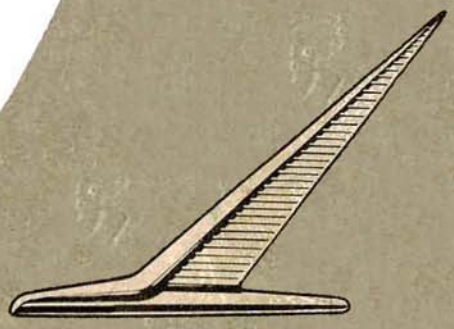
1961 FORD Falcon

SHOP MANUAL



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1961

FALCON

SHOP MANUAL

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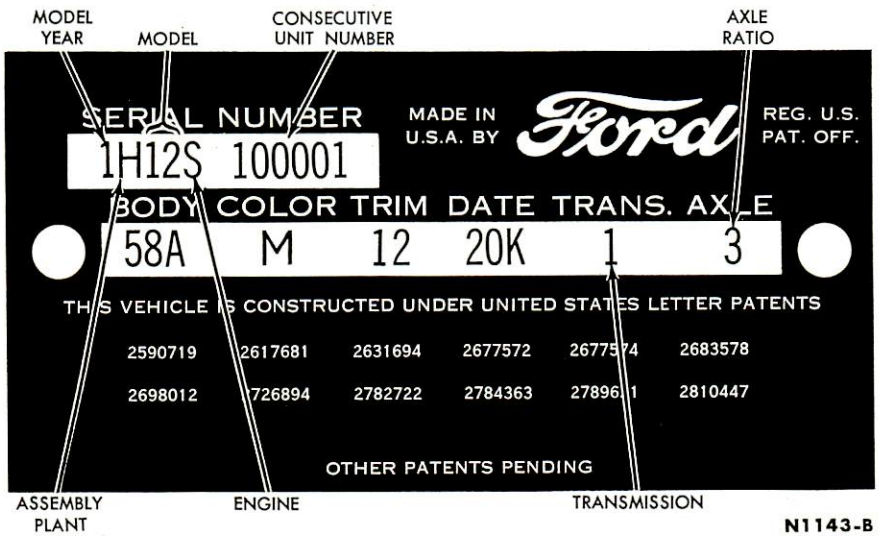
GROUP INDEX

FOREWORD

This manual provides information for the proper servicing of the 1961 Falcon. 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.

SERVICE DEPARTMENT
FORD DIVISION
FORD MOTOR COMPANY

FALCON IDENTIFICATION



Falcon Patent Plate

1 PATENT PLATE

Figure 1 illustrates a Falcon patent plate and its elements. The plate is on the rear face of the left front door inner panel.

MODEL YEAR

The number "1" designates 1961.

ASSEMBLY PLANT

H—Lorain
K—Kansas City
R—San Jose
S—Pilot Plant
T—Metuchen

MODEL

The model code number shows the product line series in the first digit. The second digit shows the body type: an odd number shows a two-door model, while an even number shows a four-door model.

SERIES 10—PASSENGER CARS

11 . . . . . 2-Door
12 . . . . . 4-Door

SERIES 20—STATION WAGONS

21 . . . . . 2-Door
22 . . . . . 4-Door
27 . . . . . Ranchero

er OHV 144 cubic inch
mpression—84 octane)
r OHV 170 cubic inch

CONSECUTIVE UNIT NUMBER

Each model year, each assembly plant begins with consecutive model numbers 100001 and continues on for each car built.

BODY

58A . . . . . 4-Door Sedan
64A . . . . . 2-Door Sedan
59A . . . . . 2-Door Wagon
66A . . . . . Ranchero
71A . . . . . 4-Door Wagon

COLOR

Code	M30J Number	Color	Promotional Name
A	1724	Black	Raven Black
C	1139	Light Turquoise	Aquamarine
D	1361	Light Blue	Starlight Blue
E	1364	Medium Green Metallic	Laurel Green
H	1367	Dark Blue Metallic	Chesapeake Blue
J	1232	Red	Montecarlo Red
K	1369	Bronze Metallic	Algiers Bronze
M	1238	White	Corinthian White
Q	1371	Light Gray Metallic	Silver Gray
R	1372	Medium Blue Metallic	Cambridge Blue
S	1373	Light Green	Mint Green
W	1385	Turquoise Metallic	Garden Turquoise

TRIM

The trim code includes 2 digits.

First Digit	Material Type	Second Digit	Color Scheme
1	Vinyl and Black Stripe Broadcloth	0	Silver or White
2	Vinyl and Black Broadcloth	1	Gray
4	Vinyl and Tweed Broadcloth	2	Blue
5	All Vinyl	3	Green
7	Vinyl and Vinyl	5	Red
		6	Black
		7	Turquoise

DATE

A number signifying the date precedes the month code letter.

Month	CODE First Year	CODE Second Year	Month	CODE First Year	CODE Second Year
January	A	N	July	G	U
February	B	P	August	H	V
March	C	Q	September	J	W
April	D	R	October	K	X
May	E	S	November	L	Y
June	F	T	December	M	Z

TRANSMISSION

1.....Conventional Drive
3.....Fordomatic

AXLE RATIO

3.....3.10
J.....3.50
4.....4.00
5.....3.20

2 OTHER IDENTIFICATION

ENGINE IDENTIFICATION

The engine is coded to show the engine plant and the date of manufacture.

This information is stamped on the top surface of the block near the crankcase breather pipe (front left side).

The first figure identifies the engine plant:

4.....Lima Engine Plant

The second figure indicates the year: "1"—1961.

The next letter indicates the month:

A.....January
B.....February
C.....March
D.....April
E.....May
F.....June
G.....July
H.....August
J.....September
K.....October
L.....November
M.....December

The next figure(s) show(s) the date of the month.

The last letter is an inspector's identification.

RADIO IDENTIFICATION

The radio serial number is on the back of the radio case.

In the illustrative serial number prefix **14MD**, the figure "1" denotes 1961 and the "4" signifies a four-tube radio (with two transistors). The "MD" identifies a Motorola radio manufactured for the Falcon. The remaining six digits are the consecutive unit manufacture number.

1961 FORD FALCON SHOP MANUAL

GROUP 1

ENGINES AND EXHAUST SYSTEM

PART 1-1 ENGINES

1 DESCRIPTION

The Falcon 144 and 170 Six engines (Figs. 1, 2, and 3) have the same basic design with a compression ratio of 8.7:1. The 144 Six engine has a piston displacement of 144 cubic inches and the patent plate identification symbol is "S". The 170 Six engine has a piston displacement of 170 cubic inches and the patent plate identification symbol is "U".

MANIFOLDS

Exhaust gases provide the heat necessary to assist in vaporizing the incoming fuel mixture (Fig. 4).

To prevent carburetor icing at the throttle plate, an engine coolant heated spacer is located between the carburetor and the intake manifold (Fig. 4). The coolant flows from the front of the engine through the spacer inlet hose into the carburetor coolant spacer. The coolant circulates through the spacer and flows into the heater inlet hose and into the heater. On cars that do not have a heater, there is no hose connection to the coolant spacer.

CYLINDER HEAD

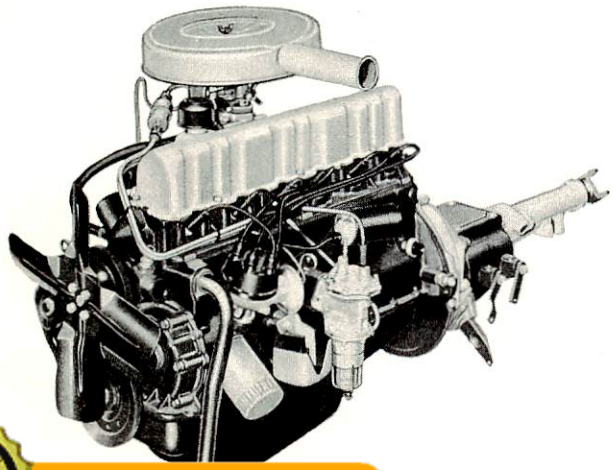
The cylinder head carries the valves, valve rocker arm shaft assembly, intake manifold assembly, the coolant outlet and thermostat. Valve guides are integral with the head. The valves are arranged from front to rear E-I-I-E-I-E-E-I-E-I-I-E.

CYLINDER BLOCK

The cylinders are numbered from 1-6 starting at the front of the engine. The firing order is 1-5-3-6-2-4.

The distributor, located on the left front of the engine, drives the oil pump through an intermediate drive shaft.

The crankshaft is supported by four main bearings. Crankshaft end thrust is controlled by the flanges of the No. 3 main bearing.



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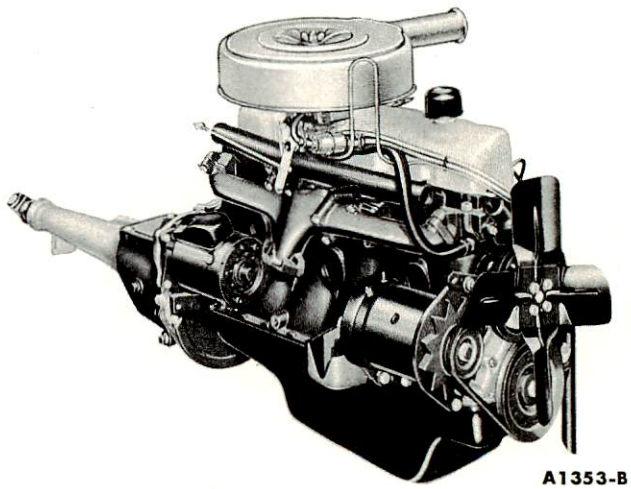

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FIG. 2—¾ Right Front View

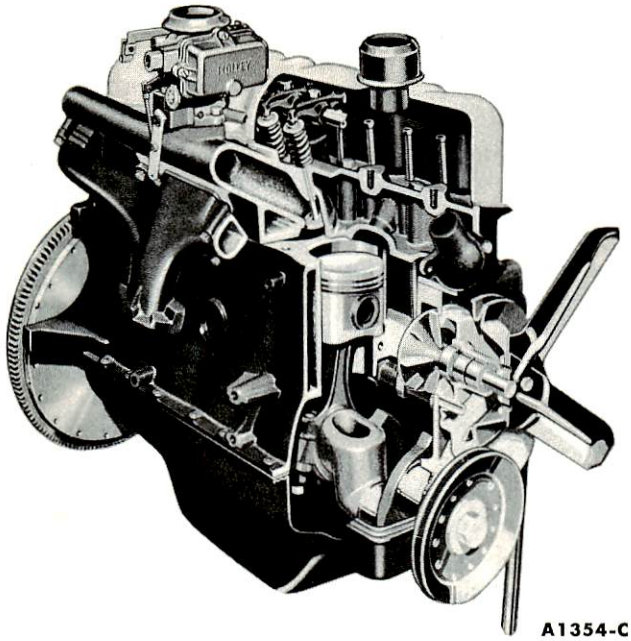

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FIG. 3—Sectional View

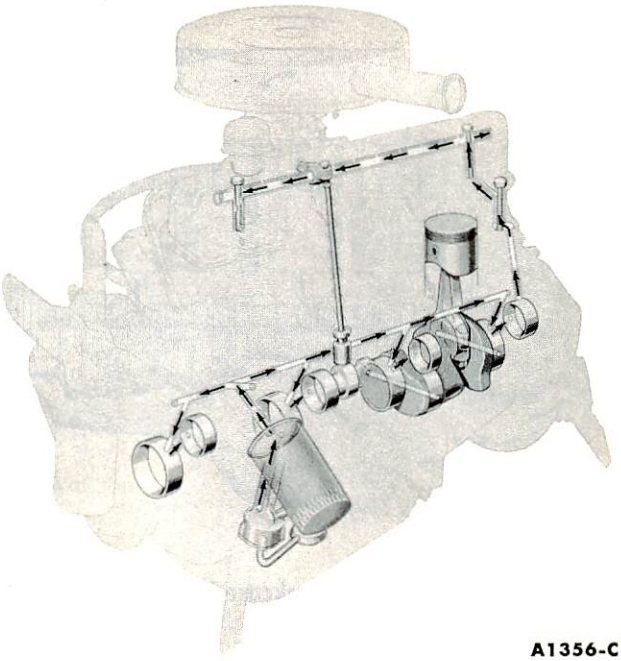

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FIG. 5—Lubrication System

The pistons have two compression rings and one oil control ring. The top compression ring is chrome-plated and the lower compression ring is phosphate-coated. The oil control ring assembly consists of a serrated spring and two chrome-plated steel rails.

VALVE TRAIN

The intake and exhaust valve assemblies are the rotating-type.

The push rods are tubular steel with oil cushioned sockets. The tappets are the barrel-type. Valve lash is maintained by self-locking adjusting screws.

The camshaft is supported by four bearings pressed into the block and is driven by a sprocket and timing chain in mesh with a sprocket on the crankshaft. Camshaft thrust is controlled by a thrust plate located between the camshaft sprocket and the front journal of the camshaft. An eccentric on the camshaft operates the fuel pump.

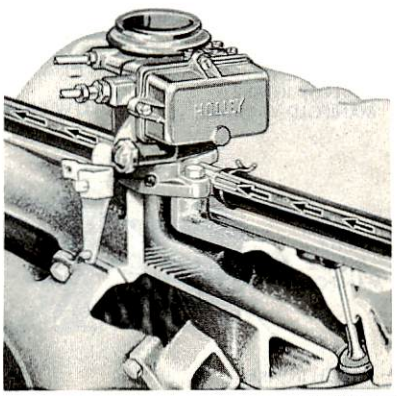
LUBRICATION SYSTEM

Oil from the oil pan sump is forced through the pressure-type lubrication system (Fig. 5) by a rotor pump. [illegible]g-loaded relief valve in the [illegible] passes through a full flow-type filter before it enters the engine. The filter has an integral relief valve and mounting gasket. The relief valve permits oil to by-pass the filter if it becomes clogged, thereby maintaining an emergency supply of oil to the engine at all times. An anti-drain back diaphragm prevents a reverse flow of oil when the engine is stopped.

