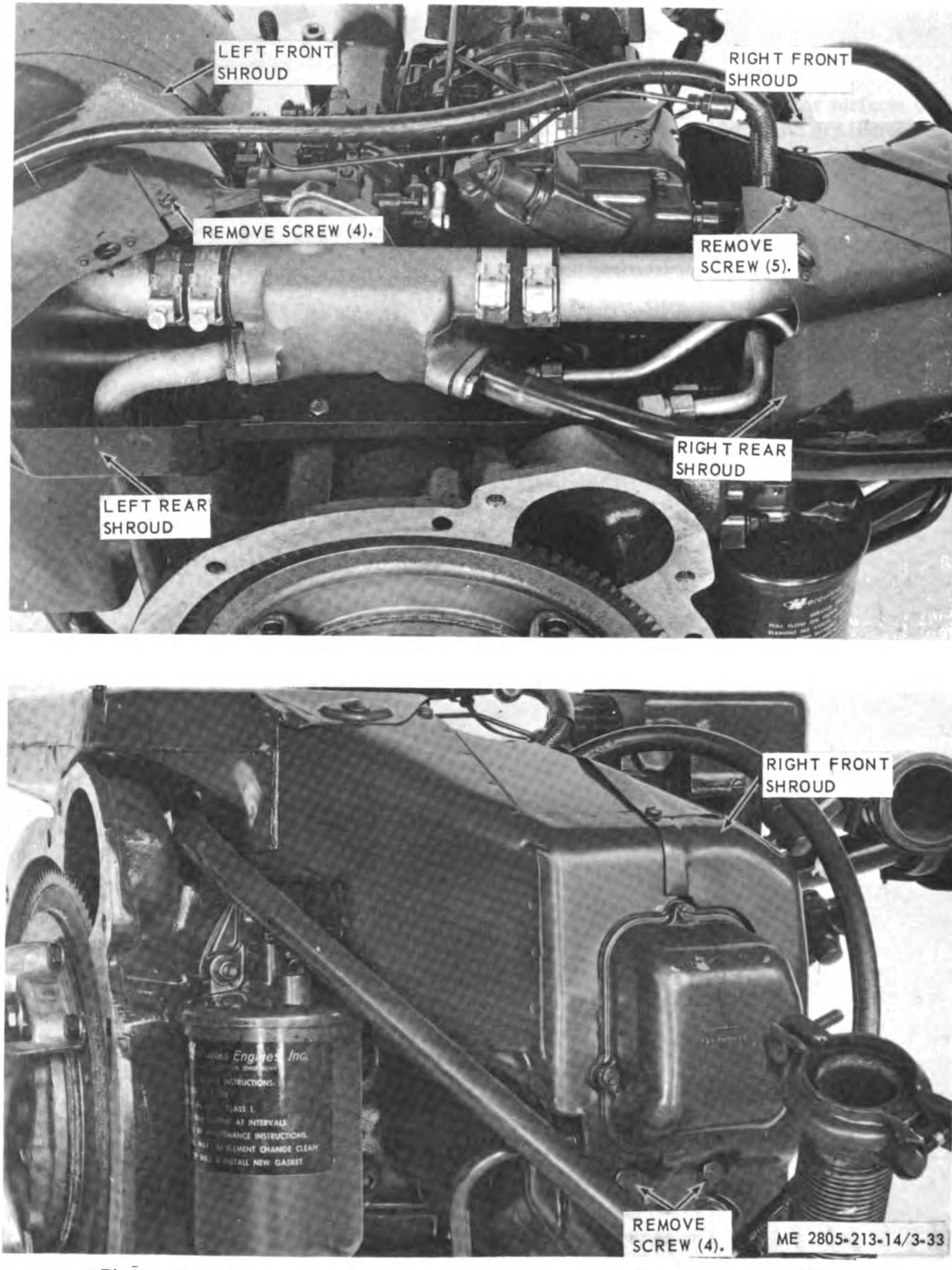


Figure 3–32.—Top shroud, removal and installation.



Figore 3–33. Left front, left rear, right front, and right rear shrouds, removal and installation.

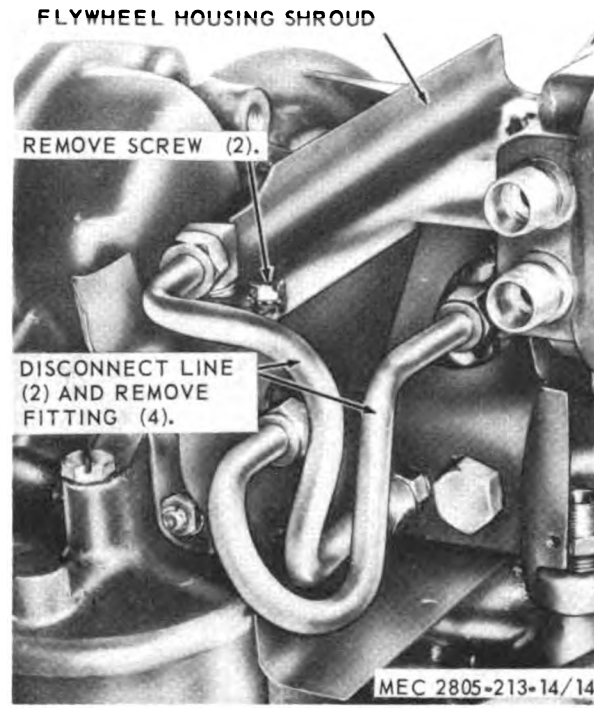


Figure 3–34. Flywheel housing shroud, removal and installation.

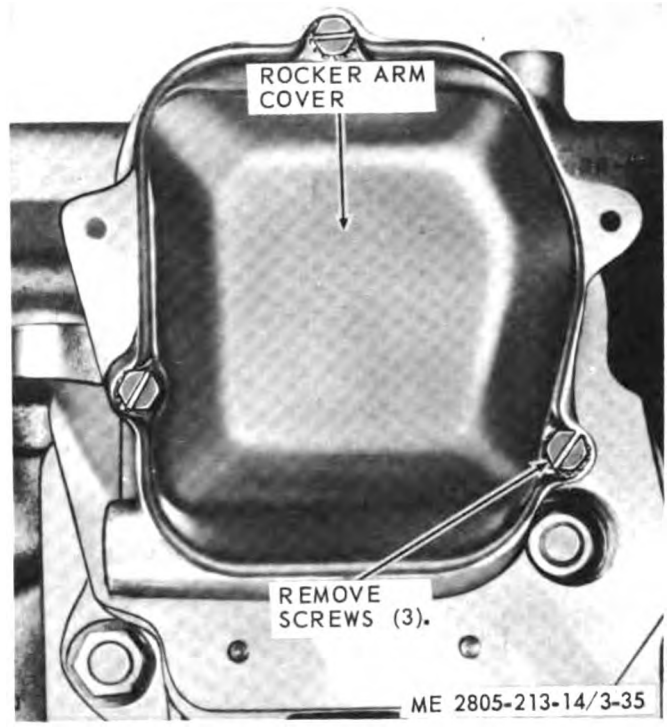


Figure 3–35. Rocker arm covers, removal and installation.

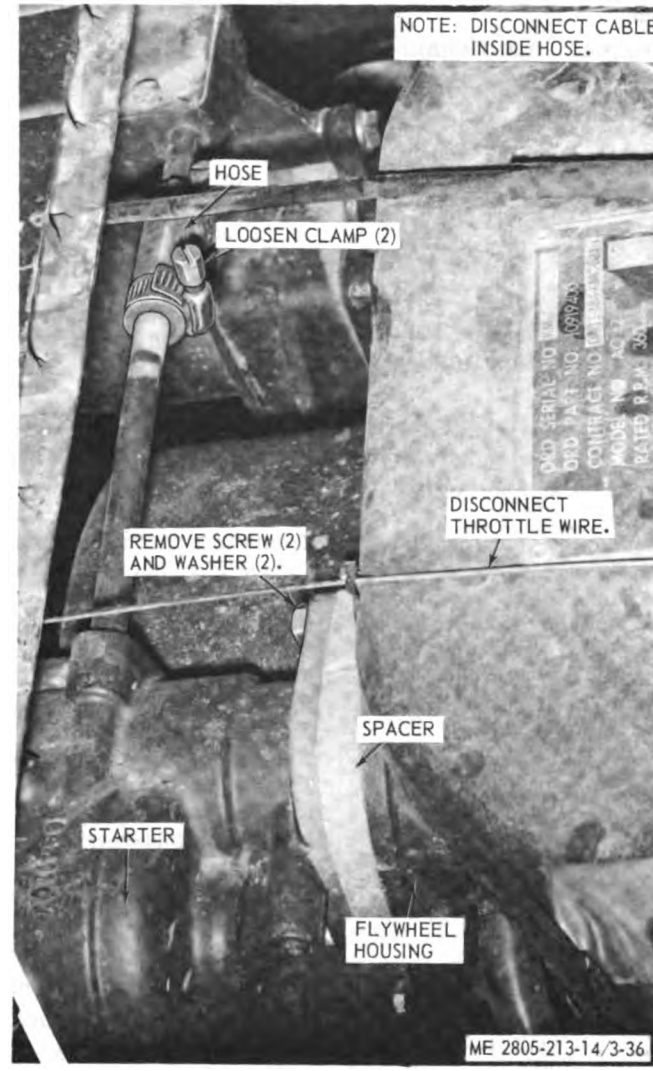


Figure 3–36. Recoil starter, removal and installation.

CHAPTER 4
DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

4–1. Scope

a. These instructions are provided for the use of direct and general support personnel. They contain information on equipment maintenance that is beyond the scope of the tools, equipment, personnel, and supplies that are normally available to organizational maintenance.

b. Direct and general support maintenance repair parts applicable to the engines are listed in TM 5–2805–213–24P.

4–2. Forms and Records

DA forms and procedures used for equipment maintenance will be only those prescribed by TM 38–750, Army Equipment Record Procedures.

Section II. DESCRIPTION AND DATA

4–3. Description

For a complete description of the Model AO42 engines, refer to paragraph 1–7.

4–4. Tabulated Data

a. General. This paragraph contains the tabulated data that is pertinent to direct and general support maintenance.

b. Engine.

Number of cylinders	2
Models	AO42–KM and AO42–V
Bore	3 in.
Stroke	3 in.
Displacement	42.40 cu. in.
Rotation	Counterclockwise (as viewed from drive end)
Compression ratio	6.5 to 1
Carburetor float level (bowl inverted-free end from lip of bowl).	0.0 to 0.093 in. above bowl flange
Firing (by cylinders)	1–2
Magneto leads simultaneous firing	
Ignition Timing (In crankshaft degrees)	
Ignition firing	
Above 500 rpm	18° BTC
Cranking	3° BTC
Static	0° TDC
Valve timing (In crankshaft degrees)	
Intake valve opens (at 3,600 rpm).	8° BTC
Intake valve closes (at 3,600 rpm).	44° ABC
Exhaust valve opens (at 3,600 rpm).	42° BBC
Exhaust valve closes (at 3,600 rpm).	10° ACT
Speed range (rpm)	950–3850
Oil capacity	
Crankcase	2½ qt.

c. Nut and Bolt Torque Data.

Connecting rod bolts nuts	180–200 in.-lb
Cylinder head nuts	260–280 in.-lb
Crankshaft-to-camshaft drive gear nut.	840–850 in.-lb
Flywheel bolt	950–1000 in.-lb
Oil drain plug	140–160 in.-lb
Oil pan screws	70–90 in.-lb
Rocker arm shaft nuts	70–90 in.-lb
Spark plugs	265–300 in.-lb
Fan drive pulley nut	950–1000 in.-lb
Exhaust bypass tube screws	70–50 in.-lb
Timing gear cover screws	70–80 in.-lb
Cylinder studs	125–150 in.-lb
Intake manifold-to-cylinder head nuts.	50–60 in.-lb
Exhaust manifold-to-cylinder head nuts.	70–80 in.-lb

d. Engine Repair and Replacement Standards. Table 4–1 lists the manufacturer's sizes, tolerances, desired clearances, and maximum allowable wear and clearances.

