GENERAC

Part No. 41124

XP

EXTENDED PERFORMANCE

DIAGNOSTIC REPAIR MANUAL

GENERAC

BOX 8 • WAUKESHA, WISCONSIN 53186

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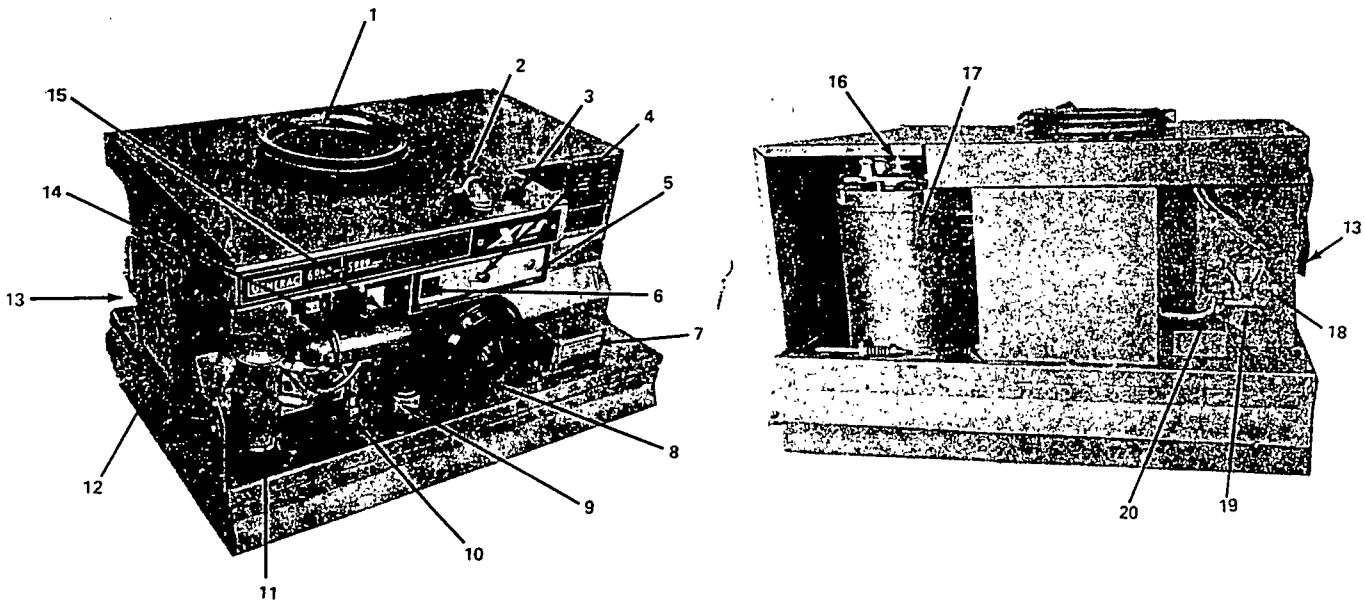


1. Rope, Start Pulley
2. AC Power Output Wiring
3. Remote Panel Wiring
4. Low Oil Pressure Light
5. Start-Stop Switch
6. Main Breaker
7. Voltage Regulator
8. Air Cleaner
9. Oil Filler Cap
10. Low Oil Pressure Shut Down Switch
11. Fuel Pump
12. Spark Plug Cover
13. Ignition Coil
14. Manual Choke Slide
15. Fuel Shut Off Solenoid
16. Brushes And Slip Rings
17. Alternator
18. Positive (+) Battery Cable Connects Here
19. Starter Solenoid
20. Lead To Starter

INTRODUCTION

This manual is intended to serve the service technician as an aid in the diagnosis and repair of the XP alternator. It is basically a problem and solution guide. That is, the technician must identify the effect, symptom, or problem. Once the specific problem is identified, the technician need only turn to the RECOMMENDED TROUBLESHOOTING PROCEDURE section (pages 2 through 11) for the specific problem identified and follow the directions given. This section lists the possible component failures and the order in which they should be checked for each particular problem. As the service technician becomes more familiar with the XP, he will need only to refer to pages 2 through 11 for the order in which to make these checks, assuming that he will be familiar with how the checks are performed.

CONTENTS

RECOMMENDED TROUBLESHOOTING PROCEDURE

ENGINE WON'T CRANK

1.) 30 amp fuse . . . . . page 11

Checks OK ↓

2.) Battery . . . . . page 11

Checks OK ↓

3.) Start/Stop switch . . . . . page 12 and 13

Checks OK ↓

4.) Starter Solenoid . . . . . page 13 and 14

Checks OK ↓

5.) Starter Pinion . . . . . page 14 and 15

Checks OK ↓

6.) Starter Motor . . . . . page 15 and 16

Checks OK ↓

Contact your Parts and Service Central for assistance.

ENGINE CRANKS BUT WILL NOT START

1.) Check for Out of Gas . . . . . page 16

Checks OK

2.) Fuel Pump . . . . . page 16 and 17

Checks OK

3.) Fuel Solenoid . . . . . page 17

Checks OK

4.) Choke Assembiy . . . . . page 18

Checks OK → Choke Linkage is not Pulsing

5.) 4 Amp Fuse . . . . . page 20

Checks OK

6.) Printed Circuit Board . . . . . page 21 "B"

Checks OK

7.) Choke Components . . . . . page 19 "G"

Checks OK

Contact your Parts and Service Central for assistance.

5.) Hold the manual start switch to the activate position with the left hand while holding the start/stop switch to the start position with the right hand

Unit Does Not Start → Unit Starts

6.) Control Relay . . . . . page 20

Checks OK

7.) Printed Circuit Board . . . . . page 21 "A"

page 5

ENGINE CRANKS BUT WILL NOT START (CONT)

6.) Check for spark with a spark plug tester . . . . . page 22

Spark OK → No Spark

7.) Ignition Module . . . . . page 22

Checks OK ↓

8.) Ignition Stator . . . . . page 23

Checks OK ↓

9.) Ignition Coil . . . . . page 23

Checks OK ↓

10.) Spark Plug Wire . . . . . page 24 and 25

Checks OK ↓

Contact your Parts and Service Central for assistance.

7.) Check the Carburetor Adjustment . . . . . page 24 and 25

Checks OK ↓

8.) Check for loose carburetor gasket, loose or bad cylinder head and/or gasket, or carbon buildup . . . . . page 25 and 26

Checks OK ↓

Contact your Parts and Service Central for assistance.

ENGINE STARTS WITH DIFFICULTY AND/OR RUNS ERRATICALLY

1.) Air Filter . . . . . page 26

Checks OK ↓

2.) Fuel Pump . . . . . page 16 and 17

Checks OK ↓

3.) Choke Assembly . . . . . page 19 "D"
page 19 "E"
page 19 "F"

Checks OK ↓

4.) Carburetor Setting . . . . . page 24 and 25

Checks OK ↓

5.) Governor Adjustment . . . . . page 26 and 27

Checks OK ↓

6.) Spark Plug . . . . . page 22

Checks OK ↓

7.) Ignition Module . . . . . page 22

Checks OK ↓

8.) Ignition Stator . . . . . page 23

Checks OK ↓

9.) Spark Plug Wire . . . . . page 24

Checks OK ↓

10.) Cylinder Head . . . . . page 25 and 26

Checks OK ↓

Contact your Parts and Service Central for assistance.

ENGINE STARTS BUT SHUTS DOWN WHEN THE START/STOP SWITCH IS RELEASED

1.) Oil Level Low . . . . . page 27

Checks OK

2.) Low Oil Switch . . . . . page 27

Checks OK

3.) Printed Circuit Board . . . . . page 21

Checks OK

Contact your Parts and Service Central for assistance.

ENGINE WILL NOT SHUT DOWN WHEN THE START/STOP SWITCH IS SET TO STOP

1.) Manual Start Lever . . . . . page 28

Checks OK ↓

2.) Relay . . . . . page 20 and 21

Checks OK ↓

3.) Printed Circuit Board . . . . . page 21"A"

Checks OK ↓

4.) Start/Stop Switch . . . . . page 12 and 13

Checks OK ↓

Contact your Parts and Service Central for assistance.

ENGINE RUNS NORMALLY BUT NO AC OUTPUT IS AVAILABLE (REACTOR EXCITED UNITS ONLY)

1.) Main Breaker ..... page 28

Checks OK

2.) Cumtomer Wiring ..... page 29

Checks OK

3.) Rectifier ..... page 29

Checks OK

4.) Residual Magnetism page 30

Checks OK

5.) Rotor, Brushes and Slip Rings page 30 and 31

Checks OK

Contact your Parts and Service Central for assistance.

ENGINE RUNS NORMAL BUT NO AC OUTPUT IS AVAILABLE (UNITS WITH V/F REGULATOR ONLY)

1.) Main Breaker page 28

Checks OK

2.) Customer Wiring page 29

Checks OK

3.) Check Stator Power Windings page 32

Checks OK

4.) Check Rotor page 32

Checks OK

5.) Check Stator Excitation Windings page 32

Checks OK

6.) Check Voltage Regulator page 33

Checks OK

7.) Check Field Boost page 33

Checks BAD

8.) Check No. 14 Wire page 33

ENGINE RUNS BUT AC OUTPUT IS LOW

1.) Governor setting . . . . . page 27"E"

Checks OK

2.) Air Filter . . . . . page 26

Checks OK

3.) Carburetor Adjustment . . . . . page 24 and 25

Checks OK

4.) Spark Plug . . . . . page 22

Checks OK

5.) Cylinder Head, Carbon Buildup . . . . . page 25 and 26

Checks OK

Contact your Parts and Service Central for assistance.

30 AMP FUSE

Remove and visually inspect the 30 amp fuse (figure 1). A more thorough check may be made by testing the fuse with a volt-ohmmeter. Set the switches on the meter to "+DC" and to the "RX1" scale. Connect the test leads together and "zero" the meter. After touching the test leads to the fuse ends, the meter needle should swing upscale and read "zero" indicating that the fuse is good.

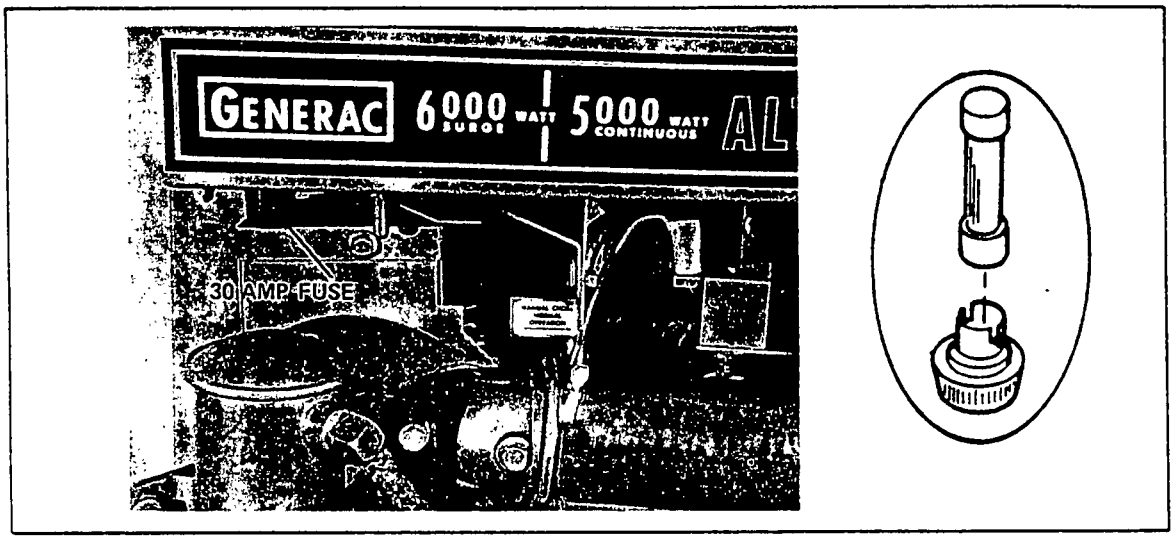


Figure 1

RESULTS: 1.) Fuse tests bad - - - - - - - - - - - - - - - - Install a new AGS 30 amp fuse.

2.) Fuse tests good - - - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure."

BATTERY

Check battery condition, as well as the condition, cleanliness and security of the battery cables and connections (figure 2).

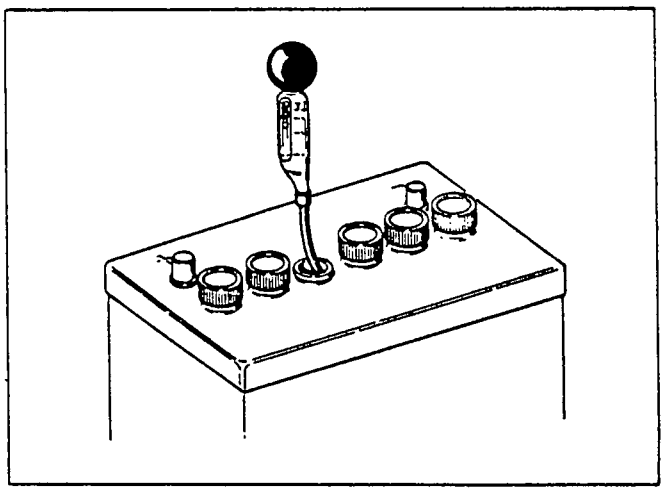


Figure 2

RESULTS: 1.) Battery, cables, and connections test bad - - - - - - - - - - - - - - - - - - - Replace or repair the defective component (Battery, cables or clamps).

2.) Battery, cables, and connections test good - - - - - - - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure."

START/STOP SWITCH

Remove the 30 amp fuse to deactivate the starting circuit as shown in figure 1, page 11. Remove the two screws that retain the front control panel (figure 3).

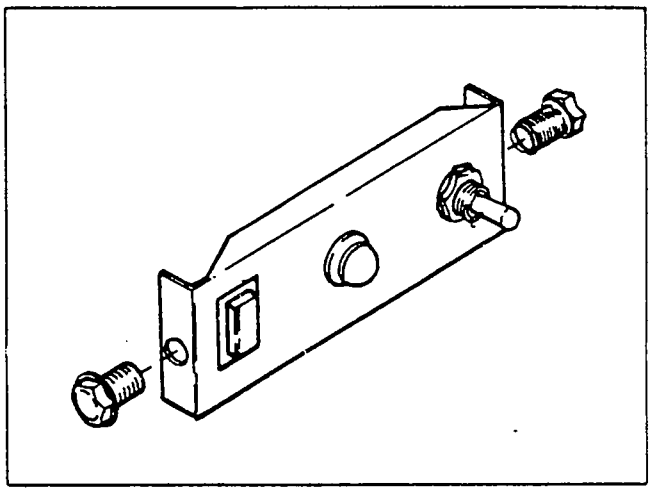


Figure 3

Lay the front control panel down as shown in figure 4. Use needle nose pliers to disconnect the wiring connectors from the switch terminals.

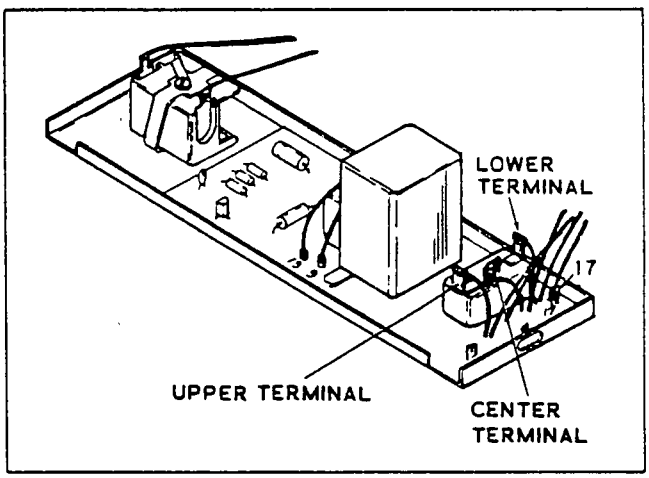


Figure 4

A.) Set the switches of a Simpson model 260 (or equivalent) volt-ohmmeter to "+DC" and to "RX1." Connect the meter test leads together and "zero" the meter.

Connect the meter test leads to the switch terminals as shown in figure 5. The meter needle should not move.

Hold the start/stop switch at the start position. The meter needle should deflect upscale and read "zero."

Hold the start/stop switch at the stop position. The needle should drop back to the far left end of the scale (infinity).

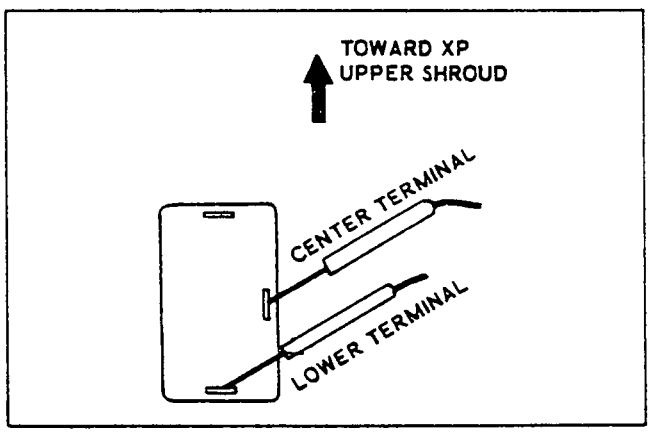


Figure 5

RESULTS: 1.) Switch Tests Bad - - - - - - - - - - - - - Install a new start/stop switch.

2.) Switch Tests Good - - - - - - - - - - - - - Continue checks below (paragraph "B").

START/STOP SWITCH - Continued

B.) Connect the meter test leads to the switch terminals as shown in figure 6.

Hold the start/stop switch at the start position. The meter needle should not move.

Leave the start/stop switch at the neutral position. The meter needle should not move.

Hold the start/stop switch at the stop position. The meter needle should deflect upscale and read "zero."

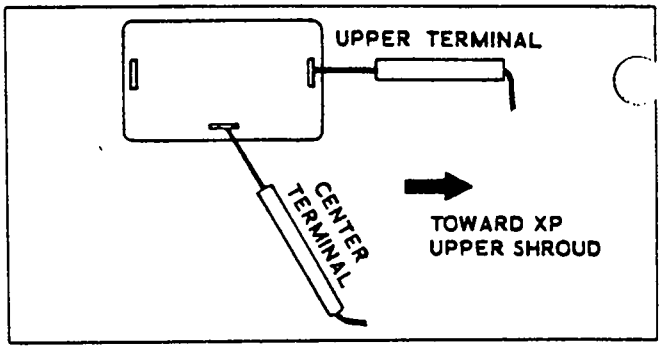


Figure 6

RESULTS: 1.) Switch tests bad - - - - - - - - - - - - - - - Install a new start/stop switch.

2.) Switch tests good - - - - - - - - - - - - - - Reconnect the wires to the start/stop switch.
Replace the front control panel.
Replace the 30 amp fuse.
Continue checks listed under "Recommended Troubleshooting Procedure."

STARTER SOLENOID

A.) Set the start/stop switch to the start position and back to neutral several times. An audible "click" should be heard as the start solenoid actuates.