From the filter, the oil flows into the main oil gallery. The oil gallery supplies oil to all the camshaft and main bearings through a drilled passage in each main bearing web.

The timing chain and sprockets are splash lubricated from the oil pan.

Oil slingers prevent leakage by directing oil away from the crankshaft front and rear oil seals.



A1355-C

FIG. 4—Water Heated Spacer

Cylinder walls, pistons, and piston pins are lubricated through a drilled hole in each connecting rod which indexes with a drilled hole in the connecting rod journal of the crankshaft.

Oil under reduced pressure is fed to the valve rocker arm shaft assembly through a drilled passage in the cylinder block at the No. 4 camshaft bearing which indexes with a hole in the cylinder head. The oil from the shaft flows through drilled holes in each rocker arm to lubricate the valve and the ball end of the rocker arm. The excess oil spirals down the rotating push rod and assists in lubricating the tappet and push rod seat. An oil outlet in the No. 1 rocker arm shaft support, exhausts excess oil from the valve rocker arm shaft. The oil from each rocker arm drains into the push rod chamber through the push rod bore holes in the cylinder head.

The oil in the push rod chamber drains back into the oil pan through cored openings in the block.

CRANKCASE VENTILATION

The engines are equipped with either a vent tube-type crankcase ventilation system or a positive crankcase ventilation system. In the vent tube-type system, the crankcase vapors are discharged to the atmosphere. In the positive system, the crankcase vapors are returned to the intake manifold.

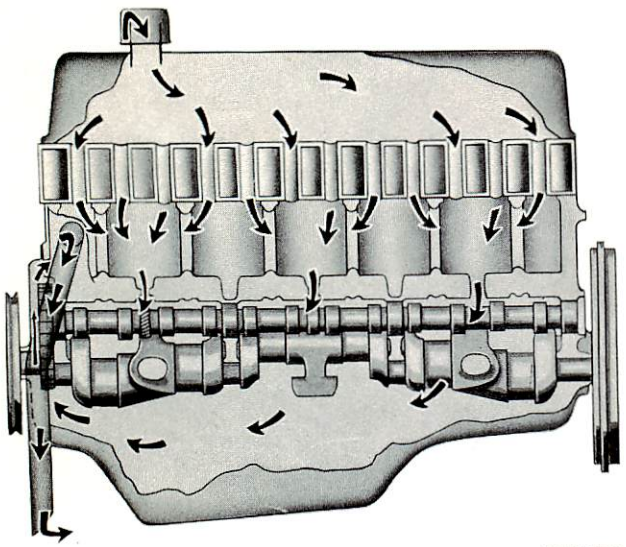


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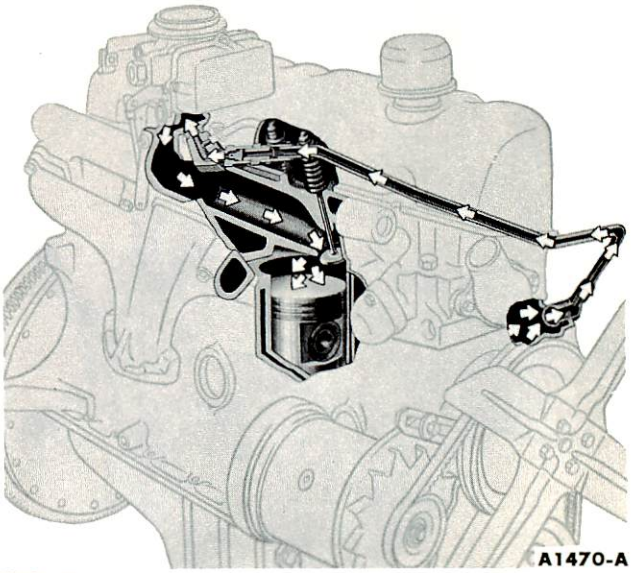
FIG. 6—Vent Tube-Type Crankcase Ventilation System



A1470-A

FIG. 7—Positive Crankcase Ventilation System

VENT TUBE-TYPE CRANKCASE VENTILATION SYSTEM

A crankcase ventilation tube is located at the left front of the engine. The forward motion of the car causes a partial vacuum to be formed at the tube outlet. This vacuum action causes air to be drawn through the engine from the combination oil filler and breather cap located in the front of the valve push rod chamber cover (Fig. 6). The filler cap contains a maze filtering element.

Filtered air from the breather cap flows into the front section of the valve rocker arm shaft chamber. Here the air normalizes its temperature before contacting contaminating vapors originating in the crankcase. Warm ventilating air minimizes the formation of crankcase sludge.

The ventilating air moves down past the push rods and into the crankcase. Air is diverted from the front section of the crankcase through holes in the front of the cylinder block wall to ventilate the timing chain chamber. The air from the crankcase is then directed into the crankcase ventilation tube by the rotating action of the crankshaft.

POSITIVE CRANKCASE VENTILATION SYSTEM

Ventilating air enters the engine in the normal manner through the

air being discharged to the atmosphere, it is returned to the intake manifold. The air is returned to the intake manifold through an exhaust tube which extends from the crankcase ventilation outlet in the left side of the cylinder block to a spring-loaded regulator valve assembly installed in the carburetor spacer (Fig. 7). The valve regulates the amount of air to meet changing operating conditions.

During idle, intake manifold vacuum is high. The high vacuum overcomes the tension of the spring pressure and seats the valve (Fig. 8). With the valve in this position, all the ventilating air passes through a calibrated orifice in the valve. With the valve seated there is minimum ventilation. As engine speed increases and manifold vacuum decreases, the spring forces the valve off its seat and to the full open position. This increases the flow of ventilating air.

COOLING SYSTEM

The coolant is drawn from the bottom of the radiator by the water pump which delivers the coolant to the cylinder block (Fig. 9).

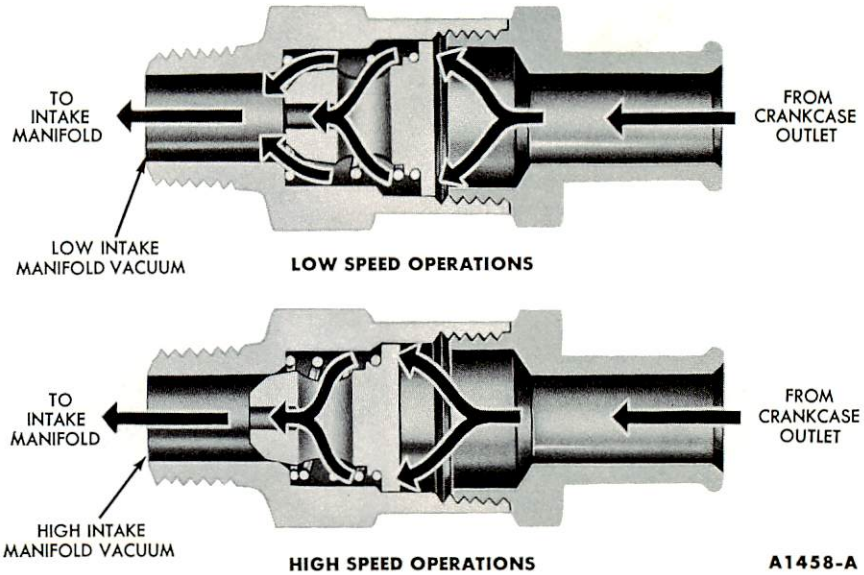
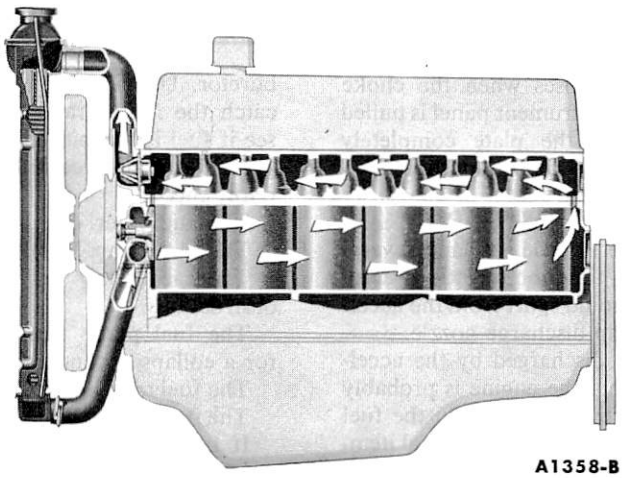


FIG. 8—Positive Crankcase Ventilation Regulator Valve



A1358-B

FIG. 9—Cooling System

As the coolant enters the block, it travels through cored passages to cool the entire length of each cylinder wall. Upon reaching the rear of the cylinder block, the coolant is directed upward into the cylinder head where it cools the combustion chambers, valves, and valve seats on its return to the front of the engine.

At this point, the coolant flows into the coolant outlet connection, past the thermostat if it is open, and into the top of the radiator. If the thermostat is closed, a small portion of the coolant is returned to the water pump for recirculation. The entire system is pressurized to 13-15 psi.

2 ENGINE TROUBLE DIAGNOSIS

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

ENGINE TROUBLE DIAGNOSIS GUIDE

ENGINE WILL NOT CRANK	The cause of this trouble is usually in the starting system (Part 11-2). If the starting system is not at fault, check for a hydrostatic lock or a seized engine as follows: 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. 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, perform the following test: Disconnect a spark plug wire. Check the spark intensity at the end of the wire by installing a terminal adapter in the terminal of the wire to be checked. Hold the adapter approximately 3/16 inch from the exhaust manifold and crank the engine. **IF THERE IS 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. With the ignition on, crank the engine and 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 or rotor. 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. **IF THERE IS A GOOD SPARK AT THE SPARK PLUGS:** Check the spark plugs. If the spark plugs are not at fault, check the following items: **CHOKE** Check the choke linkage for binding or damage. Make certain the

CONTINUED ON NEXT PAGE

ENGINE TROUBLE DIAGNOSIS GUIDE (Continued)

ENGINE CRANKS NORMALLY, BUT WILL NOT START (Continued)	choke plate closes when the choke knob on the instrument panel is pulled out and that the plate completely opens when the knob is pushed in. **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 nozzle. 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 filter. The fuel pump. The carburetor fuel inlet line for obstructions. The fuel pump flexible inlet line for a collapsed condition. The fuel tank line for obstructions. The fuel tank vent. If fuel is reaching the carburetor, check: The fuel inlet system including the fuel inlet needle and seat assembly, and the float assembly.
ENGINE STARTS, BUT FAILS TO KEEP RUNNING	**FUEL SYSTEM** Idle fuel mixture needle 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 the fuel lines or fuel filter. Carburetor icing. Fuel pump defective. Check for dirt in the carburetor not allowing fuel to enter or be discharged from the idle system. **IGNITION SYSTEM** Leakage in the high tension wiring.
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. In this case, check the: **IGNITION SYSTEM** If the miss is isolated in a particular cylinder, perform a spark plug test on the ignition lead of that cylinder. If a good spark does not occur, the trouble is in the secondary circuit of the system. Check the spark plug wire and 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 (page 1-11) test to determine which mechanical component of the engine is at fault. **MISSES ERRATICALLY AT ALL SPEEDS** **EXHAUST SYSTEM** Exhaust system restricted. **IGNITION SYSTEM** Defective breaker points, condenser, secondary wiring, coil, or spark plugs. High tension leakage across the coil, rotor, or distributor cap.

CONTINUED ON NEXT PAGE

ENGINE TROUBLE DIAGNOSIS GUIDE (Continued)

ENGINE RUNS, BUT MISSES (Continued)	**FUEL SYSTEM** Float setting incorrect. Fuel inlet system not operating properly. Dirt or water in fuel lines or carburetor. Restricted fuel filter. **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 (Page 1-11) to determine which mechanical component of the engine is at fault. **MISSES AT IDLE ONLY** **FUEL SYSTEM** Idle fuel mixture needle not properly adjusted.	**IGNITION SYSTEM** Excessive play in the distributor shaft. Worn distributor cam. **ENGINE** Perform a compression test (Page 1-11) to determine which mechanical component of the engine is at fault. **MISSES AT HIGH SPEED ONLY** **FUEL SYSTEM** Power valve clogged or damaged. Power valve diaphragm leaking. Low or erratic fuel pump pressure. Fuel inlet system not operating properly. Restricted fuel filter. **COOLING SYSTEM** Engine overheating.
ROUGH ENGINE IDLE	**FUEL SYSTEM** Engine idle speed set too low. Idle fuel mixture needle not properly adjusted. Float setting incorrect. Air leaks between the carburetor and the manifold and/or fittings. Fuel leakage at the carburetor fuel bowl. Idle fuel system air bleeds or fuel passages restricted. Fuel bleeding from the accelerating pump discharge nozzle. **IGNITION SYSTEM** Improperly adjusted or defective breaker points.	Fouled or improperly adjusted spark plugs. Incorrect ignition timing. **VACUUM BOOSTER PUMP** Leaking pump, lines, or fittings. **ENGINE** Loose engine mounting bolts or worn insulator. Cylinder head bolts not properly torqued. Valve lash set too tight. Crankcase ventilation regulator valve defective or a restricted tube (Positive Crankcase Ventilation System).
POOR ACCELERATION	**IGNITION SYSTEM** Incorrect ignition timing. Fouled or improperly adjusted spark plugs. Improperly adjusted or defective breaker points. Distributor not advancing properly. Defective spark control valve. **FUEL SYSTEM** Inoperative accelerating pump inlet ball check. Inoperative accelerating pump discharge ball check.	Accelerating pump diaphragm defective. Float setting incorrect. Throttle linkage not properly adjusted. Accelerating pump stroke not properly adjusted. Leaky power valve gasket or accelerating pump diaphragm. Dirt or corrosion in accelerating system. Distributor vacuum passages in the carburetor blocked. Restricted fuel filter. **BRAKES** Improper adjustment.

