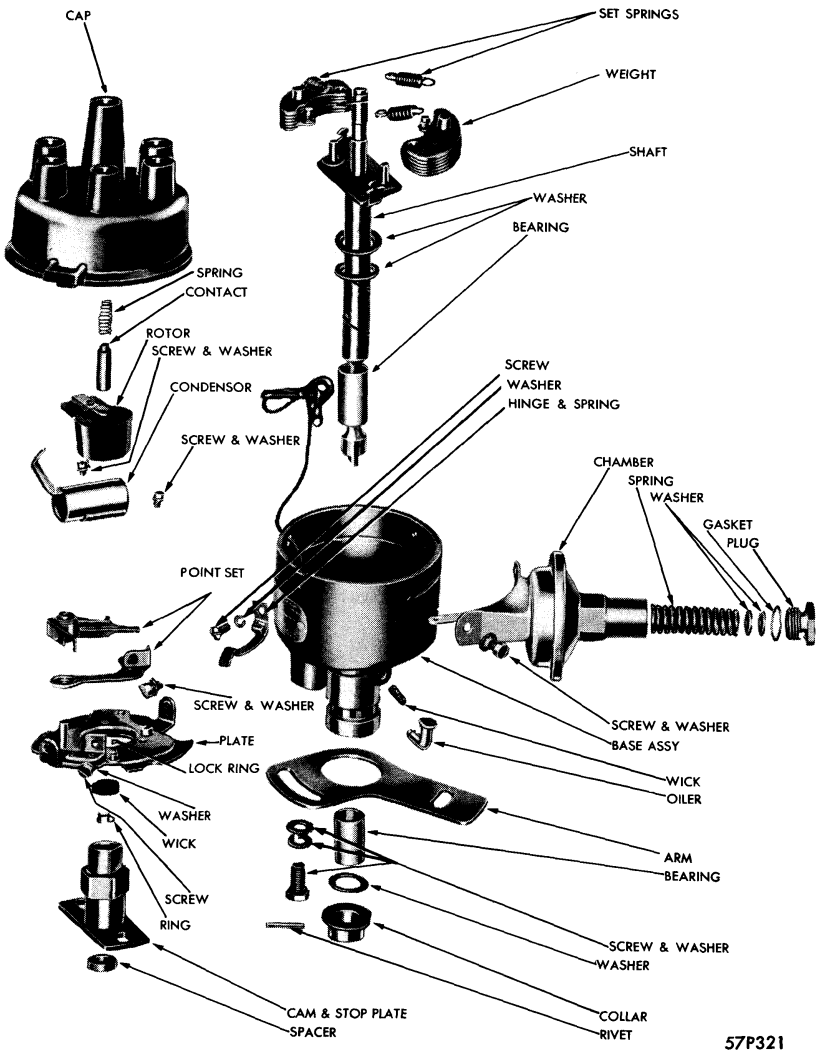

Figure 1—Distributor Disassembled—6 Cylinder Engine

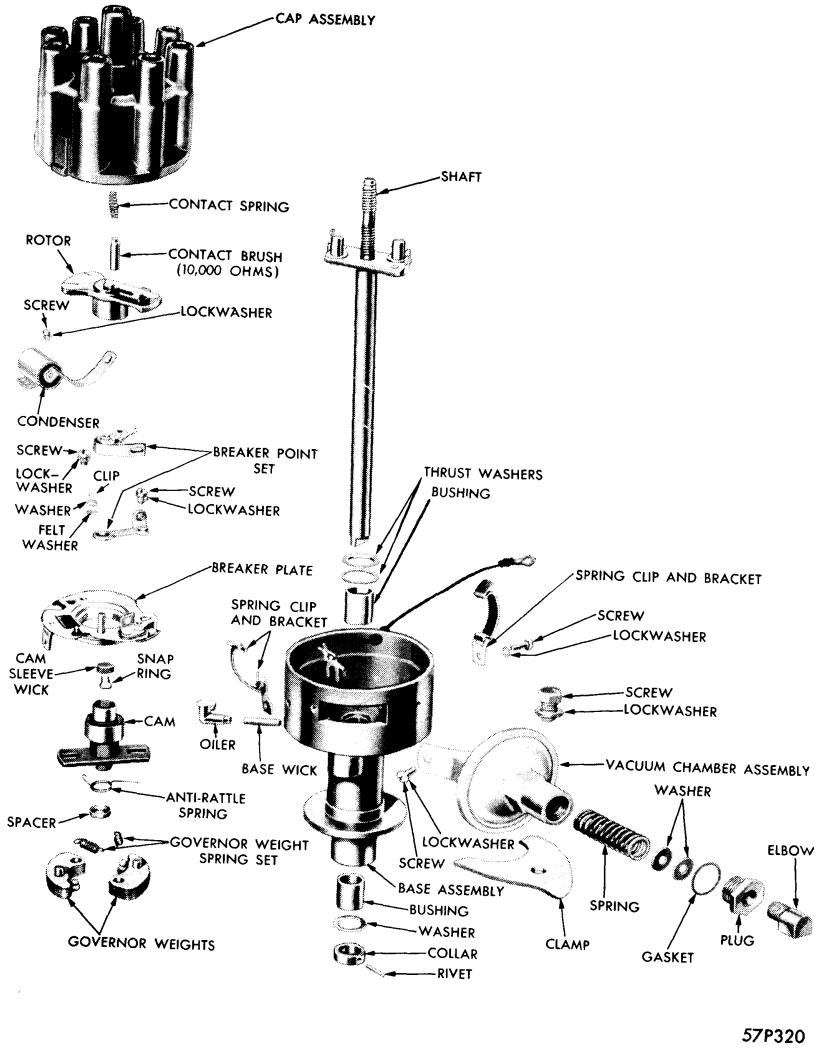

Figure 2—Distributor Disassembled—V-8 Engine

PART TWO—ENGINE & ELECTRICAL

SECTION II—IGNITION SYSTEM

1. DISTRIBUTOR

The function of the distributor is to interrupt the current flow in the primary winding of the ignition coil and to distribute the high voltage induced in the secondary winding of the ignition coil to the spark plugs. The breaker points and condenser are connected in the primary circuit (low voltage) and the rotor and cap are connected to the secondary circuit (high voltage).

Distributors used on Plymouth engines contain two controls which provide automatic advance of ignition timing according to engine speed and load. The centrifugal governor in the distributor body regulates ignition timing according to speed. The vacuum control unit attached to the outside of the distributor body regulates the ignition timing according to load.

DUAL CONTACT DISTRIBUTOR — The distributor contains two sets of points which permit additional current build-up time in the primary winding of the coil. Thus, maximum voltage is induced in the secondary winding.

