

# OPERATION MANUAL



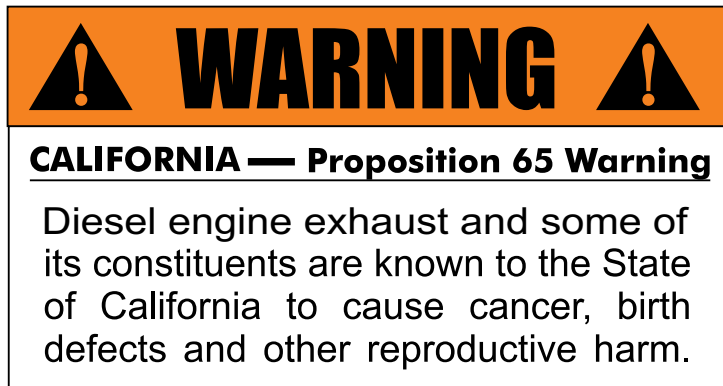
## **WHISPERWATT™ SERIES MODEL DCA1100SSC 60HZ GENERATOR (CUMMINS QST30-G5 DIESEL ENGINE)**

Revision #1 (01/17/18)

To find the latest revision of this  
publication, visit our website at:  
[www.mqpower.com](http://www.mqpower.com)



**THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.**



## REPORTING SAFETY DEFECTS

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If you believe that your vehicle has a defect that could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Multiquip at 18004211244.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Multiquip.

To contact NHTSA, you may either call the Vehicle Safety Hotline tollfree at 18883274236 (TTY: 18004249153), go to <http://www.nhtsa.dot.gov>; or write to:

Administrator  
NHTSA  
1200 New Jersey Avenue S.E.  
Washington, DC 20590

You can also obtain information about motor vehicle safety from  
<http://www.safecar.gov>.

## **DCA1100SSC 60 Hz Generator**

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### **NOTICE**

Specifications are subject to change without notice.


## SAFETY INFORMATION


**DO NOT** operate or service the generator before reading the entire manual. Safety precautions should be followed at all times when operating this generator. Failure to read and understand the safety messages and operating instructions could result in injury to yourself and others.


### SAFETY MESSAGES

The four safety messages shown below will inform you about potential hazards that could injure you or others. The safety messages specifically address the level of exposure to the operator and are preceded by one of four words: **DANGER**, **WARNING**, **CAUTION** or **NOTICE**.

### SAFETY SYMBOLS








 <b>DANGER</b>
Indicates a hazardous situation which, if not avoided, <b>WILL</b> result in <b>DEATH</b> or <b>SERIOUS INJURY</b> .

 <b>WARNING</b>
Indicates a hazardous situation which, if not avoided, <b>COULD</b> result in <b>DEATH</b> or <b>SERIOUS INJURY</b> .

 <b>CAUTION</b>
Indicates a hazardous situation which, if not avoided, <b>COULD</b> result in <b>MINOR</b> or <b>MODERATE INJURY</b> .

<b>NOTICE</b>
Addresses practices not related to personal injury.

Potential hazards associated with the operation of this generator will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety messages.

Symbol	Safety Hazard
	Lethal exhaust gas hazards
	Explosive fuel hazards
	Burn hazards
	Overspeed hazards
	Rotating parts hazards
	Pressurized fluid hazards
	Electric shock hazards

# SAFETY INFORMATION

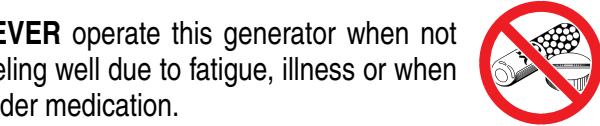
## GENERAL SAFETY

### CAUTION

- **NEVER** operate this generator without proper protective clothing, shatterproof glasses, respiratory protection, hearing protection, steel-toed boots and other protective devices required by the job or city and state regulations.



- **NEVER** operate this generator when not feeling well due to fatigue, illness or when under medication.
- **NEVER** operate this generator under the influence of drugs or alcohol.



- **ALWAYS** check the generator for loosened threads or bolts before starting.
- **DO NOT** use the generator for any purpose other than its intended purposes or applications.

### NOTICE

- This generator should only be operated by trained and qualified personnel 18 years of age and older.
- Whenever necessary, replace nameplate, operation and safety decals when they become difficult read.
- Manufacturer does not assume responsibility for any accident due to generator modifications. Unauthorized generator modification will void all warranties.

- **NEVER** use accessories or attachments that are not recommended by MQ Power for this generator. Damage to the generator and/or injury to user may result.

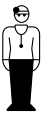
- **ALWAYS** know the location of the nearest fire extinguisher.



- **ALWAYS** know the location of the nearest first aid kit.



- **ALWAYS** know the location of the nearest phone or **keep a phone on the job site**. Also, know the phone numbers of the nearest **ambulance, doctor** and **fire department**. This information will be invaluable in the case of an emergency.



## GENERATOR SAFETY

### DANGER

- **NEVER** operate the generator in an explosive atmosphere or near combustible materials. An explosion or fire could result causing severe **bodily harm or even death**.



### WARNING

- **NEVER** disconnect any **emergency or safety devices**. These devices are intended for operator safety. Disconnection of these devices can cause severe injury, bodily harm or even death. Disconnection of any of these devices will void all warranties.

### CAUTION

- **NEVER** lubricate components or attempt service on a running machine.

### NOTICE

- **ALWAYS** ensure generator is on level ground before use.
- **ALWAYS** keep the generator in proper running condition.
- Fix damage to generator and replace any broken parts immediately.
- **ALWAYS** store generator properly when it is not being used. Generator should be stored in a clean, dry location out of the reach of children and unauthorized personnel.

# SAFETY INFORMATION

## ENGINE SAFETY

### DANGER

- The engine fuel exhaust gases contain poisonous carbon monoxide. This gas is colorless and odorless, and can cause death if inhaled.
- The engine in this generator requires an adequate free flow of cooling air. **NEVER** operate this generator in any enclosed or narrow area where free flow of the air is restricted. If the air flow is restricted it will cause injury to people and property and serious damage to the generator or engine.



### WARNING

- **DO NOT** place hands or fingers inside engine compartment when engine is running.
- **NEVER** operate the engine with heat shields or guards removed.
- Keep fingers, hands hair and clothing away from all moving parts to prevent injury.
- **DO NOT** remove the radiator cap while the engine is hot. High pressure boiling water will gush out of the radiator and severely scald any persons in the general area of the generator.
- **DO NOT** remove the coolant drain plug while the engine is hot. Hot coolant will gush out of the coolant tank and severely scald any persons in the general area of the generator.
- **DO NOT** remove the engine oil drain plug while the engine is hot. Hot oil will gush out of the oil tank and severely scald any persons in the general area of the generator.



### CAUTION

- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing generator.



## NOTICE

- **NEVER** run engine without an air filter or with a dirty air filter. Severe engine damage may occur. Service air filter frequently to prevent engine malfunction.
- **NEVER** tamper with the factory settings of the engine or engine governor. Damage to the engine or generator can result if operating in speed ranges above the maximum allowable.
- Wet stacking is a common problem with diesel engines which are operated for extended periods with light or no load applied. When a diesel engine operates without sufficient load (less than 40% of the rated output), it will not operate at its optimum temperature. This will allow unburned fuel to accumulate in the exhaust system, which can foul the fuel injectors, engine valves and exhaust system, including turbochargers, and reduce the operating performance.



In order for a diesel engine to operate at peak efficiency, it must be able to provide fuel and air in the proper ratio and at a high enough engine temperature for the engine to completely burn all of the fuel.

Wet stacking does not usually cause any permanent damage and can be alleviated if additional load is applied to relieve the condition. It can reduce the system performance and increase maintenance. Applying an increasing load over a period of time until the excess fuel is burned off and the system capacity is reached usually can repair the condition. This can take several hours to burn off the accumulated unburned fuel.

- State Health Safety Codes and Public Resources Codes specify that in certain locations, spark arresters must be used on internal combustion engines that use hydrocarbon fuels. A spark arrester is a device designed to prevent accidental discharge of sparks or flames from the engine exhaust. Spark arresters are qualified and rated by the United States Forest Service for this purpose. In order to comply with local laws regarding spark arresters, consult the engine distributor or the local Health and Safety Administrator.

# SAFETY INFORMATION

## FUEL SAFETY

### DANGER

- **DO NOT** start the engine near spilled fuel or combustible fluids. Diesel fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with **flammable** liquids.
- **DO NOT** fill the fuel tank while the engine is running or hot.
- **DO NOT** overfill tank, since spilled fuel could ignite if it comes into contact with hot engine parts or sparks from the ignition system.
- Store fuel in appropriate containers, in well-ventilated areas and away from sparks and flames.
- **NEVER** use fuel as a cleaning agent.
- **DO NOT** smoke around or near the generator. Fire or explosion could result from fuel vapors or if fuel is spilled on a hot engine.



## ELECTRICAL SAFETY

### DANGER

- **DO NOT** touch output terminals during operation. Contact with output terminals during operation can cause **electrocution, electrical shock or burn**.
- The electrical voltage required to operate the generator can cause severe injury or even death through physical contact with live circuits. Turn generator and all circuit breakers **OFF** before performing maintenance on the generator or making contact with output terminals.
- **NEVER** insert any objects into the output receptacles during operation. This is extremely dangerous. The possibility exists of **electrical shock, electrocution or death**.



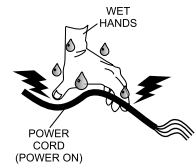
- Backfeed to a utility system can cause **electrocution** and/or property damage. **NEVER** connect the generator to a building's electrical system without a transfer switch or other approved device. All installations should be performed by a **licensed electrician** in accordance with all applicable laws and electrical codes. Failure to do so could result in electrical shock or burn, causing **serious injury or even death**.



## Power Cord/Cable Safety

### DANGER

- **NEVER** let power cords or cables **lay in water**.
- **NEVER stand in water** while AC power from the generator is being transferred to a load.
- **NEVER** use **damaged** or **worn** cables or cords when connecting generator to generator. Inspect for cuts in the insulation.
- **NEVER** grab or touch a live power cord or cable with wet hands. The possibility exists of **electrical shock, electrocution or death**.
- Make sure power cables are securely connected to the generator's output receptacles. Incorrect connections may cause electrical shock and damage to the generator.



### NOTICE

- **ALWAYS** make certain that proper power or extension cord has been selected for the job. See Cable Selection Chart in this manual.



# SAFETY INFORMATION

## Grounding Safety

### DANGER

- This generator is equipped with a grounding terminal attached to the enclosure. Electrical grounding requirements can differ by State, Province, District, Municipality, and unique application settings.
- For portable and vehicle-mounted generators, Multiquip recognizes the guidance provided in NEC Handbook Article 250.34 Parts A and B, and 29 CFR 1926.404 (f) (3) (i). If a more definitive earth-to-ground safeguard is required, please consult a qualified electrician and reference appropriate National Electrical Code (NEC) guidelines in establishing an exterior grounding point generator.
- **NEVER** use gas piping as an electrical ground.

### NOTICE

- There is a permanent conductor **bond** between generator (stator winding) and the frame.


## BATTERY SAFETY

### DANGER

- **DO NOT** drop the battery. There is a possibility that the battery will explode.
- **DO NOT** expose the battery to open flames, sparks, cigarettes, etc. The battery contains combustible gases and liquids. If these gases and liquids come into contact with a flame or spark, an explosion could occur.



### WARNING

- **ALWAYS** wear safety glasses when handling the battery to avoid eye irritation. The battery contains acids that can cause injury to the eyes and skin. 
- Use well-insulated gloves when picking up the battery.
- **ALWAYS** keep the battery charged. If the battery is not charged, combustible gas will build up.
- **ALWAYS** recharge the battery in a well-ventilated environment to avoid the risk of a dangerous concentration of combustible gasses.
- If the battery liquid (dilute sulfuric acid) comes into contact with **clothing or skin**, rinse skin or clothing immediately with plenty of water.
- If the battery liquid (dilute sulfuric acid) comes into contact with **eyes**, rinse eyes immediately with plenty of water and contact the nearest doctor or hospital to seek medical attention.

### CAUTION

- **ALWAYS** disconnect the **NEGATIVE** battery terminal before performing service on the generator.
- **ALWAYS** keep battery cables in good working condition. Repair or replace all worn cables.

# SAFETY INFORMATION

## ENVIRONMENTAL SAFETY/DECOMMISSIONING

### NOTICE

Decommissioning is a controlled process used to safely retire a piece of generator that is no longer serviceable. If the generator poses an unacceptable and unrepairable safety risk due to wear or damage or is no longer cost effective to maintain (beyond life-cycle reliability) and is to be decommissioned (demolition and dismantlement), be sure to follow rules below.

- **DO NOT** pour waste or oil directly onto the ground, down a drain or into any water source.
- Contact your country's Department of Public Works or recycling agency in your area and arrange for proper disposal of any electrical components, waste or oil associated with this generator.
- When the life cycle of this generator is over, remove battery(s) and bring to an appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this generator is over, it is recommended that the generator frame and all other metal parts be sent to a recycling center.



Metal recycling involves the collection of metal from discarded products and its transformation into raw materials to use in manufacturing a new product.

Recyclers and manufacturers alike promote the process of recycling metal. Using a metal recycling center promotes energy cost savings.

## EMISSIONS INFORMATION

### NOTICE

The diesel engine used in this generator has been designed to reduce harmful levels of carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxides (NOx) contained in diesel exhaust emissions.

This engine has been certified to meet US EPA Evaporative emissions requirements in the installed configuration.

Attempting to modify or make adjustments to the engine emission system by unauthorized personnel without proper training could damage the generator or create an unsafe condition.

Additionally, modifying the fuel system may adversely affect evaporative emissions, resulting in fines or other penalties.

### Emission Control Label

The emission control label is an integral part of the emission system and is strictly controlled by regulations.

The label must remain with the engine for its entire life.

If a replacement emission label is needed, please contact your authorized engine distributor.

# SAFETY LABELS

## SAFETY LABELS

Safety labels are attached to the generator as shown in. Keep these safety labels clean at all times. When the safety labels become worn or damaged, contact your nearest dealer or the Multiquip Parts Dept.

### NOTICE

For safety label part numbers, reference parts manual..

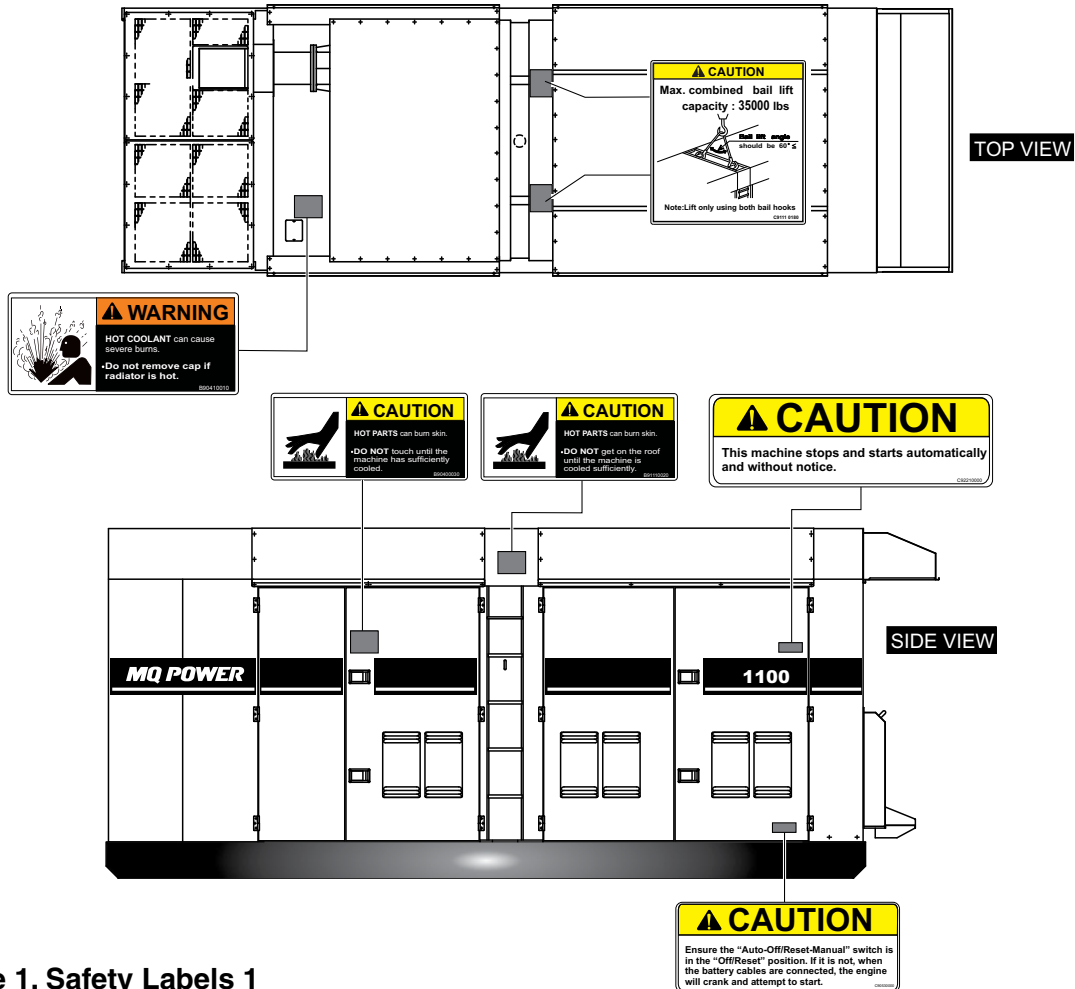
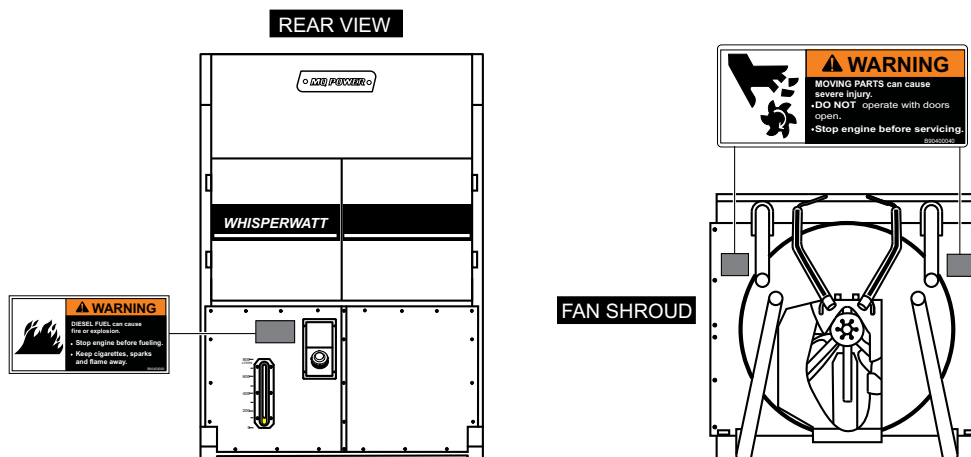


