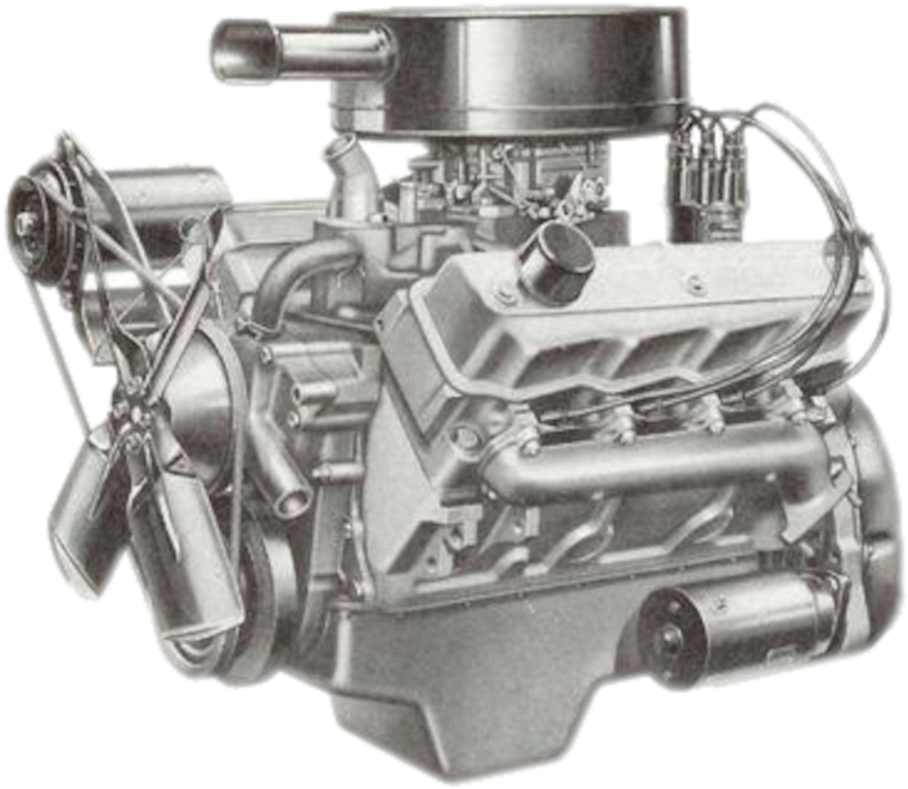
A-block Engine & Components Service Manual

Edited for Engine Information Only

Applicable to 1956 - 1961

277, 301, 303, 313, 318, 326



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Contents

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Editor's Note:

The 1956 - 1961 factory service manuals are greatly lacking in important details that are included in the 1962 - 1967 manuals. For 1956 - 1961 A-blocks, I recommend reading both this manual alongside the 1962 - 1967 manual I edited for a robust approach.

IGNITION SYSTEM

CONTENTS

DISTRIBUTOR SPECIFICATIONS

	225 Cu. In. Engine "RG"	
Distributor—Make	Chrysler	
Model	2095270	
Advance—Automatic		
(Distributor Degrees at Distributor R.P.M.)	0° @ 250 to 450 0° to 2° @ 450 5.5° to 7.5° @ 1000 10.5° to 12.5° @ 2200	
Advance—Vacuum		
(Distributor degrees at inches of Mercury)	0° @ 4.9 to 6.9″ 4.5° to 7° @ 9.5″ 7.8° to 10.3° @ 12″	
Breaker Point Gap	.017″—.023″	
Dwell Angle	36°—42°	
Breaker Arm Spring Tension	17—21.5 oz.	
Timing	5.0° BTC	
Condenser Capacity	.25—.285 mfd.	
Shaft Side Play	.000—.003″	
Rotation	CLOCKWISE	
Spark Plug Type	AG 42*	
Firing Order	1-5-3-6-2-4	
Coil	(AutoLite)—CAH-4001	Chrysler—(1688212)
Ballast Resistor	(AutoLite)—201000	Chrysler—(2095262)

*Do not use gasket

	PD1 361 Cu. In. Engine	PD2 383 Cu. In. Engine	PD1 w/Ram Manifold 383 Cu. In. Engine
Distributor—Make	Auto-Lite	Auto-Lite	Auto-Lite
Model	IBP-4005C	IBP-4005D	IBS-4006E
Centrifugal Advance			
(Degrees and RPM)	0° @ 250 to 450	0° @ 275 to 425	0° @ 325 to 475
(Degrees and RPM)	0 to 2° @ 450 3.5 to 5.5° @ 800 7 to 9° @ 2200	0 to 4.3° @ 425 3.3 to 5.3° @ 540 10 to 12° @ 2150	0 to 4.3° @ 475 4.5 to 6.5° @ 640 9 to 11° @ 2400
Vacuum Advance			
(Degrees at inches of vacuum)	0° @ 7.4 to 9″ 4.5 to 7.8° @ 12″ 8.3 to 11° @ 15″	0° @ 7.4 to 9″ 4.5 to 7.8° @ 12″ 8.3 to 11° @ 15″	0° @ 7.2 to 8.9″ 4.5 to 7.5° @ 12″ 7.5 to 10.5° @ 14.5″
Contact Gap	.014 to .019″	.014 to .019″	.014 to .019″
Dwell Angle	27 to 32°	27 to 32°	One set points 27 to 32° Both sets points 34 to 40°
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.	.25 to .285 mfd.
Arm Tension (Spring)	17 to 21.5 oz.	17 to 21.5 oz.	17 to 21.5 oz.
Rotation	Counter-Clockwise	Counter-Clockwise	Counter-Clockwise
Timing	10° BTC	10° BTC	7.5° BTC
Spark Plug Type	A42	A42	A32
Spark Plug Gap	.035″	.035″	.035″
	1—2 Bbl. Carb.	1—4 Bbl. Carb.	2—4 Bbl. Carb.

DISTRIBUTOR SPECIFICATIONS

	PD4-LM w/Manual Trans. 318 Cu. In. Engine	PD4-LM w/Auto. Trans. 318 Cu. In. Engine	PD4-LM w/Power Pak 318 Cu. In. Engine
Distributor—Make	Auto-Lite	Auto-Lite	Auto-Lite
Model	IBP 4003T	IBP 4003L	IBP 4003N
Centrifugal Advance			
(Degrees and RPM)	0° @ 270 to 430	0° @ 335 to 565	0° @ 350 to 550
	0 to 2° @ 430	0 to 2° @ 565	0 to 2° @ 550
	4.5 to 6.5° @ 800	2 to 4° @ 800	2 to 4° @ 750
	10.5 to 12.5° @ 2300	8 to 10° @ 2300	6.5 to 8.5° @ 2400
Vacuum Advance			
(Degrees at inches of vacuum)	0° @ 7.6 to 8.8″	0° @ 7.6 to 8.8″	0° @ 7.6 to 8.8″
	6.8 to 9.8° @ 13″	6.8 to 9.8° @ 13″	6.8 to 9.8° @ 13″
	12 to 14.8° @ 17″	12 to 14.8° @ 17″	12 to 14.8° @ 17″
Contact Gap	.014 to .019″	.014 to .019″	.014 to .019″
Dwell Angle	27 to 32°	27 to 32°	27 to 32°
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.	.25 to .285 mfd.
Arm Tension (Spring)	17 to 21.5 oz.	17 to 21.5 oz.	17 to 21.5 oz.
Rotation	Clockwise	Clockwise	Clockwise
Timing	5° BTC	10° BTC	10° BTC
Spark Plug Type	A42	A42	A42
Spark Plug Gap	.035″	.035″	.035″

	PD1 Hi-Performance 383 Cu. In. Engine	D-500 Police Pkg. 383 Cu. In. Engine
Distributor—Make	Auto-Lite	Auto-Lite
Model	IBP-4005D	IBS-4006D
Centrifugal Advance		
(Degrees and RPM)	0° @ 275 to 425	0° @ 375 to 525
(Degrees and RPM)	0 to 4.3° @ 425	0 to 2.5° @ 525
	3.3 to 5.3° @ 540	4.5 to 6.5° @ 810
	10 to 12° @ 2150	8.5 to 10.5° @ 2400
Vacuum Advance		
(Degrees at inches of vacuum)	0° @ 7.4 to 9″	0° @ 7.5 to 9.2″
	4.5 to 7.8° @ 12″	4.5 to 7.8° @ 12″
	8.3 to 11° @ 15″	9.5 to 12.5° @ 16″
Contact Gap	.014 to .019″	.014 to .019″
Dwell Angle	27 to 32°	One set points 27 to 32°
		Both sets points 34 to 40°
Condenser Capacity	.25 to .285 mfd.	.25 to .285 mfd.
Arm Tension (Spring)	17 to 21.5 oz.	17 to 21.5 oz.
Rotation	Counter-Clockwise	Counter-Clockwise
Timing	10° BTC	10° BTC
Spark Plug Type	A42	A32
Spark Plug Gap	.035″	.035″
	1—4 Bbl. Carb.	1—4 Bbl. Carb.

SPECIAL TOOLS

C-3296 . . . . . Electrical Leakage Detector
C-3744 . . . . . Puller (Distributor Shaft Bushing)
C-3041 . . . . . Installer and Burnisher
MTU-36 . . . . . Spring Scale

SERVICE DIAGNOSIS

CONDITIONS—POSSIBLE CAUSES

1. BURNED OR PITTED DISTRIBUTOR POINTS

Possible Causes:

(1) Dirt or oil on points.
(2) Points misaligned or gap too narrow.
(3) Defective coil.
(4) Wrong condenser or defective condenser.
(5) Generator regulator setting too high.
(6) Bushings or distributor shaft worn.
(7) Touching point faces with fingers during installation.

2. IGNITION COIL FAILURE

Possible Causes:

(1) Regulator setting too high.
(2) Coil damaged by excessive heat from engine.
(3) Coil case or tower cracked.
(4) Oil leak at tower.
(5) Coil tower carbon tracked.

3. CONDENSER FAILURE

Possible Causes:

(1) Normal fatigue.
(2) Damaged by excessive engine heat or moisture.

4. FOULED SPARK PLUGS

Possible Causes:

(1) Carburetor mixture over-rich.
(2) Excessive oil consumption.
(3) Improper plug heat range.
(4) Improper gap adjustment.

5. BURNED SPARK PLUGS

Possible Causes:

(1) Plugs loose or too tight in cylinder head.
(2) Carburetor mixture too lean.
(3) Improper plug heat range.
(4) Improper ignition timing.
(5) Leaking head gasket or cracked cylinder head.

GENERAL INFORMATION

The ignition system consist of two separate circuits: The battery, ammeter, ignition switch, primary winding of the ignition coil, distributor contacts and condenser, vehicle frame, and the primary wiring make up the low voltage primary circuit. The secondary high voltage circuit includes the coil secondary winding, the distributor cap and rotor, the spark plugs, the high tension wiring and the vehicle frame.

Operation

In operation, a primary current flows from the battery, through the ammeter and ignition switch to the coil primary winding, then to ground through the distributor contacts. When the contacts open, the current tends to continue flowing across the contact gap. The condenser, which is connected across the contacts, momentarily absorbs this current and in so doing hastens the collapse of the magnetic field produced by the current in the coil primary winding. This collapsing field induces a very high voltage in the secondary winding which is carried by the high tension wire to the center terminal of the distributor cap. The rotor connects this center terminal to one of the cap terminals which in turn is connected to the proper spark plug. The spark produced by this high tension current ignites the fuel in that cylinder. This process is repeated for every power stroke of the engine. This requires moving parts to operate at high speeds and electrical parts to perform their function with maximum efficiency.

SERVICE INFORMATION

PROCEDURES

1. CHECKING THE SECONDARY CIRCUIT

The coil to distributor cap lead wire and the spark plug wires should make good, clean contact in the ignition coil and the distributor cap towers. Wires that are loose or are not inserted all the way into the towers will corrode and increase the resistance.

The ignition coil tower and the distributor cap should be wiped clean with a cloth moistened in a cleaning solvent. This serves to eliminate leaks and hard starting due to moisture that may collect in the dirt accumulation.

The insulation of the coil lead and spark plug wires will deteriorate with usage. Leakage to ground and between the wires will occur, resulting in hard starting and inefficient engine operation. Old, cracked, or damaged wires should be replaced. The secondary cables, cap and rotor should be tested, using Tool C-3296. This tester provides high voltage which is sufficient for testing secondary insulation.

On engines equipped with resistance type wire, check for open circuit, loose terminals or high resistance. Replace cable if resistance is more than 30,000 ohms. Replace cable if terminal has pulled off.

The rotor and distributor cap electrodes should be inspected for burning. Replace the rotor if the electrode is burned on the top or worn too short.

2. DISTRIBUTOR RESISTANCE TEST

This test indicates the resistance of the ignition primary circuit from the distributor side of the coil, through the points and the distributor ground. Excessie resistance in this portion of the ignition system will prevent the coil from producing sufficient output for good over-all ignition. To perform test proceed as follows:

(1) Connect a jumper wire from armature terminal to a good ground. **Grounding armature prevents charging system operation, thus providing a stable circuit voltage for the following ignition tests.**

(2) Turn the Selector Switch of tach dwell unit to the CALIBRATE position and adjust Dwell Calibrator until the Dwell Meter reads on the set line (test leads separated).

(3) Leave selector switch in CALIBRATE position, connect tach-dwell red lead to distributor terminal of coil and black lead to a good ground.

(4) Turn ignition switch ON. Observe dwell meter reading. Meter pointer should be well within black bar marked "DISTRIBUTOR RESISTANCE". If reading is zero or outside of black bar, crank engine with starter until meter pointer moves as far to right as possible. (This will indicate that breaker points are closed). A reading now within black indicates a normal distributor primary circuit.

If reading is outside the black bar, high resistance is present in the distributor primary circuit.

(5) Remove test lead from the distributor terminal of coil and connect to the following points:

Distributor primary terminal (outside)
Distributor primary terminal (inside)
Breaker point terminal bracket (insulated bracket)
Ground side of contact points.
Distributor housing.

(6) Repeat test at each connection until a noticeable change occurs in the meter reading. If a bad connection or faulty lead is indicated clean, tighten or replace as necessary and repeat test (4).

If bad points are indicated, remove distributor for complete inspection, service, testing and calibration.

3. IDLE R.P.H. TEST

The engine idle r.p.m. setting should be tested and recorded as it is when the vehicle is first brought into the shop for testing.

This will assist in diagnosing complaints of engine stalling or complaints of creeping and hard shifting on vehicles equipped with automatic transmissions.

Test procedures as follows:

(1) Turn the selector switch to the calibrate position and adjust dwell calibrator until the dwell meter reads on the set line (test leads separated).

(2) Connect the red lead of the test unit to the distributor primary terminal at coil and the black lead to a good ground.

(3) Turn the Selector switch to the LOBE position corresponding with the number of lobes on the distributor cam.

(4) Turn the tachometer r.p.m. switch to the 1000 r.p.m. position.

(5) With engine at normal operating temperature (off fast idle). Momentarily open the throttle and release to make sure there is no bend in the linkage and that the idle speed screw is against its stop.

(6) Note engine r.p.m. on 1000 r.p.m. scale and adjust carburetor to specified idle speed.

4. DISTRIBUTOR POINT DWELL

The "degrees of dwell" of the distributor breaker

points are the degrees of rotation through which the breaker points remain closed. This is also commonly referred to as "dwell angle" or "cam angle".

Correct distributor point dwell is essential for good ignition performance and point life.

Test procedures are as follows:

(1) Connect tach-dwell red lead to distributor terminal of coil and black lead to a good ground.

(2) Turn selector switch to the LOBE position corresponding with the number of lobes in the distributor cam.

(3) Start engine and operate at 475 to 500 r.p.m.

(4) Observe dwell meter reading and compare to specifications. If the dwell reading is within specification, the point gap, cam rubbing block and breaker arm are all in satisfactory condition.

If dwell reading is not within specifications, incorrect point gap, defective cam, worn rubbing block or distorted breaker arm is indicated.

Dwell Variation

This test indicates the mechanical condition of the distributor. Excessive wear in distributor mechanical parts cause dwell variations which will affect ignition timing.

Test procedures are as follows:

(1) With engine at idle speed vacuum line disconnected and with the test leads connected as in the point dwell test, turn the tachometer r.p.m. switch to the 5000 r.p.m. position.

(2) Slowly increase engine speed to 1500 r.p.m. then slowly reduce to idle speed while observing the dwell meter reading.

If the dwell reading varies more than specified between idle speed and 1500 r.p.m. probable wear in the distributor shaft, bushings or breaker plate is indicated. Remove distributor for complete inspection and testing on a distributor tester. **Dwell variation at speeds above 1500 r.p.m. does not necessarily indicate distributor wear. IMPORTANT: Dwell and gap of the points must both be within their specified tolerance at the same time. If this cannot be accomplished, it is probable that the wrong points are installed or the cam lobes are badly worn.**

5. IGNITION TIMING

To obtain maximum engine performance, the distributor must be correctly positioned to give proper ignition timing.

The ignition timing test will indicate the timing of the spark at the No. 1 piston at idle (only).

Test procedures as follows:

(1) Disconnect vacuum line at distributor.

(2) Connect secondary lead of Power Timing light to No. 1 spark plug, red primary lead to positive terminal of battery and black primary lead to negative battery terminal.

(3) Start engine and set idle to 475 - 500 R.P.M. (transmission in neutral).

(4) Using timing light to observe position of timing mark on crankshaft dampener and check aginst specifications.

(5) Loosen distributor clamp screw and rotate distributor housing so that specified timing mark and pointer are in alignment. (Moving distributor housing against shaft rotation advances timing and with shaft rotation retards timing).

(6) Tighten distributor clamp screw after timing

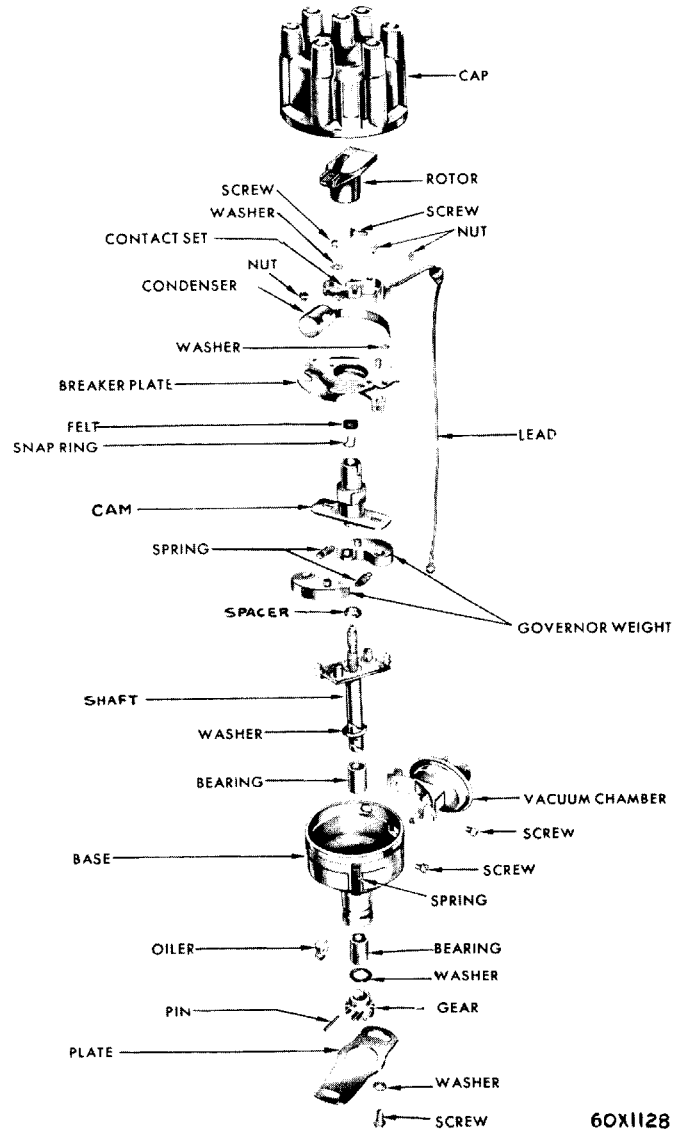


Fig. 1—Six Cylinder Distributor (Exploded View)

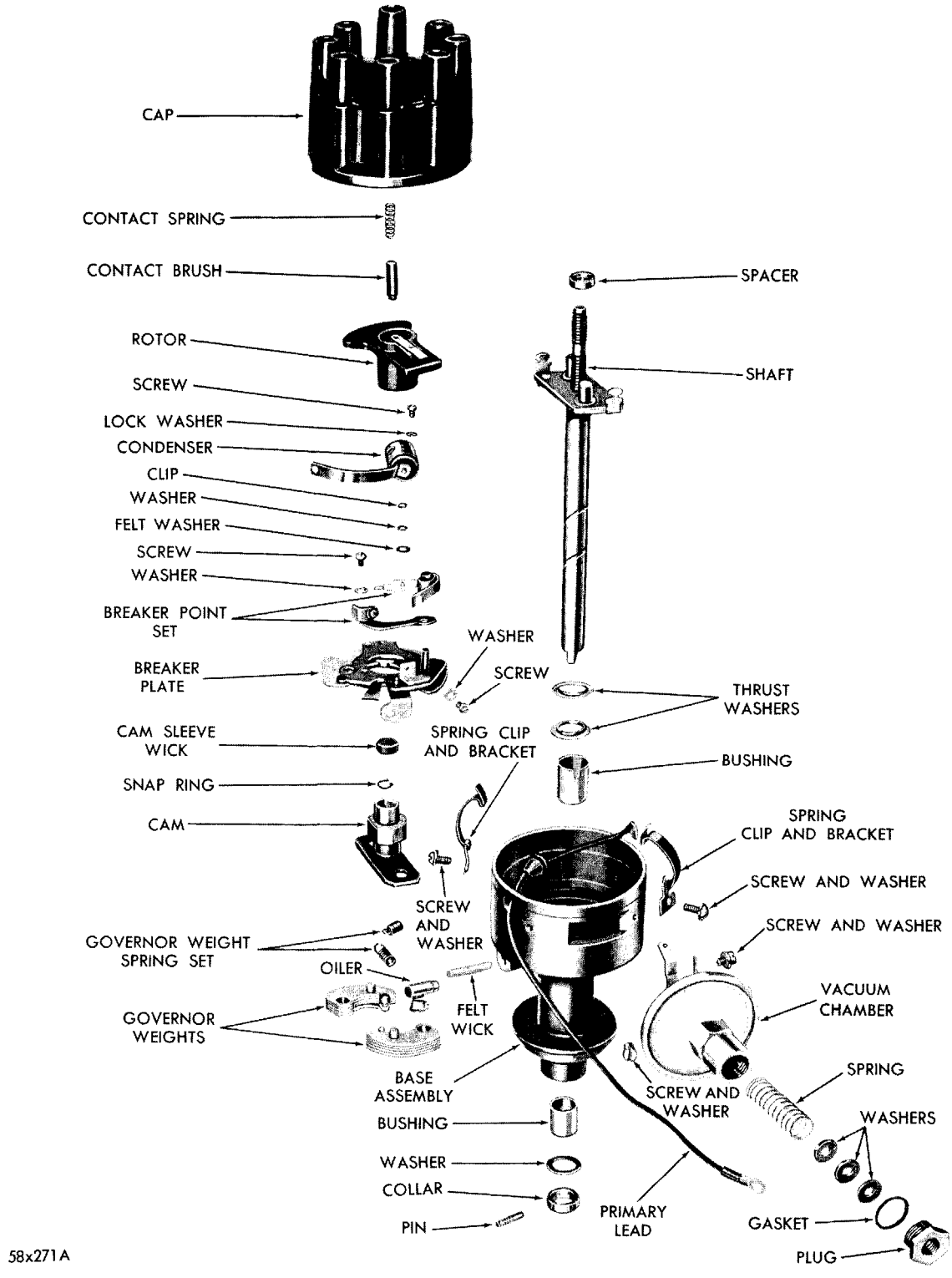


Fig. 2—Eight Cylinder Distributor—Single Breaker (Exploded View)

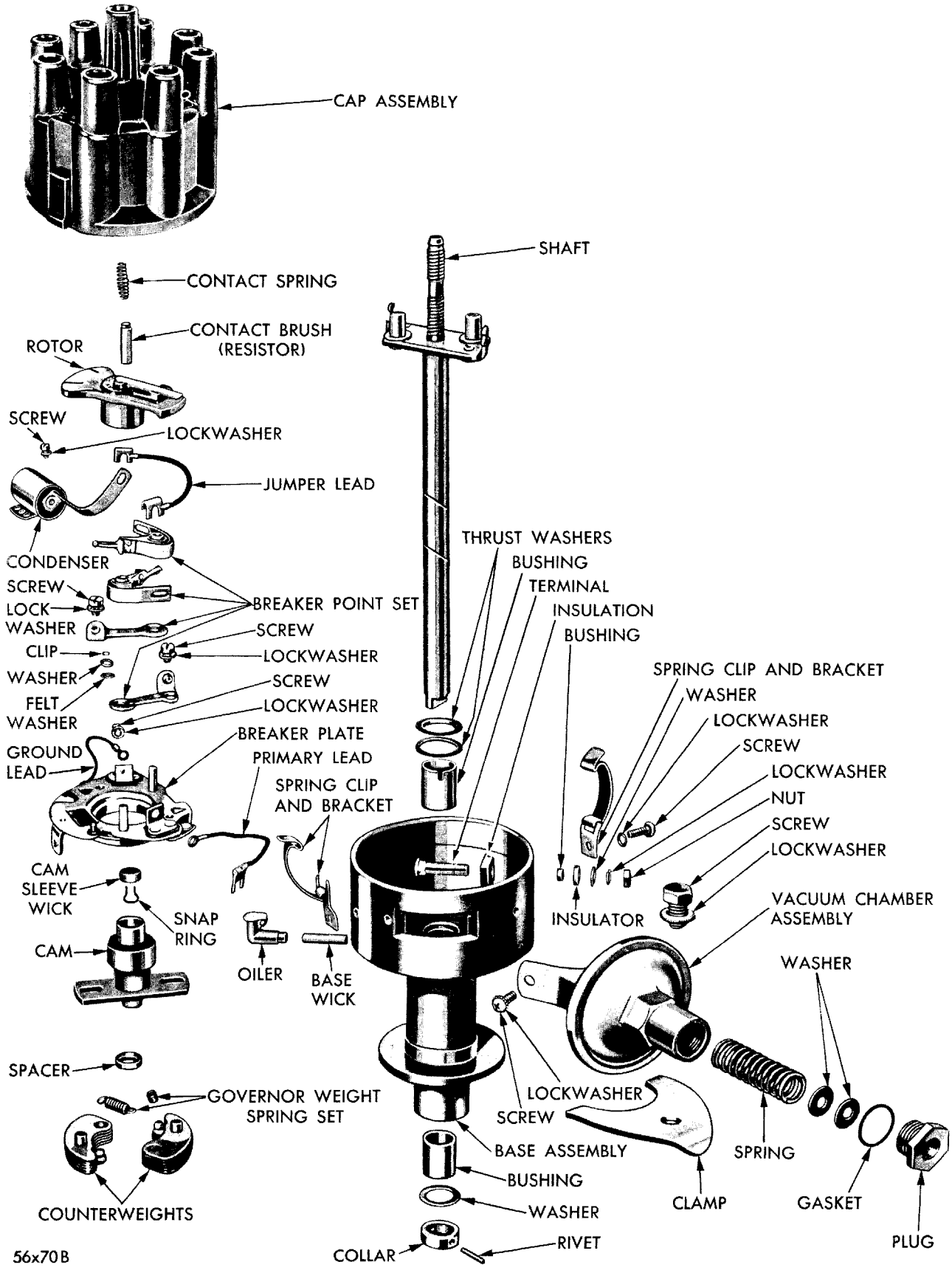


Fig. 3—Eight Cylinder Distributor—Double Breaker (Exploded View)

has been set and recheck timing adjustment with Power Timing Light.

(7) If spark timing is correct, reconnect vacuum line to distributor. As engine speed is increased, the timing mark should move down on vibration dampener below the pointer if advance units are functioning.

6. REMOVING THE DISTRIBUTOR

(1) Disconnect vacuum tube at distributor.

(2) Disconnect primary lead wire at coil.

(3) Unfasten distributor cap retaining clips and lift off the distributor cap.

(4) Scribe a mark on edge of distributor housing to indicate No. 1 position of the rotor as reference when reinstalling the distributor.

(5) Remove distributor hold down lock plate screw and lock plate.

(6) Carefully lift the distributor from the engine.

7. DISASSEMBLING THE DISTRIBUTOR

To disassemble the distributor for repair or overhaul, refer to Figures 1, 2, or 3 then proceed as follows:

(1) Remove distributor rotor.

(2) Remove the screws and lockwashers that hold the distributor cap clamp springs to the distributor housing and remove clamp spring. (8 cylinder). **The distributor cap clamp springs are held in place by peening the metal around the base of spring and should not be removed. (6 cylinder).**

(3) Remove hairpin clip and washer attaching the vacuum control unit to the breaker plate advance arm. Remove the two screws and lockwashers attaching the vacuum control unit to the distributor housing and remove vacuum control unit.

(4) Remove the primary lead terminal screw and slide the primary lead off the breaker plate terminal. On six cylinder and eight cylinder single breaker, remove wire and rubber grommet as an assembly.

(5) Remove the two screws and lockwashers attaching breaker plate to housing and lift out the breaker plate, points and condenser as an assembly.

(6) Remove oil felt from distributor cam, as shown in Figure 4. Remove spring clip from the oil well in cam, as shown in Figure 5.

(7) Clamp distributor base for 8 cylinder, distributor clamp for 6 cylinder in vise equipped with soft jaws and attach dial indicator to body of distributor, as shown in Figure 6, with indicator plunger resting against distributor shaft cam.

(8) Hook a spring scale over the shaft and pull on a line with the plunger of the gauge. Apply a 5 pound pull and read movement of the distributor shaft on in-

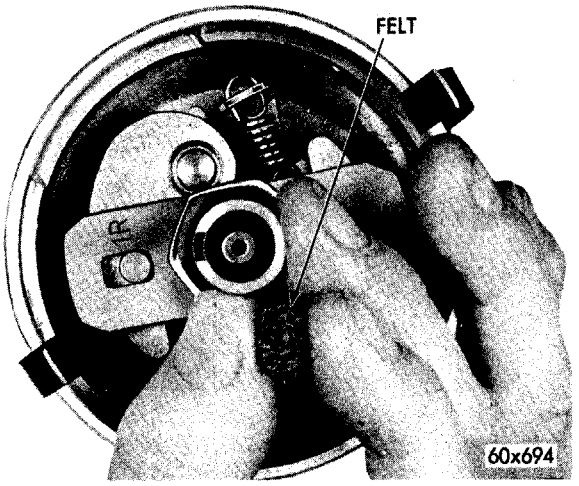


Fig. 4—Removing or Installing Oiling Felt from Distributor Cam (6 Cylinder Typical of 8 Cylinder)

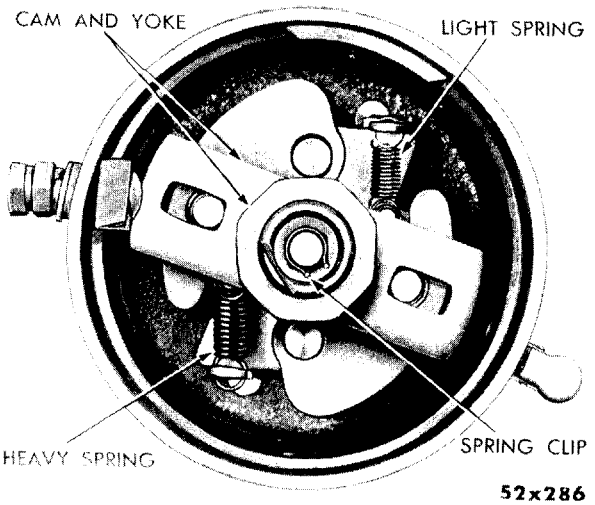


Fig. 5—Distributor Cam Installed (Typical)

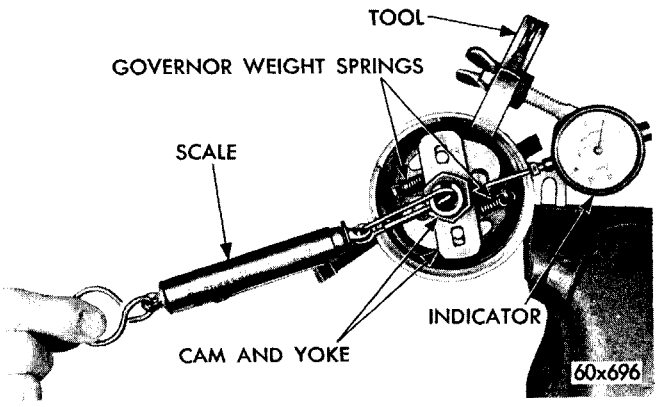


Fig. 6—Checking Distributor Shaft Side Play—6 Cylinder (Typical of 8 Cylinder)

dicator. If the side play exceeds .005 inch, replace bushing and/or shaft as follows:

(9) Remove cam and yoke assembly.

(10) Remove the distributor drive collar retaining pin and slide collar off the end of the shaft. **The 6 cylinder engine distributors are equipped with a driven gear held to the shaft with a roll-pin. Support the hub of gear in a manner that pin can be driven out without damaging the gear.**

(11) Use a fine file to clean the burrs from around the pin hole in the shaft and remove the lower thrust washer.

(12) Push the shaft up and remove through top of distributor body. Remove upper thrust washers.

(13) Remove the shaft oiler and lift out the oiler wick. **Do not drive the bushings out of the distributor housing for 6 cylinder engines.**

(14) For 6 cylinder engines, remove upper bushing with tool C-3744 (Fig. 7), by threading the tap securely into the bushing. Place body of tool over the top and install nut on threaded end of tap. Tightening nut while holding tap from turning will pull the bushing from the housing bore. Invert housing and remove lower bushing in the same manner, as shown in Figure 8.

(15) For 8 cylinder engines, support housing in an arbor press and use Driver Tool C-3041 to remove the upper and lower bushings from the bottom of housing, as shown in Figure 9.

(16) Soak the new bushings in S.A.E. 10 engine oil for approximately 15 minutes.

(17) Position the new upper bushing with slot in bushing up and in line with oil hole in housing then press bushing into housing with Tool C-3041 and adaptor, as shown in Figure 10. The bushing will measure .094 inch from the top of housing bore when properly

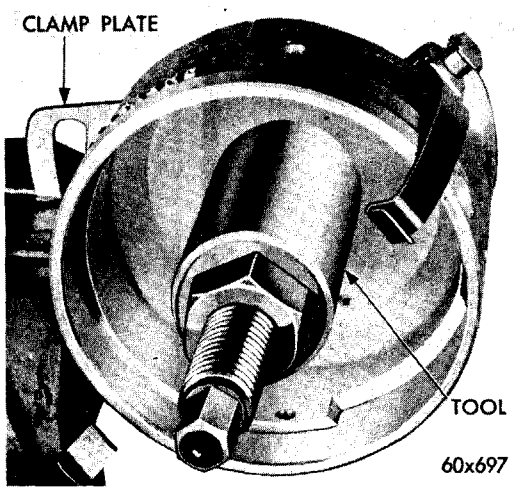


Fig. 7—Removing Distributor Housing Upper Bushing (6 Cylinder)

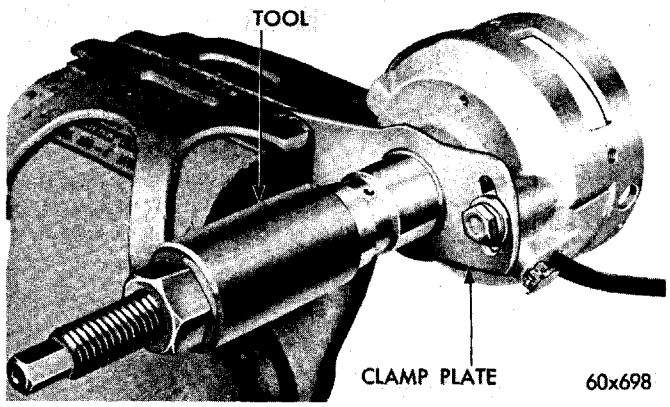


Fig. 8—Removing Distributor Housing Lower Bushing (6 Cylinder)

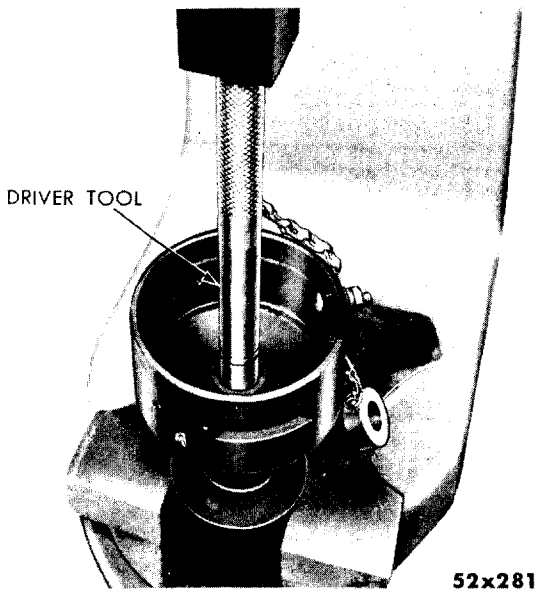


Fig. 9—Removing Drive Shaft Bushings (8 Cylinder) Typical

installed. Invert housing and install lower bushing flush with face of distributor base, as shown in Figure 11.

(18) Insert a $\frac{3}{32}$ inch rod through housing oiler hole to see if slot in bushing indexes with oiler hole in housing. If the rod cannot be inserted through housing and bushing, drill a $\frac{1}{8}$ inch hole through the upper bushing by drilling through the oil wick hole. Remove burrs caused by the drilling operation.

(19) Install burnishing tool part of C-3041 Tool Set and press the burnisher through both bushings, as shown in Figure 12. The correct bushing diameter is .4995 to .5000 inch.

8. REASSEMBLING THE DISTRIBUTOR

To reassemble the distributor, refer to Figures 1, 2, or

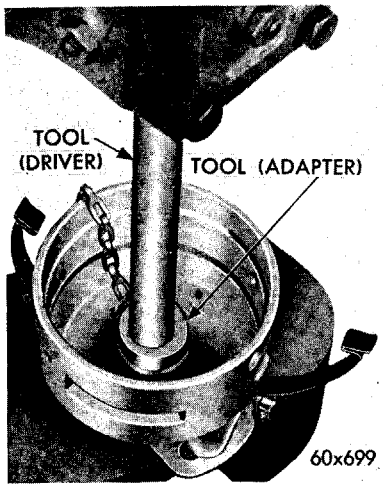


Fig. 10—Installing Upper Bushing (6 Cylinder) Typical of 8 Cylinder

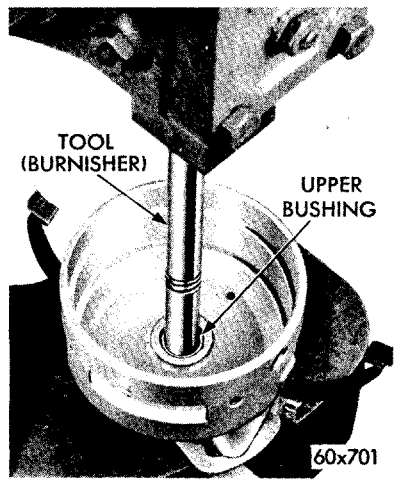


Fig. 12—Burnishing Distributor Housing Bushings (6 Cylinder) Typical of 8 Cylinder

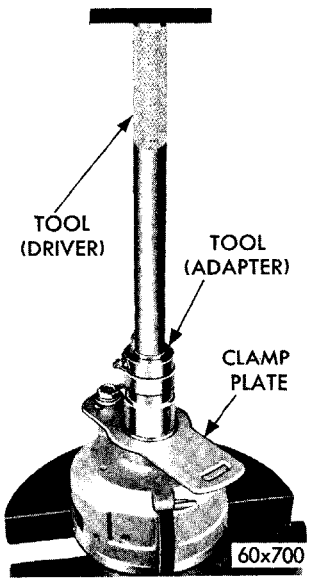


Fig. 11—Installing Distributor Housing Lower Bushing (6 Cylinder) Typical of 8 Cylinder

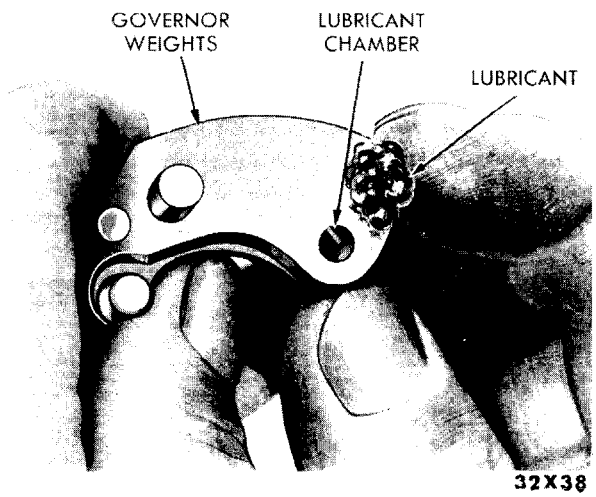


Fig. 13—Lubricating Governor Weight (8 Cylinder) Typical of 6 Cylinder

3, then proceed as follows:

(1) Check operation of centrifugal weight and check weight springs for distortion.

(2) Lubricate the governor weights, as shown in Figure 13.

(3) Inspect all bearing surfaces and pivot pins for roughness, binding or excessive looseness. Inspect distributor points for evidence of burning or pitting.

(4) Install spacer.

(5) Slide cam and yoke on distributor shaft and engage the weight lugs with the slots in the yoke, as shown in Figure 14.

(6) Install cam retaining spring clip, (refer to Figure 5).

(7) Lubricate and install upper thrust washers on shaft and slide shaft into distributor body.

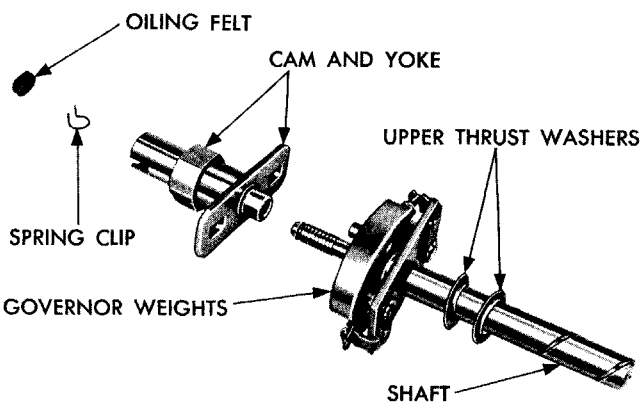


Fig. 14—Distributor Shaft—Disassembled (6 Cylinder) Typical of 8 Cylinder

(8) Position lower thrust washer and drive collar on lower end of shaft and install retainer pin (8 cylinder engines). **For 6 cylinder engines, the distributors are equipped with a driven gear and roll-pin. Support the hub of gear when installing the pin so that gear can not be damaged.**

(9) Install oiler wick and oiler.

(10) Install the breaker plate assembly, align condenser lead, breaker point spring primary lead and install attaching screw.

(11) Install distributor cap clamp springs, lockwashers and screws (8 cylinder only).

(12) Install felt wick in top of distributor cam (refer to Figure 4.)

(13) Attach vacuum control unit arm to breaker plate advance arm and install retainer clip.

(14) Install the vacuum unit attaching washers and screws.

(15) Check spring tension and adjust contact gap.

(16) Adjust contact gap (Paragraph 10.)

(17) Lubricate felt pad in top of distributor cap with 3 to 5 drops of light engine oil and install rotor.

9. TESTING BREAKER ARM SPRING TENSION

(1) Hook a spring scale MTU-36 on the breaker arm and pull in a straight line at right angle to the point surfaces, as shown in Figure 15. Take a reading as the points start to separate. Spring tension should be 17 to 21.5 ounces. If not, loosen the screw which holds the end of the point spring and slide the end of the spring in or out as necessary. **DO NOT** pull condenser strap tight against spring as this will cause the strap to fatigue and break.

(2) Retighten screw and recheck spring tension.

10. INSTALLING AND ALIGNING CONTACT POINTS

(1) Loosen terminal screw nut and remove primary lead, condenser lead and old contact set.

(2) Install a new contact set, the sleeve, at one end of the adjustable bracket fits over and pivots on the upper breaker plate mounting pin, the contact insulator also retains the terminal screw head.

(3) Align contacts if necessary to provide center contact by bending stationary contact bracket only. **Never bend** movable arm to obtain alignment.

(4) After aligning the contacts, readjust point clearance to obtain specifications using dial indicator, as shown in Figure 16.

(5) Check dwell angle to show proper degree of closure. (See Paragraph 4.) "Distributor Point Dwell". The lock screw should be loosened just enough so that the stationary point can be moved with a slight drag; otherwise, it will be difficult to set the points accurately. After setting points to correct clearance, tighten lock screw.

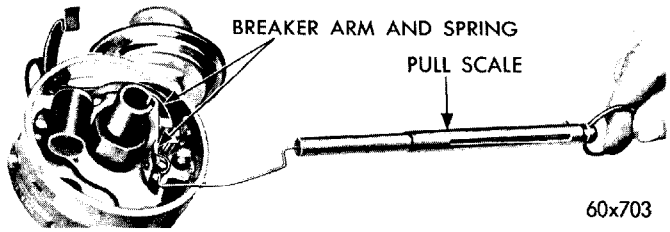


Fig. 15—Testing Breaker Arm Spring Tension (6 Cylinder) Typical of 8 Cylinder

11. DISTRIBUTOR LUBRICATION

(1) Add 3 to 5 drops of SAE 10W oil to the oiler on the outside of distributor base.

(2) Lubricate felt pad under rotor in top of distributor cam with 3 to 5 drops of SAE 10W oil.

(3) Wipe old grease from surface of the breaker cam.

(4) Apply a light film of new distributor cam grease. **Do not overlubricate, keep oil and grease away from breaker points.**

12. CHECKING DISTRIBUTOR ADVANCE

Automatic Advance Curve

The automatic advance curve varies with different model distributors. Check the model number on the identification plate of the distributor and refer to the proper specifications before making this test.

Mount the distributor assembly (less cap) in a reliable stroboscope - type distributor tester and proceed with tests as follows:

(1) Install vacuum pump hose to fitting.

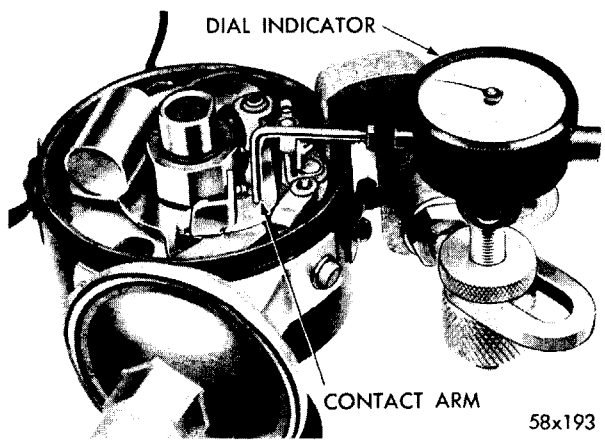


Fig. 16—Checking Point Clearance with Indicator (8 Cylinder) Typical of 6 Cylinder

(2) Turn Tach-Dwell switch to the proper lobe position and Motor Switch to proper rotation corresponding to the distributor being tested. Refer to "Distributor Advance Specifications" in this manual.

(3) Turn battery switch "ON".

(4) Adjust tester speed control to operate distributor at 200 distributor R.P.M.

(5) Hold distributor breaker plate in full retard position and align the "0" of distributor tester degree ring with any one of the arrow flashes.

(6) Adjust tester speed control to operate distributor at speeds called for under "Specifications" and observe arrow flashes opposite tester degree ring to determine degrees of advance.

(7) If the advance is not according to specifications, corrections can be made by bending the primary and secondary spring tabs to increase or decrease spring tension. The governor spring tabs can be reached through the access hole at the breaker plate. Rotate the shaft until the proper spring and tab lines up with the access holes. Insert a screwdriver blade through the access hole and bend the spring tab toward the distributor cam to decrease spring tension and advance the spark, or away from the distributor cam to increase spring tension and retard the spark.

Vacuum Diaphragm Leak Test

With distributor mounted in Distributor Tester and with Diaphragm housing attached to distributor (on 8 cylinder engines distributors make sure diaphragm spring retaining nut and gasket are properly tightened), then proceed as follows:

(1) Install vacuum adjuster fitting in diaphragm housing and turn distributor tester vacuum pump on.

(2) Place thumb over end of vacuum pump hose and adjust the regulator control knob to give a reading 20 inches with hose closed off to insure tester hose does not leak.

(3) Attach vacuum pump hose to adapter fitting in diaphragm housing. Vacuum gauge should hold on maximum vacuum obtainable if no leaks exist.

(4) Observe breaker plate while performing leak test to check response of breaker plate to vacuum advance. There should be instant response to the pull of the diaphragm, moving the plate without a drag or bind.

(5) If leakage is indicated, tighten vacuum adapter fitting (on 8 cylinder distributors replace nut and gasket) and retest. Now if leakage is indicated, replace the diaphragm housing assembly.

Vacuum Advance Curve

Perform operations 1 through 5 under "Automatic Advance Curve" and proceed as follows:

(1) Turn tester vacuum pump ON. Adjust vacuum pump regulator to vacuum test specifications. See "Specifications" and observe arrow flashes on tester degree ring to determine degrees of advance.

(2) On 8 cylinder distributors, adjust the vacuum advance unit by removing the diaphragm spring retainer nut and gasket and add or subtract the spring shim washers as required. If the spark advance is below specifications, remove washers. If higher, add washers. **On 6 cylinder distributors the vacuum advance can not be adjusted. If the spark advance is below or above specifications, replace the vacuum advance unit.**

13. INSTALLING THE DISTRIBUTOR

(1) Position distributor on engine. Align rotor with marks previously scribed on distributor housing.

(2) For 6 cylinder engines engage distributor drive gear with camshaft drive gear so that when the distributor is installed properly, the rotor will be in line with the scribed lines on the distributor housing. For 8 cylinder distributors, engage tongue of distributor shaft with slot in distributor and oil pump drive gear. **If the engine has been cranked while distributor is removed, it will be necessary to establish the proper relationship between the distributor shaft and the Number 1 piston position as follows:**

(3) Rotate crankshaft until number one piston is at top of compression stroke.

(4) Rotate rotor to position of number one distributor cap terminal.

(5) Lower distributor into opening engaging distributor gear (6 cylinder or tongued shaft (8 cylinder) with camshaft drive gear.

(6) Install distributor cap (make sure all high tension wires "snap" firmly in the cap towers.)

(7) Install hold down clamp and screw. Tighten the screw finger tight.

(8) Attach primary lead to coil.

(9) Do not connect distributor vacuum tube at this time.

(10) Connect secondary lead of a Power Timing Light to the Number 1 spark plug, red primary lead to positive terminal of battery and black primary lead to negative battery terminal.

(11) Start engine. Idle engine at slow idle. Rotate distributor housing so that specified timing mark and pointer are in alignment. (Moving distributor housing against shaft rotation advances timing and with shaft rotation retards timing).

(12) Tighten distributor clamp screw after timing has been set and recheck timing adjustment with Power Timing Light.

(13) If timing is correct, reconnect vacuum lead to distributor.

(14) Remove timing light from engine.

14. SPARK PLUGS

Cleaning and Inspection

Remove spark plugs. Examine firing ends of plugs for evidence of oil fouling, gas fouling, burned or overheating conditions. Clean and reset gaps to .035 inch.

Oil fouling is usually identified by wet, sludgy deposits caused by excessive oil consumption.

Gas fouling is usually identified by dry, black, fluffy deposits caused by incomplete combustion.

Burned or overheated spark plugs are usually identified by a white, burned or blistered insulator nose and badly burned electrodes. Improper fuel, inefficient cooling or improper ignition timing normally are the cause.

Normal conditions are usually identified by white powdery deposits or rusty-brown to grayish-tan powdery deposits. **When installing spark plugs, tighten 30 foot-pounds. On 6 cylinder distributors, do not use gaskets, the aluminum tubes take the place of gaskets.**

High tension cables should be kept clean and checked for cracked insulation and loose terminals. Make sure the cables are seated all the way in the distributor cap.

15. IGNITION COIL

The ignition coil is designed to operate with an external ballast resistor. When testing the coil for output, include the resistor in tests.

Check the coil for external leaks and arcing. Always make two tests, when checking the coil. One when coil is cold, the other after coil has been warmed up.

To check the high tension circuit, pull the secondary cable out of the distributor cap center tower. Hold the end of the cable about ¼ of an inch away from the cylinder head and crank engine with ignition switch on. If the spark jumps the ¼ inch gap, the coil can be considered satisfactory.

GENERATOR AND REGULATOR

CONTENTS

SERVICE DIAGNOSIS

CONDITIONS—POSSIBLE CAUSES

1. GENERATOR FAILS TO CHARGE

Possible Causes:

(1) Generator belt loose.

(2) Brushes sticking.

(3) Open charging circuit.

(4) Open circuit in field.

(5) Ground in armature wiring circuit.

(6) Commutator dirty, burned or grounded.

(7) Faulty soldered connections at armature or field terminal studs.

2. LOW UNSTEADY CHARGING RATE

Possible Causes:

(1) Generator belt loose.

(2) High resistance at battery terminal posts.

(3) Loose connections.

(4) Poor ground between engine and body ground wire.

(5) Resistance in charging rate circuit.

(6) Open armature windings.

(7) High insulation between commutator bars.

(8) Commutator out-of-round.

3. EXCESSIVE CHARGING RATE

Possible Causes:

(1) Generator regulator faulty.

(2) Grounded field or ground in generator to regulator wiring.

4. NOISY GENERATOR

Possible Causes:

(1) Misaligned belt or pulley, or loose pulley.

(2) Brushes seating improperly.

(3) Worn bushing or bearing.

(4) High insulation between commutator bars.

(5) Field poles loose.

(6) Armature shaft sprung.

5. ARCING GENERATOR BRUSHES

Possible Causes:

(1) Brushes worn, loose, or have hard spots.

(2) Commutator dirty, or high mica between commutator bars.

(3) Excessive charging rate.

(4) Armature shaft sprung.

6. REGULATOR POINTS OXIDIZED

Possible Causes:

(1) Poor ground connections.

(2) Improper air gap setting.

(3) Shorted field in generator.

(4) High voltage setting.

7. BURNED CONTACTS

Possible Causes:

(1) Regulator connected incorrectly.

(2) Short between battery terminal and regulator field terminal.

8. CURRENT REGULATOR POINTS STUCK OR PITTED

Possible Causes:

(1) Improper air gap setting.

(2) Reversed generator polarity.

(3) Contact point setting improper.

9. BURNED COIL WINDINGS IN REGULATOR

Possible Causes:

(1) Voltage regulator setting too high.

(2) Grounded generator field.

10. CIRCUIT BREAKER AND VOLTAGE REGULATOR POINTS STUCK

Possible Causes:

(1) Misaligned points.

(2) Poor ground connections between generator and regulator.

GENERATOR

SPECIFICATIONS

	225 Cu. In. Engine	318 Cu. In. Engine	361-383 Cu. In. Engine
GENERATOR USAGE			
Make	AutoLite	AutoLite	AutoLite
Model—(Standard)	GJM-8203A	GJM-8201A	GJM-8201A
(Low Cut-In)	GHM-8001B	GHM-8001B	GHM-8001B
(Heavy Duty)	GGA-6003	GGA-6003	GGA-6003
(Car Cooling—Single)	—	GJM-8201A	GJM-8202A
(Car Cooling—Dual)	—	GHM-8001B	GHM-8002A
(Car Cooling—Heavy Duty)	—	GGA-6003F	GGA-6003F
Type	12 Volt Shunt Wound	12 Volt Shunt Wound	12 Volt Shunt Wound
GENERATOR	FIELD COIL DRAW, MOTORING DRAW, AND OUTPUT TEST		
Model	GHM-8001B	GJM-8201A	GGA-6003
	GHM-8002A	GJM-8202A	GGA-6003F
	—	GJM-8203A	GGA-6007A
FIELD COIL DRAW (amps. at 10 volts)	1.2 to 1.3	1.6 to 1.7	1.2 to 1.3
MOTORING DRAW (amps. at 10 volts)	3.3 to 3.8	3.8 to 4.3	2.9 to 3.4
OUT-PUT TEST—(at 70° F.)			
Amps.	10	10	10
Partial Volts	13.5	13.4	13.4
Generator rpm max.	1040	1480	1020
Amps.	30	35	40
Total Volts	15	15	15
Generator rpm max.	1800	2400	1800
Rotation (at drive end)	Clockwise	Clockwise	Clockwise
Ground Polarity	Negative	Negative	Negative
Commutator Run Out	.0005″	.0005″	.0005″
Armature End Play	.003″ to .010″	.003″ to .010″	.003″ to .010″
Number of Brushes	2	2	2
Brush Spring Tension (oz.)	35 to 53	18 to 36	34 to 41
Rated Out-Put (amps.)	30	35	40
Control	Current-Voltage Regulator	Current-Voltage Regulator	Current-Voltage Regulator

SPECIAL TOOLS

C-828 . . . . . Tool Kit (Generator Regulator)
C-3615 . . . . . Puller
C-770 . . . . . Undercutter (Armature)
C-3476 . . . . . Screwdriver
C-3379 . . . . . Adjusting Tool (Belt)

CURRENT AND VOLTAGE REGULATOR

SPECIFICATIONS

VOLTAGE REGULATOR			
Make	AutoLite	AutoLite	AutoLite
Model	VBO-4202CC	VBO-4202BC	BVO-4202AC
RATED CAPACITY			
Volts	12	12	12
Amps.	30	35	40
GROUND POLARITY	Negative	Negative	Negative
VALUE OF RESISTORS			
Number—60 (ohms)	55.0 to 70.0	—	55.0 to 70.0
Number—38 (ohms)	34.5 to 42.0	34.5 to 45.0	34.5 to 42.0
Number—30 (ohms)	28.0 to 34.5	—	28.0 to 34.5
VOLTAGE REGULATOR			
Winding Resistance	44.0 to 49.0	44.0 to 49.0	44.0 to 49.0
Armature Air Gap	.048″ to .052″	.048″ to .052″	.048″ to .052″
	Contacts closed with high limit gauge installed. Contacts open with low limit gauge installed. Gauge on contact side and next to brass stop pin.		

VOLTAGE SETTING (operating)
After 15 minutes run at 7 amperes.

Temperature in Degrees F.	50°	60°	70°	80°	90°	100°	110°	120°
Maximum Setting	15.04	14.97	14.90	14.83	14.76	14.69	14.62	14.54
Minimum Setting	14.42	14.36	14.30	14.23	14.16	14.09	14.01	13.94

CURRENT LIMITING REGULATOR			
Armature Air Gap	.048″ to .052″	.048″ to .052″	.048″ to .052″
	Contacts closed with high limit gauge installed. Contacts open with low limit gauge installed. Gauge on contact side and next to brass stop pin.		

CURRENT SETTING—(after Voltage Regulator Setting)
Operating amperage after 15 minutes at 70 amperes, then followed with a 15 minute run at rated current regulator setting (below 13.5 volts).

	Temperature (F.)	50°	60°	70°	80°	90°	100°
Model VBO-4202CC (30 amp.)	Max. Setting	35	33	32	31	30	29
	Min. Setting	31	29	28	27	26	25
Model VBO-4202BC (35 amp.)	Max. Setting	39	38	37	36	35	34
	Min. Setting	35	34	33	32	31	30
Model VBO-4202AC (40 amp.)	Max. Setting	46	45	44	43	42	41
	Min. Setting	42	41	40	39	38	37

CUT-OUT RELAY			
Voltage Winding Resistance (ohms)	107 to 121	107 to 121	107 to 121
Air Gap (contacts open)	.031″ to .034″	.031″ to .034″	.031″ to .034″
(Measure gap as near to hinge as possible.)			
Point Gap (minimum)	.015″	.015″	.015″
Closing Voltage	12.6 to 13.6	12.6 to 13.6	12.6 to 13.6
Discharge Amperes	Under 6 Amps.	Under 6 Amps.	Under 6 Amps.

SERVICE INFORMATION

PROCEDURES

1. PREPARATION FOR TESTS

(1) Set voltmeter selector switch to 16 volt position.

(2) Press voltmeter check button and adjust zero correction until meter reads on voltmeter checkline.

(3) Release button, meter should return to black bar at left of scale. **The voltmeter check push button is used to connect a constant-voltage cell across the voltmeter for the purpose of checking voltmeter accuracy.**

(4) Check fan belt for proper tension. Also be sure radio suppressor condenser (if vehicle is equipped with radio) is connected to the armature terminal of generator and **never** to the field terminal.

(5) Operate engine at fast idle for at least 15 minutes to bring the charging system units up to operating temperature before performing tests.

2. GENERATOR OUTPUT TEST

A good generator is able to produce current equal to its rating or more and is capable of meeting electrical system demands and keeping the battery fully charged. A generator which does not meet specifications should be removed from the vehicle for further tests and reconditioning.

(1) Disconnect the battery wire from the battery ("B") terminal of the regulator and connect negative lead of test ammeter to the battery wire that was disconnected and the ammeter positive lead to the regulator "B" terminal, as shown in Figure 1.

(2) Connect positive voltmeter lead to the armature terminal of regulator and negative voltmeter lead to base of regulator.

