1957

FORD CAR AND *Thunderbird*

SHOP MANUAL

FORD DIVISION · FORD MOTOR COMPANY

1957 Ford Car and Thunderbird Shop Manual

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1957 FORD CAR AND *Thunderbird* *Shop Manual*

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FOREWORD

This manual has been prepared to provide information for the proper servicing of 1957 Ford Cars and the 1957 Ford Thunderbird. The manual should be kept where it will be readily available for reference at all times.

The manual is divided into 13 parts as designated on the title page. A title page is also included at the beginning of each part that lists the chapters and the sections contained in the part. The heading on each left-hand or even-numbered page indicates the name of the chapter and the heading on each right-hand or odd-numbered page indicates the section covered.

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SERVICE DEPARTMENT
FORD DIVISION
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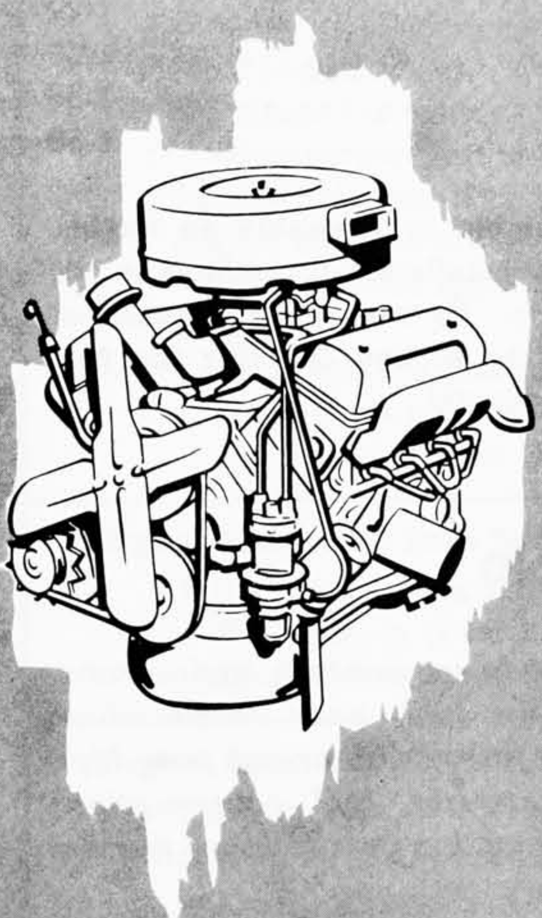
PART 1 ENGINES



Chapter 1 GENERAL ENGINE SERVICE

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Chapter 3 8-CYLINDER ENGINES

Part 1 — ENGINES

Chapter 1

GENERAL ENGINE SERVICE

The service procedures contained in this chapter apply to all engines. The cleaning, inspection, repair, and overhaul procedures of the component engine parts apply after the parts have been removed from the engine, or in the case of a complete engine overhaul, after the engine has been disassembled.

To completely disassemble or assemble an engine, follow all the removal or installation procedures in the applicable engine chapter. To remove or install an individual part, refer to the section covering the part in the applicable engine chapter.

1. GENERAL ENGINE TROUBLE SHOOTING

Poor engine performance can be caused by the need of a general engine tune-up, by gradual wear of engine parts, or by a sudden parts failure. A good trouble diagnosis will indicate the need of a complete engine tune-up, individual adjustments, part(s) replacement or overhaul, or the need of a complete engine overhaul.

The five major steps in restoring good engine performance are:

1. ESTABLISH THE TROUBLE. Make sure that the trouble as stated by the owner actually exists. Determine, if possible, if any work has been performed recently which could be the cause of the present trouble.

2. ISOLATE THE CAUSE IN THE PROPER SYSTEM. Trace the cause of the trouble to the point where it has been isolated in one of the following systems: ***ignition, fuel, engine, cooling, or exhaust.***

3. LOCATE THE CAUSE IN THE SYSTEM.

4. CORRECT THE TROUBLE.

5. ROAD TEST. Before deciding that the trouble has been corrected, road test the car as a final check on the work performed.

Engine performance complaints usually fall under one of the following basic headings: ***engine will not crank; engine cranks normally, but will not start; engine starts, but fails to keep running; engine runs, but misses; rough engine idle; poor acceleration; engine does not develop full power, or has poor high speed performance; excessive fuel consumption; engine overheats; or the engine fails to reach normal operation temperature.***

Table 1 is a general trouble shooting chart which lists basic engine troubles with procedures and checks to be performed to help isolate the cause of the trouble in a particular system. The reference after each check refers to that part of the manual which covers, in detail, checking procedures as well as corrections to be made in the various systems. When a particular trouble can not be traced to a definite system by a simple check, the possible systems that could be at fault are listed in the order of their probable occurrence; therefore, in most cases, the checks should be made in the order listed. Some consideration, however, should be given to logical order. For example, if the spark plugs are removed for testing and they are not the cause of the trouble, and several checks later calls for a compression test, to save time, check the compression while the spark plugs are out.

A separate trouble shooting chart is included in the ignition, fuel, and cooling system chapters. These charts list the basic troubles listed in Table 1, but cover only the items relating to the particular system under consideration. For example, in Table 1 under Poor Acceleration, the ignition system is listed as a probable cause of the trouble. In the Ignition System Trouble Shooting Chart under Poor Acceleration, all the ignition system items that affect acceleration are listed. These items should be all checked before proceeding to the next probable system listed in Table 1.

Table 1—General Engine Trouble Shooting

Engine Will Not Crank

The cause of this trouble is usually in the starting system (Part 7–Chapter 2).

If the starting system is not at fault, check for a hydrostatic lock or a seized engine. Remove the spark plugs, then attempt to crank the engine with the starter. If the engine cranks, it indicates that water is leaking into the cylinders. Remove the cylinder head and inspect the gasket and/or head for cracks. Also examine the cylinder block for cracks.

Engine Cranks Normally, But Will Not Start

Check the fuel supply.

If there is sufficient fuel in the tank, the cause of the trouble probably lies in either the ignition or the fuel system.

To isolate the cause:

Remove the ignition wire from one spark plug, and insert a piece of proper sized metal rod in the insulator so that it protrudes from the insulator. With the ignition on and the starter cranking the engine, hold the end of the rod approximately 3/16 inch from the cylinder block.

If there is no spark or a weak spark, the cause of the trouble is in the ignition system (Part 2—Chapter 1).

If the spark is good, check the spark plugs (Part 2—Chapter 1).

If the spark plugs are not at fault, check the fuel system (Part 2—Chapter 2).

If the fuel system is not at fault, check the valve timing (page 1-17).

Engine Starts, But Fails To Keep Running

If the engine starts and runs for a few seconds, then stops, check the:

Fuel system (Part 2—Chapter 2).

Ignition system (Part 2—Chapter 1).

Engine Runs, But Misses

First, determine if the miss is steady or erratic and at what speed the miss occurs by running the engine at various speeds under load.

MISSES STEADY AT ALL SPEEDS. Isolate the miss by running the engine with one cylinder not firing. This is done by running the engine with the ignition wire removed from one spark plug at a time, until all cylinders have been checked. Ground the spark plug wire removed.

If the engine speed changes when a particular cylinder is shorted out, that cylinder was delivering power before being shorted out. If no change in the engine operation is evident, the miss was caused by that cylinder not delivering power before being shorted out, check the:

Ignition system (Part 2—Chapter 1).

