

TABLE 3. PUMP SPECIFICATIONS

PUMP MODEL	PRESSURE RATING
Onan Electric (149-1304)	2-3/4 to 3-1/2 psi (19.0 to 24.1 kPa)
Bendix or Facet Electric	2-1/2 to 3-1/4 psi (17.2 to 22.4 kPa)

Fuel Pump

All B and N series generator sets are equipped with an electric fuel pump. The pump supplied with current BFA, BGA, and NH model generator sets is manufactured by Facet (a division of Bendix Corporation) and carries a Facet nameplate. An internal fuel shutoff valve is a standard feature of the current pump. Older versions of this pump carry the Bendix nameplate and do not have an internal fuel shutoff valve. Service procedures for the Facet or Bendix pump are the same.

The BF model generator sets were equipped with a pump that had the Onan nameplate. If the Onan pump malfunctions, it is recommended that it be replaced rather than repaired. The newer Facet pump is carried as the standard replacement pump for the Onan pump.

WARNING Do not substitute automotive type electric fuel pumps for standard Onan supplied electric pumps. The output pressure is much higher and can cause carburetor flooding or fuel leakage, creating a fire hazard.

Pump Test: Test the fuel pump by checking the pump outlet pressure. Use the following procedure.

1. Remove the fuel line from the pump outlet and install a pressure gauge.
2. Press the START switch and hold it for several seconds until pressure reading is constant.
3. Compare the pressure reading with the value given in Table 3. If the retention is good, the pressure should stay constant or drop off very slowly.

A low pressure reading with little or no pressure drop indicates a weak or broken diaphragm or diaphragm spring, worn linkage or leaky check valves. If pressure is above maximum, the pump diaphragm is too tight or the diaphragm (or plunger) return spring is too strong. Any of the above conditions are cause for repair or replacement of the pump.

Fuel Pump Repair: Service of the Facet pump is limited to the bottom cover, filter, plunger tube, and plunger assembly. All parts of the electric system are hermetically sealed in a gas atmosphere and are not serviceable. If electrical failure occurs, replace the pump.

CAUTION Do not tamper with the seal at the center of the mounting bracket on the side of the pump as it retains the dry gas which surrounds the electrical system. Electrical system components are not serviceable.

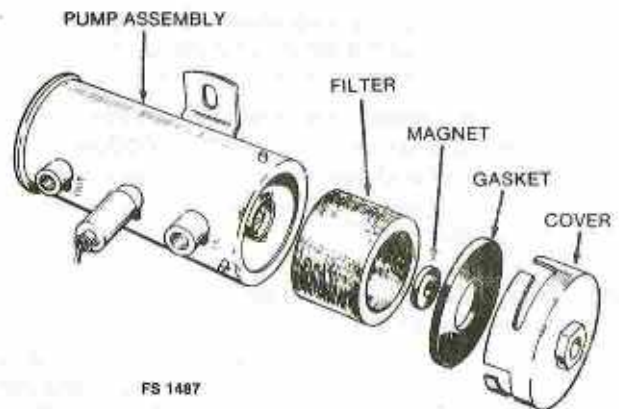


FIGURE 21. REMOVAL OF MAGNET AND FILTER

Use the following procedure for servicing the pump:

1. Using a 5/8-inch wrench, loosen the pump cover, then remove by hand.
2. Remove the filter, magnet and cover gasket (Figure 21).