CONTINUED ON NEXT PAGE

ENGINE TROUBLE DIAGNOSIS GUIDE (Continued)

POOR ACCELERATION (Continued)	**TRANSMISSION** Clutch slippage (manual-shift transmission). Improper band adjustment (Fordomatic).	Converter One-Way Clutch (Fordomatic). Improper linkage adjustment (Fordomatic).
ENGINE DOES NOT DEVELOP FULL POWER, OR HAS POOR HIGH SPEED PERFORMANCE	**FUEL SYSTEM** Restricted air cleaner. Restricted fuel filter. Clogged or undersize main jets and/or low float setting. Power valve clogged or damaged. Power valve diaphragm leaking. Fuel pump pressure incorrect. Distributor vacuum passage in the carburetor blocked. **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. Improperly adjusted or defective breaker points.	**EXHAUST SYSTEM** Restriction in system. **COOLING SYSTEM** Thermostat inoperative or incorrect heat range. Thermostat installed incorrectly. Check the cooling system for internal leakage and/or for a condition that prevents the engine from reaching normal operating temperature. **ENGINE** Perform an engine compression test (page 1-11) to determine which mechanical component is at fault. One or more camshaft lobes worn beyond wear limit. **TRANSMISSION** Improper band adjustment (Fordomatic).
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. **ODOMETER** Check calibration. **IGNITION SYSTEM** Check ignition timing.	**ENGINE** Crankcase ventilation regulator valve defective or a restricted tube (Positive Crankcase Ventilation System). **FINAL CHECKS** **FUEL SYSTEM** Check: Fuel pump pressure. Engine idle speed. Idle fuel mixture needle for proper adjustment. Accelerating pump stroke adjustment. Anti-stall dashpot for proper adjustment. Air cleaner for restrictions. Float setting or fuel level. Jet for damage. Power valve operation. Air bleeds for obstructions. Accelerating pump discharge nozzle for siphoning.

CONTINUED ON NEXT PAGE

ENGINE TROUBLE DIAGNOSIS GUIDE (Continued)

EXCESSIVE FUEL CONSUMPTION (Continued)	**IGNITION SYSTEM** Check: Spark plug condition and adjustment. Distributor spark advance operation. **ENGINE** Perform an engine compression test (page 1-11) to determine which mechanical component of the engine is at fault. **COOLING SYSTEM** Check thermostat operation and heat range. **TRANSMISSION** Check band adjustment (Fordomatic).
ENGINE OVERHEATS	**TEMPERATURE SENDING UNIT AND GAUGE** Unit or gauge defective (not indicating correct temperature), or constant voltage regulator defective. **ENGINE** Cylinder head bolts not properly torqued. Incorrect valve lash. Low oil level or incorrect viscosity oil used.	**COOLING SYSTEM** Insufficient coolant. Cooling system leaks. Drive belt tension incorrect. Radiator fins obstructed. Thermostat defective. Thermostat improperly installed. Cooling system passages blocked. Water pump inoperative. **IGNITION SYSTEM** Incorrect ignition timing.
LOSS OF COOLANT	**COOLING SYSTEM** Leaking radiator. Loose or damaged hose connections. Water pump leaking. Radiator cap defective. Overheating.	**ENGINE** Cylinder head gasket defective. Cylinder head bolts not properly torqued. Cylinder block core plugs leaking. Temperature sending unit leaking. Cracked cylinder head or block, or warped cylinder head or block gasket surface.
ENGINE FAILS TO REACH NORMAL OPERATING TEMPERATURE	**TEMPERATURE SENDING UNIT AND GAUGE** Unit or gauge defective (not indicating correct temperature) or constant voltage regulator defective.	**COOLING SYSTEM** Thermostat inoperative or of incorrect heat range.

3 TUNE-UP

mileage interval for an A tune-up is 4,000 miles, for a B tune-up it is 8,000 miles, and for a C tune-up it is 12,000 miles. For a detailed description of an operation procedure, refer to the operation number under "Tune-Up Procedure."

TABLE 1—Tune-Up Schedule

Operation No.	Operation	A	B	C
	ENGINE NOT OPERATING MECHANICAL CHECKS, TESTS, AND ADJUSTMENTS			
1	Clean, adjust, and test spark plugs.	X		
2	Take a compression reading of each cylinder.			X
3	Replace spark plugs.			X
4	Check and adjust the deflection of the drive belts.		X	
5	Clean fuel pump sediment bowl.		X	
6	Replace fuel filter.		X	
7	Check and adjust carburetor fuel level.			X
8	Clean the distributor cap and rotor		X	X
9	Lubricate the distributor cam and the distributor bushing.			X
10	Clean battery cables and terminals.			X
11	Clean positive crankcase ventilation system.		X	
	INSTRUMENT CHECKS			
12	Check battery state of charge.			X
13	Check and adjust breaker point dwell.	X		
14	Check and adjust spark advance.			X
15	Perform a spark intensity test of each spark plug wire.			X
16	Check fuel pump pressure and capacity.			X
	WHILE ENGINE IS WARMING-UP			
17	Clean carburetor air cleaner.		X	
18	Inspect the radiator, hoses, and engine for coolant leaks.			X
19	Check and adjust ignition timing.	X		
	ENGINE OPERATING AT NORMAL TEMPERATURE			
20	Adjust accelerator pump link to seasonal position.	X		
21	Check and adjust engine idle speed.	X		
22	Check and adjust idle fuel mixture.	X		
23	Check and adjust anti-stall dashpot clearance Fordomatic.	X		
24	Check and adjust valve lash.			X

TUNE-UP PROCEDURE

The tune-up is divided into 3 major parts.

The first part is performed with the engine not operating. The first step consists of visual and mechanical checks and adjustments. The second step consists of an instrument check. Always follow the instructions of the manufacturer of the test equipment used.

The second part of the tune-up covers items that can be done while the engine is warming up for carburetor and valve adjustments.

The third part of the tune-up should be performed with the engine operating at normal operating temperature. For the engine to reach normal operating temperature, it should be operated for **30 minutes at fast idle (1200 rpm).**

For more detailed information on cedure," additional engine checks and adjustments are described for use as necessary.

ENGINE NOT OPERATING

Perform the following tests with the engine off and at room temperature.

MECHANICAL CHECKS, TESTS, AND ADJUSTMENTS

1. Clean, Adjust, And Test Spark Plugs. Remove the wire from each spark plug by grasping the moulded cap only.

Clean the area around each spark plug with compressed air, then remove the spark plugs.

Clean the spark plugs on a sand blast cleaner, following the equipment manufacturer's instructions. Remove carbon and other deposits from the threads with a stiff wire brush. Clean the electrode surfaces with a small file (Fig. 10). Dress the electrode to secure flat parallel surfaces on both the center and side electrode.

After cleaning, inspect the plug for cracked or broken insulators, badly pitted electrodes, or other signs of failure. Replace as required.

Set the gap of all serviceable or new plugs to 0.032-0.036 inch by

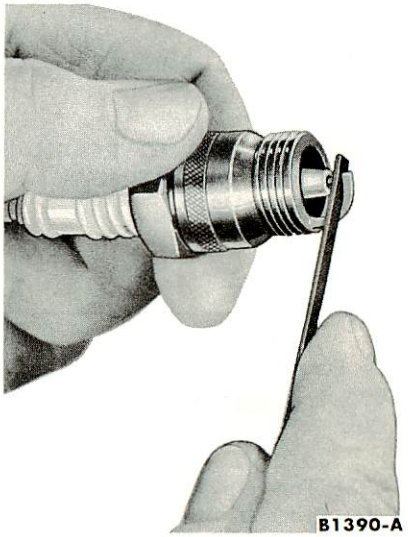


FIG. 10—Cleaning Plug Electrode

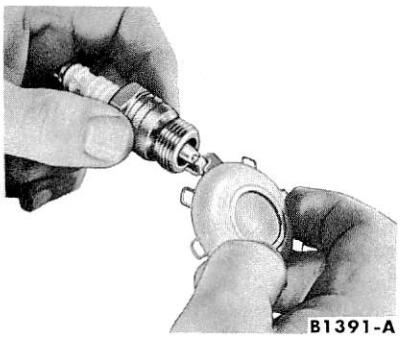


FIG. 11–Gapping Spark Plug

bending the ground electrode (Fig. 11).

After the gap has been adjusted, check the plugs on a testing machine. Compare the sparking efficiency of the cleaned and gapped plug with a new plug. Replace the plug if it fails to meet requirements. Apply a coating of oil to the shoulder of the plug where the insulator projects through the shell, and to the top of the plug, where the center electrode and terminal project from the insulator. Place the spark plug under pressure. Leakage is indicated by air bubbling through the oil. If the test indicates compression leakage, replace the plug. If the plug is satisfactory, wipe it clean.

Install the spark plugs and torque them to 15-20 ft-lbs.

2. Take A Compression Reading Of Each Cylinder. Remove the spark plugs. Remove the coil high tension lead at the distributor cap. Set the throttle plate and choke plate in the wide open position.

Install a compression gauge in the No. 1 cylinder.

Using a remote starter switch, crank the engine several times and record the highest reading registered. Note the number of compression strokes required to obtain the highest reading.

Repeat the test on each cylinder, cranking the engine the same number of times for each cylinder as was required to obtain the highest reading on the No. 1 cylinder.

A variation of ± 20 pounds from specified pressure is satisfactory. **However, the compression of all cyl- should be uniform within 10** able tolerance below normal indicates leakage at the cylinder head gasket, piston rings, or valves.

A low even compression in two adjacent cylinders indicates a cylinder 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 into the combustion chamber. Crank the engine to 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 valve.

Do not install the coil high tension lead at this time.

3. Replace Spark Plugs. Install spark plugs of the correct heat range (Part 2-3). Torque the plugs to 15-20 ft-lbs.

4. Check And Adjust The Deflection Of The Drive Belts. Check the deflection of the drive belts using tool 33-73F. Follow the instructions of the gauge manufacturer. Adjust the tension as follows:

Loosen the generator mounting bolts and the adjusting bracket bolt. Move the generator toward or away

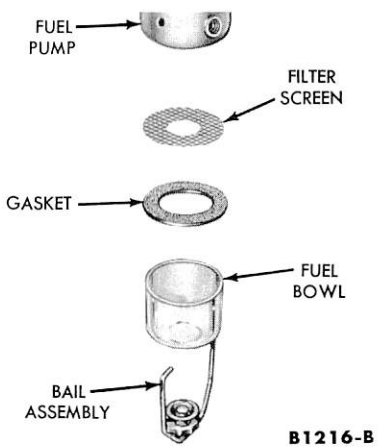


FIG. 12–Sediment Bowl

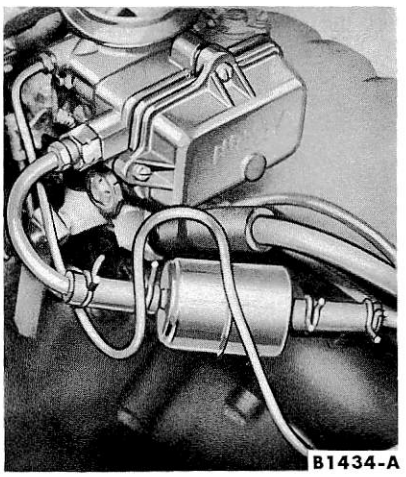


FIG. 13–Fuel Filter Installation

from the engine until the proper deflection is obtained between the water pump pulley and the generator pulley. Tighten the generator adjusting bracket bolt and the mounting bolts.

5. Clean Fuel Pump Sediment Bowl. Clean the bowl and magnetic filler (Fig. 12) with cleaning solvent and dry them with compressed air. Replace the gasket if it is defective.

6. Replace Fuel Filter. Slide the clamps closest to the filter away from the filter (Fig. 13). Slide the new filter into the rubber connections and slide the clamps into place. **Be sure the arrow on the filter is pointed toward the outlet of the filter.**

7. Check And Adjust Carburetor Fuel Level. Remove the power valve diaphragm cover and valve assembly.

Place the fuel gauge in the opening and crank the engine. The fuel should touch the tip of the "low" gauge pin and should not touch the tip of the "high" gauge pin (Fig. 14).

If the fuel level is too high or too low, drain the fuel from the fuel bowl into a suitable container and remove the fuel bowl.

Install the dummy bowl using the fuel bowl gasket and three of the retaining screws (Fig. 14). Position a suitable container under the carburetor to collect any spill-over of fuel. To adjust the fuel level, bend the float arm tab. Crank the engine and check the fuel level.

8. Clean The Distributor Cap And Rotor. Disconnect the coil high tension lead and the spark plug wires at the distributor cap. Remove the distributor cap and rotor.