Figure 1. Safety Labels 1



# SAFETY LABELS

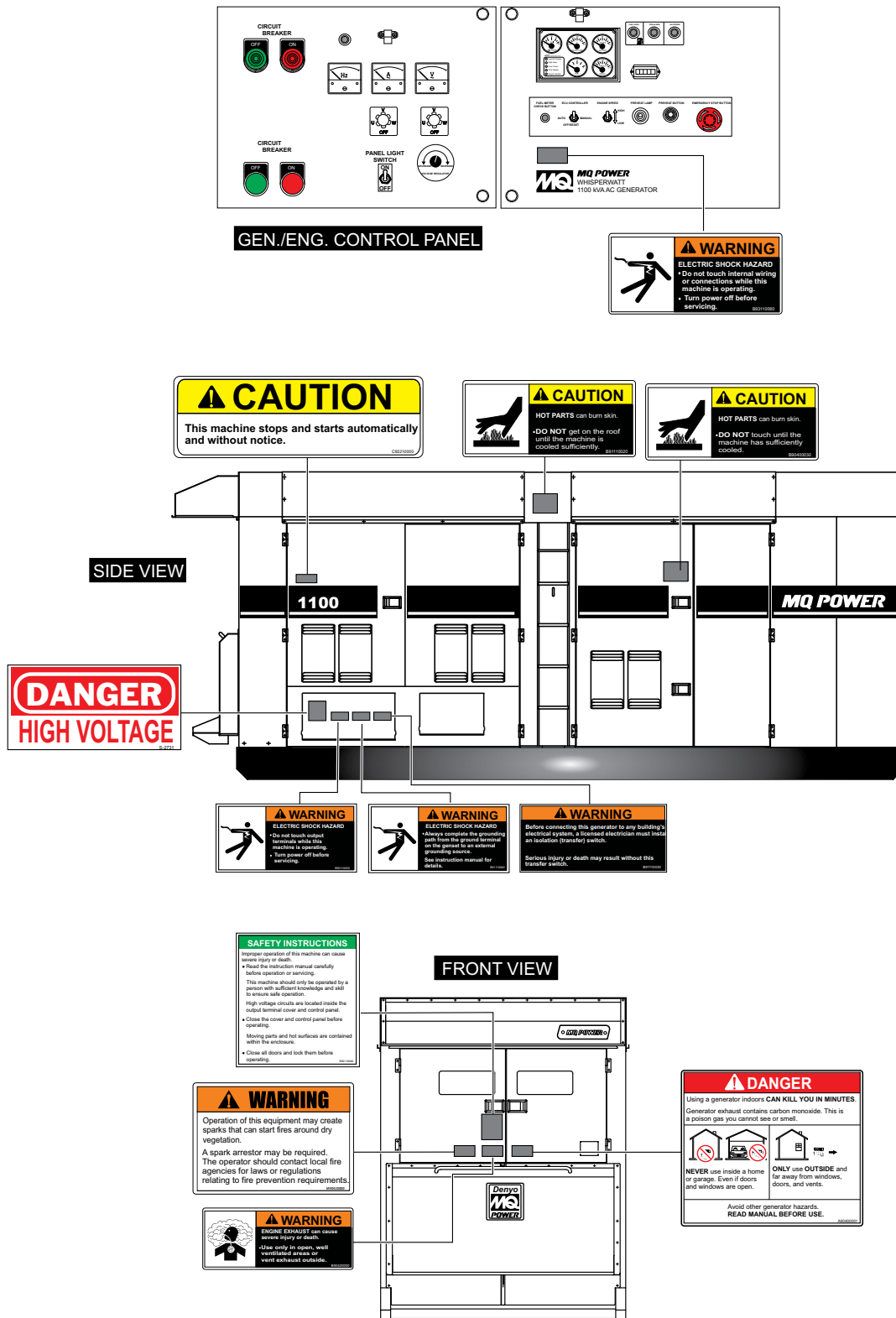


Figure 2. Safety Labels 2

# SPECIFICATIONS

Table 1. Generator Specifications		
Model	DCA1100SSC	
Type	Revolving field, self ventilated, open protected type synchronous generator	
Armature Connection	Star with Neutral	
Phase	3	
Standby Output	968 kW (1,210 kVA)	
Prime Output	880 kW (1,100 kVA)	
Voltage - 3 Ø	440, 460 and 480V Reconnectable	
Frequency	60 Hz	
Speed	1800 rpm	
Power Factor	0.8	
Aux. AC Power	Single Phase, 60 Hz	
Aux. Voltage/Output	4.8 Kw (2.4 kW x 2)	
Dry Weight	28,880 lbs. (13,100 kg.)	
Wet Weight	35,000 lbs. (15,873 kg.)	
Table 2. Engine Specifications		
Model	CUMMINS QST30-G5, Tier 2 Certified	
Type	4 cycle, watercooled, direct injection, turbocharged charged air cooled	
No. of Cylinders	12 cylinders	
Bore x Stroke	5.51 in. x 6.49 in. (140 mm x 165 mm)	
Displacement	1,860 cu. in. (30,480 cc)	
Rated Output	1350 HP @ 180 rpm	
Starting	Electric	
Coolant Capacity	55.7 gal. (211 liters)	
Lube Oil Capacity	40.7 gal. (154 liters)	
Lube Oil Type	#2 Diesel Fuel	
Fuel Type	API Service Class CI-4	
Fuel Tank Capacity	211 gal. (570 liters)	
Fuel Consumption	62.6 gal. (237 L)/hr at <b>full load</b>	46.5 gal. (176 L)/hr at <b>75% load</b>
	33.0 gal. (125 L)/hr at <b>50% load</b>	18.3 gal. (69.3 L)/hr at <b>25% load</b>
Battery	12V 200Ah x 4 (24V System)	

# DIMENSIONS

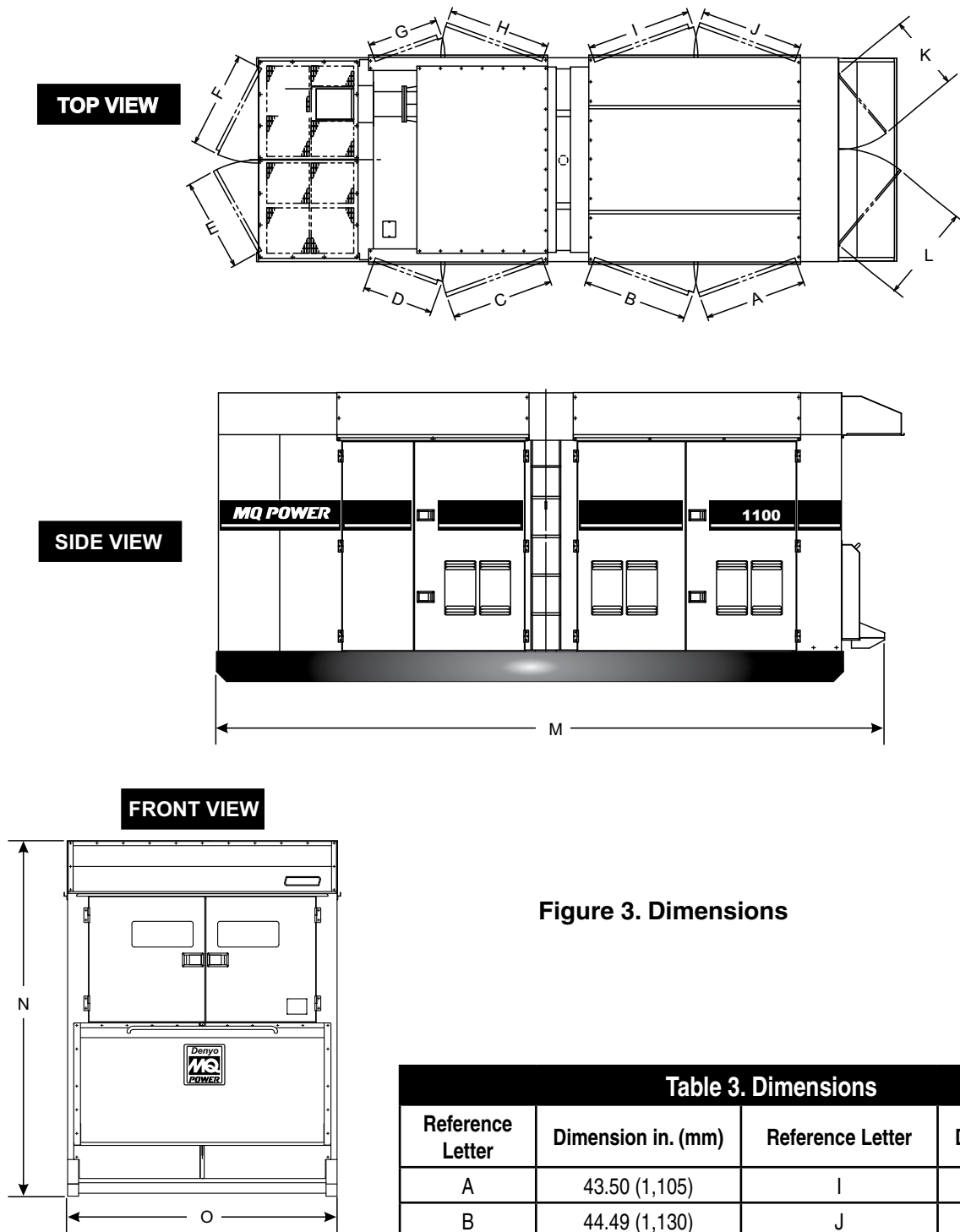


Figure 3. Dimensions

Table 3. Dimensions			
Reference Letter	Dimension in. (mm)	Reference Letter	Dimension in. (mm)
A	43.50 (1,105)	I	44.49 (1,130)
B	44.49 (1,130)	J	43.50 (1,105)
C	43.50 (1,105)	K	32.09 (815)
D	30.12 (765)	L	41.14 (1,045)
E	39.37 (1,005)	M	272 (6,910)
F	40.94 (1,040)	N	114.1 (2,900)
G	30.12 (765)	O	86.61 (2,200)
H	43.50 (1,105)		

[illegible]

# INSTALLATION

## CONNECTING THE GROUND

Consult with local Electrical and Safety Codes for proper connection based on condition of use.

### EXAMPLE of how to ground the unit if the condition of use requires such a device:

The ground terminal on the generator should always be used to connect the generator to a suitable ground when required.

The ground cable should be #8 size wire (aluminum) minimum. If copper wire is used, #10 size wire minimum should be used.

Connect one end of the ground cable terminal to the generator ground point (Figure 4). Connect the other end of the ground cable to a suitable earth ground (ground rod).

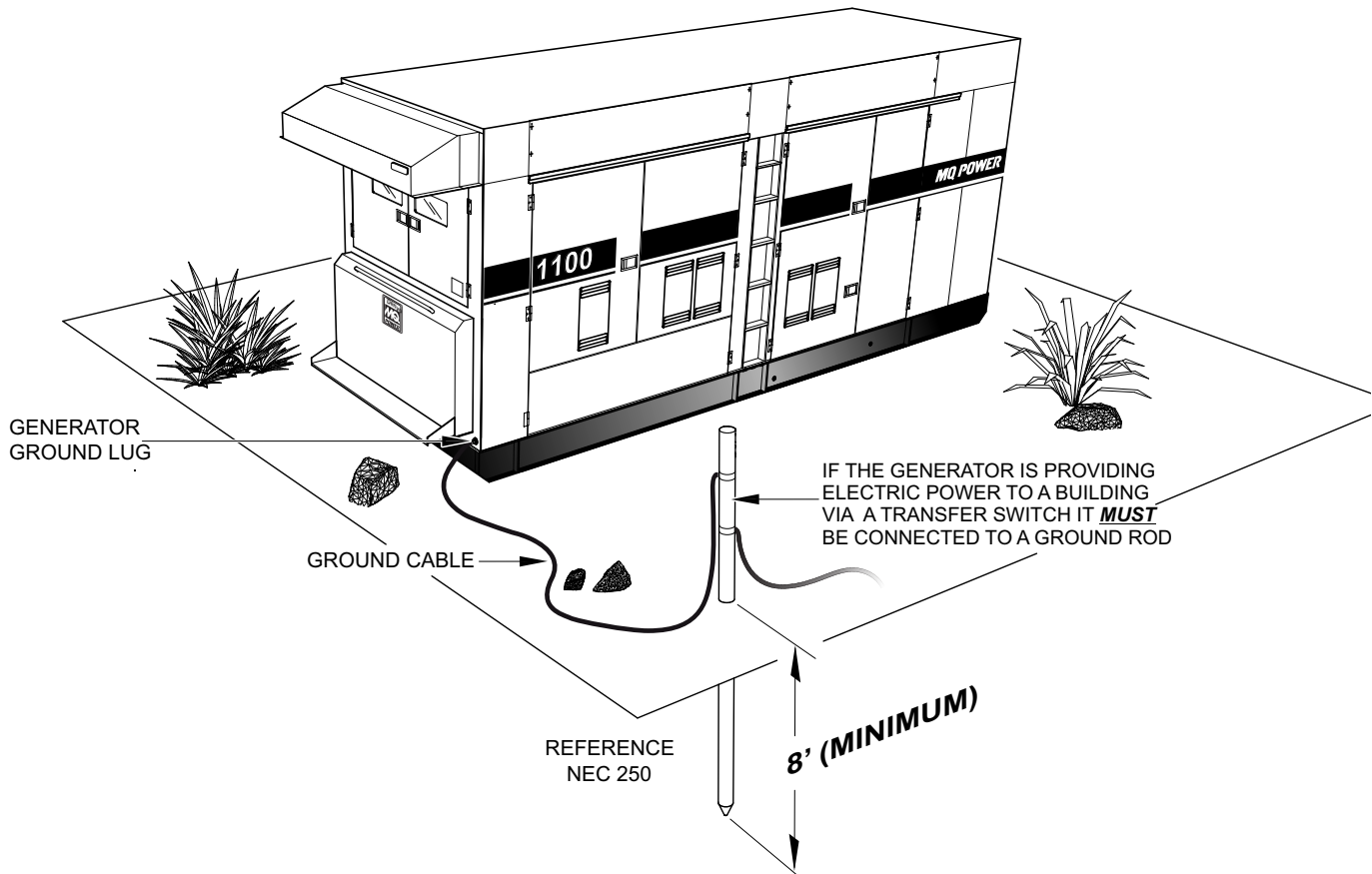


Figure 4. Typical Generator Grounding Application



## OUTDOOR INSTALLATION

Install the generator in a area that is free of debris, bystanders, and overhead obstructions. Make sure the generator is on secure level ground so that it cannot slide or shift around. Also install the generator in a manner so that the exhaust will not be discharged in the direction of nearby homes.

The installation site must be relatively free from moisture and dust. All electrical generator should be protected from excessive moisture. Failure to do will result in deterioration of the insulation and will result in short circuits and grounding.

Foreign materials such as dust, sand, lint and abrasive materials have a tendency to cause excessive wear to engine and alternator parts.

### CAUTION

Pay close attention to ventilation when operating the generator inside tunnels and caves. The engine exhaust contains noxious elements. Engine exhaust must be routed to a ventilated area.

## INDOOR INSTALLATION

Exhaust gases from diesel engines are extremely poisonous. Whenever an engine is installed indoors the exhaust fumes must be vented to the outside. The engine should be installed at least two feet from any outside wall. Using an exhaust pipe which is too long or too small can cause excessive back pressure which will cause the engine to heat excessively and possibly burn the valves.

## MOUNTING

The generator must be mounted on a solid foundation (such as concrete) and set firmly on the foundation to isolate vibration of the generator when it is running. The generator must set at least 6 inches above the floor or grade level (in accordance to NFPA 110, Chapter 54.1). **DO NOT** remove the metal skids on the bottom of the generator. They are to resist damage to the bottom of the generator and to maintain alignment.

## GENERATOR GROUNDING

### NOTICE

The Occupational Safety and Health Administration (OSHA) and the National Electrical Code (NEC) recommend that if the generator is providing electrical power to a structure (home, office shop, trailer or similar) it **must** be connected to a grounding electrode system, such a driven ground rod (Figure 4).

If applicable, to guard against electrical shock and possible damage to the generator, it is important to provide a good **EARTH** ground, (Figure 4).

### NOTICE

**ALWAYS** check with State, Province, District and Municipalities for electrical grounding requirements before using generator.

Article 250 (Grounding) of the NEC handbook provides guidelines for proper grounding and specifies that the cable ground shall be connected to the grounding system of the building as close to the point of cable entry as practical.

NEC article 250 specifies the following grounding requirements:

1. Use one of the following wire types to connect the generator to earth ground.
  - a. Copper 10 AWG (5.3 mm<sup>2</sup>) or larger.
  - b. Aluminum 8 AWG (8.4 mm<sup>2</sup>) or larger.
2. When grounding of the generator (Figure 4) is required, connect one end the ground cable to the ground lug on the generator. Connect the other end of the ground cable to the ground rod (earth ground).
3. NEC article 250 specifies that the earth ground rod should be buried a minimum of 8 ft. into the ground.

### NOTICE

When connecting the generator to any buildings electrical system **ALWAYS** consult with a licensed electrician.

## GENERATOR

The MQ Power Model DCA1000SSC is a 880 kW generator (Figure 5) that is designed as a high quality portable power source for telecom sites, lighting facilities, power tools, submersible pumps and other industrial and construction machinery.

### ENGINE CONTROL PANEL

The “Operating Panel” is provided with the following:

- ECU 750 Controller
- Gauge Unit Assembly
  - Oil Pressure Gauge
  - Water Temperature Gauge
  - Charging Voltmeter
  - Fuel Gauge
  - Tachometer
- Panel Light/Panel Light Switch
- Pre-Heat Lamp
- Fuel Level Alarm Lamp
- Pre-Alarm Lamp
- Shutdown Lamp
- Hour Meter
- Engine Speed Switch
- Auto Start/Stop Switch
- Pre-Heat Button
- Emergency Stop Button

### GENERATOR CONTROL PANEL

The “Generator Control Panel” is provided with the following:

- Frequency Meter (Hz)
- AC Ammeter (Amps)
- AC Voltmeter (Volts)
- Ammeter ChangeOver Switch
- Voltmeter ChangeOver Switch
- Voltage Regulator
- Panel Light/Panel Light Switch
- 3-Pole, 1600 amp Main Circuit Breaker
- “Control Box” (Located behind the Gen. Control Panel)
  - Automatic Voltage Regulator
  - Current Transformer
  - OverCurrent Relay
  - Voltage Rectifier
  - Starter Relay

## OUTPUT TERMINAL PANEL

The “Output Terminal Panel” is provided with the following:

- Four bus bars with terminal lugs (3Ø power)
- Battery Charger (Optional)
- Jacket Water Heater (Optional)

### OPEN DELTA EXCITATION SYSTEM

This generator is equipped with the state of the art “OpenDelta” excitation system. The open delta system consist of an electrically independent winding wound among stationary windings of the AC output section.

There are four connections of the open delta A, B, C and D. During steady state loads, the power from the voltage regulator is supplied from the parallel connections of A to B, A to D, and C to D. These three phases of the voltage input to the voltage regulator are then rectified and are the excitation current for the exciter section.

When a heavy load, such as a motor starting or a short circuit occurs, the automatic voltage regulator (AVR) switches the configuration of the open delta to the series connection of B to C. This has the effect of adding the voltages of each phase to provide higher excitation to the exciter section and thus better voltage response during the application of heavy loads.

The connections of the AVR to the AC output windings are for sensing only. No power is required from these windings. The opendelta design provides virtually unlimited excitation current, offering maximum motor starting capabilities. The excitation does not have a “fixed ceiling” and responds according the demands of the required load.

