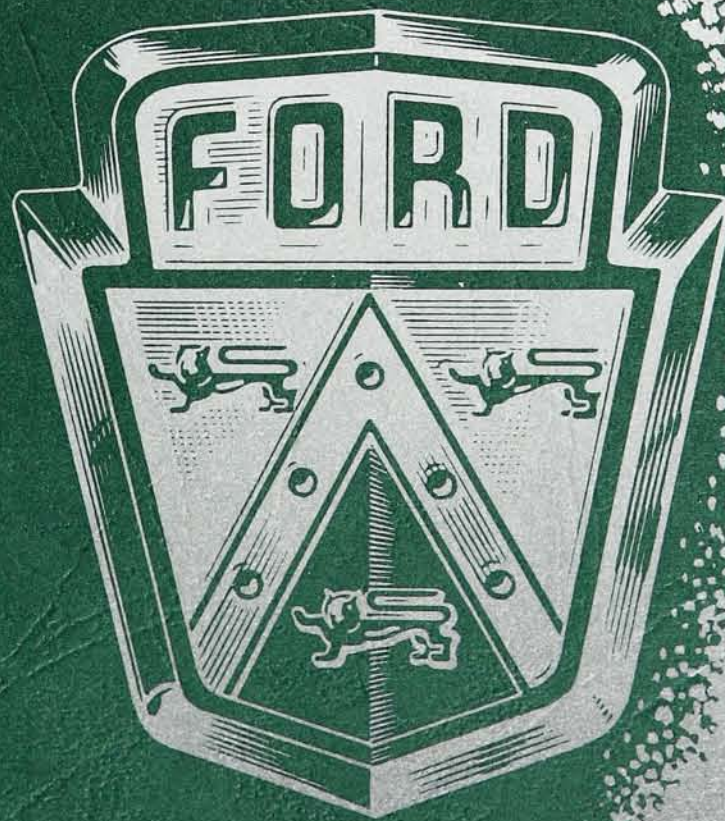


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FORD CAR SHOP MANUAL



FORD DIVISION • FORD MOTOR COMPANY

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1955 Ford Car Shop Manual

EAN: 978-1-60371-004-6

ISBN: 1-60371-004-3

Forel Publishing Company, LLC
3999 Peregrine Ridge Ct.
Woodbridge, VA 22192

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FORD CAR SHOP MANUAL



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FORD DIVISION • FORD MOTOR COMPANY

November, 1955

FOREWORD

This manual contains complete service information for all 1955 Ford Passenger Cars and the new Ford Thunderbird. Step-by-step procedures for trouble shooting, cleaning and inspecting, repairing, and replacing the various parts, assemblies, and systems on these vehicles are presented here. This manual also contains maintenance and lubrication data as well as a tabulation of service specifications. Detailed illustrations of many of the service operations are given here. Disassembled views of the principal units show the various parts in the order of their disassembly or assembly. In many cases, a glance at these illustrations will tell you all you need to know about how the parts go together.

The material presented in this manual is arranged in five main parts as listed in the Table of Contents on the following pages. Under each part, chapter headings covering the major subjects in each part are given. The section headings under each chapter title indicate the subjects covered in the chapter.

Part ONE—POWER PLANT—has to do with the 6 and 8-cylinder engines and the various systems that are necessary to their operation. These include the fuel, ignition, and cooling systems.

Part TWO—ELECTRICAL AND ACCESSORIES—covers all of the electrical systems and units (except the ignition system) and all of the accessories (except the Overdrive and Fordomatic).

Part THREE—BODIES—contains information on the maintenance and repair of

all body components, including adjustment and alignment of doors, hoods, and fenders. In addition, window glass adjustments are given in this part.

Part FOUR—CHASSIS—contains information on the entire power train (clutch, conventional transmissions, Overdrive, drive lines, rear axles, etc.) and the running gear (frames, springs, suspension, brakes, wheels, tires, steering gear, steering linkages, etc.). Service procedures for the Fordomatic transmission are published in a separate manual.

Part FIVE — MAINTENANCE AND SPECIFICATIONS—gives complete maintenance and lubrication information, and contains all the specifications necessary for the proper servicing of Ford Cars.

Throughout this manual, the top of each left-hand, even-numbered page gives the name of the chapter, and the top of each right-hand, odd-numbered page gives the name of the section involved on the page. Thus, wherever you open the manual, a glance at the top of the two pages will tell you exactly what subject matter is discussed at that point.

This manual has been prepared to help you in doing a good servicing job on Ford Cars. Keep your manual where it will be readily available for reference at all times.

FORD DIVISION
FORD MOTOR COMPANY
SERVICE DEPARTMENT

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Part ONE

POWER PLANT

Chapter

I

General Engine Repair

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Trouble shooting, tune-up, inspection, and repair procedures, applicable to all engines, are given in this chapter. For the removal and installation of engine components, refer to the chapter covering the specific engine.

Inasmuch as a determination of the basic cause of engine trouble should precede any repair work, the trouble

shooting section is presented first. Many defects in engine performance can be attributed directly to a maladjustment of one part, or a combination of parts; therefore, general engine tune-up logically follows the trouble shooting section, and precedes the actual repair work.

1. TROUBLE SHOOTING

Trouble shooting is the application of a definite procedure, in a logical sequence, to locate and eliminate the cause of trouble in a particular system or unit. It should be borne in mind, when trouble shooting, to first look for the obvious causes of trouble such as: an empty gas tank, a wet or cold engine, loose or disconnected wiring, or any other such item that may cause a temporary defect.

The various factors affecting power plant operation are outlined in this section.

a. Engine.

Poor engine performance can be attributed to the engine or to forces on the vehicle that tend to retard its motion. An example of a retarding force is dragging brakes which cause the engine to work harder and results in poor engine performance.

Engine performance depends on proper fuel distribution, correctly timed ignition, normal and uniform compression, properly regulated flow of the fuel-air mixture to the cylinders, and unobstructed flow of exhaust gases.

Engine trouble symptoms are discussed under the headings below with instructions on what to do to correct the above conditions and regain good engine performance.

(1) **ENGINE WILL NOT CRANK.** If the starter does not turn the engine over, or turns it over too slowly to

start, the fault is likely to be in the battery or the starter. Perform the following checks in the order listed, until the cause of the trouble is determined:

(a) **CHECK THE BATTERY.** Try the horn or lights. If they do not operate properly, test the battery. Recharge it, replace it, or check further, as necessary.

(b) **CHECK THE BATTERY CABLES.** Check for loose or corroded connections at the starter, relay, battery, and ground. Clean, tighten, or replace them as necessary.

(c) **CHECK THE RELAY CIRCUIT.** The relay contact surfaces seldom become so badly burned that they will prevent the starter from cranking the engine. However, other wiring may be at fault. Repair as necessary. (Refer to Electrical System Section.)