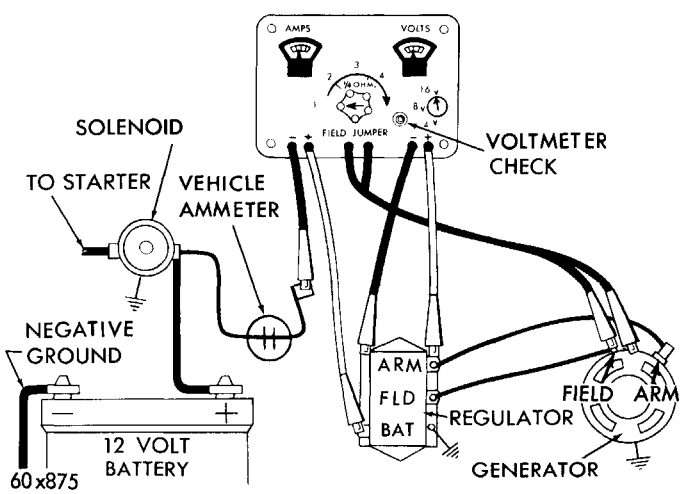


Fig. 1—Generator Out-Put Test

(3) Connect a jumper wire from generator "F" (field) terminal and a good ground.

(4) Turn control knob of tester to number 1 position. **When the control knob is turned to No. 1 position, the ammeter circuit is "direct", all lead resistors being shunted out. Also, the field jumper circuit is automatically closed for uncontrolled generator output in No. 1 position.**

(5) Start engine and slowly increase speed while observing ammeter and tachometer. Generator should reach output equal to specified current regulator setting at not more than 1500 R.P.M. **CAUTION: Perform test quickly to avoid generator damage. Check generator brushes for excessive arcing or bounce while high output is being delivered. A rough, burned or dirty commutator will cause arcing and bouncing at the brushes.**

If output is not to specifications in step (5) check for defective generator or cutout relay.

3. CUTOUT RELAY TEST

This test is made to determine whether or not the cutout relay closes and opens properly with respect to generator voltage and battery current. Unless the relay is operating within specifications, a discharged battery and/or damage to the charging system can result.

A relay which is not operating within specifications should be removed from the vehicle for further tests and adjustment.

(1) Turn control knob of tester to Number 2 position. Tester connected as shown in Figure 1. **When the control knob is turned to No. 2 position, the ammeter circuit remains "direct", but the switch in the field jumper circuit automatically opens so that generator output is controlled by the regulator.**

(2) Decrease engine speed until voltmeter reading is below battery voltage, indicating that the output relay points are open.

(3) Very slowly increase engine speed while observing both voltmeter and ammeter. **Note highest voltage reading just before ammeter pointer begins to move. This is the closing voltage of the cutout relay.**

If cutout relay fails to close, cutout relay closing voltage is above the voltage regulator setting, or field circuit in regulator is defective.

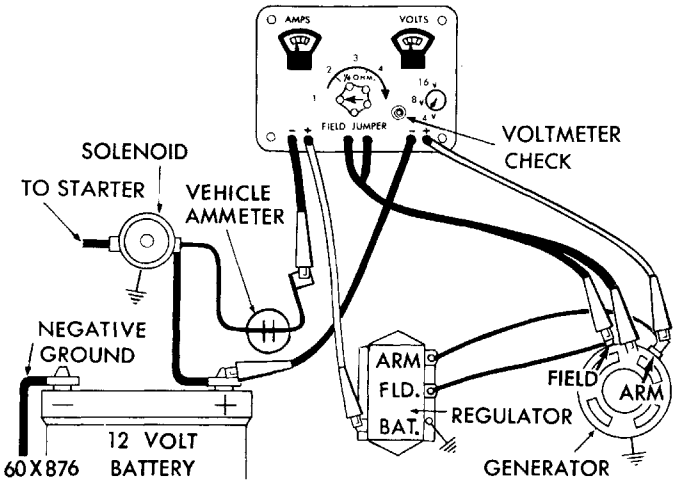


Fig. 2—Insulated Circuit Resistance Test

If closing voltage is too high, spring tension, air gap is excessive.

If closing voltage is too low, there is too little air gap, or spring tension.

If opening amperage is too low and the closing voltage is within limits, there is insufficient point gap. If amperage is too high, point gap is excessve. **CAUTION: The regulator must be cycled by reducing engine speed low enough for the cut-out relay contacts to open and increasing engine speed to 1,500 rpm before retesting after each adjustment. The regulator cover must be in place when tests are made.**

(4) Increase engine speed until **ammeter** reads 5 to 10 amperes, then slowly decrease speed while observing **ammeter** for discharge current required to open the relay. Opening amperage of the relay is the greatest discharge reading just before the ammeter pointer snaps back to zero.

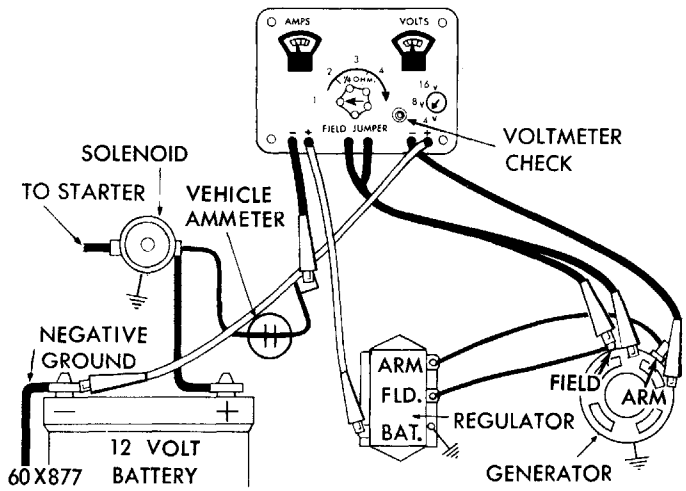


Fig. 3—Ground Circuit Resistance Test

4. INSULATED AND GROUND CIRCUIT RESISTANCE TESTS

Any voltage loss caused by high resistance between the armature terminal of the generator and the insulated battery post, and between the generator housing and the ground battery post respectively in these circuits will reduce the overall charge rate and can lead to eventual battery discharge. High resistance can be present in the form of poor connections or defective or inadequate wiring.

Insulated Circuit Resistance Test

(1) Turn the control knob to number 1 position.

(2) Turn voltmeter selector switch to 4 volt position. **When using the 4 volt scale, the zero corrector must be reset so that the meter pointer reads on zero at the left of the scale.**

(3) Disconnect the battery wire from the regulator "B" terminal and connect test ammeter negative lead to the battery wire that was disconnected and ammeter positive lead to the regulator "B" terminal, as shown in Figure 2.

(4) Connect positive voltmeter lead to the armature terminal of the generator and the negative lead to the positive battery post.

(5) Connect a jumper wire from generator "F" (field) terminal and a good ground.

(6) Start engine and adjust speed until ammeter reads exactly 20 amperes. Reading indicated on voltmeter scale represents the voltage loss in the insulated side of the charging system.

Voltage loss should not exceed 1 volt. If voltage loss exceeds 1 volt, check for loose or corroded connections at armature terminal generator, armature terminal of regulator, back of ammeter or battery terminal of starter solenoid. Also check for faulty wiring from generator to regulator armature terminals, battery terminal of regulator to ammeter or ammeter to starter solenoid. Burned or oxidized cut-out relay contacts. Loose or corroded battery cable connections. A voltmeter reading higher than specified indicates excessive resistance in this portion of the charging circuit.

Ground Circuit Resistance Test

(1) Connect test ammeter and jumper wire leads as outlined under Insulated Circuit Resistance Test.

(2) Connect positive voltmeter lead to the battery negative ground post and the negative voltmeter to generator housing, as shown in Figure 3.

(3) Start engine and adjust speed until ammeter reads exactly 20 amperes.

(4) Note voltmeter reading. This will indicate the voltage loss in the ground side of the charging system and should be not more than.1 volt. A voltmeter reading higher than .1 volt indicates excessive resistance in this portion of the charging system. Check for loose or corroded battery cable connections or a poor electrical connection between generator and engine.

Regulator Ground Circuit Resistance Test

Excessive voltage loss between the generator housing and the regulator base will cause the cut-out relay and the voltage regulator to operate at a higher than actual setting.

(1) Run engine at idle speed.

(2) Turn control knob to Number 2 position.

(3) Connect test ammeter leads and jumper wire leads as outlined under "Insulated Circuit Resistance Test" Paragraph 4.

(4) Connect voltmeter positive lead to base of regulator and negative voltmeter lead to generator housing, as shown in Figure 4.

(5) Slowly increase engine speed from idle to 1500 R.P.M. Voltmeter reading should not exceed .1 volt and should preferably stay on zero.

(6) If voltage loss exceeds .1 volt, check for a loose regulator ground wire or poor ground contact between regulator base and ground. Also inspect grounding of vehicle body and engine.

5. VOLTAGE REGULATOR TEST

A regulator setting which is higher than specified can cause battery overcharge and damage to lights and accessories. A lower than specified setting can result in a discharged battery. If the voltage regulator setting is not within the specified limits or is unstable or erratic, it should be removed from the vehicle for further tests, service and adjustment.

(1) Disconnect the battery wire from the battery terminal of the regulator and connect negative lead of test ammeter to the battery wire that was disconnected from the regulator "B" terminal and the ammeter positive lead to the regulator "B" terminal, as shown in Figure 5.

(2) Connect positive voltmeter lead to regulator "B" terminal and negative voltmeter lead to base of regulator.

(3) Turn control knob of tester to the Number 3 position.

When the control knob is turned to Number 3 position, a 1/4 ohm fired resistor is switched in series with the ammeter circuit. A 1/4 ohm resistor, when placed in series with a charging circuit causes the battery to "appear" fully charged to the regulator. This

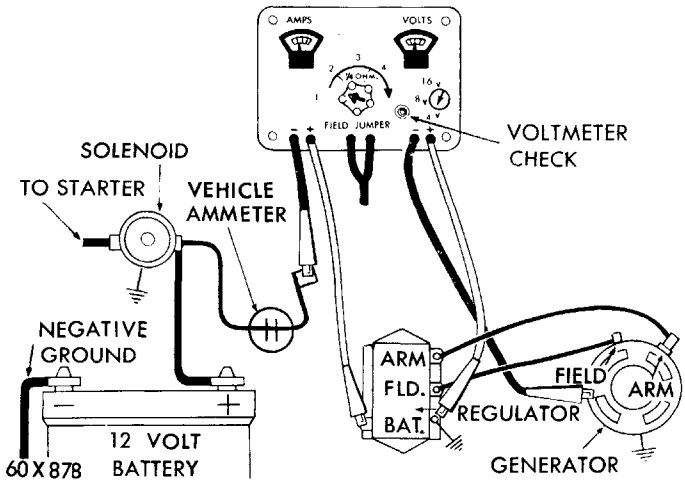


Fig. 4—Regulator Ground Circuit Test

forces the voltage limiter (voltage regulator) into operation so that its setting or adjustment can be checked.

(4) Reduce engine speed until cutout relay points open, then slowly increase engine speed to 1500 R.P.M. **The regulator must be brought to operating temperature before measuring the regulator ambient temperature. To accomplish this operate the voltage regulator for at least 15 minutes at 7 amperes.**

(5) Place a reliable thermometer 2 inches from the regulator cover, but not touching the cover, to measure the temperature of the air surrounding the regulator.

(6) Note voltmeter and temperature readings. Reading indicated on voltmeter is the voltage regulator setting at a known temperature and should be within specifications.

If voltage regulator setting is too high, check for

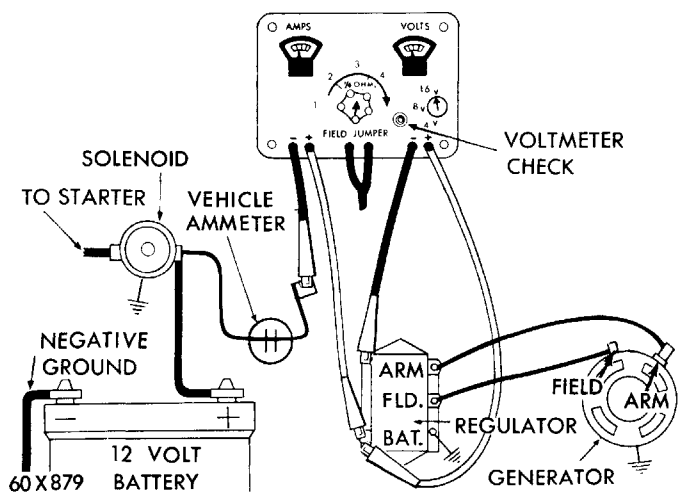


Fig. 5—Voltage Regulator Test

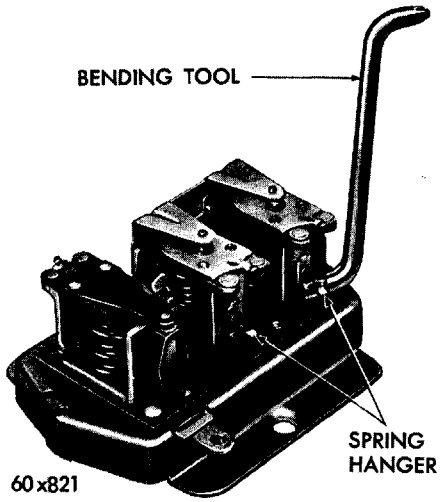


Fig. 6—Adjusting Spring Tension

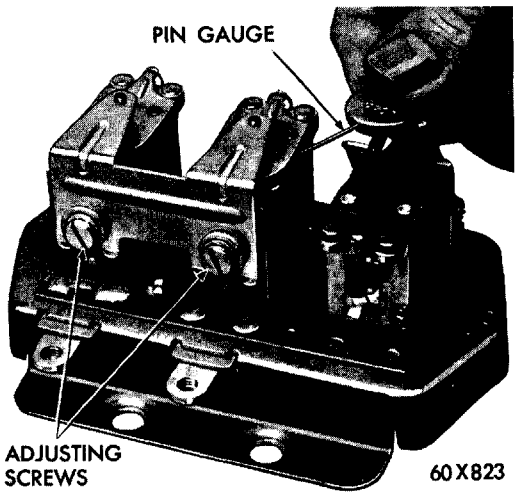


Fig. 8—Checking Regulator Air Gap

excessive spring tension or armature air gap, as shown in Figure 6.

If voltage regulator setting is too low, check for insufficient spring tension or armature air gap. (Refer to Figure 6.)

If voltage regulator setting is erratic or unstable, check for burned or oxidized regulator contacts, improper armature air gap or broken resistor on back of regulator. **After each adjustment, it is essential that a complete retest be made in order to determine the new values of the closing voltage and the discharge current required to open the relay contacts. Regulator cover must be in place when test is made.**

6. CURRENT REGULATOR TEST

A regulator setting which is higher than specified can allow the generator to exceed its rated output and consequently damage from overheating can result. A regulator setting which is lower than specified will not allow the generator to produce the current demanded by the electrical system when loads are great and as a result the battery can become discharged. If the current regulator setting is not within the specified limits or is unstable or erratic, the regulator should be removed from the vehicle for further tests, service and adjustment.

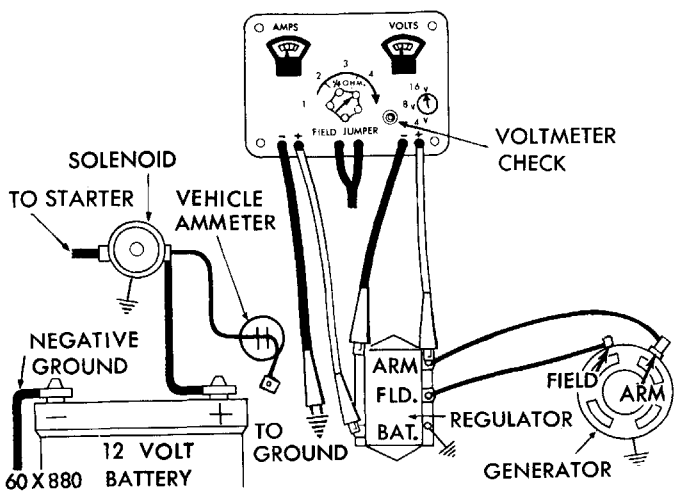


Fig. 7—Current Regulator Test

(1) Run engine at idle speed. Disconnect the battery wire from the battery terminal of the regulator, connect positive test ammeter lead to the "B" terminal of the regulator and negative lead to ground, as shown in Figure 7.

(2) Connect positive voltmeter lead to the "A" (armature) terminal of regulator and negative voltmeter lead to base of regulator.

(3) Adjust the engine speed to 2000 R.P.M.

(4) Turn control knob of tester to Number 4 position and adjust control knob for highest possible reading on the test ammeter. The peak ammeter reading is the setting of the current regulator. **When the control knob is rotated through the No. 4 position a variable carbon pile resistance is inserted in series with the ammeter circuit. When connected from the battery terminal of the regulator to ground (with the "battery" wire disconnected), the resistance of the carbon pile can be reduced so that the carbon pile "appears" as a discharged battery to the regulator. This forces the current limiter (current regulator) into operation so that its setting or adjustment can be checked.** (Refer to specifications for specified current regulator setting.)

(5) Return control knob to Number 3 position.

If current regulator setting is too high, check for ex-

cessive spring tension or armature air gap.

If current regulator setting is too low, check for insufficient spring tension or armature air gap.

If the current regulator setting is erratic or unstable, check for burned or oxidized regulator contact, improper armature air gap or broken resistor on back of regulator. **The current regulator must be cycled by reducing engine speed low enough to open the cut-out relay contacts after each adjustment. Retest the new setting after each adjustment, with the cover in place.**

If adjustment of the closing voltage (see "Specifications") is necessary, let engine idle and bend spring tension plate down to increase closing voltage or bend it up to decrease. Recheck temperature and voltage readings after making adjustments.

If adjustment of the reverse current, or discharge current needed to open contacts is necessary, adjust the height of the stationary bridge, or forcing them further apart with long nose pliers. Adjust the height of the bridge (up to decrease gap or down to increase it). Proper clearance should be a minimum of .015 inch.

(6) After completing tests reduce speed to dile momentarily, then stop engine.

(7) Disconnect tester leads and reconnect battery wire to the regulator.

7. ADJUSTING REGULATOR AIR GAP

To check the current and voltage regulator air gaps, use the pin type gap tool gauge from kit C-828. Connect a test light from the spring hanger to the regulator base. Insert the .048 inch wire gauge between the armature and the magnet core at contact side of the stop pin, as shown in Figure 8. Press down the armature plate. Contacts should open and test light should go out. Insert the .052 gauge in the same position and depress armature. Contacts should be closed and test light should remain lighted if air gap is properly adjusted.

To adjust the air gap, loosen the bracket screws and raise or lower the contact point bracket until the desired clearance is obtained. Be sure these screws are tightened securely after adjustments are made. When the armature is held down so that the stop rivet rests on the magnet core, the point gap should be a minimum of .012 inch.

8. CHECKING CUT-OUT RELAY AIR GAP

To check the cut-out relay air gap, use the flat tool gauge .031 inch from Kit C-828. Insert the gauge between the armature and the magnet core, as shown in Figure 9. Be sure that the gauge is placed as near to the hinge as possible. With the relay armature against the upper stop, the .031 inch gauge should slide in freely, but .034 inch gauge should be too tight. Adjust air gap by bending upper stop **up** to increase air gap, or **down** to decrease it.

Be sure that the stop does not interfere with the armature movement.

9. CLEANING REGULATOR CONTACT POINTS

(1) Refer to Figure 10, then remove the regulator cover. Inspect the contact points of all three units. In normal use, the contact points will become grayed.

(2) If the contact points are dirty, clean the contact points with a strip of linen, or lintless bond tape, as shown in Figure 11. Make sure that no lint remains between contact points after cleaning. **If the contact points are burned or pitted, replace the regulator. Never use sand paper, emory cloth, or a file to clean.**

After cleaning the contact points recheck the armature air gaps.

10. ADJUSTING CUT-OUT RELAY CONTACT CLEARANCE

Adjust contact clearance by expanding or contracting bridge, as shown in Figure 12. The proper clearance should be a minimum of .015 inch. Be sure to keep contact points in alignment when adjusting the contact gap. **Increasing the contact gap lowers the opening voltage and raises the opening reverse current.**

11. REMOVING THE GENERATOR

(1) Disconnect battery negative terminal. Disconnect wires at generator.

(2) Loosen generator adjusting strap bolts and generator mounting bolts.

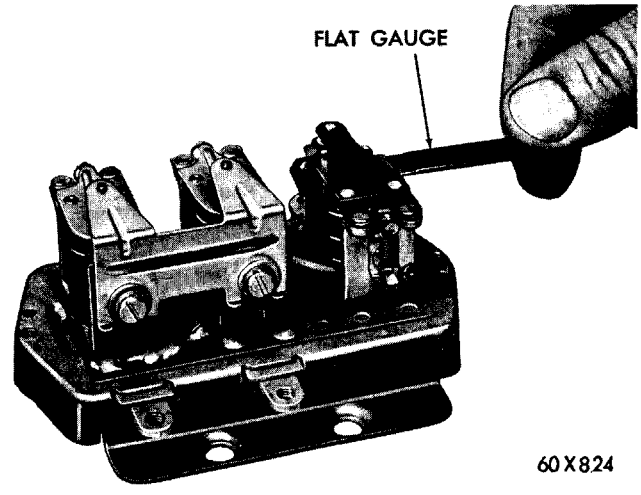
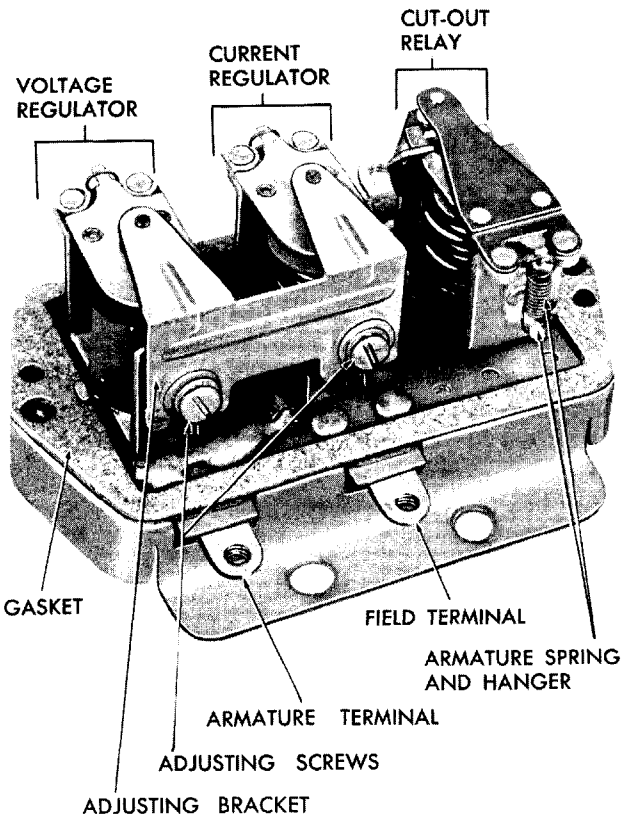


Fig. 9—Checking Cut-Out Relay Air Gap



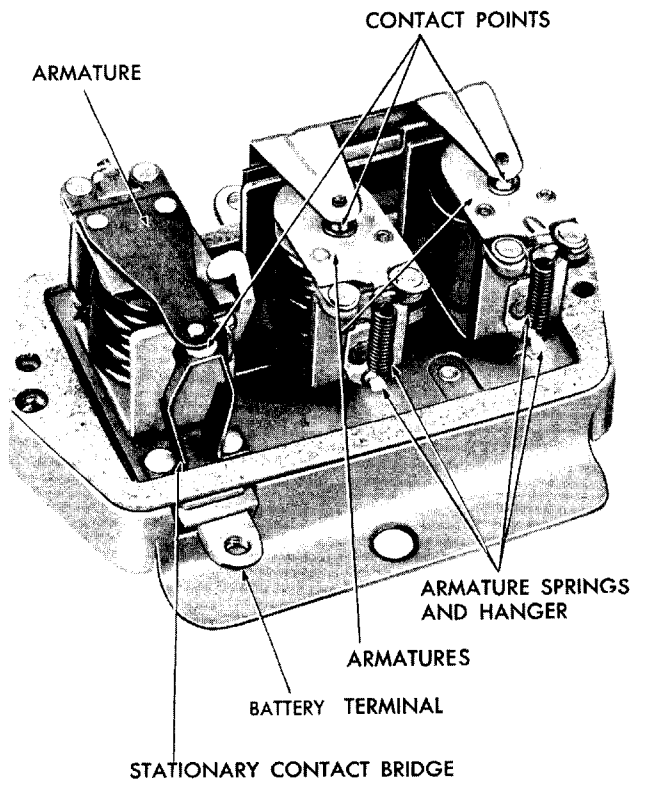


Fig. 10—Generator Regulator (Cover Removed)

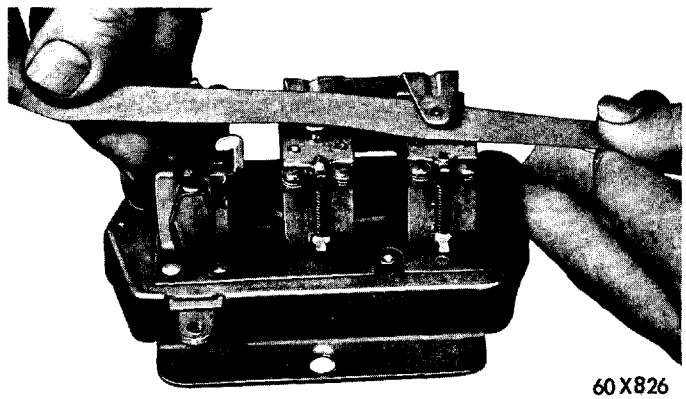


Fig. 11—Cleaning Contact Points

(3) Push generator towards engine to relieve belt tension and remove generator attaching bolts and generator.

12. DISASSEMBLING THE GENERATOR

To disassemble the generator, refer to Figure 13, then proceed as follows:

(1) On generators so equipped, remove commutator cover band, disconnect armature terminal field lead from insulated brush holder.

(2) Remove the commutator and head bearing cover screws, cover, gasket, bearing retainer screw, flat washer and bearing retaining washer.

(3) Raise brushes from commutator, pull brushes up slightly and place the end of the brush arm against the brush to hold it in place and to prevent damaging the brushes when end head is removed.

(4) Remove the two through bolts and remove commutator and head, bearing and brushes as an assembly.

(5) Remove bearing and felt from end head.

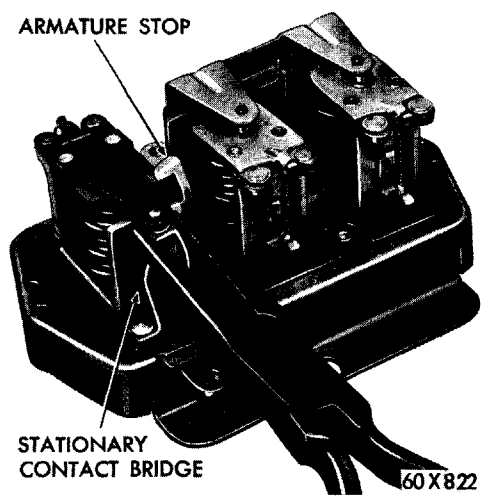


Fig. 12—Adjusting Cut-Out Relay Contact Clearance

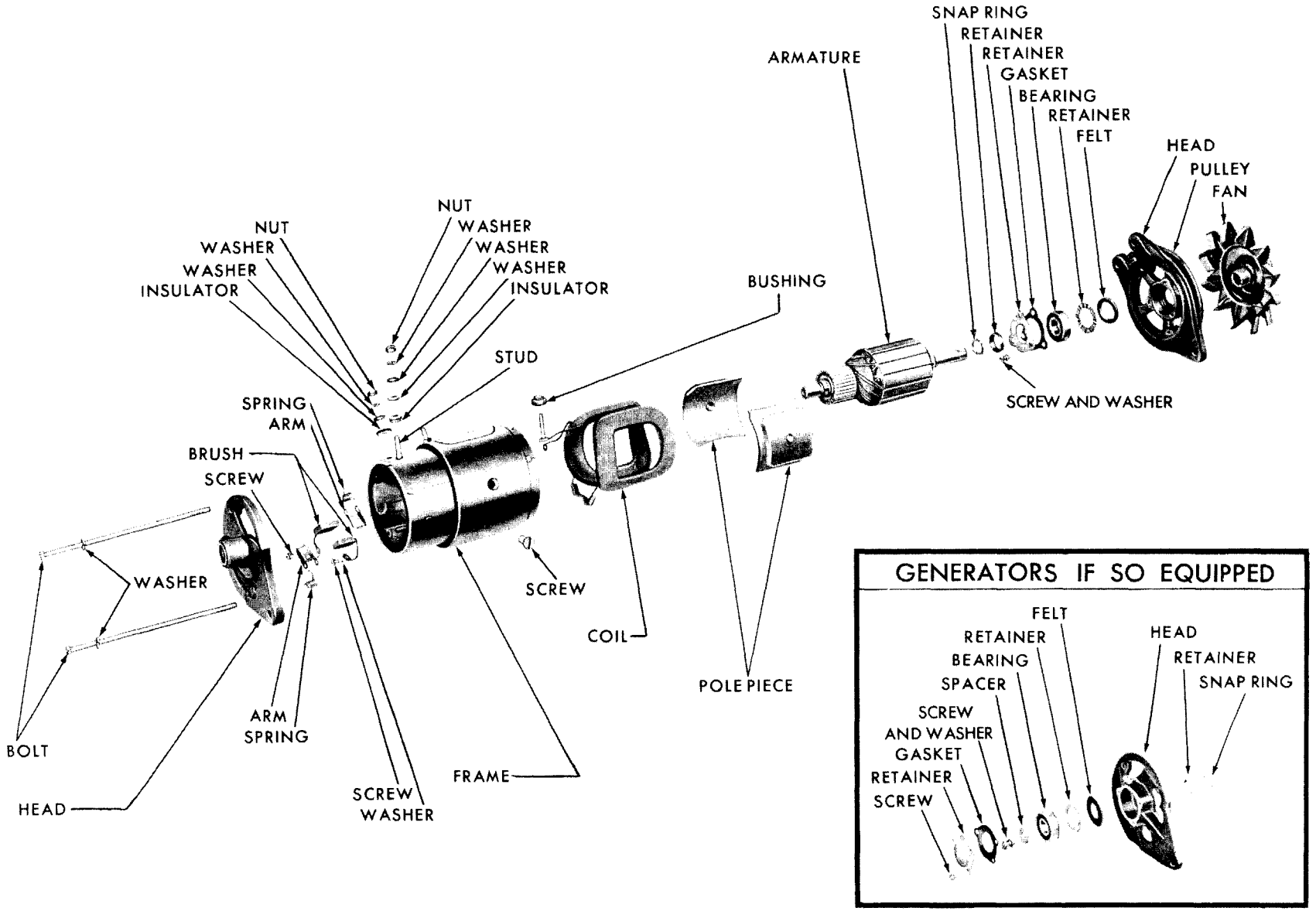


Fig. 13—Generator Assembly (Exploded View)

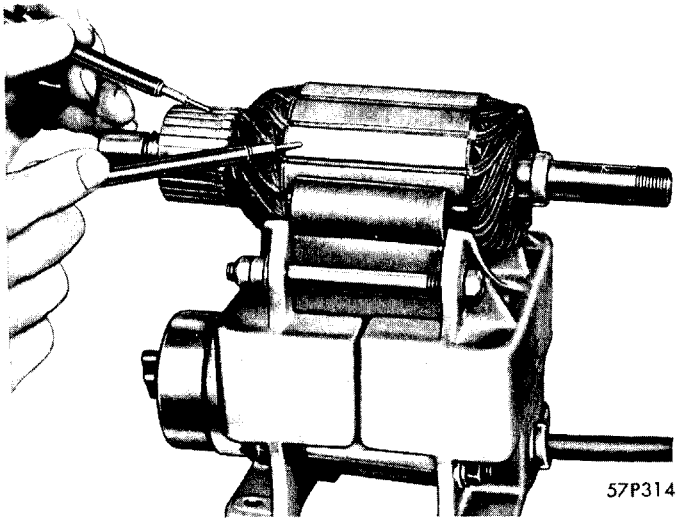


Fig. 14—Testing Armature for Ground

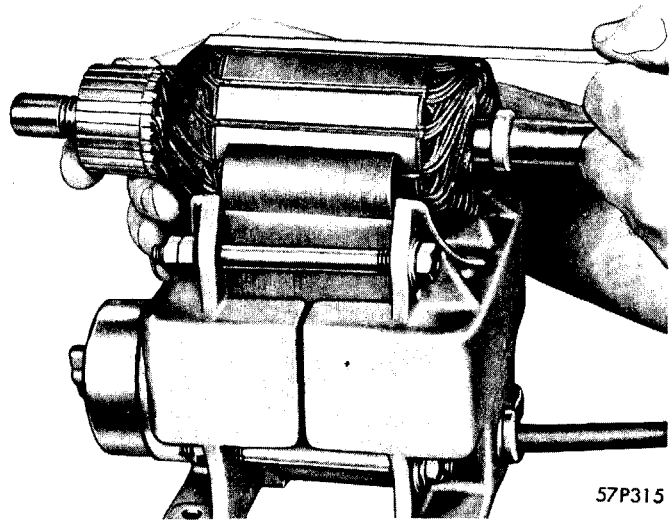


Fig. 15—Testing Armature for Short

(6) Remove grease deflector from end of armature shaft.

(7) For generators equipped with an oil impregnated bushing in the commutator and head, remove the two through bolts and remove the end and bushing as an assembly and perform operation (3) above to contain the brushes. **The remaining disassembly operations are the same for all three types of generators.**

(8) Slide armature and drive end head assembly from generator frame. **The pulley should not be removed unless it is found that the drive end bearing, and frame or armature have to be replaced.**

(9) Remove pulley with Power Steering Pump Pulley Removing Tool C-3615.

(10) The drive end bearing is a tight fit on the armature shaft, an arbor press must be used to force the armature shaft out of the bearing.

(11) After removing armature shaft, remove retainer screws, retainer, retainer gasket, bearing, felt and pulley spacer. **Do not remove field coils from field frame at this time.**

13. CLEANING AND INSPECTION

When cleaning generator parts, do not immerse armature, field frame and field assembly, or bearing felts in cleaning solution. Never steam clean a generator.

Wipe above parts with a clean cloth. When cleaning ball bearings do not spin them with compressed air. Inspect field coils for burned or damaged insulation. Inspect commutator for wear and check condition of soldered coil leads. An armature that has been overheated will show signs of throwing solder and will require resoldering or replacement. Inspect commutator for trueness.

Inspect bearings for wear or roughness. Replace worn or rough bearings. The bushing type end housing requires replacement of end housing and bushing as an assembly.

14. TESTING GENERATOR COMPONENTS

Testing Armature for Ground

Place one probe from 110-volt test lamp on armature shaft and other probe at end of any commutator bar, as shown in Figure 14. If test lamp lights, it indicates a ground. Do not touch shaft bearing surface or commutator bar brush surface with test probe as this will pit surfaces. Replace grounded armatures.

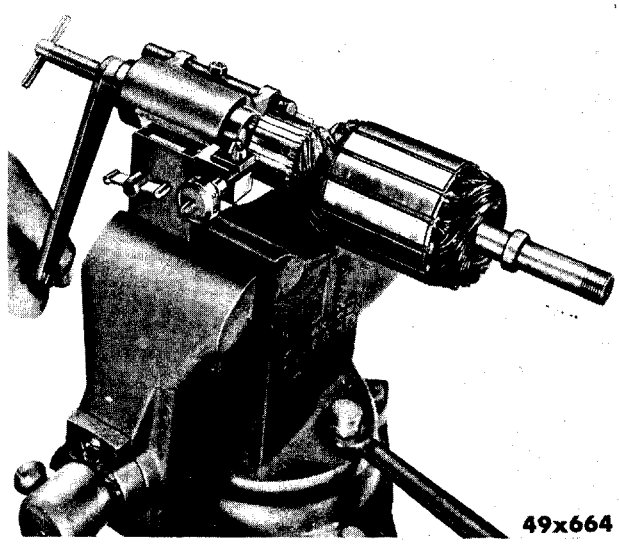


Fig. 16—Refacing Commutator

Testing Armature for Short

Place armature in growler and, while rotating armature, hold thin steel blade parallel to core and just above it, as shown in Figure 15. A shorted armature will cause steel blade to vibrate and be attracted to core. Replace shorted armature.

Checking Commutator Runout

With armature shaft bearing surfaces resting in "V" blocks, place a dial indicator against commutator. Rotate armature, while taking indicator reading. If runout is more than .005 inch, reface commutator.

Refacing Commutator

If the commutator is rough, out-of-round, burned or if the mica is even with, or extends above the surface, the commutator should be refaced with Tool C-770, as shown in Figure 16. **Remove only sufficient metal to give a smooth clean surface.**

Undercutting Mica

Undercut mica segments to a depth of approximately $\frac{1}{32}$ inch deep with Tool C-770, as shown in Figure 17. Be sure to undercut mica square, the full width of slot. After undercutting, polish the commutator with No. 00 sandpaper to remove possible burred edges.

Testing Field Frame Assembly for Ground

(1) Disconnect "ARM" terminal field lead from insulated brush holder (on units so equipped).

(2) Touch a 110-volt lamp probe to generator "FIELD" terminal post, while holding other probe against good ground on field frame (be sure brush lead terminals are not touching a ground). The lamp should not light. If lamp lights, a ground exists and it will be necessary to determine whether ground is in field coils or field terminal post.

(3) Remove terminal post from field frame and retest from field lead to ground. If lamp lights, field coils or connecting lead is grounded.

(4) Move connecting lead between two coils away from field frame. If light still burns, ground is in field coils.

(5) Touch one of 110-volt test lamp probes to "ARM" terminal post and field frame. If lamp lights, it indicates that either terminal post or brush holder is grounded.

(6) Remove terminal post and retest brush holder. If lamp still lights, brush holder is grounded. Replace defective parts. It is necessary to replace field frame if insulated brush holder is grounded on generators that have the brush holders riveted to the field frame.

Commutator End Head. (Brush Holders Riveted to End Frame)

Test the brush holders for ground by connecting one probe of a test lamp to the brush holder and the other probe to the commutator end head. If the test lamp lights, the brush holder is grounded and a new end head assembly should be installed. **Do not** attempt to tighten brush holder rivets. If the brush holders are loose on end head, the end head must be replaced.

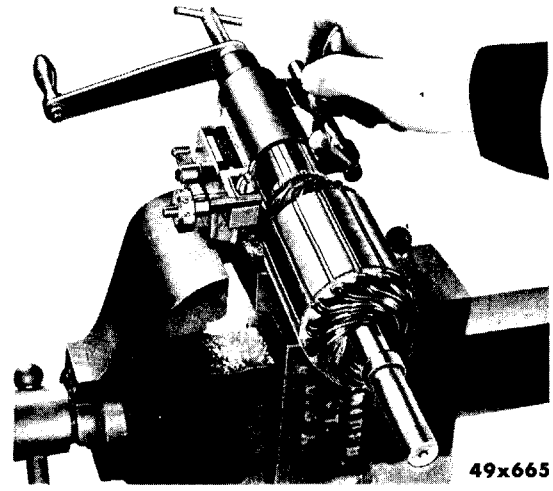


Fig. 17—Undercutting Mica

Testing Field Current Draw

Test field coils for short circuits between windings, high resistance connections, or for improper coils, by connecting test equipment, as shown in Figure 18. Adjust battery voltage to specified voltage of 10-volts with rheostat. A reading on ammeter higher than specified indicates that coil windings are shorted, or that wrong coils have been installed. A current reading that is less than specified indicates poor electrical connections or wrong field coils.

Replacing Field Coils

To replace field coils, a pole shoe impact screwdriver, such as Tool C-3475 should be used to prevent damage to screws and to assure proper tightening.

Servicing Generator Brushes

Generators with brush holders riveted to the field frame it will be necessary to disassemble the generator to service the brushes; however, a visual inspection can be made by using a small mirror and a bright light. Check through the air cooling openings in the commutator end frame to determine condition of brushes and commutator.

Generator brushes should be examined at disassembly of generator to make certain that they are free in the holders, seat properly and are not worn execessively.

Brush Inspection

Brushes which are worn to less than ½ inch in length

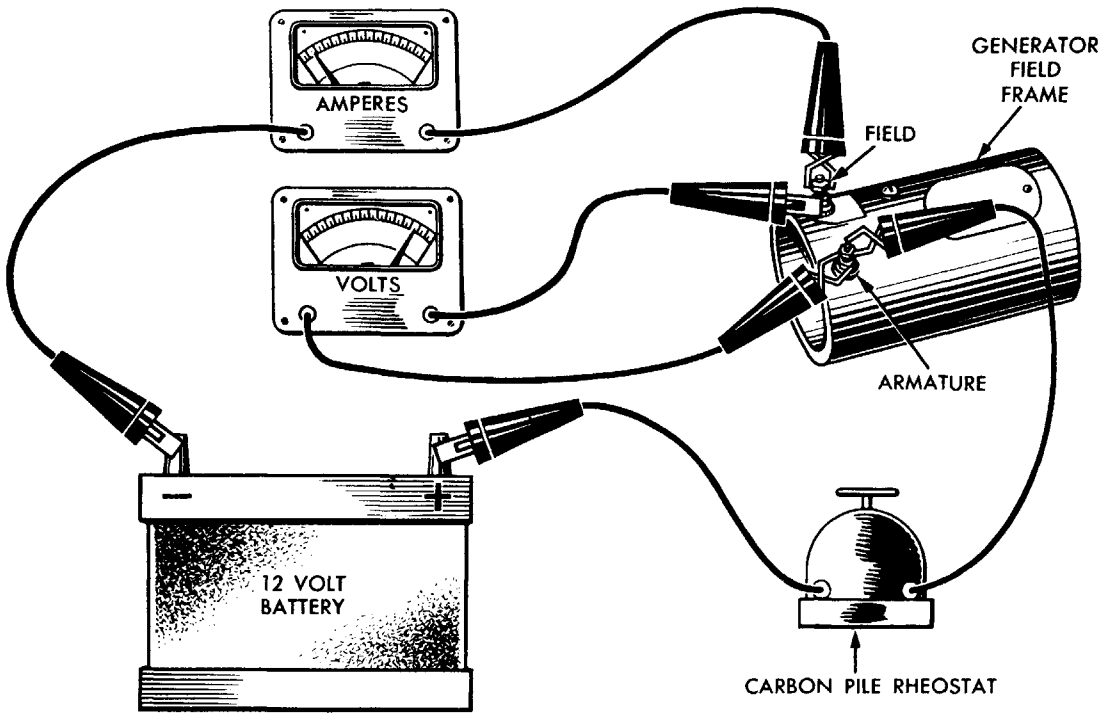


Fig. 18—Testing Field Current Draw (Typical)

or covered with dirt and oil, should be replaced to avoid damage to the commutator and windings. Should inspection show that the brushes are badly worn, or the commutator is rough or worn so that the mica is even with bars, the generator should be completely dismantled, cleaned, commutator turned, mica undercut, new brushes fitted and bench tested before installation.

Installing New Brushes

When new brushes are installed, they should be seated with sandpaper to obtain a correct fit against the commutator. To seat brush against commutator, use a strip of No. 00 sandpaper as wide as the finished surface of the commutator. Lift the brush and slide sandpaper grit side up between commutator and brush. With spring pressure against brush, slowly turn armature in reverse rotation, pulling sandpaper from under brush. Repeat operation until brushes seat at least 75 per cent over the entire contact surface. (Excessive use of sandpaper will shorten brush life and should be avoided.) Blow out all sand and carbon dust from the generator. **Generators that have the brush holders riveted to the commutator end head should have the brush spring tension checked with the commutator end head and brushes installed on the armature. Hook a spring scale under the brush spring and pull upward. Take the scale reading - just as the spring leaves the brush.**

It is difficult to measure spring tension on generators that have the brush holders riveted to the field frame, therefore it is suggested that new springs be installed when brushes are replaced.

15. REASSEMBLING THE GENERATOR

To reassemble the generator, refer to Figure 13, then proceed as follows:

(1) Dip felt washers and bushings (if so equipped) in clean SAE 10 engine oil. Compress felt slightly to remove oil before installing.

(2) Pack ball bearing about half full with high temperature nonfiber bearing lubricant.

(3) Assemble bearing, bearing felt, gasket, retainer and screws to drive end head.

(4) Install retainer over snap ring before pressing bearing and end frame assembly on shaft. **This retainer turns with the armature shaft and bearing inner race and prevents snap ring from tearing the felt washer. Be sure that the snap ring on the armature shaft is pressed firmly against the inner race of the bearing. Support armature so that pressure will be ap-**

plied to end of armature shaft. Install a suitable sleeve over the armature shaft so that the pressure is applied to the inner race when pressing the bearing on armature shaft.

(5) Install pulley spacer and pulley. Make sure that pressure is applied to end of shaft when installing pulley. Use care when applying pressure to pulley and end of shaft. The maximum pressure that should be applied is 6800 lbs. More than this maximum will cause the shaft to bend and result in permanent damage.

(6) Slide armature and drive end head assembly into the generator field frame.

(7) Align drive end head with dowel in field frame and push armature and frame into position.

(8) Install grease deflector commutator end head.

(9) For generators that have the brush holders riveted to commutator end head, slide the end head over the armature shaft, mating the dowel hole and dowel pin.

(10) Install through bolts, making sure that the lower bolt is installed under the loop in the field connection insulation to prevent grounding of the coils by the bolt.

(11) Hold the brush arms out against spring tension and slide the brushes into the brush holders with the angle on the brushes conforming with the contour of the commutator.

(12) Connect brushes to field and armature leads, being sure terminals do not touch frame.

(13) Install cover band.

(14) Place felt and bearing in commutator end frame and install bearing on armature shaft.

(15) Install bearing retainer, washer, bearing screw, gasket, dust cover and attaching screws and washers.

(16) On generators having brush holders riveted to field frame, release brushes and make sure they are properly aligned on commutator. Connect armature lead wire to insulated brush holder.

(17) Position end frame and bushing assembly and install through bolts.

(18) Install new felt wick in oiler cup, lubricate bearings with 8 to 10 drops of light oil. No lubrication required for oilite bearing.

16. GENERATOR MOTORING TEST

A generator that will motor freely with specified voltage applied will, in most cases, operate properly when driven as a generator.

Connect a carbon pile rheostat and test ammeter in series with positive post of battery and generator armature terminal post. Connect a jumper lead from field terminal post to ground. Connect a jumper lead to battery negative post and generator frame. This will cause armature to rotate as a motor. Adjust battery voltage to 10 volts. The reading on test ammeter should be within specifications with armature turning smoothly.

17. INSTALLING THE GENERATOR

(1) Install generator and mounting bolts but do not tighten.

(2) Hook Tool C-3379 over generator and install torque wrench.

(3) Adjust belt tension as outlined under "Accessory Belt Drives".

CAUTION: Condenser used for radio interference must be attached to armature ("ARM") generator terminal.

18. POLARIZING THE GENERATOR

The generator should be polarized before it is operated as follows:

Make sure all connections between the generator, regulator and battery have been properly tightened, then use a jumper wire to make a momentary connection between the battery terminal and the generator armature terminal.

BATTERY

CONTENTS

BATTERY

SPECIFICATIONS

	225 Cu. In. Engine, 6-Cyl.	318 Cu. In. Engine, 8-Cyl.	361 and 383 Cu. In. Engine, 8-Cyl.
Voltage	12 Volts	12 Volts	12 Volts
Capacity	11 plate, 50 amp. hour (Standard) 11 plate, 70 amp. hour (Optional)	11 plate, 50 amp. hour (Standard) 11 plate, 70 amp. hour (Optional)	11 plate, 60 amp. hour (Standard) 11 plate, 70 amp. hour (Optional)

GENERAL INFORMATION

The storage batteries are 12 volt, 11 plate, with ratings from 50 to 70 amp hours capacity. (See Specifications.)

A voltage and current regulator protects the battery from being overcharged.

The electrolyte liquid in the battery should be maintained at the proper level of ⅜ inch above the plates. Only distilled water should be used in the battery.

SERVICE DIAGNOSIS

CONDITIONS—POSSIBLE CAUSES

1. BATTERY IS RUN DOWN

Possible Causes:

(1) Excessive use of electrical units.
(2) Low voltage regulator setting.
(3) Circuit breaker points stuck.
(4) Short in charging circuit.
(5) Battery terminals corroded.
(6) Faulty stop light switch.

2. BATTERY WILL NOT RETAIN WATER

Possible Cause:

(1) Voltage regulator setting too high.
(2) Battery case cracked.
(3) Sealing compound defective.

3. BATTERY WILL NOT TAKE A CHARGE

(1) Low electrolyte level.
(2) Internal short.
(3) Battery worn out.
(4) Battery plates sulphated.

SERVICE INFORMATION

PROCEDURES

1. INSPECTING THE BATTERY

(1) Inspect the battery carrier for damage caused by loss of acid from the battery. If corrosion exists, it will be necessary to remove the battery hold-down clamp and battery and clean corroded areas with clean warm water and baking soda. Scrub areas with a stiff bristle brush to loosen the corrosion. Flush off loose particles of corrosion with clean water. Dry and paint corroded steel parts with acid-proof paint.

(2) The battery posts and terminals should be cleaned with a terminal cleaning tool, as shown in Figures 1 and 2 and the complete battery should be washed with warm water and baking soda and wiped clean with a damp cloth. **Care should be taken to keep cleaning solution out of battery cells to**

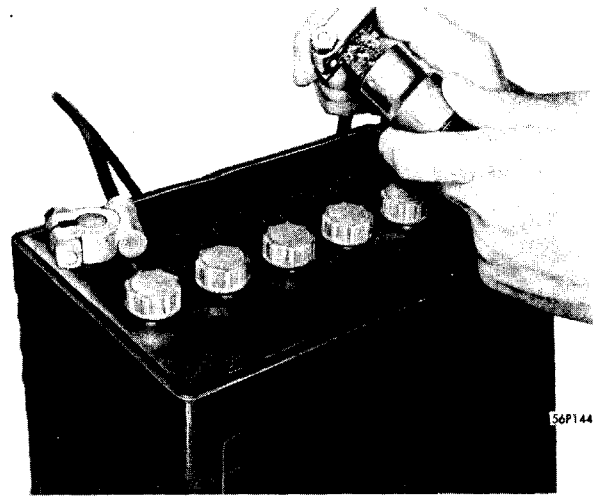


Fig. 1—Cleaning Inside of Cable Clamp

eliminate weakening the electrolyte.

(3) After cleaning, install battery, connect cable clamps to battery posts and tighten securely. Coat all connections with a light grease or petroleum to retard corrosion. Tighten battery hold down screw nuts to 3 foot-pounds.

(4) Examine the battery for cracks in case, raised cells.

2. SPECIFIC GRAVITY TEST

A hydrometer is used to measure the specific gravity of the electrolyte in a battery cell to give an indication of how much unused sulphuric acid remains in the solution and to measure the approximate capacity still available in a normal cell.

The liquid level of the battery cell should be at normal height and the electrolyte should be thoroughly mixed with any battery water which may have just been added by charging the battery before taking any hydrometer readings.

In reading a hydrometer, the barrel must be held vertically and just the right amount of fluid be drawn up into the barrel with pressure bulb fully expanded to lift the float freely so that it does not touch the sides, top or bottom of the barrel. Take a reading with eye on level with liquid in barrel. Do not **tilt** hydrometer. The reading of the hydrometer will vary with the temperature of the electrolyte. An ordinary dairy type thermometer may be used to take temperature readings from the center cells.

Hydrometer floats are calibrated to indicate correctly only at one fixed temperature.

Draw electrolyte in and out of the hydrometer barrel several times to bring the temperature of the hydrometer float to that of the acid in the cell and then measure the electrolyte temperature in the cell.

The temperature correction amounts to .004 specific gravity points for each 10 degrees Fahrenheit change in temperature. A hydrometer reading of a cell with electrolyte above 80 degree Fahrenheit will be less than a reading with the electrolyte at 80 degree Fahrenheit. The opposite holds true where the temperature of the electrolyte is below 80 degree Fahrenheit. Readings must be corrected to 80 degree Fahrenheit. (Refer to Figure 3 and examples one and two as follows:)

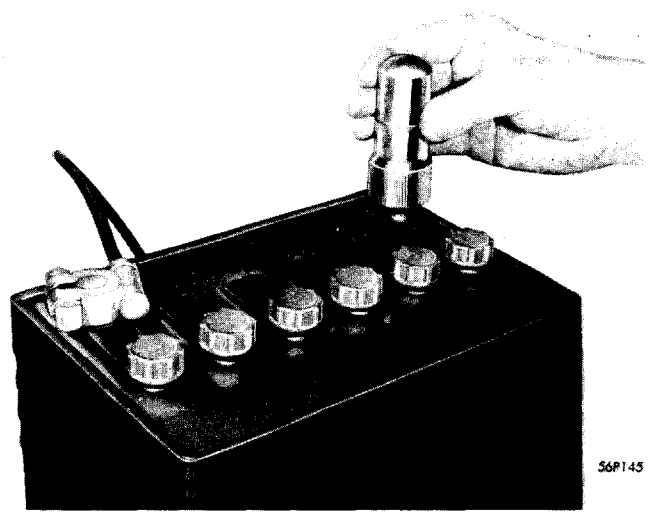


Fig. 2—Cleaning Outside of Battery Post

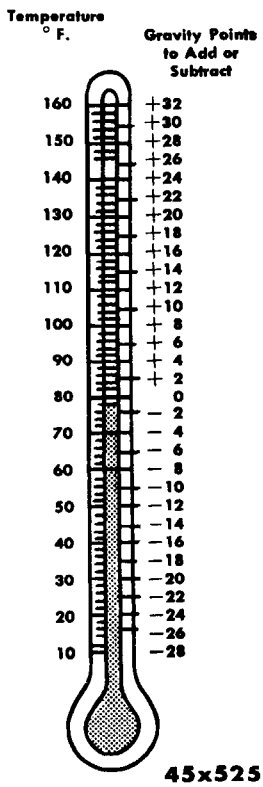


Fig. 3—Hydrometer Reading Correction Chart

Example 1. Hydrometer reading 1.260
Acid Temperature 20 degrees F.
Subtract Specific Gravity .024
Corrected Specific Gravity is 1.236

Example 2. Hydrometer Reading 1.255
Acid Temperature 100 degree Fahrenheit
Acid Specific Gravity .008
Corrected Specific Gravity is 1.263

A fully charged battery has a specific gravity reading of 1.255 to 1.275 (all batteries for use in temperate climates).

A battery that has a specific gravity reading of 1.225 or less, or 1.210 in warm climates, and all cells reading evenly within 15 specific gravity points (.015) of each other, requires recharging.

A battery that has a specific gravity reading which varies more than 15 points between any two cells, should be recharged and high rate discharge tester or other suitable method used to check battery before discarding battery as unsuitable for use.

3. VOLTAGE TESTS

Freshly charged batteries have a "surface charge" which causes high and inaccurate readings unless properly dissipated. If battery is in vehicle, turn headlights on for one to three minutes to remove surface charge. Then turn lights off and wait several minutes before taking another reading.

To make battery test, contact the meter prods of a battery cell tester to proper cell terminals (red to positive, black to negative), using caution not to connect across more than one cell. The point of prod will have to be pushed through sealing compound to make contact with buried strap for each cell reading.

The individual cell readings should not vary more than 0.15 volt between any two cells. A battery varying more than 0.15 volt between any two cells should be recharged and high rate discharge tester used to check battery before discarding battery as unsuitable for use.

4. HIGH RATE DISCHARGE TEST (Battery Capacity)

Satisfactory capacity tests can be made only when battery equals or exceeds 1.210 specific gravity at 80 degrees Farenheit. If reading is below 1.210, the battery should be slow charged until fully charged in order to secure proper test results.

Test Procedure

(1) Turn control knob of battery starter tester to the **OFF** position.

(2) Turn voltmeter selector switch to the 16 volt position.

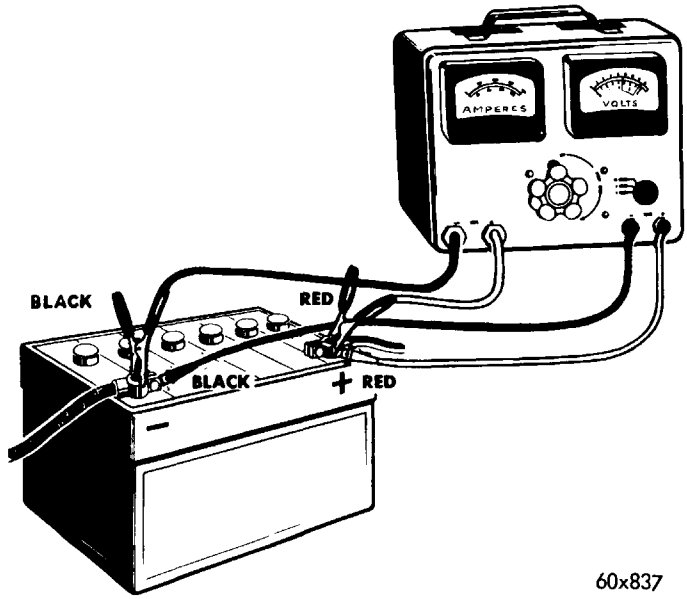


Fig. 4—High Rate Discharge Test

(3) Connect test ammeter and voltmeter positive leads to battery negative terminal and ammeter and voltmeter positive leads to battery positive terminal as shown in Figure 4. **The voltmeter clips must contact the battery posts or cable clamps and not the ammeter clips.**

(4) Turn control knob clockwise, until ammeter reading is equal to three times the ampere hour rating of the battery (180 amperes for a 60 ampere hour battery).

(5) Maintain load for 15 seconds, voltmeter should read 9.5 volts or more, which will indicate battery has good output capacity.

(6) Turn control knob to the **"OFF"** position.

5. CHARGING THE BATTERY

If voltage in "High Rate Discharge Test" in Paragraph 4 was under 9.5 volt, the battery should be test charged to determine whether the battery can be satisfactorily charged. Refer to Figure 5, then proceed as follows:

Three Minute Charge Test

(1) Connect (positive +) charger lead to the battery positive terminal and (negative —) lead to battery negative terminal.

(2) Trip power switch to **"ON"** position..

(3) Adjust charge switch to highest possible rate not exceeding 40 amperes.

(4) When fast charge cuts off at end of 3 minutes, turn back to fast charge.

(5) Use 4 volt scale of battery starter tester voltmeter and quickly measure voltage across each cell

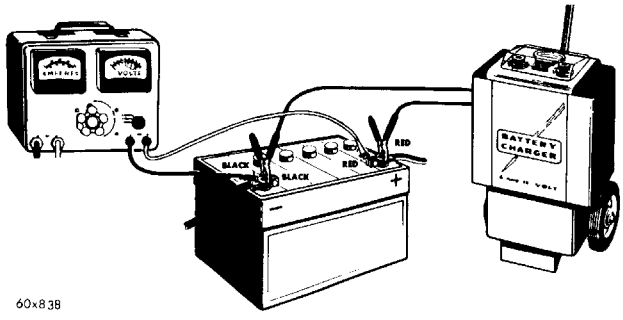


Fig. 5—Three Minute Charge Test

while battery is being fast charged. A defective cell or cells will be detected by a cell voltage variation of more than .1 volt.

(6) If cell voltages are even within .1 volt, use 16 volt scale of battery starter tester and measure total voltage of battery posts while battery is being fast charged. If total voltage under charge exceeds 15.5 volts, the battery is sulphated and should be cycled and slowcharged until specific gravity reaches 1.260. (See "Slowing Charging" Paragraph).

If the specific gravity remains constant after testing battery at one hour intervals for three hours, the battery is at its highest state of charge.

(7) Make another capacity test. If capacity test does not meet specifications, replace the battery.

A slow charge is preferable to bring the battery up to a full charge.

Safe slow charging rates are determined by allowing one ampere per positive plate per cell the proper slow charging rate would be 4 amperes for a 50 ampere hour battery or 5 amperes for a 60 ampere hour battery.

Fast Charging the Battery

If adequate time for a slow charge is not available, a high rate (FAST) charge is permissible and will give a sufficient charge in one hour enabling the battery to continue to give service proportionate to its condition and state of charge. Refer to Figure 6, then proceed as follows:

(1) Connect (positive +) charger lead to battery positive terminal and (negative —) lead to battery

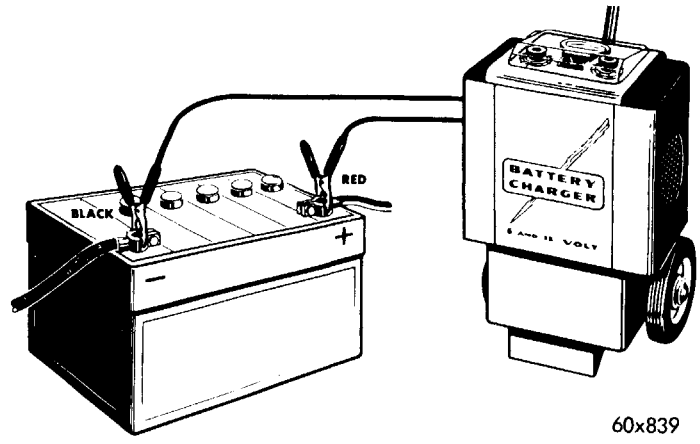


Fig. 6—Fast Charging the Battery

negative terminal. **The battery can be damaged beyond repair if the following precautions are not met.** The battery electrolyte temperature must **NEVER** exceed 125 degrees Fahrenheit.

If this temperature is reached, the battery should be cooled by reducing the charging rate or remove battery from the circuit. **The manufacturers of high rate charging equipment generally outline the precautions and some models have thermostatic temperature limiting and time limiting controls.**

(2) As the battery approaches full charge, each cell will begin to gas or bubble. Excessive gassing must not be allowed (vigorous bubbling of electrolyte).

(3) A time setting longer than one hour should not be used.

The battery is fully-charged when three successive hourly hydrometer readings show no rise in specific gravity. Remember to use the temperature correction when checking specific gravity.

If the battery does not show a significant change in specific gravity after one hour of "FAST" charge. The slow charge method should be tried. **WARNING: When batteries are being charged an explosive gas mixture forms beneath cover of each cell. Do not smoke near batteries on charge or which have recently been charged. Do not break live circuits at terminals of batteries on charge. A spark will occur where the live circuit is broken. Keep all open flames away from battery.**

Slow Charging Batteries to Remove Sulphation

To condition a battery that is sulphated, charge battery for minimum of 24 hours at a maximum charging rate of four (4) amperes. As battery approaches full charge check specific gravity at hourly intervals. With no rise in specific gravity for three successive readings, battery is charged to its peak capacity.