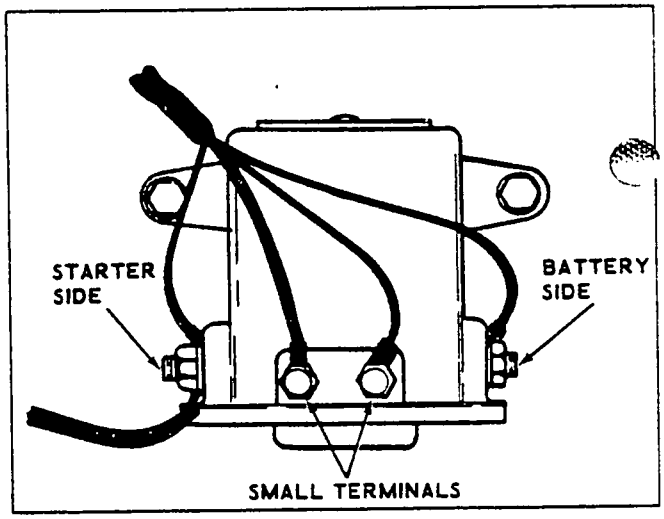


Figure 7

RESULTS: 1.) Solenoid actuates but engine does not crank - - - - - - - - - - - - - - - - - - Continue checks below (paragraph "B").

2.) Solenoid does not actuate - - - - - - - - - - Continue checks (paragraph "D"), page 14.

B.) Set your volt-ohmmeter to the "+DC" scale so that 12 volts can be read. Connect the nagative lead of your volt-ohmmeter to ground. Connect the positive lead to the battery side of the start solenoid. The meter needle should indicate 12 volts DC.

RESULTS: 1.) Meter needle indicates 12 volts DC - - - - Continue checks (paragraph "C"), page 14.

2.) Meter needle does not indicate 12 volts DC - - - - - - - - - - - - - - - - - - Check the wire and connection from the battery to the starter solenoid to make sure the wire is not open or shorted and that the connections are tight. When 12 volts is obtained at the battery side of the starter solenoid continue checks (paragraph "C"), page 14.

STARTER SOLENOID - Continued

C.) Connect the positive lead of your meter to the starter side of the starter solenoid (figure 7) and the negative lead to ground. Hold the start/stop switch at the start position. The meter needle should read 12 volts.

RESULTS: 1.) Meter needle does not read 12 volts - - - - Install a new starter solenoid.

2.) Meter needle reads 12 volts and solenoid tests OK - - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure," page 3.

D.) Set your volt-ohmmeter to "+DC" so that 12 volts can be read. Connect the positive lead of your meter to one of the small terminals on the starter solenoid. Connect the other test lead to ground. 12 volts should be indicated by the meter needle. Leave the negative lead of your meter connected to ground and connect the positive lead to the other small terminal. The meter should indicate a voltage reading of 12 volts DC again.

RESULTS: 1.) Meter needle indicates 12 volts from BOTH small terminals on the starter solenoid to ground - - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure."

2.) Meter needle does not indicate 12 volts from BOTH small terminals on the starter solenoid to ground - - - - - - Recheck the battery, 30 amp fuse and the start/stop switch. When you are sure that these components are OK and 12 volts is still not obtained from BOTH small terminals on the starter solenoid, install a new starter solenoid.

STARTER PINION

A.) Hold the start/stop switch at the start position and listen for the "whirrrring" sound of the starter motor.

RESULTS: 1.) Starter motor is heard running freely (without load) - - - - - - - - - - - - Continue checks below (paragraph "B").

2.) Starter motor is not heard running at all - Continue checks listed under "Recommended Troubleshooting Procedure," page 3.

B.) Gain access to the starter pinion by following the procedure outlined on page 32. Visually inspect the starter pinion for mechanical damage.

RESULTS: 1.) Starter pinion damaged - - - - - - - - - - Install a new starter pinion. (See page 15.)

2.) Starter pinion is not damaged - - - - - - - Continue checks below (paragraph "C").

C.)Hold the start/stop switch at the start position. The starter pinion should move upward on its splines.

RESULTS: 1.) Starter pinion does not move upward on its splines - - - - - - - - - - - Install a new starter pinion. (See page 15.)

2.) Starter pinion does move upward on its splines - - - - - - - - - - - - - - - Check the flywheel for damaged ring gear teeth. Reinstall the flywheel and check for proper alignment between the flywheel ring gear teeth and the starter pinion teeth. It may be necessary to loosen the starter motor bracket and adjust the position of the starter motor bracket to obtain the correct alignment.

- Continue checks listed under "Recommended Troubleshooting Procedure," page 3.

STARTER PINION - Continued

To replace the starter pinion, hold the armature shaft and remove the stop nut, spacer, and anti-drift spring (figure 8). Slip the starter pinion unit off over the spline and armature shaft. Install a new spring, spacer and starter pinion. Install the stop nut and tighten to 90-110 foot pounds. Do not lubricate the splines as dust may collect and cause sticking.

Make sure the #19 woodruff key is installed into the flywheel shaft's key slot (figure 45, page 32). Install the flywheel and retain with the lockwasher and 1" jam nut. Tighten the hex nut to 50-55 foot pounds. Reinstall the top shroud and retain with the ten screws. Install the rope start sheave and air inlet screen. Retain with the three capscrews.

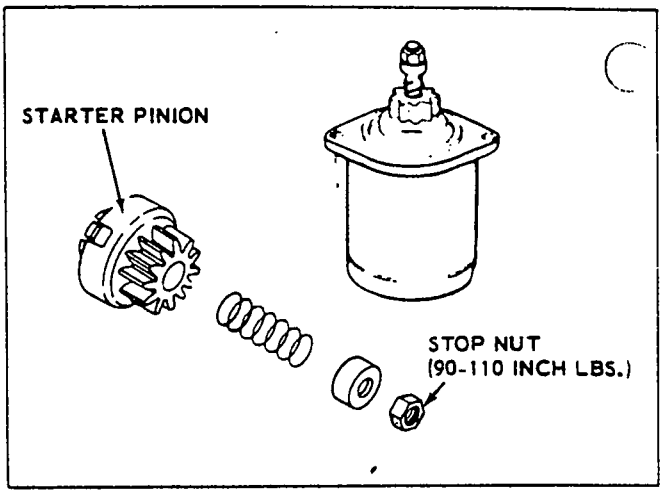


Figure 8

STARTER MOTOR

A.) Set your voltmeter on the "+DC" scale so that you can read 12 volts DC. Connect the positive lead to the left side of the starter solenoid where the starter motor cable is connected. Connect the negative meter lead to a good, paint free ground. Hold the start/stop switch to the start position. The starter motor should run and the meter needle should indicate 12 volts DC.

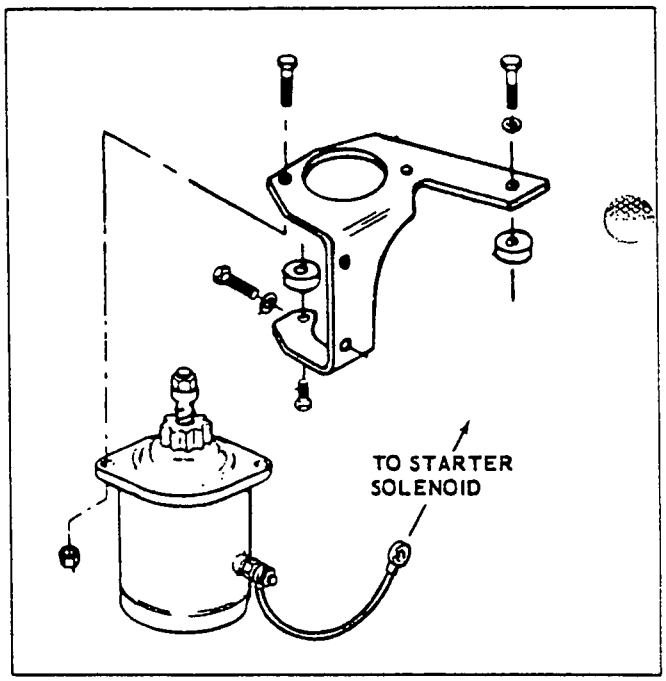


Figure 9

RESULTS:

1.) Meter needle does not read 12 volts - - - - Recheck the 30 amp fuse, battery, start/stop switch, starter solenoid and starter pinion.

2.) Meter needle indicates 12 volts but the starter motor does not run - - - - - - Continue checks below (paragraph "B").

3.) Starter motor runs, but engine does not crank - - - - - - - - - - - - - - - - - - Recheck the battery and the starter pinion.

STARTER MOTOR - Continued

B.) Follow the procedure outlined on page 32 for the removal of the air inlet screen, rope start sheave, top cover and flywheel. Remove all the taptight screws which secure the starter cover assembly (back sheet metal shroud) to the other sheet metal shrouds. Remove the taptight screws located inside the top shroud assembly which secure the starter cover assembly. Remove the starter cover to gain access to the starter motor. Check the connection of the starter cable to the starter motor terminal for tightness. Again hold the start/stop switch to the start position. The starter motor should run.

RESULTS: 1.) Starter motor does not run - - - - - - - - Install a new starter motor.*

2.) Starter motor runs - - - - - - - - - - - - Reinstall the starter cover, woodruff key, flywheel, top cover, rope start sheave and air inlet screen in the reverse order of removal.

*To install a new starter motor, remove the two bolts at the top of the starter motor bracket that retain the starter motor. Remove the single bolt at the bottom of the starter motor bracket attached to the starter motor. Remove the defective starter and install the new one in reverse order of removal.

OUT OF GAS

Check for the proper level of gas in the gas tank. It is possible that gas is available to drive the vehicle engine, but not to drive the XP power plant (figure 10). This is because the tank sensing unit has two fuel pick-up tubes; one for the vehicle engine and one for the XP power plant.

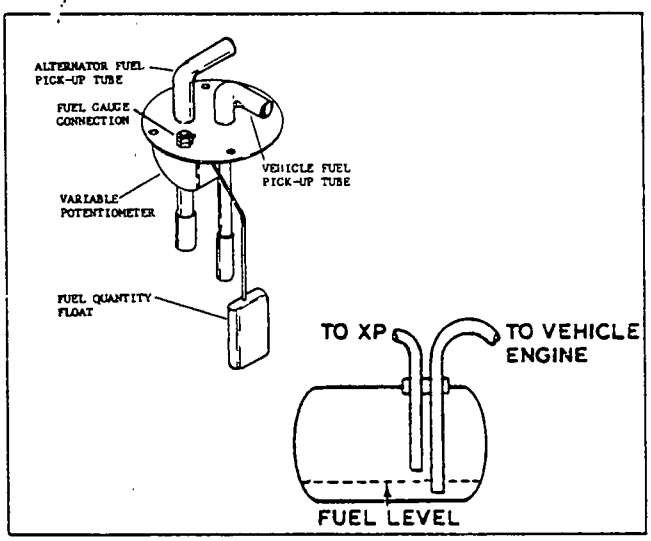


Figure 10

RESULTS: 1.) Gasoline level in tank is low - - - - - - - Fill gas tank.

2.) Gasoline level in tank is not low - - - - - Continue checks listed under "Recommended Troubleshooting Procedure," page 4.

FUEL PUMP

A.) Hold the manual start switch to the "activate" position (figure 11). The fuel pump should click rapidly at first and then taper off to a slow, steady pulse after about one minute.

RESULTS: 1.) Fuel pump operates normally - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure."

2.) Fuel pump is not heard running at all - Continue checks under paragraph "B," below.

3.) Fuel pump is heard clicking but does not slow down to a slow, steady pulse - - - Continue checks under paragraph "C," page 17.

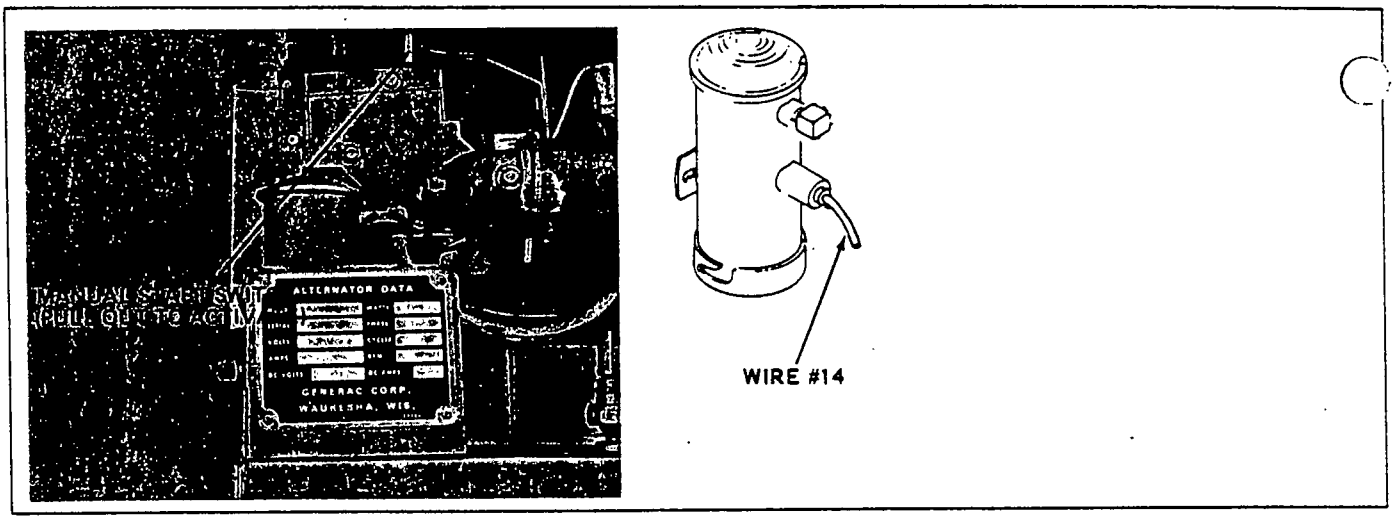


Figure 11

B.) Set the volt-ohmmeter switches to the "50V" and to the "+DC" scale. Connect the black test lead to a good, paint free ground. Connect the red test lead to a pin inserted into wire #14 at the fuel pump (figure 11). Hold the manual start switch to the activate position. The meter needle should swing upscale and indicate 12 volts on the DC scale.

RESULTS: 1.) Meter reads 12 volts and the fuel pump does not run - - - - - - - - - - - - - - Install a new fuel pump.*

2.) Meter does not indicate 12 volts at the fuel pump- - - - - - - - - - - - - - - - - - Check wire #14 for loose connections, shorts or opens.

C.) Check the fuel lines for loose connections and/or vapor lock. The fuel line should not run closer than 6 inches to any exhaust piping.

RESULTS: 1.) Fuel line connections are found loose or line is vapor locked - - - - - - - - Repair as necessary.

2.) Fuel line connections tight and no vapor lock present - - - - - - - - - - - - - - Install a new fuel pump.*

*To replace the fuel pump, cut wire #14 where it attaches to the fuel pump. Disconnect the fuel lines and remove the fuel pump from the fuel pump support. Install a new pump in the reverse order of removal. Use a wire nut to connect wire #14 to the fuel pump and tape the connection securely.

FUEL SOLENOID

Disconnect wire #14 from the fuel solenoid terminal. Hold the manual start switch at its activated position (figure 12). The fuel pump should pump fuel against the closed solenoid and the pulse rate should be relatively slow.

Touch the terminal end of wire #14 against the solenoid terminal while still holding the manual start switch. The solenoid should be felt actuating and the pump pulse rate should increase until the carburetor bowl is full.

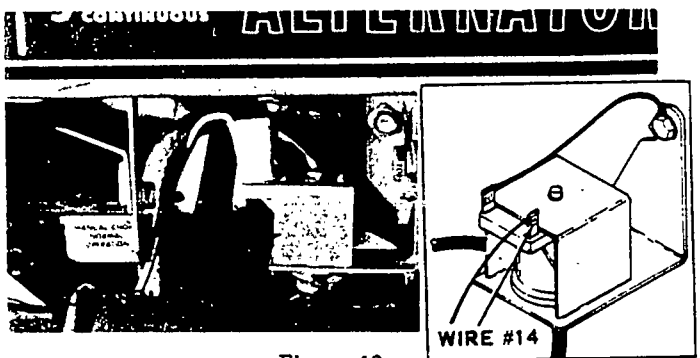


Figure 12

RESULTS: 1.) Solenoid does not actuate - - - - - - - - - - Disconnect the 2 wires from the solenoid terminals and remove the solenoid bracket capscrew, lockwasher and ground wire. Remove the solenoid and install a new one.

2.) Solenoid actuates - - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure," page 4.

CHOKE ASSEMBLY

A.) Hold the start/stop switch to the start position. While cranking, visually check the choke linkage for choke action. The choke lever should move about 3/8" every 2 to 5 seconds (figure 13).

Figure 13

RESULTS: 1.) Choke lever moves about 3/8" every 2 to 5 seconds and checks OK - - - - - - - - Continue checks (paragraph "D"), page 19.

2.) Choke lever does not move at all - - - - - Check for freedom of movement in the choke linkage (paragraph "B"), below.

3.) Choke lever goes to its fully closed position and stays there - - - - - - - - - - Replace choke components (paragraph "H"), page 20.

Inspect the choke lever for binding caused by improper ke support alignment or dirt. Push the choke lever back and forth with your finger making sure that there is no mechanical binding or sticking present.

RESULTS: 1). Mechanical binding or sticking is present - - - - - - - - - - - - - - - - - - Adjust the choke linkage and mounting to prevent mechanical binding and lubricate linkage to prevent sticking.

2.) Choke lever moves freely with no binding or sticking - - - - - - - - - - - - - - Continue checks below (paragraph "C").

C.) The solenoid coil may be out too far rendering itself too weak to pull in the choke lever. By loosening the screws, as shown in figure 14, the choke solenoid can be moved in closer, making it more effective.

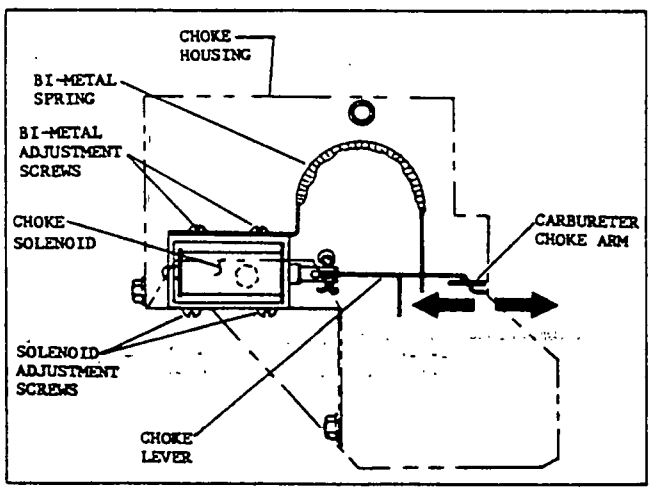


Figure 14

ULTS: 1.) Choke solenoid pulls in correctly - - - - - Continue checks (paragraph "D"), page 19.

2.) Choke solenoid does not pull in correctly - - - - - - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure."

D.) Make sure that the bi-metal assembly is cold. Then check for 1/8" to 5/32" clearance between the choke lever and its stop (figure 15).