## ENGINE

The DCA1100SSC generator is powered by a 12 cylinder, water cooled, direct injection, turbocharged, charged air-cooled CUMMINS QST30-G5 diesel engine. This engine is designed to meet every performance requirement for the generator. Reference Table 2 for engine specifications. In keeping with MQ Power’s policy of constantly improving its products, the specifications quoted herein are subject to change without prior notice.

### ELECTRIC GOVERNOR SYSTEM

The electric governor system controls the RPMs of the engine. When the engine demand increases or decreases, the governor system regulates the frequency variation to  $\pm 0.25\%$ .

### LOAD CABLES

When connecting load to generator be sure to select correct size of cables to handle full load/ampereage (1323 amps @ 480 VAC).

# MAJOR COMPONENTS

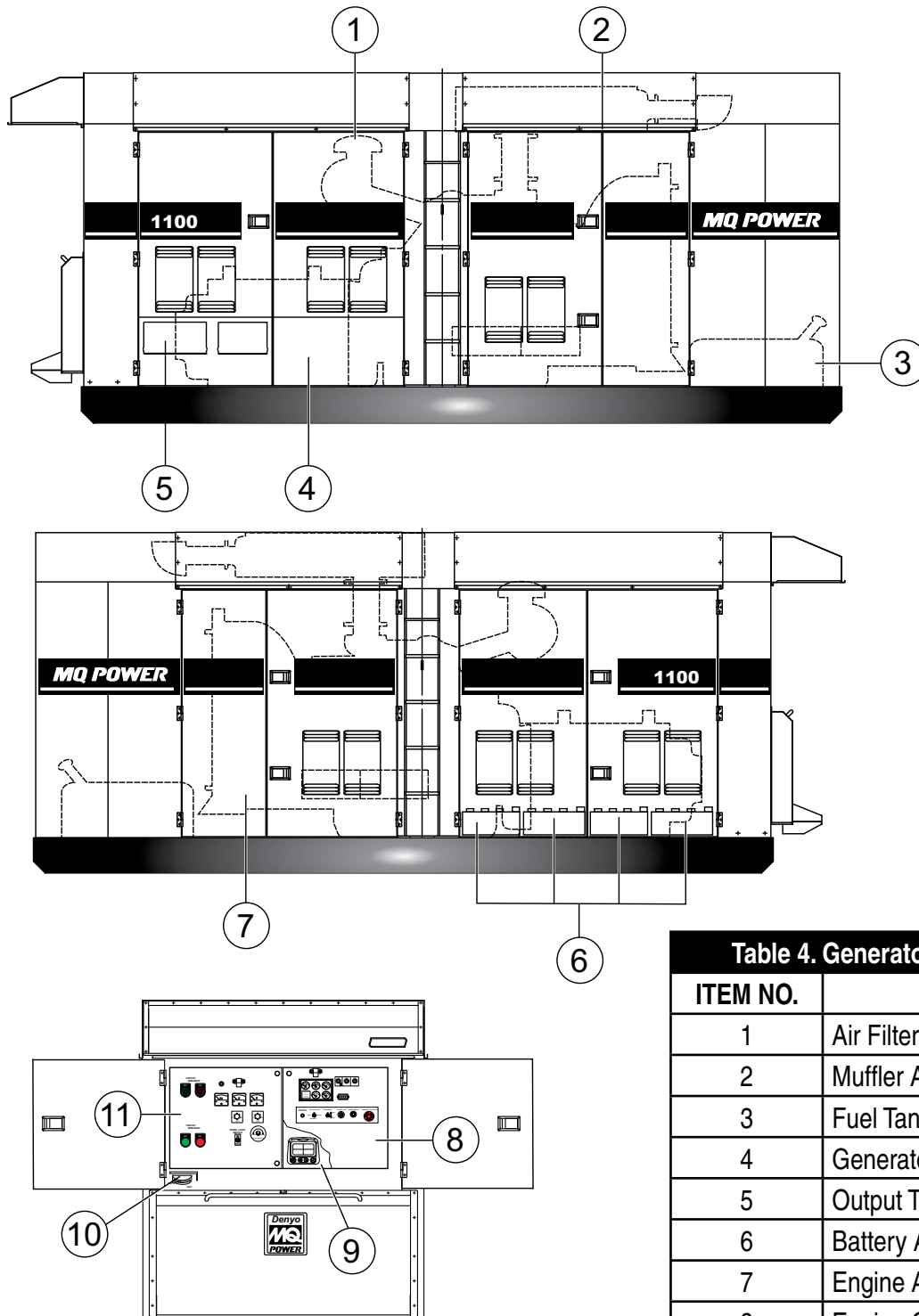
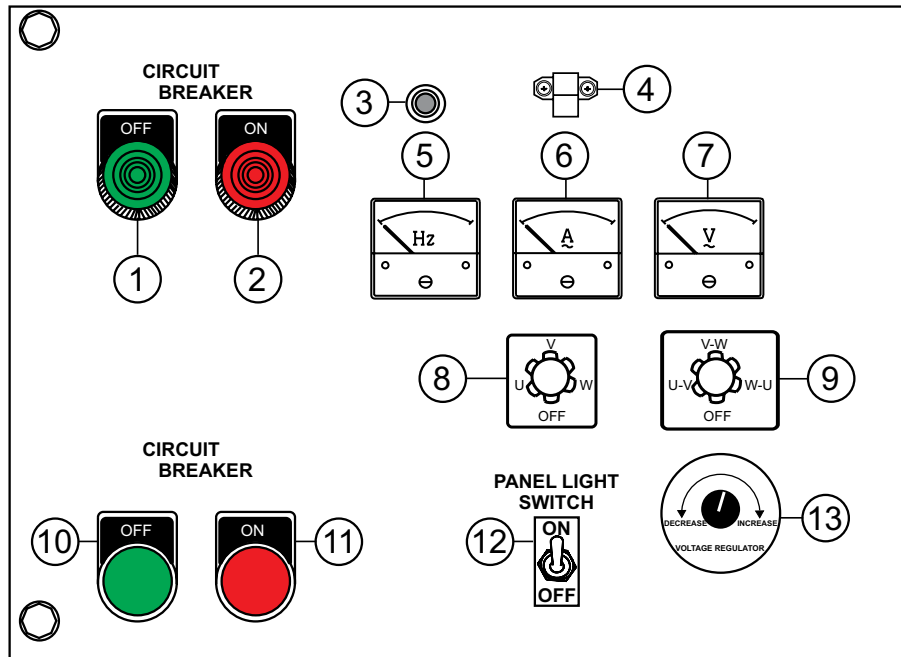


Table 4. Generator Major Components	
ITEM NO.	DESCRIPTION
1	Air Filter Assembly
2	Muffler Assembly
3	Fuel Tank Assembly
4	Generator Assembly
5	Output Terminal Assembly
6	Battery Assembly
7	Engine And Radiator Assembly
8	Engine Control Panel Assembly
9	Diagnostic Guage Assembly
10	Battery Switch
11	Generator Control Panel Assembly

Figure 5. Major Components

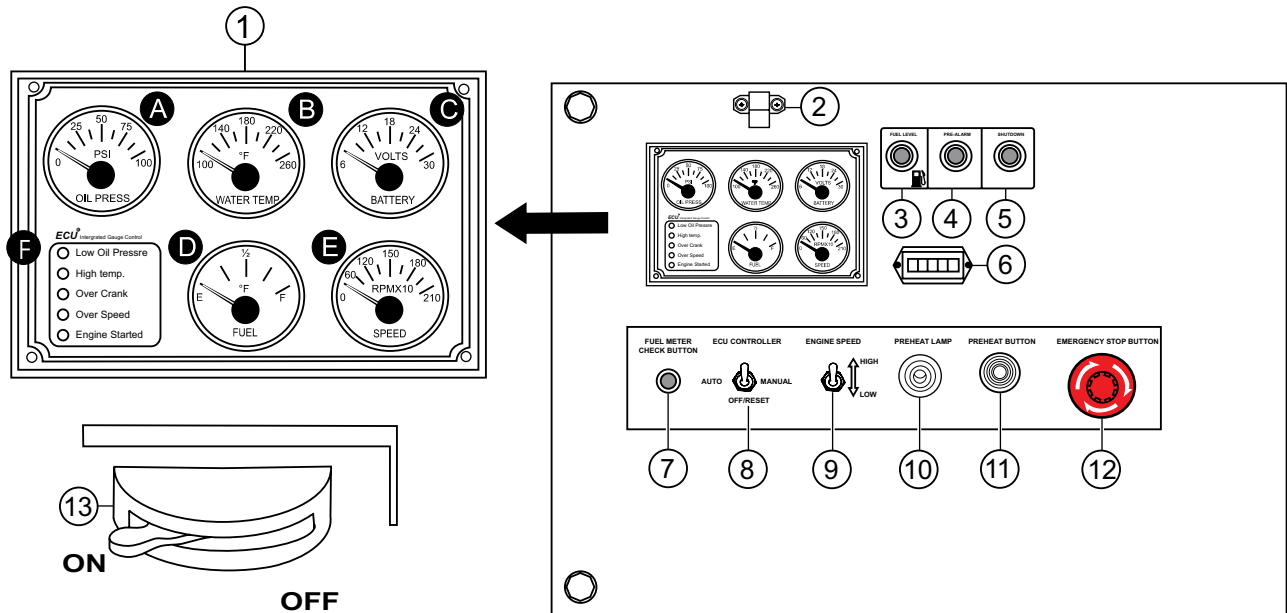
# GENERATOR CONTROL PANEL



**Figure 6. Generator Control Panel**

The definitions below describe the controls and functions of the Generator Control Panel (Figure 6).

- Circuit Breaker (OFF) Lamp** — When the circuit breaker ON switch is placed in the OFF position this lamp will be turned ON.
- Circuit Breaker (ON) Lamp** — When the circuit breaker ON switch is placed in the ON position this lamp will be turned ON.
- Pilot Lamp** — Indicates the system is running.
- Panel Light** — Normally used in dark areas or at night time. When activated, panel lights will illuminate. When the generator is not in use be sure to turn the panel light switch to the **OFF** position.
- Frequency Meter** — Indicates the output frequency in hertz (Hz). Normally 60 Hz.
- AC Ammeter** — Indicates the amount of current the load is drawing from the generator per leg selected by the ammeter phase selector switch.
- AC Voltmeter** — Indicates the output voltage present at the **U, V, and W Output Terminal Lugs**.
- Ammeter Change-Over Switch** — This switch allows the AC ammeter to indicate the current flowing to the load connected to any phase of the output terminals, or to be switched off. This switch does not effect the generator output in any fashion, it is for current reading only.
- Voltmeter Change-Over Switch** — This switch allows the AC voltmeter to indicate phase to phase voltage between any two phases of the output terminals or to be switched off.
- Circuit Breaker (ON) Switch** — Press this switch to place the 1600 amp circuit breaker in the closed (**ON**) position.
- Circuit Breaker (OFF) Switch** — Press this switch to place the 1600 amp circuit breaker in the open (**OFF**) position.
- Panel Light Switch** — When activated will turn on both control panel lights.
- Voltage Regulator Control** — Allows  $\pm 15\%$  manual adjustment of the generator's output voltage.



**Figure 7. Engine Control Panel**

The definitions below describe the controls and functions of the Engine Control Panel (Figure 7).

1. **Gauge Unit Assembly** — This assembly houses the various engine monitoring gauges. These gauges indicate: oil pressure, water temperature, charging voltmeter, fuel and engine speed RPM (tachometer).

A. **Oil Pressure Gauge** — During normal operation this gauge should read approximately 50 psi. (345 kPa). When starting the generator, the oil pressure may read a little higher, but after the engine warms up the oil pressure should return to the correct pressure range.

B. **Water Temperature Gauge** — During normal operation this gauge should read approximately 180°F (82°C).

C. **Charging Voltmeter Gauge** — During normal operation this gauge indicate minimum 14 VDC.

D. **Fuel Gauge** — Indicates amount of diesel fuel available.

E. **Tachometer** — Indicates engine speed in RPM's for 60 Hz operation. This meter should indicate 1800 RPM's when the rated load is applied.

F. **Auto Start/Stop Controller (ECU 750)** — This controller has a vertical row of five status LED's, that when lit, indicate that an engine malfunction (fault) has been detected. When a fault has been detected the engine controller will evaluate the fault and all major faults will shutdown the generator. During **cranking cycle** the ECU will attempt to crank the engine for 10 seconds before disengaging.

If the engine does not engage (start) by the third attempt, the engine will be shutdown by the engine controller's **Over Crank Protection** mode. If the engine engages at a speed (RPM's) that is not safe, the controller will shutdown the engine by initializing the **Over Speed Protection** mode.

Also the engine controller will shut down the engine in the event of low oil pressure, high coolant temperature, low coolant level, and loss of magnetic pickup. These conditions can be observed by monitoring the LED status indicators on the front of the controller module.

- **Low Oil Pressure LED** — This LED will light when the engine oil pressure drops to 14.2 psi (98 kPa). This condition will cause the engine to shut down. This is considered a **major** fault.

## ENGINE CONTROL PANEL

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- **High Temperature LED** — This LED will light when the coolant temperature has reached 212°F (100°C). This condition will cause the engine to shut down. This is considered a **major** fault.
  - **Over Crank LED** — This LED will light when the engine has attempted to start 3 times and failed. The intervals between the 3 start cycles is approximately 10 seconds. This is considered a **major** fault.
  - **Over Speed LED** — This LED will light when the engine is running at an unsafe speed. This condition will cause the engine to shut down. This is considered a **major** fault.
  - **Engine Started LED** — This LED will light when the engine has started and is operating correctly.
2. **Panel Light** — Normally used in dark areas or at night time. When activated, panel lights will illuminate. When the generator is not in use be sure to turn the panel light switch to the **OFF** position.
  3. **Fuel Level Alarm Lamp** — When this lamp is **ON**, it is time to stop the engine and add fuel. Remember to let the engine cool before adding fuel.
  4. **Pre-Alarm Lamp** — When this lamp is **ON**, it indicates that engine failures have occurred during operating.
  5. **Shutdown Lamp** — When this lamp is **ON** it indicates that a **major fault** has occurred and the engine has shutdown.
  6. **Hour Meter** — Indicates the operational hours of the generator.
  7. **Fuel Meter Check Button** — When the engine is not running, push and hold this button and the fuel level, and battery voltage will be displayed on the Gauge Unit Assembly, Figure 7, items C and D.
  8. **ECU Control Switch (ECU 750)** — This switch controls the running of the unit. If this switch is set to the **OFF/RESET** position, the unit will not run. When this switch is set to the **MANUAL** position, the generator will start immediately after the pre-heat cycle has been completed.

If the generator is to be connected to a building's AC power source via a transfer switch (isolation), place the switch in the **AUTO** position. In this position, should an outage occur, the automatic transfer switch (ATS) will start the generator automatically via the generator's autostart contacts connected to the ATS's start contacts. Please refer to your ATS installation manual for further instructions for the correct installation of the autostart contacts of the generator to the ATS.
  9. **Engine Speed Switch** — This switch controls the speed of the engine (low/high).
  10. **Pre-Heat Lamp** — When the ECU control switch is placed in **MANUAL** position the preheat lamp will be **ON**. When the preheat cycle is completed the lamp will turn **OFF**.
  11. **Pre-Heat Button** — Push this button when the engine is ready for starting during cold weather operating conditions. Keep pushing until the preheat lamp is off.
  12. **Emergency Stop Button** — Push this button inward to stop the engine in the event of an emergency. **DO NOT** use this button as a means of stopping the engine.
  13. **Battery Switch** — This switch should be set to the **ON** position during normal operation. When the engine has been stopped, place this switch in the **OFF** position. **DO NOT** move the position of this switch during normal operation, it could cause damage to the electrical generator.

# OUTPUT TERMINAL PANEL FAMILIARIZATION

## OUTPUT TERMINAL PANEL

Lift up on the output terminal panel cover (Figure 8) to gain access to the bus bar terminal lugs (load wires).

### NOTICE

Terminal legs/lugs “O” and “Ground” are considered bonded grounds.

## OUTPUT TERMINAL FAMILIARIZATION

The “Output Terminal Panel is provided with the following:

- Four Bus Bars with terminal lugs ( U, V, W, and O)
- Ground lug.

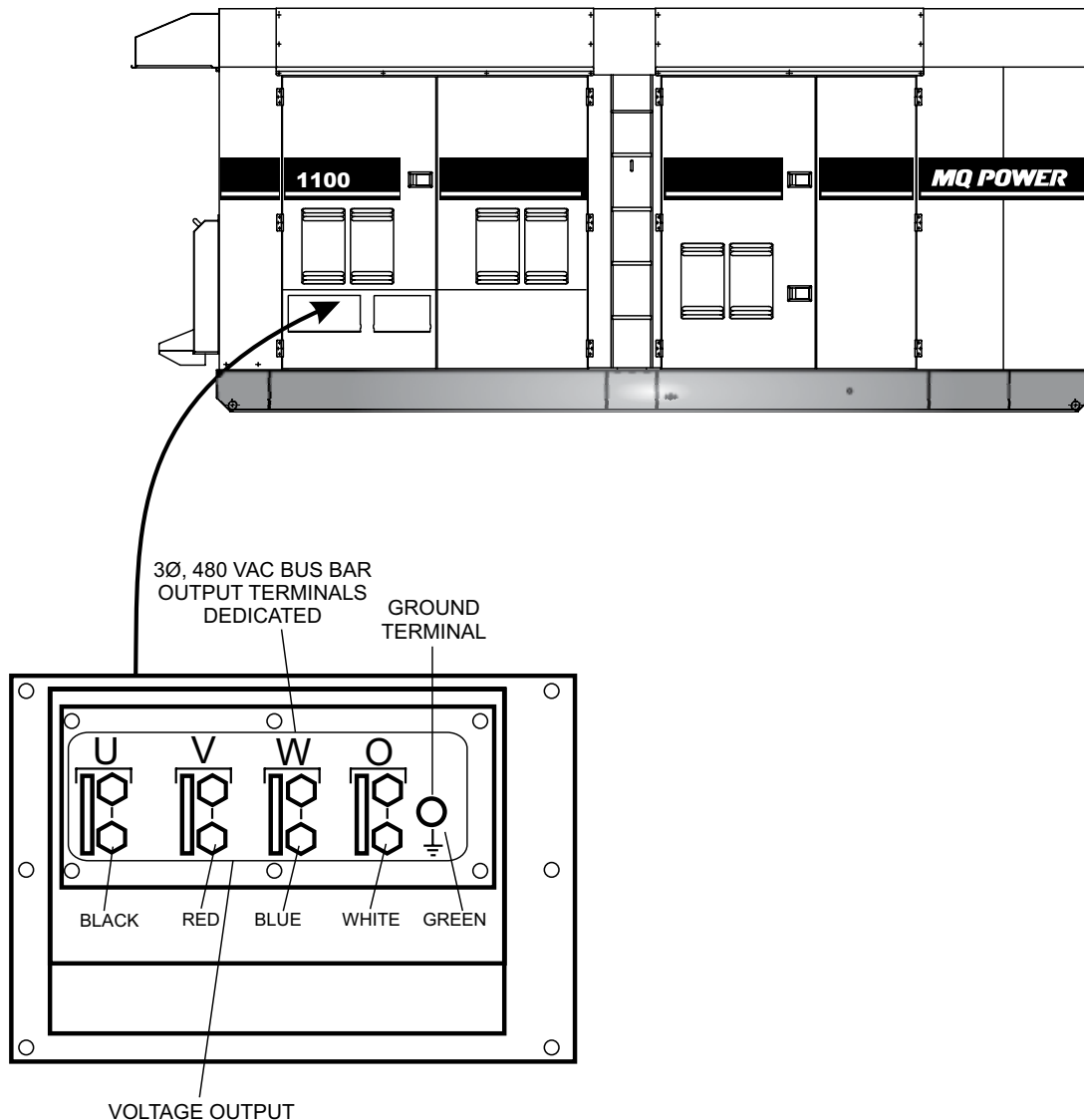


Figure 8. Output Terminal Panel (Bus Bars)

## OUTPUT TERMINAL PANEL FAMILIARIZATION

Turn the **voltage regulator control knob** (Figure 9) on the control panel to obtain the desired voltage. Turning the knob clockwise will **increase** the voltage, turning the knob counterclockwise will **decrease** the voltage.

