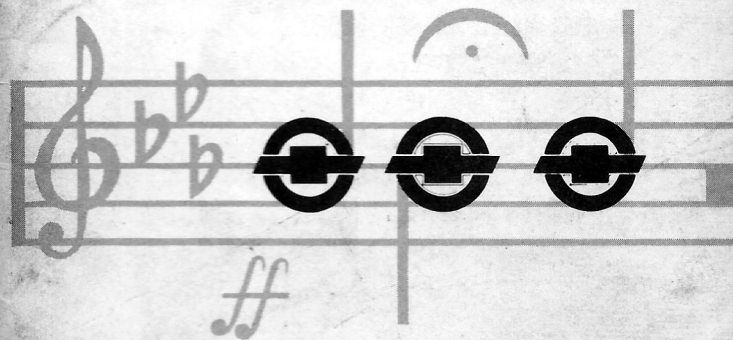


Guardian Tune for the Corvair



FOREWORD

This booklet contains a complete review of the discus-
sional slidefilms (Part 1 and Part 2—Guardian Tune
for the Corvair). Keep at least one copy of this booklet
in the Service Department file of Technical Information.

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GUARDIAN TUNE

for the



CORVAIR

PART I

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Guardian Tune-up Procedures for the Corvaire engine have been separated into two major areas of service work.

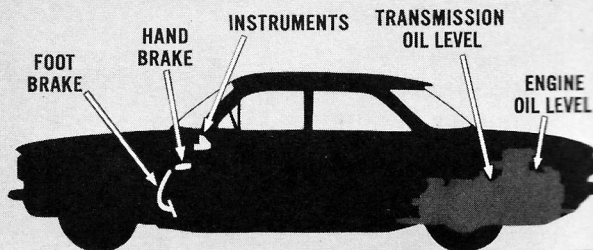
This film, Part I, contains complete information on the **MECHANICAL CHECKS AND ADJUSTMENTS**

See Part II for —

TESTING THE GUARDIAN TUNE

Tuning the Corvaire engine remains basically the same as for regular passenger-car engines. However, certain new and different precautions and service procedures must be observed. Your Review Booklet contains a complete reprint of the films, Part I and Part II.

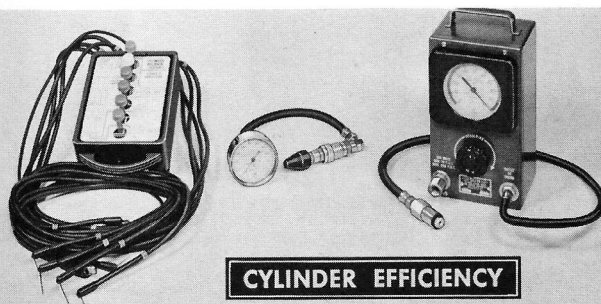
BEFORE THE TUNE: PRELIMINARY STEPS



To protect the mechanic and dealership and to prevent damage to the engine, car interiors, and equipment, always check brake operation (including parking brake), instruments and telltale lights, engine and automatic transmission oil level. Install fender and seat covers.

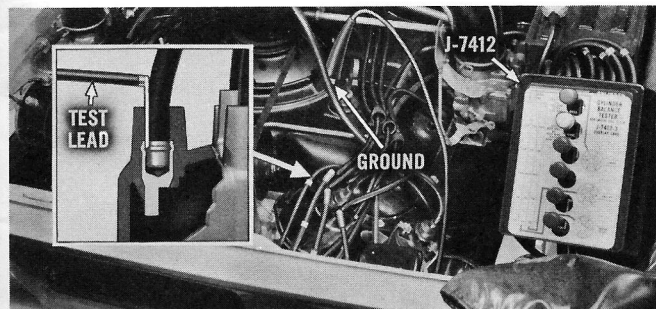
The mechanical procedures of the tune-up are listed in a very logical and practical service order. Follow the operations as listed:

- CYLINDER EFFICIENCY
- SPARK PLUG SERVICE
- DISTRIBUTOR SERVICE
- FUEL LINE FILTER SERVICE
- FUEL PUMP SERVICE
- NORMALIZE ENGINE
- CHECK COOLING AIR VALVE
- CARBURETOR ADJUSTMENT PROCEDURES
- AIR CLEANER SERVICE
- BATTERY AND BATTERY CABLE SERVICE
- FAN BELT SERVICE
- GENERATOR SERVICE



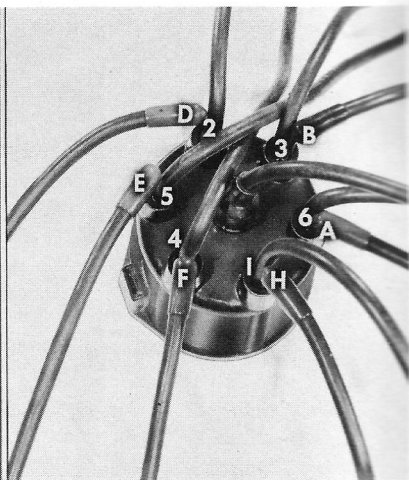
CYLINDER EFFICIENCY

Maximum results from the tune-up depend on peak operating efficiency of individual cylinders. Three practical methods which can be used to provide this information are: the cylinder balance tester, the compression gauge, and the cylinder leakage tester.

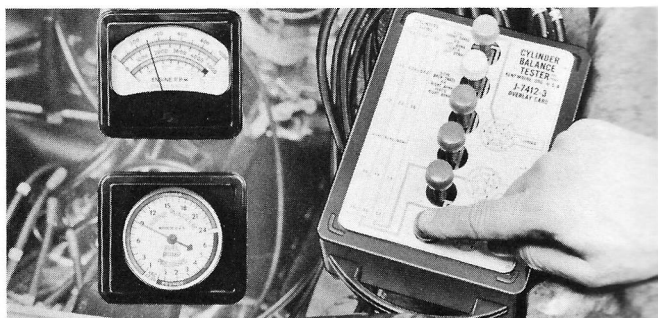
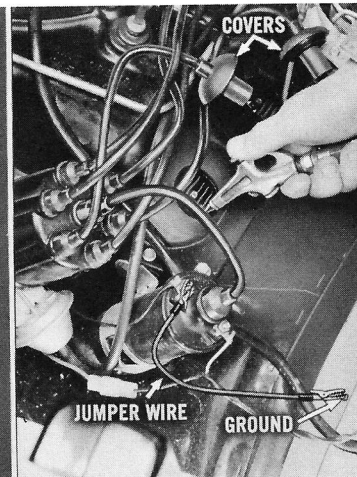


Cylinder Balance Test: This test quickly compares power output of pairs or banks of cylinders through rpm and vacuum readings. Insert the test lead prongs of J-7412 into the distributor cap spark plug sockets. Ground the unit. **CAUTION:** Do not pierce the wires.

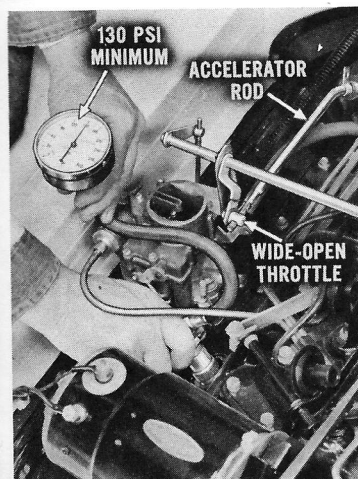
For ease of hookup of the test leads to the distributor cap sockets, each of the test lead wires is lettered. The lead marked "H" is inserted into distributor cap socket No. 1. The others are then installed as follows: F-4, E-5, D-2, B-3, A-6.



Compression Test: Connect a jumper wire from negative side of coil to ground. Carefully pull neoprene covers to disconnect plug wires. Loosen all plugs, then blow compressed air around the plug cavities to remove any dirt which may drop into the cylinders. Remove all plugs.



Rotate the fast idle cam to obtain a constant 1500 rpm. Depress the panel buttons in the order shown on the overlay card. Note vacuum and rpm for each pair or bank of cylinders being tested. Equal gauge readings indicate that the engine can be successfully tuned.



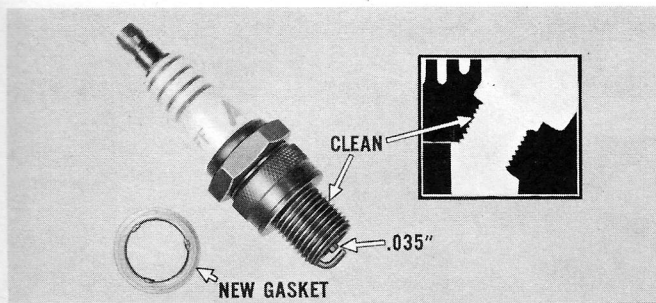
Remove the air cleaner and hoses. Block or hold the accelerator rod in the wide-open throttle position. Crank the engine over at least FOUR compression strokes. Compression should read at least 130 psi. Variation between the highest and lowest reading cylinders should not be more than 20 psi.

More than 1" variation of vacuum and 50 rpm between cylinders indicates unequal power output. A compression test or a cylinder leakage test should be performed to determine if the cause of cylinder "unbalance" is poor compression or if other factors are at fault which can be corrected during normal tune-up procedures.

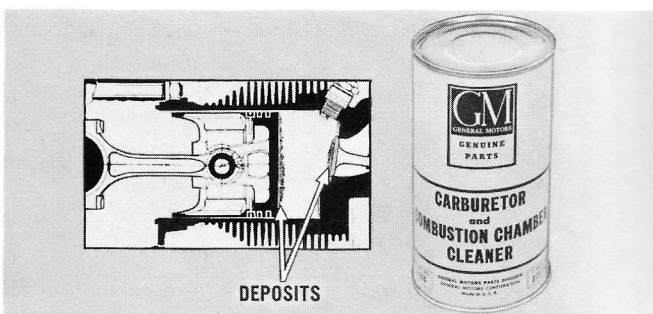
GENERAL NOTE: If one or more cylinders are below minimum compression, stop all work and advise the customer. Injecting oil into the weak cylinder to determine if valves or rings are at fault is not reliable. Oil will not seal the compression rings as in "L" head or "V8" engines, because of the horizontally opposed cylinder arrangement.



