DIAGNOSTIC REPAIR MANUAL

XT Series Portable Generators with Electronic Fuel Injection

MODELS:

XT8000EFI XT8500EFI

Important Note: Always use the unit specific Schematics and Wiring Diagrams for troubleshooting.

PORTABLE GENERATORS

Safety

Throughout this publication and on tags and decals affixed to the generator, DANGER, WARNING, and CAUTION blocks are used to alert personnel to special instructions about a particular operation that may be hazardous if performed incorrectly or carelessly. Observe them carefully. Their definitions are as follows:

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

(000001)

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

(000002)

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

(000003)

NOTE: Notes provide additional information important to a procedure or component.

These safety alerts cannot eliminate the hazards they indicate. Observing safety precautions and strict compliance with the special instructions while performing the action or service are essential to preventing accidents.

⚠ WARNING

CANCER AND REPRODUCTIVE HARM

www.P65Warnings.ca.gov.

(000393a)

Read This Manual Thoroughly

This diagnostic manual has been written and published by Generac to aid dealer technicians and company service personnel when servicing the products described herein.

It is assumed that these personnel are familiar with the servicing procedures for these products, or like or similar products manufactured and marketed by Generac, and that they have been trained in the recommended servicing procedures for these products, including the use of common hand tools and any special Generac tools or tools from other suppliers.

Generac could not possibly know of and advise the service trade of all conceivable procedures by which a service might be performed and of the possible hazards and/or results of each method. We have not undertaken any such wide evaluation. Therefore, anyone who uses a procedure or tool not recommended by Generac must first satisfy themselves that neither his nor the products safety will be endangered by the service procedure selected.

All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication.

When working on these products, remember that the electrical system and engine ignition system are capable of violent and damaging short circuits or severe electrical shocks. If you intend to perform work where electrical terminals could be grounded or touched, the battery cables should be disconnected at the battery.

Any time the intake or exhaust openings of the engine are exposed during service, they should be covered to prevent accidental entry of foreign material. Entry of such materials will result in extensive damage when the engine Is started.

During any maintenance procedure, replacement fasteners must have the same measurements and strength as the fasteners that were removed. Metric bolts and nuts have numbers that indicate their strength. Customary bolts use radial lines to indicate strength while most customary nuts do not have strength markings. Mismatched or incorrect fasteners can cause damage, malfunction and possible injury.

Replacement Parts

When servicing this equipment, it is extremely important that all components be properly installed and tightened. If improperly installed and tightened, sparks could ignite fuel vapors from fuel system leaks.

Know Generator Limits

Overloading a generator can result in damage to the generator and connected electrical devices. Observe the following to prevent overload:

- Add the total wattage of all electrical devices to be connected at one time. This total should NOT be greater than the generator's wattage capacity.
- The rated wattage of lights can be taken from light bulbs. The rated wattage of tools, appliances, and motors can be found on a data label or decal affixed to the device.
- If the appliance, tool, or motor does not give wattage, multiply volts times ampere rating to determine watts (volts x amps = watts).
- Some electric motors, such as induction types, require approximately three times more watts of power for starting than for running. This surge of power lasts only a few seconds when starting such motors. Make sure to allow for high starting wattage when selecting electrical devices to connect to the generator:

1. Calculate the watts needed to start the largest motor.
2. Add to that figure the running watts of all other connected loads.

The ***Wattage Reference Guide*** is provided to assist in determining how many items the generator can operate at one time.

NOTE: All figures are approximate. See data label on appliance for wattage requirements.

Wattage Reference Guide

Device	Running Watts
*Air Conditioner (12,000 Btu)	1700
*Air Conditioner (24,000 Btu)	3800
*Air Conditioner (40,000 Btu)	6000
Battery Charger (20 Amp)	500
Belt Sander (3")	1000
Chain Saw	1200
Circular Saw (7-1/4")	1250 to 1400
*Clothes Dryer (Electric)	5750
*Clothes Dryer (Gas)	700
*Clothes Washer	1150
Coffee Maker	1750
*Compressor (1 HP)	2000
*Compressor (3/4 HP)	1800
*Compressor (1/2 HP)	1400
Curling Iron	700
*Dehumidifier	650
Disc Sander (9")	1200
Edge Trimmer	500
Electric Blanket	400
Electric Nail Gun	1200
Electric Range (per element)	1500
Electric Skillet	1250
*Freezer	700
*Furnace Fan (3/5 HP)	875
*Garage Door Opener	500 to 750
Hair Dryer	1200
Hand Drill	250 to 1100

Device	Running Watts
Hedge Trimmer	450
Impact Wrench	500
Iron	1200
*Jet Pump	800
Lawn Mower	1200
Light Bulb	100
Microwave Oven	700 to 1000
*Milk Cooler	1100
Oil Burner on Furnace	300
Oil Fired Space Heater (140,000 Btu)	400
Oil Fired Space Heater (85,000 Btu)	225
Oil Fired Space Heater (30,000 Btu)	150
*Paint Sprayer, Airless (1/3 HP)	600
Paint Sprayer, Airless (hand-held)	150
Radio	50 to 200
*Refrigerator	700
Slow Cooker	200
*Submersible Pump (1-1/2 HP)	2800
*Submersible Pump (1 HP)	2000
*Submersible Pump (1/2 HP)	1500
*Sump Pump	800 to 1050
*Table Saw (10")	1750 to 2000
Television	200 to 500
Toaster	1000 to 1650
Weed Trimmer	500
* Allow 3 times the listed watts for starting these devices.	

Specifications

Rotor and Stator Resistance Tables

Series		Model	Alternator	Rotor Windings (Ohms)	Power Windings (Ohms)	Exciter Windings (Ohms)
XT	XT8000EFI	G007162	0L0566	52.17	0.471	1.626
	XT8500EFI	G007247	0L0566	52.17	0.471	1.626

Table 1-1. EFI Component Specifications

Component	**Specifications**
Battery Charge Coil	Open circuit voltage: 23V±5V Load voltage: 14V ±1V
Oil Pressure Sensor	3–9 PSI (0.02–0.0 6MPa)
Crank Sensor Ohm Reading	270 ±20 Ω (@25°C)
Ignition Coil	Primary: 1.5Ω ±0.1 Ω (@25°C) Secondary: 5.8Ω ±0.6 Ω (@25°C)
Injection Nozzle Ohm Reading	12 Ω
Fuel Pump	1.4 ± 0.2 Ohms
Cylinder Head Temp Sensor	14.5 k Ohms (approx. @ room temp)
Stepper Motor	25 Ω ±10%
Barometric Pressure Sensor	50–115kPa
Power Meter CT	56Ω ±10%

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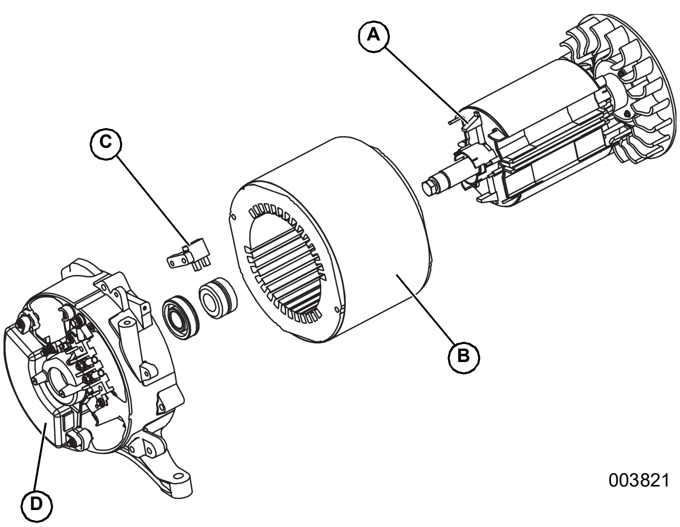
Section 1 Direct Excitation (Brush Type)

Introduction

See ***Figure 1-1***. A typical brush type portable generator needs 4 major components to function: prime mover (engine), rotor, stator, and voltage regulator.

As the engine begins to rotate, residual magnetism from the rotor creates magnetic lines of flux. The lines begin to cut across the excitation winding and induce a small voltage into the voltage regulator. The excitation voltage will power the voltage regulator and the voltage regulator will start to sense AC voltage from green and white sensing wires. The lower voltage from the sensing wires will cause DC excitation to the rotor to be driven up until AC output is at desired level of 240 VAC. Once the generator has reached 240 VAC it will maintain the DC voltage, regulating the alternator when loads are applied and removed.

NOTE: Some wire colors called out in this section represent models G0071620 and G0072470. Always use the correct schematic and wiring diagram for unit.



A. Rotor
B. Stator
C. Brushes
D. Automatic Voltage Regulator

Figure 1-1. AC Generator Exploded View

Stator Assembly

The stator has three separate windings. Two are the power (main) windings—Red and White (Hot), and Black and White (Neutral). The third winding is the excitation (DPE) winding (Blue).

Brush Holder and Brushes

The brush holder has a positive (+) brush, and a negative (-) brush, and is retained to the rear bearing carrier. The Red wire connects to the positive (+) brush and the White wire to the negative (-) brush. Rectified and regulated excitation current is delivered to the rotor windings via these brushes to the slip ring. The excitation current passes through the windings to the negative (-) slip ring and brush. This current flow creates a magnetic field around the rotor having a flux concentration that is proportional to the amount of current flow.

NOTE: Positive brush is closest to the alternator and negative brush closest to the bearing carrier.

Voltage Regulator

See ***Figure 1-1***. Unregulated AC output from the stator excitation winding is delivered to the voltage regulator. The voltage regulator rectifies and regulates that current based on stator AC power winding sensing. The rectified and regulated excitation current is then delivered to the rotor windings from the positive RD (+) and negative WH (-) wires. Stator AC power winding “sensing” is delivered to the regulator via the White and Green wires.

Operation

Startup

When the engine is running, residual magnetism from the rotor induces a voltage into the stator AC power windings and the stator excitation (DPE) windings. This residual magnetism creates the initial excitation voltage to power the AVR, which then increases output to regulated voltage.

Field Excitation

AC voltage is induced into the stator excitation (DPE) windings. The DPE winding circuit is completed to the voltage regulator. Unregulated alternating current flows from the winding to the regulator. The voltage regulator senses AC power winding output voltage. The regulator rectifies the AC from the excitation winding to DC. In addition, based on the sensing signals, it regulates the flow of direct current to the rotor. The rectified and regulated current flow from the regulator is delivered to the rotor winding.

The greater the current flow through the rotor winding, the more concentrated the lines of flux around the rotor become. The more concentrated the lines of flux around the rotor that cut across the stationary stator windings, the greater the voltage that is induced into the stator windings.

Initially, the AC power winding voltage sensed by the regulator is low. The regulator reacts by increasing the flow of excitation current to the rotor until voltage increases to the desired level. The regulator then maintains the desired voltage. For example, if voltage exceeds the desired level, the regulator will decrease the flow of excitation current. Conversely, if voltage drops below the desired level, the regulator responds by increasing the flow of excitation current.

AC Power Winding Output

A regulated voltage is induced into the stator AC power windings. When electrical loads are connected across the AC power windings to complete the circuit, current can flow in the circuit.

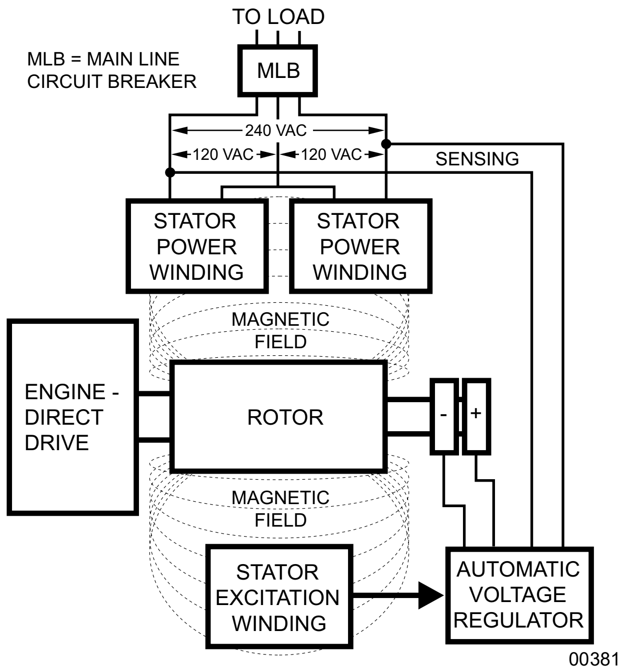


Figure 1-2. Generator Operating Diagram

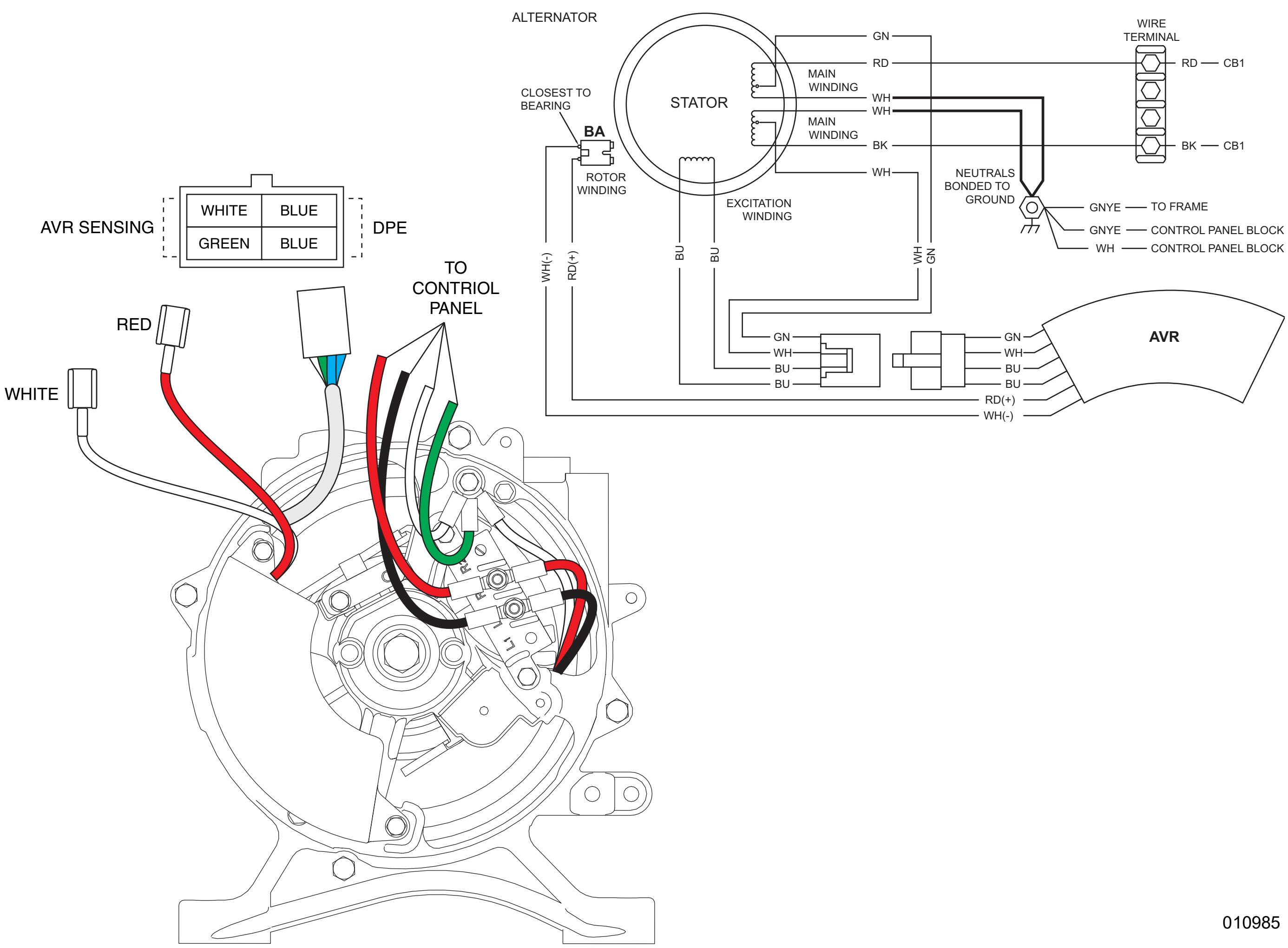


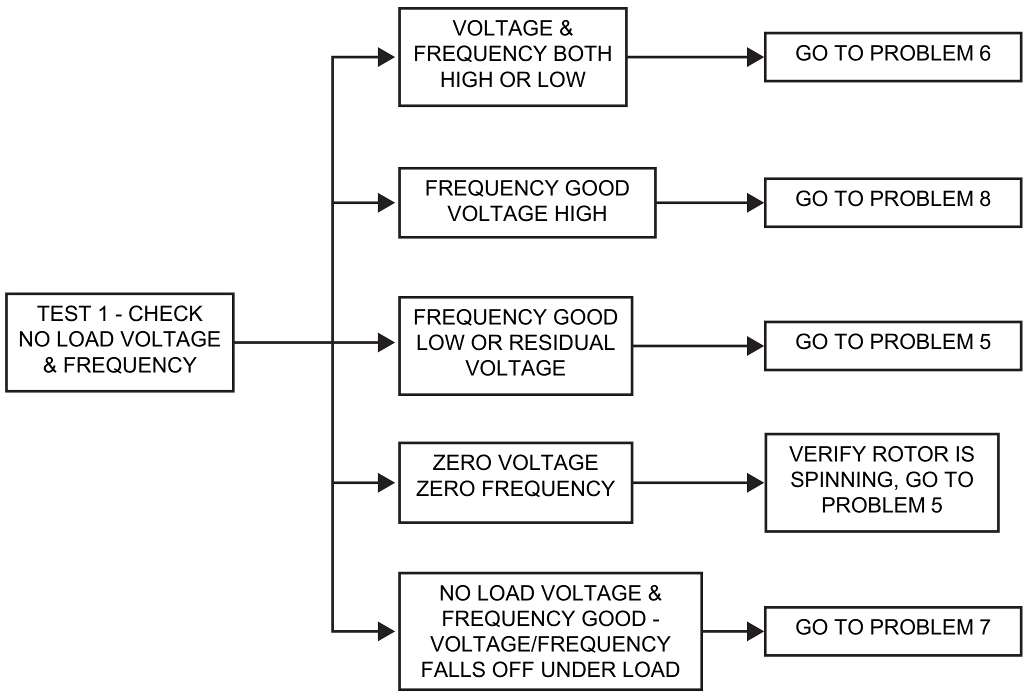
Figure 1-3. Alternator Wiring

Troubleshooting Flowcharts

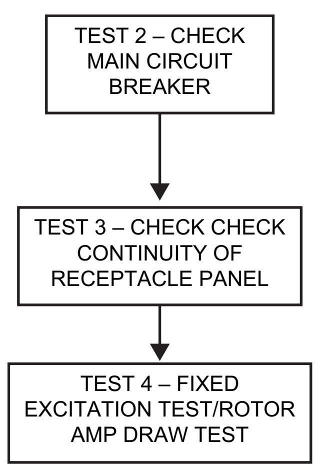
Introduction

Use the Flow Charts in conjunction with the ***AC Diagnostic Tests*** . Test numbers used in the flow charts correspond to the numbered tests in the ***AC Diagnostic Tests*** . The first step in using the flow charts is to identify the correct problem on the following pages. For best results, perform all tests in the exact sequence shown in the flow charts.