The two sets of points are connected in parallel and are positioned in relation to the 8 lobe cam so as to provide 7 degrees overlap of points opening and closing. One set of points (circuit maker points) closes the primary circuit in the coil and the second set of points (circuit breaker points) opens the circuit causing a spark at the plug. Immediately after the spark occurs, the circuit maker points are closed ahead of the circuit breaker points, thus providing a circuit to build-up the primary winding. As the cam rotates further, the secondary points also close. Just before the secondary points open, the primary points open 7 degrees ahead.

ADJUSTING DISTRIBUTOR CONTACTS

Engine performance and operation depends on the condition and setting of the contacts. Too little contact gap can cause contact burning and too wide a gap can result in high speed misfire. Contacts should be clean and make flat contact with each other. To properly align the contacts, bend the stationary contact breaker only. Do not bend the breaker arm. Inspect the alignment of the rubbing block with the cam and check for a twisted arm or pivot pin. These parts should be replaced if misalignment exists.

Rotate the distributor shaft until the rubbing block is on the high point of the distributor cam lobe. Loosen the stationary plate lock screw and set the contact gap with a feeler gauge according to specifications given in the chart. Retighten lock screw and recheck gap.

TESTING BREAKER ARM SPRING TENSION

Contact spring tension is important to the life of the contacts and performance of the engine. Too great a tension will cause excessive wear of the cam and rubbing block. Too low a spring tension will cause flutter at higher engine speeds and result in misfire. Hook a spring scale on the breaker arm and pull at a right angle to the contact face as shown in Figure 3. Take reading just as contacts separate. Refer to data and specifications for correct tension. If readings are not correct, loosen screw at end of spring and slide in to increase tension and out to decrease tension. Tighten and recheck tension.

CAM ANGLE

Cam angle or dwell is the number of degrees of cam rotation during which time the contacts are closed. Measurement of dwell or cam angle is a good check on the condition of the cam, cam sleeve, bushings or bearings, and contacts.

Set the contacts to the specified gap with a feeler gauge first. Then check dwell meter reading against specifications. If readings are erratic or do not come within specifications, check distributor for a worn or bent rubbing block, worn cam, worn bushings or bearings or bent shaft.

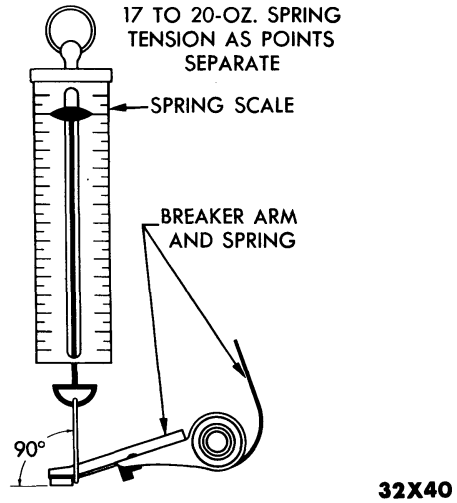

Figure 3—Testing Breaker Arm Spring Tension with Spring Scale

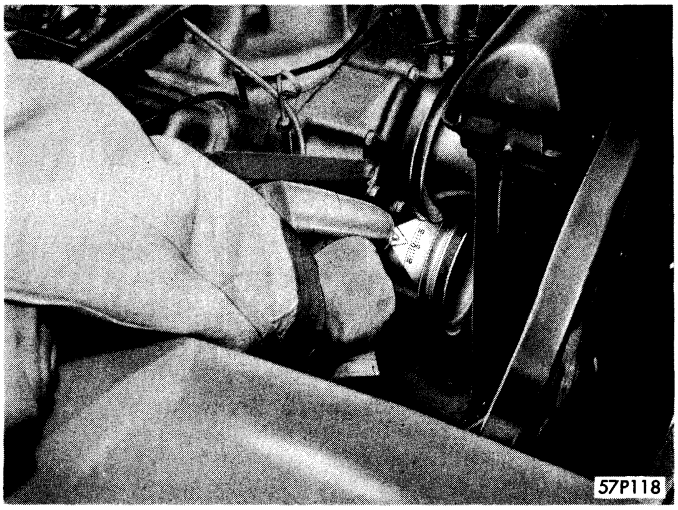

Figure 4—Timing Engine with Timing Light

DISTRIBUTOR CAP AND ROTOR

Inspect condition of distributor cap and rotor. If the cap has a crack or shows evidence of arcing, corroded high tension terminals or excessively burned inserts it should be replaced. Check the carbon plunger and spring for free movement and for good contact with the rotor.

Check the rotor for cracks or a loose contact strip. If contact is badly burned it should be replaced.

IGNITION TIMING

At low altitudes, with any good grade of "regular" gasoline, the engine will give its best performance if timed according to specifications.

When using lower grade fuels, or after carbon has accumulated, objectionable spark ping may occur with the specified timing. In cases of this nature, ignition timing should be retarded, but not to exceed 4 degrees of crankshaft rotation later than specified.

At high altitudes or when using premium gasoline, there is less tendency for spark ping. In such cases, improved performance may be obtained by advancing the spark not to exceed 4 degrees of crankshaft rotation ahead of specified timing.

Within the foregoing limits, namely, from 4 degrees ahead to 4 degrees later than specified timing, a good rule to follow is to advance the spark until a slight ping is heard when accelerating from 10 mph on 6 cylinder engines or 15 mph on 8 cylinder engines in direct drive at wide open throttle. The distributor should be moved clockwise to retard and counter-clockwise to advance ignition timing.

TIMING LIGHT—Place a chalk mark on vibration damper or pulley at the specified number of degrees advance. Start engine and allow to run at slow idle setting. The timing flash should occur at the instant the chalk mark is opposite the pointer on the timing chain cover. If not, loosen the distributor clamp bolt and rotate the distributor clockwise or counter-clockwise until the correct setting is obtained. As engine speed is increased the timing light should indicate a gradual spark advance. See Figure 4.

A minor change in ignition timing may be made on 6 cylinder engines by loosening the distributor arm lock screw and moving the arm slightly.

TIMING INDICATOR—Tool C-345 can be used to adjust the ignition timing in relation to piston travel on 6 cylinder engines. When timing ignition, always be certain the number 1 or 6 piston is at the top of the compression stroke and the rotor is pointing to the insert corresponding to that piston. Remove timing hole plug over number 6 cylinder and install Tool C-345 as shown in Figure 5.

Rotate engine, plugs removed, until top dead center is reached. Then set dial indicator at zero.

Connect test lamp from kit C-435 between the distributor primary terminal and the battery negative terminal. Loosen the distributor clamp bolt and back off the distributor by rotating it clockwise until the test lamp lights. Then turn the distributor slowly, counterclockwise and stop the instant the light goes out. Then tighten distributor clamp bolt. Recheck after tightening.

