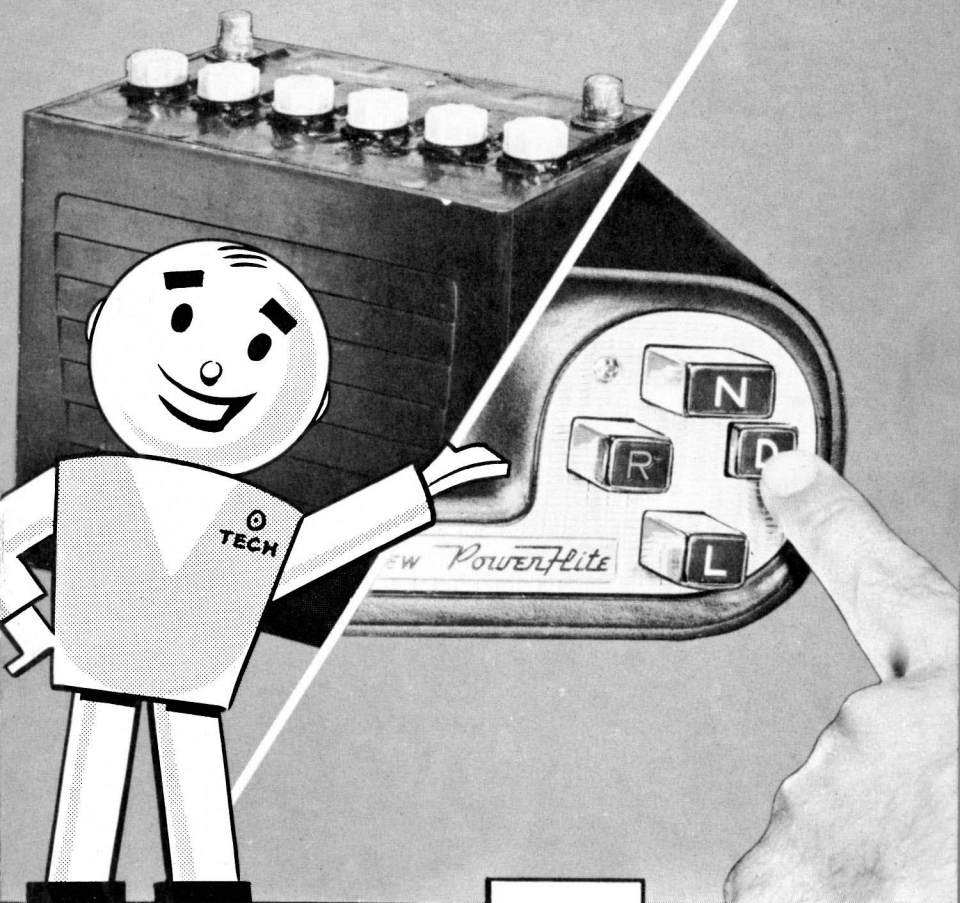


THE 12-VOLT ELECTRICAL SYSTEM ... and POWERFLITE PUSH-BUTTON CONTROL



SERVICE REFERENCE BOOK

Copyright 1955 Chrysler Corporation

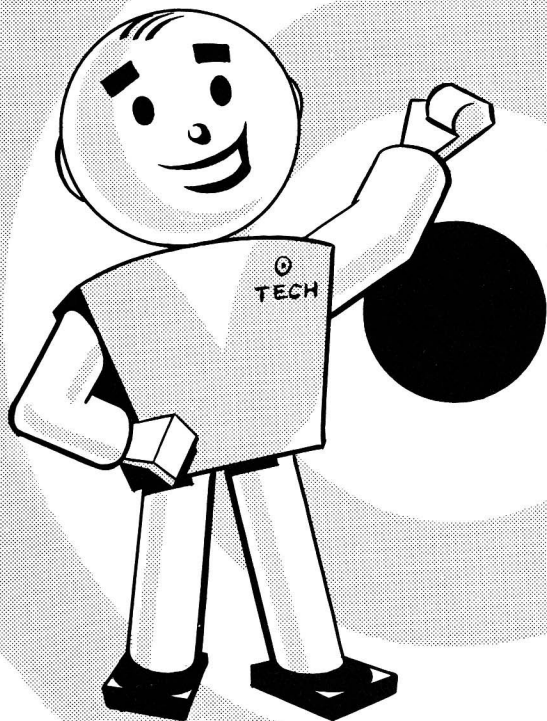
SESSION NO.

97

Prepared by
CHRYSLER CORPORATION
PLYMOUTH • DODGE • DE SOTO
AND CHRYSLER DIVISIONS

TECH SEZ:

**"KNOW WHERE TO AIM WHEN
SERVICING THE NEW FEATURES!"**



It pays to get acquainted with the new 12-volt electrical system and the PowerFlite push-button control, two of our major 1956 features. You'll save time and effort when you know *where* to concentrate if a new car comes in for electrical or transmission attention.

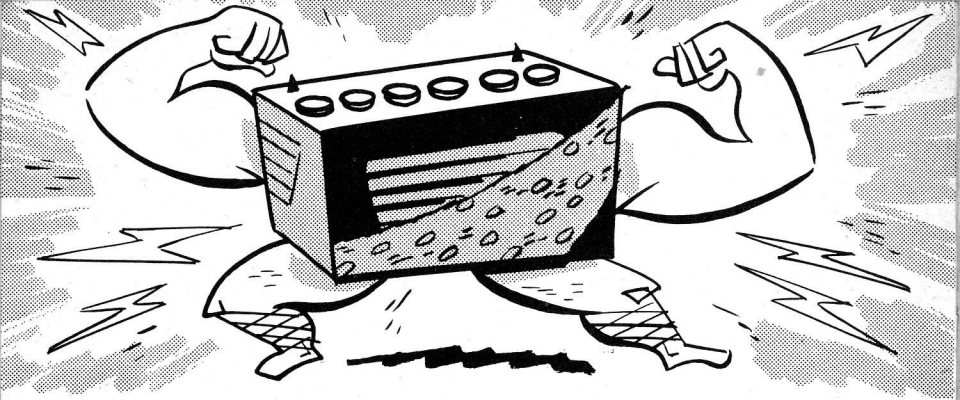
This reference book, then, explains the reasons behind the change to the 12-volt system, covers what differences there are in parts, and talks about the care you should take when electrical service is needed. In addition, there's a section on how to make adjustments on the PowerFlite push-button control cable if they should happen to be required.