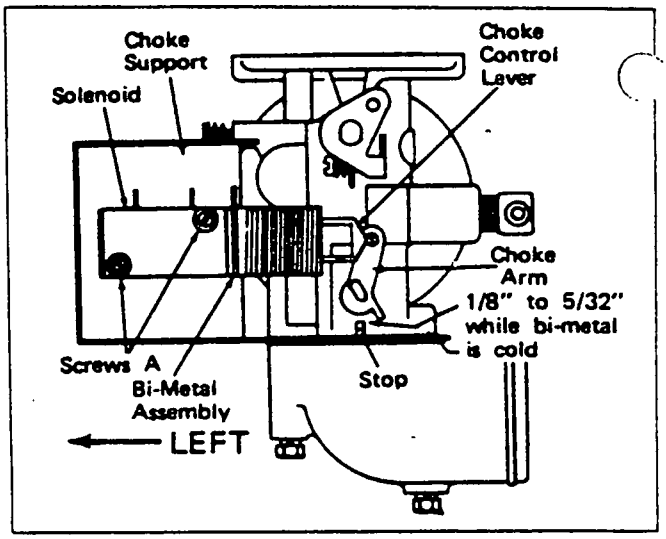


Figure 15

RESULTS: 1.) Desired clearance is present - - - - - - - - Continue checks (paragraph "E").

2.) Desired clearance is not present - - - - - Loosen screws "A" and reposition the bi-metal to obtain this clearance. Retighten screw "A." Continue checks below (paragraph "E").

E.) It's possible that the choke lever is not pulling in all the way to give the unit full choke. Check for excessive distance between the choke solenoid and the choke lever. To adjust distance, loosen the solenoid to choke support screws (figure 14). Then push the choke lever to the left (choke fully closed) and slide the solenoid to the right until no play exists between the solenoid and the choke lever. Retighten the screws.

RESULTS: 1.) Adjustment correct - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure."

2.) Adjustment not OK - - - - - - - - - - - - - - Adjust the solenoid as outlined in paragraph "E," above.

F.) Allow the engine to warm up. (Approximately 10 minutes running time.) With the engine warmed up, there should be no choking on the carburetor. Check the bi-metal spring and the choke lever to see that the choke is all the way off. Using needle nose pliers, bend the tip of the bi-metal to attain this position.

G.) While cranking the engine, short the case of transistor TR-2 (figure 17) to the case with a screwdriver. If the choke solenoid operates, replace transistor TR-2 (part #352201). Use normal precautions to protect the new transistor during installation and make sure the mica-washer is installed.

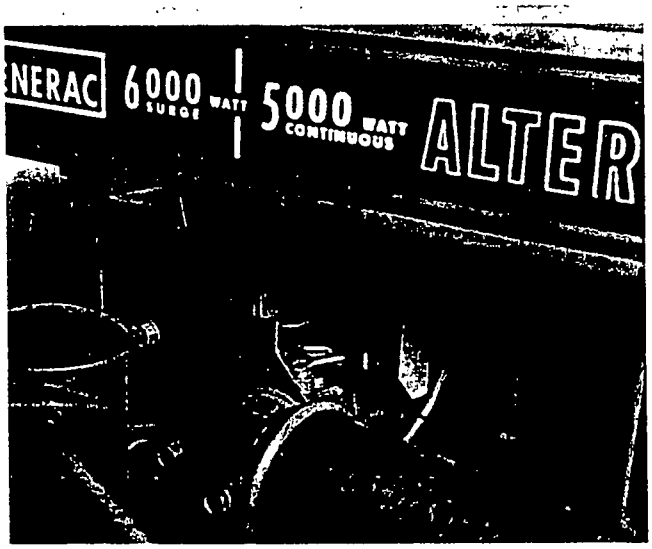


Figure 16

CHOKE ASSEMBLY - Continued

If the choke solenoid does not operate and arcing occurs with the transistor grounded, replace both transistor TR-2 (part #35220) and diode D-6 (part #26064). (See figure 17.) If no arcing is observed and the choke solenoid is inoperative during the test, replace the choke solenoid (part #36452) and diode D-6 (part #36064).

H.) Remove the choke assembly from the carburetor. Remove the choke cover. Melt the solder that holds wire #19 to the transistor pin and pull the wire free of the pin (figure 17). Remove the other wire. Remove the transistor with its mica washer. Remove diode D-7 from its terminal connector. Install a new transistor TR-2 and mica washer. Install a new diode D-7. Use a "heat sink" when soldering wires to both the transistor and the diode to prevent damaging the new components.

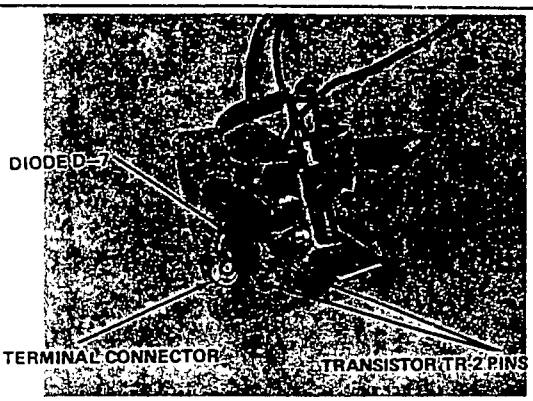


Figure 17

4 AMP FUSE

Remove the front control panel and visually inspect the 4 amp fuse (figure 18). A more thorough check may be made by testing the fuse with a volt-ohmmeter. Set the switches on the meter to "+DC" and to the "RX1" scale. Connect the test leads together and "zero" the meter. After touching the test leads to the fuse ends, the meter needle should swing upscale and read "zero".

Figure 18

RESULTS: 1.) Fuse Tests Bad - - - - - - - - - - - - - - - Install a new 4 amp fuse.

2.) Fuse Tests Good - - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure," page 4.

CONTROL RELAY

A.) Remove the two screws that retain the front control panel and lay the panel down to expose the control relay. Check the control relay to see that it is pressed firmly into its receptacle and try starting the power plant. If this does not correct the problem, install a new control relay and try starting and stopping the XP again. The power plant should start and stop correctly.

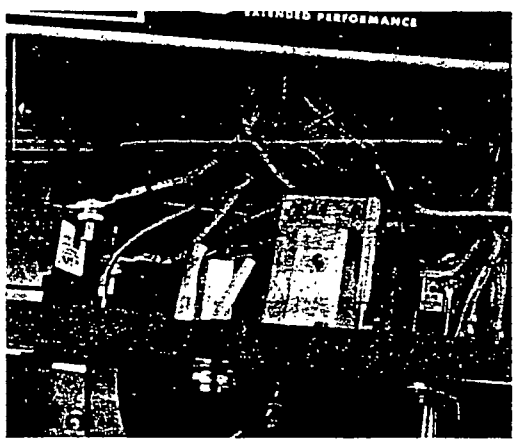


Figure 19

CONTROL RELAY - Continued

RESULTS: 1.) The XP starts and stops correctly - - - - Problem corrected.

2.) The XP does not start and stop correctly - - - - - - - - - - - - - - - - - - Replace the original relay. Continue checks listed under "Recommended Troubleshooting Procedure."

PRINTED CIRCUIT BOARD

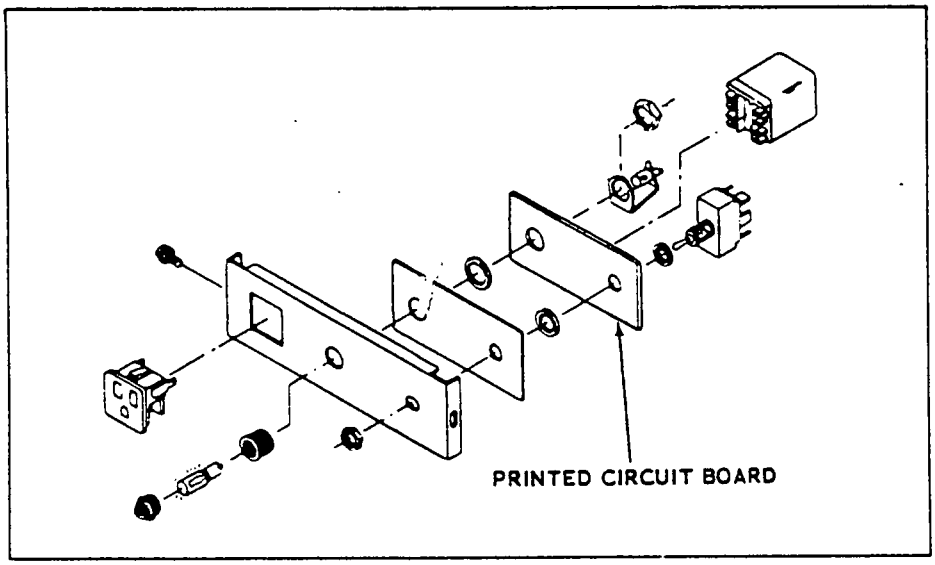


Figure 20

A.) Disconnect the wires from the printed circuit board terminals. Connect the wires to a new printed circuit board. Remove the relay from the old printed circuit board and install into the new printed circuit board. Try starting and stopping the XP. The XP should start and stop correctly.

RESULTS: 1.) XP starts and stops correctly - - - - - - Problem solved. Leave the new P.C.B. connected to the wiring. Remove the defective board from the front control panel by removing the start/stop switch and the low oil light. Install the new board to the front control panel.

2.) XP does not start and stop correctly - - - Reconnect the wiring to the existing printed circuit board and continue checks listed under "Recommended Troubleshooting Procedure."

B.) Disconnect wire #19 from its terminal on the printed circuit board. With your volt-ohmmeter set to the 10 - 15 volt scale, attach the meter's positive lead to the #19 terminal on the printed circuit board and the meter's negative lead to ground. While cranking the engine, the meter should indicate a pulsing voltage of from 7 to 12 volts DC at 2 to 5 second intervals.

To install a new printed circuit board, remove the start/stop switch and the low oil light. Disconnect all wiring and reconnect it to the new printed circuit board. Remove the control relay from the defective board and reinstall into the new printed circuit board. Install the new printed circuit board to the front control panel.

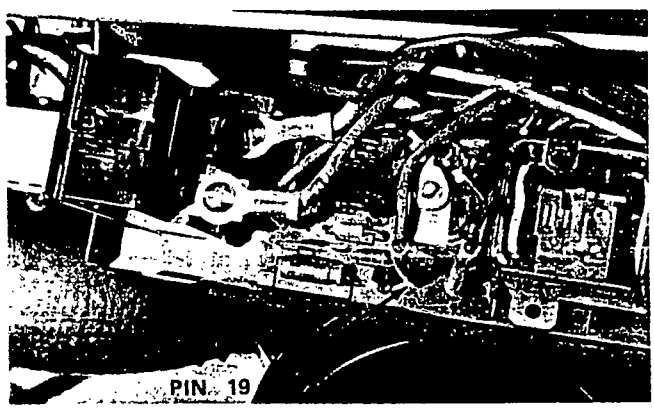


Figure 21

RESULTS: 1.) Pulsing voltage is indicated - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure."

2.) Pulsing voltage is not indicated - - - - - - Install a new printed circuit board. (See above.)

SPARK PLUG

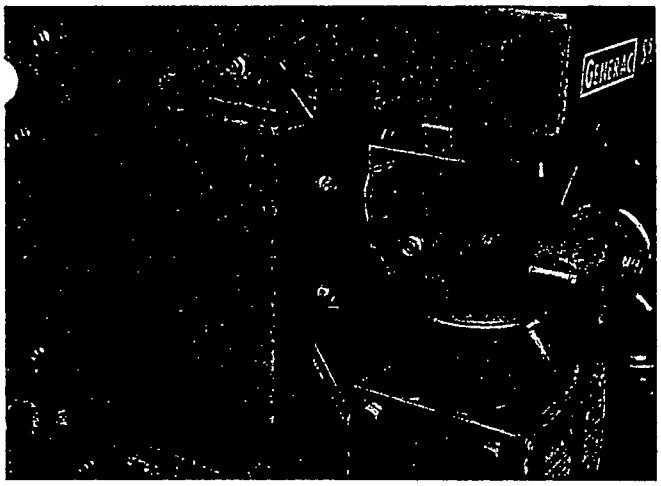


Figure 22

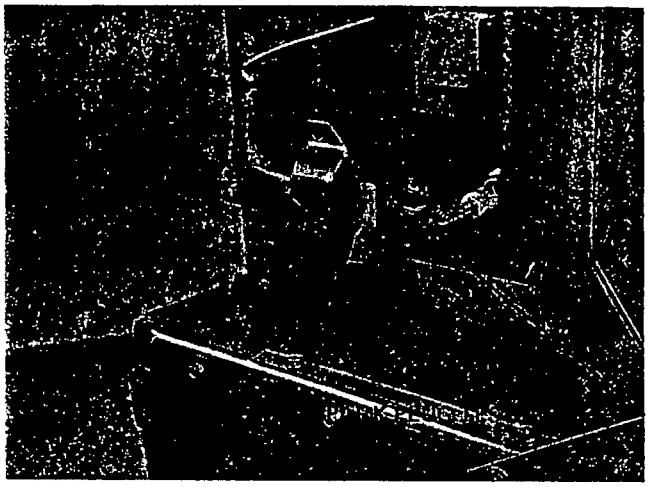


Figure 23

A.) Remove the two screws that retain the spark plug cover and remove the cover (figure 22). Remove the spark plug lead and attach it to the spark plug tester (part #41503). Attach the spark plug tester to a good, paint free ground. Slide the manual choke lever all the way to the left and hold the start/stop switch to the start position. A sharp, snappy spark should be observed.

RESULTS: 1.) A sharp, snappy spark is not observed - Continue checks listed under "Recommended Troubleshooting Procedure."

2.) A sharp, snappy spark is observed - - - - Continue checks (paragraph "B").

B.) Remove the XP spark plug and attach the spark plug wire to the plug. Ground the spark plug to the head of the engine. With the manual choke lever all the way to the left, hold the start/stop switch to the start position and observe the spark plug. A sharp, snappy spark should occur across the spark plug.

RESULTS: 1.) A sharp, snappy spark is not observed - Install a new spark plug.

2.) A sharp, snappy spark is observed - - - - Continue checks listed under "Recommended Troubleshooting Procedure."

IGNITION MODULE

A.) Remove the two screws that retain the spark plug cover and remove the spark plug cover. Remove the ignition module from its receptacle. Inspect the connections in the back of the module and the module receptacle. Make sure that they are not bent or pushed in. Install a "shop" ignition module and check for normal spark.

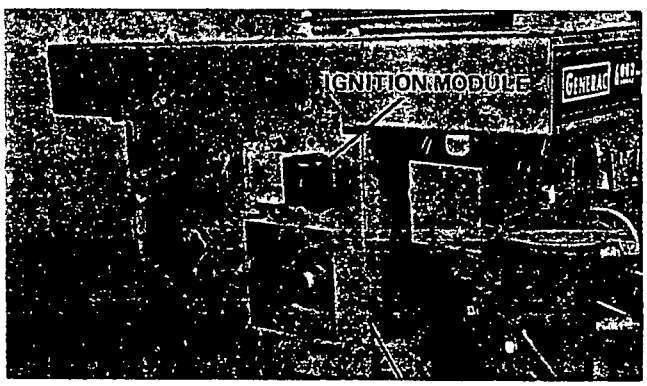


Figure 24

RESULTS: 1.) Normal "hot" sparking occurs - - - - - - - Install a new ignition module. Continue Troubleshooting.

2.) Normal "hot" sparking does not occur - Continue checks listed under "Recommended Troubleshooting Procedure."

IGNITION STATOR

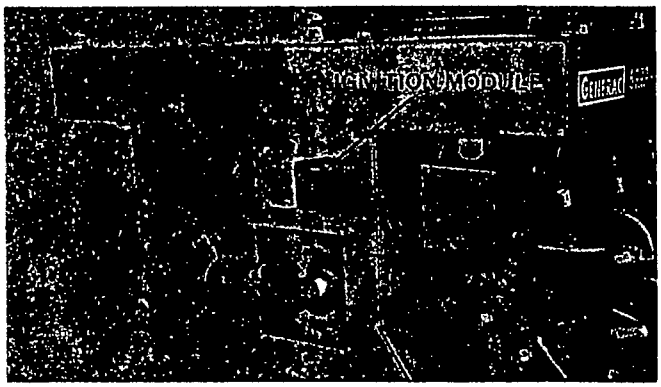


Figure 25

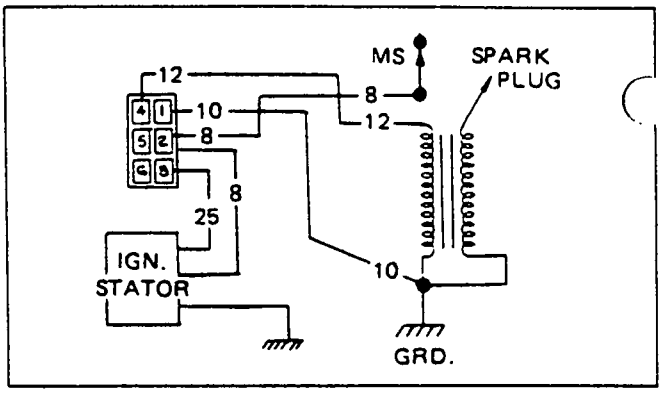


Figure 26

A.) Set the switches of your volt-ohmmeter to "Rx100." Remove the ignition module from its receptacle. Insert the test probes of the meter into the female pins "1" and "2" of the ignition module receptacle. Hold the manual start switch at the "activate" position. The meter should read approximately 750 ohms.

RESULTS: 1.) Tests Bad - - - - - - - - - - - - - - - - - - Install a new ignition stator.*

2.) Tests OK - Continue checks on this page.

B.) Reset the meter to "Rx1." Remove the test probe from female pin #2 and insert it into female pin #3. The meter should read approximately .5 ohms.

RESULTS: 1.) Tests Bad - - - - - - - - - - - - - - - - - - Install a new ignition stator.*

2.) Tests OK - Continue checks listed under "Recommended Troubleshooting Procedure."

*To gain access to the ignition stator refer to page 32.

IGNITION COIL

See figures 25 and 26 above.

A.) Set your volt-ohmmeter on the "Rx1" scale. Test the ignition coil for continuity on the primary side by placing the test probes of your volt-ohmmeter across frame ground and point 4 in the ignition module support socket. You should get a "zero" reading indicating that the primary winding is not open.

B.) Reset your volt-ohmmeter to the "Rx100" scale. Test the continuity on the secondary circuit by placing your test probe from frame ground to the spark plug wire at the spark plug. The reading you get will be determined by the type of ignition coil installed in the unit.

1.) Large, internally mounted coil: Approximately 4000 ohms.

2.) Small, externally mounted coil: Approximately 2700 ohms.

RESULTS: 1.) Tests indicate coil is defective - - - - - - Install a new ignition coil.*

2.) Tests indicate coil is OK - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure."

*To gain access to the ignition coil refer to page 32.

SPARK PLUG WIRE

A.) Refer to page 32 for removal of the top shroud to gain access to the spark plug wire where it connects to the ignition coil. Remove the spark plug wire from the ignition coil. Connect the red lead of a hi-pot tester to the coil end of the spark plug wire and the black test lead to a good pain-free ground. Turn the tester switch off. Plug the tester into a 115 volt wall socket and turn the voltage switch to 500 volts. Turn the tester switch on and make sure the tester pilot light is on. Turn the voltage switch to 2500 volts and watch the breakdown light.

