1959

FORD

Thunderbird

SHOP MANUAL

FORD DIVISION
FORD MOTOR COMPANY

1959 Ford Thunderbird Shop Manual

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FOREWORD

This manual provides information for the proper servicing of the 1959 Thunderbird. The descriptions and specifications contained in this manual were in effect at the time the manual was approved for printing. The Ford Division of Ford Motor Company reserves the right to discontinue models at any time, or change specifications or design, without notice and without incurring obligation.

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1959 THUNDERBIRD SHOP MANUAL

GROUP I

ENGINES AND EXHAUST SYSTEM

PART 1-1 GENERAL ENGINE SERVICE

The service procedures in this Part apply to both the Thunderbird 352 and 430 Special V-8 engines. The cleaning, inspection, and reconditioning of the various component parts apply after the parts have been removed from the engine, or in the case of a complete overhaul, after the engine has been disassembled.

For removal, disassembly, assembly, and installation procedures, refer to Part 1-2 or 1-3.

1 ENGINE TROUBLE DIAGNOSIS

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.

Engine performance complaints usually fall under one of the basic headings listed in the "Engine Trouble Diagnosis Guide."

In addition, the "Engine Trouble Diagnosis Guide," lists procedures and checks to be performed to help isolate the cause of the trouble. When a particular trouble can not be traced to a definite cause by a simple check, the possible items that could be at fault are listed in the order of their probable occurrence. Therefore, in most cases, the items should be checked in the order listed. For example, under Poor Acceleration, the ignition system is listed as a probable cause of the trouble. All the ignition system items that affect acceleration are listed. These items should all be checked before proceeding to the next probable cause listed in the guide.

For the checking procedures and corrections to be made in the various systems, refer to that part of the manual which covers the system in detail. For example, refer to Part 2-1 for ignition system items.

ENGINE TROUBLE DIAGNOSIS GUIDE

ENGINE WILL NOT CRANK	The cause of this trouble is usually in the starting system. 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(s) and inspect the gasket(s) and/or head(s) 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 determine which system is at fault, remove the ignition wire from one spark plug. 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.

CONTINUED ON NEXT PAGE

ENGINE TROUBLE DIAGNOSIS GUIDE (Cont.)

ENGINE CRANKS NORMALLY, BUT WILL NOT START (CONT.)	**NO SPARK OR A WEAK SPARK AT THE SPARK PLUGS** The cause of the trouble is in the ignition system. To determine if the cause of the trouble is in the primary or the secondary circuit, remove the coil high tension lead from the top of the distributor and hold it approximately 3/16 inch from the cylinder head, then with the ignition on and the engine turning over, check for a spark. If the spark at the coil high tension lead is good, the cause of the trouble is probably in the distributor cap, rotor, or the spark plug wires. If there is no spark or a weak spark at the coil high tension lead, the cause of the trouble is probably in the primary circuit, coil to distributor high tension lead, or the coil. **A GOOD SPARK AT THE SPARK PLUGS** If the spark is good at the spark plugs, check the spark plugs and the ignition timing. If the spark plugs or the ignition timing are not at fault, check the following items: **FUEL SYSTEM** Check the position of the choke plate. If the engine is warm, the plate should be open. If the plate is not open, the engine will load up due to the excessively rich mixture and will not start. If the engine is cold, the plate should be closed, if the plate is not operating properly, check the following items: The choke linkage for binding. The fast idle cam for binding. Thermostatic spring housing adjustment. Fast idle speed screw for proper adjustment. Choke plate valve for proper operation (Ford carburetor). **Fuel Supply at Carburetor.** Work the throttle by hand several times. Each time the throttle is actuated fuel should spurt from the accelerating pump discharge nozzles. If fuel is discharged by the accelerating pump, the engine is probably flooded, or there is water in the fuel system, or an engine mechanical item, such as valves, is at fault. If fuel is not discharged by the accelerating pump, disconnect the carburetor fuel inlet line at the carburetor. Use a suitable container to catch the fuel. Crank the engine to see if fuel is reaching the carburetor. If fuel is not reaching the carburetor, check: The fuel pump. The carburetor fuel inlet line for obstructions. The flexible fuel pump inlet line for a collapsed condition. The fuel tank line to flexible fuel line for obstructions. The fuel tank vent. If fuel is reaching the carburetor, check: The fuel inlet system including, the fuel inlet screen, the fuel inlet needle and seat assembly, and the float assembly. Check for dirt in the carburetor, not allowing fuel to enter or be discharged from the idle system. **ENGINE** Check the valve timing.
ENGINE STARTS, BUT FAILS TO KEEP RUNNING	**FUEL SYSTEM** Idle fuel mixture needle(s) not properly adjusted. Engine idle speed set too low. The choke not operating properly. Float setting incorrect. Fuel inlet system not operating properly. Dirt or water in fuel lines or carburetor. Carburetor icing. Fuel pump defective. **IGNITION SYSTEM** Breaker points not properly adjusted. Defective spark plugs. Open circuit at the resistor. Leakage in the high tension wiring.