(d) **CHECK THE STARTER OR STARTER DRIVE.** If the above components are not at fault, the trouble is probably in the starter or starter drive. If the starter is running, but not engaging the flywheel, remove the starter and make the necessary repairs to the starter drive. In rare cases, the starter drive may lock up with the flywheel. This can be corrected by loosening the starter and releasing the starter drive. If the starter does not operate, remove it and make the necessary repairs.

(2) **ENGINE CRANKS, BUT WILL NOT START.** The most probable cause of this trouble is a defect in the

ignition system. The next most likely cause is a malfunction of the fuel system. A simple check will determine which system is at fault. Remove one wire from a spark plug, and insert a piece of proper sized metal rod so it will protrude from the insulator. With the ignition on and the starter turning the engine over, hold the end of the rod approximately $\frac{3}{16}$ -inch from the block. If no spark is obtained, check the ignition system. If a good spark is obtained, check the fuel system.

(a) **NO SPARK.** If no spark was obtained, follow the steps below to determine the cause and make necessary repairs or replacements.

(1) Pull the coil wire from the top of the distributor, and with the ignition on and the engine turning over, see if there is a spark at this point. If there is a good spark, the trouble lies in the distributor cap, rotor, or spark plug wires. See that they are clean, dry, and not defective. Repair or replace as necessary.

(2) If there was no spark in (1) clean the coil tower socket or replace the high tension wire between the coil and distributor and check again. If a weak spark exists, the points are probably arcing. Test the condenser, replace if necessary and adjust the points. If a weak spark persists, test the coil and replace if necessary.

(3) If there was no spark in (2), remove the distributor cap and see if the points are "breaking" and there is an electrical charge to the points. Adjust or replace as necessary. If there is spark at the points, and they break properly, the secondary circuit of the coil is defective. If there is no spark at the points; install a "jumper" between the distributor post of the coil and the distributor, then check for spark at the points. If there is a spark, replace the coil to distributor primary wire. If there is no spark, install a "jumper" between the two primary coil terminals and recheck. Replace the coil if a spark now exists at the points. If not, install a "jumper" between the battery and the battery post of the coil, then check the spark at the points. If a spark exists, the ignition switch or wiring from the switch to the coil is defective and must be repaired or replaced.

(b) **WEAK SPARK.** If the spark test at the spark plug showed a weak spark, perform the following checks in the order listed:

(1) Battery may be weak. Test, recharge, or replace, the battery.

(2) Remove the distributor cap, and check the condition of the points. Adjust, clean, or replace them as necessary. Severely pitted points are usually an indication that the voltage regulator is improperly set or the condenser is faulty.

(3) Check the condition of the rotor, distributor cap, and plug wires. The wires must be clean, dry, and must be fully seated in the terminals. Always replace any wire which is damaged or has corroded terminals.

(4) If the weak spark persists, the coil should be tested and replaced if necessary.

(c) **GOOD SPARK.** If a good spark was observed, check the fuel system as follows:

(1) Check the fuel supply at the fuel tank. Do not attempt any other fuel system checks before doing this.

(2) If there is fuel in the tank, check to see if it is reaching the carburetor. Remove the air cleaner, and look down the carburetor throat while working the throttle by hand. Each time the throttle is worked, a spurt of gasoline should be emitted from the accelerator pump discharge nozzle. If there is fuel at this point, the engine is probably flooded or there is water in the fuel system.

(3) If no accelerator pump discharge is observed in the carburetor throat, loosen the fuel pump to fuel tank line at the fuel pump. Remove the fuel tank filler cap. If fuel runs out freely, the line is clean. If not, blow the line out by air pressure from the fuel pump end.

NOTE: *Check the flexible gas line for a collapsed condition.*

(4) If the fault has not been found, check the fuel pump pressure, then repair or replace the fuel pump or carburetor.

(3) **ENGINE STARTS BUT FAILS TO KEEP RUNNING.** The most probable cause of this malfunction is the fuel system. The ignition system sometimes can cause trouble, but it is usually after the engine has run for some time and is at operating temperature. In either case, check the fuel system first.

(a) Check the fuel supply at the gas tank.

(b) Try to start the vehicle. If it will operate with constant foot throttle, adjust the idle speed and check the choke adjustment.

(c) If it will not operate with constant foot throttle, remove the air cleaner, and check to see if fuel is getting to the carburetor. This is done by looking down the carburetor while operating the throttle. If gasoline is observed spurting from the accelerator pump discharge nozzle, the engine was either flooded or the fuel system has water in it.

(d) If no accelerator pump discharge is observed in the carburetor throat, loosen the fuel pump to fuel tank line at the fuel pump. Remove the fuel tank filler cap. If fuel runs out freely, the line is clear. If not, blow the line out with air pressure from the fuel pump end.

NOTE: *Check the flexible gas line for a collapsed condition.*

(e) If the cause of the trouble has not been found, check the fuel pump pressure, and repair or replace the fuel pump or carburetor.

(f) If the fuel system is operating correctly and the engine still stalls, it may be due to the coil or condenser breaking down under operating temperature. Check and replace as necessary.

(4) ENGINE CONTINUALLY MISSES AT IDLE.

When the engine continually misses on the same cylinders, the fault generally lies in the ignition system.

(a) Isolate the miss by pulling one spark plug cable at a time from the plugs. Remove the plugs, then clean, inspect, and adjust them. Replace those that are badly fouled.

(b) Check the spark plug wires for signs of deterioration and corrosion. Replace as necessary.

(c) Remove the distributor cap and rotor, then clean and inspect them. Replace if necessary.

(d) If none of the above corrects the condition, check the compression to determine if compression and intake manifold passages are satisfactory.

(5) ENGINE MISSES ERRATICALLY AT IDLE.

This may be caused by a combination of things. Check the following in sequence:

(a) Carburetor, including choke operation, idle mixture setting, and float level.

(b) The ignition system, starting with the spark plugs, if the carburetor adjustment does not eliminate the trouble. Make necessary repairs.

(c) The vacuum lines for leaks at all lines and fittings if the miss is still present. Make any necessary repairs.

(d) Valve operation and make a compression test if miss persists.

(6) ENGINE MISFIRES OR HESITATES ON ACCELERATION. This malfunction is usually a combination of faults in the ignition and fuel system, but also can be caused by the exhaust system. Perform the following checks in the sequence given:

(a) Check the operation of the accelerator pump.

(b) Check the operation of the exhaust thermostat valve. If sticking, free up or replace as necessary.

(c) Check the paint on the intake manifold heat riser passage. If the paint is not burned off, the passage may be obstructed and the carburetor may not be vaporizing the gasoline properly.

(d) Remove the spark plugs, inspect, clean and re-gap. Replace any plugs that are defective or lead fouled.