TESTING MECHANICAL ADVANCE

A light and heavy spring is used in the distributor. Make adjustments on the weak spring.

32x161

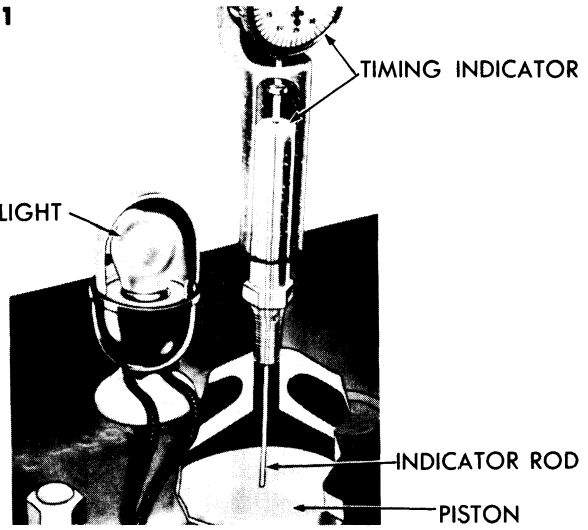

Figure 5—Timing Indicator—6 Cylinder Engine

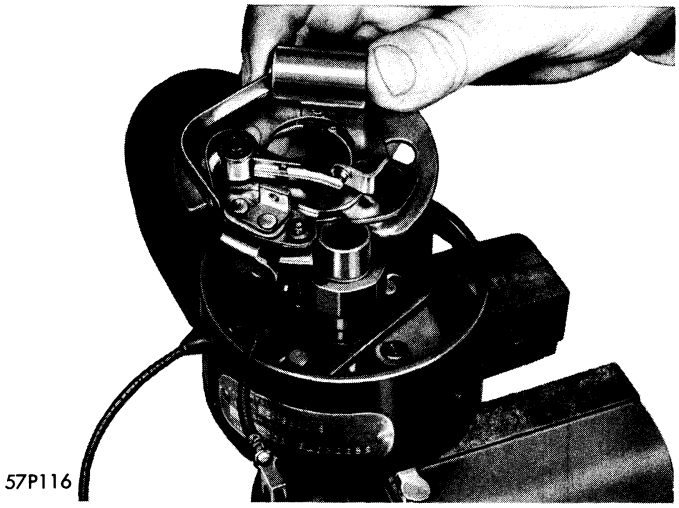

Figure 6—Removing or Installing Breaker Plate

The governor weights in distributor must be tested on a distributor tester. Operate the distributor clockwise. Check the distributor R.P.M. against the degree of advance and compare with specifications in mechanical advance specification chart.

If degrees of advance are high as compared with chart, it indicates that the light spring in the distributor is too weak. If the degree of advance is low, the spring tension is too stiff, making the advance too slow.

In either case the tension can be increased or decreased by bending the bracket on the weight plate to which the springs are attached. After making adjustments check the distributor advance at all points in the chart. Make the checks while increasing and decreasing the speed. If there is a variation of the check points between the increase and decrease readings, inspect the governor weights for alignment and adequate lubrication.

TESTING VACUUM ADVANCE

The vacuum advance chamber on the distributor automatically adjusts the spark advance to engine load conditions. Upon sudden acceleration or wide open throttle operation, manifold vacuum drops, causing the spring in the chamber to retard the ignition timing. As engine load or thottle opening decreases, the vacuum increases and overcomes the pressure spring, advancing the ignition timing.

Remove vacuum from distributor vacuum control unit and operate distributor at about 800 R.P.M. until a steady reading is obtained. Apply the amount of vacuum required for the full specified advance. If the advance does not conform with the specifications in chart, remove the retaining nut and add or remove washers to make the necessary adjustment. Check washer thickness and install a thinner washer to increase advance or a thicker washer to reduce the advance.

IMPORTANT

Before testing, be sure diaphragm will hold vacuum. Connect to vacuum pump on tester and set to give between 10 and 20 inches of vacuum. Shut off pump. If gauge reading falls, it indicates a leak in vacuum chamber and must be corrected.

When the right combination of washers is determined to permit full advance, check the amount of vacuum required to produce about one degree of advance. Usually if full advance is correct, it will be correct throughout the entire range. If readings do not conform, replace the spring and readjust the tension by selecting the right combination of washers.

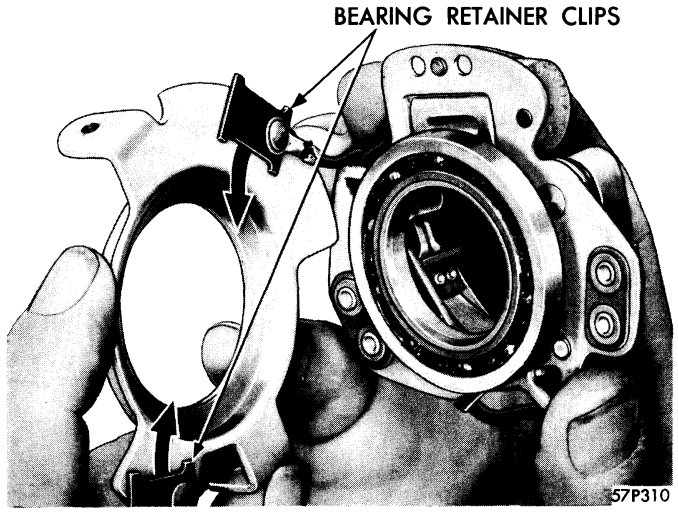

Figure 7—Releasing Distributor Breaker Plate Bearing (Dual Breaker Point Distributor Only)

DISTRIBUTOR DATA AND SPECIFICATIONS

Models	P-30, LP-1	P-31	LP-2
Type	Automatic advance, speed and vacuum control		
Location	Left side of engine	Rear of Engine	Front of engine
Drive	Camshaft Gear		
Bushings	2 Bronze	2 Bronze in Distributor 1 Bronze in Cylinder Block	
Number of Breakers	1	1 (a)	
Number of Lobes on Cam	6	8	
Cam Angle (Dwell)	36°-42°	29°-32°	
Distributor Point Gap	.020 in.	.015 in.-.018 in.	
Breaker Arm Tension	17 to 20 oz.		
Firing Order	1-5-3-6-2-4	1-8-4-3-6-5-7-2	
Timing Marks on	Crankshaft vibration damper	Crankshaft pulley	Crankshaft vibration damper

(a) Engines with 4-barrel carburetors—dual breaker points.