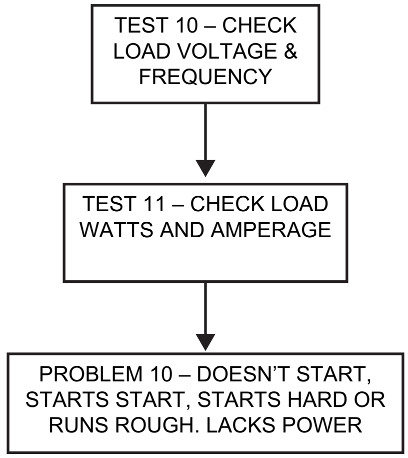
If Problem Involves AC Output



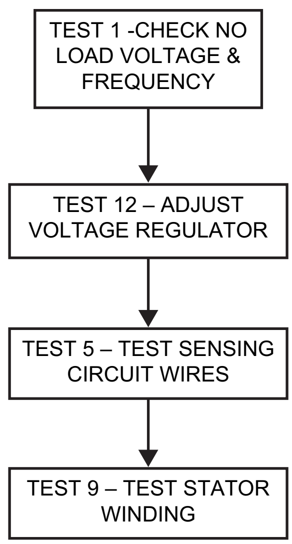
Problem 5 – Generator Produces Zero Voltage or Residual Voltage



Problem 7 – Excessive Voltage/Frequency Droop When Load is Applied



Problem 8 – Generator Produces High Voltage at No-Load



Section 2 AC Diagnostic Tests

Introduction

Perform the Diagnostic Tests in this section in conjunction with the ***Troubleshooting Flowcharts***. Test numbers in this section correspond to numbered tests in the flow charts.

Perform all tests using an RMS digital multimeter (DMM) capable of measuring True RMS AC Voltage.

NOTE: Test procedures in this manual are not necessarily the only methods for diagnosing the condition of components and circuits. All possible methods that might be used for system diagnosis have not been evaluated. If any diagnostic method is used other than the method presented in this manual, the technician must be sure that neither personal safety nor product safety, will be endangered by the procedure or method selected.

NOTE: Always use unit specific wiring diagrams and schematics for the generator being serviced.

Test 1 – Check No-Load Voltage and Frequency

Procedure

1. Disconnect or turn OFF all electrical loads connected to the generator.
2. Set digital multimeter (DMM) to measure AC voltage.
3. Reset all circuit breakers to ON.
4. Start engine and let stabilize and warm up.
5. See ***Figure 2-1***. Place meter test leads into an outlet.

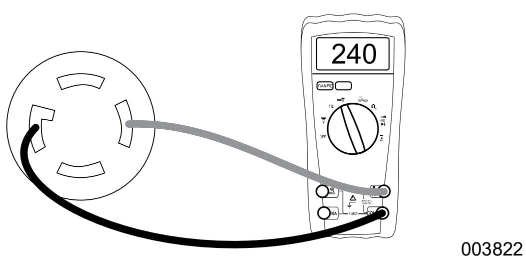


Figure 2-1. DMM Test Leads Connected to a 240 VAC Receptacle

6. Read AC voltage.
7. Connect an AC frequency meter as described in Step 5.
8. Read AC frequency.

Results

No Load Voltage	No Load Frequency
240–258 VAC	59.5 – 61.5 Hz

Refer to flow chart.

Test 2 – Check Main Circuit Breaker

Procedure

The generator has circuit breakers located on the control panel. If outlets are not receiving power, make sure breakers are set to ON or “Closed”.

If a breaker is suspected to have failed, test as follows:

1. Set DMM to measure resistance.
2. With generator shut down, disconnect all wires from suspected circuit breaker terminals to prevent interaction.
3. See ***Figure 2-2***. With the generator shut down, connect one meter test lead to one terminal of the breaker and the other meter test lead to the other terminal.
4. Set breaker to ON or “Closed”. The meter should read CONTINUITY.
5. Set breaker to OFF or “Open”. The meter should indicate INFINITY.

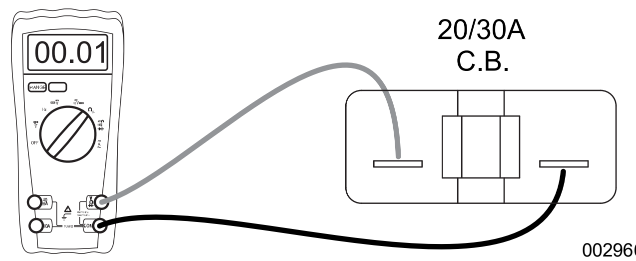


Figure 2-2. 20/30 Amp Breaker Test Points

Results

1. If circuit breaker tests good, refer to flow chart.
2. If breaker tests bad, replace.

Test 3 – Check Continuity of Receptacle Panel

Procedure

1. Set DMM to measure Resistance.
2. See ***Figure 2-3***. Connect DMM to each receptacle on unit.

NOTE: Only one outlet on each receptacle needs to be tested.

Results

1. If any other reading than CONTINUITY was measured, further troubleshooting needs to be done to determine if it is the receptacle or the wiring. Repair or replace as necessary.
2. If receptacles test good, refer to flow chart.

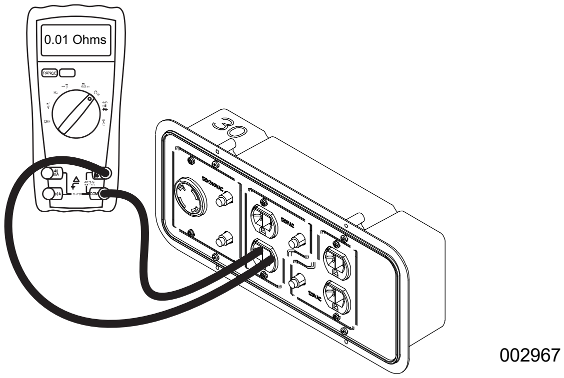


Figure 2-3. Checking Continuity of Receptacles

Test 4 – Fixed Excitation Test/Rotor Amp Draw Test

General Theory

Supplying a fixed DC current to the rotor will induce a magnetic field in the rotor. With the generator running, this should create a proportional voltage output from the stator windings.

NOTE: A standard 12 Volt battery is required for this procedure.

NOTE: Always use the unit specific schematics and wiring diagrams for brush orientation.

Procedure - Part 1

1. Remove positive and negative wires connected to the brush assembly.
2. Connect one jumper wire to the where the positive brush wire had been connected to the brush assembly.
3. Connect another jumper wire to where the negative brush wire had been connected to on the brush assembly.

NOTE: For safety, install an in-line fuse in the positive jumper wire. Maximum fuse should be 2 amps.

4. Set DMM to measure AC Voltage.
5. See ***Figure 2-4***. Connect meter test leads across the 240 VAC receptacle so the leads read line-to-line voltage. If the unit only has 120 Volt outlets, connect meter test leads from line-to-neutral and measure for 120 VAC.
6. Start the unit and allow it to run.
7. With the unit running connect one jumper wire to the negative terminal of the battery and connect the other jumper wire to the positive terminal.
8. Record the voltage measured on the 240 VAC (or 120 VAC) receptacle panel. Approximately 130 VAC (Line to Line) or approximately 65 VAC (Line to Neutral) should be measured.
9. STOP the unit.
   a. If proper voltage was measured, stop testing.
   b. If no voltage is measured, proceed to ***Procedure - Part 2***.

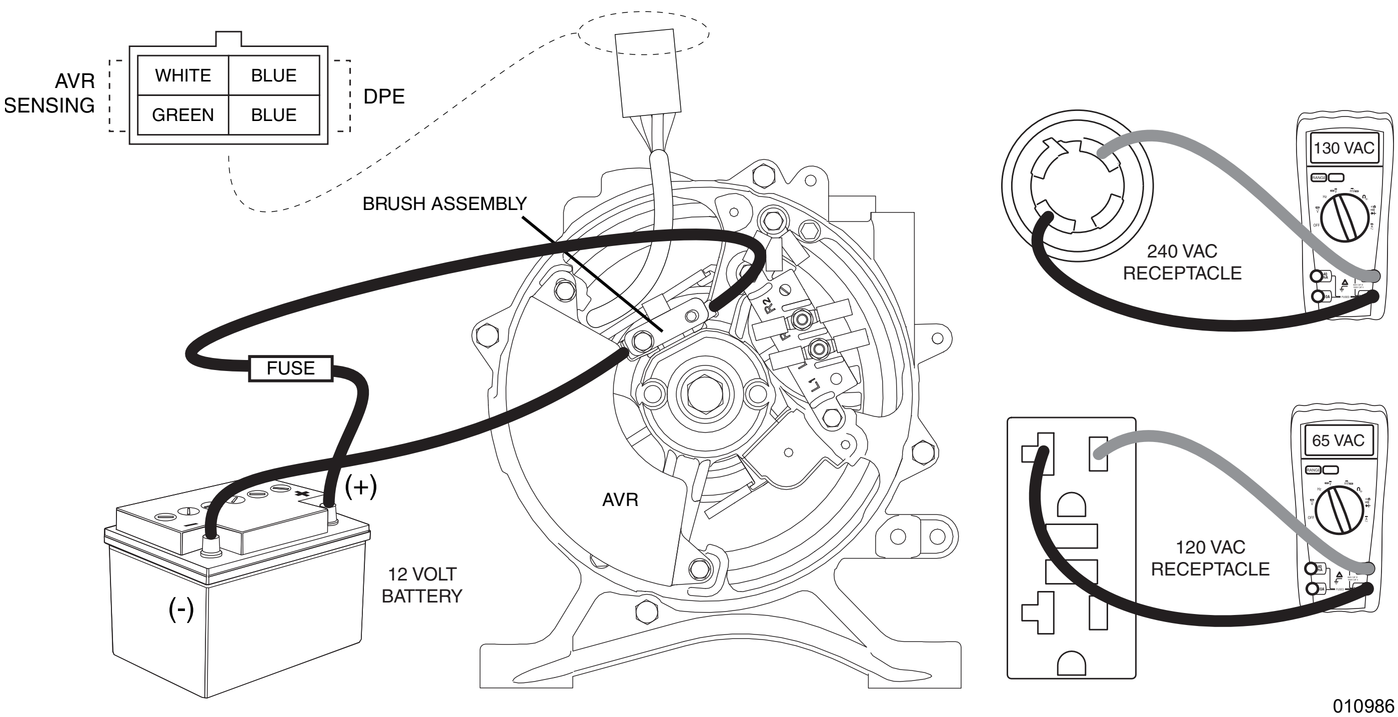


Figure 2-4. Jumper Wires Between Battery and Brush Assembly

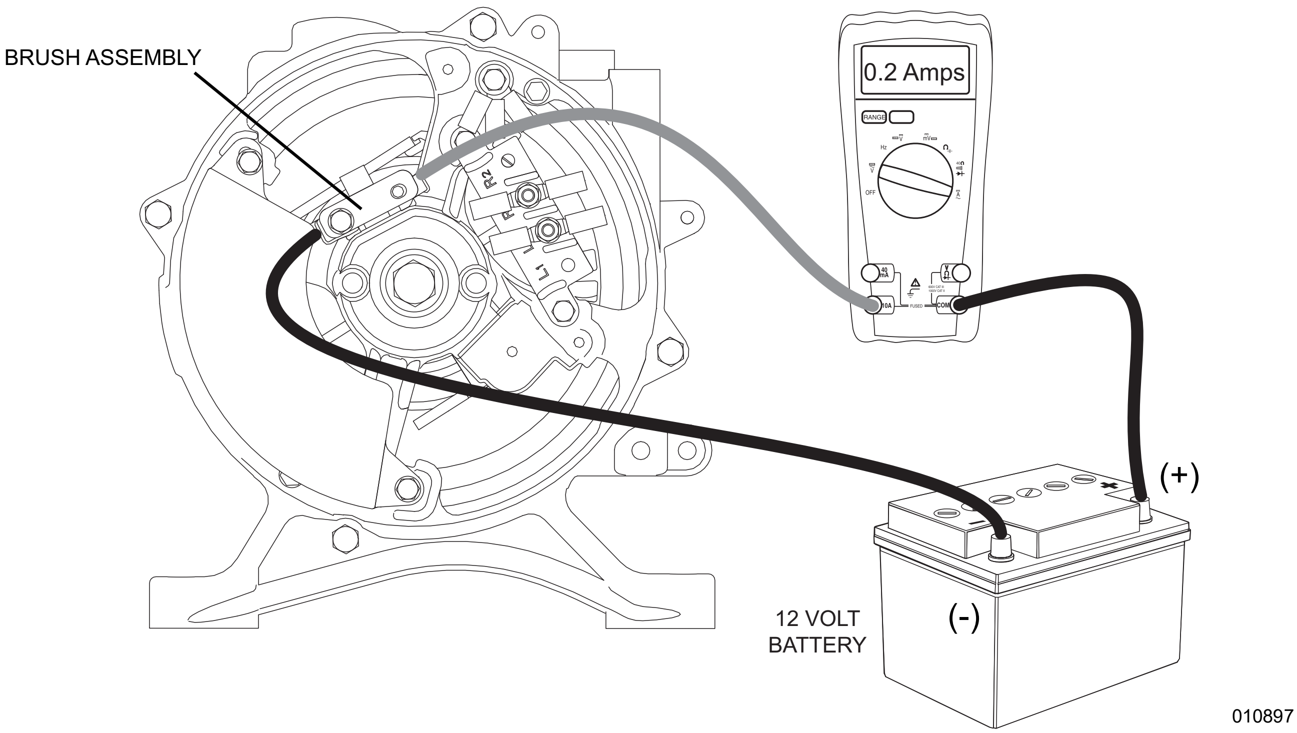


Figure 2-5. Jumper Wire and DMM Between Battery and Brush Assembly

Procedure - Part 2

1. Disconnect meter test leads from 240 VAC (or 120 VAC) receptacle.
2. See *Figure 2-5*. Connect meter test leads to the excitation windings at the back of the alternator.
3. Start the unit and allow it to run.
4. With the unit running connect one jumper wire to the negative terminal of the battery and connect the other jumper wire to the positive terminal.
5. Record voltage measured on the excitation windings. Approximately ¼ of rated output should be measured.
6. STOP the unit.
7. Disconnect jumper wires from battery and brushes.

Procedure - Part 3

1. Set DMM to measure DC amperage.

NOTE: Refer to the meter owner's manual for current draw testing and proper set up.

NOTE: Inspect meter fuses to ensure accurate test results.

2. Connect one DMM test lead to the positive brush terminal.
3. Connect the other DMM test lead to the positive terminal of the battery.

NOTE: The meter should now be connected in series from the positive (+) brush terminal to the negative (+) battery terminal.

4. Connect the negative jumper wire to the negative brush terminal.
5. START the unit and allow it to RUN.
6. Attach the negative jumper wire to the negative battery terminal.
7. Measure and record DC amperage.

NOTE: Refer to the resistance table and calculate the specific current draw. Battery DC voltage divided by resistance will provide the amp draw specification.

8. STOP the unit.
9. With the unit OFF (NOT RUNNING), measure and record the static DC amperage.
   a. If current was outside parameters, replace the rotor.
   b. If correct voltage and current was measured, replace the voltage regulator.

Procedure - Part 4

1. Set the DMM to measure resistance.
2. Place meter test leads onto the brush assembly terminals. Measure and record the resistance of the brushes and the rotor.
3. If resistance measured is not within the specifications, remove brushes and measure resistance slip ring to slip ring.
4. Reinstall brush assembly.
5. Measure resistance of the stator power windings and excitation windings.

NOTE: Always use the unit specific schematics and wiring diagrams to identify appropriate windings.