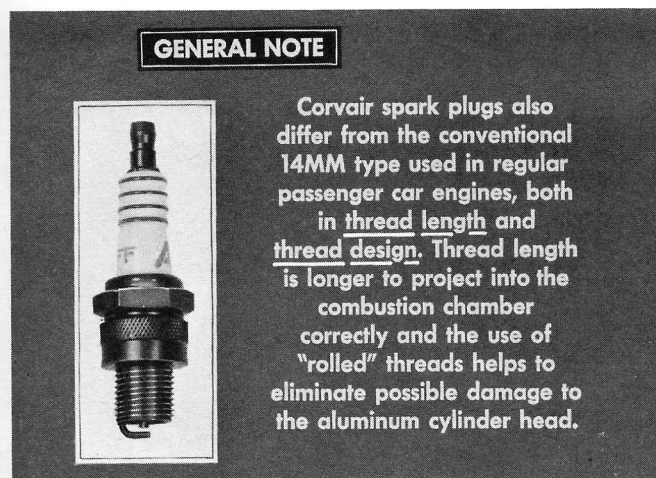
Cylinder Leakage Test: This test will help locate the exact cause of low compression through the use of compressed air. Air leakage into manifolds with the piston at TDC (compression stroke) means valve trouble. Leakage into the crankcase indicates faulty rings. Air escaping between head and piston cylinder means a defective head gasket.



If new plugs are needed, install AC 46FF for normal city driving. For drivers who travel at high speeds or on long trips, use colder heat range spark plugs, AC 44FF. Gap new or cleaned plugs .035". ALWAYS use new gaskets and make sure the cylinder head and plug threads are clean.

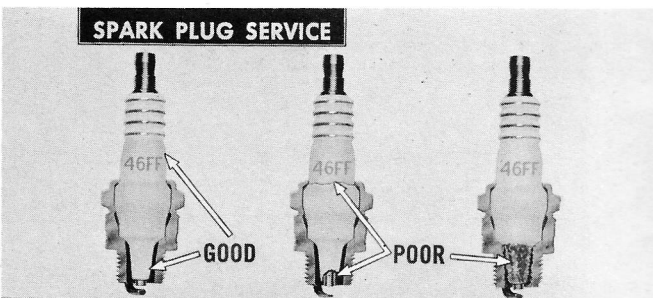


Unusually high compression may be caused by excessive combustion chamber deposits. These deposits can be inexpensively removed with GM Carburetor and Combustion Chamber Cleaner, Part Number 3727702. Follow the instructions on the can label.

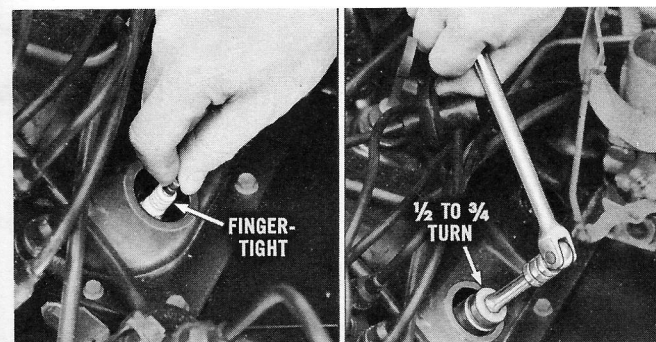


GENERAL NOTE

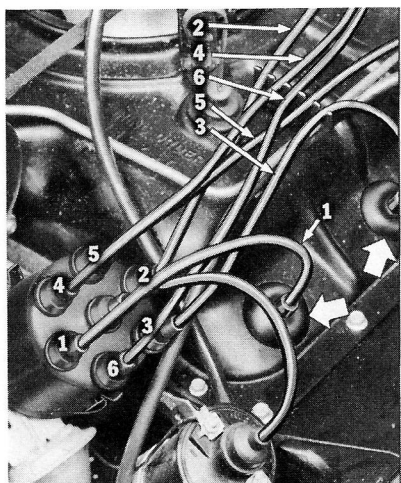
Corvair spark plugs also differ from the conventional 14MM type used in regular passenger car engines, both in thread length and thread design. Thread length is longer to project into the combustion chamber correctly and the use of "rolled" threads helps to eliminate possible damage to the aluminum cylinder head.



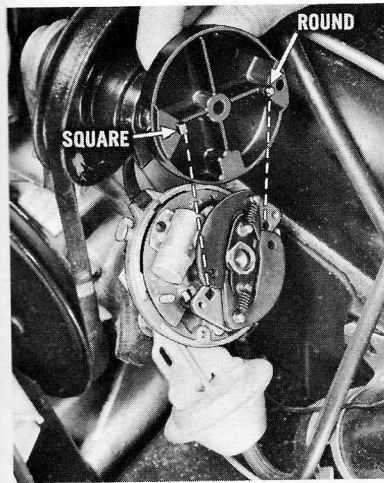
If the cylinder balance test results were good or if the compression readings were normal, carefully inspect all plugs to determine if they will fire properly until the next tune. This requires good judgment, experience, mileage information and, if possible, a knowledge of owner driving habits.



Screw the plugs all the way down until they seat on the gasket finger-tight. Tighten the plugs $\frac{1}{2}$ to $\frac{3}{4}$ turn further to provide the proper seal. If a torque wrench is used, tighten plugs to 20 to 25 foot-pounds.



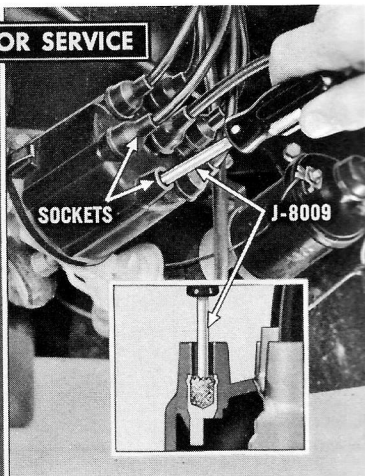
Connect all plug wires and plug covers. Improperly installed covers reduce the efficiency of the air pressure cooling system, and can cause engine overheating. Check plug wire routing. Cross firing may occur if improperly positioned.



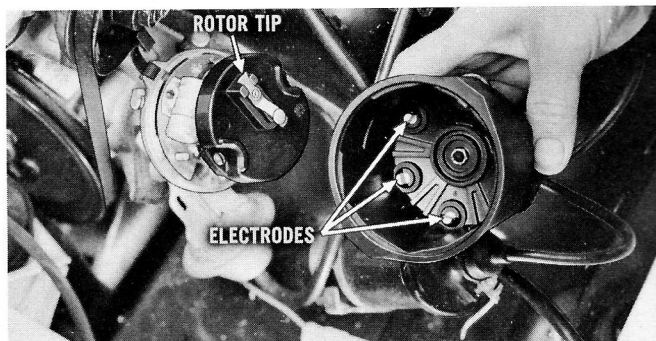
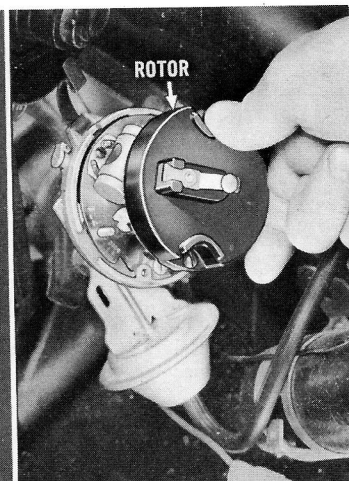
When reassembling or installing a rotor, note the round and square dowels for proper positioning. Tighten attaching screws evenly to avoid breakage.

DISTRIBUTOR SERVICE

Inspect spark plug and secondary coil wire sockets. Clean dirty or corroded sockets using a cleaning brush such as J-8009. Clean the outer surfaces of the cap with a clean, dry cloth. Check carefully for hairline cracks or other damage. Replace if necessary.

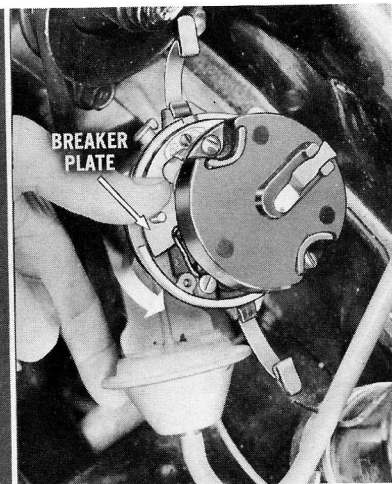


Distributor Centrifugal and Vacuum Advance: Turn the rotor clockwise until it reaches the stop, then release. The centrifugal advance springs should quickly return the rotor to the retarded position.

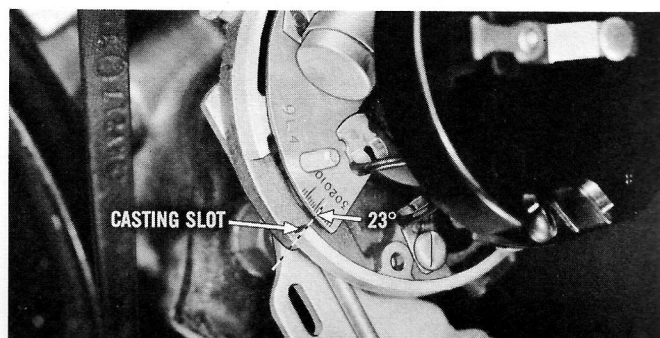


Wipe the inside of the cap and rotor surfaces with a clean, dry cloth. If chipped, cracked or showing signs of carbonized paths, replace. If the rotor tip or the cap electrodes are badly burned, replace.

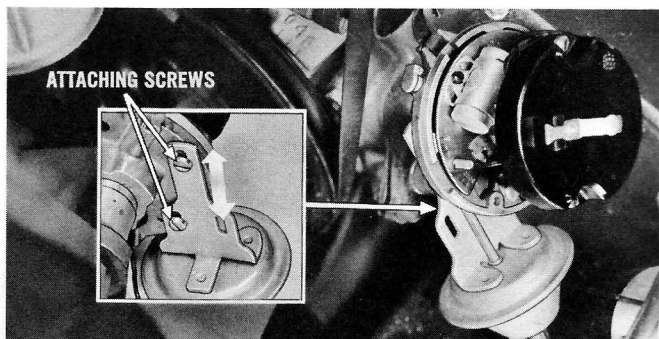
Turn the vacuum control breaker plate counterclockwise. The vacuum control spring should return the breaker plate to its retarded position without any delay.