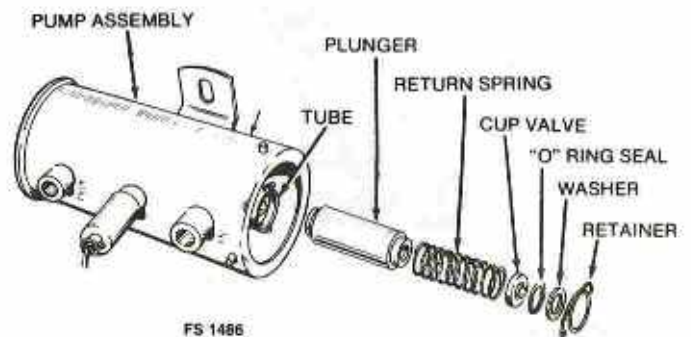


FIGURE 22. REMOVAL OF PLUNGER ASSEMBLY

3. Using a thin nose pliers, remove the retainer spring from the plunger tube. Remove the washer, "O" ring seal, cup valve, plunger spring and plunger from tube (Figure 22).
4. Wash all parts (except gasket and seal) in parts cleaning solvent. Blow out solvent and dirt with low pressure compressed air. Slosh the pump assembly in cleaning solvent, blow dry and swab the inside of the plunger tube with a cloth wrapped around a stick. If the plunger does not wash clean or has rough spots, gently clean the surface with crocus cloth.

WARNING Most parts cleaning solvents are flammable and could cause serious personal injury if used improperly. Follow the manufacturers recommendations when cleaning parts.

5. Insert plunger in tube, buffer spring end first. Check fit by slowly sliding the plunger back and forth in the tube. It should move fully without any tendency to stick. If a click cannot be heard as the plunger is slid from one end to the other, the internal pump assembly is not functioning properly and the pump should be replaced.
6. Install plunger spring, cup valve, "O" ring seal and washer. Compress the spring and install the retainer with ends in the side holes of the tube.
7. Check cover gasket and replace if deteriorated. Place cover gasket and magnet in the bottom cover and install filter and cover assembly on pump. Twist cover on by hand and tighten securely with a 5/8-inch wrench.

Fuel Shutoff Valve (When Used)

The external fuel shutoff solenoid prevents fuel flow into the carburetor after set shutdown. It connects electrically to the ignition power terminal and energizes during engine cranking and running to allow fuel flow. The device fastens directly to the fuel pump inlet (Figure 23).

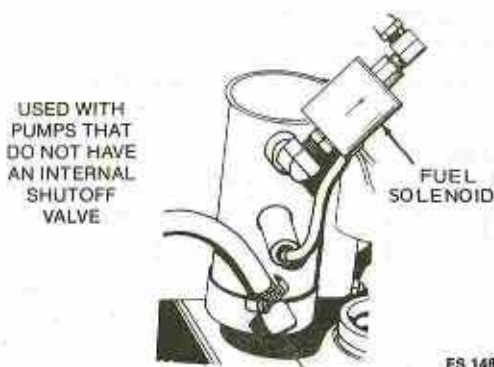


FIGURE 23. FUEL SOLENOID

To test the solenoid, connect a jumper wire from the B+ terminal on the control box to the plus (+) side of the ignition coil. If the solenoid is good, a click should be heard when the wire makes contact.

CAUTION *Twisting the body of the solenoid will cause internal damage. Do not apply twisting force to the fuel solenoid, except with a wrench on the hex nut located near the fuel inlet.*

Fuel Filters

The fuel filter on all B and N series generator sets is incorporated within the fuel pump. Refer to the following sections for service information.

Facet/Bendix Fuel Pump Filter: These pumps incorporate a filter within the casing of the pump (Figure 24). Use a 5/8 inch wrench to twist off the bottom of the pump and remove the filter element. If the filter is dirty, replace it along with the cover gasket.