NOTE: See Rotor and Stator Resistance table for correct resistance values.

a. If correct rotor resistance was measured, inspect and/or replace brushes.
b. If correct rotor resistance was NOT measured, remove brushes and measure resistance across the slip rings.
c. If rotor resistance was NOT measured across the slip rings, replace rotor.
d. If stator power windings and excitation windings resistance values was outside of parameters, replace the stator.

Test 5 – Test Sensing Circuit Wires

General Theory

The voltage regulator requires a reference voltage in order to regulate at a predetermined voltage. If the voltage regulator cannot sense the voltage, it will exhibit an over voltage condition. This test will verify the integrity of the sensing circuit.

Procedure

1. Remove the alternator end cover to expose the voltage regulator and harness connections.
2. Disconnect the appropriate harness connector from the voltage regulator.
3. Set the DMM to measure resistance.

NOTE: Stator winding resistance values are very low. Some meters will not read such a low resistance, and will simply indicate different ranges of resistance. A high quality digital type meter capable of reading a very low resistance is recommended.

4. Connect meter test leads to the correct harness pins for the GN and WH Wires. Measure and record the resistance.
5. Connect one meter test lead from each of the GN and WH Wires to ground. Measure and record the resistance.
   a. If the meter indicated a resistance value consistent with *Table 1-1*, stop testing and refer back to the flow chart.
   b. If the meter indicated OPEN in Step 4 or a reading other than OPEN in Step 5, replace the stator/alternator.

Test 9 – Test Stator Windings

Procedure

1. Isolate all stator wires from the control panel and voltage regulator.
2. Set DMM to measure resistance.
3. See *Figure 1-3* for proper test points to check the stator. Every connection needs to be checked coming out of the stator for a short to ground.

Results

1. If any wire has a direct short-to-ground, or to the chassis of the alternator, replace alternator assembly.
2. If all wires test good for a short-to-ground, refer to flow chart.

Table 1-1. TEST 9 Stator Results

Test Point A	Test Point B	Results
Resistance Test with Neutrals Disconnected		
RED Main Lead	WHITE Main Lead	
BLACK Main Lead	WHITE Main Lead	
BLUE Excitation Lead	BLUE Excitation Lead	
Test Windings for a Short to Ground		
RED Main Lead	Ground	
BLACK Main Lead	Ground	
BLUE Excitation Lead (1)	Ground	
BLUE Excitation Lead (2)	Ground	
GREEN Sensing Lead	Ground	
WHITE Sensing Lead	Ground	
Test For A Short Circuit Between Windings		
RED Main Lead	BLUE Excitation Lead	
BLACK Main Lead	BLUE Excitation Lead	
RED Main Lead	WHITE Sense Lead	
BLACK Main Lead	GREEN Sense Lead	
BLUE Excitation Lead	GREEN Sense Lead	
BLUE Excitation Lead	WHITE Sense Lead	

Test 10 – Check Load Voltage and Frequency

Procedure

Perform this test the same as Test 1 but apply a load to the generator equal to its rated capacity. Check voltage and frequency with load applied.

Frequency should not drop below 59 Hertz.

Voltage should not drop below 222 VAC.

Results

1. If voltage and/or frequency drop excessively when load is applied, refer to flow chart.
2. If load voltage and frequency are within limits, end tests.

Test 11 – Check Load Watts and Amperage

Procedure

Add up the wattages or amperages of all loads powered by the generator at one time. If desired, a clamp-on ammeter may be used to measure current flow.

See the ***Wattage Reference Guide*** to determine generator limits.

NOTE: All figures are approximate. See data label on appliance for wattage requirements.

Results

1. If unit is overloaded, reduce load.
2. If load is within limits but frequency and voltage still drop excessively, refer to flow chart.

Overloading a generator in excess of its rated wattage capacity can result in damage to the generator and to connected electrical devices. Observe the following to prevent overloading unit:

- Add up total wattage of all electrical devices to be connected at one time. This total should NOT be greater than the generator's wattage capacity.
- The rated wattage of lights can be taken from light bulbs. The rated wattage of tools, appliances and motors can be found on a data label or decal affixed to the device.
- If the appliance, tool or motor does not give wattage, multiply volts times ampere rating to determine watts (volts x amps = watts).
- Some electric motors, such as induction types, require about three times more watts of power for starting than for running. This surge of power lasts only a few seconds when starting such motors.

Be sure to allow for high starting wattage when selecting electrical devices to connect to the generator:

1. Calculate watts needed to start the largest motor.
2. Add to that figure the running watts of all other connected loads.

Test 12 – Adjust Voltage Regulator

NOTE: Always use the unit specific schematics and wiring diagrams for brush orientation.

Procedure

1. Remove cover from end of alternator assembly.
2. Remove two screws holding down the voltage regulator (AVR); refer to ***Figure 1-3*** in Section 1 for identification.
3. Leave AVR connected to stator and brushes.
4. Set DMM to measure AC voltage.
5. See ***Figure 2-6***. Connect DMM across a 240 VAC receptacle.

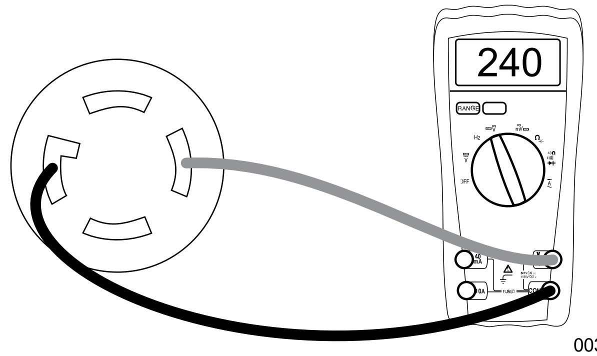


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Figure 2-6. DMM Test Leads Connected to a 240 VAC Receptacle

6. Verify all material is clear of the alternator before proceeding.

NOTE: Automatic Voltage Regulator must be adjusted to nominal output voltage with the generator running at NO LOAD.

7. Turn the engine switch to START.
8. See ***Figure 2-7*** for location of adjustment screw.

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Figure 2-7. Voltage Regulator Adjustment Screw

9. Adjusting screw clockwise will increase voltage, adjusting counterclockwise will lower voltage.

Results

1. If there is no change in voltage while adjusting, replace AVR and retest.
2. If voltage is correct, stop testing.

Introduction

Electronic Fuel Injection (EFI) was first introduced to automobiles in the late 1960s. EFI is not new, as its roots were firmly established many years ago. However, EFI is fairly new to portable generators.

Basic Open-Loop Theory

EFI uses a solenoid valve called an injector to meter fuel delivery. The typical system uses one injector per cylinder. When the solenoid is energized, fuel sprays out into the intake valve port. Fuel is delivered to the injector by a high-pressure electric pump. Fuel delivery is controlled by the fuel injector which is cycled by the integrated electronic control unit (ECU) located in the throttle body. The ECU produces a signal to open the fuel injector for a certain length of time depending on engine and load conditions. The longer the fuel injector is open, the more fuel is injected. As engine load increases, the injector open time is increased to match the increased demand. In this Open-Loop EFI system, there is no oxygen (O2) sensor to monitor or change the fuel delivery.

Engine Requirements

The correct proportion of fuel is required to be mixed with incoming air for efficient operation. A rich condition is characterized by an excess of fuel and a lean condition is characterized by an excess of air or lack of fuel. As the load is increased, up to rated load, the throttle is opened and as airflow increases fuel flow must increase proportionally.

Fuel System

See ***Figure 3-1***. EFI fuel systems consist of a fuel tank mounted pump (with integrated regulator), and an injector. Fuel is drawn from the tank by the pump, which provides working fuel pressure to the injector. Fuel pressure is controlled by the fuel pressure regulator located in the fuel pump, discharging unused fuel back into the tank. The injector has a 2-pin electrical plug to carry switching current to the injector. When the injector is energized it allows the fuel to spray out in a cone like pattern.

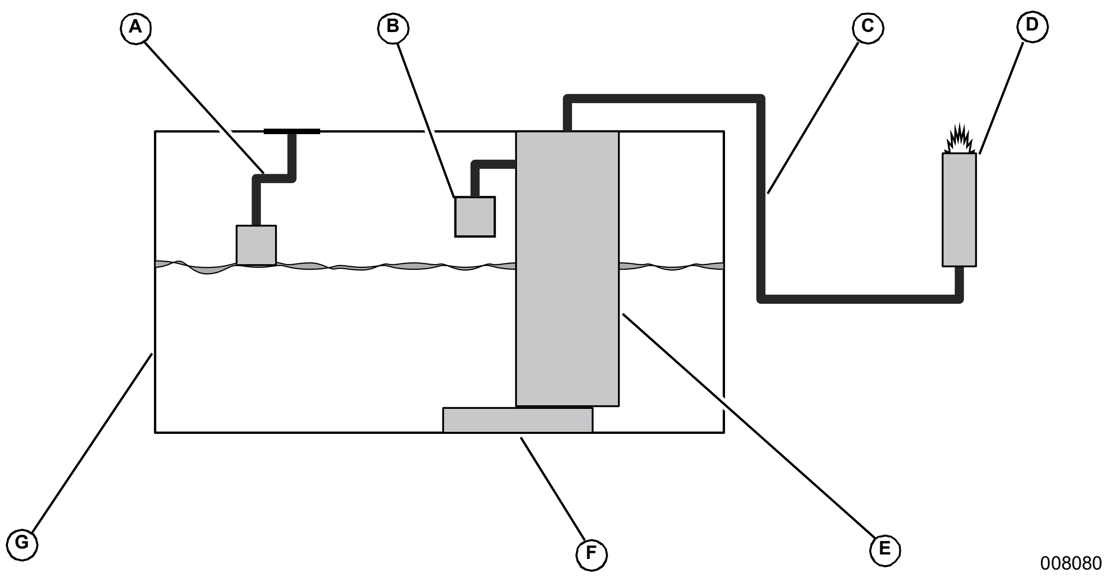


Figure 3-1. Return-less System

A. Fuel Gauge / Float
B. Pressure Regulator (Integrated with Pump)
C. Pressure Line
D. Fuel Injector
E. Fuel Pump
F. Fuel Filter
G. Fuel Tank

Air Metering and Measurement

The amount of air entering the engine is controlled by a throttle plate located in the throttle body assembly.

Airflow is measured by an integrated barometric pressure sensor in the throttle body assembly inlet. The ECU uses airflow combined with RPM, air and engine temperature to determine optimal fuel delivery in the throttle body at a specific throttle position.

Sensor Inputs

With the Open Loop EFI system, the following sensors provide input to the ECU:

RPM

RPM is measured by the crankshaft position sensor (CPS) integrated with the ignition coil. The ignition system does not fire a waste spark on the exhaust stroke—the coil only fires on the compression stroke. Testing engine RPM with a typical small engine ignition tester will only show 1800 RPM on an engine running at 3600 RPM (60 Hz). This input is primarily for governing isochronous engine speed.

Air Pressure

Air Pressure is measured by the barometric pressure sensor (BPS) located in the integrated ECU/throttle body assembly.

Throttle Position

The throttle position sensor (TPS) located in the integrated ECU/throttle body assembly.

Engine Temperature

The cylinder head thermocouple provides input to the ECU/ throttle body assembly. When the engine is cold, the air to fuel ratio must be richer to enable enough fuel to vaporize for proper starting. Where a carburetor chokes off air to enrich the mixture when cold, EFI injects extra fuel to achieve the same effect.

Air Temperature

The sensor is integrated in the ECU/throttle body assembly.

Current Transformer

The current transformer sends a load signal to the ECU/ throttle body assembly to adjust fuel injection for fast response to load changes.

Basic Operation

As explained in ***Basic Open-Loop Theory***, the computer processes all of the voltage signals from the various sensors to determine the engine operating conditions at the moment and delivers the appropriate pulse width to the injector. The computer looks at the changes in sensor inputs every few milliseconds in order to effectively regulate fuel injection.

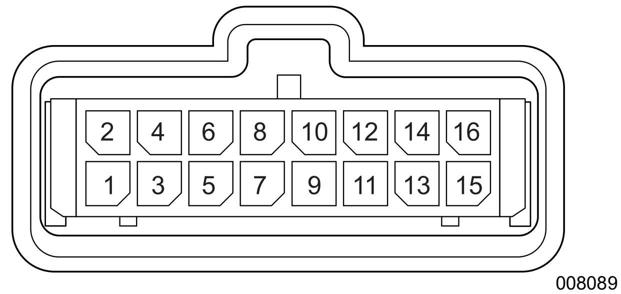


Figure 3-2. ECU/Carburetor Connector

Pin	Wire Color	Function
1	N/A	N/A
2	N/A	N/A
3	Black	Oil Pressure
4	Brown	Temperature
5	Green/White	CT (Current Transformer)
6	Grey	Idle Switch
7	Red	Battery + (POS)
8	Green/White	CT (Current Transformer)
9	Yellow/Green	Battery – (GND)
10	Red/White	Key Switch
11	Blue/White	Crankshaft Sensor
12	Yellow	Warning Lamp
13	White	Injector
14	Green	Communication
15	Orange	Fuel Pump
16	Red/Black	Ignition

If multiple failures have been detected, the fault light will turn off for 2 seconds between 2 fault codes.

Once the fault light has flashed all failure codes, the fault light will turn off for 4 seconds, and then turn on 4 seconds. The unit will repeat the fault codes again. The unit will repeat the codes up to 10 times, and then stay lit.

Once the fault(s) have been resolved, reconnect the battery. The ECU will automatically reset and stop flashing fault codes.

EFI Fault Code Diagnostics

Fault Indicator Codes – XT8000EFI

When the EFI system is connected to a power source (battery) and the generator is not running, the fault light will turn on. Once the generator starts the fault light will turn off. When a failure is detected, the fault light will flash in a series of codes. The severity of the fault will determine the flash code.

There are 3 failure levels:

- **Level 1** will flash and the generator will run. There may be a slight impact on performance.
- **Level 2** will flash and the generator will shut down if multiple errors are detected.
- **Level 3** will shut down the generator.

IMPORTANT NOTE: If the Fault Indicator Light is flashing 2/10 second on and 2/10 seconds off, this indicates a low or dead battery fault. This sequence stays on and takes precedent before other faults will be displayed.

Code ID	Failure Description	Fault Flash Pattern * (Short blink) = 0.25 sec – (Long blink) = 1.2 sec	Failure Level	Action Step
2	TPS (Throttle Position Sensor) Failure	** (2 short blinks)	3	Problem 39
3	Cylinder Temperature Failure	*** (3 short blinks)	2	Test 99
4	Temperature failure	**** (4 short blinks)	2	Problem 41
5	System Voltage Low	***** (5 short blinks)	3	Problem 43
6	System Voltage High	****** (6 short blinks)	3	Problem 43
7	Cylinder Temperature high	******* (7 short blinks)	1	Problem 42
8	Barometric Pressure Sensor Failure	******** (8 short blinks)	1	Test 69
9	Oil Pressure Abnormally Low	********* (9 short blinks)	3	Test 31
11	Fuel Injector Failure	– , * (1 long blink, 1 short blink)	3	Test 57
13	Fuel Pump Failure	– , *** (1 long blink, 3 short blinks)	3	Test 50
15	Ignition Failure	– , ***** (1 long blink, 5 short blinks)	3	Test 26
17	ECU Internal Failure	– , ******* (1 long blink, 7 short blinks)	3	Test 15
18	Crankshaft Position Sensor Failure	– , ******** (1 long blink, 8 short blinks)	1	Test 26
19	ECU Reset	– , ********* (1 long blink, 9 short blinks)	3	Problem 44
22	Engine Overspeed Failure	– , ** (2 long blinks, 2 short blinks)	3	Problem 39
24	Load Stability Sensor Failure	– , *** (2 long blinks, 4 short blinks)	1	Test 54
27	Stepper Motor Binding	– , ******* (2 long blinks, 7 short blinks)	3	Problem 39
28	Engine Starting Failure	– , ******** (2 long blinks, 8 short blinks)	1	Problem 11
None	Low Battery		0	Test 15

Fault Indicator Codes – XT8500EFI

The fault (P) code is displayed by a series of blinks to indicate the code number. There is a one second pause between blink sequences.

If multiple failures have been detected, the fault light will turn off for 2 seconds between fault codes.

Once the fault light has flashed all failure codes, the fault light will turn off for 4 seconds. Then the 4 second End Code light turns on. After the End Code light, the unit will repeat the codes up to 10 times, and then stay lit.

Once the fault(s) have been resolved, disconnect and reconnect the battery. The ECU will automatically reset and stop flashing fault codes.

Call Generac Customer Service at 1-888-GENERAC (1-888-436-3722) for assistance.

Fault code example:
Fault code P0123 is displayed by, ten blinks = 0, one second pause, one blink = 1, one second pause, two blinks = 2, one second pause, three blinks = 3, four second pause, four second light = End code.