Here's where you'll find this important information:

	<i>Page No.</i>
HERE'S WHY WE'VE CHANGED TO THE 12-VOLT SYSTEM . . .	3
DESCRIPTION OF COMPONENTS	
THE 12-VOLT BATTERY	5
HOW TO CHECK THE 12-VOLT BATTERY	8
THE STARTING MOTOR	9
THE IGNITION COIL	10
THE DISTRIBUTOR	11
THE SPARK PLUGS	13
THE 12-VOLT GENERATOR	15
MAINTENANCE	16
GENERATOR REGULATOR	16
GENERATOR INDICATOR LIGHT	23
OIL PRESSURE INDICATOR	23
SETTING IGNITION TIMING	25
THE POWERFLITE PUSH-BUTTON CONTROL CABLE	26
ADJUSTMENT	26
REMOVAL	29
INSTALLATION	31
A CLOSING SUGGESTION	31

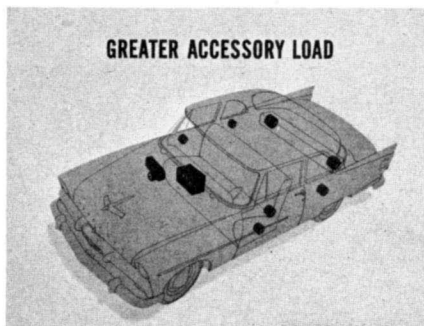
HERE'S WHY WE'VE CHANGED TO THE 12-VOLT SYSTEM . . .

Today's cars require more electrical capacity. You can get this extra capacity better from the 12-volt system. Why is more capacity needed?



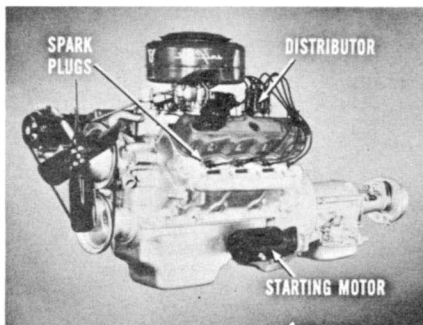
The new engines have higher horsepower, higher compression ratios, and they run at much higher speeds. Since there are higher combustion chamber pressures, more electrical energy is needed to crank and to fire the engine.

Keep in mind that the engine is, in a sense, a large air pump. Air in itself is a very good insulator. So . . . when you squeeze the air in tighter, you naturally need more voltage to fire the spark plug.

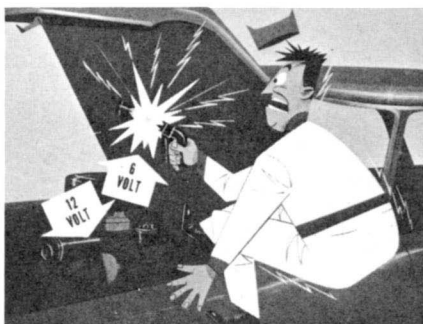


Another reason that new cars require more electrical capacity is that more of them are carrying a greater accessory load. Many new cars are being equipped with air-conditioning systems, power windows, power seats, and even larger heaters, to mention a few.

This extra electrical capacity has to come from the battery and the generator. Besides this, there are design improvements in the spark plugs, distributor, generator regulator, and in the starting motor. All of these units have been revamped to make the best use of the higher voltage.

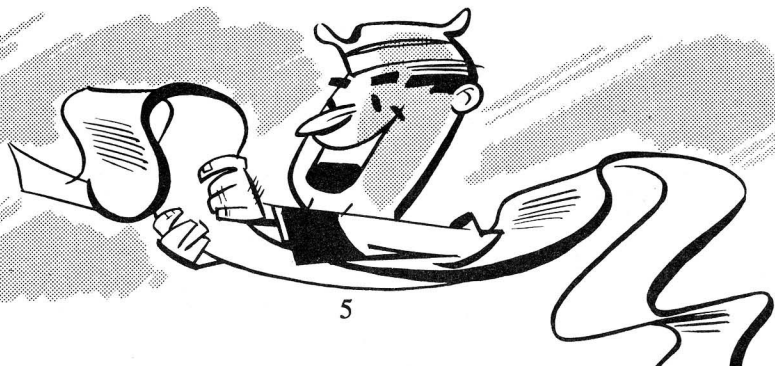


One thing you've got to remember is that it doesn't pay to go messing around the 12-volt system with 6-volt test equipment. If you do, you'll damage the equipment and will have to replace it.

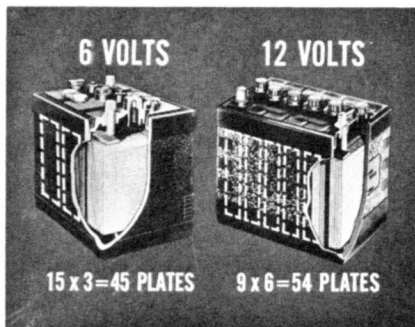


DESCRIPTION OF COMPONENTS

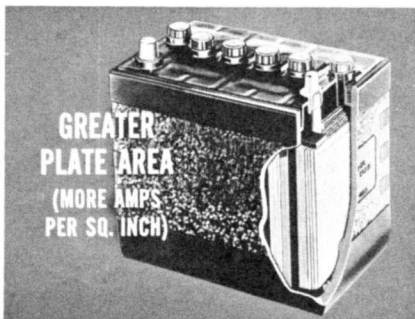
The 12-Volt Battery—You'll notice that the 12-volt battery is in the same convenient location, but uses a *negative* ground. You won't



have any trouble in hooking up the terminals properly because they differ in size to match the cable clamps. As far as operation is concerned, the negative ground system works just as well as the positive ground system used with our 6-volt system.



Over-all size hasn't been affected much, either. The 12-volt battery has 6 two-volt cells, instead of 3 cells. Inside the battery, however, there is this difference. Checking a typical 6-volt battery, for instance, we find it has 15 plates per cell for a total of 45 plates. On the other hand, the 12-volt battery has nine thinner plates per cell, for a total of 54 plates.

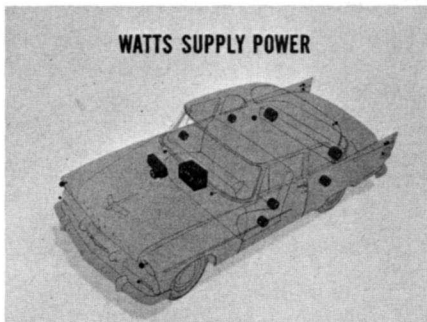


In other words, the 12-volt battery has a greater plate area. This is the key to its greater output. The number of amperes per square inch governs its rate of delivery, and the rate at which it accepts a charge.

By using thinner plates, and more of them, both plate area and battery output are increased. What's more, the thinner plates are more porous. This means there's less internal resistance because it's easier for the voltage to push amperes into the plates when the battery's being charged.