Engine compression to determine which mechanical component of the engine is at fault (page 1-9).

MISSES ERRATICALLY AT ALL SPEEDS. If the miss cannot be isolated in a particular cylinder, check the:

Exhaust gas control valve (page 1-10).

Ignition system (Part 2—Chapter 1).

Fuel system (Part 2—Chapter 2).

Engine compression to determine which mechanical component of the engine is at fault (page 1-9).

Exhaust system for restrictions (page 1-30).

Cooling system for internal leaks and/or for a condition that prevents the engine from reaching normal operating temperature (Part 2—Chapter 3).

Table 1—General Engine Trouble Shooting (cont'd)

Engine Runs, But Misses (cont'd)

MISSES AT IDLE ONLY. Check the:
- Fuel system (Part 2—Chapter 2).
- Ignition system (Part 2—Chapter 1).
- Vacuum booster pump, lines and fittings for leaks.
- Valve lash adjustment (page 1-15).
- Engine compression for low compression (page 1-9).

MISSES AT HIGH SPEED ONLY. Check the:
- Ignition system (Part 2—Chapter 1).
- Fuel system (Part 2—Chapter 2).
- Cooling system for overheating or internal leakage (Part 2—Chapter 3).

Rough Engine Idle

- Valve lash (page 1-15).
- Exhaust gas control valve (page 1-10).
- Vacuum booster pump (Part 2—Chapter 2).
- Ignition System (Part 2—Chapter 1).
- Leaking power brake vacuum booster (Part 6—Chapter 2).
- Fuel system (Part 2—Chapter 2).
- Loose engine mounts (Part 1—Chapter 2 or 3).
- Improper cylinder head bolt torque.

Poor Acceleration

- Ignition system (Part 2—Chapter 1).
- Fuel system (Part 2—Chapter 2).
- Exhaust gas control valve (page 1-10).
- Valve lash adjustment (page 1-15).
- Dragging brakes (Part 6—Chapter 1).
- Slipping clutch (Conventional and Overdrive Transmission) (Part 3—Chapter 1).
- Improper adjustment of the Fordomatic transmission.

Engine Does Not Develop Full Power, Or Has Poor High Speed Performance

Determine if the trouble exists when the engine is cold, at normal operating temperature, or at all engine temperatures.

ENGINE COLD
- Exhaust gas control valve (page 1-10).
- Fuel system (Part 2—Chapter 2).
- Cooling system if the engine reaches operating temperature slowly (Part 2—Chapter 3).

ENGINE AT NORMAL OPERATING TEMPERATURE
- Exhaust gas control valve (page 1-10).
- Fuel system (Part 2—Chapter 2).

ALL ENGINE TEMPERATURES
- Engine compression (page 1-9).
- Ignition system (Part 2—Chapter 1).
- Fuel system (Part 2—Chapter 2).
- Valve lash adjustment (page 1-15).
- Cam lobe lift (page 1-19).
- Valve timing (page 1-17).
- Cooling system if the engine overheats (Part 2—Chapter 3).

Table 1—General Engine Trouble Shooting (cont'd)

Engine Does Not Develop Full Power, Or Has Poor High Speed Performance (cont'd)

Excessive back pressure in the exhaust system.
Torque converter stall speed.
Torque converter fails to lock up at high speeds.
Brake adjustment (Part 6—Chapter 1).
Tire pressure (Part 4—Chapter 3).
Excessive carbon in engine.

Excessive Fuel Consumption

Determine the actual fuel consumption with test equipment installed in the car.

If the test indicates that the fuel consumption is not excessive, demonstrate to the owner how improper driving habits will affect fuel consumption.

If the test indicates that the fuel consumption is excessive, make the preliminary checks listed below before proceeding to the fuel and ignition systems.

PRELIMINARY CHECKS

Tires (Part 4—Chapter 3).
Wheel alignment (Part 4—Chapter 1).
Brakes (Part 6—Chapter 1).
Exhaust gas control valve (page 1-10).
Odometer calibration (Part 8—Chapter1).
Ignition timing (Part 2—Chapter 1).
Valve lash (page 1-15).

FUEL SYSTEM (Part 2—Chapter 2)

IGNITION SYSTEM (Part 2—Chapter 1)

ENGINE COMPRESSION (page 1-9)

COOLING SYSTEM (Part 2—Chapter 3)

TORQUE CONVERTER STALL SPEED

TORQUE CONVERTER CONTINUES TO CONVERT AT LOCKUP SPEED

Engine Overheats

Temperature sending unit (Part 8—Chapter 1).
Temperature gauge (Part 8—Chapter 1).
Exhaust gas control valve (page 1-10).
Cylinder head bolt torque (Part 1—Chapter 2 or 3).
Cooling system (Part 2—Chapter 3).
Ignition timing (Part 2—Chapter 1).
Valve timing (page 1-17).
Valves (page 1-14).
Exhaust system (page 1-30).
Brake adjustment (Part 6—Chapter 1).

Engine Fails To Reach Normal Operating Temperature

Temperature sending unit (Part 8—Chapter 1).
Temperature gauge (Part 8—Chapter 1).
Cooling system (Part 2—Chapter 3).

2. TUNE-UP

A tune-up is a systematic procedure for testing various engine components, and, if necessary, bringing them within recommended specifications to restore engine efficiency and performance.

The Tune-Up Schedule (Table 2) is applicable for either a minor or major tune-up as governed by the condition of the engine. The reference after each operation refers to that part of the manual which describes, in detail, the procedure to be followed. Perform the operations in the sequence listed.

Table 2—Tune-Up Schedule

Operation	Perform on		Recommended Procedure
	Minor	Major	
BATTERY AND CABLES Clean cables, connectors, and terminals.		x	Part 7 Chapter 1
Inspect cables for worn insulation.		x	
Inspect battery for cracks and leaks.		x	
Check battery state of charge.	x	x	
Grease battery cables.		x	
GENERATOR Check generator output.		x	Part 7 Chapter 1
REGULATOR Visually inspect wiring.	x	x	Part 7 Chapter 1
Check current and voltage.		x	
ENGINE COMPRESSION Take compression reading of each cylinder.		x	Page 1-9
SPARK PLUGS Clean, adjust, and test.	x	x	Part 2 Chapter 1
INTAKE MANIFOLD Check and adjust manifold bolt torque.		x	Part 1 Chapter 2 or 3
VALVE LASH Check and adjust intake and exhaust valve lash.	x	x	Page 1-15
DISTRIBUTOR Check and adjust breaker arm spring tension.		x	Part 2 Chapter 1
Check condition of contact points.	x	x	
Check and adjust point dwell.	x	x	
Check and adjust vacuum advance.		x	
Check and adjust mechanical advance (8-cyl. engines).		x	
Test distributor circuit and point resistance.		x	
Clean and inspect distributor cap and rotor.	x	x	
CONDENSER Check for leakage, series resistance, and capacity.		x	Part 2 Chapter 1
COIL AND RESISTOR Check coil output.		x	Part 2 Chapter 1
Check the voltage drop at the resistor.		x	
TIMING Check and adjust ignition timing.	x	x	Part 2 Chapter 1
VACUUM Check manifold vacuum.	x	x	Page 1-9
FUEL PUMP Clean fuel pump bowl.	x	x	Part 2 Chapter 2
Test fuel pump pressure.		x	
Test fuel pump capacity.		x	
CARBURETOR Clean carburetor air cleaner filter.	x	x	Part 2 Chapter 2
Clean carburetor fuel bowl.		x	
Adjust float setting.		x	
Check fuel level (Holley and Ford Carburetors).		x	
Adjust engine idle speed.	x	x	
Adjust idle fuel mixture.	x	x	
FUEL FILTER Clean fuel line filter.		x	Part 2 Chapter 2
EXHAUST ANALYSIS Perform an exhaust gas analysis.		x	Page 1-10
IGNITION SYSTEM RESISTANCE TEST Perform a primary circuit and secondary circuit resistance test.		x	Part 2 Chapter 1
COOLING SYSTEM Check and adjust the tension of the drive belts.	x	x	Part 2 Chapter 3
Check condition of hoses and radiator cap.	x	x	

Manifold Vacuum Test

A test of manifold vacuum is a valuable aid in determining the condition of an engine and also in helping to locate the cause of poor engine performance. To test manifold vacuum:

1. Operate the engine for a minimum of ½-hour at 1200 rpm.
2. Install an accurate, sensitive vacuum gauge on the fuel pump end of the fuel pump vacuum line.
3. Run the engine at recommended idle rpm.
4. Check the vacuum reading on the gauge.