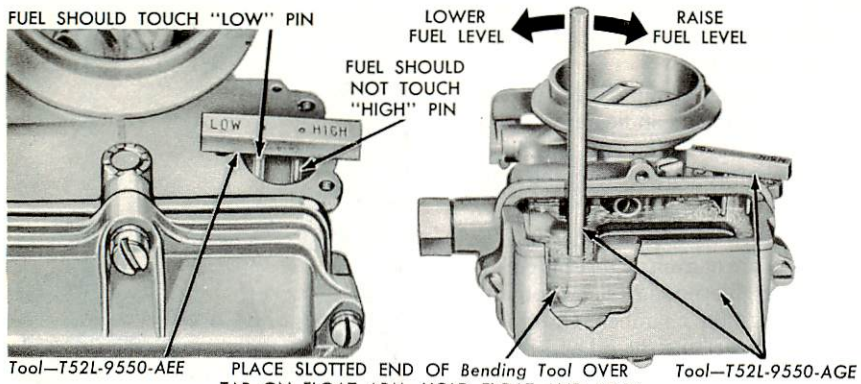


FIG. 14—Fuel Level and Fuel Level Adjustment

Clean the inside of the distributor cap and clean the rotor using a mild cleaning solvent or mineral spirits and a soft bristle brush. Remove dirt or corrosion from the sockets of the distributor cap. Inspect the cap for cracks, burned contacts, or permanent carbon tracks. Inspect the rotor for cracks or a burned tip. Replace the cap and/or rotor if they are defective.

Do not install the rotor or distributor cap at this time.

9. Lubricate The Distributor Cam And The Distributor Bushing. Apply a light film of high temperature, nonfiber grease to the distributor cam. **Do not use engine oil.**

Squirt a few drops of SAE 10W engine oil into the distributor oil cup.

10. Clean Battery Cables And Terminals. Disconnect the battery cables. Wash the battery including the terminals and battery carrier in cold water using a stiff bristle brush. If the battery is extremely dirty, use a baking soda solution. Inspect the battery cables for corrosion, fraying, or breaks. Apply grease to the battery terminals after cleaning. Connect and properly tighten the cable clamps.

11. Clean Positive Crankcase Ventilation System. Remove the crankcase ventilation regulator valve, tubing, and connections. Disassemble the regulator valve. Clean the valve and tubing in clean carburetor solvent and dry them with compressed air. Clean the rubber hose connections with a low volatile petroleum base solvent and dry them with compressed air.

tests except checking distributor spark advance can be made in-chassis. Perform the tests in the sequence listed.

12. Check Battery State of Charge. The battery state of charge can be checked by measuring the battery electrolyte solution specific gravity (hydrometer) or by measuring the voltage of the battery cells on open circuit (no current flow) with a battery charge tester.

If a hydrometer is used, a specific gravity of 1.275-1.285 indicates a fully charged battery. 1.230-1.240 indicates approximately 60% charge. If the specific gravity varies more than 0.025 between cells, the battery should be replaced.

Refer to Part 11-1 which describes in detail the procedure to be followed.

13. Check And Adjust Breaker Point Dwell. If the contacts are excessively out of alignment, replace the breaker point assembly. Do not attempt to align used breaker points. Install a new breaker point assembly if necessary (Part 2-1).

Use a dwell meter only to check the gap of used breaker points. The roughness of used breaker points makes an accurate gap reading or setting with a feeler gauge impossible. Check and set the contact dwell to specification (Part 17) by following the instructions of the meter manufacturer. Always clean used points before adjusting.

14. Check And Adjust Spark Advance. Refer to the procedure in Part 2-1.

After the spark advance has been checked and adjusted, install the rotor and position the distributor in the block so that the rotor is aligned with the mark previously scribed on the distributor body, and the marks on the body and engine block are in alignment. Position the distributor retaining clamp and install the retaining screw. Install the distributor cap. Insert each distributor wire in the proper distributor cap socket. Be sure the wires are forced all the way down into their sockets. The No. 1 socket is identified on the cap. Starting at the No. 1 socket, install the wires in the direction of distributor rotation (clockwise) in the firing order. The firing order is 1-5-3-6-2-4.

15. Perform a Spark Intensity Test of Each Spark Plug Wire. Check the spark intensity of one wire at a time. Install a terminal adapter in the terminal of the wire to be checked. Hold the adapter approximately $\frac{3}{16}$ inch from the exhaust manifold and crank the engine with a remote starter switch. The spark should jump the gap regularly.

16. Check Fuel Pump Pressure And Capacity. Disconnect the fuel line at the carburetor. Install a pressure gauge (0-15 psi) and a petcock on the carburetor fuel inlet line (Fig. 15). Vent the system, by opening the petcock momentarily, prior to taking a pressure reading. Operate the engine at the specified rpm. After the pressure has stabilized it should be within 3.5-5.5 psi.

If the pressure is not to specifications, remove the fuel filter from the system and take another pressure reading.

If the pressure is within specifications with the fuel filter removed, the fuel filter was restricted and a new one should be installed.

If the pressure is not within specifications with the fuel filter removed, the fuel pump is defective.

Operate the engine at 500 rpm. Open the petcock and expel the fuel into a suitable container. Observe the time required to expel one pint. It should be 1 pint within 30 seconds.

WHILE ENGINE IS WARMING-UP

Place the transmission selector lever in neutral position and set the parking brake. Start the engine and operate it at 1200 rpm for 30 minutes to stabilize engine temperatures. While the engine is warming up, perform the following operations:

17. Clean Carburetor Air Cleaner. Direct clean compressed air against

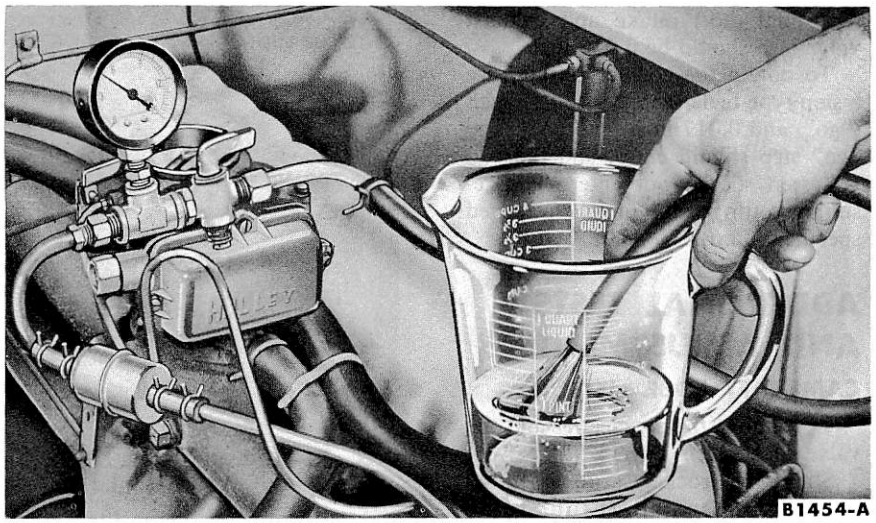


FIG. 15—Fuel Pump Pressure and Capacity Test

the element in the opposite direction of normal air flow, that is, from the inside of the filter out.

Clean the air cleaner body and cover in cleaning solvent, then wipe dry.

Do not install the air cleaner at this time.

18. Inspect the Radiator, Hoses, and Engine for Coolant Leaks. Inspect the radiator hoses for cracks, leaks, and a collapsed condition. Inspect the radiator and engine for external leaks.

Check for internal leakage by operating the engine at fast idle and looking for the formation of bubbles in the radiator. Oil in the radiator may indicate leakage in the engine block or a leak in the automatic transmission oil cooler. Water formation on the oil level dipstick could be an indication of internal leakage.

19. Check and Adjust Ignition Timing. Disconnect the distributor vacuum line.

Connect the timing light high tension lead to the No. 1 spark plug and the other two leads of the timing light to the battery terminals. Do not puncture the spark plug wire or moulded cap.

Clean the dirt from the timing marks and the notch on the pulley. If necessary, chalk the proper mark and the notch on the pulley to improve legibility.

Operate the engine at idle speed. [illegible]iming light should flash just as [illegible] mark lines up with the at 4° BTC on a car with a manual-shift transmission or 2° BTC on a car with an automatic transmission.

ENGINE OPERATING AT NORMAL TEMPERATURE

20. Adjust Accelerator Pump Link To Seasonal Position. Acceleration requirements are satisfied by controlling the quantity of fuel discharged by the accelerating pump.

The pump stroke is controlled by changing the position of the pump link in the throttle lever (Fig. 16). The inner hole (hole closest to the throttle shaft) is for average or hot weather operation. The outer hole is for cold weather operation.

21. Check And Adjust Engine Idle Speed. Final engine idle speed may be varied to suit the conditions under which the car is to be operated. Refer to Fig. 17. **On a car with an air conditioner, operate the air conditioner for 20 minutes before setting the engine idle speed.**

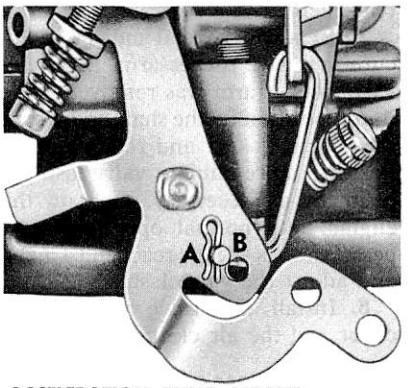
On a car with a manual-shift transmission, place the transmission selector lever in neutral position. Turn the idle speed stop screw in a direction to obtain 500-525 rpm. Open the throttle by hand and allow it to close normally. Recheck the engine idle speed.

On a car with an automatic transmission, be sure the parking brake is on. Place the transmission selector lever in drive range position. Check the engine idle speed and adjust it to 475-500 rpm. Place the selector lever in neutral, accelerate the engine and let it return to idle. Place the selector lever in drive range and check the engine idle speed.

22. Check and Adjust Idle Fuel Mixture (Refer to Fig. 17). Make the initial mixture adjustment by turning the needle in until it lightly touches the seat, then back it off 1-1½ turns. Do not turn the needle against the seat tight enough to groove the point. If the needle is damaged it must be replaced before a proper mixture adjustment can be obtained.

Turn the mixture needle in until the engine begins to run rough from the lean mixture. Turn the needle out until the engine begins to "roll" from the rich mixture. Then, turn the needle in until the engine runs smoothly. Always favor a slightly rich mixture rather than a lean mixture.

Check the engine idle speed.



ACCELERATION PUMP STROKE
SUMMER—PUT ROD IN HOLE A
WINTER—PUT ROD IN HOLE B

FIG. 16—Accelerating Pump Stroke

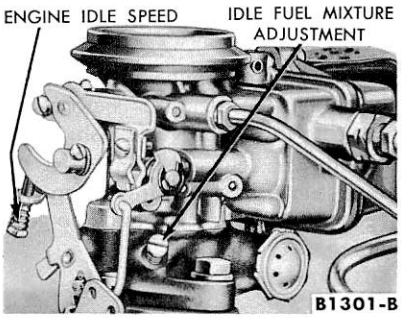


FIG. 17—Idle Adjustments

23. Check And Adjust Anti-Stall Dashpot Clearance—Fordomatic. With the engine idle speed and mixture properly adjusted, and the engine at operating temperature, turn the anti-stall dashpot adjustment screw in or away from the dashpot plunger (Fig. 18).

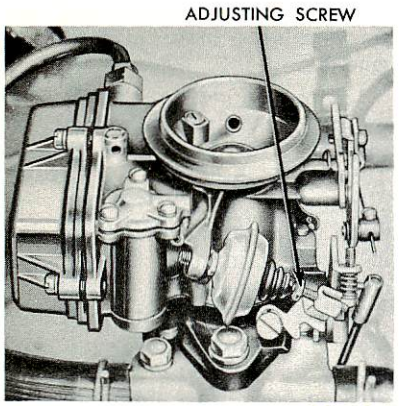


FIG. 18—Anti-Stall Dashpot Adjustment

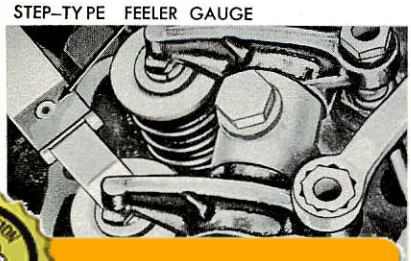
Hold the throttle in the closed position. Depress the plunger with a screw driver blade. Turn the adjustment screw out (toward the plunger) until a clearance of 0.060-0.090 inch is obtained between the screw head and the tip of the plunger.

24. Check And Adjust Valve Lash. It is very important that the valve lash be held to the correct specifications because:

If the lash is set too close, the valve will open too early and close too late, resulting in rough engine idle. Burning and warping of the valves will occur also because the valves cannot make firm contact with the seats long enough to cool properly. If the lash is excessive, it will cause the valve to open too late and close too early causing valve bounce. In addition, damage to the camshaft lobe is likely because the tappet foot will not follow the pattern of the camshaft lobe causing a shock contact between these two parts.

Be sure the engine is at normal operating temperature before attempting to set the valve lash.

With the engine idling, set the valve lash (Fig. 19) using a step-type feeler gauge only ("go" and "no go").



The final (hot) intake and exhaust valve lash should be 0.016 inch.

To obtain the correct setting, use a step-type feeler gauge of 0.015 inch ("go") and 0.017 inch ("no go"). The "go" step should enter, and the "no go" step should not enter. The resultant setting will be to the required specification (0.016 inch).

ADDITIONAL TESTS AND ADJUSTMENTS

CAMSHAFT LOBE LIFT

1. Remove the air cleaner and the valve rocker arm cover.

Slide the rocker arm assembly serving the camshaft lobe to be checked to one side. Secure it in this position. To remove the rocker arm on either end of the shaft, it will be necessary to remove the retaining pin and spring washer and slide the rocker arm off the shaft.