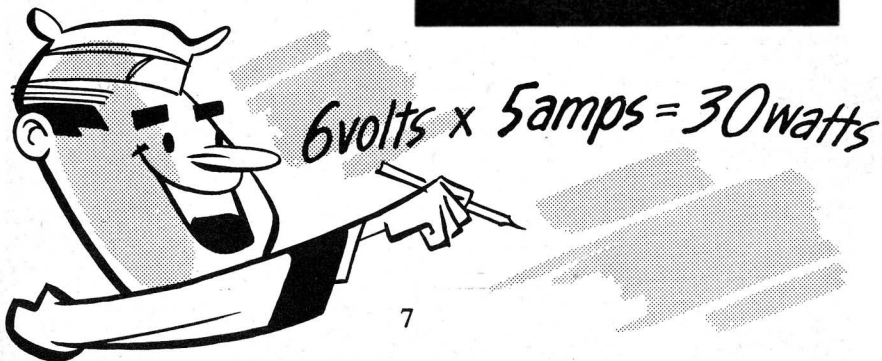
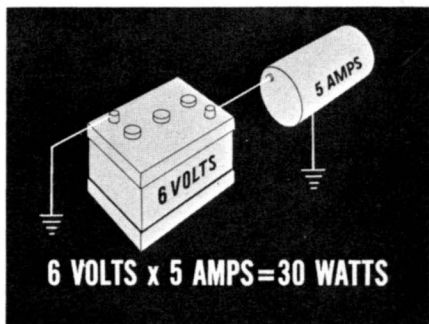
In addition, since more plate area is exposed to the electrolyte, there's less internal resistance during the delivery of amperes *from* the battery.

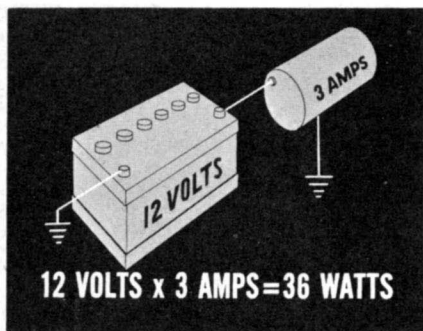
What about Ampere-Hour Rating? You might be asking yourself this question: “The 12-volt battery is rated at about 50 ampere-hours. Yet, the 6-volt battery had a 100-ampere-hour rating. Why the difference?” Well, amperes are important, of course. But actually, it’s *watts* that supply the power to do electrical work. Watts provide power to run motors, burn lights, and operate the accessories.



When you want to lift more weight, you’d use a motor that’s rated at a greater number of watts. When you want more light to see by, you’d use light bulbs of greater wattage. This same rule applies to getting electrical work done in a car. Here’s an example:

Let’s say an accessory in the 6-volt system draws 5 amps. That means it is rated at 30 watts. In short: 6 volts multiplied by 5 amps, equals 30 watts.



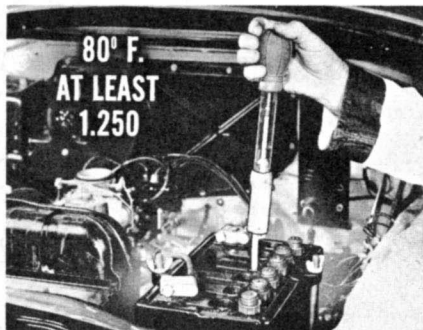


Now, in the 12-volt system, the rating of a similar accessory can be boosted to 36 watts, while the current draw can be cut down to only 3 amps. Again, 12 volts x 3 amps equals 36 watts.

Said another way, doubling the voltage with the same . . . or even fewer amperes . . . equals *greater electrical power*. In the 12-volt system, then, you get a boost in power with fewer amps. than you did in the former 6-volt system.

One big advantage in going to fewer amps. is that it increases the life of the contacts in the distributor and generator regulator. Greater point life is important from a service point of view. High currents, as you know, erode points.

How To Check The 12-Volt Battery—You'd check the 12-volt battery just about the same as you'd check any battery. Examine the electrolyte level once a week to see that the plates are covered. But, when

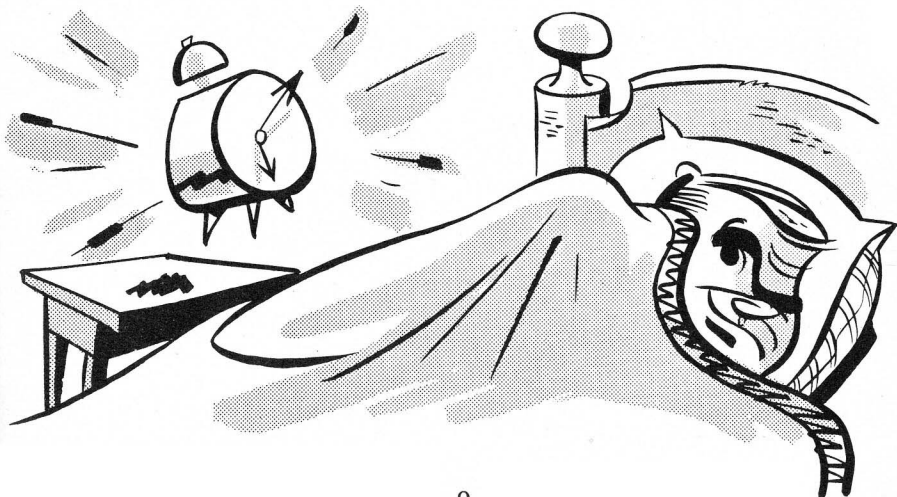


you test for specific gravity, be sure to use a hydrometer that contains a thermometer so you'll get the correct reading according to the temperature. At 80°F., you should get a reading of at least 1.250. If you don't, bring the battery up to a full charge of 1.275 to 1.300 by putting it on a *slow charger*.

NOTE: A quick-charge is only a temporary boost, and won't build the battery up to a full and lasting charge. So, take a tip. Use the slow-charger and you'll always do a much better job.

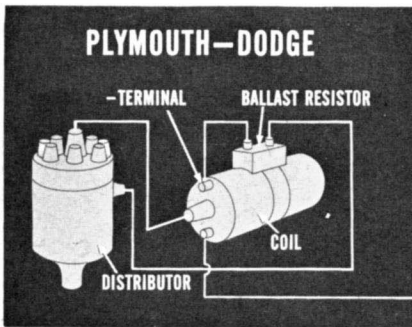
In general, you'll find the 12-volt battery a rugged source of electrical energy. It has a longer cranking ability, and recovers its charge more rapidly under normal driving conditions. The quicker recovery also means it will stay in a higher state of charge throughout its normal life.

The Starting Motor—The starting motor is still about the same size as before, but by using finer wire, the field coils have more turns. This increases the strength of the magnetic field. So, when the armature turns, more magnetic lines of force are cut. This results in greater cranking power and endurance.

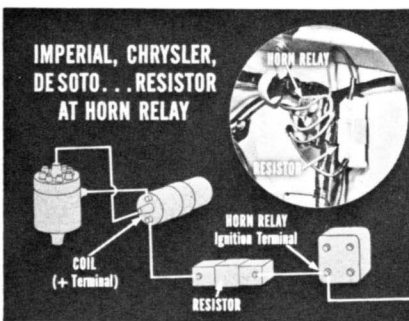


The motor cranks faster and can do this longer even though it takes less electrical energy than a 6-volt motor does. As you can see, then, the 12-volt motor leaves more voltage in reserve for ignition and quicker starts.