CONTINUED ON NEXT PAGE

ENGINE TROUBLE DIAGNOSIS GUIDE (Cont.)

ENGINE RUNS, BUT MISSES	Determine if the miss is steady or erratic and at what speed the miss occurs by operating the engine at various speeds under load. **MISSES STEADILY AT ALL SPEEDS** Isolate the miss by operating the engine with one cylinder not firing. This is done by operating 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** If the miss is isolated in a particular cylinder, perform a spark test on the ignition lead of the cylinder. If a good spark does not occur, the trouble is in the secondary circuit of the system, check the: Spark plug wire. Distributor cap. If a good spark occurs, check the spark plug. If the spark plug is not at fault, a mechanical component of the engine is probably at fault. **ENGINE** Perform a compression test to determine which mechanical component of the engine is at fault. **MISSES ERRATICALLY AT ALL SPEEDS** **EXHAUST SYSTEM** Exhaust gas control valve inoperative or sticking (352 engine). Exhaust system restricted. **IGNITION SYSTEM** Breaker points not properly adjusted. Defective breaker points, condenser, secondary wiring, coil, or spark plugs. High tension leakage across the coil, rotor, or distributor cap. **FUEL SYSTEM** Choke not operating properly. Float setting incorrect. Fuel inlet system not operating properly. Dirt or water in fuel lines or carburetor. **COOLING SYSTEM** Check the cooling system for internal leakage and/or for a condition that prevents the engine from reaching normal operating temperature. **ENGINE** Perform a compression test to determine which mechanical component of the engine is at fault. **MISSES AT IDLE ONLY** **FUEL SYSTEM** Idle fuel mixture needles not properly adjusted. **IGNITION SYSTEM** Defective coil, condenser, breaker points, rotor, ignition wiring, or spark plugs. Excessive play in the distributor shaft. Worn distributor cam. **VACUUM BOOSTER PUMP** Leaking pump, lines, or fittings. **ENGINE** Perform a compression test to determine which mechanical component of the engine is at fault. **MISSES AT HIGH SPEED ONLY** **FUEL SYSTEM** Power valve clogged or damaged (Ford carburetor). Vacumeter not operating properly (Carter carburetor). Low or erratic fuel pump pressure. Fuel inlet system not operating properly. **COOLING SYSTEM** Engine overheating.
ROUGH ENGINE IDLE	**FUEL SYSTEM** Engine idle speed set too low. Idle fuel mixture needle(s) not properly adjusted. Float setting incorrect. Air leaks between the carburetor and the manifold and/or fittings. Fuel leakage at the carburetor fuel bowl(s).

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ENGINE TROUBLE DIAGNOSIS GUIDE (Cont.)