COIL

Models		P-30, LP-1	P-31, LP-2
Ohms resistance at 70°-80° F.	Primary	4.19-4.55	1.65-1.79
	Secondary	6500-7600	8000-9200
	Ballast	None	.665-.735

CONDENSER

Capacity (microfarads)	.25 to .285

SPARK PLUGS

Models	P-30, LP-1	P-31	LP-2	Golden Commando
Type	AR 51	AR 52 AR 32 (Fury)	AR 42 AR 32 (Fury)	AR 32
	Resistor			
Size	14mm.			
Gap	.035 in.			

DISTRIBUTOR TIMING

Model	Displacement (cu. in.)	Comp. Ratio	Chrysler Part No.	Autolite Distributor No.	Basic Setting
P-30, LP-1, 6 Cyl.	230	8.0-1	1689323	1BR 4001	2° BTC
P-30, 6 Cyl.	230	8.0-1	1546755	1AT 4101B	2° BTC
P-31, V-8	277	8.0-1	1779951	1BP 4003C	4° BTC
P-31, V-8	277	8.0-1	1688649	1BJ 4301B	TDC
P-31, V-8 (Power-Pak)	301	8.5-1	1779938	1BP 4003A	4° BTC
P-31, V-8	301	8.5-1	1689318	1BP 4003	10° BTC
P-31, V-8 (Fury)	318	9.25-1	1779937	1BS 4003	8° BTC
LP-2, V-8	318	9.0-1	1842607	1BP 4003F	10° BTC
LP-2, V-8 (Super-Pak)	318	9.0-1	1841510	1BP 4003D	10° BTC
LP-2, V-8 (Fury)	318	9.25-1	1779937	1BS 4003	8° BTC
LP-2, V-8 (Golden Commando)	350	1.0-1	1779983	1BS 4006B	8° BTC

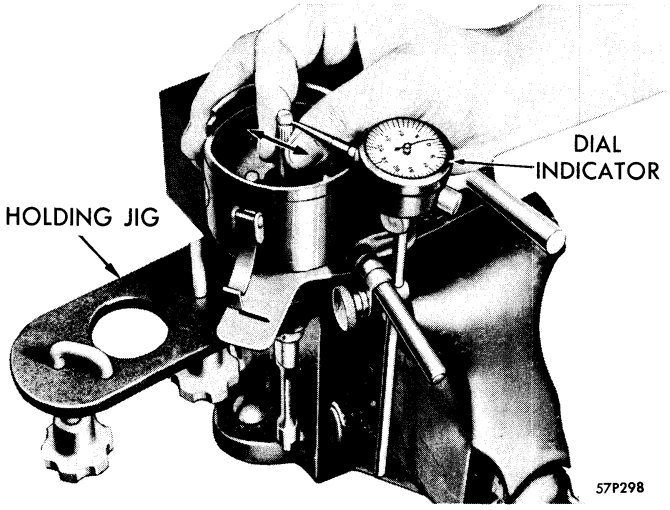

Figure 8—Measuring Drive Shaft Bushing Wear Using Dial Indicator

DISASSEMBLY OF DISTRIBUTOR

Remove vacuum control unit and then the breaker plate assembly. See Figure 6. Inspect the pivot pin or bearings in the breaker plate assembly for binding, roughness or excessive looseness. If bearing binds slide bearing retainer clips out of the way and carefully separate the upper and lower plate to expose bearing. See Figure 7. Clean in a suitable solvent and dry with compressed air. Repack the bearing ½ full with a high melting point non-fibre grease and reassemble.

Inspect distributor points for evidence of burning or pitting. High resistance in the generating circuit due to loose connections or corrosion may have caused the points to oxidize. Loose condenser connections or high resistance within the condenser will also cause burned points. Poor point contact due to improper setting will result in decreased point life.

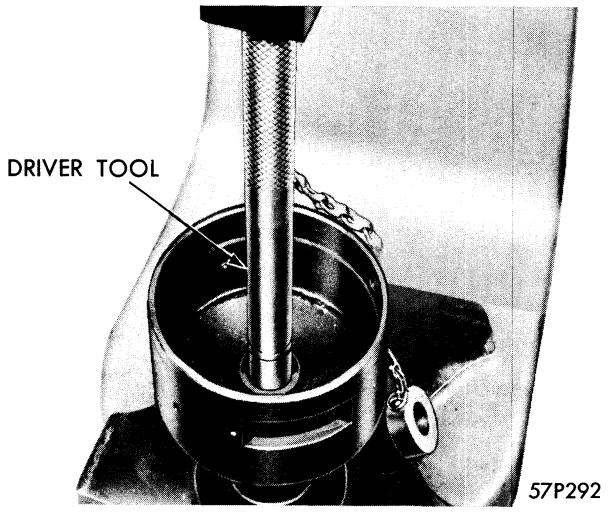

Figure 9—Removing Drive Shaft Bushing with Tool C-3041

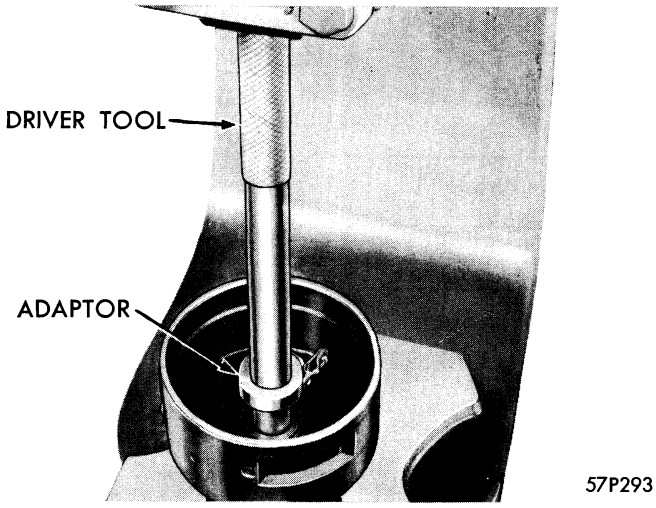

Figure 10—Installing Upper Bushing Using Tool C-3041

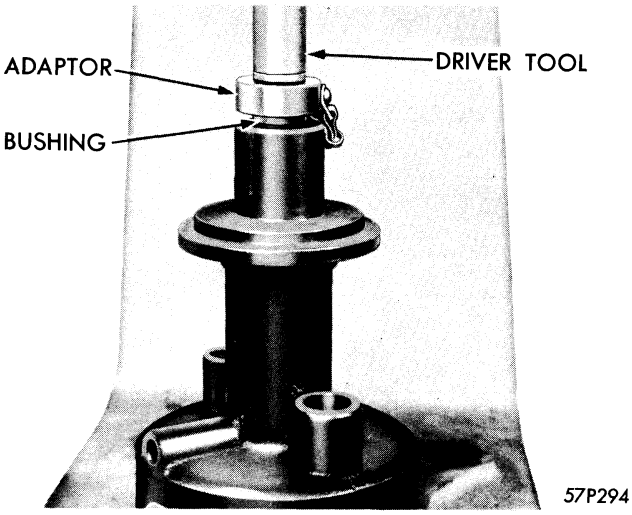

Figure 11—Installing Lower Bushing in Distributor

Remove felt wick and snap ring which holds cam and yoke assembly to drive shaft. Remove springs and governor weights. Place distributor in vise and do not tighten excessively. Attach a dial indicator to distributor base and position plunger against drive shaft at top. Move drive shaft "to and from" indicator with just enough pressure to measure the clearance between shaft and bushings. Excessive pressure will cause the shaft to spring and show a false reading. If clearance is more than .008 inch, replace the bushings. See Figure 8.