2. Make sure the push rod is in the tappet socket. 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. 20).

3. Turn the crankshaft pulley slowly in the direction of rotation until the tappet is on the base circle of the camshaft lobe. At this point, the push rod will be in its lowest position.

4. Zero the dial indicator, then continue to rotate the pulley slowly until the push rod is in the fully raised position.

5. Compare the total lift recorded on the indicator with specifications.

6. To check the accuracy of the original indicator reading, continue to rotate the pulley until the indicator reads zero.

7. Remove the dial indicator. Secure the valve rocker arm. If an end valve rocker arm was removed, slide it into position on the shaft and install the spring washer and retaining pin. Perform a preliminary valve lash adjustment as necessary. Operate the engine until normal operating temperature has been reached. Check and adjust the valve lash.

8. Install the valve rocker arm cover and the air cleaner.

MANIFOLD VACUUM TEST

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

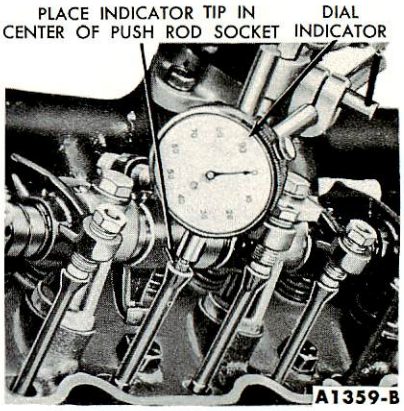


FIG. 20—Camshaft Lobe Lift

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

2. Install an accurate, sensitive vacuum gauge on the fuel pump end of the manifold vacuum line.

3. Operate the engine at the 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 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 2 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.

PRELIMINARY (COLD) VALVE LASH

If the valve rocker arm shaft assembly has been removed and installed, it will be necessary to make a preliminary (cold) valve lash adjustment before starting the engine. If the adjustment is made for an engine tune-up, follow the final adjustment procedure.

The cylinders are numbered from front to rear, 1-2-3-4-5-6 and the

TABLE 2—Manifold Vacuum Gauge Readings

Gauge Reading	Engine Condition
18 inches.	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 or valves.
Very low.	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, cylinder head gasket leak, a defect in the ignition system, or a weak valve spring.
Gradual drop in reading at engine idle.	Excessive back pressure 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 gasket leak.

valves are arranged from front to rear, E-I-I-E-I-E-E-I-E-I-I-E.

1. Turn all the valve adjusting screws until interference is noted. Check the torque required to turn the screw further. If the torque required to turn a screw is less than 3 ft-lbs (36 in-lbs), try a new self-locking adjusting screw. If this is still unsatisfactory, replace the rocker arm and adjusting screw.

2. Make two chalk marks on the crankshaft pulley (Fig. 21). Space the marks approximately 120° apart so that with the timing mark, the damper is divided into three equal parts (120° represents 1/3 of the distance around the damper circumference).

3. Rotate the crankshaft until the No. 1 piston is near TDC at the end of the compression stroke. The No. 1 piston is on TDC at the end of the compression stroke when both valves are closed and the timing mark on the crankshaft pulley is in line with the timing pointer.

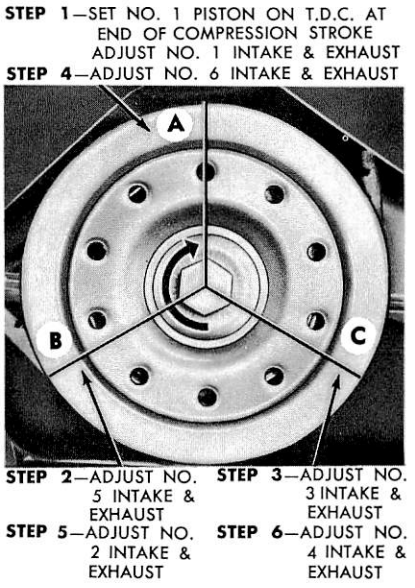


FIG. 21—Preliminary Valve Lash Adjustment

4. Adjust the intake and exhaust valve lash for No. 1 cylinder (Fig. 19). The preliminary (cold) intake and exhaust valve lash is 0.016 inch. **Use a step-type feeler gauge ("go" and "no go") to adjust the valves.**

5. Repeat this procedure for the remaining set of valves, turning the crankshaft ⅓ turn at a time, in the direction of rotation, while adjusting the valves in the firing order sequence.

4 ENGINE REMOVAL AND INSTALLATION

A typical engine installation is shown in Fig. 22.

REMOVAL

1. Remove the hood.

2. Drain the cooling system and the crankcase.

3. Remove the air cleaner. Disconnect the battery ground cable at the cylinder head. Disconnect the radiator upper hose at the water outlet housing and the radiator lower hose at the water pump.

wires at the generator, the starter cable at the starter, the accelerator rod and the choke control cable at the carburetor.

6. Disconnect the windshield wiper vacuum hose at the vacuum pump. Remove the fuel pump sediment bowl. Disconnect the flexible fuel line at the fuel tank line and plug the fuel tank line.

7. Disconnect the coil primary wire at the coil. Disconnect the oil pressure and the water temperature sending unit wires at the sending units.

8. Remove the starter and dust seal.

On a car with a manual-shift transmission, disconnect the clutch retracting spring. Disconnect the clutch equalizer shaft and arm bracket at the underbody rail and remove the arm bracket and equalizer shaft.

9. Raise the car. Remove the flywheel or converter housing upper retaining bolts through the access holes in the underbody.

10. Disconnect the muffler inlet pipe at the exhaust manifold. Disconnect the engine right and left mount at the underbody bracket. Remove the flywheel or converter housing cover.

On a car with a manual-shift transmission, remove the flywheel housing lower retaining bolts.

On a car with Fordomatic, disconnect the converter from the flywheel.

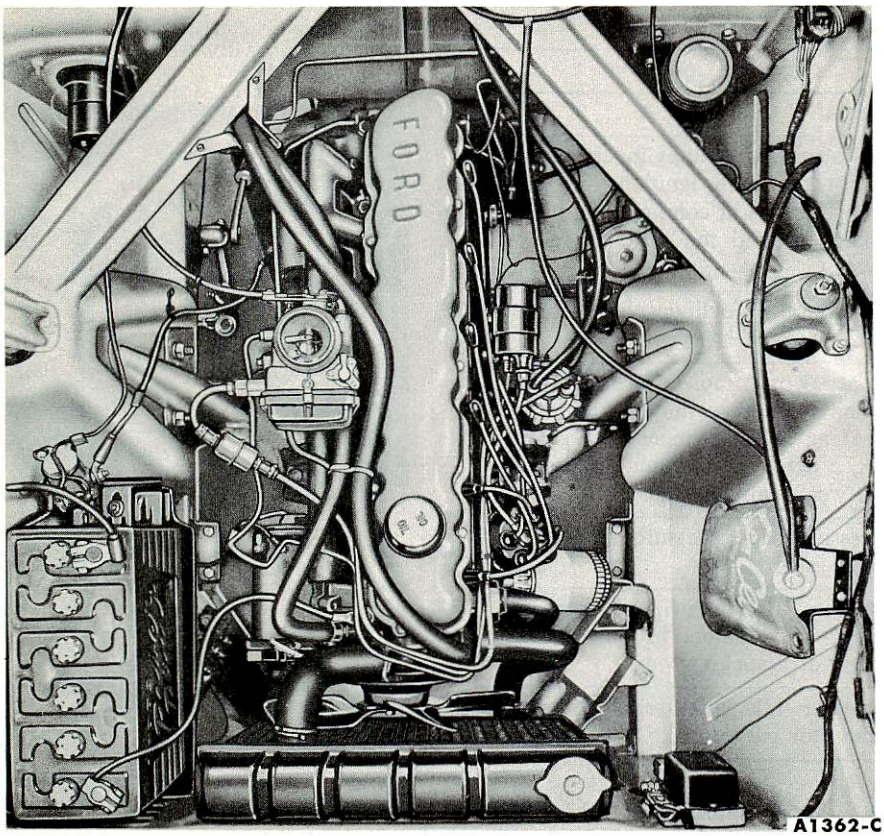


FIG. 22—Engine Installation

Remove the converter housing lower retaining bolts.

11. Lower the car. Support the transmission and flywheel or converter housing with a jack.

12. Attach the engine lifting hook (Fig. 23). Carefully lift the engine out of the engine compartment. Install the engine on a work stand (Fig. 24).

INSTALLATION

1. Install guide pins in the flywheel or converter housing bolt holes in the rear of the engine. Place a new gasket over the studs of the exhaust manifold.

2. Carefully lower the engine into the engine compartment.

3. Make sure the studs on the exhaust manifold are aligned with the holes in the muffler inlet pipe and the guide pins in the block engage the holes in the flywheel housing.

On a car with Fordomatic, start the converter pilot into the crankshaft.

On a car with a manual-shift transmission, start the transmission main drive gear into the clutch disc. It may be necessary to adjust the position of the transmission in 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 (transmission in gear) until the shaft splines mesh with the clutch disc splines.**

4. Remove the engine lifting hooks. Install the flywheel or converter housing upper retaining bolts.

5. Remove the jack from the transmission. Raise the car.

6. Remove the guide pin and install the flywheel or converter housing lower retaining bolts.

On a car with Fordomatic, attach the converter to the flywheel and tighten the retaining nuts to specifications.

7. Install the flywheel or converter housing dust cover.

On a car with a manual-shift transmission, install the clutch equalizer shaft and arm bracket. Connect the clutch retracting spring.

8. Install the engine left and right mount to the underbody bracket. Install the sediment bowl on the fuel pump.

9. Remove the plug from the fuel tank line and connect the flexible fuel line to the fuel tank line. Install the exhaust manifold to muffler inlet pipe retaining lockwashers and nuts.

10. Lower the car. Connect the oil pressure and the engine temperature sending unit wires. Connect the coil primary wire. Connect the windshield wiper vacuum hose to the vacuum pump. Connect the accelerator rod. Connect and adjust the choke control cable.

11. Install the starter motor and dust seal. Connect the starter cable. Connect the generator wires. Connect the heater hose at the water pump and carburetor spacer. Connect the battery ground cable.

12. Install the pulley, fan, and drive belt. Adjust the drive belt tension. Install the radiator. Connect the radiator upper and lower hoses. Fill and bleed the cooling system. Fill the crankcase with the proper grade and quantity of engine oil.

13. Install and adjust the hood.

14. Operate the engine at fast idle and check all gaskets and hose connections for leaks.

On a car with Fordomatic, adjust the transmission control linkage.

15. Install the air cleaner.

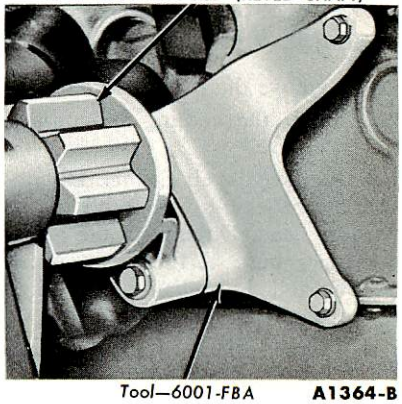


FIG. 24—Engine Work Stand

5 IN-CHASSIS REPAIR OPERATIONS

ENGINE SUPPORTS

ENGINE FRONT SUPPORT

The engine front support is shown in Fig. 25.

1. Remove the engine support to underbody nuts. The nuts must be removed from both supports so that the engine can be raised.

2. Raise the engine slightly with a jack and a wood block placed under the oil pan.

3. Remove the engine support to engine bolts. Remove the support.

4. Place the engine support into position. Install the support to engine bolts.

5. Lower the jack and guide the support studs through the holes in the underbody. Remove the jack and wood block.

6. Install the support to underbody nuts and lockwashers.

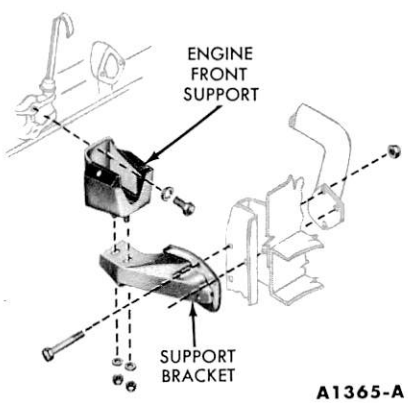


FIG. 25—Engine Front Support

ENGINE REAR SUPPORTS

The engine rear supports are shown in Fig. 26.

Car

1. Remove the support assembly to underbody bolts. Remove the support assembly to insulator bolts and remove the support assembly.

2. Remove the insulator to extension housing bolt and remove the insulator.

3. Install the insulator assembly [illegible] support assembly.

[illegible] the assembly in position

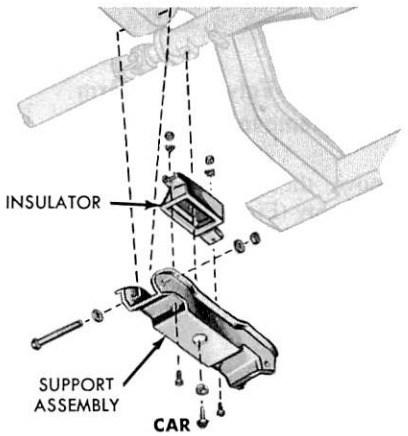
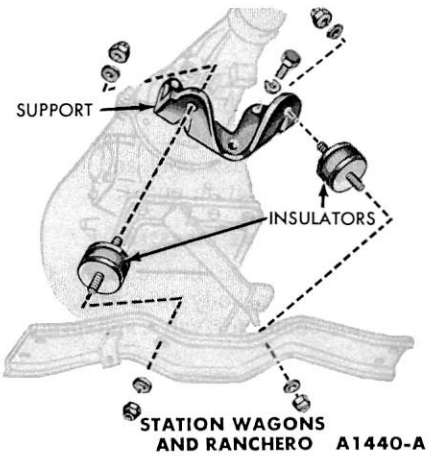


FIG. 26—Engine Rear Support



Station Wagons and Ranchero

1. On a model with a manual-shift transmission, drain the transmission.

2. Remove the insulator nuts and washers.

3. Support the transmission with a floor jack and remove the cross member bolts. Remove the cross member and the insulators.