ROUGH ENGINE IDLE (Cont.)	Idle fuel system air bleeds or fuel passages restricted. Fuel bleeding from the accelerating pump discharge nozzle(s). Throttle plates not closing. Improper secondary throttle plate stop adjustment (Ford carburetor). **IGNITION SYSTEM** Improperly adjusted or defective breaker points. Fouled or improperly adjusted spark plugs. Incorrect ignition timing. Spark plug misfiring.	**EXHAUST SYSTEM** Exhaust gas control valve inoperative or sticking (352 engine). **VACUUM BOOSTER PUMP** Leaking pump, lines, or fittings. **ENGINE** Loose engine mounting bolts or worn insulator. Cylinder head bolts not properly tightened. Intake manifold seals leaking (352 engine).
POOR ACCELERATION	**IGNITION SYSTEM** Incorrect ignition timing. Fouled or improperly adjusted spark plugs. Improperly adjusted or defective breaker points. Distributor not advancing properly. **FUEL SYSTEM** Inoperative accelerating pump inlet. Inoperative accelerating pump discharge ball check. Accelerating pump diaphragm or piston defective. Float setting incorrect. Throttle linkage not properly adjusted. Accelerating pump stroke not properly adjusted.	Leaky power valve, gaskets, or accelerating pump diaphragm or accelerating pump piston. Dirt or corrosion in accelerating system. Distributor vacuum passages in the carburetor blocked. **EXHAUST SYSTEM** Exhaust gas control valve inoperative or sticking (352 engine). **BRAKES** Improper adjustment. **TRANSMISSION** Clutch slippage (manual - shift transmissions). Improper band adjustment (automatic transmissions).
ENGINE DOES NOT DEVELOP FULL POWER, OR HAS POOR HIGH SPEED PERFORMANCE	**PRELIMINARY** Determine if the trouble exists when the engine is cold, at normal operating temperature, or at all engine temperatures. **ENGINE COLD** **EXHAUST SYSTEM** Exhaust gas control valve inoperative or sticking (352 engine). **FUEL SYSTEM** Clogged or undersize main jets and/or low float setting. Clogged or undersize secondary jets. Power valve clogged or damaged.	Secondary throttle plates not opening. Fuel pump pressure incorrect. Distributor vacuum passage in the carburetor blocked. **COOLING SYSTEM** Thermostat inoperative or incorrect heat range. **ENGINE AT NORMAL OPERATING TEMPERATURE** **EXHAUST SYSTEM** Exhaust gas control valve inoperative or sticking (352 engine). **FUEL SYSTEM** Same items as for engine cold.

CONTINUED ON NEXT PAGE

ENGINE TROUBLE DIAGNOSIS GUIDE (Cont.)

ENGINE DOES NOT DEVELOP FULL POWER, OR HAS POOR HIGH SPEED PERFORMANCE (Cont.)	**ALL ENGINE TEMPERATURES** **IGNITION SYSTEM** Ignition timing not properly adjusted. Defective coil, condenser, or rotor. Distributor not advancing properly. Excessive play in the distributor shaft. Distributor cam worn. Fouled or improperly adjusted spark plugs or spark plugs of improper heat range. Improperly adjusted or defective breaker points. **FUEL SYSTEM** Restricted air cleaner. Same items as for engine cold. **ENGINE** Perform an engine compression test to determine which mechanical component is at fault. One or more camshaft lobes worn beyond wear limit. Improper valve timing. **EXHAUST SYSTEM** Restriction in system. **TRANSMISSION** Improper band adjustment (automatic transmissions). **BRAKES** Improper adjustment. **TIRES** Improper pressure.
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 a preliminary check of the following items before proceeding to the fuel and ignition systems. **PRELIMINARY CHECKS** **CHASSIS ITEMS** Check: Tires for proper pressure. Front wheel alignment. Brake adjustment. **EXHAUST SYSTEM** Check the exhaust gas control valve operation (352 engine). **ODOMETER** Check calibration. **IGNITION SYSTEM** Check ignition timing. **FINAL CHECKS** **FUEL SYSTEM** Check: Fuel pump pressure. Engine idle speed. Idle fuel mixture needle(s) for proper adjustment. Automatic choke for proper operation. Fast idle speed screw for proper adjustment. Accelerating pump stroke adjustment. Anti-stall dashpot for proper adjustment. Air cleaner for restrictions. Float setting or fuel level. Jets for wear and/or damage. Power valve or Vacumeter operation. Air bleeds for obstructions. Accelerating pump discharge nozzles for siphoning. **IGNITION SYSTEM** Check: Ignition timing. Spark plug condition and adjustment. Distributor spark advance operation. **ENGINE** Perform an engine compression test to determine which mechanical component of the engine is at fault. **COOLING SYSTEM** Check thermostat operation and heat range. **TRANSMISSION** Check band adjustment (automatic transmissions).