File the end of the staked rivet and drive it out of the distributor shaft collar. Then remove drive shaft. Mount distributor in vise as shown in Figure 9 and press bushings out from bottom of base with driver Tool C-3041.

ASSEMBLY OF DISTRIBUTOR

The distributor shaft bushings should be soaked in light engine oil for about 15 minutes before pressing them into position. Insert the bushing and driver into

DISTRIBUTOR MECHANICAL ADVANCE AND VACUUM CONTROL SPECIFICATIONS

Distributor Model Number	Governor Advance (*Distributor Degrees and R.P.M.)				
	Start	500	700	950	Maximum
1BR 4001	0° 400-600 R.P.M.	.5°-2.4°	2.3°-4.2°	4.5°-6.5°	7.5°-9.5° at 1800 R.P.M.
1BP 4003	0° 440-575 R.P.M.	0°-1°	1.9°-3.9°	4.3°-6.3°	8.5°-10.5° at 2200 R.P.M.
1BP 4003A	0° 300-400 R.P.M.	5.5°-7.5°	7.5°-8.5°	10°-12° Maximum	— —
1BP 4003C	0° 300-400 R.P.M.	2°-4°	5.5°-7.5°	7°-9°	14°-16° at 2150 R.P.M.
1BP 4003D	0° 280-430 R.P.M.	1°-3°	3.5°5.5°	4.5°-6.5°	10°-12° at 2400 R.P.M.
1BP 4003F	0° 330-570 R.P.M.	0°-1.5°	1.2°-3.2°	2.6°-4.6°	8°-10° at 2300 R.P.M.
1BS 4003	0° 300-400 R.P.M.	3.5°-5.5°	5°-7°	6.7°-8.7°	7°-9° at 1000 R.P.M.
1BS 4006B	0° 270-420 R.P.M.	1°-3°	3.8°-5.8°	5.2°-7.2°	9°-11° at 2000 R.P.M.
1AT 4101B	0° 350-500 R.P.M.	0°-1.75°	1.5°-3.5°	3.75°-5.5°	7°-9° at 1350 R.P.M.
1BJ 4301B	0° 270-420 R.P.M.	1°-3°	3.8°-5.8°	5.2°-7.2°	9°-11° at 2000 R.P.M.

Distributor Model Number	Vacuum Advance (*Distributor Degrees and Inches of Mercury)				
	Start	8	10	12	Maximum
1BR 4001	0° 5-6 in. hg.	1.4°-3.2°	3.5°-5.5°	5.5°-7.5°	8.5°-10.5° at 16 in. hg.
1BP 4003	0° 7.5-8 in. hg.	.5°-2.5°	3.5°-5.5°	6°-8°	12°-14° at 18 in. hg.
1BP 4003A	0° 7-8 in. hg.	0°-2°	3.3°-5.3°	6°-8°	8.5°-10.5° at 14 in. hg.
1BP 4003C	0° 5-7 in. hg.	3.25°-5.5°	5.25°-8.75°	7.5°-11°	11.5°-13.5° at 16 in. hg.
1BP 4003D	0° 6-7 in. hg.	1.3°-3.4°	4.5°-6.7°	7.5°-9.5°	11.7°-14° at 16 in. hg.
1BP 4003F	0° 6.5-7 in. hg.	1.3°-3.5°	4°-6°	7.5°-9.5°	11.8°-14° at 16 in. hg.
1BS 4003	0° 5-10 in. hg.	— —	0°-2.5°	2.5°-5.5°	9.0°-11.5° at 18 in. hg.
1BS 4006B	0° 7-9 in. hg.	0°-1.5°	1.5°-3.5°	5°-8°	11.5°-14.5° at 17 in. hg.
1AT 4101B	0° 4.5-5 in. hg.	2.25°-3.25°	4°-5°	5.5°-7.25°	7°-9° at 14 in. hg.
1BJ 4301B	0° 5-6 in. hg.	3.25°-5.25°	6°-8°	8°-10°	10.5°-12.5° at 15 in. hg.

*Note: All figures are in distributor R.P.M. and distributor degrees. For engine R.P.M. and degrees of crankshaft rotation, multiply R.P.M. and degrees figures by 2.

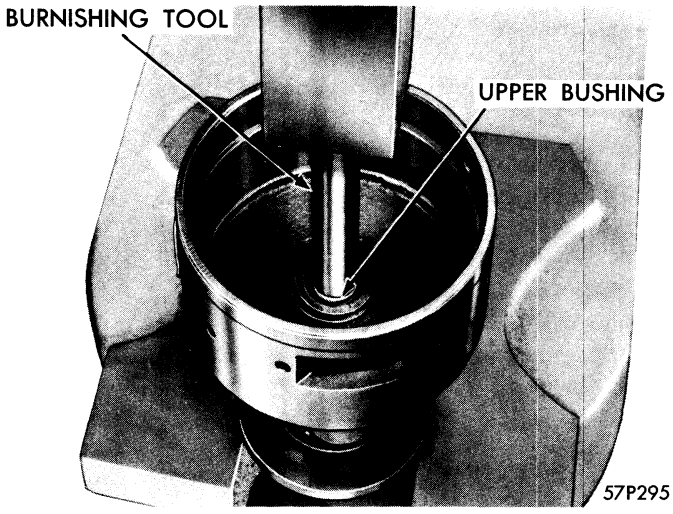

Figure 12—Burnishing Drive Shaft Bushings with Burnishing Tool

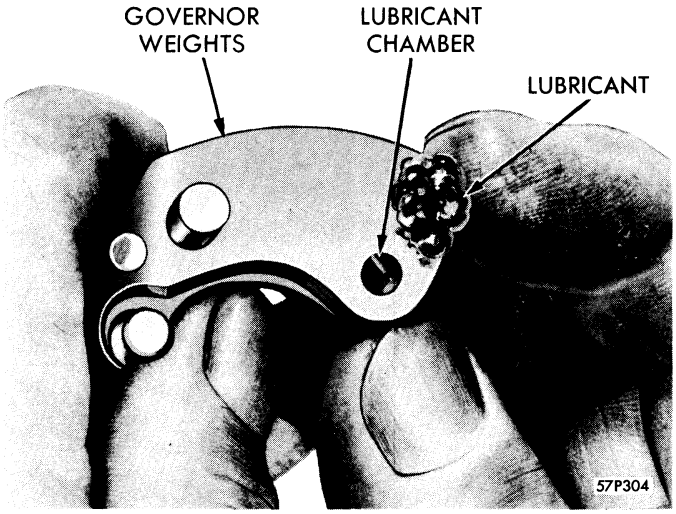

Figure 13—Lubricating Governor Weights

the bore at top of distributor base and press into position. Upper bushing should be .094 inches below top of bore. See Figure 10. Invert distributor base and press in lower bushing flush with bottom of surface. See Figure 11.