(e) Remove the distributor cap and check the point gap, distributor shaft clearance, condition of cam lobes, and points. Make necessary repairs or replacements. Check the high tension wiring for signs of deterioration, and replace if necessary.

(f) Make a coil and condenser check. Replace faulty units.

(g) Check fuel pump pressure and adjust carburetor float level.

(h) If the problem still persists, take compression readings and check the valve action. Check the valve spring rates and assembled height. Repair or replace as necessary.

(7) ENGINE DOES NOT DEVELOP FULL POWER. Lack of power is usually caused by poor

compression. However, some preliminary checks should be made. Make certain that the throttle opens all the way and that the choke remains open.

(a) After preliminary checks are made, check the compression. This should quickly indicate whether the internal components are operating properly.

(b) If the compression checks within limits, check the ignition system, including initial timing and distributor operation.

(c) If the compression and the ignition system are satisfactory, check the fuel system, including carburetion and fuel pump pressure.

(d) If the problem still exists, a check of mechanical components must be made. Check the valve lash, lift, and timing. Repair or replace as necessary.

b. Fuel System.

The fuel system consists of the fuel tank, fuel pump, carburetor, and connecting lines. Dirt and other foreign material are a major source of fuel system problems, and all components should be kept as clean as possible.

(1) EXCESSIVE FUEL CONSUMPTION. Faulty carburetion is usually responsible for excessive fuel consumption. However, the following preliminary checks should be made. Check for fuel leaks in the system, check choke operation and adjustment, and make certain the accelerator linkage is free. Check to see if the brakes are dragging. Then adjust the carburetor.

(a) Verify the complaint with test equipment installed in the vehicle. Show the customer how improper operation of the vehicle will affect fuel consumption.

(b) If test shows fuel consumption to be excessive, remove the carburetor and rebuild. Since poor carburetion is usually a combination of internal malfunctions, it is usually not advisable to try to repair only one system in the carburetor. Time will be saved by a complete carburetor overhaul.

(2) CARBURETOR FLOODS. Make a visual inspection of the carburetor for leaking gaskets or casting defects. Tap the carburetor bowl. If the flooding stops, the needle was held open by foreign material. If the flooding persists, follow the steps below:

(a) Remove the air cleaner and check choke operation.

(b) Check the float level and the condition of the carburetor float. Check the condition of the needle and seat. Replace if necessary.

(c) Check fuel pump pressure. If the pressure is excessive, the pump was forcing fuel past the float needle and should be rebuilt or replaced.

c. Cooling System.

The cooling system is thermostatically controlled to regulate engine operating temperature and provide for a short engine warm-up period.

(1) **ENGINE OVERHEATS.** Usually, engine overheating is the result of insufficient coolant supply. Check the coolant level first. Make certain that the cause of trouble is not anti-freeze evaporation.

(a) If the supply is low, check for leaks in the cooling system, make repairs as necessary.

(b) Check the water pump belt for proper tension and adjust if loose.

(c) Inspect the radiator fins for obstructions (bugs, dirt, etc.) Clean if clogged.

(d) Using a thermometer in the radiator, check the gauge reading for accuracy.

NOTE: *Inaccurate readings are sometimes caused by insufficient clearance between the head casting and the temperature sending unit element. Repair or replace as necessary.*

(e) Check the thermostat for proper operation and heat range. If defective or of the wrong heat range, replace the thermostat.

(f) Check the ignition timing and adjust if necessary.

(g) Check the radiator for proper flow. Flush if necessary.

(h) Remove the water pump and check for a defective impeller or water passage obstruction. Repair or replace as necessary.

(2) **ENGINE FAILS TO REACH NORMAL OPERATING TEMPERATURE.** Generally, this is caused by the thermostat sticking or being of the wrong heat range. Check the thermostat first. If the engine still does not reach operating temperature, check the gauge and sending unit, with a thermometer in radiator, for accuracy. Replace the defective unit.

2. ENGINE TUNE-UP

During the life of an automotive vehicle, it should receive regular maintenance and inspection services. However, to maintain satisfactory performance, an engine tune-up should be performed periodically.

Any type of engine test equipment may be used to make the tests outlined in the checking procedures. As the checks are performed, make a visual inspection of the wiring, vacuum hose, cooling system hose, heater hoses, etc.

a. Minor Tune-Up.

A minor tune-up consists of the following operations:

(1) **INSPECT IGNITION WIRES, BATTERY CABLES, AND CHECK CONDITION OF THE BATTERY.** Inspect all ignition cables for worn or damaged insulation. Make sure that the spark plug wires are firmly seated in the distributor cap and that the terminals and terminal sockets are free from corrosion.

Inspect the battery case for cracks and leaks. Check the water level in the battery. Inspect battery cable connections for corrosion, and clean if necessary. Brush the cable connectors with grease to retard further corrosion, then tighten the connectors securely.

(2) **TEST CYLINDER COMPRESSION.** Operate the engine until normal operating temperature is reached. Turn the ignition switch off. Remove all spark plugs. Set the throttle to wide open position and leave it open for the test. Using a compression tester, test the compression of each cylinder. Crank the engine for at least four compression strokes. All cylinders should be tested the same number of strokes to assure accurate readings.

The compression of all cylinders should be uniform within 10 pounds. Record the compression of each cylinder.

A reading of more than 10 pounds above normal indicates carbon or lead deposits in the cylinder.

A reading below normal indicates leakage at the rings, valves, or head gasket.

(3) **CLEAN, ADJUST, AND INSTALL SPARK PLUGS.** Sandblast the spark plugs, wipe the porcelain clean, file the electrode tips flat, and adjust the spark gap. Test the plugs in an approved spark plug tester. Replace any plugs that have broken or chipped porcelain, badly burned electrodes, or that do not check satisfactorily on the tester. Install the spark plugs and tighten to specifications.

(4) **CHECK AND ADJUST TIMING AND INSPECT BREAKER POINTS.** Disconnect the vacuum line between the distributor and carburetor. Start the engine and operate it at idle speed. Check the timing with a timing light and make the necessary adjustments. Connect the distributor vacuum line after completing the adjustments. Inspect the distributor points for pits, excessive metal transfer, and burns. Replace points which cannot be cleaned up by light application of a point file.

(5) **CHECK ENGINE VACUUM AND ADJUST CARBURETOR IDLE.** Check the engine manifold vacuum at idle speed.

If the vacuum is lower than specified, check for leakage at the vacuum lines and intake manifold. Check the carburetor idle adjustment.

If the vacuum is still below normal or is erratic, it is an indication of bad rings, sticky valves, weak valve springs, or leaky gaskets. If this condition exists, it should be reported to the customer.

Set the carburetor idle speed to specifications. Set the idle fuel adjustment to obtain the smoothest engine idle at the highest manifold vacuum and/or engine r.p.m. Reset the idle speed if required.