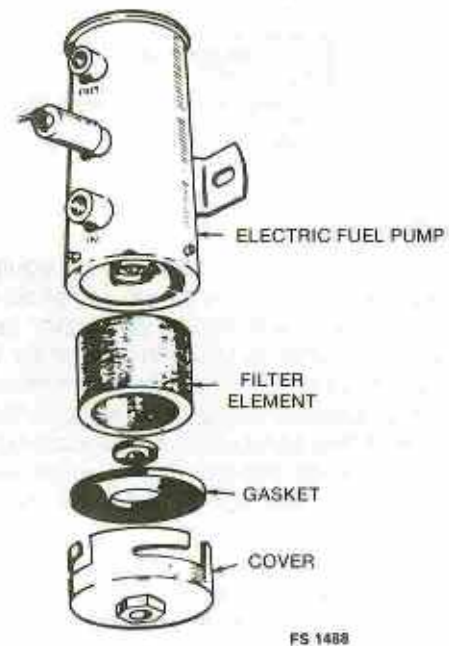


FIGURE 24. BENDIX AND FACET ELECTRIC PUMP FILTER

Onan Fuel Pump Filter: The Onan electric fuel pump has two screen filters mounted in the top of the pump. To gain access, remove the four Phillips screws and lift off top pump assembly (Figure 25). Remove and clean both the coarse and fine filter screens and reinstall with a new gasket. Remount the top pump assembly, making sure the gasket is in place.

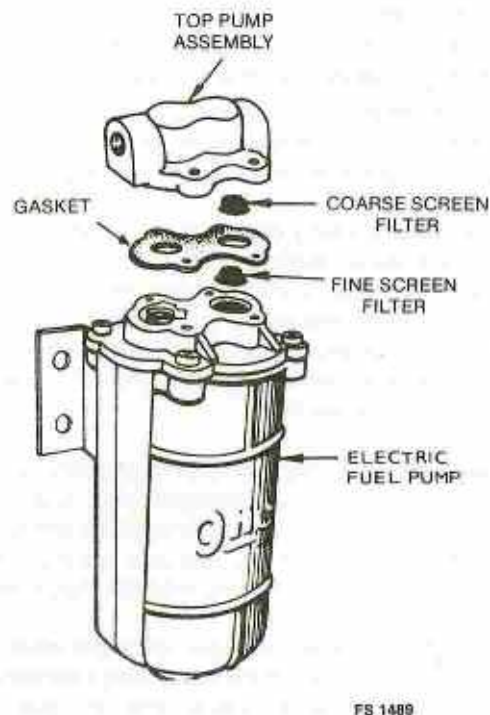


FIGURE 25. ONAN ELECTRIC PUMP FILTER LOCATION

Governor Adjustments

Before making governor adjustments, run the unit about 10 minutes under light load to reach normal operating temperature. If governor is completely out of adjustment, make a preliminary adjustment at no load to first attain a safe voltage and speed operating range.

Engine speed determines the output voltage and frequency of the generator. By increasing the engine speed, generator voltage and frequency are increased. By decreasing the engine speed, generator voltage and frequency are decreased. An accurate voltmeter and frequency meter should be connected to the generator in order to correctly adjust the governor. A small speed drop not noticeable without instruments will result in an objectionable voltage drop.

A binding in the bearings of the governor shaft, in the ball joint, or in the carburetor throttle assembly will cause erratic governor action or alternate increase and decrease in speed (hunting). A lean carburetor adjustment can also cause hunting. Springs tend to lose their calibrated tension through fatigue after long usage.

If the governor action is erratic after all adjustments are made, replace the spring. If this does not improve operation, the problem is probably within the governor mechanism. Refer to Governor Cup section for service procedures.

Adjustments to the governor should be made in the following sequence.

1. Adjust the carburetor idle adjustment screw and main adjustment screw as specified in the Mixture Screw Adjustments section before making any adjustments to the governor.

WARNING *Touching hot exhaust pipes or moving parts might result in serious personal injury. Use extreme caution when making adjustments while the engine is running.*

2. Adjust the length of the governor linkage and check for binding or excessive looseness. The length of the linkage connecting the governor arm to the throttle shaft assembly is adjusted by loosening the lock nut and rotating the ball joint (see Figure 26). Adjust this length so that with the engine stopped and tension on the governor spring, the stop on the throttle shaft assembly almost touches the stop on the side of the carburetor. (One more turn of the governor ball joint would allow the throttle shaft stop to touch the carburetor.) Tighten lock nut.
3. With the warmed up unit operating at **no load**, adjust the tension of the governor spring to obtain 127 volts and 61 hertz for voltage and speed.
4. Check the voltage and speed first with a load applied and then with no load applied. The voltage and speed should stay within the limits shown in Table 4. Adjust the sensitivity to give the closest regulation (least speed and voltage difference between no load and full load) without causing a hunting condition. To increase sensitivity, (closer regulation) shift the spring toward the governor shaft.