The Ignition Coil—An improved starting motor isn't all. Another helpful power booster is the redesigned ignition coil. In this case, again, finer wire is also used. That allows for more turns in the secondary windings. More turns, plus more voltage, boosts the ignition coil output.



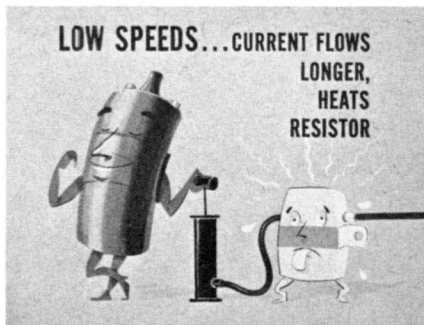
In addition, the ignition coil has a ballast resistor. You'll find this resistor on all V-8 engines with the 12-volt system. On the Plymouth and Dodge cars, this resistor is mounted on the coil. It's connected between the negative terminal of the coil, and the primary terminal of the distributor.



On Imperial, Chrysler, and De Soto cars, the resistor is mounted on the fender shield next to the horn relay. It's connected between the coil positive terminal and the ignition terminal of the horn relay.

The resistor controls the flow of current to prevent distributor point burning at low speeds. It also sees that enough primary current is supplied at high speeds when more plug voltage is needed.

At low speeds, as you know, current flows for longer periods of time. This heats the resistor, raising its resistance and reducing current flow through the points.

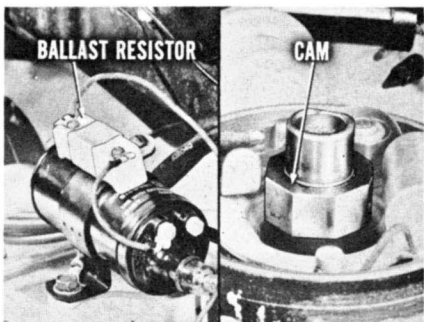


At high speeds, current flows for shorter periods. This gives the resistor a chance to cool down. This cooling lowers its resistance and increases current flow for maximum spark plug voltage.

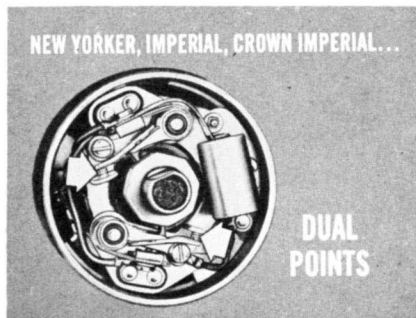


The resistor is an integral part of the ignition coil circuit. So, whenever you test the coil, be sure to include the resistor in your connections. Also, remember to use 12-volt test equipment.

The Distributor. — You may have noticed that the distributor on the Plymouth, Dodge and De Soto V-8 engines has only a single set of points. There are two reasons for changing from dual points to a single set in these engines. First, the ballast resistor helps



prolong point life. Second, the distributor cam design has been changed so that the dwell period is long enough with the increased voltage. So, dual points on these models aren't needed.



On the New Yorker, Imperial, and Crown Imperial models that use FirePower engine . . . dual points are used. That's because there's a 9 to 1 compression ratio. The longer dwell provided by dual points insures positive ignition at the higher engine speeds.

The Chrysler Windsor uses a single set of points as standard equipment. In some cases, however, dual points are used with Power Pack installations.



When you service either distributor, see that the point gap is .015" to .018", depending on the model of the car you're working on. Besides this, be sure the points line up with each other and are free of oil or grease.

One more difference in the new 12-volt distributors is the use of a slightly longer rotor. While it's possible to put the 6-volt rotor in a 12-volt distributor, there will be a lot of arcing between it and the cap segments. Your best bet to avoid this condition is to double-check the part number whenever you replace a rotor.

The Spark Plugs.—Spark plugs on all the 8-cylinder cars are new. They are a new design Power-Tip resistor plug with a *longer reach*. This leads to many advantages. By using a longer porcelain tip, the electrodes are closer to the center of the combustion chamber. This enables the mixture to burn more evenly and completely.

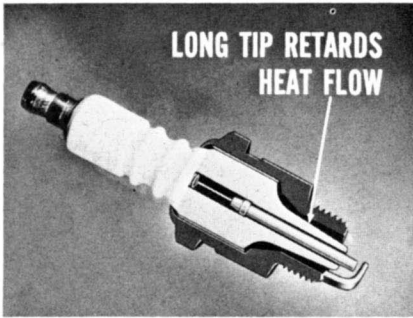


The greater power from each charge, in turn, permits a leaner mixture to be used for normal cruising speeds. Naturally, this leads to improved fuel economy.



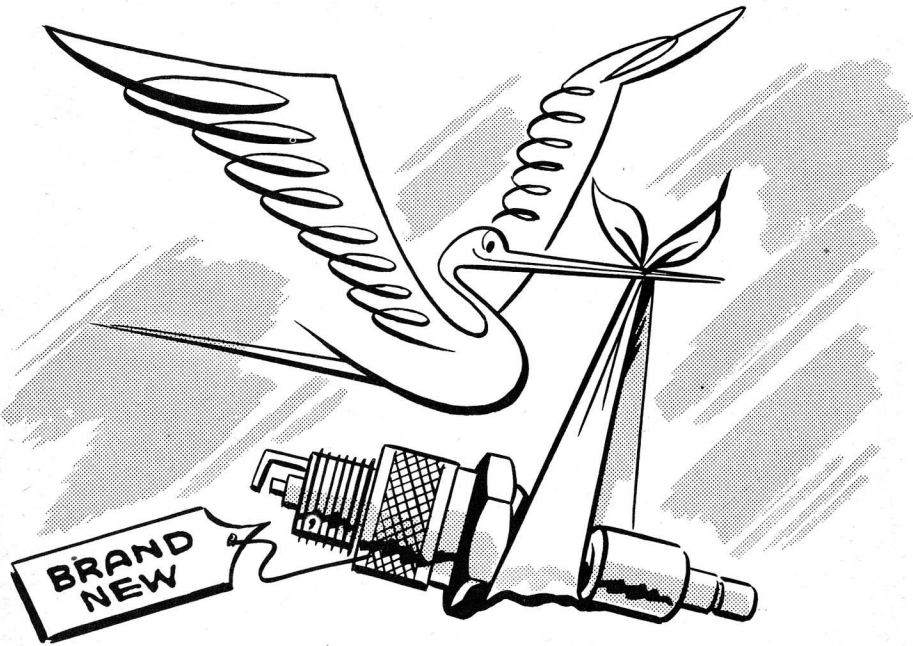
The longer porcelain, furthermore, projects farther into the combustion chamber. As a result, it is cooled better at high speeds by the rush of the cooler incoming air-fuel mixture. This keeps tip temperature lower and helps to prevent pre-ignition.