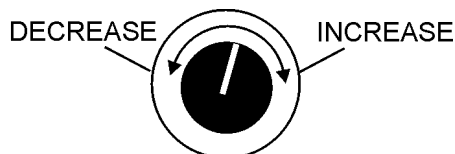


Figure 9. Voltage Regulator Control Knob

### Connecting Loads

Loads can be connected to the generator by the **Bus Bar Terminal Lugs** (Figure 10). Make sure to read the operation manual before attempting to connect a load to the generator.

To protect the output terminals from overload, a 3-pole, 1600A **main circuit breaker** is provided. Make sure to switch this circuit breaker to the **OFF** position prior to starting the engine.

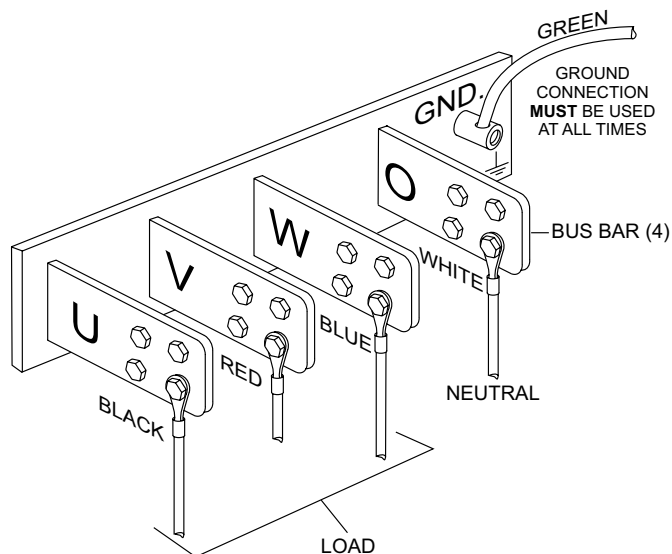


Figure 10. Connecting Loads

### Over Current Relay

An **over current relay** (Figure 11) is connected to the main circuit breaker. In the event of an overload, both the circuit breaker and the over current relay may trip. If the circuit breaker can not be reset, the **reset button** on the over current relay must be pressed. The over current relay is located in the control box.

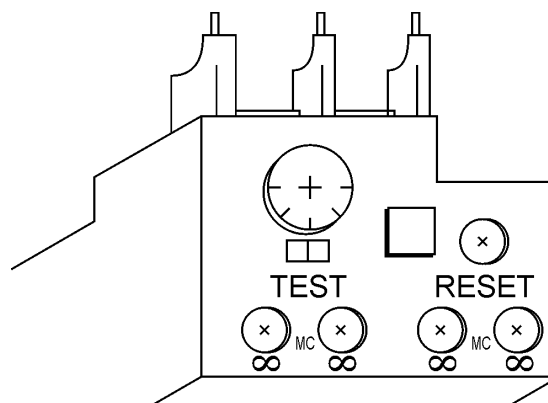


Figure 11. Over Current Relay



# LOAD APPLICATION

## SINGLE PHASE LOAD

Always be sure to check the nameplate on the generator and generator to insure the wattage, amperage, frequency, and voltage requirements are satisfactorily supplied by the generator for operating the generator.

Generally, the wattage listed on the nameplate of the generator is its rated output. Generator may require 130—150% more wattage than the rating on the nameplate, as the wattage is influenced by the efficiency, power factor and starting system of the generator.

### NOTICE

If wattage is not given on the generator's name plate, approximate wattage may be determined by multiplying nameplate voltage by the nameplate amperage.

$$\text{WATTS} = \text{VOLTAGE} \times \text{AMPERAGE}$$

The power factor of this generator is 0.8. See Table 5 below when connecting loads.

**Table 5. Power Factor By Load**

Type of Load	Power Factor
Single-Phase induction motors	0.4~75
Three-Phase induction motors	0.65~0.85
Electric heaters, incandescent lamps	1.0
Fluorescent lamps, mercury lamps	0.4~0.9
Electronic devices, communication generator	1.0
Common power tools	0.8

### NOTICE

When connecting induction motors and motor-driven generator, pay close attention to the required starting capacity. This starting capacity is considerable larger than the **full running capacity** which is usually listed on the nameplate.

The generator output cables (load) must be chosen with these requirements in mind. When connecting resistance loads such as incandescent lamps or electric heaters, a load of up to the generator's rated output (kW) can be connected.

## THREE PHASE LOAD

When calculating the power requirements for 3 phase power use the following equation:

$$\text{KVA} = \frac{\text{VOLTAGE} \times \text{AMPERAGE} \times 1.732}{1000}$$

### NOTICE

If 3Ø load (kVA) is not given on the generator nameplate, approximate 3Ø load may be determined by multiplying voltage by amperage by 1.732.

### NOTICE

Motors and motor driven generator draw much greater current for starting than during operation.

An inadequate size connecting cable which cannot carry the required load can cause a voltage drop which can burn out the appliance or tool and overheat the cable. See Table 6.

- When connecting a resistance load such as an incandescent lamp or electric heater, a capacity of up to the generating set's rated output (kW) can be used.
- When connecting a fluorescent or mercury lamp, a capacity of up to the generating set's rated output (kW) multiplied by 0.6 can be used.
- When connecting an electric drill or other power tools, pay close attention to the required starting current capacity.

When connecting ordinary power tools, a capacity of up to the generating set's rated output (kW) multiplied by 0.8 can be used.

### DANGER

Before connecting this generator to any building's electrical system, a **licensed electrician** must install an **isolation (transfer) switch**. Serious damage to the building's electrical system may occur without this transfer switch.

# GENERATOR OUTPUTS

## GENERATOR OUTPUT VOLTAGES

Table 6. Voltages Available			
Three Phase	440V	460V	480V

## Generator Amperage

Table 7 shows the **maximum** amps the generator can provide. **DO NOT** exceed the maximum amps as listed.

Table 7. Generator Maximum Amps	
Rated Voltage	Maximum Amps
3Ø 480 Volt	1323 amps (4 wire)

## HOW TO READ THE AC AMMETER AND AC VOLTAGE GAUGES

The AC ammeter and AC voltmeter gauges are controlled by the AC ammeter and AC voltmeter changeover switches.

Both of these switches are located on the control panel and **DO NOT** effect the generator output. They are provided to help observe how much power is being supplied, produced at the UVW terminals lugs.

## AC Voltmeter Gauge Reading

Place the **AC Voltmeter Change-Over Switch** (Figure 12A) in the WU position and observe the phase to phase voltage reading between the W and U terminals as indicated on the **AC Voltmeter Gauge** (Figure 12B).

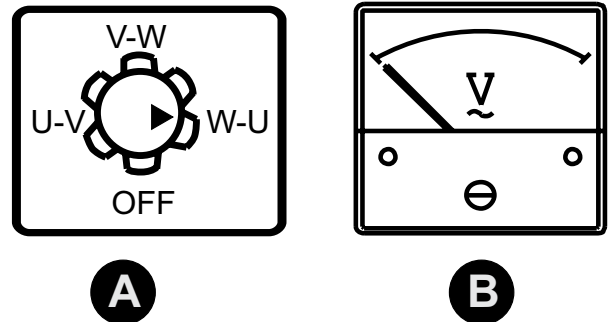


Figure 12. AC Voltmeter Change-Over Switch

## AC Ammeter Gauge Reading

Place the **AC Ammeter Change-Over Switch** (Figure 13A) in the U position and observe the current reading (load drain) on the U terminal as indicated on the **AC Ammeter Gauge** (Figure 13B). This process can be repeated for terminals V and W.

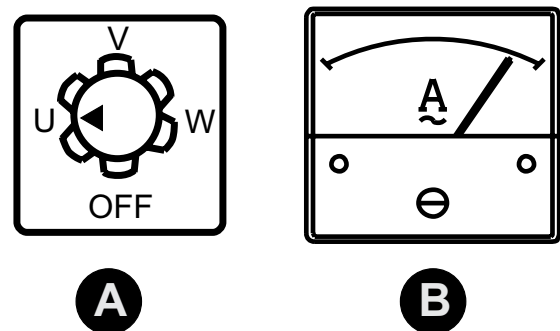


Figure 13. AC Ammeter Change-Over Switch

### NOTICE

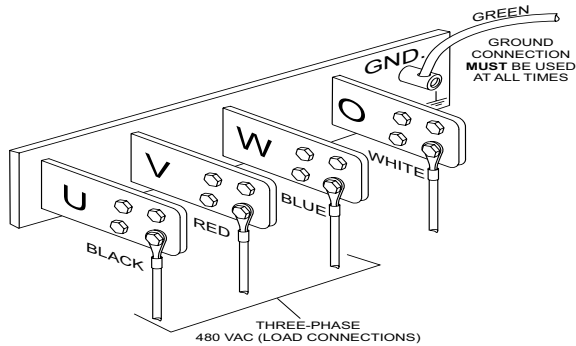
The **ammeter** gauge will only show a reading when the **bus bar output terminal lugs** are connected to a load and is in use.

# OUTPUT TERMINAL PANEL CONNECTIONS

## UVWO TERMINAL OUTPUT VOLTAGES

### 3Ø-480V UVWO Terminal Output Voltages

1. Connect the load wires to the UVWO terminals as shown in Figure 14.

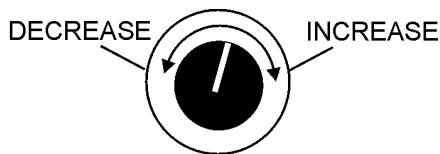


**Figure 14. UVWO Terminal Lugs 3Ø-480V Connections**

#### NOTICE

**ALWAYS** make sure that the connections to the UVWO bus bar terminals are **secure** and **tight**. The possibility of arcing exists which could cause a fire.

2. Turn the voltage regulator knob (Figure 15) clockwise to increase voltage output, turn counterclockwise to decrease voltage output. Use voltage regulator adjustment knob whenever ***fine tuning*** of the output voltage is required.



**Figure 15. Voltage Regulator Knob**

#### NOTICE

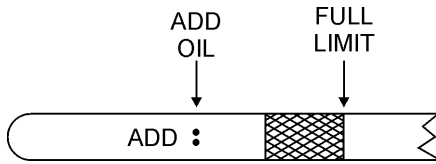
Use the voltage regulator knob to adjust the UVW output for 440, 460 or 480 VAC.

## CIRCUIT BREAKER

To protect the **U, V, and W** output terminals from overload, a 3-pole, 1600 amp, main circuit breaker is provided. **ALWAYS** make sure this breaker is **OFF** prior to starting the engine.

## LUBRICATION OIL

Fill the engine crankcase with lubricating oil through the filler hole, but **DO NOT** overfill. Make sure the generator is level and verify that the oil level is maintained between the two notches (Figure 16) on the dipstick. See Table 11 for proper selection of engine oil.



**Figure 16. Engine Oil Dipstick**

When checking the engine oil, be sure to check if the oil is clean. If the oil is not clean, drain the oil by removing the oil drain plug, and refill with the specified amount of oil as outlined in the **Cummins Engine Owner's Manual**. Oil should be warm before draining.

Other types of motor oils may be substituted if they meet the following requirements:

- API Service Classification CC/SC
- API Service Classification CC/SD
- API Service Classification CC/SE
- API Service Classification CC/SF

		OIL: SAE	
°F	°C		
122	50		
104	40		
86	30	10W/40	30
68	20		
50	10		
32	0		
-14	-10	5W/30	10W/40
-4	-20		
-22	-30		
-40	-40		

**Table 8. Recommended Motor Oil**

## FUEL CHECK

### **! DANGER**



Fuel spillage on a **hot** engine can cause a **fire** or **explosion**. If fuel spillage occurs, wipe up the spilled fuel completely to prevent fire hazards. **NEVER** smoke around or near the generator.

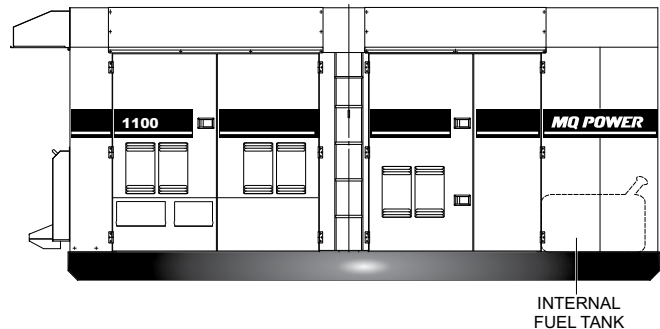
## Refilling the Fuel System

### **! CAUTION**

**ONLY** properly trained personnel who have read and understand this section should refill the fuel tank system.

This generator has an internal fuel tank (Figure 17) located inside the generator and may also be equipped with an external fuel tank (). **ALWAYS** fill the fuel tanks with clean fresh **#2 diesel fuel**. **DO NOT** fill the fuel tanks beyond their capacities.


Pay attention to the fuel tank capacity when replenishing fuel. The fuel tank cap must be closed tightly after filling. Handle fuel in a safety container. If the container does not have a spout, use a funnel. Wipe up any spilled fuel immediately.



**Figure 17. Internal Fuel Tank System**

## Refueling Procedure:

**! WARNING**



**Diesel fuel** and its vapors are dangerous to your health and the surrounding environment. Avoid skin contact and/or inhaling fumes.

1. **Level Tanks** — Make sure fuel cells are level with the ground. Failure to do so will cause fuel to spill from the tank before reaching full capacity (Figure 18).

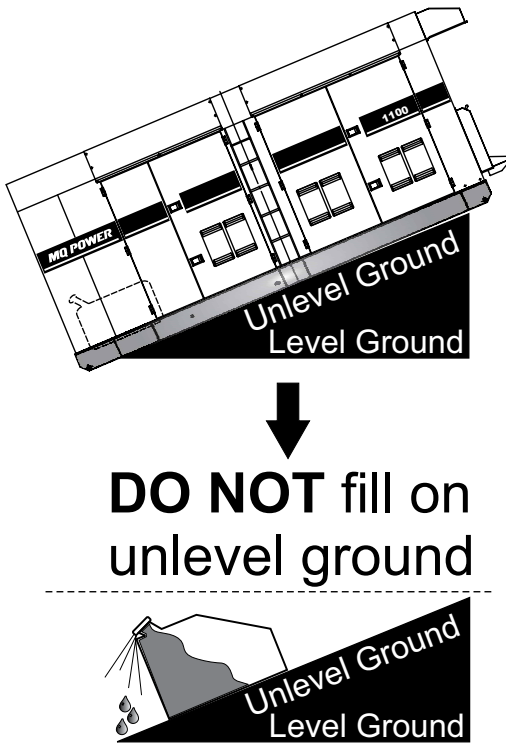


Figure 18. Only Fill on Level Ground

**! CAUTION**

**ALWAYS** place generator on firm level ground before refueling to prevent spilling and maximize the amount of fuel that can be pumped into the tank.

**NOTICE**

**ONLY** use #2 diesel fuel when refueling.

2. Read the fuel gauge (Figure 19 ) and determine if the fuel level is low.

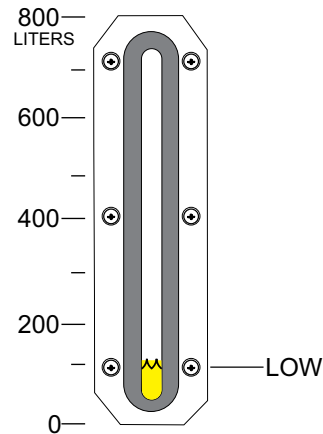


Figure 19. Fuel Gauge

3. If the fuel level is low, remove fuel cap and fill tank as shown in Figure 20.

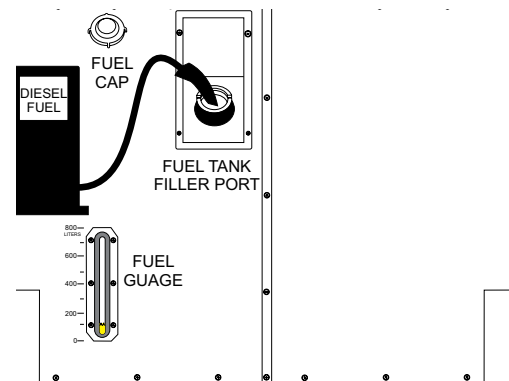


Figure 20. Fueling the Generator

4. **NEVER overfill fuel tank** — It is important to read the fuel gauge when filling fuel tank.

**! CAUTION**

**DO NOT OVERFILL** fuel system. Leave room for fuel expansion. Fuel expands when heated (Figure 21).



Figure 21. Fuel Expansion

## COOLANT (ANTIFREEZE/SUMMER COOLANT/WATER)

Cummins recommends antifreeze/summer coolant for use in their engines, which can be purchased in concentrate (and mixed with 50% demineralized water) or prediluted. See the **Cummins Engine Owner's Manual** for further details.

### WARNING



If adding coolant/antifreeze mix to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. The possibility of **hot!** coolant exists which can cause severe burns.

Day to day addition of coolant is done from the recovery tank. When adding coolant to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. See Table 10 for engine, radiator, and recovery tank coolant capacities. Make sure the coolant level in the recovery tank is always between the "H" and the "L" markings.

**Table 9. Coolant Capacity**

Engine and Radiator	55.7 gal (211 liters)
Reserve Tank	N/A

## Operation in Freezing Weather

When operating in freezing weather, be certain the proper amount of antifreeze (Table 10) has been added.

**Table 10. AntiFreeze Operating Temperatures**

Vol % AntiFreeze	Freezing Point	
	°C	°F
50	37	34

### NOTICE

When the antifreeze is mixed with water, the antifreeze mixing ratio **must be** less than 50%.

## CLEANING THE RADIATOR

The engine may overheat if the radiator fins become overloaded with dust or debris. Periodically clean the radiator fins with compressed air. Cleaning inside the generator is dangerous, so clean only with the engine turned off and the **negative** battery terminal disconnected.

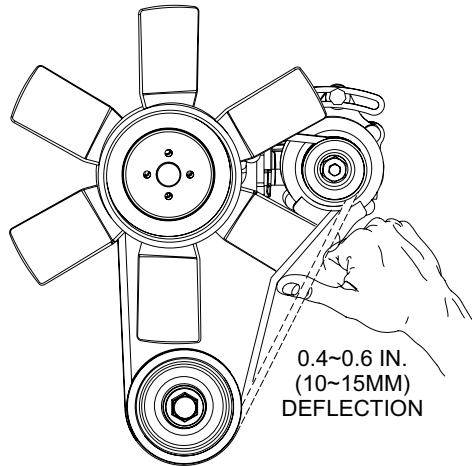
## AIR CLEANER

Periodic cleaning/replacement is necessary. Inspect it in accordance with the **Cummins Engine Owner's Manual** and the maintenance section of this manual.