TEST CONCLUSIONS. Manifold vacuum is affected by carburetor adjustment, valve timing, the condition of the valves, cylinder compression, and leakage of the manifold, carburetor, or cylinder head gaskets.

Because abnormal gauge readings may indicate that more than one of the above factors is at fault, exercise caution in analyzing an abnormal reading. For example, if the vacuum is low, the correction of one item may increase the vacuum enough so as to indicate that the trouble has been corrected. It is important, therefore, that each cause of an abnormal reading be investigated and further tests conducted where necessary in order to arrive at the correct diagnosis of the trouble.

Table 3 lists various types of readings and their possible causes. This table is merely a guide, however, and not a firm standard.

Allowance should be made for the affect of altitude on the gauge reading. The engine vacuum will decrease with an increase in altitude.

Engine Compression Test

1. Be sure the battery is good. Operate the engine for a minimum of ½ hour at 1200 rpm. Turn the ignition switch off, then remove all the spark plugs.
2. Set the throttle (primary throttle plates only on 4-barrel carburetor) and choke in the wide open position.
3. Install a compression gauge in No. 1 cylinder.
4. Crank the engine until the gauge registers a maximum reading and record the reading. Note the number of compression strokes required to obtain the maximum reading.
5. Repeat the test on each cylinder, cranking the engine the same number of strokes for each cylinder as was required to obtain a maximum reading on No. 1 cylinder.

TEST CONCLUSIONS. A variation of ± 10 pounds from specified pressure is satisfactory. However, the compression of all cylinders should be uniform within 10 pounds.

A reading of more than 10 pounds above normal indicates excessive deposits in the cylinder.

A reading of more than 10 pounds below normal indicates leakage at the head gasket, rings, or valves.

A low even compression in two adjacent cylinders indicates a head gasket leak. This should be checked before condemning the rings or valves.

To determine whether the rings or the valves are at fault, squirt the equivalent of a tablespoon of heavy oil in the combustion chamber, then crank the engine to

Table 3—Manifold Vacuum Gauge Readings

Gauge Reading	Engine Condition
18-20 inches (6-cylinder engine) 19-20 inches (8-cylinder engine)	Normal
Low and steady	Loss of power in all cylinders caused possibly by late ignition or valve timing, or loss of compression due to leakage around the piston rings.
Very low	Manifold, carburetor, or cylinder head gasket leak.
Needle fluctuates steadily as speed increases.	A partial or complete loss of power in one or more cylinders caused by a leaking valve, leaking head or manifold gasket, a defect in the ignition system, a weak valve spring.
Gradual drop in reading at engine idle.	Restriction in the exhaust system.
Intermittent fluctuation	An occasional loss of power possibly caused by a defect in the ignition system or a sticking valve.
Slow fluctuation or drifting of the needle.	Improper idle mixture adjustment, carburetor or manifold gasket leak, or possibly late valve timing.

distribute the oil and repeat the compression test. The oil will temporarily seal leakage past the rings. If approximately the same reading is obtained, the rings are satisfactory, but the valves are leaking. If the compression has increased 10 pounds or more over the original reading, there is leakage past the rings.

During a compression test, if the pressure fails to climb steadily and remains the same during the first two successive strokes, but climbs higher on the succeeding strokes, or fails to climb during the entire test, it indicates a sticking or stuck valve.

Exhaust Gas Analysis

An exhaust gas analysis is a method of testing the ratio of fuel and air entering the cylinders, and the adjustment and performance of the carburetor. ***However it cannot be used to calibrate a carburetor.***

As there are various types of analyzers, follow the instructions of the manufacturer. On a dual exhaust system, install the analyzer in the outlet pipe opposite the side of the system that contains the exhaust gas control valve. For example, if the valve is on the right side, install the analyzer in the left muffler outlet pipe.

3. MANIFOLDS AND EXHAUST GAS CONTROL VALVE

Hot exhaust gases are diverted into the intake manifold to provide the heat necessary to vaporize the incoming fuel-air mixture and to minimize engine stalling and carburetor icing during cold engine operation. The hot exhaust gases are directed into the intake manifold by a thermostatically controlled valve located in the exhaust manifold.

On the 6-cylinder engine, the hot exhaust gases are directed into a chamber (heat riser) which is cast into the intake manifold section where the carburetor and exhaust manifold are attached.

All 8-cylinder intake manifolds contain a passage through the center section and under the carburetor, through which the hot exhaust gases are directed.

Manifolds

Clean the manifolds in a suitable solvent, then dry them with compressed air. Scrape all carbon deposits from the center exhaust passage below the carburetor heat riser of the intake manifolds. This carbon acts as an insulator restricting the heating action of the hot exhaust gases.

Blow out the automatic choke passages of the 8-cylinder intake manifolds with compressed air. Make sure the passages are completely open, otherwise choke operation will be impaired.

On intake manifolds used with a four-barrel carburetor, check the fresh air heat tube that passes through the manifold for leaks, as follows:

Adjust a vacuum pump to obtain a steady reading of three inches of vacuum. Block off one opening of the tube with a moistened finger, then connect the vacuum pump hose to the other opening. If the pump does not maintain a steady reading there is a leak in the tube and the tube should be replaced.

Inspect the manifolds for cracks, leaks, or other defects that would make them unfit for further service. Replace all studs that are stripped or otherwise damaged.

Remove all filings and foreign matter that may have entered the manifolds as a result of repairs.