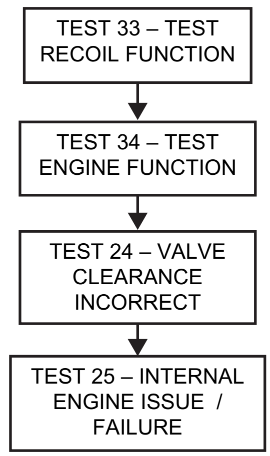
There is a one second pause between blink sequences	Fault (P) Code Example
0 = 10 Blinks - **********	P ********** (0) * (1) ** (2) *** (3) Fault Code P0123 Four Second Pause Four Second Light End Code
9 = 9 Blinks - *********	
8 = 8 Blinks - ********	
7 = 7 Blinks - *******	
6 = 6 Blinks - ******	
5 = 5 Blinks - *****	
4 = 4 Blinks - ****	
3 = 3 Blinks - ***	
2 = 2 Blinks - **	
1 = 1 Blink - *	
End Code = 4 Second Light	

Failure Description	Fault Code	Action Step
TPS high, open circuit or 5v, 12v short circuit	P0123	Problem 39
TPS low, to 0V short circuit	P0122	Problem 39
Cylinder temp high, open circuit or 5V, 12Vshort circuit	P0118	Test 99
Cylinder temp low, to 0V short circuit	P0117	Test 99
Air temp high, open circuit or 5V, 12Vshort circuit	P0113	Problem 41
Air temp low, 0Vshort circuit	P0112	Problem 41
System Voltage Low	P0562	Problem 43
System Voltage High	P0563	Problem 43
Cylinder Temperature High	P0217	Problem 42
Barometric Pressure Sensor Failure	P0226	Test 69
Oil Pressure Abnormally Low	P0524	Test 31
Injection 1 open circuit	P0201	Test 57
Injection 1 to 0V short circuit	P0261	Test 57
Injection 1 overcurrent	P0262	Test 57
Fuel pump open circuit	P0627	Test 50
Fuel pump to 0V short circuit	P0628	Test 50
Fuel pump overcurrent	P0629	Test 50
Ignition 1 open circuit	P2300	Test 26
Ignition 1 overcurrent	P2301	Test 26
ECU Internal Failure	P0606	Test 15
Crankshaft Position Sensor Failure	P0336	Test 26
ECU Reset	P1600	Problem 44
Engine Over speed Failure	P0219	Problem 39
AC current sensor open circuit failure	P1500	Test 54
AC current sensor to ground short circuit failure	P1501	Test 54
AC current sensor to 5Vshort circuit failure	P1502	Test 54
Stepper Motor Binding	P2101	Problem 39

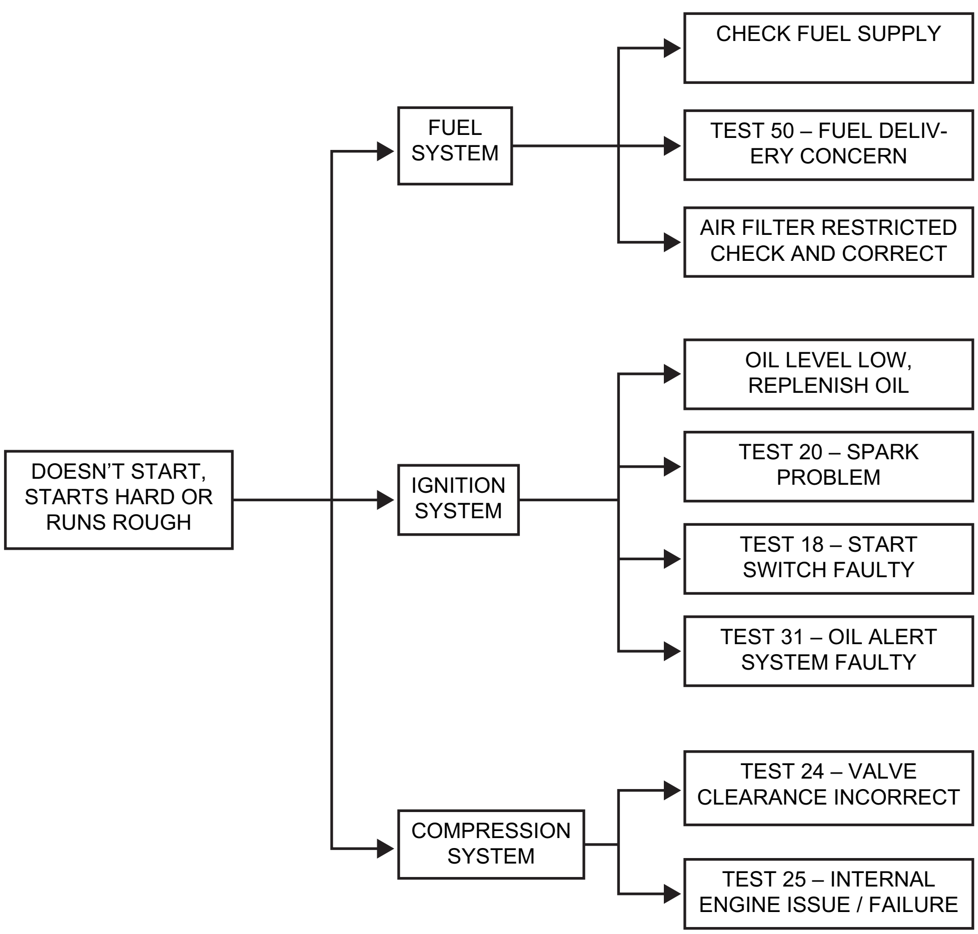
Diagnostic Flow Charts

Use the Flow Charts in conjunction with the numbered tests in this section. Test numbers used in the flow charts correspond to the numbered tests. The first step in using the flow charts is to identify the correct problem on the following pages. For best results, perform all tests in the exact sequence shown in the flow charts.

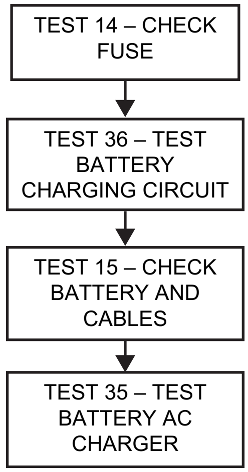
Problem 9 – Recoil Cord Will Not Pull



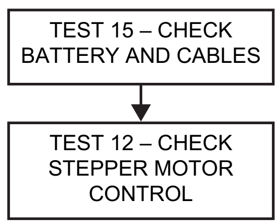
Problem 10 – Engine Starts Hard and Runs Rough



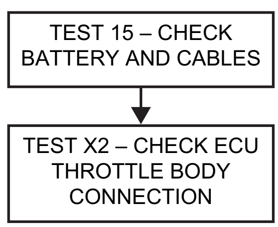
Problem 18 – Battery Will Not Charge



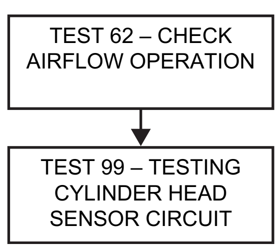
Problem 39 – Throttle Position Sensor (TPS) Failure



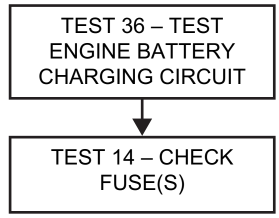
Problem 41 – Air Temperature Sensor Failure



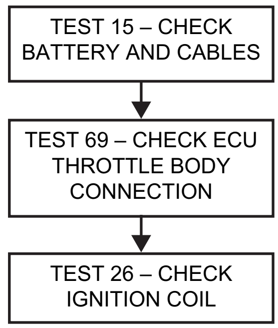
Problem 42 – Cylinder High Temp Fault



Problem 43 – System Voltage High Or Low



Problem 44 – ECU Reset



Introduction

Perform the Diagnostic Tests in this section in conjunction with the ***Diagnostic Flow Charts***. Test numbers in this chapter correspond to numbered tests in the flow charts.

NOTE: Test procedures in this manual are not necessarily the only methods for diagnosing the condition of components and circuits. All possible methods that might be used for system diagnosis have not been evaluated. If any diagnostic method is used other than the method presented in this manual, the technician must be sure that neither personal safety nor product safety, will be endangered by the procedure or method selected.

Test 12 – Check Stepper Motor Throttle Body

General Theory

If the ECU/throttle body assembly or its throttle plate is compromised in any way, it may cause the engine not to start or to set codes from the ECU.

Procedure

NOTE: The engine will not be running during this procedure.

1. Remove air cleaner cover to access the ECU/ throttle body assembly.
2. Move throttle plate by hand and verify stepper motor does not bind in any way. Some resistance should be felt as the stepper motor is moved manually.
   a. If any binding is felt, replace the ECU/throttle body assembly.
   b. If the throttle plate moves relatively freely with no binding, refer back to the flowchart.

Test 14 – Check Fuse(s)

General Theory

See ***Figure 3-2***. Three fuses protect the wiring and battery charger from a short circuit.

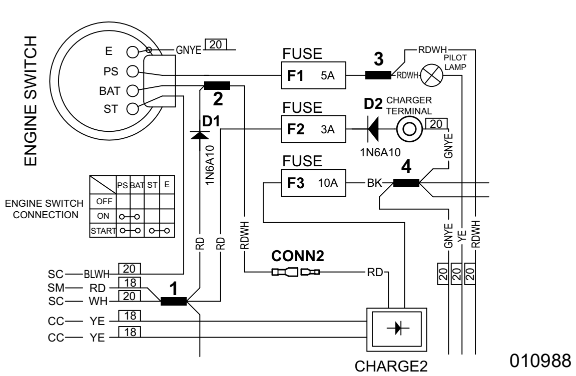


Figure 3-1. Fuses F1, F2, and F3

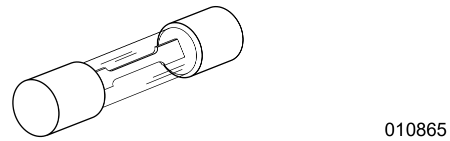


Figure 3-2. Typical Fuse

See ***Figure 3-3***. Fuse F2 (A) is located on the control panel. Fuses F1 and F3 are located in the wire harness behind the control panel.

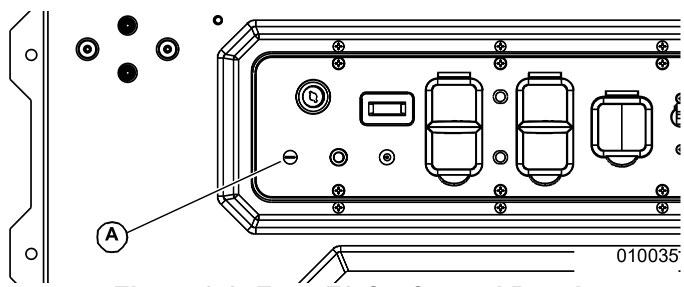


Figure 3-3. Fuse F2 On Control Panel

See ***Figure 3-4*** and ***Figure 3-5***. Fuse F1 (B) and Fuse F3 (C) are located in the wire harness behind the control panel.

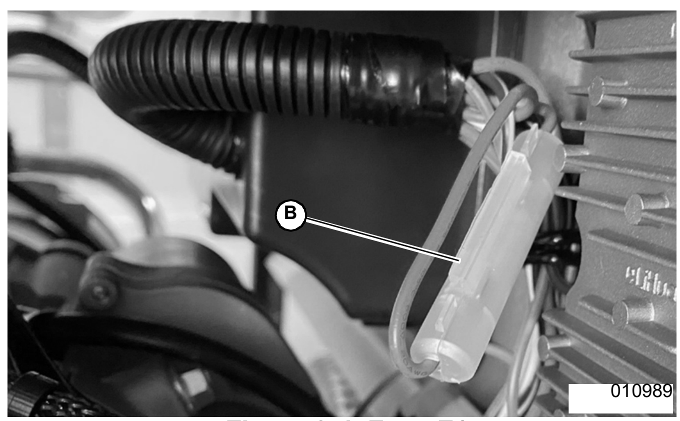


Figure 3-4. Fuse F1

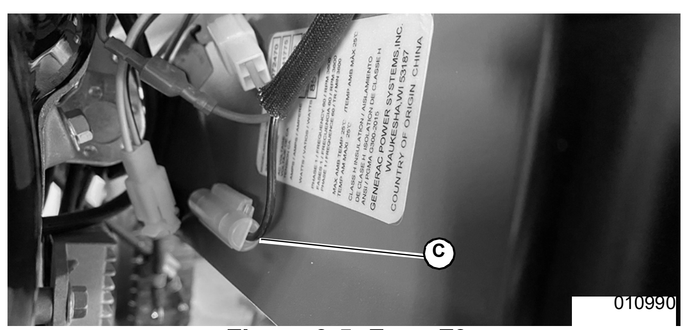


Figure 3-5. Fuse F3

Procedure

Remove and inspect fuse(s).

Results

If fuse element melted open, replace fuse with an identical size fuse. If fuse is good, refer to flow chart.

Test 15 – Checking Battery and Cables

General Theory

Battery power is used to (a) crank the engine and (b) to power the circuit board. Low or no battery voltage can result in failure of the engine to crank.

The battery charging circuit is not designed to recharge a dead battery. As well, if there is a loose connection or corrosion associated with a wire (positive or negative), battery voltage may be present, but due to high resistance, will not allow current to flow.

Electrical voltage drop varies according to current flow. Voltage drop cannot be measured unless the circuit is operated so current can flow through it. A crank attempt will need to be performed to properly measure voltage drop. This test will determine whether the battery, battery cables, or both are at fault.

Procedure A – Perform Starter Circuit Voltage Drop Test

1. Set a digital multimeter (DMM) to measure DC voltage.
2. Connect the red meter test lead to the positive battery post and connect the black meter test lead to the negative battery post.
   a. If battery voltage is 12.1 VDC or below, recharge the battery and retest.
   b. If battery voltage is 12.2 VDC or above, proceed to next step. (For this test, battery voltage should be at least 12.2 VDC)
3. To inhibit any possible startup, turn off the fuel source and ground the ignition control wire. (refer to applicable schematic)
4. Refer to battery post and starter connections in ***Figure 3-6*** and ***Figure 3-7*** then perform a voltage drop test as indicated.
5. Turn engine switch to START. Allow the engine to crank long enough to obtain a steady measurement.
6. Record voltage readings from test points V1, V2, V3 and V4. Although resistance-free connections, wires and cables would be ideal, most of them will contain at least some voltage drop. The maximum voltage readings should be as follows:
   a. 0.00-0.10 VDC across a connection or battery post (V4).
   b. 0.10-0.20 VDC on a ground connection.
   c. 0.20-0.30 VDC across a wire or cable (V1, V2).
   d. 0.20-0.30 VDC across a switch or starter contactor (V3).
   e. 0.40-0.50 VDC across the entire circuit

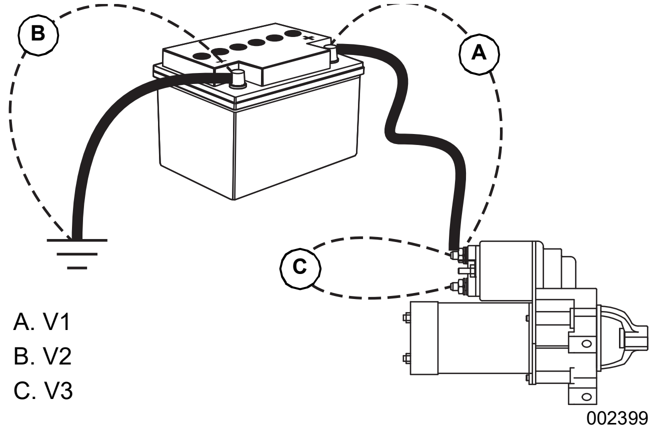


Figure 3-6. Starter Circuit Voltage Drop Test Connections

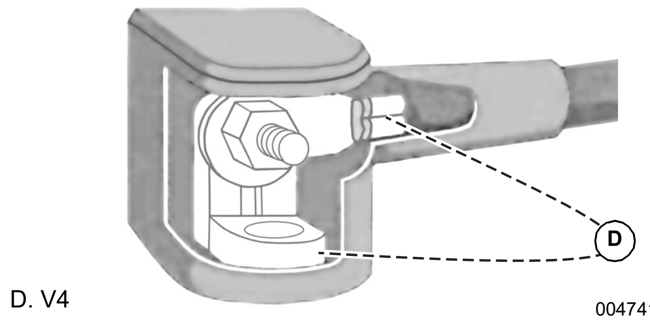


Figure 3-7. Starter Circuit Voltage Drop Test Connections

7. If voltage drop is greater than the above, based on the circuit or component, clean or replace the failed connection or component. If voltage drop test results are within the above, based on the circuit or component, refer back to the flowchart.

Test 18 – Testing Engine Switch

General Theory

The engine switch activates the system (ECU, fuel pump, etc.) when set to the ON position. When moved to the START position, the starter contactor circuit is completed to ground. If this switch is not operating properly, the system may fail to activate, or the engine may fail to start.

Procedure

1. Remove the control panel faceplate screws and pull the control panel back on the left side to access the engine switch.
2. Disconnect the engine switch.
3. Set DMM to measure resistance/continuity.
4. Set the engine switch to the OFF position.
   a. No continuity should be measured between terminals.
5. Set the engine switch to the ON position.
   a. Continuity should be measured between the RD (BAT) and the RD/WH (PS) wires.

6. Hold the engine switch in the START position.
    a. Continuity should be measured between the RD (BAT) and the RD/WH (PS) wires and the BL/WH (ST) and the GN/YE (E) wires.
7. If continuity is different than what is stated in Steps 5, 6 & 7, replace the switch.

Wire	RD/WH	RD	BL/WH	GN/YE
Terminal	PS	BAT	ST	E
OFF				
ON	●────	────●		
START	●────	────●	●────	────●

Test 19 – Check Starter Motor

The following conditions affect starter motor performance:

1. Binding or seizing in starter motor bearings.
2. A shorted, open, or grounded armature.
    a. Shorted, armature (wire insulation worn and wires touching),. indicated by low or no RPM.
    b. Open armature (wire broken), indicated by low or no RPM and excessive current draw.
    c. Grounded armature (wire insulation worn and wire touching armature lamination or shaft), indicated by excessive current draw or no RPM.
3. A defective starter motor switch.
4. Broken, damaged or weak magnets.
5. Starter drive dirty or binding.