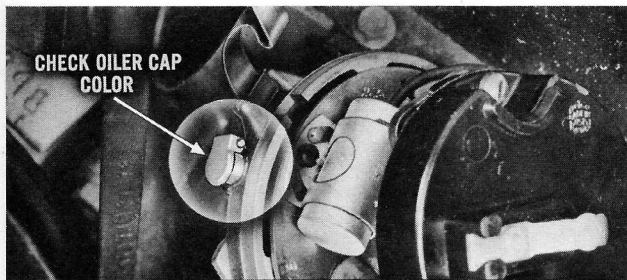
If either the rotor or breaker plate does not return promptly to its retarded position, remove the distributor from the engine and correct the cause of binding or stiffness before proceeding with the tune-up. Improper operation of either of these spark control units will directly affect distributor timing, the degree of spark advance, and cause sluggish engine performance.



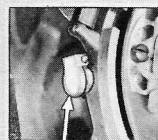
Vacuum Control Setting (all models): The vacuum control is properly set when the 23-degree mark on the calibrated scale is aligned to the edge of the casting slot on the distributor body.



If the vacuum control setting has changed, loosen the two attaching screws on the underside of the distributor body. Slide the unit as needed to align marks. Tighten screws securely.

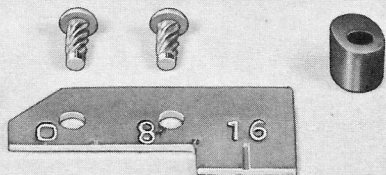


Distributor Identification: When tuning Powerglide-equipped engines, check the distributor oiler cap. A **BLACK** cap indicates the centrifugal advance mechanism is the intermediate or late type and has a specific advance curve. A **copper-plated** cap indicates the engine is the high-performance unit.



CADMIUM-PLATED OILER CAP

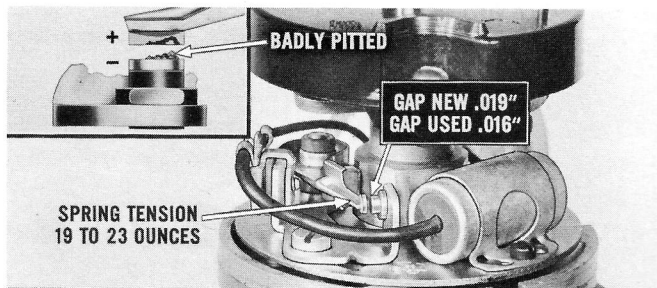
DISTRIBUTOR TIMER KIT
3784096



All engines teamed with Powerglide which have a cadmium-plated oiler cap should have the distributor modified. Distributor Timer Kit, Part Number 3784096, is available for field use and contains installation instructions. After installation of this kit the oiler cap must be painted black for future identification.

The operating difference between distributors with black or cadmium-plated oiler caps (Powerglide) is due to the design of the stop pin bushing. Late design stop pin bushings change the centrifugal advance curve. The bushing can be checked when the rotor is positioned at the 2 o'clock position. A small mirror will be helpful.





Distributor Points: Install new points if badly pitted. If mildly rough, use a clean point file. Never attempt to file smooth by removing all of the roughness. Gap new points .019" — used points .016". Dwell should always be checked (33°). See Part II for dwell tests.

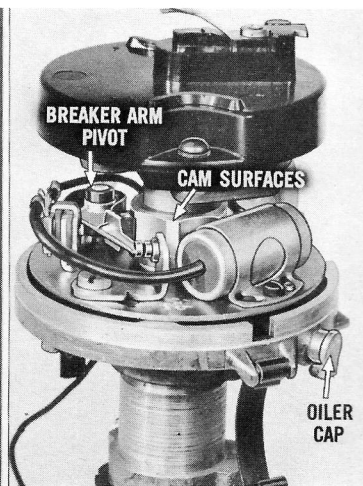
NOTE: Spring tension should be 19 to 23 ounces.

SPRING TENSION
19 TO 23 OUNCES

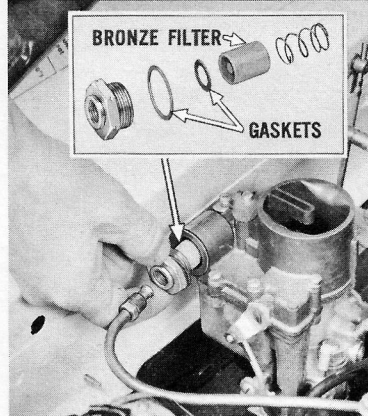
Excessive pitting and rapid failure of the contact points indicates a malfunction in the ignition system which must be corrected. Meter equipment will uncover the cause which may be: excessive primary circuit resistance, high primary circuit operating voltage, incorrect coil polarity, or a condenser—with improper capacity, series resistance or leakage. Testing for these conditions is covered later.

Distributor Lubrication:

Fill the oiler cap reservoir with light engine oil and apply one or two drops to the breaker arm pivot. Apply a thin film of Delco-Remy Cam and Ball Bearing Lubricant (or equivalent) to the cam surfaces. Install the cap. NOTE: Distributor removed for photographic purposes only.



FUEL LINE FILTER SERVICE



Disconnect both fuel lines and remove both large inlet nuts. Remove the sintered bronze filters, the filter gaskets and springs. Blow compressed air in the opposite direction to fuel flow to remove loose particles and reinstall parts as shown.

FUEL PUMP SERVICE

Generally, during a tune-up, the fuel pump is not tested for pressure or volume unless there is a complaint of poor high-speed performance or the carburetors tend to flood. The service procedures for these two tests are covered in detail on Pages 7-15 of the Corvair Shop Manual.

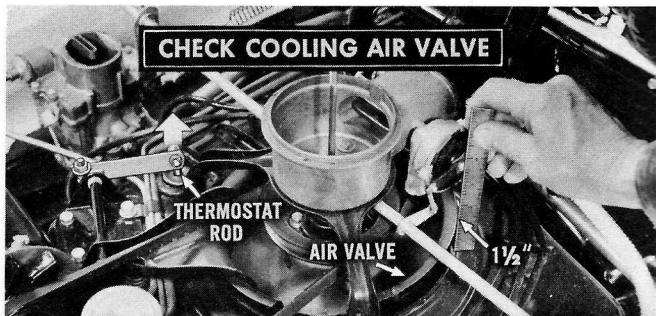
However, normal service during a tune-up should include tightening the pump cover screws, the pump body attaching bolts and checking all gasoline line connections.

NORMALIZE ENGINE

Start the engine and run until normal operating temperature is reached (10 to 15 minutes). During engine warm-up quick-check each of the items listed. If any of the components fail to operate properly, the customer should be notified of the extent of the trouble.

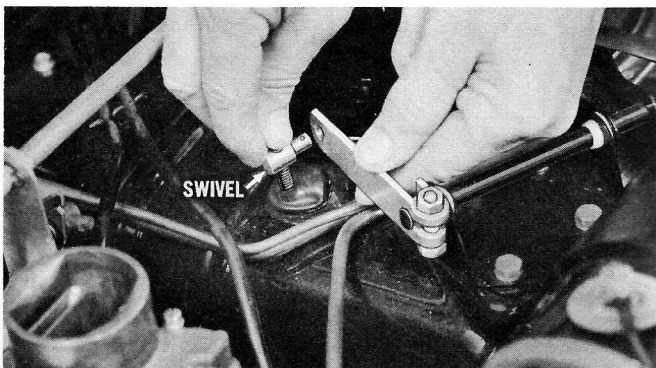
- Windshield Wiper
- Headlights
- Parking Lights
- Taillights
- Stop Lights
- Directional Lights
- Horns and Accessories
- Instruments and Indicator Lights
- Brake and Clutch Pedal Adjustment

The following service work must be performed with the engine at normal operating temperature to insure accurate checks and adjustments.

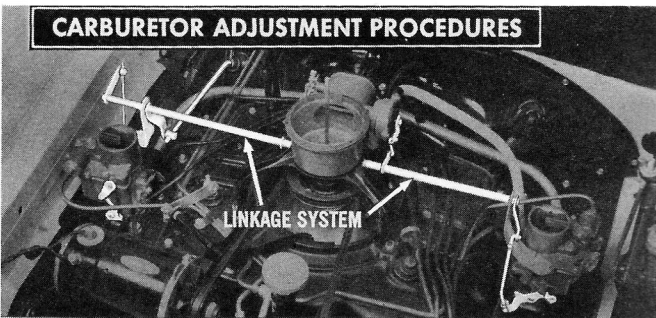


CHECK COOLING AIR VALVE

With the engine normalized, turn ignition switch OFF. Pull up on the thermostat rod (not the cooling air ring) until the bellows is stopped within its mounting bracket. The opening of the air valve directly opposite the hinge should measure $1\frac{1}{2}$ ".



If the measurement is incorrect, disconnect the swivel and adjust the length of the rod. Reinstall swivel and recheck. Make sure all air valve ring bumpers are in place.



CARBURETOR ADJUSTMENT PROCEDURES

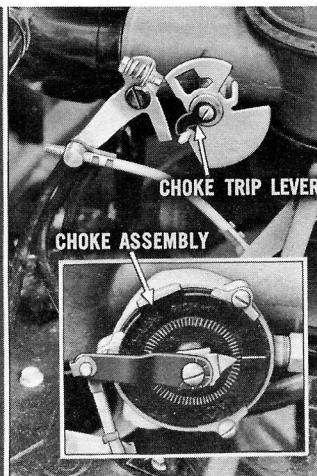
To achieve maximum performance and mileage from the Corvair engine, both carburetors must be "in balance." Improper adjustment of the connecting linkage can cause an "out of balance" condition which results in rough idle, stalling and surging.

When adjusting carburetor linkage and carburetor components, follow the procedures in the order listed:

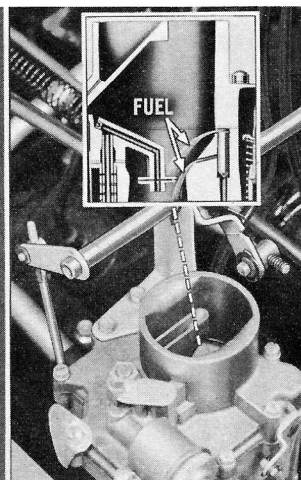
- Preliminary Checks
- Linkage Check: Full Throttle
- Synchronizing the Carburetors
- Choke Unloading
- Fast Idle Adjustment
- Slow Idle and Idle Mixture Adjustment
- Choke Adjustment

Begin this important part of the tune-up by checking the following:

Preliminary Checks:
Before making any carburetor adjustments, check the color of the choke trip lever. If **BLACK**, it indicates that the choke assembly has been changed over to the late type. Kit 3781235 should be installed on all Corvairs which do not have this modification.