318 CUBIC INCH ENGINE
CONTENTS

(CONTENTS Continued)

SPECIFICATIONS
(318 CUBIC INCH ENGINE)

ENGINE	
Type	90° V
Valve arrangement	In Heads
	Opposed
Number of Cylinders	8
Bore	3.91″
Stroke	3.31″
Piston Displacement (cu. in.)	318 Cu. In.
Compression Ratio	9.0 to 1
Compression Pressure (speed minimum 150 rpm)	
Plugs removed, wide open throttle	125 psi
	165 psi
Maximum Variation between Cylinders (any one engine)	20 psi
Firing Order	1-8-4-3-6-5-7-2
CYLINDER NUMBERING—(from driver's seat, front to rear)	
Left Bank	1-3-5-7
Right Bank	2-4-6-8
ENGINE LUBRICATION	
Pump Type	Rotary—Full Pressure
Crankcase Capacity (qts.)	5*
*When filter element is changed, add 1 quart.	
Pump Drive	Camshaft
Minimum Pump Pressure at 500 rpm	20 psi
Operating Pressure at 40 to 50 mph, 1500 rpm	45-65 psi
Oil Filter:	
Type	Shunt
Replaceable Element	Yes
CYLINDER BLOCK	
Cylinder Bore (standard)	3.910-3.912″
Cylinder Bore Out-of-Round (Max. allowable before reconditioning)	.005″
Cylinder Bore Taper (Max. allowable before reconditioning)	.020″
Reconditioning Working Limits (for taper and out-of-round)	.001″
Maximum Allowable Oversize (cylinder bores)	.040″
Tappet Bore Diameter	.9050-.9058″
Distributor Lower Drive Shaft Bushing (press fit in block)	.0005-.0040″
Ream to	.4865-.4880″
Shaft to Bushing Clearance	.0007-.0027″

(SPECIFICATIONS Continued)

CAMSHAFT	
Drive	Chain
End Play	.002–.006″
Maximum Allowable	.010″
Radial Clearance	.001–.003″
Maximum Allowable	.005″
Thrust Taken by	Thrust Plate
CAMSHAFT JOURNALS	
Diameter	No. 1—1.998–1.999″
	No. 2—1.982–1.983″
	No. 3—1.967–1.968″
	No. 4—1.951–1.952″
	No. 5—1.5605–1.5615″
CAMSHAFT BEARINGS	
Diameter	No. 1—2.000–2.001″
	No. 2—1.984–1.985″
	No. 3—1.969–1.970″
	No. 4—1.953–1.954″
	No. 5—1.5625–1.5635″
TIMING CHAIN	
Number of Links	68
Pitch	.375″
Width	1.02″
CRANKSHAFT	
Type	Fully Counter-Balanced
Bearings	Steel Backed Babbitt
Thrust Taken by	No. 3 Main Bearing
End Play	.002–.007″
Maximum Allowable	.010″
Radial Clearance—Desired	.005–.0015″
Maximum Allowable	.0025″
Finish at Rear Oil Seal Surface	Diagonal Knurling
MAIN BEARING SIZES	
Diameter and Length	No. 1—2.5015 x 0.872″
	No. 2—2.5015 x 0.872″
	No. 3—2.5015 x 1.151″
	No. 4—2.5015 x 0.872″
	No. 5—2.5015 x 1.562″
MAIN BEARINGS (Service)	
Available in Standard and the following undersizes	No. 1–5—.01, .002, .003, .010, .012″
MAIN BEARING JOURNALS	
Diameter	2.4995–2.5005″
Maximum Allowable Out-of-Round	.001″
Maximum Allowable Taper	.001″
Center Bearing Run-Out (Total Indicator Reading) when supported at front and rear main bearing	.002″
CRANKSHAFT ROD JOURNALS	
Diameter	2.124–2.125″
Maximum Allowable Out-of-Round	.001″
Maximum Allowable Taper	.001″

(SPECIFICATIONS Continued)

CONNECTING RODS	
Length (center to center)	6.123″
Weight (less bearing shell)	726 gms.
Bearings	Steel-Backed Grid Type
Diameter and Length	2.126 x .842″
Clearance—Desired	.0005–.0015″
Maximum Allowable	.0025″
Side Clearance	.006–.014″
Bearings for Service	Std. .001, .002, .003, .010, .012″
CONNECTING ROD BUSHING	
Type	Steel Backed Bronze
	.9842–.9843–1.20″
PISTONS	
Type	Conformatic with Steel Band
Material	Aluminum—Alloy Tin Coated
Clearance in Bore (with .0015 x ½″ feeler stock)	5–10 pounds pull
Land Clearance (in bore)	.0219–.034″
Clearance (top of skirt)	.0005–.0015″
Weight (standard through all oversizes)	592 gms.
Ring Groove Width (upper)	.0795–.0805″
(intermediate)	.0795–.0805″
(lower)	.1875–.1890″
Piston for Service	Std. .005, .020, .040″ O.S.
PISTON PINS	
Type	Full Floating
Diameter and Length	.9842 x 2.995″
Clearance in Piston (light thumb push at 70° F.)	.0000–.0005″
End Play	.004–.026″
Clearance in Rod	.0001–.0004″
Pins for Service	Std. .003, .008″ O.S.
PISTON RINGS	
Compression	2
Oil with Expander	1
Piston Ring Gaps	.010–.020″
Ring Side Clearance (upper)	.0015–.0030″
(intermediate)	.0015–.0030″
(lower)	.0010–.0030″
TAPPETS	
Type	Mechanical
Body Diameter	.9040–.9045″
Clearance in Block	.0005–.0018″
Service Tappets Available in Standard and .001, .008, .030″ O.S.	
Operating Clearance (hot)	.010″ intake .018″ exhaust
VALVES—(Intake)	
Head Diameter	1.844″
Length (to center of valve face)	4.51″
Stem Diameter (standard)	.3725″
Stem to Guide Clearance	.001–.003″
Maximum Allowable	.004″
Face Angle	45°
Valves for Service	Std. .005, .015, .030″ (O.S. stem diameter)

(SPECIFICATIONS Continued)

VALVES—(Exhaust)	
Head Diameter	1.563″
Length (to center of valve face)	4.45″
Stem Diameter	.3715″
Stem to Guide Clearance	.002–.004″
Maximum Allowable	.006″
Face Angle	45°
Valves for Service	Std. .005, .015, .030″ (O.S. stem diameter)
VALVE GUIDES	
Type	Cast-in-head
Ream for Next Oversize Valve Stem	.374″ Standard Valve Stem .379, .389, .404″ O.S. Valve Stems
VALVE SPRINGS	
Load when compressed (valve closed)	1 1/16″—78–88 lbs.
Load when compressed (valve open)	1 5/16″—170–184 lbs.
Maximum Allowable Out-of-Plumb	1/16″
Valve Spring Installed Height (spring seat to retainer)	1 5/8–1 1/16″
Use a 1/16″ spacer to reduce spring height when over specification.	

VALVE TIMING	2 Barrel		4 Barrel
Intake Opens (BTC)	17°	—	13°
Intake Closes (ABC)	47°	—	55°
Exhaust Opens (BBC)	55°	—	51°
Exhaust Closes (ATC)	9°	—	17°
Valve Overlaps	26°	—	30°
Intake and Exhaust Valve Duration	244°	—	248°

CYLINDER HEAD	
Valve Seat Run-Out (Maximum)	.002″
Intake Valve Seat Angle	45°
Seat Width (finished)	.060–.085″
Exhaust Valve Seat Angle	45°
Seat Width (finished)	.040–.060″
Cylinder Head Gasket (thickness compressed)	.028″
ROCKER SHAFT ASSEMBLY	
Clearance Between Rocker Arm and Shaft	.001–.003″
Clearance Between Rocker Shaft and Bracket	.001–.0045″

TOOL LIST

C-119	Cylinder Bore Gauge	C-522	Sleeve
C-260	Ring Installer	C-536	Remover
C-263	Ring Compressor	C-584	Bearing Remover
C-385	Ring Compressor	C-647	Spring Tester
C-394	Scale	C-690	Spring Scale
C-430	Dial Indicator	C-710	Fixture
C-455	Box Wrench	C-711	Alignment Fixture
C-481	Fixture	C-732	Remover
C-484	Pliers	C-741	Reamer

(TOOLS Continued)

C-756 . . . . . Cleaner
C-823 . . . . . Hone
C-867 . . . . . Driver
C-876 . . . . . Refacer
C-897 . . . . . Driver
C-3012 . . . . . Reamer
C-3023 . . . . . Spring Compressor
C-3024 . . . . . Compressor
C-3025 . . . . . Sleeve
C-3026 . . . . . Sleeve
C-3027 . . . . . Installer
C-3028 . . . . . Reamer
C-3033 . . . . . Puller—Installer
C-3034 . . . . . Bearing Remover
C-3052 . . . . . Puller
C-3053 . . . . . Installer
C-3054 . . . . . Socket
C-3059 . . . . . Bearing Remover
C-3068 . . . . . Holder
C-3131 . . . . . Seal Installer
C-3132 . . . . . Bearing Remover
C-3160 . . . . . Tappet Pliers
C-3159 . . . . . Driver
C-3162 . . . . . Lifting Bracket
C-3200 . . . . . Reamer
C-3209 . . . . . Holding Fixture
C-3221 . . . . . Piston Remover
C-3379 . . . . . Adjusting Bracket
C-3422 . . . . . Spring Compressor
C-3427 . . . . . Reamer
C-3428 . . . . . Spring Compressor
C-3430 . . . . . Reamer
C-3433 . . . . . Reamer
C-3436 . . . . . Gauge
C-3443 . . . . . Reamer

SERVICE DIAGNOSIS

1. ENGINE WILL NOT START

(1) Weak battery.
(2) Corroded or loose battery connections.
(3) Faulty starting motor.
(4) Faulty coil or condenser.
(5) Dirty or corroded distributor contact points.
(6) Moisture on ignition wires and distributor cap.
(7) Improper spark plug gap.
(8) Improper timing (ignition).
(9) Dirt or water in the fuel line or carburetor.
(10) Carburetor flooded.
(11) Incorrect carburetor float setting.
(12) Faulty fuel pump.
(13) Vapor lock. Check to see that heat shield is in place.
(14) Faulty ignition cables.

2. ENGINE STALLS

(1) Idle speed set too low.
(2) Idle mixture tool lean or too rich.
(3) Incorrect carburetor float setting.
(4) Improper choke adjustment.
(5) Leak in intake manifold. Check intake manifold gasket.
(6) Faulty coil or condenser.
(7) Distributor contact points dirty, burned or improperly gapped.
(8) Distributor rotor burned or cracked.
(9) Faulty ignition wiring.

3. ENGINE HAS LOSS OF POWER

(1) Incorrect ignition timing.
(2) Defective coil or condenser.
(3) Distributor rotor burned or cracked.
(4) Wrong mechanical or vacuum distance (distributor).
(5) Excessive play in distributor shaft.
(6) Worn distributor cam.
(7) Dirty or incorrectly gapped spark plugs.
(8) Dirt or water in fuel line or carburetor.
(9) Improper carburetor float level.
(10) Defective fuel pump.
(11) Incorrect valve timing.
(12) Blown cylinder head gasket.
(13) Low compression.
(14) Burned, warped, or pitted valves.
(15) Plugged or restricted muffler or tail pipe.
(16) Faulty ignition cables.

4. ENGINE MISSES WHILE IDLING

(1) Dirty or incorrectly gapped spark plugs.
(2) Broken or loose ignition wires.
(3) Burned or pitted contact points.
(4) Faulty coil or condenser.

(5) Weak battery.
(6) Distributor cap cracked.
(7) Distributor rotor burned or cracked.
(8) Moisture on ignition wires, distributor cap or spark plugs.
(9) Excessive play in distributor shaft.
(10) Burned, warped, or pitted valves.
(11) Incorrect carburetor idle adjustment.
(12) Incorrect carburetor float level.
(13) Low compression.

5. ENGINE MISSES ON ACCELERATION

(1) Distributor contact points dirty or improperly gapped.
(2) Coil or condenser defective.
(3) Spark plugs dirty or gap too great.
(4) Incorrect ignition timing.
(5) Dirt in carburetor.
(6) Burned, warped, or pitted valves.
(7) Acceleration pump in carburetor.

6. ENGINE MISSES AT HIGH SPEED

(1) Dirt or water in fuel line or carburetor.
(2) Dirty jets in carburetor, especially the economizer jet.
(3) Defective coil or condenser.
(4) Incorrect ignition timing.
(5) Distributor contact points dirty or incorrectly gapped.
(6) Distributor rotor burned or cracked.
(7) Excessive play in distributor shaft.
(8) Spark plugs dirty or gap set too wide.
(9) Distributor shaft cam worn.

7. NOISY VALVES

(1) Worn tappets.
(2) Worn valve guides.
(3) Excessive run-out of valve seats or valve face.
(4) Broken spring or cocked springs.

8. CONNECTING ROD NOISE

(1) Low oil pressure.
(2) Insufficient oil supply.
(3) Thin or diluted oil.
(4) Misaligned connecting rods.
(5) Excessive bearing clearance.
(6) Crankpin journals out-of-round.

9. MAIN BEARING NOISE

(1) Low oil pressure.
(2) Insufficient oil supply.
(3) Thin or diluted oil.
(4) Loose flywheel or torque converter.
(5) Excessive bearing clearance.
(6) Excessive end play.
(7) Crankshaft journals out-of-round.
(8) Sprung crankshaft.
(9) Loose vibration damper.

10. OIL PUMPING AT RINGS

(1) Worn, scuffed or broken rings.
(2) Incorrect ring size.
(3) Out-of-round rings.
(4) Rings fitted too tight in grooves.
(5) Carbon in oil ring slots.
(6) Insufficient tension in rings.
(7) Rings stuck.
(8) Rings upside down on pistons.

11. OIL PRESSURE DROP

(1) Low oil level.
(2) Clogged oil filter.
(3) Worn parts in oil pump.
(4) Excessive bearing clearance.
(5) Thin or diluted oil.
(6) Oil pump relief valve stuck.
(7) Oil pump suction tube not aligned or bent.

SERVICE INFORMATION (318 CUBIC INCH ENGINE)

DESCRIPTION (Figs. 1, 2 and 3)

The 318 cubic inch V-8 engine is a 90 degree type unit with polyspherical combustion chambers and inclined valves in the cylinder heads. The engine is equipped with mechanical tappets.

A Maltese Cross stamped on the engine numbering pad indicates that engine is equipped with a crankshaft which has one or more connecting rods and main bearing journals finished .001 inch undersize. The position of the undersize journal or journals is stamped on the machined surface of a counter weight. Connecting rod

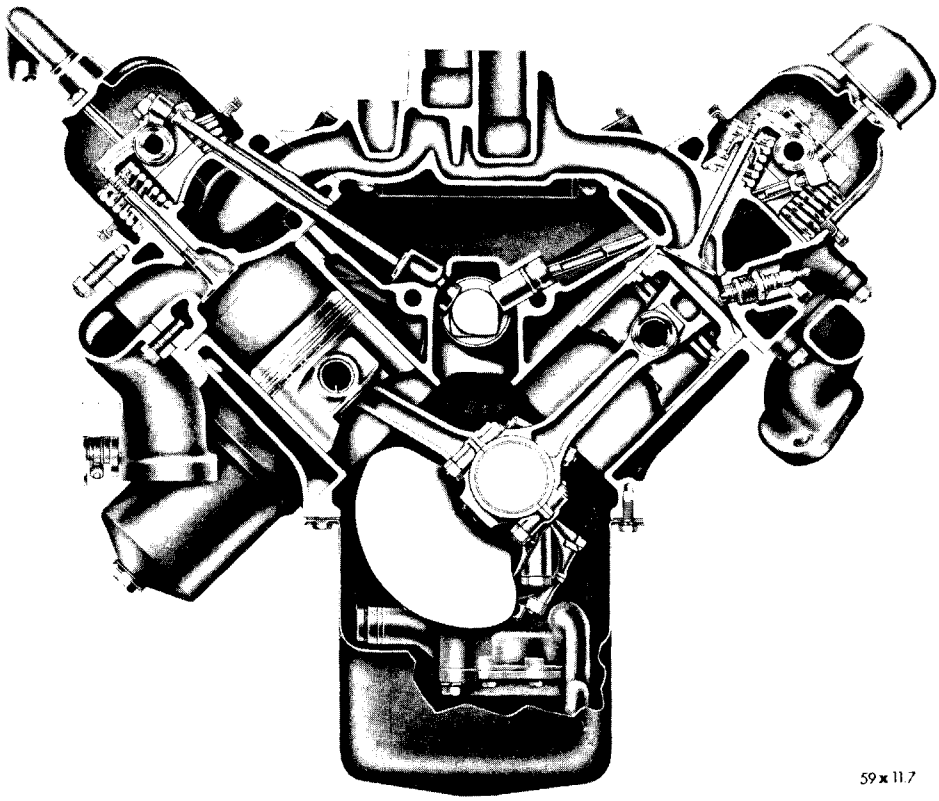


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Fig. 1—318 Cu. In. Engine (End Sectional View)

journals are identified by letter "R" and main bearing journals by the letter "M". Thus, "M-1" indicates that Number 1 main bearing journal is .001 inch undersize. A diamond-shaped marking stamped on engine numbering pad indicates that tappet bodies are .008 inch oversize.

12. REMOVAL OF ENGINE FROM CAR

(1) Scribe hood hinge outlines on hood and remove hood.

(2) Drain cooling system and remove battery.

(3) Remove fan shroud (on air conditioned cars) and radiator.

(4) Disconnect fuel lines and wiring to engine.

(5) Remove carburetor air cleaner and carburetor. Attach engine lifting fixture, Tool C-3466 to carburetor flange studs on intake manifold.

(6) Remove engine front mounting nuts.

(7) Disconnect propeller shaft and tie out of way.

(8) Disconnect wires and linkage at transmission.

(9) Disconnect exhaust pipes at manifolds.

(10) Attach engine support fixture, Tool C-3487 and remove engine rear support crossmember.

(11) Remove transmission.

(12) Attach crane or other suitable lifting tool to intake manifold fixture. Remove support fixture. Remove engine from car. Mount engine on repair stand.

13. INSTALLING OF ENGINE IN CAR

(1) Attach engine lifting fixture, Tool C-3466, to intake manifold.

(2) Attach crane or other suitable lifting tool and disconnect engine from repair stand.

(3) Lower engine in place in car with front engine mounts in place.

(4) Install engine support fixture, Tool C-3487 and remove crane.

(5) Install transmission.

(6) Attach wires and linkage to transmission.

(7) Install engine rear support crossmember.

(8) Connect propeller shaft.

(9) Connect exhaust pipes to manifold.

(10) Remove engine support fixture.

(11) Remove engine lifting fixture.

(12) Install carburetor.

(13) Connect fuel lines and wiring to engine.

(14) Tighten front engine mounts to frame.

(15) Install radiator and fan shroud (on air conditioned cars).

(16) Fill cooling system and install battery.

(17) Install hood and carburetor air cleaner.

(18) Fill crankcase and transmission to level. Whenever an engine has been reconditioned or a new camshaft or new tappets have been installed, add one quart of special oil additive to the engine oil.

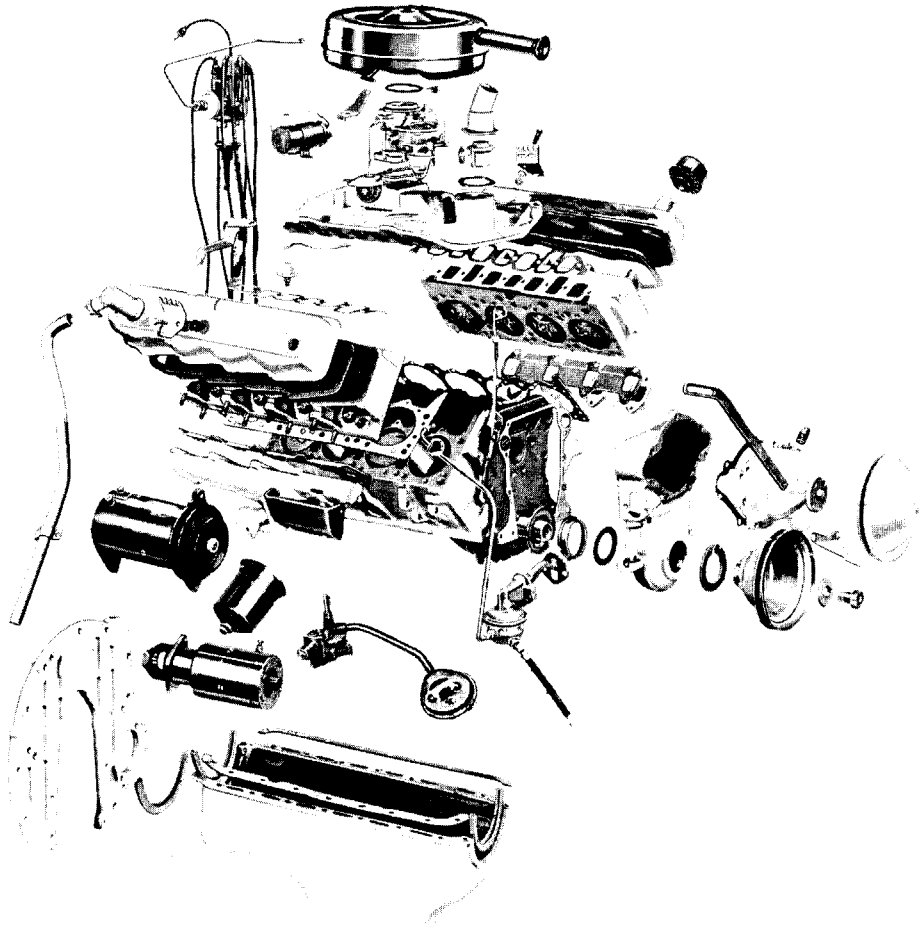

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Fig. 2—Engine External Parts

14. CYLINDER HEAD ASSEMBLY

Removal

(1) Drain cooling system. Remove carburetor air cleaner, fuel line from pump and carburetor, distributor vacuum tube, and the generator.

(2) Disconnect throttle linkage at carburetor, distributor cap, coil wires, heat indicator sending unit wire, heater hoses at engine.

(3) Remove spark plugs and cables, engine ventilating outlet pipe.

(4) Remove intake manifold attaching bolts and remove manifold, carburetor and coil as an assembly.

(5) Remove exhaust manifolds.

(6) Remove cylinder head covers.

(7) Remove 10 head bolts and remove cylinder head and push rods.

(8) Place cylinder heads in holding fixtures, Tool C-3626.

(9) Remove lock plug, rocker shaft and arms from rocker shaft struts.

Installation

A check of the accuracy of the timing marks at the front of the engine can be made before the left cylinder head is installed. (The valve timing can be checked after the engine has been run.)

(1) Mount a dial indicator so that the indicator will read the exact maximum upward travel of the piston (T.D.C.).

(2) With the dial indicator at its highest reading, the straight line on the vibration damper should be centered between the first calibrations each side of the DC stamp on the timing indicator (on chain case cover). If the calibration is not correct, relocate T.D.C. position on the damper. The method of checking valve timing follows in Step 10.

(3) Coat new cylinder head gaskets with a suitable sealer and place gaskets on the cylinder block.

(4) Slide rocker shaft into bore of strut and at same time engage intake rocker arm. Install spring and engage the exhaust rocker arm. Install remainder of rocker arms in the same sequence. Make sure that

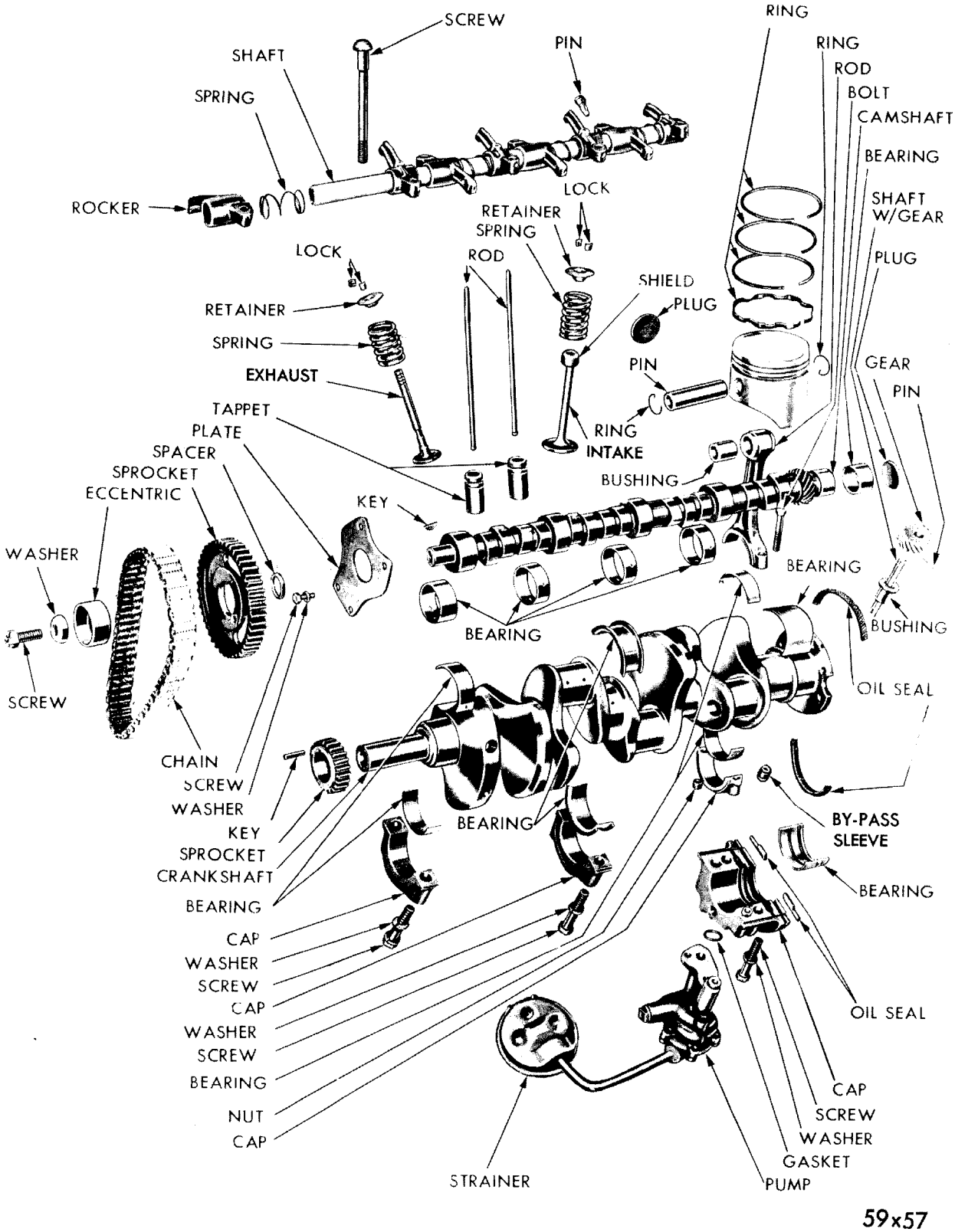


Fig. 3—Engine Internal Parts

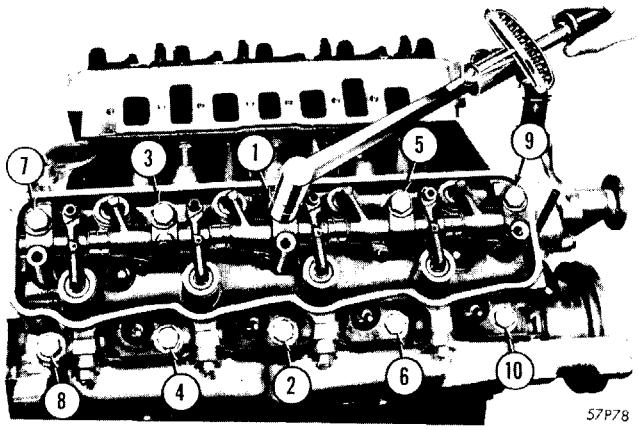


Fig. 4—Cylinder Head Tightening Sequence

rocker shaft head bolt grooves line up with head bolt holes in rocker shaft strut. The plug hole in strut must also line up with hole in rocker shaft. Tap in new rocker shaft plug.

(5) Remove cylinder heads from holding fixtures, Tool C-3626 and place heads on engine.

(6) Install and tighten all bolts on each head in sequence (Fig. 4). Retighten in the same sequence to 85 foot-pounds torque.

(7) Install push rods with small ends in tappets. When using Tool C-3695 (Fig. 5), rocker arm valve spring compressor, to position large end of push rod under rocker arm, **make certain low point of camshaft lobe is under tappet.**

(8) Install new intake manifold gaskets and seals.

(9) Install intake manifold, with coil and carburetor, tighten manifold to 30 foot-pounds.

(10) Check the accuracy of the TDC mark on the pulley (vibration damper) by bringing the number one piston to TDC by means of an indicator placed in the spark plug opening.

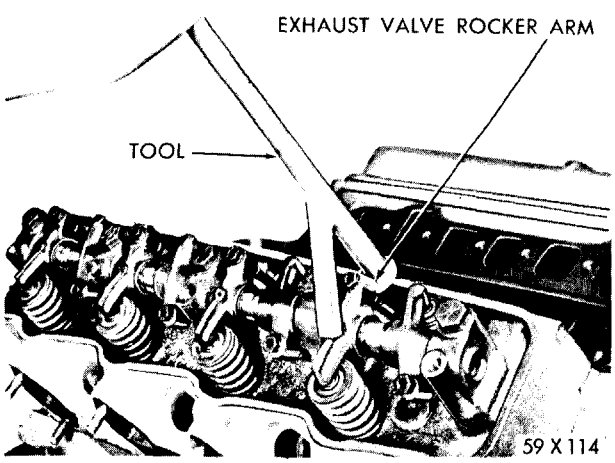


Fig. 5—Compressing Exhaust Valve Spring

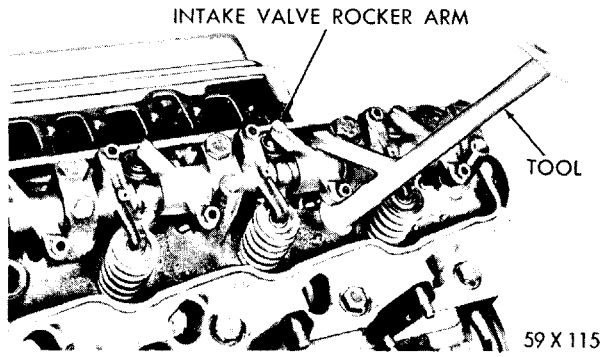


Fig. 6—Compressing Intake Valve Spring

Rotate the crankshaft until #6 exhaust valve is closing and #6 intake valve is opening. Install a dial indicator on #1 intake valve so that the indicator pointer contacts the spring retainer as near to a 90° angle as possible.

Turn #1 intake adjusting screw in one complete turn. Adjust the dial indicator to zero. Rotate the crankshaft clockwise (normal running direction) until the valve has lifted (.033 inches for 2 bbl. camshaft), (.024 inches for 4 bbl. camshaft).

The timing of the crankshaft pulley should now read from 10 degrees before top dead center to two degrees after top dead center. Readjust lash.

(11) Using new cylinder head cover gaskets, install covers. Tighten bolts to 40 inch-pounds torque. Install ventilator outlet pipe and air cleaners.

(12) Install spark plugs with new gaskets. Tighten to 30 foot-pounds torque.

(13) Install exhaust manifolds, with new gaskets, tightening to 30 foot-pounds torque.

(14) Connect throttle linkage, install distributor cap and connect cables, coil wires, heat indicator sending unit wire and heater hoses.

(15) Install fuel line, distributor vacuum tube, generator and belt. Tighten generator bracket bolts to 50 foot-pounds torque and mounting nut to 20 foot-pounds torque. Tighten adjusting strap mounting bolt to 30 foot-pounds torque and the adjusting bolt to 15 foot-pounds torque. See accessory belt drive section on adjusting belt tension.

(16) Fill cooling system and install carburetor air cleaner.

15. SERVICING CYLINDER HEAD ASSEMBLIES

Disassembly

(1) With cylinder heads in holding fixtures Tools C-3626, compress valve springs using Tool C-3428 and remove valve locks. Release compressor and remove retainers, springs and intake valve stem cup seals. If valves do not slide out of heads, remove burrs from lock grooves to prevent damage to guides. Place valves in a numbered rack.

(2) Clean valves thoroughly and discard burned, warped or cracked valves.

(3) Measure valve stems. Intake should measure from .372 to .373 inch, exhaust from .371 to .372 inch.

(4) Clean cylinder heads thoroughly. Use Tool C-756 to clean valve guides.

(5) Test valve guides for wear. Install sleeve, Tool C-3025 on intake valve and C-3026 on exhaust valve over valve stem to hold valve at working height in head. Attach dial indicator, having stem at right angle with edge of valve. Move valve to and from indicator. Total movement should not exceed .008 inch on intake valves and .014 inch on exhaust valves. If tolerance is excessive, ream guides and install valves with oversize stems. Reamer Tool C-3433 will ream guides for .005 inch oversize valve stems, C-3427 for .030 inch oversize. Turn reamer by hand, and clean guides thoroughly when finished. Use .005 inch reamer first and, if necessary, the .015 inch, then the .030 inch so the guides remain true in relation to the seat.

(6) Reface valves to 45°, dressing the stone before refacing each valve. Discard valves having less than $^{3}/_{64}$ inch margin remaining after grinding.

(7) When refacing valve seats, the correct size pilot must be used and the correct size stone of proper grit should be dressed to 45° before grinding each seat. A true and complete surface must be obtained. Check the seat with dial indicator. Total runout should not exceed .002 inch.

(8) Check the valve seat with Prussian Blue to determine where the valve contacts the seat. If this contact surface is not properly centralized, the seat should be relocated by using a 20° stone at the top, or a 60° stone at the bottom, whichever is necessary. When the seat is properly positioned, the width of intake valve seats should be from $^{1}/_{16}$ inch to $^{3}/_{32}$ inch exhaust valve seats from $^{3}/_{64}$ inch to $^{1}/_{16}$ inch. After valves have been refaced and the cylinder heads reseated, the valve stems will extend farther out of the cylinder heads. This increased dimension will decrease valve spring compression.

Assembly

(1) To check the installed valve spring height, install the retainer and locks on the valve and pull on the retainer, to seat the locks in the retainer and to hold the valve on its seat. The distance from the spring contact area on the head to the contact area on the retainer should not exceed 1 $^{11}/_{16}$ inch. If space is greater than 1 $^{11}/_{16}$ inch, a $^{1}/_{16}$ inch spring spacer should be installed next to the cylinder head.

(2) To check installed valve stem length, hold the valve on its seat and place gauge over the stem. If valve stem extends above the gauge, grind the end of stem to fall between maximum and minimum.

Whenever valves have been removed, the valve springs should be tested. Check springs for squareness. If a spring is more than $^{1}/_{16}$ inch out of square, install a new spring. Test spring tension with Tool C-647. Spring tension should be from 170 to 184 pounds when compressed to 1 $^{5}/_{16}$ inches and from 78 to 88 pounds when compressed to 1 $^{11}/_{16}$ inches.

Lubricate valve stems and insert in head. Install new seals on intake valve stems with lip of seal contacting cylinder head. Place springs and retainers over valve stems. Use Tool C-3422 to compress springs and install valve locks.

16. TIMING CHAIN AND SPROCKETS

Timing Chain Case Cover Removal

(1) Drain cooling system.

(2) Remove radiator, fan and belt.

(3) Remove water pump and housing as an assembly.

(4) Remove crankshaft bolt and remove the pulley.

(5) Remove key from crankshaft.

(6) Remove fuel line and fuel pump.

(7) Remove chain case cover and gasket, using extreme caution to avoid damaging the oil pan gasket. It is normal to find particles of neoprene collected between the crankshaft seal retainer and the crankshaft oil slinger.

Chain Case Cover Oil Seal Removal

If the chain case cover oil seal should be replaced, use Tool C-3506 as follows: Refer to the 361 cubic inch engine section for illustrations covering the application of the tool.

(1) Insert puller screw through seal toward inside of cover.

(2) Position angular lip of both puller blocks under the flanges of the seal retainer and with the blocks directly opposite each other. In this position the blocks will be leaning against the screw.

(3) Place washer and the nut on puller screw. As nut is tightened and the blocks move down the shaft, the lips will be forced outward under the seal retainer. The nut must be tight. The tool is only positioned at this time.

(4) Place tool sleeve over seal retainer. Place removing and installing plate into sleeve. Place washer and nut on puller screw. Tighten nut to remove seal retainer.

Installing Chain Case Cover Oil Seal

To install a seal, use Tool C-3506 as follows:

(1) Place removing and installing plate on puller screw with the thick shoulder up.

(2) Insert puller screw through seal opening toward inside of cover.

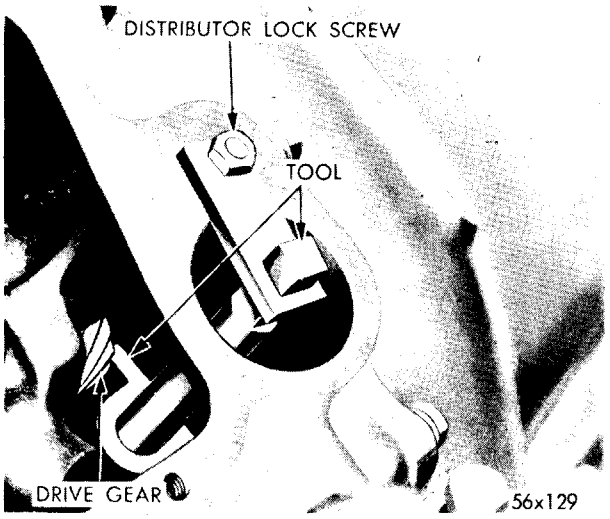


Fig. 7—Camshaft Holding Tool

(3) Place seal in recess in cover with neoprene section down (retainer section up). Make certain seal is centered.

(4) Place installing plate on screw with the circular recess toward seal retainer.

(5) Install flat washer and nut on screw. Hold screw and tighten nut securely.

(6) Remove tool and check seal for proper seat with .0015 inch feeler gauge. Seal is seated if gauge cannot be inserted.

Testing Timing Chain

(1) Block crankshaft from moving in either direction.

(2) Apply 15 foot-pounds torque to camshaft bolt in counter-clockwise direction (30 foot-pounds with cylinder heads installed and engine under compression).

(3) Place a scale next to chain and take reading of chain position. Hold scale in same position.

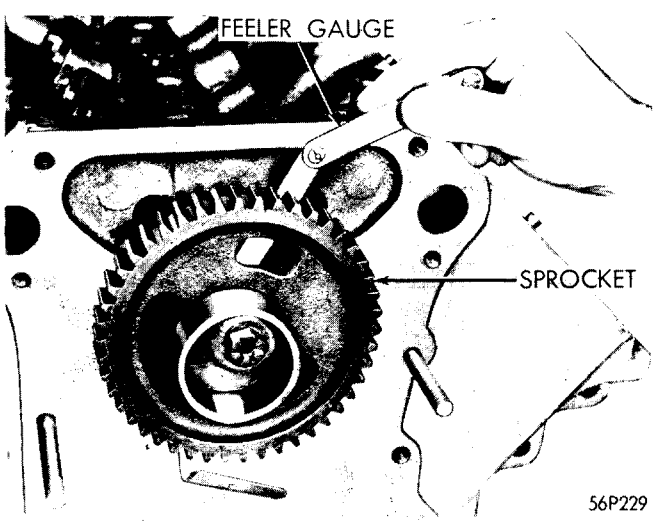


Fig. 8—Measuring Camshaft End Play

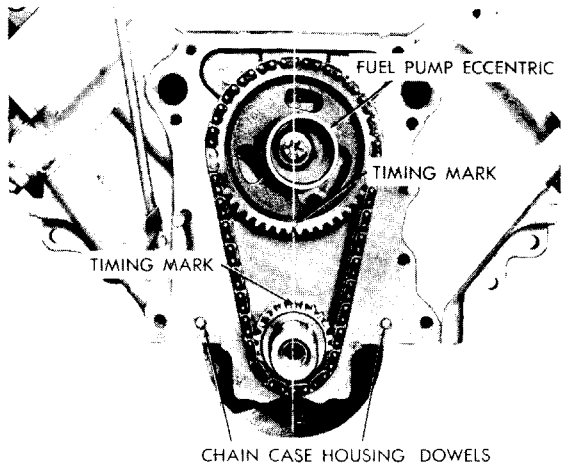


Fig. 9—Timing Marks

(4) Apply 15 foot-pounds torque to camshaft bolt in clockwise direction (30 foot-pounds torque with cylinder heads installed).

(5) Read scale for amount of chain movement. Replace chain if movement exceeds $\frac{3}{16}$". If removal of the chain is necessary, remove the crankshaft oil slinger and the camshaft sprocket bolt. Slide both sprockets and the chain off as an assembly.

Installing Timing Chain

When installing the timing chain, use Tool C-3509 to prevent the camshaft from contacting the welch plug in the rear of the engine block. Remove the distributor and the oil pump-distributor drive gear. Locate tool against rear side of cam gear and attach the tool with distributor retainer plate bolt (Fig. 7).

(1) Place chain on bench and locate both sprockets in chain in a position such that a straight line between the timing marks will pass through center of each sprocket.

(2) Rotate crankshaft to line up key in shaft with keyway in sprocket.

(3) Rotate camshaft to line up keyways in shaft and sprocket.

(4) Slide sprockets and the chain on shafts as an assembly.

(5) Check camshaft for .002 to .006 inch end play. If not within these limits, install new spacer and/or thrust plate (Fig. 8). Install fuel pump eccentric.

(6) Check valve timing (Fig. 9).

(7) Install camshaft bolt and tighten to 35 foot-pounds torque and install crankshaft oil slinger.

(8) Install chain cover with new gaskets and tighten bolts to 15 foot-pounds torque.

(9) Install fuel pump and fuel lines.

(10) Install crankshaft pulley, washer and bolt. Tighten bolt to 135 foot-pounds torque.

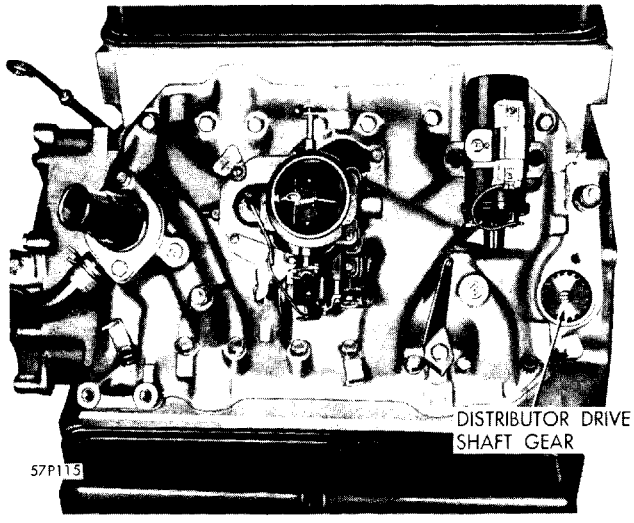


Fig. 10—Position of Distributor Drive Shaft

(11) Install water pump and housing assembly using new gaskets. Tighten bolts to 30 foot-pounds torque.

(12) Install radiator, fan and belt, hoses and close drains.

(13) Fill cooling system.

(14) With timing indicator on T.D.C., install distributor drive gear with slot pointing to the first intake manifold bolt on the left side of engine (Fig. 10).

17. CAMSHAFT AND TAPPETS

Removing Camshaft

(1) Remove mechanical tappets from the tappet bore (Fig. 11). Place push rods and tappets in their respective places in Tool C-3068 since each part should be replaced in its original location.

(2) To remove the camshaft, remove all tappets and remove the timing chain and sprockets.

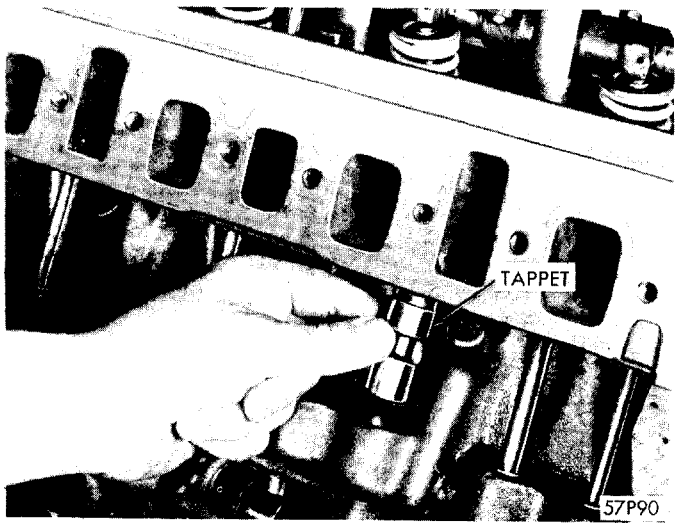


Fig. 11—Removing Mechanical Tappet

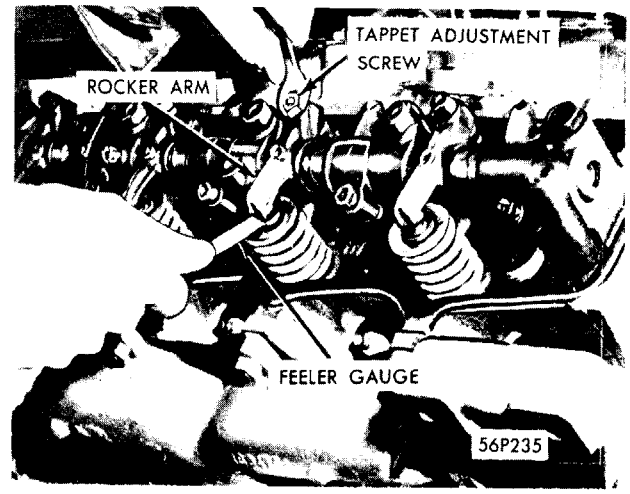


Fig. 12—Adjusting Mechanical Tappets

(3) Remove the distributor and the oil pump distributor drive gear.

(4) Remove the camshaft. Use care to avoid damaging the camshaft bearings while removing or replacing the camshaft. Camshaft bearing replacement will be found under **CYLINDER BLOCK.**

Installing Camshaft

(1) Lubricate the cam lobes and bearing journals before inserting the camshaft.

(2) Install Tool C-3509 with tongue back of distributor drive gear (Fig. 7).

(3) Push camshaft into final position.

(4) Keep tool in place until sprockets and chain have been installed. Complete installation as described in Paragraph "Timing Chain and Sprockets."

18. MECHANICAL TAPPET ADJUSTMENT

Mechanical tappet adjustments should be made after engine reaches normal operating temperature. Adjust intake rocker arms to have .010 inches clearance and the exhaust rocker arms to have .018 inches clearance. (Fig. 12) The adjustment is made at the self-locking rocker arm adjusting screw. The screw should have a minimum of 3 foot-pounds tension as it is turned. If less than this, replace the adjustment screw and if necessary, the rocker arm.

19. CRANKSHAFT AND BEARINGS

Servicing main and connecting rod bearings may be done with the engine in the car after removing the oil pan.

Precision type bearings require careful handling. Do not touch or wipe a bearing when it is dry. When cleaning with a suitable solvent, use only a light finger pressure. When necessary to dry a bearing, use air pressure only.

Crankshaft Bearing Removal

With the engine in repair stand C-3167 and the cylinder heads, oil pan, torque converter and timing chain removed:

(1) Check and mark all bearing caps as necessary for proper location.

(2) Use ridge reamer C-3012 to remove ridge at top of any cylinder bore.

(3) Remove oil strainer, tube and pump.

(4) Remove all connecting rod and piston assemblies, one at a time, using Tool C-3221 on one connecting rod bolt and the short portion of tool on the other bolt. Install cap on rod as soon as removed.

(5) Remove main bearing caps and crankshaft. If necessary to remove or install main bearings with engine in car, the upper half of the bearings may be removed by inserting Tool C-3059 in the oil hole in the crankshaft, and turning crankshaft clockwise.

The crankshaft journals should be checked for excessive wear, taper and scoring. Limits of taper or out-of-round on any crankshaft journals should be held to .001 inch. Journal grinding should not exceed .012 inch under the standard journal diameter. DO **NOT** grind thrust faces of Number 3 main bearing. Do **NOT** nick crankpin or main bearing fillets. After regrinding, remove rough edges from crankshaft oil holes and clean out all oil passages.

The bearing caps are not interchangeable. The lower main bearing halves of 1, 2, and 4 are interchangeable. The upper main bearing halves of 1, 2, and 4 are interchangeable. Upper and lower bearing halves are NOT interchangeable.

The upper and lower Number 3 bearing halves are flanged to carry the crankshaft thrust loads and are **NOT** interchangeable with any other bearing halves in the engine (Fig. 13).

NOTE: Bearings that are not badly worn or pitted must be reinstalled in their original position.

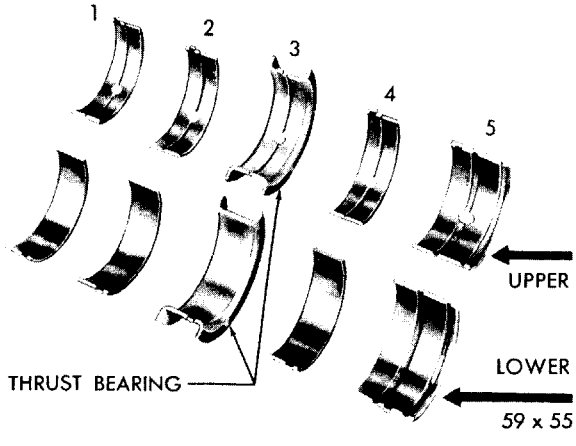


Fig. 13—Upper and Lower Main Bearings

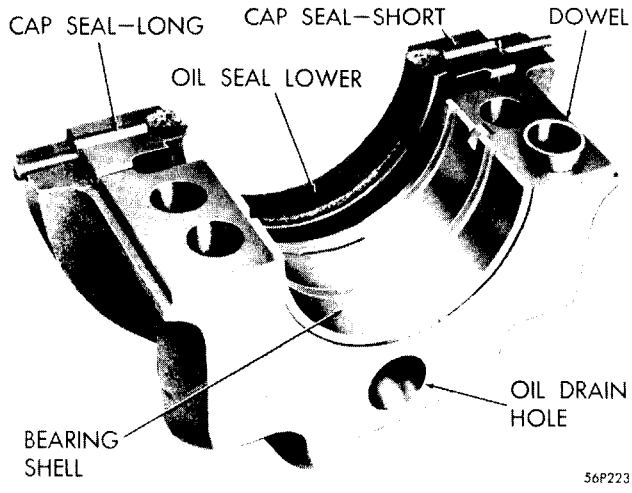


Fig. 14—Rear Main Bearing Cap and Seals

Crankshaft Bearing Installation

(1) Install upper half of a new rear main bearing oil seal using Tool C-3511. Seal is seated when tool bottoms in main bearing bore. Hold seal in place with tool while trimming ends of seal flush with block.

(2) Install upper half of all main bearings with tangs of bearings in grooves in block and lubricate the bearings.

(3) Position crankshaft in the block.

(4) Smooth the edges of a ½ x ¾ inch piece of soft copper or brass shim stock, .001 inch thickness.

(5) Lubricate the main bearing journals and position the shim stock across the center main journal.

(6) Install bearing in center main bearing cap, bearing tang in groove in cap, lubricate bearing and seat cap on block. Tighten bolts to 85 foot-pounds torque.

(7) If a slight drag is felt as the crankshaft is turned (moved no more than ¼ turn in either direction), the clearance is .001 inch or less and is considered satisfactory. If, however, no drag is felt, or the crankshaft cannot be rotated, the bearing is either too large or too small and should be replaced with the correct size.

(8) Check crankshaft end play to .002-.007 inch. If end play is less than .002" or more than .007", install a new Number 3 main bearing.

(9) Fit the remaining bearings in same manner.

(10) Install new rear main bearing oil seal in the cap with Tool C-3511.

(11) Hold seal in place with tool and trim ends of seal flush with cap.

(12) Install bearing shell and cap seals (Fig. 14).

Checking Connecting Rod Bearings

Connecting rod bearings caps have a small "V" groove across the parting face. When installing a lower bearing, the "V" groove of the bearing must be placed on the "V" groove side of the cap. This provides lubrication of the cylinder wall in the opposite bank. Also,

the tangs in the steel back must be placed in the grooves in the rods and caps.

Connecting rod bearings are fitted in the same manner and to the same clearance as main bearings. They are available in .001, .002, .003, .010, and .012 inch undersize.

20. CYLINDER BLOCK

Whenever the camshaft, oil pump, crankshaft and pistons are removed, the engine block should be thoroughly cleaned and all oil and water passages checked for full, unobstructed flow.

Camshaft Bearing Replacement

Camshaft bearings can be removed and replaced with Tool C-3132 after removing the welch plug at the rear of the camshaft. Remove end bearings last and install them first to hold the tool in a centralized position. Select an adapter to fit each bearing. For removal, have the adapter shoulder and horseshoe retainer to the rear of the bearing. For installation, the shoulder and horseshoe is forward of the bearing. When installing bearings, they should be lubricated before placing them on the adapters. Bearings must be carefully aligned to bring oil holes into full register with oil passages from main bearings. Also, the Number 4 bearing must index with the two oil passages to the cylinder heads. Check bearing position by sighting toward the bearing. Use Tool C-897 to install new welch plug at rear of camshaft.

Distributor Drive Shaft Bushing Replacement

The distributor drive shaft bushing can be removed by threading Tool C-3052 into the bushing until a tight fit is obtained. Hold puller screw and tighten nut to remove bushing. To install, place new bushing on Tool C-3053 and insert tool and bushing. Drive bushing into position. As tool is removed by tightening nut the burnisher will wedge the bushing in the block and also burnish it to correct size. DO NOT REAM THIS BUSHING.

Cylinder Walls

Cylinder walls which are badly scored, scuffed, scratched, or worn more than .005 inch out-of-round or .010 inch taper should be rebored and new pistons and rings fitted. Tool C-119 is used in checking cylinder walls for out-of-round and taper. Micrometer measurement for size is to be taken half way down the bore and crosswise to the engine. Cylinder walls not requiring reboring should be resurfaced with Tool C-3501 using 280 grit stones. This tool can also be used after rough honing Desirable cross hatch pattern is obtained by operating at 20 strokes in 20 seconds. This treatment can also be used to eliminate minor surface scratches and irregularities.

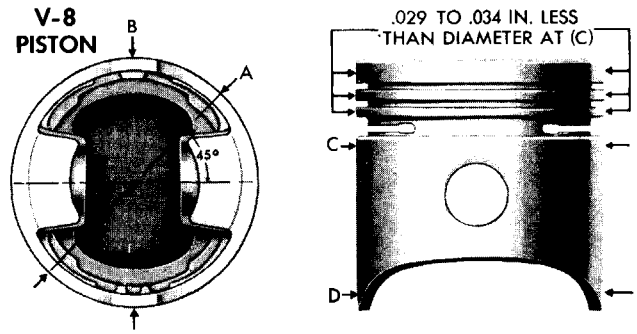


Fig. 15—Piston Check Points

CAUTION: Be sure all abrasives are removed from engine parts. Use hot water and soap with a brisk scrubbing and thorough drying. Lacking soap and water, clean SAE 10 oil and clean cloths may be used. Cylinder walls are clean when a clean white cloth remains clean after wiping the cylinder walls. Coat cylinder walls with oil immediately after drying.

21. PISTONS

The pistons are cam ground so that the diameter at the pin boss is less than its diameter across the thrust face. This allows for expansion under normal operating conditions. Under operating temperatures, expansion forces the pin bosses away from each other, thus, causing the piston to assume a more nearly round shape. It is important that pistons be checked for taper and elliptical shape before they are fitted into the cylinder bore. See Figure 15.

Finished Pistons

All pistons are machined to the same weight in grams, regardless of oversize to maintain piston balance. For cylinder bores which have been honed or rebored, pistons are available in standard and the following oversizes: .005, .020, .040 inch.

Piston Fitting

Piston fitting should be done at normal room temperature, 70° F. Use a spring scale and a strip of ½ inch wide feeler stock .0015 inch thickness. The feeler stock should be long enough to extend into the cylinder bore to the full length of piston travel. **Cylinder bore and piston must be clean.**

(1) Coat the cylinder bore lightly with SAE 10W engine oil. Insert the piston in the bore upside down

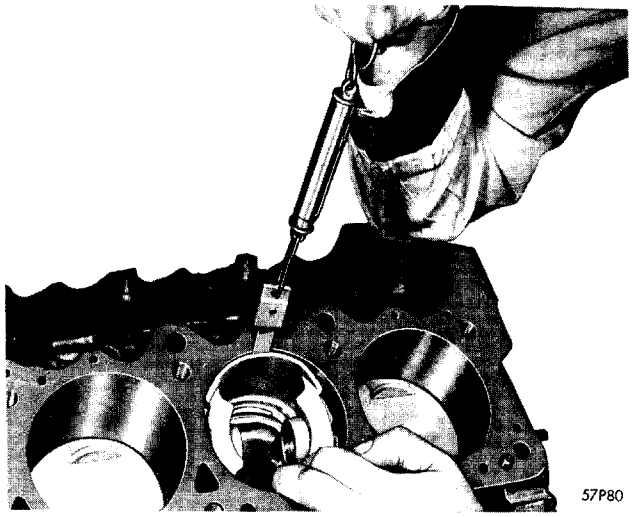


Fig. 16—Fitting Piston in Cylinder Bore

with the feeler stock between the thrust face of the piston and the cylinder wall.

(2) Hold the piston and draw the feeler stock straight out, with the spring scale.

(3) The amount of pull required should be from 5 to 10 pounds (Fig. 16).

Piston Pins

(1) With new pistons and new pins at room temperature, 70° F., the pin should be a tight thumb push fit in the piston and connecting rod. Replacement is necessary if there is excessive clearance between the pin and the piston. Ream piston and connecting rod to next oversize. New pistons are supplied with properly fitted pins.

(2) Assemble pistons and rods for the left hand cylinder bank (1-3-5-7) with piston boss marked

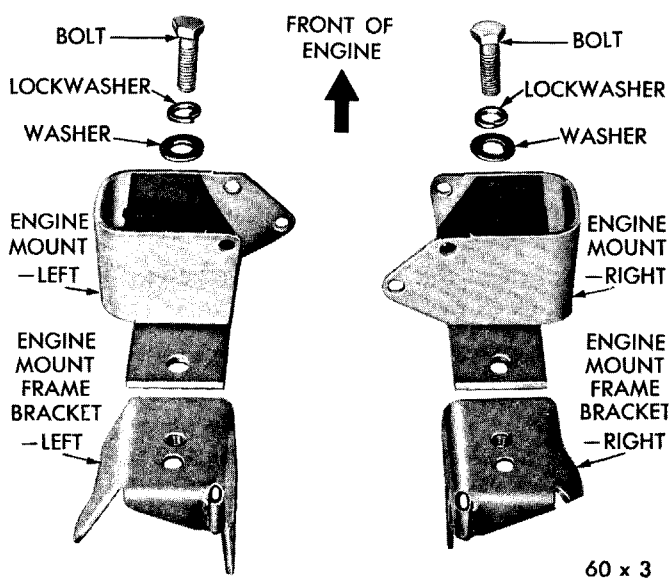


Fig. 17—Engine Front Mount

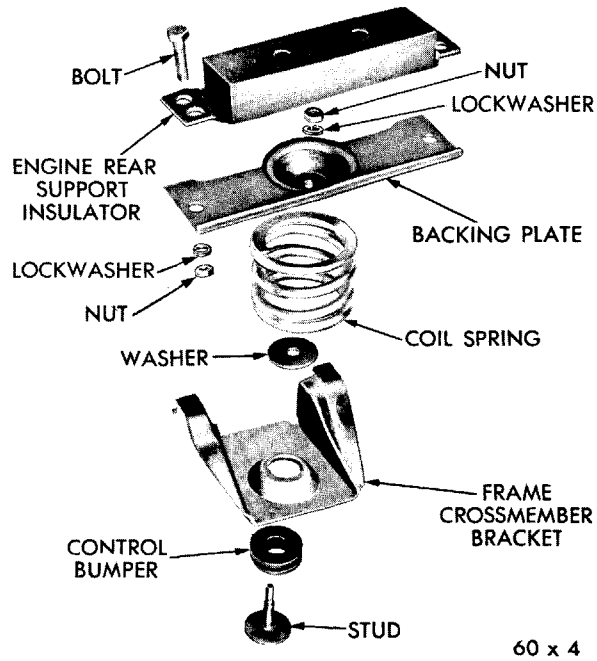


Fig. 18—Engine Rear Mount

"Front" and indent on piston head on the same side as the large chamfer on large end of connecting rod. Assemble pistons and rods to be used in the right cylinder bank (2-4-6-8) with "Front" and indent opposite the large chamfer in the connecting rod.

Piston Rings

Measure the piston ring gap about 2 inches from the bottom of the cylinder bore in which it is to be used. (An inverted piston can be used to push the rings down into position. This will insure the rings being exactly square with the cylinder wall before measuring).

(1) Insert feeler stock in gap. The ring gap should be from .010 inch to .020 inch.

(2) Insert ring in the piston groove in which it will be installed. Insert feeler stock between the ring and ring land and roll ring around piston. Clearance should be uniform and for compression rings, from .0015 inch to .003 inch; and for oil rings from .001 inch to .003 inch.

(3) Use ring installing Tool C-3495. When installing piston rings, place expander in lower ring groove with ends toward the outside of "V" of engine. Install oil control ring over expander.

(4) Install compression rings with side marked "TOP" up.

(5) Position oil control ring gap in line with oil hole in connecting rod. Position the gap in compression rings opposite each other, with neither in line with the oil control ring gap.