## FAN BELT TENSION

A slack fan belt may contribute to overheating, or to insufficient charging of the battery. Inspect the fan belt for damage and wear and adjust it in accordance with the **Cummins Engine Owner's Manual**.

The fan belt (Figure 22) tension is proper if the fan belt bends 0.4~0.6 in. (10~15 mm) when pressed.



**Figure 22. Fan Belt Tension**

### CAUTION



**NEVER** place hands near the belts or fan while the generator set is running.

## BATTERY

This unit is of negative ground **DO NOT** connect in reverse. Always maintain battery fluid level between the specified marks. Battery life will be shortened, if the fluid level are not properly maintained. Add only distilled water when replenishment is necessary.

**DO NOT** over fill. Check to see whether the battery cables are loose. Poor contact may result in poor starting or malfunctions. **ALWAYS** keep the terminals firmly tightened. Coating the terminals with an approved battery terminal treatment compound. Replace battery with only recommended type battery.

The battery is sufficiently charged if the specific gravity of the battery fluid is 1.28 (at 68° F). If the specific gravity should fall to 1.245 or lower, it indicates that the battery is dead and needs to be recharged or replaced.

Before charging the battery with an external electric source, be sure to disconnect the battery cables.

### Battery Cable Installation

**ALWAYS** be sure the battery cables (Figure 23) are properly connected to the battery terminals as shown below. The **red cable** is connected to the positive terminal of the battery, and the **black cable** is connected to the negative terminal of the battery.

#### CAUTION

**ALWAYS** disconnect the negative terminal **FIRST** and reconnect negative terminal **LAST**.

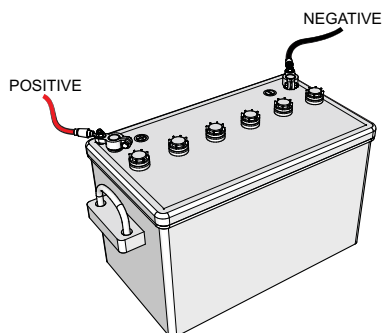


Figure 23. Battery Connections

When connecting battery do the following:

1. **NEVER** connect the battery cables to the battery terminals when the **ECU Control Switch** is in either the **AUTO** or **MANUAL** position. **ALWAYS** make sure that the **ECU Control Switch** is in the **OFF/RESET** position when connecting the battery.
2. Place a small amount of battery terminal treatment compound around both battery terminals. This will ensure a good connection and will help prevent corrosion around the battery terminals.

#### NOTICE

If the battery cable is connected incorrectly, electrical damage to the generator will occur. Pay close attention to the polarity of the battery when connecting the battery.

#### CAUTION

Inadequate battery connections may cause poor starting of the generator, and create other malfunctions.

## ALTERNATOR

The polarity of the alternator is negative grounding type. When an inverted circuit connection takes place, the circuit will be in short circuit instantaneously resulting the alternator failure.

**DO NOT** put water directly on the alternator. Entry of water into the alternator can cause corrosion and damage the alternator.

## WIRING

Inspect the entire generator for bad or worn electrical wiring or connections. If any wiring or connections are exposed (insulation missing) replace wiring immediately.

## PIPING AND HOSE CONNECTION

Inspect all piping, oil hose, and fuel hose connections for wear and tightness. Tighten all hose clamps and check hoses for leaks.

If any hose (**fuel** or **oil**) lines are defective replace them immediately.



# GENERATOR STARTUP PROCEDURE (MANUAL)

## BEFORE STARTING

### CAUTION

The engine's exhaust contains harmful emissions. **ALWAYS have adequate ventilation when operating.** Direct exhaust away from nearby personnel.

### WARNING

**NEVER** manually start the engine with the **main, or auxiliary** circuit breakers in the **ON** (closed) position.

If applicable perform the following:

- Apply commercial power to the internal battery charger receptacle (to ensure good starting) via commercial power. An external power cord will be required. This capability is an **option**.
- Apply commercial power to the jacket water heater receptacle (not necessary for warm climates) via commercial power. An external power cord will be required. This capability is an **option**.

1. Press the main circuit breaker “OFF” pushbutton switch (Figure 24).

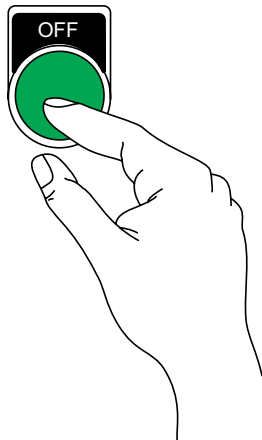


Figure 24. Main Circuit Breaker OFF Switch

2. Verify that the **main** circuit breaker “OFF” lamp (Figure 25) is lit (ON).

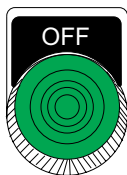


Figure 25. Main Circuit Breaker OFF Lamp

3. Connect the load to the UVWO bus bar terminals as shown in Figure 26. These load connection points can be found on the output terminal panel. To gain access to the UVWO bus bar terminals unlock the access cover and lift the door.

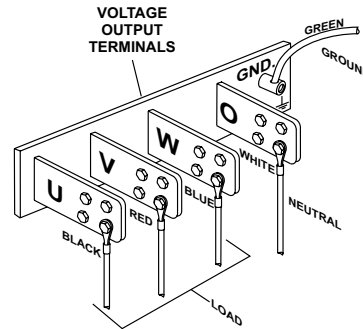
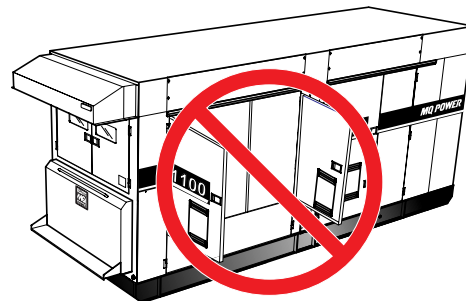
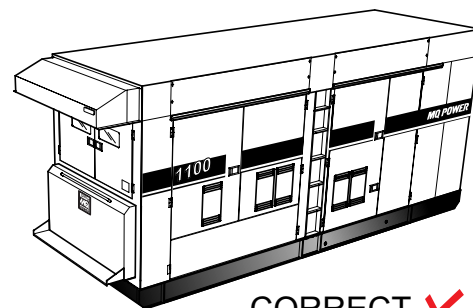


Figure 26. Load Connections

4. Tighten the UVWO terminal nuts securely to prevent load wires from arcing.
5. Close all enclosure doors (Figure 27)



INCORRECT



CORRECT ✓

Figure 27. Enclosure Doors



# GENERATOR STARTUP PROCEDURE (MANUAL)

## STARTING (MANUAL)

1. Set the **battery ON/OFF switch** (Figure 28) to the "ON" position.

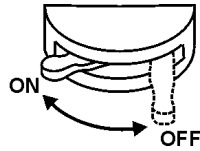


Figure 28. Battery Switch (ON)

2. Place the **engine speed switch** in the "LOW" position (Figure 29).



Figure 29. Engine Speed Switch (Low)

3. Place the **ECU 750 control switch** in the **MANUAL** position to start the engine (Figure 30).

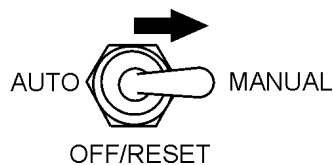
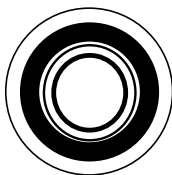


Figure 30. ECU Control Switch (Manual Position)

4. Press and hold the engine pre-heat button (Figure 31). Verify that the pre-heat lamp is lit. Continue pressing button until pre-heat cycle is complete. After completion of the pre-heating cycle, the light will go OFF and the engine will start up automatically.

### PREHEAT LAMP



### PREHEAT LAMP

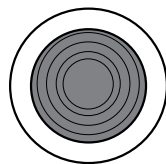


Figure 31. Pre-Heat Lamp/Pre-Heat Button

5. Once the engine starts, let the engine run for 3~5 minutes. Listen for any abnormal noises. If any abnormalities exist, shut down the engine and correct the problem.
6. If the engine is running smoothly, place the engine speed switch (Figure 32) in the **HIGH** (up) position.



Figure 32. Engine Speed Switch (High)

7. The generator's frequency meter (Figure 33) should be displaying the 60 cycle output frequency in **HERTZ**.

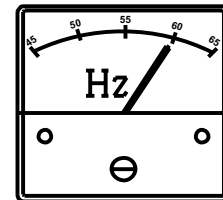


Figure 33. Frequency Meter

8. The generator's AC voltmeter (Figure 34) will display the generator's output in **VOLTS**.

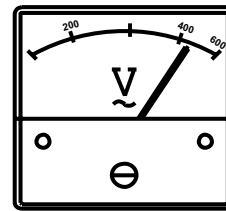


Figure 34. Voltmeter

9. If the voltage is not within the specified tolerance, use the voltage adjustment control knob (Figure 35) to increase or decrease the desired voltage.

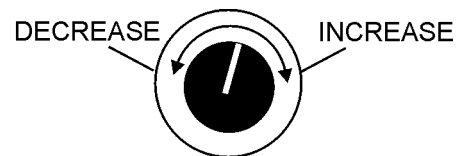


Figure 35. Voltage Adjust Control Knob

10. Verify that the **engine started** status LED on the ECU 750 controller (Figure 36) is lit (ON) after the engine has started.

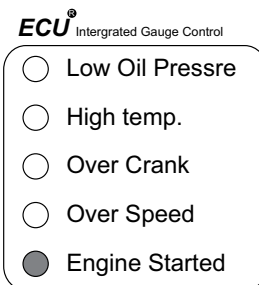
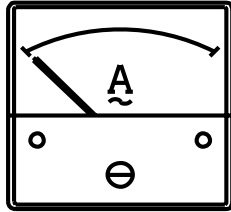


Figure 36. Engine Started LED (ON)

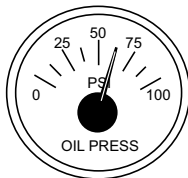
# GENERATOR STARTUP PROCEDURE (MANUAL)

11. The ammeter (Figure 37) will indicate **zero amps** with no load applied. When a load is applied, the ammeter will indicate the amount of current that the load is drawing from the generator.



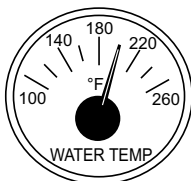
**Figure 37. Ammeter (No Load)**

12. The engine oil pressure gauge (Figure 38) will indicate the oil pressure of the engine. Under normal operating conditions the oil pressure is approximately 14 psi. (96 kPa).



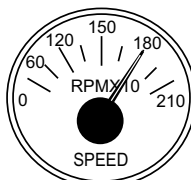
**Figure 38. Oil Pressure Gauge**

13. The **coolant temperature gauge** (Figure 39) will indicate the coolant temperature. Under normal operating conditions the coolant temperature should be approximately 212°F (100°C).



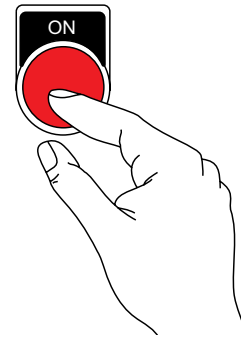
**Figure 39. Coolant Temperature Gauge**

14. The **tachometer gauge** (Figure 40) will indicate the speed of the engine when the generator is operating. Under normal operating conditions this speed is approximately 1800 RPM's.



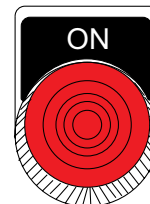
**Figure 40. Engine Tachometer Gauge**

15. Press the **main** circuit breaker "ON" pushbutton switch (Figure 41).



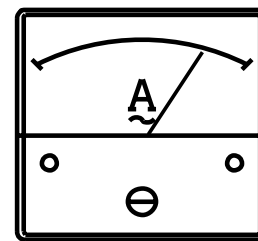
**Figure 41. Main Circuit Breaker ON Switch**

16. Verify that the main circuit breaker "ON" lamp (Figure 42) is lit (**ON**).



**Figure 42. Main Circuit Breaker ON Lamp**

17. Verify that the generator's ammeter (Figure 43) reads the anticipated amount of current with respect to the load. The ammeter will only display a current reading if a load is in use.



**Figure 43. Ammeter (Load)**

18. The generator will run until manually stopped or an abnormal condition occurs.

# GENERATOR STARTUP PROCEDURE (AUTO MODE)

## CAUTION

When connecting the generator to a isolation (transfer) switch, **ALWAYS** have power applied to the generator's internal battery charger. This will ensure that the engine will not fail due to a dead battery.

## DANGER



Before connecting this generator to any building's electrical system, a **licensed electrician** must install an **isolation (transfer) switch**. Serious damage to the building's electrical system may occur without this transfer switch.

## NOTICE

When the generator is set in the **AUTO** mode, the generator will **automatically start** in the event of commercial power falling below a prescribed level by means of a contact closure that is generated automatically by a transfer switch.

## WARNING

When running the generator in the **AUTO** mode, remember the generator can start up at any time without warning. **NEVER** attempt to perform any maintenance when the generator is in the auto mode.

## CAUTION

The engine speed switch **must** be set to the "High" position when running in the **autostart** mode. Failing to set the switch in the proper position can result in damage to your generator when it turns on.

## NOTICE

When the ECU control switch is placed in the **AUTO** position, the engine glow plugs will be warmed and the engine will start automatically.

## STARTING (AUTO MODE)

When starting generator in **AUTO** mode use the "Manual Startup" procedure except where noted (see below).

1. Perform steps 1 through 4 in the Before Starting section as outlined in the Manual Starting Procedure.
2. Place the **engine speed switch** (Figure 44) in the **HIGH** position

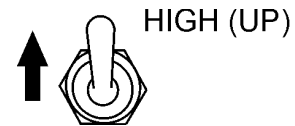


Figure 44. Engine Speed Switch (High)

3. Place the **ECU Control Switch** (Figure 45) in the **AUTO** position.



Figure 45. ECU Control Switch (AUTO)

4. Continue operating the generator as outlined in the Manual Startup procedure (start at step 5).

# GENERATOR SHUTDOWN PROCEDURES

## NORMAL SHUTDOWN PROCEDURE

To shutdown the generator, use the following procedure:

1. Place the three **auxiliary** circuit breakers in the **OFF** position (Figure 46).
2. Place the engine speed switch (Figure 46) in the **LOW** (down) position.



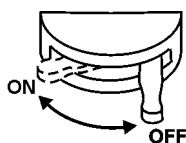
**Figure 46. Engine Speed Switch (Low)**

3. Let the engine cool by running it at low speed for 3-5 minutes with no load applied.
4. Place the **ECU Control Switch** (Figure 47) to the **OFF/RESET** position.



**Figure 47. ECU Control Switch (Off/Reset)**

5. Verify that **all** the status LEDs on the ECU 750 display are **OFF** (not lit).
6. Set the **battery ON/OFF switch** (Figure 48) to the "**OFF**" position.

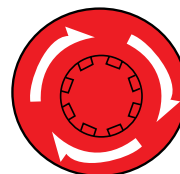


**Figure 48. Battery Switch (OFF)**

7. Remove all loads from the generator.
8. Inspect entire generator for any damage or loosening of components that may have occurred during operation.

## EMERGENCY SHUTDOWN PROCEDURE

1. To stop the engine in the event of an emergency, **PUSH** the emergency stop button (Figure 49) inward. This button is located on the engine operating panel, see Figure 5.



**Figure 49. Emergency Stop Button**

## BASIC ENGINE INSPECTION AND MAINTENANCE

See Table 11 below for a general engine inspection and maintenance checklist. For more detailed maintenance, refer to the Cummins Engine Owner's Manual.

Table 11. Inspection/Maintenance		10 Hrs DAILY	250 Hrs	500 Hrs or Every 12 Months	3000 Hrs or Every 36 Months	OTHER
Engine	Check Engine Oil and Coolant Levels	X				
	Check Fuel Filter/Water Separator Bowl	X				
	Check Air Cleaner/Element	X				
	Exhaust System* <sup>5</sup>		X			
	Check for Leaks/Hoses/Clamps* <sup>4</sup>	X				
	Check for Loosening of Parts	X				
	Change Engine Oil and Oil Filter * <sup>1</sup>		X			
	Clean Unit, Inside and Outside		X			
	Replace Fuel Filter Elements			X		
	Check Engine Mounts			X		
	Service Battery			X		
	Check Air Intake Hoses			X		
	Check Fan Belt Condition			X		
	Check Automatic Belt Tensioner			X		
	Check Electrical Ground Connection			X		
	Clean Radiator, Check Cooling System			X		
	Coolant Solution Analysis, Add SCA's As Required			X		
	Pressure Test Cooling System			X		
	Check Engine Speed			X		
	Test Thermostats				X	
	Check and Adjust Engine Valve Clearance				X	
	Test Glow Plugs				X	
	Flush and Refill Cooling System* <sup>2</sup>					2 yrs. or 2000 hrs.
	Clean Inside of Fuel Tank					1000 hrs.
	Check Crankcase Ventilation Filter					1500 hrs.
	Replace Air Cleaner Elements * <sup>3</sup>					As Required

\*<sup>1</sup> During initial operation of a new engine, change oil and filter between a minimum of 100 hrs. and a maximum of 250 hrs. Service interval depends on type of oil.

\*<sup>2</sup> Add "Supplemental Coolant Additives (SCA'S)" to recharge the engine coolant.

\*<sup>3</sup> Replace primary air filter element when restriction indicator shows a vacuum of 625 mm (25 in. H<sub>2</sub>O).

\*<sup>4</sup> If blowby hose needs to be replaced, ensure that the slope of the blowby hose is at least a 1/2 inch per foot, with no sags or dips that could collect moisture and/or oil.

\*<sup>5</sup> Accumulation of carbon (soot, unburned fuel) in the exhaust pipe line and muffler could cause not only system derates but also could lead to fire incident. To destroy the soot and unburned fuel, run the unit at rated power for some period of time until the exhaust gas become mostly colorless every 250 hours operation time. The carbon will be easier to be generated when the unit operates at less than 30% of rated power. In this case, perform the above procedures at shorter interval time.

## GENERAL INSPECTION

Prior to each use, the air generator should be cleaned and inspected for deficiencies. Check for loose, missing or damaged nuts, bolts or other fasteners. Also check for fuel, oil, and coolant leaks. Use Table 11 as a general maintenance guideline for engine maintenance.

### Air Filter Dust Indicator

#### NOTICE

The air filter **should not be changed** until the dust indicator reads “**RED**”. Dispose of old air filter. It may not be cleaned or reused.

The air filter dust indicator (Figure 50) is attached to the air filter body. When the air filter element is clogged, air intake restriction becomes greater and the air filter dust indicator signal shows **RED**.

When the indicator is **RED**, replace the filter immediately. After changing the air filter, press the reset button located at the bottom of the air filter dust indicator.