On the other hand, this new spark plug is basically a "hot" type plug. It has the long tip which retards heat flow and maintains a high tip temperature. The over-all effect under operation is to be "hot" at low speeds, and "cold" at high speeds.

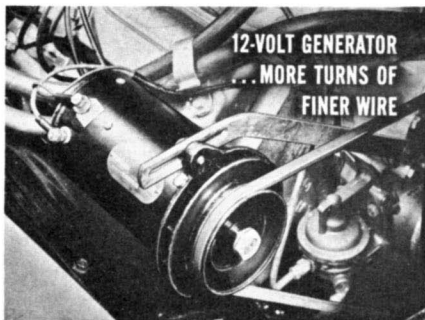
In addition to working better over a wider range of operating conditions, it's harder for this new plug to become fouled. The longer porcelain means that more desposits have to build up before this plug will become shorted.



Remember to use a round wire gauge and gap these plugs at .035". Another thing, once the plugs are properly gapped, don't bump the electrodes or you'll change the gaps.



The 12-Volt Generator.—The 12-volt generator, like the starting motor, also has more turns of finer wire. So, with the increased voltage, it turns out plenty of watts to run the accessories and keep the battery charged, even though fewer amps. are involved. Of even greater importance, this 12-volt generator reaches its maximum output at a slower car speed. So, while your owner may be a city driver, the generator will do its part in keeping the electrical system healthy.



The Generator Regulator.—Output of the 12-volt generator is controlled by a three-unit regulator which consists of: (1) circuit breaker, (2) voltage regulator; and (3) a current regulator. The regulator on a 12-volt system, however, is especially made to operate on the negative ground system. If it were installed in error on a positive ground system, the contact points would pit and stick. This, in turn, could lead to overcharging by the generator, and damage to it and other parts of the system.

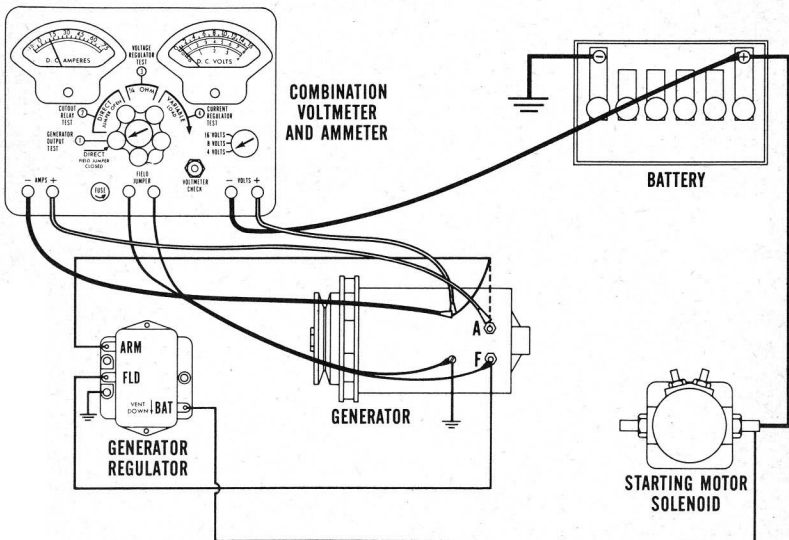
MAINTENANCE

GENERATOR REGULATOR

Before testing the generator regulator, it is important to check circuit resistance, and the battery. Also, it's wise to clean and tighten loose connections, generator brackets, and the regulator base screws to insure a good electrical ground.

Making the Circuit Resistance Test (Insulated Side of Circuit)—To test for circuit resistance, connect a ground jumper from the generator field terminal to ground. This will by-pass the voltage regulator during this part of the test.

Next, disconnect the regulator armature wire at the armature terminal of the generator. Connect a zero to 50-ampere ammeter between this wire and the terminal. Also, connect a low-reading voltmeter with .10 volt divisions between the disconnected armature terminal wire and the positive terminal post of the battery.



Start the engine. Slowly increase speed until 10 amperes register on the ammeter. The voltmeter reading should not exceed .50 volt. If you get a higher voltage reading, there's either a bad connection, burned relay points, or undersized wiring between the voltmeter connections. In addition, a higher reading shows the need for a point-to-point voltage-drop test.



You'd make the voltage-drop test by moving one of the voltmeter test leads back along the circuit toward the other test lead. A sudden drop in voltage reading indicates the trouble is between that point and the last point checked. Generally, it merely calls for cleaning and tightening connections at the circuit breaker, or you might have to repair or replace faulty wiring.

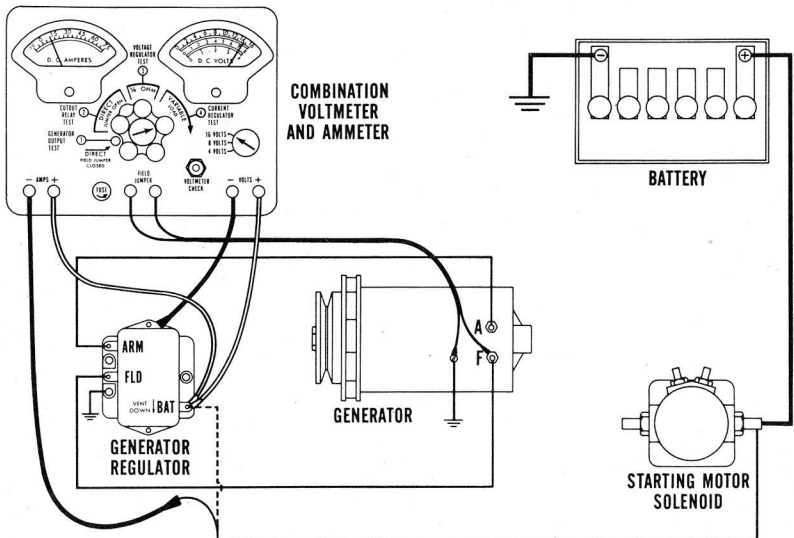
Circuit Resistance Test (Ground Side of Circuit)—Test the ground side of the circuit breaker as above, except that you'd connect the voltmeter between the generator and the negative battery terminal. A voltage reading that's higher than .10 volt means there's resistance in the ground circuit.

Circuit Resistance Test (Regulator Base to Generator) —Here you'd connect the voltmeter between the regulator base and generator frame. With engine running and generator charging ten amps., the voltage drop should not exceed .10 volt. A barely perceptible movement of the meter pointer usually means there is a normal ground.