(6) Immerse piston in clean oil, position compressor C-385 over the rings and tighten securely.

(7) Remove connecting rod bearing cap and install both parts of Tool C-3221 on rod cap bolts.

(8) Lubricate cylinder wall and insert piston in cylinder. Lubricate crankshaft journal.

(9) Guide connecting rod into position on crankshaft journal while pulling on long portion of tool to enter rings in cylinder. Connecting rod should be in normal contact with crankshaft before removing tool.

(10) Install bearing cap and tighten to 45 foot-pounds torque.

(11) Install all connecting rod and piston assemblies in same manner.

22. ENGINE SUPPORT ASSEMBLIES

Refer to Figures 17 and 18 for engine support assemblies.

GROUP 10

ENGINE OILING SYSTEM

CONTENTS

TORQUE SPECIFICATIONS

	Foot-Pounds
Engine Mounting Bolts—Front (225 C.I. Engine)	85
Oil Filter Attaching Stud	30
Oil Pan Bolt	15
Oil Pan Drain Plug	35
Oil Pump Attaching Bolt (8 Cylinder)	35
(6 Cylinder)	200 inch-pounds
Oil Pump Cover Bolt (8 Cylinder)	10
(6 Cylinder)	130 inch-pounds

CONTENTS

(318 CUBIC INCH ENGINE)

SPECIFICATIONS

CRANKCASE CAPACITY (quarts)	5
(add 1 quart when changing filter)	
OIL FILTER TYPE	Shunt—Replaceable element
OIL PUMP	
Type	Rotary—Full Pressure
Drive	Camshaft
OPERATING PRESSURE (40 to 50 mph)	45—65 psi

SERVICE INFORMATION

(318 CUBIC INCH ENGINE)

DESCRIPTION

The engine oiling system of the 318 cubic inch engine consists of a rotor type oil pump and a shunt type oil filter. Oil is forced by the oil pump to a series of oil passages in the engine, as shown in Figure 1.

1. OIL PAN

Removal

(1) Remove dipstick and drain oil. Leave plug out.
(2) Disconnect steering linkage from steering arm.
(3) Remove starter.
(4) On single exhaust system, remove crossover exhaust pipe.
(5) Remove converter dust shield. Raise engine approximately 1¼ inch by attaching support fixture and disconnecting front engine mounts.
(6) Block engine and remove support fixture.
(7) Remove oil pan attaching bolts.
(8) Lower the rear of the pan, turning it sideways to clear crossmember.

Installation

Clean the oil strainer and check it for alignment. The bottom of the strainer must be parallel with the lower, machined surface of the engine block. Use new gaskets. With engine raised approximately 1¼ inch on wood blocks:

(1) Turn pan sideways and place front end of pan to clear crossmember before raising rear of pan into position.
(2) Tighten attaching bolts to 15 foot-pounds torque.
(3) Install converter dust shield.
(4) Install engine support fixture and remove wood blocks.
(5) Lower the engine and connect front engine mounts. Tighten nuts to 80 foot-pounds torque.
(6) Remove support fixture.
(7) Install starter.
(8) Connect steering linkage.
(9) Install drain plug. Fill oil pan to level and install dipstick.

2. OIL PUMP (Fig. 2)

Removal

With the oil pump removed from rear main bearing cap:

(1) Remove oil pressure relief valve plug carefully as it is under spring pressure. Remove spring and valve.
(2) Remove cover screws and remove cover.

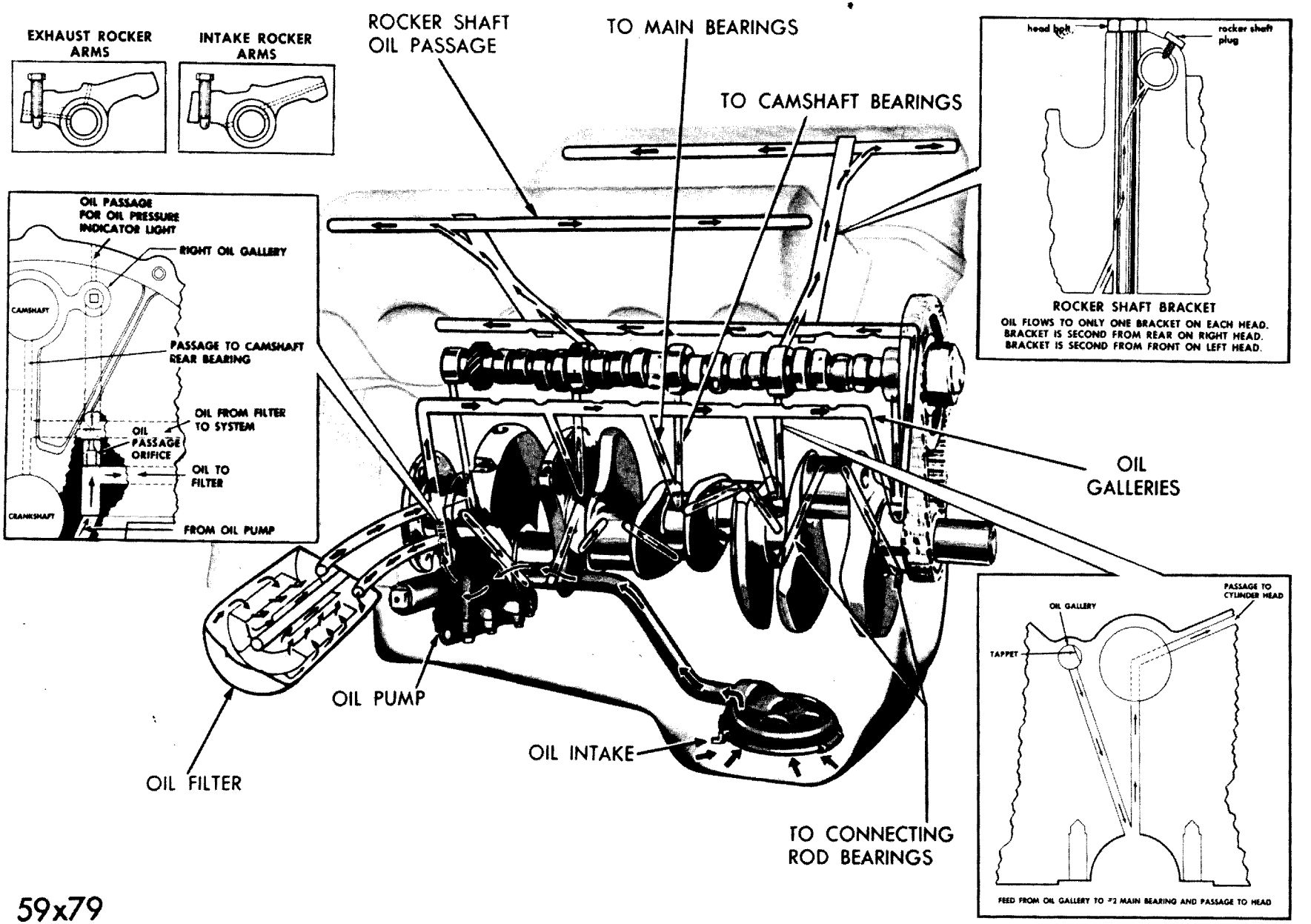


Fig. 1—Engine Oiling System (318 cubic inch engine)

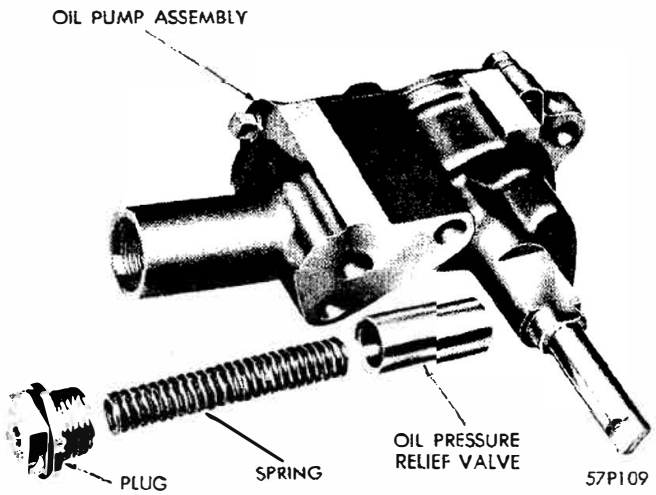


Fig. 2—Oil Pump Assembly

(3) Remove inner and outer rotors.

(4) Clean all parts thoroughly.

(5) Measure the diameter and thickness of the outer rotor. If the rotor measures less than .998 inch and the diameter less than 2.244 inches, install a new rotor.

(6) Place outer rotor in pump body. Press the rotor to one side with the fingers and measure the clearance between the rotor and pump body. If the measurement is more than .012 inch, install a new oil pump body. (This check is not necessary if a new pump body is being used.)

(7) Measure the thickness of the inner rotor. If the inner rotor measures less than .998 inch, a new rotor should be installed.

(8) Place inner rotor in outer rotor. Check the clearance between the inner rotor and outer rotor. If measurement is more than .012 inch, install new pump rotors.

(9) Place straight edge across the pump body (between bolt holes). If feeler gauge of more than .004 inch can be inserted between rotors and straight edge, install a new pump body and/or rotors.

(10) The mating face of the oil pump should be smooth. If the cover is scratched, or grooved, it should be discarded and a new one installed.

(11) Check for excessive cover wear, by laying a straight edge across the cover surface. If a .0015 inch feeler gauge can be inserted between cover and straight edge, the cover should be discarded and a new one installed.

(12) Check the oil pump relief valve for scoring and for free operation in its bore. If the valve is scored, install a new cover. The spring should conform to the specifications listed below. If for any reason, the spring has to be replaced, the same color spring should be used.

RELIEF VALVE SPRING CHART

Color	Height Free	Under Load Height	Compression Pounds
Gray (Lt.)	3 1/32"	2 1/16"	16.1 to 17.1
Red (Std.)	2 27/32"	2 1/16"	19.5 to 20.5
Brown (Hvy.)	2 31/32"	2 1/16"	22.9 to 23.9

GROUP 11

EXHAUST SYSTEM

CONTENTS

TORQUE REFERENCE

	Foot-Pounds
V-8 ENGINES	
Ball Joint Screw	20
Exhaust Manifold Nuts	30
Exhaust Pipe Flange Nut	40
Exhaust Pipe Support Clamp Bolts	10
Converter Housing Bracket Screw	15
6-CYL. ENGINES	
Exhaust Pipe Flange Nuts	30
Intake to Exhaust Manifold Bolts	15
Manifold to Cylinder Head Nuts	10

SERVICE DIAGNOSIS

1. EXCESSIVE EXHAUST NOISE OR VIBRATION

(1) Check for interference of exhaust pipe, muffler or tail pipe.

(2) Check hangers for looseness or damage and position hangers to insure free movement of system.

(3) Check engine mounts for looseness, deterioration or rubber from oil or excessively hard rubber mounts.

(4) Check muffler for loose internal baffles.

(5) Loosen entire exhaust support system, road test to permit self alignment and retighten.

2. LEAKING EXHAUST GASES

(1) Mating faces of manifold to cylinder head should be checked and held within .010 alignment in manifold gasket failure.

(2) Check muffler and connections for leakage.

(3) Check tail pipe for restrictions.

(4) Check leaks at pipe joints, and manifold connections.

(5) Check for cracked manifold.

(6) Remove manifold and install new gaskets if necessary, after carefully inspecting both cylinder head and manifold mating surfaces. Tighten manifold nuts evenly, working from center to outer ends of manifold.

(7) Check for bent or pinched exhaust or tail pipes. Such conditions will retard the flow of exhaust gases. Install new parts as required.

(8) Tighten clamp at rear muffler connection.

3. ENGINE HARD TO WARM UP

(1) Check operation of heat control valve and make necessary repairs.

(2) Choke sticking.

(3) Incorrect engine timing.

4. MANIFOLD HEAT CONTROL VALVE RATTLE

(1) Check for broken thermostatic spring and make necessary corrections.

(2) Check for weak or broken anti-rattle spring and make necessary repairs or replacement.

(3) Check shaft for looseness in manifold.

(8-CYLINDER ENGINES)

DESCRIPTION

The new exhaust systems are rerouted through the propeller shaft tunnel allowing added protection against road damage. Aluminized exhaust system components are used on all models. New loop type hangers support the exhaust system components (Figs. 4 and 5).

7. INTAKE MANIFOLDS (Figs. 6 and 7)

With intake manifold removed (See Engine Group):

(1) Clean manifold in solvent. Blow dry with compressed air.

(2) Inspect exhaust crossover passage and pressure check for leakage into any of the intake passages.

(3) Check mating surfaces for parallelism.

(4) Use new gaskets when installing manifold.

8. EXHAUST MANIFOLD

Removal

(1) Disconnect spark plug cables at spark plugs.

(2) Remove generator from right exhaust manifold (8 cylinder engines).

(3) Disconnect exhaust pipes at exhaust manifold flanges.

(4) Remove nuts that hold exhaust manifolds to cylinder heads.

(5) Slide manifolds off studs and away from cylinder heads.

(6) Clean intake and exhaust manifolds in solvent. Blow dry with compressed air.

(7) Inspect manifolds for cracks and distortion.

Installation

(1) Place exhaust manifolds on studs on cylinder heads and install nuts. Tighten to 30 foot-pounds.

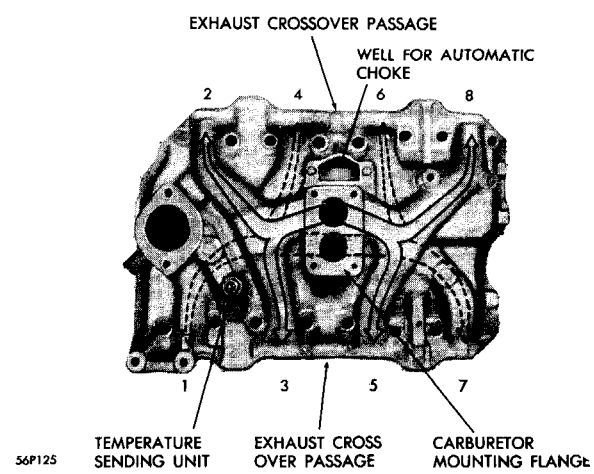


Fig. 6—Intake Manifold (318 C.I. Engine)

(2) Connect exhaust pipes at exhaust manifolds. Tighten nuts to 40 foot-pounds.

(3) Install generator on right exhaust manifold and adjust belt tension.

(4) Connect spark plug cables at spark plugs.

9. EXHAUST PIPES, MUFFLERS AND TAIL PIPES (Figs. 4 and 5)

Removal

(1) Remove clamps from exhaust pipes, mufflers and tail pipes.

(2) Disconnect exhaust pipe at exhaust manifold and remove exhaust pipe.

(3) Remove muffler and extension pipe assembly.

(4) Jack up rear of car to relieve body weight from rear springs.

(5) Remove tail pipes.

Installation

(1) Assemble exhaust system loosely.

(2) Connect exhaust pipes at exhaust manifolds. Tighten nuts to 40 foot-pounds.

(3) Adjust hanger heights.

(4) Tighten all slip joints to 10 foot-pounds. Work from rear to front of car.

(5) Tighten all support clamps to 10 foot-pounds.

(6) Tighten ball joint screws to 20 foot-pounds. The lower surfaces of flanges should be parallel to each other and perpendicular to the pipe axis.

(7) On 383-413 cubic inch engines equipped with single exhaust system proceed as follows:

(8) Adjust converter housing bracket, so it is flat against converter housing and in proper contact with the pipe tab. Tighten screws to 15 foot-pounds.

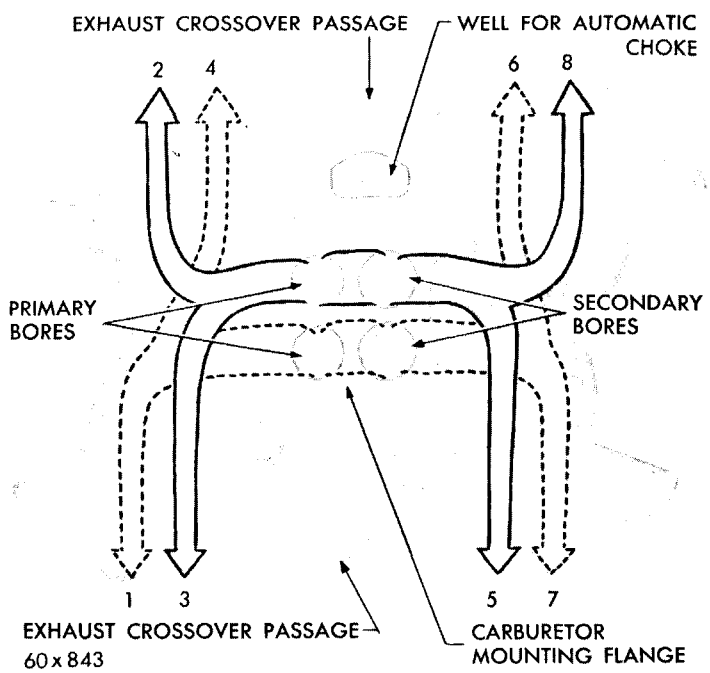


Fig. 7—Intake Manifold (361 C.I. Engine)

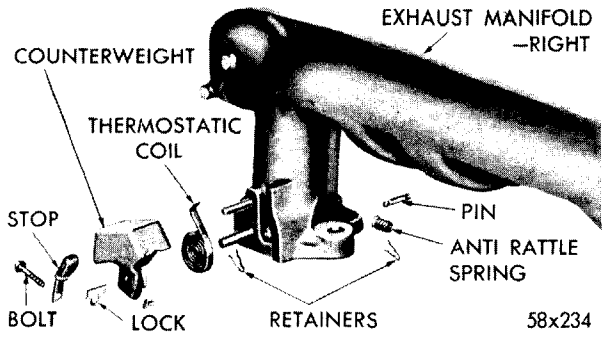


Fig. 8—Manifold Heat Control Valve (8 Cyl.)

10. MANIFOLD HEAT CONTROL VALVE

The manifold heat control valve is controlled by a thermostatic coil counterweight, and velocity of exhaust gas through the exhaust manifold. The thermostatic coil is installed in a manner which will maintain sufficient tension on valve shaft to keep valve in closed position when engine is cold.

In cold position, hot gases circulate up and around "hot spot" chamber in intake manifold. This, in turn, preheats vaporized fuel passing down through manifold, resulting in smooth engine performance. **Should heat control valve become stuck in either open or closed position car performance would be affected.**

11. TESTING MANIFOLD HEAT CONTROL VALVE

Inspect operation of heat control valve every 1,000 miles. With engine idling (car standing) accelerate to wide open throttle and release quickly. The counterweight should respond by moving clockwise approximately ½ inch and returning to its normal position. If no movement is observed, the valve shaft may be frozen or the coil is weak or broken. In either case, heat control valve should be disassembled and replaced with new parts.

Disassembly (Fig. 8)

(1) Loosen retaining nut and remove counterweight, lock and stop from end of shaft, exposing the thermostatic coil.

(2) Unhook coil from pin and remove by prying out of valve shaft slot.

(3) If valve shaft is frozen in manifold, apply manifold heat control valve solvent, and allow to stand several minutes. Loosen by turning shaft clockwise or counter-clockwise (depending on frozen position) until shaft is free.

Assembly

(1) Position valve shaft in extreme counter-clockwise position.

(2) Place the new coil in position over shaft slot, with outer end tongue of coil in lower right-hand position, as shown in Fig. 9. Press inner end of coil into slot of shaft and seat firmly.

(3) Move outer end tongue around and hook under pin, as shown in Figure 9.

(4) Place counterweight over shaft (with weight in upward position) and insert lock in shaft slot, as shown in Figure 10. Center counterweight on shaft and turn assembly clockwise until stop passes the pin. Press counterweight on shaft until seated, install stop, and tighten nut securely with Tool T-109-173. **If fabric on stop is worn, replace with new stop. (Fig. 8).** Test valve for proper operation.

Servicing

The manifold heat control valve should be checked and lubricated for proper operation at all lubrication and engine tune-up. See Lubrication Group.

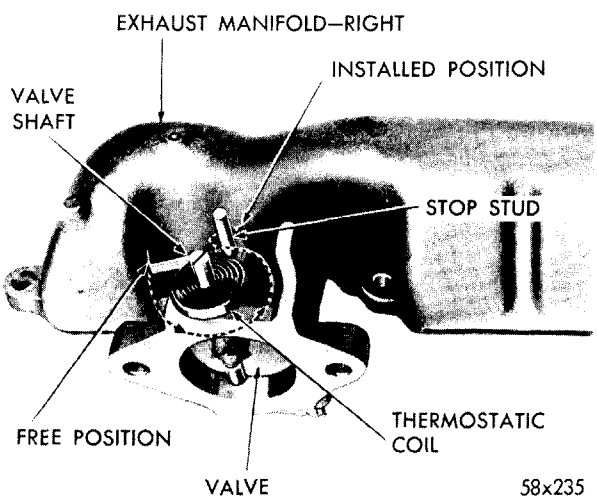


Fig. 9—Positioning Thermostatic Coil

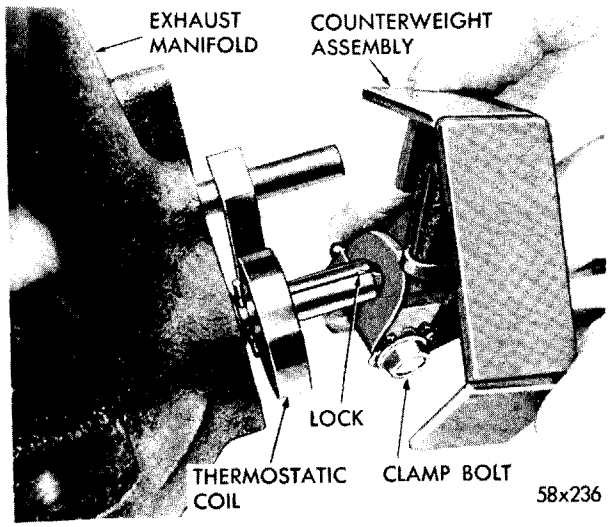


Fig. 10—Installing Counterweight Assembly

GROUP 14

FUEL SYSTEM

CONTENTS

GENERAL INFORMATION

The fuel system consists of the fuel tank, fuel pump, fuel filter, carburetor, fuel lines and vacuum lines. (See Figure A.)

The fuel tank assembly consists of the tank, filler neck cap, air vent, and a fuel gauge sending unit.

In operation, the fuel pump draws fuel from the tank and forces it to the filter and carburetor. The carburetor meters the fuel into the air stream drawn into the engine, in quantities suitable for all engine speed and load conditions.

The new fuel filter for 1960 is a paper element sealed, disposable type unit, located in the fuel line between the fuel pump and the carburetor. The filter unit should be replaced every 9,000 miles.

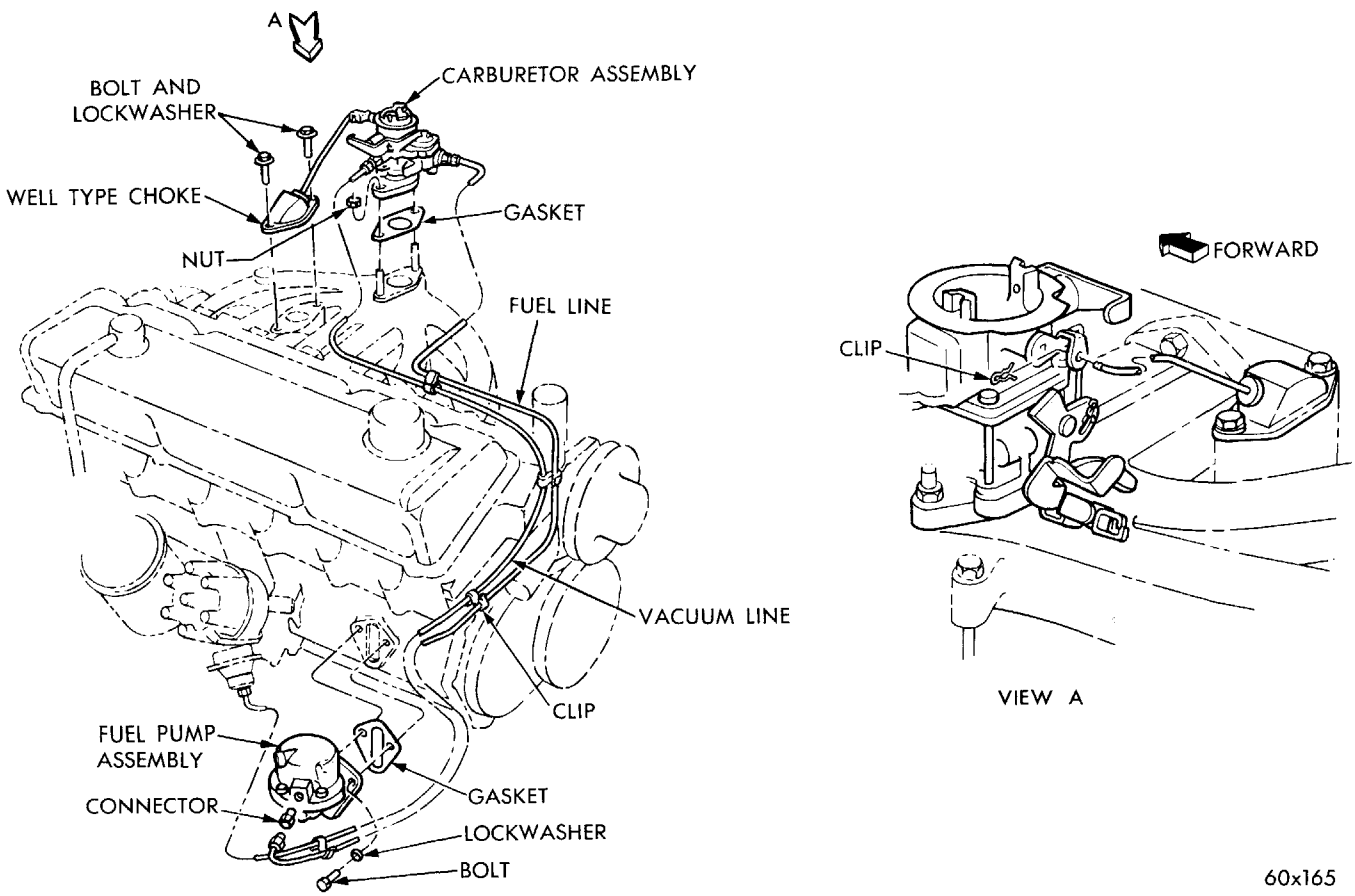


Fig. A — Fuel System (Engine Compartment)

SERVICE DIAGNOSIS

CONDITIONS—POSSIBLE CAUSES

1. POOR IDLING

Possible Causes:

(1) Incorrect air idle adjustment.
(2) Carbonized idle tube or poor seating shoulder.
(3) Idle air bleed carbonized or of incorrect size.
(4) Idle discharge holes plugged or gummed.
(5) Throttle body carbonized or worn throttle shaft.
(6) Air leak at mounting between carburetor and manifold.
(7) Damaged or worn idle needle.
(8) Incorrect fuel or float level.
(9) Choke does not completely open.
(10) Loose main body to throttle body screws.
(11) Carburetor icing.
(12) Distributor advance vacuum leak.
(13) Loose distributor base plate bearing.
(14) Corroded wire ends or distributor towers.
(15) Incorrect distributor point gap.
(16) Fouled spark plugs.
(17) Incorrect ignition timing.
(18) Incorrect spark plug gap.
(19) Overheated spark plugs.
(20) Incorrect valve timing.
(21) Compression not within limits.
(22) Intake manifold leak.
(23) Manifold heat control valve stuck.
(24) Internal coolant leak.
(25) Low boiling point fuel (winter fuel in summer).
(26) Low grade fuel.

2. POOR PERFORMANCE—MIXTURE TOO LEAN

Possible Causes:

(1) Damaged main metering jet.
(2) Damaged tip or bad top shoulder seat of main discharge jet.
(3) Vacuum piston worn or stuck.
(4) Incorrect fuel or float level.
(5) Automatic choke not operating properly.
(6) Incorrect fuel pump pressure.

3. POOR PERFORMANCE—MIXTURE TOO RICH

Possible Causes:

(1) Restricted air cleaner.
(2) Excessive fuel pump pressure.
(3) High float or fuel level.
(4) Damaged needle and seat.
(5) Leaking float.
(6) Worn main metering jet.
(7) Sticking choke.

4. EXCESSIVE FUEL CONSUMPTION

Possible Causes:

(1) Overloading (pulling trailers, etc.).
(2) Improper rear axle ratio.
(3) Wrong speedometer pinion.
(4) Brakes dragging.
(5) Driving at excessive speeds.
(6) Low tire pressure.
(7) Short trip or heavy traffic driving.
(8) Driving in snow or mud.
(9) Driving in high winds.
(10) Unnecessary use of accelerator.
(11) Sticky choke.
(12) Incorrect ignition timing.
(13) Incorrect distributor advance.
(14) Incorrect valve timing.
(15) High fuel level in carburetor.
(16) Stuck manifold heat control valve.
(17) Detonation or pre-ignition.
(18) Fouled spark plugs.
(19) Low engine compression.
(20) Worn camshaft lobes.
(21) Sticking valves.
(22) Elevation and atmospheric conditions.
(23) Restricted tail pipe or muffler causing exhaust back pressure.

5. CARBURETOR FLOODS OR LEAKS

Possible Causes:

(1) Cracked body.
(2) Defective body gaskets.
(3) High float or fuel level.
(4) Worn needle valve and seat.
(5) Leaking float.
(6) Excessive fuel pump pressure.

NOTE: Presence of fuel dye around carburetor gaskets does not necessarily denote a leak or a flooding condition. Tighten air horn attaching screws securely to correct.

6. POOR ACCELERATION

Possible Causes:

(1) Step-up piston stuck in down position (lean mixture at wide open throttle).
(2) Accelerator pump piston (or plunger) leather too hard, worn or loose on stem.
(3) Faulty acceleration pump discharge ball.
(4) Accelerator pump inlet check ball faulty.
(5) Incorrect fuel or float level.
(6) Worn accelerator pump and throttle linkage.
(7) Automatic choke not operating properly.
(8) Carburetor gummed up.
(9) Faulty coil.
(10) Loose distributor base plate bearing.
(11) Distributor not advancing properly.
(12) Incorrect ignition timing.
(13) Incorrect spark plug gap.
(14) Fouled spark plugs.
(15) Overheated spark plugs.
(16) Manifold heat control valve stuck.
(17) Low fuel pump pressure or vacuum.
(18) Compression not up to specifications.
(19) Incorrect valve timing.
(20) Low grade of fuel.
(21) Detonation or pre-ignition.

BBS SERIES CARBURETOR

CONTENTS

BBS SERIES CARBURETOR SPECIFICATIONS

CARBURETOR	
Type	Ball and Ball Single Throat
Model (Manual 3-Speed Transmission)	BBS 2985S
(Automatic Transmission)	BBS 2986S
Bore	$1\frac{1}{16}$"
Venturi	$1\frac{1}{32}$"
Main Metering Jet—(Standard)	# 120—207S
(One Size Lean)	# 120—205S
(Two Sizes Lean)	# 120—206S
ADJUSTMENTS	
Float Setting	$\frac{7}{32}$"
Accelerator Pump (Top of Plunger and Air Horn)	$2\frac{7}{32}$"
Choke Unloader	$\frac{9}{64}$"
Idle Mixture Screw	1 full turn open
Idle Speed (Curb Idle) (Manual Transmission)	550 rpm
(Automatic Transmission)	500 rpm
CHOKE	
Control	Thermostatic Coil Spring
Type	Well
Setting	On Index

SPECIAL TOOLS

C-3225	Repair Stand
T109-239	Float Gauge (7/32")
T109-213	Bending Tool
T109-32	Choke Unloader Gauge (9/64")
T109-59T	Screwdriver bit (accelerator pump jet)
T109-43	Plug Remover (pump jet)

BBS SERIES CARBURETOR

GENERAL DESCRIPTION

The BBS series carburetor is a single throat downdraft carburetor. The operation of the float, low speed, high speed and accelerator pump systems are described briefly as follows:

FLOAT SYSTEM

The float system maintains a fuel supply at a constant level for all operating conditions. The fuel level is kept at a minimum to prevent as little fuel vaporization as possible and to aid in warm engine starting. It is important that floats are properly adjusted, and needle valve assembly is in good condition. Equally important is a good seal between the air horn and main body. A poor gasket at this point causes leakage resulting in lowering of the fuel in the fuel bowl and might allow the entrance of dirt or other foreign material, which would result in poor performance.

LOW SPEED SYSTEM

During engine idle or part throttle operation, fuel is supplied to the engine through the low speed system. Fuel enters the main metering jet and is metered through the idle orifice tube where it mixes with air drawn through the idle air bleed. The idle restriction breaks up the fuel as it mixes with air drawn through the idle air bleed. This provides an air-fuel mixture at the idle port and idle bleed adjustment screw port.

It is important that the idle air bleed, idle orifice tube, idle restriction, idle passage, idle port, and idle adjustment screw port are kept clean. Any clogging will result in poor low speed operation. Air leakage through the gaskets will also cause poor engine idling or low speed operation.

HIGH SPEED SYSTEM

During part or full throttle operation, fuel is supplied to the engine through the high speed system.

When the engine is under a heavy load, suddenly accelerated, or operated at very high engine speeds, the step up system supplies additional fuel through the diffuser bar discharge port. Fuel flow through the fuel passage of the main metering jet is controlled by the movement of the step up rod which in turn is moved by a spring and a vacuum controlled piston. A vacuum passage to the intake manifold is provided for by a drilled passage in the carburetor body and throttle body, and a slotted flange gasket.

Under normal driving conditions, manifold vacuum exerts a strong pull on the vacuum piston. This holds the piston down keeping the step up rod in the fuel passage of the main metering jet. Fuel then flows around the rod, through the jet, and through the diffuser bar discharge port.

When manifold vacuum falls off, due to a heavy load, sudden acceleration, or very high engine speed, the spring moves the piston up, moving the step-up rod out of the main metering jet fuel passage. Additional fuel is then supplied to the engine.

Air is drawn through the high speed air bleed and mixes with the fuel surrounding the main vent tube. The mixture is then drawn from the diffuser discharge ports. It is important that the vent tube is clean. A clogged tube may cause excessively rich mixtures. Leakage of air at the gaskets will decrease or destroy the vacuum and the step up piston will remain up resulting in excess fuel consumption.

ACCELERATOR PUMP SYSTEM

The accelerator pump system momentarily supplies an extra charge of fuel to the engine when the throttle is opened. The amount of fuel added is directly proportional to the amount the pedal is depressed. When the accelerator pedal is depressed, the pump plunger spring forces the plunger down and the fuel is discharged past the discharge check ball through the jet and into the air stream. The inlet passage is closed by the inlet check ball as this occurs.

When the accelerator pedal returns, the pump plunger is pulled up drawing a new charge of fuel past the

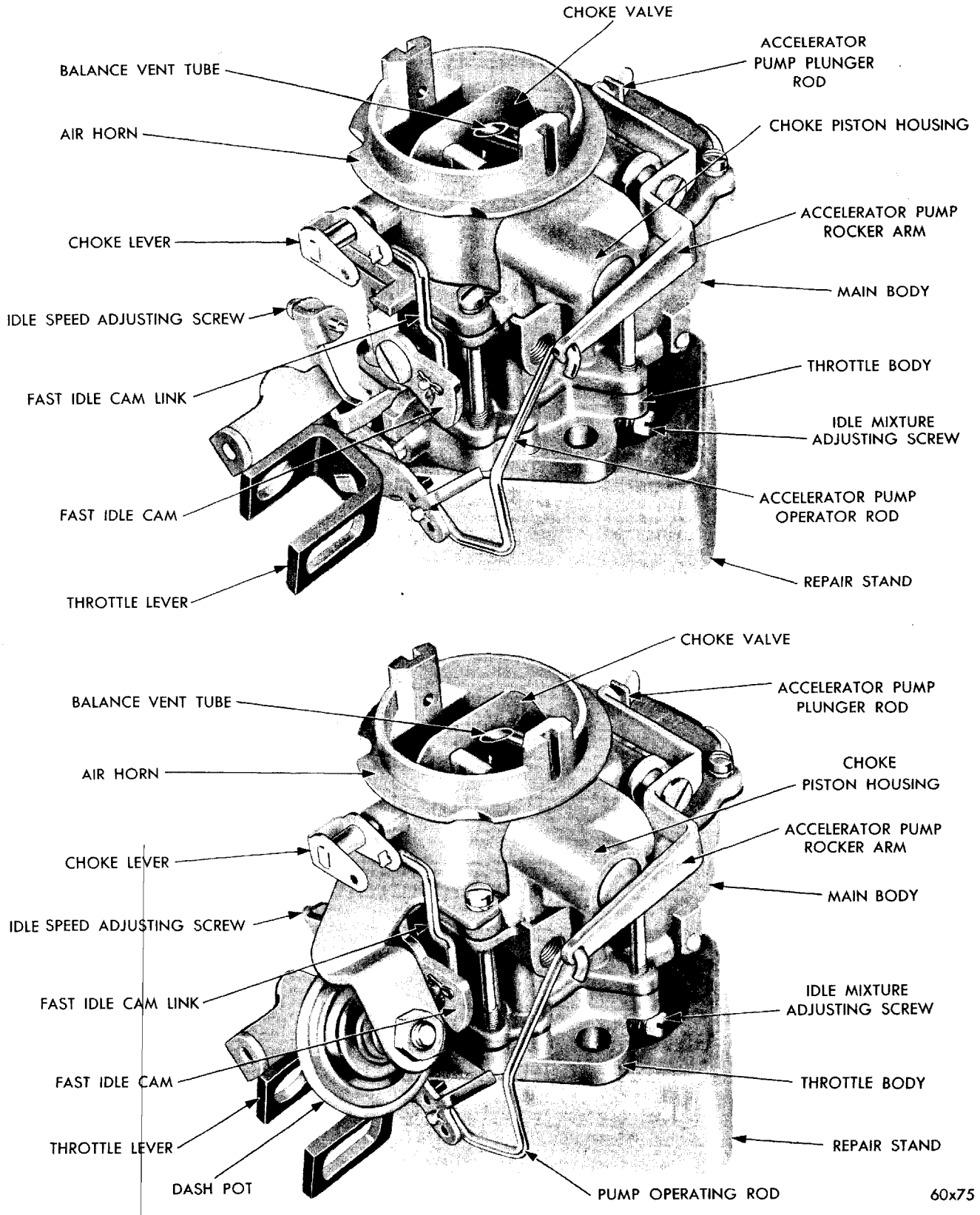


Fig. 1—Carburetor Identification (BBS2985S and BBS2986S)

inlet check ball. The discharge check ball is closed, preventing air bleeding into the passage when the pump plunger is pulled up.

When the engine is operated at high speeds, a vacuum exists at the accelerator pump jet. To prevent fuel being drawn out of the pump system, the pump jet air bleed is vented through a passage in the air horn to the float bowl.

A vent is also provided in the plunger to relieve vapor pressure developed by heat in the pump system.

AUTOMATIC CHOKE

The automatic choke used on the carburetor is of the well type. The choke operates through a combination of linkage that connects the choke thermostatic coil spring to the offset choke valve, and a vacuum choke piston. The thermostatic coil spring is located in a well directly over the exhaust passage in the exhaust manifold. The vacuum choke piston is connected to the choke valve through a link and pin.

The heat generated in the well of the exhaust manifold, acts on the thermostatic coil spring so that as the engine warms up, the choke valve moves toward the open position. The position of the choke valve is further controlled by the action of manifold vacuum on the choke piston.

The offset choke valve tends to position itself according to engine speed and load conditions, governed by the air flowing into the carburetor. The combination of these features provides the required choke mixture calibration for efficient operation.

To prevent choking a warm or hot engine, the heat retained by the exhaust manifold prevents the thermostatic coil spring from cooling off too quickly, thereby closing the choke valve while the engine is still hot. The choke is connected to the fast idle cam which provides the necessary increased idle speed during the warm up period.

SERVICE INFORMATION

PROCEDURES

1. SERVICING THE CARBURETOR

Often, the carburetor is blamed for a great variety of trouble which is classed as "POOR CAR PERFORMANCE." Therefore, be definitely sure that the trouble is not located elsewhere before disassembling the carburetor.

When overhauling the carburetor, several items of importance should be observed to assure a good job:

(1) The carburetor must be completely disassembled.

(2) All parts should be cleaned in a suitable solvent then inspected for damage or wear.

(3) Use air pressure only, to clean the various orifices or channels.

(4) Replace questionable parts with NEW ONES. When checking parts removed from the carburetor, it is at times difficult to be sure they are satisfactory for further service. It is therefore recommended that in such case, NEW parts be installed.

2. DISASSEMBLING THE CARBURETOR

To disassemble the carburetor for cleaning or overhaul, refer to Figure 1, and proceed as follows:

(1) Place the carburetor assembly on repair block, Tool C-3225.

(2) Remove hairpin clip and disengage the accelerator pump operating rod, as shown in Figure 2.

(3) Remove the fast idle cam link retaining clip.

(4) Remove the airhorn retaining screws.

(5) Tilt the air horn toward the throttle lever far enough to disengage the fast idle cam link from the fast idle cam, as shown in Figure 3. Lift airhorn up and away from main body. Discard the gasket.

(6) Disengage the accelerator pump plunger from the rocker arm, by pushing up on the bottom of plunger and sliding plunger shaft off hook, as shown in Figure 4. Slide plunger out of airhorn and remove bowl vent valve, spring seat and spring. If the old plunger can be used again, or if a new plunger is to be install-

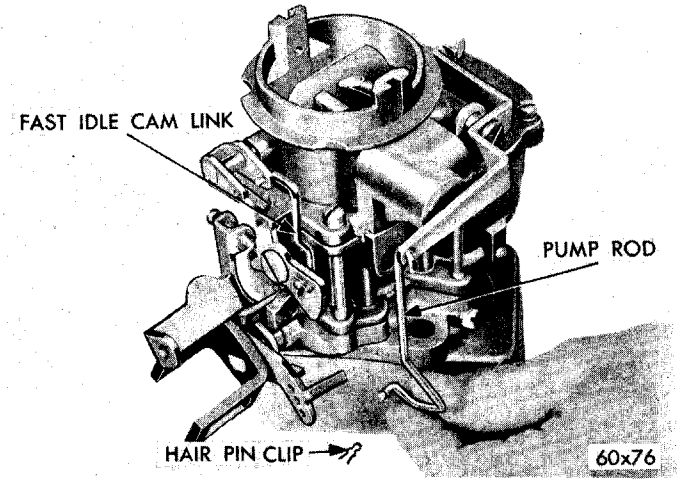


Fig. 2—Removing or Installing Accelerator Pump Rod

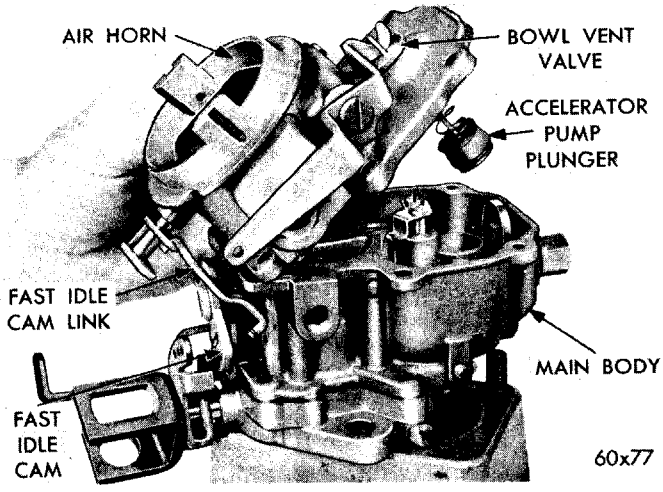


Fig. 3 — Removing or Installing Air Horn

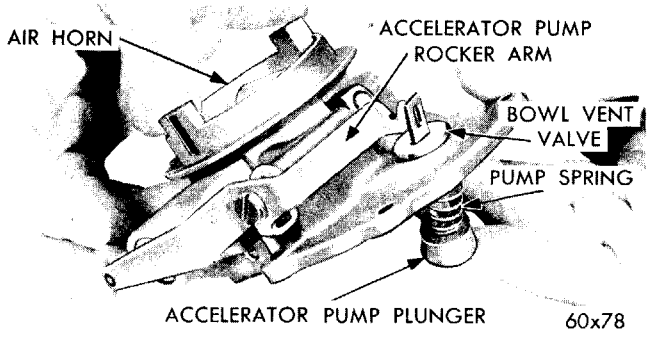


Fig. 4 — Removing or Installing Accelerator Pump Plunger

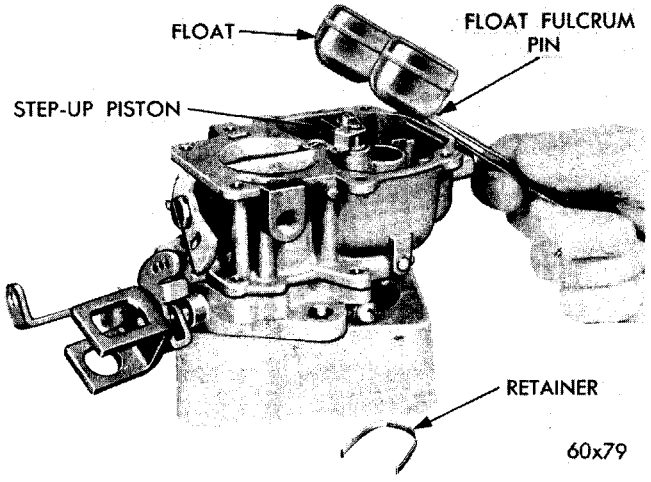


Fig. 5 — Removing or Installing Float

ed, place the plunger in a jar of clean gaoline or kerosene to prevent the leather from drying out.

(7) Lift out the float fulcrum pin retainer, then lift out the floats and fulcrum pin, as shown in Figure 5.

(8) Remove the fuel inlet needle valve, seat and gasket from the main body.

(9) Remove the step-up piston retaining screw, and slide step-up piston and rod out of well, as shown in Figure 6. Now lift out the step-up piston spring. Remove the step-up piston gasket from the bottom of the well.

(10) Remove the main metering jet and gasket, as shown in Figure 7.

(11) Unscrew and remove the idle orifice tube, as shown in Figure 8.

(12) Invert the carburetor and drop out the accelerator check ball from the discharge passage.

(13) Using Tool T109,-43 plug remover, remove the accelerator pump jet plug. Using Tool T109-59T, remove the accelator pump jet, as shown in Figure 9.

(14) Unscrew and remove the idle mixture adjusting screw and spring.

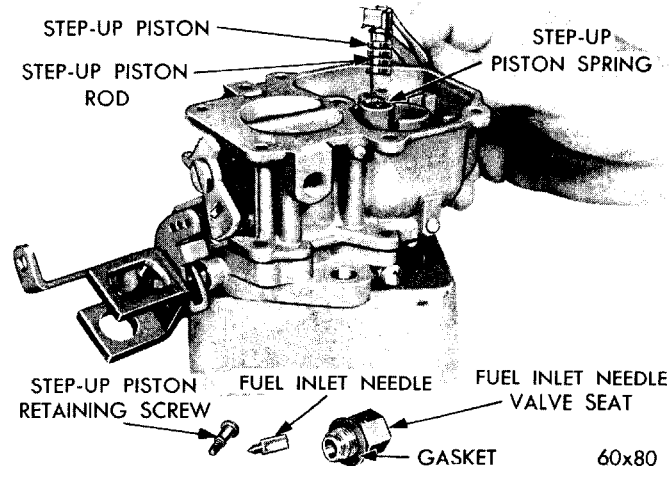


Fig. 6 — Removing or Installing Step-up Piston

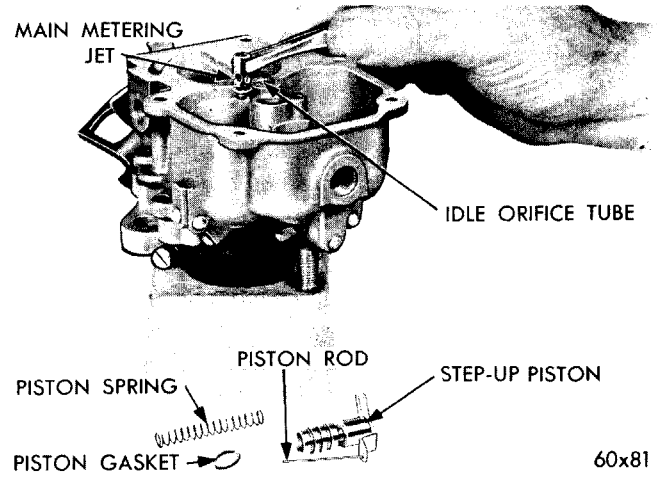


Fig. 7 — Removing or Installing Main Metering Jet

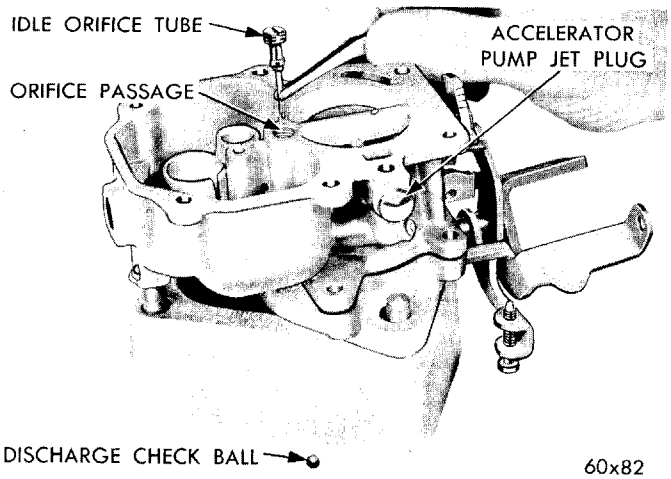


Fig. 8 — Removing or Installing Idle Orifice Tube

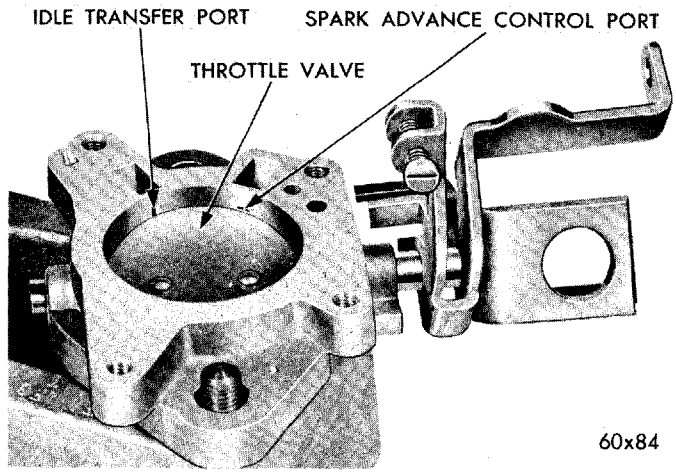


Fig. 10 — Ports in Relation to Throttle Valve

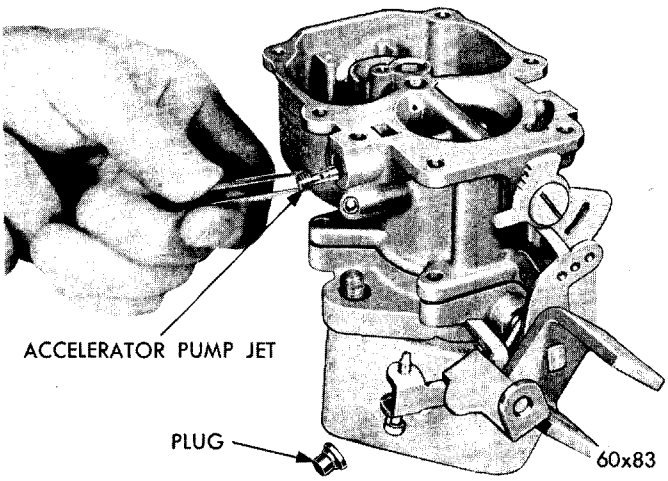


Fig. 9 — Removing or Installing Accelerator Pump Jet

The carburetor now has been disassembled into three main units, namely, the air horn, main body and throttle body and the component parts of each disassembled as far as necessary for cleaning and inspection.

It is usually not advisable to remove the throttle shaft or valve from the throttle body, unless wear or damage necessitates the installation of new parts.

3. CLEANING CARBURETOR PARTS

The recommended solvent for gum deposits is denatured alcohol which is easily obtainable. However, there are other commercial solvents which may be used with satisfactory results.

IMPORTANT: If the commercial solvent or cleaner recommends the use of water as a rinse, it should be "HOT". After rinsing, all trace of water must be blown from the passages with air pressure. It is further advisable to rinse all parts in clean kerosene or gasoline to be certain no trace of moisture remains. Never clean jets with a wire, drill, or other mechanical means, because the orifices may become enlarged, making the mixture too rich for proper performance.

4. INSPECTION AND REASSEMBLY

Throttle Body

(1) Check the throttle shaft for excessive wear in the throttle body. If wear is extreme, it is recommended that the throttle body assembly be replaced rather than installing a new shaft in the old body.

During manufacture, the location of the idle transfer port and the spark advance control ports to the throttle valve is carefully established for one particular assembly (See Figure 10).

If a new shaft should be installed in an old, worn throttle body, it would be very unlikely that the original relationship of the ports to the valve would be obtained. Changing the relationship of the valve to the ports would adversely affect normal car operation between the speeds of 15 and 30 miles per hour. However, if it has been determined that a new shaft or valve is to be installed, adhere to the following instructions:

(2) Mark the position of the throttle valve in the bore.

(3) Remove the screws that hold the throttle valve to the shaft, then slide the valve out of the bore. **CAUTION: These screws are staked on the opposite side and care should be used at removal so as not to break in the shaft.**

(4) Slide the throttle shaft out of the throttle body.

(5) Install new throttle shaft and lever (or new valve).

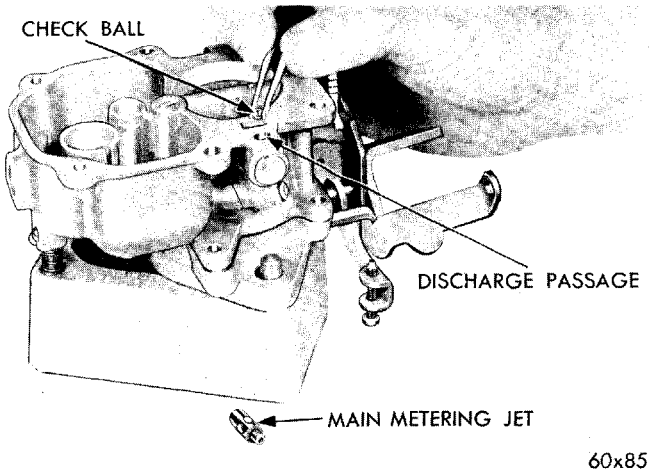


Fig. 11 — Installing Accelerator Pump Discharge Check Ball

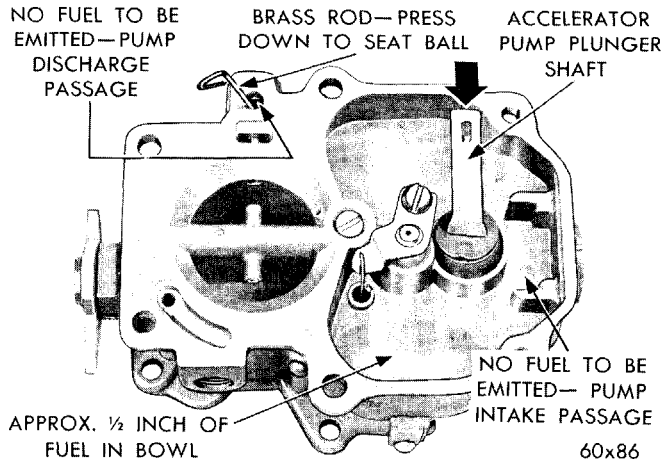


Fig. 12 — Testing Accelerator Pump Intake and Discharge Check Balls

(6) Install NEW screws but do not tighten. Hold the valve in place, with the fingers pressing on the high side of valve. Tap the valve lightly with a screwdriver to seat in the throttle bore. Now, tighten the screws securely and stake by squeezing with pliers.

(7) Install the idle mixture screw and spring in the throttle body. (The tapered position must be straight and smooth. If the tapered portion is grooved or ridged, a new idle mixture screw should be installed to insure having correct idle mixture control). **Do no use a screwdriver.** Turn the screw **lightly** against its seat with the fingers. Back off 1 full turn for approximate adjustment.

Main Body

(8) Install the accelerator pump discharge check ball in the discharge passage, as shown in Figure 11.

To check the accelerator pump system; fuel inlet and discharge check balls proceed as follows:

(9) Pour clean gasoline into the carburetor bowl, approximately ½ inch deep. Remove the pump plunger from the jar of gasoline and slide down into the pump cylinder. Raise the plunger and press lightly on the plunger shaft to expel air from the pump passage.

(10) Using a small clean brass rod, hold the discharge check ball down firmly on its seat. Again raise the plunger and press downward. No fuel should be emitted from either the intake or discharge passage, as shown in Figure 12.

If any fuel does emit from either passage, it indicates the presence of dirt or a damaged check ball. Clean the passage again and repeat test. If leakage is still evident, install a NEW check ball. The fuel inlet check ball is located at the bottom of the plunger well and should rattle freely when the carburetor is shaken. Remove fuel from bowl.

(11) Install the accelerator pump jet, as shown in Figure 9. Tighten securely, using Tool T109-59T. Install a new plug and drive tightly in place.

(12) Install the idle orifice tube, (refer to Figure 8). Tighten securely.

(13) Install the main metering jet and gasket, (refer to Figure 7). Tighten securely.

(14) Before installing the step-up piston, be sure the step-up rod is able to move freely each side of the vertical position, as shown in Figure 13. The step-up rod must be straight and smooth.

(15) Slide the step-up piston gasket down into position in the piston well, then install the step-up piston spring and step-up piston and rod, (Refer to Figure 6). Install retaining screw and tighten securely. Carefully guide the step-up rod into the main metering jet. Be sure the step-up piston slides freely in its cylinder. A step-up piston stuck in the **UP** position will cause a rich mix-

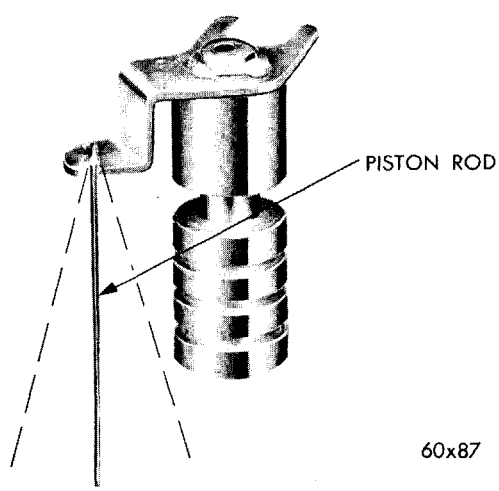


Fig. 13 — Step-up Rod Free Play

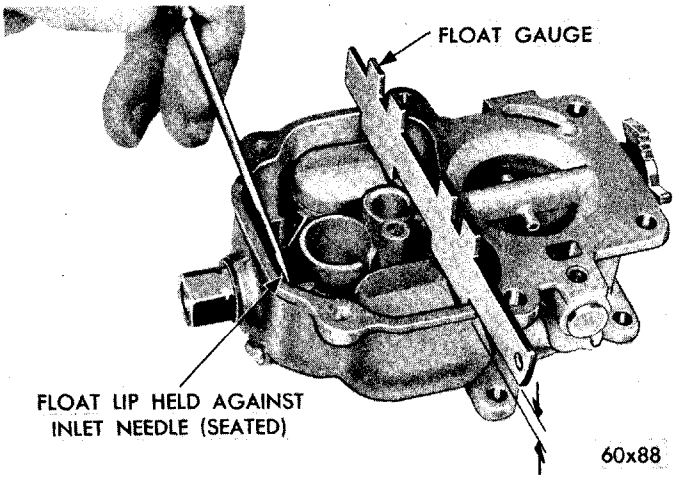


Fig. 14 — Checking Float Setting

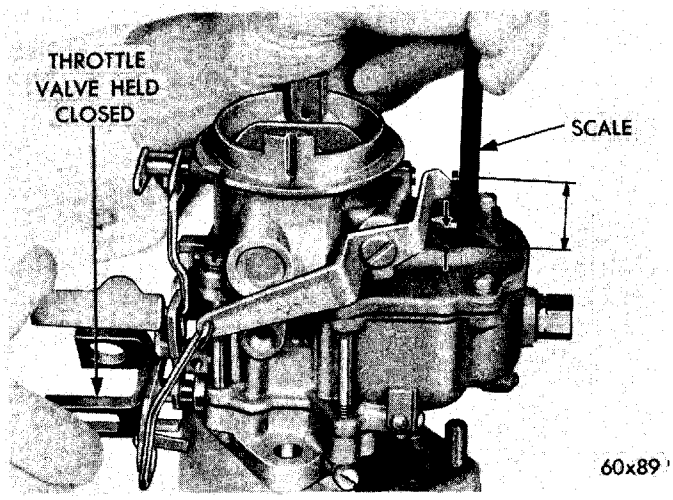


Fig. 15 — Measuring Accelerator Pump Travel

ture at part throttle, whereas a piston stuck in the **DOWN** position will cause a lean mixture at wide open throttle and poor acceleration.

Checking Float Setting

Install the floats and proceed as follows:

(16) Assemble the fuel inlet needle valve, seat and gasket, then insert in position in the main body. Tighten securely. (If the needle valve is ridged or badly worn, install a new needle valve and seat assembly).

(17) Using Tool T109-239 or "T" scale check the float as shown in Figure 14. There should be $\frac{7}{32}$ inch from top of the crown of each float to the top of the main body. Each float must be adjusted to this setting and must not touch the sides of the bowl. Install float fulcrum pin retainer.

(18) Place a new gasket on the throttle body and position the main body making sure they are aligned.

