

# FORD



## Service Manual

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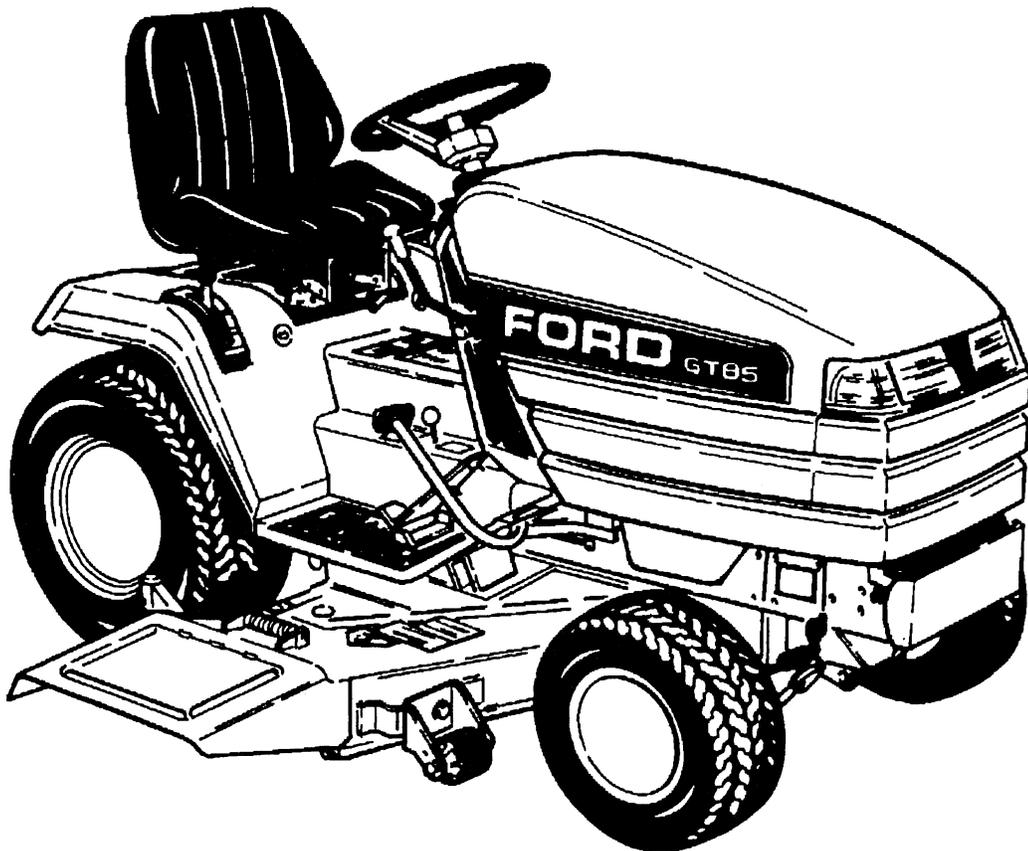
Lawn and Garden Tractor  
GT65 and GT75 Diesel  
GT85 and GT95 Gasoline

Section 1 – Engine Systems  
– Kohler Engine Service Manual

Section 2 – Fuel Systems

Vol. 1

40006540



# FOREWORD

This manual provides information for the proper servicing and overhaul of the Ford GT tractor models and is an essential publication for all service personnel carrying out repairs and maintenance procedures.

The Manual is divided into ten Sections, each sub-divided into Chapters. Each Chapter contains information on general operating principles, detailed inspection and overhaul and, where applicable, troubleshooting, special tools and specifications.

The material contained in this Manual was correct at the time of going to print but Ford New Holland, Inc. Policy is one of continuous improvement and the right to change prices, specifications, equipment or design at anytime without notice is reserved. All data in this Manual is subject to production variations, so overall dimensions should be considered as approximate only and the illustrations do not necessarily depict the unit to standard build specification.

FORD NEW HOLLAND, INC.

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# SECTION 1

## ENGINE SYSTEMS

### DIESEL ENGINE (GT65 AND GT75)

### ENGINE AND LUBRICATION SYSTEM

#### DESCRIPTION AND OPERATION



FIGURE 1-1

GT Diesel Tractor (Ford GT65 Shown)

This chapter describes the overhaul and repair of the Ford GT65 and GT75 diesel engine.

The Ford GT65 and GT75 tractors, Figure 1-1, are equipped with a 3-cylinder in-line, four cycle, liquid cooled, overhead valve engine. The GT65 and GT75 engines are identified by code number E643 (GT65) and E673 (GT75). The code number is cast into the left side of the block and readily accessible for reference.

The GT65 engine has a 37.6 cu. in. (617 cc) displacement with a compression ratio of 23:1.

The GT75 engine has a 41.2 cu. in. (676 cc) displacement with a compression ratio of 24:1.

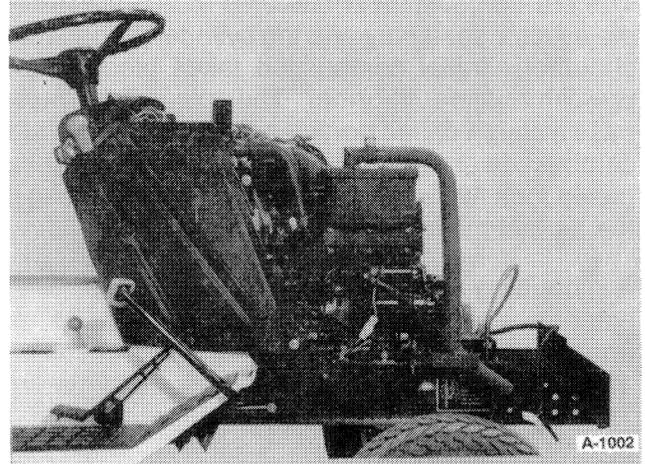


FIGURE 1-2

GT Diesel Engine

The engine is positioned in the tractor chassis in reverse position, i.e., with the engine (fan, radiator, water pump, etc.) facing the rear of the tractor as shown, Figure 1-2.

All reference to left, right, front and rear in this repair manual is made as follows:

**WHOLE TRACTOR:** All reference to the tractor are as viewed by the operator traveling in the forward direction.

**ENGINE ONLY (Removed From Tractor):** All reference to the engine when removed from the chassis is consistent with normal engine repair procedures. That is, with the water pump at the front and the flywheel at the rear of the engine.

## **CYLINDER HEAD AND VALVE TRAIN COMPONENTS**

The cylinder head assembly includes the intake and exhaust valve assemblies, rocker shaft assembly and the pre-combustion chambers.

The intake manifold is incorporated into the valve cover assembly.

The exhaust manifold is an integral part of the muffler assembly.

The pre-combustion chamber is located between the injector assembly and the cylinder combustion chamber. Initial combustion takes place in the pre-combustion chamber. The expanding gases pass through drilled ports leading into the cylinder combustion area forming a swirl pattern of burning gases for a more complete and efficient burning of the air fuel mixture.

A glow plug located inside of the cylinder head extends into the pre-combustion area. When energized, the glow plug heats the incoming air/fuel mixture which provides improved starting for cold weather conditions.

## **CYLINDER BLOCK ASSEMBLY**

The cylinder block assembly contains the pistons, connecting rods, crankshaft, timing gears and engine oil pump.

The crankshaft is supported by four main bearings. The front bearing is a full circle bearing located in the front casting wall of the engine block.

The second, third and fourth main bearings are split liners located in bearing holders bolted to the engine block.

The fourth main bearing holder is made of cast aluminum and has thrust bearing surfaces for controlling the crankshaft end play.

The camshaft assembly is supported on one roller bearing located at the center and two ball bearings located one on each end of the engine block.

The pistons are of three ring design consisting of two compression and one oil control ring.

The oil control ring uses a coil spring type expander.

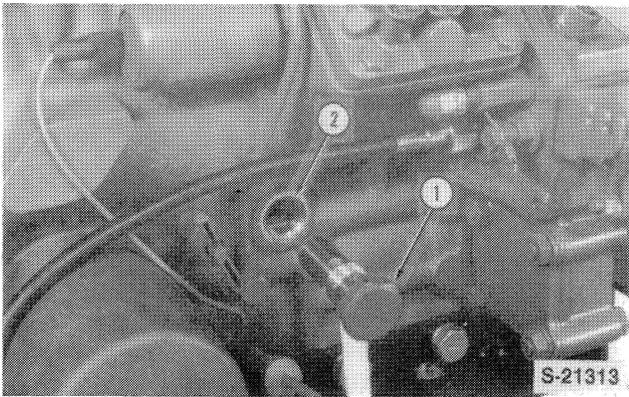


FIGURE 1-3

## Engine Oil Relief Valve Location

- 1 Relief Valve
- 2 Main Oil Gallery

## LUBRICATION SYSTEM

The gerotor type oil pump is an integral part of the idler timing gear and is driven by the crankshaft gear. It is located in the front of the engine block and to the left of the crankshaft as viewed from the front of the engine.

## OIL FLOW

Engine lubrication oil is picked up from the crankcase sump through a screen by the pump intake tube and drawn into a lower side drilling in the engine block to the oil pump. Oil pressurized by the pump then flows through passages in the block, past the relief valve, through the oil filter and returns to the main oil gallery in the block in the area of the drilled bolt located on the side of the block. Oil flow in the main oil gallery extends to the

four main bearing journals through passages in the crankshaft to the three connecting rod bearing journals. The remaining portion of the oil flow is directed through the external tube to the cylinder head. Oil flows from the external tube into a passage in the cylinder head to the front rocker shaft pedestal. The oil flows upward into the pedestal, through a roll pin that extends into the rocker shaft.

The roll pin serves to hold the rocker shaft in a fixed position and it also acts as a restrictor to maintain adequate oil pressure in the main oil gallery.

Oil seepage through the clearance between the rocker arms and the shaft overflows into the valve cover area and lubricates the valve stems, push rods and tappets. The relief valve, 1, Figure 1-3, is mounted in the side of the engine block and intersects the main oil gallery. When the oil pressure exceeds the rated pressure, oil is by-passed through the relief valve directly to sump through a passage in the engine block.

The cylinder walls, pistons and piston pins are splash lubricated by the crankshaft.

## ENGINE OIL FILTER

Because engine oil becomes contaminated with dust, carbon particles, metal and sludge it is first directed through a filter before entering the lubrication system. The filter is a full flow type, whereby all the oil from the pump is routed through the filter. To protect the engine from loss of lubrication in the event of a plugged or restricted filter, a relief valve in the filter opens and permits unfiltered oil to flow through the system to maintain engine lubrication.