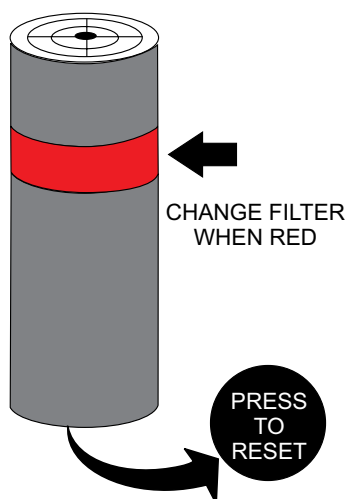


Figure 50. Air Filter Dust Indicator

### AIR CLEANER (DAILY/500 HOURS)

#### NOTICE

If the engine is operating in very **dusty** or **dry** grass conditions, a clogged air cleaner will result. This can lead to a loss of power, excessive carbon buildup in the combustion chamber and high fuel consumption. Change air cleaner more **frequently** if these conditions exist.

This Cummins diesel engine is equipped with a replaceable, high-density paper air cleaner element (Figure 51). This air cleaner is also equipped with an inner element (secondary) that is used as a backup filter should the primary element becomes damaged.

Remove air cleaner elements and clean the heavy duty paper element with a light spray of compressed air. Replace the air cleaner element every 500 hours.

#### CAUTION



Wear protective generator such as approved safety glasses or face shields and dust masks or respirators when cleaning air filters with compressed air.

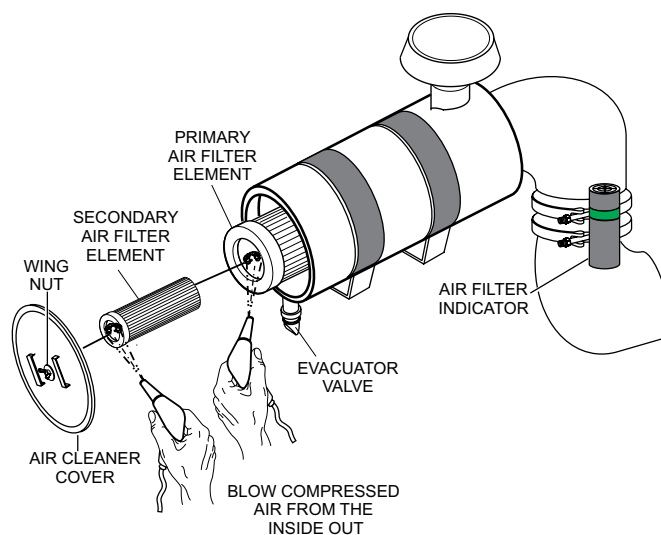


Figure 51. Air Cleaner

1. Remove the wing nut that secures the cover to the air cleaner body.
2. Remove the air cleaner cover and set aside.
3. Remove both the primary and secondary air cleaner elements.
4. Check the air cleaner daily or before starting the engine
5. Check for and correct heavy buildup of dirt and debris along with loose or damaged components.

#### NOTICE

Operating the engine with loose or damaged air cleaner components could allow unfiltered air into the engine causing premature wear and failure.

## NOTICE

**DO NOT** use **excessive** air pressure or the paper air filter element will be damaged and will need to be replaced. If air filters are excessively dirty (oily). Replace air filters, **DO NOT** clean.

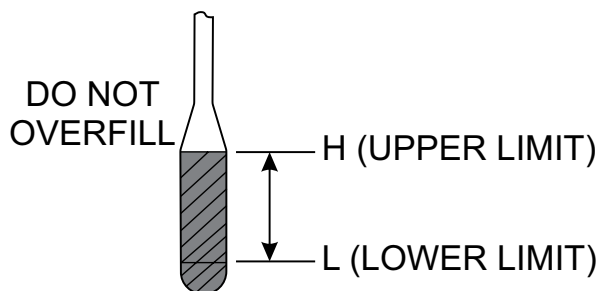
- To clean the primary element (paper air filter) as referenced in (Figure 51), tap the filter element several times on a hard surface to remove dirt, or blow compressed air (not to exceed 30 psi (207 kPa, 2.1 kgf/cm<sup>2</sup>) through the filter element from the inside out.
- Clean the secondary element (paper air filter) as referenced in step 6.
- Replace both elements if they are damaged or **excessively dirty**.
- Clean the inside of the air cleaner body.
- Reinstall the primary and secondary air filter elements back into air cleaner body.
- Reinstall the air cleaner cover, and secure with wing nut.

## NOTICE

**DO NOT** run the engine with the air cleaner removed or without an element.

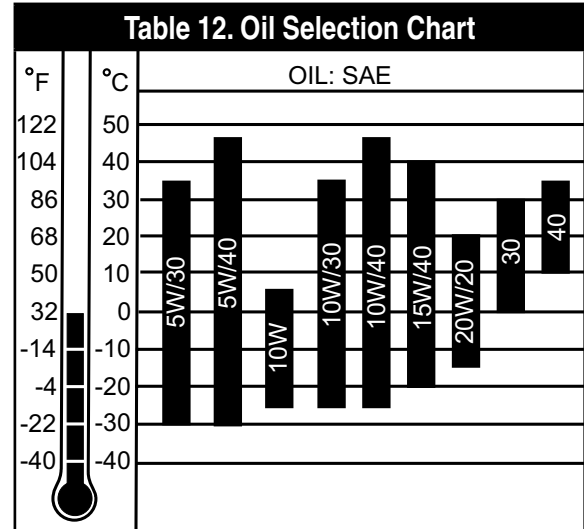
## ENGINE OIL (CHECK DAILY)

- When checking or adding oil, place the generator so the engine is level.
- Pull the engine oil dipstick from its holder.
- Determine if engine oil is low. Oil level should be between the upper and lower limit (Figure 52) on the dipstick.



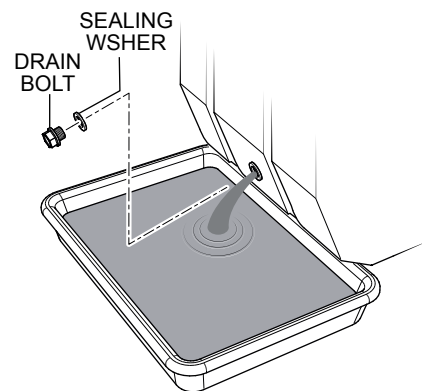
**Figure 52. Dipstick Engine Oil Level**

- If oil level is low, add correct amount of engine oil to bring oil level to a normal safe level (See Recommended Viscosity Grades, Table 12).
- Allow enough time for any added oil to make its way to the oil pan before rechecking.



## DRAINING ENGINE OIL

- Run the engine until the engine coolant reaches a temperature of 140° (60°C). Turn the engine off.
- Remove the oil dipstick from its holder.
- Next, remove oil drain bolt and sealing washer and allow the oil to drain into a suitable container (Figure 53).



**Figure 53. Draining Engine Oil**

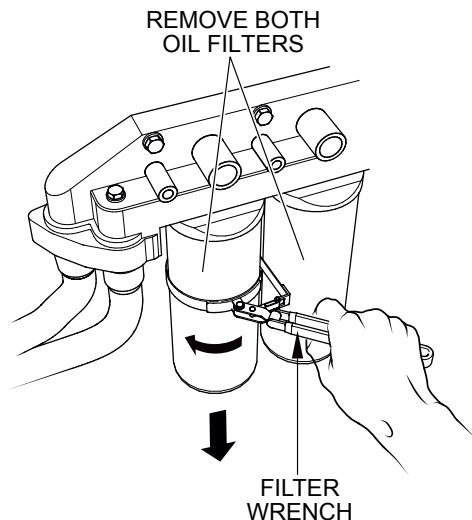
- After engine oil has been completely drained, reinstall drain bolt with sealing washer and tighten securely.

## NOTICE

For composite oil pans always install a **new** sealing washer.

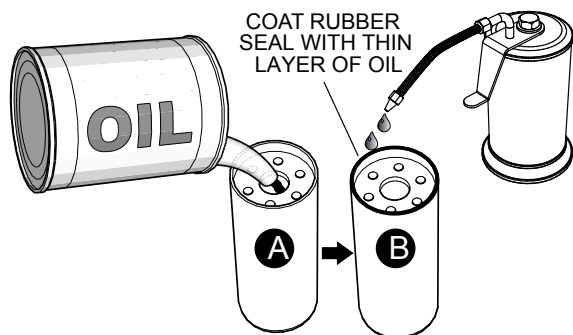
## ENGINE OIL FILTER REPLACEMENT

1. Clean the area around the lubricating oil filter head.
2. Using an oil filter wrench (Figure 54), remove both oil filters.



**Figure 54. Removing Oil Filters**

3. Fill the each oil filter (Figure 55A) with clean engine oil as recommended in Table 2 and Table 12.



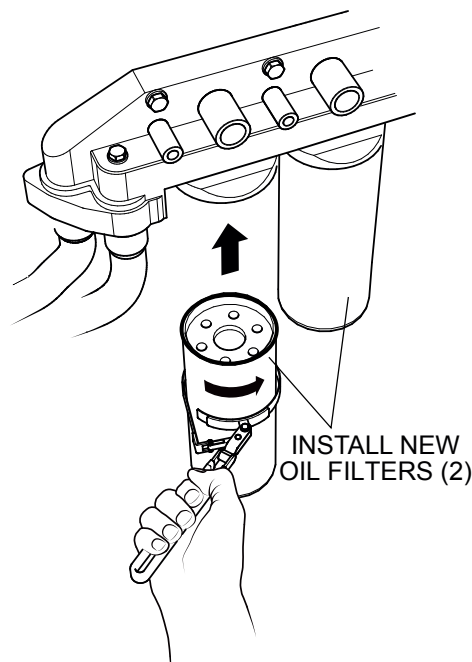
**Figure 55. Oil Filters**

### NOTICE

The lubricating oil filter should be full of oil at engine start-up to prevent engine damage.

4. Coat the rubber seal (gasket) surface of each oil filter (Figure 55B) with clean 15W-40 engine oil.

5. Install new oil filter (Figure 56) first by hand until it makes contacts with the filter head surface. Tighten it another 3/4 turn using the filter wrench.



**Figure 56. Installing Oil Filters**

6. Fill engine crankcase with high quality detergent oil classified "For Service CI-4. Fill to the upper limit of dipstick. **DO NOT** overfill. Crankcase oil capacity with oil filter replacement is 40.7 gal. (154 liters).
7. Run the engine for several minutes. Watch for oil leakage. Shut the engine down and allow it to sit for several minutes. Top off the oil to the upper limit on the dipstick.



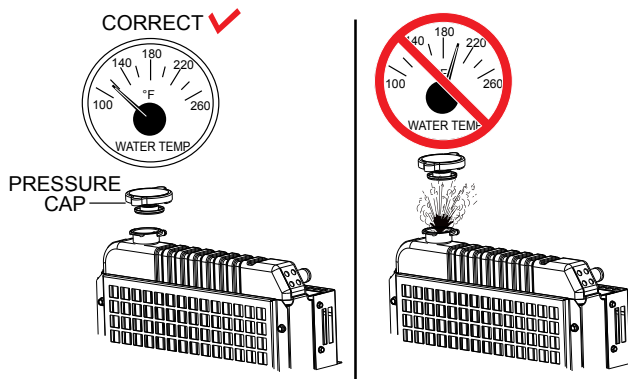
## DRAINING ENGINE COOLANT

### WARNING

**DO NOT** remove the pressure cap from the radiator when the engine is hot! Wait until the coolant temperature is below 120°F (50°C) before removing pressure cap.

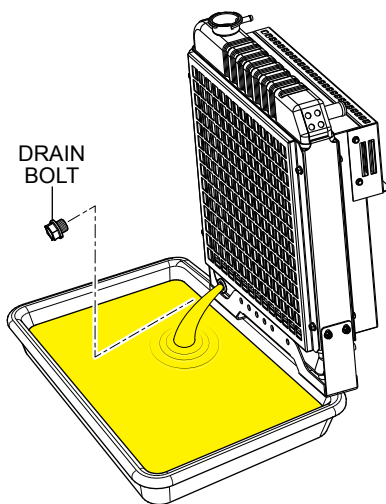
Heated coolant spray or steam can cause severe scalding and personal injury.

1. Remove the radiator pressure cap (Figure 57) only if the coolant temperature is below 120°F (50°C).



**Figure 57. Radiator Pressure Cap Removal**

2. Remove the coolant (Figure 58) bolt or **OPEN** the drain valve on the radiator and allow the coolant to drain into a suitable container.



**Figure 58. Draining Engine Coolant**

3. After the cooling system is completely drained, reinstall the coolant drain bolt or **CLOSE** the drain valve on the radiator.

## FLUSHING RADIATOR

### WARNING



Allow engine to **cool** when flushing out radiator. Flushing the radiator while hot could cause serious burns from water or steam.

1. Remove radiator cap.
2. Open radiator drain cock/valve located at the bottom of the radiator and drain coolant into a suitable container.
3. If equipped, remove the overflow tank. Drain and clean overflow tank.
4. Replace the overflow tank if necessary.
5. Check hoses for softening and kinks. Check clamps for signs of leakage.
6. Flush the radiator by running clean tap water through radiator until signs of rust and dirt are removed. **DO NOT** clean radiator core with any objects, such as a screwdriver.
7. Replace with coolant as recommended by the engine manufacturer. Reference Table 2 for coolant capacity.
8. Tighten drain cock and close radiator cap tightly.

## COOLANT (ANTIFREEZE/SUMMER COOLANT/ WATER)

Cummins recommends antifreeze/summer coolant for use in their engines, which can be purchased in concentrate (and mixed with 50% demineralized water) or pre-diluted. See the **Cummins Operation and Maintenance Manual** for further details.

### WARNING



If adding coolant/antifreeze mix to the radiator, **DO NOT** remove the radiator cap until the unit has completely cooled. The possibility of **hot!** coolant exists which can cause severe burns.

Day-to-day addition of coolant is done via the radiator. When adding coolant to the radiator, **DO NOT** remove the radiator pressure cap until the unit has completely cooled. Reference Table 9 for coolant capacity.

## OPERATION IN FREEZING WEATHER

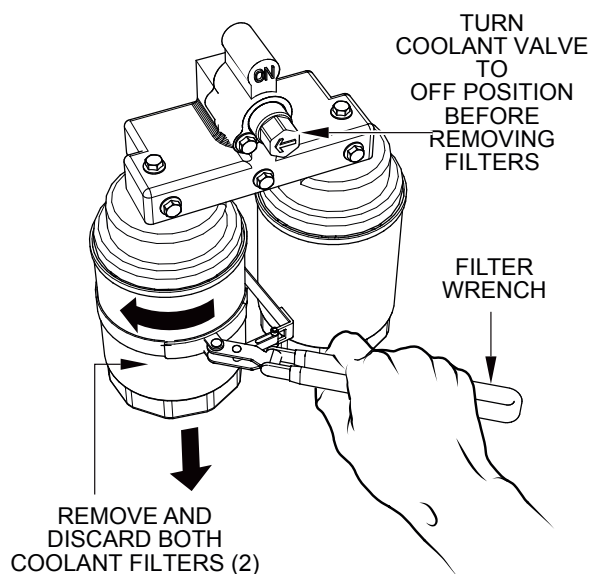
When operating in freezing weather, be certain the proper amount of antifreeze has been added.

**Table 13. Anti-Freeze Operating Temperatures**

Vol % Anti-Freeze	Freezing Point		Boiling Point	
	°C	°F	°C	°F
50	-37	-34	108	226

## COOLANT FILTER REPLACEMENT

1. Remove the pressure cap from the radiator.
2. Turn the shutoff valve on the coolant filter to the **OFF** position by rotating the knob from the vertical to **horizontal** as shown in Figure 59.



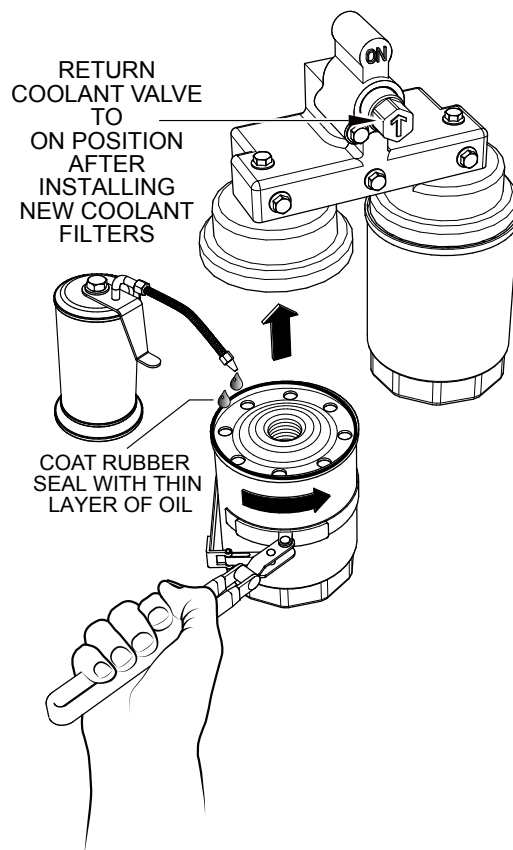
**Figure 59. Coolant Filters Removal**

3. Coat the rubber seal (gasket) surface of each coolant filter (Figure 60) with clean 15W-40 engine oil.

### NOTICE

**DO NOT** allow oil to enter the coolant filter.

4. Install new coolant filter (Figure 60) first by hand until it makes contacts with the filter head surface. Tighten it another 3/4 turn using the filter wrench.



**Figure 60. Installing Coolant Filters**

5. Place the shutoff valve on the coolant filter to the **ON** position by rotating the knob from horizontal to **vertical**.

## RADIATOR CLEANING

The radiator (Figure 61) should be sprayed (cleaned) with a high pressure washer when excessive amounts of dirt and debris have accumulated on the cooling fins or tube. When using a high pressure washer, stand at least 5 feet (1.5 meters) away from the radiator to prevent damage to the fins and tube.



Figure 61. Radiator Cleaning

## FUEL WATER SEPARATOR

1. To **OPEN** the drain valve on the fuel water separator turn the knob **counterclockwise** (Figure 62A) approximately 3-1/2 turns until the valve drops down 1-inch (25.4 mm) and draining occurs (Figure 62B).

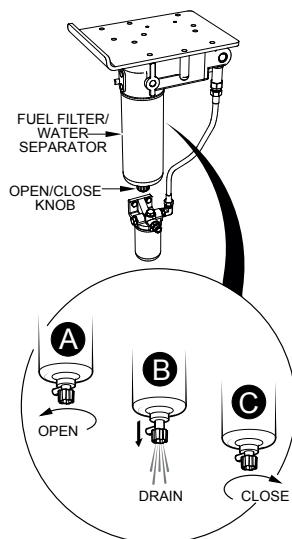


Figure 62. Fuel Water Separator

2. Continue draining until fuel is clear.
3. To **CLOSE** the drain valve on the fuel water separator turn knob **clockwise** (Figure 62C).

## REMOVING WATER FROM THE FUEL TANK

After prolonged use, water and other impurities accumulate in the bottom of the tank. Occasionally inspect the fuel tank for water contamination and drain the contents if required.

During cold weather, the more empty volume inside the tank, the easier it is for water to condense. This can be reduced by keeping the tank full with diesel fuel.

## CLEANING INSIDE THE FUEL TANK

If necessary, drain the fuel inside the fuel tank completely. Using a spray washer (Figure 63) wash out any deposits or debris that have accumulated inside the fuel tank.