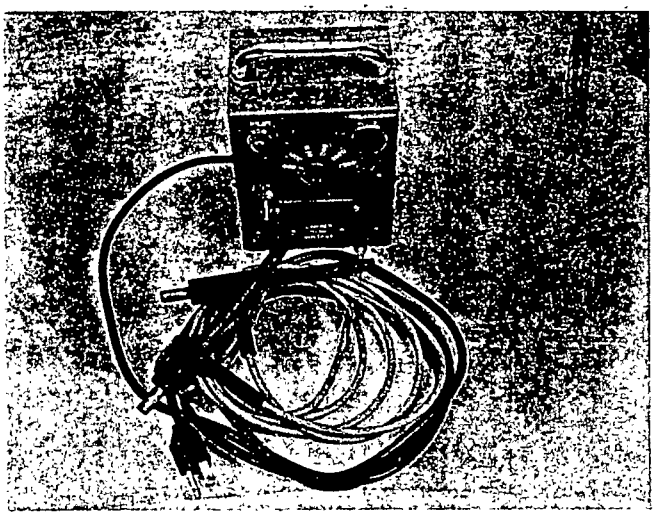


Figure 27

RESULTS: 1.) Hi-pot tester indicates spark plug wire breakdown - - - - - - - - - - - - - - - Install a new spark plug wire (page 32).

2.) Hi-pot tester does not indicate spark plug wire breakdown - - - - - - - - - - - - - Continue checks (paragraph "B").

B.) Check all ignition wiring for loose connections, frayed wires and shorts or opens.

Check for a pinched or frayed #9 wire between the manual start switch and the printed circuit board.

Check for a frayed or pinched spark plug wire.

Continue checks listed under "Recommended Troubleshooting Procedure."

CARBURETOR ADJUSTMENTS

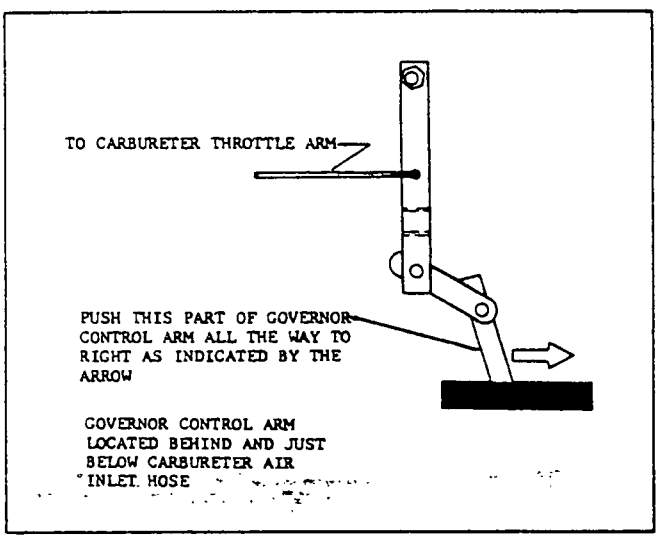


Figure 28

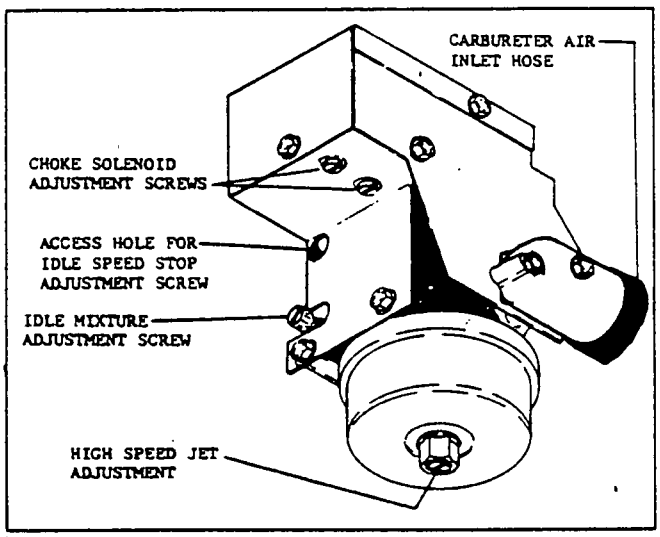


Figure 29

1.) Start the unit, letting it warm up.

2.) As shown in figures 28 and 30, hold the governor control arm all the way to the right, bringing the engine speed to idle.

3.) Turn the idle speed adjust screw in or out until 60 volts are read on the load bank voltmeter. (The voltmeter acts as a tachometer.)

4.) Turn the idle mixture adjust screw until the highest voltage is attained.

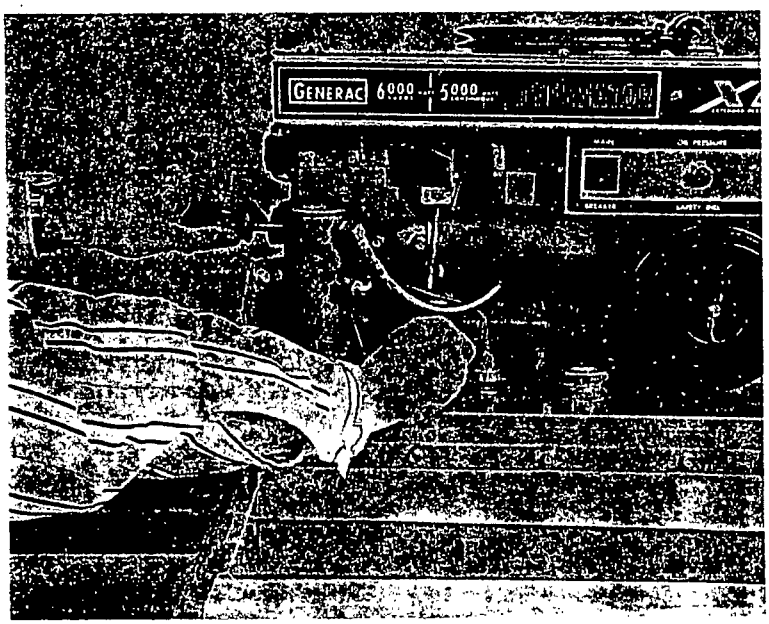


Figure 30

5.) Readjust the idle speed adjustment back to 60 volts if this idle voltage has changed.

6.) Apply approximately two-thirds load to the alternator.

7.) Turn the high speed jet adjustment in or out until the highest voltage is attained. (Generac carburetor adjustment tool #39977 may be used.

8.) Turn the high speed jet out (richer by 1/8 turn).

CYLINDER HEAD - CARBON BUILD UP

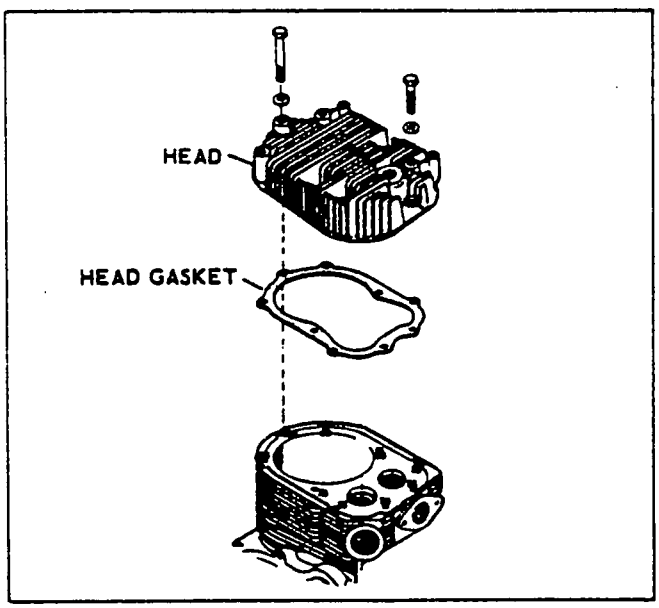


Figure 31

Figure 32

CYLINDER HEAD - CARBON BUILD UP - Continued

A.) If the cylinder head gasket is leaking, a "hissing" sound may be heard during operation of the XP. Check the cylinder head bolts for tightness.

RESULTS: 1.) A "hissing" sound is heard during and/or inspection reveals evidence of leakage - - - - - - - - - - - - - - - - - - Install a new cylinder head gasket and/or cylinder head (whichever is defective).*

2.) No "hissing" sound or evidence of leakage is present - - - - - - - - - - - - - Contact your Parts and Service Central for assistance.

B.) A lack of full output power from the power plant may be caused by excessive carbon buildup on the cylinder head of the engine. To check this, remove the nine head bolts and remove the cylinder head. Check the cylinder head visually for any evidence of carbon buildup. Thoroughly clean away all carbon from the cylinder head and from the combustion chamber and valves using a putty knife. If any portion of the head is burned away replace the cylinder head and gasket.

*To install the cylinder head, install the cylinder head gasket and cylinder head and retain with the short and long head bolts according to the height of the bosses on the cylinder head. Tighten the head bolts in three stages. First torque all the bolts to 10 foot pounds; then to 14 foot pounds; and finally to 18 foot pounds. Install a new spark plug and tighten to 38-40 foot pounds.

AIR FILTER

A.) Remove the air filter cover and inspect the air filter element for dirt or oil. Install a new air filter element, if necessary.

DO NOT OIL THE FILTER ELEMENT!

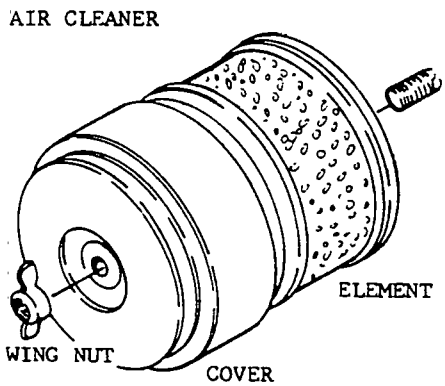


Figure 33

GOVERNOR ADJUSTMENT

A.) With the XP NOT running, remove the governor cover plate located directly behind the low oil switch (figure 34).

B.) Loosen the nut and screw on the throttle arm assembly with a screwdriver and a 3/8" nut driver.

C.) Reach in with your left hand and hold the carburetor throttle lever to the full, wide open position while tightening both the screw and the nut on the throttle arm assembly.

D.) The governor spring should be in the center top hole of the throttle arm assembly. Start the XP and alternately apply and remove load from the unit. If the XP "hunts" or "surges," the governor is too sensitive and the governor spring should be moved one hole to the right. If the XP does not respond quickly enough to changes in the load, the governor is not sensitive enough and the governor spring must be moved one hole to the left.

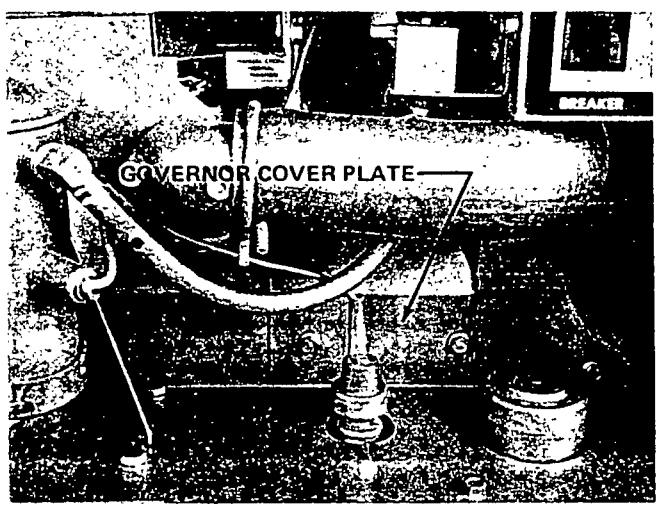


Figure 34

E.) TO ADJUST ALTERNATOR OUTPUT TO 62 cycles, locate the governor adjuster screw at the top of the governor control arm directly underneath the front of the top shrouding (figure 35). Loosen the locknut and turn the screw in or out until your cyclemeter indicates a no-load voltage of 62 cycles per second. Tighten the locknut to hold the screw in place.

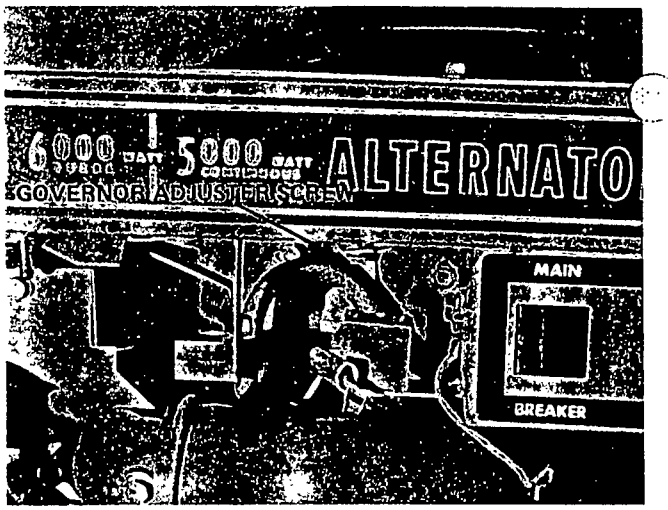


Figure 35

OIL LEVEL LOW

A.) Check the oil level and add oil to the proper level if necessary. Hold the start/stop switch to the start position and try starting the power plant.

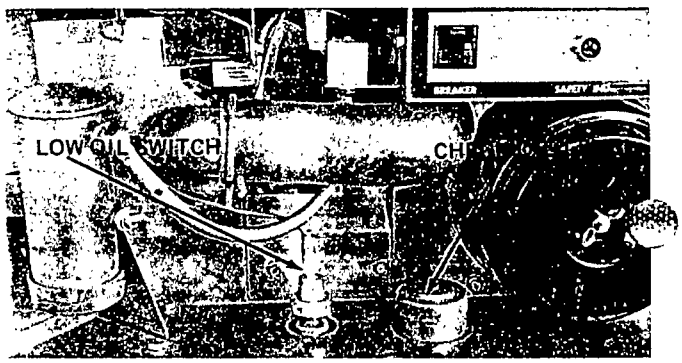


Figure 36

RESULTS:
1.) Engine starts and continues running - Problem solved.

2.) Engine starts, but continues to shut down when the start/stop switch is released - - - - - - - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure," page 7.

LOW OIL SWITCH

See figure 36 above.

A.) Check the oil level and add oil to the proper level, if necessary. Disconnect the wire from the low oil switch (figure 36). Position the wire so that the terminal connector is not making contact with any sheet metal. Hold the start/stop switch to the start position and try starting the XP.

RESULTS:
1.) Engine starts and runs normally - - - - - Install a new low oil switch.* If the XP continues to shut down when the start/stop switch is released, it may be necessary to install a 3 to 7 PSI switch (part #35534A). If the installation of this low oil switch does not solve the problem, continue checks listed under "Recommended Troubleshooting Procedure," page 7.

2.) Engine continues to shut down when the start/stop switch is released - - - - - Continue checks listed under "Recommended Troubleshooting Procedure," page 7.

*To replace the low oil switch, turn the switch counterclockwise, unscrewing it from the sump. Install the new low oil switch turning it clockwise to a good, snug fit. DO NOT OVER TIGHTEN THE LOW OIL SWITCH AS THIS MAY CRACK THE SWITCH MOUNT MAKING REPLACEMENT OF THE OIL SUMP NECESSARY. Reconnect the wire to its terminal and slide the sleeving over the connection.

MANUAL START LEVER

A.) Check the position of the manual start lever. It should be all the way to the right and not in contact with the manual start switch.

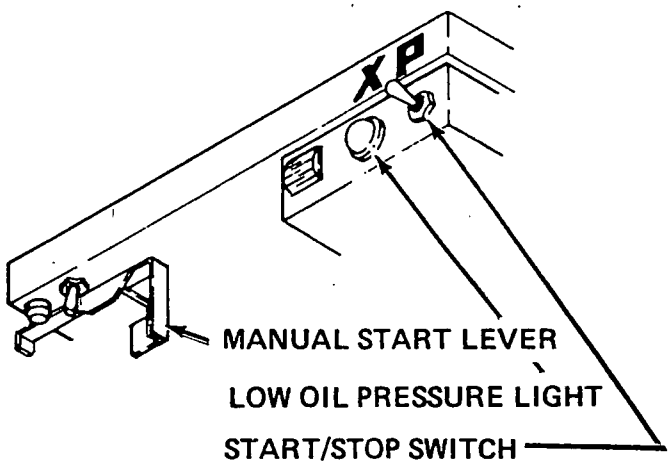


Figure 37

RESULTS:

1.) Manual start lever is pushed to the left and in contact with the manual start switch - - - - - - - - - - - - - - - - - Push the manual start lever all the way to the right. Try starting and stopping the power plant with the start/stop switch.

2.) Manual start lever is not pushed to the left and is not in contact with the manual start switch - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure," page 8.

MAIN BREAKER

A.) On later model XP units, check that the main circuit breaker has not opened. Earlier models will have a fuse or circuit breaker in the power plant compartment.

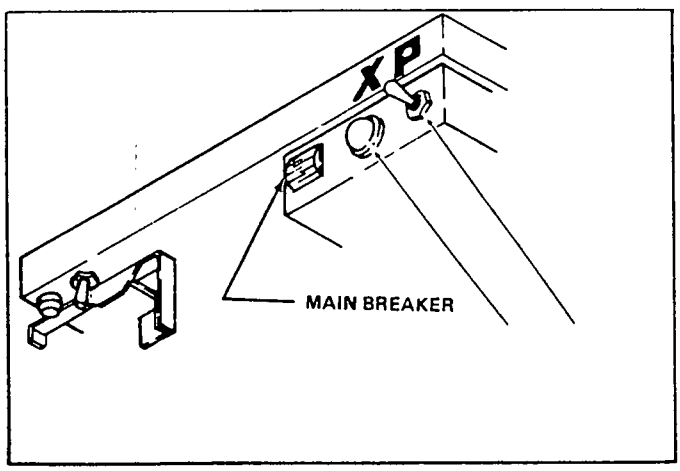


Figure 38

RESULTS:

1.) Main breaker open - - - - - - - - - - - - - - Reset the circuit breaker. Check the XP for AC output.

2.) Main breaker is not open - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure," page 9.

CUSTOMER WIRING (REACTOR EXCITED UNITS ONLY)

Disconnect the customer wiring at the XP connection panel. Set your voltmeter to the "AC" scale so that you can read 120 volts. Connect your voltmeter to the XP output wires using the same connections that was used for the customer's load. Start the XP and check the voltmeter for 120 volt AC output.

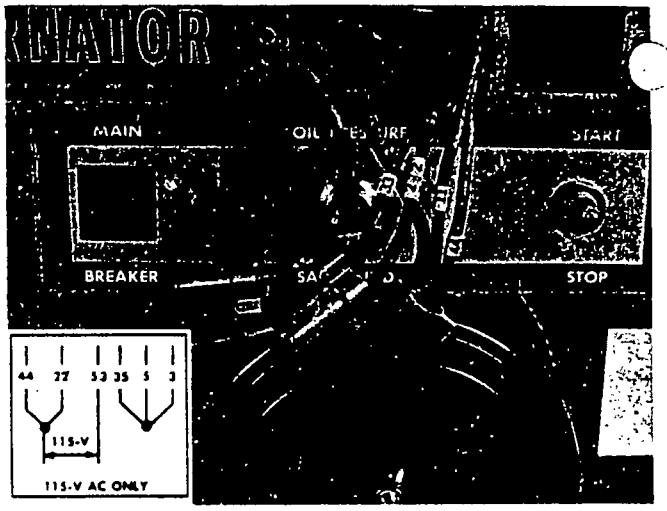


Figure 39

RESULTS: 1.) Normal 120 volt AC output is obtained - - - - - - - - - - - - - - - - - - - Problem lies in the customer's motor home wiring. Check the customer's load wiring, air conditioner, etc. for shorts or opens. (Non-warranty repairs.)