Air Horn

(19) Assemble pump plunger, spring and spring seat and slide plunger shank through opening in air horn. Install bowl vent cap over plunger shank, then engage with pump rocker arm. (Refer to Figure 4).

(20) Place a new gasket on the main body, then install air horn by tilting air horn, as shown in Figure 3 in order to engage fast idle link with fast idle cam. After engaging link, slowly lower air horn and at the same time guide accelerator plunger into its well.

(21) Install air horn attaching screws. Tighten securely.

(22) Install the accelerator pump operating rod and secure with hairpin clip. Normal operation of the accelerator pump is obtained by installing pump rod in the center hole of the throttle arm. (Refer to Figure 2).

5. CARBURETOR ADJUSTMENTS

It is very important that the following adjustments be made on a reconditioned carburetor, and in the sequence listed.

Accelerator Pump

(1) Back off the idle speed adjusting screw. Open the choke valve so that the throttle valve can be completely seated in the carburetor bore. Be sure the pump connector rod is in the center hole of the throttle lever.

(2) Close the throttle valve tightly. Now, measure the distance between the top of the air horn and the end of the plunger shaft as shown in Figure 15. This measurement should be 27/32".

(3) To adjust the pump travel, bend the pump connector rod, using Tool T109-213, at the lower angle until correct travel has been obtained.

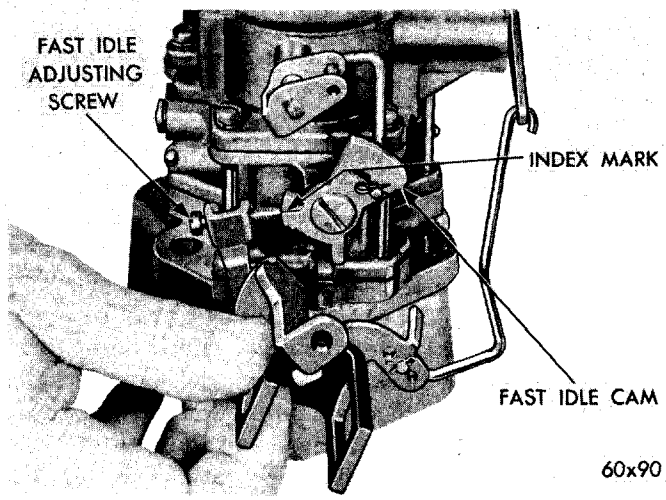


Fig. 16 — Fast Idle Index Mark Aligned

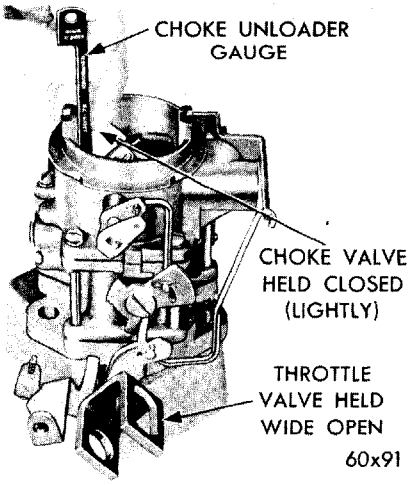


Fig. 17 — Checking Choke Unloader Setting

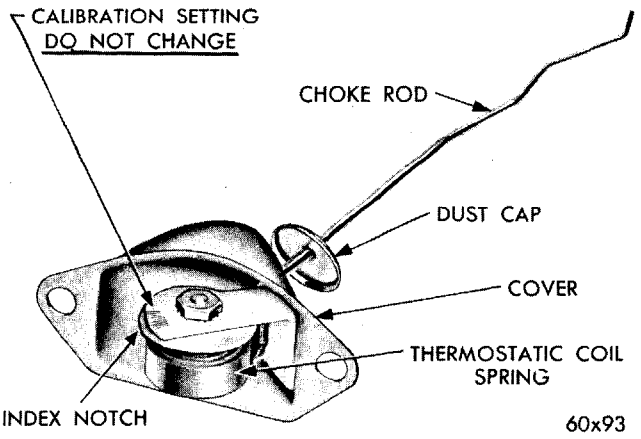


Fig. 18—Well Type Automatic Choke Unit

Fast Idle Cam Index—(Fast Idle Speed Setting not required on this Carburetor)

(1) Open the throttle valve and hold the choke valve in the fully closed position. Now close the throttle valve. This will position the fast idle cam to fast idle position.

(2) Release the choke valve only. This positions the fast idle cam to fast idle. The index mark on the cam should split the center of the fast idle adjusting screw, as shown in Figure 16.

If an adjustment is necessary, bend the fast idle connector rod at the angle, using Tool T109-213, until the index mark on the cam indexes with the fast idle adjusting screw.

Choke Unloader (Wide Open Kick)

(1) Hold the throttle valve in the wide open position, insert Tool T109-34 or a 9/64" drill between the upper edge of the choke valve and the inner wall of the air horn, as shown in Figure 17.

(2) If no drag is felt, or if too much drag is apparent, bend the unloader tang on the throttle lever, until correct clearance has been obtained.

Bowl Vent Adjustment

If the pump rod is installed in either the long or short stroke hole, it will be necessary to move the hair pin clip (directly under bowl vent valve) either up or down to compensate for the change in order to obtain correct bowl vent clearance.

Idle Speed Adjustment (Curb Idle)

The idle speed adjustment is made after the carburetor has been installed on the engine.

(1) With the throttle valve closed and the choke valve wide open (engine at normal operating temperature) adjust the fast idle screw (on the low step of fast idle cam) to give 550 r.p.m. (500 r.p.m. automatic transmission) using a tachometer.

(2) Adjust the idle mixture screw until the engine operates smoothly, then recheck the tachometer and again adjust the fast idle screw to give the correct engine r.p.m.

6. AUTOMATIC CHOKE—WELL TYPE

To function properly, it is important that all parts be clean and move freely. Other than an occasional cleaning, the choke requires no servicing. However, it is very important that the choke control unit work freely in the well and at the choke shaft. Move the choke rod up and down to check for free movement on the pivot. If the unit binds, a new choke unit should be installed. **THE WELL TYPE CHOKE UNIT, is serviced as an assembly. Do not attempt to repair.** (See Figure 18).

When installing the well type choke unit, be certain that the coil housing does not contact the sides of the well in the exhaust manifold. Any contact at this point will affect choke operation. DO NOT lubricate any parts of the choke or the control unit. This causes an accumulation of dirt which will result in binding of the mechanism.

WW SERIES STROMBERG CARBURETOR

CONTENTS

WW SERIES STROMBERG CARBURETOR

SPECIFICATIONS

CARBURETOR		
Type	Dual Throat Downdraft	
Model (Manual Transmission)	WW 15-41-A	—
(Automatic Transmission)	—	WW 15-42
Bore	1 7/16"	1 7/16"
Venturi	1 3/16"	1 3/16"
Main Metering Jet (Standard)	.053"	.054"
(One Step Lean)	.052"	.053"
(Two Steps Lean)	.051"	.052"
Power Jet	2—#56	2—#56
ADJUSTMENTS		
Idle Mixture (Both Screws)	1¼ turns open	1¼ turns open
Idle Speed (rpm)	500	500
(with air conditioning)	550	550
Fast Idle Speed (rpm)	1375 to 1425	1375 to 1425
Fast Idle Speed Cam Index (Choke Blade Opening)	13/64"	13/64"
Bowl Vent Valve (at fully closed throttle)	3/32"	3/32"
Vacuum Kick Adjustment (drill size)	31/64	11/32"
Float Setting	7/32"	7/32"
Unloader Adjustment (wide open kick)	15/64"	15/64"
CHOKE		
Type	Well Type	Well Type
Control	Thermostatic Coil Spring	Thermostatic Coil Spring
Setting	On Index	On Index

SPECIAL TOOLS

C-3225 ..... Repair Block
73598 ..... Plug Remover and Installer
73609 ..... Socket Handle
73606 ..... Jet Remover and Installer (Main Metering)
73608 ..... Jet Remover and Installer (Discharge)
73519 ..... Float Gauge (7/32")
73605 ..... Bending Tool (Float Lip)
T109-213 ..... Bending Tool
T109-214 ..... Bending Tool

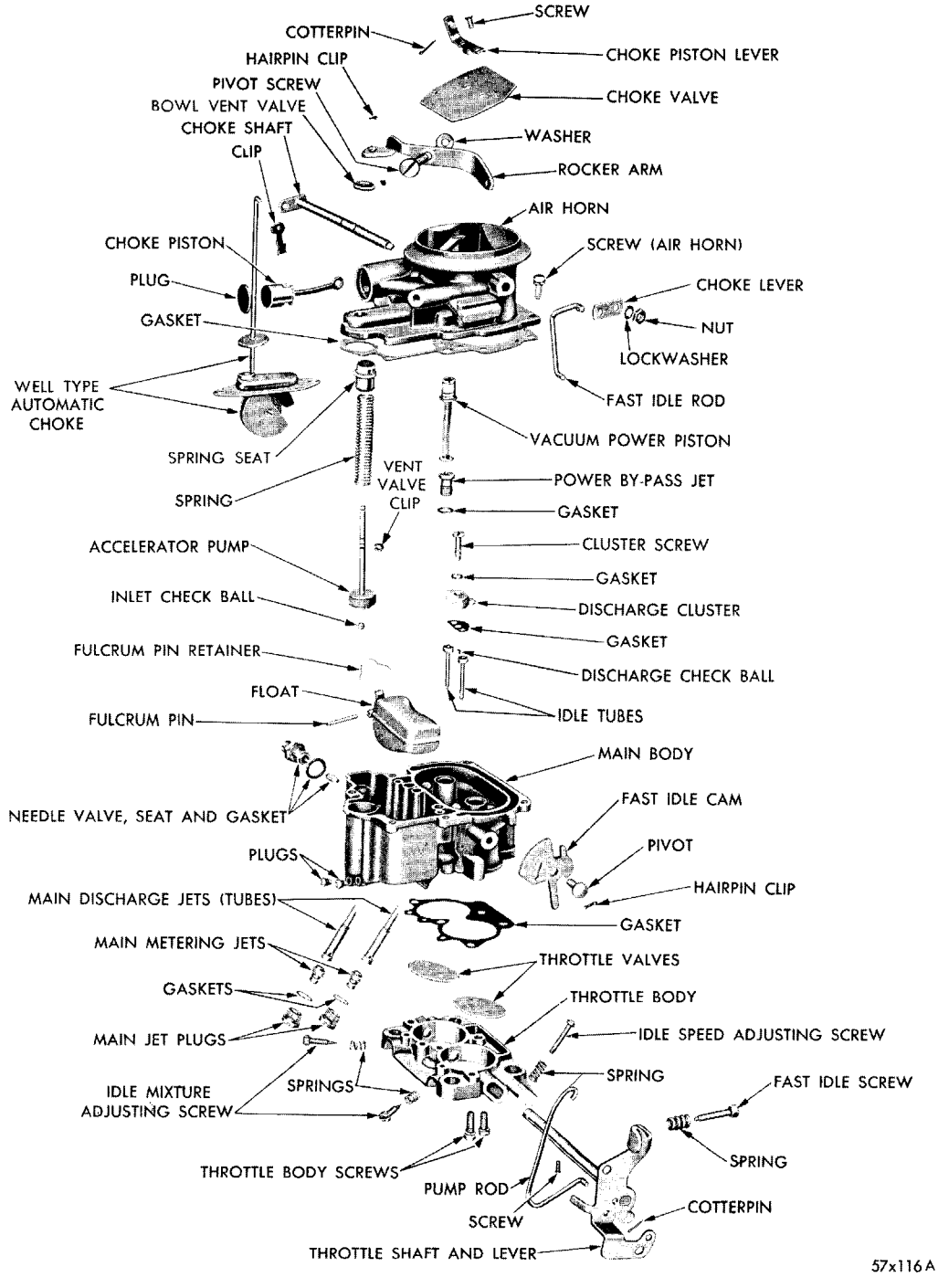


Fig. 1—Carburetor Assembly (Exploded View)

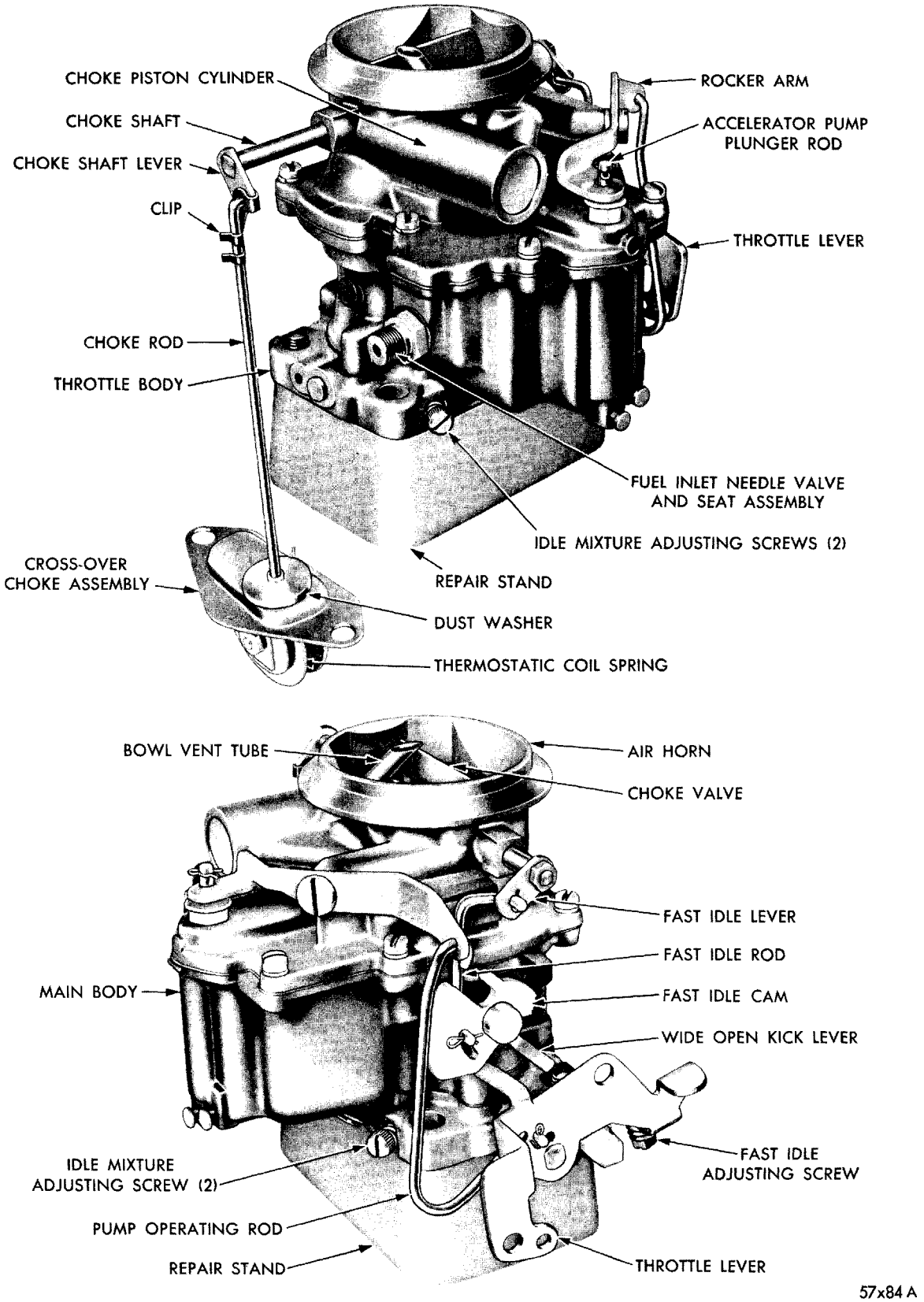


Fig. 2—Carburetor Assembly (WW 15-41 and WW 15-42)

SERVICE INFORMATION

PROCEDURES

GENERAL INFORMATION

There are two models of the WW series carburetor, depending on the type of transmission with which the car is equipped. The same basic design applies to both models regardless of adaptions. Refer to Specifications for detailed information.

(1) **Model WW-15-41A** is used when the car is equipped with the standard 3 Speed Transmission only.

(2) **Model WW-15-42** is used when the car is equipped with either the PowerFlite or Torque-Flite Transmissions. (This carburetor varies only in the idle system, the fast idle cam positioning setting, the vacuum kick setting and main metering jet size).

1. SERVICING THE CARBURETOR

Dirt, dust, water and gummy deposits are some of the main causes for poor carburetor operation. However, proper cleaning and installation of new parts, where required, will return the carburetor to its originally designed performance.

When overhauling the carburetor, several items of importance should be observed to assure a good job.

(1) All parts should be carefully cleaned in a suitable solvent, then inspected for damage or wear.

(2) Use air pressure only, to clear the various orifices and channels.

(3) Replace questionable parts with **NEW** ones. When checking parts removed from the carburetor, it is at times rather difficult to be sure they are satisfactory for further service. It is therefore recommended that in such case, **NEW** parts be installed.

2. DISASSEMBLING THE CARBURETOR

To disassemble the carburetor for cleaning or overhaul, refer to Figures 1 or 2 (depending on model of carburetor) then proceed as follows:

(1) Place the carburetor assembly on repair block Tool C-3225. (This Tool is used to protect the throttle valves from damage and to provide a suitable base for working.) Disconnect cross-over choke rod.

(2) Remove the cotterpin that holds the pump operating in the center hole of the throttle lever. Disengage rod from lever.

(3) Remove the fast idle rod. (Rotate fast idle rod far enough to disengage from the thermostat crank arm, as shown in Figure 3.)

(4) Remove the air horn attaching screws and remove the air horn.

(5) Disengage the accelerator pump plunger rod from the rocker arm by removing the clip. Remove the bowl vent valve clip from the center groove on plunger rod, then slide plunger and rod out of air horn. Remove the bowl vent valve. Slide the spring seat and compression spring off rod.

Place the accelerator pump plunger in a jar of clean gasoline or kerosene to prevent the leather from drying out.

(6) Remove the vacuum power piston from the air horn, using an open end wrench and a wood block, as shown in Figure 4. (Exert sufficient pressure on end of

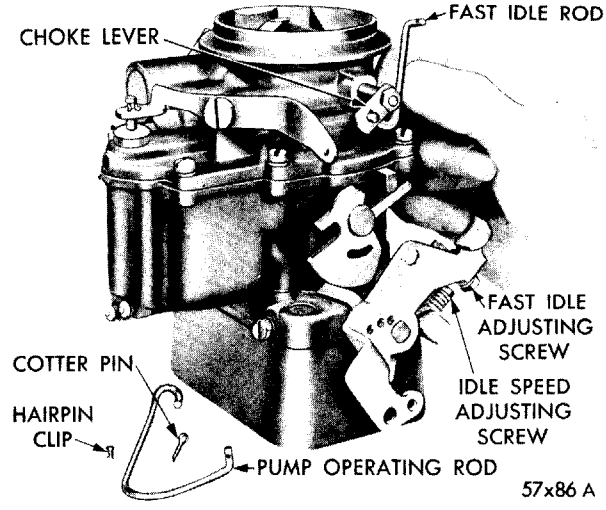


Fig. 3—Removing or Installing Fast Idle Rod

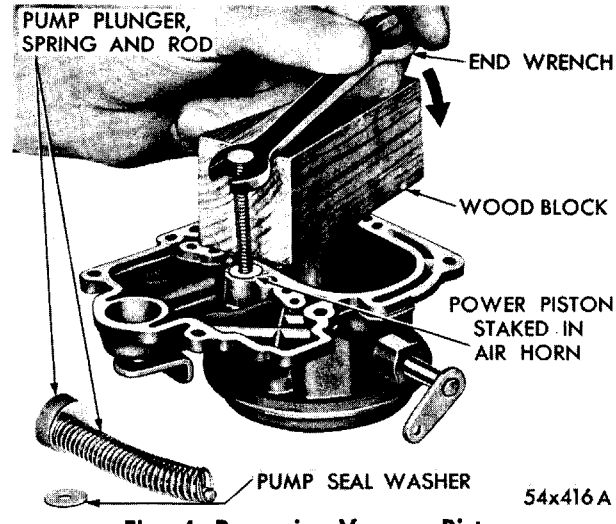


Fig. 4—Removing Vacuum Piston

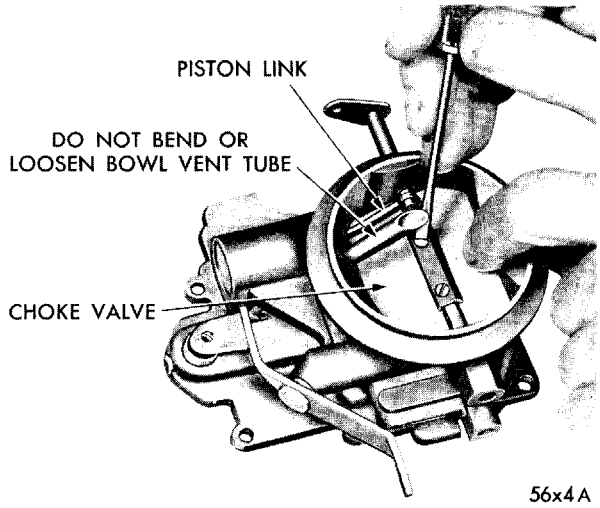


Fig. 5—Removing or Installing Choke Valve

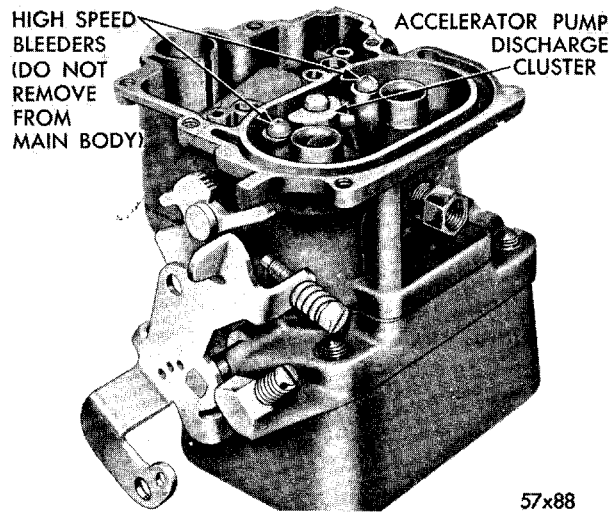


Fig. 7—High-Speed Bleeders

wrench to force piston out of air horn. This assembly is staked and care should be used at removal.)

(7) Remove the screws that hold the choke valve and the choke piston link bracket to the choke shaft, as shown in Figure 5. **These screws are staked to prevent loosening, and extreme care is necessary to avoid breaking off in choke shaft.**

(8) Lift out choke valve, allowing link and bracket to hang, then withdraw the choke shaft and lever out of the air horn.

(9) Lift the idle tubes out of the main body, as shown in Figure 6. (The idle tubes are interchangeable.)

(10) Invert the carburetor main body, and drop out the accelerator pump inlet check ball.

Do not attempt to remove the high-speed bleeders located in the main discharge strut section of the carburetor main body. (See Figure 7.)

(11) Remove the screw and gasket from the accelerator pump discharge cluster, then lift off cluster and gasket, as shown in Figure 8.

(12) Invert the carburetor main body and drop out the accelerator pump discharge check ball from the center of the discharge strut section. (See Figure 17).

(13) Remove the fuel inlet needle valve seat and gasket assembly. Discard the gasket.

(14) Using a small screwdriver, pry out the float fulcrum pin retaining spring. (Cup the hand over the float chamber to prevent the spring from flying out.) Lift out the float and fulcrum pin, as shown in Figure 9.

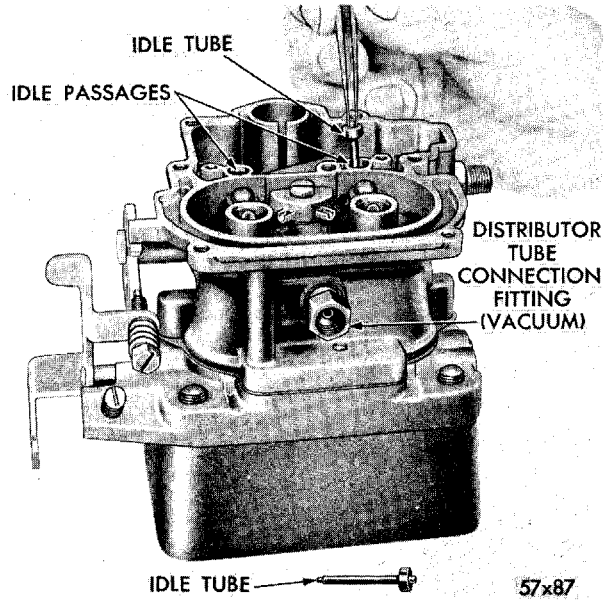


Fig. 6—Removing or Installing Idle Tubes

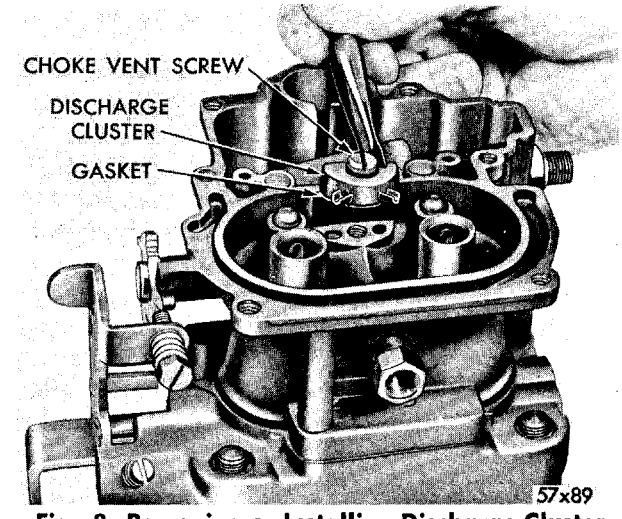


Fig. 8—Removing or Installing Discharge Cluster

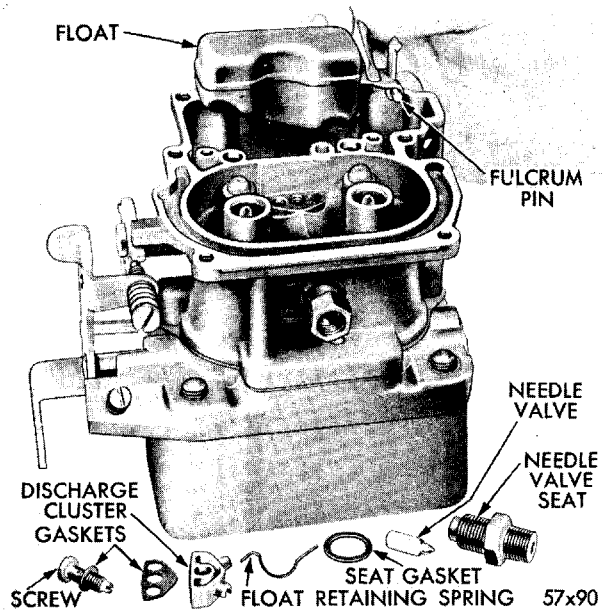


Fig. 9—Removing or Installing Float

(15) Remove the power by-pass jet and gasket, as shown in Figure 10.

(16) Remove the screws and lockwashers that hold the throttle body to the main body. Lift off the throttle body. Discard the gasket.

(17) With the main body in an inverted position, remove the main jet plugs, using Tool 73598 and 73609. Discard the plug gaskets.

(18) Using Tool 73606, remove the main metering jets, as shown in Figure 11.

(19) Now, remove the main discharge jets (or tubes), using Tool 73608. This Tool has a tapered right hand thread and should be screwed into jet. The threads that

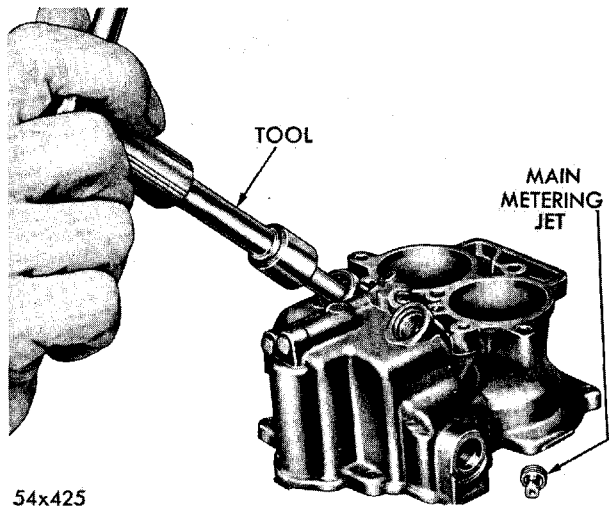


Fig. 11—Removing or Installing Main Metering Jets

are formed in the jet during removal, will not damage the jet.

(20) Unscrew and remove the idle mixture adjusting screws and springs, from the throttle body.

The carburetor now has been disassembled into three units, namely, the air horn, main body and throttle body, and the component parts of each disassembled as far as necessary for cleaning and inspection.

It is usually not advisable to remove the throttle shaft or valves unless wear or damage necessitates installation of new parts. To install new valves or throttle shaft, refer to Inspection and Reassembly Paragraph.

3. CLEANING CARBURETOR PARTS

The recommended solvent for gum deposits is de-

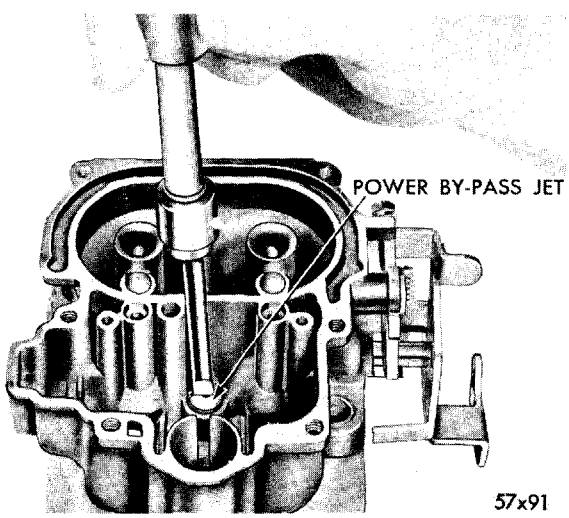


Fig. 10—Removing or Installing Power By-Pass Jet

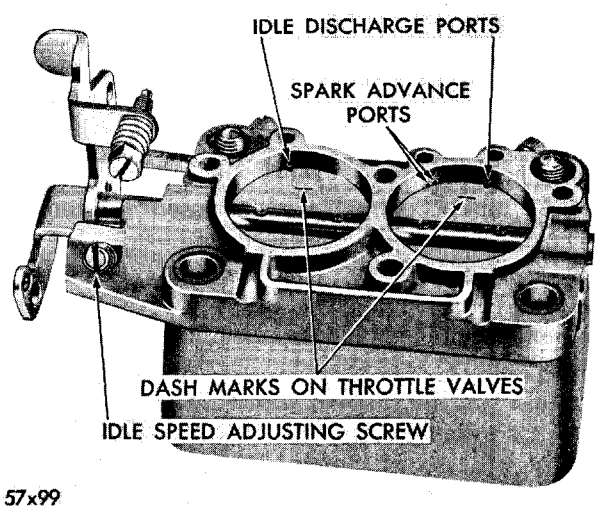


Fig. 12—Ports in Relation to Throttle Valves

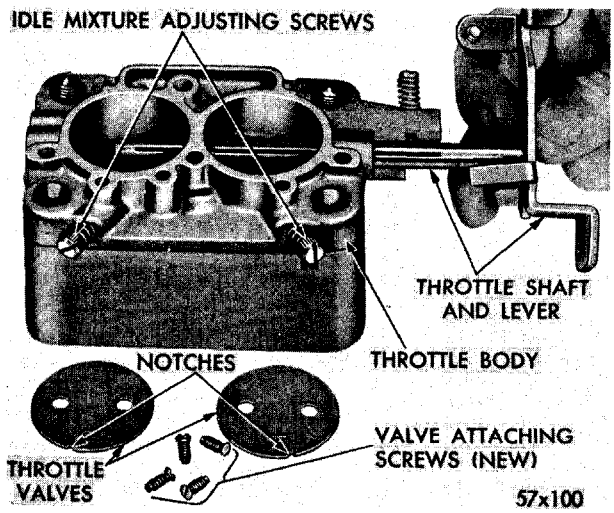


Fig. 13—Removing or Installing Throttle Shaft

natured alcohol which is easily obtainable. However, there are other commercial solvents which may be used with satisfactory results.

IMPORTANT

If the commercial solvent or cleaner recommends the use of water as a rinse, it should be "HOT." After rinsing, all trace of water must be blown from the passages with air pressure. It is further advisable to rinse all parts in clean kerosene or gasoline to be certain no trace of moisture remains. Never clean jets with a wire, drill or other mechanical means because the orifices may become enlarged, making the mixture too rich for proper performance.

4. INSPECTION AND REASSEMBLY

Throttle Body

(1) Check the throttle shaft for excessive wear in the throttle body. If wear is extreme, it is recommended that the throttle body be replaced, rather than installing a new throttle shaft in the old body.

During manufacture, the location of the idle transfer port and the spark advance control ports to the valves is carefully established for one particular assembly. (See Figure 12.)

If a new shaft should be installed in an old worn throttle body, it would be very unlikely that the original relationship of these ports to the valves would be obtained. Changing the port relationship would adversely affect normal car operation between the speeds of 15 and 30 miles per hour. However, if it has been determinded that a new shaft is to be installed, adhere closely to the following instructions:

(2) Mark the valves to be sure each is replaced in the same bore from whence removed.

(3) Remove the screws that hold the throttle valves to the throttle shaft, then slide the valves out of the throttle shaft. **CAUTION: These screws are staked on the opposite side and care should be used at removal so as not to break the screws in the shaft.**

(4) Slide the throttle shaft out of the throttle body.

(5) Install the new throttle shaft and lever in the throttle body, as shown in Figure 13. The fast idle lever should rest against the idle speed adjusting screw. **The idle speed adjusting screw must be backed out when seating the valves in the following operation.**

The "dash" stamped on the valves must be toward the idle port and visible from the top of the throttle body when valves are installed. The notch cut in the edge of the throttle valves should be centered over idle discharge port. (See Figure 12.)

(6) Slide the valves in position through the throttle shaft, then insert NEW screws, but do not tighten. Now hold the valves in place with the fingers, as shown in Figure 14. (Fingers pressing on the high side of valves.)

(7) Tap the valves lightly with a screwdriver to seat in the throttle bores. Holding the valves in this position, tighten screws securely and stake by squeezing with pliers.

(8) Install the two idle mixture adjusting screws and springs in the throttle body. (The tapered portion must be straight and smooth.) If the tapered portion is grooved or ridged, a new idle mixture adjusting screw should be installed to insure having correct idle mixture control.

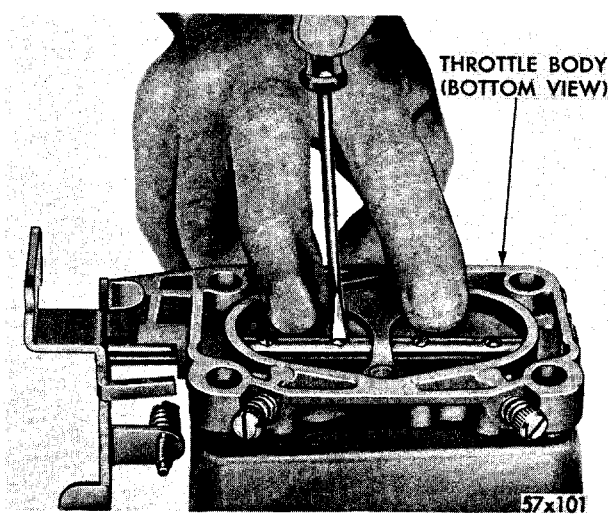


Fig. 14—Installing Throttle Valves

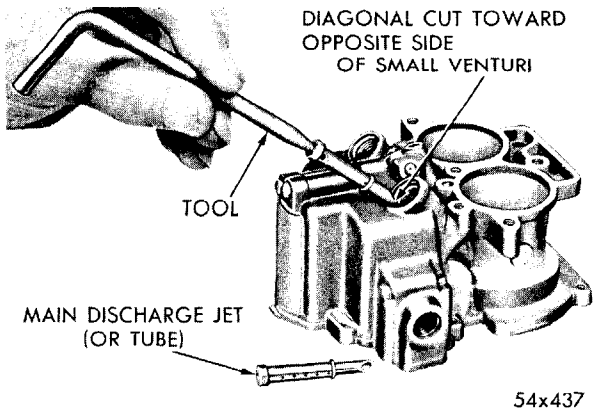


Fig. 15—Installing Main Discharge Jets (or Tubes)

Idle Mixture Screw Adjustment

DO NOT USE A SCREWDRIVER. The adjustment should be made with the fingers. Turn the idle mixture adjusting screw **lightly** against its seat, then back off one full turn for approximate adjustment.

Reassembling the Carburetor Main Body

(1) Place the main discharge jets (or tubes) firmly on Tool 73608, as shown in Figure 15. Now, slide into position in the main body. Be sure the opening in the end of tube (diagonal cut end) is facing the opposite side of the small venturi. **These two jets must be seated firmly in the main body.**

(2) Insert the main metering jets in the body over the discharge jets (or tubes) just installed. Tighten securely, using Tool 73606. (See Figure 11.)

(3) Slide new copper gaskets in the main jet plug openings, then insert the plugs and tighten securely.

(4) Place the assembled throttle body on the inverted main body, using a new gasket. Install screws and lockwashers, then tighten securely.

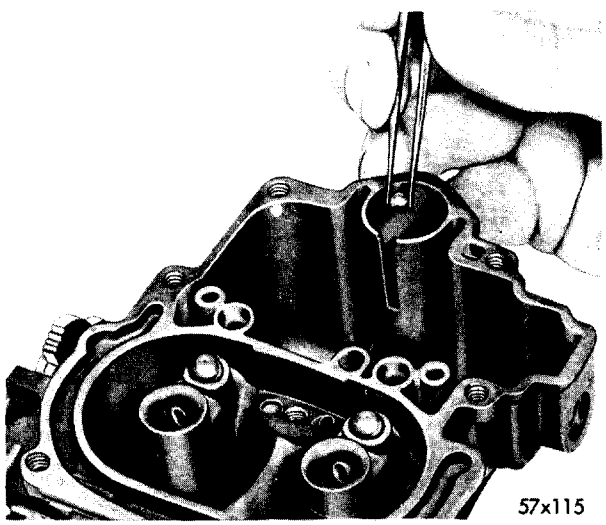


Fig. 16—Installing Accelerator Pump Check Ball

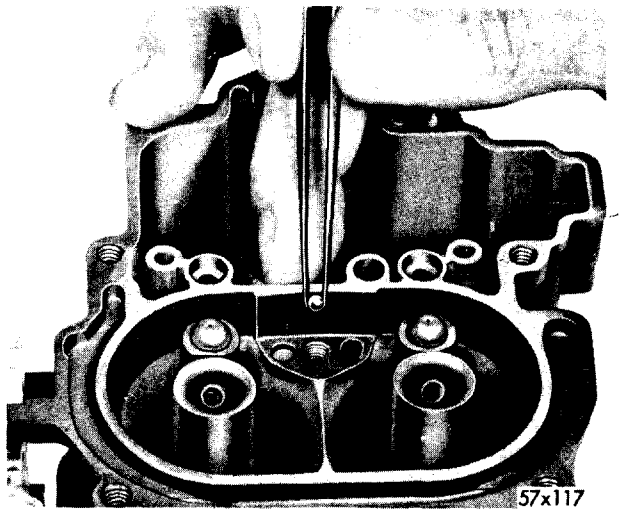


Fig. 17—Installing Discharge Check Ball

(5) Invert the carburetor and place on repair block C-3225, then install the power by-pass jet and new gaskets.

(6) Install the accelerator pump inlet check ball ($\frac{3}{16}$ inch diameter) in the check ball seat at the bottom of the pump cylinder, as shown in Figure 16.

(7) Install the accelerator pump discharge check ball ($\frac{1}{8}$ inch diameter) in the orifice in the center passage of the discharge strut section of the main body, as shown in Figure 17.

Accelerator Pump Test

(1) Pour clean gasoline into the carburetor bowl, approximately ½ inch deep. Remove the accelerator pump plunger from the jar of gasoline and slide down into the pump cylinder. Raise the plunger and press lightly on the plunger shaft to expel the air from the pump passage.

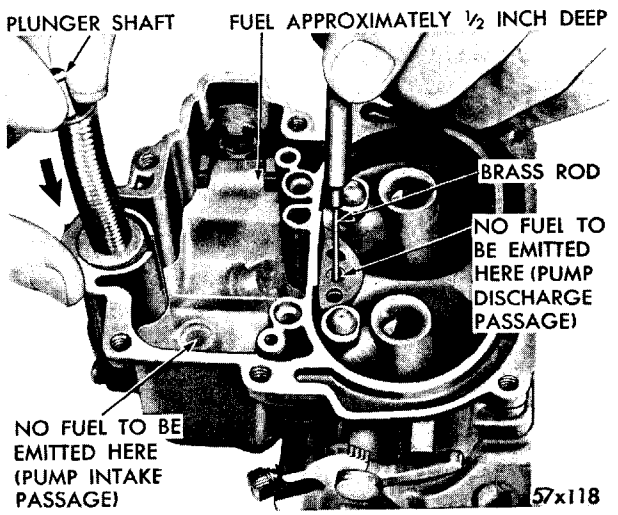


Fig. 18—Testing Accelerator Pump Intake and Discharge Check Balls

(2) Using a small clean brass rod, hold the discharge check ball firmly down on its seat. Again raise the plunger and press downward. No fuel should be emitted from either the intake or discharge passage, as shown in Figure 18.

(3) If any fuel does emit from either the intake or discharge passages, it indicates the presence of dirt or a damaged check ball. The passage should be recleaned and then thoroughly blown out with compressed air. Examine the check ball for signs of damage that would not allow the ball to seat properly.

(4) Reinstall check ball and test again. If still leaking, place a piece of drill rod down on ball and rap sharply with a hammer. Remove old check ball and install new ball. Then retest. (This operation forms a new ball seat in the carburetor casting.)

(5) Install the discharge cluster gasket, cluster and screw. Tighten securely. (See Figure 8.)

Again depress the accelerator pump plunger. A clear straight stream should emit from each cluster jet. If the streams are not identical (if either one is diverted or restricted), a new discharge cluster should be installed.

After test, pour the gasoline from the carburetor bowl and remove the accelerator pump plunger.

(6) Check the float for leaks or damage. If satisfactory for further service, install in position in the carburetor bowl.

(7) Assemble the fuel inlet needle valve, seat and gasket, then insert in position in the main body. Tighten securely. (If the needle is ridged or badly worn, install a new needle valve and seat assembly.)

(8) Install the float fulcrum pin retaining spring in position and force under lip of boss to keep fulcrum pin in position.

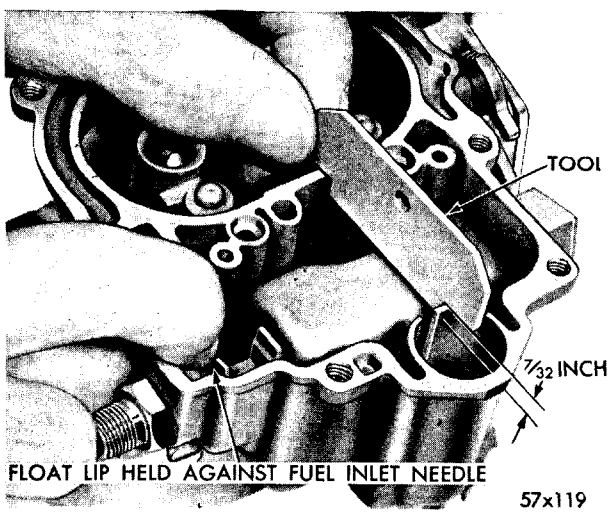


Fig. 19—Checking Float Setting

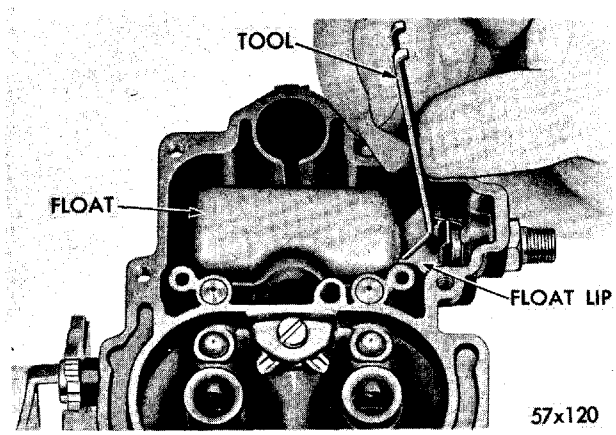


Fig. 20—Bending Float Lip

Checking Float Height

(y) Using a "T" scale or Tool 73519, check the float setting, as shown in Figure 19. The top of float must be 7/32 inch from the top of main body (gasket removed) with the gauge at the center float and the float lip held firmly against the fuel inlet needle. **Do not bend float lip by forcing float. Use Tool 73605, as shown in Figure 20.**

(2) To change the float setting, bend the float lip toward the needle to lower, and away from needle to raise the float.

Install the idle tubes in the main body. (See Figure 6). **These tubes are interchangeable.**

Assembling Air Horn

(1) Slide the choke shaft into air horn with choke lever pointing toward pump end of air horn. Slide the choke valve down into slot in shaft. Hold the choke valve closed, then position choke piston bracket and install new screws. **DO NOT TIGHTEN.** Holding the valve in the closed position, tap gently with a screwdriver to center and locate the valve. Tighten screws securely, then stake by squeezing with pliers. (See Figure 5.)

(2) Remove the accelerator pump plunger from the jar of gasoline. Check the leather. If the leather is hard, cracked, or worn, install a new plunger and shaft.

(3) Slide the bowl vent valve seat over plunger shaft followed by the compression spring. Insert assembly through air horn, then install bowl vent valve clip in the center groove of shaft.

(4) Slide bowl vent valve over shaft and down against seat. Engage pump shaft with pump arm and secure with clip.

(5) Install the vacuum power piston and plunger in the air horn, as shown in Figure 21. Lock in position by prick punching on the retaining rim. Compress the pis-

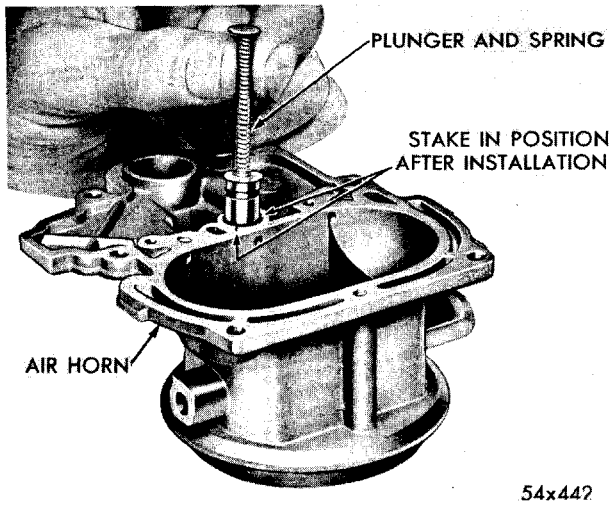


Fig. 21—Installing Vacuum Power Piston

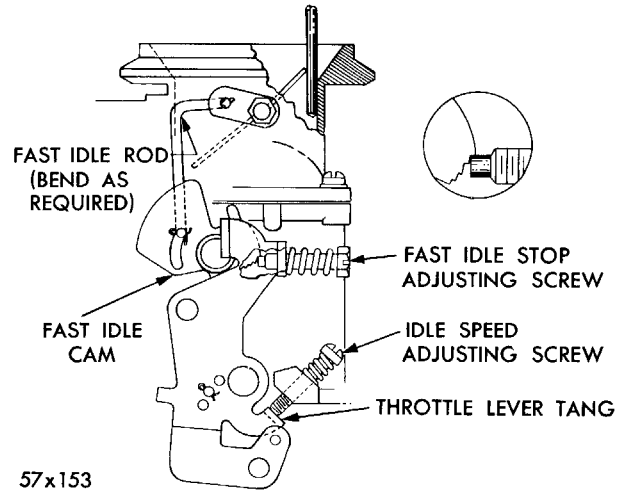


Fig. 22—Fast Idle Adjustment

ton plunger to be sure no binding exists. If the piston sticks or binds enough to hinder smooth operation, install a new piston assembly.

(6) Slide a new air horn gasket over accelerator pump plunger, and down against air horn. Now, lower air horn straight down on main body, with the accelerator pump plunger sliding into its well. (Be sure the leather on the pump does not curl or fold back.) Install air horn retaining screws and lockwashers, then tighten securely.

Install the accelerator pump and choke connector rods, then work the accelerator pump plunger several times, to be sure it operates freely.

5. CARBURETOR ADJUSTMENTS

It is very important that the following adjustments be made on a reconditioned carburetor and in the sequence listed namely,

Fast Idle Speed and Cam Position Adjustment
Unloader Adjustment (wide open kick)
Vacuum Kick Adjustment
Accelerator Pump Travel Adjustment

Fast Idle Speed and Cam Position Adjustment

(1) To make the fast idle speed and cam position adjustment, turn the idle speed adjusting screw **out** far enough to clear the throttle lever tang when the throttle valves are closed.

(2) Hold the throttle valves in closed position, then turn the fast idle adjusting screw **out** until the fast idle cam can be positioned, as shown in Figure 22.

(3) From the point of initial contact with the step of the cam as shown, turn the fast idle screw **in** 8 turns.

(4) With the fast idle screw held in the position illustrated, move the choke valve with light pressure toward closed and insert a $^{13}/_{64}$ inch drill between the choke valve and wall of air horn, as shown in Figure 23.

(5) If adjustment is necessary, bend the fast idle rod at the upper bend, as shown in Figure 24, until correct opening has been obtained. (Use Tool T-109-213.)

Unloader Adjustment (Wide Open Kick)

(1) To make the unloader adjustment, lightly hold the choke valve closed, then open the throttle valves to wide open position. The choke valve should open sufficiently to allow a No. 1 or $^{15}/_{64}$" drill to be inserted between the choke valve and wall of air horn, as shown in Figure 25.

(2) To adjust, bend the tang on the throttle lever using Tool T109-214, as shown in Figure 26.

(3) Hold choke open and then open and close the throttle valves. Failure to obtain full throttle operation

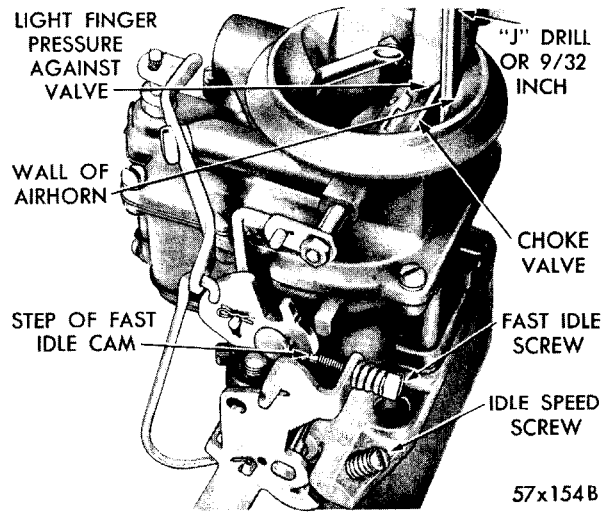


Fig. 23—Checking Choke Valve Opening

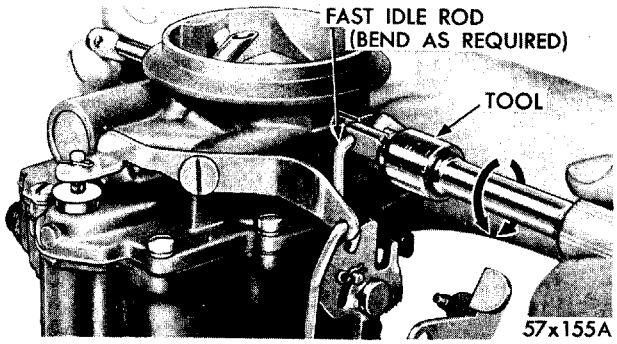


Fig. 24—Bending Fast Idle Rod

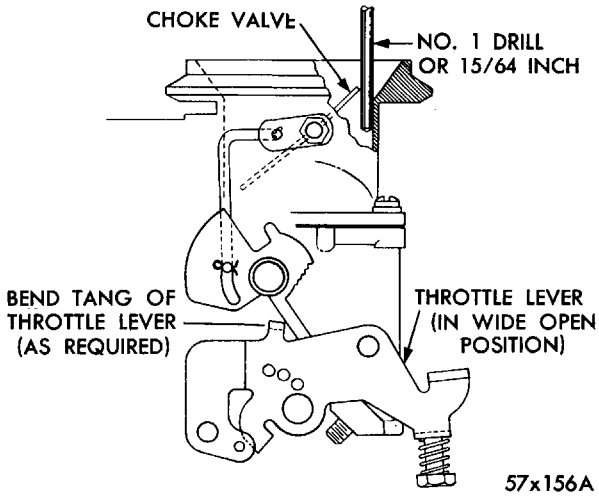


Fig. 25—Unloader Adjustment (wide Open Kick)

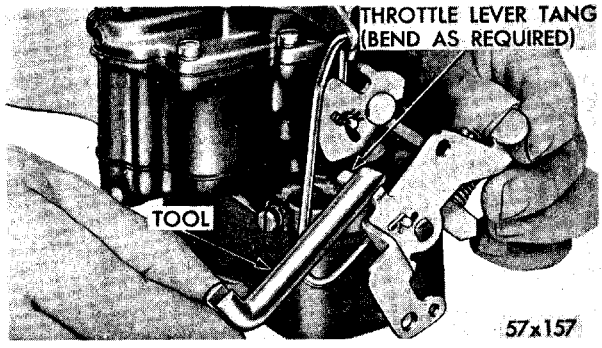


Fig. 26—Bending Tang on Throttle Lever

indicates improper assembly or adjustment of the choke mechanism.

(4) With the throttle valves held in open position, open the choke valve slowly to wide open position. There should be no bind throughout the entire travel of choke mechanism.

Vacuum Kick Adjustment

(1) To make the vacuum kick adjustment, bend a paper clip or a piece of .040 inch diameter wire into the shape shown in Figure 27. Insert the bent end into the slot at the bottom of the vacuum piston bore, as shown in Figure 27.

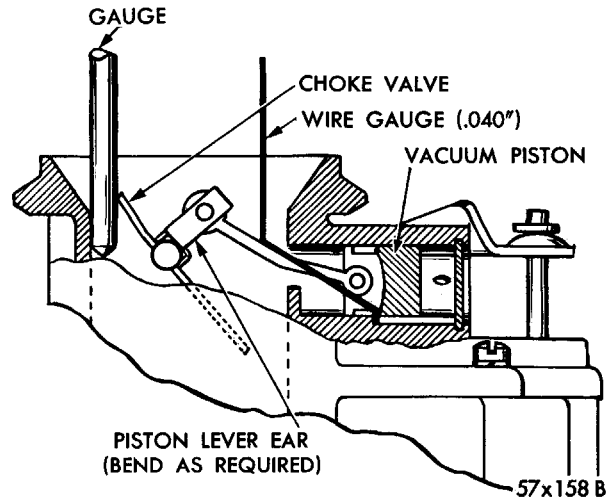


Fig. 27—Vacuum Kick Adjustment

(2) Apply a light closing pressure against the choke valve.

(3) With the wire held in place between the piston and the end of slot, it should be possible to insert a $^{11}/_{32}$" drill for automatic transmission or $^{31}/_{64}$" drill for manual transmission between the choke valve and wall of air horn. (See Figure 27).

(4) If adjustment is necessary, bend the ear on the choke piston lever until correct clearance has been obtained.

Accelerator Pump Adjustment

The following adjustment is made with the

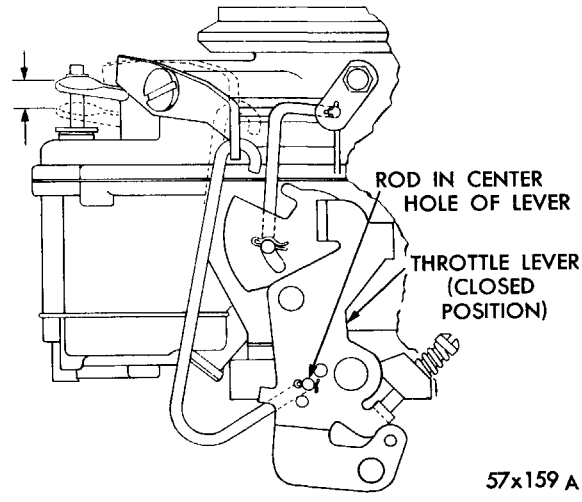


Fig. 28—Accelerator Pump Adjustment

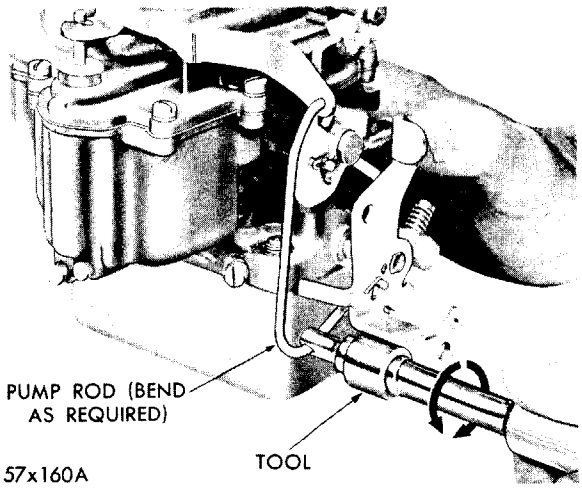


Fig. 29—Bending Accelerator Pump Rod

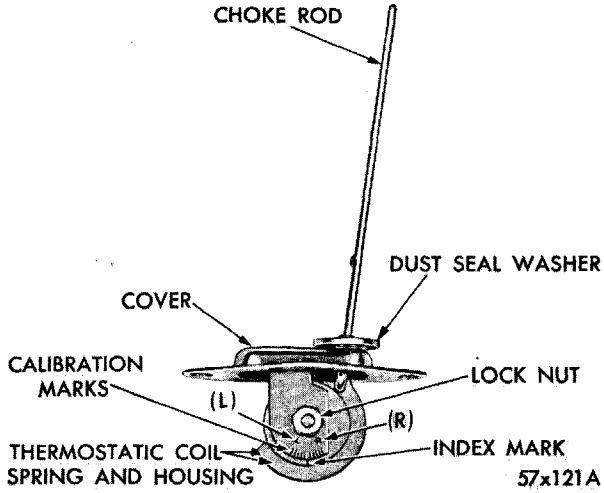


Fig. 30—Well Type Automatic Choke Unit

accelerator pump rod in the center hole of the throttle lever.

(1) To check the accelerator pump travel, hold the carburetor in a vertical position, then operate the accelerator pump to permit the check ball at the bottom of well to take its normal position on seat.

(2) With the choke valve held open, measure the travel of the accelerator pump as the throttle valves are moved from fully closed to wide open position. The accelerator pump travel should measure from $^{9}/_{32}$ to $^{5}/_{16}$ inches, as shown in Figure 28.

(3) To adjust, remove the accelerator pump rod from the center hole in the throttle lever and bend (at angle), using Tool T-109-213, as shown in Figure 29. Bend until correct travel has been obtained. Re-install rod.

Idle Speed Adjustment (Curb Idle)

The idle speed adjustment is made after the carburetor has been installed on the engine.

(1) With the throttle valves closed and the choke valve wide open (engine at normal operating temperature), adjust the idle screw to 500 R.P.M., using a tachometer. On air condition cars, refer to Specifications.

(2) Adjust the idle mixture screws until the engine operates smoothly, then recheck the tachometer and again adjust the idle screw to give the correct engine R.P.M.

Bowl Vent Adjustment

(1) With the throttle valves held closed and idle speed screw backed out, it should be possible to insert a $^{3}/_{32}$ inch drill shank between the bowl vent valve and the air horn.

(2) If an adjustment is to be made, bend the accelerator pump rod at the lower angle until correct clearance has been obtained.

If the pump rod is installed in either the long or short stroke hole, it will be necessary to move the clip (directly under the bowl vent valve) either up or down to compensate for the change in order to obtain correct bowl vent clearance.

6. AUTOMATIC CHOKE (well type)

To function properly, it is important that all parts be clean and move freely. Other than the occasional cleaning, the automatic choke control requires no servicing. However, it is very important that the choke control unit works freely at the thermostatic coil spring housing and at the choke shaft. Move the choke rod up and down to check for free movement of the coil housing on the pivot. If unit binds, a new unit should be installed.

The Well Type Choke Unit is serviced only as a complete unit. Do not attempt to repair.

Figure 30 shows the component parts of the control unit along with the number stamped on the crown of the cover.

When installing the well type choke unit, make certain that the coil housing does not contact the sides of the well. Any contact at this point will affect choke operation.

Do not lubricate any parts of the choke or control unit since this causes dirt accumulation which would result in binding of the choke mechanism.

Do not attempt to change the calibration setting. This is predetermined and should it be changed, improper choke action would result.