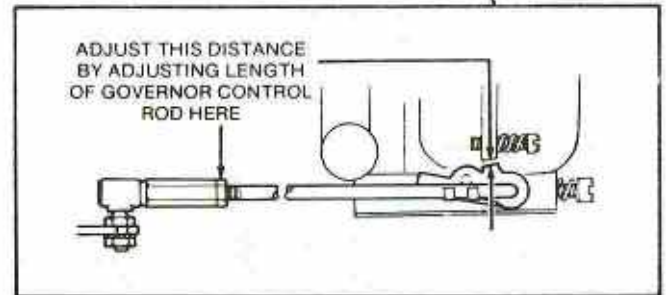
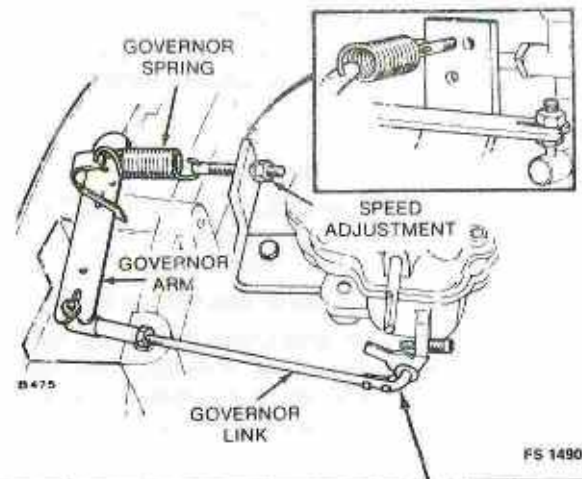


FIGURE 26. GOVERNOR ADJUSTMENTS

TABLE 4
VOLTAGE AND SPEED CHARTS

VOLTAGE CHART FOR CHECKING GOVERNOR REGULATION		120 VOLT 1 PHASE 2 WIRE
MAXIMUM NO-LOAD VOLTAGE		132
MINIMUM FULL-LOAD VOLTAGE		108
SPEED CHART FOR CHECKING GOVERNOR REGULATION		
MAXIMUM NO-LOAD SPEED (RPM)		1890
HERTZ (FREQUENCY)		63
MINIMUM FULL-LOAD SPEED (RPM)		1770
HERTZ		57

5. Recheck the speed adjustment made in step #4.
6. Set the carburetor throttle stop screw as specified in the Mixture Screw Adjustments section.

Carburetor Air Preheater (Optional on Certain Models)

The carburetor air preheater is adjusted at the factory and will seldom require adjustment unless disturbed. Adjustment is as follows:

1. Loosen the lock nut (see Figure 27).
2. With ambient temperature at 80°F (27°C), turn vernatherm in or out so plunger just touches shutter lever with shutter door closed.
3. Hold vernatherm in place and tighten lock nut.
4. Start generator set and check for proper operation and normal power output from set. After warm up and with compartment temperature above 100°F (38°C), shutter door should be fully open.