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ENGINE TROUBLE DIAGNOSIS GUIDE (Cont.)

ENGINE OVERHEATS	**TEMPERATURE SENDING UNIT AND GAUGE** Unit or gauge defective, not indicating correct temperature. **EXHAUST SYSTEM** Exhaust gas control valve inoperative or sticking (352 engine). Restriction in system. **ENGINE** Cylinder head bolts not properly tightened. Low oil level or incorrect viscosity oil used.	**COOLING SYSTEM** Insufficient coolant. Cooling system leaks. Drive belt tension incorrect. Radiator fins obstructed. Thermostat(s) defective Cooling system passages blocked. Water pump inoperative. **IGNITION SYSTEM** Incorrect ignition timing. **BRAKES** Dragging brakes.
ENGINE FAILS TO REACH NORMAL OPERATING TEMPERATURE	**TEMPERATURE SENDING UNIT AND GAUGE** Unit or gauge defective, not indicating correct temperature.	**COOLING SYSTEM** Thermostat inoperative, incorrect heat range, or thermostat not installed.
LOSS OF COOLANT	**COOLING SYSTEM** Leaking radiator. Loose or damaged hose connections. Water pump leaking. Radiator cap defective. Overheating. **ENGINE** Cylinder head gasket defective.	Intake manifold to cylinder head gasket defective. Improper tightening of cylinder head or intake manifold bolts. Cylinder block core plugs leaking. Temperature sending unit leaking. Cracked cylinder head or block, or warped cylinder head or block gasket surface.
NOISY HYDRAULIC VALVE LIFTER	A noisy valve lifter can be located by operating the engine at idle speed and placing a finger on the face of the valve spring retainer. If the lifter is not functioning properly, a shock will be felt when the valve seats. Another method of identifying a noisy lifter is by the use of a piece of hose. With the engine operating at idle speed, place one end of the hose near the end of the valve stem and the other end to the ear and listen for a metallic noise. Repeat this procedure on each intake and exhaust valve until the noisy lifter(s) has been located. The most common causes of hydraulic valve lifter troubles are dirt, gum, varnish, carbon deposits, and air bubbles. Dirt in the lifter assembly can prevent the disc valve from seating, or it may become lodged between the plunger and body surfaces. In either case, the lifter becomes inoperative due to failure to "pump-up," or because the internal parts are no	longer free to function properly. When dirt is found to be responsible for lifter malfunction, remove the lifter assembly and thoroughly clean it. Recommended engine oil and filter change intervals should be followed to minimize lifter problems caused by dirt. Deposits of gum and varnish cause similar conditions to exist which may result in lifter malfunction. If these conditions are found to be present, the lifter should be disassembled and cleaned in solvent to remove all traces of deposits. Air bubbles in the lubricating oil, caused by an excessively high or low oil level, may likewise cause lifter malfunction. A damaged oil pick up tube may allow air to be drawn into the lubricating system. To check for the presence of air, remove a valve rocker arm shaft cover and note the condition of the oil as it flows from the valve rocker arm shaft assembly. Perform corrective action as required to remove air from the lubricating oil.