WWC3 SERIES STROMBERG

CARBURETOR

CONTENTS

WWC3 SERIES STROMBERG

SPECIFICATIONS

CARBURETOR	
Type	Dual Throat Downdraft
Model	WWC3-188
Bore	1 9/16″
Venturi	1 5/16″
Main Metering Jet (Standard)	.068″
(One Step Lean)	.066″
(Two Steps Lean)	.064″
Power Jet	.040 to .063″
ADJUSTMENTS	
Idle Mixture (Both Screws)	½ to 5/8 Turns Open
Idle Speed (rpm)	500
(with car cooling) (rpm)	550
Fast Idle Speed (rpm)	1375 to 1425
Fast Idle Speed Cam Index (choke blade opening)	¼″ Drill—3½ Turns
Accelerator Pump Travel (blades fully closed)	9/16″
Bowl Vent Valve (blades fully closed)	3/32″
Vacuum Kick (drill size)	# 14 and # 59
Float Setting	⅛″
Unloader Adjustment (wide open kick)	¼″
CHOKE	
Type	Well Type
Control	Thermostatic Coil Spring
Setting	1 Notch Rich

SPECIAL TOOLS

T109-287S	Elevating Legs (set of 5)	T109-214	Bending Tool
73598	Jet Remover	73605	Bending Tool
T109-173	Jet Remover	# 59 Drill)	Vacuum Kick
73725	Float Gauge (⅛″)	# 14 Drill)	
T109-213	Bending Tool	¼ inch Drill—	Unloader and Fast Idle Speed

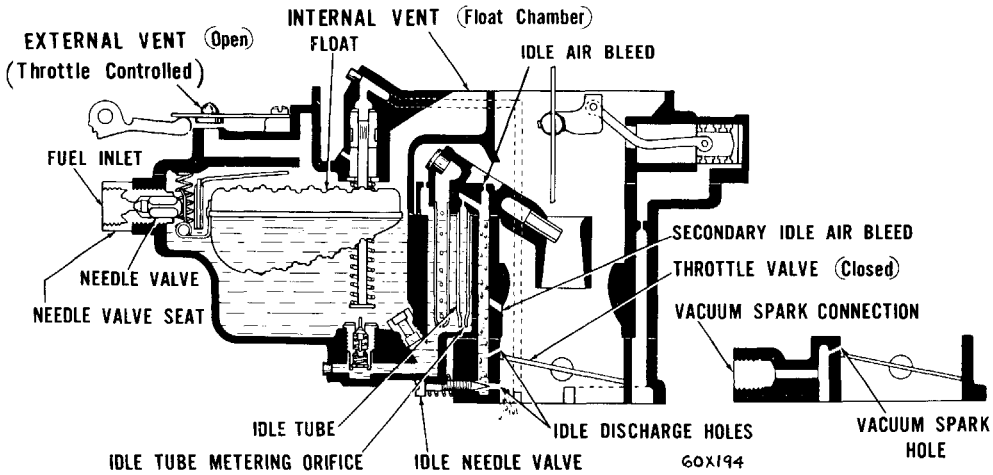


Fig. 1—Float System and First Stage of Idle

GENERAL INFORMATION

The WWC3 Series Stromberg carburetor is a dual throat downdraft type, with each throat having its own idle system, main metering system and throttle valve. The idle and main metering systems are supplemented by the float system, the accelerating system and the power system.

The WWC3 Series carburetor incorporates an idle system vent, operated from the throttle linkage, a double venturi cluster which in addition to the small venturi also includes the discharge nozzles, the main discharge tubes and the idle tubes in a single assembly.

The Float System

The function of the float system is to maintain a constant level of fuel in the float chamber at all times and under all conditions of operation. Fuel enters the carburetor at the fuel inlet, flowing through the float chamber, as shown in Figures 1 and 2. When the fuel reaches a given level, the float shuts off the supply of fuel at the needle valve. The float chamber is vented internally by a vent passage which connects the float chamber with the air horn and by an external idle vent valve in the top of the air horn, which opens when the throttle is returned to the idle position. The external vent supplements the internal vent at a time when the gaseous vapors which accumulate due to high temperatures, are at their maximum.

The Idle System

With the throttle valves closed and the engine running at slow idle speed, fuel from the float chamber is metered into the idle tubes by an orifice at the base of each idle tube, as shown in Figures 2 and 3. The air taken in through the idle air bleeds, mixes with the fuel at the top of the idle tubes. This mixture of air and fuel then flows down the channels where it is mixed

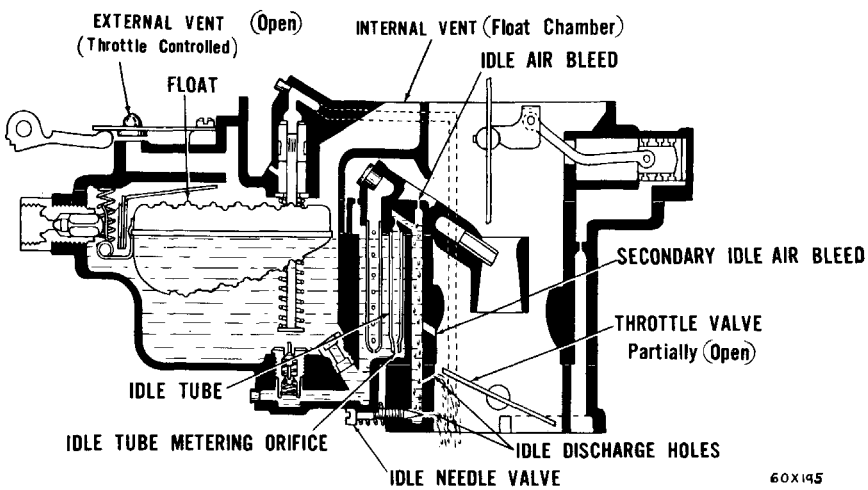


Fig. 2—Idle System (2nd Stage of Idle)

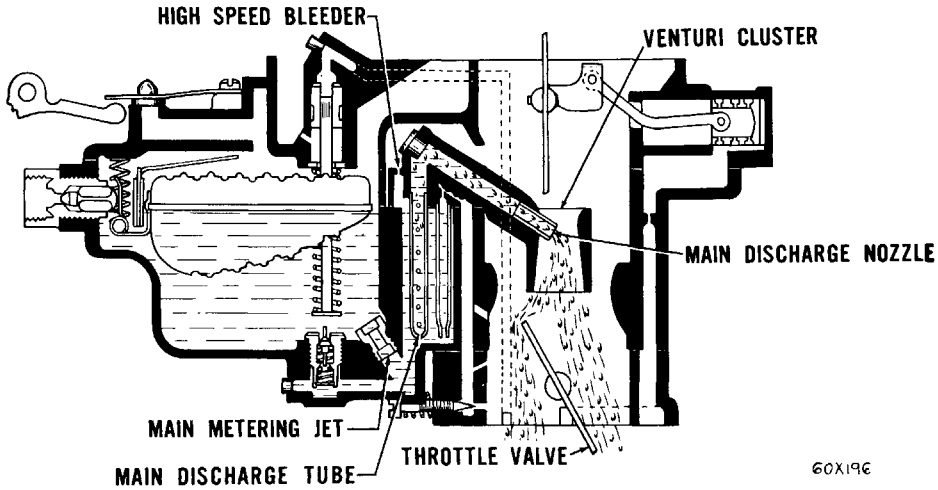


Fig. 3—Main Metering System

with additional air entering through the secondary idle air bleeds. This mixture is then discharged at the lower idle discharge holes. The quantity of fuel discharged is controlled by adjustable needle valves. As the throttle valves are opened slightly, the air-fuel mixture is also discharged from the upper idle discharge holes, to supply the additional fuel required for increased engine speed, as shown in Figure 2.

The Main Metering System

The main metering system controls the flow of fuel during the intermediate or part throttle range of operation. With the throttle valves in a partially open position, fuel flows from the float chamber through the main metering jets and into the main discharge tubes where it is mixed with air taken in through the high speed air bleeders, as shown in Figure 3. This mixture of air and fuel is then discharged from the tips of the main discharge nozzles into the air stream through the auxiliary venturi. The main body and main discharge tubes are so designed that should vapor bubbles form in the fuel in the main discharge system, due to high temperatures while the vehicle is standing, the vapor bubbles will collect in the channel surrounding the main discharge tubes from where they will rise into the cavity above the fuel level. In this location the vapor bubbles are free to break and dissipate without causing any difficulty.

The Power System

The power system is incorporated into the carburetor to provide a richer mixture for maximum power and high speed operation. The extra fuel for power is supplied by a vacuum controlled power piston which automatically operates a two-stage power by-pass jet in accordance with the throttle opening.

Intake manifold vacuum is maintained above the vacuum power piston through a vacuum channel which

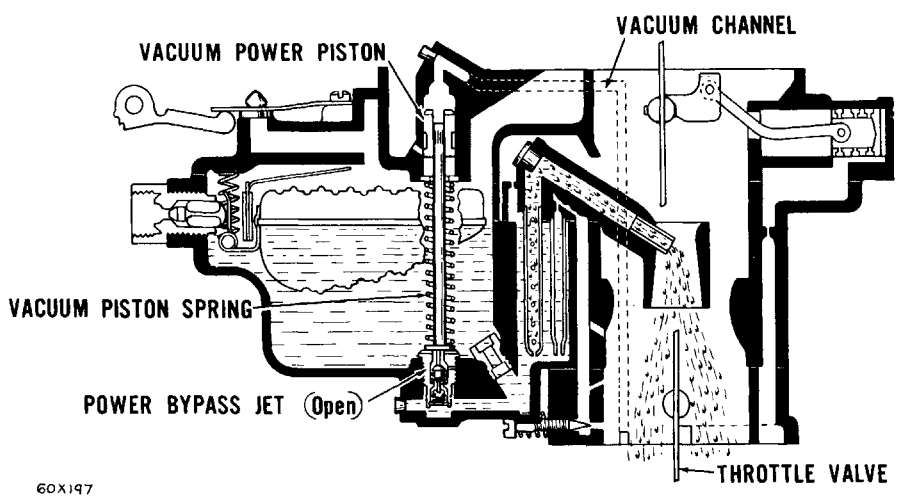


Fig. 4—Power System

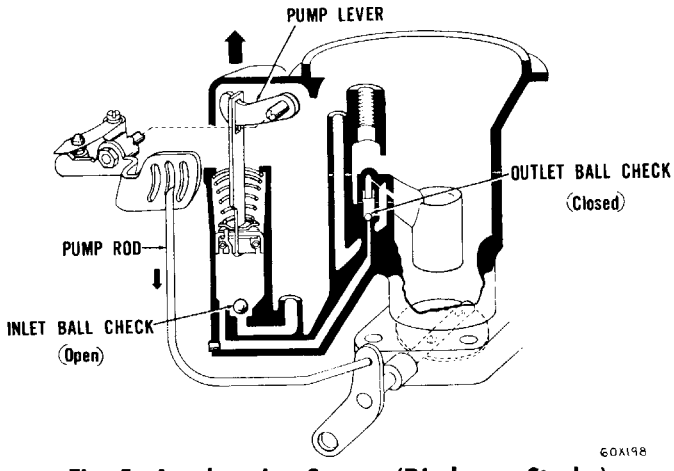


Fig. 5—Accelerating System (Discharge Stroke)

leads to the mounting flange of the carburetor, as shown in Figure 4. During initial or part throttle opening, the vacuum above the vacuum piston is sufficient to overrule the compression spring and hold the piston in the "UP" position. When the throttle valves are opened to the point where the manifold vacuum drops to approximately 10 to 12 Hg., the piston compression spring then moves the piston "DOWN" to open the upper (first) stage of the power by-pass jet and meters additional fuel through the upper hole into the main metering system. With increased demand for power and consequent further drop in manifold vacuum approximately 3 to 7 Hg., the piston moves "DOWN" an additional amount to open the lower (second) stage valve and meters an additional amount of fuel into the main metering system through the hole at the bottom of the power by-pass jet. When the demand for power is satisfied and the throttle opening is decreased, the manifold vacuum again builds up to raise the power piston. As soon as the manifold vacuum exceeds 7" Hg., the lower (second) stage valve closes, cutting off the supply of fuel through the bottom hole. When the manifold vacuum exceeds 12" Hg., the upper (first) stage valve closes, cutting off the supply of fuel through the upper hole.

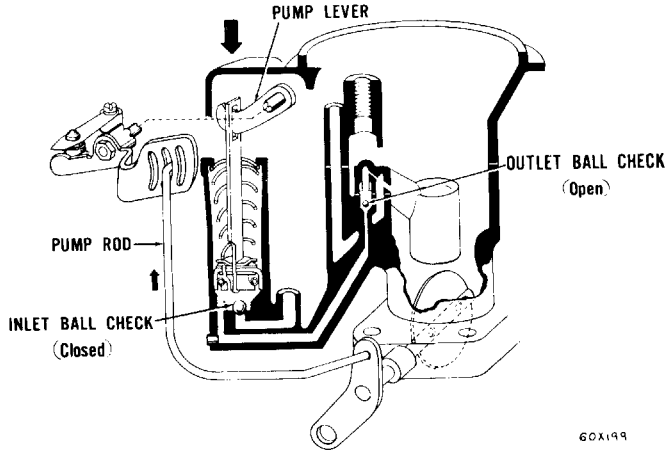


Fig. 6—Accelerating System (Return Stroke)

The Accelerating System

To insure a smooth uninterrupted flow of power for acceleration, additional fuel must be metered into the engine. This is accomplished through the use of a spring loaded accelerator pump, and is operated by the throttle linkage. As the throttle valves are opened, the accelerator pump piston moves "DOWN" to close the inlet ball check valve and force a metered quantity of fuel through the outlet ball check valve and pump discharge nozzle, into the air stream, as shown in Figures 5 and 6.

A slotted type of pump lever is used, as shown in Figure 6. When the throttle is closed, the piston is raised against the compression of the duration spring. When the throttle is opened the pump lever moves down and permits the compression spring above the piston to move the piston down. The calibrated spring then delivers a given quantity of fuel over a metered period of time.

With the release of the accelerator pedal and the return of the accelerator pump to the released position, the outlet check ball "CLOSES" while the inlet check ball "REOPENS" thus permitting fuel from the float chamber to enter and refill the accelerator pump cylinder, as shown in Figures 5 and 6.

The Automatic Well Type Choke

The operation of the automatic choke control is based

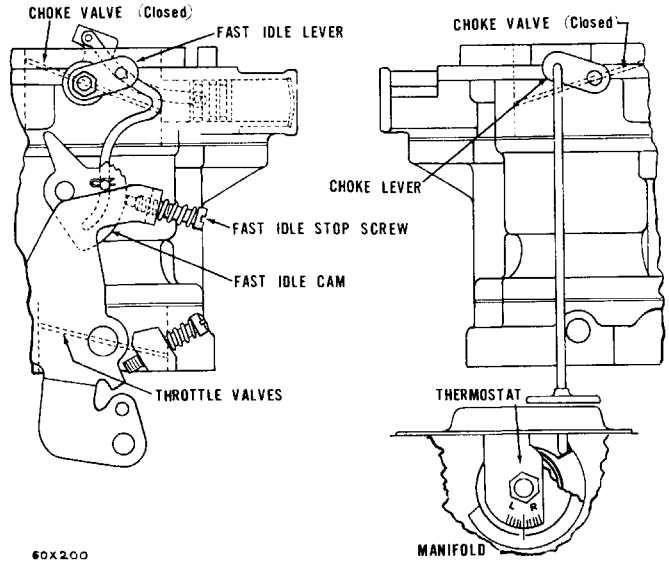


Fig. 7—Choke Closed — Cold Engine — Fast Idle

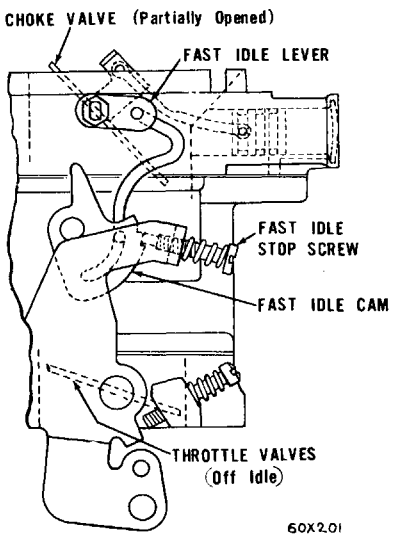


Fig. 8—Choke Partially Open — Engine Warming Up

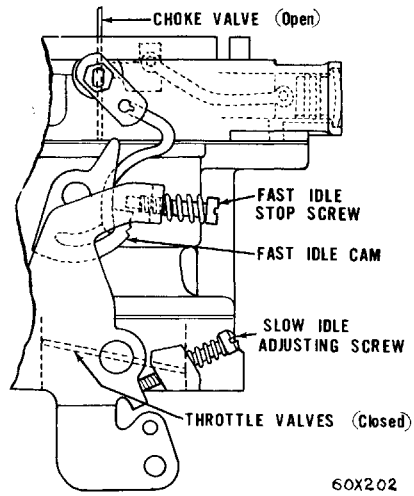


Fig. 9—Choke Open — Engine Warm — Slow Idle

upon the combination of intake manifold vacuum, a vacuum operated piston, an offset choke valve and a thermostatic coil spring, located within the manifold and connected to the choke lever by a rod.

Heat from the manifold governs the tension of the thermostatic coil spring. The fast idle cam operates in conjunction with the automatic choke mechanism, to provide the correct throttle opening to prevent the engine from stalling during the warm-up period.

Choke Closed — Fast Idle — Cold Engine

As the engine cools, the thermostatic coil spring also cools and gradually gains tension, as shown in Figure 7. The thermostatic coil spring, however, is unable to close the choke valve, until the throttle valves are opened sufficiently to move the fast idle stop screw away from the fast idle cam. The tension on the thermostatic spring will then close the choke valve according to the prevailing temperature. As the engine begins to operate, manifold vacuum exerts a pull on the vacuum piston to open the choke valve just enough to supply the necessary air for a running mixture.

Choke Partially Open — Engine Warming Up

As the engine warms, the amount the choke valve opens is governed by the pressure of air against the offset choke valve, as shown in Figure 8. The heat from the manifold gradually decreases the tension of the thermostatic coil spring, until the spring offers no further resistance to the opening of the choke valve. With the engine partially warm, the fast idle stop screw will rest on a lower step of the fast idle cam, when the accelerator is released to allow the engine to idle at a slower idle speed.

Engine Warm — Choke Open — Slow Idle

When the engine reaches its normal operating temperature and the accelerator is released, as shown in Figure 9, the fast idle cam rotates to its fully released position with space between the fast idle cam and the end of the fast idle stop screw. In this position the throttle opening is controlled entirely by the slow idle adjustment screw.

SERVICE INFORMATION

PROCEDURES

1. SERVICING THE CARBURETOR

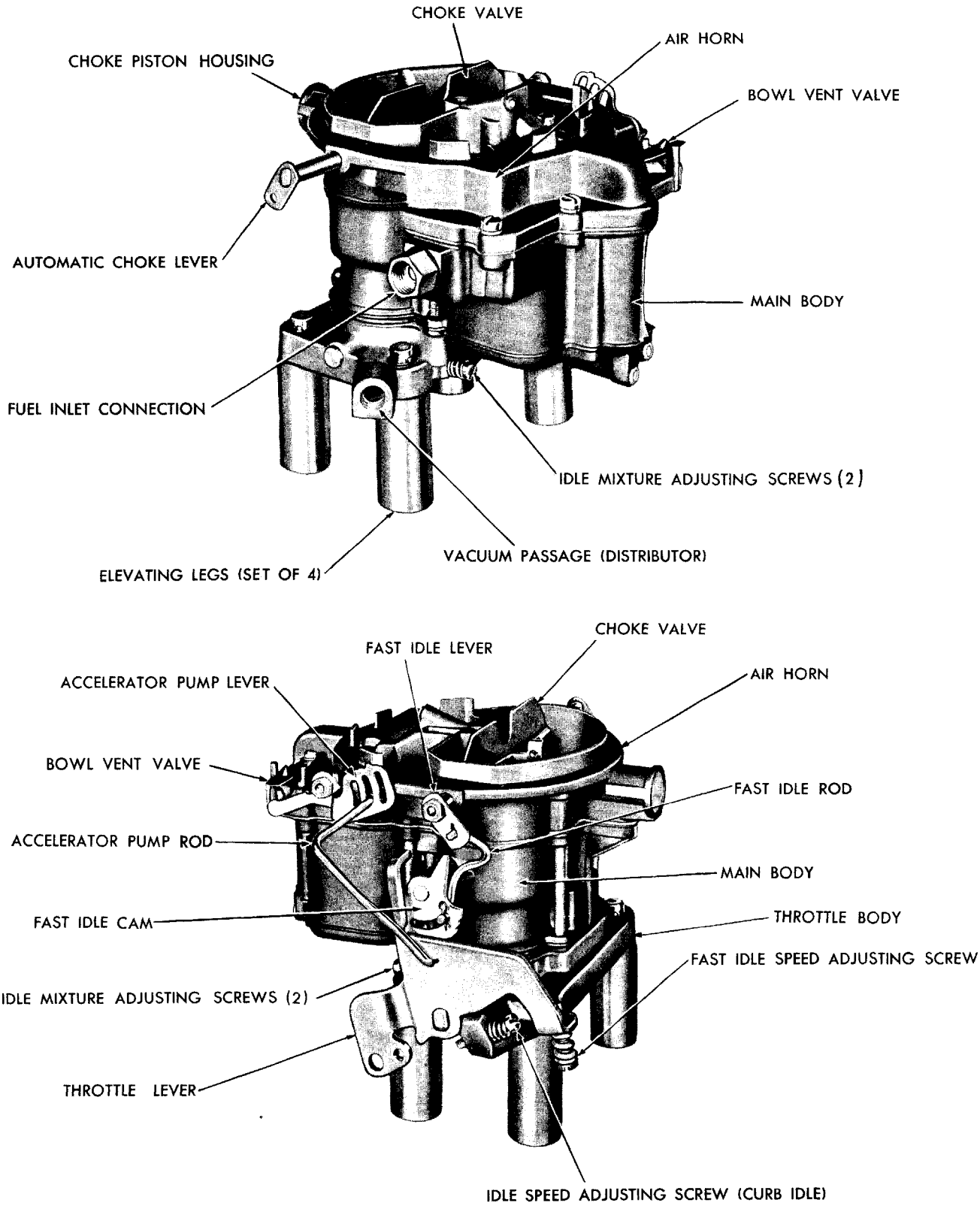
Dirt, dust, water and gummy deposits are some of the main causes for poor carburetor operation. However, proper cleaning and the installation of new parts, where required, will return the carburetor to its originally designed performance.

When overhauling the carburetor, several items of importance should be observed to assure a good job:

(1) All parts should be carefully cleaned in a suitable solvent, then inspected for damage or wear.

(2) Use air pressure only, to clear the various orifices and channels.

(3) Replace questionable parts with NEW ones. When checking parts removed from the carburetor, it is at times rather difficult to be sure they are satisfactory for further service. It is, therefore, recommended that in such case, NEW parts be installed.



60 x 331

Fig. 1—Carburetor Assembly (WWC3 Series)

(4) Always use a complete kit when overhauling the carburetor. Using the code number stamped on the air horn, adjacent to the fuel inlet, refer to the parts catalog and order the correct repair kit for the carburetor being worked on.

2. DISASSEMBLING THE CARBURETOR

To disassemble the carburetor for cleaning or overhaul, refer to Figures 1 and 2, then proceed as follows:

(1) Install four elevating legs, Tool T109-287S in the mounting flange holes in the throttle body. These legs are used to protect the throttle valves from damage and to provide a suitable base for working.

(2) Remove the hairpin clip that holds the pump rod in the center slot of the pump arm. Remove rod from slot and disengage from the throttle lever, as shown in Figure 3.

(3) Remove the hairpin clip that holds the fast idle rod in the fast idle cam. Disengage rod from cam, then rotate rod to disengage from choke lever, as shown in Figure 4.

(4) Remove the three short air horn attaching screws, then remove the two long air horn attaching screws next to the choke piston. Install two short

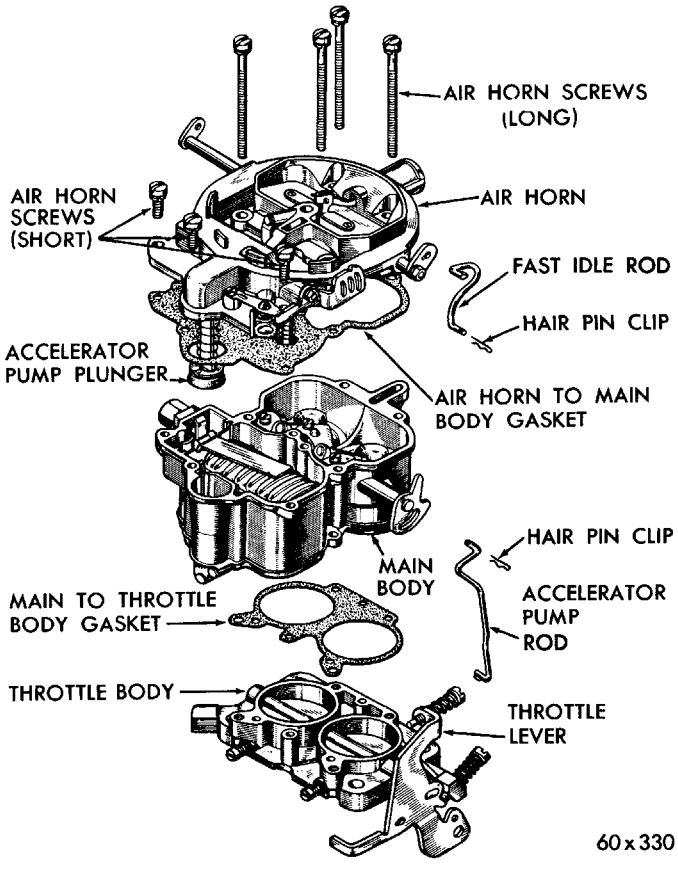


Fig. 2—Carburetor Assembly (Exploded View)

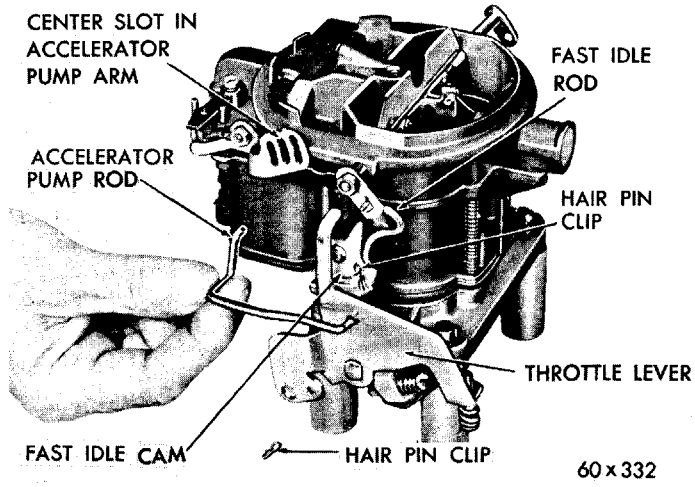


Fig. 3—Removing or Installing Pump Rod

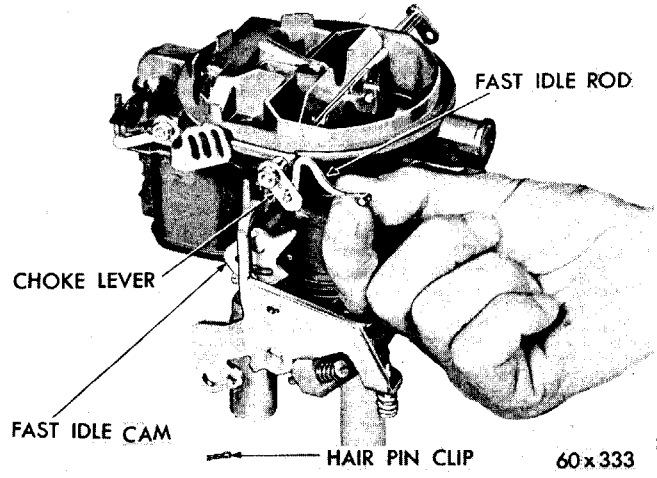


Fig. 4—Removing or Installing Fast Idle Rod

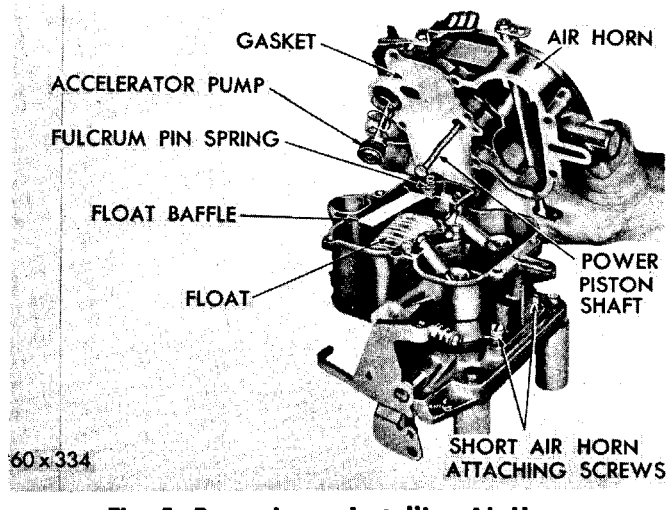


Fig. 5—Removing or Installing Air Horn

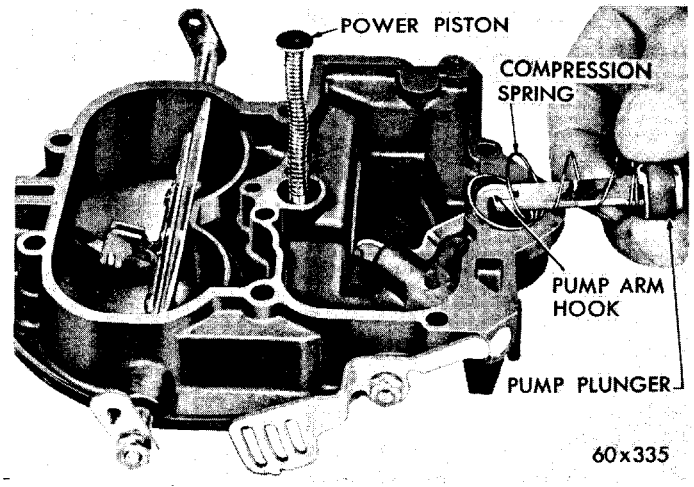


Fig. 6—Removing or Installing Accelerator Pump Plunger

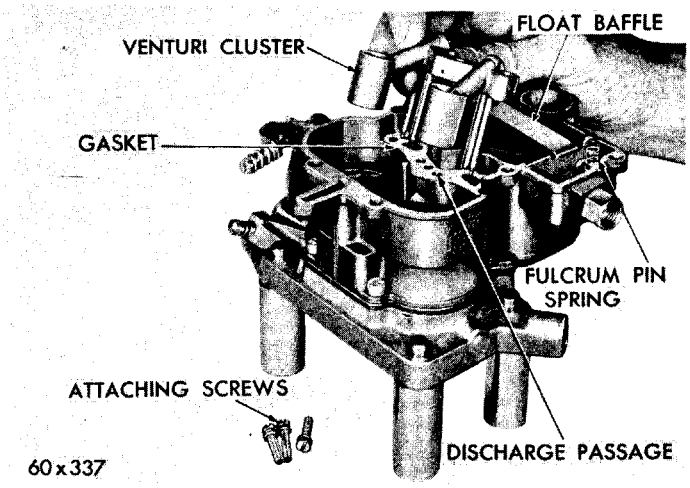


Fig. 8—Removing or Installing Venturi Cluster

screws through the main body into the throttle body to hold the bodies together. (Refer to Figure 5.)

(5) Remove the remaining air horn attaching screws, then lift air horn straight up and away from main body, as shown in Figure 5.

(6) Disengage the accelerator pump plunger from the pump arm hook by tilting down and out from under hook, as shown in Figure 6. Remove the compression spring.

Place the accelerator pump plunger in a jar of clean gasoline or kerosene to prevent the leather from drying out.

(7) Remove the vacuum power piston from the air horn, using an open end wrench and wood block, as shown in Figure 7. (Exert sufficient pressure on end of wrench to force piston out of its well in air horn. This assembly is staked in the air horn and care should be used at removal). Discard air horn gasket.

(8) Remove the screws that hold the choke valve and the choke piston link bracket to the choke shaft. **These screws are staked to prevent loosening, and care is necessary to avoid breaking in the shaft.** Remove choke lever nut and slide lever off end of choke shaft.

(9) Lift out the choke valve, allowing the link and bracket to hang, then withdraw choke shaft and lever out of the air horn.

Main Body

(10) Remove the venturi cluster attaching screws, then remove the venturi cluster and gasket, as shown in Figure 8. Discard the gasket.

(11) Remove the float fulcrum pin spring, then remove the fuel inlet needle valve, seat and gasket.

(12) Slide the float baffle up out of its grooves, then remove the float and fulcrum pin, as shown in Figure 9.

(13) Invert the carburetor main body and drop out

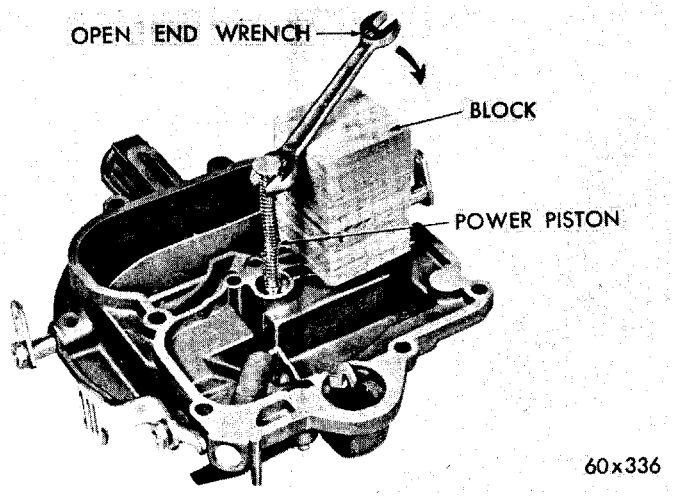


Fig. 7—Removing the Vacuum Power Piston

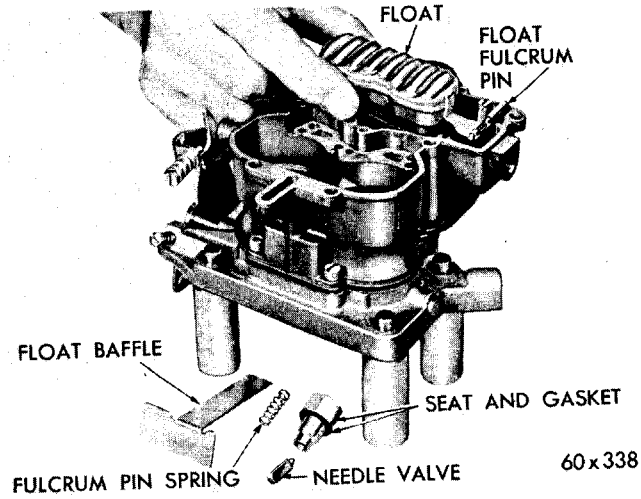


Fig. 9—Removing or Installing Float and Fulcrum Pin

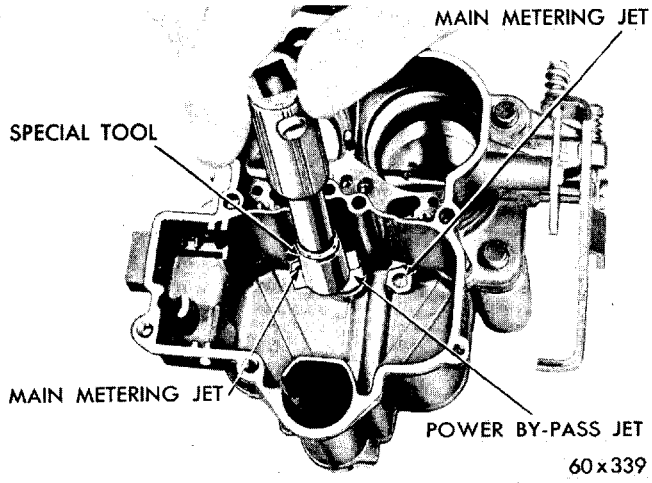


Fig. 10—Removing or Installing Power By-Pass Jet

the discharge check ball from the discharge passage, (refer to Figure 8), and the accelerator pump inlet check ball from the pump well.

(14) Using Tool 73598, remove the power by-pass jet and gaskets, as shown in Figure 10.

(15) Using Tool T109-173, remove the two main metering jets, as shown in Figure 11.

(16) Remove the two air horn screws, used to hold the main and throttle bodies together. Separate the throttle and main bodies, and discard the gasket.

Throttle Body

(17) Unscrew and remove the two idle mixture adjusting screws and springs from the throttle body.

The carburetor now has been disassembled into three units, namely, the air horn, main body and throttle body and the component parts of each disassembled as far as necessary for cleaning and inspection.

It is usually not advisable to remove the throttle shaft or valves unless wear or damage necessitates installation of new parts. To install new valves or throttle shaft, refer to Inspection and Reassembly paragraph.

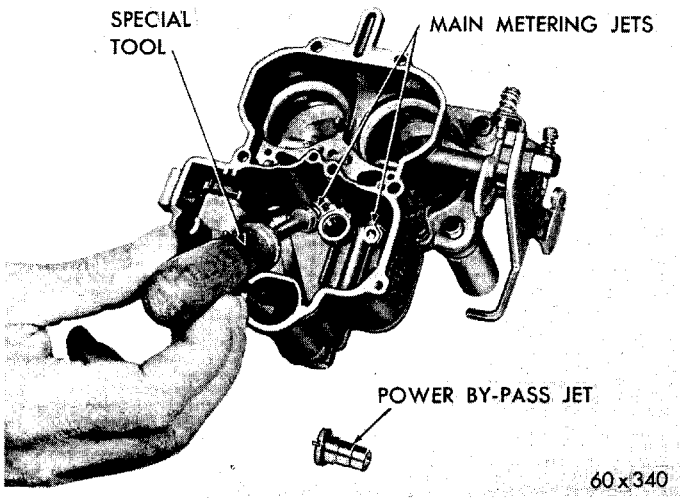


Fig. 11—Removing or Installing the Main Metering Jet

3. CLEANING CARBURETOR PARTS

The recommended solvent for gum deposits is denatured alcohol which is easily obtainable. However, there are other commercial solvents, (such as Metalclene) which may be used with satisfactory results.

IMPORTANT

If the commercial solvent or cleaner recommends the use of water as a rinse, it should be "HOT". After rinsing, all trace of water must be blown from the passages with air pressure. It is further advisable to rinse all parts in clean gasoline or kerosene to be certain no trace of moisture remains. Never clean jets with a wire, drill or other mechanical means because the orifices may become enlarged, making the fuel mixture too rich for proper performance.

4. INSPECTION AND REASSEMBLY

Throttle Body

(1) Check the throttle shaft for excessive wear in the throttle body. If wear is extreme, it is recommendd that the throttle body be replaced, rather than installing a new throttle shaft in the old body.

During manufacture, the location of the idle transfer ports and the spark advance control ports to the valves are carefully established for one particular assembly. (See Figure 12.)

If a new shaft should be installed in an old worn throttle body, it would be very unlikely that the original relationship of these ports to the valves would be obtained. Changing the port relationship would adversely affect normal car operation between the speeds

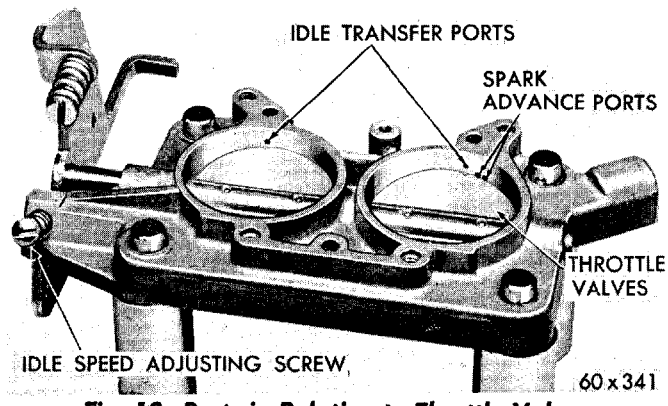


Fig. 12—Ports in Relation to Throttle Valves

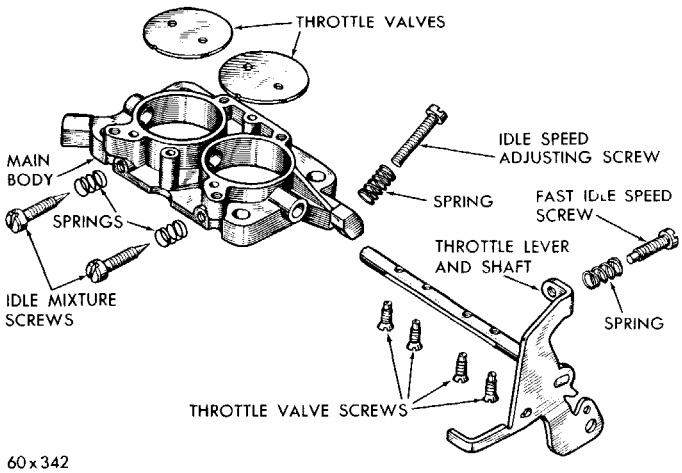


Fig. 13—Throttle Body (Exploded View)

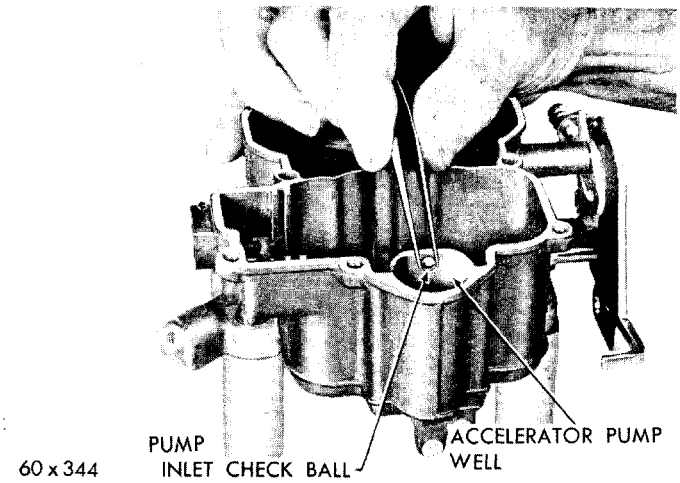


Fig. 15—Installing Accelerator Pump Inlet Check Ball

of 15 and 30 miles per hour. However, if it has been determined that a new shaft or valves are to be installed, adhere closely to the following instructions: To install a new throttle shaft or valves, refer to Figure 13, then proceed as follows:

(2) Mark the valves to be sure each is replaced in the same bore from whence removed (if replacing throttle shaft only).

(3) Remove the screws that hold the throttle valves to the shaft. Slide the valves out of shaft and bore. **CAUTION: These screws are staked on the opposite side and care should be used at removal so as not to break the screws in the shaft.** Remove the staking with a file.

(4) Slide the throttle shaft and lever out of the throttle body.

(5) Install the new throttle shaft and lever in the throttle body. The idle tab on the lever should rest against the stop. **The idle speed adjusting screw must be backed off when seating the valves in the following operation.**

(6) Slide the valves down into position with the notches in the valves at the ports. Install **new** screws but do not tighten. Hold the valves in place with the fingers pressing on the high side of valves.

(7) Tap the valves lightly with a screwdriver to seat in the throttle bores. Holding the valves in this position, tighten the screws securely and stake by squeezing with pliers.

(8) Install the two idle mixture adjusting screws and springs in the throttle body. (The tapered portion must be straight and smooth). If the tapered portion is grooved or ridged, a new idle mixture adjusting screw should be installed to insure having correct idle mixture control.

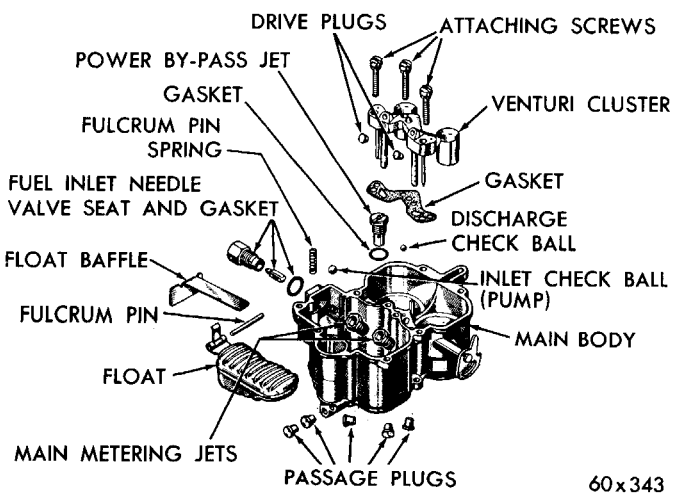


Fig. 14—Main Body (Exploded View)

Idle Mixture Screw Adjustment

DO NOT USE A SCREWDRIVER. The adjustment should be made with the fingers. Turn the screws **lightly** against their seats, then back off one full turn for an approximate setting.

Main Body

To assemble the main body, refer to Figure 14, then proceed as follows:

(1) Place a new gasket on the throttle body, then install main body. Install two short screws to secure.

(2) Install the main metering jets in the main body. Tighten securely, using Tool T109-173. (Refer to Figure 11).

(3) Install the power by-pass jet and new gasket. Tighten securely, using Tool 73598. (Refer to Figure 10).

(4) Install the accelerator pump inlet check ball (⅛ inch) in the pump well, as shown in Figure 15.

(5) Install the accelerator pump discharge check ball ($\frac{3}{16}$ inch) in the discharge passage, as shown in Figure 16.

Accelerator Pump Test

(6) Pour clean gasoline into the carburetor bowl approximately ½ inch deep. Remove the accelerator pump plunger from the jar of gasoline and slide down in its well. Raise the plunger and press lightly on the plunger shaft to expell the air from the pump passage.

(7) Using a small clean brass rod, hold the discharge check ball firmly down on its seat. Raise the pump plunger and press downward. No fuel should be emitted from either the intake or discharge passage, as shown in Figure 17.

(8) If any fuel does emit from either the intake or discharge passages, it indicates the presence of dirt or a damaged check ball. The passages should be recleaned and then thoroughly blown out with compressed air. Examine the check ball for signs of damage that would not allow the ball to seat properly.

(9) Reinstall the check ball and test again. If still leaking, place a piece of drill rod down on the check ball and rap sharply with a hammer. Remove the old check ball and install a new one. Then retest. (This operation forms a new ball seat in the carburetor casting).

(10) Install the venturi cluster gasket, then slide the venturi cluster down into position. Install attaching screws and tighten securely. (Refer to Figure 8).

Again depress the accelerator plunger. A clear straight stream should emit from each jet orifice. If the streams are not identical (if either one is restricted or diverted), remove venturi cluster and reclean.

After test, pour gasoline from the bowl and remove the pump plunger.

(11) Check the float for leaks or damage. If satisfactory for further service, install in position in the bowl. (Refer to Figure 9).

(12) Assemble the fuel inlet needle valve, seat and gasket, then insert in the main body. Tighten securely. (If the needle valve is ridged or grooved, or badly worn, a new inlet needle valve assembly should be installed).

Checking Float Height

(13) Using a "T" scale or Tool 73725, check the float setting, as shown in Figure 18. The float must be ⅛ inch from the top of the main body (gasket removed) with the gauge at the center of the float and the lip held firmly against the fuel inlet needle. **Do not bend float lip by forcing float, use Tool 73605.**

(14) To change the float setting, bend the float lip toward the needle to lower, and away from needle to raise the float.

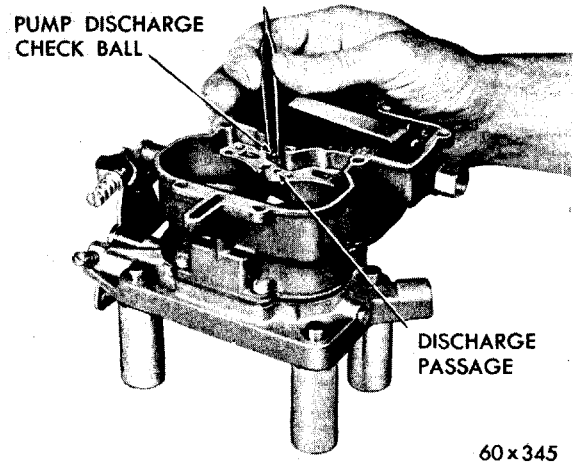


Fig. 16—Installing the Discharge Check Ball

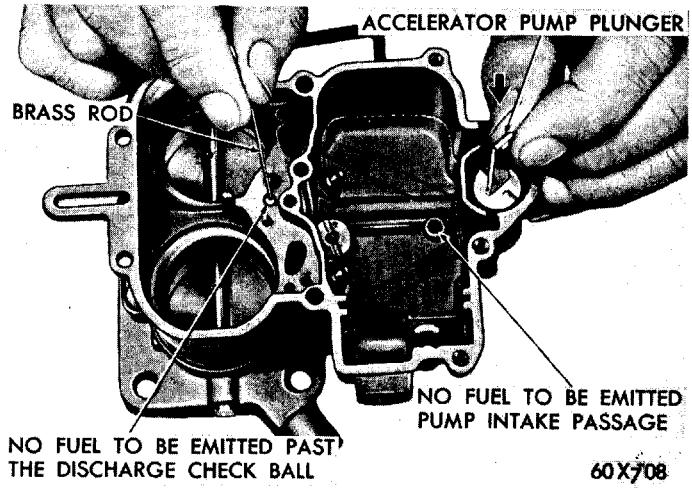


Fig. 17—Testing Accelerator Pump

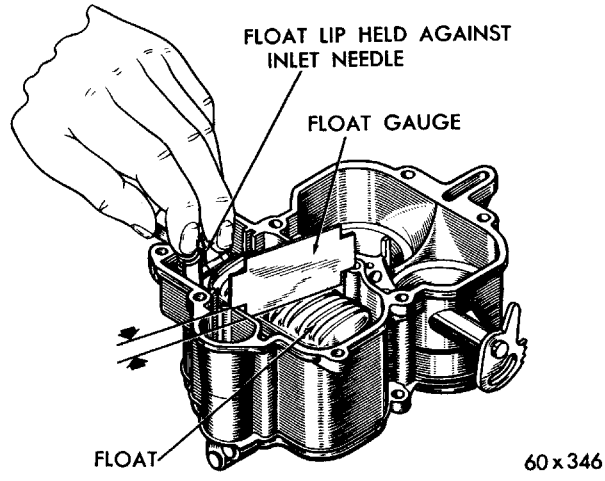


Fig. 18—Checking Float Setting

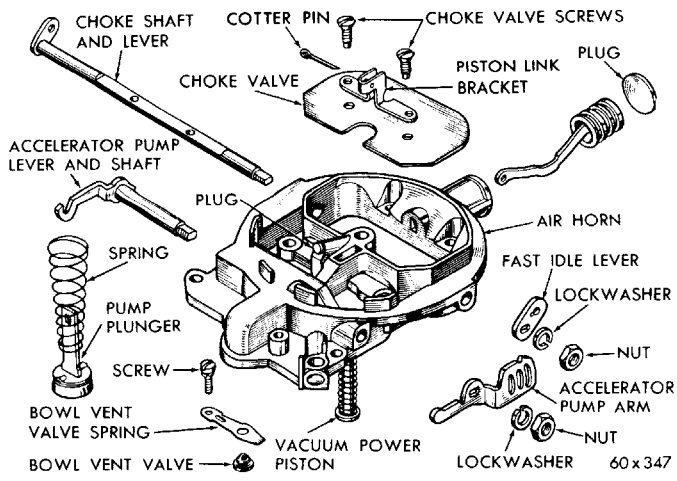


Fig. 19—Air Horn (Exploded View)

(15) Slide the float baffle down into position and then install the fulcrum pin spring. (Refer to Figure 5).

Air Horn

To assemble the air horn, refer to Figure 19, then proceed as follows:

(1) Slide the choke shaft and lever into the air horn with the choke lever pointing down and away from air horn. Slide the choke valve down into the slot in shaft.

(2) Hold the choke valve closed, then position the choke piston bracket and install new screws. **DO NOT TIGHTEN.** Holding the valve in the closed position, tap gently with a screwdriver, to center and locate the valve.

(3) Tighten attaching screws securely, then stake by squeezing with pliers. Reinstall the fast idle lever and secure with lockwasher and nut.

(4) Remove the accelerator pump plunger from the jar of gasoline. Check the leather. If the leather is hard, cracked, or worn, install a new pump plunger. (Be sure and flex the leather several times before installing plunger in air horn).

(5) Slide the compression spring over plunger shaft, then slide plunger over hook and into position. (Refer to Figure 6).

(6) Install a new air horn gasket, then install the vacuum power piston in air horn. Lock in position by prick punching on the retaining rim. Compress the piston plunger to be sure no binding exists. If the piston sticks or binds enough to hinder smooth operation, install a new piston assembly.

Vacuum Kick Adjustment

(7) Insert a #59 drill in the top groove of the vacuum piston, as shown in Figure 20. Apply light closing pressure against the choke valve (to take up slack in parts). It should be possible to insert a #14 drill between the air horn and choke valve. If an adjustment is necessary, bend the ear on the bracket as shown, until correct opening has been obtained.

(8) Install the air horn assembly on the main body, guiding the pump plunger into its well. (Be sure the leather does not curl or fold back). Install retaining screws and tighten securely. (Refer to Figure 5). **The choke valve must be held partially closed while installing the air horn.**

(9) Remove the two short screws holding the main body and throttle body together, (refer to Figure 5), and install in air horn. Reinstall the two long screws and tighten securely.

(10) Install the fast idle rod and secure with hairpin clip. (Refer to Figure 4).

(11) Install the pump rod and secure with hairpin clip. (Be sure rod is in the center slot of arm). (Refer to Figure 3). Work the accelerator pump plunger several times, to be sure it operates smoothly.

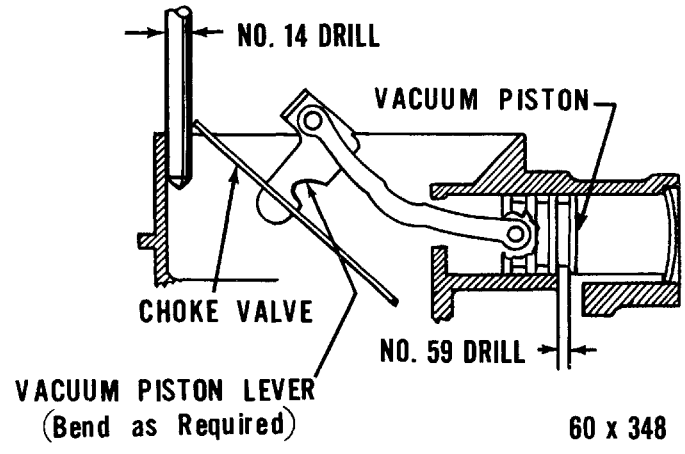


Fig. 20—Vacuum Kick Setting

5. CARBURETOR ADJUSTMENTS

It is very important that the following adjustments be made on a reconditioned carburetor and in the sequence listed, namely:

Fast Idle Speed and Cam Position Setting
Unloader Adjustment (wide open kick)
Accelerator Pump Travel
Bowl Vent Valve Setting
Vacuum Kick Adjustment (Refer to Step 7)

Fast Idle Speed and Cam Position Adjustment

To make the fast idle speed and cam position adjustment, refer to Figure 21, then proceed as follows:

(1) Turn the idle speed adjusting screw **out** far enough to clear the throttle lever tang when the throttle valves are closed.

(2) Hold the throttle valves in the closed position,

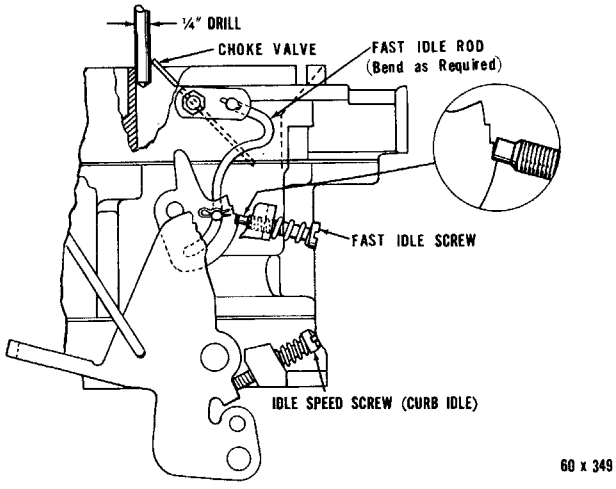


Fig. 21—Fast Idle Speed and Cam Position Setting

then turn the fast idle adjusting screw out until the fast idle cam can be positioned as shown.

(3) From the point of initial contact with the step of the cam, as shown, turn the fast idle screw **in** 3½ turns.

(4) With the fast idle screw held in the position illustrated, move the choke valve (with light pressure) toward the closed position and insert a ¼ inch drill between the choke valve and the wall of the air horn.

(5) If an adjustment is necessary, bend the fast idle rod at the upper bend, using Tool T109-213, until correct opening has been obtained.

Unloaded Adjustment (wide open kick)

To make the unloaded adjustment, refer to Figure 22, then proceed as follows:

(1) Lightly hold the choke valve closed, then open the throttle valves to the wide open position. The choke valve should open sufficiently to allow a ¼ inch drill to be inserted between the choke valve and the wall of the air horn as shown.

(2) To adjust, bend the tang on the throttle lever, using Tool T109-214 until correct opening has been obtained.

(3) Hold the choke valve open and then open and close the throttle valves. Failure to obtain full throttle operation indicates improper assembly or adjustment of the choke mechanism.

(4) With the throttle valves held in the open position, open the choke valve slowly to the wide open position. There should be no bind throughout the entire travel of the choke mechanism.

Accelerator Pump Travel

To check the accelerator pump travel, refer to Figure 23, then proceed as follows:

(1) With the throttle valves fully closed, measure the pump travel from the fully closed to the fully open throttle.

(2) This travel should be $\frac{7}{16}$ inch as shown.

(3) If an adjustment is necessary, bend the pump rod at the point shown, using Tool T109-213, until correct travel has been obtained.

Bowl Vent Valve Setting

To make the bowl vent valve setting, refer to Figure 24, then proceed as follows:

This setting is made after the pump travel setting.

(1) With the idle speed screw set at curb idle, hold the throttle in the closed position, and choke valve wide open.

(2) Check the opening of the bowl vent valve at the center of hole with the rubber valve hanging free.

(3) The opening should be .062 to .094 inch.

(4) If an adjustment is necessary, bend the bowl vent lever, using Tool T109-214, until correct opening has been obtained.

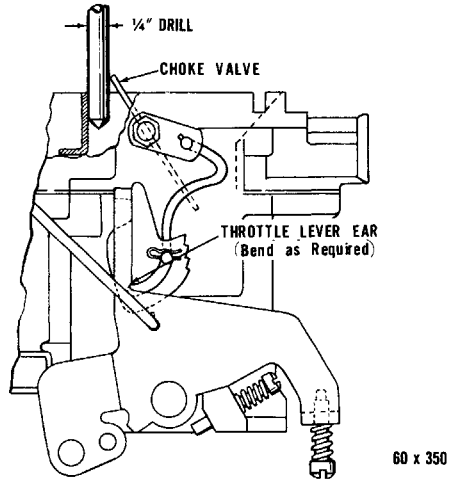


Fig. 22—Unloader Adjustment (wide open kick)

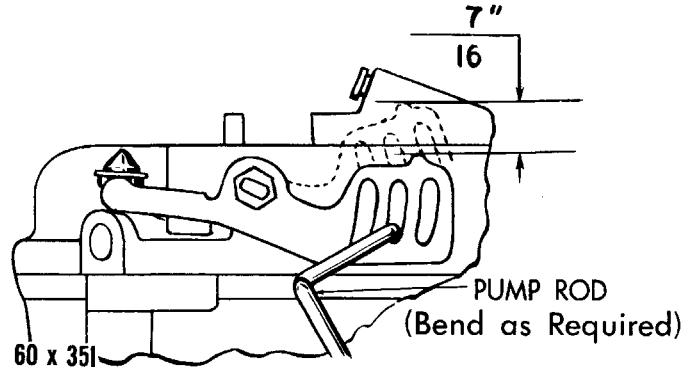


Fig. 23—Accelerator Pump Travel

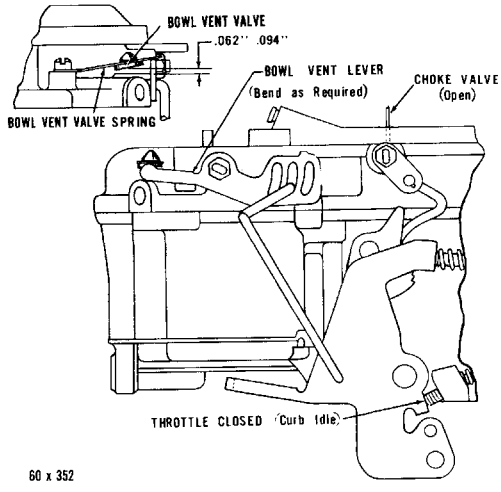


Fig. 24—Bowl Vent Valve Setting

Idle Speed Adjustment

The idle speed adjustment is made after the carburetor has been installed on the engine.

(1) With the throttle valves closed and the choke valve wide open, (engine at normal operating temperature), adjust the idle speed screw to give 500 r.p.m. using a tachometer.

(2) Adjust the idle mixture screws until the engine operates smoothly, then recheck the tachometer and adjust the idle speed screw to give the correct engine r.p.m.

6. AUTOMATIC CHOKE (Well Type)

To function properly, it is important that all parts be clean and move freely. Other than an occasional cleaning, the automatic choke control requires no servicing. However, it is very important that the choke control unit works freely at the thermostatic coil spring housing and at the choke shaft. Move the choke rod up and down to check for free movement of the coil housing on the pivot. If the unit binds, a new unit should be installed.

The well type choke unit is serviced only as a complete unit. Do not attempt to repair.

Figure 25 shows the component parts of the control unit along with the number stamped on the crown of the cover.

When installing the well type choke unit, make certain that the coil housing does not contact the sides of the well. Any contact at this point will affect choke operation.