2.) Normal 120 volt AC output is not obtained - - - - - - - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure," page 9.

RECTIFIER (REACTOR EXCITED UNITS ONLY)

A.) Remove the rectifier by pulling it out of its receptacle and install a "shop" rectifier. Depending on the particular model, the rectifier can be found either on the front of the unit next to the reactor, on the left side panel directly behind the spark plug cover or under the left side of the top shroud as shown in figure 40. Start the XP and check for AC voltage. If you do not have a "shop" rectifier or wish to verify the condition of one you suspect is defective, use the following procedure: Set your ohmmeter on a low resistance scale (Rx1) and check for continuity between pins 1 and 4. You should get a reading in only one (1) direction. Touching the test leads to pins 3 and 6, you should NOT get a reading in EITHER direction.

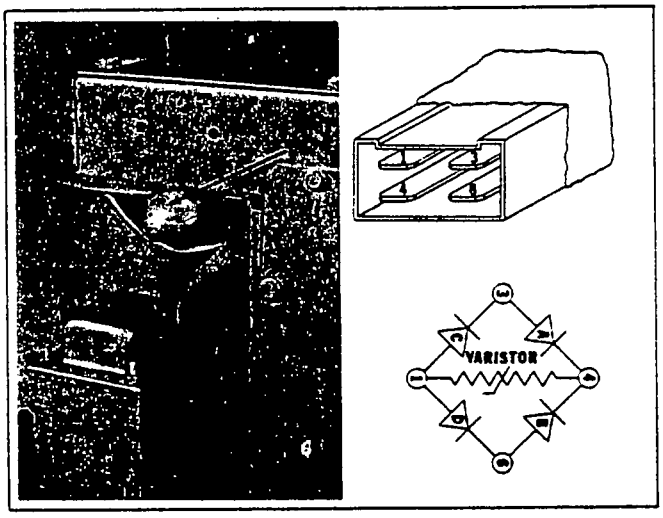


Figure 40

RESULTS: 1.) Rectifier tests bad - - - - - - - - - - - - - Install a new rectifier.

2.) Rectifier tests good - - - - - - - - - - - - - Continue checks listed under "Recommended Troubleshooting Procedure," page 9.

RESIDUAL MAGNETISM

(REACTOR EXCITED UNITS ONLY)

Remove the rectifier from the rectifier receptacle. Disconnect the customer wiring at the XP connection panel. Connect the voltmeter leads to the XP output wires using the same connections as was used for the customer load. Start the power plant. The meter should read at least 2 - 5 volts AC output.

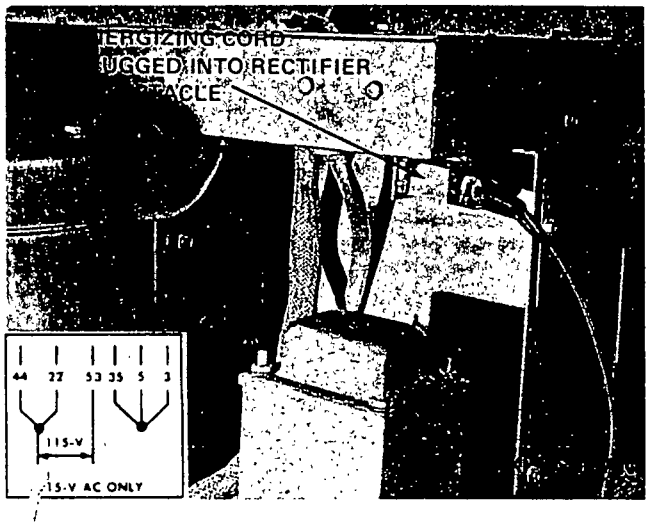


Figure 41

RESULTS: 1.) Meter reads at least 2-5 volts AC output - Check other components listed under "Engine Runs Normally But No AC Output Is Available," page 9.

2.) Meter does not read at least 2-5 volts AC output- - - - - - - - - - - - - - - - Continue checks on this page.

To restore the residual magnetism, remove the rectifier and install the energizing cord (part #26679) as shown in figure 41. Start the XP. Plug the energizing cord into a 115 volt wall outlet momentarily (2 to 3 seconds) and then unplug the cord. Shut the XP down and install the rectifier. Start the XP again and check with a voltmeter for proper AC output. AC output should be at least 115 volts AC.

ALTERNATE METHOD - Remove the rectifier assembly. Start the XP. While the unit is running, momentarily (2 to 5 seconds) connect the positive terminal of a 12 volt battery to the red wire connected to the brushes and the negative terminal to the grey wire on the brushes. Shut the XP down and install the rectifier. Start the XP again and check for proper AC output. The AC output should be at least 115 volts.

RESULTS: 1.) AC output is at least 115 volts- - - - - - - Problem solved.

2.) AC output is not at least 115 volts- - - - - Check other components listed under "Engine Runs Normally But No AC Output Is Available," page 9.

ROTOR, BRUSHES AND SLIP RINGS

(SEE PAGE 32 FOR UNITS WITH V/F REGULATOR)

A.) ROTOR OPEN - Connect the test plug (part #27069) into the rectifier receptacle. Set your volt-ohmmeter to the "Rx10" scale and zero the meter. While the unit is not running, connect the ohmmeter test leads to wires #1 and 4. The meter needle should indicate a resistance of 30-70 ohms.

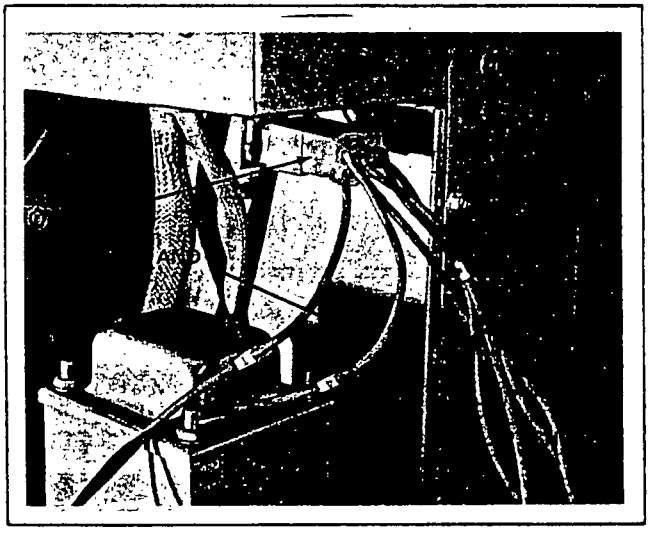


Figure 42

ROTOR, BRUSHES AND SLIP RINGS - Continued

RESULTS: 1.) Meter needle reads 30-70 ohms - - - - - - - Continue checks (paragraph "B").

2.) Meter needle indicates more than 70 ohms resistance - - - - - - - - - - - - - Continue checks (paragraph "C").

B.) BRUSHES AND SLIP RINGS - Proceed exactly as in paragraph "A," but make your resistance checks with the XP running. The meter needle should indicate a STEADY resistance of 30-70 ohms.

RESULTS: 1.) Meter needle reads a steady resistance of 30-70 ohms - - - - - - - - - - Continue checks (paragraph "E").

2.) Meter needle fluctuates - - - - - - - - - - - Continue checks (paragraph "C").

3.) Meter needle indicates more than 70 ohms resistance - - - - - - - - - - - - - Continue checks (paragraph "C").
(14.5 ohms for units with V/F regulator)

C.) Check for proper contact and alignment between the brushes and the slip rings. Inspect the slip rings and clean if necessary. To clean the slip rings, use a fine piece of sandpaper (DO NOT USE EMERY PAPER) and lightly sand until the slip rings are bright and shiny. If the brushes are cracked, chipped, or shorter than 5/16", replace them. Connect your test leads to wires #1 and 4 and again check for 30-70 ohms resistance.(11.5 - 14.5 units with V/F regulator).

RESULTS: 1.) Correct resistance reading obtained - - - - - - - - - - - - - - - - - - - Remove the test plug and install the rectifier. Start the XP and check for 120 AC output. If 120 volt AC output is not obtained, recheck for residual magnetism (page 30). If residual magnetism checks OK, continue checks in paragraph E.

2.) Correct resistance reading is not obtained - - - - - - - - - - - - - - - - - - - Continue checks (paragraph "D").

D.) Check for 30-70 ohms resistance by connecting the leads of your meter directly across the slip rings on the rotor.
(Check for 11.5 - 14.5 ohms on units with V/F regulator)

RESULTS: 1.) Meter needle indicates 30-70 ohms resistance - - - - - - - - - - - - - - - - - Check the wiring and connections between the brushes and the rectifier receptacle for shorts or opens. Check all connections for tightness. Check the pins in the rectifier receptacle to make sure they are not bent or pushed out. If wiring and connections are OK, continue checks in paragraph "E."

2.) Meter needle does not indicate 30-70 ohms resistance - - - - - - - - - - Install a new rotor.
(11.5 - 14.5 units with V/F regulator)

E.) ROTOR SHORTED - Use a hi-pot tester (part #40502) to test the rotor for breakdown under load. Connect the hi-pot test leads to each slip ring and ground. Set the voltage switch on the hi-pot to 1250 volts. If a breakdown is indicated, install a new rotor.

CAUTION: DO NOT CONNECT THE HI-POT LEADS ACROSS THE SLIP RINGS.

STATOR POWER WINDINGS (UNITS WITH V/F REGULATOR ONLY)

A.) Disconnect customer wiring from alternator AC output wires No. 11, 22, 33, and 44. Set ohmmeter to Rx1 scale and zero the meter. Check for approximately 0.3 (+10%)ohmsresistance across wires 11 and 22, and then across wires 33 and 44.

B.) Set ohmmeter to Rx10,000 scale and zero the meter. Check from wire No. 11 to GROUND and then from wire No. 33 to GROUND for a shorted condition.

RESULTS: (1) Stator windings check BAD----- Remove unit from compartment. Check for open or shorted wires No. 11, 22, 33 or 44. Remove stator, check with Insulation Breakdown Tester (Hi-Pot Tester).

(2) Stator windings check GOOD----- Continue checks under "Recommended Troubleshooting Procedure", Page 9.

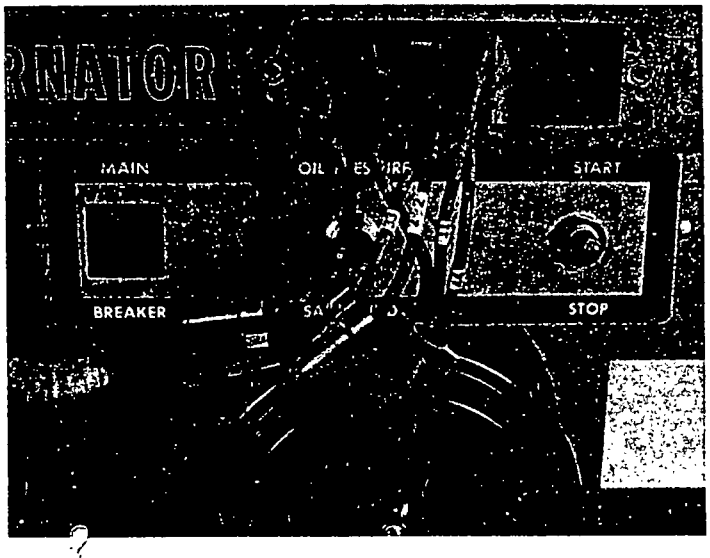


Figure 43

ROTOR, BRUSHES AND SLIP RINGS (UNITS WITH V/F REGULATOR ONLY)

A.) Remove 2 Taptitle screws that retain the Voltage Regulator to alternator. Set Regulator out of the way, and remove Support Plate. Plug Test Plug (Part No. 27069) into white receptacle. Set ohmmeter to Rx1 scale and zero the meter. Check resistance across Test Plug wires No. 1 and 4 - Ohmmeter should read approximately 11.5 to 14.5 ohms.

RESULTS: (1) Meter reads 11.5 - 14.5 ohms----- Continue checks under Paragraph "B", Page 31.

(2) Meter reads more than 14.5 ohms--- Continue checks under Paragraph "C", Page 31.

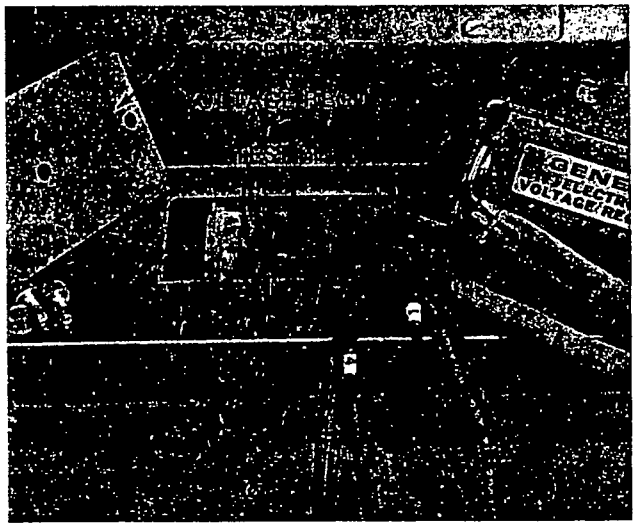


Figure 44

STATOR EXCITATION WINDINGS (UNITS WITH V/F REGULATOR ONLY)

A.) OPEN WINDINGS: Set ohmmeter to Rx1 scale and zero the meter. Connect meter test leads across test plug leads No. 2 and 6. Meter should indicate approximately 0.7 ohms.

B.) SHORTED WINDINGS: Set meter to Rx10,000 scale and zero the meter. Connect meter test leads to test plug lead No. 2 and to GROUND' Meter needle should not move upscale (infinity).

RESULTS: (1) Excitation windings check BAD----- Remove unit from compartment. Check for open of shorted wires No.2 and 6.

(2) Excitation windings checkGOOD---- Continue check under "Recommended Troubleshooting Procedure", Page 9.

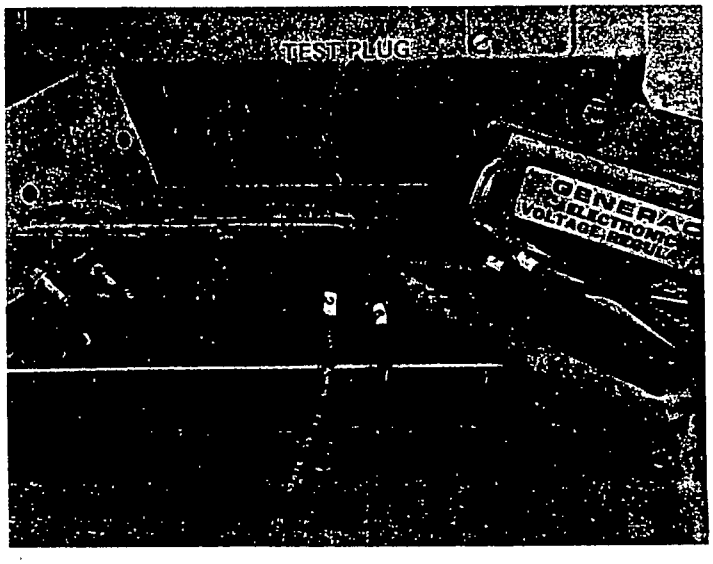


Figure 45

VOLTAGE REGULATOR (UNITS WITH V/F REGULATOR ONLY)

A.) Unplug voltage regulator from white receptacle and disconnect from Sensing Transformer leads by removing two wire nuts. Plug in and connect a "shop" regulator to white receptacle and to sensing transformer leads. Start unit and Check AC output voltage.

RESULTS: (1) ACOutput voltage GOOD------
Replace voltage regulator.

(2) Still no AC output voltage-----
Continue checks under "Recommended Troubleshooting Procedure", Page 9.

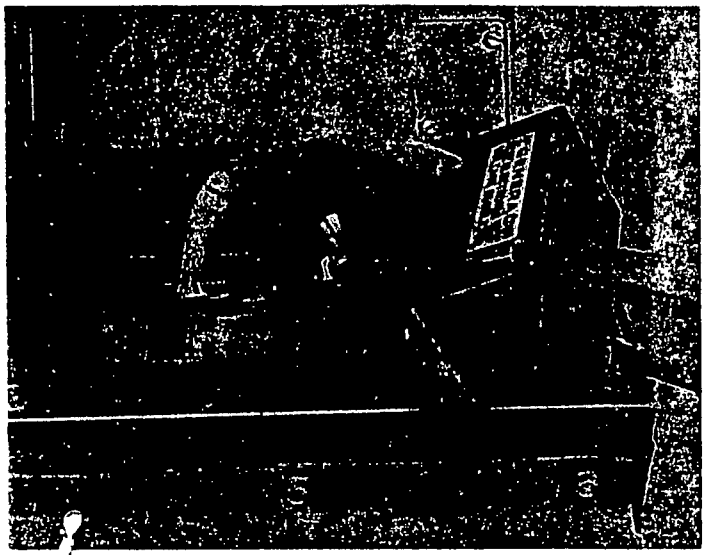


Figure 46

FIELD BOOST (UNITS WITH V/F REGULATOR ONLY)

A.) Plug Test Plug (Part No. (27069) into white receptacle. Set VOM to "+DC" and to any scale greater than 12 volts. Connect meter test lead from "+" jack to Test Plug lead No. 4 and from the "COMMON" jack to GROUND. Start the alternator. Meter should indicate approximately 5 - 7 volts DC.

RESULTS: (1) No field boost voltage-----
Continue checks under "Recommended Troubleshooting Procedure", Page 9.

(2) Meter indicates 5 - 7 volts DC-----
Field boost is operating normally.

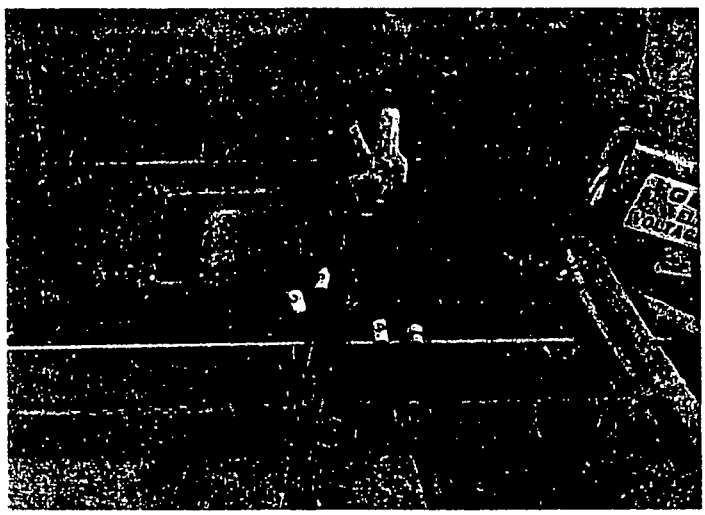


Figure 47

NO. 14 WIRE (UNITS WITH V/F REGULATOR ONLY)

A.) Gain access to field boost diode assembly as outlined on Pages 34 and 35. Locate the Wire No. 14 solder connection on the field boost diode assembly. Set VOM to "+DC" and to any scale greater then 12 volts DC. Connect the "+" meter test lead to the Wire No. 14 solder connection and the "COMMON" test lead to GROUND' Start the alternator. Meter should indicate approximately 12 volts DC.