## ENGINE OVERHAUL

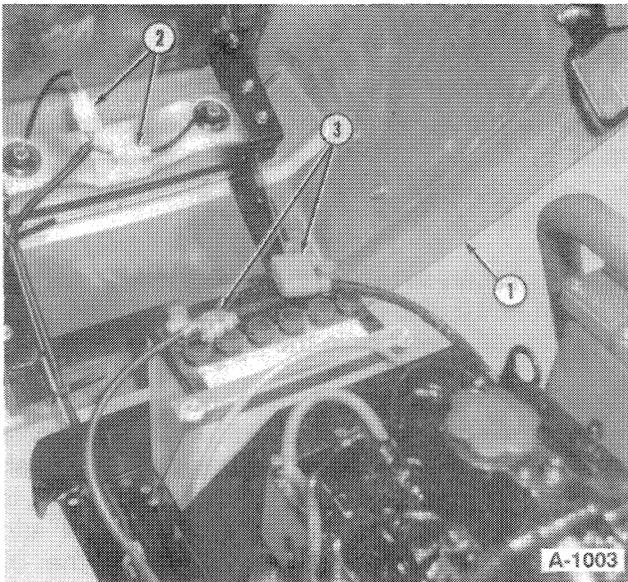


FIGURE 1-4

### Engine Hood Removal

- 1 Hood
- 2 Headlight Connectors
- 3 Battery Cables

### ENGINE REMOVAL

1. Raise the hood, 1, and disconnect the headlight wiring connector, Figure 1-4.
2. Remove the two bolts of hood pivot pins R.H. and L.H. and remove the hood from the tractor.
3. Drain the coolant from the radiator and engine block, Figure 1-5.
4. Disconnect the battery cables, 3, Figure 1-4 from the battery terminal posts.



**WARNING: DISCONNECT THE NEGATIVE CABLE AT THE BEGINNING.**

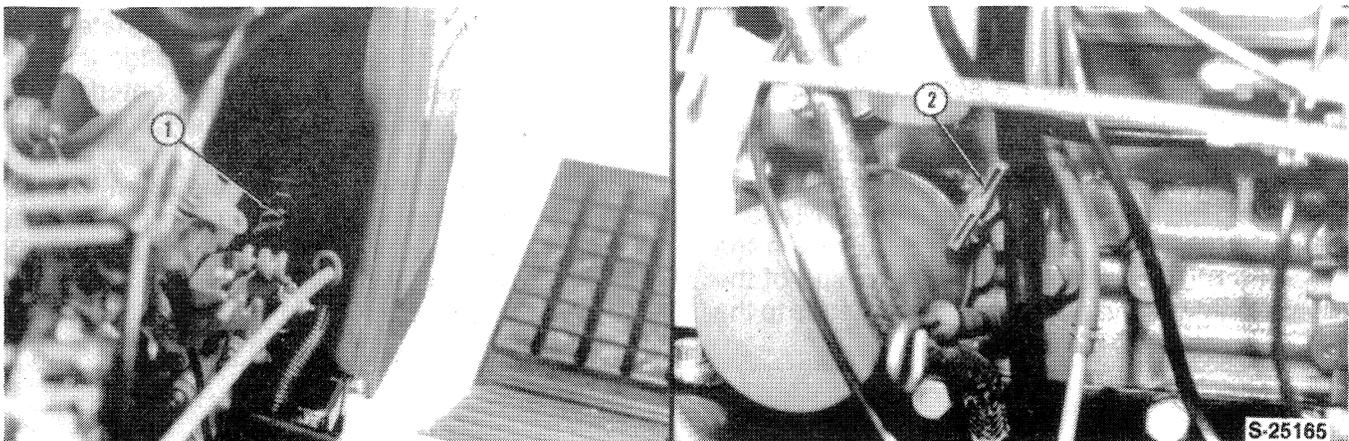


FIGURE 1-5

### Coolant Drainage Locations

- 1 Radiator Drain Cock
- 2 Engine Block Drain Cock

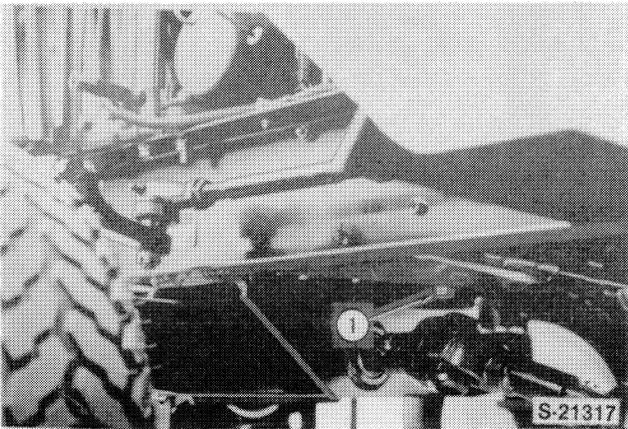


FIGURE 1-6

Crankcase Oil Drain

- 1 Drain Plug

5. Drain the engine crankcase oil, Figure 1-6.
6. Loosen the exhaust pipe clamp, 1, and fixed bolts, 3, and remove the exhaust pipe, 2, Figure 1-7.
7. Remove the air cleaner as follows:

Reference Figure 1-8.

- Loosen the intake tube clamps, 3, and remove the intake tube, 2,
- Loosen the air cleaner hose clamps, 5, and remove the hose, 4,
- Loosen the air cleaner canister retaining clamps, 6, and remove the air cleaner assembly from the mounting bracket.
- Remove the mounting bracket bolts and spacers and remove the bracket, 1, from the cylinder head, Figure 1-9.

8. Remove the upper radiator hose, 7, Figure 1-8.
9. Remove the injector fuel leak-off tube, 8, Figure 1-8.

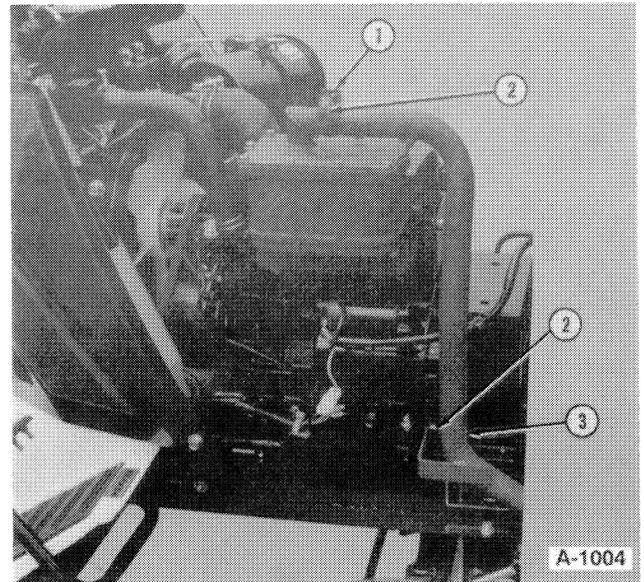


FIGURE 1-7

Exhaust Pipe Removal

- 1 Clamp
- 2 Exhaust Pipe
- 3 Bolt

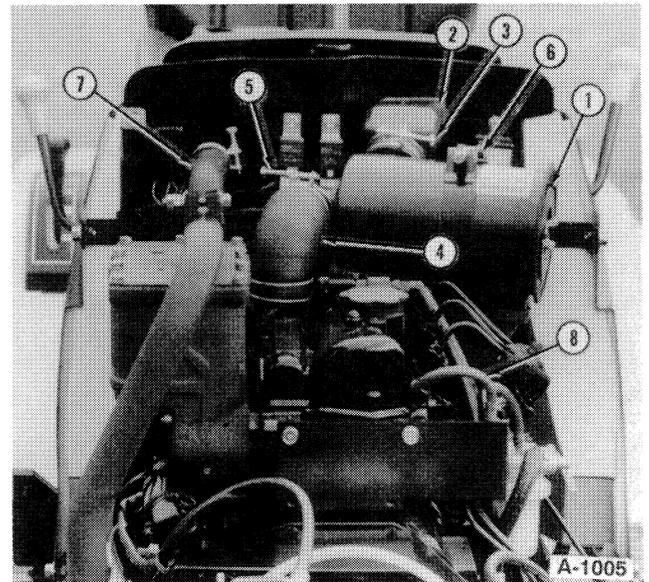


FIGURE 1-8

Air Cleaner Removal

- 1 Air Cleaner Assembly
- 2 Intake Tube
- 3 Intake Tube Clamp
- 4 Air Cleaner Hose
- 5 Air Cleaner Hose
- 6 Air Cleaner Retaining Strap
- 7 Upper Radiator Hose
- 8 Injector Leak-Off Tube

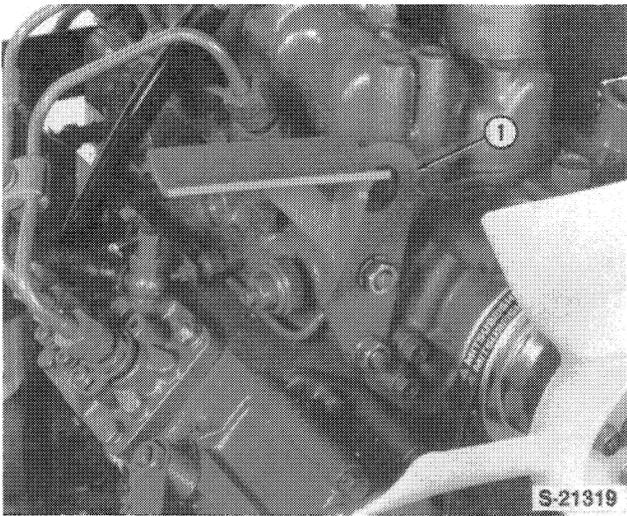


FIGURE 1-9

Air Cleaner Support Removal

- 1 Support Bracket

10. Disconnect the flexible fuel line hose, 1, from the fuel filter, Figure 1-10.

**NOTE: If the fuel has not been drained from the fuel tank, pinch the flexible hose closed to prevent fuel leakage.**

11. Disconnect the glow plug terminal wire, 1, Figure 1-11.
12. Disconnect the engine oil pressure sensor switch wire, 2, Figure 1-11.