4. Remove the engine support bolts and lockwashers. Remove the support.

5. Position the engine support and install the bolts and lockwashers.

6. Place the insulators in the cross member mounting holes. Position the cross member to the underbody and install the bolts.

7. Make sure the insulators are seated properly on the cross member, and then install the washers and nuts.

On a model with a manual-shift transmission, fill the transmission.

EXHAUST MANIFOLD

REMOVAL

1. Remove the air cleaner. Disconnect the muffler inlet pipe from the exhaust manifold.

2. Bend the exhaust manifold retaining bolt lock tabs back and remove the retaining bolts. Remove the exhaust manifold.

INSTALLATION

1. Place a new exhaust manifold to muffler inlet pipe gasket over the studs of the exhaust manifold.

2. Place the exhaust manifold into position on the muffler inlet pipe and against the block. Install the exhaust manifold to block retaining bolts and tab washers. Torque the retaining bolts to 24-30 ft-lbs. Lock the bolts by bending one tab of the washer over a flat on the bolt.

3. Install the muffler inlet pipe to exhaust manifold lockwashers and nuts. Torque the nuts to 24-30 ft-lbs. Install the air cleaner.

CLEANING AND INSPECTION

Scrape the old gasket material from the flanges of the muffler inlet pipe and from the exhaust manifold inlet pipe flange. Inspect the manifold for cracks, leaks, or other defects that would make it unfit for further service.

REGULATOR VALVE—POSITIVE CRANKCASE VENTILATION SYSTEM

REMOVAL

1. Remove the crankcase ventilation exhaust tube by disconnecting the exhaust tube from the crankcase ventilation outlet and from the regulator valve assembly (Fig. 27).

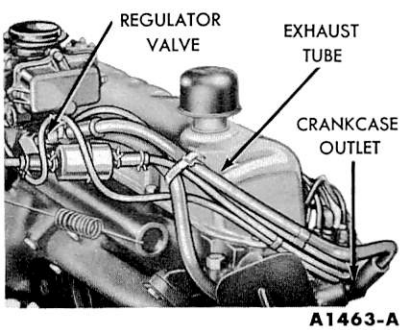


FIG. 27—Regulator Valve and Exhaust Tube

2. Remove the regulator valve assembly from the fitting in the carburetor spacer.

INSTALLATION

1. Install the regulator valve assembly in the carburetor spacer.

2. Connect the exhaust tube to the regulator valve assembly and to the crankcase ventilation outlet.

REGULATOR VALVE DISASSEMBLY

Place the large hex end of the regulator valve body in a vise. Remove the connector, valve, and spring.

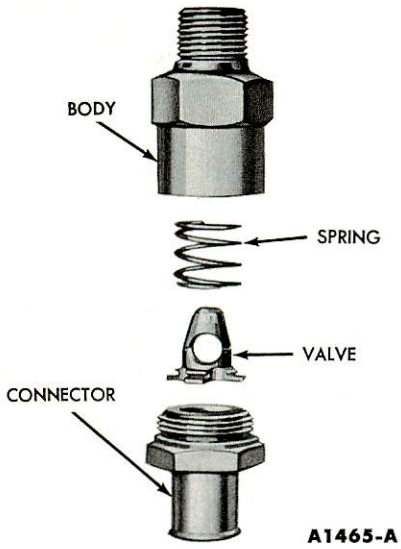


FIG. 28—Regulator Valve Assembly

CLEANING

Clean the valve parts and tubing in clean carburetor solvent and dry with compressed air. Clean the rubber hose connections with a low volatility petroleum base solvent and dry with compressed air.

REGULATOR VALVE ASSEMBLY

Position the spring and valve inside the regulator valve body (Fig. 28). Install the regulator valve connector.

VALVE ROCKER ARM SHAFT ASSEMBLY

REMOVAL

1. Operate the engine until normal operating temperature has been reached. Remove the valve rocker arm cover and discard the gasket.

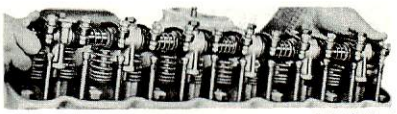


FIG. 29—Valve Rocker Arm Shaft Removal

move the valve rocker arm shaft assembly (Fig. 29).

INSTALLATION

1. Apply Lubriplate to both ends of the push rods and to the valve stem tip.

2. Position the valve rocker arm shaft assembly on the head.

3. Tighten all the valve rocker arm shaft retaining bolts two turns at a time in sequence. Torque the bolts to 30-35 ft-lbs.

4. Perform a preliminary valve lash adjustment (page 1-14).

5. Clean the valve rocker arm cover. Coat one side of a new valve rocker arm cover gasket with oil resistant sealer. Lay the cemented side of the gasket in place in the cover (Fig. 30). Install the cover, making sure that the gasket seats evenly around the head. The cover is tightened in two steps. First torque the retaining bolts to 3-5 ft-lbs. Two minutes after the initial tightening, torque the bolts to the same specification.

DISASSEMBLY

1. Remove the pin and spring washer from each end of the valve rocker arm shaft.

2. Slide the valve rocker arms, springs, and supports off the shaft. Be sure to identify the parts.

3. If it is necessary to remove the plugs from each end of the shaft, drill or pierce the plug on one end. Use a steel rod to knock out the plug on the opposite end. Working from the open end, knock out the remaining plug.

CLEANING AND INSPECTION

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 ID of the rocker arm bore and the OD of the shaft. If the clearance between any rocker arm and the shaft exceeds the wear limit, replace the shaft and/or the rocker arm. Inspect the shaft and the rocker bore for nicks, scratches, scores, or scuffs. Dress up minor surface defects with a hone.

FIG. 30—Valve Rocker Arm Cover Gasket Installation

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.**

ASSEMBLY

1. Lubricate all parts with engine oil. Apply Lubriplate to the valve and push rod ends of the rocker arm.

2. If the plugs were removed from the ends of the shaft, use a blunt tool or large diameter pin punch and install a plug, cup side out, in each end of the shaft.

3. Install the spring washer and pin on one end of the shaft.

4. Install the valve rocker arms, supports, and springs in the order shown in Fig. 31. **Be sure the oil holes in the shaft are facing downward.** Complete the assembly by installing the remaining spring washer and pin.

CYLINDER HEAD AND VALVES

CYLINDER HEAD REMOVAL

1. Operate the engine until normal operating temperature has been reached. Drain the cooling system. Remove the air cleaner. Disconnect the battery cable at the cylinder head.

2. Disconnect the muffler inlet pipe at the exhaust manifold. Pull the muffler inlet pipe down. Remove the gasket.

3. Disconnect the accelerator rod retracting spring. Disconnect the choke control cable and the accelerator rod at the carburetor.

4. Disconnect the fuel inlet line and the distributor vacuum line at the carburetor. Disconnect the vacuum line at the carburetor spacer.

5. Disconnect the carburetor spacer outlet line at the spacer. Disconnect the radiator upper hose at the coolant outlet elbow. Disconnect the heater hoses at the water pump and at the cylinder head.

6. Disconnect the distributor vacuum line at the distributor. Disconnect the carburetor fuel inlet line and the vacuum line at the fuel pump.

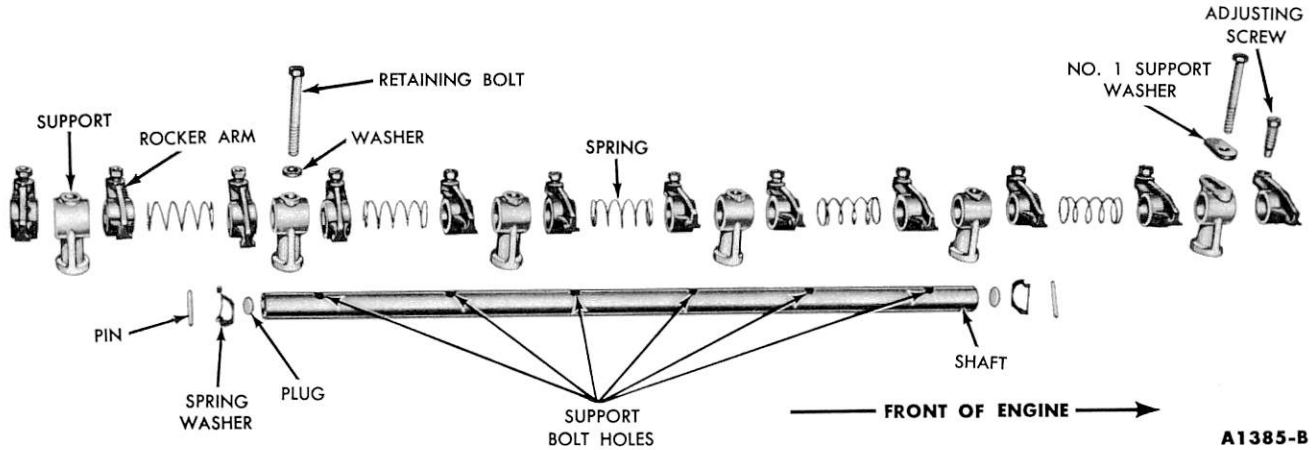


FIG. 31—Valve Rocker Arm Shaft Assembly

Remove the three lines as an assembly.

On an engine with positive crankcase ventilation, disconnect the exhaust tube at the regulator valve and crankcase outlet. Remove the regulator valve. Disconnect the vacuum line at the regulator valve fitting and fuel pump.

7. Disconnect the spark plug wires at the spark plugs and the temperature sending unit wire at the sending unit.

8. Remove the valve rocker arm cover.

9. Remove the valve rocker arm shaft assembly. Remove the valve push rods in sequence (Fig. 32).

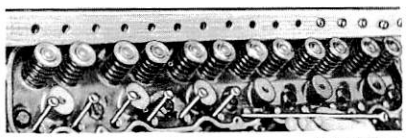
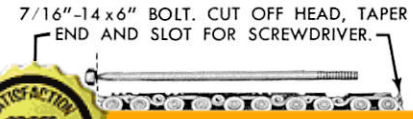


FIG. 32—Valve Push Rod Removal

10. Remove one cylinder head bolt from each end of the head at opposite corners and install the cylinder head guide studs (Fig. 33). Remove the remaining cylinder head bolts and remove the cylinder head. **Do not pry between the cylinder head and block as the gasket surfaces may become damaged.**



CYLINDER HEAD INSTALLATION

1. Clean the head and block gasket surfaces. If the cylinder head was removed for a gasket change, check the flatness of the cylinder head and block.

2. Apply cylinder head gasket sealer to both sides of a new gasket. Use the brush furnished to spread the sealer evenly over the entire gasket surface. Position the gasket over the guide studs on the cylinder block.

3. Install a new gasket on the flange of the muffler inlet pipe.

4. Lift the cylinder head over the guides and slide it down carefully, guiding the exhaust manifold studs into the muffler inlet pipe.

5. Coat the threads of the end bolts for the right side of the cylinder head with a small amount of water resistant sealer. Install, but do not tighten, two bolts at opposite ends of the head to hold the head and gasket in position. Remove the guides, then install the remaining bolts.

6. The cylinder head bolts are tightened in three progressive steps. Torque all the bolts in sequence (Fig. 34) to 55 ft-lbs, then to 65 ft-lbs, and finally to 75 ft-lbs. **After the cylinder head bolts have been tightened to specifications, the bolts should not be disturbed.**

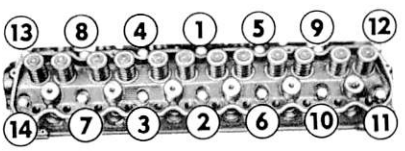


FIG. 34—Cylinder Head Bolt Tightening Sequence

7. Apply Lubriplate to both ends of the push rods. Install the push rods in their original bores, positioning the lower end of the rods into the tappet sockets. Apply Lubriplate to the valve stem tips and to the rocker arm pads.

8. Install the valve rocker arm shaft assembly following steps 2 and 3 under "Valve Rocker Arm Shaft Installation."

9. Perform a preliminary (cold) valve lash adjustment (page 1-14).

10. Install the muffler inlet pipe lockwashers and retaining nuts.

11. Connect the radiator upper hose at the coolant outlet elbow. Connect the heater inlet and outlet hoses at the water pump. Connect the carburetor spacer outlet line at the spacer.

12. Position the distributor vacuum line, the carburetor fuel inlet line, and the vacuum line on the engine. Connect the fuel inlet line and the distributor vacuum line at the carburetor. Connect the vacuum line at the carburetor spacer. Connect the battery cable to the cylinder head.

On an engine with positive crankcase ventilation, position and connect the vacuum line at the regulator valve fitting and fuel pump. Clean the regulator valve parts, exhaust tube, and rubber hose connections. Install the regulator valve. Position and connect the exhaust tube at the regulator valve and crankcase outlet.

13. Connect the accelerator rod retracting spring. Connect the choke control cable and the accelerator rod at the carburetor. Adjust the choke control cable.

14. Connect the distributor vacu-

um line at the distributor. Connect the carburetor fuel inlet line at the fuel filter and the intake manifold vacuum line at the fuel pump.