IMPORTANT

If bushings have oil holes be sure to line them up with oil holes in distributor base as the bushings are pressed into position. If bushings do not have holes, press them into the distributor base and drill bushings with a ⅛ inch drill. Remove oiler to drill upper bushing in both 6 and 8 cylinder distributors. In addition, the 6 cylinder distributor has a ⅛ inch oil hole through the lower bushing.

After bushings are installed they should be burnished with burnishing tool which is part of Tool C-3041. See Figure 12. Press tool through bushings. If special tool is not available, ream bushings from .4995 to .5000 inches.

Remove any burrs from inside of bushings and make certain oil passages are clean. Install upper thrust washers on the distributor shaft and insert shaft in base, Install lower thrust washer collar and rivet. Do not peen rivet until end play is checked with feeler gauge. Replace thrust washer if end play exceeds .008 inches.

Lubricate the governor weights and install them on pivot pins. See Figure 13. Install the spring. Slide cam and yoke on shaft and engage the weight lugs with the slots in the yoke. See Figure 14. Install spring lock ring and felt wick at top of drive shaft. See Figure 15. Install the breaker plate assembly in distributor body, and then the vacuum control unit.

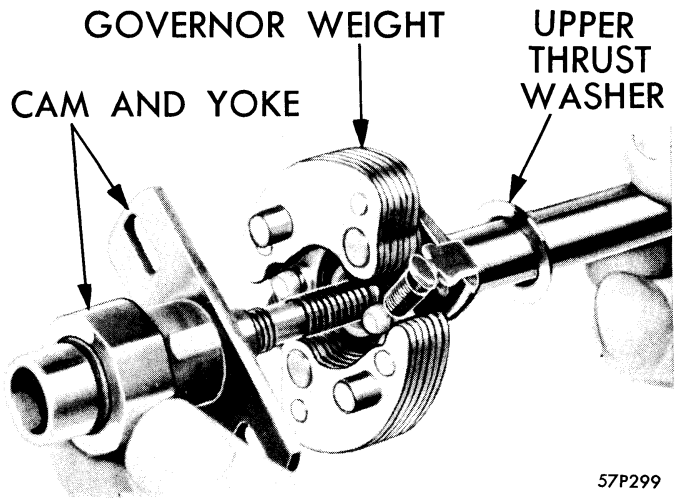

Figure 14—Distributor Shaft Assembly

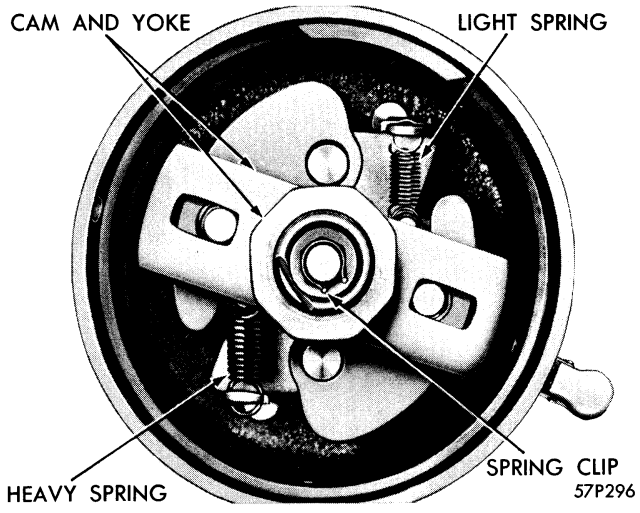

Figure 15—Distributor Cam Installed

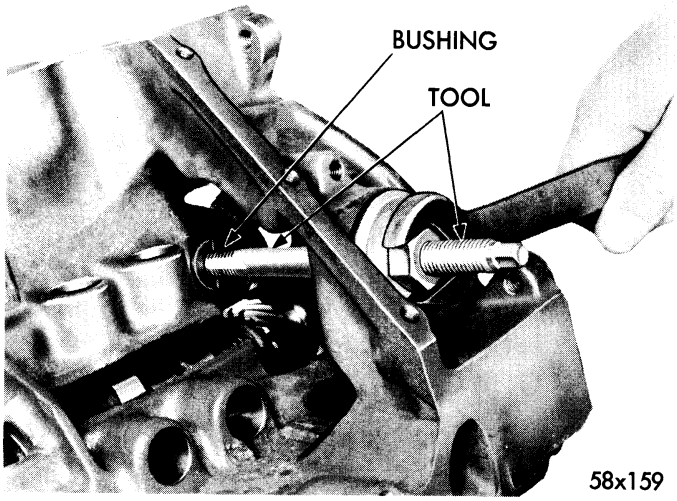

Figure 16—Removing Distributor Drive Shaft Bushing—350 Cubic Inch V-8 Engine
Typical of 277, 301 and 318 Cubic Inch V-8 Engine

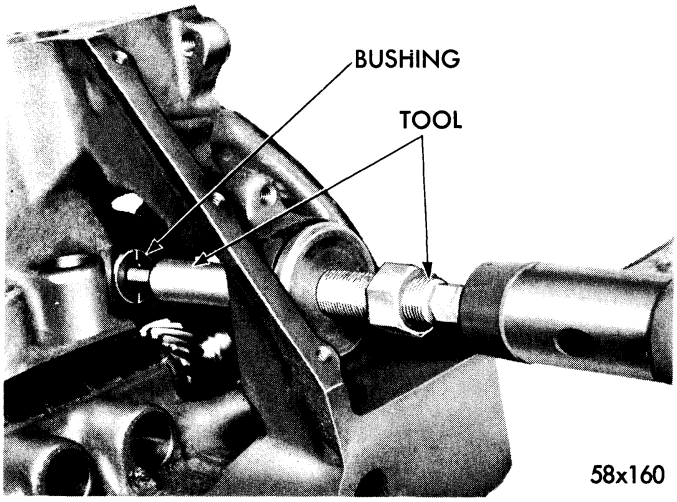

Figure 17—Installing Distributor Drive Shaft Bushing—350 Cubic Inch V-8 Engine
Typical of 277, 301 and 318 Cubic Inch V-8 Engine