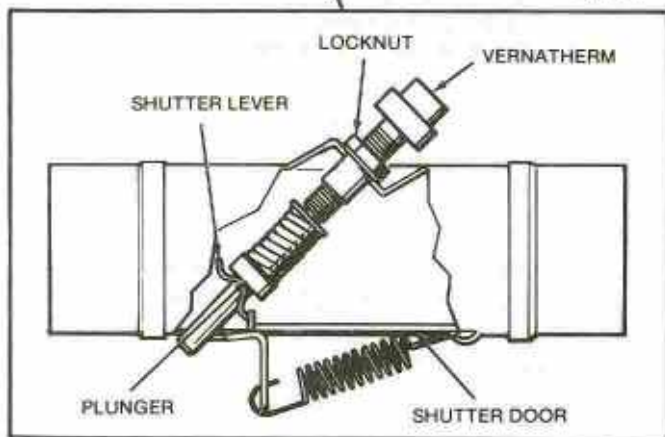
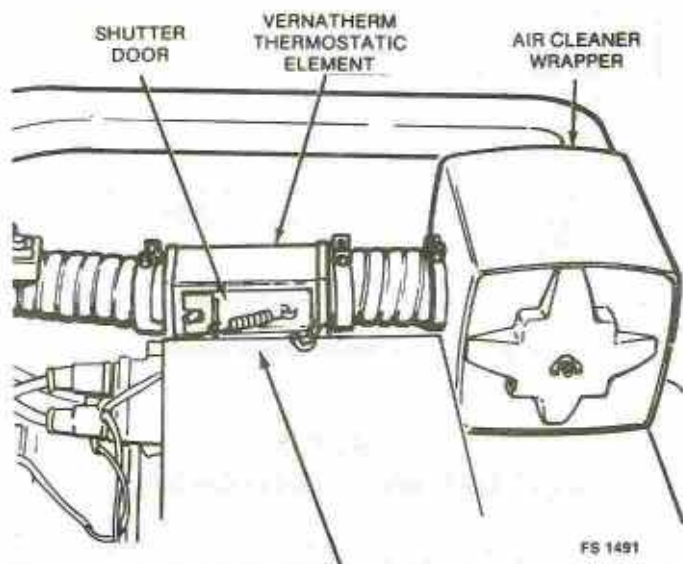


FIGURE 27. CARBURETOR AIR PREHEATER

IGNITION SYSTEM

The ignition system consists of the breaker points, condenser, ignition coil, spark plugs, and wiring. For reliable generator set operation, the complete ignition system must be in good working order and properly adjusted. Many generator set "problems" can be traced to an improperly maintained ignition system. Refer to the following sections when servicing or making adjustments.

Breaker Points And Condenser

The breaker points and condenser mount on top of the engine block directly behind the carburetor. A small plunger rides on an ignition cam at the end of the camshaft. The plunger actuates the points which open and close twice with every revolution of the camshaft. Point opening is determined by the point gap setting. The exact timing of the ignition spark is dependent on when the points open.

It is important that the breaker points have the correct gap for easy starting, efficient operation, full power, and proper cooling. A retarded ignition will reduce efficiency while an advanced ignition will cause overheating.

The condenser extends point life by preventing arcing across the opening breaker points. A defective condenser causes a weak spark and rapid point wear. Replace the condenser if defects are suspected. A new condenser is supplied with the engine tune-up kit.

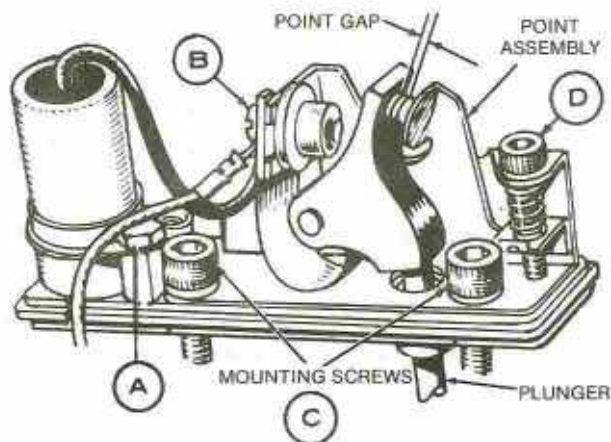


FIGURE 28. TIMING AND POINT GAP ADJUSTMENT

Breaker Point Replacement And Adjustment: Inspect the breaker points at the interval specified in the Operators Manual and replace if pitted or burned. Filing of the points is not recommended. Use the following procedure to replace and adjust the points.