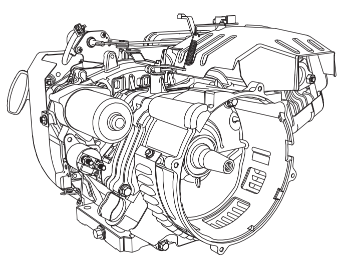


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Figure 3-8. Starter Motor (SM)

Procedure

Verify battery has been fully charged and checked before proceeding.

Set a DMM to measure DC voltage (12 VDC). Connect meter positive (+) test lead to starter contactor stud (the small jumper wire connected to starter). Connect common (-) test lead to starter motor frame.

Turn engine switch to start and observe meter. Meter should indicate battery voltage. Starter motor should operate and engine should crank.

Results

1. If battery voltage is indicated on meter but motor did NOT operate, remove and test starter motor for proper operation independent of engine.
2. If battery voltage was indicated and Starter Motor tried to engage (pinion engaged) but engine did not crank, check for mechanical binding of engine or rotor.

NOTE: If a starting problem is encountered, the engine itself should be thoroughly checked to eliminate it as the cause of starting difficulty. It is good practice to check engine for freedom of rotation by removing spark plugs and turning crankshaft over slowly by hand to be sure it rotates freely.

IMPORTANT NOTE: Do not rotate engine with electric starter with spark plugs removed. Arcing at the spark plug ends may ignite the gasoline vapor exiting the spark plug hole.

⚠DANGER

Explosion and Fire. Fuel and vapors are extremely flammable and explosive. Store fuel in a well ventilated area. Keep fire and spark away. Failure to do so will result in death or serious injury.

(000143)

⚠WARNING

Explosion. Turn fuel supply OFF before checking for spark. Failure to do so could result in death or severe injury.

(000333)

Checking The Pinion

See ***Figure 3-9***. When starter motor is activated, the pinion gear should move and engage flywheel ring gear. If pinion does not move normally, inspect pinion for binding or sticking.

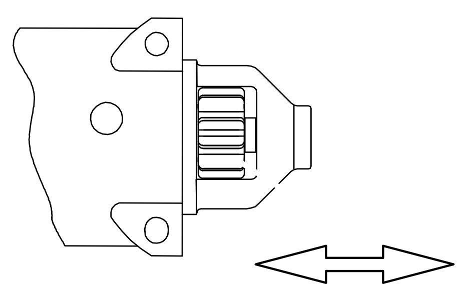

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Figure 3-9. Check Pinion Gear Operation

Test 20 – Check Ignition Spark

Procedure

A commercially available spark tester may be used to test engine ignition system. One can also be purchased from Generac or local supplier (Generac P/N 0C5969).

NOTE: Set the distance of the adjustment screw tip at the 10kV mark. When performing the test monitor the gap for proper spark and color.

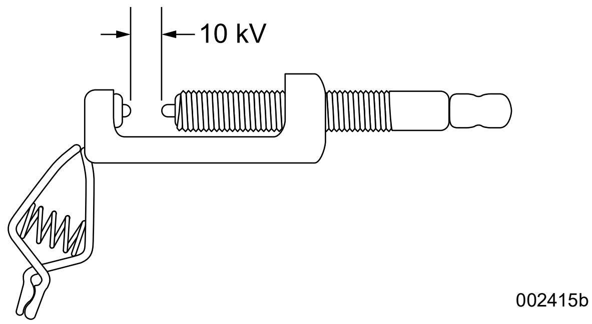


Figure 3-10. Spark Tester

The cranking system and engine must be in proper working order to insure accurate results.

1. Disconnect spark plug lead from spark plug.
2. Attach high tension lead to spark tester terminal.
3. See ***Figure 3-11*** and ***Figure 3-12***. Ground spark tester clamp by attaching to cylinder head.
4. Crank engine rapidly. Engine must crank at 350 rpm or more. If spark jumps tester gap, assume the ignition system is working properly. Repeat on remaining cylinder spark plug.

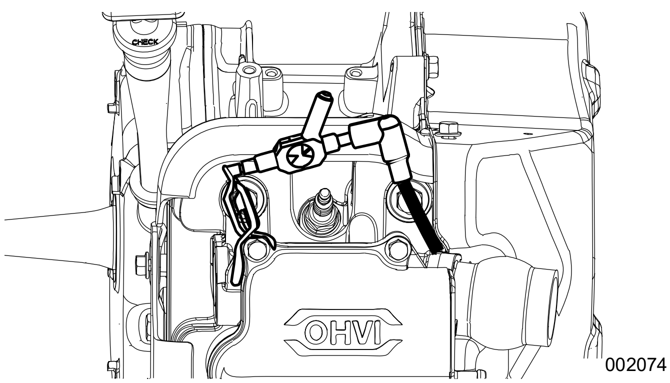


Figure 3-11. Testing Ignition System

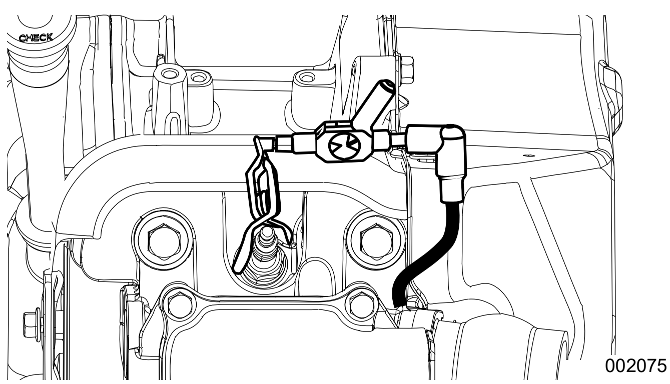


Figure 3-12. Checking Engine Misfire

5. If spark jumps tester gap intermittently, the problem may be in the ignition magneto.

Results

Refer to flow chart.

Test 21 – Check Spark Plug(s)

Procedure

See ***Figure 3-13*** and ***Figure 3-14***. Remove spark plug(s). Clean with commercial solvent. Replace spark plugs if badly fouled, if ceramic is cracked, or if badly worn or damaged.

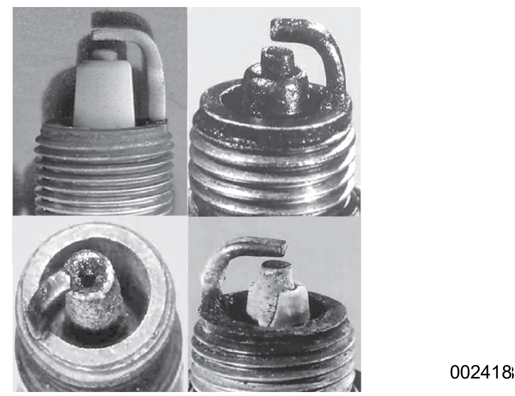


Figure 3-13. Spark Plug Conditions

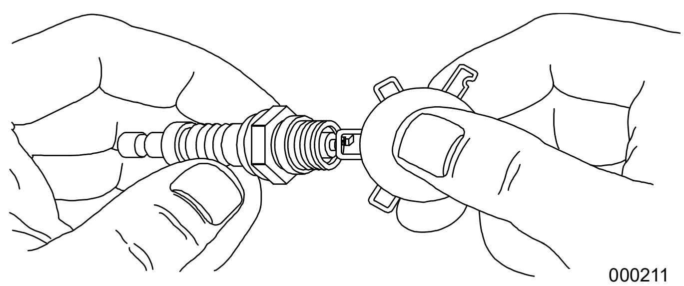


Figure 3-14. Setting Spark Plug Gap

Results

1. Clean and gap or replace spark plug(s) as necessary.
2. Refer to flow chart.

Test 24 – Check Valve Adjustment

Adjusting Valve Clearance

Improperly adjusted valves can cause various engine related problems including, but not limited to, hard starting, rough running and lack of power.

Adjust valve clearance with engine at room temperature. The piston should be at top dead center (TDC) of its compression stroke (both valves closed).

Another method is to turn engine over and position intake valve fully open (intake valve spring compressed) and adjust exhaust valve clearance. Turn engine over and position exhaust valve fully open (exhaust valve spring compressed) and adjust intake valve clearance.

1. See ***Figure 3-15***. Loosen rocker arm jam nut (A). Turn pivot ball stud (B) while checking clearance between rocker arm and valve stem with a feeler gauge.

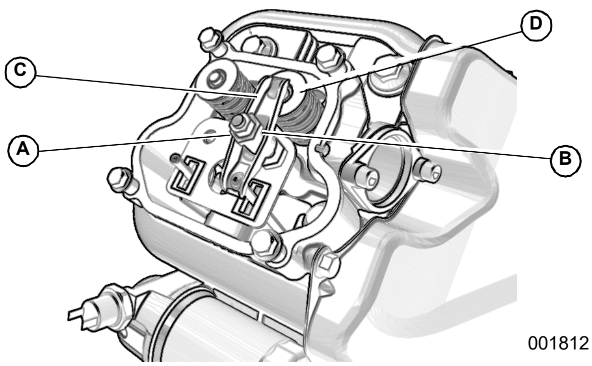


Figure 3-15. Adjusting Valve Clearance

2. See ***Figure 3-15***. When clearance is correct, hold pivot ball stud with wrench and tighten rocker arm jam nut to specified torque. After tightening jam nut, recheck valve clearance.

Table 3-1.	
Rocker Arm Jam Nut	ft-lbs
459cc	9 to 12

Adjust Valve Clearance

See ***Figure 3-15***. Check and adjust the valve to rocker arm clearance as follows:

1. Remove the four screws attaching the valve cover and remove valve cover.
2. Discard valve cover gasket.
3. Loosen the rocker jam nut (A) using a 10 mm wrench.
4. Turn the pivot ball stud (B) using a 14 mm wrench while checking clearance between the rocker arm (C) and the valve stem (D) with a feeler gauge. Adjust clearance per ***Table 3-2***.

Table 3-2.	
Engine	Intake & Exhaust Valve
459cc	0.003–0.004 inch (0.08–0.10 mm)

Install Rocker Arm Cover

1. Use a new rocker arm cover gasket. Install rocker arm cover and retain with four screws.

Results

Adjust valves to specification and test. If problem continues, refer to flow chart.

Test 25 – Check Engine / Cylinder Leak Down Test / Compression Test

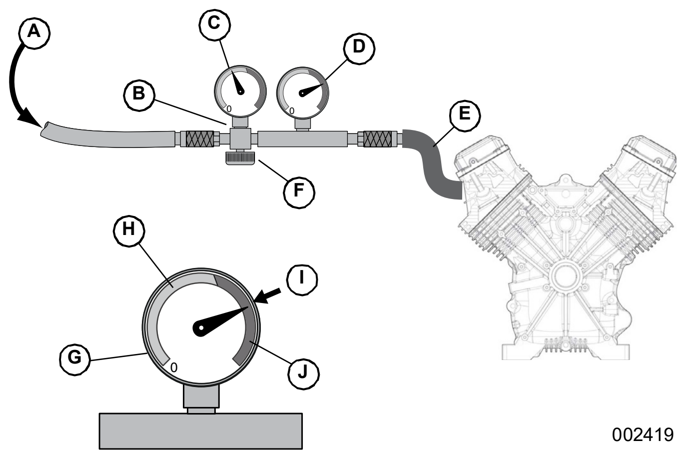
General Theory

Most engine problems may be classified as one, or a combination of the following:

- Will not start
- Starts hard
- Lack power
- Runs rough
- Vibration
- Overheating
- High oil consumption

General Theory

The Cylinder Leak Down Tester checks sealing (compression) ability of engine by measuring air leakage from combustion chamber. Compression loss can present many different symptoms. This test detects the section of the engine where the fault lies before disassembling the engine. ***Figure 3-16*** represents a standard tester available on the market.



A. Compressed air in
B. Air pressure regulator
C. Inlet gauge pressure set point
D. Outlet gauge pressure
E. To spark plug hole
F. Regulator adjustment knob
G. Outlet gauge
H. Red range indicates unacceptable leakage
I. Needle indicates minimal air leakage
J. Green range indicates acceptable leakage

Figure 3-16. Cylinder Leakdown Tester

Procedure

1. Shut off the fuel supply.
2. Remove spark plug.
3. Gain access to flywheel.
4. Remove valve cover.

5. Rotate engine crankshaft until the piston reaches top dead center (TDC). Both valves should be closed.
6. Lock flywheel at top dead center.
7. Attach cylinder leak down tester adapter to spark plug hole.
8. Connect an air source of at least 90 psi to the leak down tester.
9. Adjust regulated pressure on gauge to 80 psi.
10. Read right hand gauge on tester for cylinder pressure. 20 percent leakage is normally acceptable. Use good judgment, and listen for air escaping at carburetor, exhaust, and crankcase breather. This determines where the fault lies.

Results

- Air escapes at carburetor – check intake valve.
- Air escapes through exhaust – check exhaust valve.
- Air escapes through breather – check piston rings.
- Air escapes from cylinder head – replace head gasket.

Check Compression

To check engine compression, remove spark plug. Insert an automotive type compression gauge into the spark plug hole. Crank engine until there is no further in pressure. The highest reading obtained is engine compression pressure.

Minimum Allowable Compression Pressure Cold Engine – 60 psi

If compression is poor, look the following causes:

- Loose cylinder head bolts
- Failed cylinder head gasket
- Burned valves or valve seats
- Insufficient valve clearance
- Warped cylinder head
- Warped valve stem
- Worn or broken piston ring(s)
- Worn or damaged cylinder bore
- Broken connecting rod
- Worn valve seats or valves
- Worn valve guides

NOTE: The 459cc engine has a compression release system that will not allow full compression pressure while cranking. Compression test results can range from 60–110 psi.

Test 26 – Check Ignition Coil

General Theory

The ignition system is a solid-state (breakerless) type. The system utilizes a magnet on the engine flywheel to induce a relatively low voltage into an ignition coil assembly. The ignition coil increases voltage and delivers the high voltage across spark plug gap.

The ignition coil houses a solid-state circuit board controlling ignition timing. Timing is fixed, air gap is non-adjustable, and spark advance is automatic.

Major components of the ignition system include (a) ignition coil assembly, (b) spark plug, and (c) engine flywheel.

Solid-state components encapsulated in ignition coil are not accessible and cannot be serviced. If coil is defective, replace assembly. The air gap between the coil and flywheel magnet is fixed and non-adjustable.

See *Figure 3-17*. The ignition coil assembly consists of (a) ignition coil, (b) spark plug high tension lead, and (c) spark plug boot.

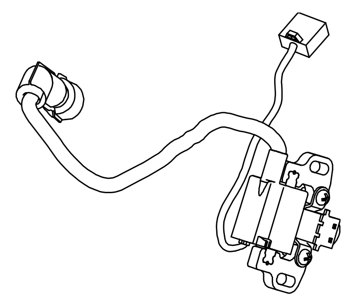


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Figure 3-17. Ignition Coil

Procedure

1. Disconnect Wire 18 at bullet connector and repeat Test 20.
2. If unit produces spark, a short to ground exists on Wire 18 between the Ignition Coil and RUN-STOP switch.
3. If unit still failed to produce spark, proceed to Step 4.
4. Set a DMM to measure resistance. Connect negative (-) test lead to Wire 18, going to the coil. Connect positive (+) test lead to frame ground. Approximately 1.5 kΩ should be measured.
5. Set a DMM to measure resistance. Disconnect high tension lead from spark plug. Connect one test lead to high tension lead. Connect other test lead to frame ground. Approximately 16 kΩ should be measured.

Results

1. If unit was able to produce spark after disconnecting Wire 18, a short to ground or a faulty switch is supplying Wire 18 with a ground inhibiting the engine from producing spark.
2. If Ignition Coil fails Step 4 or Step 5 by a high margin, replace Ignition Coil.

3. If coil passes Step 4 and Step 5 but there is still no spark, replace ignition coil.

NOTE: Before replacing ignition coil, check flywheel magnet.

Checking Flywheel Magnet

The flywheel magnet rarely loses magnetism. To determine if a magnet is be defective, perform this test:

1. Place flywheel on a wooden surface.
2. Hold a screwdriver at the utmost end of handle with its point down.
3. Move tip of screwdriver to about 3/4 inch (19mm) from magnet. The screwdriver blade should be pulled in against magnet.

Flywheel Key

In all cases, the flywheel's taper is locked on the crankshaft taper by the torque of the flywheel nut. A keyway is provided for alignment only and theoretically carries no load.

If flywheel key becomes sheared or even partially sheared, ignition timing can change. Incorrect timing can result in hard starting or failure to start.

Test 27 – Check Flywheel

General Theory

In Test 20, a spark tester was used to check for engine ignition. If sparking or weak spark occurred, a possible cause might be the ignition magneto. This test checks magnetism of flywheel and will check the flywheel key.

Procedure

1. Check flywheel magnet by holding a screwdriver at extreme end of handle with its point down. When the tip of screwdriver is moved to within 3/4 inch (19mm) of magnet, the blade should be pulled in against the magnet.
2. For rough running or hard starting engines, check flywheel key. The flywheel's taper is locked on the crankshaft taper by the torque of the flywheel nut. A keyway is provided for alignment only and theoretically carries no load.

NOTE: If flywheel key becomes sheared or even partially sheared, ignition timing can change. Incorrect timing can result in hard starting or failure to start.