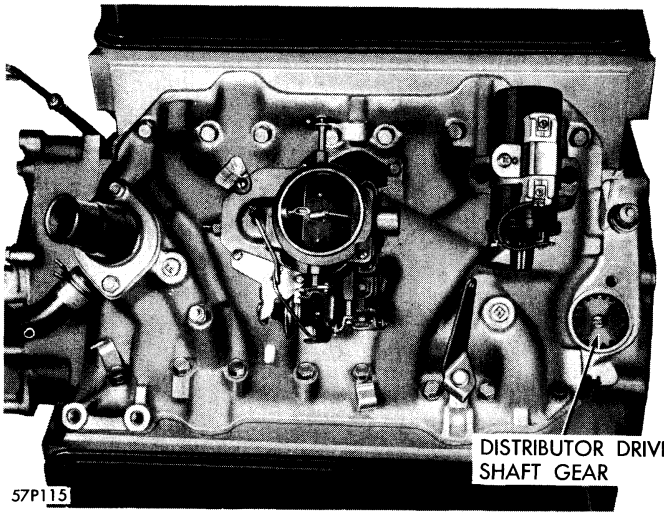

Figure 18—Position of Distributor Drive Shaft—277, 301 and 318 Cubic Inch V-8 Engine

DISTRIBUTOR DRIVE SHAFT BUSHING

V-8 ENGINES—It is advisable to replace the distributor drive shaft bushing whenever the engine or distributor is reconditioned.

Use a pair of snap ring pliers to remove the distributor drive shaft and gear. Install Tool C-3052 and remove bushing. See Figure 16. Install new bushing over tool C-3053 and insert tool and bushing into bore as shown in Figure 17. Drive bushing in place with soft hammer. As the burnisher is pulled through the bushing by turning the nut, the tool swedges the bushing tight in the bore and burnishes it to correct size. *Do not ream this bushing to size.*

DISTRIBUTOR INSTALLATION

6 CYLINDER ENGINE—Rotate crankshaft until number 1 piston is at top dead center, on the compression stroke. Timing indicator pointer should be pointing to the dead center mark on vibration damper. Check compression stroke by holding finger over spark plug hole as crankshaft is rotated. Turn rotor to No. 1 spark plug wire insert and install distributor making sure drive shaft engages oil pump shaft slot.

V-8 ENGINE — Before installing the distributor drive shaft, it will be necessary to time the engine. Rotate crankshaft until No. 1 piston is at top dead center, on compression stroke. Pointer should be at dead center mark on crankshaft pulley. Coat the shaft of the drive gear and insert it into the bushing. Spiral the shaft into place so that the slot in the shaft indexes with the oil pump shaft. The slot at the gear end of the distributor drive shaft should point to the first intake manifold bolt on the left side of the engine on 277, 301, and 318 cubic inch engines. See Figure 18. The slot on 350 cubic inch engines should be parallel to the crankshaft centerline. See Figure 19.