Exhaust Gas Control Valve

Check the thermostatic spring to make sure it is

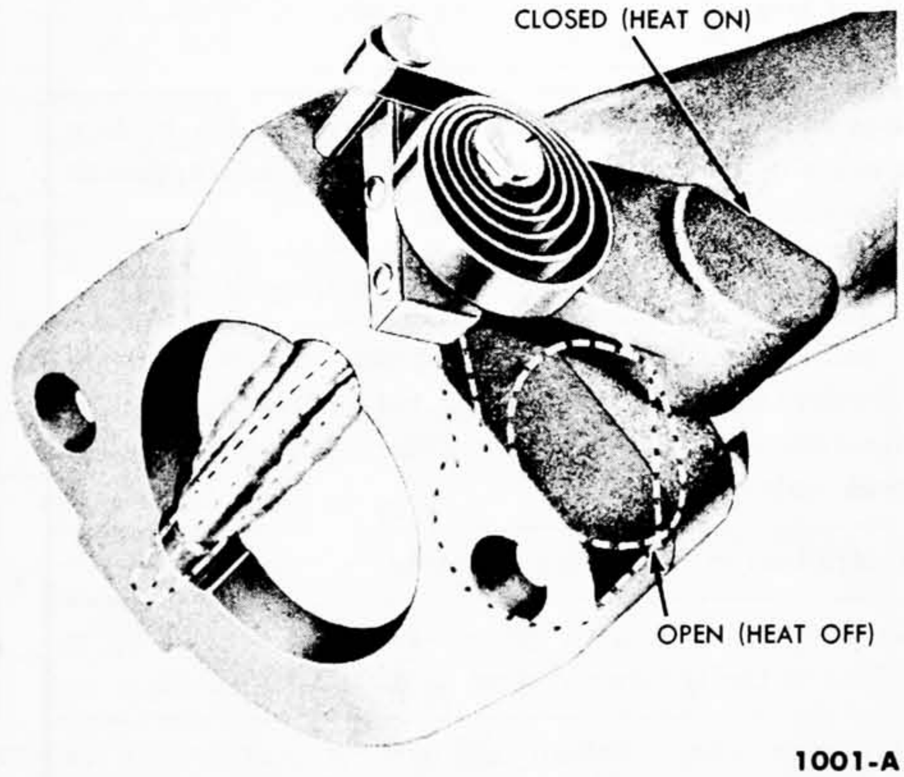

Fig. 1—Exhaust Gas Control Valve—8-Cylinder Engines

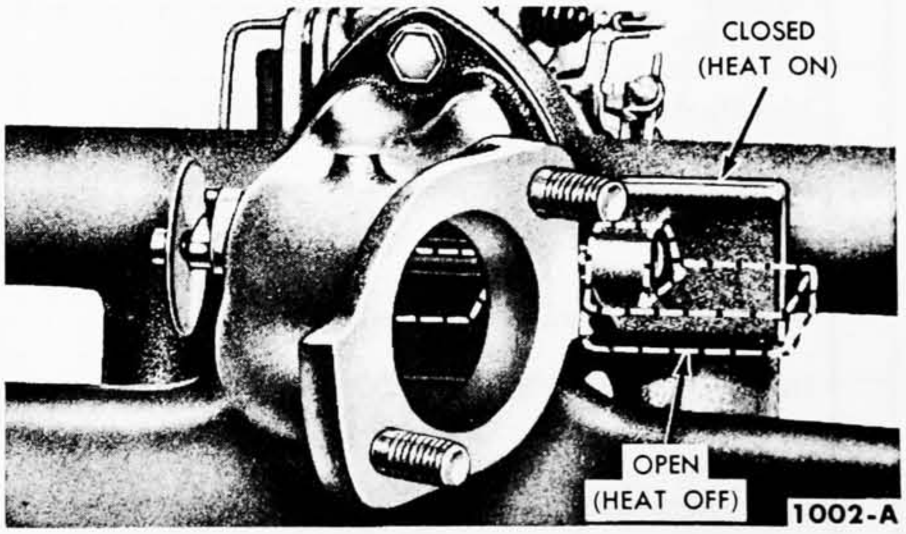

Fig. 2—Exhaust Gas Control Valve—6-Cylinder Engine

hooked on the stop pin. The spring stop is at the top of the valve housing when the valve is properly installed. The action of the valves is illustrated in Figs. 1 and 2.

Check to make sure the spring holds the valve closed when the engine is cold. Actuate the counterweight by hand to make sure it moves freely through approximately 90° of rotation without binding.

The valve is closed when the engine is at normal operating temperature and running at idle speed. However, a properly operating valve will open when very light finger pressure is applied to the counterweight. Rapidly accelerate the engine to make sure the valve momentarily opens. The valve is designed to open when the engine is at normal operating temperature and is operated at high rpm. Free stuck valves with a penetrating oil or graphite mixture.

4. ROCKER ARM ASSEMBLY, PUSH RODS, AND CYLINDER HEADS

Rocker Arm Assembly

Clean all the parts thoroughly. Make sure that all oil passages are open.

Check the clearance between each rocker arm and the shaft by checking the I. D. of the rocker arm bore and the O. D. of the shaft. If the clearance between any rocker arm and the shaft approaches 0.006 inch (wear limit), replace the shaft and/or the rocker arm. Inspect the shaft and the rocker arm bore for nicks, scratches, scores, or scuffs. Dress up minor surface defects with a hone.

Inspect the pad at the valve end of the rocker arms for a grooved radius. If the pad is grooved, replace the rocker arm. ***Do not attempt to true this surface by grinding.***

Check the rocker adjusting screws and the push rod end of the rocker arms for stripped or broken threads, and the ball end of the adjusting screw for nicks, scratches, or excessive wear.

Check for broken locating springs and inspect the oil drain tube for cracks or sharp bends.

Push Rods

Check the ball end and the socket end of the push rods for nicks, grooves, roughness, or excessive wear.

The push rods can be visually checked for straightness while they are installed in the engine by rotating them with the valve closed. They also can be checked between ball and cup centers with a dial indicator (Fig. 3). If the runout exceeds 0.020 inch at any point, discard the rod. ***Do not attempt to straighten push rods.***

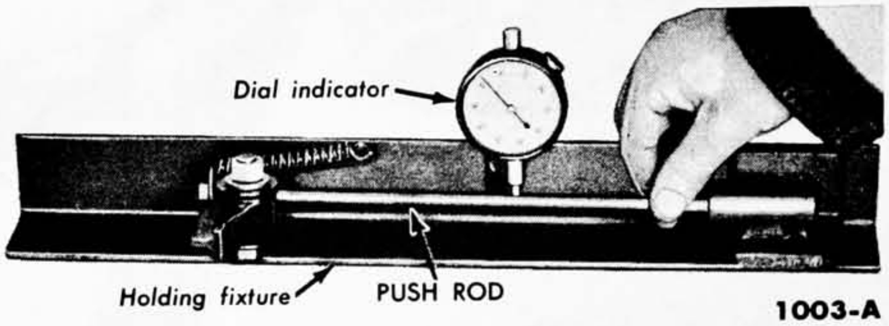

Fig. 3—Push Rod Runout—Typical

Cylinder Heads

To protect the machined surfaces of the cylinder head, do not remove the holding fixtures while the head is off the engine.

CLEANING AND INSPECTION. With the valves installed to protect the valve seats, remove carbon deposits from the combustion chambers and valve heads with a scraper and a wire brush. ***Be careful not to scratch the cylinder head gasket surface.*** After the valves are removed, clean the valve guide bores with a valve guide cleaning tool. Use cleaning solvent to remove old gasket sealer, dirt, and grease.

Check the head for cracks, and the gasket surface for burrs and nicks. Replace the head if it is cracked. ***Do not plane or grind more than 0.010 inch from the cylinder head gasket surface.*** Remove all burrs or scratches with an oil stone.

Cylinder Head Flatness

Check the flatness of the cylinder head gasket surface (Fig. 4). Specifications for flatness are 0.006 inch maximum over all, or 0.003 inch in any 6 inches.

Valve Seat Runout

Check the valve seat runout with an accurate gauge (Fig. 5). Follow the instructions of the gauge manufacturer. The total runout should not exceed 0.0025 inch (wear limit).