The ignition adjustments should be made with the engine in a static condition and cold.

1. Remove cover by loosening screw and lift off.
2. Remove the spark plugs and rotate the flywheel in a clockwise direction until the points are open the maximum amount. The flywheel can be rotated by turning the flywheel capscrew with a socket wrench.
3. Remove the condenser (screw A) and detach the condenser lead and coil lead (screw B). See Figure 28.
4. Remove the mounting screws (screw C) and lift the breaker assembly from the engine.
5. Replace the condenser and point assembly and install in reverse order of removal.

- Use an allen head wrench to adjust set screw D to obtain the gap setting specified in the Specifications section. Measure the point gap with a flat thickness gauge (See Figure 28).

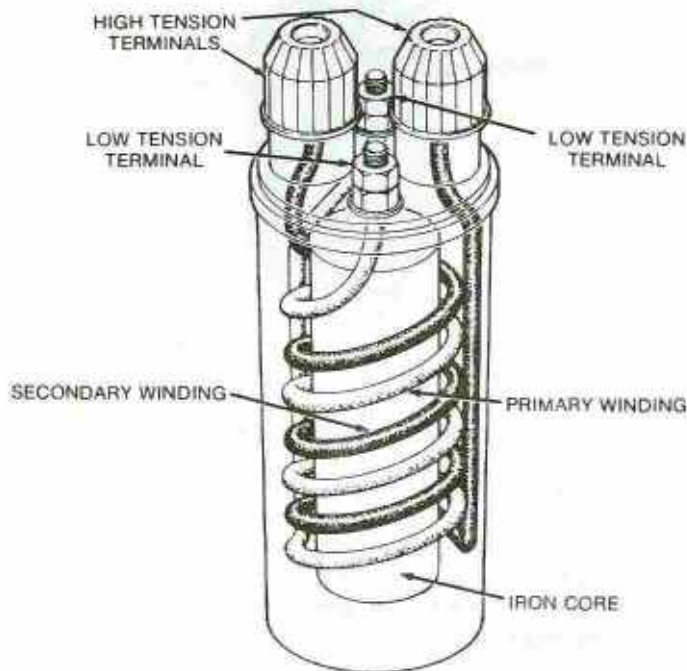
Make sure feeler gauge is clean and free of any grease, oil or dirt.

The timing is adjusted during initial engine assembly and is fixed by the point gap adjustment. No other adjustment or alignment is necessary.

- Replace the point box cover and spark plugs.

Ignition Coil

The ignition coil is a transformer that steps up the battery voltage to about 20,000 volts for spark plug firing. The coil is composed of a core, a primary winding, insulators, secondary winding, sealing compound, bakelight cap, and the outside case and necessary terminals (Figure 29).



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FIGURE 29. IGNITION COIL

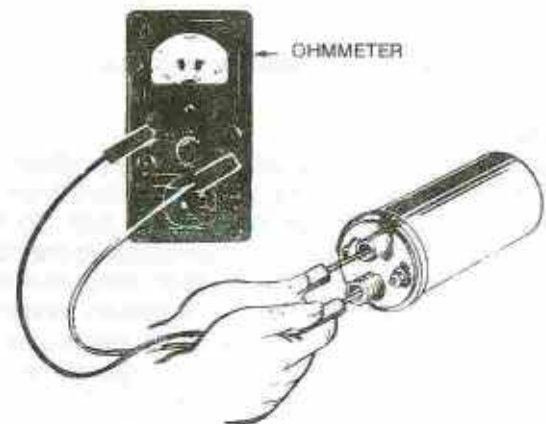
Ignition coils do not normally require any service other than to keep all terminals and connections clean and secure. Also, check for loose seams, dents, punctures, and other mechanical damage. If poor ignition performance is evident and other ignition components are not at fault, the coil can be tested with the specified procedures. When replacing the coil, observe proper polarity. The negative (-) terminal connects to the breaker points and the positive (+) terminal connects to a battery positive (B+) source within the control.