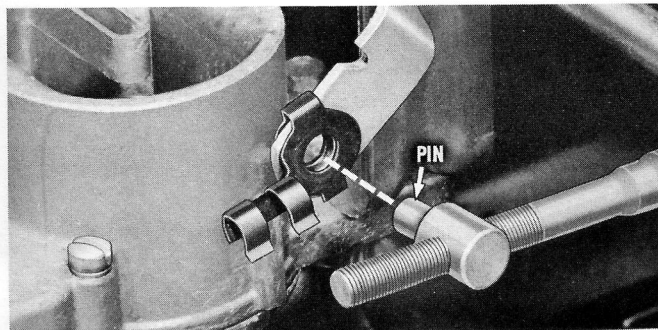
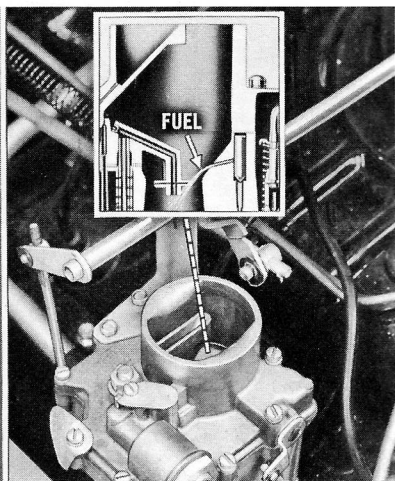


Severe hesitation on acceleration may be caused by insufficient fuel being discharged by the accelerating pump circuits. Late model carburetors and those which have been modified should show **TWO** distinct streams of fuel when the throttle valves are opened.

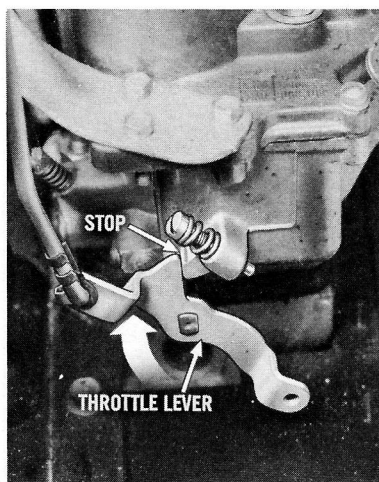


If only one stream is noted from either carburetor and the discharge openings are not plugged, install the Carburetor Accelerating pump unit, Part Number 7017524.

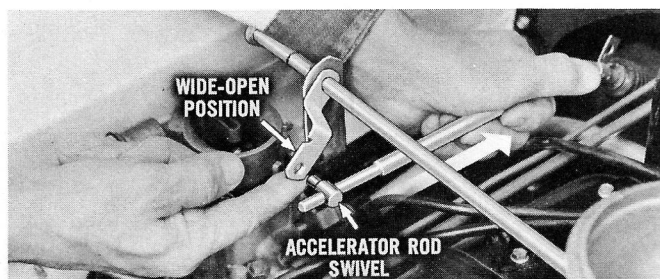
Complete instructions are packaged with the kit.



Rotate the swivel on the accelerator rod to align the swivel pin to the cross shaft lever hole. The pin should enter the attachment hole without forcing. Connect linkage and make sure clip is firmly installed.



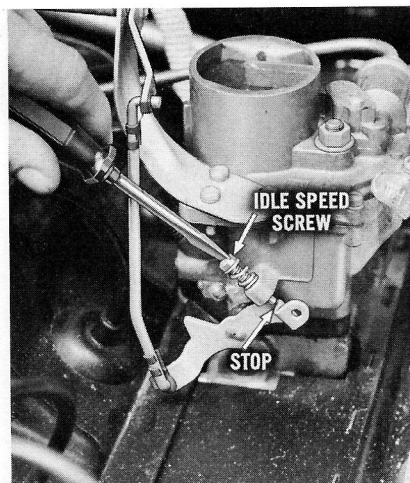
Linkage Check — Full Throttle:
Depress the accelerator pedal all the way down to the floor mat. Check to see if the carburetor throttle levers reach their stops. If wide-open throttle position cannot be reached, proceed as follows:



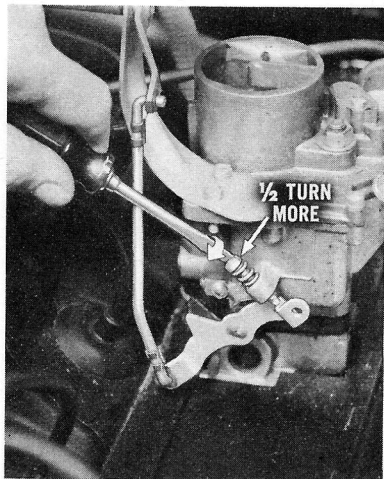
Disconnect the accelerator rod swivel from the cross shaft lever. Hold the lever in the wide-open throttle position. With the accelerator pedal held all the way down to the floor mat (a pedal depressor tool may be used) grasp the accelerator rod and push firmly toward the front of the car to remove all slack in the linkage.

SYNCHRONIZING THE CARBURETORS

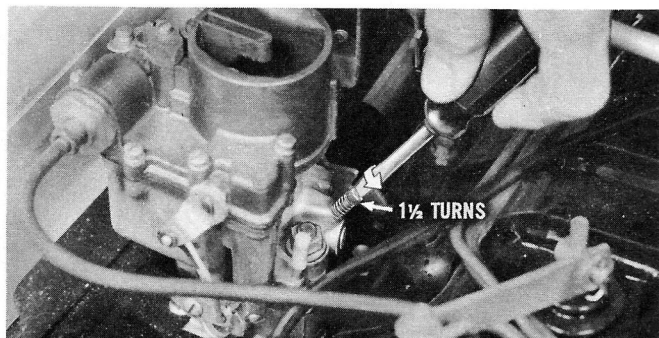
CAUTION: Throughout the linkage and carburetion checks and adjustments, engine rpm should be increased or decreased by means of the accelerator rod ONLY. Never open the throttle valves by any other parts of the linkage system as this may upset the relationship of linkage components and give false readings and improper settings. During these adjustment steps the engine must be at normal operating temperature.



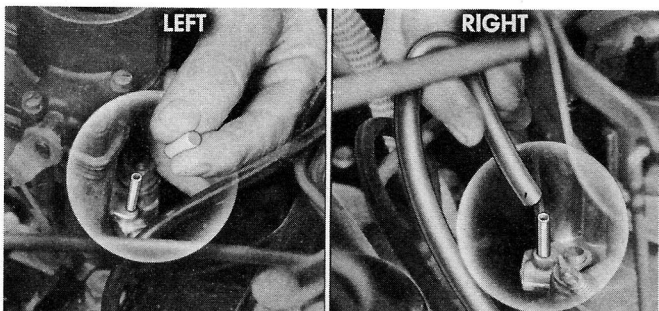
With the engine not running, make sure the choke is in the full OFF position. Back off both idle speed screws until they clear the throttle shaft lever stops.



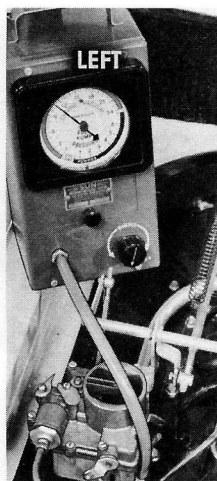
Starting with the **RIGHT** carburetor, turn the idle speed screw in until it just touches the throttle shaft lever, then turn clockwise an additional $\frac{1}{2}$ turn. Repeat this procedure for the left carburetor.



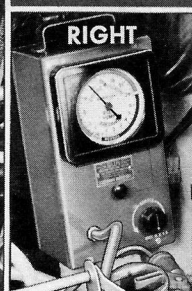
Turn the idle mixture screws on both carburetors in until they are lightly seated, then back off $1\frac{1}{2}$ turns. This is an approximate setting. Connect the tachometer and start engine.



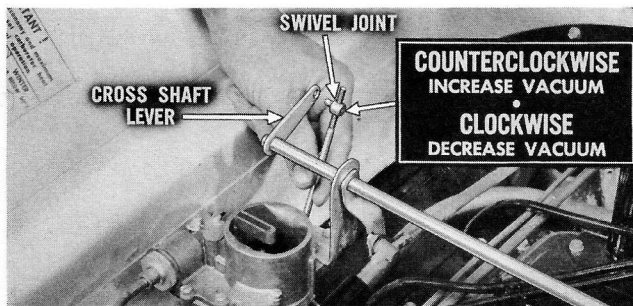
Disconnect the vacuum spark control hose from the right carburetor and the spark control plastic cap from the left carburetor. Rotate the fast idle cam to produce a constant 1200 rpm. A higher or lower rpm will reduce the accuracy of the balance settings.



Connect a vacuum gauge to the right carburetor vacuum control tube. The hose must be a tight fit to insure accurate results.

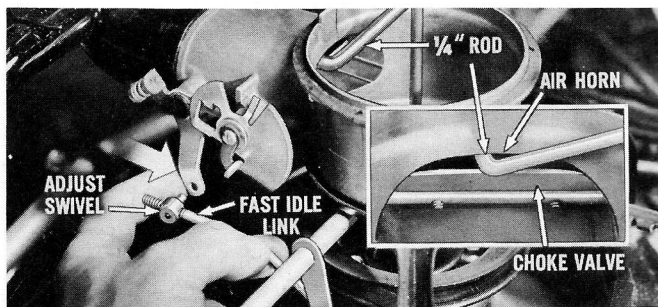


Note the vacuum reading, then connect the vacuum gauge to the left carburetor and again note the gauge reading.



If the carburetors show a difference of more than 1" of vacuum, they are "out of balance." Disconnect the left carburetor swivel joint at the cross shaft lever. Turn the swivel counterclockwise to **INCREASE** left carburetor vacuum; clockwise **DECREASES** left carburetor vacuum.

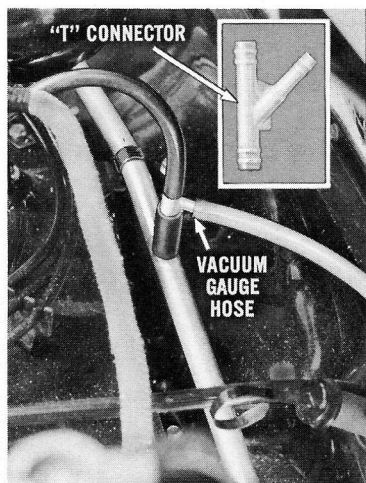
If engine rpm changes when setting the swivel, reset the fast idle cam to 1200 rpm and re-check for vacuum differences. Replace spark control hose and plastic cap.