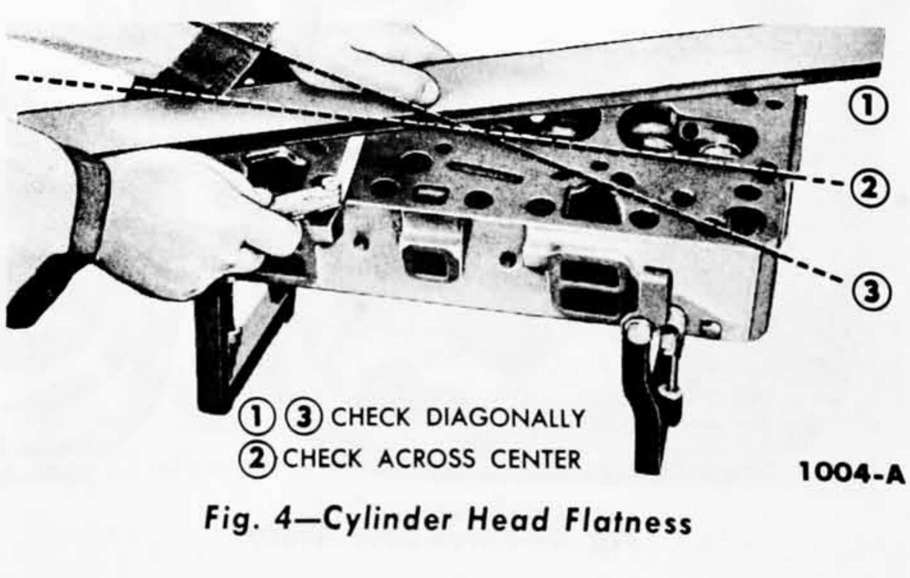

Fig. 4—Cylinder Head Flatness

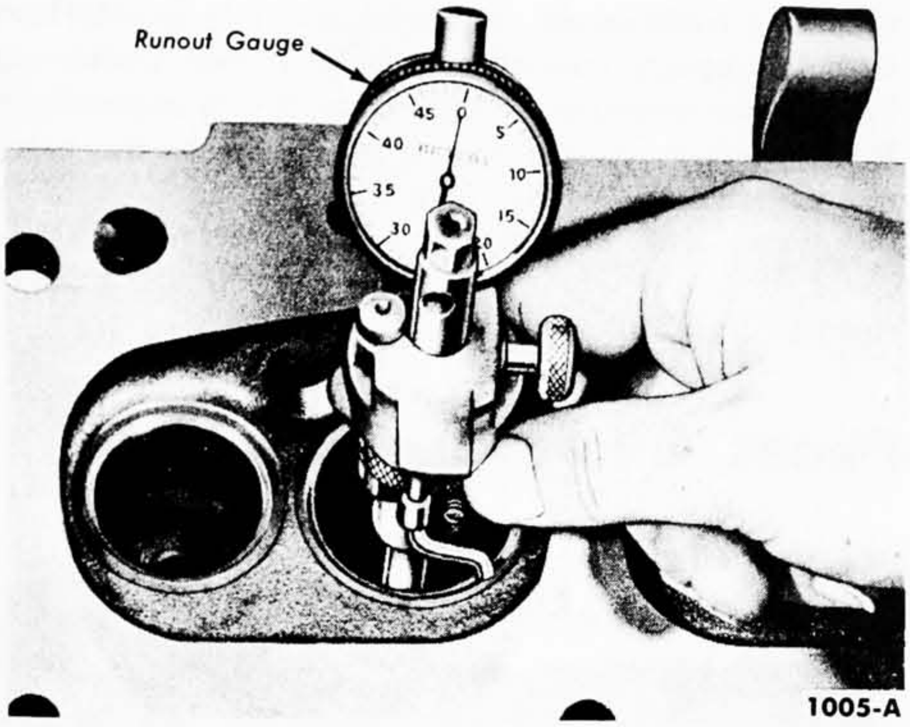

Fig. 5—Valve Seat Runout—Typical

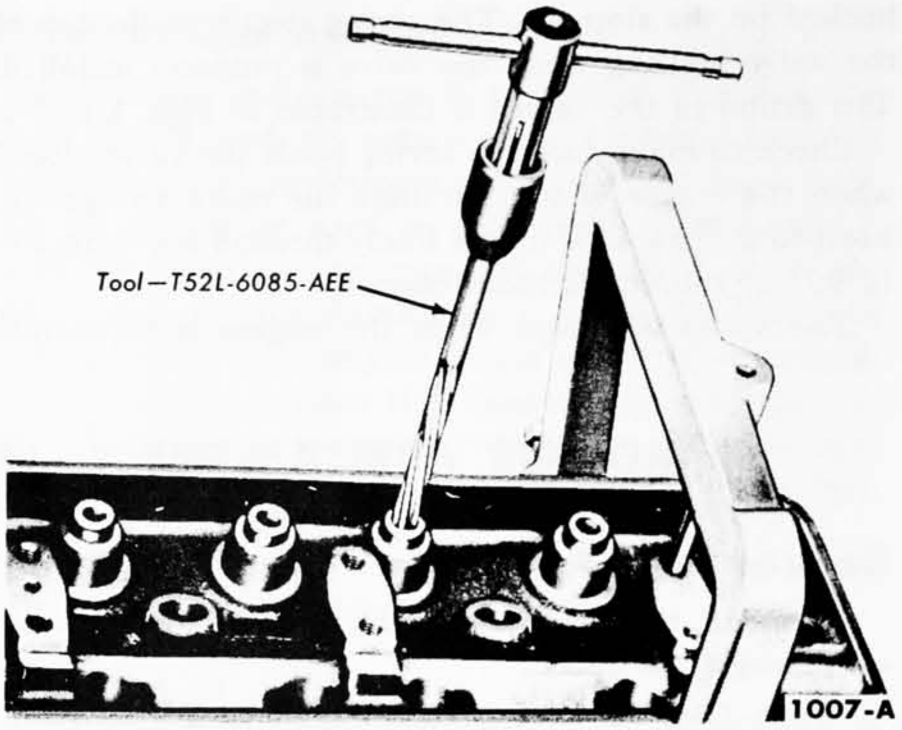

Fig. 7—Reaming Valve Guides

Valve Seat Width

Measure the valve seat width (Fig. 6). The intake valve seat width limits are 0.060-0.080 inch and the exhaust valve seat width limits are 0.070-0.090 inch.

REAMING VALVE GUIDES. If it becomes necessary to ream a valve guide (Fig. 7) to install a valve with an oversize stem, a reaming kit is available which contains the following reamer and pilot combinations: a 0.003-inch O.S. reamer with a standard diameter pilot, a 0.015-inch O.S. reamer with a 0.003-inch O.S. pilot, and a 0.030-inch reamer with a 0.015-inch O.S. pilot

When going from a standard size valve to an oversize valve, always use the reamers in sequence. ***Always grind the valve seat after the valve guide is reamed.***

REFACING VALVE SEATS. Refacing of the valve seats should be closely coordinated with the refacing of the valve face so the finished seat will match the valve face and be centered. This is important so that the valve and seat will have a good compression tight fit. Be sure that the refacer grinding wheels are properly dressed.

Grind the valve seat to a true 45° angle (Fig. 8). Remove only enough stock to clean up pits, grooves, or to correct the valve seat runout. After the seat is ground, measure the seat width (Fig. 6). Narrow the seat, if necessary to bring it within limits.