Table 4–1. Engine Repair and Replacement Standards

Component	Manufacturer's dimensions and tolerances		Desired clearance		Maximum allowable wear or clearance
	Minimum	Maximum	Minimum	Maximum	
CAMSHAFT					
Bearing journal diameter					
Front	0.9365	0.9370	0.001	0.0025	0.9363
Rear	0.8740	0.8745	0.002	0.003	0.8738

Table 4-1. Engine Repair and Replacement Standards—Continued

Component	Manufacturer's dimensions and tolerances		Desired clearance		Maximum allowable wear or clearance
	Minimum	Maximum	Minimum	Maximum	
Cam lift	0.2437	0.2487			0.005
End play	0.002	0.008			0.010
Bearing inside diameter	0.938	0.939			
Bearing journal-to-bearing clearance	0.001	0.0025	0.001	0.0025	0.0027
CRANKSHAFT					
Main bearing journals					
Front	1.6255	1.6260	0.0015	0.0027	
Rear	1.6255	1.6260	0.0015	0.0027	
Connecting rod journal od	1.4975	1.4980	0.0004	0.0019	
End play	0.003	0.010			0.015
Crankshaft bearings					
Main bearings id	1.6275	1.6282			
Main bearing od	1.7545	1.7560			
CONNECTING RODS					
Connecting rod bearing clearance	0.0004	0.0019			
Side clearance	0.006	0.014	0.006	0.014	0.017
Connecting rod bearing id	1.4984	1.5004			
Connecting rod bearing od					
Piston pin					
Length	2.485	2.500			
Diameter	0.8591	0.8593			
Piston pin clearance in bearing	0.0001	0.0006			0.0008
PISTON					
Cylinder inside dia	2.9990	2.9995			
Piston pin hole dia	0.8591	0.8594		0.8602	
Piston pin bushing od	0.9165	0.9185			
Piston pin bushing id	0.8594	0.8597		0.8599	
Skirt od	2.9962	2.9972		2.9955	
Piston-to-cylinder clearance	0.0018	0.0033			0.004
Piston ring groove depth					
Top	2.652	2.662			
Second	2.631	2.641			
Third	2.631	2.641			
Piston ring groove width					
Top	0.1200	0.1210			
Second	0.0955	0.0965			
Third	0.188	0.189			
Piston rings					
Width spacer	0.148	0.152			
Top	0.140	0.150			
Second	0.140	0.150			
Third	0.115	0.125			
Spacer	0.132	0.140			
Thickness spacer	0.0235	0.0245			
Top	0.0930	0.0940			
Second	0.0930	0.0940			
Third	0.1340	0.1350			
Spacer	0.0235	0.0245			
Gap clearance	0.035	0.060			
Top	0.010	0.020	0		0.026
Second	0.010	0.020			0.026
Third	0.020	0.030			0.049
Spacer	0.007	0.036			0.055
Side clearance					
First	0.0015	0.0045			
Second	0.0015	0.0035			
Third	0.0045	0.008			

Table 4–1. Engine Repair and Replacement Standards—Continued

Component	Manufacturer's dimensions and tolerances		Desired clearance		Maximum allowable wear or clearance Maximum
	Minimum	Maximum	Minimum	Maximum	
VALVES					
Exhaust					
Length	4.443	4.458			
Stem diameter	0.3405	0.3415			0.3385
Head diameter	1.120	1.130			
Seat angle	45° 0′	45° 0′			
Stem-to-guide clearance	0.003	0.0045			0.006
Clearance valve to lift					
Minimum edge thickness of valve head relative to seat surface					0.031
Intake					
Length	4.443	4.458			
Stem diameter	0.3405	0.3415			0.3385
Head diameter	1.370	1.380			
Seat angle	45° 0′	45° 15′			
Stem-to-guide clearance	0.0005	0.002			0.0045
Clearance valve to lift					
VALVE SPRINGS					
Length (valve open)	1.440				
Pounds load (valve open)	100.0	110.0			90.0
Length (valve closed)	1.20				
Pounds load (valve closed)	57.0	63.0			47.0
VALVE GUIDE					
Exhaust					
Length	1.795	1.825			
Outside dia	0.5005	0.5010			
Inside dia	0.3445	0.3450			0.3465
Intake					
Length	1.795	1.825			
Outside dia	0.5005	0.5010			
Inside dia	0.3420	0.3425			0.3450
VALVE SEAT INSERTS					
Exhaust					
Outside dia	1.2595	1.2605			
Inside dia	0.960	0.970			
Seat angle	43° 45′	44° 15′			
Intake					
Outside dia	1.4895	1.4905			
Inside dia	1.275	1.285			
Seat angle	43° 45′	44° 15′			
VALVE TAPPETS					
Outside dia	0.8740	0.8745			0.8747
Clearance in guide	0.0015	0.003			0.0032
Rocker arms					
Rocker shaft od	0.6246	0.6248	0.0001	0.0007	0.6240
Rocker arm bushing od	0.745	0.751			
Rocker arm bushing id	0.6253	0.6249			
CYLINDER					
Bore	2.9990	2.9995			
Out of round	0.0000	0.0005			0.004
Taper	0.0000	0.001			0.0025
OIL PUMP					
Gear to end cover tolerance	0.0043	0.0097			
Gear tooth tolerance (od)	1.529	1.530			
Timing gear tooth tolerance	0.002	0.004			0.006

Section III. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

4-5. Special Tools and Equipment

No special tools or equipment are required to perform direct support and general support maintenance on the engine.

4-6. Direct Support and General Support Maintenance Repair Parts

Direct support and general support maintenance repair parts are listed and illustrated in MT 5-2805-213-24P.

Section IV. TROUBLESHOOTING

4-7. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the engines. This is presented in tabular form and it provides probable causes of trouble and possible corrective action that may be taken to eliminate the problem.

4-8. Troubleshooting

For troubleshooting information that is applicable to direct support and general support maintenance, refer to table 4-2.

Table 4-2. Troubleshooting

Malfunction	Probable cause	Corrective action
1. Engine misses or runs erratically	a. Valves sticking or burned	a. Clean valve stems, grind faces and seats, or replace valves (para 5-20).
	b. Valve spring broken	b. Replace valve spring (para 5-20).
	c. Tappet defective	c. Replace tappet (para 5-20).
	d. Piston burned or broken	d. Replace piston (para 5-21).
2. Engine oil consumption excessive	a. Engine leaks oil at oil seals	a. Replace front oil seal (para 5-4) or rear oil seal (para 5-11).
	b. Piston rings, worn, stuck, or broken	b. Replace piston rings (para 5-21).
	c. Pistons worn or broken	c. Replace pistons (para 5-21).
	d. Valve guides worn	d. Replace valve guides (para 5-20).
	e. Cylinder worn	e. Replace cylinder (para 5-21).
3. Engine lacks power	a. Engine misses	a. Refer to 1, above.
	b. Piston rings worn or stuck	b. Replace piston rings (para 5-21).
	c. Cylinder worn	c. Replace cylinder (para 5-21).
4. Engine excessively noisy	a. Tappet defective	a. Replace tappets (para 5-20).
	b. Valve spring broken	b. Replace valve spring (para 5-20).
	c. Valve sticking	c. Clean and free sticking valve (para 5-20).
	d. Valve bent	d. Replace valve (para 5-20).
	e. Connecting rod bearing, bearing or piston pin bearing loose.	e. Replace connecting rod bearing, connecting rod, or piston (para 5-21).

CHAPTER 5
REPAIR INSTRUCTIONS

Section I. RECOIL STARTER

5-1. General

This section provides the direct support and general support maintenance instruction that are applicable to the recoil starter.

5-2. Recoil Starter

a. Removal and Disassembly.

(1) Remove the recoil starter (para 3-43).

(2) Refer to figure 5-1 and disassemble the recoil starter.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts with an approved cleaning solvent and dry thoroughly.

(2) Inspect the housing for cracks, breaks, and other damage.

(3) Inspect the bearings for roughness and excessive wear. Replace a defective bearing.

(4) Inspect the pins, actuator, plunger, rachets, and retaining rings for cracks, breaks, and other damage.

(5) Inspect the mounting hardware for damaged threads, cracks, and wear.

(6) Replace all defective parts.

c. Reassembly and Installation.

(1) Refer to figure 5-1 and reassemble the recoil starter.

(2) Install the recoil starter (para 3-43).

Section II. FRONT OIL SEAL, TIMING GEAR COVER, AND CRANKCASE BAFFLE

5-3. General

This section provides the direct support and general support maintenance instructions applicable to the front oil seal, timing gear cover, and crankcase baffle.

5-4. Front Oil Seal

a. Removal.

(1) Remove the fan drive pulley (para 3-35).

(2) Refer to figure 5-2 and remove the front oil seal.

b. Cleaning, Inspection, and Repair.

(1) Clean the seal with an approved cleaning solvent and dry thoroughly.

(2) Inspect the seal for wear, cracks, and other damage.

(3) Replace a damaged or defective oil seal.

c. Installation.

(1) Refer to figure 5-2 and install a new front oil seal.

(2) Install the fan drive pulley (para 3-35).

5-5. Timing Gear Cover and Crankcase Baffle

a. Removal.

(1) Remove the air cleaner adapter and tube (para 3-18).

(2) Remove the fan drive pulley (para 3-35).

(3) Remove the air breather cover (para 3-31).

(4) Remove the governor (para 3-21).

(5) Remove the magneto (para 3-23).

(6) Remove the fuel line (para 3-14).

(7) Remove the fuel pump (para 3-17).

(8) Refer to figure 5-3 and remove the timing gear cover and crankcase baffle.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts with an approved cleaning solvent and dry thoroughly.

(2) Inspect the timing gear cover for cracks and breaks.

(3) Inspect the crankcase baffle for dents, distortion, cracks, and other damage.

(4) Inspect the mounting hardware for damaged threads.

(5) Replace all defective parts.

c. Installation.

(1) Refer to figure 5-3 and install the timing gear cover and crankcase baffle.

(2) Install the fuel pump (para 3-17).

(3) Install the fuel line (para 3-14).

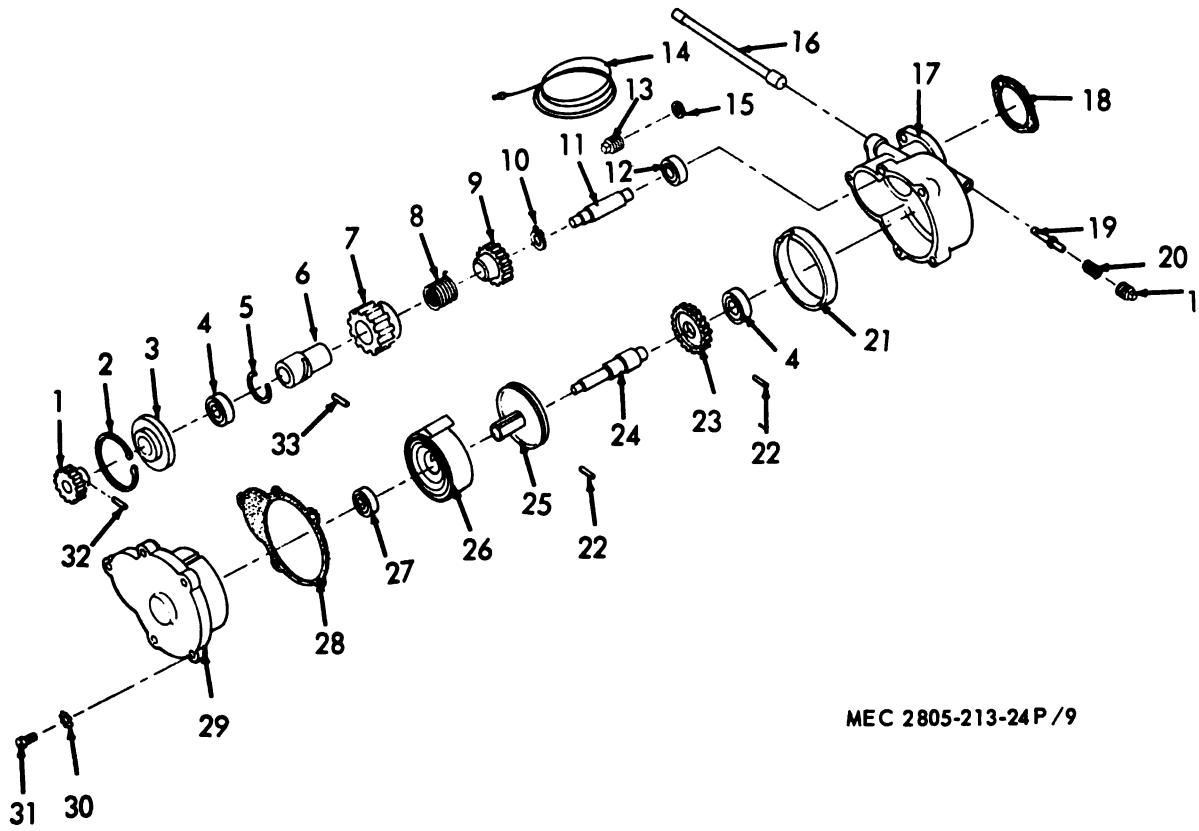
(4) Install the magneto (para 3-23).

(5) Install the governor (para 3-21).

(6) Install the air breather cover (para 3-31).

(7) Install the fan drive pulley (para 3-35).

(8) Install the air cleaner adapter and tube (para 3-18).



1 Gear
2 Ring
3 Housing
4 Bearing, ball (2 rqr)
5 Ring
6 Actuator
7 Rachet
8 Spring
9 Pinion
10 Ring
11 Shaft
12 Bearing, ball
13 Plug (2 rqr)
14 Cable
15 Seal
16 Guide
17 Housing
18 Gasket
19 Plunger
20 Spring
21 Ring
22 Pin (2 rqr)
23 Gear
24 Shaft
25 Sheave assembly
26 Spring
27 Bearing, ball
28 Gasket
29 Cover
30 Washer, lock (5 rqr)
31 Screw, No. 10–32 (5 rqr)
32 Pin
33 Pin

Figure 5–1. Recoil starter, disassembly and reassembly.