Choke Unloading: Hold or block the accelerator pedal to the floor mat (through detent on Powerglide models). Using a suitable $\frac{1}{4}$ " diameter rod, adjust the swivel on the fast idle link to obtain $\frac{1}{4}$ " clearance between the top of the choke valve and the upper wall of the air horn.



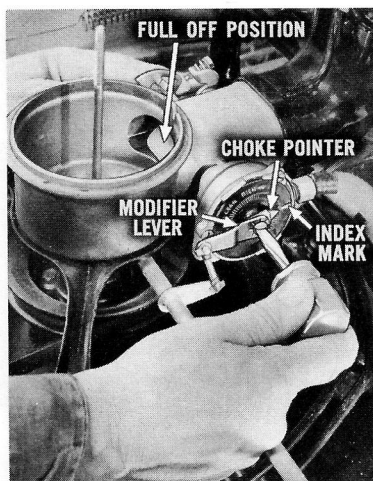
Fast Idle Adjustment: When the carburetors have been balanced as closely as possible, rotate the fast idle cam counterclockwise to the maximum high position. Adjust the fast idle screw to obtain 2200 rpm. Normal operation of the choke will then provide about 1500 rpm.



Slow Idle and Idle Mixture Adjustment: Connect the vacuum gauge hose to the vacuum balance tube. On cars teamed with Powerglide, remove the modulator hose at the plastic "T" fitting and attach the gauge at this point. Standard transmission models require the use of a "T" connector.

- Adjust the idle mixture screws on both carburetors to obtain the highest and steadiest vacuum reading.
- Turn the screws in or out as required, but keep in mind that both screws should be turned an equal amount to achieve precise vacuum and engine idle smoothness and maintain synchronization.
- Adjust both idle speed screws in equal amounts to produce the engine rpm shown in the chart below.

TRANSMISSION	RPM	RANGE
Powerglide	500	Drive Position
3-Speed	500	Neutral Position



Choke Adjustment: Place the choke in the full OFF position. To adjust, loosen the modifier lever slightly, and rotate the choke pointer to the index mark. Tighten the lever screw. If a lean condition is noted on acceleration (after a cold start), set pointer 3 to 4 notches rich.

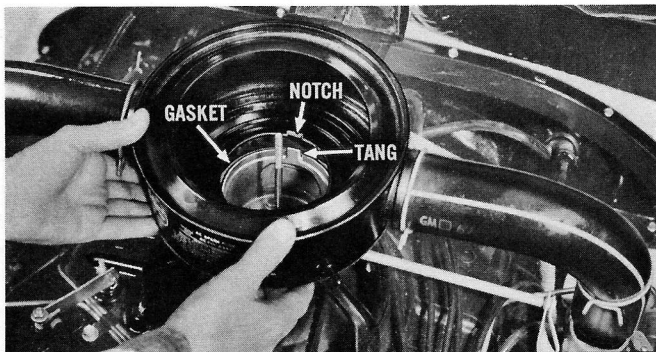
AIR CLEANER SERVICE



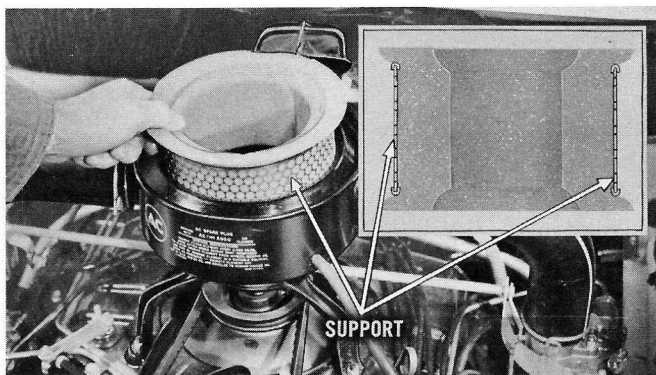
Proper maintenance service of the air filter element (every 2,000 miles) is extremely important to provide maximum engine life and a minimum of fuel consumption. Replace torn or ripped elements. Thoroughly clean the element in clean kerosene or mineral spirits. **CAUTION:** Never use a hot degreaser or solvents containing acetone or paint thinner.



Squeeze dry, then immerse in light engine oil. Squeeze the element to remove excess oil. Never shake, wring or swing the filter element when removing cleaning solvent or excess oil. **NOTE:** Applying oil to the filter element with a squirt gun is not recommended because some areas may not receive sufficient oiling.



Clean the air cleaner assembly and cover. Install a new gasket on the air horn casting. Install the unit so that the notch indexes with the tang.



Install the filter element into the screen support. The upper and lower flanges must provide a good seal to the air cleaner and to the cover when installed.

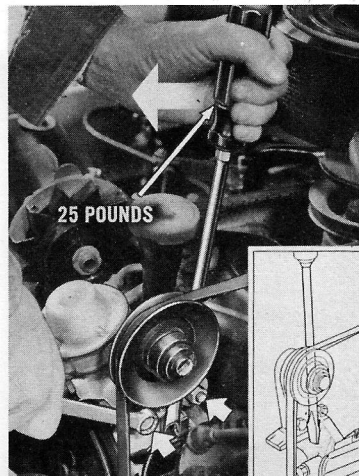
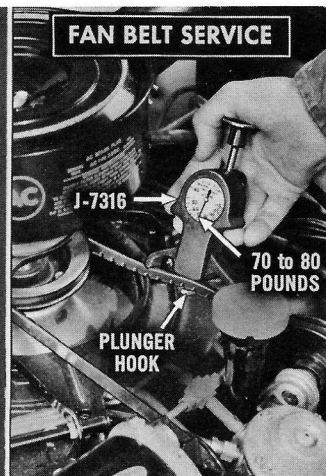
BATTERY AND BATTERY CABLE SERVICE

- Clean up all corrosion on battery or cables and the surrounding area. Use a soda solution or diluted ammonia to neutralize acid. Flush off with clear water.

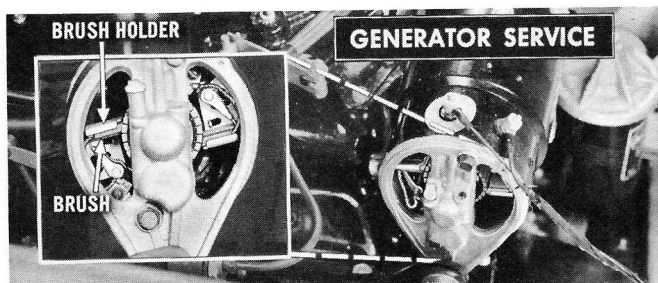
NOTE: Remove and clean the battery out of the car if corrosion is excessive.

- Inspect battery case for cracks or bulges.
- Check the electrolyte level.
- Check battery hold-down strap.
- Make sure the cables are tight to the battery posts. If any indication of battery trouble is noted by the customer or through visual inspection, follow the test procedures in Part II.

Inspect and replace belt if cracked, frayed or greasy. Check adjustment using a universal strand tension gauge, such as J-7316, located mid-point between the blower and idler pulleys. The plunger hook must contact the wide section on toothed belts. Correct tension: 70 to 80 pounds.



If belt needs adjustment and a tension gauge is not available, loosen the idler bracket bolt and nut. Insert a 16" (over-all length) screw driver between the pulley and bracket with the blade tip against the engine boss. Hold a 25-pound pull, then tighten the attaching nut and bolt.



Check the brushes for free movement in the holders. Brushes which are less than half of their original length ($\frac{15}{16}$ ") should be replaced. Clean oily or dirty commutators using a soft, clean rag. Worn-out brushes or a scored commutator should be corrected as shown in the Corvaire Shop Manual, Pages 8-11 to 8-16.

Now that we've seen the extent of the mechanical steps, the details of adjustments and the service precautions to observe, refer to the next section, Part II, for complete testing procedures. Testing will assure the mechanic that adjustments and corrections have been made that will insure customer satisfaction and eliminate hidden deficiencies that would cause premature performance failure.

End of **PART I** GUARDIAN TUNE FOR THE CORVAIR

See **PART II** for:
**TESTING THE
GUARDIAN TUNE**

GUARDIAN TUNE

for the



CORVAIR

PART II

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PART I of Guardian Tune for
the Corvaire covered:

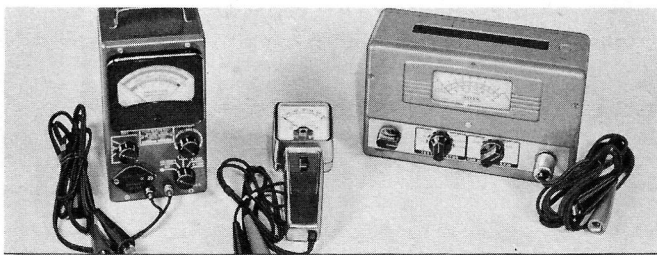
Mechanical Checks and Adjustments

In this film, we will see the
procedures for:

Testing the Guardian Tune

TESTING THE GUARDIAN TUNE

Testing the tune-up proves the results of the mechanical work and uncovers any subnormal or borderline operating conditions which would affect engine performance or cause premature parts failure. Making the following tests eliminates sudden road breakdowns, gives the customer what he is looking for, and promotes return business.



Throughout this film, various types of test equipment are demonstrated to show how and where meter connections are made and to emphasize gauge readings.

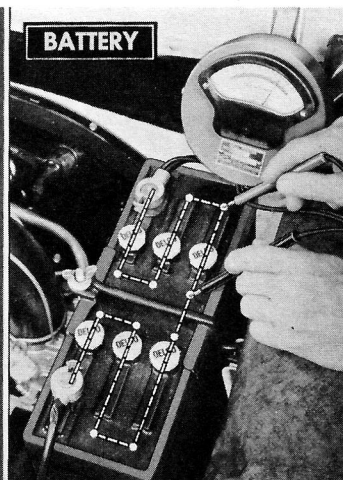
Because there are many makes of quality equipment available, the pieces shown in the service procedures do not form a recommendation of a particular manufacturer's product.