If the valve seat width exceeds the maximum limit, remove enough stock from the top edge and/or bottom edge of the seat to reduce the width to specifications (Fig. 8). Use a 30° angle grinding wheel to remove stock from the bottom of the seat (raise the seat). Use a 60° angle wheel to remove stock from the top of the seat (lower the seat).

The finished valve seat should contact the approximate center of the valve face. To determine where the valve seat contacts the face, coat the seat with Prussian blue, then set the valve in place. Rotate the valve with

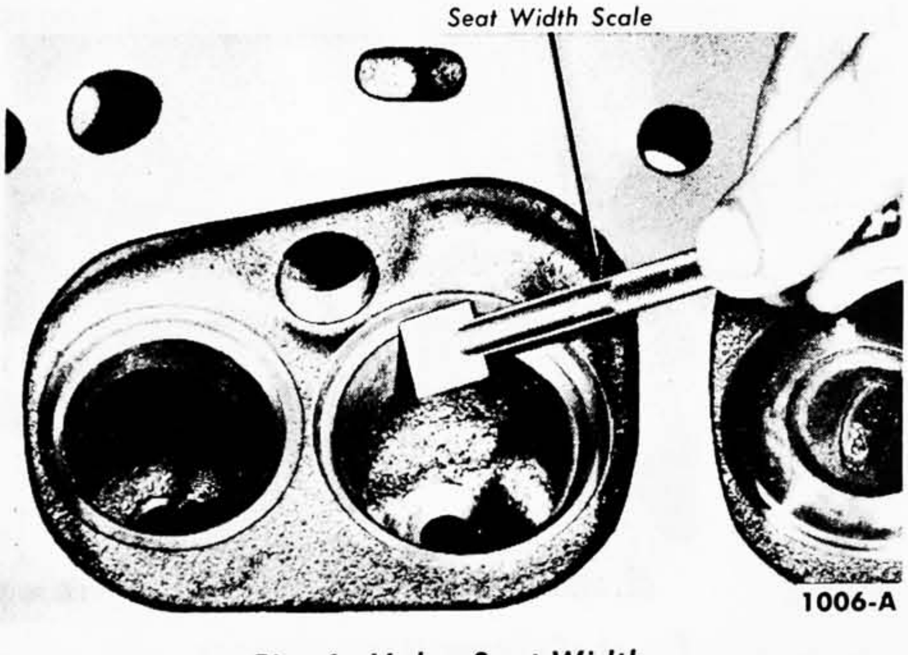

Fig. 6—Valve Seat Width

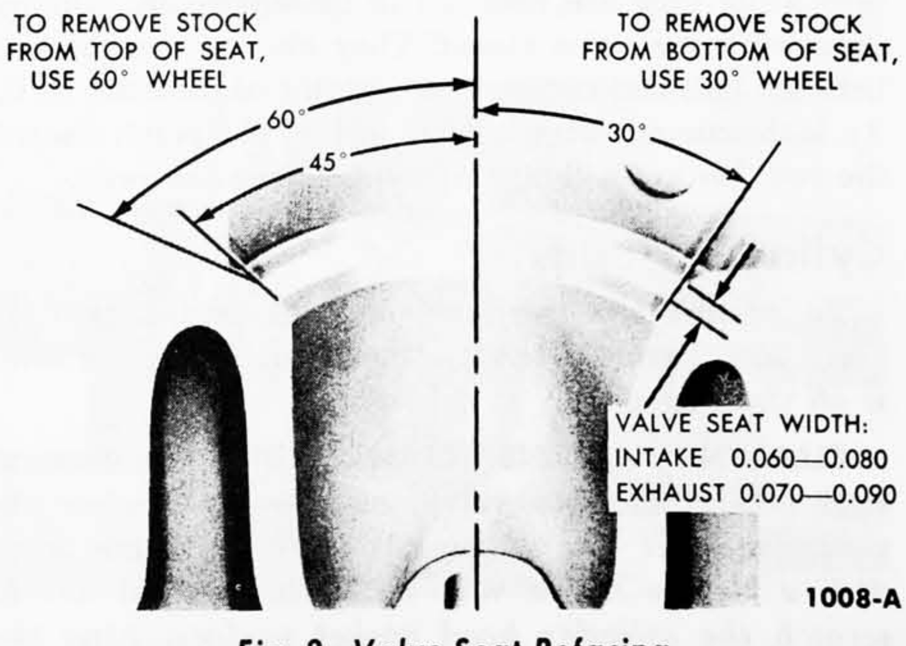

Fig. 8—Valve Seat Refacing

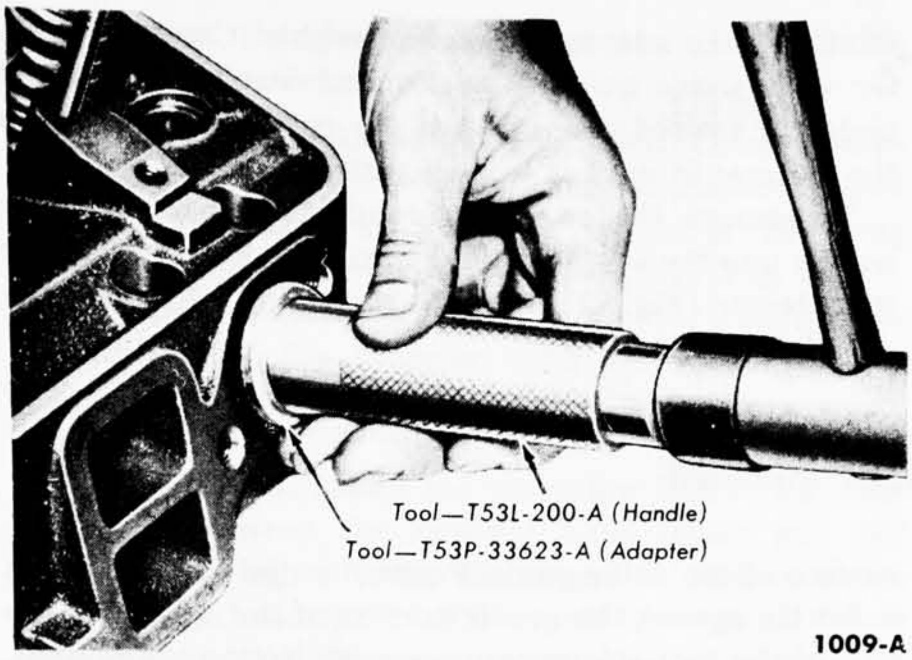

Fig. 9—Water Outlet Plug Installation—8-Cylinder Engines

light pressure. If the blue is transferred to the center of the valve face, the contact is satisfactory. If the blue is transferred to the top edge of the valve face, lower the valve seat. If the blue is transferred to the bottom edge of the valve face, raise the valve seat.

After refacing the valve seat, it is good practice to lightly lap in the valve with a medium grade lapping compound. Remove all the compound from the valve and seat after the lapping operation.