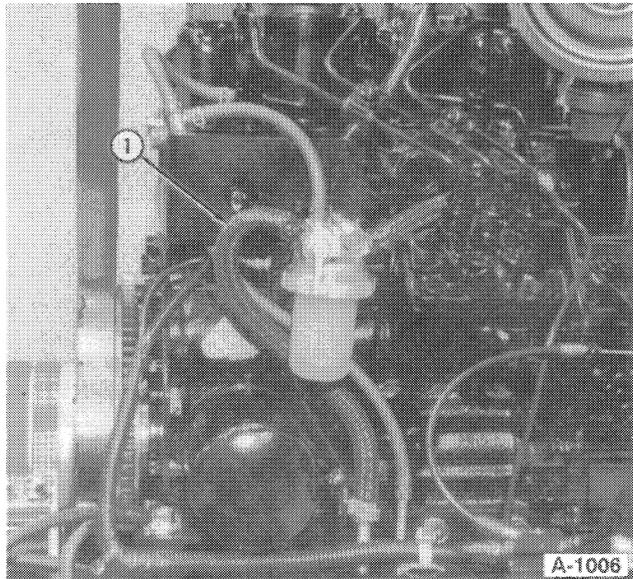


FIGURE 1-10

Fuel Line

- 1 Flexible Fuel Line

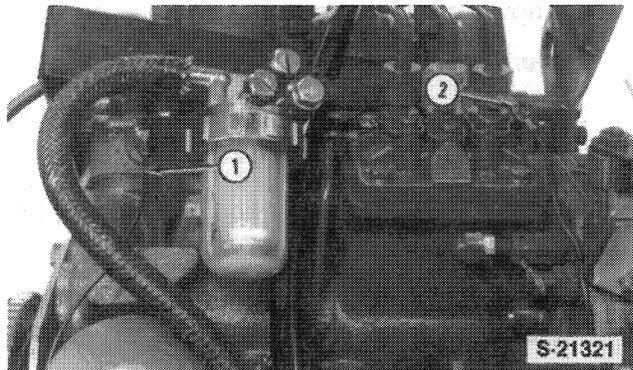


FIGURE 1-11

Glow Plug and Oil Pressure Wire Location

- 1 Glow Plug Terminal Wire
- 2 Oil Pressure Sensor and Wire

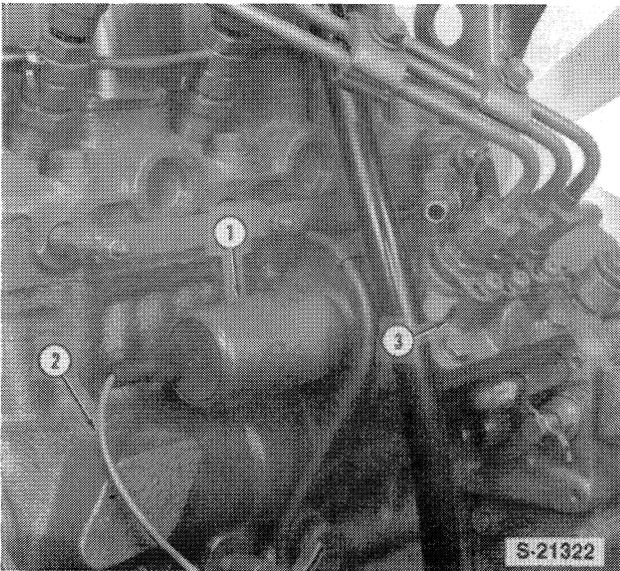


FIGURE 1-12

Engine Stop Solenoid

- 1 Solenoid
- 2 Solenoid Wire
- 3 Injection Pump



FIGURE 1-13

Throttle Cable Removal

- 1 Throttle Cable
- 2 "E"-Ring

- 13. Disconnect the wire, 2, from the injection pump solenoid stop control, Figure 1-12.
- 14. Remove the "E"-ring, 2, and remove the throttle control cable, 1, from the injection pump, Figure 1-13.
- 15. Disconnect the coolant temperature sensor wire, 1, from the sensor switch, Figure 1-14.
- 16. Remove the wires, 2, from the alternator assembly, Figure 1-14.
- 17. Remove the battery cable and wires, 3, from the starter motor, Figure 1-14.

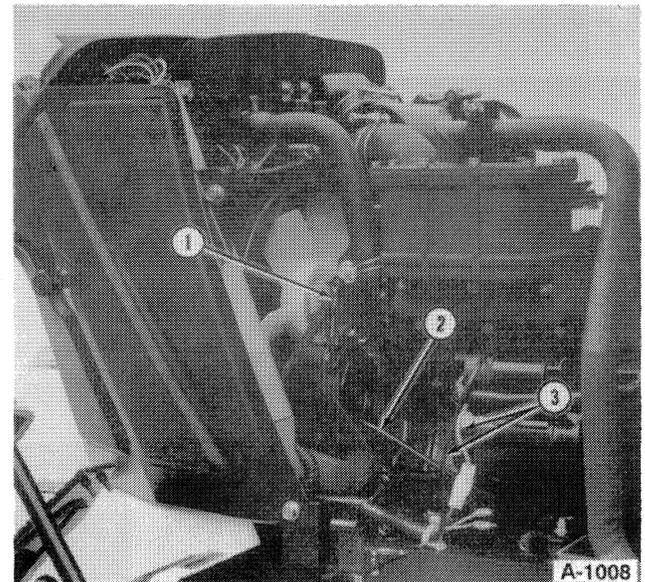


FIGURE 1-14

Engine Removal

- 1 Coolant Temperature Sensor Wire
- 2 Alternator Wires
- 3 Starter Motor Cable and Solenoid Wires

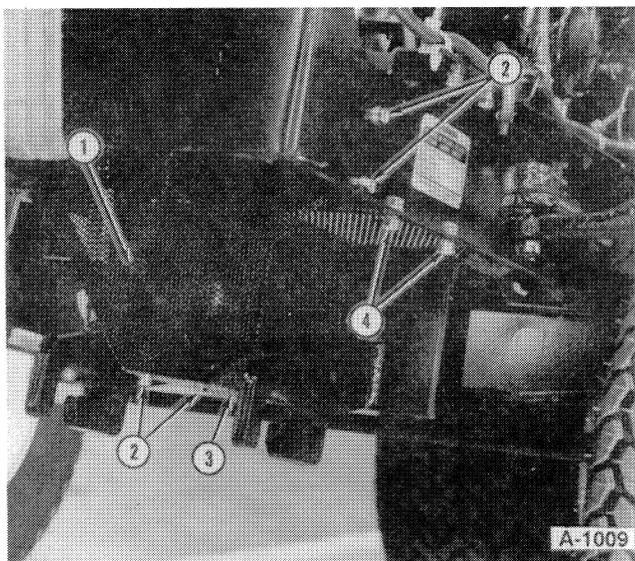


FIGURE 1-15

PTO Drive Shield Removal

- 1 Front Shield
- 2 Front Shield Mounting Bolts (6)
- 3 Lower Shield
- 4 Lower Shield Mounting Bolts (4)

18. Remove the PTO drive belts as follows:

Reference Figures 1-15 and 1-16.

- Remove the upper and lower shields, 1 and 3, Figure 1-15.
- Remove the cover.
- Loosen the belt guide bolts and slide the guides, 1, away from the belts, 3, Figure 1-16.
- Loosen the PTO control cable locknut, 4, Figure 1-16, and unscrew the locknut to allow maximum slack in the cable and conduit assembly.
- Remove the PTO tightener lower spring, 5,
- Disconnect the PTO cable from the tension spring, 6, Figure 1-16.
- Remove the drive belts, 2, from the pulleys.

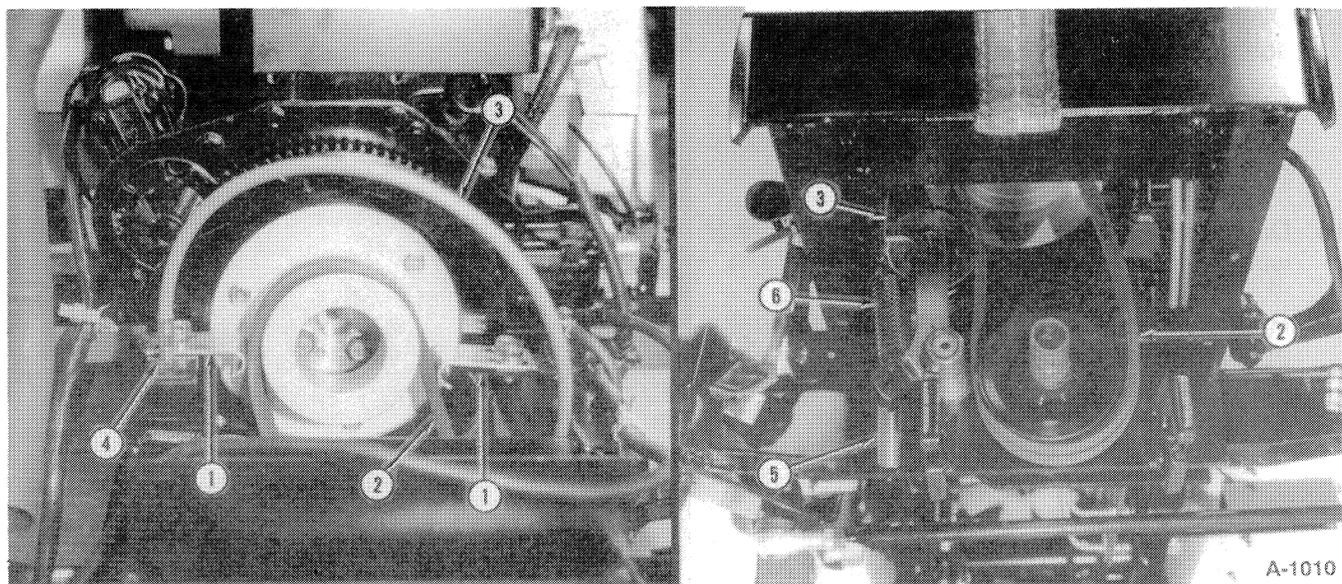


FIGURE 1-16

PTO Drive

- |                     |                        |
|---------------------|------------------------|
| 1 Belt Guide, 2,    | 4 Locknut              |
| 2 Belts (2)         | 5 Lower Tension Spring |
| 3 PTO Control Cable | 6 Upper Tension Spring |