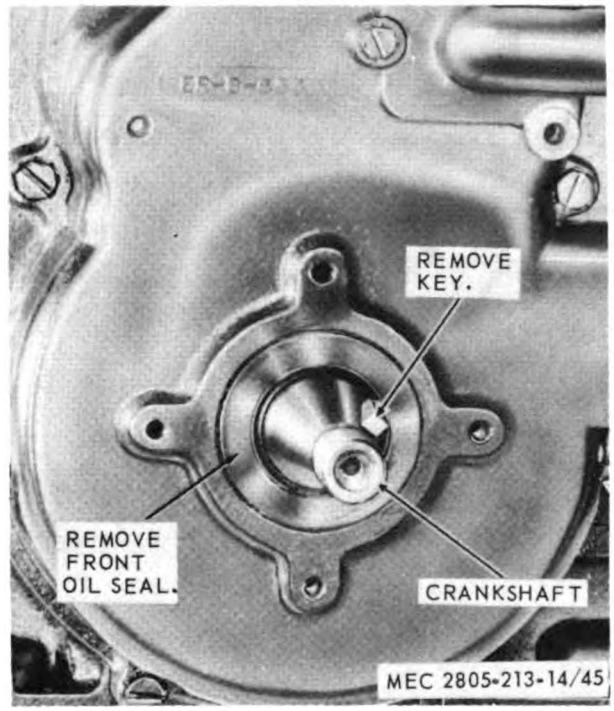
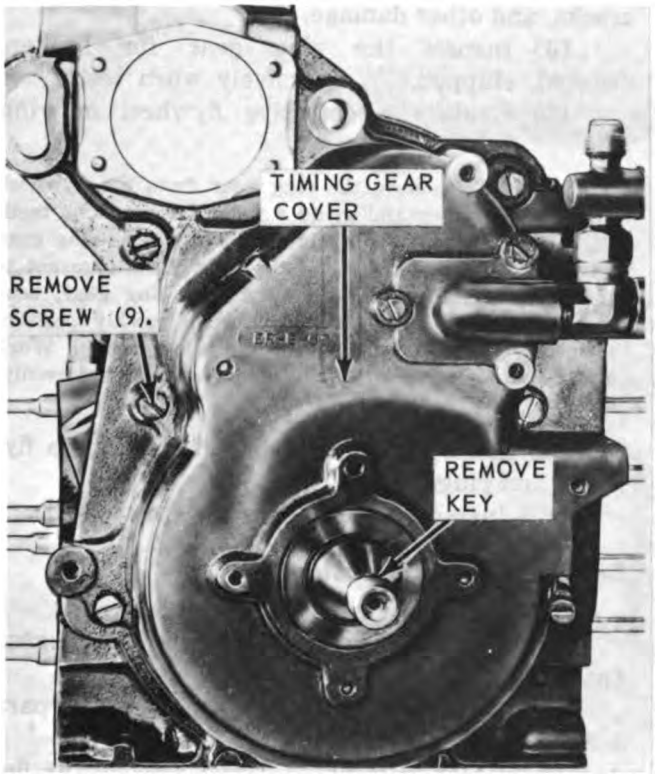
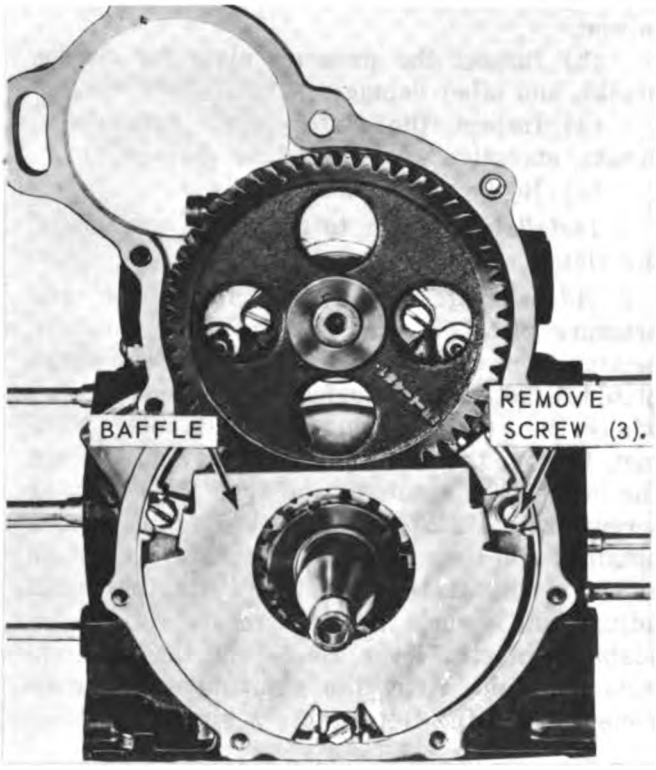


Figure 5–2. Front oil seal, removal and installation.



A. TIMING GEAR COVER REMOVAL.



B. CRANKCASE BAFFLE REMOVAL.

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Figure 5–3. Timing gear cover and crankcase baffle, removal and installation.

Section III. CLUTCH, PILOT BEARING, FLYWHEEL, FLYWHEEL HOUSING, AND REAR OIL SEAL

5–6. General

This section provides direct support and general support maintenance instructions for the clutch, pilot bearing, flywheel, flywheel housing, and the rear oil seal.

5–7. Clutch

a. Removal. Refer to figure 5–4 and remove the clutch.

b. Cleaning and Inspection.

(1) Clean the pressure plate with an approved cleaning solvent and dry thoroughly.

(2) Clean the clutch plate with a clean cloth that has been slightly dampened with an approved cleaning solvent. Do not saturate the lining with solvent.

(3) Inspect the pressure plate for cracks, breaks, and other damage.

(4) Inspect the clutch plate for cracks, breaks, excessive wear and other damage.

(5) Replace all deefctive parts.

c. Installation. Refer to figure 5–4 and install the clutch.

d. Adjustment. Install the clutch disk and pressure plate onto the flywheel. The point of measurement is between the face of the pressure plate bracket and the surface of the clutch levers where the release baring normally makes contact. Remove the clutch lever return clips. Loosen the locknut, as required, and turn the adjusting screw until a 2.202- to 2.232-inch dimension is obtained and then tighten the locknut. Adjust all levers to the same dimension. After the initial adjustment is made at all levers, recheck the adjustment of each lever. Be certain that all locknuts are tight. After the adjustments are completed, install the clutch lever return clips.

5–8. Pilot Bearing

a. Removal.

(1) Remove the clutch (para 5–7).

(2) Refer to figure 5–5 and remove the pilot bearing.

b. Cleaning and Inspection.

(1) Clean the pilot bearing and retaining ring with a clean cloth that has been dampened with an approved cleaning solvent.

(2) Inspect the pilot bearing for wear, roughness, and other damage.

(3) Inspect the retaining ring for cracks, breaks, and distortion.

(4) Replace defective parts.

c. Installation.

(1) Refer to figure 5–5 and install the pilot bearing.

(2) Install the clutch (para 5–7).

5–9. Flywheel and Ring Gear

a. Removal.

(1) Remove the pilot bearing (para 5–8).

(2) Refer to figure 5–6 and remove the flywheel and ring gear.

b. Cleaning and Inspection.

(1) Clean the flywheel and ring gear with an approved cleaning solvent and dry thoroughly.

(2) Inspect the flywheel for a scored face, cracks, and other damage.

(3) Inspect the ring gear for broken, cracked, chipped, or excessively worn teeth.

(4) Replace a defective flywheel or ring gear.

Note. To remove the ring gear from the flywheel, use a hand grinder and grind a notch between two teeth of the ring gear. Using a cold chisel, break the ring gear at the notch and remove the ring gear. Take care not to damage the flywheel. To install a new ring gear, heat the ring gear by use of a blowtorch. Quickly position the heated gear on the flywheel and allow to cool. Work quickly and be certain the ring gear is positioned evenly.

c. Installation.

(1) Refer to figure 5–6 and install the flywheel and ring gear.

(2) Install the pilot bearing (para 5–8).

5–10. Flywheel Housing

a. Removal.

(1) Remove the flywheel and ring gear (para 5–9).

(2) Remove the left rear shroud (para 3–38).

(3) Refer to figure 5–7 and remove the flywheel housing.

b. Cleaning and Inspection.

(1) Clean the flywheel housing with an approved cleaning solvent and dry thoroughly.

(2) Inspect the flywheel housing for cracks, breaks, and other damage.

(3) Inspect the mounting hardware for damaged threads.

(4) Replace all damaged parts.

c. Installation.

(1) Refer to figure 5–7 and install the flywheel housing.

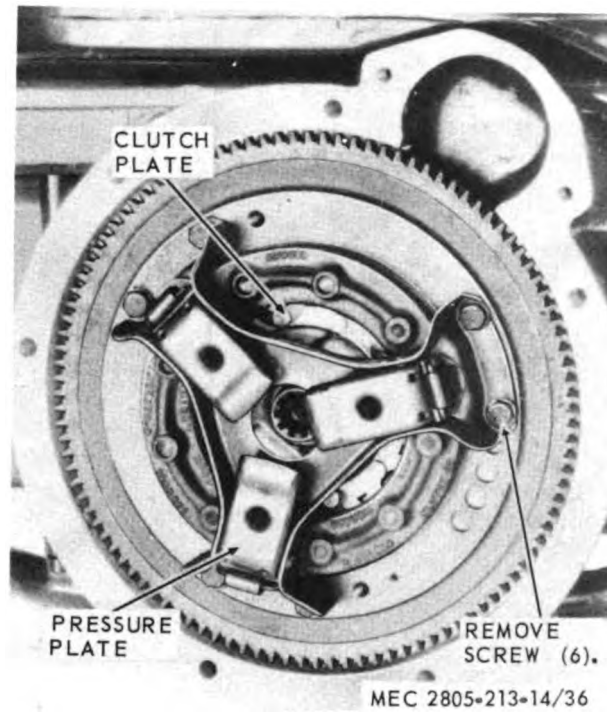

Figure 5–4. Clutch, removal and installation.

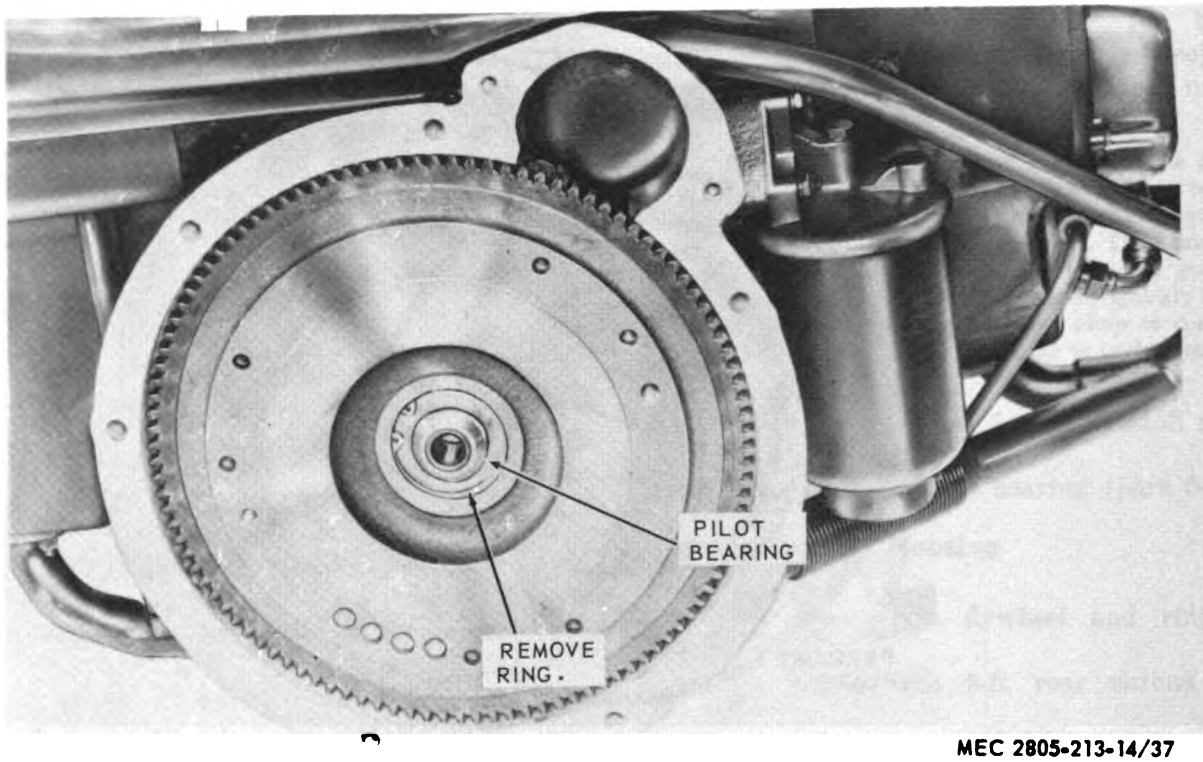

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Figure 5–5. Pilot bearing, removal and installation.