15. Connect the temperature sending unit wire at the sending unit. Connect the spark plug wires. **Be sure the wires are forced all the way down into their sockets.**

16. Fill and bleed the cooling system. Start the engine and operate it for a **minimum of 30 minutes at 1200 rpm** to stabilize engine temperatures. Check for coolant and oil leaks. Adjust the engine idle speed and the idle fuel mixture. Check the valve lash with the engine idling and adjust the lash if necessary using a step-type gauge (Page 1-14).

17. Install the valve rocker arm cover following step 5 under "Valve Rocker Arm Installation" on page 1-18. Install the air cleaner.

CYLINDER HEAD DISASSEMBLY

1. Install the cylinder head holding fixtures (Fig. 35). Remove deposits from the combustion chambers and valve heads with a scraper and a wire brush before removing the valves. **Be careful not to scratch the cylinder head gasket surface.**

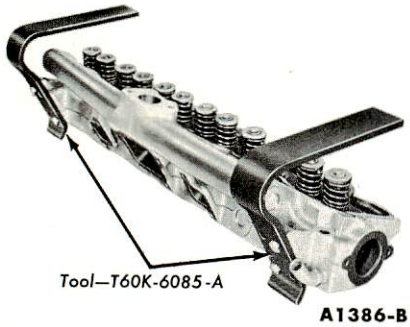


FIG. 35—Cylinder Head Holding Fixtures

2. Compress the valve springs (Fig. 36). Remove the valve retainer locks and release the spring.

3. Remove the sleeve, spring retainer, stem seal, and valve. Discard the valve stem seals. Identify all valve parts.

CYLINDER HEAD CLEANING

After the valves are removed, clean

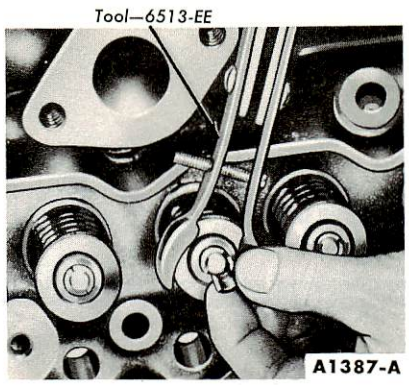


FIG. 36—Compressing Valve Spring

Check the cylinder 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 INSPECTION

Cylinder Head Flatness. Check the flatness of the cylinder head gasket surface (Fig. 37).

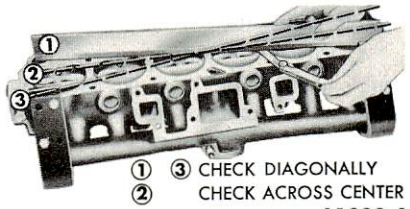


FIG. 37—Cylinder Head Flatness

Valve Seat Runout. Check the valve seat runout with an accurate gauge (Fig. 38). Follow the instructions of the gauge manufacturer.

Valve Seat Width. Measure the valve seat width (Fig. 39).

Reaming Valve Guides. If it becomes necessary to ream a valve guide (Fig. 40) 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**

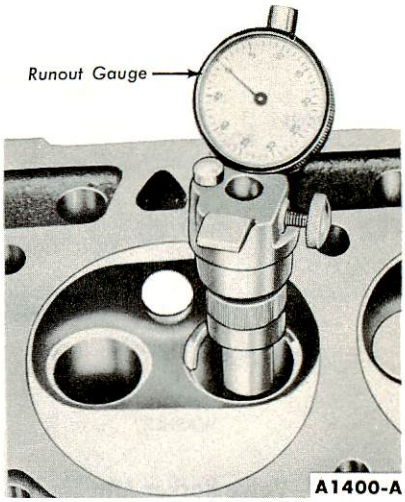


FIG. 38—Valve Seat Runout

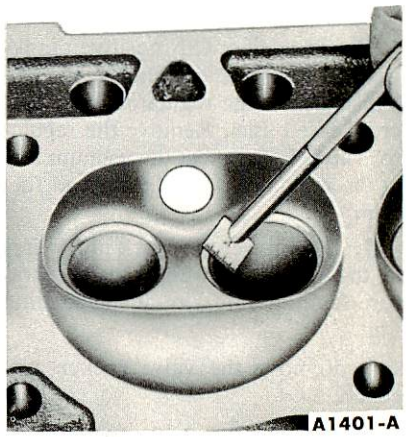


FIG. 39—Valve Seat Width

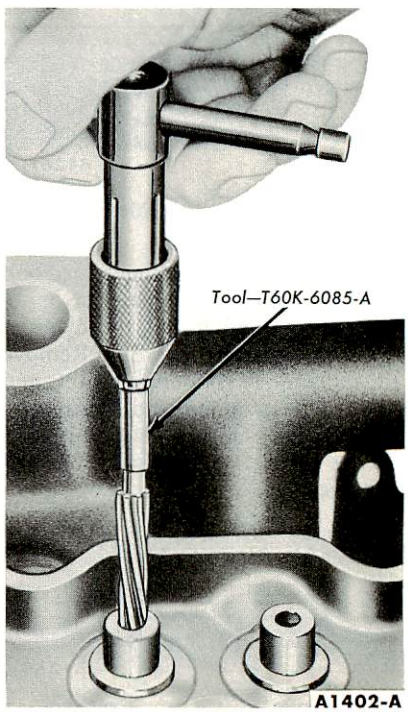


FIG. 40—Reaming Valve Guides

reface the valve seat after the valve guide has been reamed.

Refacing Valve Seats. Refacing of the valve seats should be closely coordinated with 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 seats to a true 45° angle (Fig. 41). Remove only enough stock to clean up pits, grooves, or to correct the valve seat runout. After the seat has been refaced, measure the seat width (Fig. 39). 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. 41).

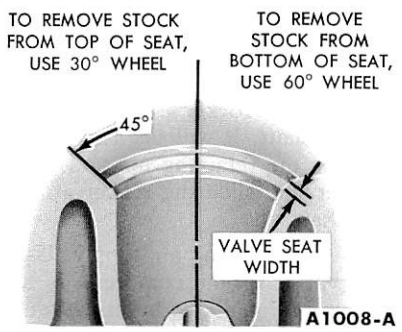


FIG. 41—Valve Seat Refacing

Use a 30° angle grinding wheel to remove stock from the top of the seats (raise the seats) and use a 60° angle wheel to remove stock from the bottom of the seats (lower the seats).

The finished valve seat should contact the approximate center of the valve face. It is good practice to determine where the valve seat contacts the face. To do this, coat the seat with Prussian blue, then set the valve in place. Rotate the valve with 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.

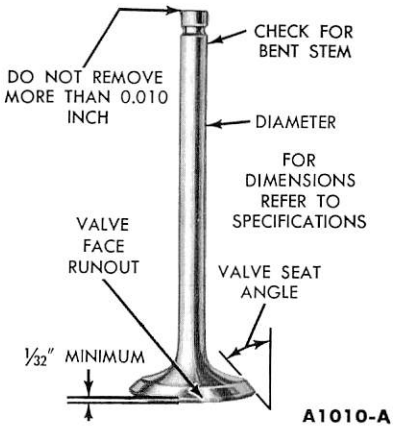


FIG. 42—Critical Valve Tolerances

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.

INSPECTION

Valve Face Runout. Check the valve face runout (Fig. 43). It should not exceed the wear limit.

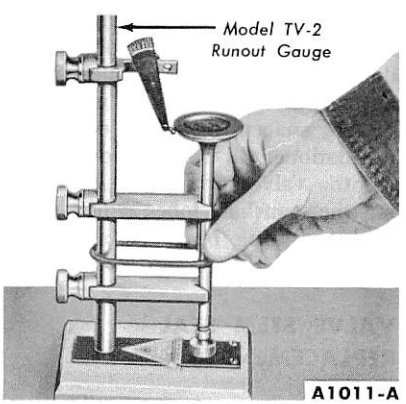


FIG. 43—Valve Face Runout

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. 44 or its equivalent.

If the clearance exceeds the wear limit, try a new valve.

Valve Spring Pressure. Check the spring for proper pressure (Fig. 45). Weak valve springs cause poor engine performance; therefore, if the pressure of any spring approaches the wear limit, replace the spring.

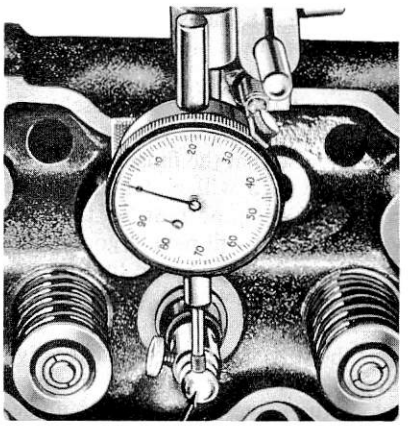


FIG. 44—Valve Stem Clearance

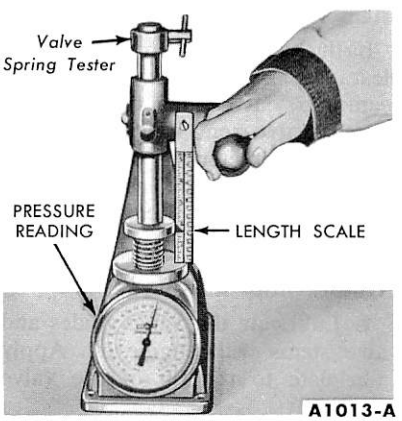


FIG. 45—Valve Spring Pressure

Valve Spring Squareness. Check each spring for squareness using a steel square and a surface plate (Fig. 46). Stand the spring and square on end on the surface plate. Slide the spring up to the square. Revolve the spring slowly and observe the space between the top coil of the spring and

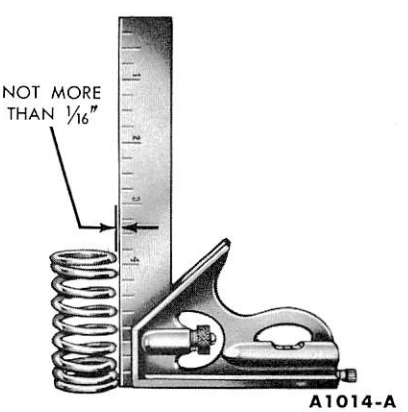


FIG. 46—Valve Spring Squareness

the square. If the spring is out of square more than 1/16 inch, replace it.

Refacing Valves. The valve refacing operation should be closely coordinated with the valve seat refacing operation so that the finished angle of the valve face will match the valve seat. 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.

If the valve face runout is excessive and/or to remove pits and grooves, reface the valves to a true 44° angle. Remove only enough stock to correct the runout or to clean up the pits and grooves. If the edge of the valve head is less than 1/32 inch after grinding, replace the valve as the valve will run too hot in the engine.

SELECT FITTING VALVES

If the valve stem to valve guide clearance exceeds the wear limit, ream the valve guide for the next oversize valve stem. Valves with oversize stem diameters of 0.003, 0.015, and 0.030 inch are available for service. Refer to "Reaming Valve Guides" on page 1-20.

CYLINDER HEAD ASSEMBLY

1. Lubricate the valve guides and valve stems with engine oil. Apply Lubriplate to the tip of the valve stems.

2. Install each valve (Fig. 47) in the valve guide from which it was removed or to which it was fitted. Install a new stem seal on the valve.

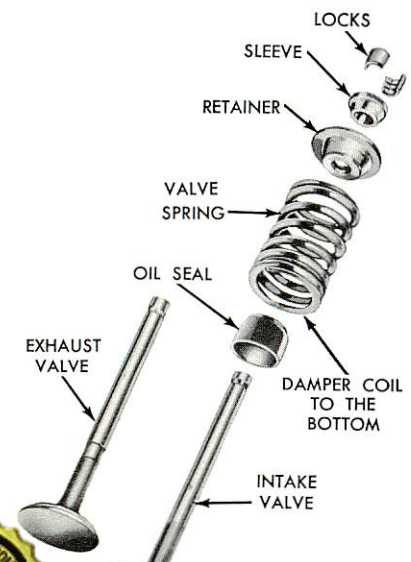


FIG. 47—Valve Assembly

3. Install the valve spring assembly over the valve. **Be sure the damper coil is down.** Install the spring retainer and sleeve.

4. Compress the spring and install the retainer locks (Fig. 36).

5. Measure the assembled height of the valve spring from the surface of the cylinder head spring pad to the underside of the spring retainer with dividers (Fig. 48).

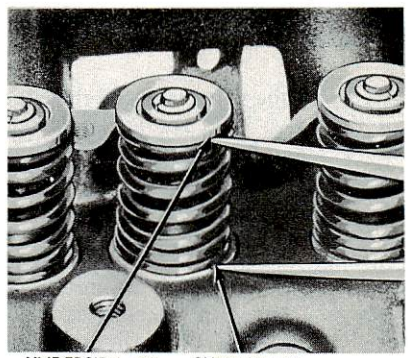


FIG. 48—Valve Spring Assembled Height

6. Check the dividers against a scale. If the assembled height is greater than 1 39/64 inches, install the necessary 0.030-inch thick spacer(s) between the cylinder head spring pad and the valve spring to bring the assembled height to the recommended dimension of 1 9/16-1 39/64 inches. **Do not install spacers unless necessary. Use of spacers in excess of recommendations will result in overstressing the valve springs and overloading the camshaft lobes which could lead to spring breakage and worn camshaft lobes.**

VALVE STEM SEAL REPLACEMENT

1. Operate the engine until normal operating temperature has been reached. Remove the air cleaner and the valve rocker arm cover. Remove the applicable spark plug.