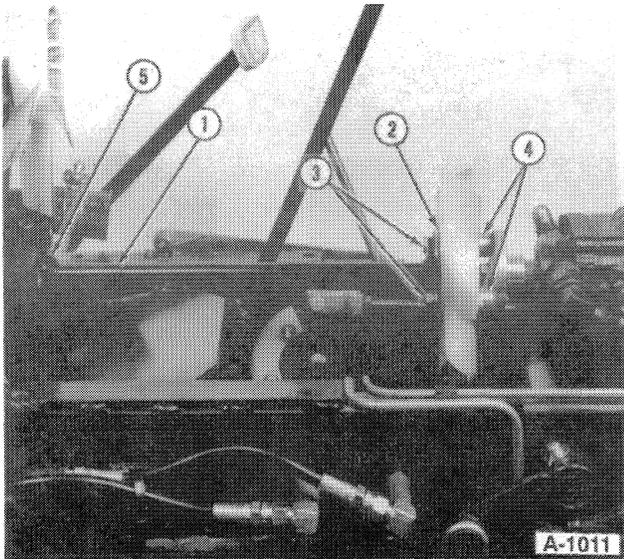


FIGURE 1-17

## Transmission Drive and Coupling

- |               |              |
|---------------|--------------|
| 1 Drive Shaft | 4 Spacers    |
| 2 Plate       | 5 Pulley Hub |
| 3 Bolts       |              |

19. From under the tractor, remove the two transmission drive shaft coupling bolts, 3, and spacers, 4, Figure 1-17.
20. Remove the transmission drive shaft by sliding the shaft rearward to disengage the spline drive to the crankshaft pulley coupling, 5,
21. Remove the three air flow baffle mounting screws, and remove the baffle, 1, Figure 1-18.
22. Remove the two fan shroud mounting screws, 3, Figure 1-18.
23. Reposition the fan shroud so as to be clear of the radiator and side screens.

**NOTE: Shown with sheet metal removed for clarity.**

24. Attach an overhead hoist to the engine lifting brackets and take up the chain slack.
25. Remove the four engine base mounting nuts, 1, Figure 1-19.
26. Remove the ground cable from the frame mounting bolt.

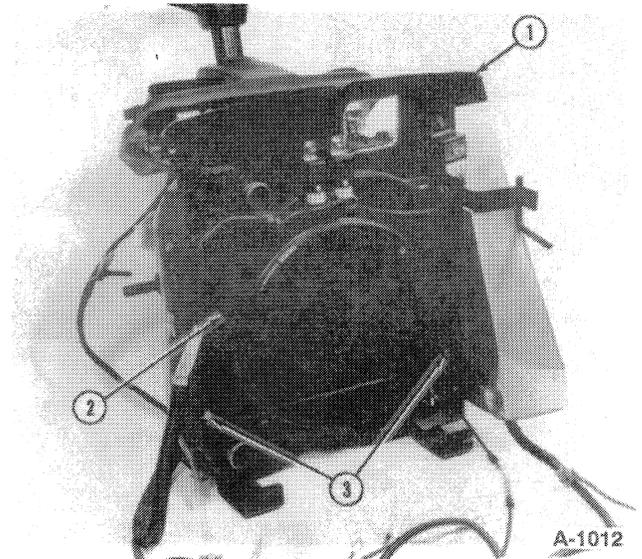


FIGURE 1-18

## Fan Shroud and Air Baffle Removal

- |                               |
|-------------------------------|
| 1 Air Baffle                  |
| 2 Fan Shroud                  |
| 3 Fan Shroud Retaining Screws |

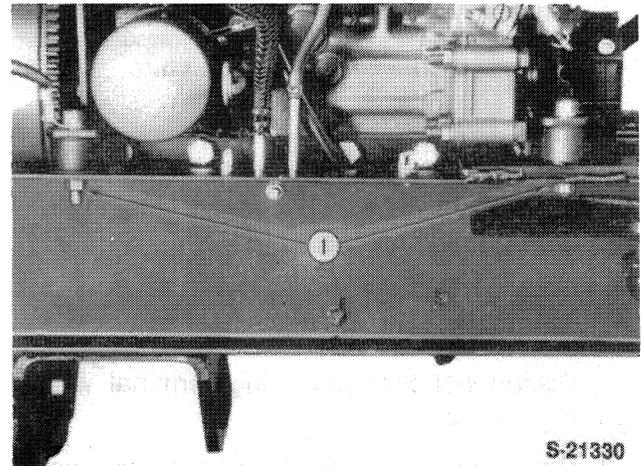


FIGURE 1-19

## Engine removal

- |                         |
|-------------------------|
| 1 Engine Mounting Bolts |
|-------------------------|
27. Carefully lift the engine out of the tractor.

**NOTE: Use care not to damage the engine fan or fan shroud due to the small amount of clearance available.**

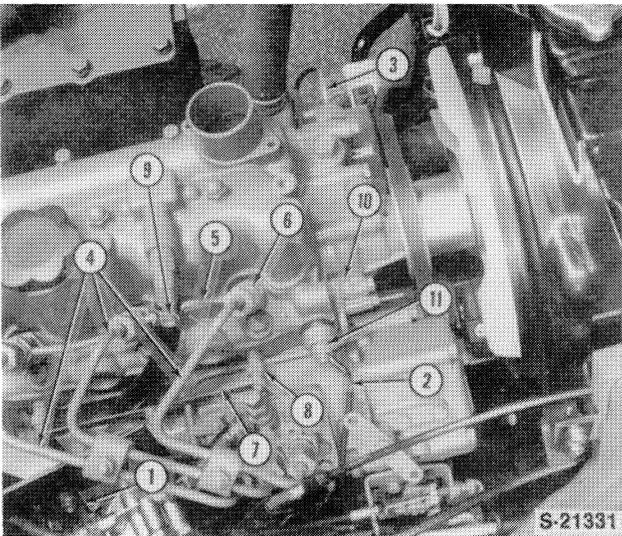


FIGURE 1-20

Engine Disassembly

- |                                   |                                 |
|-----------------------------------|---------------------------------|
| 1 Glow Plug Wire                  | 7 Glow Plug Connector Strap     |
| 2 Oil Pressure Sensor Wire        | 8 Glow Plugs                    |
| 3 Coolant Temperature Sensor Wire | 9 Vapor Vent Tube               |
| 4 Injector Lines (3)              | 10 External Oil Tube Banjo Bolt |
| 5 Fuel Leak-Off Line              | 11 Oil Pressure Sensor Switch   |
| 6 Injectors (3)                   |                                 |

**ENGINE DISASSEMBLY**

**NOTE:** The cylinder head and related components can be serviced with the engine in place in the tractor.

1. Perform steps 1-5 and 7-10 under "Engine Removal" as described.
2. Disconnect the glow plug terminal wire, 1, Figure 1-20.
3. Disconnect the engine oil pressure sensor wire, 2, Figure 1-20.

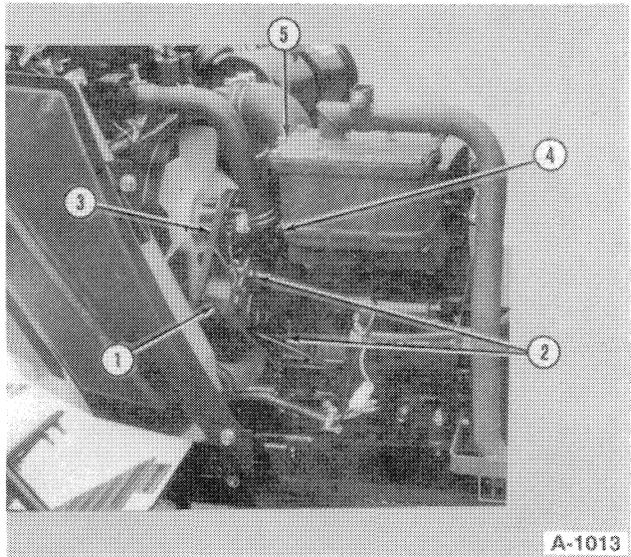


FIGURE 1-21

Engine Disassembly

- |                            |
|----------------------------|
| 1 Alternator Assembly      |
| 2 Alternator Mounting Bolt |
| 3 Belt                     |
| 4 Thermostat Housing       |
| 5 Muffler Assembly         |

4. Disconnect the coolant temperature sensor wire, 3, from the temperature sensor, Figure 1-20.
5. Remove the injector lines, 4, and cap all openings.
6. Remove the vapor vent tube, 9,
7. Remove the external oil tube banjo bolt, 10, from the front of the head.
8. Loosen the alternator bracket bolt, 2, Figure 1-21. Then remove the belt from the alternator and fan pulley.

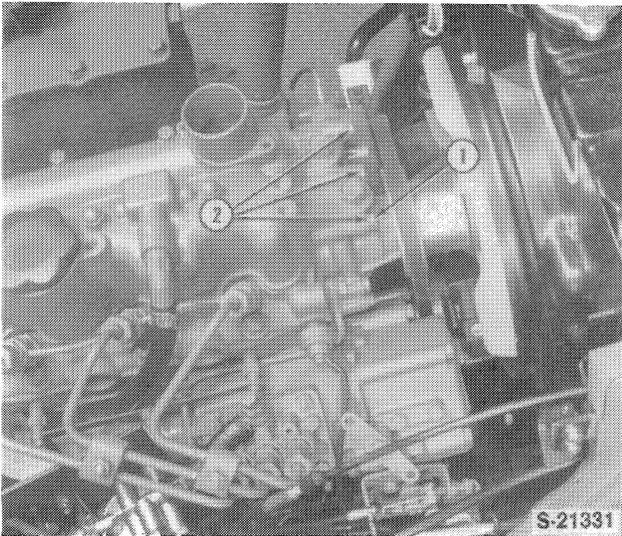


FIGURE 1-22

Water Pump Removal

- 1 Water Pump Assembly
- 2 Water Pump Mounting Bolts

9. Remove the water pump mounting bolts, 2, and remove the water pump and fan as an assembly, Figure 1-22.
10. Remove the muffler/exhaust manifold assembly, 5, Figure 1-21.
11. Remove the valve cover/intake manifold assembly, 1, Figure 1-23.
12. Remove the valve rocker shaft as an assembly, Figure 1-24.