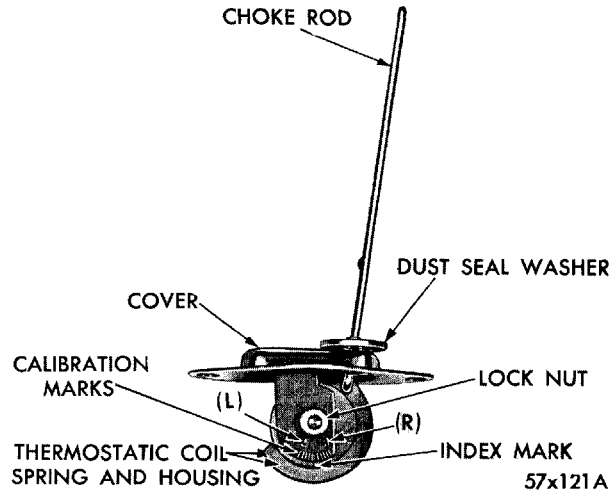


Fig. 25—Automatic Well Type Choke

Do not lubricate any of the choke parts or the control unit, since this causes dirt to accumulate, which would result in a binding condition of the choke mechanism.

Do not attempt to change the calibration setting. This is pre-determined and should it be changed, improper choke action would result.

The choke control unit is accurately adjusted when originally assembled. Under normal service operation, it is recommended **not** to change the setting, or to disassemble the components for servicing. If however, the setting has been disturbed, refer to Figure 26, then reset as follows:

Loosen locknut "A" and turn part with screwdriver until index mark on disk "B" coincides with the first mark to the right of center mark on the bracket. Hold in this position with screwdriver while tightening nut. **After adjustment is made and the choke unit installed on the engine, lift the cover disc and**

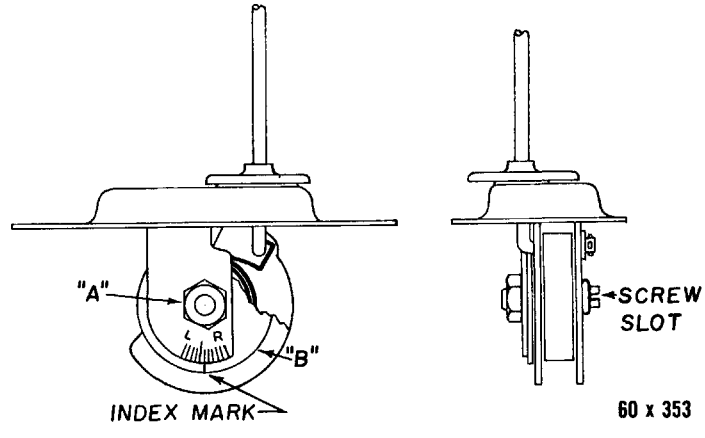


Fig. 26—Adjusting the Well Type Choke

check to see that the rod has clearance when the choke is opened and closed. The rod should have clearance at hole in cover plate.

Checking Float Setting or Fuel Level (on the vehicle)

Remove the three short air horn to main body attaching screws. Then remove one long air horn to throttle body screw next to fuel bowl and assemble short screw through main body flange and thread into the throttle body. Remove long screw from side away from fuel bowl and on opposite side and assemble short screw through main body flange. Securely tighten. Remove remaining two long screws and lift off air horn. After checking float setting or fuel level, assemble air horn and screws in their original position.

HOLLEY R2052A AND R1971A SERIES CARBURETOR

CONTENTS

HOLLEY R2052A and R1971A SERIES CARBURETOR

SPECIFICATIONS

CARBURETOR		
Type	4 Barrel Downdraft	
Part Number (Automatic Transmission)	R1971A	
(Manual Transmission)	R2052A	
BORE		
Primary	1 7/16"	
Secondary	1 7/16"	
VENTURI		
Primary	1 3/16"	
Secondary	1 3/16"	
MAIN METERING JET	R1971A	R2052A
Standard	22R-40 60	22R-40 61
1 Size Lean	22R-40 59	22R-40 60
2 Sizes Lean	22R-40 58	22R-40 59
ADJUSTMENTS		
Idle Mixture	1 Full Turn Open	
Idle Speed (rpm)	500	
With Car Cooling (rpm) (with compressor "on")	500	
Fast Idle Speed (rpm)	1400	
Fast Idle Adjustment	.014"–.016"	
Bowl Vent Valve	.050"–.070"	
Unloader Adjustment (wide open kick) min.	1/16"	
Accelerator Pump Override Adjustment	.015"	
Choke Lever Position	1 3/4"	
Float Setting	Even with Sight Hole	
CHOKE		
Type	Well	
Control	Thermostatic Coil Spring	
Setting	1 Notch Rich	

SPECIAL TOOLS

C-3748	Remover and Installer (Primary Jets)
T109-213	Bending Tool
T109-287S	Elevating Legs (4)
C-3747	Remover and Installer (power valve)

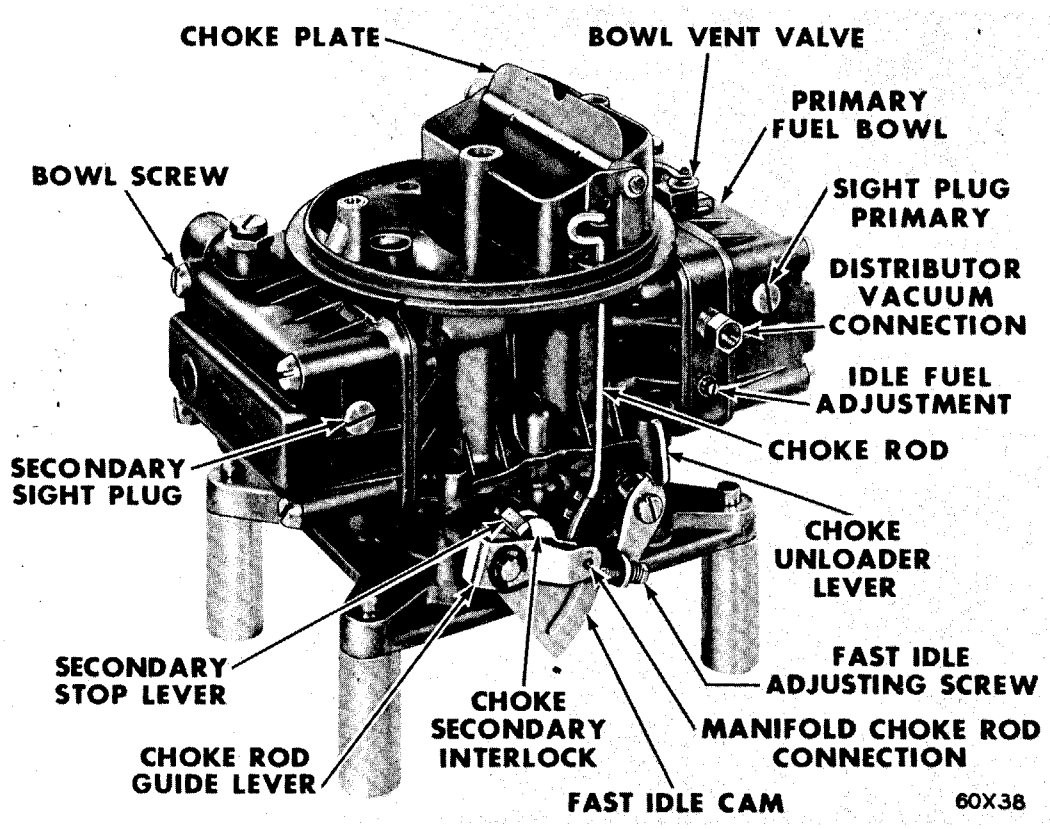


Fig. 1—Carburetor Assembly (R2052A and R1971A)

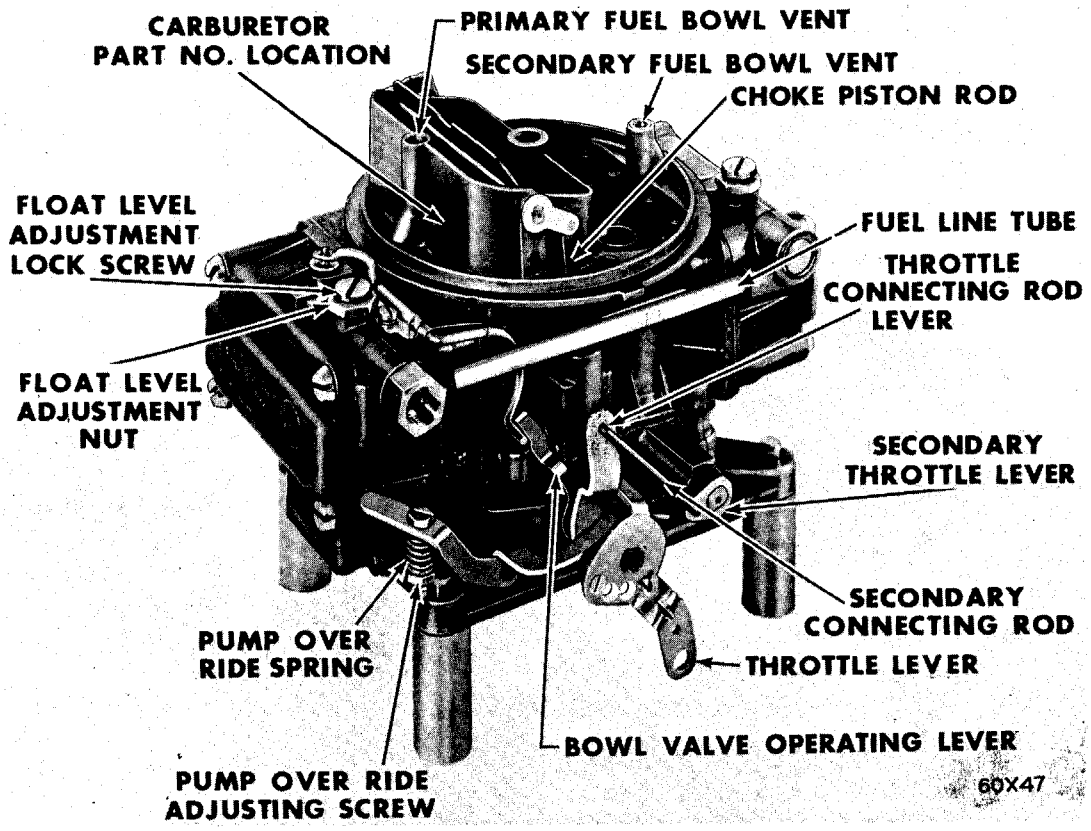


Fig. 2—Carburetor Assembly (R2052A and R1971A)

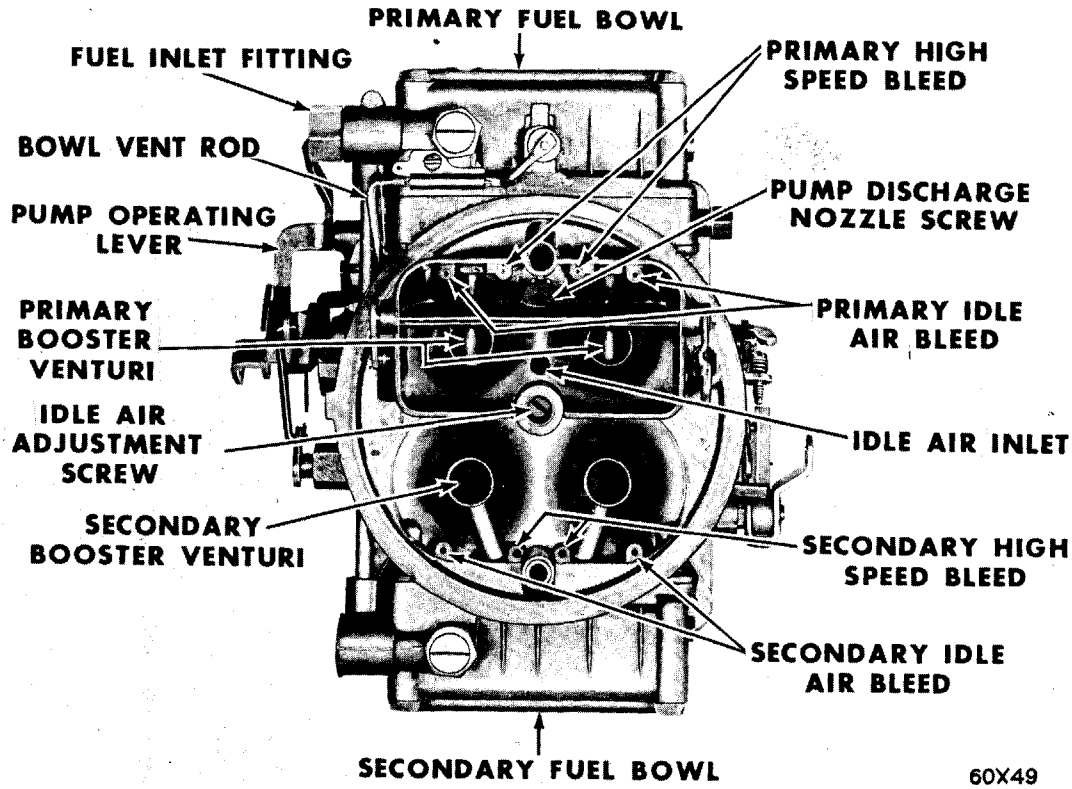


Fig. 3—Carburetor Assembly (R2052A and R1971A) Top View

GENERAL INFORMATION

The Holley Model R-2052A or R-1971A Series Carburetors, shown in Figures 1, 2 and 3, can be considered as two dual downdraft carburetors mounted side by side, each having its own fuel bowl and float system. The two fuel bowls insure a constant supply of fuel for all the fuel metering systems. Fuel from the bowls flow into the primary and the secondary metering bodies where the fuel is mixed with air for all phases of engine operation. This type of metering provides for adequate diagnosis and easier servicing.

The two primary bores have one choke valve, connected to a well type automatic choke. Each bore has its own venturi, booster venturi, main fuel discharge nozzle and throttle valve.

Additional fuel for acceleration is supplied by a diaphragm type, mechanically operated pump which is located on the primary fuel bowl. The pump is actuated from a cam on the primary throttle. An override spring on the pump operating lever prolongs the discharge of fuel for smoother acceleration.

A power valve, mounted on the primary metering body, which is actuated by manifold vacuum, delivers the additional fuel necessary for full power and high speed operation.

The larger volume of fuel, in two separate bowls exposed to the cooling air stream, is an effective means of reducing percolation and hard starting when the engine is hot. An external vent on the primary bowl, vents the primary fuel bowl when the throttle is closed.

The fuel needles and seat assemblies can be removed with this carburetor on the engine. Float level adjustments are made with the engine running.

SERVICE INFORMATION PROCEDURES

1. SERVICING THE CARBURETOR

Dirt, dust, water and gummy deposits are some of the main causes for poor carburetor operation. However, proper cleaning and the installation of new parts, where required, will return the carburetor to its originally designed performance.

When overhauling the carburetor, several items of importance should be observed to assure a good job:

(1) All parts should be carefully cleaned in a suitable solvent, then inspected for damage or wear.

(2) Use air pressure only, to clear the various orifices and channels.

(3) Replace questionable parts with NEW ones.

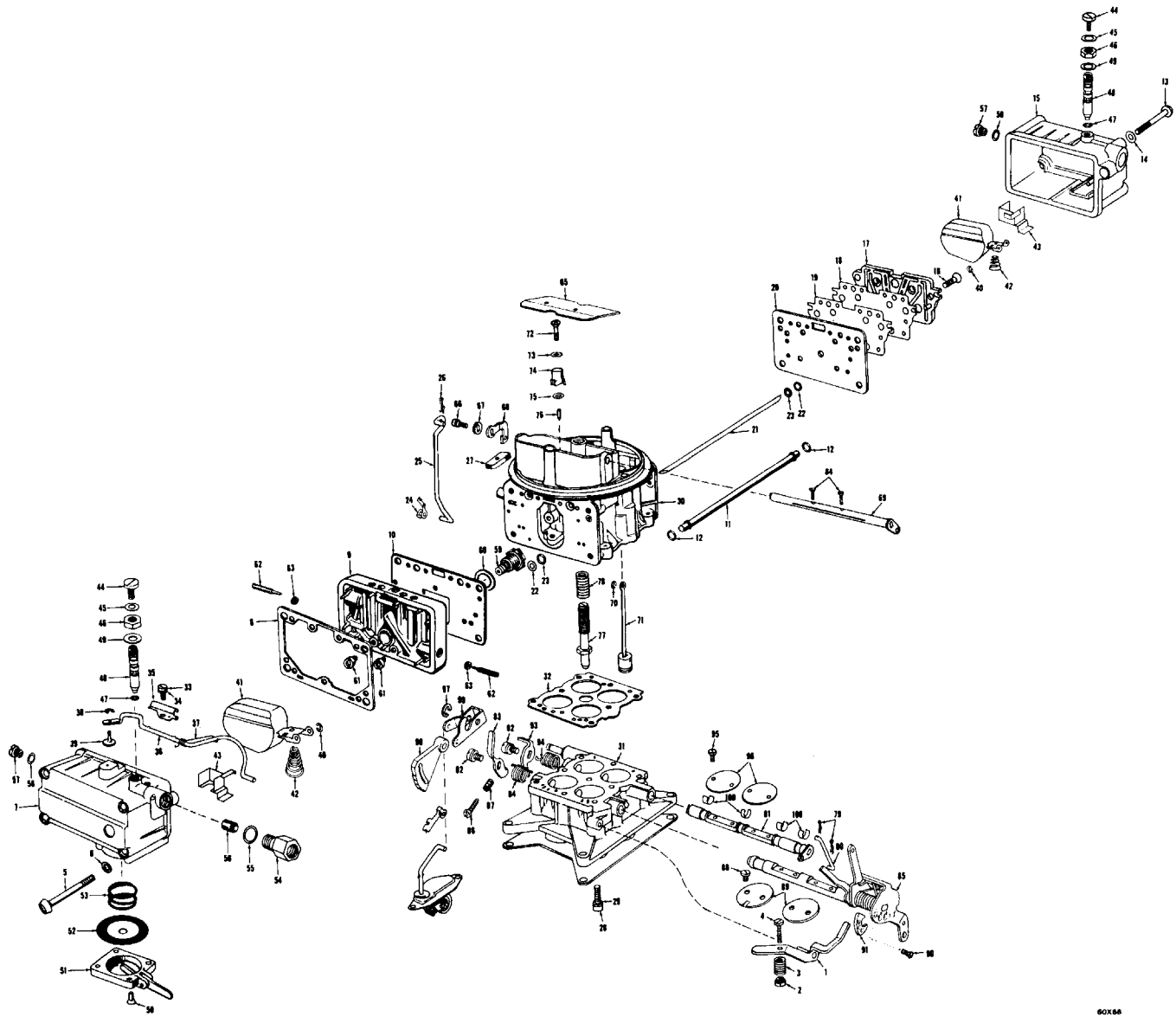


Fig. 4—Carburetor Assembly (Exploded View) R2052A & R1971A

1—Lever, Pump Operating
2—Locknut
3—Spring, override
4—Screw, Pump Adjusting
5—Screw, Fuel Bowl (Primary)
6—Gasket, Bowl Screw
7—Fuel Bowl (Primary)
8—Gasket, Fuel Bowl
9—Metering Body (Primary Side)
10—Gasket, Metering Body
11—Fuel Tube (Float Bowl Connecting)
12—"O" rings, Fuel Tube
13—Screw, Fuel Bowl (Secondary)
14—Gasket, Bowl Screw
15—Fuel Bowl (Secondary)
16—Screw, Metering Body (Secondary)
17—Metering Body (Secondary)
18—Gasket, Metering Body (Secondary)
19—Plate, Metering Body (Secondary)
20—Gasket, Metering Body Plate
21—Balance Tube
22—Washers, Balance Tube
23—"O" Rings, Balance Tube
24—Spring Clip, Choke Rod
25—Choke Rod
26—Retainer, Choke Rod
27—Seal, Choke Rod
28—Throttle Body Screws
29—Lockwashers, Throttle Body Screws
30—Main Body
31—Throttle Body
32—Gasket, Main to Throttle Body
33—Screw, Bowl Vent Valve Rod Clamp
34—Lockwasher
35—Clamp, Valve Rod
36—Rod, Bowl Vent Valve
37—Spring Vent Valve Rod
38—Retainer Clips Bowl Vent Valve
39—Valve, Bowl Vent
40—Retainer, Clip, Float
41—Float
42—Spring, Float
43—Baffle, Float
44—Screw, Float Adjusting Lock
45—Seal, Lock Screw
46—Nut, Float Adjusting
47—"O" Seal, Needle Valve
48—Needle Valve and Seat
49—Seal, Adusting Nut
50—Screws, Fuel Pump Cover
51—Cover Assembly, Fuel Pump
52—Diaphragm, Fuel Pump
53—Spring, Fuel Pump Diaphragm
54—Fitting, Fuel Inlet
55—Gasket, Fuel Inlet, Fitting
56—Screen, Fuel Inlet Filter
57—Plug, Fuel Bowl Sight
58—Gasket, Sight Plug
59—Valve Assembly, Power
60—Gasket, Power Valve

Fig. 4—Carburetor Assembly (Exploded View) Continued

61—Primary Jets
62—Needles, Idle Adjusting
63—Seal, Idle Needles
64—Screws, Choke Valve
65—Choke Valve
66—Screw and Washer, Choke Shaft
67—Flatwasher, Choke Shaft
68—Lever, Choke Shaft
69—Choke Shaft
70—Retainer Clip, Vacuum Piston Link
71—Link, Vacuum Piston
72—Discharge Nozzle Screw, Pump
73—Gaskets, Nozzle Screw
74—Nozzle, Pump Discharge
75—Gasket, Nozzle
76—Needle, Pump Discharge Jet
77—Adjusting Screw, Idle Air
78—Spring, Idle Air Adjusting Screw
79—Cotter pins, Connecting Rods
80—Rod, Secondary Connecting
81—Shaft, Secondary Throttle
82—Screw and Lockwasher, Fast Idle Cam Lever
83—Lever, Fast Idle Cam
84—Spring, Cam Lever
85—Throttle Shaft Assembly, Primary
86—Screw, Fast Idle Cam
87—Spring, Fast Idle Cam Screw
88—Screws, Primary Throttle Valve
89—Throttle Valves, Primary
90—Screw, Pump Cam
91—Pump Cam
92—Screw and Lockwasher, Secondary Stop Lever
93—Lever, Secondary Stop
94—Spring, Secondary Stop Lever
95—Screws, Secondary Throttle Valves
96—Throttle Valves, Secondary
97—Retainer Clip, Fast Idle Cam
98—Fast Idle Cam
99—Lever, Choke
100—Bushings, Secondary Throttle Shaft

When checking parts removed from the carburetor, it is at times rather difficult to be sure they are satisfactory for further service. It is, therefore, recommended that in such cases, NEW parts be installed.

(4) Always use a complete repair kit when overhauling the carburetor. Using the code number stamped on the air horn, adjacent to the fuel inlet, refer to the parts catalog and order the correct repair kit for the carburetor being worked on.

2. DISASSEMBLING THE CARBURETOR

To disassemble the carburetor for cleaning or overhaul, refer to Figures 1, 2, 3 and 4, then proceed as follows:

(1) Install four elevating legs, Tool T109-287S in the mounting flange holes in the throttle body. These legs are used to protect the throttle valves from damage and to provide a suitable base for working.

(2) Remove the accelerator pump operating lever assembly, then remove adjusting nut, spring and bolt from the lever, as shown in Figure 5.

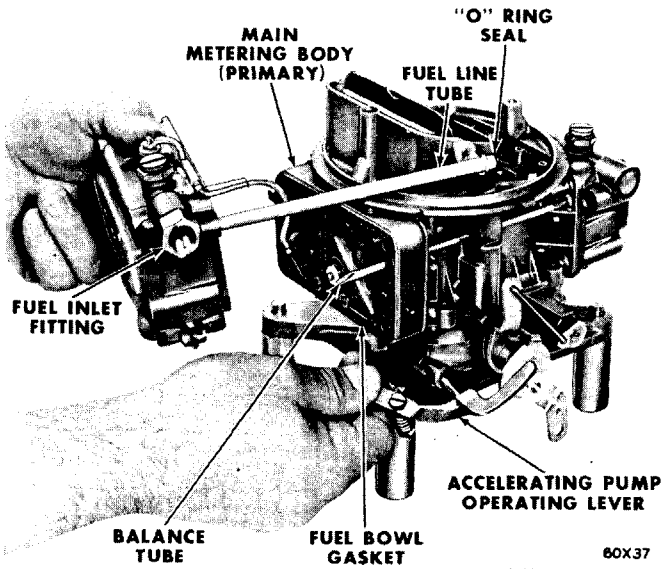


Fig. 5—Removing or Installing Pump Lever and Fuel Bowl

(3) Remove the primary fuel bowl and metering body by sliding the assembly straight off the balance tube, as shown in Figure 5.

(4) Remove the fuel tube and "O" rings.

(5) Remove the secondary fuel bowl.

(6) Remove the secondary metering body and plate, see Figure 6.

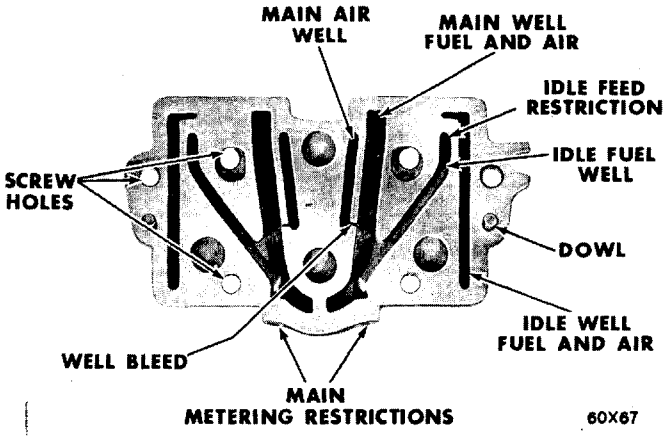


Fig. 6—Secondary Metering Body Identification

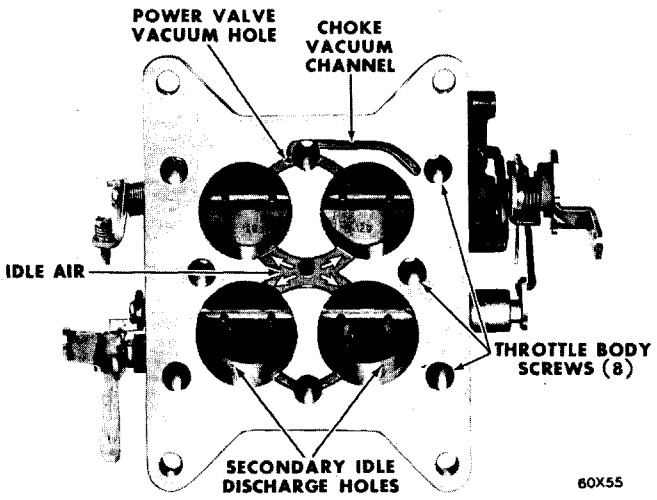


Fig. 7—Throttle Body Inverted

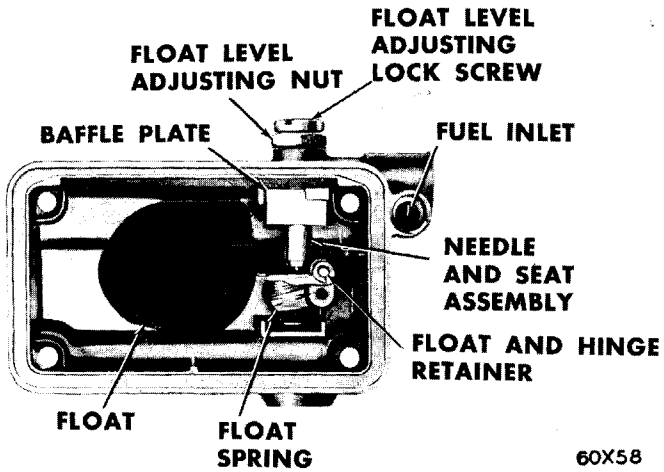


Fig. 8—Primary Fuel Bowl Assembly

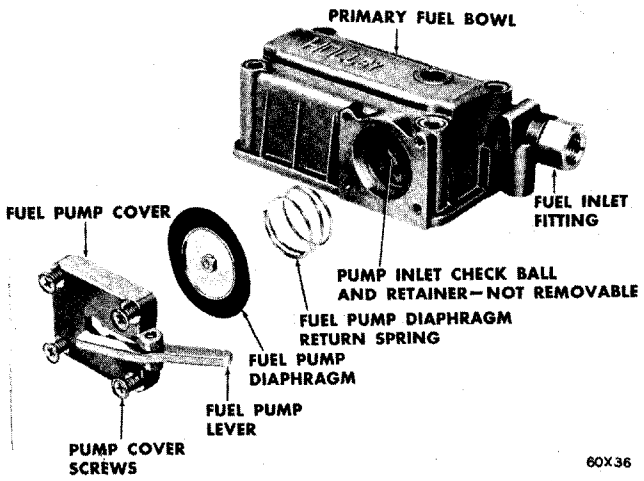


Fig. 10—Accelerator Pump (Fuel Pump — Exploded View)

(7) Remove the balance tube, washers and "O" rings.

(8) Remove the choke connector rod by sliding upward through the seal and carburetor body.

(9) Remove the choke connector rod and seal.

(10) Refer to Figure 7, then remove the screws that attach the throttle body to the main body. Separate bodies and discard the gasket.

Fuel Bowls

(11) Remove the primary bowl vent valve assembly.

(12) Remove the float retainer clip, then slide float and spring out of float chamber (see Figure 8). Remove the float baffle.

(13) Remove the float adjusting lockscrew and gasket (see Figure 9).

(14) Remove the needle valve and seat assembly, by turning float adjusting nut. Lift out needle valve assembly, then discard the "O" ring (refer to Figure 9).

(15) Remove the screws that attach the accelerator pump cover (fuel pump) to the primary fuel bowl. Remove the diaphragm assembly and spring (see Figure 10).

(16) Remove the fuel inlet fitting and filter screen.

(17) Remove the sight plug and gasket.

(18) Disassemble the secondary fuel bowl, after removal, as described in Steps 12, 13 and 14.

Main Metering Body

(19) Using Tool C-3747, remove the power valve assembly from the primary metering body, as shown in Figure 11.

(20) Using Tool C-3748, remove the main metering jets, as shown in Figure 12.

(21) Remove the idle adjusting needles and gaskets.

Main Body

(22) Remove the choke vacuum piston from the main body. (See Figure 13).

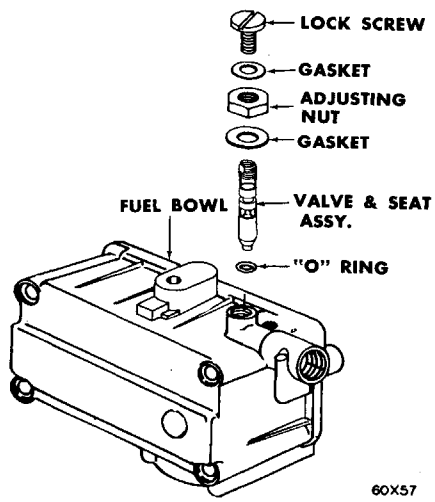


Fig. 9—Fuel Inlet Needle Valve and Seat (Exploded View)

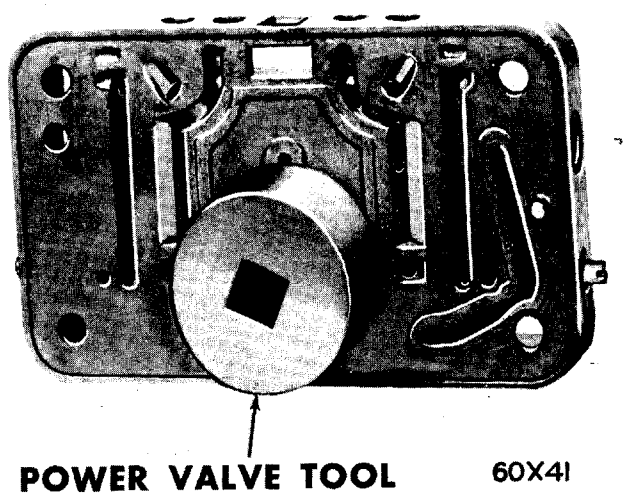


Fig. 11—Removing or Installing Power Valve

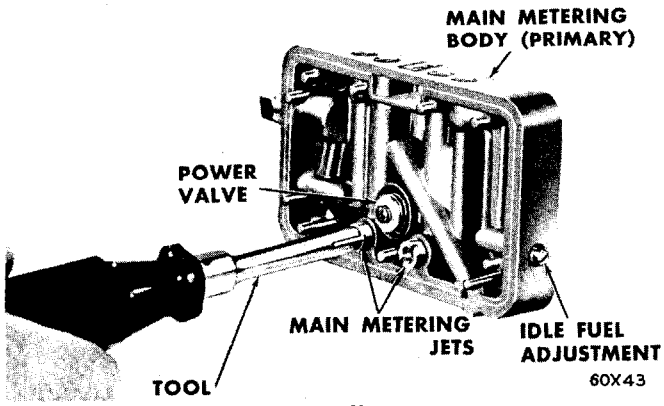


Fig. 12—Removing or Installing Main Metering Jets

(23) Remove the choke valve from the choke shaft, then slide choke shaft out of main body.

(24) Remove the pump discharge nozzle screw, nozzle and gaskets.

(25) Invert the main body and drop out the pump discharge needle.

(26) Remove the idle air adjusting screw from the well in the top of main body, by turning the screw clockwise to remove screw and spring from the underside of the main body.

Throttle Body

(27) Scribe lines on the throttle valves along the throttle shafts and mark valves, using paint or ink, for proper location at reassembly. Remove the valves from the throttle shafts.

(28) Remove the secondary throttle connecting rod.

(29) Remove the fast idle cam assembly and spring from the end of the primary shaft. Slide shaft out of body.

(30) Remove the pump cam (only) from the primary shaft assembly.

(31) Remove the secondary shaft lever. Slide shaft out of body and remove the four ribbon bushings from the shaft.

(32) Remove the clip that attaches the fast idle cam and choke lever to the stub shaft. Remove fast idle cam and choke lever.

3. CLEANING CARBURETOR PARTS

The recommended solvent for gum deposits is denatured alcohol which is easily obtainable. However, there are other commercial solvents (such as Metalclene) which may be used with satisfactory results.

IMPORTANT

If the commercial solvent or cleaner rec-

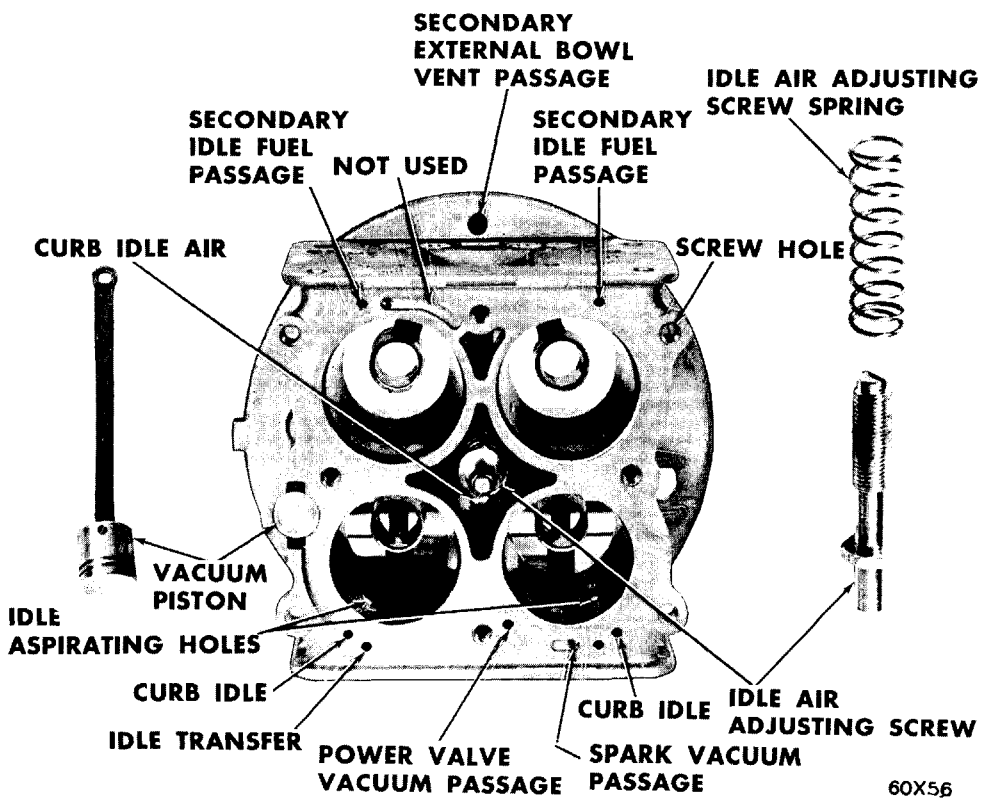


Fig. 13—Main Body Identification (Bottom View)

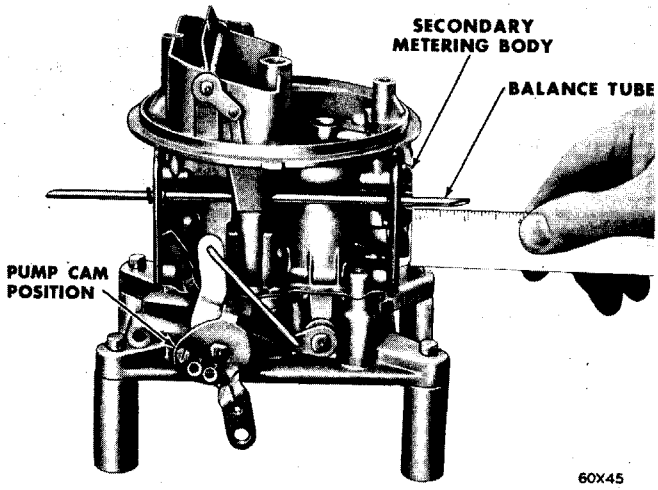


Fig. 14—Positioning the Balance Tube

ommends the use of water as a rinse, it should be "HOT". After rinsing, all trace of water must be blown from the passages with air pressure. It is further advisable to rinse all parts in clean gasoline or kerosene to be certain no trace of moisture remains. Never clean jets with a wire, drill or other mechanical means because the orifices may become enlarged, making the fuel mixture too rich for proper performance.

4. INSPECTION AND REASSEMBLY

Throttle Body

(1) Wrap two ribbon bushings in grooves nearest lever end of secondary throttle shaft and install shaft almost into position.

(2) Wrap bushing in farthest groove and start bushing into housing.

(3) Wrap narrow bushing in groove and push shaft into position.

(4) Install throttle valves as marked before removal but do not tighten.

(5) Install pump cam to primary throttle lever, using center hole, as shown in Figure 14.

(6) Install primary throttle shaft and attach throttle valves as marked before removal, but do not tighten.

(7) Install secondary throttle connector rod.

(8) Center the four throttle valves in their bores by slowly tightening the screws while closing the throttle valves and opening them slightly. When tight, shafts must operate smoothly, without drag or sticking. Also the light, which is visible around the throttle valves when closed, should be uniform in the bores.

(9) Locate fast idle cam spring on primary throttle shaft with hook in hole in body.

(10) Install fast idle lever assembly on shaft.

(11) Bring outer end of spring up over lever.

(12) Locate secondary throttle shaft stop lever with hooked end on lever and install spring on shaft with straight end extending downward between the shaft and the boss on body. Install the lever.

(13) Install fast idle cam and choke lever on stub shaft.

Primary Metering Body

(1) Install idle fuel adjustment needles and gaskets finger tight, then out one turn.

(2) Install power valve, using Tool C-3747. (Refer to Figure 11). Tighten securely.

(3) Install primary main jets with Tool C-3748. (Refer to Figure 12).

Fuel Bowls

(1) Test pump inlet check ball for proper seating. Hold finger over outlet hole in edge of bowl casting and blowing against check ball. No air should escape into bowl.

(2) Install accelerator pump spring, diaphragm and housing assembly with diaphragm contact button toward pump lever. (Refer to Figure 10).

(3) Install float, spring and clip.

(4) Install new "O" ring on inlet needle and seat assembly. Install the assembly, using the adjusting nut. Invert the bowl and adjust until top of float is parallel with housing, as shown in Figure 15. Install gaskets and lock screw.

(5) Install baffle.

(6) Install inlet screen and fitting.

(7) Install sight plug and gasket.

(8) Assemble the secondary fuel bowl, using steps (3), (4), (5), and (7).

Main Body

(1) Install idle air adjusting screw and spring from underside of body. Turn screw until end of screw is above base of body.

(2) Install choke shaft assembly. (Valve will be installed later).

(3) Install choke vacuum piston. Attach to choke shaft with clip.

(4) Install main body on throttle body. Gasket must seal the vacuum bore.

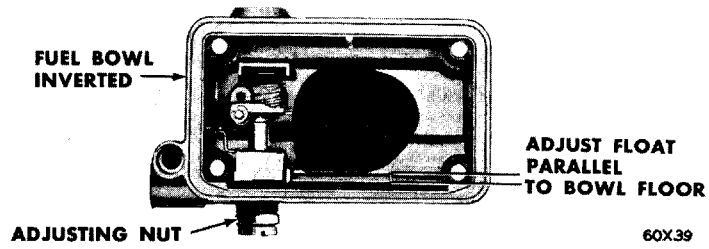


Fig. 15—Positioning the Float (Approximate Setting)

(5) Install primary metering body and gasket.

(6) Install balance tube, "O" rings and washers. (Refer to Figure 14).

(7) Install primary fuel bowl and gasket.

(8) Install accelerator pump discharge needle.

(9) Test the needle for seating. Pour clean gasoline into primary fuel bowl. Hold needle on seat with a small rod and push pump lever down. Fuel should not escape past needle.

(10) Install pump discharge nozzle, gaskets and screw.

(11) Test nozzle operation. Press pump lever down. The two streams of fuel should be equal and should strike the two venturi in the same spot.

(12) Install choke valve (with curve down), centering the valve in the opening before final tightening.

(13) Install secondary metering body plate, gasket, plate, body gasket and body.

(14) Adjust balance tube to extend one inch beyond metering body. (Refer to Figure 14).

(15) Place "O" rings on ends of fuel tube and install fuel tube in primary bowl. "O" ring will roll on tube, against the stop.

(16) Install secondary fuel bowl and gasket.

(17) Install bowl vent valve assembly on primary fuel bowl.

(18) Install choke connector rod seal.

(19) Install choke connector rod.

(20) Adjust idle air adjusting screw, as shown in Figure 16. Seat the screw lightly, then back off one turn. (use screwdriver).

5. CARBURETOR ADJUSTMENTS

It is very important that the following adjustments be made on a reconditioned carburetor:

Checking the Bowl Vent Valve Clearance

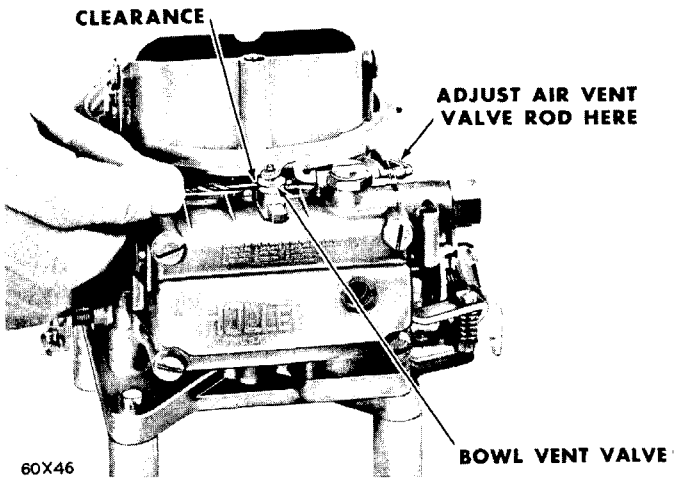


Fig. 17—Checking the Bowl Vent Valve Clearance

Checking the Pump Lever Clearance
Checking the Choke Lever Position
Choke Unloader Adjustment
Fast Idle Adjustment
Checking Fuel Level in Bowl (on vehicle).

Checking the Bowl Vent Valve Clearance

To check the bowl vent valve clearance, refer to Figure 17, then proceed as follows:

(1) With the throttle valves fully closed, it should be possible to insert a .050 to .070 inch drill shank between the bowl vent valve and the air horn, as shown.

(2) If an adjustment is necessary, bend the rod to change the arc of contact with the throttle lever, using Tool T109-213, until correct clearance has been obtained.

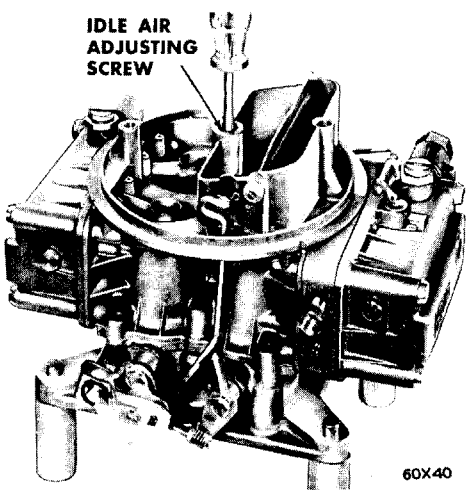


Fig. 16—Adjusting the Idle Air Needle

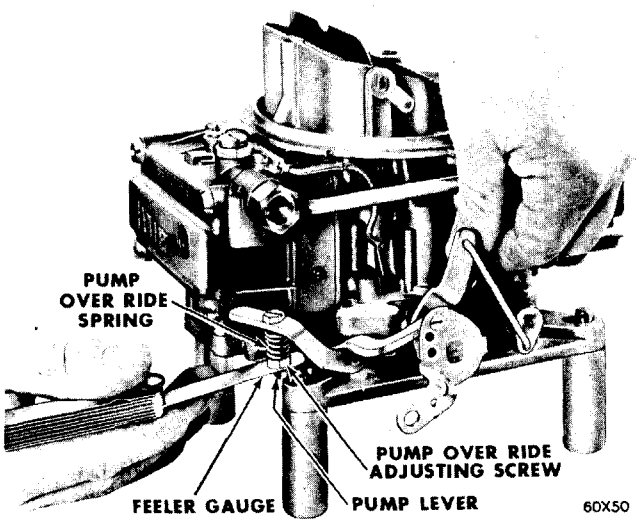


Fig. 18—Checking the Accelerator Pump Lever Clearance

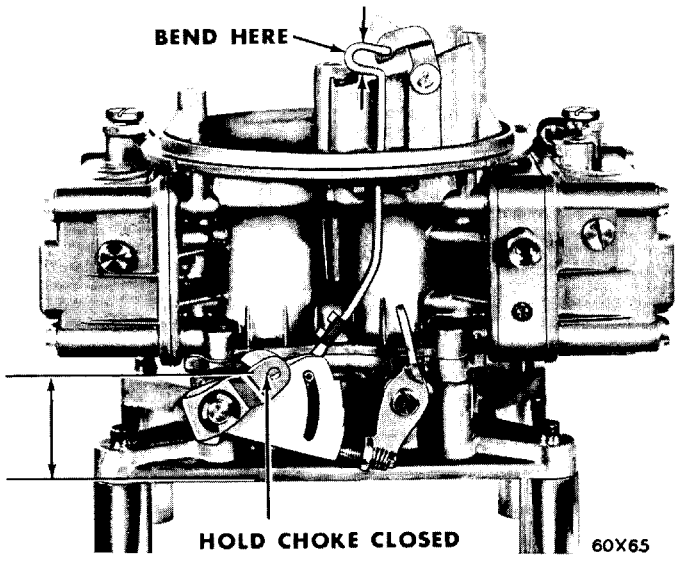


Fig. 19—Checking the Choke Lever Position

Checking the Pump Lever Clearance

To check the accelerator pump lever over-ride clearance, refer to Figure 18, then proceed as follows:

(1) With the throttle valves wide open, and the pump lever held down, it should be possible to insert a .015 inch feeler gauge between the adjusting nut and lever, as shown.

(2) If an adjustment is necessary, adjust the pump over-ride screw, until correct clearance has been obtained.

Checking the Choke Lever Position

To check the choke lever position, refer to Figure 19, then proceed as follows:

(1) Hold the choke closed with the choke lever. Measure the distance from the center of hole in the lever to the underside of the throttle body as shown.

(2) This measurement should be 1 and ¾ inches.

(3) If an adjustment is necessary, bend the top portion of the choke connector rod, as shown, using Tool T109-213 until correct measurement has been obtained.

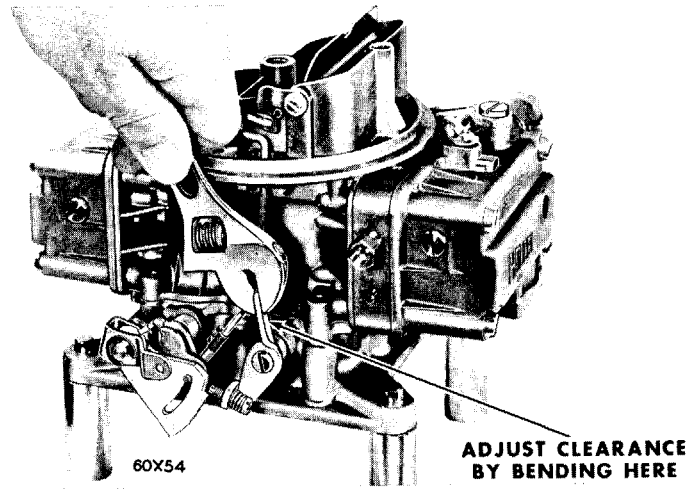


Fig. 21—Bending the Fast Idle Cam Lever

Choke Unloader Adjustment — (Wide Open Kick)

To check the choke unloader adjustment, refer to Figure 20, then proceed as follows:

(1) Hold the choke valve lightly closed, then open the throttle valves to wide open position.

(2) The choke valve should open sufficiently to allow a minimum of a $\frac{1}{16}$ inch drill shank between the wall of air horn and choke valve.

(3) If an adjustment is necessary, bend the fast idle cam lever, as shown in Figure 21, until correct clearance has been obtained.

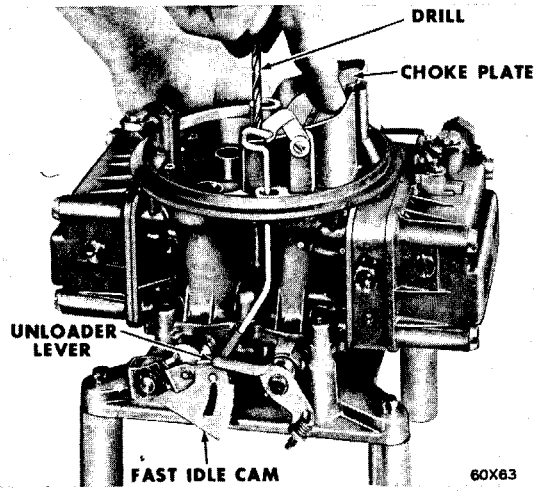


Fig. 20—Choke Unloaded Adjustment (wide open kick)

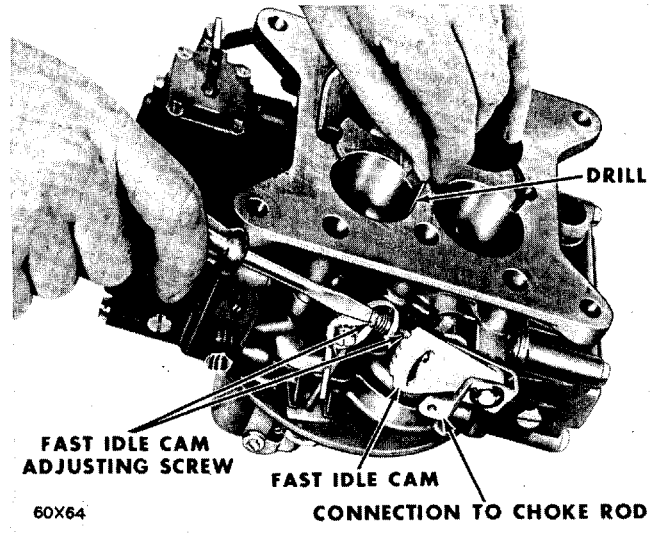


Fig. 22—Fast Idle Adjustment

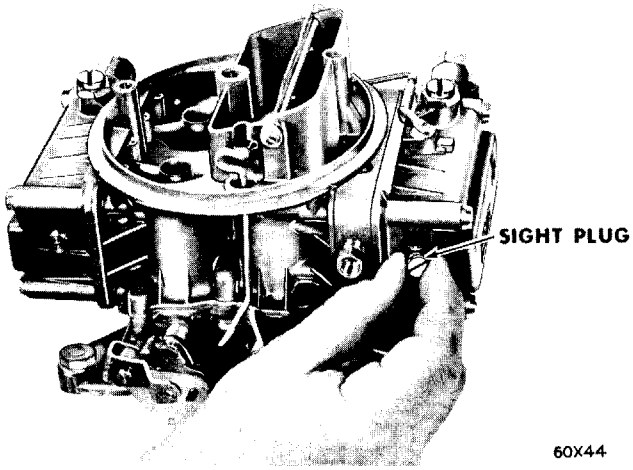


Fig. 23—Removing or Installing Sight Plug

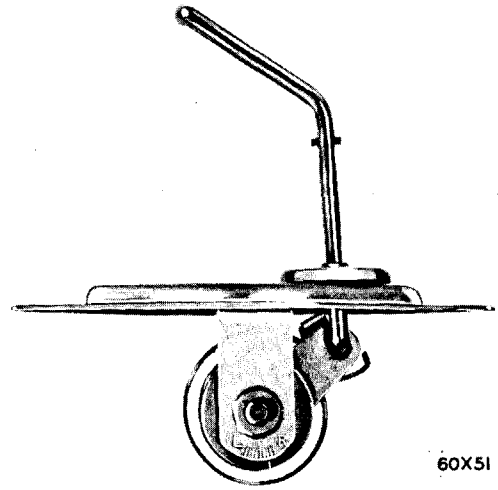


Fig. 25—Automatic choke (well type)

Fast Idle Adjustment

To make or check the fast idle adjustment, refer to Figure 22, then proceed as follows:

(1) With the choke and the throttle valves fully closed (carburetor inverted) and the fast idle screw in contact with the high step on the fast idle cam, as shown. Turn the fast idle screw **in** or **out,** until it is possible to insert a .014 to .016 inch drill shank between primary throttle valves and bore (side toward center) as shown.

(2) Turn the screw until drill shank is trapped then back off until a slight drag is felt as drill is being removed.

Checking Fuel Level in Bowl (on vehicle)

(1) To check the fuel level in the bowl, start the engine then remove the sight plug from the primary bowl, as shown in Figure 23.

(2) Using a wrench and screwdriver, turn the adjusting nut either up or down until the fuel just dribbles out of the sight hole, as shown in Figure 24.

(3) After correct level has been obtained, tighten the lock screw while holding adjusting nut with wrench.

(4) Reinstall sight plug and tighten securely.

Check the fuel level in the secondary bowl in the same manner. **CAUTION: It is suggested that suitable precaution be taken by placing a shop towel or a container under the bowl to catch any fuel that might be liberated due to a high improper previous setting.**

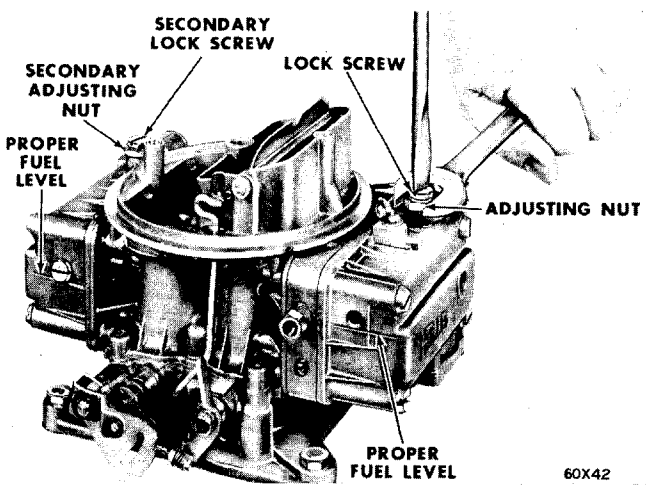


Fig. 24—Adjusting Fuel Level in Bowl

6. AUTOMATIC CHOKE (well type)

To function properly, it is important that all parts be clean and move freely. Other than an occasional cleaning, the automatic choke control requires no servicing. However, it is very important that the choke control unit works freely at the thermostatic coil spring housing and at the choke shaft. Move the choke rod up and down to check for free movement of the coil housing on the pivot. If the unit binds, a new unit should be installed. **The well type choke unit is serviced only as a complete unit. Do not attempt to repair.**

Figure 25 shows the component parts of the control unit along with the number stamped on the crown of the cover.

When installing the well type choke unit, make certain that the coil housing does not contact the sides of the well. Any contact at this point will affect choke operation.

Do not lubricate any of the choke parts or the control unit, since this causes dirt to accumulate, which would result in a binding condition of the choke mechanism.

Do not attempt to change the calibration setting. This is pre-determined and should it be changed, improper choke action would result.

AFB SERIES CARTER CARBURETOR

CONTENTS

AFB CARBURETOR SPECIFICATIONS

CARBURETOR				
Type	4 Barrel Downdraft			
Model (automatic transmission)	AFB-2991S	—	AFB-2968S	AFB-2903S
(manual transmission)	—	AFB-2948S	—	—
THROTTLE BORE				
Primary	1 7/16"	1 7/16"	1 7/16"	1 7/16"
Secondary	1 7/16"	1 9/16	1 9/16"	1 11/16"
MAIN VENTURI				
Primary	1 3/16"	1 1/16"	1 3/16"	1 3/16"
Secondary	1 3/16"	1 1/4"	1 5/16"	1 9/16"
LOW SPEED JET				
Primary	#65—.035"	#68—.031	#65—.035"	#65—.035"
ADJUSTMENTS				
Accelerator Pump Setting				
(top of plunger to airhorn)	7/16"	7/16"	7/16"	1/4"
Choke Unloader (wide open kick)	1/4"	1/4"	1/4"	1/4"
Fast Idle Adjustment	.020"	.010"	.020"	.010"
Fast Idle Speed (rpm)	1775-1825	1200-1300	1775-1825	1475-1525
Idle Speed Adjustment (rpm)	500	500	500	700-725
(with air conditioning) rpm	550	550	550	700-725
Secondary Throttle Lever Adjustment	1 9/64"	1 9/64"	1 9/64"	1 9/64"
Secondary Throttle Lock-out Adjustment	.020"	.020"	.020"	.020"
Float Setting (gasket to top of floats)	7/32"	5/16	7/32"	9/32"
Float Drop	3/4"	3/4"	3/4"	3/4"
Idle Mixture (both screws—turns open)	1-2	1-2	1-2	1-2
Automatic Choke Unit Setting	on index	on index	on index	1 notch rich
Velocity Valve Adjustment	—	—	—	—

SPECIAL TOOLS

C-3400	Repair Stand
T109-287S	Elevating Legs
T109-58	Screwdriver Bit
T109-59	Screwdriver Bit
T109-106	Float Gauge (7/32")
T109-107	Float Gauge (5/16"
T109-22	Bending Tool
T109-200	Wire Gauge—.010" and .012" (fast idle)
T109-213	Bending Tool
T109-31	Gauge 1/4" (choke unloader)
T109-41	Bending Tool (fast idle and unloader)
T109-29	Wire Gauge—.020" and .030" (fast idle)
T109-126	Float Gauge (9/32")

GENERAL DESCRIPTION

The AFB (aluminum four barrel) carburetor contains many features, some of which are, a new location for the step-up rods and pistons. The step-up rods, pistons and springs are accessible for service without removing the air horn, or the carburetor from the engine. The venturi assemblies (primary and secondary) are replaceable and contain many of the calibration points for both the high and low speed system. One fuel bowl feeds both the primary and secondary nozzles on the right side while the other fuel bowl takes care of the primary and secondary nozzles on the left side. This provides improved performance in cornering, quick stops and acceleration.

All the major castings of the carburetor are aluminum, with the throttle body cast integral with the main body. This allows an overall height reduction in the carburetor. The section containing the accelerator pump is termed the primary side of the carburetor. The rear section is the secondary. The five conventional systems used in previous four barrel carburetors are also used in this unit. The five conventional systems are, two float systems, two low speed systems, (primary side only) two high speed systems, one accelerator pump system and one automatic choke control system.

SERVICE INFORMATION

PROCEDURES

1. SERVICING THE CARBURETOR

Dirt, dust, water and gummy deposits are some of the main causes for poor carburetor operation. However, proper cleaning and the installation of new parts, where required, will return the carburetor to its originally designed performance.

When overhauling the AFB Carburetor, several items of importance should be observed to assure a good job.

The carburetor should be carefully disassembled.

All parts cleaned in a suitable solvent, then inspected for wear or damage.

Air pressure only should be used to clean the various orifices and channels.

Questionable parts should be replaced with new ones. When inspecting parts removed from the carburetor, it is at times rather difficult to determine if they are satisfactory for further service. It is recommended therefore, in such cases, that **new** parts be installed.