(6) **CLEAN AIR CLEANER AND FUEL PUMP BOWL.** Clean the air cleaner, and re-oil the element (dry-type). If the air cleaner is the oil bath-type, refill to the indicated level with engine oil of the specified viscosity.

Remove and clean the fuel pump bowl. Install a new filter. Install the sediment bowl and a new gasket.

b. Major Tune-Up.

A major tune-up consists of checking the cylinder compression, the ignition system, the fuel system, the engine vacuum, and adjusting the valves.

(1) **CLEAN AND INSPECT BATTERY CABLES.** Remove the cables from the battery. Clean the battery terminals and cable connectors. Inspect the battery case for cracks and leaks. Fill to the proper water level. Replace deteriorated connectors, and cables that are shorted or have worn insulation. Brush the cable connectors with grease to retard corrosion. Connect the cables to the battery.

(2) **TEST CHARGING SYSTEM.** Test the battery, and recharge or replace it, if necessary, to insure dependable service. Check the charging circuit, the generator output, and the regulator. Repair or replace a faulty generator. Adjust or replace the regulator if necessary.

(3) **TEST CYLINDER COMPRESSION.** Follow the procedure given under, "a. Minor Tune-Up."

(4) **CHECK MANIFOLD BOLT TORQUE.** Tighten the intake and exhaust manifold bolts and nuts to 23-28 foot-pounds torque.

(5) **CLEAN, ADJUST, AND INSTALL SPARK PLUGS.** Sandblast the spark plugs, wipe the porcelain clean, file the electrode tips flat, and adjust the spark gap. Test the plugs in an approved spark plug tester. Replace any plugs that have broken or chipped porcelain, badly burned electrodes, or that do not check satisfactorily on the tester. Install the spark plugs, and tighten them to the specified torque.

(6) **TEST DISTRIBUTOR.** Test the distributor vacuum advance on a suitable distributor test stand, and make adjustments, repairs, or replacements as required. Set the distributor point gap at 0.014-0.016 inch (8-cylinder engine) or 0.024-0.026 inch (6-cylinder engine). After setting the gap, check the point dwell. The point dwell should be 35-38 degrees (6-cylinder engine), and 26-28½ degrees (8-cylinder engine). If the dwell angle is not correct at the specified point gap, the distributor cam is worn or the point assembly is damaged. Replace the necessary parts. Lubricate the distributor cam lightly with distributor cam lubricant.

(7) **CLEAN AND INSPECT THE DISTRIBUTOR CAP.** Inspect the distributor cap for cracks or other damage. Terminal housing sockets should be free from corrosion.

(8) **TIME IGNITION.** Before connecting the vacuum line between the distributor and carburetor, start the engine and operate it at idle speed. Check the timing with a timing light and make the necessary adjustments. Connect the distributor vacuum line after completing the adjustment, and check for ignition advance.

(9) **CHECK IGNITION PRIMARY CIRCUIT.** Check the primary circuit amperage with a suitable test machine. The amperage draw with the engine stopped should be 5-5.5 amps. With the engine operating at idle speed, the amperage draw should be 2.75-3.0 amps. Visually inspect the wires for faulty insulation and poor connections.

(10) **TEST SPARK INTENSITY.** Determine if the spark from each spark plug wire will jump a ⅜" inch gap.

If the spark is unsatisfactory at all spark plugs, trouble exists in the coil, condenser, rotor or cap, internally in the distributor, or in the external primary circuit.

If the spark is unsatisfactory at some but not all of the spark plug wires, the trouble is in the wire itself, the wire is not seated in the housing socket, or the distributor cap is shorted.

(11) **CHECK AND ADJUST VALVE LASH.** Check and adjust the valve lash after the engine is thoroughly warmed up.

(12) **TEST FUEL PUMP PRESSURE.** Check the fuel pump pressure. The pressure should be within 4.0-5.0 p.s.i. at 900 r.p.m.

(13) **TEST FUEL PUMP VACUUM.** Check the fuel pump vacuum. If the vacuum is below 10.5 inches of mercury, or if the vacuum drops rapidly when the engine is stopped, repair or replace the pump.

(14) **INSPECT AND CLEAN THE FUEL PUMP.** Remove and clean the fuel pump bowl. Install a new filter. Install the sediment bowl and a new gasket.

(15) **CLEAN CARBURETOR.** Clean the carburetor fuel bowl. Set the float level, and check the accelerator pump operation.

(16) **CLEAN AIR CLEANER.** Clean the air cleaner, oil the element (dry-type), and install. If the air cleaner is the oil bath-type, fill to the indicated level with engine oil.

(17) **TEST ENGINE VACUUM.** Check the engine manifold vacuum at idle speed.

If the vacuum is lower than specified, check for leakage at the vacuum lines and intake manifold. Check the carburetor idle adjustment.

If the vacuum is still below normal or is erratic, it is an indication of bad rings, sticky valves, weak valve springs, or leaking gaskets. If this condition exists, it should be reported to the customer.

(18) **ADJUST CARBURETOR IDLE.** Connect a vacuum gauge, and set the idle speed to specifications with a tachometer installed on the engine. Set the idle

fuel adjustment to obtain the smoothest engine idle at the highest manifold vacuum and/or engine r.p.m. Reset the idle speed if required.

(19) **ROAD TEST.** Road test the vehicle as a final

check on the work performed. Also, notice the performance of the transmission, axle, brakes, and any optional accessories. Recommend any additional service required when the vehicle is delivered to the owner.

3. ENGINE REMOVAL AND INSTALLATION

Separate procedures are given for the conventional passenger car and the Thunderbird.

a. Conventional Passenger Car.

The following procedures apply to all conventional passenger cars. Differences in the procedures peculiar to vehicles equipped with an 8 or 6-cylinder engine are noted when they exist.

The procedures given are for the engine only, without the transmission attached. Engine compartment tolerances make it impractical to remove or install the engine with the transmission attached.

(1) **REMOVAL.** If the vehicle is equipped with a standard or overdrive transmission, follow steps (a) and (c). If the vehicle is equipped with Fordomatic, follow steps (b) and (c).

(a) **STEPS PECULIAR TO STANDARD OR OVERDRIVE TRANSMISSION.** Disconnect the clutch release spring. Remove the screws retaining the equalizer bar support to the flywheel housing, then remove the support and bushing. Disconnect the accelerator linkage at the manifold bellcrank. Remove the two upper flywheel housing bolts. Remove the flywheel housing cover, support the transmission with a jack, then remove the remaining flywheel housing bolts.

(b) **STEPS PECULIAR TO FORDOMATIC.** Disconnect the transmission throttle linkage at the cross shaft, and tie the linkage to the dash panel. Remove the idler arm bracket. Fold back the floor mat, remove the two rubber plugs, then remove the two top converter housing to engine bolts. Jack up the front of the vehicle and position safety stands. Support the transmission with a jack, then remove the remaining converter housing to engine bolts. Remove the converter housing lower access cover, then remove the six converter to flywheel assembly bolts. Remove the dip stick tube assembly.