**NOTE: Alternately loosen the rocker shaft support bolts a turn at a time to prevent bending the rocker shaft.**

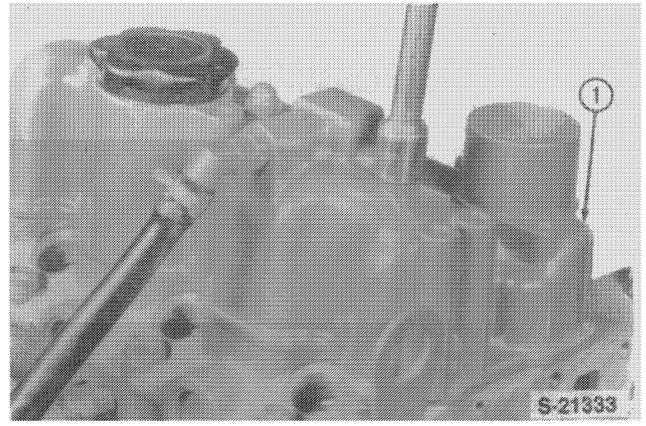


FIGURE 1-23

Valve Cover Removal

- 1 Valve Cover

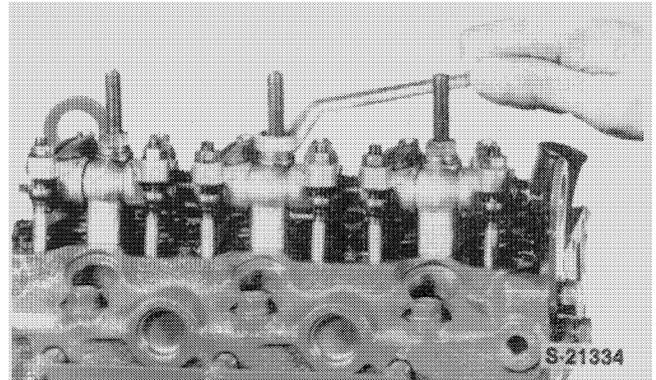


FIGURE 1-24

Valve Rocker Shaft Removal

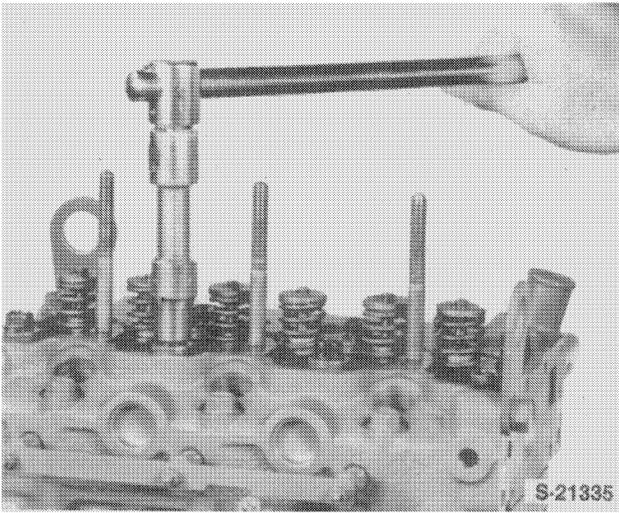


FIGURE 1-25

Cylinder Head Removal

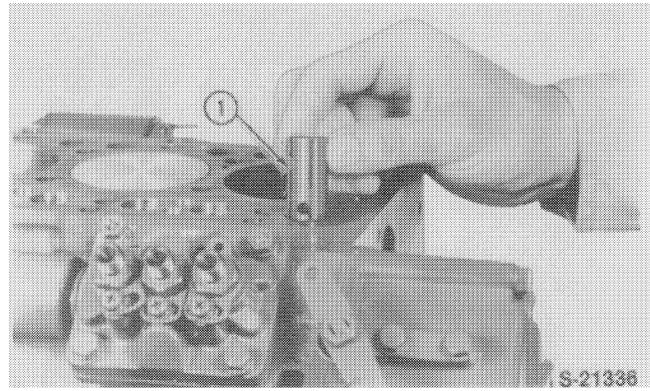


FIGURE 1-26

Valve Tappet Removal

- 1 Valve Tappets

13. Remove the push rods and place them in a separately marked holder for installation in their original location.
14. Remove the cylinder head bolts by loosening the bolts a half turn at a time to prevent warping the head, Figure 1-25.
15. Using a magnetic rod, remove the valve tappets, 1, from the top of the engine block, Figure 1-26.

## CYLINDER HEAD, VALVES AND RELATED COMPONENTS

### DISASSEMBLY

1. Clean the cylinder head and remove any carbon deposits from around the valve heads.
2. Use a suitable valve spring compressor and remove the valve spring retainer locks, 4, retainers, 3, and springs, 2, Figure 1-27.
3. Remove the valves and place all valve components together in separately marked containers for reassembly in their original location.
4. Remove the valve guide seals and discard.
5. Remove the injectors from the head.

**NOTE:** Be sure to remove the injector sealing washer from the bore if it was not removed along with the injector.

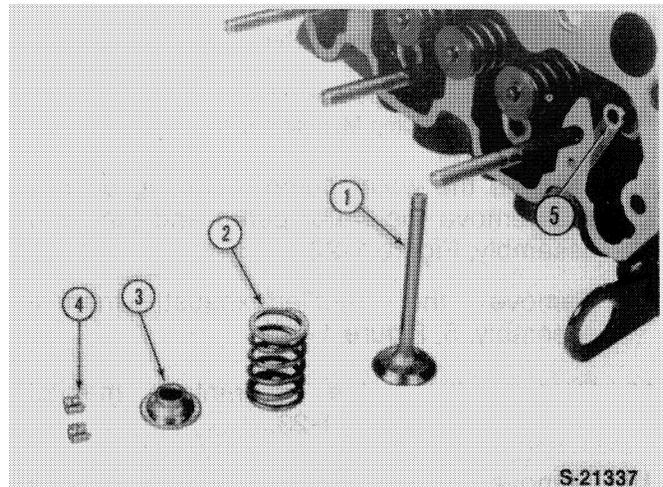


FIGURE 1-27

Cylinder Head Disassembly

- 1 Valve
- 2 Spring
- 3 Retainer
- 4 Retainer Locks
- 5 Valve Guide Seal

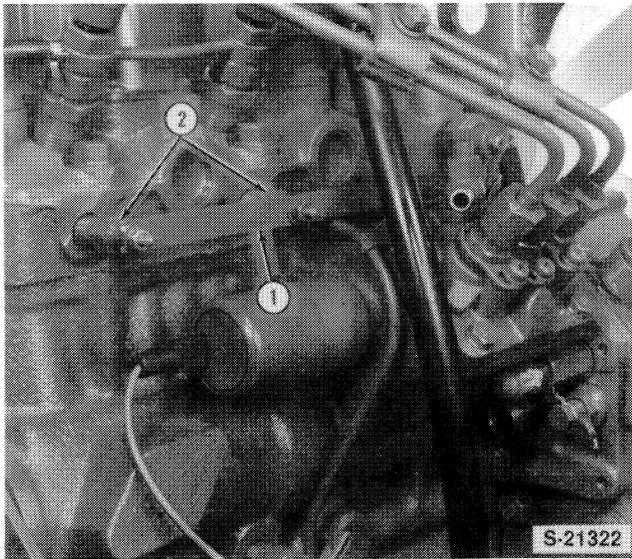


FIGURE 1-28

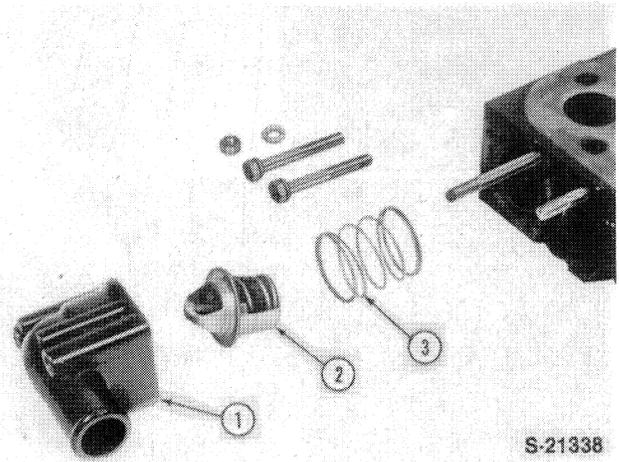
Glow Plug Removal

- 1 Connector Strap
- 2 Glow Plugs

6. Disconnect the glow plug connector strap, 1, and remove the glow plugs, Figure 1-28.
7. Remove the thermostat housing, 1, and remove the thermostat, spring and gasket, Figure 1-29.
8. Remove the oil pressure sensor switch from the head, Figure 1-30.

**INSPECTION AND REPAIR**

1. Clean all carbon deposits from the combustion chambers, pre-combustion chambers and valve ports using a soft wire brush and scraper.
2. Clean all deposits and residue from the gasket surface using care to not scratch or nick the machined surface.
3. Wash the cylinder head in a suitable solvent and air dry.

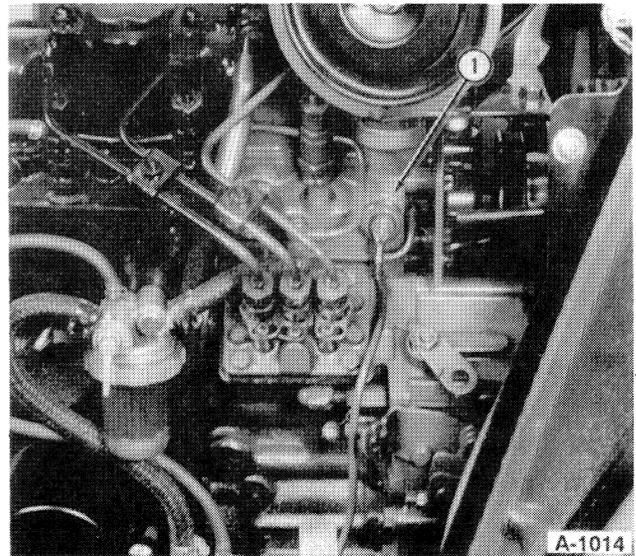


S-21338

FIGURE 1-29

Thermostat Removal

- 1 Housing
- 2 Thermostat
- 3 Spring



A-1014

FIGURE 1-30

Oil Pressure Switch Location

- 1 Oil Pressure Switch

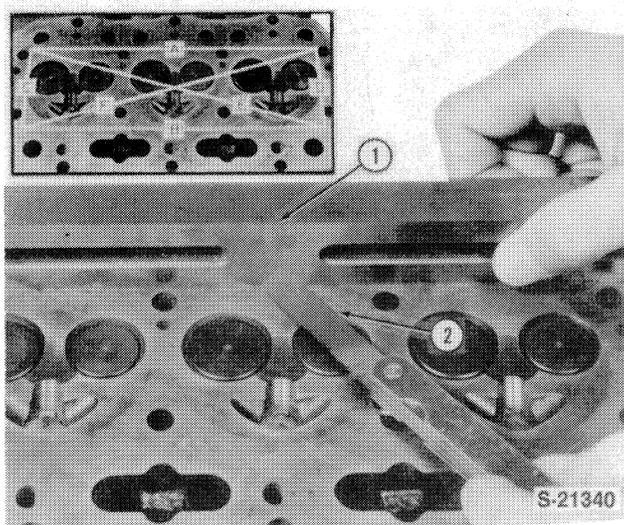


FIGURE 1-31

## Cylinder Head Warpage Check

- 1 Straight Edge
- 2 Feeler Gauge

4. Check the cylinder head for cracks or other damage paying particular attention to the following areas:

- Valve ports
- Valve seats
- Combustion chamber
- Water jacket

5. Inspect the gasket surface for scratches or nicks which would cause coolant or combustion leakage.

6. Examine the core plugs for rust or other signs of coolant leakage. If a plug shows signs of leakage, replace all core plugs in the head.