RESULTS: (1) Meter does not indicate 12 volts DC-----
Check Wire No. 14 for open or shorted condition.

(2) Meter indicates 12 volts DC-----
If meter did NOT indicate 5 - 7 volts DC in FIELD BOOST test above, replace field boost diode assembly.

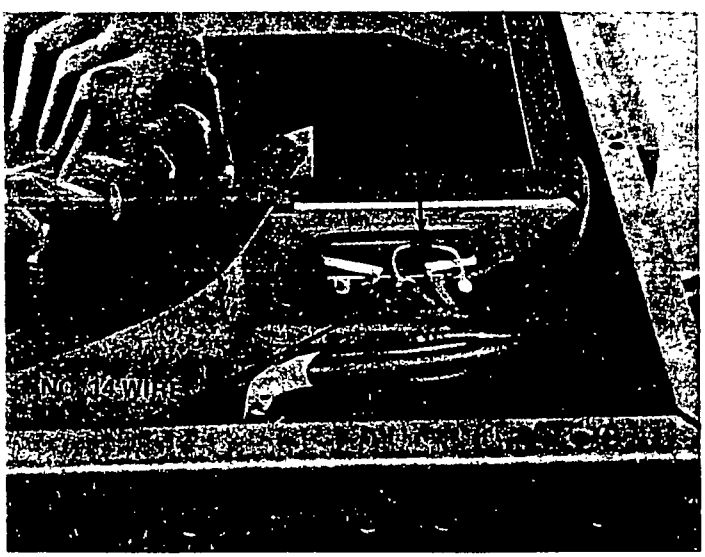


Figure 48

TO GAIN ACCESS TO IGNITION STATOR
SPARK PLUG WIRE
IGNITION COIL
STARTER PINION
FIELD BOOST DIODE ASSEMBLY

(Note: On later model units the ignition coil is mounted on the left side of the XP directly behind the spark plug cover.)

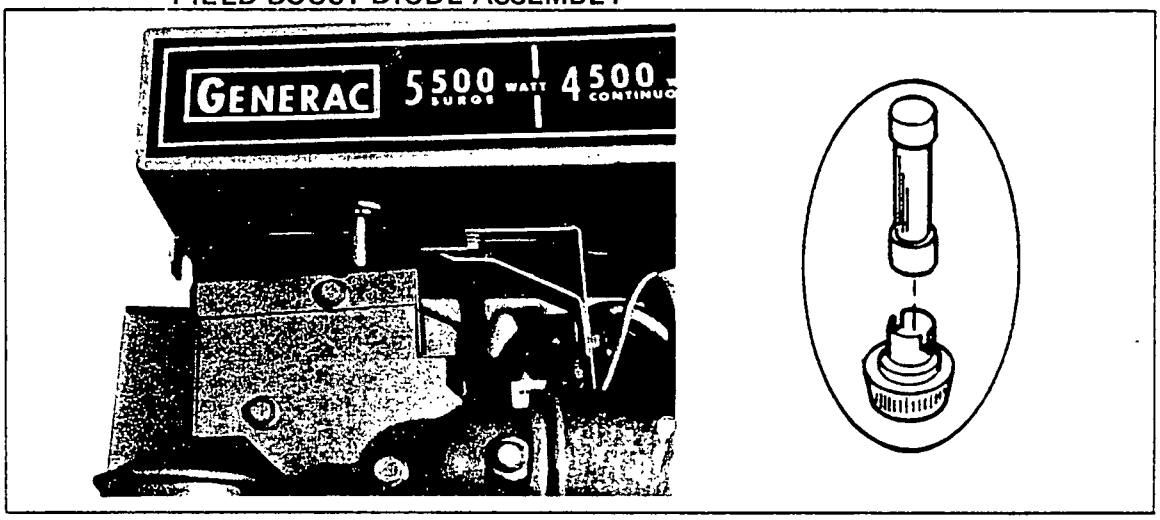


Figure 49

1.) Remove the 30 amp fuse (figure 43).

2.) Remove the air inlet screen and rope start sheave by removing the three capscrews. Use a 5/16" nut driver to remove the ten screws that retain the top shroud. Remove the top shroud.

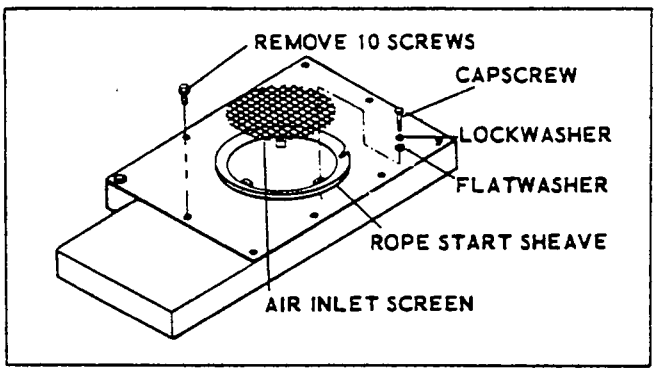


Figure 50

3.) Remove the 1" hex jam nut and lockwasher that retain the flywheel assembly (figure 45). Remove the flywheel by prying up around its entire circumference and tapping with a soft mallet at the same time. For unusually hard-to-remove flywheels, it may be necessary to use a three jaw puller.

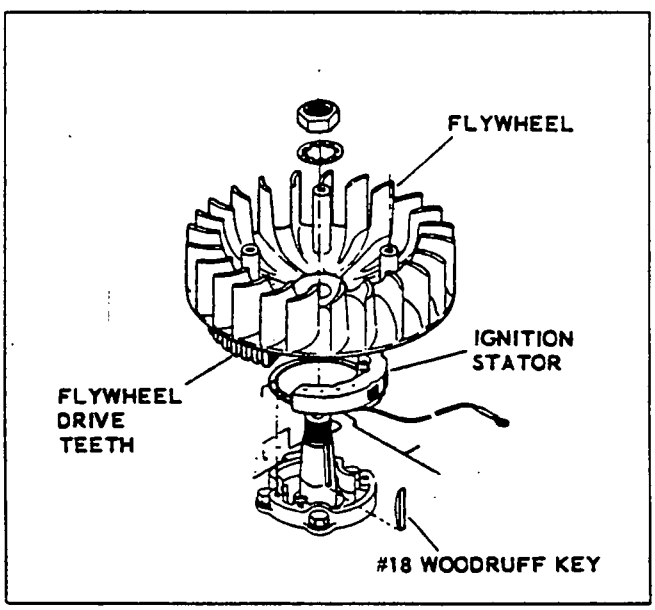


Figure 51

TO GAIN ACCESS TO IGNITION STATOR
SPARK PLUG WIRE
IGNITION COIL
STARTER PINION - Continued
FIELD BOOST DIODE ASSEMBLY

Following the installation of the new component, make sure the #18 woodruff key is installed into the flywheel shaft's key slot. Install the flywheel and retain with the lockwasher and 1" jam nut. Tighten the hex nut to 50-55 foot pounds. Reinstall the top shroud and retain with the ten screws. Install the rope start sheave and air inlet screen. Retain with the three cap-screws.

Figure 52

CONDITION: Engine Won't Crank (page 4)	Engine Cranks But Will Not Start (page 4 and 5)	Engine Starts With Difficulty and/or Runs Erratically (page 6)	Engine Starts But Shuts Down When Switch is Released (page 7)	Engine Will Not Shut Down When Switch is Set to Stop (page 8)	Engine Runs Normally But No AC Output is Available (page 9)	Engine Runs But AC Output is Low (page 10)	TROUBLESHOOTING GUIDE CONDITION	PAGE
		●				●	Air Filter	26
●							Battery	11
					●		Brushes, Rotor	30&31
	●	●					Carburetor Adj.	24&25
	●	●					Choke Assembly	18,19,20
					●		Main Breaker	28
	●			●			Control Relay	20&21
					●		Customer Wiring	29
	●	●					Fuel Pump	16&17
	●						Fuel Solenoid	17
	●						Fuse - 4 amp	20
●							Fuse - 30 amp	11
		●				●	Governor Adjustment	26&27
	●	●					Ignition Coil	23
	●	●					Ignition Module	22
	●	●					Ignition Stator	23
			●				Low Oil Switch	27
				●			Manual Start Lever	28
			●				Oil Level Low	27
	●						Out of Gas	16
	●		●	●			Printed Circuit Bd.	21
					●		Rectifier	29
					●		Residual Magnetism	30
	●	●				●	Spark Plug	22
	●	●					Spark Plug Wire	24
●							Starter Solenoid	13&14
●				●			Start/Stop Switch	12&13
●							Starter Motor	15&16
●							Starter Pinion	14&15
	●	●				●	Cylinder Head	25&26

XP ENGINE OVERHAUL

Engine repairs should be made by an experienced mechanic. When disassembling the engine it is advisable to have several boxes available so that parts belonging to certain groups can be kept together. Capscrews of various lengths are used, therefore great care must be exercised in reassembly so that the correct screws are used in the proper places.

Tighten the capscrews of the cylinder head, gear cover, connecting rod, stator plate and the spark plug to the specified torque readings indicated in the paragraphs of reassembly, relative to these parts.

With the disassembling operations, instructions on reassembling are also given, as often it will not be necessary to disassemble the entire engine.

While the engine is partly or fully dismantled, all parts should be thoroughly cleaned. Use all new gaskets in reassembly and lubricate all bearing surfaces.

Special tools used in disassembly and reassembly of engine, noted as Wisconsin Motor Part, are available from Teledyne Wisconsin Motor, Milwaukee, Wisconsin 53246.

TESTING REBUILT ENGINE

An engine that has been completely overhauled; such as having the cylinder rebored and fitted with new piston, rings and valves, should go through a thorough "run-in" period before any load is applied to it.

The engine should be started and allowed to run for about one-half hour, at from 1600 to 1800 R.P.M. without load. The R.P.M. should then be increased to engine operating speed, still without load, for an additional three and one-half to four hours.

The proper "running-in" of the engine will help to establish polished bearing surfaces and proper clearances between the various operating parts.

DRAIN OIL FROM CRANKCASE BEFORE DISASSEMBLY

DISASSEMBLY and REASSEMBLY of ENGINE

CYLINDER HEAD AND SPARK PLUG

Remove spark plug and take out cylinder head screws. Disassemble cylinder head, gasket, and cylinder side shroud. Clean out carbon from combustion chamber and dirt from between the cooling fins.

In reassembly, use new cylinder head and spark plug gaskets. Use the different length capscrews according to the height of the bosses on the cylinder head. Torque head screws to 18 ft. lbs., in three alternate stages: 10 ft. lbs., 14 ft. lbs. and finally 18 ft. lbs.

Leave spark plug off temporarily, for ease in turning engine over for remainder of assembly and for timing adjustments. When mounting spark plug, tighten 28 to 30 ft. lbs. torque.

VALVES and SEAT INSERT

Take off valve inspection cover and gasket. By means of a standard automotive valve lifter, remove retainer locks and take out valves from top of cylinder block.

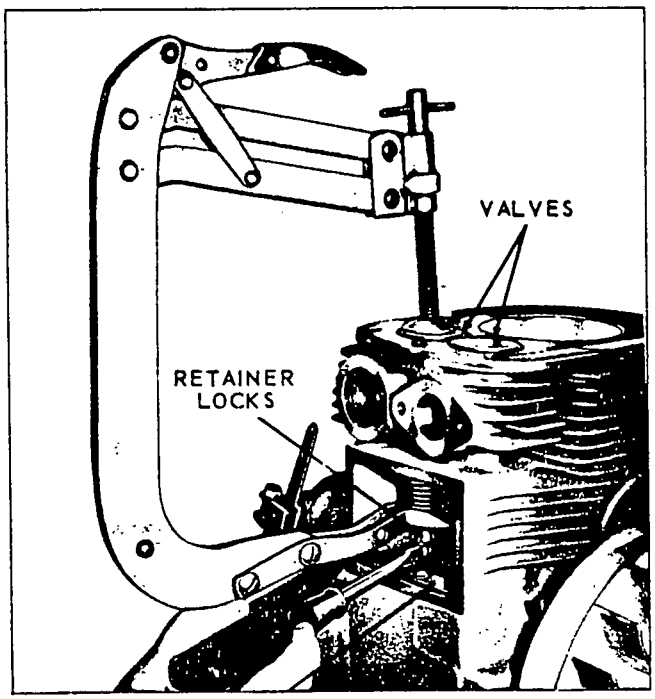


Figure 1

Clean out carbon and gum deposits from the valves, seats, ports and guides. Replace valves that are badly burned, pitted or warped.

The exhaust valve seat insert is replaceable, whereas the inlet seat is an integral part of the cylinder block. The positive type valve rotators, furnished with long life exhaust valve and seat, should be cleaned and checked for efficient operation.

The exhaust valve seat insert can be removed when replacement becomes necessary, by means of Wisconsin Motor DF-66-A insert puller. See Figure 2.

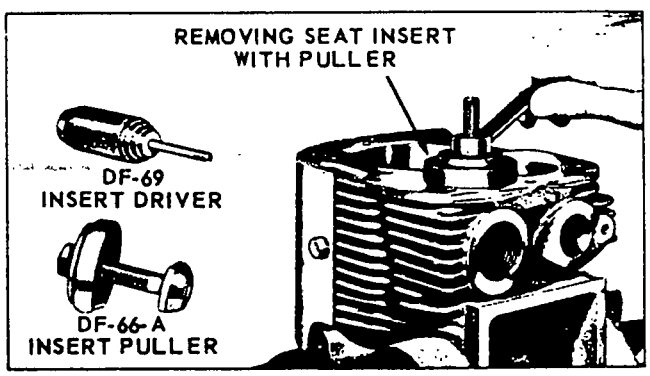


Figure 2

Grinding of valves and seats should be done at an authorized Generac facility.

Before grinding, inspect valve guides for possible replacement. Refer to Figure 3 for proper method of driving out guides, and see chart, Figure 4 for valve, seat and guide specifications.

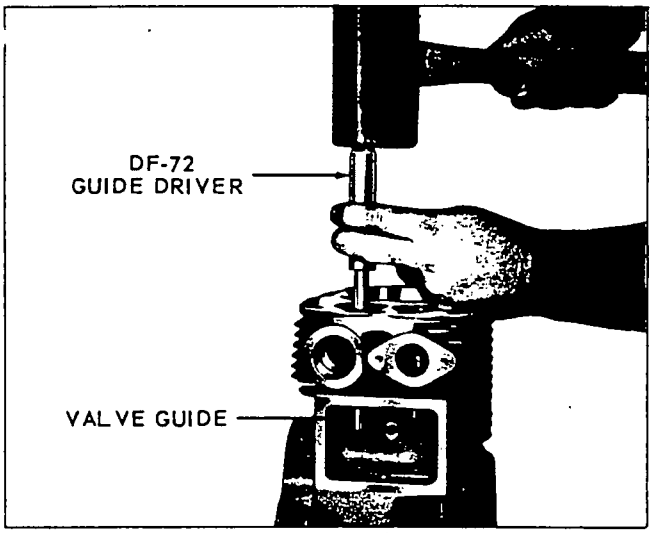
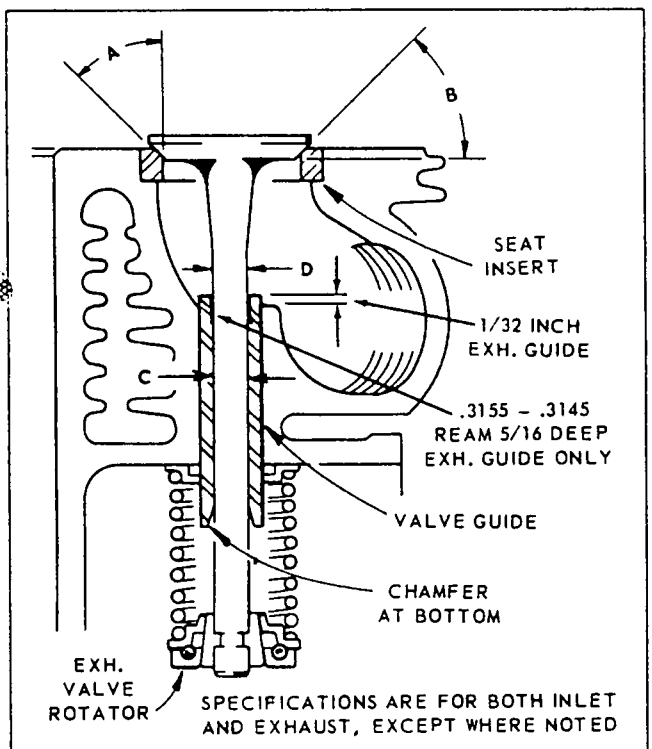


Figure 3



A – VALVE FACE ANGLE		45°
B – SEAT INSERT ANGLE		45°
C – GUIDE INSIDE DIAMETER		.312 – .313
D – VALVE STEM DIAMETER	INLET	.310 – .311
	EXH.	.309 – .310
MAXIMUM ALLOWABLE CLEARANCE BETWEEN C AND D		.006

Figure 4

Use a dial indicator to measure true roundness of the valve seats. The maximum deviation should not be more than .003 inch. See Figure 5.

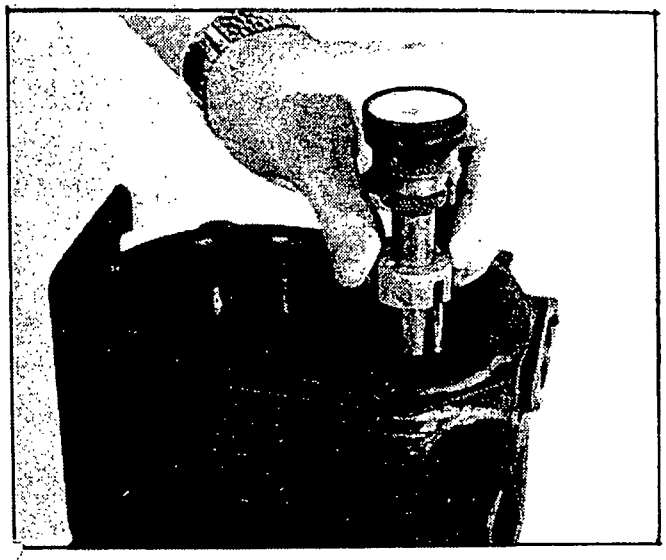


Figure 5

After grinding, lap valves in place until a uniform ring will show entirely around the face of the valve. Clean valves, and wash block thoroughly with a hot solution of soap and water. Wipe cylinder walls with clean lint free rags and light engine oil. Do not assemble valve springs until tappet clearance has been checked. See 'Tappet Adjustment.'

VALVE GUIDES

When valve stem clearance becomes excessive, the valve guides should be driven out, as illustrated in Figure 3, and new guides pressed in place. Use Wisconsin Motor DF-72 valve guide driver. In reassembly, press guides into valve ports with the internal chamfer in guide pointing downward. Exhaust guide to extend 1/32 inch above top of guide boss - Inlet guide flush with top of boss. Ream upper end of exhaust guide only; 5/16 inch deep by .3155 - .3145 dia. Refer to Figure 4 for clearance specifications and proper assembly.