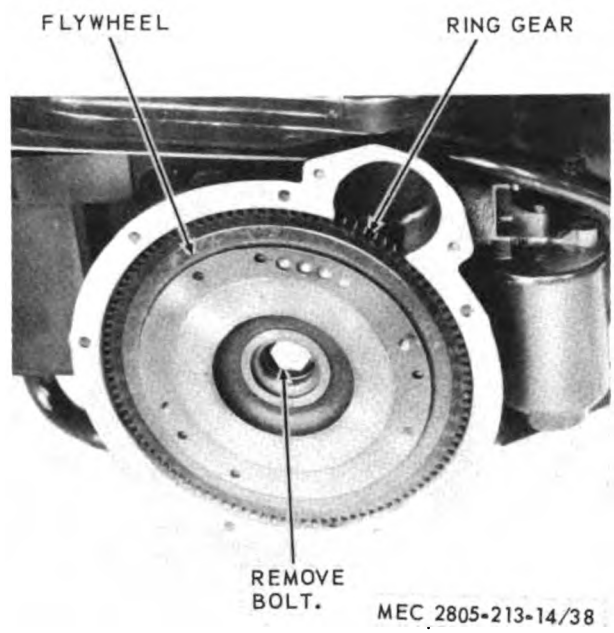


Figure 5–6. Flywheel and ring gear, removal and installation.

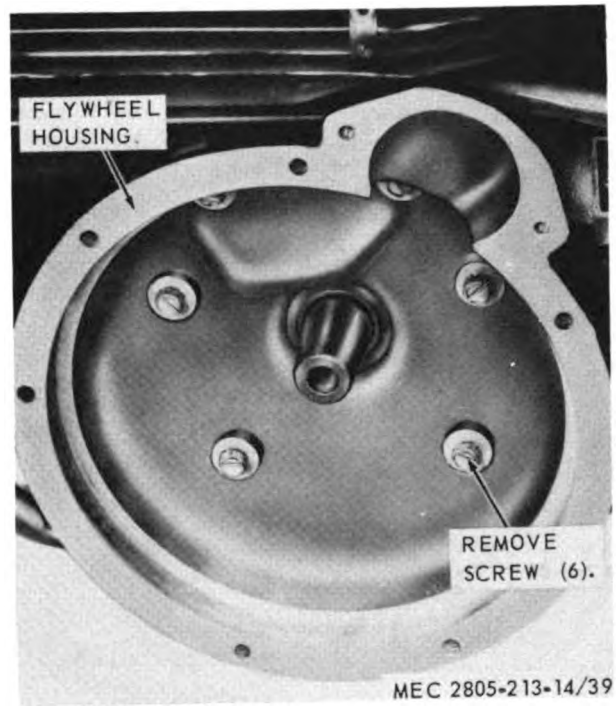


Figure 5–7. Flywheel housing, removal and installation.

(2) Install the left rear shroud (para 3-38).

(3) Install the flywheel and ring gear (para 5-9).

5-11. Rear Oil Seal

a. Removal.

(1) Remove the flywheel housing (para 5-10).

(2) Refer to figure 5-8 and remove the rear oil seal.

b. Cleaning and Inspection.

(1) Clean the rear oil seal with an approved cleaning solvent and dry thoroughly.

(2) Inspect the seal for wear, cracks, and other damage.

(3) Replace a damaged or defective oil seal.

c. Installation.

(1) Refer to figure 5-8 and install the rear oil seal.

(2) Install the flywheel housing (para 5-10).

Section IV. OIL PUMP COVER AND GEARS, OIL PAN AND ADAPTER, OIL STRAINER AND CHECK VALVE, AND OIL PRESSURE REGULATOR VALVE

5-12. General

This section provides the direct suport and general support maintenance instructions that are applicable to the oil pump cover and gear, oil pan and adapter, oil strainer and check valve, and the oil pressure regulator valve.

5-13. Oil Pump Cover and Gears

a. Removal.

(1) Remove the flywheel housing (para 5-10).

(2) Refer to figure 5-9 and remove the oil pump cover and oil pump gears.

b. Cleaning and Inspection.

(1) Clean the oil pump cover and gears with an approved cleaning solvent and dry thoroughly.

(2) Inspect the oil pump cover for scored areas, cracks, and other damage.

(3) Inspect the oil pump gears for scored areas, breakage, and excessive wear. If damage is found to have occurred to one gear, replace both.

(4) Measure the gear-to-cover clearance and the gear tooth clearance. Refer to table 4-1.

(5) Inspect the mounting hardware for damaged threads.

(6) Replace all defective parts.

c. Installation.

(1) Refer to figure 5-9 and install the oil pump gears, and oil pump cover.

(2) Install the flywheel housing (para 5-10).

5-14. Oil Pan, Oil Adapter, Strainer, and Check Valve

a. Removal. Refer to figure 5-10 and remove the oil pan, oil pan adapter, strainer, and check valve.

b. Cleaning and Inspection.

(1) Clean the oil pan, adapter, and strainer with an approved cleaning solvent and dry thoroughly.

(2) Inspect the oil pan, adapter, and strainer, for cracks, distortion, and other damage.

(3) Inspect the mounting hardware for damaged threads, cracks, distortion, and other damage.

(4) Replace all defective parts.

c. Installation. Refer to figure 5-10 and install the oil pan, oil pan adapter, strainer, and check valve.

5-15. Oil Pressure Regulator Valve.

a. Removal.

(1) Remove the left rear shroud (para 3-38).

(2) Refer to figure 5-11 and remove the oil pressure regulator valve.

b. Cleaning and Inspection.

(1) Clean the plug, spring, and valve with an approved cleaning solvent and dry thoroughly.

(2) Inspect the plug for damaged threads.

(3) Inspect the spring for corrosion, cracks, and other damage.

(4) Inspect the valve for a grooved seating surface, distortion, and other damage.

(5) Replace all defective parts.

c. Installation.

(1) Refer to figure 5-11 and install the oil pressure regulator valve.

(2) Install the left rear shroud (para 3-38).

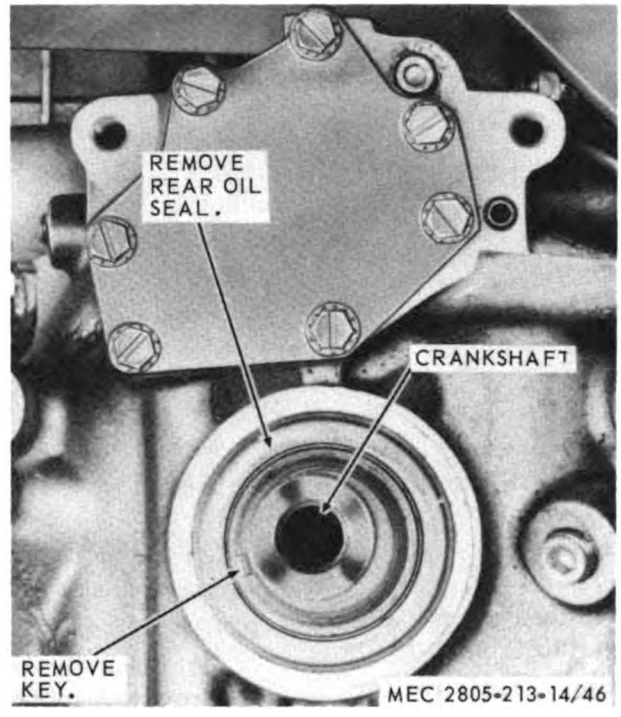


Figure 5–8. Rear oil seal, removal and installation.

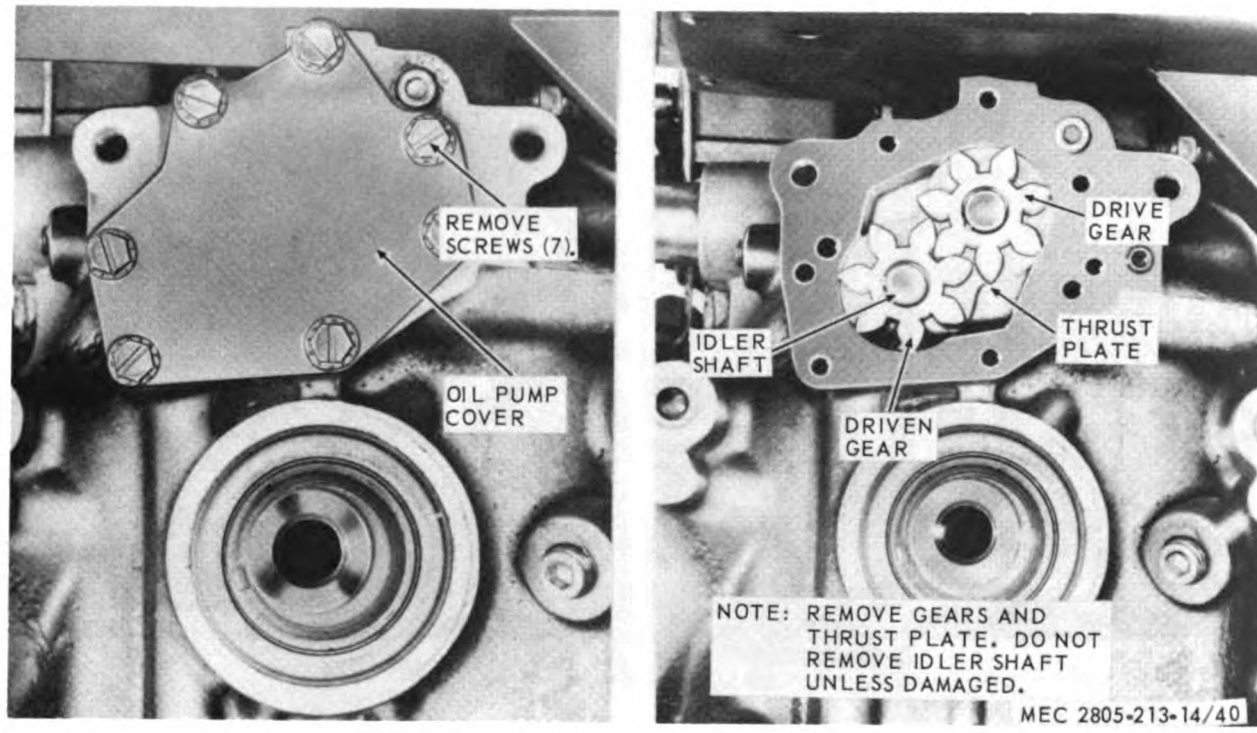


Figure 5–9. Oil pump cover and oil pump gears, removal and installation.

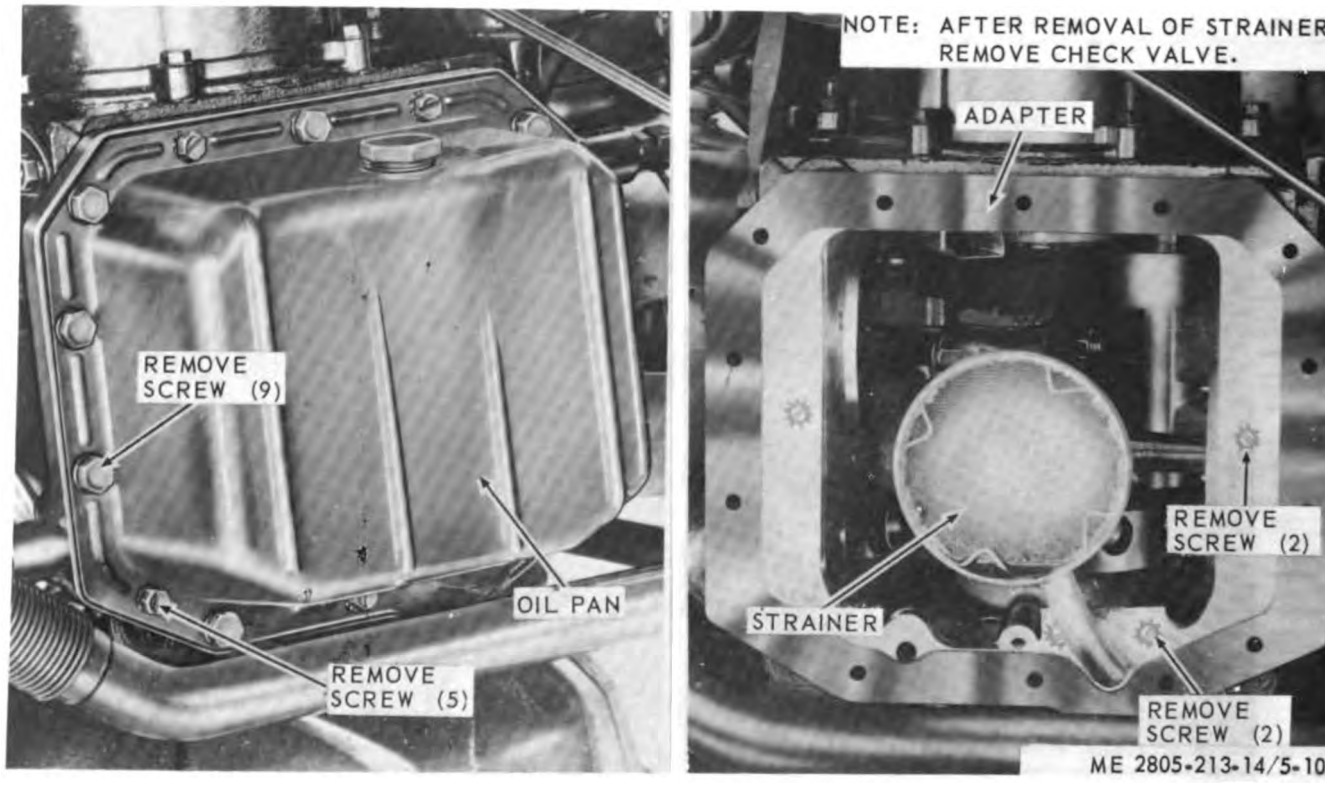


Figure 5–10. Oil pan, oil pan adapter, strainer, and check valve, removal and installation.