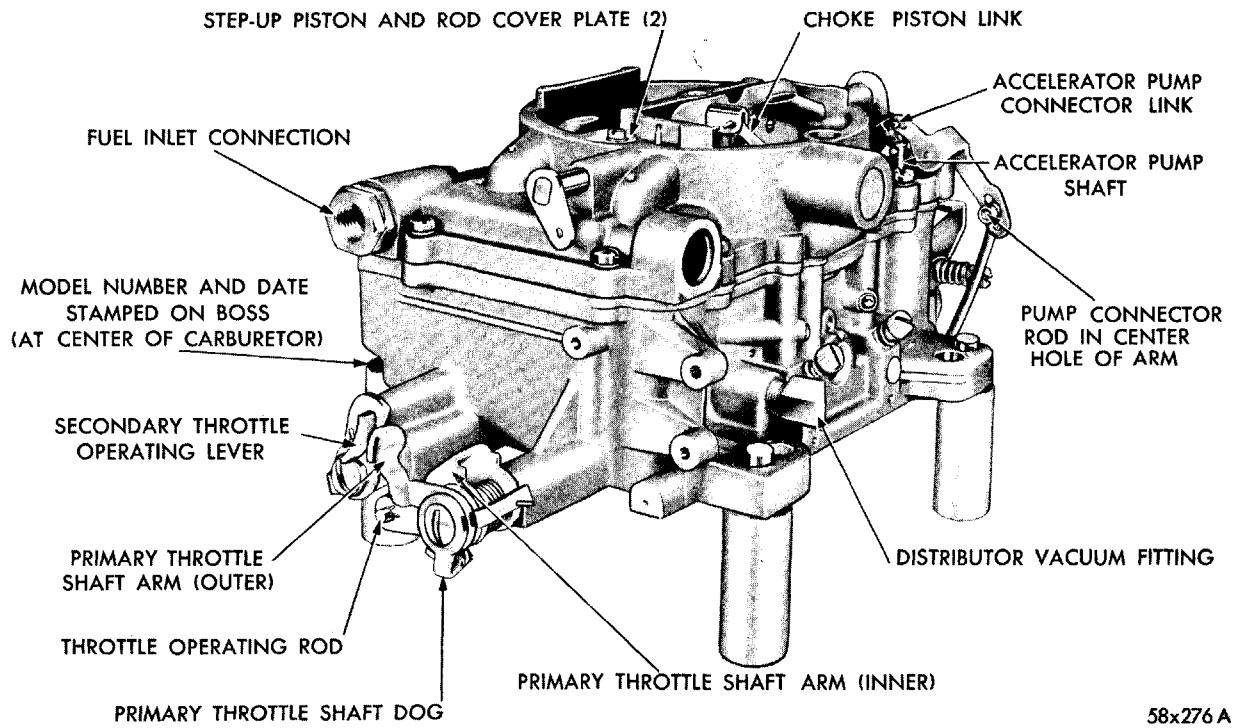
2. DISASSEMBLING THE CARBURETOR

To disassemble the carburetor for cleaning or overhaul, refer to Figure 1, then proceed as follows:

(1) Place the carburetor assembly on repair stand Tool C-3400 or T-109-287S elevating legs. These tools are used to protect the throttle valves from damage and to provide a suitable base for working.

2) Remove the hairpin clip that attaches the fast idle connector rod to the choke lever. Disengage rod from lever, then swing rod at an arc until it can be disengaged from the fast idle cam.

(3) Remove the retainer and spring that holds the throttle connector rod in the center hole of the accelerator pump arm. Remove the hairpin clip that attaches



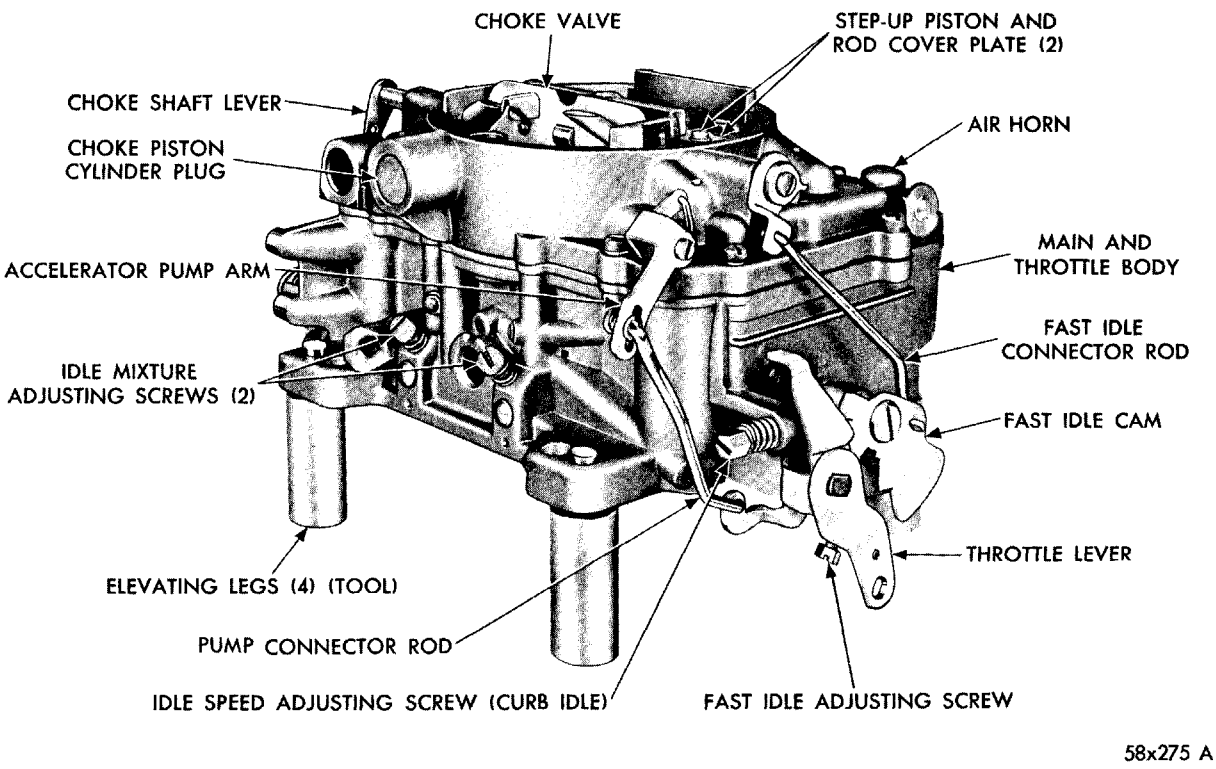


Fig. 1—Carburetor Assembly (AFB Series)

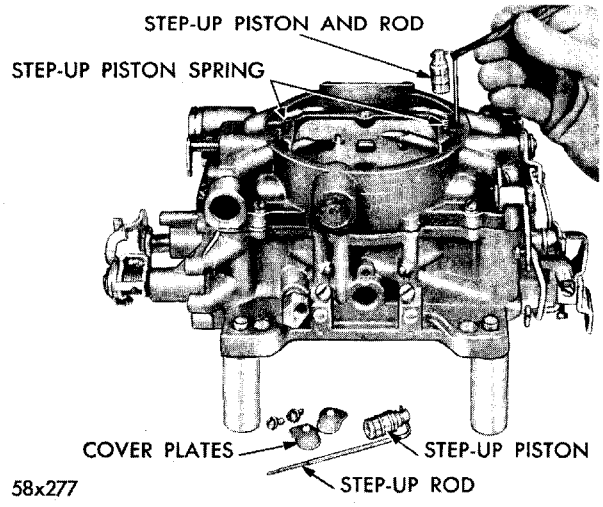


Fig. 2—Removing or Installing Step-Up Pistons and Rods

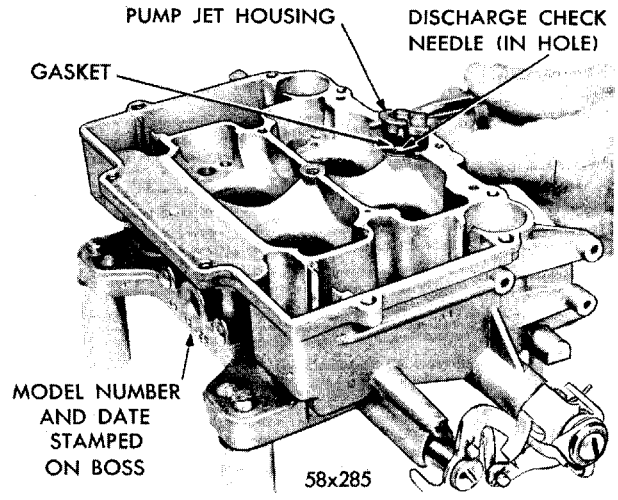


Fig. 3—Removing or Installing Accelerator Pump Jet Housing

the lower end of rod in the primary throttle shaft lever. Disengage rod from arm and lever, then remove from carburetor.

(4) Remove the screws attaching the step-up piston and rod cover plates. **Hold cover down with a finger to prevent the piston and rods from flying out.** Lift off the plates and slide the step-up pistons and rods out of the air horn, as shown in Figure 2. Remove the step-up piston springs.

(5) Remove the ten screws that attach the air horn to the main body. (1 screw in hole in air horn.) Lift air horn straight up and away from the main body. **When removing air horn, use care so as not to bend or damage the floats.** Remove the accelerator pump, plunger lower spring from the pump cylinder.

Disassembling the Air Horn

Place the air horn in an inverted position on the bench (to protect the floats) then proceed to disassemble as follows:

(1) Using a suitable Tool, remove the float fulcrum pins, (left and right) then lift the floats up and out of bosses on air horn. **It is suggested that the float on the pump side be marked so that the floats can be re-installed in their respective positions.**

(2) Remove the two needle valves from their respective seats, after marking the one on the pump side for identification. Using a wide blade screw driver, remove the needle valve seats. Be sure each needle valve is returned to its original seat at reassembly.

(3) Remove the hairpin clip that holds the accelerator pump connector link in the pump arm and plunger shaft. Disengage link from pump arm and shaft. Slide the accelerator pump plunger and spring out of the air horn. Remove the air horn to main body gasket and discard.

(4) Place the accelerator pump plunger in a jar of clean gasoline or kerosene, to prevent the leather from drying out.

(5) Remove the fuel inlet fitting and filter screen from the air horn.

(6) Using a prick punch, pierce the welsh plug and remove it from the end of choke piston cylinder. Remove cotter pin that attaches the piston link to the choke valve lever. Slide choke piston and link out of cylinder.

Main Body Disassembly

(1) Remove the screws that attach the accelerator pump jet housing to the main body. Lift out the jet housing and gasket, as shown in Figure 3. Discard the gasket. Now, invert the main body and drop out the discharge check needle, from the discharge passage.

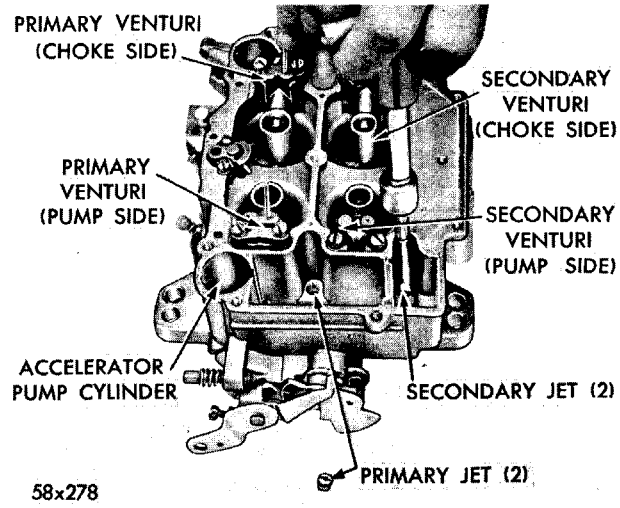


Fig. 4—Removing or Installing Main Metering Jets

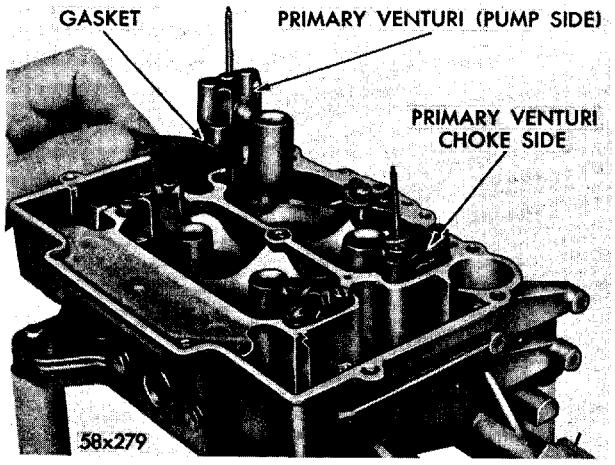


Fig. 5—Removing or Installing Primary Venturi

(2) Using Tool T109-58, remove the main metering jets (primary side), as shown in Figure 4. **The primary and secondary main metering jets are not interchangeable. It is very important that these jets be installed in their respective locations in the main body at reassembly.**

(3) Again using Tool T109-58, remove the main metering jets (secondary side), as shown in Figure 4.

(4) Remove the screws that attach the primary venturi (choke and pump side) to the main body. Lift the venturi straight up and away from the main body, as shown in Figure 5. Discard the gaskets.

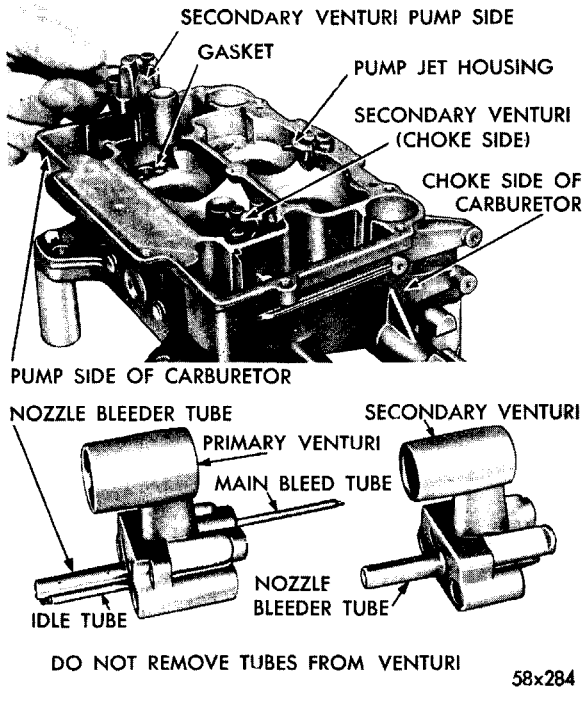


Fig. 6—Removing or Installing Secondary Venturi

The venturi assemblies are not interchangeable, side for side and must be reinstalled in their original locations at reassembly.

(5) Remove the screws that attach the secondary venturi (choke and pump side) to the main body. Lift the secondary venturi assemblies straight up and away from the body, as shown in Figure 6.

(6) Invert the main and throttle body casting, then remove the accelerator pump intake check ball plug. Using Tool T109-59, screw driver bit, remove the check ball seat, as shown in Figure 7. Again invert the body casting and drop out the intake check ball.

(7) Remove the two idle mixture adjusting screws and springs from the throttle body portion of the main casting.

The carburetor now has been disassembled into two units, namely the air horn and the main and throttle body casting. The component parts of each, have been disassembled as far as necessary for cleaning and inspection.

It is usually not advisable to remove the throttle shafts or valves, unless wear or damage necessitates the installation of new parts. During the manufacture of the carburetor, the location of the idle transfer ports and the idle discharge ports to the valve is carefully established for one particular assembly, as shown in Figure 8. The valves are milled to give the proper part relation.

If new throttle shafts should be installed in an old worn body, it would be very unlikely that the original relationship of these ports to the valves would be obtained. A very slight change in the port relationship to the valves would adversely affect normal carburetor operation, between the speeds of 15 and 30 miles per hour.

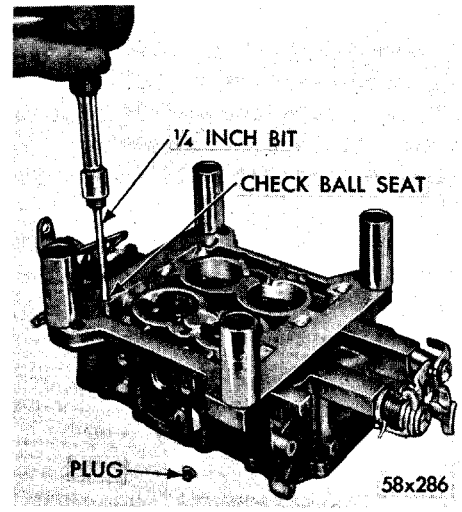


Fig. 7—Removing or Installing Accelerator Pump Intake Check Ball Seat

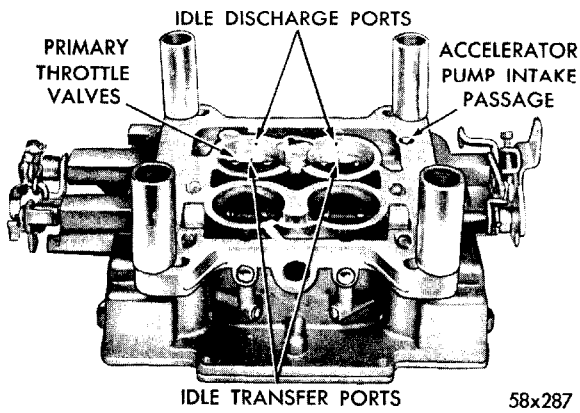


Fig. 8—Ports in Relation to Throttle Valves

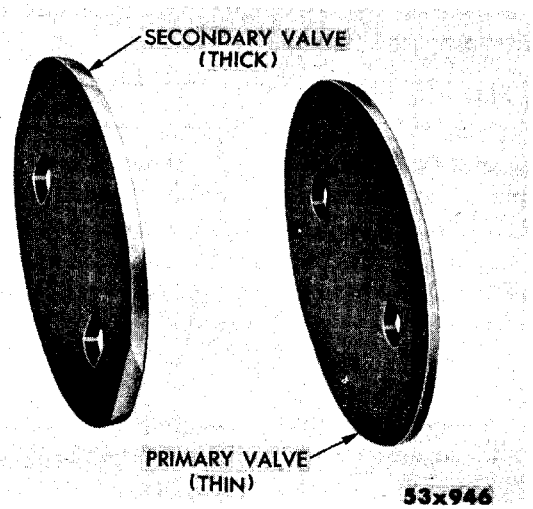


Fig. 9—Throttle Valve Identification

It is recommended that if the throttle shafts are excessively worn, that a new carburetor be installed. However, if the throttle valves have become nicked, burred or damaged, new valves may be installed, providing the following instructions are carefully followed.

The screws that attach the throttle valves are staked on the opposite side and care should be used in removal so as not to break the screws in the throttle shaft. Remove the staked portion of the screws with a file.

Remove the screws that attach the primary throttle valves to the throttle shaft and slide valve (or valves) out of the bores.

Remove the screws that attach the secondary throttle valves to the throttle shaft and slide valve (or valves) out of bores.

The primary valves and secondary valves are not interchangeable and should be kept separate in order that each may be returned to its respective bore. (See Figure 9).

3. CLEANING CARBURETOR PARTS

The recommended solvent for gum deposits is denatured alcohol, which is easily obtainable. However, there are other commercial solvents which may be used with satisfactory results.

IMPORTANT: If the commercial solvent or cleaner recommends the use of a water rinse, it should be "HOT." After rinsing, all trace of water must be blown from the passages with air pressure. It is further advisable to rinse all parts in clean kerosene or gasoline to be certain no trace of moisture remains. Never clean jets with a wire, drill or other mechanical means, because the orifices may become enlarged, making the mixture too rich for proper performance.

4. INSPECTION AND REASSEMBLY

(1) Slide the primary throttle valve (or valves into their respective bores, install new screws, but do not tighten. Be sure the idle speed adjusting screw is backed out. Hold the valves in place with fingers. (Fingers pressing on the high side of valves).

(2) Tap the valves lightly in this position, tighten the screws securely. Stake screws by squeezing with pliers.

(3) Install the two idle mixture adjusting screws and springs in the throttle body portion of the casting. The tapered portion must be straight and smooth. If the tapered portion is grooved or ridged, a new idle mixture adjusting screw should be installed to insure having correct idle mixture control. **Do not use a screw driver.** The adjustment should be made with the fingers. Turn the idle mixture adjusting screws lightly against their seats, then back off one full turn for an approximate adjustment.

(4) Place new secondary venturi gaskets in position, then install the secondary venturi (pump and choke side) by lowering straight down on gaskets. Install attaching screws and tighten securely. **Be sure all the metering holes and vent tubes are clean, in both the primary and secondary venturi.**

(5) Place new primary venturi gaskets in position, then install the primary venturi (pump and choke side) by lowering straight down on the gaskets. (Refer to Figure 5). Install attaching screws and tighten securely.

(6) Install the primary and secondary main metering jets, using Tool T109-58. (Refer to Figure 4). Tighten jets securely.

(7) Invert the carburetor and install the accelerator pump intake check ball. Install seat and tighten se-

curely, using Tool T-109-59. (Refer to Figure 7). Install screw plug and tighten securely.

Accelerator Pump Test

(1) Pour clean gasoline into the carburetor bowl (approximately ½ inch deep). Remove the accelerator pump plunger from the jar of gasoline. Flex the leather several times, then slide into the pump cylinder.

(2) Install the accelerator pump discharge check needle in the discharge passage. Raise the pump plunger and press lightly on the plunger shaft to expel air from the pump passages. Using a small clean brass rod, hold the discharge check needle firmly on its seat. Again raise the plunger and press downward. No fuel should be emitted from either the intake or discharge passage.

(3) If fuel does emit from the intake passage, disassemble the intake check ball and reclean the passage. Fuel leakage at the discharge check needle indicates the presence of dirt or a damaged check needle. Clean again and then install a new check needle. Retest for leakage.

(4) If either the intake check ball or discharge check needle leaks after above test and service fix, attempt to reseat as follows:

Intake Check Ball

Remove the screw plug, gasket, ball seat and ball from the bottom of the throttle body flange. Install a new ball and ball seat. Install screw plug and new gasket, then retest as described previously.

Discharge Check Needle

(1) With the discharge check needle installed, insert a piece of drill rod down on the needle. Lightly tap the drill rod with a hammer to form a new seat. Remove and discard old needle and install a new one. Retest as described previously. If the service fix does not correct the condition, new carburetor will have to be installed.

(2) Install the accelerator pump discharge check needle, jet housing and gasket. Install housing and attaching screws. Tighten screws securely.

(3) Press down on the accelerator pump plunger shaft, and as the plunger is being depressed, a clear straight stream should emit from each jet. If the streams are identical, (if either one is diverted or restricted) a new accelerator pump jet housing should be installed. After test, pour the gasoline from the carburetor bowl and remove pump plunger.

Assembling the Air Horn

(1) Slide the fuel inlet screen into the fuel line fitting, then install fitting in air horn. Tighten securely.

(2) Check to see if the leather on the accelerator pump plunger is hard, cracked or worn. If any sign of wear or deterioration is evident, install a new plunger assembly.

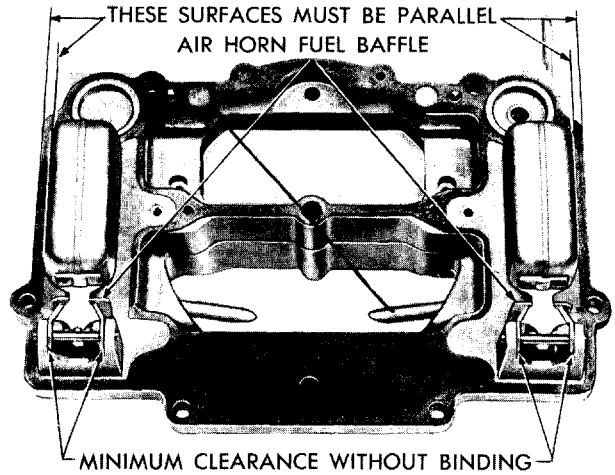


Fig. 10—Checking Float Alignment

(3) Slide the accelerator plunger into air horn, then install the accelerator pump link. Install the retaining hairpin clip to secure.

(4) Place a new air horn to main body gasket in position on the air horn, then install the float needle valve seats. (Be sure each needle seat and needle is reinstalled in its original position).

(5) Slide the right and left floats into position in the air horn, then install the float fulcrum pins. **(Be sure the marked float is installed on the pump side of the air horn).**

(6) After the floats have been installed, check the float alignment, level and drop settings as follows:

Float Alignment Setting

(1) Sight down the side of each float shell to determine if the side of the float is parallel to the outer edge of the air horn casting, as shown in Figure 10.

(2) If the sides of the float are not in alignment with the edge of casting, bend the float lever by applying pressure to the end of the float shell with the fingers while supporting the float lever with the thumb. **To avoid damage to the float, apply only enough pressure to bend the float lever.**

(3) After aligning the floats, remove as much clearance as possible between the arms of the float lever and the lugs on the air horn.To do this, bend the float lever. The arms of the float lever should be parallel as possible to the inner surfaces of the lugs or the casting.

Float Level Setting

(1) With the air horn inverted, the air horn gasket in place and the float needle seated, slide float gauge (refer to specifications for carburetor being worked on) between the top of the float (at outer end) and

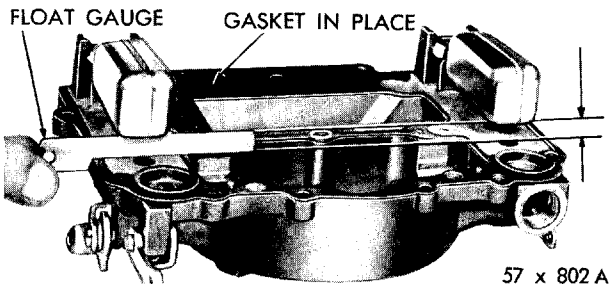


Fig. 11—Checking Float Height

the air horn gasket, as shown in Figure 11. Float should just touch gauge.

(2) Check the other float in the same manner. If an adjustment is necessary, bend the float arm using Tool T109-22, until correct clearance has been obtained. After bending arm, recheck the float alignment.

Float Drop Setting

(1) Holding the air horn in an upright position, measure the distance from the top of the floats (outer end) to the air horn gasket, as shown in Figure 12. This measurement should be ¾ inch. If an adjustment is necessary, bend the stop tabs on the float levers until the correct drop setting has been obtained. Bend the tab towards the needle seat to lessen the drop, or away from the seat to increase the drop.

(2) After the floats have been checked and adjusted, continue to assemble the carburetor as follows:

(3) Place the accelerator pump plunger lower spring in the pump cylinder, then lower the air horn carefully down on the main body.

CAUTION: Be sure the fuel baffles on the air horn, slide down in front, (bowl side) of the float chamber baffles, or the air horn will not index correctly with the main body and can cause the floats to hang up. Be sure the leather on the plunger does not curl or wrinkle. Accelerator pump operation will be affected if this precaution is not observed.

(4) Install the 10 air horn attaching screws and tighten securely. (The two long screws should be installed in the holes that are located at the air cleaner mounting surface. The 1 inch screw at the front and the 1½ inch at the rear).

(5) Slide the step-up piston springs into the piston cylinders, followed by the step-up pistons and step-up rods. Install the cover plates and attaching screws while holding the step-up pistons down in position. Tighten screws securely.

(6) Slide the choke piston into its cylinder in the air horn, guiding the link into the slot in the choke valve lever. Align hole, then install attaching cotter pin. Place a new welsh plug over cylinder opening and secure by rapping with a hammer. Check the fit of the choke valve in air horn. The valve should be evenly spaced on all sides. Loosen screws and reposition if necessary.

(7) Engage the throttle connector rod with the primary throttle shaft lever, then install hairpin clip. Slide the flat washer over the other end of rod and engage with the accelerator pump arm. Install retainer spring and retainer secure.

(8) Engage the lower end of the fast idle connector rod with the fast idle cam, then swing in an arc to lock in cam. Slide other end of rod into the choke shaft lever and secure with hairpin clip.

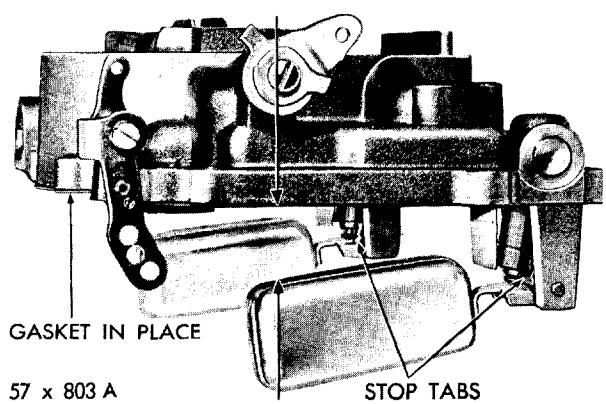


Fig. 12—Checking Float Drop

5. CARBURETOR ADJUSTMENTS

The following adjustments should be made with the carburetor on the bench for ease of working, and, should be made in the following order:

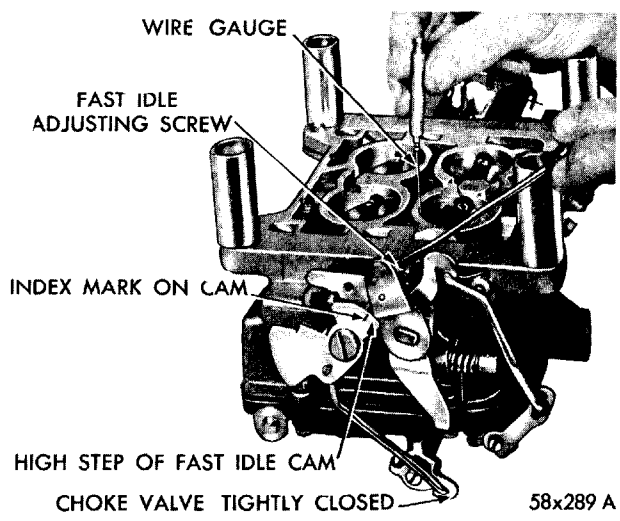


Fig. 13—Checking Fast Idle Adjustment

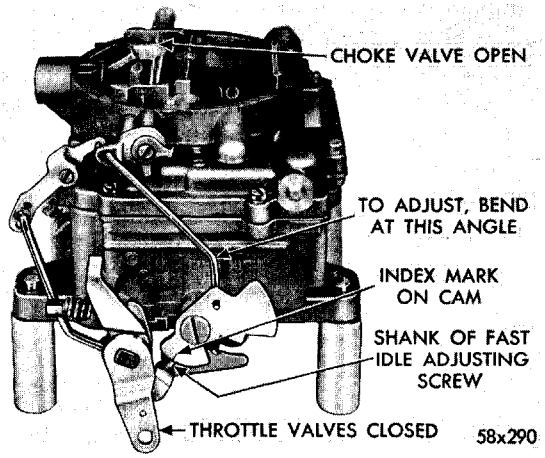


Fig. 14—Fast Idle Cam Indexing

Fast Idle Adjustment

With the choke valve held tightly closed and carburetor inverted, tighten the fast idle adjusting screw (on the high step of the fast idle cam), until wire gauge (refer to specifications for gauge size) can be inserted between the primary throttle valve and the bore (side opposite idle port), as shown in Figure 13. The index mark on the fast idle cam should be in direct line with the fast idle screw shank.

Invert the carburetor and open the throttle valves to wide open position. Close the choke valve tightly and then close the throttle valves. Release the choke valve. This will position the fast idle cam to fast idle. The index mark on the cam should split the center of the fast idle adjusting screw, as shown in Figure 14. If an adjustment is necessary, bend the fast idle connector rod at the angle, using Tool T109-213, until the index mark on the cam indexes the fast idle adjusting screw.

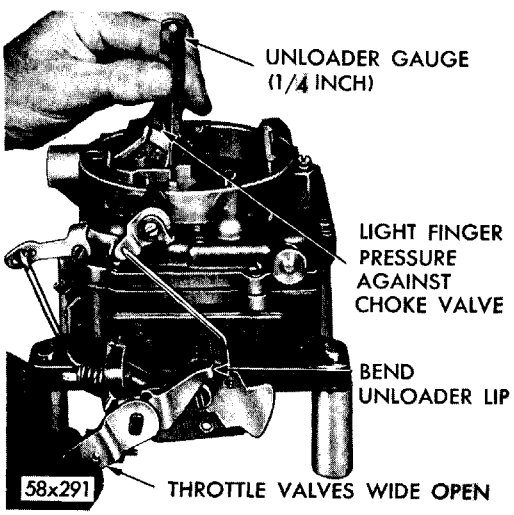


Fig. 15—Checking Choke Unloader (wide open kick)

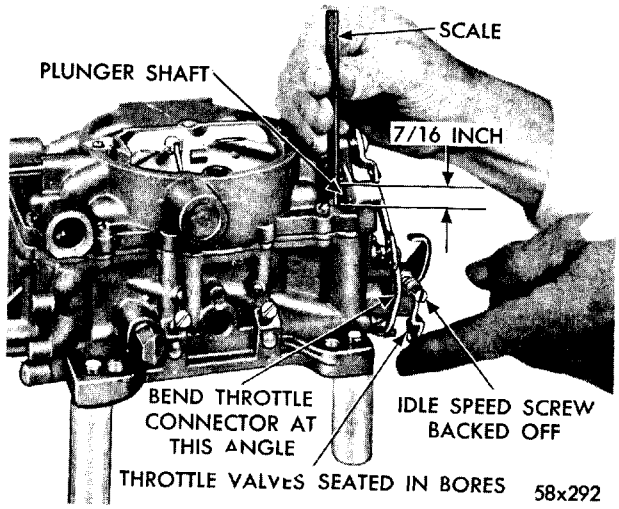


Fig. 16—Checking Accelerator Pump Travel

Choke Unloader Adjustment

With the throttle valves in the wide open position, it should be possibe to insert Tool T109-31 (¼ inch) gauge between the upper edge of the choke valve and the inner wall of the air horn, as shown in Figure 15.

If an adjustment is necessary, bend the unloader lip on the throttle shaft lever, using Tool T109-41, until correct opening has been obtained.

Accelerator Pump Adjustment

Move the choke valve to wide open position, to release the fast idle cam. Back off the idle speed adjusting screw (curb idle) until the throttle valves are seated in the bores.

Measure the distance from the top of the air horn to the top of the plunger shaft, using a "T" scale, as shown in Figure 16. This distance should be 7/16 inch, (¼ inch on AFB 2903S).

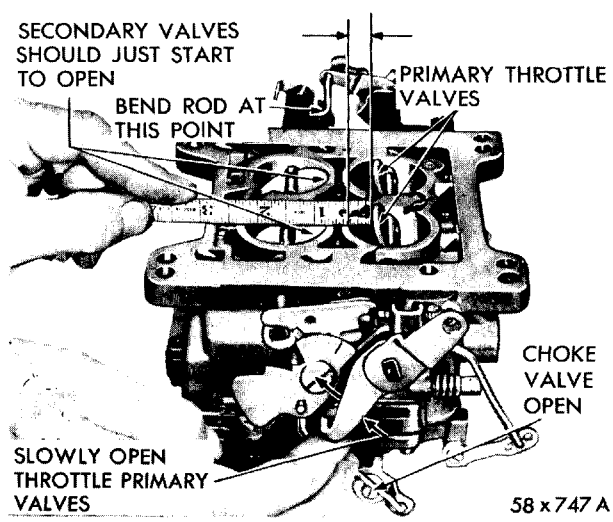


Fig. 17—Checking Secondary Throttle Opening

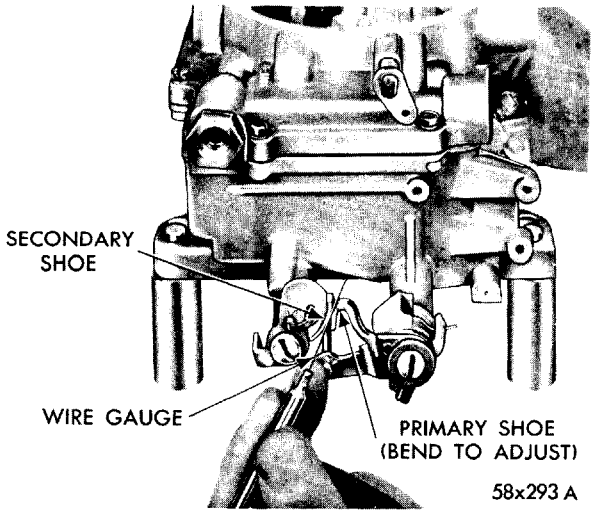


Fig. 18—Checking Clearance Between Closing Shoes

If an adjustment is necessary, bend the throttle connector rod at the lower angle, using Tool T109-213, until correct travel has been obtained.

Secondary Throttle Lever Adjustment

To check the secondary throttle lever adjustment, block the choke valve in the wide open position and invert the carburetor. Slowly open the primary throttle valves until it is possible to measure 19/64 inch between the lower edge of the primary valve and the bore (opposite idle port) as shown in Figure 17. At this measurement, the secondary valves should just start to open. The stop lugs on both the primary and secondary throttle levers should contact the bosses on the flange at the same time. If an adjustment is necessary, bend the secondary throtte operating rod at the angle, using Tool T109-213, until correct adjustment has been obtained. At wide open throttle, the primary and secondary throttle valves should reach the full vertical position.

With the primary and secondary throttle valves in the tightly closed position, it should be possible to insert Tool T109-29 (.020") wire gauge, between the positive closing shoes on the secondary throttle levers, as shown in Figure 18.

If an adjustment is necessary, bend the shoe on the secondary throttle lever, using Tool T109-22, until correct clearance has been obtained.

Secondary Throttle Lock-Out Adjustment

Crack the throttle valves, then manually open and close the choke valve. The tang on the secondary throttle lever should freely engage in the notch of the lockout dog.

If an adjustment is necessary, bend the tang on the secondary throttle lever, until engagement has been made. Use Tool T109-22 for this operation.

After adjustments have been made, reinstall carburetor or engine, using a new gasket.

It is suggested that the carburetor bowl be filled with clean gasoline. This will help prevent dirt that is trapped in the fuel system, from being dislodged by the free flow of fuel, as the carburetor is primed.

6. AUTOMATIC CHOKE (Well Type)

To function properly, it is important that all parts be clean and move freely. Other than the occasional cleaning the automatic choke control requires no servicing. However, it is very important that the choke control unit works freely at the thermostatic coil spring housing and at the choke shaft. Move the choke rod up and own to check for free movement of the coil housing on the pivot. If unit binds, a new unit should be installed. The Well Type Choke Control Unit **is serviced only as a complete unit. Do not attempt to repair. (See Figure 19).**

When installing the well type choke unit, make certain that the coil housing does not contact the sides of the wall in the intake manifold. Any contact at this point will affect choke operation.

Do not lubricate any parts of the choke or control unit since this causes dirt accumulation which would result in binding of the choke mechanism.

Do not attempt to change the calibration setting. (Refer to specifications). This is predetermined and should it be changed, improper choke action would result .

Clean all choke parts using a suitable solvent and then blow dry with compressed air. Examine all choke parts for wear or damage. Worn or damaged parts must be replaced with new in order to insure proper choke operation.

Idle Speed Adjustment (Curb Idle)

The idle speed adjustment is made after the carburetor has been installed on the engine.

(1) With the throttle valves closed and the choke valve wide open (engine at normal operating temperature), adjust the idle screw to give 500 R.P.M., (700-725

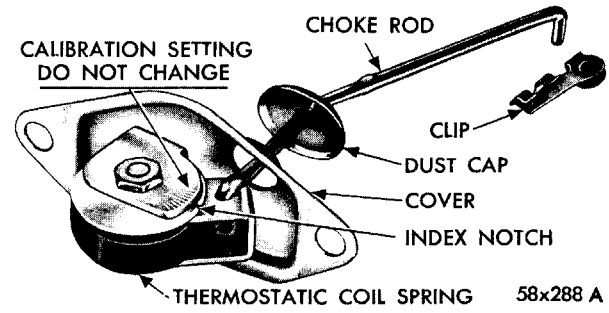


Fig. 19—Well Type Choke Control Unit

on AFB 2903S Ram Manifold Carburetors) using a tachometer. (Refer to specifications.)

(2) Adjust the idle mixture screws until the engine operates smoothly, then recheck the tachometer and again adjust the idle screw to give the correct engine R.P.M.

7. ADJUSTING THE AFB-2903S SERIES CARBURETORS (Ram Manifold)

Twin 4-barrel AFB series 2903S carburetors are used on the Ram induction manifold equipped cars. These carburetors are basically the same as previous AFB carburetors. The service procedures for disassembly, cleaning, inspection and reassembly follow the same sequence of operations as covered previously.

The following information covers only the adjustments that differ from the conventional mounted carburetors. (Refer to Specifications).

Fast Idle Adjustment (On the vehicle)

When making the fast idle adjustment on the vehicle, each AFB carburetor should be adjusted individually. To make the fast idle adjustment, proceed as follows:

(1) The engine should be at normal operating temperature and idling from 700 to 725 r.p.m.

(2) Remove each air cleaner.

(3) Disconnect each carburetor throttle rod at the bellcrank.

(4) Open the throttle valves far enough to allow positioning of the fast idle cam to the fast idle index mark.

(5) Adjust the fast idle speed screw to obtain the required r.p.m. (Refer to specifications). **This step must be done on each carburetor individually while the other remains at curb idle.**

(6) After the required r.p.m. has been obtained, open the throttle slightly to allow the fast idle cam to return the open choke (or off fast idle) position.

(7) Follow the same procedure when adjusting the other carburetor. **It is very important at the completion of this adjustment, that both carburetors have identical fast idle speeds.**

(8) After adjusting the fast idle on both carburetors, reconnect both carburetor throttle rods to the bellcrank.

Indexing The Choke Piston

Before indexing the choke piston, be sure the ignition system and timing are at the required specifications, that the manifold heat control valves are operating properly (this is very important for normal warm-up of the engine.)

After the above items have been checked and corrected if necessary, index the choke piston as follows:

(1) Remove the choke housing baffle plate.

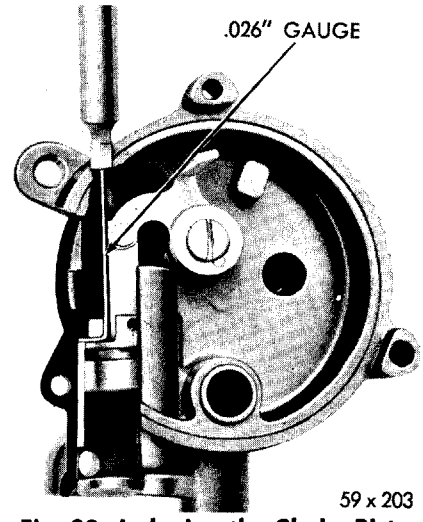


Fig. 20—Indexing the Choke Piston

(2) Remove the throttle return spring, so that the throttle can be set at one quarter open.

(3) Be sure the choke valve is wide open.

(4) Slide a .026 inch wire into the choke piston slot, so that the hook on the end enters the slot in the cylinder, as shown in Figure 20. (This gauge can be made by bending a piece of .025 inch wire from an old BBD carburetor step-up rod or the .026 inch end of wire gauge Tool T109-189 to form the shape shown in Figure 20.

(5) Push on the choke valve, counter-clockwise, trapping the wire gauge between the piston and the cylinder slot (choke linkage hanging free).

(6) It should now be possible to insert a #32 drill between the choke valve and wall of air horn. If an adjustment is necessary, bend the link that connects the choke shaft to the choke piston lever (at angle) until correct clearance has been obtained.

(7) Place the choke baffle plate in position and install retaining screws. Tighten securely.

(8) Reconnect the throttle return spring.

Idle Speed and Mixture Adjustment (On the vehicle)

Before the idle speed and mixture adjustments are made, check to be sure that the throttle linkage to both carburetors allows a return to idle simultaneously. This is very important in securing a good idle setting, since these carburetors are equipped with a by-pass air bleed for setting the idle speed.

The basic ignition timing should be checked and with specifications, as this also affects idle quality. (If the ignition timing is not to specifications, disconnect the vacuum advance line at the distributor and set timing to specifications, with the engine idle speed below 600 r.p.m.)

Connect the vacuum advance line and warm engine

up to normal operating temperature. Disconnect each carburetor throttle rod at the bellcrank, then proceed as follows:

(1) Turn all adjusting screws (mixture and by-pass) in finger tight.

(2) Open the by-pass idle bleed screws one full turn.

(3) Open each idle mixture screw ¾ of a turn.

(4) Connect a tachometer, then start engine.

(5) Turn the mixture screws on the left hand carburetor ⅛ turn at a time until the smoothest idle has been obtained.

(6) Repeat this procedure on the right hand carburetor, keeping the mixture screws within ⅛ turn of each other.

(7) With the transmission in neutral set the curb idle speed from 700 to 725 r.p.m., by adjusting the by-pass air bleed screws on each carburetor. **Be sure and keep the openings equal.**

The by-pass air bleed screws are located at the front of each carburetor between the idle mixture screws.

(8) Repeat steps 4 and 5 until a smooth idle at 700 to 725 r.p.m. has been obtained.

(9) Reconnect each carburetor throttle rod at the bellcrank.

If either carburetor had been removed for cleaning or overhaul, set the throttle linkage as outlined under the Ram Manifold Section.

FUEL PUMP

CONTENTS

SERVICE DIAGNOSIS

CONDITIONS - POSSIBLE CAUSES

1. FUEL PUMP LEAKS (Fuel)

Possible Causes:

1. Loose housing screws.
2. Worn, ruptured or torn diaphragm.
3. Loose diaphragm mounting plates.
4. Loose inlet or outlet line fittings.

2. FUEL PUMP LEAKS (Oil)

Possible Causes:

1. Cracked or deteriorated pull rod oil seal.
2. Loose rocker arm pivot pin.
3. Loose pump mounting bolts.
4. Defective pump to block gasket.

3. INSUFFICIENT FUEL DELIVERY

Possible Causes:

1. Vent in tank filler neck restricted. (This will also cause collapsed fuel tank).
2. Leaks in fuel line or fittings.
3. Dirt or restriction in fuel tank.
4. Worn, ruptured, or torn diaphragm.
5. Frozen gas lines.
6. Improperly seating valves.
7. Vapor lock.
8. Weak main spring.
9. Incorrect fuel pump.
10. Restricted Fuel filter.

4. FUEL PUMP NOISE

Possible Causes:

1. Loose mounting bolts.
2. Scored or worn rocker arm.
3. Weak or broken rocker arm spring.

FUEL PUMP SPECIFICATIONS

FUEL PUMP	6 225 Cu. In.	Car Cooling V-8 318 Cu. In.	V-8 318 Cu. In.	V-8 361 Cu. In.	V-8 383 Cu. In.
Make	Carter	Carter	Carter	Carter	Carter
Model	M2996S	M2611S	M2608S	*M2769S	*M2769S
Type	Diaphragm	Diaphragm	Diaphragm	Diaphragm	Diaphragm
Number of Valves	2	3	2	3	3
Driven By	Camshaft	Camshaft	Camshaft	Camshaft	Camshaft
Pump Pressure (pounds)	3½ to 5	5 to 7	5 to 7	3½ to 5	3½ to 5

SPECIAL TOOLS

T109-45 ..... Plug Remover
C-3411 ..... Pressure Gauge

FUEL PUMP

GENERAL INFORMATION

Five different models of fuel pumps are used in production. The same basic design applies to all five models. The service procedures for testing, disassembly, overhaul, cleaning and reassembly of these pumps are the same. However, slight modifications do exist, and will be covered in the text wherever they appear. For detailed information, refer to Specifications.

SERVICE INFORMATION

PROCEDURES

1. SERVICING THE FUEL PUMP

Fuel pump Model M-2996S, shown in Figure 1, is used exclusively on the 225 cubic inch 6 cylinder engine. Model M-2608S, shown in Figure 2, is used on the 318 cubic inch V-8 engine, without air conditioning. Model M-2611S, shown in Figure 4, is used on the 318 cubic inch engine equipped with air conditioning. Model M-2769S, shown in Figure 3, is used on the 361 cubic inch engine, when equipped with the Stromberg WWC-3 series dual carburetor, is also used on the 383 cubic inch V-8 engine.

The fuel pumps are driven by an eccentric cam that is cast on the camshaft in the 225, 361 and 383 cubic inch engines, or by a pressed steel eccentric cam mounted on the gear end of the camshaft in the 318 cubic inch engine.

As the camshaft rotates, the eccentric cam presses down on the pump rocker arm. (On the 361 and 383 cubic inch engines, a push rod operates between the camshaft and the fuel pump rocker arm.) This action lifts the pull rod and diaphragm upward against the fuel pump main spring, thus creating a vacuum in the valve housing and opens the inlet valve (or valves) and fuel is drawn into the valve housing chamber. On the return stroke the main spring forces the diaphragm to the down position which closes the inlet valve (or valves) and expels the fuel in the valve housing chamber through the outlet valve to the fuel filter and the carburetor.

The fuel filter (ceramic or paper) should be changed every 9,000 miles, to insure having an unrestricted flow of fuel at all times. DO NOT ATTEMPT TO CLEAN.

2. TESTING FUEL PUMP - (On Car)

If the fuel pump fails to supply fuel properly to the carburetor, the following tests should be made before removing the fuel pump from the vehicle.

Pressure Test

If leakage is not apparent, test pump for pressure, as follows:

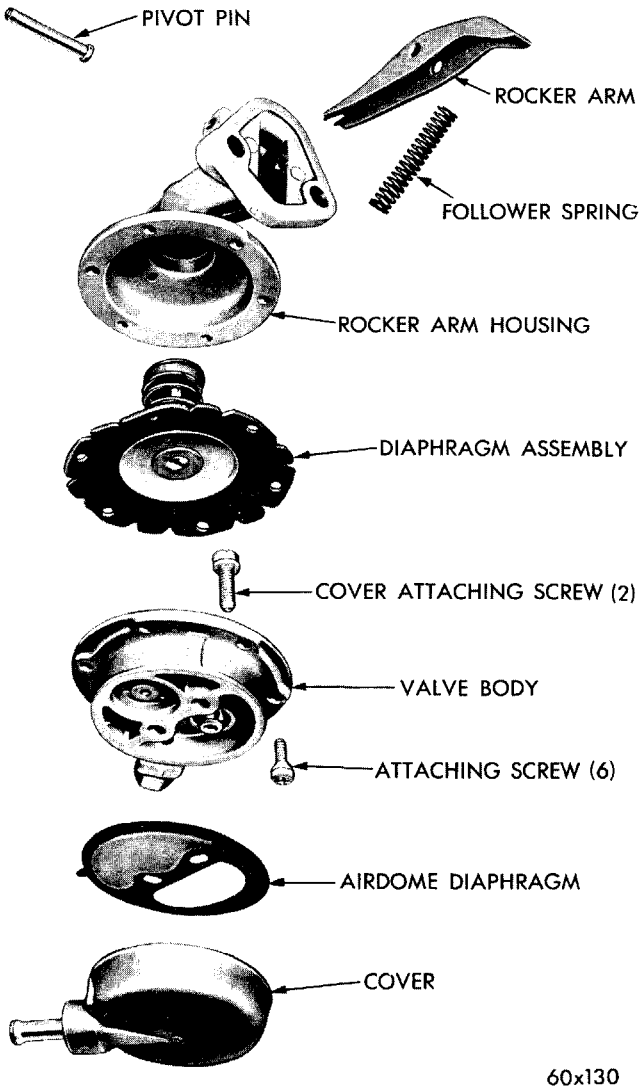


Fig. 1—Fuel Pump (Exploded View) M-2996S

(1) Insert a "T" fitting in the fuel line at the carburetor, as shown in Figure 5.

(2) Connect a 6 inch piece of hose between the "T" fitting and gauge C-3411. (The hose should not exceed 6 inches. A longer hose may collect fuel and the additional weight would be added to the pressure of the pump and result in an inaccurate reading.)

(3) Vent the pump for a few seconds (this relieves any air trapped in the fuel chamber). If this is not done, the pump will not operate at full capacity and a low pressure reading will result.

(4) Connect a tachometer, then start the engine and run at 500 r.p.m. The reading should be from 3½ to 5 p.s.i. on Models M-2996S, and M-2769S and from 5 to 7 p.s.i. on Models M-2608S and M-2611S. The pressure should remain constant or return to zero very, very slowly when the engine is stopped. An instant drop to zero indicates a leaky outlet valve. If the pressure is too low, a weak main spring, or improper assembly of the diaphragm may be the cause. If the pressure is too high, the main spring is too strong.

Vacuum Test

The vacuum test should be made with the fuel line disconnected from the carburetor. (This will allow the pump to operate at full capacity, which it must do to prime a dry carburetor.)

The vacuum reading should be at least 10" Hg, (mercury) vacuum at 500 r.p.m. with the fuel line disconnected at the carburetor.

Volume Test

The fuel pump should supply 1 quart of fuel in 1 minute or less at 500 r.p.m.

Inlet Valve Test

To test the inlet valve, connect a vacuum gauge on

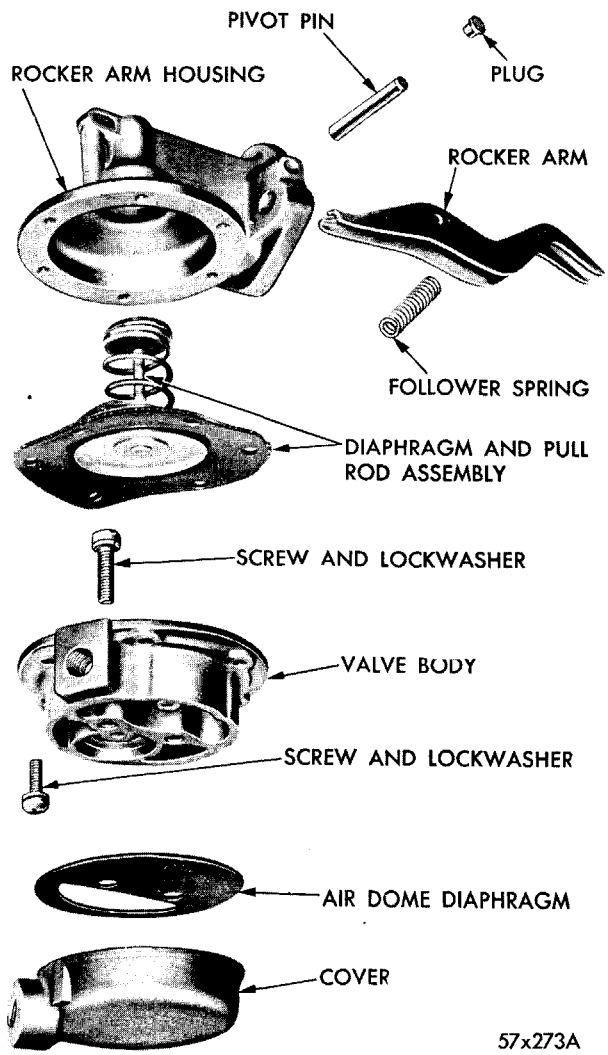


Fig. 2—Fuel Pump (Exploded View) M-2608S

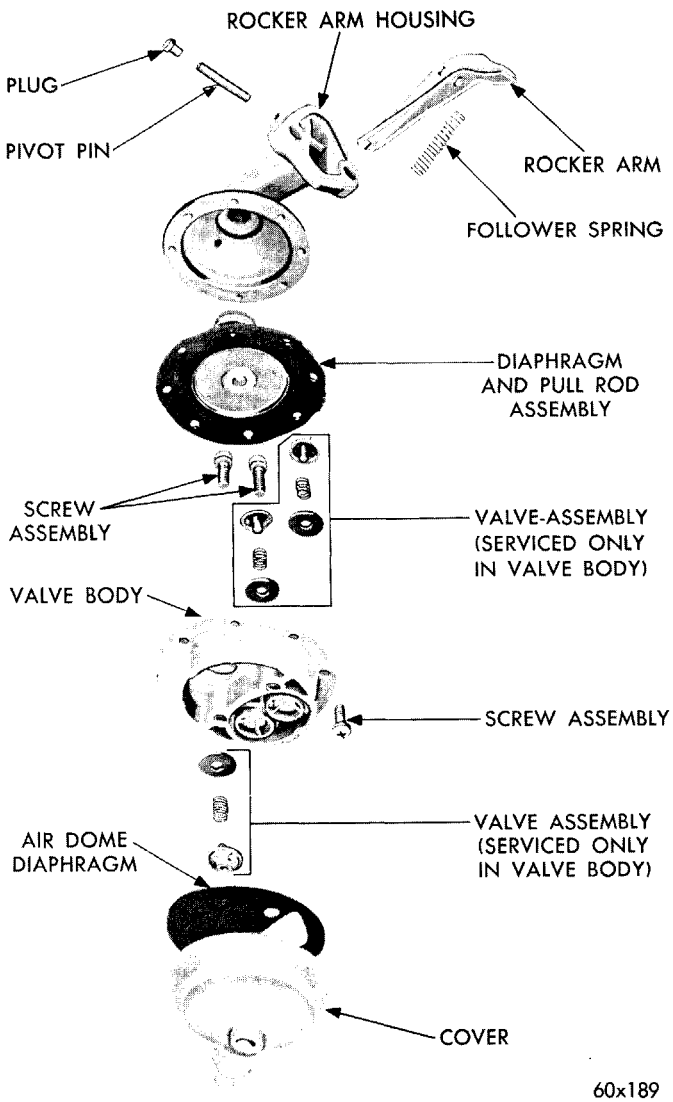


Fig. 3—Fuel Pump (Exploded View) M-2769S

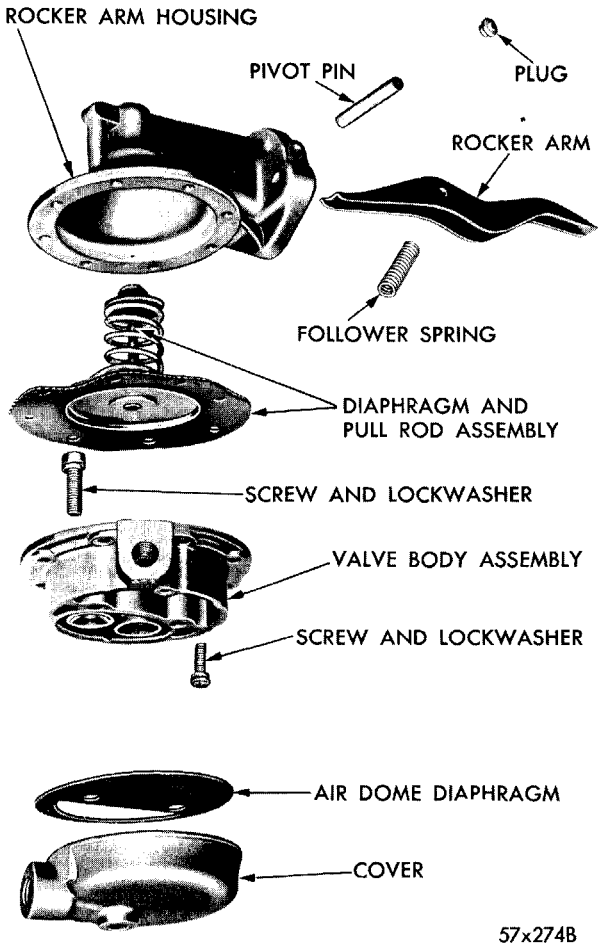


Fig. 4—Fuel Pump (Exploded View M-2611S (Car Cooling)

the inlet fitting while the line is disconnected:

(1) Start the engine or turn over with starting motor.

(2) There should be a noticeable vacuum present, not alternated by blowback.

(3) If blowback is present, the inlet valve (or valves) are not seating properly and should be cleaned, or a new valve body installed.

If the fuel pump does not perform to the above test requirements, the fuel pump should be removed from the vehicle and overhauled as follows:

3. DISASSEMBLING THE FUEL PUMP

Before disassembling the fuel pump, mark the housings in such a manner that the "Inlet" will be facing the inlet fuel line when reassembled. This is important!

To disassemble the fuel pump for cleaning or over-

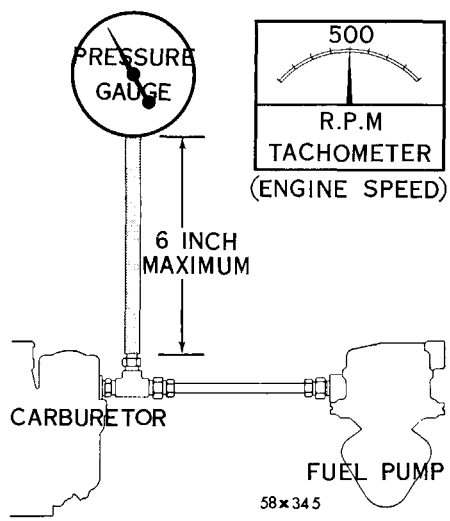


Fig. 5—Pressure Testing the Fuel Pump

haul, refer to Figures 1, 2, 3, or 4, then proceed as follows:

(1) Remove the pivot pin plug, using Tool T109-43.

(2) Disengage the rocker arm follower spring from the rocker arm and the rocker arm housing.

(3) Turn the pump on its side (pivot pin hole down) and rap gently to remove the pivot pin.

(4) Disengage the rocker arm from the diaphragm pull rod, by sliding rocker arm out of housing.

(5) Remove the screws attaching the valve body to the rocker arm housing. Separate the valve body and rocker arm housing, and lift out the diaphragm and pull rod assembly.

(6) Remove the screws that attach the valve body to the valve housing cover. Separate cover and valve body and remove the outlet air dome diaphragm.

4. CLEANING FUEL PUMP PARTS

Clean all fuel pump parts (except diaphragm) in a suitable solvent, then blow dry with compressed air. Check the condition of the valve seats and parts for gum deposits. If gum deposits are found, remove with denatured alcohol. If the valves are badly worn or damaged, install a complete new valve body assembly. **The valves are not serviced individually.**

5. REASSEMBLING THE FUEL PUMP

Examine the diaphragm for cracks, torn screw holes or ruptures. Check the rubber oil seal on the end of the pull rod for deterioration. Check the outlet air dome diaphragm for cracks or deterioration. Check the rocker arm for scoring or galling on the camshaft (or push rod on 361 and 383 cubic inch engines) bearing surface.

To reassemble the fuel pump, refer to Figures 1, 2, 3, or 4, then proceed as follows:

(1) Place the airdome diaphragm in position on the valve body with inlet passage hole over passage.

(2) Align the scribe marks on the cover and the valve body, then install attaching screws. Tighten securely.

(3) Slide the diaphragm pull rod up into the rocker arm housing. Place the valve body in position on the diaphragm with the scribe marks aligned. (Be sure the holes in the diaphragm, rocker arm housing and valve bodies are aligned.) Compress the unit together, then install the attaching screws, but do not tighten. **NEVER USE SHELLAC OR ANY OTHER ADHESIVE ON THE DIAPHRAGM.**

(4) Slide the rocker arm into the housing and engage the diaphragm pull rod. Align the pivot pin holes in the arm with those in the housing, then install pivot pin. Install new plug and drive in securely.

(5) Install the rocker arm follower spring over the tab on the rocker arm and over the dimple in the housing.

(6) Place the pump in a vise (with protector jaws) then push on the rocker arm until full travel is reached. Hold in this position, while tightening the attaching screws. (This will prevent tearing of the diaphragm when the pump is in operation and the pump arm in its full stroke.)

(7) Test the fuel pump as described previously.