TAPPET ADJUSTMENT

With engine cold and tappet in lowest position, hold valve down and check clearance.

inlet - 0.006 inch
exhaust - 0.015

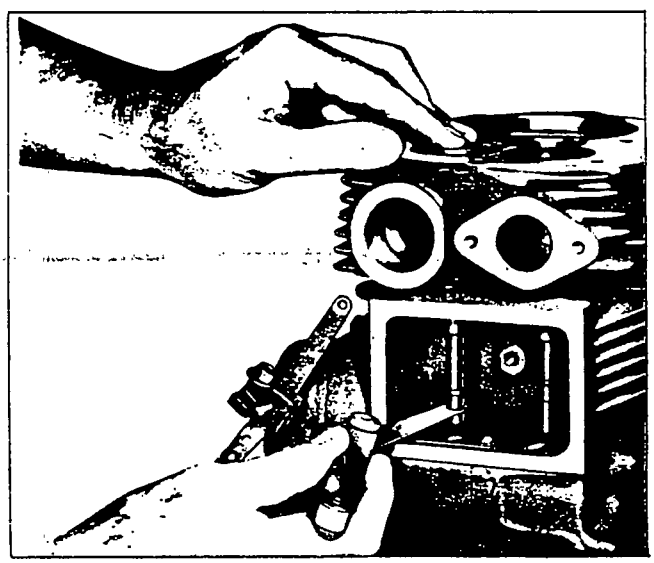


Figure 6

Caution: Be sure exhaust tappet is not riding on compression release spoiler cam.

If the clearance is less than it should be, grind the end of valve stem a very little at a time and remeasure. Stems must be ground square and flat. Reassemble the valve springs, exhaust rotator and inlet spring seat, locking them in place with the retainer locks. Be sure the valve springs are seated properly in the valve spring locating cups lest they cock off to one side and hamper the valve action.

To check tappet clearance on an assembled engine; turn crankshaft so that take-off or flywheel keyways are up, or in a 12 o'clock position, and on compression stroke. Observe position of valve stems in the inspection compartment. Both valves should be in their lowest position (closed), then proceed to check clearance.

OIL PAN, OIL SUMP, and OIL PUMP

Remove 10-32 Taptite screws attaching main seal to pan and oil pan to sump. Using a flat bladed screwdriver, gently pry main seal and oil pan free. See Figures 7, 8, 9, and 10.

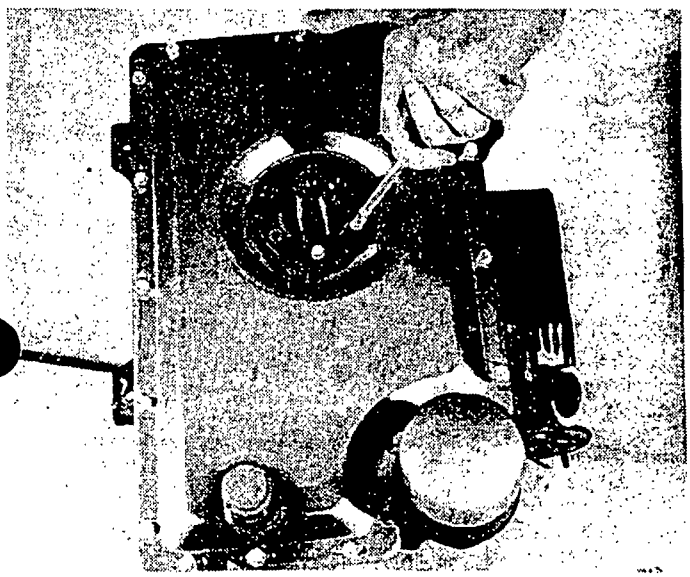


Figure 7

Figure 8

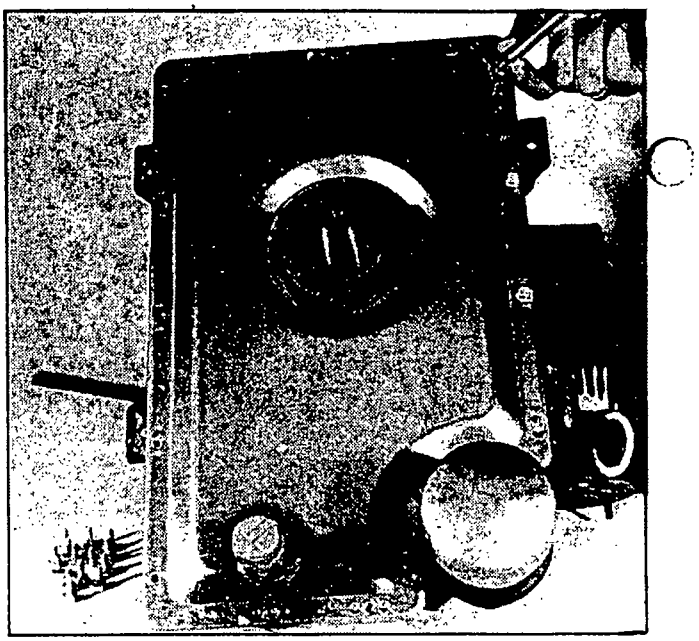


Figure 9

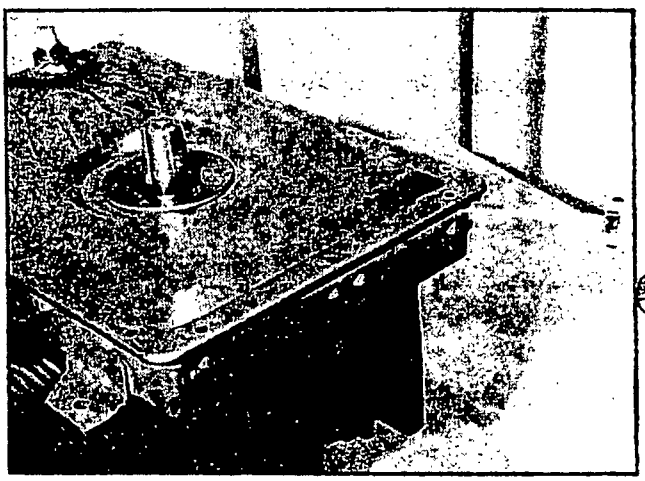


Figure 10

Remove (6) 1/4-20 screws attaching oil sump to block. Using a soft mallet, gently tap sump to free it from crankshaft. See Figures 11 and 12.

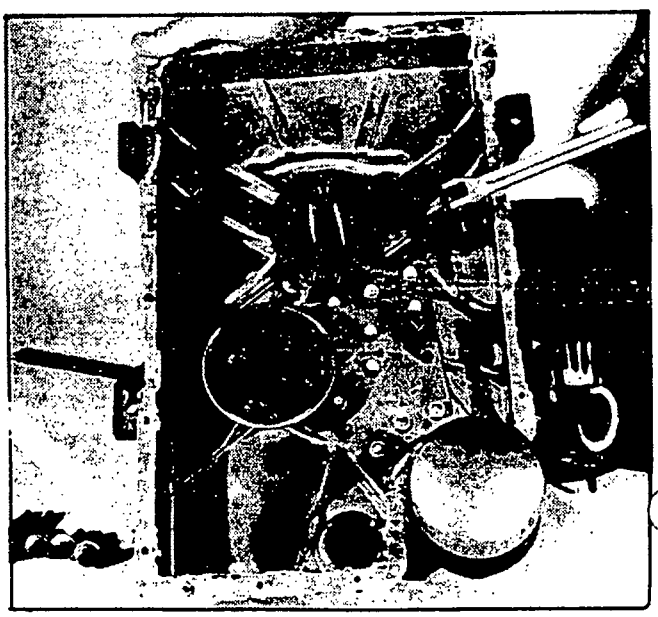


Figure 11

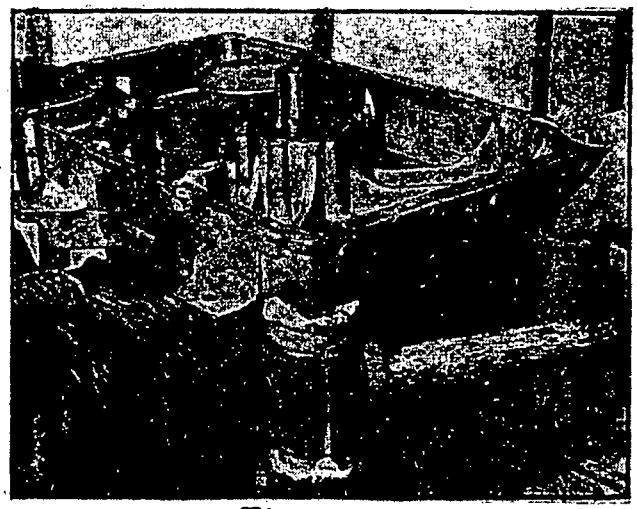


Figure 12

Always replace the pressure relief spring when overhauling an XP engine. See Figures 13 and 14.

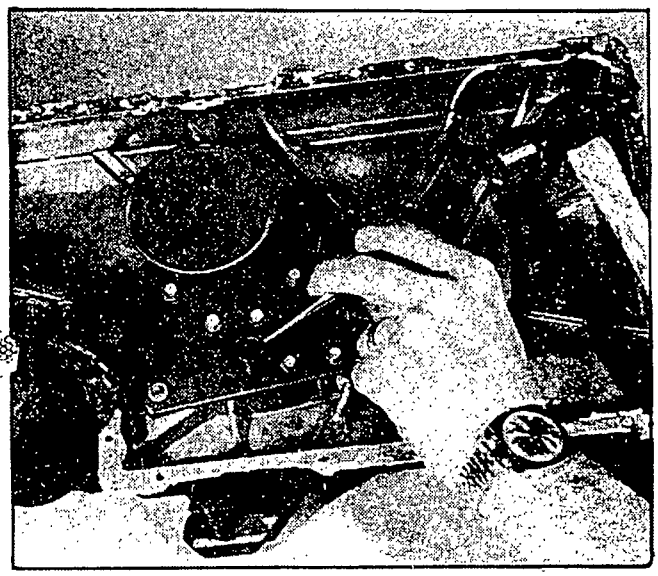


Figure 13

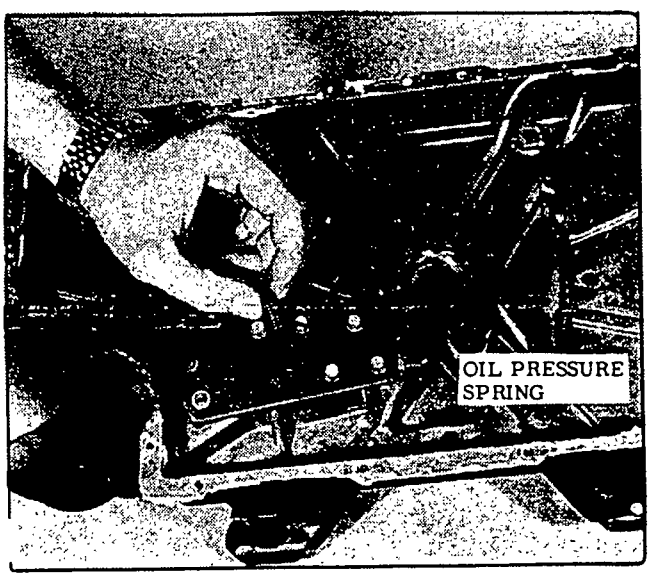


Figure 14

Remove (3) 1/4-20 screws attaching oil filter support to sump. Remove oil pump cover and inspect oil pump gears and casting for wear. Replace gears, and/or entire sump if necessary. See Figure 15.

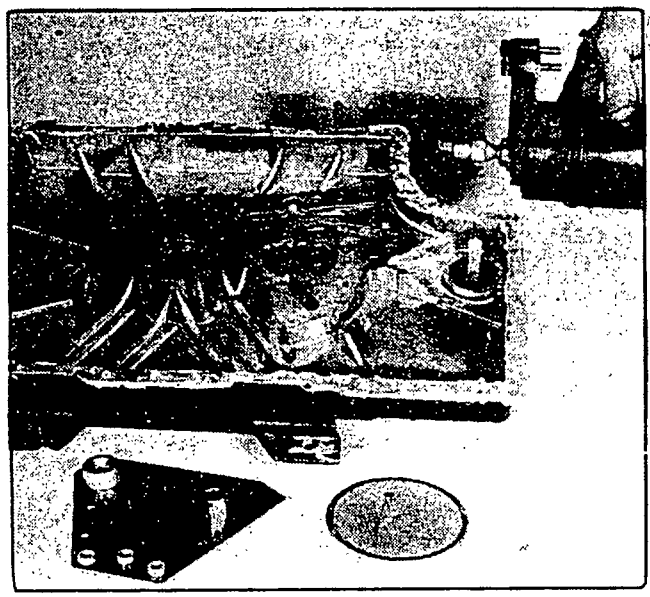


Figure 15

Clean sump thoroughly, making sure oil pick-up screen is free of debris.

In reassembling sump to block, use gear cover gasket Part No. 30542. Apply R.T.V. 112 or 118 on both sides of gasket. See Figures 16 and 17.

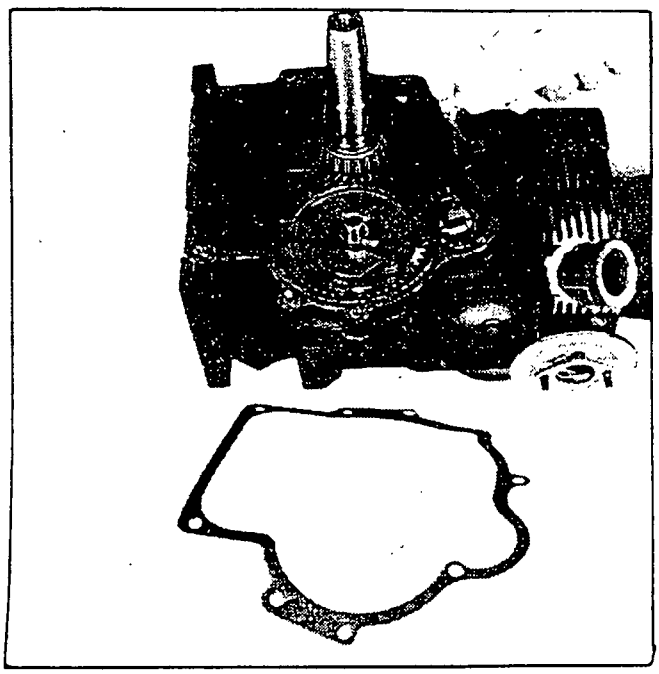


Figure 16

Note: Care must be taken when reinstalling the sump to assure proper alignment of the timing marks on crankshaft and camshaft.

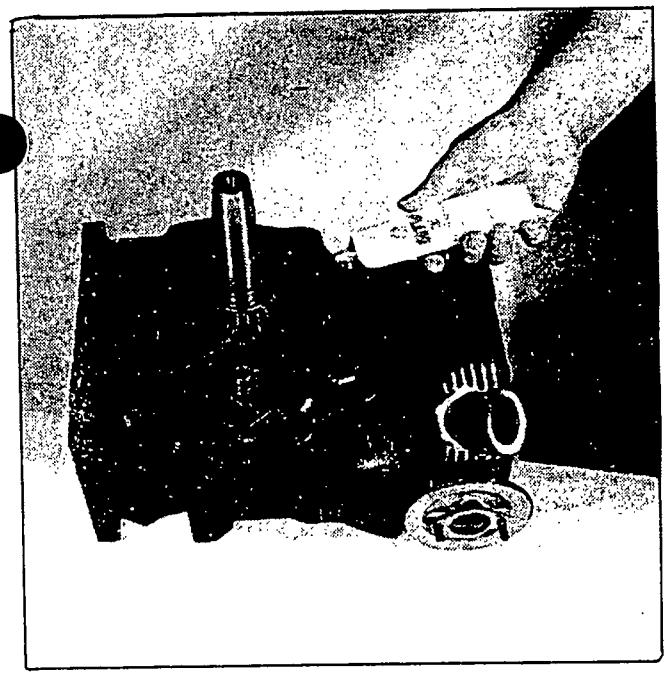


Figure 17

In reassembly, always use gasket Part No. 40214, using R.T.V. 112 or 118 on both sides. R.T.V. should be applied so as to form a sealing bead between sump and pan. See Figures 18 and 19.

The seal support gasket part no. 36783 should also be replaced and sealed with R.T.V. See Figure 18.

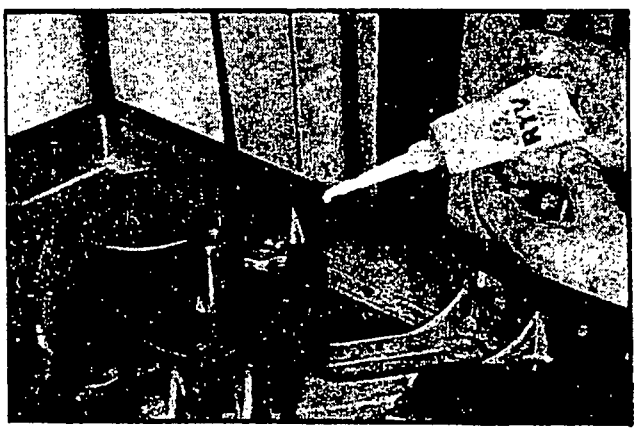


Figure 18

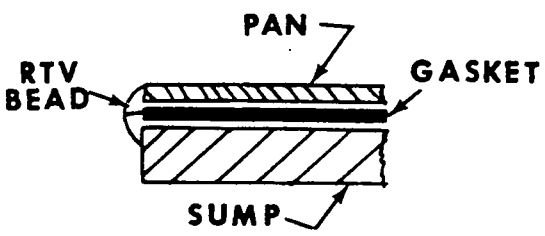


Figure 19

CONNECTING ROD and PISTON

By means of a 1/2" socket wrench, loosen and remove connecting rod bolts, and take off connecting rod cap.

Scrape off all carbon deposits that might interfere with removal of piston from upper end of cylinder. Turn crankshaft until piston is at top, then push connecting rod and piston assembly upward and out thru top of cylinder.