Circuit Resistance Test (Accessory Load).—To make this test, connect the voltmeter from the generator frame to the car body. Turn on all accessories. Voltage drop shouldn't exceed .10 volt. If there's an abnormal drop, clean and tighten the engine ground strap. If there is no ground strap, install one from the car body to the engine.

NOTE: After testing for circuit resistance, test the voltage regulator, current regulator and circuit breaker in that order. But, before you do this, you'll have to normalize the regulator temperature.

Normalizing Regulator Temperature. Connect the test ammeter in series between the positive battery lead and the regulator battery terminal. Connect a test voltmeter from the regulator battery terminal to ground. Then, connect a variable resistance across the two battery terminals. Start the engine. Adjust speed to 1500 r.p.m. as indicated by a tachometer. Adjust the variable resistance to indicate a load of 10 amps. Run the engine at this load for about 15 minutes to normalize the regulator temperature.



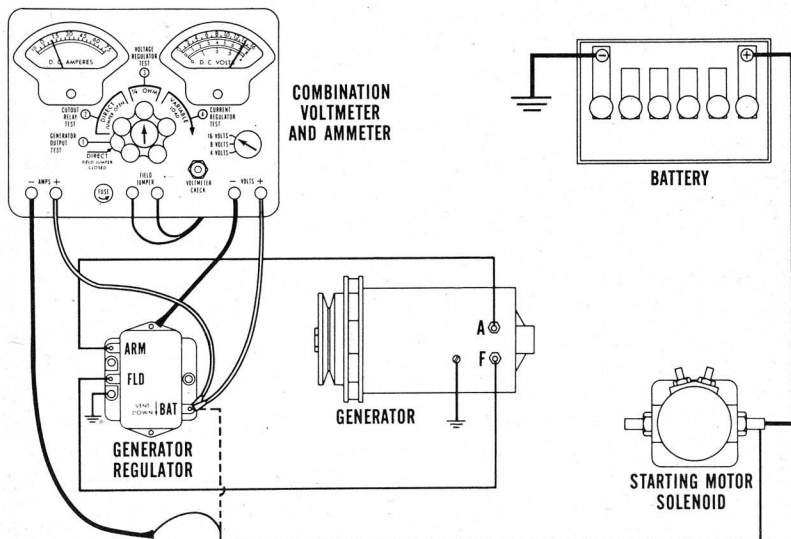
Test temperature with the cover in place. Hold an accurate thermometer 2" from the cover. Correct voltage settings of the unit for various temperatures with 10 amps. flowing are listed in the table below:

TABLE I.—VOLTAGE SETTINGS ACCORDING TO TEMPERATURE

TEMPERATURE:	50°	60°	70°	80°	90°	100°	110°	120°
VOLTAGE:	14.68	14.62	14.58	14.51	14.44	14.37	14.30	14.23

The Voltage Regulator Test. Use the same instrument connections you used for normalizing, but remove the resistance unit. Install a ¼-ohm resistor in series between the ammeter lead and the lead from the generator indicator.

Start the engine and set speed at 1500 r.p.m. Hold a thermometer two inches from the cover and note the temperature. Refer to the table above and see if the voltage setting is right for the temperature you've observed.

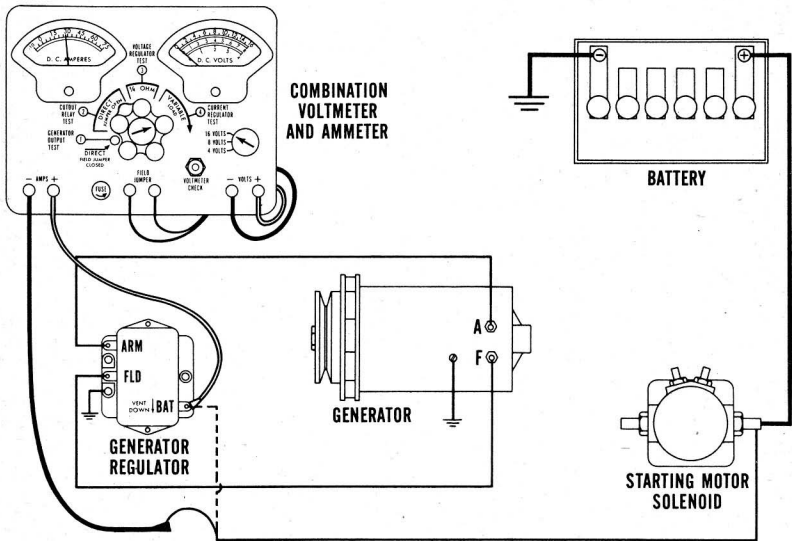


If an adjustment is required, decrease engine speed to idle. Remove the regulator cover. Bend the lower spring hanger of the voltage regulator *down* to increase voltage. Bend the hanger *up* to decrease voltage.

Replace the cover. Increase engine speed to 1500 r.p.m. and recheck the temperature and voltage reading.

NOTE: Before making the next test, cycle the regulator by reducing engine speed low enough for the circuit breaker points to separate and then increase engine speed to 1500 r.p.m. Be sure the regulator cover is in place.

The Current Regulator Test. Run the generator at its rated output for 15 minutes before testing the current regulator. Connect the variable



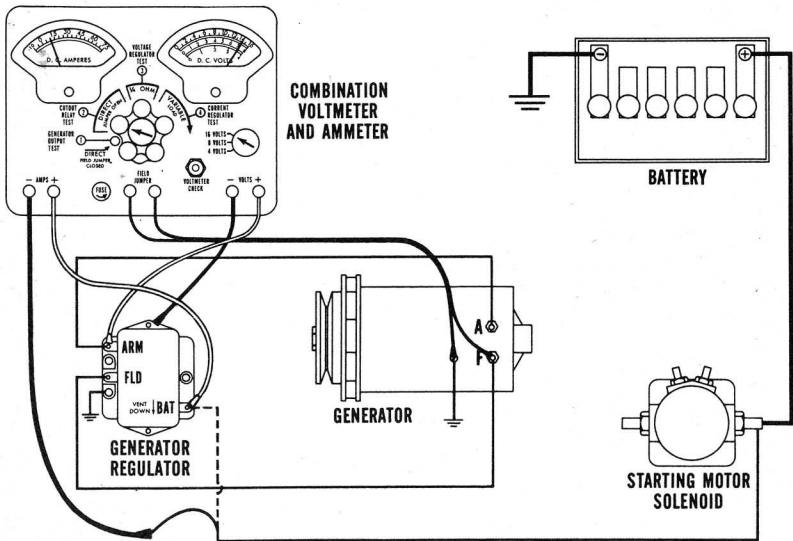
resistance across the two battery terminals. Also, connect the test ammeter in series between the regulator battery terminal and the battery lead wire.

Start the engine and increase its speed to 2000 r.p.m. Adjust the variable resistance until the current regulator settles at a steady ampere output as indicated on the generator nameplate, plus or minus 2 amperes.