7. Using a straight edge and feeler gauge, check the cylinder head for warpage as shown, Figure 1-31.

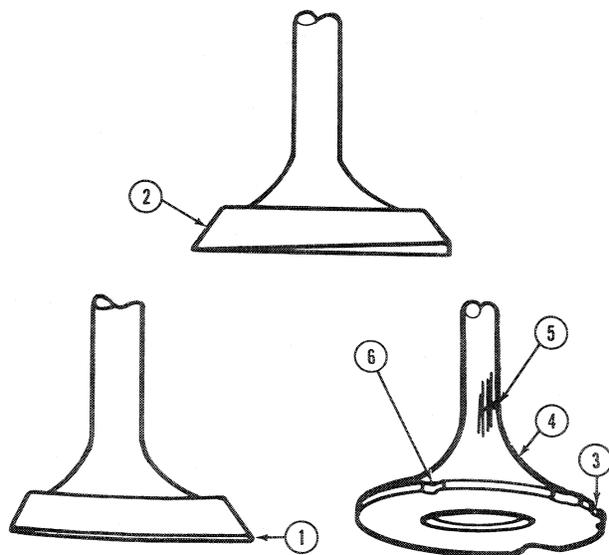


FIGURE 1-32

## Valve Defect Inspection

- 1 Margin Too Thin - Min. .020" (0.5 mm)
- 2 Bent Valve
- 3 Pitting
- 4 Indented
- 5 Wear or Necking
- 6 Burned

Resurface or replace the cylinder head if warpage is greater than 0.005 in. (0.12 mm).

**VALVES**

1. Using a soft wire brush, clean all carbon deposits from the valves. Inspect the condition of the valves and discard any that are badly burned, cracked or bent as shown, Figure 1-32.

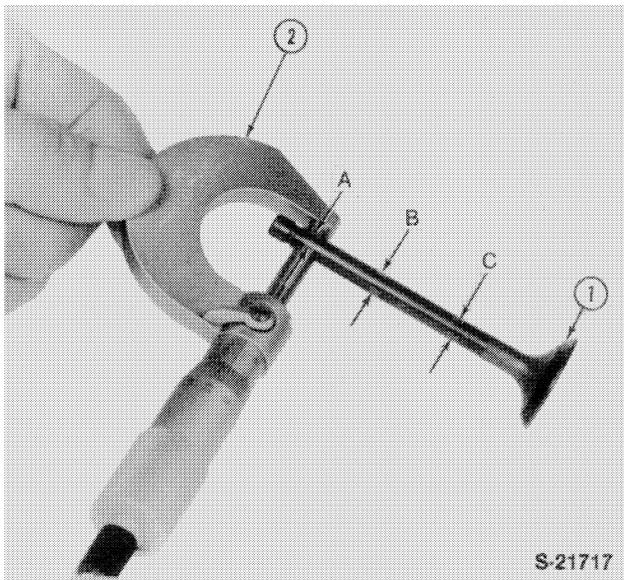


FIGURE 1-33

Valve Stem Wear Check

- 1 Valve
- 2 Micrometer A-B-C, Wear Points

2. Using a micrometer measure the valve stem at points “A,” “B” and “C,” Figure 1-33.

Replace valves if the stem wear at any point is such that the stem diameter is less than 0.23 in. (5.9 mm).

3. If inspection indicates that the valve may be reused, the valve face and seat should be ground as shown, Figures 1-34 and 1-35.

After grinding, recheck the valve margin, 2, Figure 1-34, to be sure that the correct valve head thickness is maintained.

Minimum margin . . . . . 0.020 in. (0.5 mm)

*IMPORTANT: After finish grinding the valve face and seat, check to assure that the seat contacts the center of the valve face. Using Prussian Blue, lightly coat the valve seat, then place the valve in position in the head and rotate the valve slightly while holding a light downward pressure on the valve. If the blueing is transferred to the center of the valve face the contact is correct.*

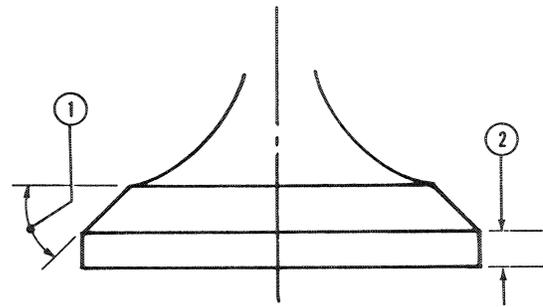


FIGURE 1-34

Valve Correctly Ground

- 1 45° Angle Seat
- 2 Minimum Valve Margin .020 in. (.5 mm)

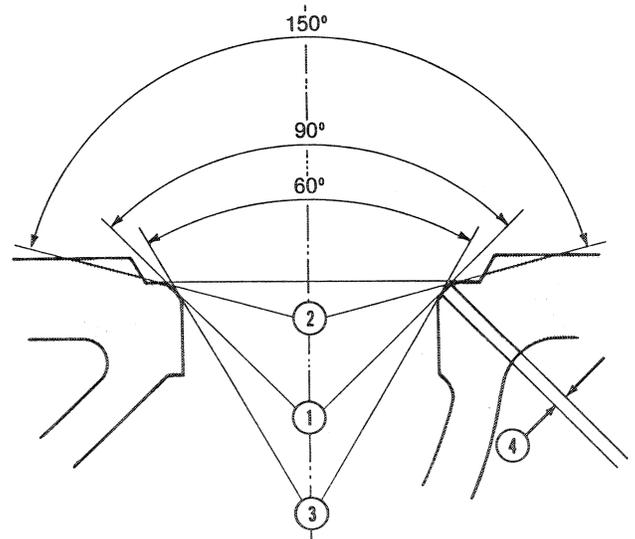


FIGURE 1-35

Valve Seat Grinding

- 1 Valve Seat angle - 45°
- 2 Lower Seat - 30° Stone
- 3 Raise Seat - 60° Stone
- 4 Seat Width - 0.062-0.070 in. (1.59-1.80 mm)

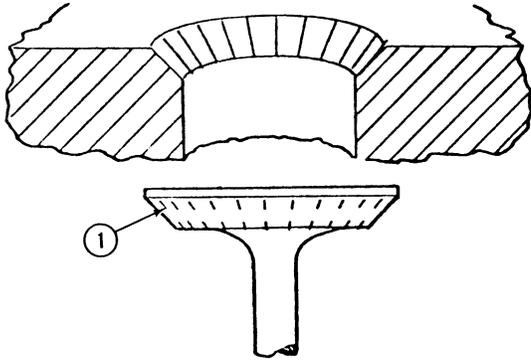


FIGURE 1-36

Valve Seat Contact Location

1 Seat

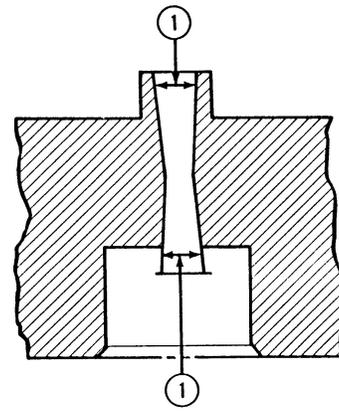


FIGURE 1-37

Valve Guide Wear Check

1 Wear Point

If Prussian Blue is not available, mark the valve face or seat with a soft lead pencil as shown, Figure 1-36. Turn the valve slightly in the seat. The penciled lines will be broken at the seat contact area.

## VALVE GUIDES

1. Thoroughly clean the valve guides before attempting to check for internal wear.
2. Using a small hole gauge, measure the valve guide bore at the top and bottom wear points as shown, Figure 1-37.
3. Determine the stem to guide clearance by subtracting the valve stem diameter from the valve guide diameter as measured above.

If the clearance, Figure 1-38, exceeds 0.008 in. (0.2 mm) intake or 0.010 in. (0.25 mm) exhaust, replace the valve and/or head as required.

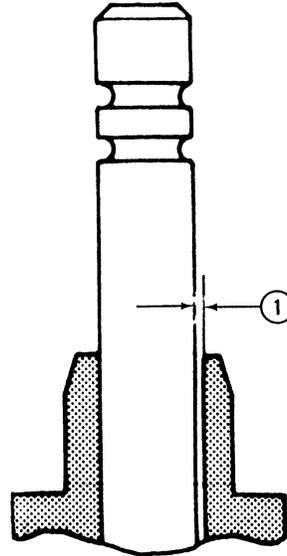


FIGURE 1-38

Valve Stem to Guide Clearance Check

1 Clearance

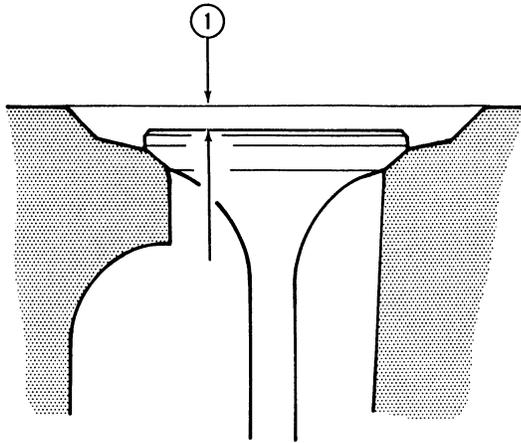


FIGURE 1-39

Valve Recess Depth

- 1 Depth - 0.070 in. (1.8 mm) Max.