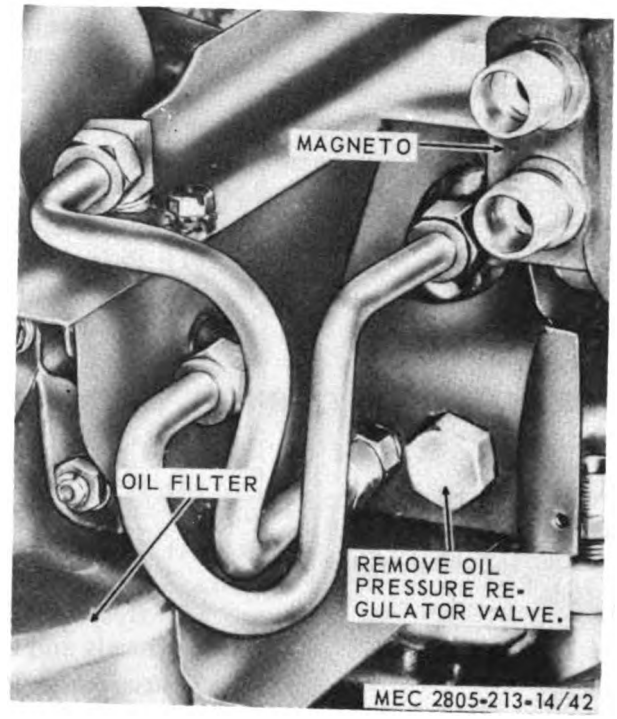


Figure 5–11. Oil pressure regulator valve, removal and installation.

Section V. COMPRESSION TESTING, ROCKER ARMS, PUSHRODS, AND PUSHROD HOUSINGS

5-16. General

This section provides the direct support and general support maintenance instructions that are applicable to compression testing and to the rocker arms, pushrods, and pushrod housings.

5-17. Compression Testing

a. Remove the spark plugs (para 3-24).

b. Make certain the ignition is disconnected and insert a compression gage in one of the spark plug holes.

c. Crank the engine by use of the recoil starter and record the reading indicated by the gage. The correct reading is 110 to 125 psi.

d. Test the pressure at both cylinders as described in *b* and *c* above.

e. If the gage readings are below 100 psi or if the readings differ more than 10 psi between the cylinders, corrective action should be taken.

f. Install the spark plugs (para 3-24).

5-18. Rocker Arms, Pushrods, and Pushrod Housings

a. Removal (Model AO42-KM).

(1) Remove the rocker arm covers (para 3-41).

(2) Refer to figure 5-12 and remove the rocker arms, pushrods, and pushrod housings.

b. Removal (Model AO42-V).

(1) Remove the rocker arms covers (para 3-41).

(2) Refer to figure 5-13 and remove the rocker arms, pushrods, and pushrod housings.

c. Cleaning and Inspection.

(1) Clean all parts thoroughly with an approved cleaning solvent.

(2) Inspect the rocker arms for cracks, excessive wear, and other damage.

(3) Inspect the rocker arm shafts for scored areas, dents, cracks, roughness, and other damage.

(4) Inspect all threaded parts for damaged threads, burs, distortion, and other damage.

(5) Replace all defective parts.

d. Installation (Model AO42-V).

(1) Refer to figure 5-13 and install the rocker arms, pushrods, and pushrod housings.

(2) Install the rocker arm covers (para 3-41).

e. *Installation* (Model AO42-KM).

(1) Refer to figure 5-12 and install the rocker arms, pushrods, and pushrod housings.

(2) Install the rocker arm covers (3-41).

Section VI. CYLINDER HEADS, TAPPETS, CYLINDERS, PISTONS AND CONNECTING RODS

5-19. General

This section provides the direct support and general support maintenance instructions that are applicable to the cylinder heads, tappets, cylinders, pistons, and connecting rods.

5-20. Cylinders Heads and Tappets

a. Removal (Model AO42-KM).

(1) Remove the spark plugs (para 3-24).

(2) Remove the left front, left rear, right front, and right rear shrouds (para 3-38).

(3) Remove the exhaust manifolds (para 3-26).

(4) Remove the intake manifold and elbows (para 3-20).

(5) Refer to figure 5-14 and remove the cylinder heads and tappets.

b. Removal (Model AO42-V).

(1) Remove the spark plugs (para 3-24).

(2) Remove the left front, left rear, right front and right rear shrouds (para 3-38).

(3) Remove the exhaust manifolds (para 3-26).

(4) Remove the intake manifold and elbows (para 3-20).

(5) Refer to figure 5-15 and remove the cylinder heads and tappets.

c. Disassembly. Refer to figure 5-16 and disassemble the cylinder heads.

d. Cleaning and Inspection.

(1) Clean the cylinder heads and all components part with an approved cleaning solvent and dry thoroughly. Remove all carbon deposits.

(2) Inspect the cylinder heads for cracks, breaks, evidence of burning or gas cutting, and for burned valve seats.

(3) Inspect the valve springs for cracks, rust, distortion, crystalization, and fatigue.

(4) Inspect the valves for warpage, excessive wear, and burned or worn faces.

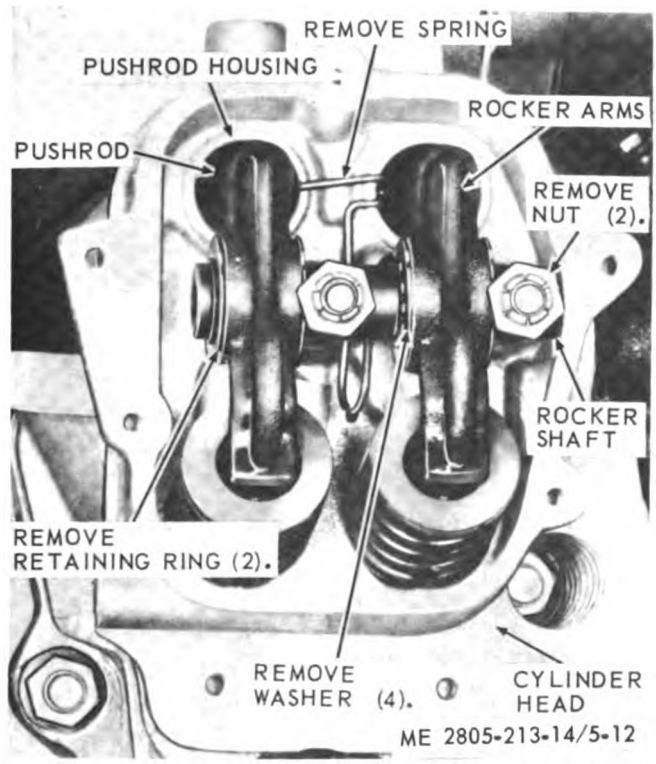


Figure 5-12. Rocker arms, pushrods, and pushrod housings, removal and installation (Model AO42-KM).

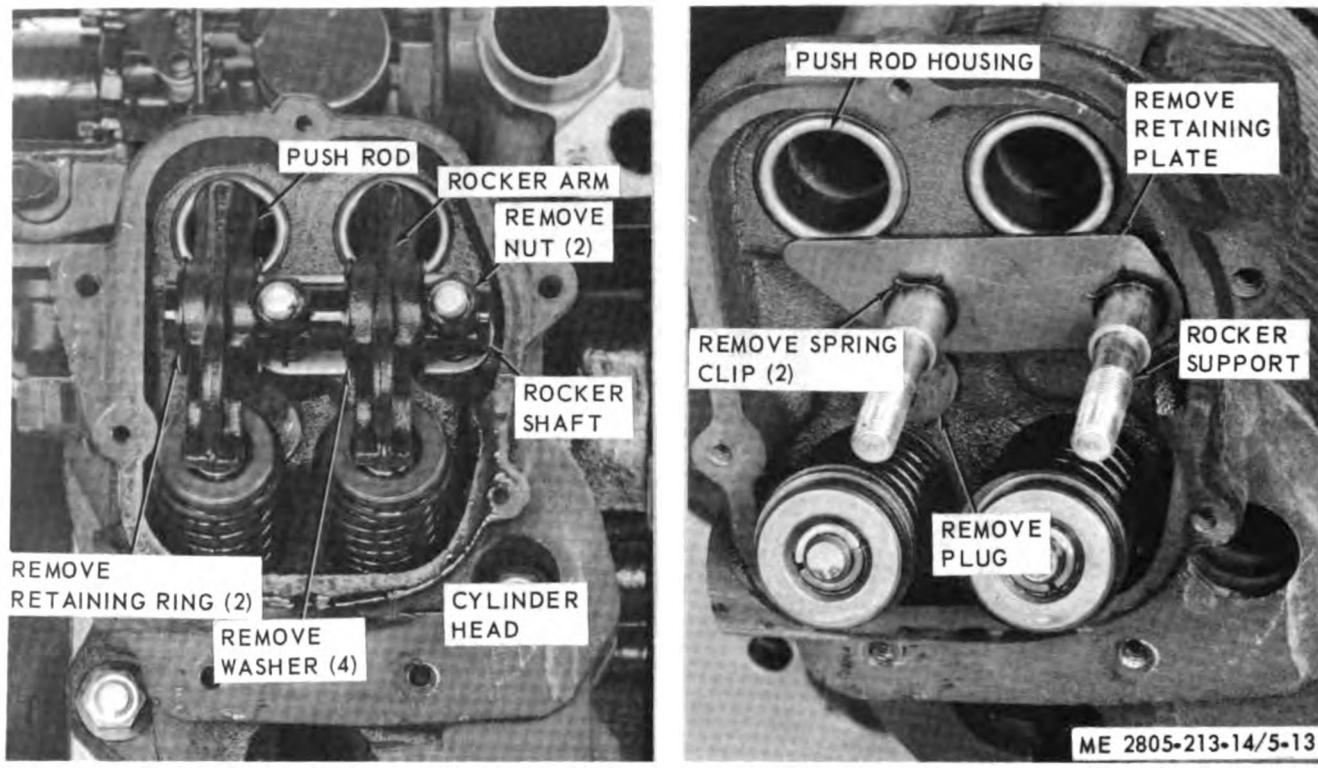


Figure 5–13. Rocker arms pushrods, and pushrod housing, removal and installation (Model AO42–V).

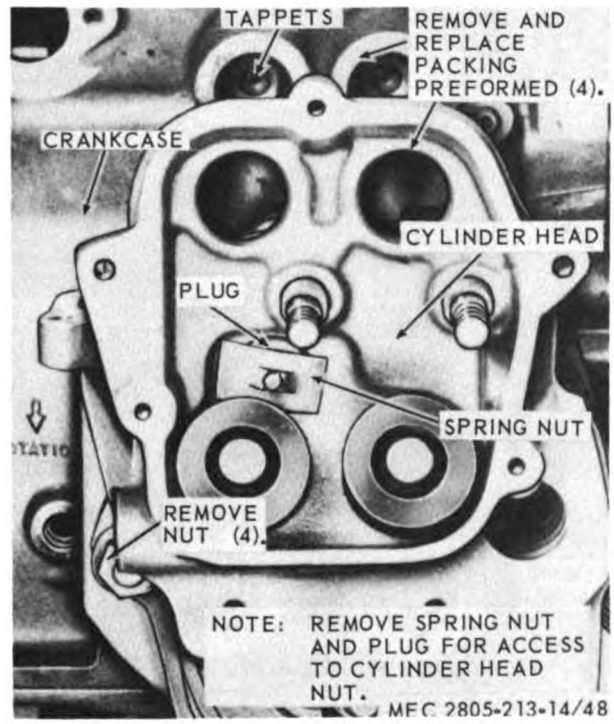


Figure 5-14. Cylinder heads and tappets, removal and installation (Model AO42-KM).