The service subjects will be covered in the order shown:

- BATTERY
- CRANKING VOLTAGE
- IGNITION PRIMARY CIRCUIT WIRING
- PRIMARY CIRCUIT OPERATING VOLTAGE
- CHARGING VOLTAGE
- DISTRIBUTOR PRIMARY RESISTANCE TEST
- DWELL AND DWELL VARIATION
- DISTRIBUTOR IDENTIFICATION
- IGNITION TIMING CHARTS
- DISTRIBUTOR ADVANCE
 - ON-THE-CAR TESTING
 - BENCH TESTING
- SECONDARY RESISTANCE
- COIL POLARITY
- IGNITION OUTPUT — SECONDARY LEAKAGE

The following test procedure replaces the former hydrometer state of charge, the capacity test and the 3-minute tests. Crank the engine for 3 seconds. If the engine starts, turn the ignition OFF. Turn the headlights ON (low beam) for 1 minute.

Then test each cell, using a voltmeter having .01-volt divisions.



Compare individual cell readings and decide what needs to be done by using the following chart as a guide:

BATTERY CONDITION AND GUIDE CHART

INDIVIDUAL CELL VOLTAGES	COMPARISON OF CELL VOLTAGES	BATTERY CONDITION	SOLUTION
More than 1.95 Volts on All Cells	Less than .05 Volts	Good	Maintain in Service
Less than 1.95 Volts on All Cells	Unable to Test	Discharged	Recharge and Retest
More than 1.95 Volts on Any Cell	More than .05 Volts	Poor	Replace Battery
Less than 1.95 Volts on Any Cell	Less than .05 Volts	Good	Needs Recharging

Battery Recharge: The following information supersedes all other Corvair recharging procedures.

- **Slow Charge:** Batteries may be slow charged at 5 amperes for a minimum of 8 hours.
- **Fast Charge:** If time or equipment prevents slow charging, boost charge with a fast charging unit at 35 amperes for 1 hour. To bring battery closer to a full charge, the fast charger rate should then be reduced to 5 amperes for an additional 4 hours.

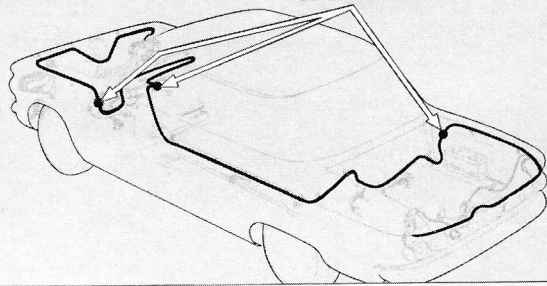
CAUTION: The charge rate must be tapered to a lower limit if electrolyte reaches 125 degrees or when gassing becomes excessive.

If the customer complains of battery rundown overnight or during a short period of time, and the light load test indicates all cells are in good condition, perform the following

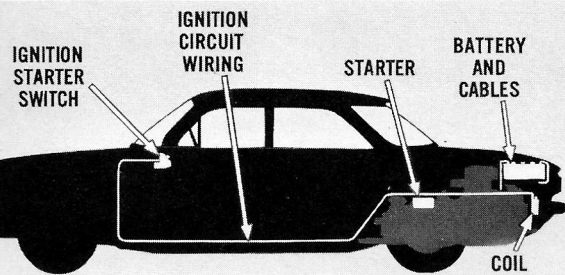
test. Disconnect the positive battery cable from its post and hook up a voltmeter between battery post and cable. All switches and accessories must be OFF.



WIRING HARNESS CONNECTORS



If meter reads a voltage figure, it indicates a short in the wiring or switches. Disconnect each individual wiring harness at the connectors until the voltmeter reads zero, then trace the cause in that particular circuit.



A reading of 9 volts or more at normal cranking speed indicates the starter switch contacts, the ignition circuit wiring to coil, the starter and battery and cables are in good operating condition. A proper test reading also indicates that sufficient voltage is being delivered to the ignition system during engine cranking.

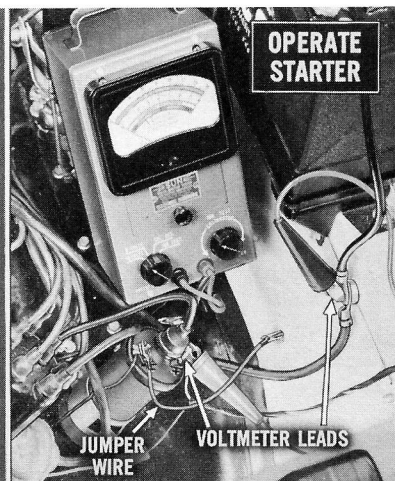
CRANKING VOLTAGE

This test will quickly tell the operating condition of the battery, battery cables, ignition switch wiring and ignition switch contacts. The resistor wire (in series with the coil and ignition switch) is by-passed during the check.

EXCESSIVE VOLTAGE DROP

A reading below 9 volts indicates an excessive voltage drop in the circuit, which must be found and corrected. To help locate the cause of low voltage, proceed to the following test.

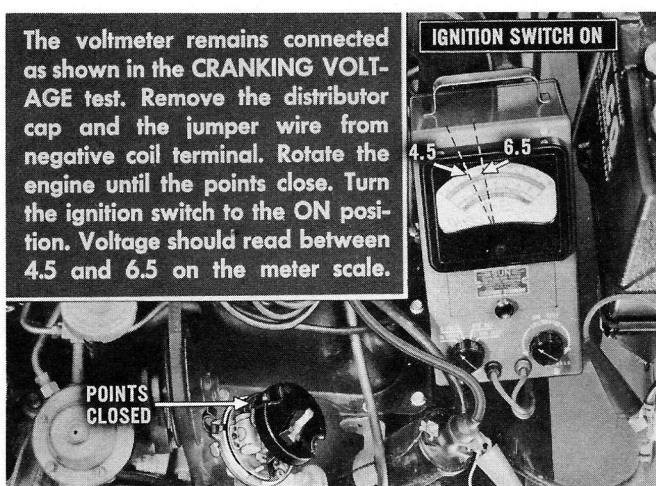
Install a jumper wire from the negative coil terminal to ground to prevent the engine from firing. Connect voltmeter leads to coil primary terminal (positive terminal) and to a good clean ground. Operate the starter using the ignition-starter switch.



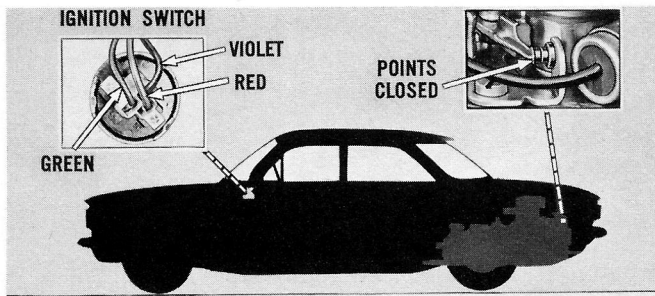
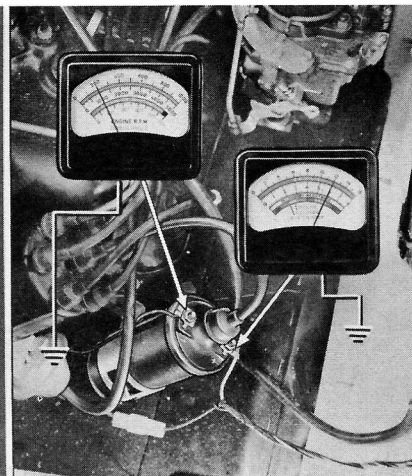
IGNITION PRIMARY CIRCUIT WIRING

This test checks the same electrical components as the previous test, with one exception: Starter motor "draw" is eliminated, and the resistor wire "draw" will now be represented in the test readings.

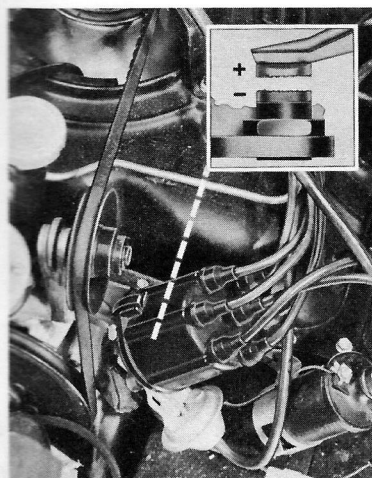
The voltmeter remains connected as shown in the **CRANKING VOLTAGE** test. Remove the distributor cap and the jumper wire from negative coil terminal. Rotate the engine until the points close. Turn the ignition switch to the ON position. Voltage should read between 4.5 and 6.5 on the meter scale.



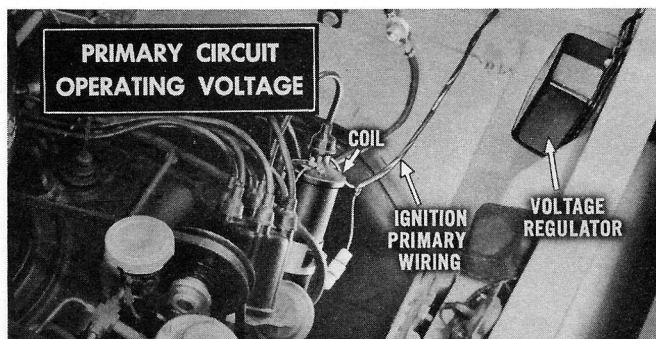
Connect the voltmeter as described for the **CRANKING VOLTAGE** test. Connect a tachometer. Start the engine and run at 1000 rpm. The voltmeter should read between 10 and 12.5 volts.



A reading of less than 4.5 volts (points closed) may be caused by loose or corroded wiring at the ignition switch, or main wiring harness connectors, or poor internal contacts in the ignition switch. Inspect all wiring and connectors and correct any electrical difficulty found. If this does not eliminate the cause of low voltage, install a new ignition switch.



Primary circuit operating voltage over 12.5 volts causes excessive current flow through the points (when closed). This produces excessive heat at the points, which, in turn, results in rapid point burning or bluing. In doing so, an oxide coating forms on the point contact surfaces.

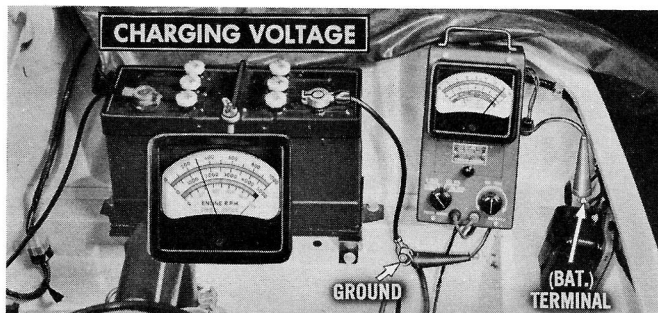


This test is a quick operating check of the voltage regulator, the ignition primary wiring and the coil primary windings. It will also indicate whether short distributor point life is caused by high operating voltage.