Test 31 – Check Oil Pressure Switch

If engine cranks and starts, then shuts down almost immediately, check the following:

- Low engine oil level.
- Low oil pressure.
- Defective oil pressure switch.

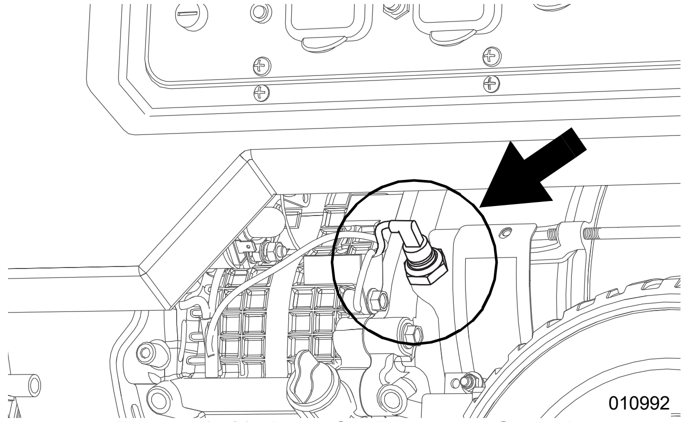

Figure 3-18. Low Oil Pressure Switch

Procedure

1. Check engine crankcase oil level.
   a. Check engine oil level.
   b. If necessary, add recommended oil to dipstick FULL mark. DO NOT OVERFILL ABOVE FULL MARK.
2. Do the following:
   a. Disconnect Black wire from oil pressure switch terminal.
   b. Remove switch and install an oil pressure gauge.
   c. Start engine while observing oil pressure reading on gauge.
   d. Note oil pressure.
      (1) Normal oil pressure is approximately 20–40 psi with engine running. If normal oil pressure is indicated, go to Step 4 of this test.
      (2) If oil pressure is below about 5 psi, shut engine down immediately. A problem exists in engine lubrication system.
3. Remove oil pressure gauge and install oil pressure switch. Do NOT connect Black wire to switch terminal.
   a. Set a DMM to measure resistance.
   b. Connect meter test leads across switch terminals. With engine shut down, the meter should read INFINITY.
   c. Crank and start engine. The meter should read CONTINUITY.
   d. Connect one test lead to Wire 0 (disconnected from LOP). Connect the other test lead to a clean frame ground. CONTINUITY should be measured. If CONTINUITY is NOT measured repair or replace Wire 0 between the LOP and the ground terminal connection on engine mount.
4. If LOP switch tests good in Step 3 and oil pressure is good in Step 2 but unit still shuts down with a LOP fault, check wire between engine switch and EFI controller. If wire is damaged, replace wire.

Results

1. If LOP switch, oil pressure, and wiring all test good, refer to flow chart.
2. If LOP switch failed, replace switch.
3. If no pressure was measured, an internal failure of oil pump may have occurred.

Test 33 – Test Recoil Function

Procedure

1. Attempt to pull start engine and observe that the cord pulls easily and smoothly, returns with no assistance and turns engine crankshaft over as the cord is pulled. If recoil did not perform correctly, possible problems could be:
   a. Recoil mechanism not engaging flywheel starter cup.
   b. Recoil mechanism not properly retracting.
2. Remove recoil and inspect. If recoil is damaged, doesn't pull or the cord doesn't retract easily replace the recoil assembly.
3. If recoil is okay, attempt to turn engine over by hand by grasping the starter cup or by inserting a screwdriver into the cup slots and exerting rotational force on the engine. If the engine is difficult to turn over, or doesn't turn, possible problems could be:
   a. Compression release mechanism malfunctioning.
   b. Valve adjustment incorrect.
   c. Engine seized.
4. If any of the attempts to turn the engine over fail in Step 3, refer to Flowchart.

Test 34 – Test Engine Function

Procedure

1. Remove recoil and front cover assembly.
2. Remove spark plug from unit.
3. Attempt to turn engine over by hand.
4. Visually inspect for obstructions that would cause binding of the recoil once installed.

Results

1. If engine cannot turn over freely with spark plug removed, either:
   a. the engine has suffered an internal failure and seized,
   b. and/or the alternator end has seized.
2. Disconnect engine from alternator end and retest.
3. Refer to flow chart.

Test 35 – Test Battery Wall Charger

General Theory

The EFI generator is equipped with a battery charger circuit to charge the battery when the generator IS running. A 120 VAC wall charger also comes with the generator to plug into a 120 VAC outlet to charge the battery when the generator is NOT running. This test will determine if the wall charger is operational or has failed.

Procedure

1. Check AC voltage for the charger at the outlet.
   a. If voltage is not present try another outlet.
   b. If voltage is present go to Step 2.
2. With the charger plugged in, check for DC voltage at the external battery charger connector.
3. Set DMM to read DC volts and place the positive lead in the center of the plug and the negative lead to the outside of the plug.
   a. The voltage should be Approximately 14 VDC.
   b. If voltage is not present, replace charger.
   c. If voltage is present, go to step 4.
4. Remove battery cables from battery.
5. Place meter leads, red to positive cable, and negative to ground cable. Approximately 14 VDC should be measured
   a. If voltage is not measured, check of an open F2 Fuse. If open, replace and repeat Step 5.
   b. If voltage is measured, refer to Test 15.

Test 36 – Test Engine Battery Charging Circuit

General Theory

The charging circuit has two wires coming from one charging coil and two other wires from a second charging coil. The battery charging circuit is identified as CHARGE 1 and is strictly for charging the battery. The ECU/fuel pump charging circuit two (CHARGE 2) is strictly for and is separated by a blocking diode (1N6A10).

Each charging circuit has its own regulator/rectifier. CHARGE 1 regulator/rectifier is mounted to the engine under the control panel. CHARGE 2 regulator/rectifier is located on the back of the control panel. CHARGE 1 circuit is unfused. CHARGE 2 circuit is protected by a 10A fuse (F3).

The battery is constantly being charged during the operation of the generator. The charge coils are located under the flywheel. CHARGE 1 and has two AC White wires that lead to its regulator/rectifier and CHARGE 2 has two AC Yellow (or Tan) wires that lead to its regulator/rectifier. DC voltage is delivered to the battery via a “Red” wire with each circuit/system. See Wiring Diagram for greater detail.

Procedure/Results

NOTE: Be sure to check battery condition with a Conductance Tester prior to conducting the following test. Battery should be fully charged and its condition should be greater than 65%.

NOTE: Refer to the specific Wiring Diagram for proper component and wire identification.

NOTE: Engine will be running during each test.

1. Start Engine and let run for one two minutes. Measure voltage on Battery positive and negative terminals. Shut engine off.
   a. If voltage measured greater than 12.6 VDC, stop testing and refer back to the flowchart. Charging circuit is good.
   b. If voltage measured greater than 16 volts, and battery tested okay above, go to Step 6.
   c. If voltage measured less than 12.6 VDC, proceed to Step 3.
2. Set DMM to measure AC Volts and check for AC Volts on two White Wires coming from the CHARGE COIL.
   a. If voltage measured less than 18 VAC, repair wire/terminal if compromised or replace the CHARGE COIL.
   b. If voltage measured greater than 18 VAC, go to Step 4.
3. Set DMM to measure DC Volts and check for DC Volts on the Red Wire coming from the CHARGE 1 regulator/rectifier.
   a. If voltage measured less than 12.5 VDC, and battery is fully charged, replace the CHARGE 1 regulator/rectifier.
   b. If voltage measured greater than 12.5 VDC, but less than 16 VDC, go to Step 4.
4. Set DMM to measure AC Volts and check for AC Volts on two Yellow (or Tan) Wires coming from the CHARGE COIL.
   a. If voltage measured less than 26 VAC, repair wire/terminal if compromised and/or replace the CHARGE COIL.
   b. If voltage measure greater than 26 VAC, go to Step 5.
5. Set DMM to measure DC Volts and check for DC Volts on the Red Wire coming from the CHARGE 2 regulator/rectifier.
   a. If voltage measured less than 13.0 VDC, replace the 10A Fuse (F3).
   b. If voltage measured less than 13.0 VDC after replacing the fuse, replace the CHARGE 2 regulator/rectifier.
   c. If voltage measured greater than 13.0 VDC, but less than 16 VDC, go to Step 6.
6. Set DMM to measure DC volts. Disconnect CHARGE 1 regulator/rectifier from the CHARGE COIL and check for voltage at the Battery Positive terminal.
   a. If voltage measured other than static battery voltage, replace diode/harness.

Test 37 – Test Idle Control

The XT8000-EFI is equipped with a low idle control system that reduces the engine idle speed while at no load.

Procedure

1. Remove all loads from generator.
2. Test low idle switch.
3. Remove wires. Set DMM to Ohms and zero out meter.
4. With wires removed, place meter leads on the switch. Place switch to (ON) low idle. The meter should read CONTINUITY.
5. Place low idle switch to OFF. The meter should read open.
6. If CONTINUITY was measured in step 6, continue testing.
7. If CONTINUITY was not measured, replace switch and test.

Generator Will Not Switch Off Low Idle When Load Is Applied

8. Check idle control transformer. Remove plugs from idle control transformer.
9. Set DMM to read Ohms between the leads of the idle control transformer 53.9 Ohms. If idle control transformer reads open, replace. If transformer reads resistances, replace control board.

Test 50 – Testing Fuel Pump

General Theory

The fuel pump pickup sock needs to be submerged in fuel in order for fuel to pressurize in the system.

The ECU supplies battery voltage (typically 12.6 to 13.8 VDC) to the fuel pump in the KO (Key On) and KS (Key Start) positions. When the key is first set to the ON position, the fuel pump will run momentarily to pressurize the fuel system. When the generator is running, the fuel pump provides necessary pressure to the fuel injector to maintain a run condition.

IMPORTANT NOTE: See *Figure 3-19*. Do not pierce wires with test probes. Use needle multimeter test probes (Generac P/N A0000683522) to back probe the wires at the connection.

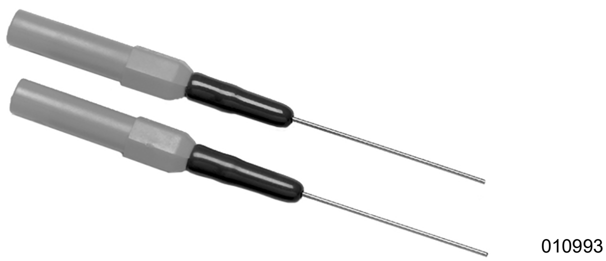

Figure 3-19. Needle Multimeter Test Probes

NOTE: During this procedure, battery voltage must be a minimum of 12.5 VDC.

Procedure

NOTE: During these tests, the engine will not be running.

1. Set the KEY SWITCH to the ON position and listen for the fuel pump to run (hum or buzz momentarily).
   a. If fuel pump does not run, go to Step 2.
   b. If fuel pump runs, check fuel level.
   c. If fuel level is sufficient, remove the pump cover, remove the screws, lift the pump out of the tank and check for contamination and/or blockage of the fuel pickup sock. Clean sock or replace fuel pump. Repeat Step 1.
2. See ***Figure 3-20***. Set key switch to the OFF position. Remove the cover from the fuel pump and disconnect the fuel pump connector (A) and the ECU connector (CONN1), observing the integrity of the wires and the connections.

Figure 3-20. Fuel Pump Connector

   a. If the fuel pump wires, harness connector or fuel pump connector itself appears compromised or damaged, repair or replace.
   b. If the fuel pump wires, harness connector or fuel pump connector itself appears okay, go to Step 4.
3. See ***Figure 3-21***. Reconnect the fuel pump harness connector and verify proper operation of the fuel pump circuit by back probing between the OG Wire (A) and the RD/WH (B) Wire at the fuel pump to monitor voltage. Set the KEY SWITCH to the ON position. Battery voltage should be measured.

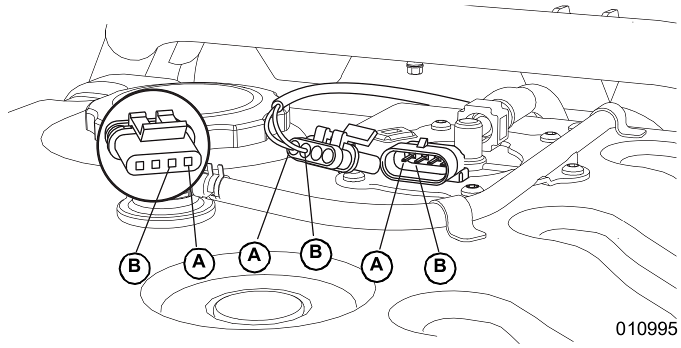

Figure 3-21. Fuel Pump Connector Test Points

   a. If the voltage value is not correct, check for minimum battery voltage at the battery.
   b. If the battery voltage is correct and the voltage is incorrect at the fuel pump connector, go to Step 5.
   c. If the voltage value at the pump connector is correct, go to Step 6.
4. Disconnect the fuel pump connector and the 16-pin harness connector (CONN1) at the ECU. Probe the OG terminal (A) at the fuel pump connector and at the OG terminal at the ECU (CONN1). Then probe the RD/WH terminal (B) at the fuel pump connector and at the RD/WH terminal at the ECU (CONN1). Also, check each wire (OG and RD/WH) to ground. Refer to the Pin-Out of the 16-pin connector (CONN1).
   a. The resistance of each wire should not be greater than 0.3 ohms.
   b. If the resistance of each wire is greater than 0.3 ohms, or if the wire is open (OL), or if the wire is shorted to ground, replace the wire harness.
   c. If the resistance is good, go to Step 6.
5. Disconnect the fuel pump, measure the resistance of the fuel pump between the OG (A) terminal and the RD/WH (B) terminal, and measure the resistance of the fuel pump connector pins to ground.
   a. Compare the resistance value of the pump to the values in ***Specifications***.
   b. If the fuel pump resistance value does not match the resistance in ***Specifications***, replace the fuel pump.
   c. If the fuel pump resistance is good and the ECU harness connections are good, replace the ECU.

Table 3-3. Fuel Pump Resistances

OG to RD/WH Terminals	1.4 ± 0.2 Ohms
OG Terminal to Ground	OL - Open Circuit
RD/WH Terminal to Ground	OL - Open Circuit

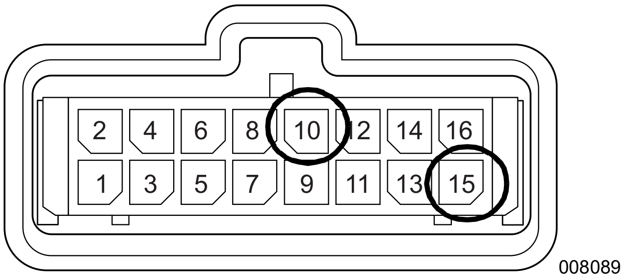

Figure 3-22. ECU/Throttle Body Connector

Pin	Wire Color	Function
10	Red/White	Key Switch
15	Orange	Fuel Pump

Test 54 – Check Current Transformer (CT)

General Theory

An EFI unit monitors load (current) through a Current Transformer (CT) mounted in the Control Panel. The CT provides an AC output signal proportional to the current flowing in the MAIN WINDING leads RD and BK.

Procedure

DANGER

Electrocution. Lethal voltage may be present at current transformers (CTs). Do not touch CTs while primary current is applied. Doing so will result in death or serious injury. (000310)

1. Set DMM to measure resistance.
2. See ***Figure 3-23***. Remove ECU/throttle body connector (CONN1). Probe the two GN/WH Wires and measure resistance. Approximately 378 ohms should be measured.
   a. If proper resistance was not measured, replace the CT/Wire Harness
   b. If proper resistance was measured, refer back to the flowchart.

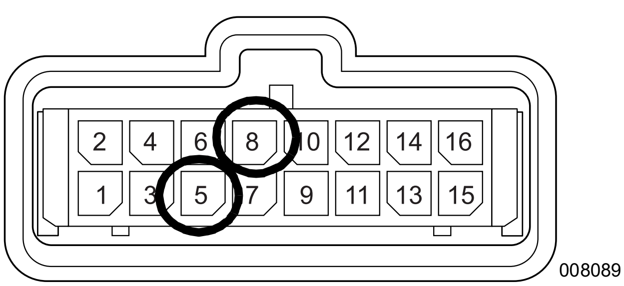

Figure 3-23. ECU/Carburetor Connector

Pin	Wire Color	Function
5	Green/White	CT (Current Transformer)
8	Green/White	CT (Current Transformer)

Test 57 – Testing Fuel Injector

Procedure

1. Disconnect fuel injector at the ECU/throttle body.
2. Measure resistance between RD Wire terminal and RD/WH Wire terminal on the injector connector and then from each connector terminal to ground.
   a. If the measurements were consistent with the values found in ***Specifications***, refer back to the flowchart.
   b. If the measurements were inconsistent with the values found in ***Specifications***, replace the ECU/throttle body assembly
3. Reconnect the fuel injector to the ECU/throttle body.

Test 62 – Engine Over Temperature Diagnostic

General Theory

The ECU monitors the cylinder head sensor for overheating. When the engine begins overheating, a High Temperature Alarm is triggered.

Procedure

NOTE: During these tests, the engine will not be running.