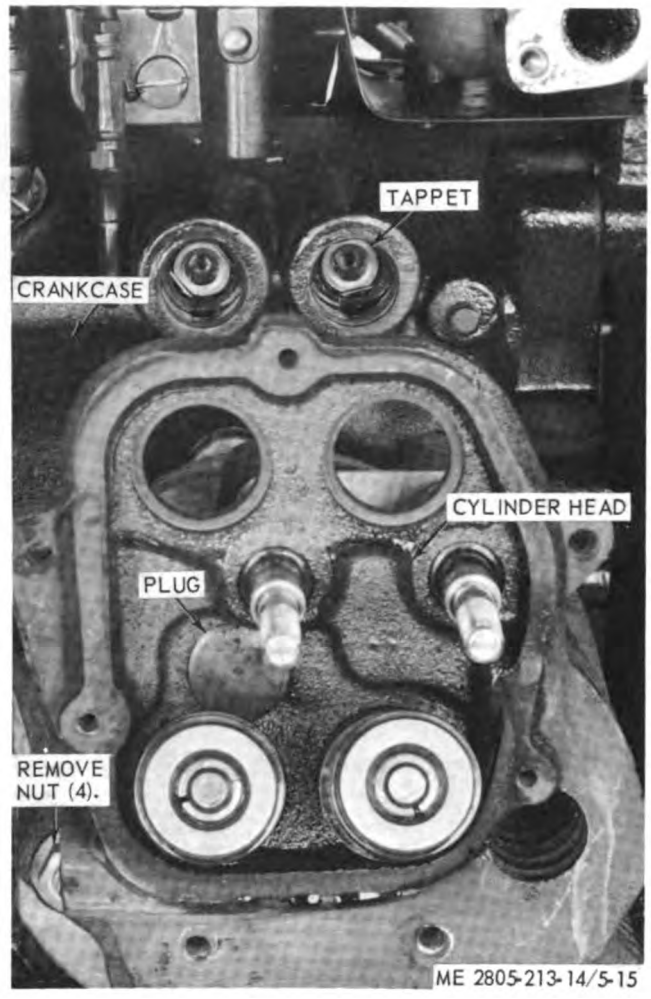
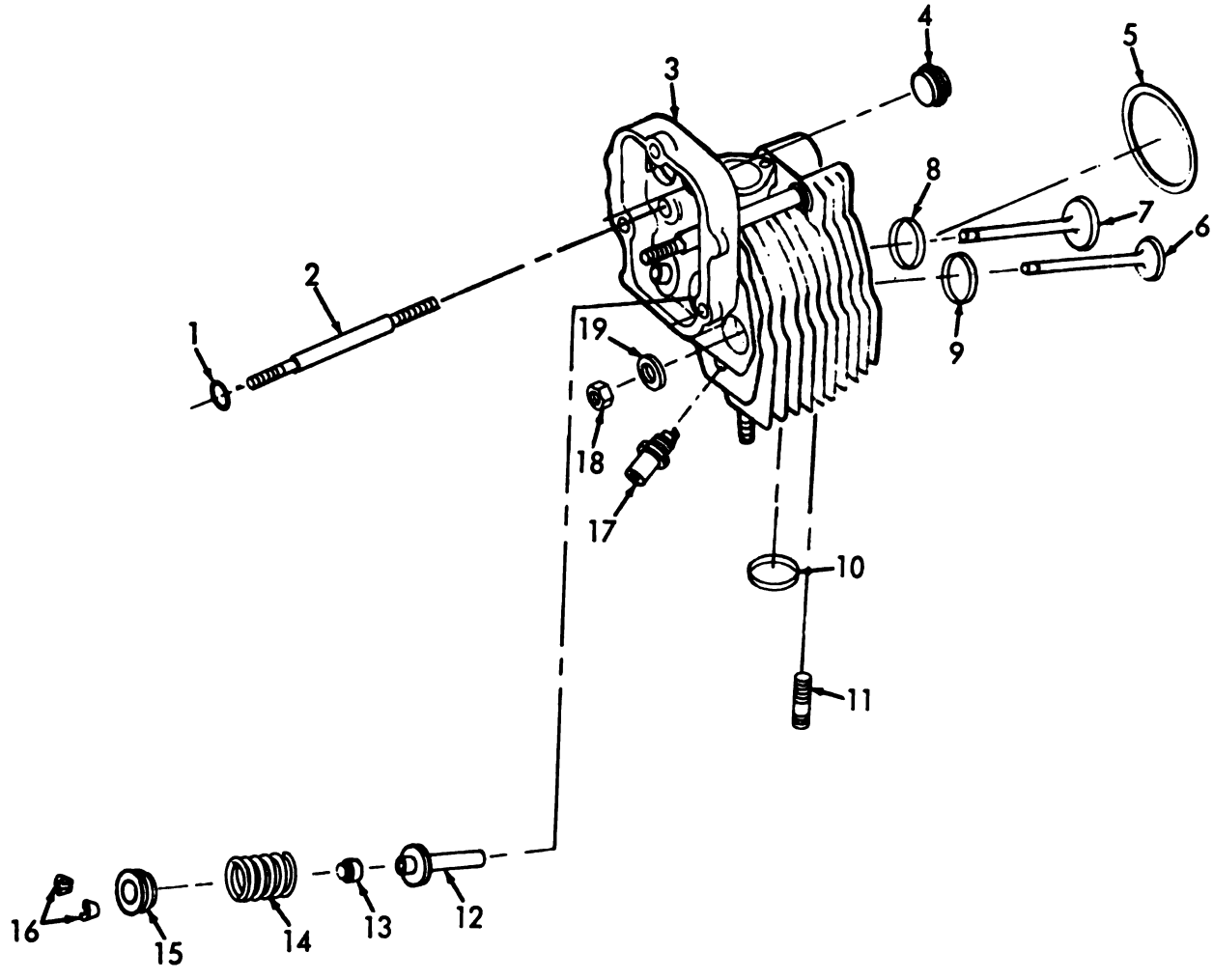


Figure 5–15. Cylinder heads and tappets, removal and installation (Model AO42–V).



ME 2805-213-14/5-16

1	O-ring	11	Stud
2	Stud	12	Guide
3	Head	13	Seal
4	Plug	14	Spring
5	Gasket	15	Cap
6	Valve	16	Retainer
7	Valve	17	Plug
8	Insert	18	Nut
9	Insert	19	Washer
10	Insert		

Figure 5-16. Cylinder head, disassembly and reassembly.

(5) Inspect the tappets for pits, scored surfaces, and excessive wear. Inspect the cam following surface for brinelling.

(6) Measure the valve stems and valve guides. The correct diameter is shown in Table 4-1.

(7) Reface the valve seats in the cylinder heads and those of the intake and exhaust valves. Refer to table 4-1 for the correct angles and dimensions. After refacing the valves and valve seats, lap each valve in its individual seat in the cylinder head and then remove all lapping compound.

(8) Replace all valve stem seals.

(9) Replace all defective parts.

Note. Valve seats and guides can only be replaced by heating the cylinder head to 475-500° F. and by cooling the valve seats and guides to −65° F.

e. Reassembly. Refer to figure 5-16 and reassemble the cylinder heads.

f. Installation (Model AO42-V).

(1) Refer to figure 5-15 and install the cylinder heads and tappets.

(2) Install the intake manifold and elbow (para 3-20).

(3) Install the exhaust manifold (para 3-26).

(4) Install the left front, left rear, right front, and right rear shrouds (para 3-38).

(5) Install the spark plugs (para 3-24).

g. Installation (Model AO42-KM).

(1) Refer to figure 5-14 and install the cylinder heads and tappets.

(2) Install the intake manifold and elbows (para 3-20).

(3) Install the exhaust manifold (para 3-26).

(4) Install the left front, left rear, right front and right rear shrouds(para 3-38).

5-21. Cylinders, Pistons, and Connecting Rods

a. Removal.

(1) Remove the cylinder heads and tappets (para 5-20).

(2) Remove the oil pan (para 5-14).

(3) Refer to figure 5-17 and remove the cylinders, pistons, and connecting rods.

b. Disassembly. Refer to figure 5-18 and disassemble the piston and connecting rods.

c. Cleaning, Inspection, and Repair.

(1) Clean all parts with an approved cleaning solvent and dry thoroughly.

(2) Inspect each cylinder for cracks, breaks, and scored areas. Measure the inside diameter at the top, middle, and bottom. Take 2 measurements at each location with 1 measurement at 90° with respect to the other. Refer to table 4-1 for the correct dimensions.

(3) Inspect each piston for cracks, breaks, and scored areas. Measure the skirt diameter at the top and bottom of the piston. Take measurements on the sides of the pistons opposite the piston pin hole. Refer to table 4-1 for the correct dimensions. Clean the ring grooves and check for proper dimensions. Refer to table 4-1.

(4) Inspect each connecting rod and cap and the connecting rod bolts for cracks and other damage. Measure the inside diameter of the piston pin bushing. Refer to table 4-1 for the correct dimensions. Assemble the cap to the connecting rod and torque tighten the connecting rod bolt nuts to 180-200 in.-lb. With the cap assembled, measure the connecting rod bearing bore diameter. Refer to table 4-1 for the correct dimensions.

(5) Replace all defective parts.

d. Reassembly. Refer to figure 5-18 and reassemble the pistons and connecting rods.

e. Installation.

(1) Refer to figure 5-17 and install the cylinders, pistons, and connecting rods.

(2) Install the oil pan (para 5-14).

(3) Install the cylinder heads and tappets (para 5-20).

Section VII. CAMSHAFT, GEAR, AND BEARING, CRANKSHAFT AND MAIN BEARINGS, AND CRANKCASE

5-22. General

This section provides the direct support and general support maintenance instructions that are applicable to the camshaft, gear, and bearing crankshaft and main bearings, and the crankcase.

5-23. Camshaft, Camshaft Gear, and Camshaft Bearing

a. Removal.

(1) Remove the fuel pump (para 3-17).

(2) Remove the oil pump cover and gea (para 5-13).