Excessive resistance which builds up at the point contact surfaces eventually limits primary circuit current flow. Therefore the result will be hard starting or an ignition miss on acceleration or at high speeds. When primary circuit operating voltage is over 12.5 volts, the charging system should be tested.

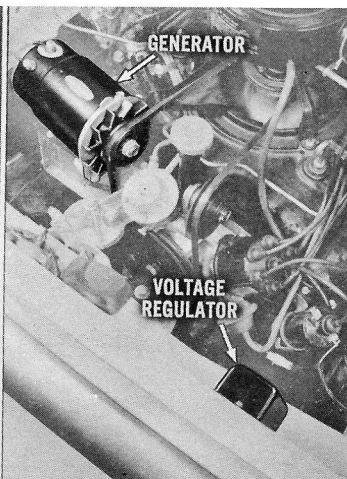
GENERAL NOTE: During primary circuit operating voltage tests or charging system tests, it is important to bear in mind that the voltage regulator is "speed sensitive" and "temperature sensitive." Therefore, when the gauge reading is noted, the voltage regulator must be at operating temperature, and engine rpm should be maintained at the exact speed called for in the various tests.

CHARGING VOLTAGE

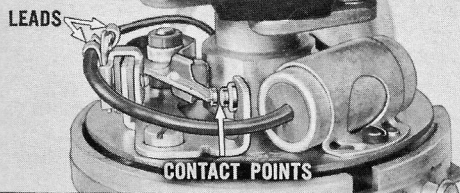


Connect the voltmeter to the battery (BAT.) terminal of the voltage regulator and to a good ground. Run the engine at a constant 1500 rpm. A reading of 14 to 15 volts indicates the charging system and voltage regulator are operating satisfactorily.

A charging rate above 15 volts or below 14 volts indicates additional tests are necessary to localize the trouble. The difficulty may be caused by poor electrical connections, excessive resistance in the regulator ground circuit, a defective generator field circuit, a misadjusted or improperly operating voltage regulator.



DISTRIBUTOR PRIMARY RESISTANCE TEST



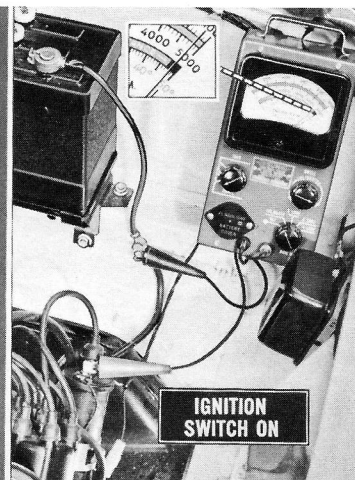
This test measures primary circuit resistance within the distributor assembly. Excessive resistance will reduce primary current flow through the coil, thus weakening its ability to handle peak loads. Factors causing this condition may be traced to oxidized contact points, loose or improperly connected leads, or leads which are frayed internally. Also contributing to excessive resistance may be —

DISTRIBUTOR BODY TO GROUND

BREAKER PLATE TO GROUND LEAD

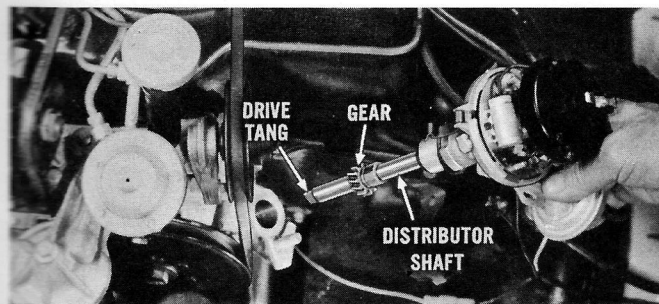
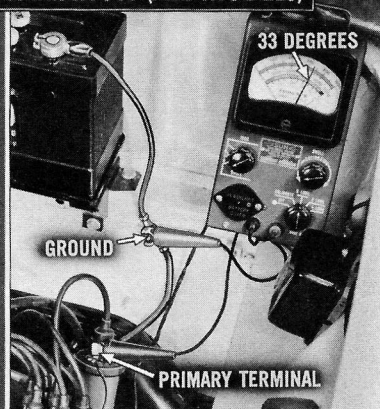
— a poor ground connection between breaker plate and distributor body, or a poor ground at the distributor mounting to the engine. Testing for these conditions requires the use of a meter as follows:

Connect the test meter as directed by the manufacturer. Turn the ignition-starter switch ON. The meter should read in the black bar when the points are closed. An incorrect meter reading indicates a poor distributor primary circuit which must be corrected before proceeding with tests.



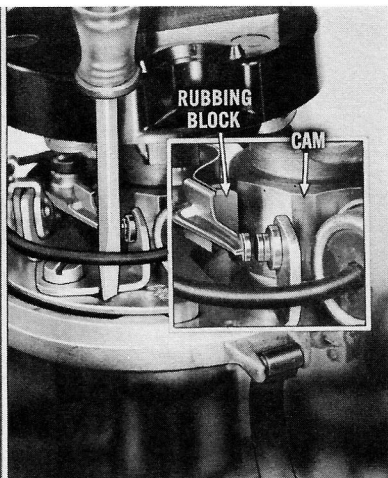
DWELL AND DWELL VARIATION (ALL MODELS)

Connect a dwell meter to the primary terminal of the coil, distributor side, and to a good clean ground. With the engine at normal idle speed, the dwell should be 33 degrees.



If dwell varies more than the 3-degree limit, pull the distributor (noting rotor position) and check the distributor shaft, the bushings, the breaker plate, gear teeth and drive tang. If any parts are worn or loose, service or replace as required. Repeat dwell tests.

If dwell reading is not within limits, recheck the point gap and, if necessary, regap points to obtain proper dwell specifications. Use a screw driver as shown to make adjustment. Also inspect carefully for a misaligned point rubbing block or a worn distributor cam.

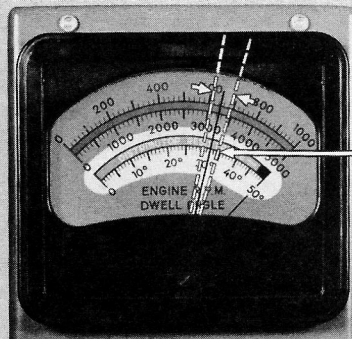


DISTRIBUTOR IDENTIFICATION

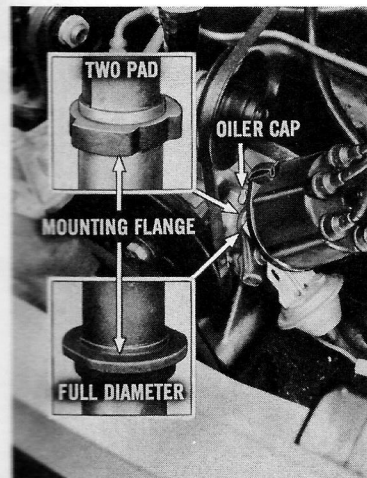
Before checking ignition timing and the degrees of advance, the distributor model must be correctly identified.

Recent changes have been made in the construction of the centrifugal advance mechanism and in distributor model application. These changes provide maximum engine-operating efficiency for the various power team options.

Knowing the distributor model will also tell whether the engine is the high-performance or regular-production unit.



Slowly bring engine up to a constant 1500 rpm. Note the dwell reading. Return engine to idle speed and note the dwell reading again. Dwell reading should not vary more than a total of 3 degrees within the rpm range.



Check the distributor color-coded oiler cap and determine the type of distributor mounting flange used. Two designs are in service, the two-pad type or the full-diameter type. When the oiler cap color and flange design are known, check the following charts to determine the correct specifications.

REGULAR PRODUCTION ENGINES IGNITION TIMING CHART

POWER TEAM	DISTRIBUTOR PART NO.	OILER CAP COLOR	IGNITION TIMING	MOUNTING FLANGE
Early Production: All	1110252	Cadmium	4 BTDC*	2 Pads
Late Production: Standard Transmission	1110258	Zinc	4 BTDC	Full Diameter
Intermediate Production: Powerglide	1110256	Black	16 BTDC**	2 Pads
Late Production: Powerglide	1110259	Black	13 BTDC	Full Diameter

*Powerglide models which have the field-modified distributor (see Part I) are set to 16 degrees initial timing.

**If detonation or pre-ignition occurs during the road-test, retard the timing to 14 degrees.

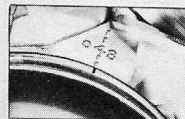
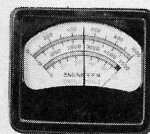
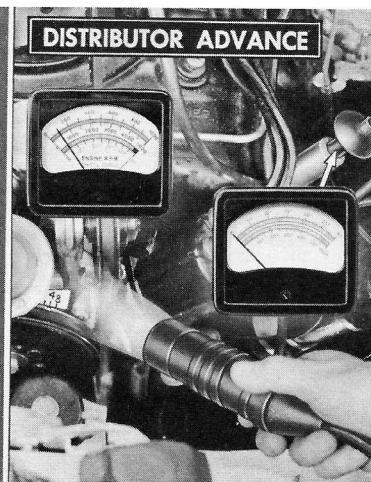
HIGH-PERFORMANCE ENGINES IGNITION TIMING CHART

POWER TEAM	DISTRIBUTOR PART NO.	OILER CAP COLOR	IGNITION TIMING	MOUNTING FLANGE
Early Production: All	1110257	Copper	16 BTDC**	2 Pads
Late Production: All	1110260	Copper	13 BTDC	Full Diameter

**If detonation or pre-ignition occurs during the road-test, retard the timing to 14 degrees.

DISTRIBUTOR ADVANCE

This on-the-car test quickly checks the degrees of spark advance produced by the centrifugal and vacuum control units. Connect a tachometer and advance tester which is equipped with a timing light. Initial timing must be correct to make this check.



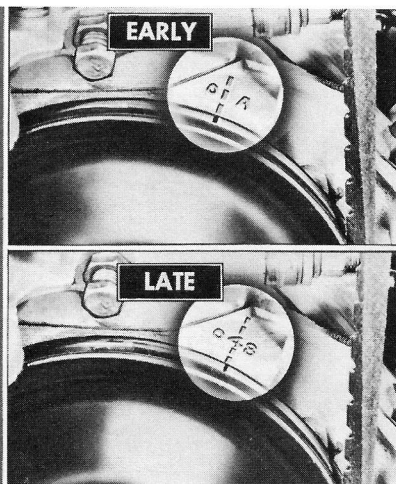
Bring engine rpm up to 2500. Adjust meter knob to electronically align timing mark to proper initial setting. Check the following chart for correct advance specifications.