Ignition Coil Testing

A quick test of coil output can be made by checking the ignition spark. Remove one of the spark plugs. Reconnect the spark plug wire to the spark plug. Ground the spark plug to bare engine metal and crank the engine. A good spark should be observed between the plug center electrode and side electrode. If the spark is weak, the coil, points and condenser, or wiring is probably defective.

Direct Testing With Ohmmeter: To test a coil directly, remove all the wires connected to it. For easier access to the terminals, the coil may be removed from the engine. Use the following procedure to test.

- Inspect terminals for corrosion, looseness, cracks, dents or other damage. Look for evidence of electrical leakage around high tension terminals (indicated by carbon runners). Damaged or leaking coils should be replaced.
- Clean the outside of the coil with a cloth dampened in parts cleaning solvent.
- To measure resistance in the primary circuit, connect one ohmmeter lead to the positive (+) terminal and the other to the negative (-) terminal on the coil. The resistance should be between 3.87 and 4.73 ohms. A high resistance value indicates an open circuit or poor connection inside the coil, and the coil should be replaced.
- To measure resistance in the secondary circuit, connect the ohmmeter leads to the two high tension terminals (see Figure 30). The resistance measured should be between 12,600 and 15,400 ohms. A lower resistance value indicates a shorted secondary winding. A higher resistance value indicates the coil has excessive internal resistance or an open circuit. Replace coil if not within specifications.



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FIGURE 30. TESTING COIL SECONDARY

Spark Plugs

Remove and inspect the spark plugs at the intervals recommended in the Operators Manual. A careful examination of the plug can often pin point the source of an engine problem. The following covers some common spark plug conditions and the probable cause.

- One Plug Carbon Fouled — Check for an open ignition cable or low compression.
- Black Soot Deposits — Check for faulty choke operation, overly rich fuel mixture, or dirty air filter.
- Oil Fouled — Check for faulty crankcase breather, worn rings, or worn valve guides.
- Burned Or Overheated — Check for leaking intake manifold gaskets, lean fuel mixture, or incorrect ignition timing. Be sure plug is not in wrong heat range.
- Chipped Insulator — Check for advanced timing. Bend only side electrode when setting gap.
- Splash Fouled — Check for accumulated combustion chamber deposits. See Cylinder Head section.
- Light Tan Or Grey Deposits — Normal plug color.

Clean or replace fouled plugs and regap (see Figure 31) to value specified in the Specifications section. Use only the recommended plug type.



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FIGURE 31. CHECKING PLUG GAP

Wiring

Ignition system wiring includes: (1) One positive (B+) wire which carries the low voltage current from the battery to the primary winding of the coil. (2) One negative (-) wire which carries low voltage to the points and condenser. (3) Two high tension wires that carry the high voltage current from the secondary winding of the coil to the spark plugs. The spark plugs and coil secondary are all grounded to the engine making a complete circuit for the voltage back to the battery. The ignition coil primary (low voltage side) is grounded when the breaker points close.

Check all low voltage wiring for loose connections and cuts or breaks in the insulation. Clean all terminals and connections and test for continuity with an ohmmeter. Use a megger to check for breaks in the spark plug wire insulation.

CRANKCASE VENTILATION SYSTEM

The crankcase breather prevents pressure from building up in the crankcase. It also prevents oil contamination by removing moisture or gasoline vapors and other harmful blow-by materials from the crankcase. These vapors are routed to the carburetor where they are mixed with incoming air and burned in the combustion chamber. A sticky breather valve can cause oil leaks, high oil consumption, rough idle, reduced engine power and a rapid formation of sludge and varnish within the engine.

Crankcase Breather Service

If the crankcase becomes pressurized as evidenced by oil leaks at the seals, use the following procedures to service.