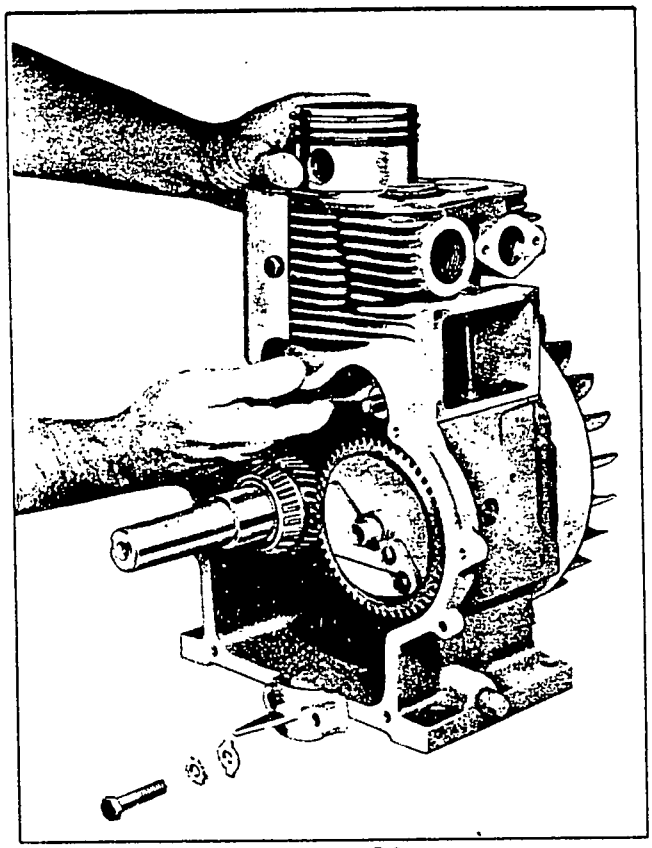
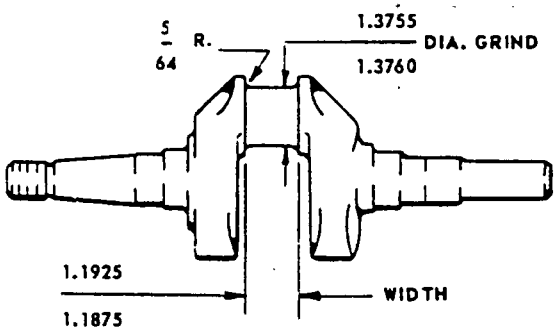


Figure 20

PISTON, RING AND ROD CLEARANCE CHART

PISTON TO CYLINDER AT PISTON SKIRT THRUST FACE	MODEL TRA-12D .0025 to .003"	TR-10D, TRA-10D .004 to .0045"
PISTON RING GAP		.010 to .020"
PISTON RING SIDE CLEARANCE IN GROOVES	TOP RING	.002 to .0035"
	2nd RING	.001 to .0025"
	OIL RING	.002 to .0035"
CONNECTING ROD TO CRANK PIN	DIAMETER	.0015 to .0005"
	SIDE	.009 to .016"
PISTON PIN TO CONNECTING ROD		.0002 to .0008"
PISTON PIN TO PISTON		.0000 to .0008" tight



STANDARD CRANK PIN DIMENSIONS

Figure 21

The piston skirt is cam-ground to an elliptical contour. Clearance between the piston and cylinder must be measured at the bottom of the piston skirt thrust face. Refer to Chart, Figure 21 for proper clearance. The thrust face on the piston skirt is 90° from the axis of the piston pin hole.

In reassembly; use a ring compressor and stagger the piston ring gaps 90° apart around the piston. Oil the piston, rings, wrist pin, rod bearings and cylinder walls before assembly.

Note: Mount piston and rod assembly with the cast arrow on the connecting rod bolt boss facing toward the open end of the crankcase, and the oil hole in rod toward camshaft side of engine. Figure 22. Assemble connecting rod cap in like manner so that the two arrows are on the same side. Turn crankshaft to lower end of stroke and tap piston down until rod contacts crank pin. Torque bolts to 22 ft. lbs.

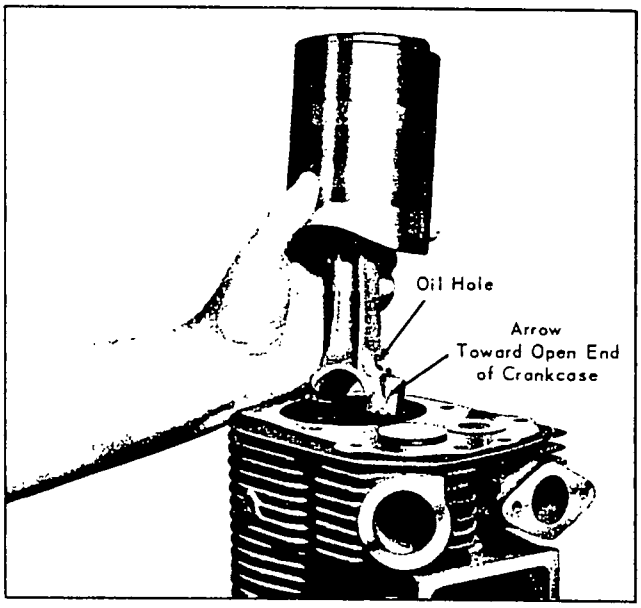


Figure 22

PISTON RINGS

If a ring expander tool is not available, install rings by placing the open end of the ring on piston first, as shown in Figure 23. Spread ring only far enough to slip over piston and into correct groove, being careful not to distort ring. The word 'top,' stamped on the compression and scraper rings, indicates the proper mounting of these two rings. See Figure 24 for correct placement of all three rings.

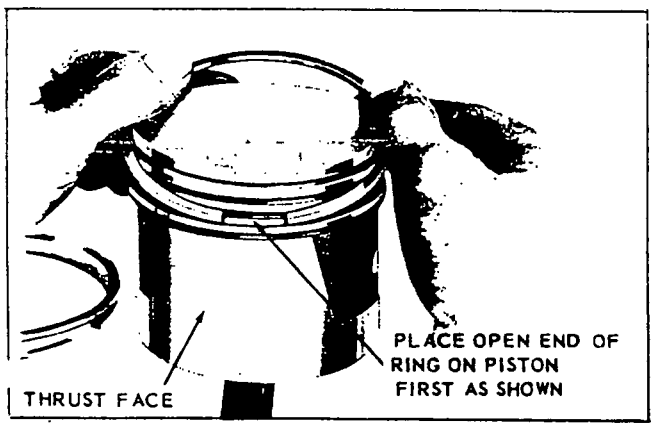


Figure 23

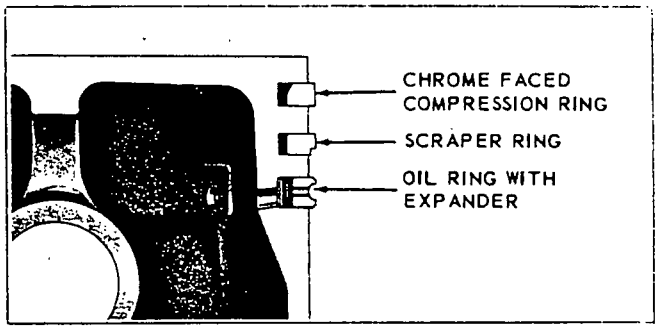


Figure 24

CAMSHAFT and VALVE TAPPETS

To prevent tappets from falling out and becoming damaged when camshaft is removed, turn crankcase over on its side as shown in Figure 25. Push tappets inward to clear cam lobes, and remove camshaft.

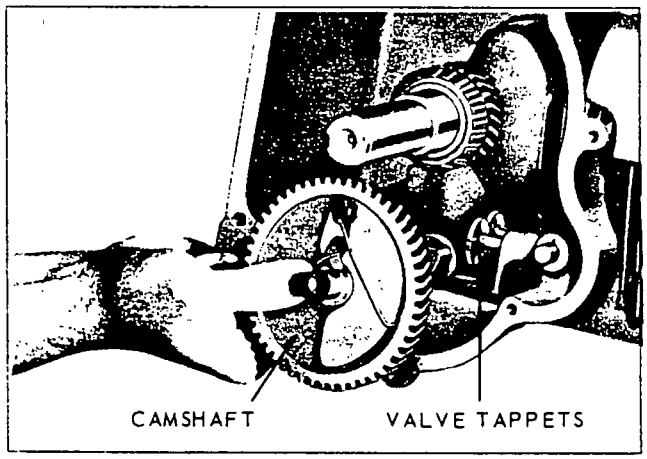


Figure 25

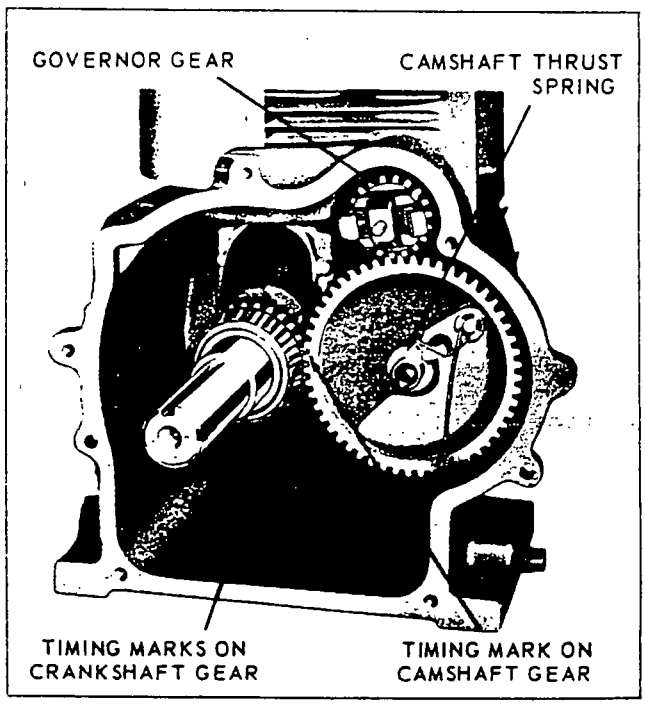


Figure 26

Note: Withdraw tappets and mark them for identification with the hole that they were removed from. In reassembly, put tappets back in their corresponding guide hole. This will eliminate unnecessary valve stem grinding for obtaining correct tappet clearance.

The tappet stem diameter is .309/.310, and has a clearance of .002 to .006" in the guide hole.

Timing mark on camshaft gear must be located between the two marked teeth on the crankshaft gear. See Figure 17. If valve timing is off, engine will not function properly or may not run at all.

While cranking engine, a spoiler cam holds the exhaust valve slightly open thru a part of the compression stroke. This condition reduces the compression pressure, allowing the engine to be turned over faster and with less effort. After the engine starts and speed reaches 650 R.P.M., the flyweight places spoiler cam in an inoperative position and normal compression is returned to combustion chamber.

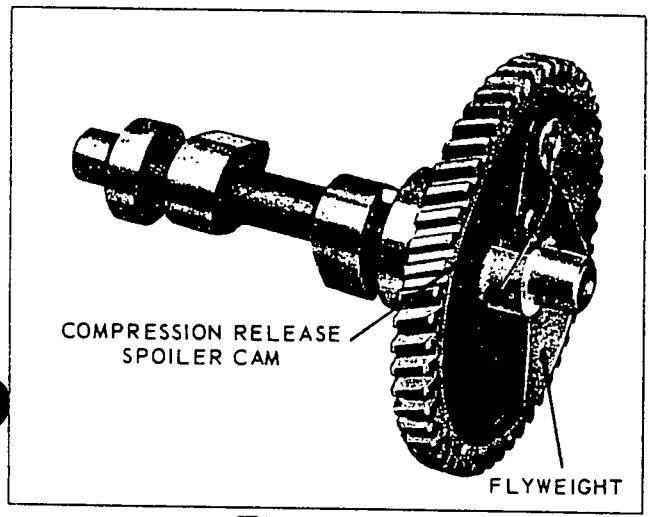


Figure 27

CRANKSHAFT

Take off flywheel nut and remove flywheel if this has not already been done. Knock out woodruff key and pull crankshaft out from open end of crankcase.

In reassembly; mount flywheel after crankshaft is assembled, and hand tighten flywheel nut. Flywheel will support crankshaft for mounting of connecting rod and piston.

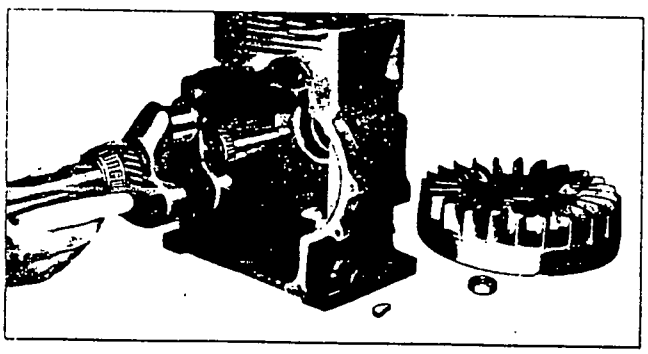


Figure 28

INSTALLATION OF BAFFLE PLATE (4000 WATT AND 5000 WATT UNITS ONLY)

On 4000 watt and 5000 watt units a baffle plate is being installed to retard blow by through the breather. If a 4000 watt or 5000 watt unit is disassembled and found not to have this plate, shown in Figure 29, it should be installed.

Position the baffle plate, part no. 40741 as in Figure 29. Using a punch mark the location of the mounting holes. Drill through the block with a number 21 bit. Using a No. 10-32 tap, tap the two holes. Apply a small amount of Lock-tite to two 10-32 x 3/4 machine screws, part no. 33141 and secure the baffle plate with machine screws and lock nuts, part no. 24237.

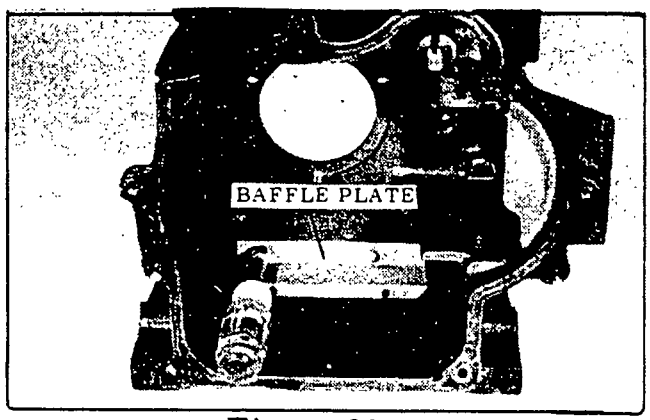


Figure 29

CYLINDER

The cylinder should be deglazed with a deglazing tool. See Figure 30.

Lightly oil the cylinder with a good grade of machine oil and rotate a deglazing brush using an electric drill. Make several quick passes until, thru visual inspection, the cylinder looks well deglazed.

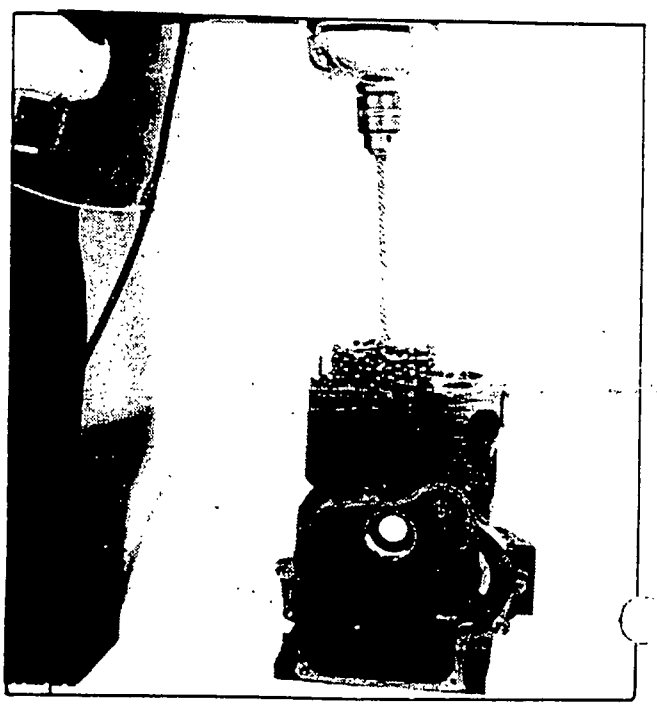


Figure 30

STATOR PLATE and END PLAY

The front end bearing plate functions as a support for the stator assembly on breakerless ignition engines. Do not remove plate unless replacement is necessary.

To remove stator plate, take out mounting screws and tap plate from inside crankcase with a wooden handle.

In reassembly: Use new gasket and shims having the same total thickness of those removed. Torque stator plate mounting screws 20 to 22 ft. lbs.

If new seal is installed, use Generac Installation Tool, part no. 41902.

End play: The end play should be .003 to .004 inch with engine cold, and can be determined as shown in Figure 31. If there is too much end play, a corresponding thickness of gasket or shim will have to be removed from behind plate. Not enough end play and gasket or shim will have to be added.

If new tapered crankshaft main bearings have been installed, seat the bearings by alternately striking each end of the crankshaft several sharp blows with a lead hammer. Then proceed to check end play.

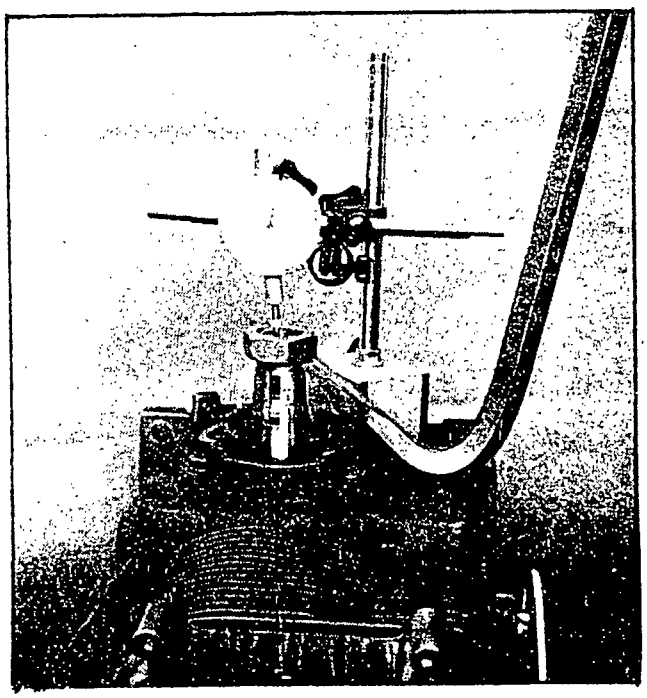
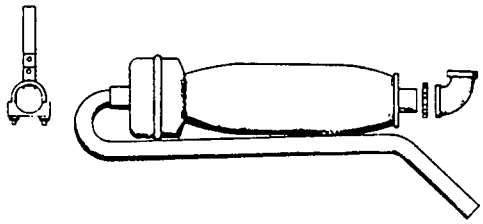


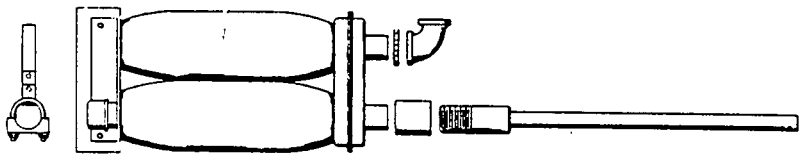
Figure 31

Muffler Kits
MC-40
Model No. 6897-5

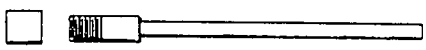


MODEL 6814

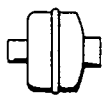
MODEL 6815



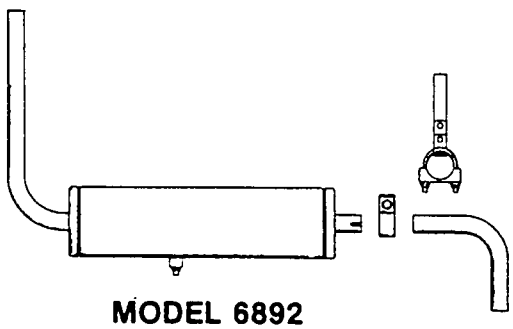
MODEL 6816



MODEL 6757



MODEL 6287



MODEL 6892