If an adjustment is required, reduce engine speed to idle and remove the regulator cover. Bend the spring hanger *down to increase* current output. Bend it *up to decrease* the output.

Cycle the current regulator just as you cycled the voltage regulator before you go ahead with the circuit breaker test.

The Circuit Breaker Test. Connect the test ammeter in series between the regulator battery terminal and the battery lead wire. Connect the variable resistance between the generator field terminal and the



generator field lead wire. Next, connect the voltmeter, with a zero to 16-volt reading, from the regulator armature terminal to ground.

If this test immediately follows the voltage and current regulator tests, you won't have to normalize regulator temperature. But if the regulator's cold, go ahead and normalize it as explained earlier.

Start the engine and adjust speed to a slow idle. Rotate the variable resistance knob to its *full* resistance position. Then, slowly rotate the resistance control knob toward the *no* resistance position and carefully observe the voltage reading.

The circuit breaker points close when the voltmeter pointer jumps back slightly. The closing voltage is the highest reading in volts reached just before the pointer jumps back. It should be from 13 to 13.75 volts.

Following that, rotate the resistance control knob toward the *no* resistance position. Observe the ammeter. If a charging rate of 10 amps. is not indicated, increase idle speed slightly until you do read 10 amps.

Next, slowly rotate the resistance control knob toward the *full* resistance position and observe the ammeter. The pointer will drop toward zero—and beyond—and then suddenly return to zero. The discharge amperes noted will be the reverse current required to open the circuit breaker points. The points should open at zero to 6 amps. discharge current (8.2 to 9.3 volts) after a charge of 10 amps.

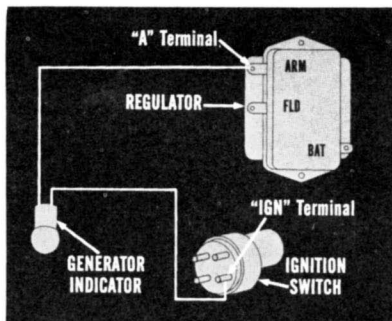
If an adjustment is necessary, bend the lower spring hanger *down* to increase closing voltage. Bend it *up* to decrease the closing voltage.

NOTE: After each adjustment, make a complete retest so you can determine the new values of the closing voltage and the discharge current needed to open the relay contacts. Be sure the regulator cover is in place when you make the test.

GENERATOR INDICATOR LIGHT

There's a new red signal light on the instrument panel of Plymouth models to indicate generator operation instead of the usual ammeter. When it glows, the generator's not charging. If the light glows when the engine runs above idle speed, check for a loose fan belt . . . trouble in the regulator . . . or in the generator itself. And check those items in that order.

If the light doesn't glow when the ignition's turned on, or when the engine speed drops to idle, check for a burned out indicator bulb. If the bulb turns out to be okay, check for a loose connection, or broken wire to the "A" terminal of the regulator . . . or the "IGN" terminal of the ignition switch.



OIL PRESSURE INDICATOR

Like the generator signal light, oil pressure also has a signal light on the instrument panel. The light is operated by a diaphragm-type switch in the main oil gallery at the rear end of the engine. When the ignition switch is turned to start the light glows, indicating there's no pressure in the oiling system. A coil spring in the switch holds the contact points within the switch closed, thus completing the circuit to the indicator. When the engine starts and pressure reaches 10 to 12 pounds, the light goes out. This occurs as the oil pressure against a diaphragm offsets the pressure of the spring and causes the points to be separated.



When the engine speed is reduced to idle, the indicator light may glow continuously or intermittently, depending upon oil temperature and driving conditions. This doesn't mean difficulty in the system and no oil to moving parts.

But if the light flashes or glows continuously when the engine runs above idle, it usually means an interruption in the engine oiling system or a low oil level. You'd notice the latter condition when the car is driven at high speeds around sharp curves when a momentary oil surge carries oil away from floating oil strainer.

If the lamp doesn't glow when the ignition switch is turned to start, check for a burned out bulb. There might also be a loose connection in the wire at the oil pressure switch or the ignition switch. A broken or weak diaphragm spring or ruptured diaphragm may also be the cause of the light failing to come on. In either case the contact points in the switch wouldn't be closed.

You can test the oil pressure switch by removing it from the block and inserting a "Tee" connection in the oil passage and installing a pressure gauge temporarily.

Then, install a suitable fitting and a “Tee” connection. Install the oil pressure switch in one arm of the “Tee” and a pressure gauge in the remaining arm.

If the indicator light glows at a pressure of about 10 to 12 pounds, replace the switch since it cannot be repaired.

SETTING IGNITION TIMING

The 12-volt electrical system, plus the increase in compression ratio, calls for new ignition timing specifications. The important point to notice in the table given below is that some models allow a slight tolerance in the setting while others do not.



IGNITION TIMING — 1956 Models

Plymouth 6-Cylinder	2° BTDC, Plus or Minus 4°
Plymouth V-8	4° BTDC, Plus or Minus 4°
Dodge 6-Cylinder	2° BTDC, Plus or Minus 4°
Dodge Coronet V-8	4° BTDC, Plus or Minus 4°
Dodge Royal and Custom Royal V-8	6° BTDC, Plus or Minus 2°
De Soto Fireflite	4° BTDC (no tolerance)
De Soto Firedome	8° BTDC (no tolerance)
Chrysler Windsor	2° BTDC (no tolerance)
Chrysler New Yorker	4° BTDC (no tolerance)
Imperial and Crown Imperial	4° BTDC (no tolerance)

THE POWERFLITE PUSH-BUTTON CONTROL CABLE

ADJUSTMENT

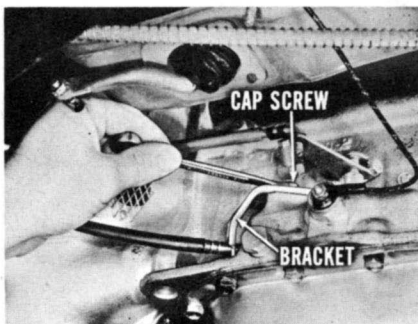
Two things are important with regard to operation of the new PowerFlite Push-Button controls. First, be sure that all owners understand the need for pushing the button *all the way in*. That full-distance travel is needed in order for the transmission to make the proper gear selection. Second, remember that no adjustments are provided in the push-button selector panel unit. If the transmission

doesn't shift properly, the transmission fluid level should be checked and brought up to the proper level, if necessary. If the transmission still does not shift properly it will probably be necessary to adjust the control cable. If that's the case, have somebody in the car push the "L" button all

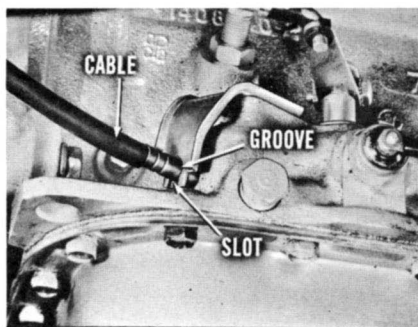


the way in, and hold it there. Holding the "L" button in will remove backlash from the cable actuator in the panel control unit.