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 1) is applicable for either a minor or major tune-up. A minor tune-up is recommended each 6000 miles and a major tune-up is recommended each 12,000 miles.

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 1—Tune-Up Schedule

Operation	Perform on		Recommended Procedure
	Minor	Major	
SPARK PLUGS Clean, adjust, and test.	X	X	Part 2-1
ENGINE COMPRESSION Take compression reading of each cylinder.		X	Part 1-1
INTAKE MANIFOLD Check and tighten bolts.	X*	X	Part 1-2, 1-3
DRIVE BELTS Check and adjust the tension of all drive belts.	X	X	Part 2-3
BATTERY Clean battery cables and terminals.		X	Part 9-1
Tighten cable clamps.		X	
Grease battery terminals.		X	
Check battery state of charge.	X	X	
ELECTRICAL			Part 9-1
Check generator output.		X	
Check starter motor current draw.		X	
Check coil output.		X	Part 2-1
Perform a primary circuit resistance test.		X	
Perform a secondary circuit continuity test.		X	
DISTRIBUTOR Check the condition of the breaker points.	X		Part 2-1
Replace the breaker points and the condenser.		X	
Check and adjust breaker arm spring tension.		X	
Lubricate the distributor cam. Oil the lubricating wick. Lubricate the distributor bushing through the oil cup.		X	
DISTRIBUTOR (Cont.) Check and adjust point dwell.		X	Part 2-1
Check and adjust centrifugal advance.		X	
Check and adjust vacuum advance.		X	
Clean distributor cap and rotor.	X	X	
FUEL SYSTEM Clean fuel pump filter bowl.	X	X	Part 2-2
Replace fuel pump filter bowl strainer.		X	
Check fuel pump pressure and capacity.		X	
Clean carburetor fuel bowls and adjust float setting.		X	
ADJUSTMENTS Check and adjust ignition timing.	X	X	Part 2-1
Check and adjust engine idle speed.	X	X	Part 2-2
Adjust idle fuel mixture.	X	X	
EXHAUST Free the exhaust gas control valve (352 engine).	X	X	Part 1-4
COOLING SYSTEM Inspect the radiator, hoses, and engine for leaks.		X	Part 2-3
Add rust inhibitor to radiator.		X	

*On 352 engine only.

3 TESTS AND ADJUSTMENTS (ENGINE INSTALLED)

CAMSHAFT LOBE LIFT

1. Remove the valve rocker arm shaft assembly and install a solid tappet-type push rod in the push rod bore of the camshaft lobe to be checked.

2. Make sure the push rod is in the lifter push rod cup, then install a dial indicator in such a manner as to have the actuating point of the indicator in the push rod socket and in the same plane as the push rod movement (Fig. 1).

3. Rotate the crankshaft slowly in the direction of rotation until the lifter is on the base circle of the camshaft lobe. At this point, the push rod will be in its lowest position. Zero the dial indicator, then continue to rotate the damper slowly until the push rod is in the fully raised position. Compare the total lift recorded on the indicator with specifications.

4. Continue to rotate the crankshaft until the indicator reads zero. This is a check on the accuracy of the original indicator reading.