Remove the transmission control linkage splash shield from the cylinder block, then remove the oil filter.

(c) **ENGINE REMOVAL.** Remove the hood. Drain the cooling system and the crankcase. Remove the heater hoses.

On vehicles equipped with an 8-cylinder engine, remove the heater inlet duct.

On vehicles equipped with a 6-cylinder engine, remove the heater blower motor.

Remove the upper and lower radiator hoses, then remove the radiator. Disconnect the battery ground cable

at the cylinder block, and the flex fuel line at the fuel pump. Remove the fan.

Disconnect the windshield wiper vacuum hose, temperature sending unit wire, and the oil pressure sending unit wire. Disconnect the primary wire at the coil. Remove the starter cable at the starter then remove the starter. Disconnect the ground cable from the rear of the engine. Remove the air cleaner, then tape the air horn closed. Disconnect the choke cable at the carburetor. Disconnect the accelerator linkage.

Disconnect the muffler inlet pipes at the exhaust manifold.

Attach the engine lift bracket or sling (fig. 1 or 2). Remove the right and left front splash aprons.

Loosen the two engine front steady rest to frame bolts. Raise the vehicle and position safety stands.

On 8-cylinder engines, remove the left-hand engine support. Remove the cap screws from the right-hand engine support at the engine.

On 6-cylinder engines, remove the left-hand mounting bolts at the insulator, and the right-hand mounting nuts at the engine.

Raise the engine slightly, then carefully pull the engine from the transmission. Carefully lift the engine out of the engine compartment. Do not let the engine swing against the grille.

Install the engine on a work stand using the appropriate engine mount (fig. 3 or 4). Remove the engine lifting bracket or sling.

(2) **INSTALLATION.** If the vehicle is equipped with a standard or overdrive transmission, follow steps (a), (b), and (d). If the vehicle is equipped with Fordomatic, follow steps (a), (c), and (d).

(a) **ENGINE INSTALLATION.** Install the appropriate engine lift bracket or sling, then remove the engine from the work stand. Lower the engine carefully into the engine compartment.

On 8-cylinder engines, lower the engine until the oil pump to oil pan line clears the left-hand engine support.

Start the transmission main drive gear into the clutch disc. On Fordomatic units, start the converter pilot into the crankshaft.

NOTE: *On standard or overdrive units, it may be necessary to adjust the position of the transmission with relation to the engine if the transmission input shaft will not enter the clutch disc. If the engine "hangs up" after the shaft enters, turn the crank-*

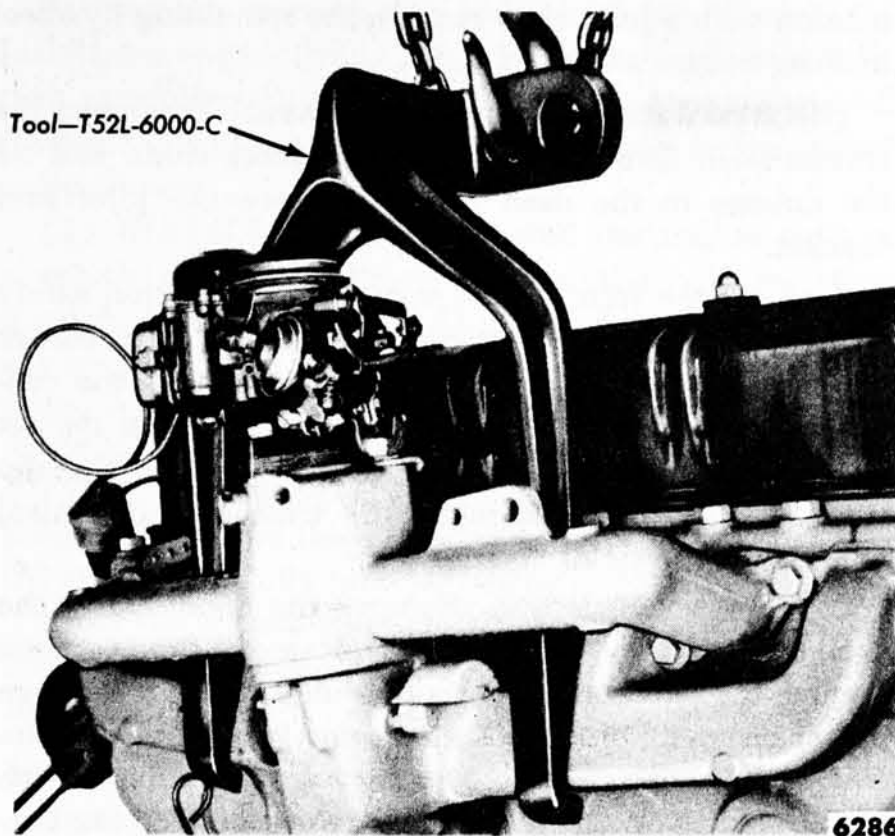


Fig. 1—Lift Bracket—6-Cylinder Engine

shaft slowly (with the transmission in gear) until the shaft splines mesh with the clutch disc splines.

Make sure the studs on the manifolds of both the 6 and 8-cylinder engines are aligned with the holes in the muffler inlet pipes, and the dowels in the block engage the holes in the clutch housing (on Fordomatic units the block dowels must engage the holes on the converter housing).

On the 6-cylinder engine, install the right-hand mounting nuts. Install the left-hand mounting bolts. Tighten all