**VALVE SEATS**

Examine the valve seats and reface if worn or damaged. Valve seat grinding requires that the seat be ground to the correct width and established in the proper position as shown, Figure 1-35.

A valve that extends too deep into the combustion area will result in valve burning. If the valve is recessed too deep into the cylinder head it will cause a rapid buildup of carbon deposits.

*IMPORTANT: The valve guide serves as the standard when correcting the valve seat. Be sure that the valve guide wear is within the specified wear limit before attempting to regrind the valve seat.*

Valve seat grinding requires that the seat be ground to the correct width and positioned as shown, Figure 1-33.

1. Check the seat surface for defects. Use a 45° stone if necessary to reface the seat. Grind away only enough material to provide a smooth, even seat.
2. Check the seat width, Figure 1-35.

If necessary, use a 30° stone to lower the seat contact area and a 60° stone to raise the seat contact area.

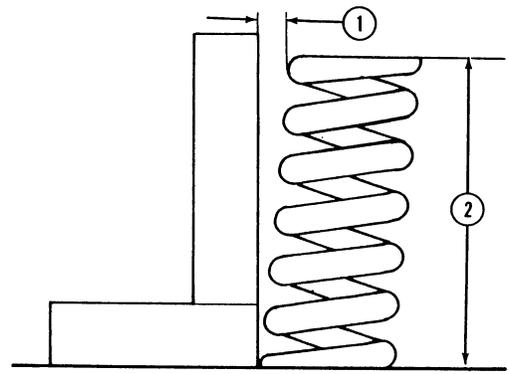


FIGURE 1-40

Valve Spring Length and Squareness Check

- 1 Squareness
- 2 Free Length

Regrind the valve seat to obtain a seat contact width as follows:

- Standard seat width . . . . . 0.062-0.070 in. (1.59-1.80 mm)
- Max. Seat Width . . . . . 0.10 in. (2.5 mm)

If the valve head is found to exceed the maximum depth of 0.070 in. (1.8 mm), replace the cylinder head, Figure 1-39.

**NOTE: Refacing the seat should always be coordinated with refacing of the valve to assure a compression tight fit.**

**VALVE SPRINGS**

Place the valve springs on a flat surface and measure the free length and squareness of the spring as shown, Figure 1-40.

Replace springs that do not meet the following requirements:

	Standard	Service Limit Maximum
Out-of-Round	0.04 in. (1.0 mm)	0.05 in. (1.2mm)
Free Length	1.3 in. (33 mm)	1.24 in. (31.5 mm)

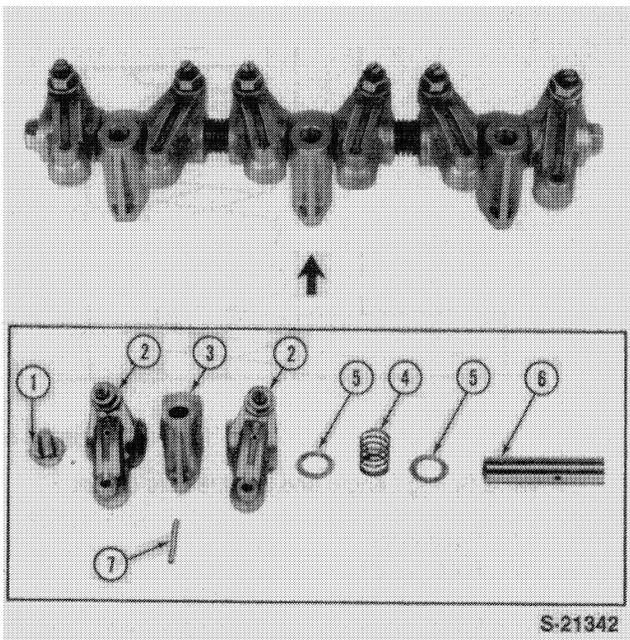


FIGURE 1-41

## Rocker Shaft Components

- |              |            |
|--------------|------------|
| 1 Bolts (2)  | 5 Shims    |
| 2 Rocker Arm | 6 Shaft    |
| 3 Pedestal   | 7 Roll Pin |
| 4 Spring     |            |

Place the spring in a suitable spring load tester and measure the spring load rating. Replace springs that do not meet the following specifications:

Compressed  
Load Rating ..... 13.2 lbs. (60 Kg) Min.  
when compressed to  
1.71 in. (28.3mm) length

**ROCKER ARM ASSEMBLY****DISASSEMBLY**

1. Remove the bolts, 1, at each end of the rocker arm shaft, 6, and remove the rocker arm, 2, pedestal, 3, spring, 4, and shims, 5, Figure 1-41.
2. Remove the roll pin, 7, in the front pedestal and shaft and remove the pedestal from the shaft.



FIGURE 1-42

## Rocker Shaft Wear Check

**INSPECTION AND REPAIR**

1. Inspect the rocker arms and pivot shaft for wear or other damage.
2. Check the adjusting screws for damaged threads and excessive wear.
3. Check the rocker arm to valve stem contact tips for excess wear or damage. Replace the rocker arm if defective.
4. Using a micrometer, measure the rocker arm wear points on the shaft, Figure 1-42.

Replace the rocker shaft if the wear at any point is such that the shaft diameter is less than 0.455 in. (11.77 mm) diameter (minimum).

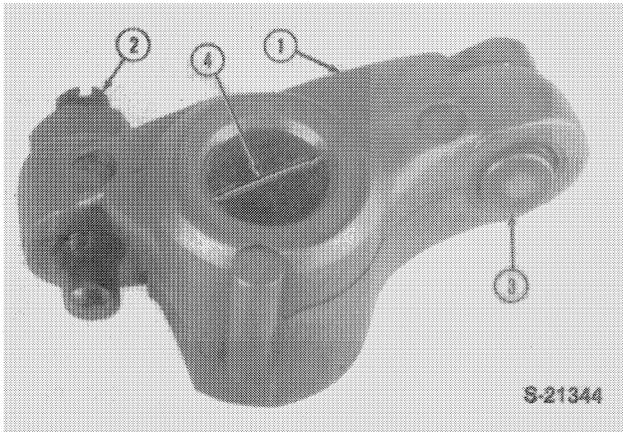


FIGURE 1-43

## Rocker Arm Assembly

- 1 Arm Assembly
- 2 Adjusting Bolt
- 3 Valve Stem Contact Pin
- 4 Bore Diameter

5. Determine the rocker arm to shaft clearance by subtracting the rocker shaft diameter from the rocker arm bore diameter. Replace the rocker shaft and/or rocker arm if the clearance exceeds 0.008 in. (0.2 mm), Figure 1-43.

**ASSEMBLY****ROCKER SHAFT**

Assemble the rocker shaft components on the shaft in the order as shown, Figure 1-41. On assembly observe the following requirements.

Position the front pedestal on the shaft aligning the roll pin hole in the pedestal with the hole in the shaft. Using a new roll pin, drive the roll pin into the shaft so that the outer end is just below the pedestal to head mating surface.

**NOTE: Rocker shaft lubrication oil flows through the roll pin to the inside of the rocker shaft. Therefore, be sure the roll pin is not damaged on installation or driven in too far to bottom against the top side of the rocker shaft.**

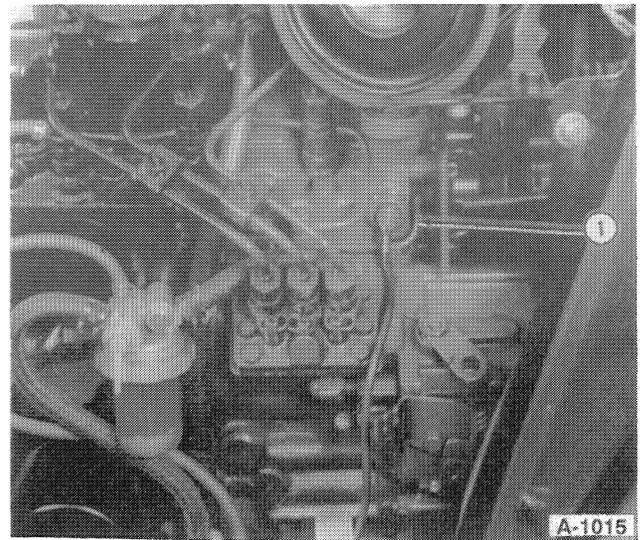


FIGURE 1-44

## Oil Pressure Switch Installation

- 1 Dial Indicator

**VALVES**

1. Insert the valves in the guides from which they were removed and lightly lap the valve to be sure of an even seat contact around the valve face. Then remove the valve and remove all traces of valve lapping compound by washing with soap and water.
2. Install new seals on the valve guides using Tool No. 1587.
3. Using a suitable compressor, assemble the valves, springs, retainers and locks.
4. Install the oil pressure switch, Figure 1-44.

**INSTALLATION**

During assembly the engine compression is established by selecting the head gasket of the correct thickness. The proper head gasket is selected based upon the distance the pistons protrude on the Model GT65 or the depth on the Model GT75 from the face of the engine block when the piston is at top-dead-center.

Head gaskets of three different thicknesses are available for the Model GT65, see chart.

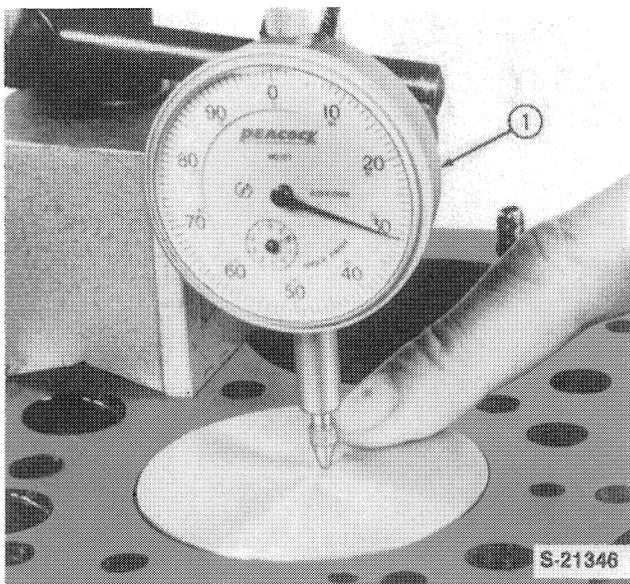


FIGURE 1-45

Measure Piston Height Above Face of Block

- 1 Dial Indicator

Two different thicknesses are available for the Model GT75, see chart.