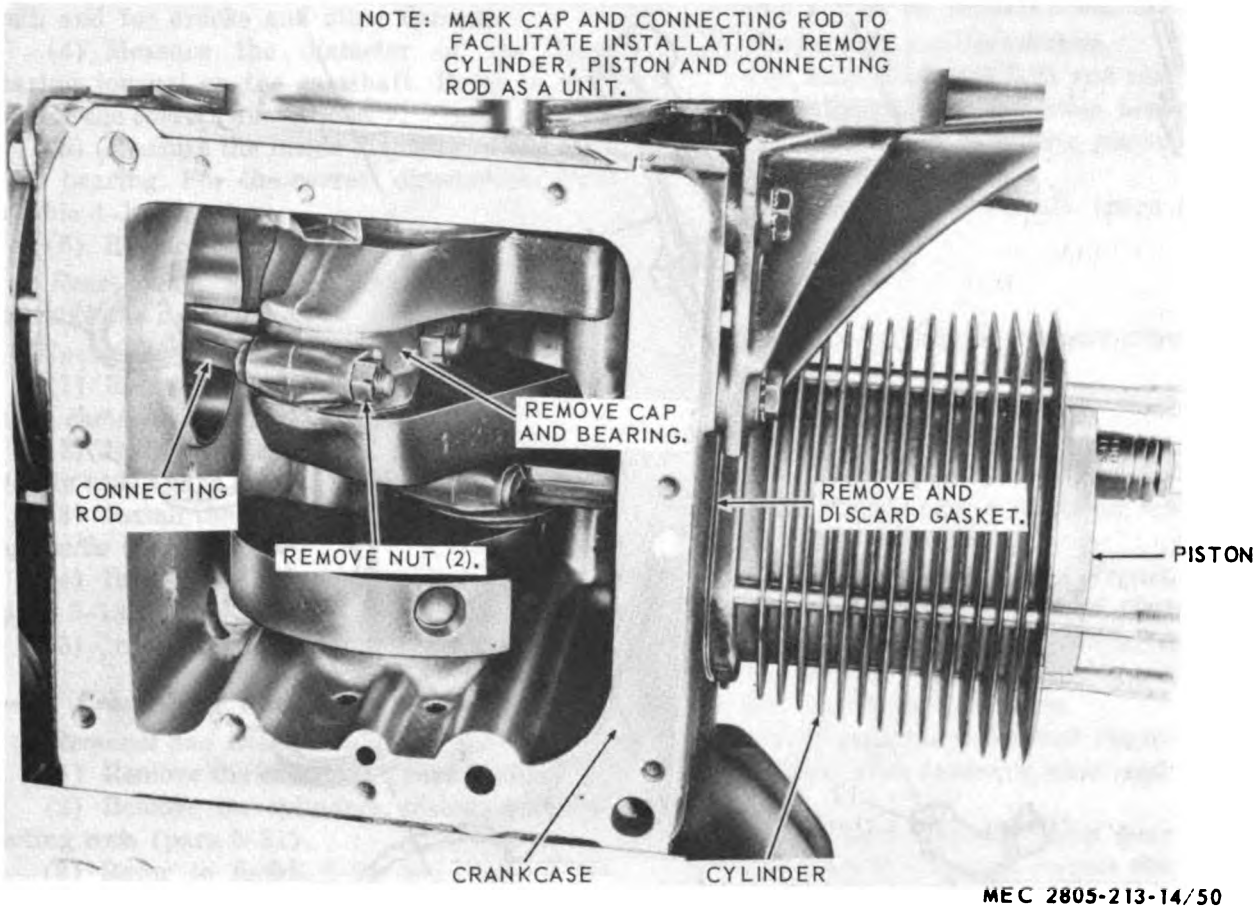
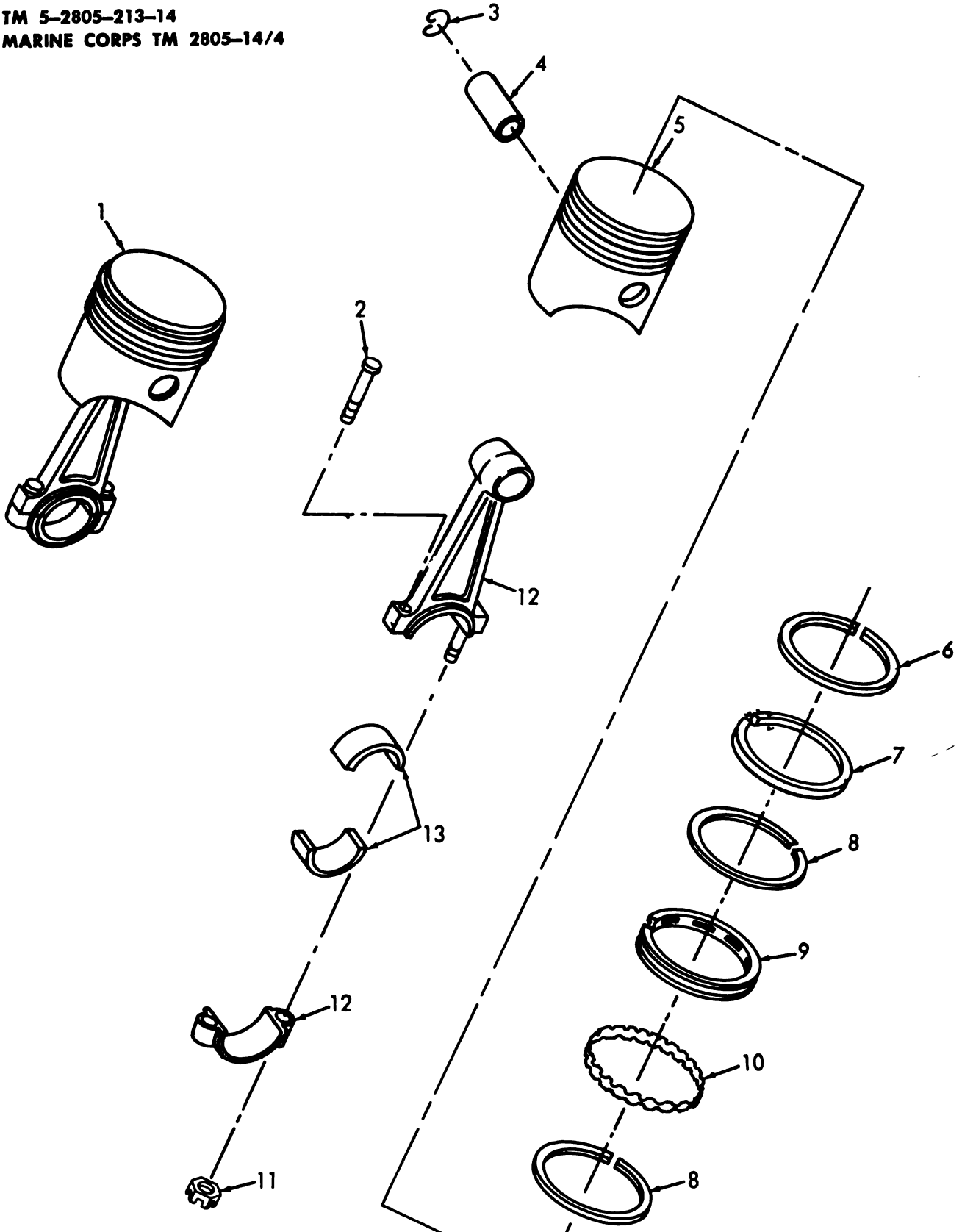


Figure 5–17. Cylinders, pistons. and connecting rods, removal and installation.



1 Piston and connecting rod assembly
2 Bolt, 5/16-24 (2 rqr)
3 Ring (2 rqr)
4 Pin
5 Piston
6 Spacer
7 Ring (2 rqr)
8 Ring (2 rqr)
9 Spacer
10 Expander
11 Nut, 5/16-24 (2 rqr)
12 Connecting rod assembly
13 Bearing (2 rqr)

Figure 5-18. Pistons and connecting rods, disassembly and reassembly.

(3) Remove the timing gear cover and crankcase baffle (para 5-5).

(4) Remove the cylinders, pistons, and connecting rods (para 5-21).

(5) Refer to figure 5-19 and remove the camshaft, camshaft gear, and bearing.

b. Disassembly. Refer to figure 5-20 and disassemble the camshaft.

c. Cleaning, Inspection, and Repair.

(1) Clean all parts with an approved cleaning solvent and dry thoroughly.

(2) Inspect the camshaft for cracks, pitting, and wear.

(3) Inspect the gear for broken or worn teeth and for cracks and other damage.

(4) Measure the diameter of the front bearing journal on the camshaft. Refer to table 4-1 for the correct dimensions.

(5) Measure the inside diameter of the camshaft bearing. For the correct dimensions, refer to table 4-1.

(6) Replace defective parts.

d. Reassembly. Refer to figure 5-20 and reassemble the camshaft.

e. Installation.

(1) Refer to figure 5-19 and install the camshaft, camshaft gear, and bearing.

(2) Install the cylinders, pistons, and connecting rods (para 5-21).

(3) Install the timing gear cover and crankcase baffle (para 5-5).

(4) Install the oil pump cover and gears (para 5-13).

(5) Install the fuel pump (para 3-17).

5-24. Crankshaft and Main Bearings

a. Removal and Disassembly.

(1) Remove the camshaft (para 5-23).

(2) Remove the cylinders, pistons and connecting rods (para 5-21).

(3) Refer to figure 5-21 and remove and disassemble the crankshaft and main bearings.

b. Cleaning, Inspection, and Repair.

(1) Clean all part swith an approved cleaning solvent and dry with compressed air.

(2) Inspect the crankshaft for cracks, scored journals, and other damage.

(3) Measure the main bearings and connecting rod bearings journals. Refer to table 4-1 for the correct dimensions.

(4) Inspect the crankshaft gear for cracks, pits, chipped teeth, wear, and other damage.

(5) Inspect the front main bearing diaphragm for cracks and other damage. Inspect the front and rear of the diaphragm for signs of wear at the outside of the main bearing bore.

(6) Measure the inside diameter of the main bearings. Refer to table 4-1 for the correct dimensions.

(7) Assemble the front main bearing as described in *c*, below, and measure the crankshaft end clearance between the crankshaft and diaphragm. Refer to table 4-1 for the correct clearance.

(8) Repair or replace all defective parts.

c. Reassembly and Installation.

(1) Refer to figure 5-21 and reassemble and install the crankshaft and main bearings.

(2) Install the cylinders, pistons, and connecting rods (para 5-21).

(3) Install the camshaft (para 5-23).

5-25. Crankcase

a. Removal.

(1) Remove the oil pressure regulator valve (para 5-15).

(2) Remove the flywheel housing (para 5-10).

(3) Remove the crankshaft (para 5-24)

b. Disassembly. Refer to figure 5-22 and disassemble the crankcase.

c. Cleaning, Inspection, and Repair.

(1) Clean all parts with an approved cleaning solvent and blow dry with compressed air.

(2) Inspect the crankcase for cracks, breaks, and worn or damaged threads.

(3) Inspect the interior of the oil pump gear counterbores for excessive wear and for scored areas.

(4) Measure the oil pump gear clearance. Refer to table 4-1 for the correct dimensions.

(5) Replace all defective parts.

d. Reassembly. Refer to figure 5-22 and reassemble the crankcase.

e. Installation.

(1) Install the crankshaft (para 5-24).

(2) Install the flywheel housing (para 5-10).

(3) Install the oil pressure regulator valve (para 5-15.)

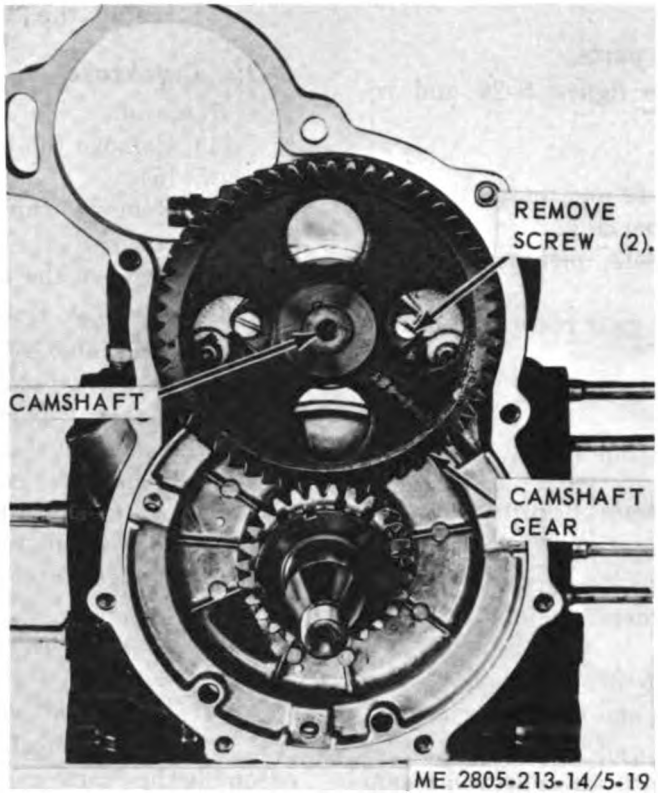
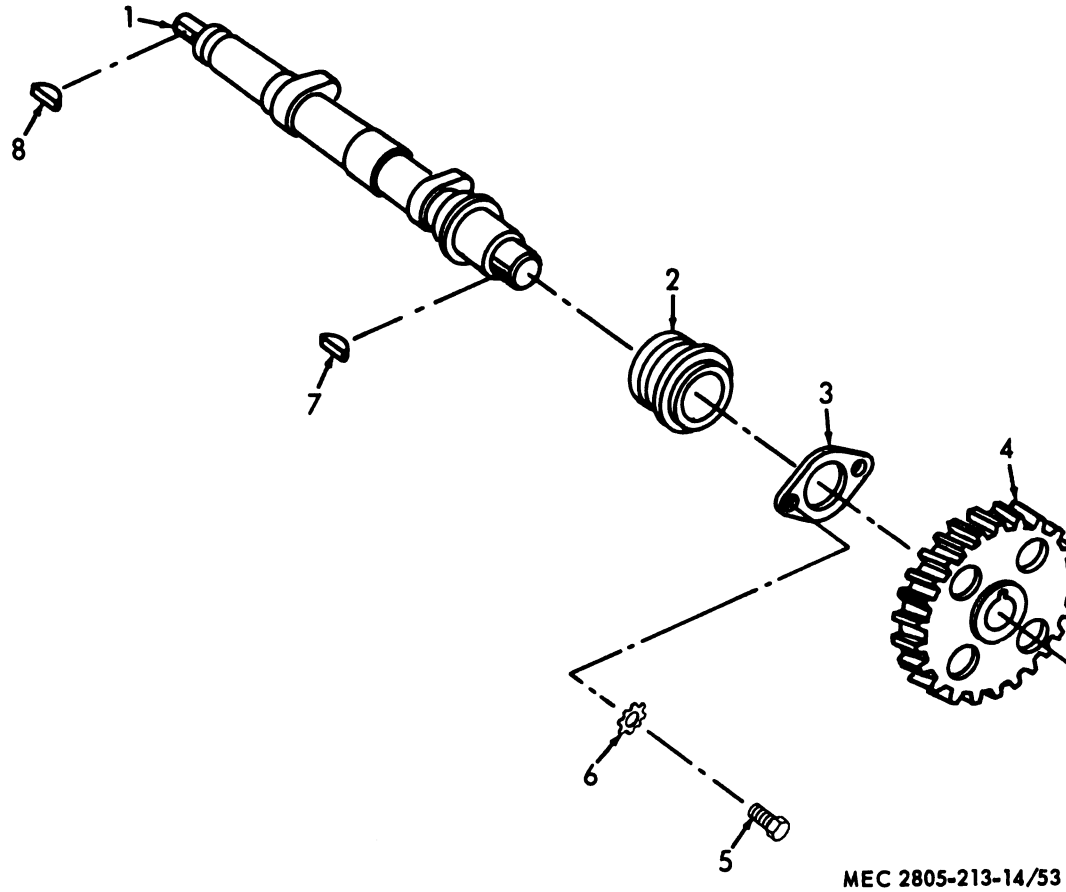
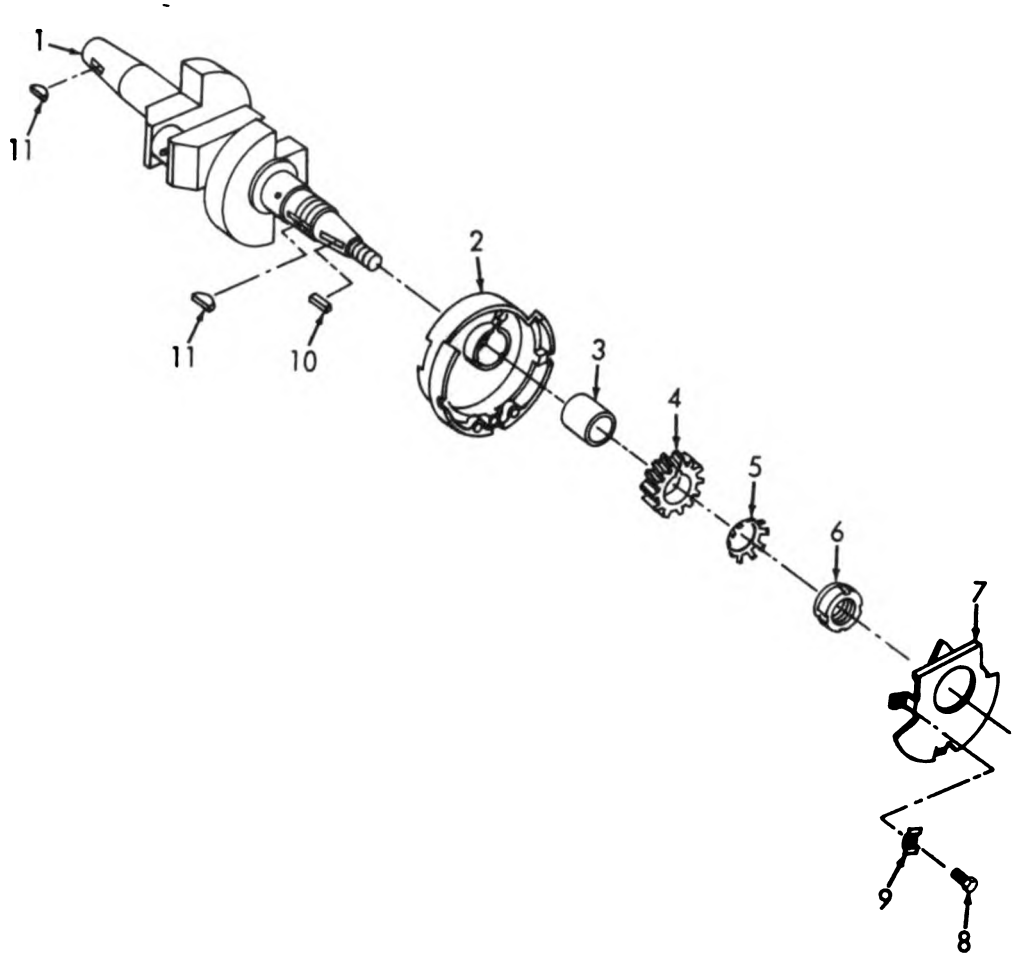