2. Crank the engine until the applicable cylinder is on TDC after the compression stroke. Be sure that both valves are closed.

3. Loosen the valve rocker arm adjusting screw to remove the valve spring load. Remove the valve push rod.

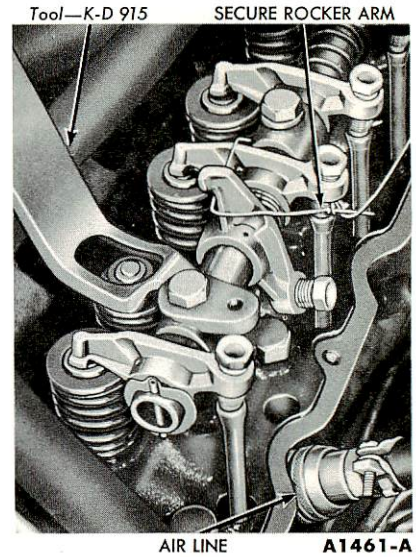


FIG. 49—Compressing Valve Spring

4. Install an air line with an adapter in the spark plug hole.

5. Push the rocker arm to one side and secure it in this position (Fig. 49). To move the rocker arm on either end of the shaft, it will be necessary to remove the retaining pin and spring washer and slide the rocker arm off the shaft.

6. Turn on the air supply. Using the valve spring compression tool shown in Fig. 49, compress the valve and remove the valve spring retainer locks, the sleeve, spring retainer, and the valve spring.

7. Remove the valve stem seal (Fig. 50).

8. Install a new valve stem seal. Place the spring in position over the valve. **Be sure the damper coil is down.** Install the spring retainer and sleeve. Compress the valve spring and install the valve spring retainer locks.

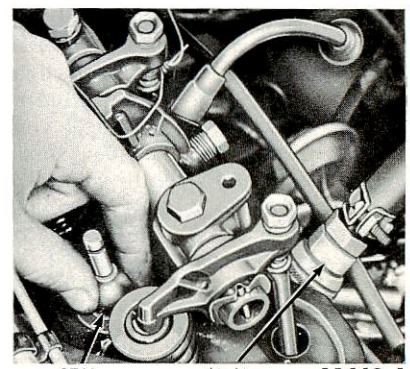


FIG. 50—Valve Stem Seal Removal

9. Apply Lubriplate to both ends of the push rod, the valve and push rod end of the rocker arm, and the valve stem tip. Install the push rod making sure the lower end of the rod is positioned in the tappet push rod cup.

10. Remove the wire securing the valve rocker arm and slide the rocker arm into position. If an end valve rocker arm was removed, slide it into position on the shaft and install the spring washer and retaining pin. Turn off the air and remove the air line and adapter. Install the spark plug and spark plug wire.

11. Perform a preliminary valve lash on the applicable valve. Operate the engine until normal operating temperature has been reached and perform a final valve lash adjustment.

12. Install the valve rocker arm cover following step 5 under "Valve Rocker Arm Installation" on page 1-18. Install the air cleaner.

CYLINDER FRONT COVER AND TIMING CHAIN

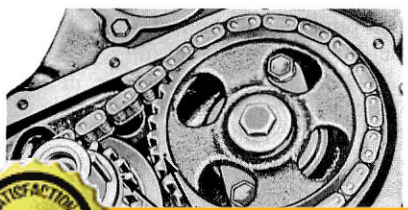
REMOVAL

1. Drain the cooling system and the crankcase. Disconnect the radiator upper hose at the coolant outlet elbow and the radiator lower hose at the water pump.

2. Remove the radiator. Remove the drive belt, fan and pulley, and the crankshaft pulley.

3. Remove the cylinder front cover and gasket (the crankcase ventilation tube bracket is retained by one cylinder front cover bolt). Remove the crankshaft front oil slinger.

4. Establish a reference point on the block and measure from this point to the chain. Rotate the crankshaft in the opposite direction to take up the slack on the right side of the chain. Force the left side of the chain out with the fingers and measure the distance between the reference point and the chain. The deflection is the difference between the two measurements. If the deflection exceeds ½ inch, replace the timing chain and sprockets.



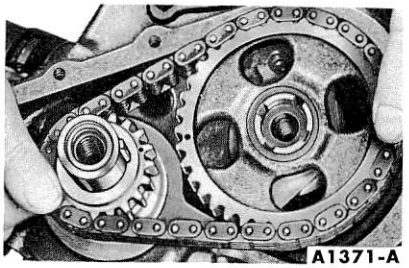


FIG. 52—Timing Chain and Sprockets Removal

5. Crank the engine until the timing marks are aligned as shown in Fig. 51. Remove the camshaft sprocket retaining bolt and washer. Slide both sprockets and timing chain forward and remove them as an assembly (Fig. 52).

6. Remove the oil pan and related parts (page 1-31).

INSTALLATION

1. Position the sprockets and timing chain on the camshaft and crankshaft. Be sure the timing marks on the sprockets and chain are positioned as shown in Fig. 51. Install the camshaft sprocket cap screw and washer. Install the oil slinger so that the timing pointer on the slinger is aligned with the camshaft timing mark.

2. Clean the cylinder front cover and the gasket surface of the cylinder block. Apply sealer to a new cylinder front cover gasket and position the gasket on the cylinder front cover. Install the cylinder front cover using the tool shown in Fig. 53 (the crankcase ventilation tube bracket is retained by one cylinder front cover bolt). Torque the retaining bolts to 6-9 ft-lbs. Install the crankshaft pulley.

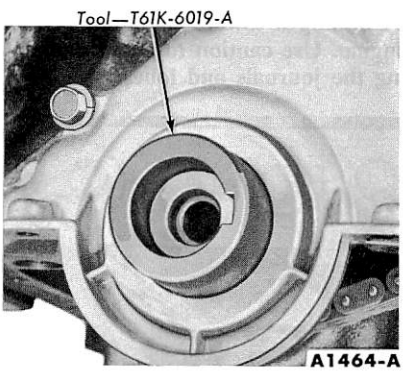


FIG. 53—Cylinder Front Cover Alignment

3. Install the oil pan and related parts (page 1-31).

4. Install the fan, pulley, and drive belt. Adjust the drive belt.

5. Install the radiator. Connect the radiator upper and lower hoses.

6. Fill and bleed the cooling system. Fill the crankcase with the proper quantity and grade of engine oil.

7. Start the engine and check the ignition timing. Adjust the ignition timing if necessary. Operate the engine at fast idle and check all hose connections and gaskets for leaks.

CLEANING AND INSPECTION

Clean all parts in solvent and dry them with compressed air. Inspect the chain for broken links and the sprockets for cracks, and worn or damaged teeth. Replace all components of the timing chain and sprocket assembly if any one item needs replacement.

FRONT OIL SEAL REPLACEMENT

1. Drive out the old seal with a pin punch. Clean out the recess in the cover.

2. Coat a new seal with grease and install the seal (Fig. 54). Drive the seal in until it is fully seated in the recess. Check the seal after installation to be sure the spring is properly positioned in the seal.

CAMSHAFT

The camshaft and related parts are shown in Fig. 55.

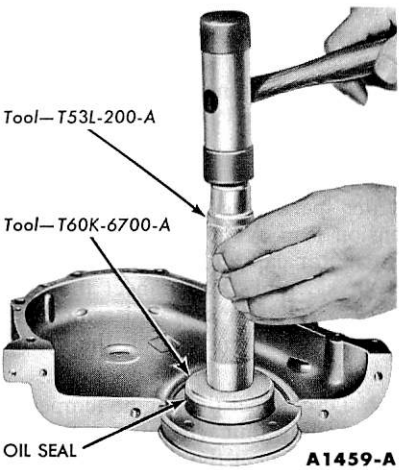


FIG. 54—Crankshaft Front Oil Seal Replacement

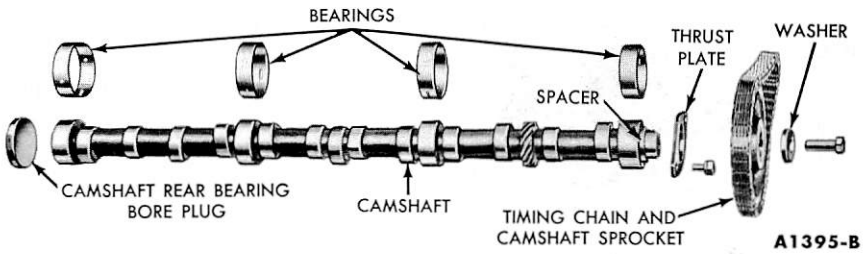


FIG. 55—Camshaft and Related Parts

REMOVAL

1. Drain the cooling system and the crankcase. Remove the air cleaner. Disconnect the battery cable at the cylinder head.

2. Disconnect the radiator hoses at the coolant outlet elbow and the water pump. Remove the radiator. Remove the grille.

3. Disconnect the accelerator rod retracting spring. Disconnect the choke control cable and the accelerator rod at the carburetor.

4. Disconnect the fuel inlet line and the distributor vacuum line at the carburetor. Disconnect the vacuum line at the carburetor spacer.

5. Disconnect the carburetor spacer outlet line at the carburetor spacer. Disconnect the heater hose at the water pump and at the cylinder head.

6. Disconnect the muffler inlet pipe at the exhaust manifold. Pull the muffler inlet pipe down. Remove the gasket.

7. Disconnect the distributor vacuum line at the distributor. Disconnect the carburetor fuel inlet line and the vacuum line at the fuel pump. Remove the three lines as an assembly. Disconnect the windshield wiper vacuum line at the fuel pump.

On an engine with positive crankcase ventilation, disconnect the exhaust tube at the regulator valve and crankcase outlet. Remove the regulator valve. Disconnect the vacuum line at the regulator valve fitting and fuel pump.

8. Disconnect the spark plug wires at the spark plugs and the coil high tension lead at the coil. Remove the distributor cap and spark plug wires as an assembly. Disconnect the primary wire at the coil and remove it from the retaining clip on the cylinder head.

9. Disconnect the engine tempera-

10. Remove the valve rocker arm cover. Follow steps 9 and 10 under "Cylinder Head Removal" (page 1-19) and remove the cylinder head.

11. Using a magnet, remove the tappets and keep them in order so that they can be installed in their original location (Fig. 56).

12. Remove the drive belt, fan and pulley, and the crankshaft pulley.

13. Remove the oil level dipstick. Remove the oil pan (page 1-31). Remove the oil pump and inlet tube assembly.

14. Remove the cylinder front cover and gasket (the crankcase ventilation tube bracket is retained by one cylinder front cover bolt).

15. Push the camshaft toward the rear of the engine. Install a dial indicator so that the indicator point is on the camshaft sprocket cap screw (Fig. 57). Zero the dial indicator. Position a large screw driver between the camshaft sprocket and the block. Pull the camshaft forward and release it. Compare the dial indicator reading with specifications. If the end play is excessive, replace the thrust plate.

16. Remove the dial indicator. Remove the timing chain and sprockets following steps 4 and 5 under "Cylinder Front Cover and Timing Chain Removal" on page 1-23.

17. Remove the camshaft thrust plate. Carefully remove the camshaft by pulling it toward the front of the engine. **Use caution to avoid damaging the journals and lobes.**

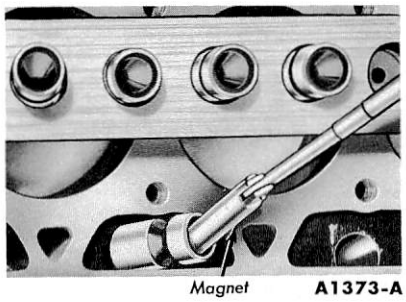


FIG. 56—Valve Tappet Removal

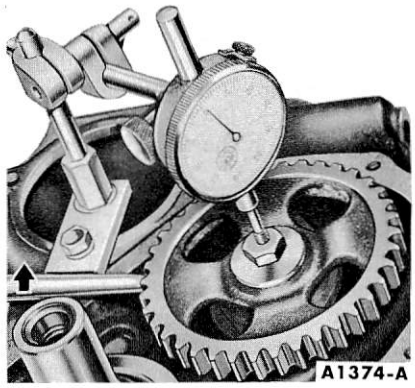


FIG. 57—Camshaft End Play

INSTALLATION

1. Oil the camshaft and apply Lubriplate to all the camshaft lobes. Carefully slide the camshaft through the bearings.

2. Install the thrust plate and torque the retaining screws to 12-15 ft-lbs. Replace the crankshaft front oil seal (page 1-23).

3. Follow steps 1 and 2 under "Cylinder Front Cover and Timing Chain Installation" (page 1-23) and install the sprockets and timing chain, oil slinger, the cylinder front cover, and the crankshaft pulley.

4. Clean the oil pump inlet tube screen, and the oil pan and block gasket surfaces. Install the oil pump inlet tube, oil pump, and the oil pan and related parts (page 1-31). Install the oil level dipstick.

5. Install the fan and fan pulley, and drive belt. Adjust the belt tension. Install the radiator and the grille.

6. Dip the tappet foot in Lubriplate. Coat the remainder of each valve tappet with engine oil. Install the tappets in their original bores.

7. Install the cylinder head, push rods, and the valve rocker arm shaft assembly (including a preliminary valve lash adjustment) by following steps 1 through 9 under "Cylinder Head Installation" (page 1-19).

8. Using a new gasket, install the fuel pump and connect the flexible fuel line. Install the oil filter.

9. Position the distributor in the block with the rotor at the No. 1 firing position and the breaker points open. Install the distributor hold down clamp.

10. Connect the engine temperature sending unit wire. Connect the coil primary wire. Install the distributor cap. Connect the spark plug wires and the coil high tension lead.