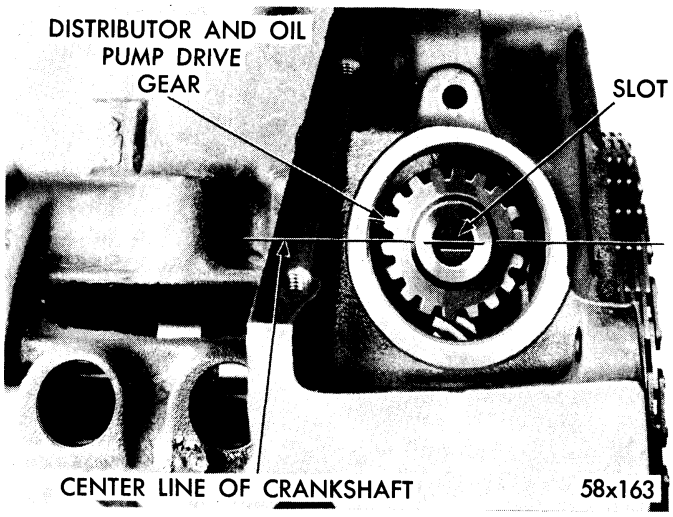

Figure 19—Position of Distributor Drive Shaft—350 Cubic Inch V-8 Engine

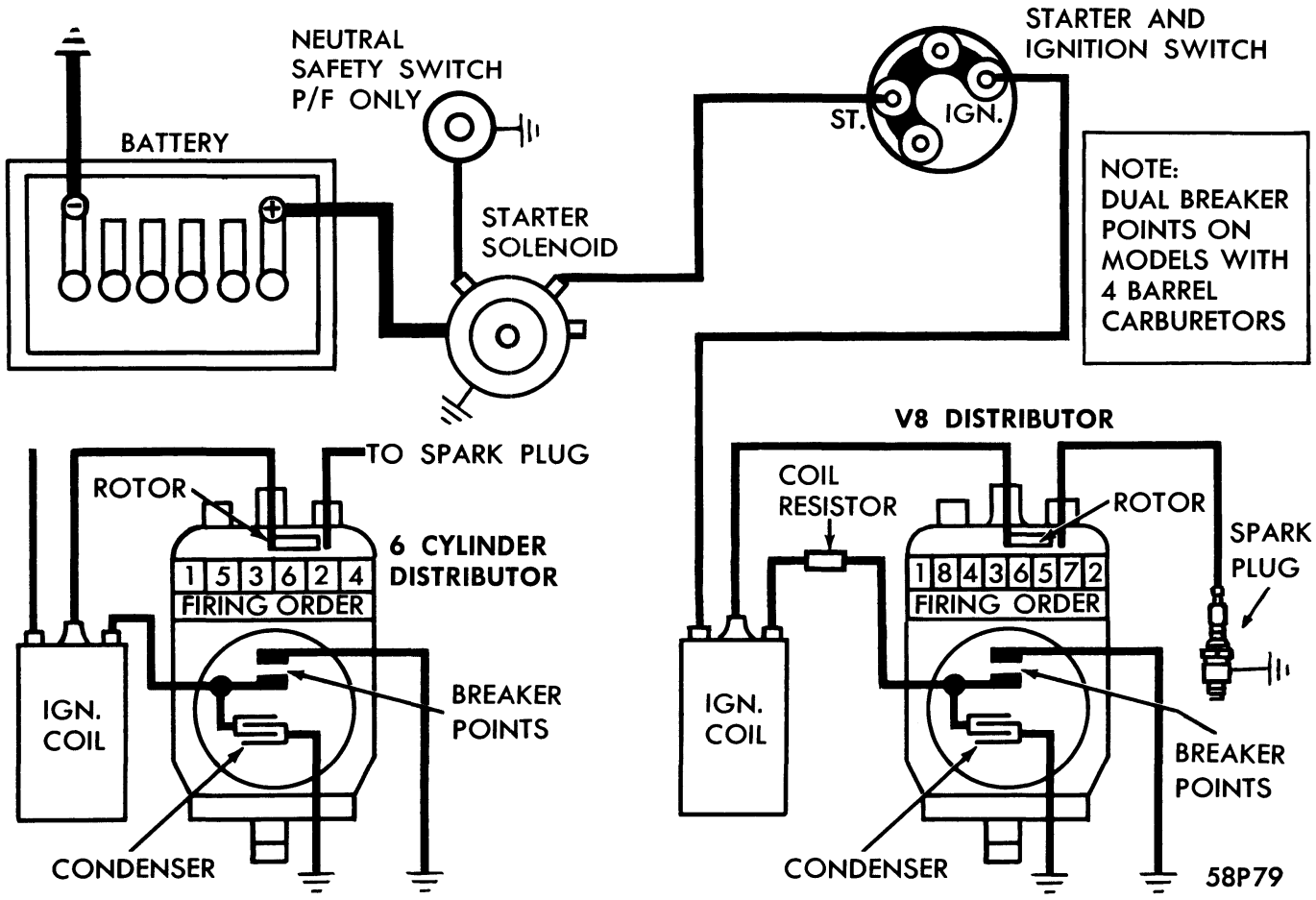

Figure 20—Typical Ignition Circuit

Turn distributor rotor to number one spark plug insert. Turn rotor counter-clockwise until points just separate. Position oil seal ring in place and install distributor. Make sure shaft engages in lower drive shaft. Install clamp and check distributor timing.

2. COIL AND CONDENSER

TESTING COIL

Clean and inspect the coil and terminals. Inspect coil for cracks or damage which would cause leakage. Use reliable test equipment when checking ohm resistance in the primary and secondary coil windings. See Data and Specifications.

To check the secondary, or high tension circuit, first pull the secondary cable out of the distributor cap. Hold the end of the cable about ¼ of an inch away from the cylinder head and crank the engine with the ignition key turned on. If the spark jumps the ¼ inch gap, the coil should be satisfactory.

If test is unsatisfactory, bench test coil on coil tester and replace if necessary.

IMPORTANT

Always check coil for external leaks and arcing. Two tests should be made on the coil, one when the coil is cool and one after coil has warmed up.

When testing the coil on V-8 models, test the ballast resistor and coil independently of each other. The ballast resistor is connected in series with the primary windings and is attached to the outside of of coil.

TESTING CONDENSER

Inspect condenser for broken leads, frayed insulation, a loose or corroded terminal or poor ground contact. Insulate breaker point, with cardboard and check condenser for capacity and ground. Check capacity and resistance from the primary terminal through the condenser to the distributor base. If tests indicate a faulty condenser, perform breakdown, capacity and resistance tests on a condenser tester.

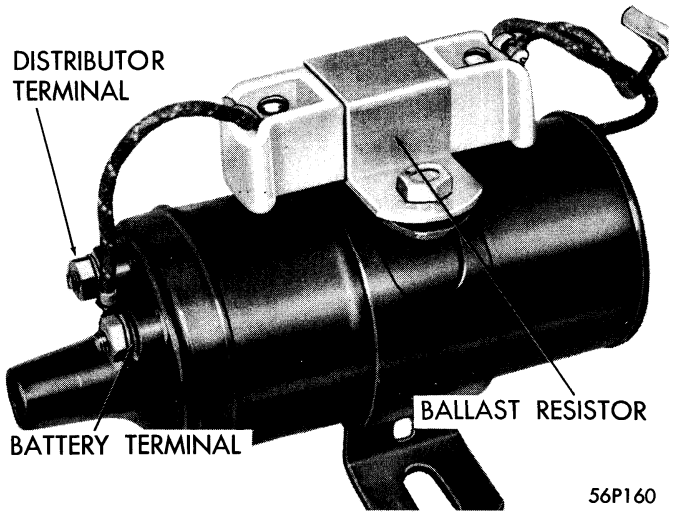

Figure 21—Coil and Ballast Resistor

3. SPARK PLUGS

The condition under which spark plugs have been operating can be determined, in most cases, by visual inspection. It is important that plugs are periodically cleaned and the gaps reset to insure good engine performance, economy and long life of the spark plugs. Improper installation of plugs will result in premature failures. It should be made certain that the cylinder head seat is clean, the proper torque (32 ft. lbs.) is used to fully compress the gasket, and that the threads on the plug and in the cylinder head are free of carbon and dirt.

INSPECTION

EXCESSIVE HEAT—Loose spark plugs, poorly seating valves, excessively lean fuel mixture, incorrect ignition timing or use of incorrect plugs will cause the spark plugs to run too hot.

The insulator nose will be white with dark spots or blisters near the tip, or blistered dark brown deposits near the tip plus excessive burning of the electrodes. If the insulator material is badly fused and blistered and the center and side electrodes are badly burned, there may be water leaking into the cylinder head in addition to one or more of the above conditions. Care should be taken when installing plugs to prevent distorting the shell. If leaks occur between the shell and the insulator, gas may leak by leaving dark streaks up the side of the insulator top. This condition may also cause burning of the insulator and the electrodes.

INSUFFICIENT HEAT—An excessively rich fuel mixture, excessive oil consumption or prolonged idling or low speed operation may cause the plugs to run too cold. A dull black film or "sooty" appearance is the result of prolonged idling or low speed operation. An accumulation of oily carbon or fouling of the plugs will indicate rich mixture or excessive oil consumption.

NORMAL—A soft, powdery tan deposit or a reddish brown deposit accompanied by normal electrode erosion will indicate normal plug condition. The reddish brown condition is usually the result of continued high speed or heavy load operation.

A coil of higher out-put than specified for the particular engine or spark plug will cause rapid burning of the electrodes. Always check the generator circuit and coil out-put when continued plug failure is encountered.

Check spark plug gaps accurately, preferably with a wire gauge. Always inspect the insulator for chips and cracks before and after cleaning and gapping.

When testing resistor type plugs in a spark plug tester, the spark (under pressure) will be thin and purple in stead of heavy and blue as with conventional type plugs. This is due to the resistor and is not an indication of a defective plug.

4. DIAGNOSIS PROCEDURES

Diagnosis procedures concerning units of the ignition system are included in the various procedures described under Engine (Section I).