1. Verify that the engine has cooled down (engine block is cool to the touch). This will allow the cylinder head sensor to cool as well.
2. Check the area surrounding the generator. There should be at least three feet of clear area around the entire unit. Verify there are no blockages or obstructions preventing cooling air from entering or exiting the unit.
   a. Remove any blockages or obstructions and restart the unit. Retest.
   b. If the area surrounding the unit is clear of blockages or obstructions, go to Step 3.
3. Check for air blockage/restriction in the blower housing or possible broken fan that may be causing the overheating issue. Remove recoil and inspect the blower housing and flywheel fan.
   a. If the fan is damaged or broken, replace the fan/flywheel assembly.
   b. If the blower housing is clear of debris and the fan is not damaged or broken, recheck Step 2.
   c. If Step 3 indicates no blockage, restriction or obstruction, refer back to the flowchart.

Test 69 – Testing ECU Connector

General Theory

If the ECU connector or its pins are compromised in any way, this may cause the engine not to start or to set codes from the controller.

Procedure

1. See ***Figure 3-24***. Disconnect the 16-pin harness connector (CONN1) at the ECU. Visually inspect the connector to be sure each wire terminal is locked into the connector. Also, inspect the terminal pins to be certain no pins are spread apart. Use a magnifying glass if necessary.
    a. If any there are any loose pins, spread pins or damaged wires present, replace the harness.

Figure 3-24. 16-Pin Harness Connector (CONN1)

Test 99 – Testing Cylinder Head Sensor Circuit

General Theory

See ***Figure 3-25***. The ***cylinder head sensor*** is located on the lower right screw of the valve cover and has two wires.

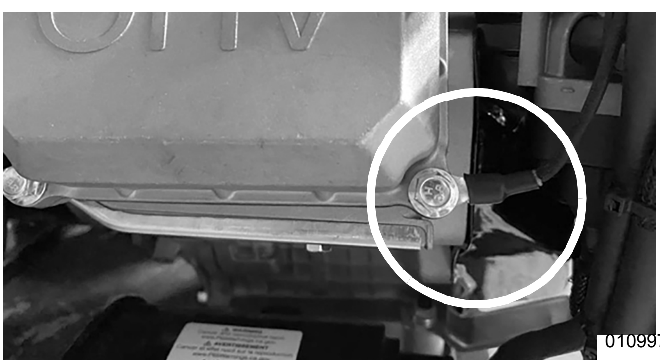

Figure 3-25. Cylinder Head Sensor

When the engine begins overheating, a High Temperature Alarm is triggered.

IMPORTANT NOTE: See *Figure 3-26*. Do not pierce wires with test probes. Use needle multimeter test probes (Generac P/N A0000683522) to back probe the wires at the connection.

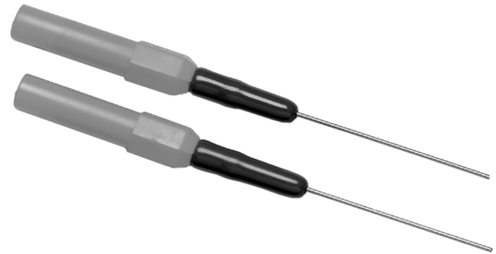

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Figure 3-26. Needle Multimeter Test Probes

Procedure

NOTE: During these tests, the engine will not be running.

1. Disconnect and reconnect the cylinder head temperature sensor connector, ensuring that it has a good connection to the wire harness.
    a. If the cylinder head temperature sensor appears compromised or damaged, replace the sensor.
    b. If the harness connector for the cylinder head temperature sensor appears compromised or damaged, replace the wire harness.
2. See ***Figure 3-27***. Disconnect the Cylinder Head Temperature Sensor and the 16-pin harness connector (CONN1) at the ECU. Probe the YE terminals at the sensor connector and at the ECU (CONN1).

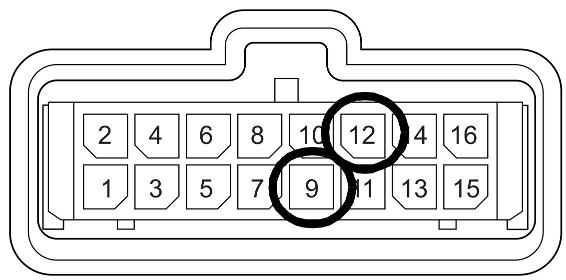

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Figure 3-27. ECU/Throttle Body Connector

Pin	Wire Color	Function
9	Yellow/Green	Battery – (GND)
12	Yellow	Warning Lamp

3. Probe the GN/YE terminal at the sensor and at the GN/YE terminal at the ECU (CONN1). Also, check each wire (YE and GN/YE) to ground. Refer to the Pin-Out of the 16-pin connector (CONN1).
    a. The resistance of each wire should not be greater than 0.3 ohms.
    b. If the resistance of each wire is greater than 0.3 ohms, or if the wire is open (OL), or if the wire is shorted to ground, replace the wire harness.
    c. If the resistance is good, go to Step 4.

4. See *Figure 3-28*. Disconnect the cylinder head temperature sensor. Measure the resistance of the sensor between the YE terminal and the GN/YE terminal, and measure the resistance of the sensor pins to ground.

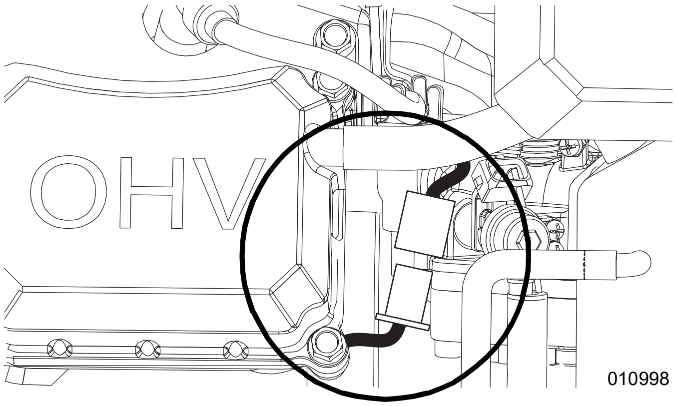


Figure 3-28. Cylinder Head Sensor Connector

a. Compare the resistance value to *Table 3-4*. If not within the specification, replace the sensor.
b. If no other faults are found, replace the ECU.

Table 3-4. Cylinder Head Sensor Resistance	
YE to GN/YE Terminals	approx. 14.5 Ohms @ambient temp
YE Terminal to Ground	OL - Open Circuit
GN/YE Terminal to Ground	OL - Open Circuit

Section 4 Major Disassembly

Introduction

Each generator model has a unique method of disassembly. ***Figure 4-1*** is a simplified version of disassembly that does not go into step by step instructions. The figure below represents the basic disassembly of the fuel tank, stator, rotor, and the engine.

NOTE: Factory installed Oetiker clamps on fuel lines are single use and must be replaced after removal.

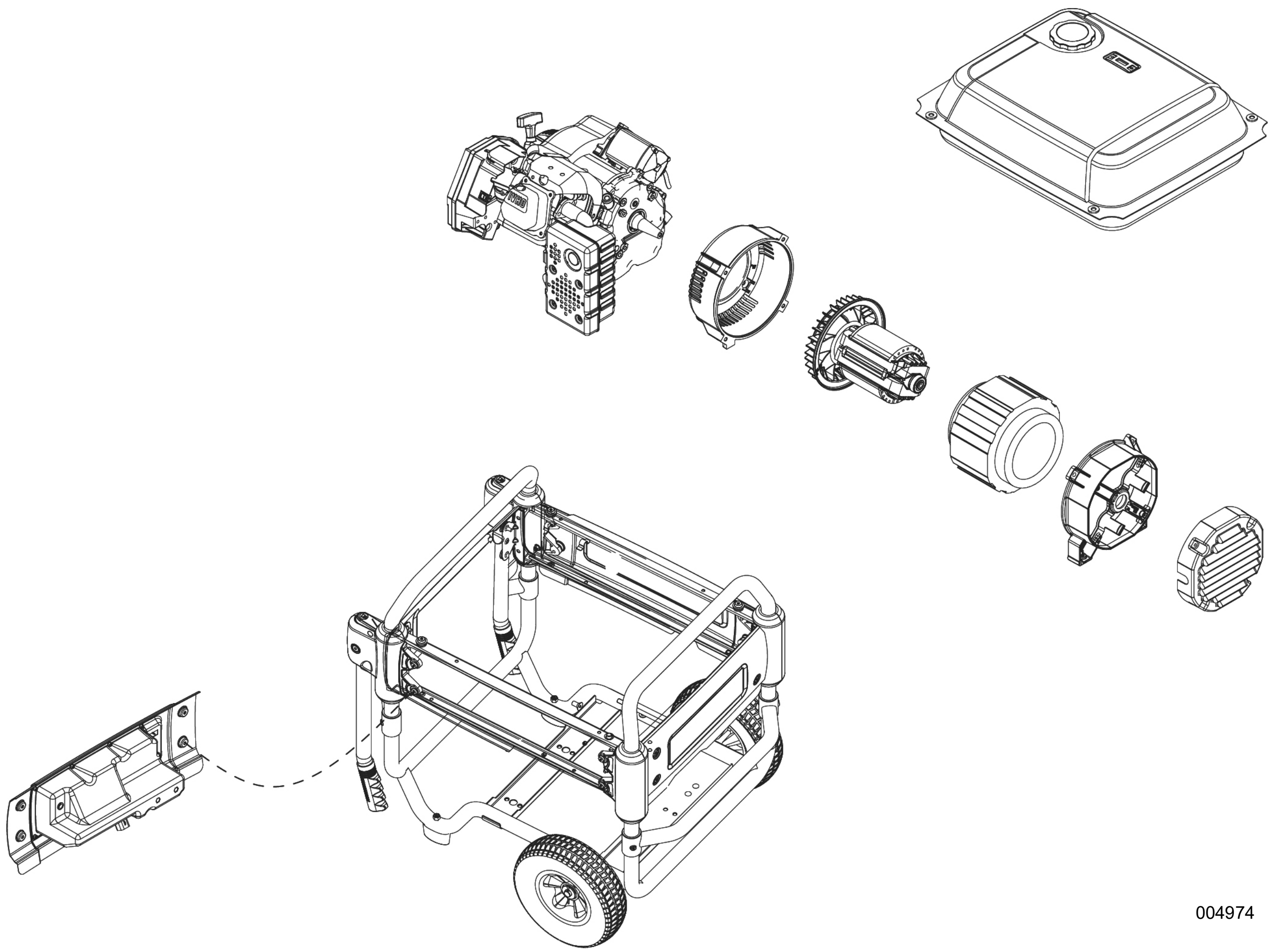
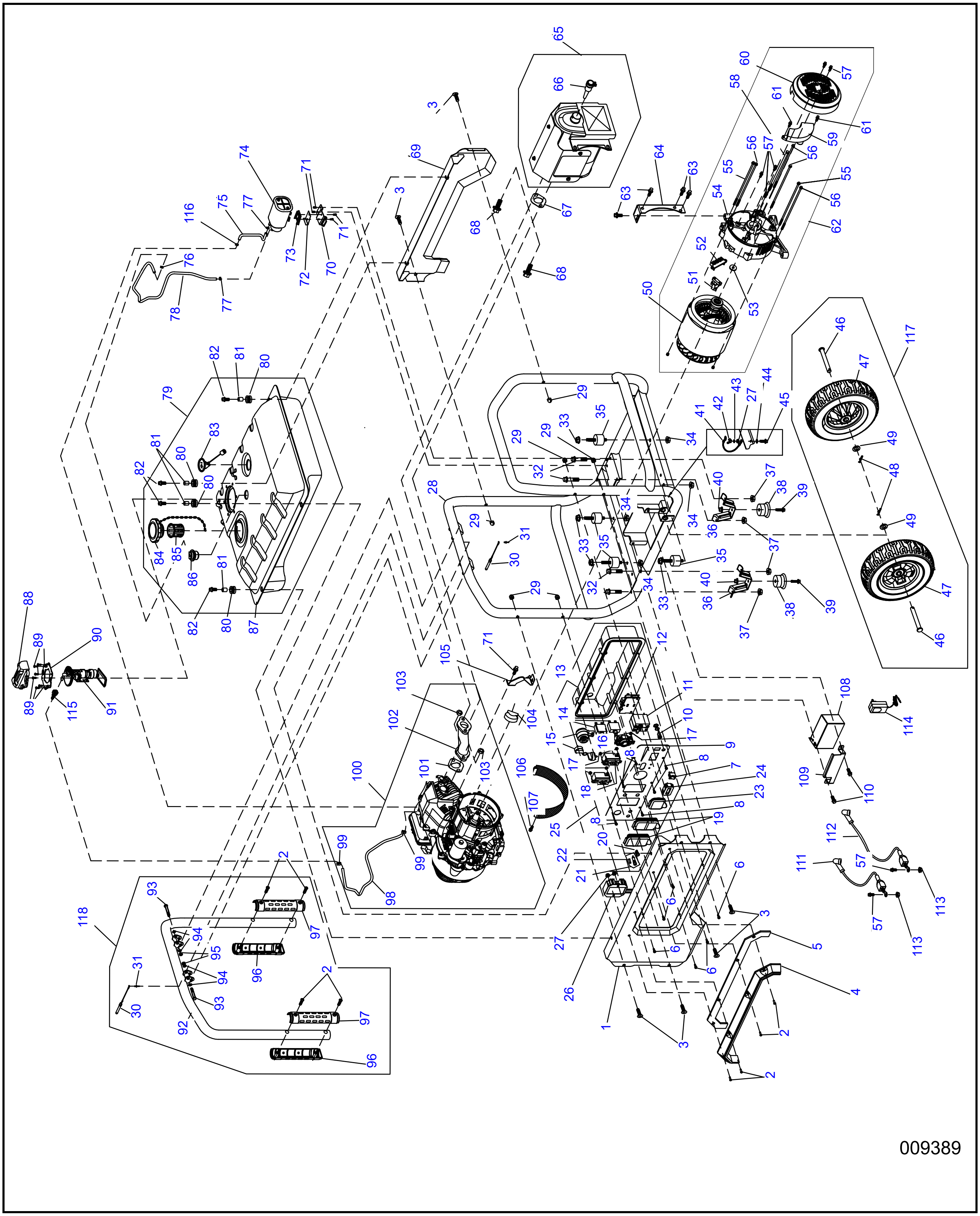


Figure 4-1. Typical Disassembly

Exploded View XT8000EFI



Exploded View XT8000EFI

ITEM	DESCRIPTION	QTY
1	PANEL, CONTROL SIDE	1
2	SCREW (M6X25MM)	8
3	BOLT, CURVED HEAD (M8X40MM)	6
4	VISOR, PLASTIC	1
5	VISOR, GASKET	1
6	SCREW, PAN HEAD (ST4.8X16MM)	6
7	SWITCH, IDLE	1
8	SCREW, PAN HEAD (ST4X16MM)	6
9	FACE PLATE W/DECAL	1
10	INPUT, 12VDC BATTERY CHARGER	1
11	BREAKER, CIRCUIT (BSB-30 30A)	1
12	METER, POWER	1
13	COVER, CONTROL PANEL BACK	1
14	BREAKER CIRCUIT (20A)	2
15	SWITCH, ENGINE	1
16	RECEPTACLE (L14-30R)	1
17	NUT (M4)	6
18	RECEPTACLE (GFCI 5-20R 120V 20A)	2
19	COVER, RECEPTACLE	2
20	LAMP, RED	1
21	HOLDER INLINE FUSE	1
22	FUSE, 5 AMP 250V 5X20MM	1
23	COVER, RECEPTACLE	1
24	METER, HOUR	1
25	PANEL ASSEMBLY, CONTROL	1
26	RECTIFIER	1
27	NUT (M6)	3
28	FRAME	1
29	NUT, LOCKING CAP (M8)	6
30	CHAIN	1
31	RIVET	1
32	BOLT, (M8X45MM)	4
33	NUT(M10X1.25)	4
34	NUT (M8)	4
35	MOUNT, RUBBER VIBRATION	4
36	BRACKET, FOOT	2
37	NUT (M8)	4
38	ISOLATOR, FOOT	2
39	BOLT (M6X28MM)	2
40	NUT (M6)	2
41	WIRE ASSEMBLY, GROUND	1
42	NUT, BUTTERFLY (M6)	1
43	WASHER, FLAT	1
44	WASHER, SPECIAL LOCK	1
45	BOLT, FLANGE (M6X20MM)	1

ITEM	DESCRIPTION	QTY
46	PIN, AXLE	2
47	WHEEL	2
48	PIN, COTTER	2
49	WASHER, FLAT	2
50	ALTERNATOR	1
51	BRUSH, ALTERNATOR	1
52	TERMINAL, WIRE	1
53	WASHER, FLAT (M10X4)	1
54	HOUSING, REAR BEARING CARRIER	1
55	BOLT, ROTOR (M5X232MM)	2
56	BOLT, STATOR (M6X193MM)	4
57	BOLT, (M5X12MM)	8
58	BOLT, ROTOR (M10X285MM)	1
59	REGULATOR, AUTOMATIC VOLTAGE	1
60	COVER, GENERATOR END	1
61	SCREW, HHFC (M5-0.8X16MM)	3
62	ALTERNATOR ASSEMBLY	1
63	BOLT (M8X16MM)	4
64	BRACKET, MUFFLER	1
65	MUFFLER	1
66	ARRESTOR, SPARK	1
67	GASKET, EXHAUST MUFFLER	1
68	BOLT (M8X25MM)	2
69	PANEL, EXHAUST SIDE	1
70	BRACKET, CARBON CANISTER TO FRAME	1
71	BOLT (M6X12MM)	5
72	BRACKET, CARBON CANISTER STOP	1
73	WELDMENT CARBON CANISTER MOUNT	1
74	CANISTER, CARBON 682CC	1
75	TUBE, BREATHER, CARBON CANISTER	1
76	CLAMP/COLLAR	1
77	CLAMP, HOSE	1
78	HOSE, PRE FORMED	1
79	TANK ASSEMBLY, FUEL	1
80	MOUNT, FUEL TANK RUBBER	4
81	INSERT, ANTI-CRUSH	4
82	SCREW, HHFC (M8-1.25X20MM WITH M10)	4
83	GAUGE, FUEL (8 GALLON TANK)	1
84	CAP ASSEMBLY, FUEL (SEALED CHROME)	1
85	FILTER, FUEL (IN TANK)	1
86	VALVE, ROLL OVER	1
87	WELDMENT, FUEL TANK	1