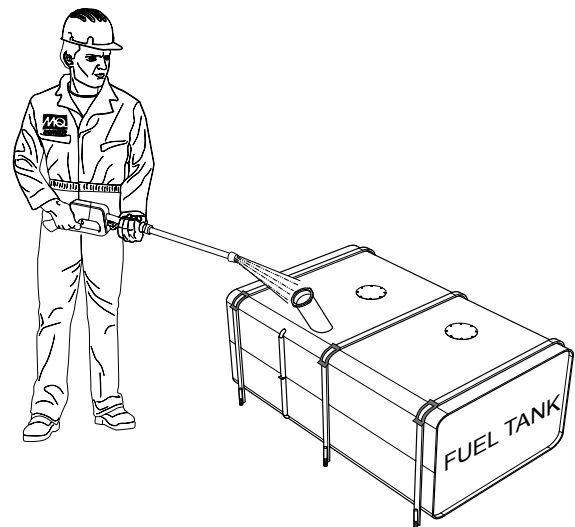


Figure 63. Fuel Tank Cleaning

## FUEL TANK INSPECTION

In addition to cleaning the fuel tank, the following components should be inspected for wear:

- **Rubber Suspension** — look for signs of wear or deformity due to contact with oil. Replace the rubber suspension if necessary.
- **Fuel Hoses** — inspect nylon and rubber hoses for signs of wear, deterioration and hardening.
- **Fuel Tank Lining** — inspect the fuel tank lining for signs of excessive amounts of oil or other foreign matter.

## AIR REMOVAL (FUEL INJECTION SYSTEM)

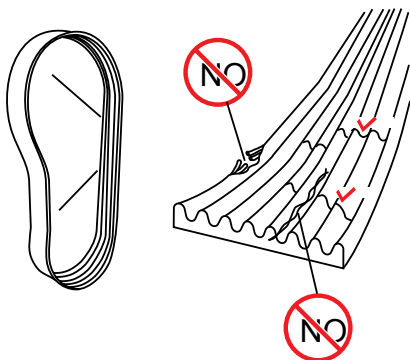
If air enters the fuel injection system of a diesel engine, starting becomes impossible. After running out of fuel, or after disassembling the fuel system, bleed the system according to the following procedure. See the **Cummins Operation and Maintenance Manual** for details.

## Drive Belt Tension

A slack drive belt may contribute to overheating, or to insufficient charging of the battery, adjust drive belt in accordance with the John Deere Operator's manual.

## Drive Belt inspection

1. Inspect the drive belt (Figure 64) for damage and wear. Horizontal (across the belt) cracks are acceptable. Vertical (direction of belt ribs) cracks that intersect with horizontal cracks are not acceptable.



**Figure 64. Drive Belt Inspection**

2. If the drive belt is frayed, punctured, or material is missing **DO NOT** use drive belt.

## GENERATOR STORAGE

For long term storage of the generator the following is recommended:

- Drain the fuel tank completely. Treat with a fuel stabilizer if necessary.
- Completely drain the oil from the crankcase and refill if necessary with fresh oil.
- Clean the entire generator, internal and external.
- Cover the generating set and store in a clean, dry place.
- Disconnect the battery.
- Make sure engine coolant is at proper level.
- If generator is mounted on a trailer, jack trailer up and place on blocks so tires do not touch the ground or block and completely remove the tires.

## JACKET WATER HEATER AND INTERNAL BATTERY CHARGER 120 VAC INPUT RECEPTACLES (OPTIONAL)

This generator can be equipped as an **option** with a **engine block heating element** and an **internal battery charger**. They are provided with electric cords to connect to a commercial power source.

The engine block heating element and internal battery charger both require 120 VAC in order to operate. A receptacle (Figure 65) has been provided on the output terminal panel to allow commercial power to be applied.

These receptacles will **ONLY** function when commercial power has been supplied to them (Figure 65). To apply commercial power to these receptacles, a power cord of adequate size will be required (See Table 6).

When using the generator in **hot** climates there is no reason to apply power to jacket water heater. However, if the generator will be used in **cold** climates it is always a good idea to apply power to the jacket water heater at all times. To apply power to the jacket water heater simply apply power to the jacket water heater receptacle via commercial power using an power cord of adequate size.

If the generator will be used daily, the battery should normally not require charging. If the generator will be idle (not used) for long periods of time, apply power to the battery charger receptacle via commercial power using a power cord of adequate size.

### NOTICE

If the generator will be idle (not used) for long periods of time and to ensure adequate starting capability, always have power applied to the generator's internal battery charger.

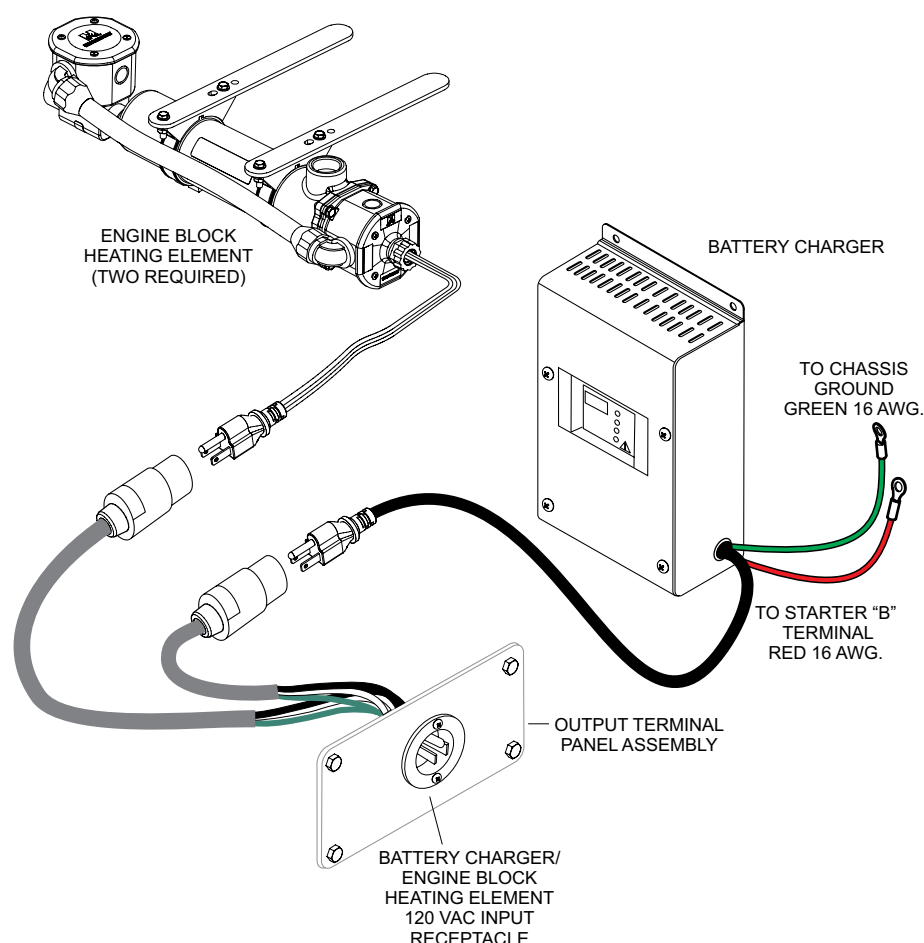
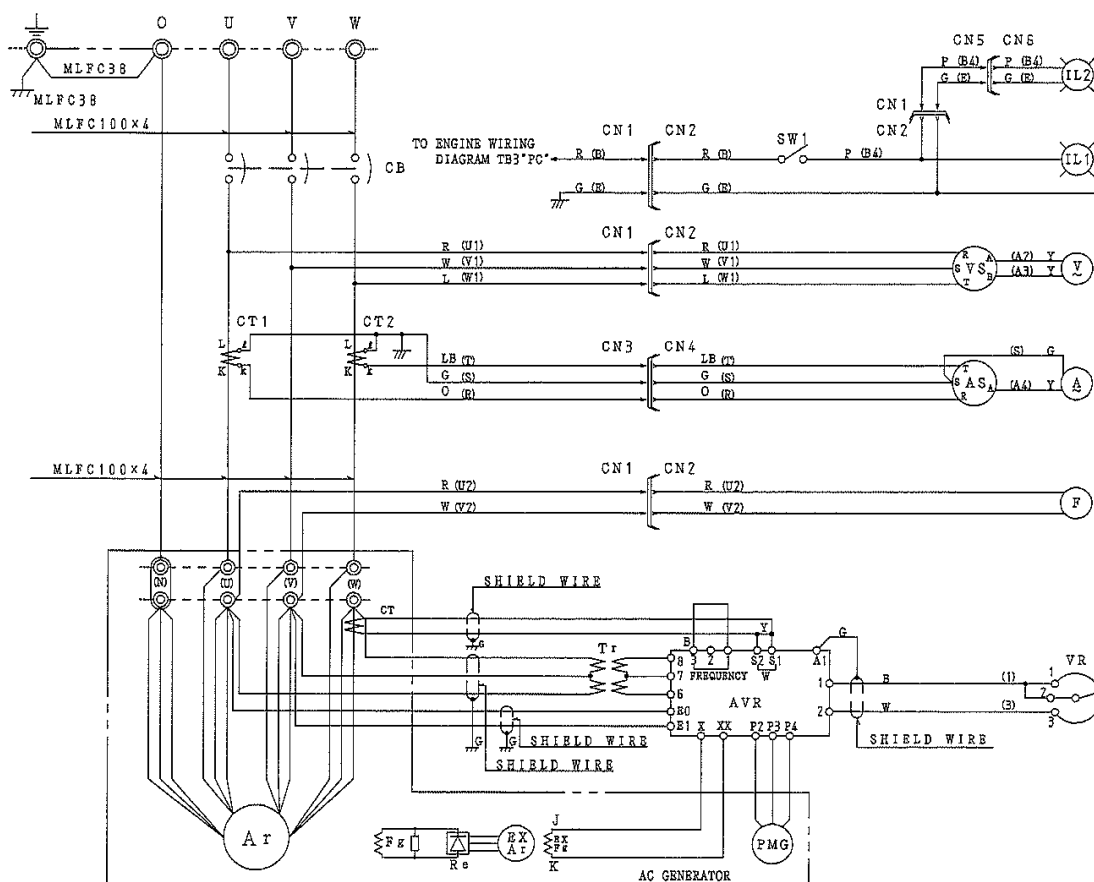
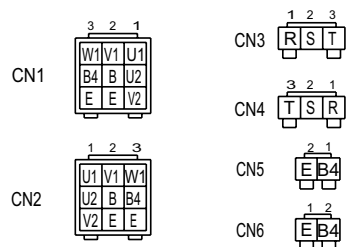


Figure 65. Battery Charger and Jacket Water Heater Power Connections

# GENERATOR WIRING DIAGRAM



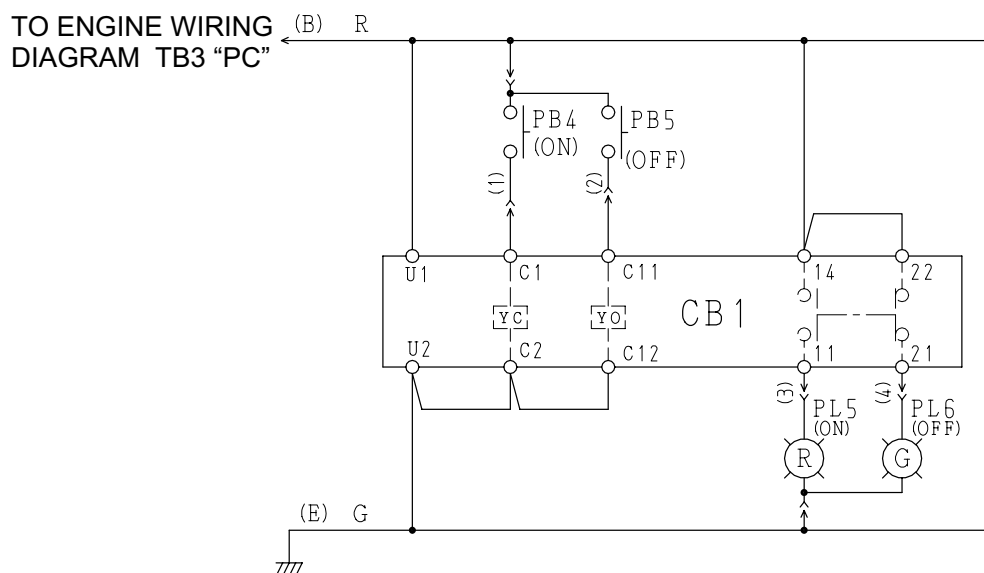
SYMBOL	DESIGNATION
SW1	SELECTOR SWITCH
V	AC. VOLTMETER
VS	CHANGE-OVER SWITCH, VOLTMETER
A	AC. AMMETER
AS	CHANGE-OVER SWITCH, AMMETER
F	FREQUENCY METER
CT 1,2	CURRENT TRANSFORMER
CB	CIRCUIT BREAKER, 3P 1600A
VR	VOLTAGE REGULATOR (RHEOSTAT)
AVR	AUTOMATIC VOLTAGE REGULATOR
IL1, IL2	PANEL LIGHT



CONNECTOR ARRANGEMENT  
(WIRING VIEW)

WIRE SIZE	CODE	WIRE COLOR
125: 125 mm <sup>2</sup>	B	BLACK
100: 100 mm <sup>2</sup>	L	BLUE
80: 80 mm <sup>2</sup>	BR	BROWN
22: 22 mm <sup>2</sup>	G	GREEN
14: 14 mm <sup>2</sup>	GR	GRAY
8: 8 mm <sup>2</sup>	V	VIOLET
5.5: 5.5 mm <sup>2</sup>	P	PINK
NO MARK WIRE SIZE: 1.25 mm <sup>2</sup>		

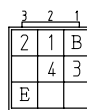
# GENERATOR WIRING DIAGRAM (MAIN BREAKER)



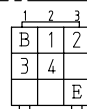
WIRE SIZE	COLOR CODE			
	CODE/ WIRE COLOR			
125: 125 mm <sup>2</sup>	B	BLACK	R	RED
100: 100 mm <sup>2</sup>	L	BLUE	W	WHITE
80: 80 mm <sup>2</sup>	BR	BROWN	Y	YELLOW
22: 22 mm <sup>2</sup>	G	GREEN	LB	LIGHT BLUE
14: 14 mm <sup>2</sup>	GR	GRAY	LG	LIGHT GREEN
8: 8 mm <sup>2</sup>	V	VIOLET	O	ORANGE
5.5: 5.5 mm <sup>2</sup>	P	PINK		
NO MARK WIRE SIZE: 1.25 mm <sup>2</sup>				

SYMBOL	DESIGNATION
PB4	CIRCUIT BREAKER (ON) SWITCH
PB5	CIRCUIT BREAKER (OFF) SWITCH
PL5	CIRCUIT BREAKER (ON) LAMP
PL6	CIRCUIT BREAKER (OFF) LAMP