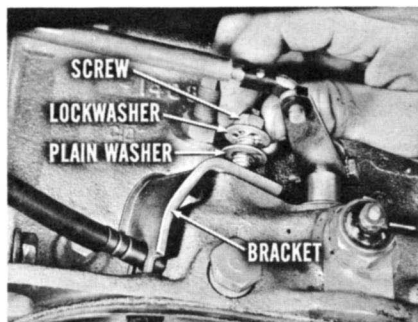
Next, raise the car on the hoist. Loosen the cap screw on top of the cable bracket. If there are any washers between the bracket and case, remove and discard them.

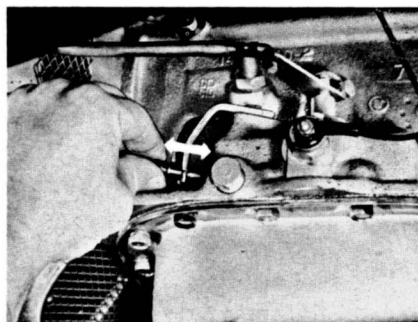
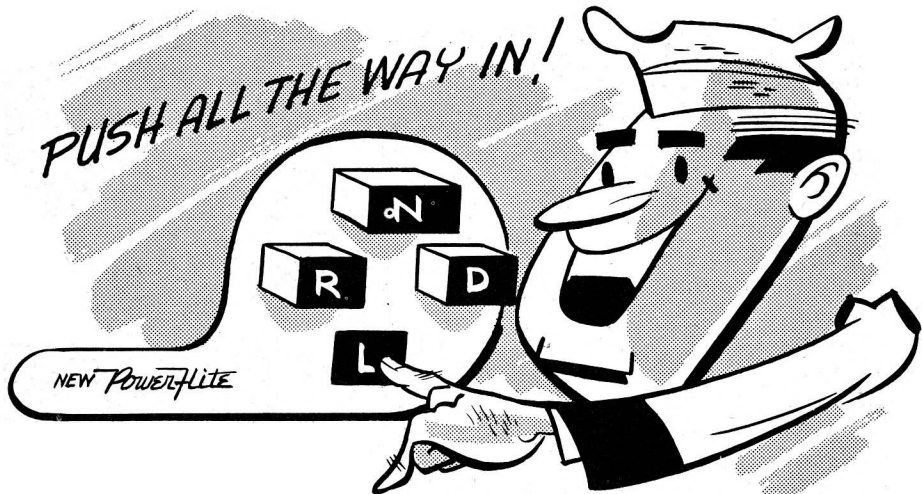


The cable should bottom in the bracket slot. If it doesn't, rework the bracket to enlarge the slot until the cable will enter the slot freely. Clean off any burrs you might raise at the filed edges.

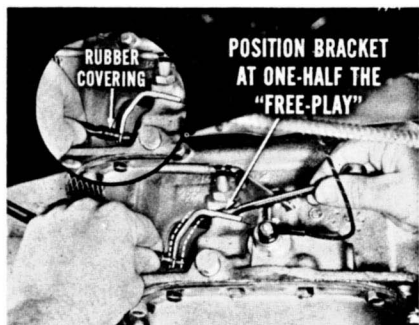


Install the bracket and screw next. Put a plain washer and a lockwasher under the screw to keep the bracket from moving.





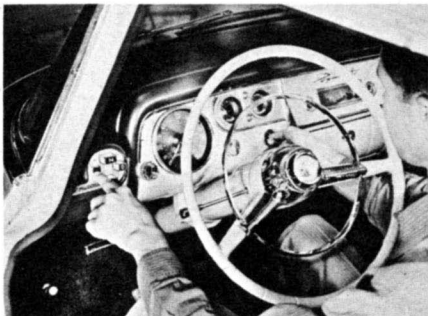
Following that, push the cable all the way into the transmission. Make sure the "L" button is being held in. Then, gently pull and push the cable into the transmission to determine the total amount of free play.



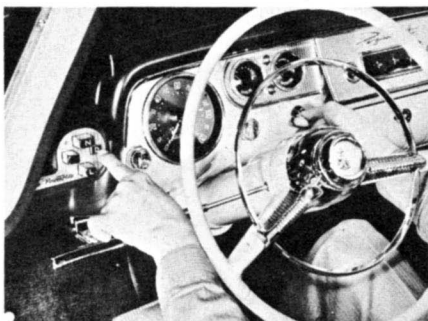
When you know how much free play exists, position the bracket so it's exactly one-half the total free play, and tighten the screw securely. Pull the rubber covering over the end of the housing to prevent oil leakage. While this is about the extent of the adjust-

ment, you'll still have to check and make sure you got it right. So, lower the car to within a few inches of the floor. This is a safety-first practice to keep the car in place just in case your adjustment may be off.

Push in the "R" button slowly. Then, turn the ignition key to start position. The engine *should not* start. Push the "N" button in slowly, turn the key, and the engine *should* start.



To continue the check, turn off the engine. Push the "D" button in slowly, and turn the ignition key to start. The engine *should not* start. Push the "N" button in slowly, turn the key, and the engine again should start.



If the engine starts while either the "R" or "D" button is pushed in, or does not start when the "N" button is pushed in, you'll have to readjust the cable as outlined.

REMOVAL

Push in the "L" button and raise the car on the hoist. Also, remove the neutral switch and throttle valve adjusting screw plug and drain

RECORD YOUR ANSWERS TO THESE QUESTIONS ON QUESTIONNAIRE NO. 97

We've changed to the 12-volt electrical system because new cars require more electrical capacity due to higher horsepower, compression ratios, and engine speeds.

RIGHT

1 WRONG

Always use 12-volt test equipment when testing the 12-volt system.

RIGHT

2 WRONG

Using fewer amps. increases the life of the distributor and generator regulator contact points.

RIGHT

3 WRONG

Always slow-charge a 12-volt battery for a better, longer lasting full charge.

RIGHT

4 WRONG

When the ballast resistor heats up during low speeds, its resistance increases and cuts down the current flow through the points.

RIGHT

5 WRONG

The longer porcelain tip of the spark plug used on 8-cylinder cars brings the electrodes closer to the center of the combustion chamber.

RIGHT

6 WRONG

Always normalize the temperature of the regulator before you test it.

RIGHT

7 WRONG

The PowerFlite push-button control cable is always adjusted while the "L" button is being held in to remove backlash from the cable actuator.

RIGHT

8 WRONG

For proper operation, make sure that the push-button cable bottoms in the bracket slot.

RIGHT

9 WRONG

Always be sure the rubber covering is pulled over the end of the push-button cable housing to prevent oil leakage.

RIGHT

10 WRONG