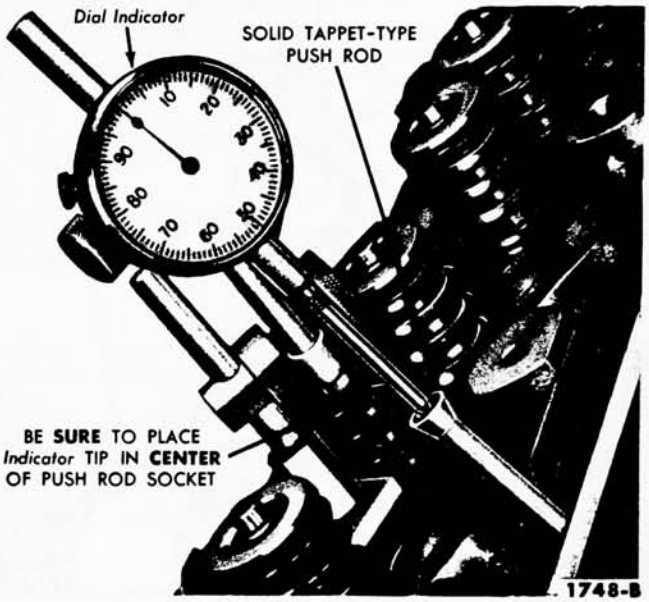

FIG. 1—Camshaft Lobe Lift—Typical

VALVE TIMING

The valve timing should be checked when poor engine performance is noted and **all other checks,** such as carburetion, ignition timing, etc. fail to locate the cause of the trouble.

Before the valve timing is checked, check for a bent timing pointer. Bring the No. 1 piston to T.D.C. on the compression stroke and see if the timing pointer is aligned with the T.D.C. mark on the damper.

If the valve timing is not within specifications, check the timing chain, camshaft sprocket, crankshaft sprocket, camshaft, and crankshaft in the order of accessibility.

To check the valve timing with the engine installed, proceed as follows:

1. Install a quadrant on the crankshaft damper.

Remove the right valve rocker arm shaft assembly and remove the No. 1 intake valve push rod (the second push rod) and install a solid tappet-type push rod in its place.

2. Make sure the push rod is in the lifter push rod cup, then install a dial indicator in such a manner as to have the actuating point of the indicator in the push rod socket and in the same plane as the push rod movement (Fig. 1).

3. Rotate the crankshaft slowly in the direction of rotation until the lifter is on the base circle of the camshaft lobe. At this point the push rod will be in its lowest position. Zero the dial indicator and continue rotating the crankshaft slowly in the direction of rotation until the dial indicator registers the specified camshaft lobe lift (Table 2).

4. Compare the crankshaft degrees indicated on the quadrant with specifications (Table 2). After the valve opening is checked, continue to rotate the damper to check the valve closing.

VALVE CLEARANCE

A 0.060-inch shorter push rod (color coded white) or a 0.060-inch longer push rod (color coded yellow) is available for service to provide a means of compensating for dimensional changes in the valve mechanism. Valve stem to valve rocker arm clearance should be 0.078-0.218 inch (352 engine) or 0.126-0.226 inch (430 engine) with the hydraulic lifter completely collapsed. Repeated valve reconditioning operations (valve and/or valve seat refacing) will decrease this clear-

TABLE 2—Valve Timing Specifications

Engine	Intake Valve				Exhaust Valve			
	Opens		Closes		Opens		Closes	
	Crankshaft Degrees (BTDC)	Camshaft Lobe Lift (Inch)	Crankshaft Degrees (ABDC)	Camshaft Lobe Lift (Inch)	Crankshaft Degrees (BBDC)	Camshaft Lobe Lift (Inch)	Crankshaft Degrees (ATDC)	Camshaft Lobe Lift (Inch)
352	22°	0.002	68°	0.005	68°	0.002	22°	0.005
430	22°	0.002	68°	0.005	63°	0.002	27°	0.005