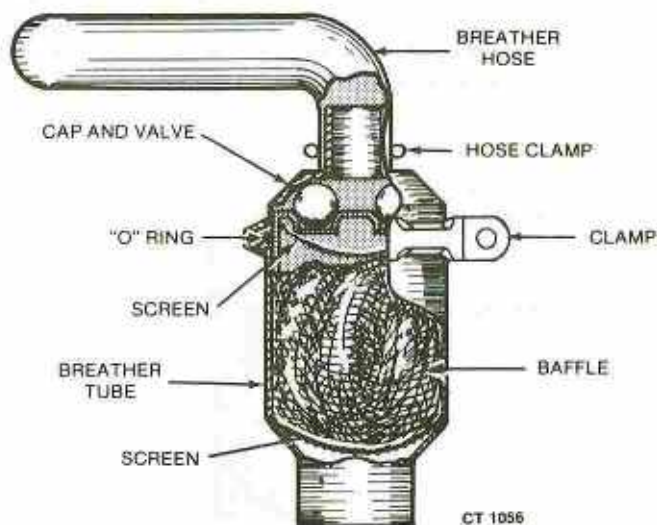


FIGURE 32. CRANKCASE BREATHER FOR NH

NH Breather: Remove the cap (see Figure 32) from the crankcase tube and pry the valve out of the cap. Clean the valve in parts cleaning solvent or replace if worn. Pull the baffle out of the breather tube and clean in parts cleaning solvent. Assemble with the perforated disk toward the engine.

WARNING

Most parts cleaning solvents are flammable and could cause serious personal injury if used improperly. Follow the manufacturers recommendations when cleaning parts.

BF, BFA, And BGA Breather: Remove the breather tube from the valve cover (see Figure 33) and pull out the pack. Remove the valve cover, spring, washer, reed valve, and breather baffle. Clean all parts in parts cleaning solvent and replace any worn parts. The reed valve must be flat with no sign of a crease. Assemble using a new gasket and plastic tie.

WARNING

Most parts cleaning solvents are flammable and could cause serious personal injury if used improperly. Follow the manufacturers recommendations when cleaning parts.

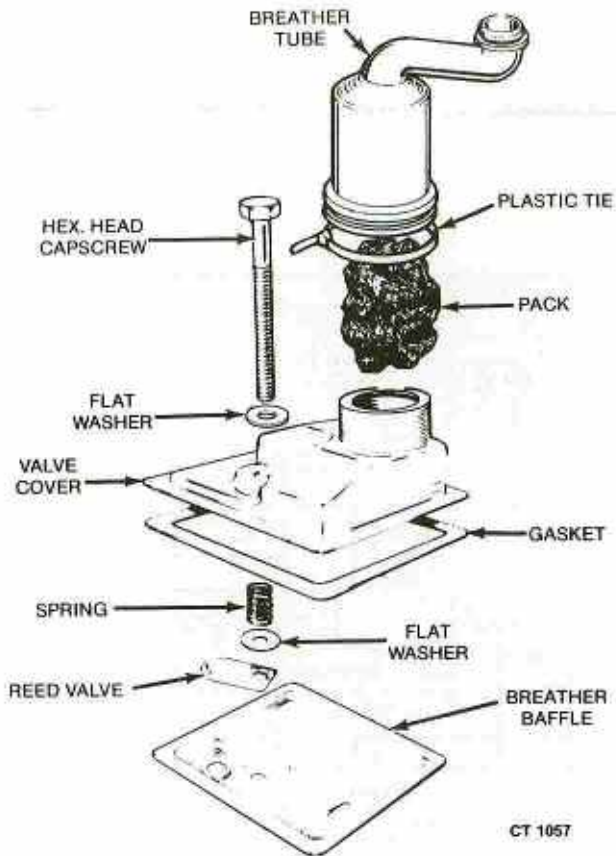


FIGURE 33. CRANKCASE BREATHER FOR BF, BGA, AND BFA

Reed valve must be assembled as shown with washer on top and breather baffle on the bottom.

CAUTION *Over tightening the valve cover might cause an air leak and allow dirt to enter the engine. Be careful not to distort the valve cover when tightening.*