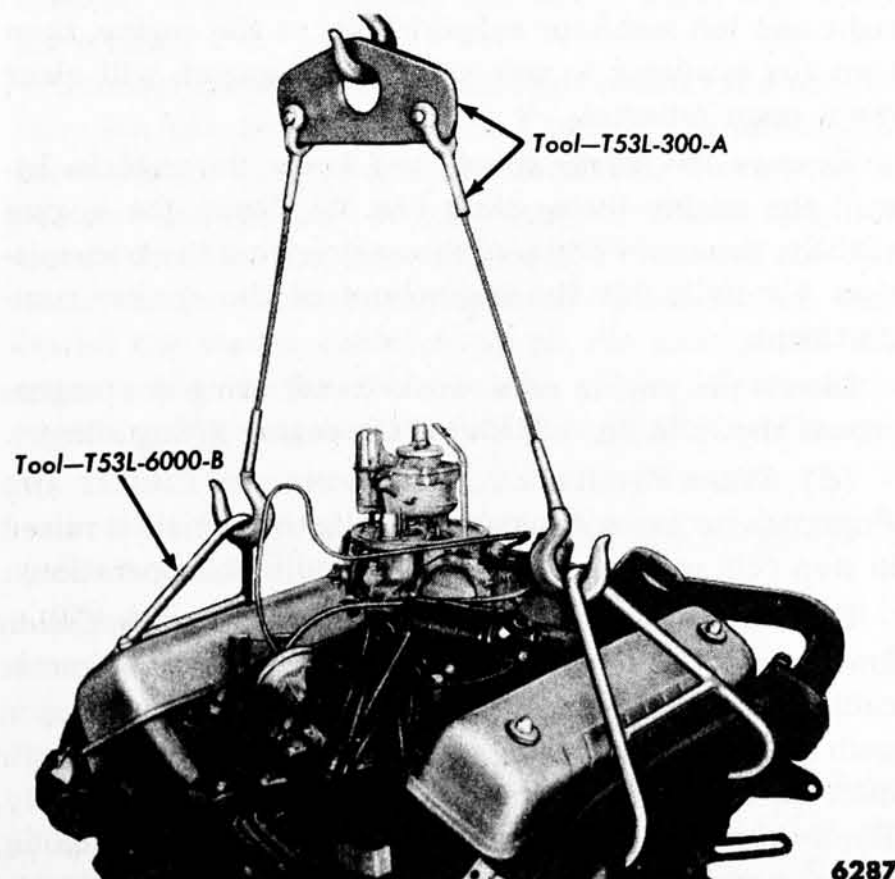


Fig. 2—Lifting Sling—8-Cylinder Engine

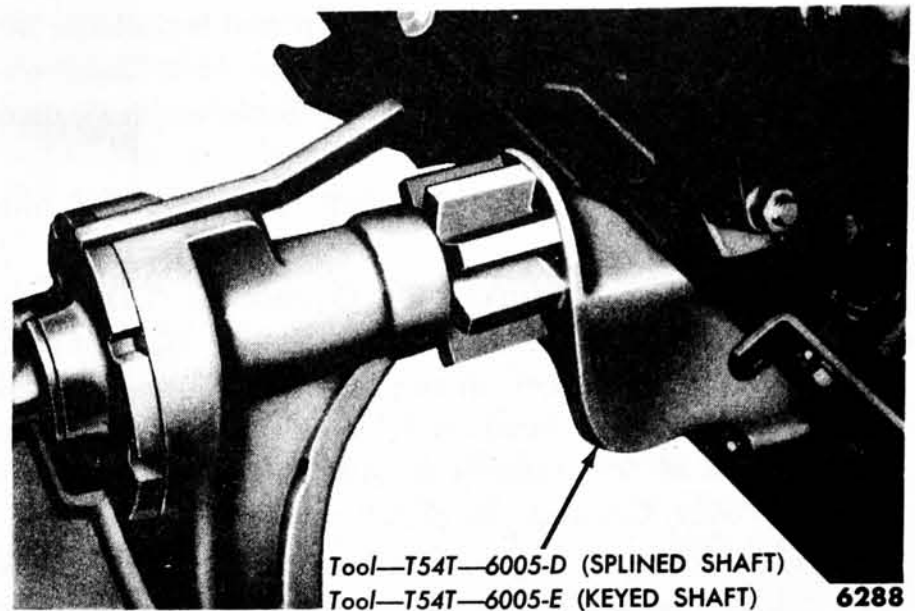


Fig. 3—Engine Mount—8-Cylinder Engine

mounting nuts and bolts to specifications. Tighten the two engine front steady rest to frame bolts to specifications.

On the 8-cylinder engine, align the holes in the engine left support insulator with the mounting holes in the block. Install the two cap screws on the right side of the engine. Tighten the two engine front steady rest to frame bolts to specifications. Install the right and left front splash aprons.

Connect the manifold to the muffler inlet pipe. Install the starter, then connect the starter cable (except Fordomatic). Connect the ground cable to the rear of the engine, the temperature sending unit and oil pressure sending unit wires, the generator wires, and the ignition switch wire to the coil. Connect the ignition switch wire to the engine clips. Connect the accelerator linkage and the choke wire.

Connect the windshield wiper line and the fuel pump vacuum line. Connect the fuel pump flexible line. Install the fan assembly, then adjust the fan belt.

Install the radiator and connect the radiator hoses. Connect the battery ground cable to the engine. Remove

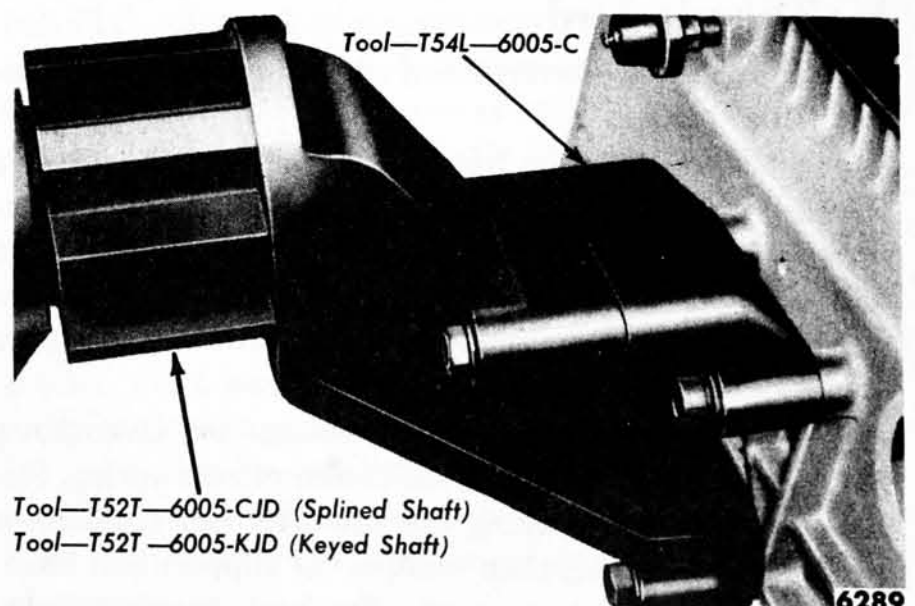


Fig. 4—Engine Mount Adapter—6-Cylinder Engine

the tape from the carburetor air horn and install the air cleaner. Install the heater blower motor (6-cylinder engine) and the heater inlet duct (8-cylinder engine), then connect the heater hoses.

Install the hood. Fill the cooling system and the crankcase.

(b) **CONNECT STANDARD OR OVERDRIVE TRANSMISSION.** Install the bushings in the equalizer bar support, then install the support on the flywheel housing. Install the transmission to flywheel housing bolts, and tighten them to 40-50 foot-pounds torque. Install the flywheel housing cover. Connect the clutch release spring.

Remove the jack supporting the transmission. Check the clutch pedal free play ($1\frac{1}{8}$ - $1\frac{3}{8}$ inch). Adjust the free play if necessary.