CONTROL BOX SIDE

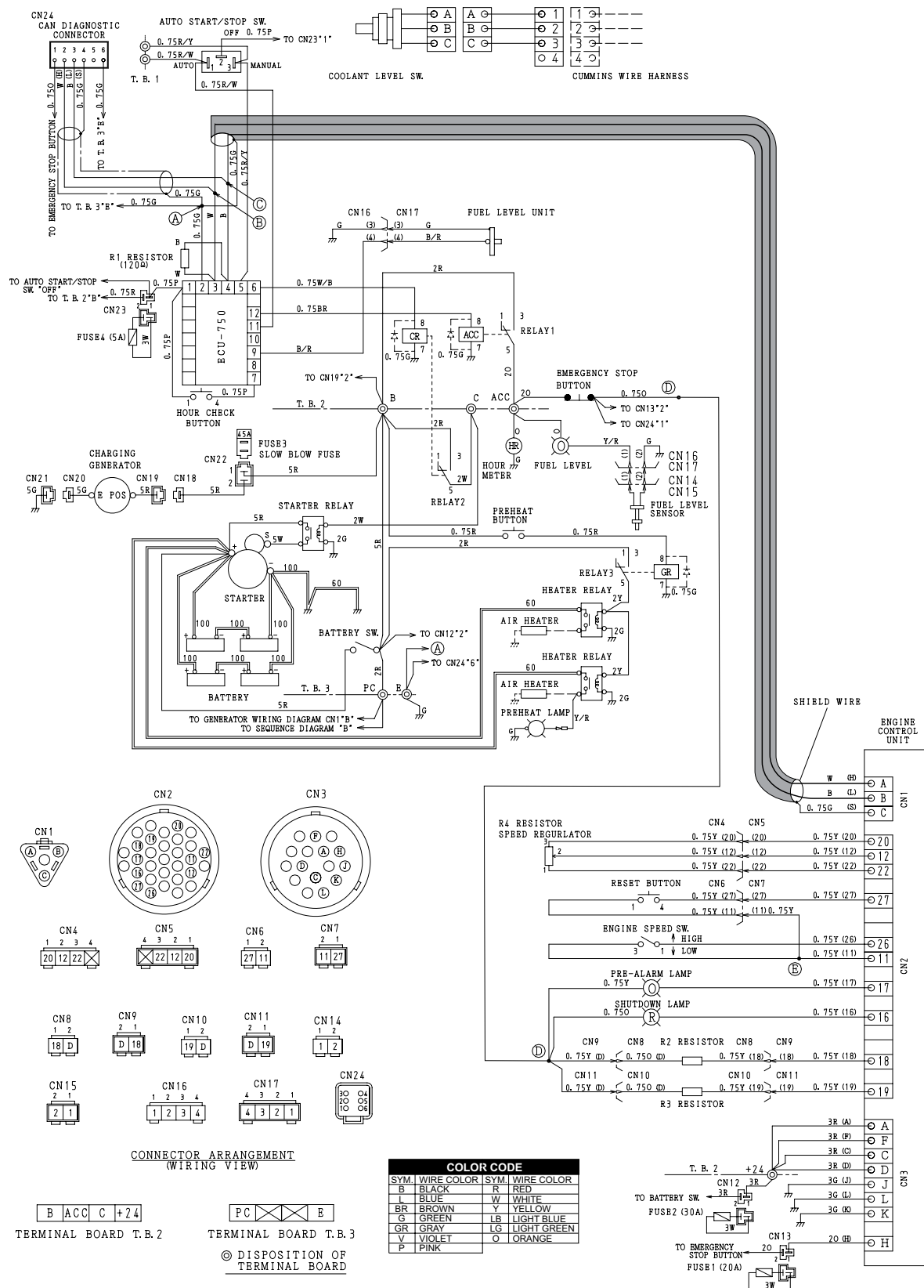


CONTROL PANEL SIDE



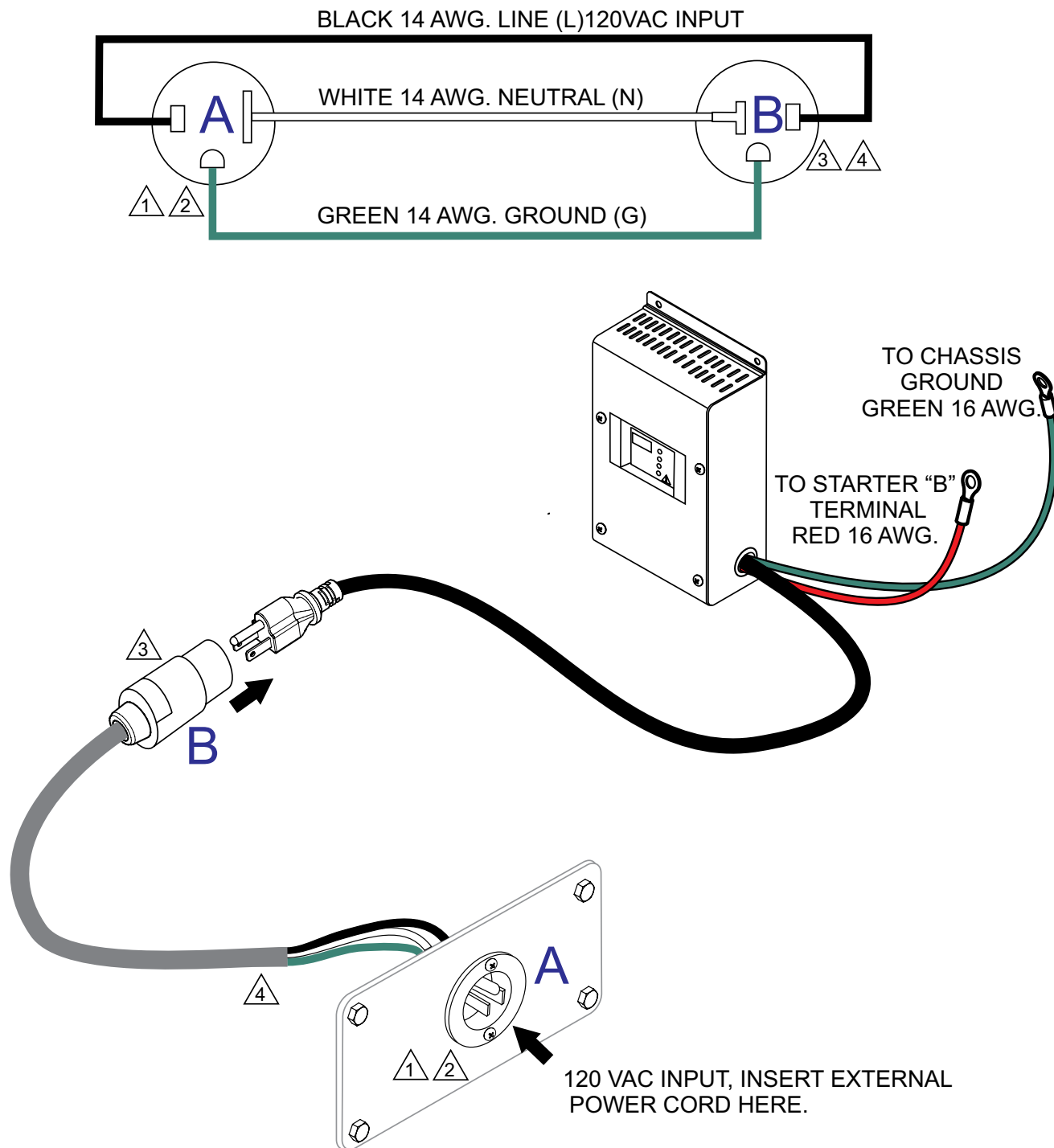
CONNECTOR  
(VIEW FROM INSERTING WIRE SIDE)

# ENGINE WIRING DIAGRAM





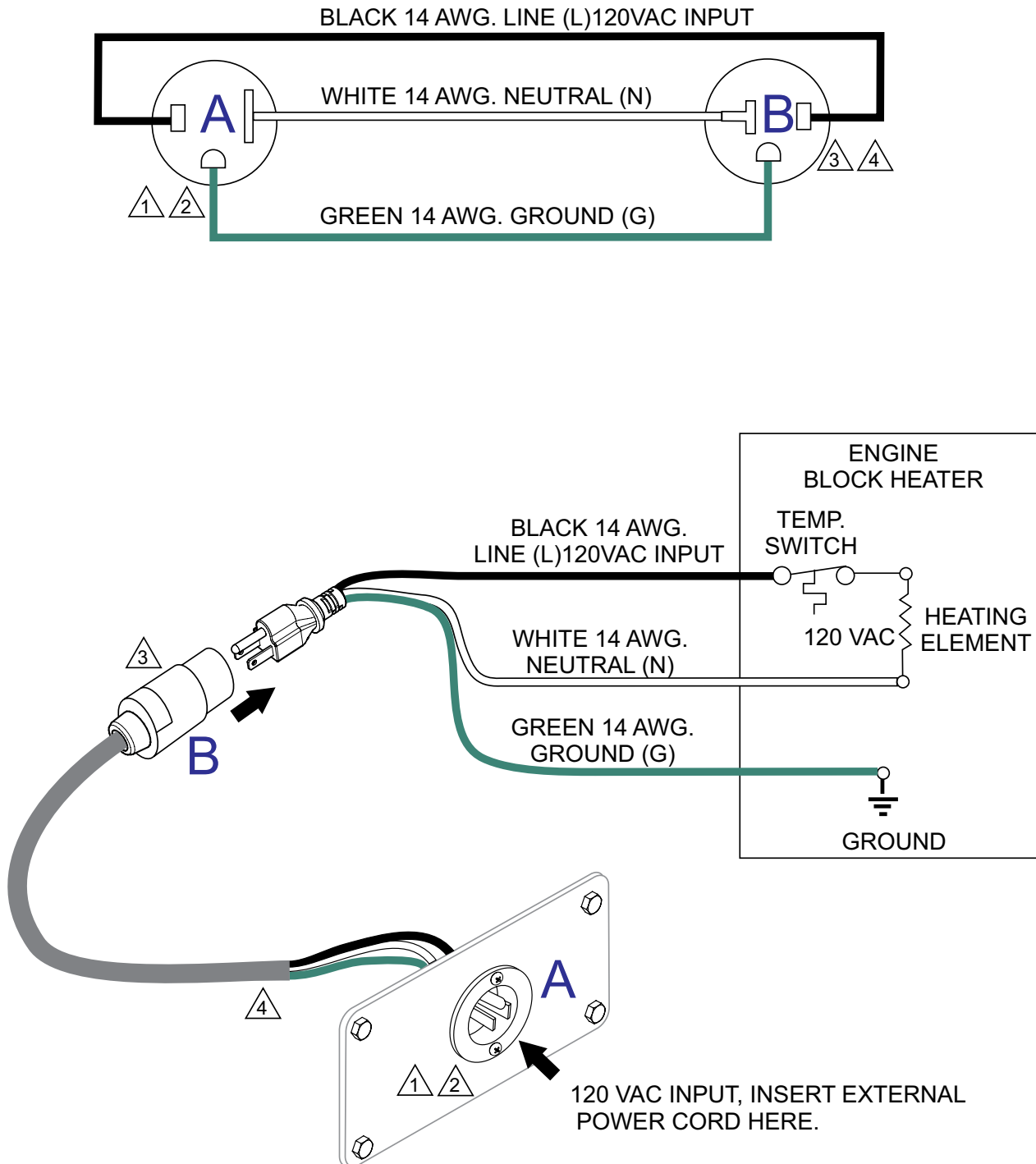
## BATTERY CHARGER WIRING DIAGRAM (OPTION)



### NOTES:

- ① NEMA 5-15, 15A, 120 VAC, P/N EE6176 (HBL5278C/HUBBLE RECEPTACLE).
- ② RECEPTACLE IS MOUNTED ON OUTPUT TERMINAL PANEL ASSY.
- ③ 20 AMP, 5-20R RECEPTACLE, P/N EE6131 (HBL5369C/HUBBLE RECEPTACLE).
- ④ CORD, CAROL 3/C 14 AWG., P/N EE56557.

# ENGINE BLOCK HEATER WIRING DIAGRAM (OPTION)



## NOTES:

- ① NEMA 5-15, 15A, 120 VAC, P/N EE6176 (HBL5278C/HUBBLE RECEPTACLE).
- ② RECEPTACLE IS MOUNTED ON OUTPUT TERMINAL PANEL ASSY.
- ③ 20 AMP, 5-20R RECEPTACLE, P/N EE6131 (HBL5369C/HUBBLE RECEPTACLE).
- ④ CORD, CAROL 3/C 14 AWG., P/N EE56557.

## TROUBLESHOOTING (GENERATOR)

Practically all breakdowns can be prevented by proper handling and maintenance inspections, but in the event of a breakdown, use Table 16 shown below for diagnosis of the Generator. If the problem cannot be remedied, consult our company's business office or service plant.

Table 14. Generator Troubleshooting		
Symptom	Possible Problem	Solution
No Voltage Output	AC Voltmeter defective?	Check output voltage using a voltmeter.
	Is wiring connection loose?	Check wiring and repair.
	Is AVR defective?	Replace if necessary.
	Defective Rotating Rectifier?	Check and replace.
	Defective Exciter Field?	Check for approximately 17.3 ohms across J & K on CN1
Low Voltage Output	Is engine speed correct?	Turn engine throttle lever to "High".
	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
High Voltage Output	Is wiring connections loose?	Check wiring and repair.
	Defective AVR?	Replace if necessary.
Circuit Breaker Tripped	Short Circuit in load?	Check load and repair.
	Over current?	Confirm load requirements and reduce.
	Defective circuit breaker?	Check and replace.
	Over current Relay actuated?	Confirm load requirement and replace.

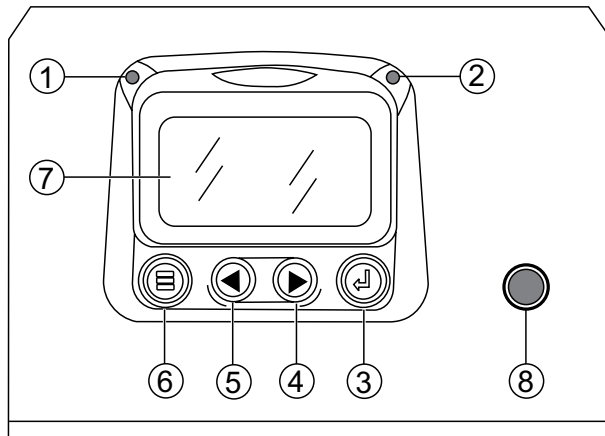
## TROUBLESHOOTING (ENGINE CONTROLLER)

Practically all breakdowns can be prevented by proper handling and maintenance inspections, but in the event of a breakdown, use Table 17 as a basic guideline for troubleshooting the Engine Control Unit (ECU). If the problem cannot be remedied, consult our company's business office or service plant.

**Table 15. Engine Control Unit Troubleshooting (ECU-750)**

Symptom	Possible Problem	Solution
Low oil pressure light is on.	Low oil level?	Fill oil level.
	Oil pressure sending unit failure?	Replace oil pressure sending unit.
	Time delay malfunction in controller?	Refer to dealer.
	Wire shorted?	Inspect/repair wire.
Low coolant level light is on. (Optionally installed)	Low coolant level?	Fill coolant level.
	Sending unit failure?	Replace sending unit.
	Low battery voltage?	Replace/charge battery.
High coolant temperature light is on.	Fan belt tension incorrect?	Tighten/replace fan belt.
	Air flow is not circulating through radiator?	Clean/repair radiator grill.
	Doors open?	Close doors.
	Exhaust leaking?	Replace/repair gaskets or faulty part.
	Generator being overloaded?	Check/reduce load.
	Thermostat failure?	Replace thermostat.
	Air intake blocked?	Clean all air intakes.
	Temperature switch failure	Replace temperature switch.
Overcrank light is on.	No or low fuel?	Fill fuel level.
	Controller needs to be calibrated?	Refer to dealer.
Overspeed light is on.	RPM engine speed too high?	Adjust RPM.
	Governor actuator needs to be adjusted?	Adjust governor actuator.
	Governor controller needs to be adjusted?	Adjust governor controller.
	Engine controller needs to be calibrated?	Refer to dealer.
Loss of MPU light(s) or on.	Magnetic pick up out of adjustment?	Adjust magnetic pick up.
	Magnetic pick up dirty?	Clean magnetic pick up.

## DIAGNOSTIC DISPLAY



**Figure 66. Diagnostic Display**

The diagnostic display unit located inside the control box on the generator (Figure 66) is designed to meet the needs for instrumentation and control of electronically controlled engine communication using the SAEJ1939 Controller Area Network (CAN).

The Engine Control Unit (ECU750) used with this generator diagnosis engine faults that arise with the engine control system and the engine itself. Engine faults can be determined by viewing the Diagnostic Trouble Codes (DTC)

### NOTICE

Reference the Cummins Operator's Manual for a complete listing of active fault codes and countermeasures.

The following definitions describe the controls and functions of the Diagnostic Display Panel (Figure 66).

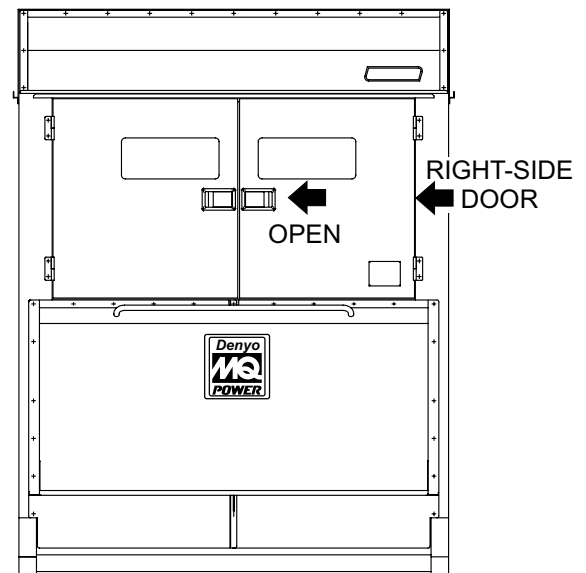
1. **Warning LED** – When lit (AMBER), indicates a engine parameter has exceeded its limits (minor fault). The generator will still run in this condition.
2. **Emergency Stop LED** – When lit (RED) indicates a major fault has occurred. This condition will shutdown the generator.
3. **Enter Key Button** – Press this button to select the parameter that is highlighted on the screen.
4. **Right Arrow Button** – Press this button to scroll through the screen either moving the parameter selection toward the right or downward.

5. **Left Arrow Button** – Press this button to scroll through the screen either moving the parameter selection toward the left or upward.
6. **Menu Button** – Press this button to enter or exit menu screens.
7. **Display Screen** – Graphical backlight LCD screen. Back lighting is controlled via menu or external dimmer potentiometer. The display can show either a single parameter or a quadrant display showing four parameters simultaneously.
8. **Reset Button** – To clear the display after a fault or abnormal parameter has occurred, press and hold this button for one second. This will reset the display.

## PROCEDURE

When the emergency shutdown system has shutdown the engine, perform the following:

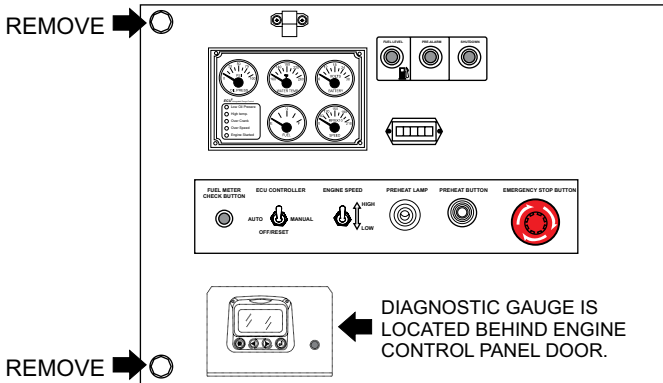
1. Open the right-side door (ECU side) on the generator. Secure door with latch (Figure 67).



**Figure 67. Opening Right-Side Door**

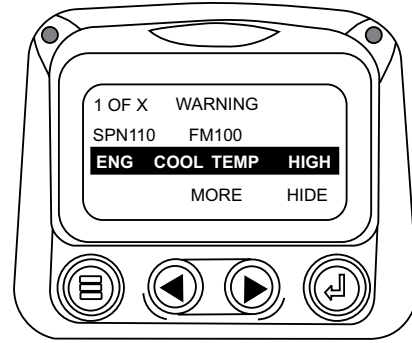
## DIAGNOSTIC DISPLAY

- Next, remove the two screws that secure the engine control panel door to the generator frame (Figure 68).



**Figure 68. Engine Control Panel Door**

- Open the engine control panel door to gain access to the diagnostic gauge.
- Secure panel door with latch.
- When the engine is not running, **PUSH** and **HOLD** the **fuel check button** and at the same time place the ECU Auto Start/Stop Switch in the **MANUAL** position.
- PRESS** the **menu key** to display the main menu. Use the arrow keys to scroll through the main menu until the "Stored Codes" parameter is highlighted.
- Once the "Stored Codes" parameter is highlighted, **PRESS** the **enter key** to view the stored codes. Figure 69 is a typical example of a high temperature code.

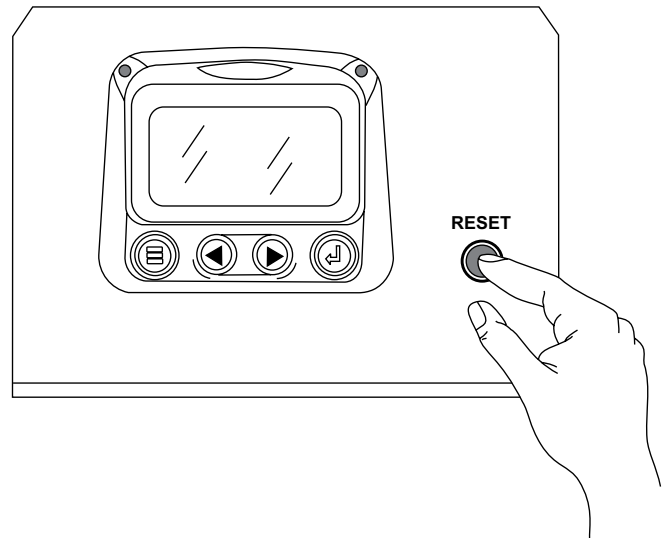


**Figure 69. High Temperature Code Example**

- After performing the diagnostic test, place the ECU Auto Start/Stop Switch in the **OFF** position.
- For more detail information regarding engine diagnostic trouble codes reference the Cummins engine operator's manual.

### RESTARTING GENERATOR

- Make sure all engine faults have been corrected before restarting the generator.
- PUSH** the reset button (Figure 70) on the diagnostic panel for at least 1 second to clear the display.



**Figure 70. Reset Button**

- Place the ECU Auto Start/Stop Switch in the desired position (Auto or Manual).
- Restart generator as outlined in the Operation Section of this manual.

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**NOTES**

[illegible]

# OPERATION MANUAL

## HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL  
NUMBER ON-HAND WHEN CALLING

### **UNITED STATES**

#### ***Multiquip Corporate Office***

18910 Wilmington Ave.  
Carson, CA 90746  
Contact: mq@multiquip.com

Tel. (800) 421-1244  
Fax (310) 537-3927

#### ***Service Department***

800-421-1244  
310-537-3700

#### ***Technical Assistance***

800-478-1244 Fax: 310-943-2238

#### ***MQ Parts Department***

800-427-1244 Fax: 800-672-7877  
310-537-3700

#### ***Warranty Department***

800-421-1244 Fax: 310-943-2249  
310-537-3700

### **CANADA**

#### ***Multiquip***

4110 Industriel Boul.  
Laval, Quebec, Canada H7L 6V3  
Contact: infocanda@multiquip.com

Tel: (450) 625-2244  
Tel: (877) 963-4411  
Fax: (450) 625-8664

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Contact: sales@multiquip.co.uk

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