WATER OUTLET CONNECTION —8- CYLINDER ENGINES. The cylinder head assemblies of each particular engine are interchangeable from one cylinder bank to the other, provided a plug is installed in the water

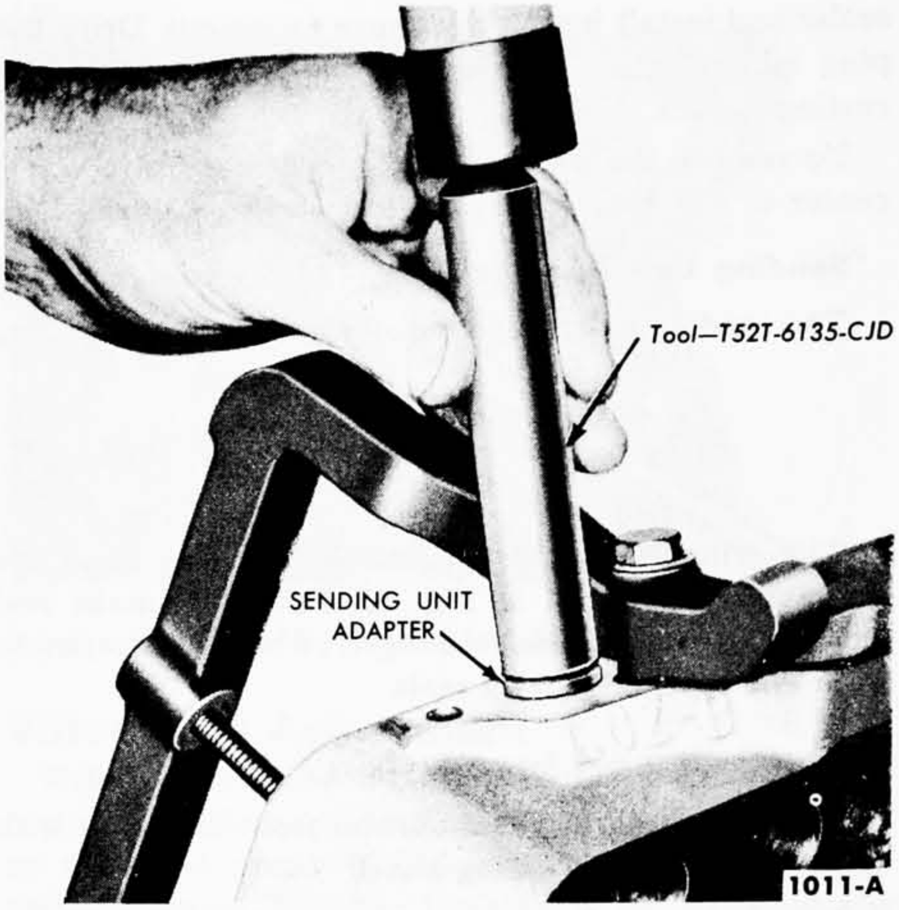

Fig. 11—Temperature Sending Unit Adapter Installation—8-Cylinder Engines

outlet at the rear of the right head and a water temperature sending unit adapter is installed in the water opening at the rear of the left head. Replacement cylinder heads do not have either the plug or adapter installed; therefore, they can be readily adapted for either right or left installations.

Water Outlet Plug

Install the plug (Fig. 9). Clean the plug recess thoroughly. Coat the flange of the plug with water resistant

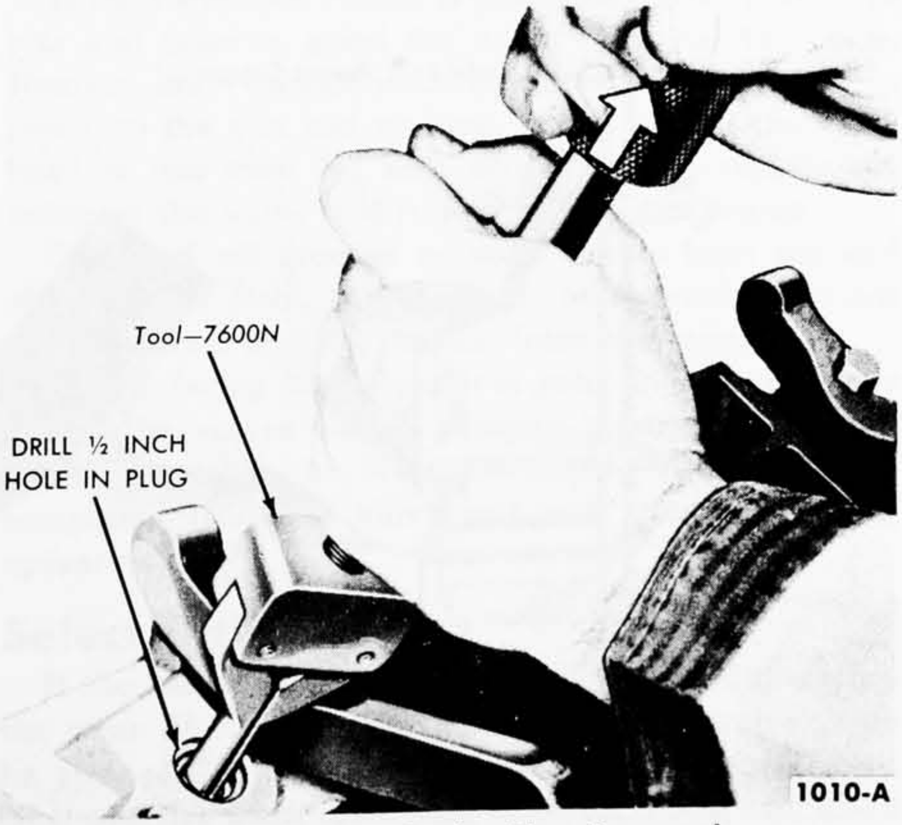

Fig. 10—Water Outlet Plug Removal—8-Cylinder Engines

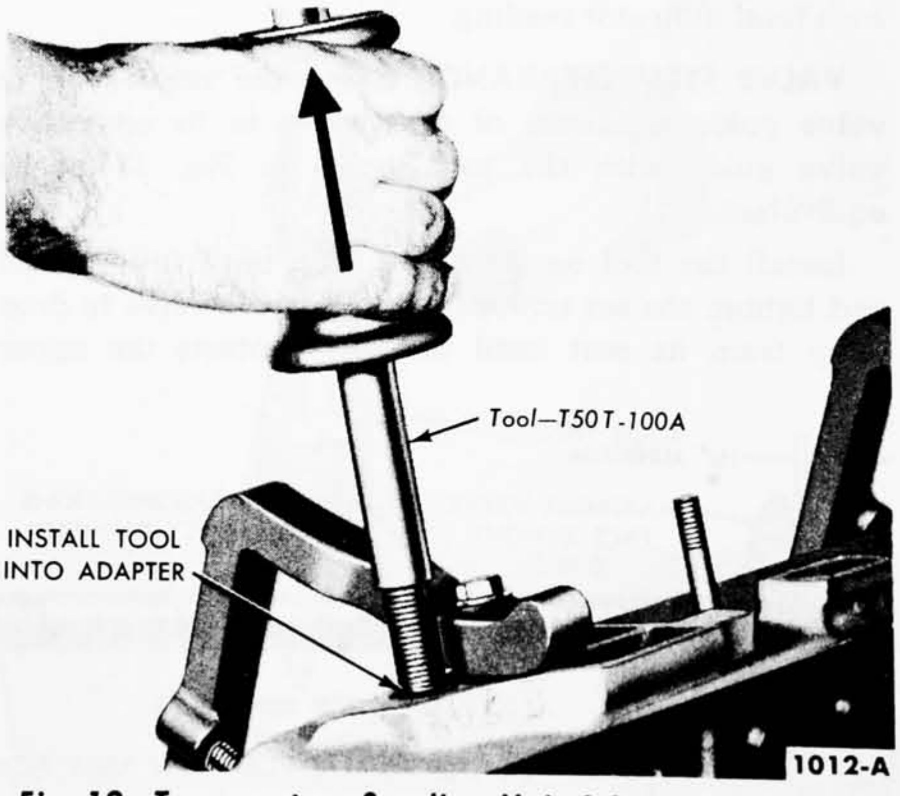

Fig. 12—Temperature Sending Unit Adapter Removal—8-Cylinder Engines

sealer and install it with the flange facing out. Drive the plug in until the flange is flush or slightly below the casting surface.