(c) **CONNECT FORDOMATIC TRANSMISSION.** Install the two converter housing to engine lower bolts, and tighten them to 40-45 foot-pounds torque.

NOTE: *Tighten the bolts slowly and evenly to avoid binding on the dowel pins.*

Install the two converter housing to engine upper engine bolts, and tighten them to 40-45 foot-pounds torque. Install the floor pan plugs, and position the floor mats. Align the flywheel and drive plate holes with the converter, install the six bolts, and tighten them to 25-28 foot-pounds torque.

Install the starter, and tighten the bolts to 15-20 foot-pounds torque. Install the dipstick tube assembly. Install the idler arm and bracket. Tighten the idler arm bracket nuts to 28-43 foot-pounds torque. Install the converter housing lower access covers.

Install and connect the throttle linkage and make the necessary linkage adjustments. Remove the jack supporting the transmission.

(d) **CHECK ENGINE FOR OIL OR COOLANT LEAKS.** Warm the engine to normal operating temperature, then check all gaskets and hose connections for leaks.

b. Thunderbird.

The engine may be removed with or without the transmission attached.

(1) **REMOVAL.** To remove the engine only, from a vehicle equipped with a standard or overdrive transmission, follow steps (a) and (c). To remove the engine only, from a vehicle equipped with Fordomatic, follow steps (b) and (c). To remove the engine and Fordomatic as an assembly, follow steps (c) and (d).

(a) **STEPS PECULIAR TO STANDARD OR OVERDRIVE TRANSMISSION.** Disconnect the clutch release spring. Remove the screws retaining the equalizer bar support to the flywheel housing, then remove the support and bushing. Remove the two upper flywheel housing bolts. Remove the flywheel housing cover, support the trans-

mission with a jack, then remove the remaining flywheel housing bolts.

(b) **STEPS PECULIAR TO FORDOMATIC.** Disconnect the transmission throttle linkage at the cross shaft, and tie the linkage to the dash panel. Remove the idler arm bracket.

Jack up the front of the vehicle, and position safety stands. Support the transmission with a jack, then remove the converter housing to engine bolts. Remove the converter housing lower access cover, then remove the six converter to flywheel assembly bolts. Remove the dip stick tube assembly. Remove the transmission control linkage splash shield.

(c) **ENGINE REMOVAL.** Remove the hood. Drain the cooling system and the crankcase. Remove the fan, then remove the radiator and shroud as an assembly. Remove the air cleaner. Disconnect the engine ground wire at the dash panel. Disconnect the battery ground cable at the engine and the battery to starter relay cable at the battery. Disconnect the vacuum pump line, and the fuel inlet line at the fuel pump. Disconnect the starter cable at the starter solenoid, then remove the cable clamp at the dash panel. Disconnect the ignition switch to coil wire at the coil. Disconnect the two heater hoses. Remove the generator wires. Remove the wires from the oil pressure sending unit and the temperature sending unit. Remove the heater blower assembly. Disconnect the tachometer cable. Disconnect the accelerator rod, then disconnect the link bracket at the block (this bracket also serves as the ignition cable bracket).

Raise the vehicle and position safety stands. Disconnect the exhaust pipes at the exhaust manifold. Remove the engine front mount bolt and insulator. Remove the engine right and left insulator support bolts at the engine, then turn the insulator to one side so the engine will clear them upon removal.

Remove the safety stands and lower the vehicle. Install the engine lifting sling (fig. 2). Raise the engine slightly, then carefully pull the engine from the transmission. Carefully lift the engine out of the engine compartment.

Install the engine on a work stand, using the engine mount shown in fig. 3. Remove the engine lifting sling.

(d) **STEPS PECULIAR TO REMOVING THE ENGINE AND FORDOMATIC AS AN ASSEMBLY.** While the vehicle is raised in step (c), perform the following additional operations:

Disconnect the shift control linkage at the transmission and the throttle control rod. Disconnect the speedometer cable. Remove the drive shaft, and plug the transmission with an extension housing cap. Remove the converter air duct assembly. Remove the dip stick tube assembly. Remove engine rear mount bolt, raise the transmission, and remove the cross member that serves as the engine rear mount.

Remove the transmission jack and lower the vehicle. Install the engine lifting sling. Raise the engine slightly, then carefully pull the engine and transmission forward. Carefully lift the engine and transmission from the engine compartment.

(2) **INSTALLATION.** To install the engine only in a vehicle equipped with a standard or overdrive transmission, follow steps (a), (b), and (e). To install the engine only in a Fordomatic equipped vehicle, follow steps (a), (c), and (e). To install the engine and Fordomatic as an assembly, follow steps (a), (d), and (e).

(a) **ENGINE INSTALLATION.** Install the engine lifting sling, then remove the engine from the work stand. Lower the engine carefully into the engine compartment.

Start the transmission main drive gear into the clutch disc. On Fordomatic units, start the converter pilot into the crankshaft.

NOTE: *On standard or overdrive units, it may be necessary to adjust the position of the transmission with relation to the engine, if the input shaft will not enter the clutch disc. If the engine "hangs up" after the shaft enters, turn the crankshaft slowly (with the transmission in gear) until the shaft splines mesh with the clutch disc splines.*

Make sure the studs on the manifold are aligned with the holes in the muffler inlet pipe, and the dowels in the block engage the holes in the clutch housing (on Fordomatic units the block dowels must engage the holes on the converter housing).

Raise the vehicle and position safety stands. Install the engine front insulator and bolt. Install the right and left insulator support bolts. Connect the exhaust pipe to the exhaust manifold. Remove the safety stand and lower the vehicle.

Connect the accelerator rod, then connect the accelerator link bracket to the block. Connect the tachometer cable. Install the heater blower assembly. Install the oil pressure sending unit and the temperature sending unit wires. Connect the generator wires. Connect the two heater hoses. Connect the ignition switch to coil wire. Install the starter cable clamp on the dash panel, and connect the starter cable to the starter. Connect the vacuum pump line and the fuel pump inlet line. Connect

the battery ground cable to the engine and the starter solenoid cable. Connect the engine ground wire. Install the air cleaner. Install the radiator and shroud, then install the fan. Install the hood. Fill the cooling system. Fill the crankcase with the correct quantity and grade of engine oil.

(b) **CONNECT STANDARD OR OVERDRIVE TRANSMISSION.** Install the bushings in the equalizer bar support, then install the support on the flywheel housing. Install the transmission to flywheel housing bolts, and tighten them to 40-50 foot-pounds torque. Install the flywheel housing cover. Connect the clutch release spring.

Remove the jack supporting the transmission. Check the clutch pedal free play ($1\frac{1}{8}$ - $1\frac{3}{8}$ inches). Adjust the free play, if necessary.