Select the proper head gasket as follows:

1. Position each of the pistons in turn at top-dead-center. Using a dial indicator determine the distance each piston protrudes on the Model GT65 or the depth on the Model GT75 from the face of the block while holding down pressure on the piston as shown in Figure 1-45.

Use the dimension taken from the cylinder which has the greatest piston projection and select the proper gasket as indicated in the following chart.

**NOTE:** The last four digits of the part number are stamped on the top surface of the gasket as shown, Figures 1-46 and 1-47.

2. If removed, install the tappets in their respective bores.

**NOTE:** On installation, lubricate the tappets with heavyweight clean engine oil before inserting in the block.

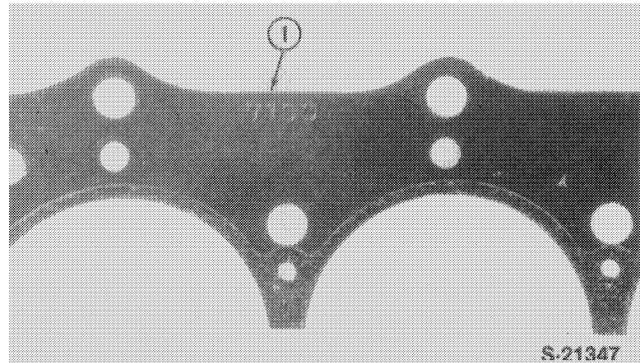


FIGURE 1-46

Head Gasket Part Number code Location

- 1 Part Number Code

### GT65 (E643)

Piston Projection Measurement	Head Gasket Part Number	Gasket Installed Thickness
0.021-0.0255 in. (0.55-0.65 mm)	111147090	0.043 in. (1.1 mm)
0.0255-0.029 in. (0.65-0.75 mm)	111147100	0.047 in. (1.2 mm)
0.029-0.033 in. (0.75-0.85 mm)	111147110	0.051 in. (1.3 mm)

### GT75 (E673)

Piston Depth Measurement	Head Gasket Part Number	Gasket Installed Thickness
0.01-0.16 in. (0.25-0.4 mm)	111147390	0.016 in. (0.4 mm)
0.006-0.01 in. (0.15-0.25 mm)	111147400	0.02 in. (0.5 mm)

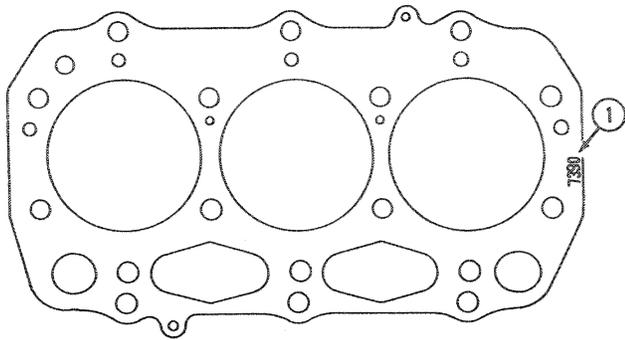


FIGURE 1-47

Head Gasket Part Number Code Location

- 1 Part Number Code

**NOTE: Clean both the block and cylinder head mating surfaces before installing the gasket and cylinder head.**

- 3. Select the proper head gasket and place it on the block with the part number facing up.

**NOTE: If the part number digit code is illegible, the gasket may be identified by the notch cutouts or with grommet/without grommet as shown, Figures 1-48 and 1-49.**

On Model GT65

Part Number Code . . . . . 7090 (one notch)  
 7100 (two notches)  
 7110 (no notch)

On Model GT75

Part Number Code . . . . 7390 (without grommet)  
 7400 (With grommet)

- 4. Install the cylinder head using care to locate the roll pin dowel in the pin locating bore.
- 5. Lubricate the head bolt and stud threads and tighten in stages in sequence as shown, Figure 1-48.

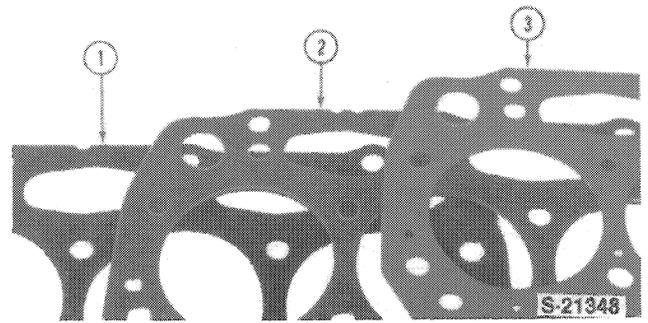


FIGURE 1-48

Head Gasket Identification

- 1 Single Notch - Part No. Code 7090
- 2 Two Notches - Part No. Code 7100
- 3 No Notch - Part No. code 7110

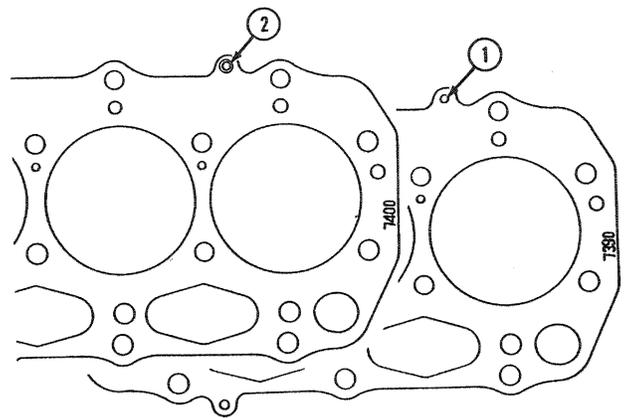


FIGURE 1-49

Head Gasket Identification

- 1 Without Grommet - Part No. Code 7390
- 2 With Grommet - Part No. Code 7400

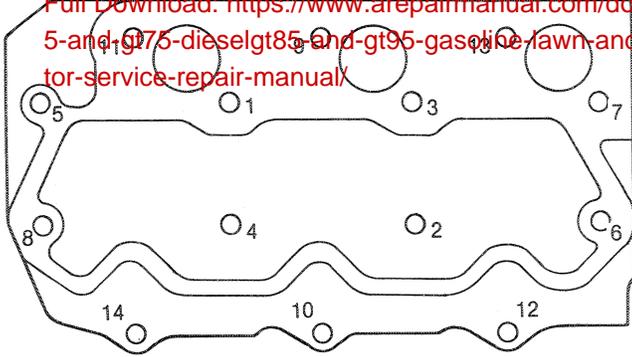


FIGURE 1-50

Head Bolt Tightening Sequence

Head Bolt Torque . . . . . 25-28 lbs. ft.  
 (33-38 N·m)

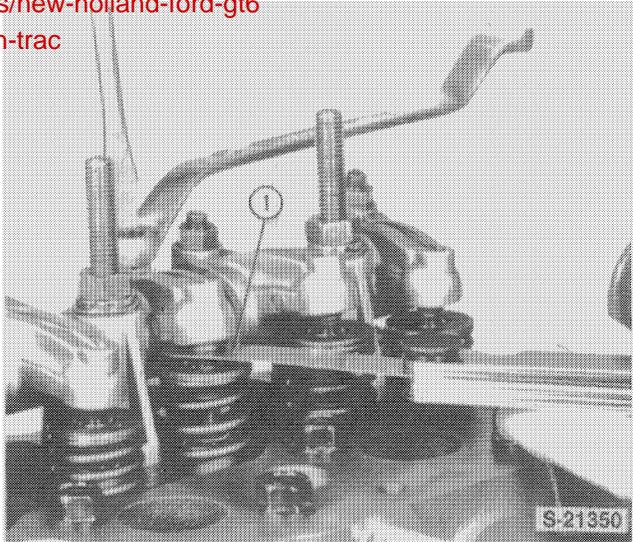


FIGURE 1-51

Valve Tappet Adjustment

1 Tappet Clearance - 0.008 in. (0.2 mm)

6. Reinstall the push rods in their original locations.
7. Install the assembled rocker shaft and tighten the pedestal bolts in steps to the specified torque.

Pedestal Bolt Torque . . . . . 15-18 lbs. ft.  
 (20-24 N·m)

8. Adjust the rocker arm clearance, Figure 1-51. Be sure the tappets are in their lowest position before making the adjustment as follows:

Bring the piston to top-dead-center on the compression stroke (both valves closed). With the locknut loosened, turn the adjusting screw to obtain 0.008 in. (0.2 mm) "cold" clearance and tighten the locknut.

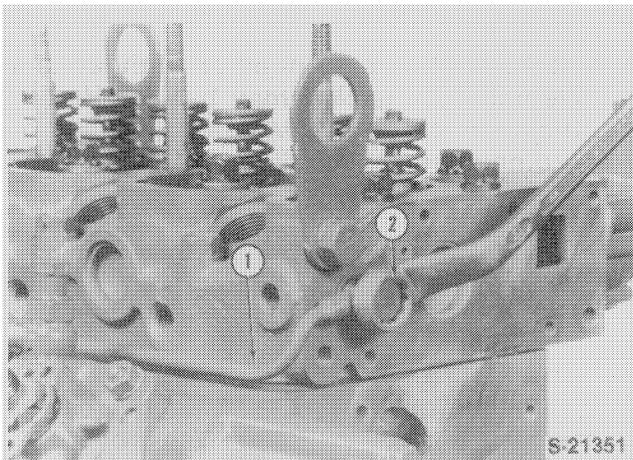


FIGURE 1-52

External Oil Transfer Tube Installation

1 Tube  
 2 Banjo Bolt

9. Using a new valve cover gasket, install the valve cover/intake manifold assembly. Tighten the cover bolts in steps to the specified torque.

Valve Cover Bolt Torque . . . . . 7-9 lbs. ft.  
 (9-12 N·m)

10. Install the oil transfer tube banjo bolt, 2, Figure 1-52, and tighten to the specified torque.

Banjo Bolt Torque . . . . . 7-9 lbs. ft.  
 (9-12 N·m)