To remove the water plug, drill a ½-inch hole in the center of the plug and remove it as shown in Fig. 10.

Sending Unit Adapter

The sending unit adapter is installed as shown in Fig. 11. Clean the adapter recess thoroughly. Coat the adapter with water resistant sealer and install it with the undercut toward the inside of the cylinder head. Drive the adapter in until it is flush with the casting surface.

To remove the adapter, thread the impact hammer handle into the adapter, then tighten the lock nut against the adapter (Fig. 12). Remove the adapter by using the slide hammer.

5. VALVE MECHANISM

The critical inspection points and tolerances of the valve are illustrated in Fig. 13. Both the intake and exhaust valves are the rotating type which incorporate umbrella-type valve stem seals.

Cleaning and Inspection

Remove all carbon and varnish from the valve with a fine wire brush or buffing wheel.

Inspect the valve face and the edge of the valve head for pits, grooves, scores, or other defects. Inspect the stem for a bent condition and the end of the stem for grooves or scores. Check the valve head for signs of burning or erosion, warpage, and cracking. Defects, such as minor pits, grooves, etc., may be removed. Discard valves that are severely damaged.

Inspect the valve springs, valve spring retainers, locks, and sleeves for defects. Discard any defective parts.

VALVE FACE RUNOUT. Check the valve face runout (Fig. 14). The recommended limit for runout is 0.0015 inch total indicator reading. The wear limit is 0.002 inch total indicator reading.

VALVE STEM CLEARANCE. Check the valve stem to valve guide clearance of each valve in its respective valve guide with the tool shown in Fig. 15 or its equivalent.

Install the tool on the valve stem until fully seated and tighten the set screw, then permit the valve to drop away from its seat until the tool contacts the upper surface of the valve guide. Position a dial indicator with a flat tip against the center portion of the spherical section of the tool at approximately 90° to the valve stem. Move the tool back and forth on a plane that parallels normal rocker action and take the indicator reading without lifting the tool from the valve guide upper surface. Divide the indicator reading by 2 (division factor of the tool) to obtain the actual stem clearance.

The recommended intake valve stem clearance limits are 0.001-0.0024 inch. The wear limit is 0.0045 inch. The recommended exhaust valve stem clearance limits are 0.0023-0.0037 inch. The wear limit is 0.0065 inch. If the clearance approaches the wear limit, try a new valve.

VALVE SPRING PRESSURE. Check the spring for proper pressure (Fig. 16). The springs should exert a pressure of 71-79 pounds when compressed to 1.780 inches (wear limit 64 pounds) or a pressure of 161-177 pounds when compressed to 1.390 inches (wear limit 145 pounds). Weak valve springs cause poor engine

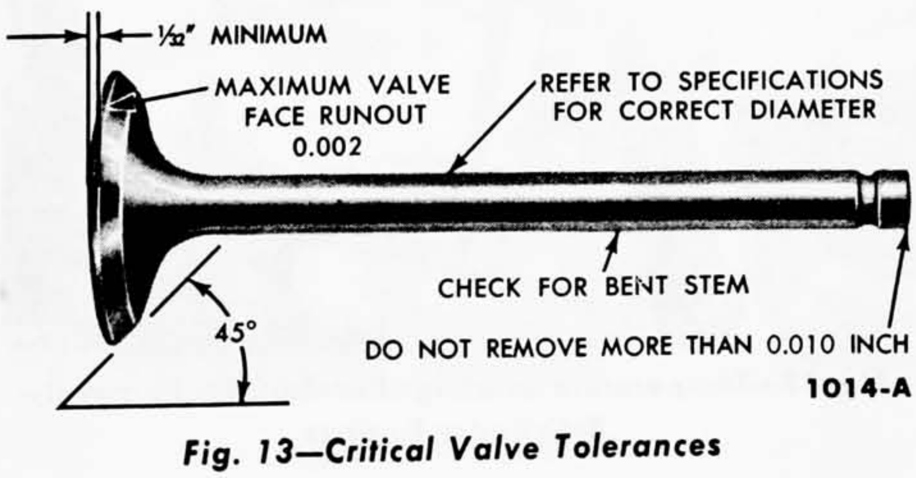

Fig. 13—Critical Valve Tolerances

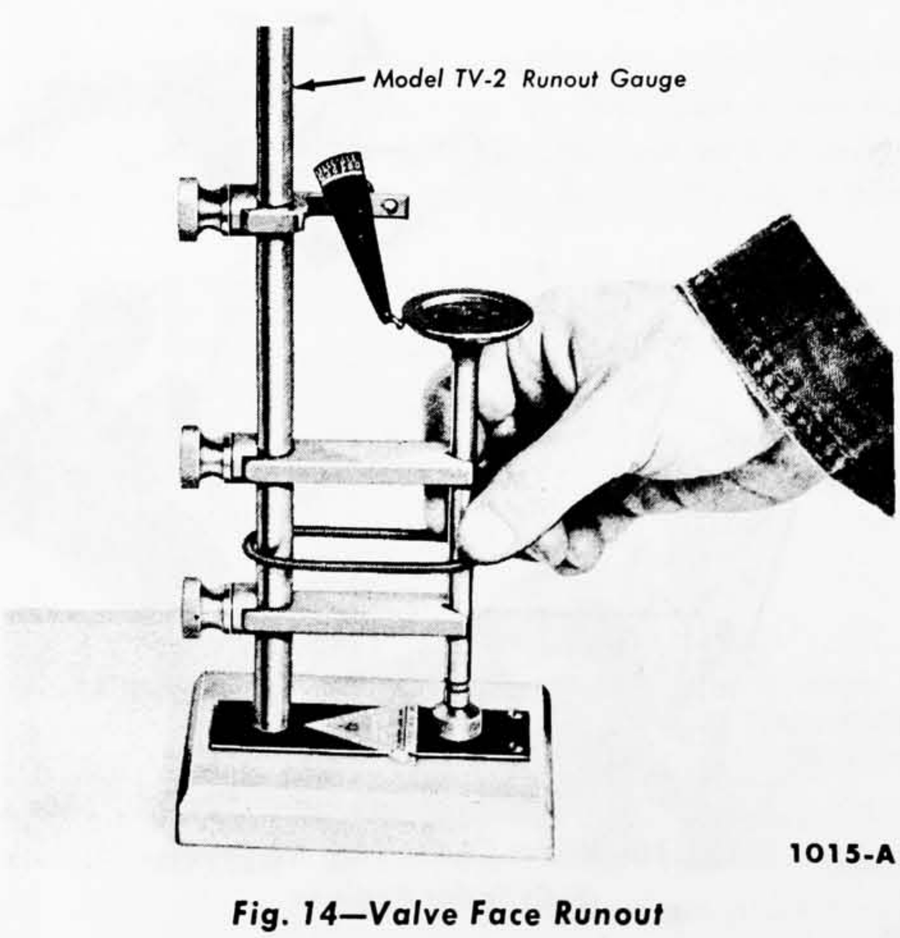

Fig. 14—Valve Face Runout