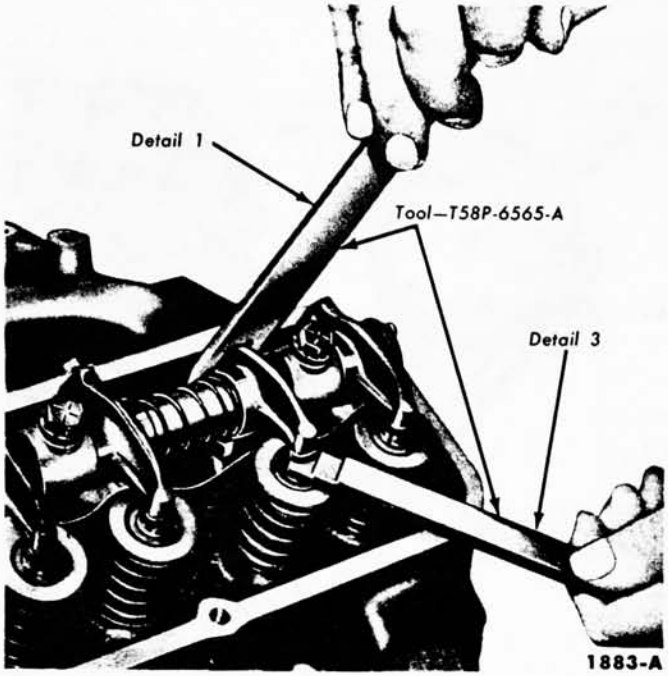

FIG. 2—Valve Clearance—Typical

ance to the point that if not compensated for, the hydraulic valve lifter will cease to function.

The correct operating range of the hydraulic valve lifter plunger must be maintained because:

If the plunger travel is excessive, the lifter pump-up time will be prolonged resulting in excessive valve train noise following engine start-up. If the travel is insufficient to compensate for normal expansion of the valve operating components, the valve would not be permitted to seat properly resulting in a rough engine and/or premature valve failure.

To check the valve clearance:

1. Position the crankshaft as outlined in Steps 2 and 3. Position the hydraulic lifter compressor tool on the rocker arm and slowly apply pressure to bleed down the hydraulic lifter until the plunger is completely bottomed (Fig. 2). Hold the lifter in the fully collapsed position.

On a 352 engine, insert the clearance gauge (Fig. 2) between the valve stem and the rocker arm of the valve being checked.

On a 430 engine, insert a 0.126 inch feeler gauge between the valve stem and the rocker arm of the valve being checked.

If the first step of the gauge enters (352 engine) or if the feeler gauge enters (430 engine), a standard length push rod may be used.

If the first step of the gauge does not enter (352 engine) or if the feeler gauge does not enter (430 engine) replace the standard push rod with a 0.060-inch shorter push rod.

If the second step of the gauge enters (352 engine) or if a 0.226-inch feeler gauge enters (430 engine), the operating range of the lifter is excessive. This indicates that the incorrect push rod has been installed or severe wear has occurred at the push rod ends, rocker arm, or valve stem. In this case, it will be necessary to determine the area of discrepancy and the incorrect or defective part(s) replaced.

If all the valve train components except the push rod are within limits, install a 0.060-inch longer push rod.

2. Rotate the crankshaft until No. 1 piston is on T.D.C. at the end of the compression stroke. With No. 1 piston on T.D.C., check the following valves:

No. 1 Intake	No. 1 Exhaust
No. 3 Intake	No. 4 Exhaust
No. 7 Intake	No. 5 Exhaust
No. 8 Intake	No. 8 Exhaust

3. Position No. 6 piston on T.D.C. and check the following valves:

No. 2 Intake	No. 2 Exhaust
No. 4 Intake	No. 3 Exhaust
No. 5 Intake	No. 6 Exhaust
No. 6 Intake	No. 7 Exhaust

To replace a push rod, it will be necessary to remove the valve rocker arm shaft assembly.

Upon replacement of a valve push rod and/or valve rocker arm shaft assembly, the engine should not be cranked or rotated until the hydraulic lifters have had an opportunity to leak down to their normal operating position. The leak down rate can be accelerated by using the tool shown in Fig. 2 on the valve rocker arm, apply pressure in a direction to collapse the lifter.

MANIFOLD VACUUM TEST

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

1. Operate the engine for a minimum of 30 minutes at 1200 rpm.

2. Install an accurate, sensitive vacuum gauge on an intake manifold vacuum line.

3. Operate 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 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.

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

COMPRESSION TEST

1. Be sure the battery is good. Operate the engine for a minimum of 30 minutes at 1200 rpm. Turn the ignition switch off, then remove all the spark plugs.

2. Set the primary throttle plates