DISTRIBUTOR ADVANCE SPECIFICATIONS — ON-THE-CAR TESTING

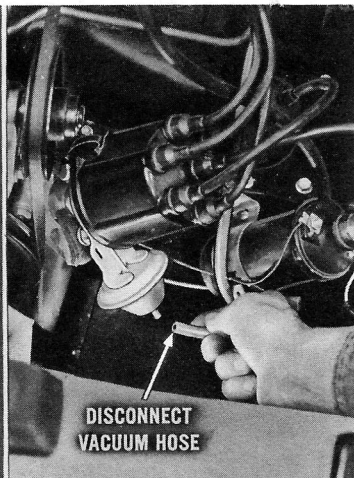
Power Team	Oiler Cap Color	Mounting Flange	Vacuum Hose Connected Degrees	Vacuum Hose Disconnected Degrees
Early Production: All	Cadmium	2 Pads	41° to 45°	18° to 22°
Late Production: Standard Transmission	Zinc	Full Diameter	41° to 45°	18° to 22°
Intermediate Production: Powerglide	Black	2 Pads	29½° to 33½°	6½° to 10½°
Late Production: Powerglide	Black	Full Diameter	32½° to 36½°	9½° to 13½°
Early High-Performance Engines	Copper	2 Pads	26° to 30°	11° to 15°
Late High-Performance Engines	Copper	Full Diameter	26° to 30°	11° to 15°

NOTE: All figures are read in "engine degrees" and at 2500 rpm.

When timing early model regular-production engines equipped with a standard transmission, the 4-degree BTDC setting is 1/2 the distance between the letters "O" and "A." Late model engines have a 4-degree indicator mark.



If the degrees of advance is incorrect with the vacuum hose connected, disconnect the vacuum control line at the carburetor to obtain only a centrifugal advance reading. Repeat the test procedure at 2500 rpm.



DISCONNECT
VACUUM HOSE

When testing distributor operation in a bench test unit, the degrees of advance should be within the specifications shown.

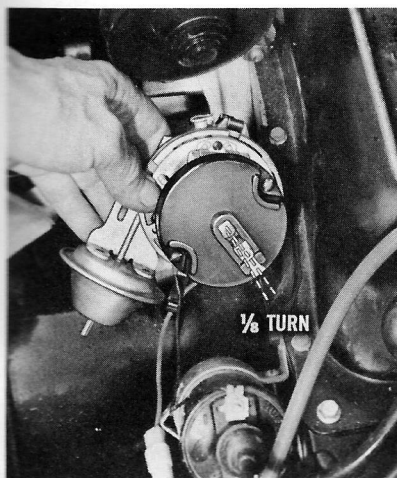
OILER CAP	DISTRIBUTOR PART NO.	CENTRIFUGAL ADVANCE*	RPM*	VACUUM ADVANCE DEGREES (Hg)	DWELL
Cadmium or Zinc	1110252	0°	200	0° at 6"	33
	1110258	16°	1800	23° at 15.2"	
Black	1110256	0°	850	0° at 7"	33
	1110259	10°	1800	23° at 16"	
Copper	1110257	0°	350	0° at 8"	33
		3.2°	600	15° at 15.5"	
	12°	2400	0° at 6"	23° at 15.2"	

*NOTE: Advance specifications are shown in DISTRIBUTOR RPM and DISTRIBUTOR degrees.



VACUUM
CONTROL UNIT

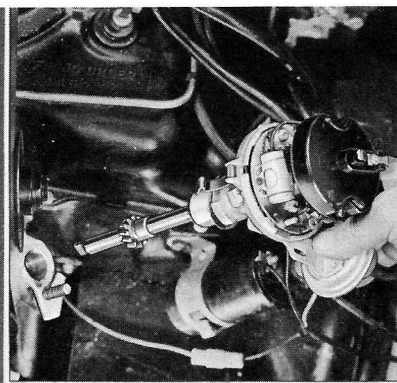
If centrifugal advance now reads correctly within the limits shown on the advance specification chart, the cause of improper total advance is improper vacuum control system operation. If necessary, remove distributor (note rotor position) and install a new control unit. Set advance plate to 23 degrees.



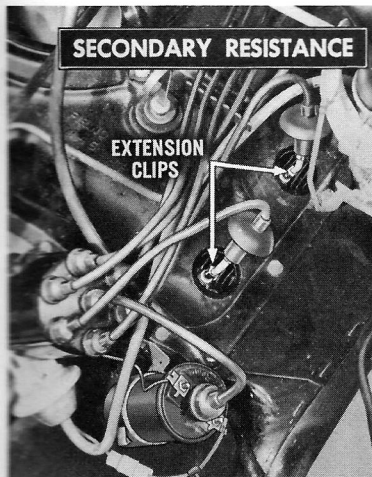
1/2 TURN

Reinstall distributor by turning rotor about 1/2 turn in a counterclockwise direction past the mark (or noted position) previously made. Mesh gears, install clamp and all connections. Install distributor cap and recheck timing.

If the advance reading is not within the limits as specified, with the vacuum hose connected or disconnected, the distributor must be removed from the car and overhauled. Note or mark rotor arm position. See Pages 8-31 and 8-32 of the Corvair Shop Manual for service instructions.

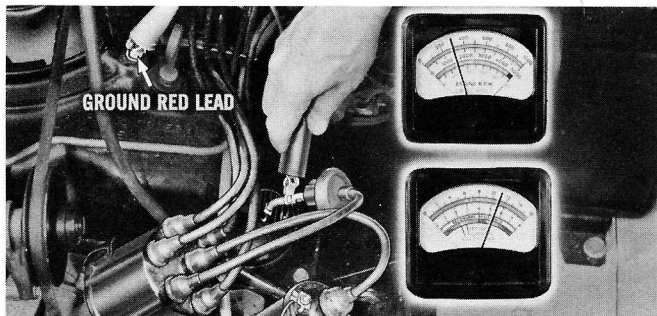


SECONDARY RESISTANCE



EXTENSION
CLIPS

This test checks the ability of the secondary circuit to conduct the proper voltage and current to the spark plugs. Install extension clips between the plug terminals and plug wires.

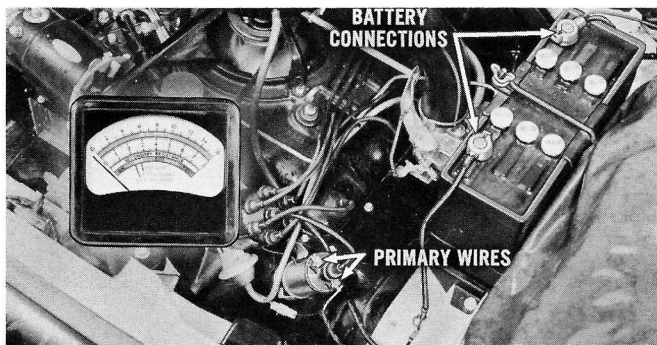


GROUND RED LEAD

Run the engine at 1500 rpm. Ground the red lead of the secondary resistance tester, then touch each plug (in order) with the black lead. A uniform reading of "5" to "5½" within the **GOOD** range indicates the secondary circuit components are in good operating condition.

COIL POLARITY

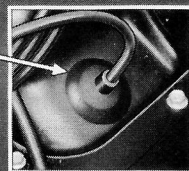
This test is made with the same meter and at the same time as the secondary resistance test. Correct meter readings will indicate that the coil is properly installed for polarity and the battery is properly installed and charged in the correct direction.



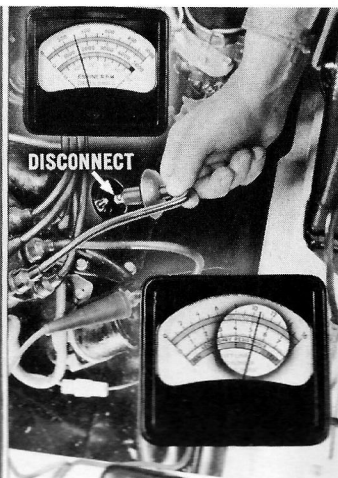
If the pointer reads off the scale to the left with the meter properly connected, it indicates reversed coil polarity. Check for reversed primary wires, battery connections, or battery charged incorrectly. Service as required.

IGNITION OUTPUT — SECONDARY LEAKAGE

The output test checks the over-all efficiency of the ignition system. The secondary leakage test checks the condition of the secondary wiring insulation. Hook up the meter as directed by the manufacturer. Loosen all spark plug wires and access covers (do not disconnect).

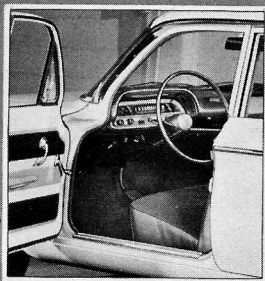


With the meter set as directed by the manufacturer and the engine running at 1500 rpm, disconnect one plug wire. Meter should read in the **GOOD** band of the scale. Replace wire and repeat test for each plug. Good readings indicate the ignition output and secondary insulation are good and there are no carbon paths in the distributor cap.



DISCONNECT

If the customer has made a serious complaint about excessive fuel consumption, it is suggested that the vehicle be road-tested with a Gas-per-Mile Gauge such as J-8381. Specific instructions are packaged with the unit and are also described in detail in the Chevrolet Service News of November, 1959, Pages 4 and 5. The mileage test should be made with the customer present and will help show any unusual driving habits which have contributed to the poor mileage complaint.

ROAD-TEST

A final CHECK of the tune-up should be performed on a ROAD-TEST. Note engine operation at the various speeds and throttle openings. Before turning the repair order in as a completed job, make sure that all grease or dirt on floor mats, seats, handles or steering wheel is wiped clean.

Engines which do not indicate the need for a thorough checking and testing may require only a smaller series of service operations which have been previously covered.

This is called:

ENGINE SMOOTH-UP

This type of tune-up, which is only part of the over-all or complete Guardian Tune-up, consists of a:

- CYLINDER BALANCE OR COMPRESSION TEST
- CHECKING, CLEANING OR REPLACING PLUGS
- BATTERY TEST
- DISTRIBUTOR CHECKS AND CORRECTIONS
- SET TIMING
- SYNCHRONIZE CARBURETORS, ADJUST IDLE RPM AND MIXTURE
- ROAD-TEST

NOTES