Figure 5-19. Camshaft, camshaft gear, and bearing, removal and installation.



1 Camshaft
2 Bearing
3 Retaining plate
4 Gear
5 Screw (2 rqr)
6 Lockwasher (2 rqr)
7 Key
8 Key

Figure 5–20. Camshaft, disassembly and reassembly.



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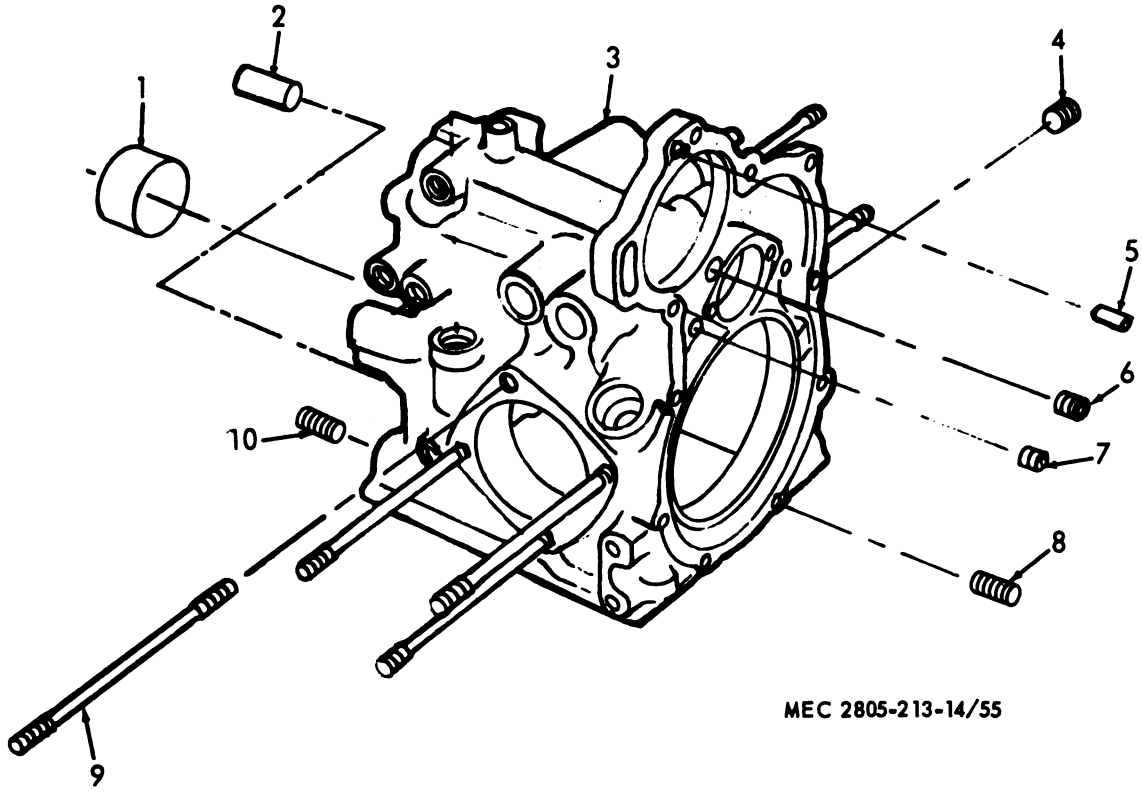
1 Crankshaft
2 Diaphram
3 Bushing
4 Gear
5 Washer
6 Nut
7 Baffle
8 Screw
9 Lockplate
10 Key
11 Key (2 rqr)

Figure 5–21. Crankshaft and main bearings, removal, disassembly, reassembly, and installation.



1 Bushing
2 Shaft
3 Crankcase assembly
4 Plug
5 Pin
6 Insert
7 Plug
8 Insert (2)
9 Stud
10 Plug

Figure 5–22. Crankcase, disassembly and reassembly.

APPENDIX A
REFERENCES

A-Fire Protection

TB 5-4200-200-10	Hand Portable Fire Extinguishers for Army Users.

A-2. Lubrication

C9100 IL	Fuels, Lubricants, Oils, and Waxes.
LO 5-2805-213-12	Lubrication Order, Engine, Gasoline: 14 HP (Military Standard Model AO42).

A-3. Painting

TM 9-213	Painting Instructions for Field Use.

A-4. Radio Suppression

TM 11-483	Radio Interference Suppression.

A-5. Maintenance

TM 5-2805-213-24P	Organizational, Direct and General Support Maintenance Repair Parts and Special Tools List: Engine, Gasoline, 14 HP (Military Standard Model AO42).
TM 38-750	Army Equipment Record Procedures.
TM 9-2320-213-10	Operator's Manual for: Truck, Platform, Utility: ½-Ton 4 × 4, M274 (2320-049-4804) and M274A1 (2320-6373).

A-6. Shipment and Storage

TM 740-90-1	Administrative Storage of Equipment.

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III not applicable.

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

B-2. Explanation of Columns in Section II

a. Group Number, Column (1). The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes (obtained from TB 750-93-1, Functional Grouping Codes) are listed on the MAC in the appropriate numerical sequence. These indexes normally are set up in accordance with their function and proximity to each other.

b. Functional Group, Column (2). This column contains a brief description of the components of each functional group.

c. Maintenance Functions, Column (3). This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows:

C—Operator or crew
O—Organizational maintenance
F—Direct support maintenance
H—General support maintenance
D—Depot maintenance

The maintenance functions are defined as follows:

A—INSPECT.
To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

B—TEST.
To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

C—SERVICE.
To clean, to preserve, to charge, to paint, and to add fuel, lubricants, cooling agents, and air.

D—ADJUST.
To rectify to the extent necessary to bring into proper operating range.

E—ALIGN.
To adjust specified variable elements of an item to bring to optimum performance.

F—CALIBRATE.
To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

G—INSTALL.
To set up for use in an operational environment such as an emplacement, site, or vehicle.

H—REPLACE.
To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

I—REPAIR.
To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

J—OVERHAUL.
To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.

K—REBUILD.
To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

d. Tools and Equipment, Column (4). This column is provided for referencing by code the special tools and test equipment (sec III) required to perform the maintenance functions (sec II).

e. Remarks, Column (5). This column is provided for referencing by code the remarks (sec IV) pertinent to the maintenance functions.

B–3. Explanation of Columns in Section IV

a. Reference Code. This column consists of two letters separated by a dash, both of which are references to sec II. The first letter references column 5 and the second letter references a maintenance function, column 3, A through K.

b. Remarks. This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) Maintenance functions											(4)	(5)
Group No.	Functional group	A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	Tools and equipment	Remarks
01	ENGINE													
0100	Engine Assembly	C	O	O					F	F	H			A
0101	Crankcase, Block Cylinder Head													
	Cylinder assembly	H							H	H				B
	Crankcase assembly	F		F					H		H			C
	Head assembly, cylinder	F		F					F	F				D
0102	Crankshaft	H							H	H				E
	Pulley, fan drive	O							O					
0103	Flywheel Assembly:													
	Flywheel assembly	F							F	H				
	Housing assembly, flywheel	F							F	H				F
0104	Pistons, Connecting Rods	H				H			H	H				G
0105	Valves Camshafts and Timing System:													
	Cover, rocker arm	O							O					
	Camshaft assembly	H							H					
	Gears, timing	H							H					H
	Packing, push rod housing	O							F					
	Rocker and shaft assembly	F							F					
	valves.	F			F				F	F				I
0106	Engine Lubrication System:													
	Filter assembly, oil	C		C					O					
	Gear, oil pump	F							F					
	Oil pan, w/screen and Check valve.	F							F					
	Line assembly	O							O					
	Reed, air breather	O		O					O					
	Valve, oil pressure regulator	F							F					
	Valve assemblies check and air inlet shutoff.	O							O					
0107	Engine Starting System:													
	Cable, internal	F							F					
	Starter assembly	O						O	O	F				
0108	Manifold	O							O					
02	CLUTCH													
0200	Clutch Assembly:													
	Disc assembly	F							F					
	Plate assembly, pressure	F							F					
03	FUEL SYSTEM:													
0301	Carburetor													
	Carburetor assembly	O			O				O					

Section II. MAINTENANCE ALLOCATION CHART—Continued

(1) Group No.	(2) Functional group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
0302	Fuel Pump													
	Pump assembly, fuel	C							O					
0304	Air Cleaner	C		O					O					
0306	Tanks, Lines, and Fittings:													
	Line assembly, fuel	C							O					
	Valve, shutoff	O							O					
0308	Engine Speed Governor and Controls:													
	Governor assembly	O		O					O					
0309	Fuel Filters	C		C					O					
05	COOLING SYSTEM													
0502	Shrouds	O							O					
0505	Fan Assembly	O							O	O				
	Belt, V	C							O					
06	ELECTRICAL SYSTEM													
0605	Ignition Components													
	Cable, ignition	O	O						O					
	Magneto assembly	O			O				O	O				J
	Spark plug	O	O		O				O					
22	BODY CHASSIS OR HULL, AND ACCESSORY ITEMS													
2210	Data Plates													
	Plate, identification								O					
	Plate, data								F					

Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS

No special tools required.

Section IV. REMARKS

Reference code	*Remarks*
A—B	Test includes compression and engine operation.
B—I	Repair includes, Hone cylinder only.
C—J	Includes micrometer measurements.
D—C	Service includes cleaning carbon from combustion chamber.
D—I	Repair includes refacing as necessary.
E—H	Includes micrometer measurements.
F—I	Repair includes replacing ring gear.
G—H	Includes measurements of ring gap and side clearance.
H—H	Includes checking backlash with dial indicator.
I—I	Repair of valves and inserts includes refacing only.
J—I	Repair consists of replacing point set and condenser.

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By Order of the Secretaries of the Army and the Navy:

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General, United States Army,
Chief of Staff.

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