(c) **CONNECT FORDOMATIC TRANSMISSION.** Install the two lower converter housing to engine bolts, and tighten them to 40-45 foot-pounds torque.

NOTE: *Tighten the bolts slowly and evenly to avoid binding on the dowel pins.*

Install the converter housing to engine bolts, and tighten them to 40-45 foot-pounds torque. Align the flywheel and drive plate holes with the converter, install the six bolts, and tighten them to 25-28 foot-pounds torque.

Install the starter, and tighten the bolts to 15-20 foot-pounds torque. Install the dipstick tube assembly. Install the idler arm and bracket. Tighten the idler arm bracket nuts to 28-43 foot-pounds torque. Install the converter housing lower access covers.

Install and connect the throttle linkage, and make the necessary linkage adjustments. Remove the jack supporting the transmission.

(d) **INSTALL ENGINE AND FORDOMATIC AS AN ASSEMBLY.** While the vehicle is raised in step (a), perform the following additional operations:

Jack up the transmission. Install the engine rear mount. Lower the transmission, then install the engine rear mount bolt. Install the converter air duct assembly. Install the dip stick tube assembly. Remove the extension housing cap from the transmission, and install the drive shaft. Connect the speedometer cable. Connect the shift control linkage and the throttle control rod.

4. INTAKE AND EXHAUST MANIFOLDS

The following inspection procedures are applicable to new and used manifolds.

a. Cleaning and Inspection.

Remove the manifolds. Wash grease, oil, and dirt from the outside of the manifold. Clean the inside of the manifold with a round, bristle brush attached to a flexible wire handle. Dry with compressed air.

Inspect the mating flanges of the intake manifold for cracks, nicks, burrs, or scratches.

On the intake manifold, check the fuel-air passages and the heat riser for restrictions. Check the manifold openings for proper alignment with their respective cylinder head ports. Improper alignment may result in a loss of power.

Inspect the entire intake manifold for cracks or visible

casting defects which would make the manifold unfit for further service.

Inspect the exhaust manifold for burned out spots, cracks, deep nicks, and scratches.

b. Repairs.

Dress nicked or warped mating surfaces on a surface plate. Minor nicks, burrs, or scratches may be removed with a file.

5. ROCKER MECHANISM, CYLINDER HEAD, VALVES, VALVE LASH ADJUSTMENT, AND VALVE TIMING

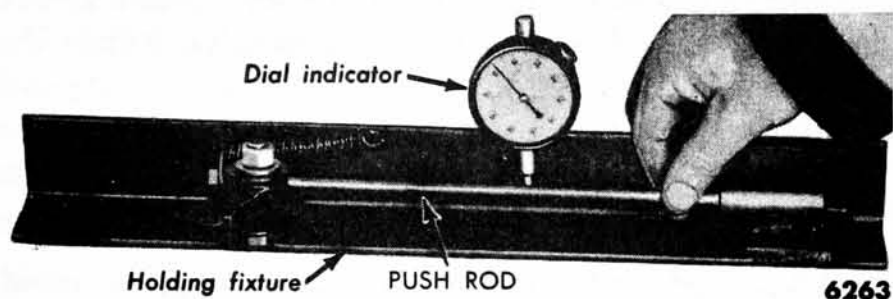


Fig. 5—Push Rod Runout Check

This section covers the inspection and repair procedures applicable to the rocker mechanism, cylinder head, and valves. In addition, the methods used to check valve timing are given.

a. Rocker Mechanism.

Remove and disassemble the rocker mechanism.

(1) **CLEANING AND INSPECTION.** Check the I. D. of the rocker arm bore and the O. D. of the rocker arm shaft, at the location of the rocker arms, against specifications. Make sure these surfaces are free of scuffs, scores, nicks, or scratches. Inspect the rocker arms for grooved pads. Check the rocker adjusting screws and lock nuts for stripped or broken threads and the ball end of the screw for nicks and scratches. Make sure the adjusting screws turn freely in the rocker arms.

Inspect the locating springs for cracks or other signs of failure.

Inspect the oil drain tube for cracks or sharp bends.



Fig. 6—Checking Flatness of the Cylinder Head Gasket Surface

Remove all obstructions from the intake manifold passages. Replace cracked or severely warped manifolds and those manifolds which contain unremovable obstructions. Replace defective exhaust manifolds.

CAUTION: Remove all filings and foreign matter that may have entered the manifold as a result of repair work.

Check the push rods for bend between ball and cup centers with a dial indicator (fig. 5). Check the ball end and socket end of the push rods for nicks, grooves, or roughness.

NOTE: A rough check for bent push rods can be made while they are installed in the engine by rotating them (valve closed) and observing the runout. If any runout is observed, be sure to check the rod between centers as described above.

(2) **REPAIRS.** If the clearance between the shaft and rocker arms exceeds .004 inch, replace the shaft and/or the rocker arms. Replace all rocker arms that have severely scored or scuffed bores and/or grooved pads. Replace all severely scored or scuffed rocker shafts. Dress up minor nicks or scratches. Replace all damaged rocker arm lock nuts, adjusting screws, and springs.

Replace the oil drain tube if it is cracked or has a sharp bend.

If the total runout of a push rod exceeds 0.020 inch, at any point, discard the rod. Do not attempt to straighten push rods.

b. Cylinder Head.

Remove the cylinder head.

(1) **CLEANING AND INSPECTION.** Remove carbon deposits from the combustion chamber and valve heads with a scraper and a wire brush. Be careful not to scratch the gasket surface. Clean the gasket surface with solvent to remove any gasket sealer.

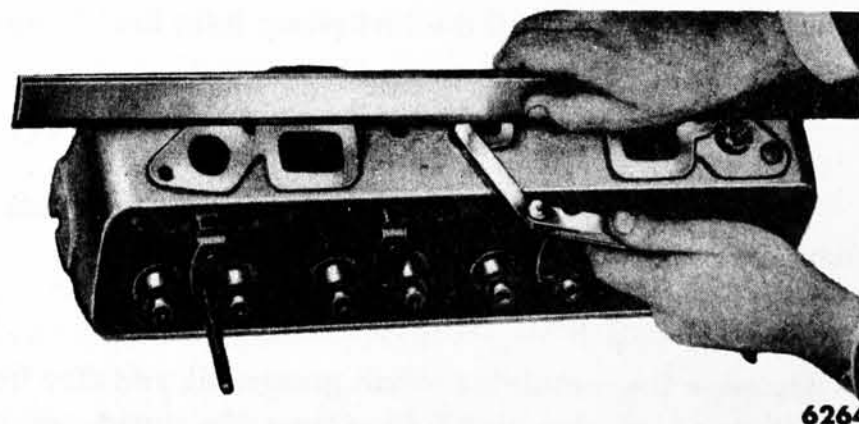


Fig. 7—Checking Flatness of the Intake Port Mating Surfaces