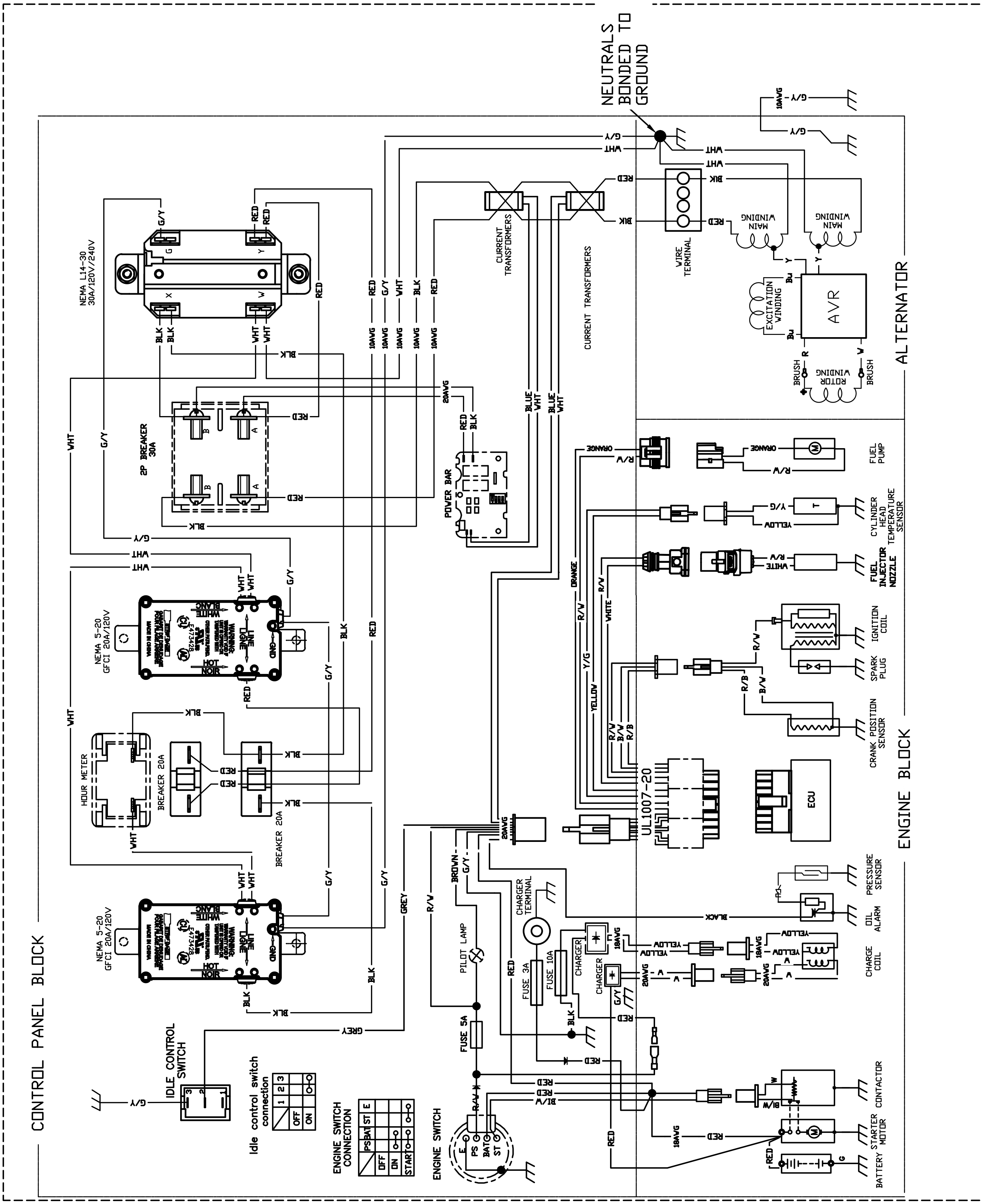
ITEM	DESCRIPTION	QTY
88	COVER, FUEL PUMP	1
89	SCREW, PAN HEAD (M5X10 MM)	6
90	CLAMP, FUEL PUMP	1
91	PUMP, FUEL	1
92	HANDLE, BENT TUBE	1
93	BOLT (M8X55MM)	2
94	WASHER, FLAT	2
95	NUT (M8)	2
96	GRIP, HANDLE (TOP)	1
97	GRIP, HANDLE (BOTTOM)	1
98	HOSE, FORMED FUEL	1
99	CLAMP	2
100	ENGINE, LC192FD-E	1
101	GASKET, EXHAUST CYLINDER	1
102	MANIFOLD, EXHAUST	1
103	NUT, HEX (M8)	2
104	BAFFLE	1
105	BRACKET, AIR CLEANER	1
106	COVER, DUST	1
107	BOLT, FLANGE (M5X10MM)	1
108	BATTERY (9AH)	1
109	COVER, BATTERY	1
110	BOLT (M6X12MM)	2
111	CABLE, BATTERY POSITIVE RED	1
112	CABLE, BATTERY NEGATIVE, GREEN	1
113	NUT (M5)	2
114	CHARGER, BATTERY	1
115	CONNECTOR, QUICK CHANGE	1
116	LOOP, TUBE (CLAMP)	1
117	KIT-WHEEL ASSEMBLY	1
118	KIT-HANDLE ASSEMBLY	1
N/S	COVER, INLINE FUSE	2
N/S	FUSE, 10A LITTLEFUSE SLO-BLO 1.25 INCH X 0.25 INCH	1
N/S	FUSE, FAST CERAMIC 1/4X1-1/4	1

Section 5 Electrical Data

Introduction

Go to www.generac.com (http://www.generac.com/service-support/product-support-lookup) for the most current wiring diagrams and electrical schematics. Use model or serial number.

Wiring Diagram, XT8000EFI Drawing No. 10000023894-A



WIRING - DIAGRAM

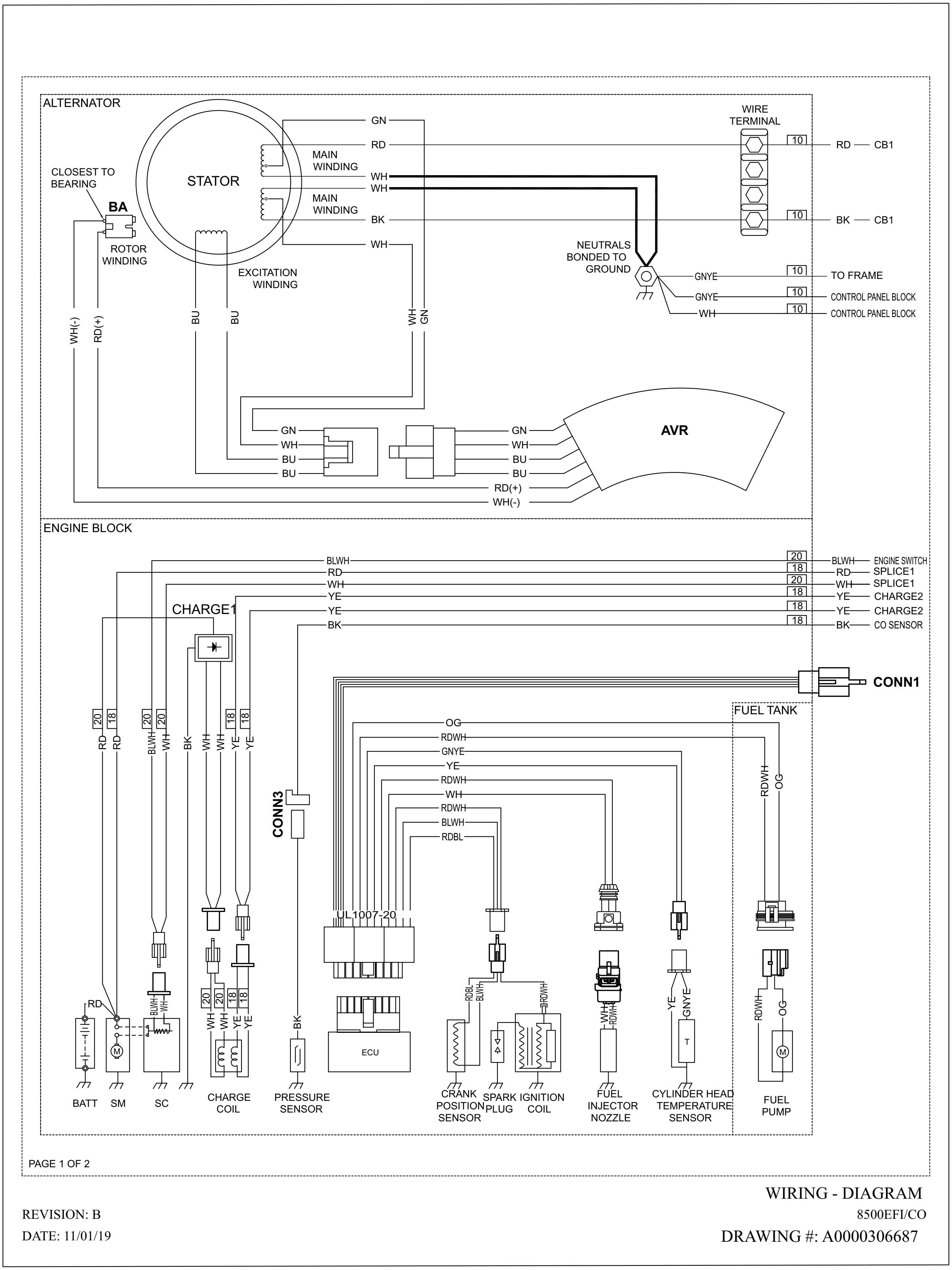
REVISION: A

8000EFI

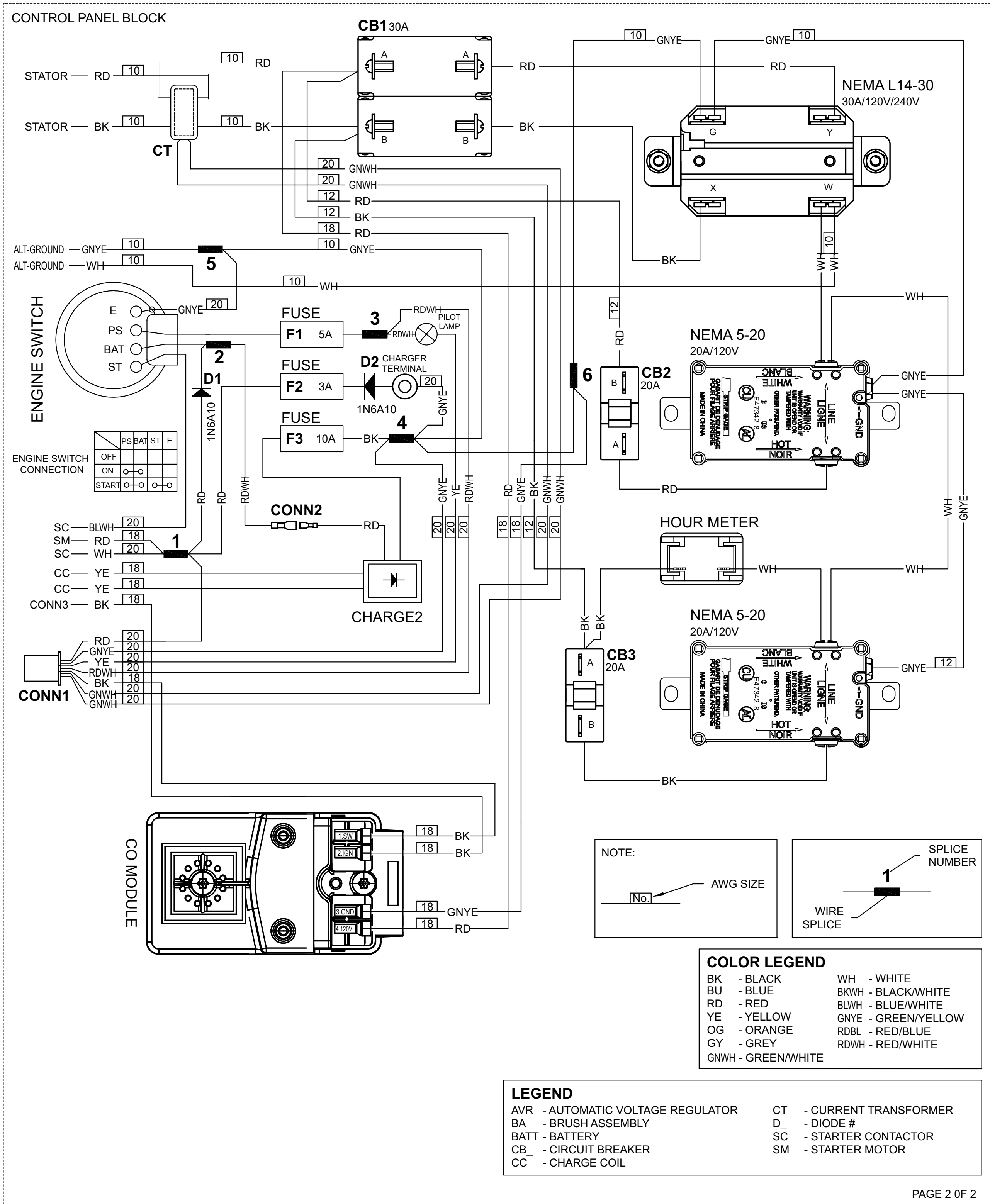
DATE: 01/15/2018

DRAWING #: 10000023894

Wiring Diagram and Electrical Schematic, XT8500EFI/CO Drawing No. A0000306687-B



Wiring Diagram and Electrical Schematic, XT8500EFI/CO Drawing No. A0000306687-B



WIRING - DIAGRAM

REVISION: B

8500EFI/CO

DATE: 11/01/19

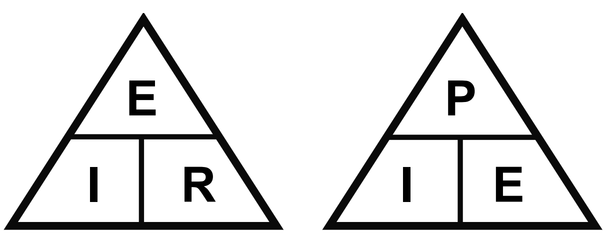
DRAWING #: A0000306687

Electrical Formulas

To Find	Known Values	1-phase	3-phase
Kilowatts (kW)	Volts, Current, Power Factor	$\frac{E \times I}{1000}$	$\frac{E \times I \times 1.73 \times PF}{1000}$
KVA	Volts, Current	$\frac{E \times I}{1000}$	$\frac{E \times I \times 1.73}{1000}$
Amperes	kW, Volts, Power Factor	$\frac{kW \times 1000}{E}$	$\frac{kW \times 1000}{E \times 1.73 \times PF}$
Watts	Volts, Amps, Power Factor	Volts x Amps	E x I x 1.73 x PF
No. of Rotor Poles	Frequency, RPM	$\frac{2 \times 60 \times \text{Frequency}}{\text{RPM}}$	$\frac{2 \times 60 \times \text{Frequency}}{\text{RPM}}$
Frequency	RPM, No. of Rotor Poles	$\frac{\text{RPM} \times \text{Poles}}{2 \times 60}$	$\frac{\text{RPM} \times \text{Poles}}{2 \times 60}$
RPM	Frequency, No. of Rotor Poles	$\frac{2 \times 60 \times \text{Frequency}}{\text{Rotor Poles}}$	$\frac{2 \times 60 \times \text{Frequency}}{\text{Rotor Poles}}$
kW (required for Motor)	Motor Horsepower, Efficiency	$\frac{HP \times 0.746}{\text{Efficiency}}$	$\frac{HP \times 0.746}{\text{Efficiency}}$
Resistance	Volts, Amperes	$\frac{E}{I}$	$\frac{E}{I}$
Volts	Ohm, Amperes	I x R	I x R
Amperes	Ohms, Volts	$\frac{E}{R}$	$\frac{E}{R}$

E = Volts I = Amperes R = Resistance (Ohms) PF = Power Factor

Term	Symbol	Measurement
Current	I	Amps
Wattage	P	Watts
Voltage	E	Volts
Resistance	R	Ohms



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Constant	Shift		Result	
Voltage E	Resistance Increase	⇧	Current Decrease	⇩
Voltage E	Resistance Decrease	⇩	Current Increase	⇧
Resistance R	Voltage Decrease	⇩	Current Decrease	⇩
Resistance R	Voltage Increase	⇧	Current Increase	⇧
Current I	Resistance Decrease	⇩	Voltage Decrease	⇩
Current I	Resistance Increase	⇧	Voltage Increase	⇧
Power P	Voltage Increase	⇧	Power Increase	⇧
Power P	Voltage Decrease	⇩	Power Decrease	⇩
Power P	Current Increase	⇧	Power Increase	⇧
Power P	Current Decrease	⇩	Power Decrease	⇩

Part No. A0000657508 Rev. A 04/14/2020

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